

Harbansus, a New Genus of
Marine Ostracoda, and a Revision
of the Philomedidae (Myodocopina)

LOUIS S. KORNICKER

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Harbansus, a New Genus of Marine Ostracoda, and a Revision of the Philomedidae (Myodocopina)

Louis S. Kornicker

Introduction

The new genus *Harbansus* is proposed to include 8 species, of which 5 are new, and 2 additional taxa in open nomenclature: *H. paucichelatus* (Kornicker, 1958), *H. rhabdion* (Kornicker, 1970), *H. schornikovi* (Kornicker and Caraion, 1977), *H. bradmyersi*, new species, *H. mayeri*, new species, *H. dayi*, new species, *H. bowenae*, new species, *H. barnardi*, new species, *H. species A*, and *H. species B*.

Known species of the genus live along the western coast of Africa, the western coast of North and South America, the eastern coast of Central and North America, in the Gulf of Mexico, the Bahamas, and Hawaii (Figure 1).

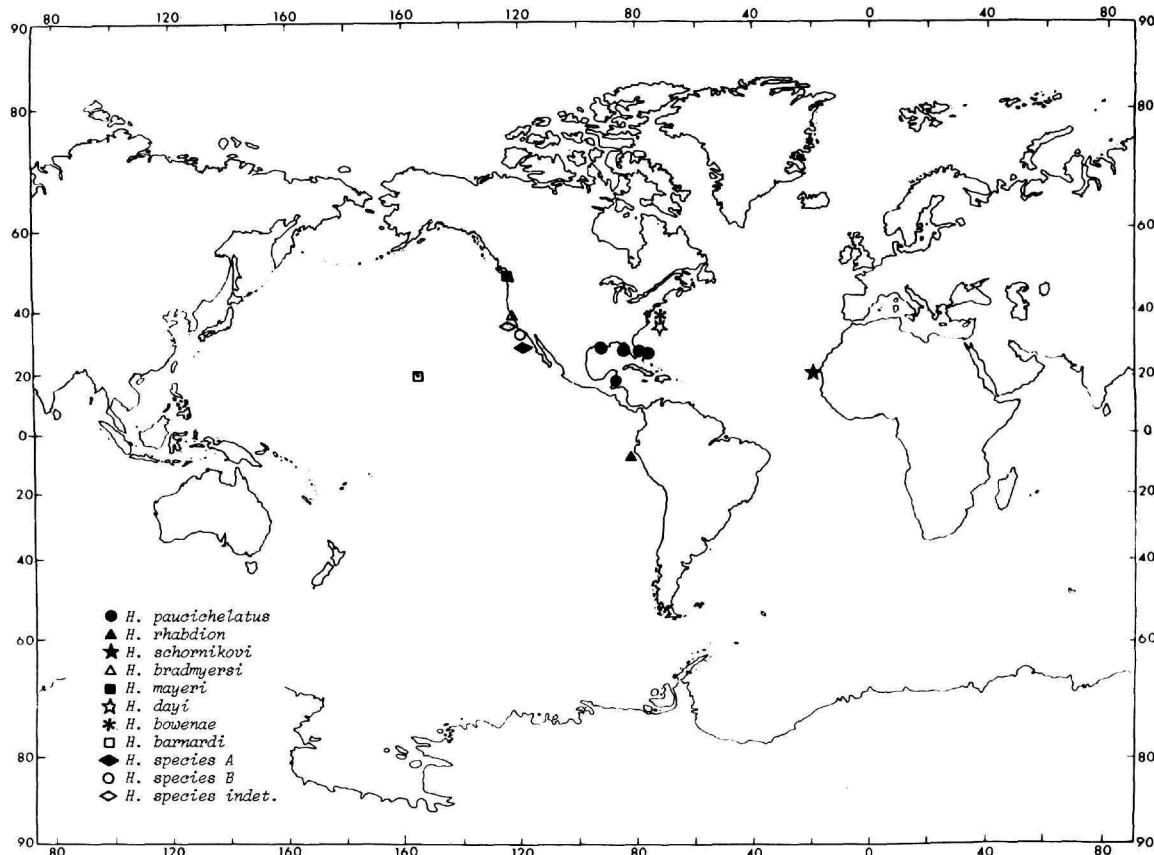
Also treated herein are 3 species of *Streptoleberis*, a genus that resembles *Harbansus*, but because it is poorly known was correctly referred to "Cypri-dinidarum genera dubia and species dubiae" by Müller (1912:51,52).

The Philomedidae is revised using the phylogenetic principles proposed by Hennig (1966) to arrive at a classification having genera more equally distributed among the 2 existing subfamilies than in the previous classification. An attempt is made to explain the distribution of species of *Harbansus*

using principles of Hennig (1966) and Croizat (1958, 1964).

ACKNOWLEDGMENTS.—I thank the following for specimens of *Harbansus* and *Streptoleberis*: Dr. Albert G. Long and Dr. Anthony Tynan, The Hancock Museum, Scotland; Mr. David L. Mayer, Fisheries Research Institute, University of Washington; Mr. Brad Myers, Southern California Coastal Water Research Project; Dr. M. Băcescu, Museum of Natural History "Grigore Antipa," Bucharest, Romania; Ms. Marcia Bowen, Virginia Institute of Marine Science; Dr. John H. Day, Beaufort Marine Laboratory, Duke University; Mrs. Anne Cohen, Dr. Roger F. Cressey, Jr., Dr. F. M. Bayer, and Dr. J. Laurens Barnard, Smithsonian Institution, and David Gettleson, Texas A&M University. Some specimens were collected as part of the benthic macrofaunal project of the southern California baseline studies and analyses, funded by the U.S. Bureau of Land Management. I also thank Mr. Walter R. Brown and Miss Mary J. Mann, Smithsonian Institution, who operated the scanning electron microscope. Freeze-drying of specimens for photography was done in the laboratory of Mr. Roland Hower, Smithsonian Institution. Most initial drawings of appendages were made by Mr. Paul Mazer, who also inked the final drawings. I especially thank Mrs. Carolyn Bartlett Gast for the shaded renderings of carapaces; Mrs. Anne Cohen, Mr. Brad

Louis S. Kornicker, Department of Invertebrate Zoology, National Museum of Natural History, Smithsonian Institution, Washington, D.C. 20560.

FIGURE 1.—Locality map of species of *Harbansus*.

Myers, and Dr. Thomas E. Bowman for reviewing all or parts of the manuscript; Miss Maura Manus for assisting in its preparation; Dr. W. Ronald Heyer and Dr. Donald R. Whitehead, Smithsonian Institution, for assistance in the Henningian analysis, and Dr. Gareth Nelson, American Museum of Natural History, for correspondence concerning the biogeographical principles of Dr. Croizat.

This paper is contribution number 34 of the Smithsonian Institution Investigations of Marine Shallow-Water Ecosystems Project (IMSWE).

DISPOSITION OF SPECIMENS.—Most of the specimens have been deposited at the National Museum of Natural History, Smithsonian Institution under the catalog numbers of the former United States National Museum (USNM). The disposition of

other specimens is given in the text in the appropriate section where the species is described.

Station Data

BELIZE

Carrie Bow Cay, 16°48'N, 88°05'W, part of the Smithsonian Coral Reef project (IMSWE); small aquarium net scraping surface of sand; 1976; collector: Anne C. Cohen

Sta 16, Transect I, depth 1.5 m; sand and rubble zone of lagoon, sandy with some patches of *Thalassia*, staghorn coral, coral rubble, water and sediment temperature 28°C; 12 May 1976.

Harbansus paucichelatus: 11 specimens including 1 adult male.

Sta 20, 300–400 m S34°W from Carrie Bow Cay, bottom depth 9.1 m; sand with some silt and *Thalassia* patches adjacent to patch reef, water temperature about 28°C; 14 May 1976.

Harbansus paucichelatus: 1 specimen.

Sta 24, adjacent to Transect I, depth 24 m; sand trough of outer fore-reef, water temperature 28°C; 15 May 1976.

Harbansus paucichelatus: 1 specimen.

Sta 47, adjacent to Transect I, near bottom on inner reef slope just above sand trough, bottom depth 24 m; sand patch surrounded by coral on slope, water temperature about 28°C; 21 May 1976.

Harbansus paucichelatus: 2 specimens including 1 adult male.

Sta 62 (same locality as sta 24); 24 May 1976.

Harbansus paucichelatus: 1 ovigerous female.

Twin Cays (larger island), 16°48'N, 88°06'W; small aquarium net scraping surface of sand; 1976; collector: Anne C. Cohen

Sta 9, sheltered inlet surrounded by mangroves on W side of island, depth 15 cm; bottom of silty sand and decaying vegetation, water temperature above 28°C; 10 May 1976.

Harbansus paucichelatus: 1 specimen.

CALIFORNIA

Continental shelf off Oxnard; 1973–1974; collector: Brad L. Myers

Sta A-2, 18.3 m; Mar 1974.

Harbansus bradmyersi: 1 ovigerous female.

Sta C-2, 18.3 m; Dec 1973.

Harbansus bradmyersi: 2 adult females.

Sta C-2c, 18.3 m; Sep 1974.

Harbansus bradmyersi: 1 ovigerous female.

Sta C-3, 27.4 m; Mar 1974.

Harbansus bradmyersi: 1 adult female.

Sta OC-3, 27.4 m; Mar 1974.

Harbansus bradmyersi: 1 ovigerous female, 1 adult female.

Sta OC-3a, 27.4 m; Sep 1974.

Harbansus bradmyersi: 2 ovigerous females.

Sta OC-3b, 27.4 m; Sep 1974.

Harbansus bradmyersi: 5 ovigerous females, 1 adult female without eggs, 1 juvenile or adult female without eggs.

Off Laguna Beach, Orange County; from rock scrapings; 1974; collector: Brad L. Myers

Sta K-1, 12.5 m; Mar 1974.

Harbansus bradmyersi: 1 ovigerous female.

Off Santa Catalina Island, under reef canopy, 10.7 m; rock scraping; 1974; collector: Brad L. Myers

Harbansus bradmyersi: 1 adult female without eggs.

Offshore islands, R/V *Velero III*, collected under

contract for Bureau of Land Management as a baseline presurvey for leasing oil drilling sites; 1975–1976; from collection of Allan Hancock Foundation, specimens received from Brad L. Myers

Sta 23086 BFI, Santa Rosa Island, 33°40'N, 119°58'W, 140 m.

Harbansus species B: 1 ovigerous female.

Sta 24075 BFI, off W end of Santa Catalina Island, 33°29' 24"N, 118°44'12"W, 414 m.

Harbansus species indeterminate: 1 adult female.

FLORIDA

Anclope Anchorage, off Tarpon Springs, N of Tampa; shallow water grab sample (15 × 15 cm); 1976; collector: Dr. Patsy A. McLaughlin

Sta 30, 2.23 m; 6 Apr 1976.

Harbansus paucichelatus: 1 adult male.

Biscayne Bay, Norris Cut, off N end of Virginia Key, opposite Fisher Island, water depth about 20 cm; tidal flat with *Diplanthera*; sample obtained with small net drawn through sediment in few centimeters of water; 17 Feb 1976; collector: F. M. Bayer

Harbansus paucichelatus: 1 specimen.

Placida Harbor (part of Charlotte Harbor), off Bird Key; 1974; collector: Roger F. Cressey

Sample 3, 2–3m; Ockelman dredge tied to Otter trawl, mud washings; 1 May 1974.

Harbansus paucichelatus: 3 ovigerous females and 27 additional specimens.

Sample 4, 2–3 m; mud bottom; weed washings from Otter trawl; 2 May 1974.

Harbansus paucichelatus: 1 ovigerous female.

Sample 5, 1–2 m; mud washings from Ockelman dredge tied to Otter trawl; 16 Jul 1974.

Harbansus paucichelatus: 3 specimens including 1 ovigerous female.

Virginia Key, NE shore facing Bear Cut, water depth about 20 cm; tidal flat with rocks, green algae, *Caulerpa*, *Padina*; sample obtained with small net drawn through sediment between rock; 17 Feb 1976; collector: F. M. Bayer

Harbansus paucichelatus: 1 ovigerous female, 1 juvenile.

HAWAII

Sta JLB Hawaii 10, Sampan Pass, Kaneohe Bay, Oahu, 2 m; heads of *Pocillopora meandrina*; 23 Feb 1967; recovered by divers Kruschwitz

and Bowers (see Barnard, 1970:277 for amphipods of 23 species collected at station)

Harbansus barnardi: 1 ovigerous female; 1 A-I male.

MEXICO

Guadalupe Island, 1.6 mi and 60°T (true) from South Bluff, R/V *Velero III*; sand bottom; dredge; from collection of Allan Hancock Foundation, specimen received from Brad L. Myers

Sta 1927, 73.2–102.4 m; 20 Dec 1949.

Harbansus species A: 1 ovigerous female.

NEW JERSEY

Outer continental shelf, research vessel *Columbus Iselin*; 0.10 square meter MacIntyre grab sampler; Nov 1975; collector: Marcia Bowen, Virginia Institute of Marine Science

Sta A3-8, 39°16'37"N, 72°29'57"W, 136 m.

Harbansus dayi: 1 adult male and 2 juveniles.

Sta A4-9, 39°14'17"N, 72°26'43"W, 196 m.

Harbansus dayi: 7 specimens including 1 adult female and juveniles.

Harbansus bowenae: 3 juveniles plus 1 2nd antenna of adult female.

Sta A4-11, 39°14'17"N, 72°26'43"W, 196 m.

Harbansus dayi: 12 specimens including adult females and juveniles.

Harbansus bowenae: 18 specimens including adult females and juveniles.

Sta A4-12, 39°14'17"N, 72°26'43"W, 196 m.

Harbansus dayi: 2 juvenile females.

Sta F4-7, 39°44'36"N, 73°03'04"W, 183 m.

Harbansus dayi: 11 specimens including ovigerous females and juveniles.

Harbansus bowenae: 47 specimens including ovigerous females and juveniles.

Sta F4-10, 39°44'36"N, 73°03'04"W, 183 m.

Harbansus dayi: 1 adult male.

NORTH CAROLINA

Beaufort Shelf Transect; 1964–1965; collector: John H. Day

Sta 55 P, 34°19'30"N, 75°56'18"W, 160 m; sandy mud, sediment temperature 22°C; 0.2 square meter Van Veen Grab; 6 Apr 1964.

Harbansus dayi: 1 adult female.

Sta 155 G, 34°00'00"N, 75°53'42"W, 160 m; sandy mud, sediment temperature 19.5°C; 0.2 square meter Van Veen Grab; 30 Sep 1965.

Harbansus dayi: 1 adult female.

Sta 251 N-P, 34°23'18"N, 75°54'12"W, 160 m; sediment median grain size 0.250 mm, sediment temperature 16.5°C; 0.2 square meter Van Veen Grab; 30 Nov 1965.

Harbansus dayi: 1 adult female.

Sta 253 M, 34°22'48"N, 75°51'48"W, 190 m; sediment median grain size 0.166 mm (mud), sediment temperature 12.7°C; dredge for 10 minutes; 30 Nov 1965.

Harbansus dayi: 1 ovigerous female.

Sta 256 Q-R, 34°22'48"N, 75°51'24"W, 198 m; sediment median grain size 0.166 mm, sediment temperature 12.7°C; 0.2 square meter Van Veen Grab; 30 Nov 1965.

Harbansus dayi: 1 adult female.

PERU

Peru–Chile trench, 08°23'S, 80°45'W, 3086–3202 m, R/V *Anton Bruun*, cruise 11; benthic trawl sample; 18 Oct 1965; collector: M. Băcescu, Museum of Natural History, "Grigore Antipa," Bucharest, Romania.

Harbansus rhabdion: 1 ovigerous female.

TEXAS

Gulf of Mexico, off Galveston, R/V *Gyre* (Texas A&M University); 1974; collector: David Gentleman

Cruise 10.

Sta 8, 25°10'N, 94°18'W, 56 m.

Harbansus paucichelatus: 5 specimens.

Sta 16, 25°10'N, 94°18'W, 53.5 m.

Harbansus paucichelatus: 2 specimens.

Cruise 11.

Sta 1, 28°24'N, 93°57'30"W, 49.25 m.

Harbansus paucichelatus: 3 specimens.

Sta 2, 28°22'36"N, 94°01'30"W, 49.75 m.

Harbansus paucichelatus: 6 specimens.

Sta 5, 28°19'30"N, 94°09'00"W, 50 m.

Harbansus paucichelatus: 4 specimens.

Sta 7, 28°16'N, 94°06'30"W, 53 m.

Harbansus paucichelatus: 17 specimens.

Sta 8, 28°15'18"N, 94°03'00"W, 57.75 m.

Harbansus paucichelatus: 5 specimens.

Sta 9, 28°21'06"N, 93°40'18"W, 57.5 m.

Harbansus paucichelatus: 13 specimens.

Sta 11, 28°22'12"N, 93°49'30"W, 54.75 m.

Harbansus paucichelatus: 13 specimens.

Sta 12, 28°23'30"N, 93°53'30"W, 51.75 m.

Harbansus paucichelatus: 8 specimens.

Gulf of Mexico, Heald Bank, 40 mi SW of Sabine Pass, *Magnolia* cruise 15, depth about 15 m; 18 Oct 1953; collector: W. G. Hewatt

Harbansus paucichelatus: 1 ovigerous female.

WASHINGTON

North side of Kiket Island, Similk Bay, 48°25'10"N, 122°35'50"W, water depth 8 m; soft mud bottom, salinity range 21.07–29.75 parts per thousand, temperature range 5.9°–14.1°C, tidal range 4.9 m; diver operated core sampler, 2.21 cm diameter, material sieved through 0.495 mm Tyler standard sieve; 1972; collector: David Mayer

Harbansus mayeri: 8 specimens including 3 ovigerous females, 3 adult females, and 2 juveniles.

Phylogeny and Classification

Philomedidae Müller, 1908, consists of 2 subfamilies: Philomedinae Müller, 1908, and Pseudophilomedinae Kornicker, 1967b. Kornicker (1968: 449) recognized only 2 genera in Pseudophilomedinae: *Pseudophilomedes* Müller, 1893, and *Paramekodon* Brady and Norman, 1896. At that time, adult males were unknown for both genera. Adult males remain unknown for *Paramekodon*, but they have been described for 2 species of *Pseudophilomedes* by Kornicker and Caraion (1977). Some of the morphological characters of the adult males of *Pseudophilomedes* suggest that the genus might be closely related to the genus *Tetragonodon* Brady and Norman, 1896, a genus that had been assigned to Philomedinae by Kornicker (1968:449), and also closely related to the new genus *Harbansus* proposed herein.

Because of this, it was decided to investigate the phylogeny of Philomedidae using the principles proposed by Hennig (1966) in which derived (apomorphic) rather than primitive (plesiomorphic) character states are considered important for grouping taxa. This method was used for reconstructing a phylogeny of superfamilial and higher categories of Ostracoda by Kornicker and Sohn (1976).

One of the difficulties in making a Hennigian analysis is determining directionality, i.e., which condition of a character is plesiomorphic and which is apomorphic. Another difficulty is deciding which of many reconstructed phylogenies is more likely to approximate the actual phylogeny. If a satisfactory phylogeny is derived from the analysis, it is then necessary to decide to what degree it should be used to form the basis of a classification. Perhaps the greatest advantage of this method for recon-

structing a phylogeny, and ultimately for developing a classification, is that each step in the derivation is clearly defined, and thus open to future revision in an objective manner.

The objective of the present analysis was to determine whether or not Philomedidae should be split into smaller groupings (subfamilies) and, if so, which genera should be included in each group. First to be considered was the present division of the family into 2 subfamilies: Pseudophilomedinae with 2 genera, and Philomedinae with the remaining genera. With that division it was possible to assign 2 synapomorphic character states (shared derived) to Pseudophilomedinae, but none to Philomedinae. The 2 apomorphic characters states used were those upon which Pseudophilomedinae was based (Kornicker 1968:448, 449): a small 3rd endite on the maxilla and a saber-like tooth on the 2nd exopodial joint of the 5th limb. Those character states are found in no other myodocopids. Clearly, a phylogeny in which more synapomorphic character states are present in the divisions would be preferable to the present division.

The reconstructed phylogeny finally arrived at is one in which Pseudophilomedinae contains 3 synapomorphic character states, and Philomedinae contains 1 synapomorphic character state. In the proposed phylogeny, Pseudophilomedinae contains the genera *Pseudophilomedes*, *Paramekodon*, *Tetragonodon*, and *Harbansus*, and the remaining 6 genera are retained in Philomedinae (Figure 2). The 4 morphological characters used in the analysis are discussed below. A total of 4 character states is an insufficient number to arrive at more than a very tenuous phylogeny; additional information is needed to confirm the proposed phylogeny.

An attempt was made to derive the phylogeny of the genera in the subfamily Pseudophilomedinae, but because of the inability to justify a decision as to whether some of the character states are apomorphic or plesiomorphic, the results were unsatisfactory. The directionality of character states are indicated in Figure 2 more as a guide showing available data rather than as support for the proposed phylogeny. The proposed phylogeny in Figure 2 for the subfamily Philomedinae is based on overall similarities and differences because of the inability to justify directionality of character states.

Cypridinacea contains 5 families: Cypridinidae, Philomedidae, Sarsiellidae, Rutidermatidae, and

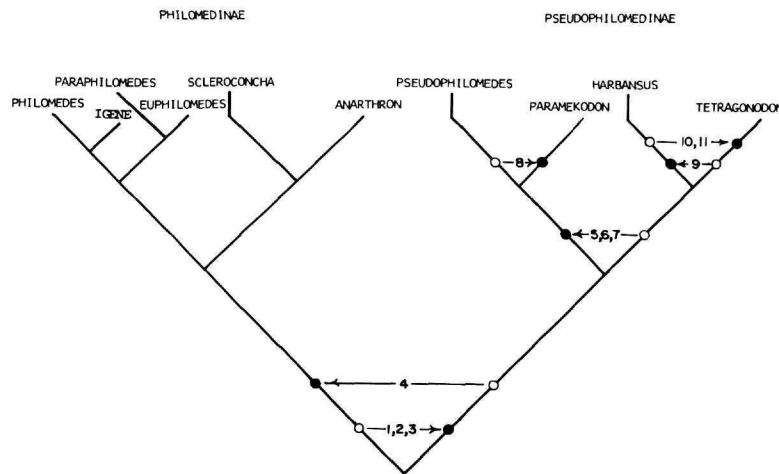


FIGURE 2.—Reconstructed phylogeny of the Philomedidae (open circle = plesiomorphic character state; closed circle = apomorphic character state; numbers correspond to characters listed in text under "Character Analysis").

Cylindroleberididae. Of these, only the members of Cypridinidae are known as Paleozoic fossils. Because fossils of that family are fairly abundant in the Paleozoic, it seems likely that if members of other families were living at that time, some of them would also have been preserved. Therefore, an assumption is made herein that some character states present on recent Cypridinidae are probably plesiomorphic. Because evolutionary rates are unknown in the families, this criterion for determining the directionality of character states must be used with caution, which I have attempted to do.

Another method used for estimating directionality of character states is the distribution of the character states among the various taxa. In general, character states widespread in taxa other than the sister groups being evaluated are considered plesiomorphic.

Character Analysis

DICHOTOMY

Subfamilial Dichotomy

1. Sensory bristle of the 5th joint of the male 1st antenna: In the Cypridinidae the sensory bristle of the male is similar to that of the female or bears a few additional filaments. In some genera

(*Bathyvargula*, *Metavargula*) some of the filaments are much wider than those of the female, but usually the filaments are slender on both sexes, or only slightly wider on the male. In the Philomedidae and in other families of the Cypridinacea, the sensory bristle of the male bears many more filaments than are present on the female. Because of the antiquity of the Cypridinidae, the sensory bristle of the male Cypridinidae is considered here to be a primitive type.

The genera of the Philomedidae exhibiting the male sensory bristle character may roughly be divided into 2 types (see Figure 3), depending on the state of this character: type 1, long filaments concentrated along an elongate widened segment occupying the proximal one-third to two-thirds of the bristle; type 2, long filaments concentrated on a bulbous segment occupying about the proximal one-fifth of the bristle (the proximal edge of the bulb projects backward). The sensory bristle of the male *Paraphilomedes* (see Poulsen, 1962:403, fig. 176e') appears to be transitional between character states 1 and 2 in having the long filaments concentrated near the proximal end of the bristle (Figure 3e). It is, however, assigned to type 1 because the proximal part containing the filaments does not project backward as does the bulbous part of the type 2 bristle.

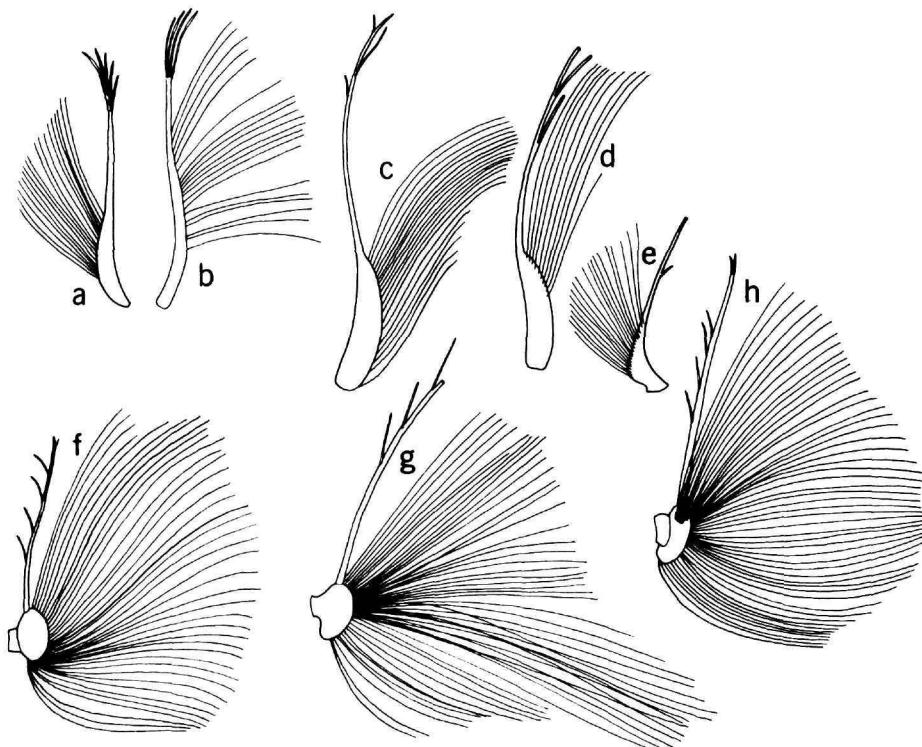


FIGURE 3.—Sensory bristle of 1st antennae of adult males of selected genera of the subfamilies Philomedinae (a-e) and Pseudophilomedinae (f-h): a, *Euphilomedes agilis* (Thomson, 1879); b, *Philomedes heptathrix* Kornicker, 1975; c, *Scleroconcha arcuata* Poulsen, 1962; d, *Igene walleni* Kornicker, 1975; e, *Paraphilomedes unicornuta* Poulsen, 1962 (adapted from Poulsen, 1962:403, fig. 176e'); f, *Harbansus dayi*, new species; g, *Tetragonodon ctenorhynchus* (Brady, 1887); h, *Pseudophilomedes thalassa* Kornicker and Caraion, 1977. (Tips of stems broken in d,e,g.)

Because the type 1 bristle appears to be intermediate between the sensory bristle of the male Cypridinidae and the type 2 bristle, it is considered here to be plesiomorphic, and genera having the type 2 bristle to be synapomorphic. The type 2 sensory bristle is also present on males of the Sarsiellidae. I consider this to be convergence. The male sensory bristle of other families (Cylindroleberididae, Rutidermatidae) more closely resembles the type 1 bristle. The adult male of the genus *Paramekodon* is unknown but I assume it to be similar to that of the closely related genus *Pseudophilomedes*.

2. Bristles on list of infold of caudal process: In the Philomedidae the bristles consist of 2 types: type 1, small, slender, bare bristles; type 2, broad, spinous, frondlike bristles. I consider the latter type,

which is found elsewhere only in some of the Sarsiellidae, to be the apomorphic character state, and those genera having the type 2 bristles to be synapomorphic. An exception to the two types is seen in the bristles on the caudal process of *Euphilomedes ferox* Poulsen, 1962 (Poulsen, 1962:392, fig. 171b), which bears slender bristles branching distally. These bristles may be intermediate between types 1 and 2, but I consider them as a variation of type 1 bristles.

3. End joint of the 6th limb: The 6th limbs of the Cypridinidae, Philomedidae, Sarsiellidae, and Rutidermatidae are more or less similarly constructed, whereas the 6th limb of the Cylindroleberididae is considerably different. The end joints of the 6th limbs of the first 4 families are of 2 types:

type 1, end joint with considerable posterior projection; type 2, relatively slight posterior projection. The type 1 end joint is present on all of the Cypridinidae and on some of the Philomedidae; whereas the type 2 end joint is present on the remainder of the Philomedidae and on the Sarsiellidae and Rutidermatidae. Because of the antiquity of the Cypridinidae, I consider the type 1 end joint to be the plesiomorphic character state. The presence of the type 2 end joint in many divergent groups is interpreted to be due to convergence. With the exception of *Igene walleni* and a few species of *Euphilomedes*, those genera in the Philomedidae having the type 2 end joint are considered to be synapomorphic. *Igene walleni* and the few species of *Euphilomedes* having the type 2 end joint are considered to be convergent.

4. Relative lengths of the 2nd and 3rd joints of the exopodite of the male 2nd antenna: In the Cypridinidae and the Sarsiellidae the exopodites of males and females are similar in having the 2nd joints slightly longer than the 3rd joints. In the Cylindroleberididae, the exopodites of the males and females are similar, or the males have a much longer 2nd joint than present on the females. The exopodite of the male Philomedidae may be divided into 2 types: type 1, similar to that of female; type 2, 3rd joint much longer than 2nd. The type 1 exopodite of the male is considered here to be the plesiomorphic character state, and genera having the type 2 exopodite to be synapomorphic. Males of the Rutidermatidae also have the type 2 exopodite. I consider this to be convergence.

Generic Dichotomy in the Subfamily Pseudophilomedinae

5. Large tooth of 2nd exopodial joint of the 5th limb of the female: In the Pseudophilomedinae this tooth may be divided into 2 types: type 1, tooth squarish in shape; type 2, tooth with saberlike prolongation. The type 1 tooth is also present in members of the Philomedinae and Rutidermatidae, and is considered here to be the plesiomorphic character state. Genera with the type 2 tooth are considered synapomorphic. The teeth on *Euphilomedes ferox* Poulsen, 1962, and *Euphilomedes agilis* (Thomson, 1879) appear to be intermediate types and are here assigned to type 1.

6. Endite III of the maxilla: In the Pseudophilomedinae this endite may be divided into 2 types: type 1, endite well developed; type 2, endite very small. The type 1 endite is present also on members of the Cypridinidae and Philomedinae and is considered here to be the plesiomorphic character state. The type 2 endite is present only in the Pseudophilomedinae. Genera with the type 2 endite are considered synapomorphic.

7. Exopodite of the maxilla: In the Pseudophilomedinae the exopodite consists of 2 types: type 1, exopodite consisting of lobe with 3 bristles near ventral margin of basale; type 2, exopodite consisting of 3 bristles near dorsal margin of basale, lobe absent. (It is possible that the type 2 exopodite is not really an exopodite but merely 3 bristles on the basale. In that interpretation the type 2 endite considered above in item 6 would be considered the exopodite, and the Pseudophilomedinae would have only 2 endites; this interpretation would not change the proposed phylogeny or classification.) The type 1 exopodite is present also on the Cypridinidae and Rutidermatidae and is considered herein to be the plesiomorphic character state. Genera with the type 2 character state are synapomorphic.

8. Bristles on the 7th joint of the female 1st antenna: Among the Philomedidae, the b-bristle is absent only on members of *Paramekodon*. The absence of the bristle is considered here to be the apomorphic character state.

9. Number of furcal claws: Members of the genus *Harbansus* have only 5 or 6 furcal claws. Most members of the Cypridinidae and Philomedidae have more than 6 claws. Therefore, the presence of fewer claws on the furca of *Harbansus* than on the sister group *Tetragonodon*, which has many furcal claws, is considered here to be apomorphy. However, species with 6 furcal claws are also present in the out groups *Euphilomedes* and *Pseudophilomedes*. These are considered here to be cases of convergence, but they are sufficiently numerous to make the directionality of this character questionable.

10. Rod-shaped organ: This organ is absent only on members of the genus *Tetragonodon*. Therefore, this character state (absence) is considered to be apomorphic.

11. Medial eye: The organ is absent only on members of the genus *Tetragonodon*. This absence is considered the apomorphic character state.

CONVERGENCE

In reconstructing a most parsimonious phylogeny using the principles of Hennig, it is not uncommon to find seemingly apomorphic character states in some members of different lineages. These are assumed here to be the result of convergence, but no attempt has been made to discriminate between convergence and parallelism. The reconstructed phylogeny is that which contains fewest convergences. These are summarized below. The same numbers are used as those listed under "Dichotomy." No convergences occurred in states 4, 6-8, or 11.

1. Sensory bristle of the 5th joint of the male 1st antenna: The genus *Paraphilomedes* Poulsen, 1962, is known from 2 species, of which the adult male is known for only *Paraphilomedes unicornuta* Poulsen, 1962. The base of the sensory bristle of the 1st antenna of the adult male of that species is much broader than that of other members of the Philomedinae as revised herein (Figure 3e). It may be an intermediate form between the typical plesiomorphic type 1 and apomorphic type 2 character states of the sensory bristle. As an intermediate form it could belong in the branch containing the Pseudophilomedinae, rather than in the branch containing the Philomedinae as proposed herein. However, *Paraphilomedes* is referred to the Philomedinae because it has the apomorphic type 2 exopodite of the male 2nd antenna (character state 4), also referral of *Paraphilomedes* to the Pseudophilomedinae would result in convergences in characters 2 and 3.

The type 2 character state, considered here to be synapomorphic among the Pseudophilomedinae, is also characteristic of the family Sarsiellidae. This is considered to be convergence because the Sarsiellidae and Pseudophilomedinae differ from one another in many of other apomorphic character states. This observation lends support to the suggested convergence between *Paraphilomedes* and Pseudophilomedinae.

If the type 2 character state should prove to be plesiomorphic rather than apomorphic, the proposed reconstructed phylogeny would remain unchanged, but the character state would serve to show a close relationship among the Philomedinae rather than among the Pseudophilomedinae.

2. Bristles on list of infold of caudal process: *Euphilomedes ferox* Poulsen, 1962, bears setose bristles that could be considered intermediate be-

tween the simple plesiomorphic type 1 bristles of the Philomedinae and the setose apomorphic type 2 bristles of the Pseudophilomedinae. Adult males of *E. ferox* are not known; however, I assume them to have the apomorphic type 2 exopodite of the 2nd antenna (character state 4) of the adult male of the presumably closely related *E. agilis* (Thomson, 1879) and of other Philomedinae. For this reason I consider *E. ferox* to be a member of the Philomedinae. However, it should be mentioned that the female 5th limb of both *E. ferox* and *E. agilis* resembles that of species of *Pseudophilomedes* and *Paramekodon*, both members of the Pseudophilomedinae. This is discussed further under character state 5 below wherein additional reasons are given for assuming convergence. Setose bristles on some members of the Sarsiellidae are also considered convergent.

3. End joint of the 6th limb: Although the type 2 end joint, considered herein to be synapomorphic among the Pseudophilomedinae, is also present on the Sarsiellidae and Rutidermatidae, I consider this to be convergence because those families differ considerably in other apomorphic characters.

Igene walleni Kornicker, 1975, *Euphilomedes multichelatus* (Kornicker, 1958), *E. arostratus* Kornicker, 1967a, *E. polae* (Graf, 1931), and probably *E. fonsecensis* (Hartmann, 1959) and *E. oblongus* (Juday, 1907) have the type 2 end joint of the 6th limb, which is synapomorphic among the Pseudophilomedinae. The type 2 end joints of the above 6 species of *Euphilomedes* are considered to be convergent, because these species have the apomorphic type 2 exopodite of the male 2nd antennae indicating that they belong in the Philomedinae. Also, referral of these species to Pseudophilomedinae would result in convergences in character states 1 and 2.

5. Large tooth of the 2nd exopodial joint of the 5th limb of the female: As mentioned under character state 2 above, the teeth on the exopodite of the 5th limb of *Euphilomedes ferox* and *E. agilis* appear to be intermediate between the plesiomorphic type 1 and apomorphic type 2 character states. As discussed above, the bristles on the infold of the caudal process of the carapace of *E. ferox* also could be intermediate between the plesiomorphic and apomorphic character states of the bristles. The similarity of the teeth on the 5th limbs of *E. ferox* and *E. agilis* to those of species of *Pseudophilomedes*

and *Paramekodon* is considered convergence because the 2 species have the apomorphic type 2 exopodite of the 2nd antenna characteristic of the Philomedinae (known for *E. agilis*, assumed for *E. ferox*). These 2 species have neither the apomorphic type 2 sensory bristle on the male 1st antenna, nor the apomorphic type 2 end joint of the 6th limb, whose presence would indicate them to be more closely related to the Pseudophilomedinae than to the Philomedinae. Thus, even if this group of *Euphilomedes* is considered a basal element of the Pseudophilomedinae lineage (close to the point where the 2 subfamilies branch), characteristic 5 is not synapomorphic within the lineage and is therefore unequivocably convergent. At present, I regard this group of *Euphilomedes* as at least related to, if not truly congeneric, with other *Euphilomedes*; if this is so, their possession of apomorphic character states 2 and 5 must be regarded as convergent with those of the Pseudophilomedinae. The question of relationships within *Euphilomedes* remains to be worked out.

9. Number of furcal claws: Several species of *Pseudophilomedes* (*P. angulatus* Müller, 1894, *P. foveolatus* Müller, 1894, and *P. tetrathrix* Kornicker and Caraion, 1977) bear 6 claws on the caudal furca, a character state considered herein to be apomorphic when comparing the genera *Harbansus* and *Tetragonodon*. *Euphilomedes bradyi* Poulsen, 1962, also bears only 6 furcal claws. In the family Sarsiellidae, members of the genera *Sarsiella* and *Adelta* have only 5 furcal claws. Reduction of the number of furcal claws also occurs in the Cypridinidae. Therefore, the reduction of furcal claws should not be used to separate higher taxa, and is of marginal use at the generic level. It is used herein as a synapomorphic character state in the genus *Harbansus*, but it would not be unexpected for new species of *Harbansus* to be found with more than 6 furcal claws.

10. Rod-shaped organ: The absence of a rod-shaped organ is considered the apomorphic character state herein. The state is exhibited only in the genus *Tetragonodon*. The rod-shaped organ is small in the genus *Igene* Kornicker, 1975, which is referred to the Philomedinae, and also in the species *Harbansus rhabdion* (Kornicker, 1970), which is referred to the Pseudophilomedinae. All members of the presumably ancestral family Cypridinidae also have a small rod-shaped organ, suggesting that a

small organ is plesiomorphic. However, members of the other cypridinid families have the long organ. Therefore, I have been unable to resolve satisfactorily the directionality of the short and long rod-shaped organ in the Philomedidae, but I believe that the complete absence of the organ is apomorphic. I think it possible that the small organ of the ancestral Cypridinidae evolved into a long organ in the other families, and that the organ in some members of those families later became small or was lost.

Phylogeny and Zoogeography of *Harbansus*

I have attempted to interpret the phylogeny and zoogeography of *Harbansus* using the principles of Hennig (1966) and Croizat (1958, 1964; also see Croizat et al., 1974). This method was applied with notable success by Brundin (1966), Rosen (1975), and Platnick (1976) to other taxa, and has been discussed by Nelson (1969, 1974). The character states for which apomorphic and plesiomorphic conditions could be postulated with reasonable confidence were of insufficient number to reconstruct more than a very tenuous phylogenetic relationship for known species of *Harbansus* (Table 1; Figure 4). Because Croizat's views, however, have not previously, to my knowledge, been applied to Ostracoda I believe it is warranted to present the results for the purpose of stimulating examination of the method by others. The localities of the specimens are noted in Figure 4.

Assuming a widespread ancestral population, and that speciation resulted from "vicariance" (fragmen-

TABLE 1.—Plesiomorphic and apomorphic character states in species of *Harbansus*

Character state	Plesiomorphic	Apomorphic
1. Number of sutures in rod-shaped organ	0-1	3-7
2. Number of bristles on 7th limb	6-8	4
3. Anterior edge of valve relative to anterior edge of rostrum	parallel	oblique
4. Number of lateral bristles on mandibular basale*..	3	2
5. Length of rod-shaped organ	long	short
6. Number of bristles in distal group on ventral margin of 2nd endopodial joint of mandible	2	3
7. Number of long claws in distal group of bristles on ventral margin of 2nd endopodial joint of mandible	0	1

*On some specimens these bristles have their bases on the ventral margin; presumed to have migrated from the lateral surface, they are termed "lateral bristles" herein.

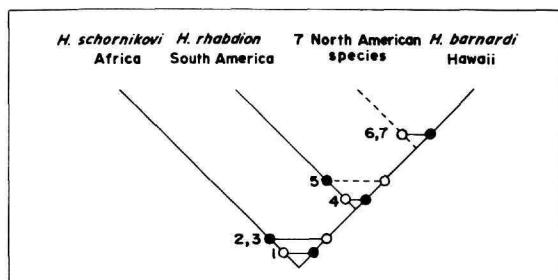


FIGURE 4.—Reconstructed phylogeny and geographic distribution of species of *Harbansus* (numbers correspond to characters listed in Table 1; for meaning of symbols see Figure 2).

tation) of that population, the reconstructed phylogeny suggests the following series of events: (1) the first vicariant event separated the African population from the New World and Hawaiian population; (2) a second vicariant event separated the South American population from the North American and Hawaiian population; and (3) a third vicariant event separated the North American population from the Hawaiian population. I will not attempt to speculate on the vicariant events nor on the possible influence of migration.

Functional Morphology of *Harbansus*

Natatory hairs are absent on the exopodial bristles of the 2nd antennae of juveniles of both sexes of all species of *Harbansus*, and on adult females of *Harbansus*, except for the adult female *H. paucichelatus*. Therefore, all except the latter are incapable of swimming and are restricted to crawling on, and burrowing into, the sediment. The latter function is assisted by stout ventral spines on exopodial bristles of the 2nd antenna. Although the adult male is known for only 2 species of *Harbansus* (*H. dayi* and *H. paucichelatus*), it seems likely that all adult males have natatory bristles on the 2nd antennae allowing them to actively seek the female by swimming. The adult male of *H. paucichelatus*, but not that of *H. dayi*, has ventral spines on the exopodial bristles of the 2nd antennae suggesting that the former species may be more efficient at burrowing than the latter species.

The distal part of the natatory bristles on the adult female of some species of *Philomedes* and *Scleroconcha*, both members of the Philomedinae,

break off soon after mating so she must spend the remainder of her life on the bottom (Kornicker, 1975:76). In the present collections, the natatory bristles on several ovigerous females of *H. paucichelatus* were unbroken, but the 2nd antenna of the specimen from the Bahamas illustrated by Kornicker (1958: fig. 54C) has the tips of several bristles missing suggesting that the distal ends of the bristles may break off in this species also. However, it is possible that the appendage illustrated by Kornicker (1958) is not representative. An indication of this is that the bristle of the 2nd joint is broken, but not that of the 3rd joint. In other species in which the bristles of the adult female are broken, the broken bristles are restricted to the distal joints.

The absence of natatory bristles on the 2nd antennae of juveniles is common in the family Philomedidae, where natatory bristles have been reported on juveniles of only 1 species (Kornicker, 1975:74). On the other hand, the absence of natatory bristles on adult females is uncommon, and has been reported only in the genera *Tetragonodon* and *Igene*, both known only from deep water (Kornicker, 1975:74). Many adult females in the family are known to rise in the water column to mate; probably adult females of *H. paucichelatus* also do this, but other species of *Harbansus* must remain on the bottom during mating.

Members of Philomedidae are detritus feeders (collectors) (Kornicker, 1975:39). Although gut content of only *H. bradmyersi* was examined, it is assumed all species of *Harbansus* are probably also detritus feeders. The inability of juveniles and adult females of most of the species to swim suggests that they feed while crawling on the bottom, or possibly, while burrowing in the sediment. The extreme reduction of the coxale endite of the mandible and the reduced and weakly developed maxilla and 5th limb of the adult male indicate that it may not eat; therefore, the adult male probably dies soon after mating.

PHILOMEDIDAE Müller, 1908

Philomedidae contains two subfamilies: Philomedinae Müller, 1908, and Pseudophilomedinae Kornicker, 1967b.

DIAGNOSIS OF FEMALES AND JUVENILE MALES.—

Carapace: Lamellar prolongation of selvage with hirsute fringe.

First Antenna: 3rd and 4th joints separated by distinct suture; a-bristle of 7th joint not clawlike.

Second Antenna: Protopodite without distomedial bristle.

Mandible: Coxale endite consisting of short spinous process with bifurcate tip. Exopodite 40–100 percent of length of dorsal margin of 1st endopodial joint, usually with 2 bristles, of which 1 is as long as, or longer than, exopodite.

Maxilla: End joint usually with more than 8 bristles, some pectinate.

Fifth Limb: 2nd joint of exopodite with large tooth.

Sixth Limb: Consisting of 4 endites and large flat end joint.

Seventh Limb: Tip with single comb opposite 1 or more pegs.

Furca: All claws separated from lamella by suture. Long hairs medial to bases of some claws and along margin of lamella following claws.

Upper Lip: Glandular field present but not easily seen except for minute processes on anterior tip.

DIAGNOSIS OF ADULT MALES.—**Carapace:** Lamellar prolongation of selvage with hirsute fringe.

First Antenna: 3rd and 4th joints separated by distinct suture; sensory bristle of minute 5th joint with numerous long hairs; a-bristle of 7th joint not clawlike; b- and c-bristles without suctorial discs.

Mandible: Coxale endite consisting of minute process. Exopodite similar to that of adult female.

Maxilla: Reduced; end joint usually with more than 8 bristles, none pectinate.

Fifth Limb: Exopodite reduced; 2nd joint without large flat tooth.

Sixth Limb: Similar to that of adult female.

Seventh Limb: Generally similar to that of female or with fewer bristles, but absent on some species of *Harbansus*.

Furca and Upper Lip: Similar to those of adult female.

Key to the Subfamilies of Philomedidae

ADULT MALES

Sensory bristle of the 5th joint of the 1st antenna on bulbous segment occupying about the proximal one-fifth of the bristle (the proximal edge of the bulb projecting backwards)	PSEUDOPHILOMEDIINAE
Sensory bristle of the 5th joint of the 1st antenna on widened segment occupying the proximal one-third to two-thirds of the bristle (the proximal edge of the widened segment not projecting backwards)	PHILOMEDIINAE

FEMALES AND JUVENILE MALES

1. End joint of 6th limb with considerable posterior projection	PHILOMEDIINAE [part]
End joint of 6th limb without considerable posterior projection	2
2. Furca with more than 6 claws	PHILOMEDIINAE [part]
Furca with 5 or 6 claws	PSEUDOPHILOMEDIINAE

PHILOMEDIINAE Müller, 1908

I recognize 6 genera in Philomedinae: *Philomedes* Lilljeborg, 1853, *Paraphilomedes* Poulsen, 1962, *Euphilomedes* Poulsen, 1962, *Scleroconcha* Skogsb erg, 1920, *Anarthron* Kornicker, 1975, and *Igene* Kornicker, 1975.

DIAGNOSIS.—Sensory bristle of 1st antenna of adult male with long filaments concentrated along

an elongate widened segment occupying the proximal one-third to two-thirds of the bristle (the proximal edge of the widened part not projecting backward). End joint of 6th limb with considerable posterior projection (except for *Igene* and some species of *Euphilomedes*). Third joint of exopodite of 2nd antenna of adult male much longer than 2nd joint. Bristles on list of caudal infold slender, usually bare (except in *Euphilomedes ferox*).

Key to the Genera of Philomedinae

1. Each lamella of furca with 6 claws *Euphilomedes bradyi* Poulsen
Each lamella of furca with more than 6 claws 2
2. Endopodite of female 2nd antenna with single joint *Paraphilomedes*
Endopodite of female 2nd antenna with 2 joints 3
3. Carapace of female with 2 or more horizontal ribs (absent or reduced on male) 4
Carapace without horizontal ribs 5
4. Rod-shaped organ with about 15 sutures *Scleroconcha*
Rod-shaped organ with wrinkles or few sutures *Anarthon*
5. Furca with secondary claws between primary claws *Euphilomedes*
Furca without secondary claws, or secondary claws following primary claws 6
6. Rod-shaped organ rodlike, long *Philomedes*
Rod-shaped organ conelike, short *Igene*

PSEUDOPHILOMEDINAE Kornicker, 1967

I recognize 4 genera in Pseudophilomedinae: *Pseudophilomedes* Müller, 1893, *Paramekodon* Brady and Norman, 1896, *Tetragonodon* Brady and Norman, 1896, and *Harbansus*, new genus.

DIAGNOSIS.—Sensory bristle of 1st antenna of adult male with long filaments concentrated on bulbous

segment occupying about the proximal one-fifth of the bristle (the proximal edge of the bulb projecting backwards). End joint of the 6th limb with relatively slight posterior projection. Third joint of exopodite of 2nd antenna of adult male slightly shorter than 2nd joint. Bristles on list of caudal infold broad, spinous, frondlike.

Key to the Genera of Pseudophilomedinae

1. Tooth of 2nd exopodial joint of 5th limb of adult females or juvenile males and females with saberlike prolongation 2
Tooth of 2nd exopodial joint of 5th limb of adult females or juvenile males and females without saberlike prolongation 3
2. 7th joint of female 1st antenna with b-bristle *Pseudophilomedes*
7th joint of female 1st antenna without b-bristle *Paramekodon*
3. Rod-shaped organ elongate *Harbansus*, new genus
Rod-shaped organ lacking *Tetragonodon*

Harbansus, new genus

ETYMOLOGY.—The genus is named after Harbans S. Puri, Florida Geological Survey, who has contributed much to the knowledge of Ostracoda. Gender masculine.

TYPE-SPECIES.—*Harbansus bradmyersi*, new species.

DISTRIBUTION.—Members of the genus have been collected off the coast of Spanish Sahara at a depth of 260 m; in the Peru-Chile Trench off Peru at a depth of 991–1015 m; in the Bahamas at depths of 1–20 m; in Biscayne Bay, Florida, at subtidal depths; in Placida Harbor, Florida, at depths of 1–3 m; in Similk Bay, Washington, at a depth of 4.9 m; off Oxnard, California, at depths of 18.3–27.4 m; off Catalina Island, California, at depths of 10.7 and

414 m; off Laguna Beach, California, at a depth of 12.5 m; on Heald Bank, Gulf of Mexico, off Texas, at a depth of about 15 m; off Beaufort, North Carolina, at depths of 160–198 m; at the edge of the continental shelf off New Jersey; in Kaneohe Bay, Oahu, Hawaii, at a depth of 2 m; off Tarpon Springs, Florida, at a depth of 2.23 m; Carrie Bow Cay and Twin Cays, Belize, at depths of 15 cm to 24 m; in the Gulf of Mexico off Galveston, Texas, at depths of 49.25–57.75 m; off Santa Rosa Island, California, at a depth of 140 m; off Guadalupe Island, Mexico, at depths of 73.2–102.4 m.

TERMINOLOGY.—Species in this genus have on the mandibular basale 2–5 bristles on the medial surface, 3 bristles on the dorsal margin, 1 terminal bristle on the ventral margin, and 2–3 bristles on the lateral surface. On some specimens the lateral bristles

TABLE 2.—Morphological characters of adult females of species of *Harbansus*

Morphological character	<i>bradmyersi</i>	<i>paucichelatus</i> ^a	<i>rhabdion</i> ^b	<i>schornikovi</i> ^c	<i>mayeri</i>	<i>dayi</i>	<i>bowenae</i>	<i>barnardi</i>	Species A	Species B
Carapace, length (mm)	0.91-0.95	0.80-1.03	1.41	0.96	0.96-1.06	1.34-1.44	0.92-1.14	1.01	1.18	1.26
Rostral infold, number of bristles	6-7	4	4	4-6	7-8	5	3	7-8	4	4-6
Caudal process infold, number of frondlike bristles on list	6-7	6	6	5	5-6	6	6	7	6-7	6
Lateral ribs, present (+), absent (-)	+	+	-	-	-	-	-	-	-	+
First antenna, number of bristles										
2nd joint (ventral/dorsal/lateral)	0/1/0	0/1/0	1/1/0	1/1/0	0/1/0	1/1/0	0/1/0	0/1/0	0/1/0	0/1/0
3rd joint (ventral/dorsal)	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
4th joint (ventral/dorsal)	2/1	2/1	1/2	2/2	2/1	2/1	3/1	3/2	2/1	2/1
Second antenna, exopodite										
Some bristles with (+), or without (-) natatory hairs	-	+	-	- ^d	-	-	-	-	-	-
Some bristles with ventral spines (+)	+	+	+	+	+	+	+	+	+	+
9th joint, number of bristles	2	2	3	3	2	3	3	1-2	2	2
Second antenna, endopodite										
1st joint, number of bristles	2	2	3-4	2	2	2	1	3	2	2
2nd joint, number of spines or bristles (ventral/terminal)	1/1	1/0-1	1/1	not applicable	1/1 ^e	1/0	0/1	1/1	1/1 ^e	1/1
Mandible, number of bristles										
Basale										
Lateral surface ^f	2	2	3	2-3	2	2	2	2	2	2
Dorsal margin	3	3	3	3	3	3	3	3	3	3
Medial surface	2	2	4	5	2	4	3	4	2	2
2nd endopodite joint, ventral margin (proximal group/distal group)	2/2	2/2	2/2	2/2	2/2	2/2	1/2	2/3 ^g	2/2	2/2
End joint, number of claws	3	3	3	3	3	3	3	3	3	3
Short claw as percent of longest claw	14	20	39	36	18	19	43	12	14	10
Sixth limb, number of epipodial bristles	1	1	1	1	1	1	1	1	1	1
End joint, number of bristles	8	6	6	8	8	6	6	6	6-7	6-7
End joint, not prolonged posteriorly (+)	+	+	+	+	+	+	+	+	+	+
Seventh limb, number of bristles	6	6	6	4	6	8	7-8	8	6	6
Terminus, number of pegs	3	2-3	3	2	4-5	3	2	3	ca. 3	4
furca, number of claws	6	5-6	6	6	6	6	6	6	6	6
Claw 3, secondary type (+)	+	+	+	+	+	+	+	+	+	+
Rod-shaped organ, long (+), short (-)	+	+	-	+	+	+	+	+	+	+
Number of sutures	6-7	3-4	0	1	4-5	4	4-7	7	4-6	4

^aData from Kornicker (1958) and herein.^bData from Kornicker (1970, 1975) and herein.^cData pertains to A-1'; from Kornicker and Caron (1977).^dThe adult female could have natatory bristles.^eTerminal bristle actually on minute 3rd joint.^fThese bristles on some specimens have bases on ventral margin.^gThe 3rd bristle is clawlike.

have their bases on the ventral margin. These are assumed to have migrated from the lateral surface and are considered herein to be lateral bristles. Thus, except for the terminal bristle on the ventral margin, bristles with bases on the ventral margin are termed lateral bristles.

Some of the morphological characters of the species are compared in Table 2.

DIAGNOSIS.—*Carapace*: In adult female, small (0.80-1.44 mm) with prominent rostrum and small backward projecting caudal process. Faint horizontal ribs present on *H. bradmyersi* and *H. paucichelatus*, strong ribs on *H. species B*. Edge of valve medial to anterior end of rostrum of *H. schornikovi* oblique, on remaining species edge parallel to rostral margin. Infold of rostrum with 3-8 spinous bristles; infold of caudal process with 5-7 frondlike

bristles along posterior part of list. Surface of carapace with distinct fossae.

First Antenna: Second joint with 1 dorsal bristle, 1 or no ventral bristles, and no lateral bristles; 3rd joint with 1 ventral and 2 dorsal bristles; 4th joint with 2 or 3 ventral and 1 or 2 dorsal bristles.

Second Antenna: Ninth joint of exopodite with 2 or 3 bristles (rarely 1); exopodial bristles of adult females of *H. Paucichelatus* with natatory hairs, adult females of other known species without natatory bristles. Endopodite: 1st joint with 1-4 bristles, 2nd joint of adult female elongate with 1 ventral and 1 or no terminal bristles, or minute with 1 bristle (*H. bowenae*). *Harbansus mayeri* and *H. species A* with minute 3rd joint with terminal bristle.

Mandible: Dorsal margin of basale with 1 mid-

bristle and 2 terminal bristles; medial surface with 2–4 bristles; lateral surface with 2–3 bristles; ventral margin of 2nd endopodial joint with bristles forming 2 distal groups (1–2 bristles in proximal group; 2–3 bristles in terminal group).

Fifth Limb: Main tooth of female with single bifurcate tooth or with 4 or 5 teeth similar to species of *Philomedes*. Large tooth of 2nd exopodial joint squarish, without long projection like on species of *Pseudophilomedes* and *Paramekodon*.

Sixth Limb: A single bristle in place of epipodial appendage; end joint with 6–8 bristles and not projecting posteriorly.

Seventh Limb: Each limb of adult female with 6–8 bristles, 2 in proximal group, 4–6 in terminal group. Terminus with 2–5 pegs opposite comb. (Only the A-1 male of *H. schornikovi* is known; its 7th limb bears no proximal and 4 terminal bristles.)

Furca: Each limb with 5 or 6 claws: claws 3, 5, 6 (when present), secondary; claws 1, 2, 4 stout, primary.

Rod-shaped Organ: Organ of *H. schornikovi* elongate with suture near middle; of *H. rhabdion* very short, without sutures; of remaining species elongate, with 3–7 sutures.

Lateral Eyes: Adult female either without eyes or with minute eyes.

SEXUAL DIMORPHISM.—Adult males are known for only *H. paucichelatus* and *H. dayi*. In general, dimorphism is similar to that which occurs in other genera of Philomedidae.

Carapace: The caudal process is somewhat broader on males than on females of both *H. dayi* and *H. paucichelatus*.

First Antenna: The 5th joint of the male is small, triangular, and wedged ventrally between the 4th and 6th joints. The proximal part of the sensory bristle of the 5th joint is bulbous and bears numerous long slender filaments. On the adult male of *H. paucichelatus* ventral bristles are lacking on the 3rd and 4th joints.

Second Antenna: The endopodite of the adult female is 1- or 2-jointed, whereas the endopodite of the adult male is 3 jointed with the 3rd joint capable of being reflexed on the 2nd. The exopodite of the female and juvenile males and females of *H. dayi* bears some bristles with ventral spines, but none with natatory hairs, whereas the adult male exopodite bears some bristles with natatory hairs, but none with ventral spines. Both the male and

female exopodite of *H. paucichelatus* bear some bristles with natatory hairs and ventral spines, but the bristles of the female bear more ventral spines than do the bristles of the male.

Mandible: The coxale endite of the adult female is large with a bifurcate tip, whereas the coxale endite of the adult male is represented by a minute spine (so small that even with $\times 100$ magnification it is difficult to be certain of its presence).

Maxilla and 5th Limb: Reduced with weakly developed bristles on endopodite of maxilla and exopodite of 5th limb of adult male.

Seventh Limb: Adult male of *H. paucichelatus* lacks 7th limbs. The 7th limb of the adult male of *H. dayi* bears fewer bristles than are present on the limb of the adult female. Lack of a 7th limb has not been reported for any other species of the Philomedidae. Extreme reduction of the 7th limb is common in species of the Sarsiellidae.

Furca: In general similar in both sexes, except for a reduction in marginal teeth on the stout claws in the adult male of *H. dayi*.

Lateral Eye: The adult female of *H. dayi* is without lateral eyes, whereas the male has small lateral eyes with 5 ommatidia. The adult female of *H. paucichelatus* bears small lateral eyes with 3–5 ommatidia, whereas the adult male bears large eyes with about 11 ommatidia.

COMPARISONS.—Species of the new genus *Harbansus* differ from those of *Paraphilomedes* in lacking 2 small horns at the dorsal margin of the carapace, and from those of *Pseudophilomedes* and *Paramekodon* in lacking the prolonged spearlike tip on the tooth of the 2nd exopodial joint of the 5th limb. Members of *Harbansus* differ from members of *Scleroconcha*, *Anarthron*, and *Philomedes* in the following ways: species of *Harbansus* have fewer furcal claws; the end joint of the 6th limb does not project backward; and both the 1st endopodial joint and the 9th exopodial joint of the 2nd antenna have fewer bristles. The last 2 characters also help distinguish *Harbansus* from *Euphilomedes*. The only species of *Euphilomedes* that has as few as 6 furcal claws is *E. bradyi* Poulsen, 1962. *E. bradyi* is not included in *Harbansus* because it has a backward projecting end joint on the 6th limb and only 1 claw on the end joint of the mandible. Members of the genus *Igene* differ from those of *Harbansus* in having many more furcal claws and 6 bristles on

the 9th exopodial joint of the 2nd antenna. *Harbansus rhabdion* and *Igene walleni* Kornicker, 1975, have in common the presence of a short rod-shaped organ; other known species of *Harbansus* have a long rod-shaped organ. The infolds of the rostral process of species of *Harbansus* have fewer bristles than present on most species in other genera. *Harbansus* has frondlike bristles on the infold of the caudal process; these bristles occur elsewhere only

on species of *Tetragonodon*, *Pseudophilomedes*, *Paramekodon*, and on *Euphilomedes ferox*. Species of *Tetragonodon* differ from those of *Harbansus* in having more furcal claws and in lacking a rod-shaped organ. The carapace of some species of *Harbansus* resembles that of *Streptoleberis crenulata* Brady, 1890, a species correctly referred by Müller (1912:51) to the category "Cypridinidarum genera dubia et species dubiae."

Key to the Species of *Harbansus*

- | | |
|---|------------------------------------|
| 1. Carapace with lateral ribs | 2 |
| Carapace without lateral ribs | 3 |
| 2. Tip of 2nd joint of endopodite of female 2nd antenna bare or with minute spine..... | <i>H. paucichelatus</i> |
| Tip of 2nd joint of endopodite of female 2nd antenna with short bristle | 4 |
| 3. Edge of valve cuts obliquely across distal end of rostrum | <i>H. schornikovi</i> |
| Edge of valve parallel to distal end of rostrum | 5 |
| 4. Upper lateral rib of carapace forming distinct angle with dorsal margin | <i>H. species B</i> |
| Upper lateral rib of carapace horizontal | <i>H. bradmyersi</i> , new species |
| 5. Rod-shaped organ very short | <i>H. rhabdion</i> |
| Rod-shaped organ long | 6 |
| 6. End joint of endopodite of female 2nd antenna minute | <i>H. bowenae</i> , new species |
| End joint of endopodite of female 2nd antenna elongate | 7 |
| 7. End joint of endopodite of female 2nd antenna bare | <i>H. dayi</i> , new species |
| End joint of endopodite of female 2nd antenna with terminal bristle | 8 |
| 8. Rostral infold of adult female with 4 bristles | <i>H. species A</i> |
| Rostral infold of adult female with 7–8 bristles | 9 |
| 9. Distal group of bristles on ventral margin of 2nd endopodial joint of mandible with 2 bristles | <i>H. mayeri</i> , new species |
| Distal group of bristles on ventral margin of 2nd endopodial joint of mandible with 2 bristles plus a long claw | <i>H. barnardi</i> , new species |

Harbansus paucichelatus (Kornicker, 1958), new combination

FIGURES 5–9; PLATES 1, 2

Philomedes paucichelata Kornicker, 1958:233, figs. 46, 4A,B,
54A–F, 55A–C, 87B,E,H.

Euphilomedes paucichelata.—Kornicker, 1970:36.

HOLOTYPE.—USNM 122905, dry specimen in poor condition.

TYPE-LOCALITY.—Bimini Islands, Bahamas.

MATERIAL.—*Belize*: Sta 9: USNM 156981, 1 specimen; sta 16: USNM 156988, 1 adult male, USNM 156980, 156970, 10 specimens; sta 20: USNM 156991, 1 specimen; sta 24: USNM 157321, 1 specimen; sta 47: USNM 156990, 2 specimens; sta 62: USNM 157320, 1 ovigerous female.

Florida: Anclote Anchorage, sta 30: USNM 156992, 1 adult male. Biscayne Bay: USNM 156740, 1 specimen. Placida Harbor: sample 3: USNM 150107, 1 ovigerous female; USNM 151160, 1 adult female; USNM 151985, 25 specimens includ-

ing 1 ovigerous female; USNM 151988, 1 ovigerous female; USNM 152302, 152309, 2 specimens; sample 4: USNM 149329, 1 ovigerous female; sample 5: USNM 151987, 1 adult female with 1 large egg either in marsupium or unextruded; USNM 151986, 2 specimens. Virginia Key: USNM 156738, 2 specimens including 1 ovigerous female.

Texas: Gulf of Mexico, off Galveston, R/V Gyre: Cruise 10: sta 8: USNM 156885, 156818, 156821, 5 specimens; sta 16: USNM 156905, 2 specimens; cruise 11: sta 1: USNM 156899, 3 specimens; sta 2: USNM 156894, 156881, 156900, 6 specimens; sta 5: USNM 156890, 156893, 4 specimens; sta 7: USNM 156823, 156886, 156888, 17 specimens; sta 8: USNM 156903, 156822, 5 specimens; sta 9: USNM 156827, 156896, 156879, 13 specimens; sta 11: USNM 156820, 156898, 156902, 13 specimens; sta 12: USNM 156880, 156882, 156883, 8 specimens. Gulf of Mexico, Heald Bank: USNM 96478, 1 ovigerous female.

DISTRIBUTION.—Bahamas; Belize; Florida: Anclote Anchorage, Biscayne Bay, Placida Harbor, Virginia Key; Texas: Gulf of Mexico off Galveston

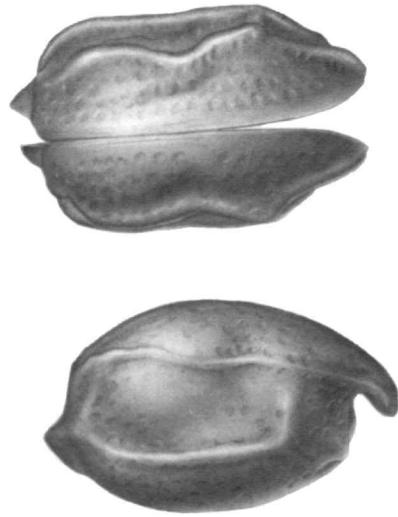


FIGURE 5.—*Harbansus paucichelatus* (Kornicker, 1958), adult female, USNM 149329, length 0.92 mm, complete specimen, dorsal and lateral views.

and on Heald Bank. Known depth range 15 cm to 57.75 m.

SUPPLEMENTARY DESCRIPTION OF ADULT FEMALE (Figures 5–8; Plates 1, 2).—**Carapace:** Elongate with long narrow rostrum and small projecting caudal process; shallow vertical sulcus present on dorsal half of shell near middle (Figure 5); outline of sides parallel in dorsal view.

Ornamentation: Each valve with 2 horizontal ribs, upper rib dorsal to central adductor muscle scars and extending onto rostrum, but not projecting past rostrum, lower rib ventral to central adductor muscle scars; carapace with shallow fossae containing roughly concentric crescentic ridges (Plates 1a,d, 2a,b); bottom of fossae with (1) small nodes with central pit and (2) some flat-bottomed pits and low nodes (Plate 2b,c); area between fossae with (1) rimmed flat-bottomed pits containing ring of about 12 pustules on bottom (Plates 1e,f, 2b,c), (2) low nodes with central pit surrounded by 6–7 pustules (Plate 1e,f), and (3) open pores rimmed with pustules (Plate 1b,c,e); short blunt spines scattered over valve surface (these appear white in photographs) (Plates 1c,e,f, 2b,c); long bristles emerging from pore surrounded by wrinkled rims (Plate 1b,c); thin long rods shown on Plates 1e,f and 2c

may be bristles; pustulose surface of valves visible only at high magnification (Plate 1b,c,e,f).

Infold: Infold of rostrum with 4 long spinous bristles (Figure 6a; Plate 2d); anteroventral infold with short bristle below inner end of incisur and with about 6 ridges parallel to valve margin; posterovenital and posterior infold with about 8 short bristles near inner margin of infold; ridge on infold of caudal process with 6 frondlike bristles (Figure 6b; Plate 2e,f).

Selvage: Fringed lamellar prolongation present along anterior, ventral, and posterior margins of each valve (Plate 1a).

Size: USNM 96478, length 0.96 mm, height 0.55 mm; USNM 149329, length 0.92 mm, height 0.56 mm; USNM 150107, length 0.91 mm, height 0.60 mm; USNM 156818, length 0.93 mm, height 0.55 mm; USNM 151160, length 0.96 mm, height 0.59 mm; USNM 151985, length 0.96 mm, height 0.57 mm; USNM 151988, length 0.94 mm, height 0.56 mm; USNM 151987, length 0.90 mm, height 0.57 mm; USNM 156738, length 1.03 mm, height 0.61 mm. Specimens reported from the Bahamas by Kornicker (1958:234) are not as long as the Florida specimens: 0.80–0.87 mm (Bahamas) compared to 0.90–1.03 mm (Florida).

First Antenna (Figure 6c): 1st joint: dorsal margin and medial surface spinous; lateral surface with few spines. 2nd joint: spinous, with 1 short dorsal bristle with long proximal spines. 3rd joint: short with 3 bristles (1 ventral, 2 dorsal). 4th joint: few proximal spines on medial surface and with 3 bristles (2 ventral, 1 dorsal). 5th joint: sensory bristle with 2 short proximal filaments and 4 distal filaments including stem (1 short, 3 long). 6th joint: medial bristle of about half length of a-bristle of 7th joint. 7th joint: a-bristle with marginal spines; b-bristle about three-fourths length of sensory bristle of 5th joint, with 1 short distal filament excluding stem (may also have short proximal filament?); c-bristle about same length as sensory bristle, with 5 filaments excluding stem. 8th joint: d- and e-bristles bare with blunt tips, about same length as c-bristle; f-bristle about same length as c-bristle, with 4–5 filaments excluding stem; g-bristle same length as f-bristle, with 5 filaments excluding stem.

Second Antenna: Protopodite with spines forming rows on dorsal half of medial surface, but without medial bristle. Endopodite 2-jointed (Figures 6e,



FIGURE 6.—*Harbansus paucichelatus* (Kornicker, 1958), adult female, USNM 149329, length 0.92 mm: *a*, rostrum of right valve, inside view; *b*, caudal process of right valve, inside view; *c*, left 1st antenna, medial view; *d*, exopodite of left 2nd antenna, medial view; *e*, endopodite of left 2nd antenna, medial view; *f*, right mandible, lateral view.



FIGURE 7.—*Harbansus paucichelatus* (Kornicker, 1958), adult female, USNM 149329, length 0.92 mm: a, right maxilla, medial view; b, distal part of right 5th limb, anterior view; c, distal part of left 5th limb, anterior view; d, left 6th limb, medial view; e, distal part of 7th limb; f, left side of posterior end of body showing left lamella of furca, Y-sclerite, and genital organ; g, right lamella of furca; h, medial eye and rod-shaped organ; i, anterior of body showing medial eye, rod-shaped organ, anterior and lateral processes, upper and lower lips, and mouth. Adult female, USNM 151160, length 0.96 mm: j, right lateral eye.

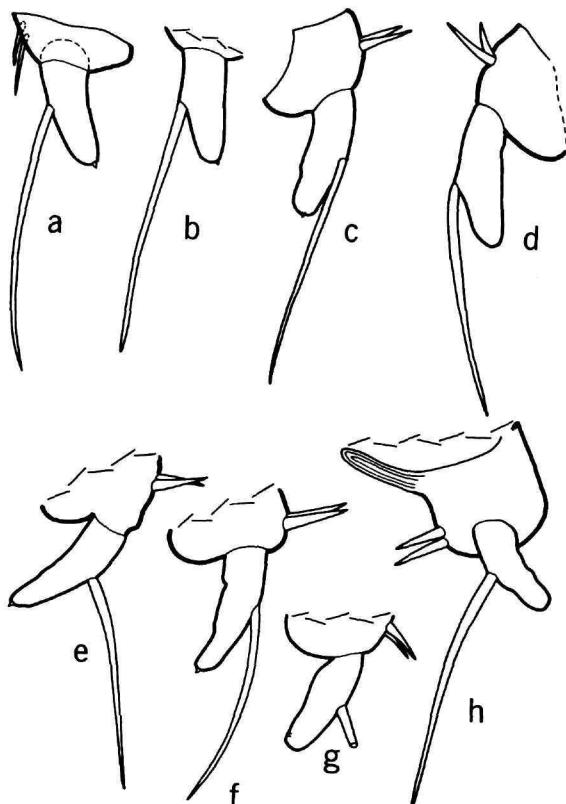


FIGURE 8.—Variability of the endopodites of the 2nd antennae of adult females of *Harbansus paucichelatus* (Kornicker, 1958), USNM 150107: *a*, left endopodite, lateral view; *b*, right endopodite, medial view (bristles of basal segment not shown). USNM 151988: *c*, left endopodite, medial view; *d*, right endopodite, medial view. USNM 151160: *e*, left endopodite, medial view; *f*, right endopodite, lateral view. USNM 151987: *g*, right endopodite, lateral view; *h*, left endopodite, lateral view.

8): 1st joint with 2 short bristles; 2nd joint elongate with 1 long midbristle on ventral margin; tip bare or with minute spine on dorsal margin. Exopodite (Figure 6d): 1st joint with small medial spine on distal margin; joints 2–8 with spines forming row along distal margin, bristle of 2nd joint with few long proximal hairs on dorsal margin, 9–16 spines along middle of ventral margin, and distal natatory hairs; bristles of joints 2–8 with few long proximal hairs on dorsal margin, 8–10 stout proximal spines along ventral margin, and distal natatory hairs; 9th joint with 2 bristles, ventral bristle with stout

spines proximally along ventral margin and distal natatory hairs, dorsal bristle about one-half length of ventral bristle, with short marginal spines, basal spines absent, but 9th joint with minute lateral spine.

Mandible (Figure 6f): Coxale endite bifurcate; no small bristle at base. Basale: medial surface spinous with 2 short bristles near ventral margin (1 proximal, 1 near middle); lateral surface with few spines and 2 short spinous bristles near ventral margin; ventral margin with 1 medium terminal bristle; dorsal margin with 3 bristles (1 near middle, 2 terminal). Exopodite: one-half to three-fourths length of dorsal margin of 1st endopodite joint, hirsute near tip, with 2 bristles (outer bristle about one-fourth length of inner bristle). Endopodite: 1st joint with 3 terminal ventral bristles (2 long, 1 short); ventral margin of 2nd endopodite joint with distal bristles forming 2 groups, each with 2 bristles; dorsal margin with 5 bristles near middle, proximal 2 of these short (1 of the proximal bristles not shown in Figure 6f); end joint with 3 claws and 3 bristles, dorsal claw very short, all claws with minute ventral spines.

Maxilla (Figure 7a): Endites I and II with 6 distal bristles; endite III with 1 proximal and 4 distal bristles (proximal bristle lateral and could be considered to be on basale). Precoxale with transparent fringed epipodial appendage along dorsal margin. Coxale with stout hirsute dorsal bristle. Basale with 3 long bristles along distal margin. Exopodite short with 3 bristles (2 long, 1 short). Endopodite: 1st joint with 1 α -bristle and 2 β -bristles; end joint with 2 α -bristles and 7 terminal bristles, including 2 stout pectinate clawlike bristles.

Fifth Limb (Figure 7b,c): Epipodial appendage with 35–36 bristles. Endite I with 1 short bristle; endite II with about 5 bristles; endite III with about 8 bristles. Exopodite: 1st joint with anterior side with 1 bristle near middle of distal margin, main tooth with 3 constituent teeth (proximal of these small, peglike, other 2 trilobate), short spinous bristle present proximal to peglike tooth; 2nd joint with distal margin of large tooth almost straight, forming right angle with outer edge, inner edge of joint concave with prominent node near middle and on anterior side, bristles of posterior side not clearly observed on USNM 149329; 3rd joint with outer lobe with 2 bristles, inner lobe with 3; 4th and 5th joint hirsute, with 5 bristles. (Appendage

could be interpreted as having 4 endites with 1 bristle on 1st and 2nd endites, 4 on 3rd, 8 on 4th.)

Sixth Limb (Figure 7d): 1 short spinous bristle in place of epipodial appendage; endite I with 3 spinous bristles (2 short, 1 long); endite II with 3 terminal bristles; endites III and IV with 5 terminal bristles; end joint not prolonged posteriorly, with 6 bristles (4 anterior bristles spinous, 2 posterior bristles plumose), hairs present on margin of end joint, proximal lateral surface of end joint, and on lateral surface in vicinity of epipodial bristle.

Seventh Limb (Figure 7e): Each limb with 6 bristles (2 proximal, 4 terminal), each bristle with marginal spines and 2–4 bells; terminal comb with about 6 teeth; 2–3 spinous pegs present opposite comb.

Furca (Figure 7f,g): Each lamella with 5 or 6 claws: claws 1, 2, 4 stout; claw 3 and claws following claw 4 short, slender; claw 3 shorter than claw 4; stout claws with teeth along posterior margin; short slender claws with slender spines along posterior margins; long hairs at bases of some claws and on lamellae posterior to claws. (The furca illustrated in Figure 7f which bears 7 claws is considered aberrant.)

Rod-shaped Organ (Figure 7h,i): Elongate with 3–4 faint sutures in proximal half; tip rounded with minute nipple. (Proximal segmentation more evident by spacing in sclerotized exoskeleton of organ than by sutures.)

Eyes (Figure 7h-j): Medial eye pigmented, bare; lateral eye small with 3 to 5 minute ommatidia.

Upper Lip (Figure 7i): With anterior hairs or processes; lateral process present on each side between upper lip and medial eye.

Y-Sclerite (Figure 7f): Normal for family.

Genitalia (Figure 7f): Sclerotized oval on each side proximal to furca.

Eggs: USNM 149329 with 3; USNM 150107 with 1; USNM 151985 with 3; USNM 151987 with 1; USNM 151988 with 1; USNM 156738 with 6.

DESCRIPTION OF ADULT MALE (Figure 9).—Except for having a somewhat broader rostrum and caudal process, carapace of male similar in shape and ornamentation to that of adult female (Figure 9a,b); anterior edge of rostrum with about 8 minute teeth. Inner end of incisur with 2 bristles.

Infold: Infold of rostrum with 4 long bristles; 1

short bristle on infold ventral to inner end of incisur; ridge on infold of caudal process with 5 frondlike bristles.

Size: USNM 156992, length 0.84 mm, height 0.47 mm; USNM 156988, length 0.93 mm, height 0.49 mm.

First Antenna (Figure 9c) 1st joint: spines forming rows on medial surface. 2nd joint: 1 hirsute dorsal bristle. 3rd joint: short with 2 hirsute dorsal bristles, no ventral bristles. 4th joint: 1 dorsal bristle, no ventral bristles. 5th joint: wedged ventrally between 4th and 6th joints; 5th joint sensory bristle with bulbous proximal part with abundant filaments, and stem with 3 filaments near middle and 2 spines at tip. 6th joint: medial bristle with short marginal spines. 7th joint: a-bristle spinous, longer than bristle of 6th joint; b-bristle one-third longer than a-bristle, with 1 distal filament and 2 minute spines at tip; c-bristle longer than sensory bristle of 5th joint, with 4 marginal filaments and bifurcate tip. 8th joint: d- and e-bristles slightly shorter than c-bristle, bare with blunt tips (both bristles broken on illustrated appendage); f-bristle slightly shorter than c-bristle, with 5 marginal filaments and 2 minute spines at tip; g-bristle same length as c-bristle, with 5-marginal filaments and spine at tip.

Second Antenna: Protopodite bare (Figure 9d). Endopodite 3-jointed (Figure 9a,d): 1st joint short with 4 short anterior bristles; 2nd joint elongate, with 2 long proximal bristles; 3rd joint elongate, reflexed, with 2 short bristles near sclerotized beak-like tip. Exopodite: 1st joint elongate with minute terminal medial bristle; 2nd joint slightly larger than 3rd, bristle of 2nd joint with 3 proximal hairs on dorsal margin followed by 6–10 stout spines on ventral margin, and also natatory hairs on both margins; bristles of joints 3–8 longer than bristle of 2nd joint, with more proximal hairs on dorsal margin than on bristle of 2nd joint, with only 3 or 4 stout spines on ventral margin, and also natatory hairs on both margins; 9th joint with 2 bristles (dorsal bristle shorter than ventral bristle and with 3 slender spines on dorsal margin followed by natatory hairs on both margins, ventral bristle with natatory hairs); joints 2–9 with short spines forming row along distal margin, no basal spines; joints of bristles with spines longer than joints with natatory hairs.

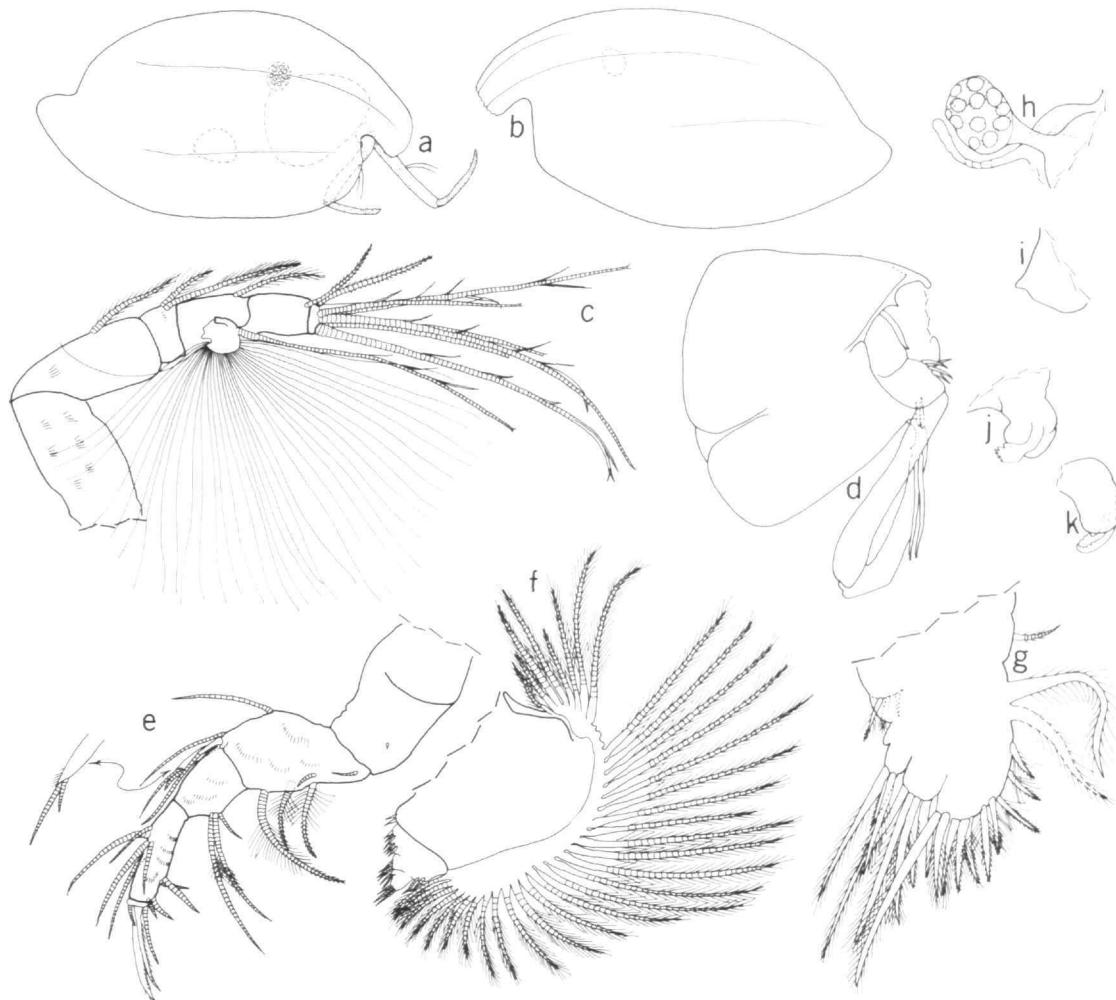


FIGURE 9.—*Harbansus paucichelatus* (Kornicker, 1958), adult male, USNM 156992, length 0.84 mm: *a*, complete specimen showing right lateral eye, outline of central adductor muscle scar area, outline of protopodite of 2nd antenna, and extended endopodites of the left and right 2nd antennae. USNM 156988, length 0.93 mm: *b*, outline of complete specimen showing outline of left lateral eye; *c*, left 1st antenna, medial view; *d*, protopodite and endopodite of left 2nd antenna, medial view; *e*, right mandible, medial view; *f*, 5th limb; *g*, left 6th limb, lateral view; *h*, left lateral eye, medial eye and rod-shaped organ; *i*, upper lip, anterior to left; *j*, *k*, right medial and left lateral copulatory limbs.

Mandible (Figure 9*e*): Coxale endite represented by minute, faint spine. Basale: medial surface spinous, with 2 short bristles near ventral margin (1 proximal, 1 near middle); ventral margin with 1 long spinous subterminal bristle; dorsal margin with

3 long bristles (2 terminal, 1 near middle); lateral surface with 2 spinous bristles with bases near or on ventral margin. Exopodite spinous, reaching past middle of dorsal margin of 1st endopodial joint, with 1 long and 1 short bristle. Endopodite

narrow: 1st joint with medial spines and 3 ventral bristles (2 long, 1 short); 2nd joint with ventral margin with bristles forming 2 distal groups, each with 2 bristles, middle of dorsal margin with 5 bristles, medial surface of joint with spines forming rows; end joint with 2 long claws with ventral spines and few distal dorsal teeth, 1 short dorsal bristle (in place of usual claw), and 1 ventral bristle.

Maxilla: Limb reduced and with weakly developed bristles.

Fifth Limb (Figure 9f): Endites and exopodite weakly developed. Endite I with 2 weak bristles; endite II with about 3 weak bristles; endite III with about 4 bristles, 2 of these finger-formed. Exopodite: 1st and 2nd joints with bristles obscure but with 1 or 2 finger-formed bristles; 3rd joint with outer lobe with 2 slender ringed bristles, inner lobe obscure but possibly with 3 bristles; end joint with 4 bristles.

Sixth Limb (Figure 9g): Only 3 endites present (possibly 4th endite and end joint are fused). Endite I with 3 small bristles; endite II with 3 spinous and hirsute bristles; endite III with 5 spinous and hirsute bristles; end joint with 12 bristles, posterior 2 of these stout, hirsute; limb hirsute.

Seventh Limb: Absent on both specimens in collection.

Furca: Each lamella with 5 or 6 claws: claws 1, 2, 4 stout; claw 3 and claws following claw 4 slender, shorter than claw 4; all claws with teeth or slender spines along posterior margins.

Rod-shaped Organ (Figure 9h): Elongate with 4 faint sutures on middle part, tip rounded.

Eyes (Figure 9h): Medial eye pigmented, bare; lateral eye about same size as medial eye, pigmented, with about 12 ommatidia.

Upper Lip (Figure 9i): Helmet-shaped.

Genitalia (Figure 9j,k): Each limb elongate, lobate, with terminal process with marginal teeth.

***Harbansus rhabdion* (Kornicker, 1970), new combination**

FIGURE 10

Euphilomedes rhabdion Kornicker, 1970:32, figs. 21-23.
Tetragonodon rhabdion (Kornicker).—Kornicker, 1975:76, 224, 367.

HOLOTYPE.—USNM 123611, A-1? female, length 1.24 mm.

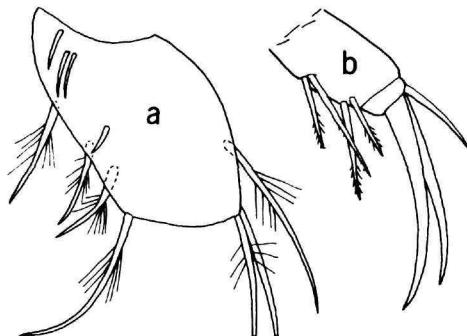


FIGURE 10.—*Harbansus rhabdion* (Kornicker, 1970), A-1? female, holotype, USNM 123611, length 1.24 mm, left mandible, medial view: *a*, basale; *b*, distal part of 2nd endopodial joint and 3rd endopodial joint (3 bristles of 3rd joint not shown).

TYPE-LOCALITY.—Peru-Chile trench, 07°59'S, 80°37'W, 991-1015 m.

MATERIAL.—Holotype; Peru-Chile trench, R/V *Anton Bruun*, cruise 11; USNM 141106, 1 ovigerous female.

DISTRIBUTION.—Known only from off Peru in Peru-Chile trench.

SUPPLEMENTARY DESCRIPTION OF HOLOTYPE.—*Mandible* (Figure 10): Basale with 4 medial bristles and 3 lateral bristles (all near ventral margin), 1 terminal bristle on ventral margin, and 3 bristles on dorsal margin (1 near middle, 2 terminal); ventral margin of 2nd endopodial joint with 4 distal bristles forming 2 groups with 2 bristles in each group; end joint of endopodite with 3 bristles and 3 claws of which dorsal claw is about 39 percent of the length of longest claw.

***Harbansus schornikovi* (Kornicker and Caraion, 1977), new combination**

FIGURE 11

Euphilomedes schornikovi Kornicker and Caraion, 1977:27, figs. 19-22.

HOLOTYPE.—USNM 156644, A-1 male, length 0.96 mm.

TYPE-LOCALITY.—Continental shelf off Spanish Sahara, Africa, 21°47'00"N, 17°28'02"W, 260 m.

MATERIAL.—Holotype.

DISTRIBUTION.—Known only from type-locality.

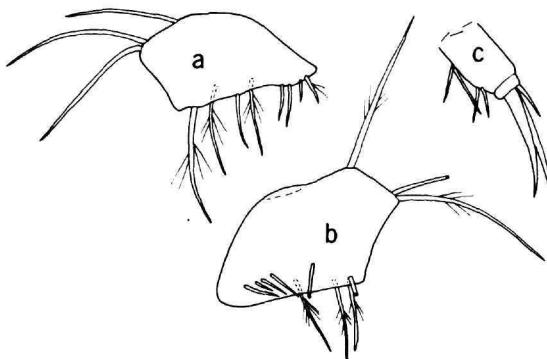


FIGURE 11.—*Harbansus schornikovi* (Kornicker and Caraion, 1977), A-1 male, holotype, USNM 156644, length 0.96 mm, mandibles: *a*, basale of right mandible, medial view; *b*, basale of left mandible, medial view; *c*, distal end of 2nd endopodial joint and 3rd endopodial joint (bristles of 3rd joint not shown).

SUPPLEMENTARY DESCRIPTION OF HOLOTYPE.—**Mandible** (Figure 11): Basale with 5 medial bristles and 2 or 3 lateral bristles (all with bases near or on ventral margin), 1 subterminal bristle on ventral margin, and 3 bristles on dorsal margin (2 terminal, 1 near middle); ventral margin of 2nd endopodial joint with 4 distal bristles forming 2 groups with 2 bristles in each group; end joint with 3 bristles and 3 claws of which dorsal claw is about 36 percent of the length of longest claw.

Harbansus bradmyersi, new species

FIGURES 12–14; PLATES 3–6

ETYMOLOGY.—The species is named for Mr. Brad L. Myers, Southern California Costal Water Research Project, El Segundo, California, who collected the specimens.

HOLOTYPE.—USNM 151989, 1 adult female, on slides and in alcohol.

TYPE-LOCALITY.—C-2 on continental shelf off Oxnard, California, depth 18.3 m.

PARATYPES (all from California).—USNM 156688, 1 ovigerous female from sta OC-3; USNM 156689, 1 ovigerous female from sta A-2; USNM 156690, 1 adult female from sta C-3; USNM 156691, 1 adult female from sta C-2; USNM 156692, 1 ovigerous female from sta K-1; USNM 156693, 1 adult female from sta OC-3. Specimens returned to Mr. Myers: 2 ovigerous females from sta OC-3a; 1 ovigerous female from sta C-2c; 5 ovigerous females, 1 adult female without eggs, 1 juvenile or



FIGURE 12.—*Harbansus bradmyersi*, new species, adult female, holotype, USNM 151989, length 0.95 mm, complete specimen.

adult female without eggs, from sta OC-3b; 1 female without eggs from off Santa Catalina Island.

DISTRIBUTION.—Off Oxnard, Laguna Beach, and Santa Catalina Island, California. Known depth range 10.7–27.4 m.

DESCRIPTION OF FEMALE (Figures 12–14; Plates 3–6).—**Carapace:** Elongate with long narrow rostrum and small projecting caudal process (Figure 12); dorsal margin more convex than ventral margin; sides parallel in dorsal view.

Ornamentation: Each valve with 3 faint horizontal ribs (Plate 3a–c); upper rib dorsal to central adductor muscle scars and extending onto rostrum, but not projecting past rostrum; middle rib ventral to central adductor muscle scars; lower rib just within ventral margin and not visible on all specimens; carapace with large shallow fossae (Plates 3a–d, 4a, 5a,b); surface with scattered long bristles mostly along anterior, anterodorsal, and ventral margins (Plates 3d–f, 4a–d, 5b–e), some bristles bifurcate (Plates 3e, 4c, 5d,e); 2 bristles present at inner end of incisur; bottom of fossae with crescents or wrinkles (Plates 3d, 4a, 5a,b); pustules visible on surface at high magnification (Plate 4).

Infold: Infold of rostrum with 6 or 7 long bristles (Figure 14c; Plates 5f, 6a,b); anteroventral infold with short bristle below inner end of incisur and with about 4 ridges parallel to valve margin; 2 to 4 small bristles present on anteroventral infold posterior to ridges; posteroventral infold with 6 short bristles near inner margin; ridge on infold of caudal process with 6 or 7 frondlike bristles (Figure 14d; Plate 6c–f); 1 short bristle present on posterior infold dorsal to caudal process (Plate 6c).

Selvage: Fringed lamellar prolongation present along anterior and ventral margins (Plates 3e, 6a); fringe may not be present on lamellar prolongation



FIGURE 13.—*Harbansus bradmyersi*, new species, adult female, holotype, USNM 151989, length 0.95 mm: *a*, right 1st antenna, medial view; *b*, endopodite of right 2nd antenna, medial view; *c*, joints 7-9 of exopodite of right 2nd antenna, medial view; *d*, aberrant right mandible, medial view; *e*, right maxilla, lateral view; *f*, distal end of right 5th limb, posterior view; *g*, 6th limb; *h*, posterior of body showing left lamella of furca, left genital organ, and left Y-sclerite.

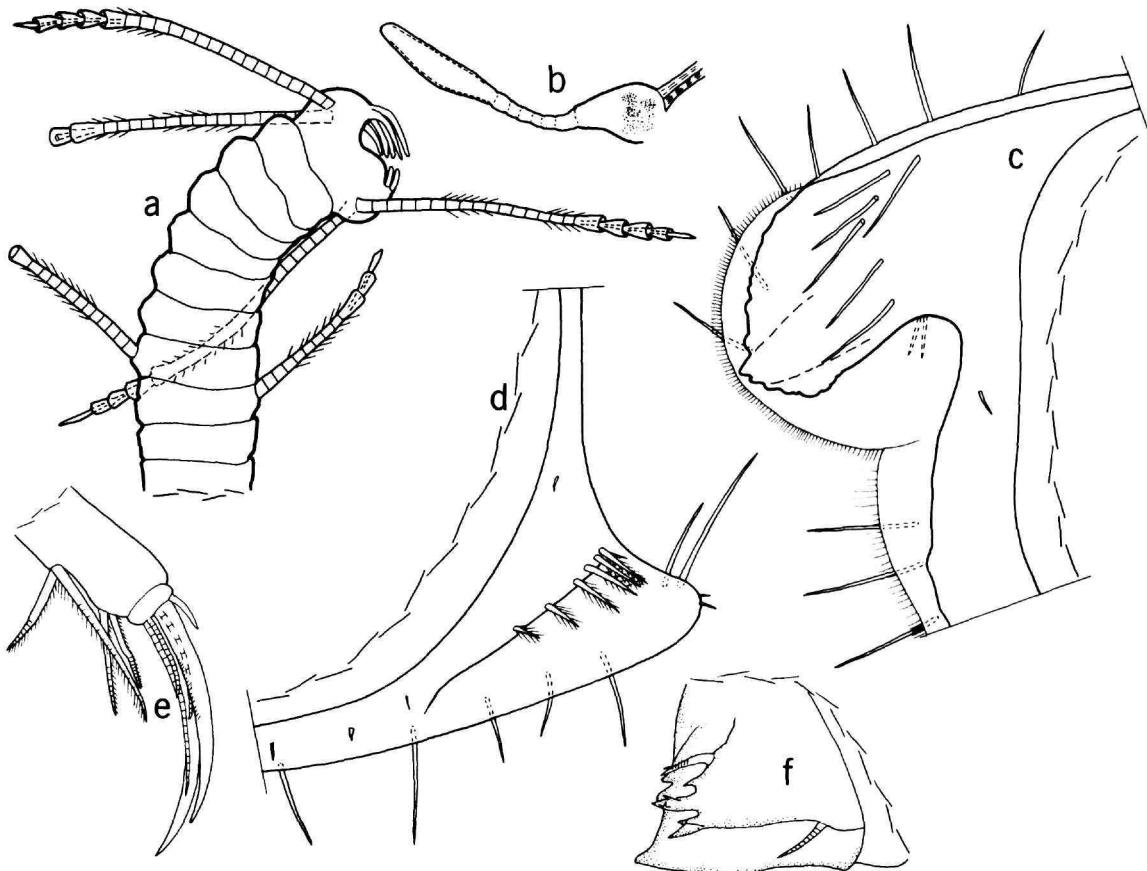


FIGURE 14.—*Harbansus bradmyersi*, new species, adult female, holotype, USNM 151989, length 0.95 mm: *a*, distal end of 7th limb; *b*, medial eye and rod-shaped organ. Adult female, paratype, USNM 156688, length 0.93 mm: *c*, anterior of right valve, inside view; *d*, caudal process of right valve, inside view; *e*, distal end of left mandible, medial view; *f*, 1st and 2nd exopodal joints of left 5th limb, anterior view.

along posterior margin dorsal to caudal process.

Size: USNM 151989, length 0.95 mm, height 0.54 mm; USNM 156688, length 0.93 mm, height 0.53 mm; USNM 156689, length 0.92 mm, height 0.56 mm; USNM 156690, length 0.94 mm, height 0.55 mm; 156691, length 0.91 mm, height 0.58 mm.

First Antenna (Figure 13*a*): 1st joint: spines on medial surface and on ventral margin. 2nd joint: 1 dorsal bristle and spines along ventral and dorsal margins. 3rd joint: 3 bristles (1 ventral, 2 dorsal) and with few spines on medial surface and along ventral margin. 4th joint: 3 bristles (2 ventral, 1 dorsal). 5th joint: sensory bristle with 2 short proximal filaments, 1 short distal filament, and 3 long terminal filaments, including stem. 6th joint: medial bristle about three-fourths to four-fifths length of 5th joint. 7th joint: a-bristle about 3 times length of bristle of 6th joint, with short marginal spines; b-bristle about one-third longer than a-bristle, with 1 short distal filament and bifurcate tip; c-bristle with 1 short proximal filament, 2 short distal filaments, and 3 long terminal filaments, including stem. 8th joint: d- and e-bristles bare, same length as c-bristle; f-bristle same length as c-bristle, with 2 short proximal filaments, 1 short distal filament, and 3 longer terminal filaments,

mal filaments, 1 short distal filament, and 3 long terminal filaments, including stem. 6th joint: medial bristle about three-fourths to four-fifths length of 5th joint. 7th joint: a-bristle about 3 times length of bristle of 6th joint, with short marginal spines; b-bristle about one-third longer than a-bristle, with 1 short distal filament and bifurcate tip; c-bristle with 1 short proximal filament, 2 short distal filaments, and 3 long terminal filaments, including stem. 8th joint: d- and e-bristles bare, same length as c-bristle; f-bristle same length as c-bristle, with 2 short proximal filaments, 1 short distal filament, and 3 longer terminal filaments,

including stem; g-bristle about same length as f-bristle, with 1 short filament near middle, 1 short distal filament, and 3 longer terminal filaments, including stem. (Not all short filaments on sensory bristle and bristles of 7th and 8th joints shown in Figure 13a.)

Second Antenna: Protopodite bare. Endopodite 2-jointed (Figure 13b): 1st joint short with 2 short bristles; 2nd joint elongate with 1 long ventral bristle near middle and 1 short terminal bristle. Exopodite: distal margin of 1st joint with minute medial bristle; bristle of joints 2-8 short, with stout ventral spines, no natatory hairs; 9th joint with 2 bristles (Figures 13c), ventral of these about same length as joints 2-9, with spines along ventral margin, also few along dorsal margin, dorsal bristle of 9th joint about same length as joints 5-9, with slender spines along dorsal margin, also few slender spines along ventral margin; joints 2-8 with spines forming terminal row; minute basal spines on some joints.

Mandible (Figures 13d, 14e): Coxale endite bifurcate, basal bristle not seen. Basale: spinous medial side with 2 short proximal bristles near middle; ventral margin with 1 long spinous distal bristle; lateral side with 2 bristles near ventral margin; dorsal margin with 1 bristle distal to middle and 2 terminals. Exopodite hirsute, reaching past middle of dorsal margin of 1st endopodite joint, with 2 terminal bristles. Endopodite: 1st joint with short spines forming rows on medial surface, and 3 spinous terminal bristles (2 long, 1 short) on ventral margin; 2nd joint with ventral margin with 4 distal bristles forming 2 groups, each with 2 bristles, middle of dorsal margin with 5 bristles; 3rd joint with 3 bristles and 3 claws (2 long with ventral spines, and 1 short, dorsal); USNM 151989 with aberrant right mandible having 2 short ventral bristles on 1st endopodial joint, no ventral bristles on 2nd joint, and 2 claws and 4 bristles on 3rd joint (Figure 13d).

Maxilla (Figure 13e): Endites I and II each with 6 bristles (not all shown in Figure 13e); endite III with 1 proximal and 6 terminal bristles. Coxale with spinous dorsal bristle. Basale with 3 long bristles (1 lateral, 1 medial, 1 ventral). Exopodite with 3 bristles (2 long, 1 short: inner long bristle with 4 or 5 very long spines proximal to middle; outer long bristle with short, faint, marginal spines; short bristle bare). Endopodite (twisted in Figure

13e): 1st joint with 1 α -bristle with long proximal spines and 2 β -bristles (lateral of these with swelling at base); end joint with 9 bristles including 3 claws (2 long stout, 1 short, ventral).

Fifth Limb (Figures 13f, 14f): Epipodal appendage with about 41 bristles. Endite I with 2 bristles; endite II with 4 bristles; endite III with about 8 bristles (not all endite bristles shown in Figure 13f). Exopodite: 1st joint with main tooth with well defined distal tooth having 2 main prongs and 2 smaller prongs, a 2nd large poorly defined tooth near inner edge of distal tooth; anterior distal margin of 1st joint with 1 bristle; 2nd joint with posterior side with stout proximal bristle with marginal spines and usual 3 bristles forming group (middle of these longer and stouter than others and weakly pectinate), large squarish tooth of 2nd joint with 2 nodes along inner margin; 3rd joint with 2 short spinous bristles on outer lobe and 3 bristles on inner lobe; 4th and 5th joints fused, with total of 5 bristles.

Sixth Limb (Figure 13g): One short bristle in place of epipodal appendage; endite I with 2 or 3 bristles; endite II with 3 terminal bristles; endite III with 5 terminal bristles; endite IV with 4 or 5 terminal bristles; end joint not projecting posteriorly, with 8 marginal bristles; posterior 2 bristles of end joint hirsute, remaining bristles and bristles of endites with long proximal and short distal spines; medial surface of limb hirsute.

Seventh Limb (Figure 14a): 2 bristles in proximal group (1 on each side); 4 bristles in distal group; each bristle with up to 4 bells and distal marginal spines; terminal comb with 6 recurved teeth; 3 spinous pegs present opposite comb.

Furca (Figure 13h): Each lamella with 6 claws; claws 1, 2, and 4 stout; claws 3, 5, and 6 short, slender; stout claws with teeth forming lateral and medial row along concave margin; distal medial teeth on claw larger than other teeth on claw; short slender claws with spines along anterior and posterior margins; hairs on lamella following claws and at bases of some claws.

Rod-shaped Organ (Figure 14b): Elongate with 6 or 7 faint sutures in proximal half; distal half with faint pustules on surface (faintly visible under oil immersion); tip rounded.

Eyes: Medial eye pigmented, bare (Figure 14b); lateral eyes small, faint, with 5 or 6 minute omm-

tidia, but eyes not visible on all specimens examined.

Y-Sclerite (Figure 13*h*): Typical for family.

Genitalia (Figure 13*h*): Sclerotized oval on each side proximal and anterior to furca.

Eggs: USNM 156688, 156689, 156692, each with 3 eggs.

Gut Content: USNM 151989 with unrecognizable organic particles and many grains of sediment. Species apparently detritus feeder.

Parasites: USNM 151989 and 156691 with 1 female choniostomatid copepod and 2 choniostomatid egg clones.

COMPARISONS.—The new species *H. bradmyersi* is closely related to *H. paucichelatus* (Kornicker, 1958). The tip of the 2nd joint of the endopodite of the female 2nd antenna of *H. paucichelatus* is either bare or has a minute spine, whereas that of *H. bradmyersi* bears a short bristle. Also, some bristles of the exopodite of the 2nd antenna of the adult female *H. paucichelatus* are long and bear natatory hairs, whereas, all the bristles on that limb of *H. bradmyersi* are short and are without natatory hairs. This indicates that adult females of *H. paucichelatus* are capable of swimming, whereas adult females of *H. bradmyersi* are restricted to burrowing. The caudal furca of *H. paucichelatus* usually bears 5 claws compared to 6 on the furca of *H. bradmyersi*.

Harbansus mayeri, new species

FIGURES 15–17; PLATES 7, 8

ETYMOLOGY.—The species is named for Mr. David Mayer, Fisheries Research Institute, University of Washington, who collected the specimens.

HOLOTYPE.—USNM 156694, ovigerous female, on slides and in alcohol.

TYPE-LOCALITY.—North side of Kiket Island, Similk Bay, Washington, 122°35'50"W, 48°25'10"N.

PARATYPES.—Same locality as holotype: USNM 156695, 1 ovigerous female; USNM 156696, 1 ovigerous female; USNM 156697, 5 specimens including 3 adult females.

DISTRIBUTION.—Collected only at type-locality. Water depth 8 m.

DESCRIPTION OF ADULT FEMALE (Figures 15–17; Plates 7, 8).—*Carapace*: Elongate with long narrow rostrum and small projecting caudal process (Figures 15, 16*a*); ventral margin more convex than dorsal margin; sides parallel in dorsal view.

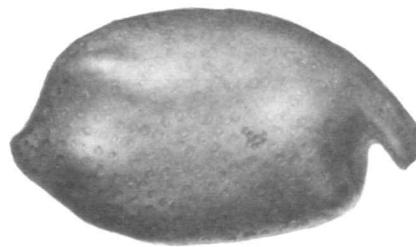


FIGURE 15.—*Harbansus mayeri*, new species, adult female, paratype, USNM 156696, length 1.06 mm, complete specimen.

Ornamentation: Valves without horizontal ribs, but with upper and lower posterior nodes (nodes in same position as posterior ends of upper and lower ribs present on *Harbansus bradmyersi*); carapace with large shallow fossae (Plates 7, 8*a,b*); prior to cleaning of specimen with sonic vibrator all fossae contained debris (Plate 8*b*). Flat bottom of fossae with small nodes with central pit having peripheral lip (Plates 7*f*, 8*a,c,e*); sides of nodes with concentric rows of minute papillae (Plate 8*c,e*); area between fossae with low nodes with central pit (Plate 8*b,d,f*); bristles numerous along ventral margin (Plate 7*a*); surface of carapace with few scattered bristles emerging from shallow fossae (Plates 7*f*, 8*f*); some bristles with crenulations at base (Plate 8*f*).

Infold: Infold of rostrum with 7 or 8 long bristles (Figures 16*c*, 17*j*); anteroventral infold with short bristle below inner end of incisur and with about 5 ridges paralleling valve margin; posterior part of ventral infold with 3 or 4 small bristles; ridge on infold of caudal process with 5 or 6 frondlike bristles (Figures 16*b*, 17*i*); 1 short bristle on posterior infold dorsal to caudal process.

Selvage: Fringed lamellar prolongation present along anterior and ventral margins; lamella divided at incisur with anterior infold overlapping ventral infold in lateral view.

Size: USNM 156694, length 0.96 mm, height 0.62 mm; USNM 156695, length 1.03 mm, height 0.66 mm; USNM 156696 (removed right valve), length 1.06 mm., height 0.60 mm; USNM 156697 (2 specimens), length 1.00 mm, height 0.60 mm, and length 1.00 mm, height 0.61 mm.

First Antenna (Figure 16*d*): 1st joint: medial and lateral spines. 2nd joint: 1 short dorsal bristle. 3rd joint: 3 bristles (1 ventral, 2 dorsal). 4th joint: 3 bristles (2 ventral, 1 dorsal). 5th joint: sensory

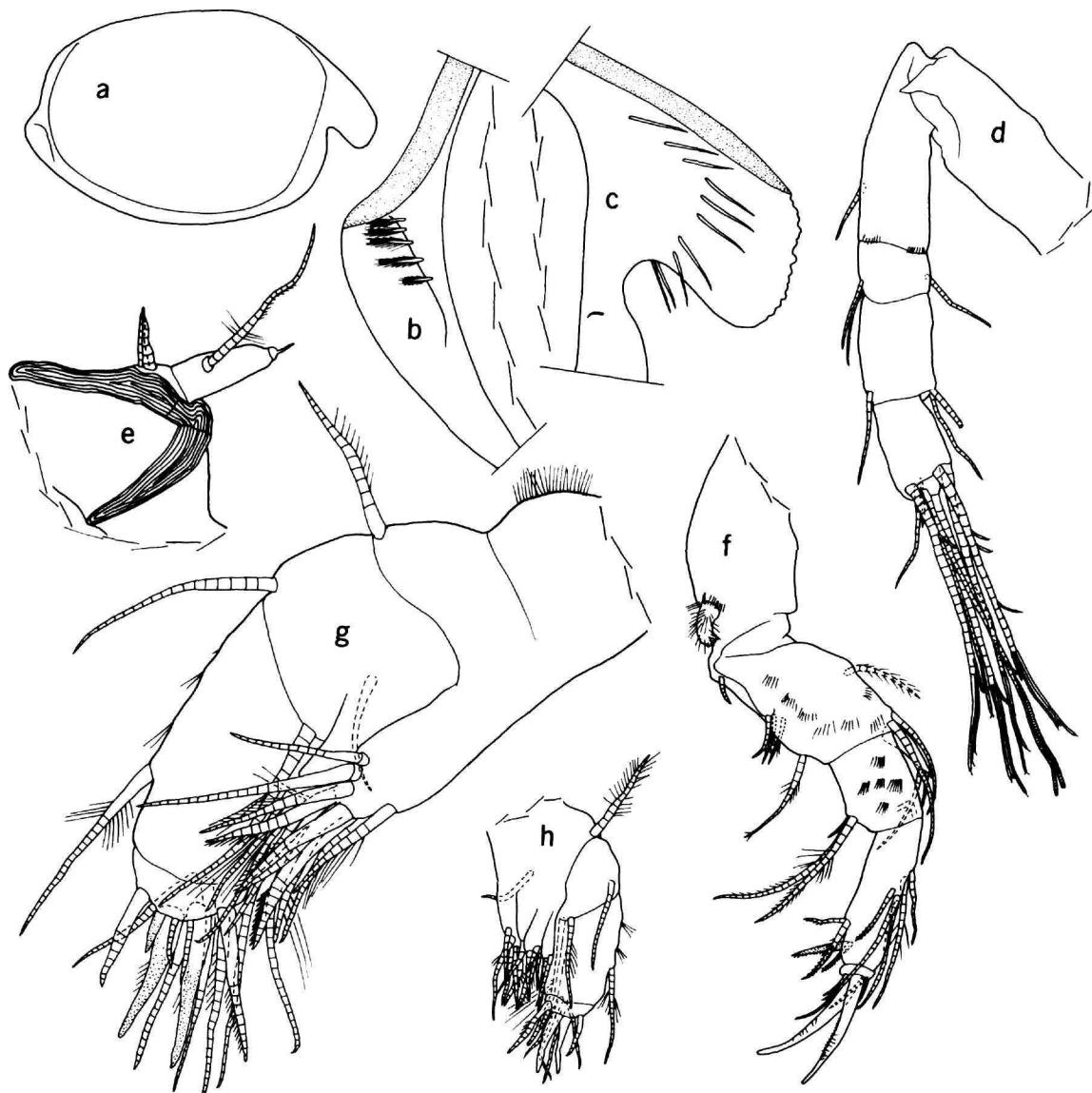


FIGURE 16.—*Harbansus mayeri*, new species, adult female, holotype, USNM 156694, length 0.96 mm: *a*, left valve, inside view (infold bristles not shown); *b*, caudal process of left valve, inside view; *c*, rostrum of left valve, inside view; *d*, left 1st antenna, lateral view; *e*, endopodite of left 2nd antenna, medial view; *f*, left mandible, medial view; *g*, right maxilla, medial view; *h*, left maxilla, medial view.



FIGURE 17.—*Harbansus mayeri*, new species, adult female, holotype, USNM 156694, length 0.96 mm: *a*, distal end of 5th limb; *b*, 6th limb; *c*, distal end of 7th limb; *d*, left lamella of furca; *e*, medial eye and rod-shaped organ (drawn with appendage under cover slip); *f*, left lateral eye (drawn with $\times 100$ objective and eye under cover slip); *g*, left genital organ and brushlike organ; *h*, posterior showing posterior 2 claws of left lamella of furca, left Y-sclerite, and hairs at upper part of posterior margin. Adult female, USNM 156696, length 1.06 mm: *i*, caudal process of right valve, inside view; *j*, rostrum of right valve, inside view; *k*, distal end of 5th limb showing main tooth of 1st exopodial joint and part of tooth of 2nd exopodial joint, anterior view.

bristle with 1 short distal marginal filament, 4 long terminal filaments and 2 minute spines at tip of stem. 6th joint: medial bristle short. 7th joint: a-bristle about length of 5th joint; b-bristle about twice length of a-bristle, with 1 short distal filament and 2 minute spines at tip of stem; c-bristle about same length as sensory bristle of 5th joint, with 2 short proximal filaments, 2 short distal filaments, and 3 long terminal filaments including stem, filaments with minute spine at tip, stem with 2 minute spines at tip. 8th joint: d- and e-bristles bare, slightly longer than c-bristle, with blunt tips; f-bristle about same length as c-bristle, with 2 short proximal filaments, 1 short distal filament, and 3 long terminal filaments including stem, minute spine at tip of filaments, 2 minute spines at tip of stem; g-bristle slightly longer than f-bristle, otherwise similar to f-bristle. (Not all filaments shown on sensory bristle and bristles of 7th and 8th joints of Figure 16d.)

Second Antenna: Protopodite bare. Endopodite 3-jointed (Figure 16e): 1st joint short with 2 short anterior bristles; 2nd joint elongate with 1 long spinous ventral bristle; 3rd joint minute with short terminal bristle. Exopodite: 1st joint with small recurved terminal bristle; bristle of joints 2-8 short, with stout ventral spines, no natatory hairs; 9th joint with 2 bristles, ventral of these with spines along ventral margin and more slender distal spines along dorsal margin, dorsal bristle of 9th joint about same length as joints 5-9, with slender spines along ventral and dorsal margins, joints 2-8 with spines forming terminal row; some joints with minute basal spine; 9th joint with minute blunt spine at dorsal corner medial to base of dorsal bristle.

Mandible (Figure 16f): Coxale endite spinous, bifurcate without minute bristle at base. Basale: spinous medial side with 2 short bristles very close to ventral margin (1 proximal, 1 near middle); ventral margin with 1 fairly long, spinous, distal bristle; lateral side near ventral margin with 2 short spinous bristles and long proximal hairs; dorsal margin with 1 spinous bristle near middle and 2 terminal. Exopodite hirsute, about two-thirds length of 1st endopodite joint, with 2 terminal bristles. Endopodite: 1st joint with spines forming rows on medial surface, and 3 ventral bristles (1 very short, 2 long spinous) on ventral margin; 2nd joint with ventral margin with distal bristles form-

ing 2 groups, each with 2 short spinous bristles, middle of dorsal margin with 5 bristles; 3rd joint with 3 bristles and 3 claws (dorsal claw very short).

Maxilla (Figure 16g,h): Endites I and II each with about 6 bristles; endite III with 1 short proximal bristle and about 6 terminal bristles. Precoxale with dorsal fringe of long hairs. Coxale with spinous dorsal bristle. Basale with 3 long bristles near terminal margin (1 lateral, 1 medial, 1 ventral). Exopodite with 3 bristles (2 long, 1 short). Endopodite: 1st joint with 1 α -bristle with long proximal spines and 2 β -bristles; end joint with 8 or 9 bristles including 3 claws (2 long stout, 1 short, medial).

Fifth Limb (Figure 17a,k): Epipodial appendage with 42 bristles. Endite I with 2 bristles; endite II and 3 or 4 bristles; endite III with numerous bristles. Exopodite: 1st joint with main tooth with 2 stout teeth, bristles of 1st joint obscure on specimen examined; 2nd joint consisting of large squarish tooth; 3rd joint with 2 short spinous bristles on outer lobe and 3 bristles on inner lobe; 4th and 5th joints fused, with total of 5 bristles.

Sixth Limb (Figure 17b): Endite I obscure on specimen examined but with at least 1 bristle; endite II with 3 bristles; endites III and IV each with 5 bristles; end joint not projecting posteriorly, with 6 spinous anteroventral bristles separated by space from 2 posterior hirsute bristles; 1 short bristle in place of epipodial bristle.

Seventh Limb (Figure 17c): 2 bristles in proximal group with 1 on each side; 4 bristles in distal group; each bristle with up to 4 bells and distal marginal spines; terminal comb with 6 recurved teeth opposite 4 or 5 recurved alate pegs.

Furca (Figure 17d): Each lamella with 6 claws: claws 1, 2, and 4 stout; claws 3, 5, and 6 short, slender; claw 1 with teeth forming medial and lateral row, distal teeth larger than others; claws 2 and 4 with teeth along posterior margins; claws 3, 5, and 6 with very slender spinelike teeth along posterior margins, and also with spines along distal anterior margins; margin of lamella between claws 4 and 5, 5 and 6, and following claw 6, hirsute; anterior margin of lamella with few hairs.

Rod-shaped Organ (Figure 17e): Elongate, with 4 or 5 weak proximal sutures, tip rounded.

Eyes: Medial eye pigmented, bare (Figure 17e); lateral eyes small, faint, unpigmented, with 4 ommatidia (Figure 17f).

Posterior of Body (Figure 17h): Dorsum evenly rounded with faint hairs forming row.

Y-Sclerite (Figure 17h): Typical for family.

Genitalia (Figure 17g): Sclerotized oval on each side proximal and anterior to furca.

Brushlike Organ (Figure 17g): Consisting of 5 minute bristles proximal to genitalia.

Eggs: USNM 156694 with 5; USNM 156695 with 6; USNM 156696 with 2 larvae and 5 empty egg sheaths.

Parasites: Carapace of USNM 156694 with stalked protistans (Plate 7a,e).

COMPARISONS.—The carapace of *H. mayeri* differs from that of *H. bradmyersi* in lacking lateral ribs. The rostral infold of *H. mayeri* bears 7–8 bristles compared to only 4 on *H. paucichelatus*. The terminal bristle on the endopodite of the 2nd antenna of the adult female of *H. mayeri* is on a minute 3rd joint not present on *H. paucichelatus*.

Harbansus dayi, new species

FIGURES 3f, 18–22; PLATES 9, 10

ETYMOLOGY.—The species is named for Dr. J. H. Day, who collected some of the specimens.

HOLOTYPE.—USNM 156779, 1 undissected adult female, length 1.40 mm, in alcohol.

TYPE-LOCALITY.—Continental shelf off North Carolina, Beaufort Shelf Transect, sta 155 G.

ALLOTYPE.—USNM 156941, adult male from R/V *Columbus Iselin*, sta F4-10, New Jersey shelf.

PARATYPES.—North Carolina shelf, Beaufort Shelf Transect: sta 55 P: USNM 156776, 1 adult female; sta 253 M: USNM 156784, 1 ovigerous female; sta 256 Q-R: USNM 156786, 1 adult female; sta 251 N-P: USNM 156790, 1 adult female. New Jersey shelf, R/V *Columbus Iselin*: sta F4-7: USNM 156914, 1 ovigerous female; USNM 156915, 10 specimens including ovigerous females; sta A4-11: USNM 157132, 1 female; USNM 156945, 1 A-1 male; USNM 156946A,C, 2 A-1 males; USNM 156946B, 4 specimens; USNM 156946D, 1 adult female; USNM 156947A, 1 A-2 or A-3 female; USNM 156947B, 1 juvenile female; USNM 156951, 1 specimen; sta A4-12: USNM 156953A, 2 juvenile females; sta A4-9: USNM 156952A, 1 A-1 male; USNM 156952B, 1 instar III male; USNM 156952D, 1 juvenile male; USNM 156952E, 2 juveniles; USNM 156954, 1 A-1 male; USNM 156958, 1 adult female; sta A3-8: USNM 157111, 1 adult male; USNM 157112, 2 juveniles.

DISTRIBUTION.—North Carolina shelf at depths of 160–198 m; New Jersey shelf at depths of 136–196 m.

ONTOGENY.—I have interpreted USNM 156952B as an instar III because of the absence of bristles on the 7th limb and because the 6th limb bears more than 1 bristle (refer to key to early instars, Kornicker, 1969:3). I consider the specimen to be male because of the endopodite of the 2nd antenna having 3 joints with the 2nd joint bearing 2 ventral bristles (Figure 22e). Poulsen (1962:351) interpreted a somewhat similar endopodite on a juvenile of *Philomedes dentata* Poulsen, 1962 to be that of a female. My interpretation of the sex of the juvenile *H. dayi* (USNM 156952B) is, I believe, supported by the way in which its endopodite differs from a specimen (USNM 156947A) that I interpret to be a female because of the similarity of its endopodite (Figure 22b) to that of an A-1 female (USNM 156953) (Figure 22c). The endopodite of USNM 156947A has only 2 joints and only 1 ventral bristle on the 2nd joint (Figure 22b).

The endopodite of the 2nd antenna of juvenile females of *H. dayi* differs from that of the adult female in having a short terminal bristle on the 2nd joint. The tip of the 2nd joint is bare on adult females. The loss of a bristle in this position is unusual in the family Philomedidae. The ontogenetic development of the endopodite of the male is normal for the subfamily (see Figures 21d, 22e,g).

DESCRIPTION OF ADULT FEMALE (Figures 18–20; Plates 9, 10).—**Carapace:** Elongate with narrow rostrum and small projecting caudal process.

Ornamentation: Surface of valves with shallow fossae but without horizontal ribs (Figures 18, 19a; Plates 9a–e,g, 10a); minute nodes with central pore present on bottom of fossae (Plate 10a,b); surface

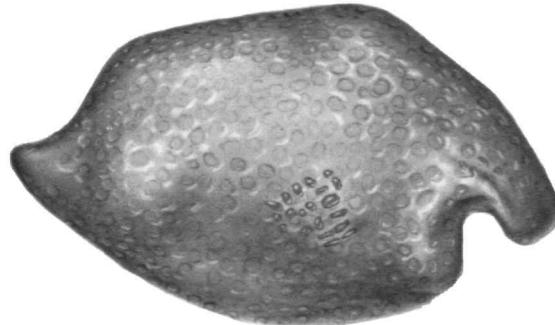


FIGURE 18.—*Harbansus dayi*, new species, adult female, holotype, USNM 156779, length 1.40 mm, complete specimen.



FIGURE 19.—*Harbansus dayi*, new species, adult female, paratype, USNM 156776, length 1.36 mm: *a*, right valve showing location of central adductor muscle attachments (dashed circle) and some fossae, outside view; *b*, rostrum of left valve, inside view; *c*, caudal process of left valve, inside view; *d*, right 1st antenna, medial view; *e*, endopodite and exopodite of right 2nd antenna, medial view; *f*, right mandible, medial view; *g*, tip of left mandible, lateral view (only 2 of the claws on end joint shown).

between fossae with simple pores and minute pustules, (Plate 10a,c-f), the latter also present in fossae (Plate 10b); some parts of surface of USNM 156776 with spaghetti-like structure, possibly a foreign

growth (Plate 10c-f); bristles present along ventral margin and sparsely distributed over valve surface (Plates 9e, 10a); 2 bristles present on inner end of incisur; faint sinus in dorsal part of shell above



FIGURE 20.—*Harbansus dayi*, new species, adult female, paratype, USNM 156776, length 1.36 mm:
a, maxilla; *b*, 6th limb; *c*, distal end of right 5th limb, anterior view; *d*, distal end of 7th limb;
e, anterior of body showing medial eye, rod-shaped organ, anterior process, and upper lip; *f*,
posterior of body showing right lamella of furca, genitalia, and right Y-sclerite.

central adductor muscle attachment scars; small process present in anteroventral corner of valve.

Infold: Infold of rostrum with 5 long bristles (Figure 19b); anteroventral infold with short bristle below inner end of incisur, about 6 ridges parallel to valve margin, and 1 spinous bristle near posterior end of ridges; posterior infold with a few minute bristles near inner margin of infold; ridge on infold of caudal process with 6 frondlike bristles (Figure 19c, not clearly visible on Plate 9f).

Selvage: Lamellar prolongation present along anterior, ventral, and posterior margins; fringed in vicinity of incisur, possibly elsewhere.

Central Adductor Muscle Attachment Scars (Figure 18): Consisting of about 17–20 oval and elongate scars.

Size: USNM 156776, length 1.36 mm, height 0.81 mm; USNM 156784, length 1.44 mm, height 0.81 mm; USNM 156779, length 1.40 mm, height 0.83 mm; USNM 156790, length 1.38 mm, height 0.83 mm; USNM 156786, length 1.42, height 0.71 mm; USNM 156914, length 1.34 mm, height 0.77 mm.

First Antenna (Figure 19d): 1st joint: bare. 2nd joint: 2 bristles (1 dorsal, 1 ventral), a single cluster of faint spines on medial surface near dorsal bristle, and lateral spines forming row near distal margin. 3rd joint: short, with 3 bristles (1 ventral, 2 dorsal), and short spines forming rows on medial surface. 4th joint: 3 bristles (1 dorsal, 2 ventral). 5th joint: sensory bristle with 4 short marginal filaments and 3 longer terminal filaments including stem. 6th joint: 1 short medial bristle. 7th joint: a-bristle spinous, about twice length of bristle of 6th joint (a-bristle of illustrated left limb of USNM 156776 aberrant in being shorter than normal a-bristle; the bristle did not completely emerge and its proximal part is embedded in limb); b-bristle shorter than sensory bristle of 5th joint, with 1 short distal filament, portion of stem distal to filament unringed; c-bristle slightly shorter than sensory bristle, with 4 short marginal filaments and 3 longer terminal filaments including stem. 8th joint: d- and e-bristles slightly longer than sensory bristle, bare with blunt tips; f-bristle about same length as c-bristle, with 3 short marginal filaments and 3 longer terminal filaments including stem; g-bristle about same length as sensory bristle, with 3 short marginal filaments and 3 longer terminal filaments

including stem; tips of filaments with 1 or 2 minute spines.

Second Antenna (Figure 19e): Protopodite bare. Endopodite 2-jointed: 1st joint with 2 short anterior bristles; 2nd joint elongate with long spinous bristle near middle and bare, rounded tip. Exopodite: 1st joint with short medial terminal bristle; joints 2–8 with short spines forming rows along distal margins, bristles of joints 2–8 with stout spines along ventral margin, no natatory hairs; 9th joint with 3 bristles, ventral of these longer than others and with stout ventral spines, middle bristle with spines less stout than those on ventral bristle, dorsal bristle short, bare.

Mandible (Figure 19f,g): Coxale endite spinous, bifurcate, without bristle near base. Basale: medial surface spinous, with 4 bristles near ventral margin (3 proximal, 1 near middle); ventral margin with 1 terminal bristle; lateral surface with 2 bristles having bases on or near ventral margin, and with long hairs forming rows (some hairs extend past ventral margin); dorsal margin with 3 bristles (1 near middle, 2 terminal). Exopodite hirsute, about one-half length of dorsal margin of 1st endopodial joint, with 1 long subterminal bristle, and 1 minute terminal bristle (presence or absence of this minute bristle cannot be resolved with certainty with available light microscope). Endopodite: 1st joint with 1 short and 2 long bristles, medial surface of joint spinous; 2nd joint with ventral margin with bristles forming 2 groups (each with 2 bristles), middle of dorsal margin with 6 bristles (1 of these located more proximally than others), medial surface with spines forming rows in proximal half; end joint with 2 long claws with ventral spines, 1 very short, bare, dorsal claw, and 3 bristles (2 of these less than one-half length of long claws, the other about three-fourths length).

Maxilla (Figure 20a): Coxale with stout, spinous, dorsal bristle. Basale with 2 (possibly 3) terminal bristles. Exopodite with 2 long and 1 short bristle. Endopodite: 1st joint with 1 α - and 1 β -bristle; end joint with 3 clawlike bristles and about 4 slender bristles; 3 endites present.

Fifth Limb (Figure 20c): Endite I with 1 bristle; endite II with about 7 bristles; endite III with about 5 bristles. Exopodite: 1st joint with anterior side with 2 bristles at middle of distal margin, main tooth consisting of stout anterior tooth and posterior tooth with several prongs (obscure on speci-

men examined); 2nd joint with large squarish tooth, posterior side of joint with 3 bristles; 3rd joint with inner lobe with 3 bristles, outer lobe with 2; 4th and 5th joints with total of 5 bristles. (Exact number of bristles on exopodial joints and endites uncertain.)

Sixth Limb (Figure 20b): Endite I with 2 short and 1 long bristle; endite II with 3 terminal bristles; endites III and IV each with 5 bristles; end joint not prolonged posteriorly, with 4 spinous anterior bristles and 2 hirsute posterior bristles; 1 short bristle in place of epipodal appendage; one side of end joint and endites III and IV with long hairs.

Seventh Limb (Figure 20d): 6 bristles in terminal group (3 on each side), 2 in proximal group (1 on each side); each bristle with marginal spines and 2–5 bells; terminus with comb of 7 teeth opposite 3 recurved spinous teeth.

Furca (Figure 20f): Each lamella with 6 claws; claw 1, 2 and 4 stout primary claws; claws 3, 5, 6 slender secondary claws; claw 3 shorter than claw 4; primary claws with teeth along posterior margins; claw 1 with 2 distal teeth oriented anteriorly and 2 large distal teeth on posterior margin; secondary claws with spines along ventral and dorsal margins (not all teeth shown in Figure 20f); hairs along lamella following claws.

Rod-shaped Organ (Figure 20e): Elongate with about 4 proximal segments, tip rounded.

Eyes: Medial eye bare, unpigmented (Figure 20e); lateral eyes not observed.

Upper Lip and Anterior Process (Figure 20e): Hirsute with minute processes. An anterior process present on each side of animal between upper lip and medial eye.

Y-Sclerite (Figure 20f): Typical for family.

Genitalia (Figure 20f): Consisting of oval sclerotized cup on each side of animal.

Eggs: USNM 156784 with 3; USNM 156914 with 3.

DESCRIPTION OF ADULT MALE (Figures 3f, 21).—Except for having a somewhat broader caudal process, carapace of male similar in shape and ornamentation to that of adult female (Figure 21a).

Infold: Infold of rostrum with 5 long bristles; short bristle present on infold ventral to inner end of incisur; posterior infold with 3 minute bristles near inner margin of infold; ridge on infold of caudal process with 5 frondlike bristles; 3 minute bristles along posterior edge of caudal process.

Central Adductor Muscle Attachment Scars (Figure 21a): Similar to those of adult female but located closer to shell middle.

Size: USNM 156941, length 1.17 mm, height 0.65 mm; USNM 157111, length 1.16 mm, height 0.60 mm.

First Antenna (Figure 21b): 1st joint: few short medial spines forming rows. 2nd joint: 2 bristles (1 dorsal, 1 ventral). 3rd joint: short, with 2 dorsal bristles and 1 medial bristle, all near ventral margin. 4th joint: 1 terminal dorsal bristle and 2 proximal medial bristles, all near ventral margin. 5th joint: triangular, wedged between 4th and 6th joints and not extending to dorsal margin of limb; sensory bristle with bulbous proximal part with abundant long filaments and stem with about 4 marginal filaments (Figures 3f, 21b); 6th joint: long, with short medial bristle located near dorsal margin. 7th joint: a-bristle bare, slightly longer than bristle of 6th joint; b-bristle 3 times length of a-bristle, with 3 or 4 short marginal filaments; c-bristle very long, with 10 or 11 marginal filaments. 8th joint: d- and e-bristles bare with blunt tips, about one-half length of c-bristle; f-bristle almost same length as c-bristle, with 10 marginal filaments, some with spine at base; g-bristle about same length as d-bristle, with about 4 marginal filaments.

Second Antenna: Protopodite bare (Figure 21c). Endopodite 3-jointed (Figure 21d): 1st joint short, with 4 short anterior bristles; 2nd joint elongate, with 3 bristles on concave margin (proximal of these slender, faint, unringed, and not observed on USNM 157111); 3rd joint elongate, reflexed, with 2 short bristles and ridges at tip. Exopodite: 1st joint elongate, with minute, terminal, medial bristle; 2nd joint slightly larger than 3rd joint, with ventral bristle reaching past end of 9th joint; bristles of joints 2–8 with natatory hairs, no spines; 8th joint with 4 bristles (2 long with natatory hairs, 2 short with short marginal hairs), USNM 156941 aberrant in having only 8 exopodial joints on each limb.

Mandible (Figure 21e): Coxale endite represented by minute spine. Basale: medial surface spinous, with 4 short bristles (3 proximal, 1 near middle) near ventral margin; ventral margin with 1 long spinous distal bristle; lateral surface with 2 long spinous bristles with base on ventral margin; dorsal margin with 3 long bristles (2 terminal, 1 distal to middle). Exopodite: spinous, reaching just past middle of 1st endopodial joint, with 1 long sub-



FIGURE 21.—*Harbansus dayi*, new species, adult male, paratype, USNM 156941, length 1.17 mm:
 a, complete specimen showing central adductor muscle attachments and some fossae and hairs;
 b, left 1st antenna, medial view (only proximal ends of filaments of sensory bristle shown);
 c, protopodite of left 2nd antenna and left lateral eye; d, endopodite of left 2nd antennae, medial view;
 e, left mandible, medial view; f, maxilla, g, distal end of 5th limb; h, 6th limb; i, distal end of 7th limb;
 j, posterior of body showing right lamella of furca, right Y-sclerite, right copulatory organ and testis;
 k, anterior of body showing medial eye and rod-shaped organ, left anterior process, and upper lip.

terminal bristle; tip of exopodite pointed and with several short spines. Endopodite: 1st joint with medial spines and 3 ventral bristles (2 long, 1 short); 2nd joint with ventral margin with bristles forming 2 distal groups, each with 2 bristles, middle of dorsal margin with 6 bristles, medial surface with spines forming rows; end joint with 2 long claws with ventral spines, 1 short dorsal claw, and 3 bristles (1 long, 2 short).

Maxilla (Figure 21f): Limb reduced and with weakly developed bristles.

Fifth Limb (Figure 21g): Endites weakly developed with few bristles; endite III with 1 or 2 finger-like bristles. Exopodite: 3rd joint with 2 long outer bristles; inner bristles obscure; remaining joints fused, with total of about 4 bristles.

Sixth Limb (Figure 21h): A single spinous bristle in place of epipodial appendage. Endite I with 3 bristles; endite II with 3 terminal bristles; endite III with 4 bristles; endite IV with 5 bristles; end joint not prolonged posteriorly, with 2 hirsute anterior bristles followed by 2 bristles with long proximal and short distal spines, a space, and then 2 hirsute posterior bristles; limb hirsute.

Seventh Limb (Figure 21i): 4 bristles in terminal group, 2 on each side, each with 4 or 5 bells and distal marginal spines; no proximal bristles; terminus with comb of 5 spinous teeth opposite 1 or 2 recurved spinous pegs.

Furca (Figure 21j): Similar to that of female but claws 1 and 2 without large distal teeth.

Rod-shaped Organ (Figure 21k): Elongate with 5 or 6 proximal segments, tip rounded.

Eyes: Medial eye bare, unpigmented (Figure 21k); lateral eyes small, each with 5 ommatidia (Figure 21c).

Upper Lip (Figure 21l): With anterior projection.

Anterior (Figure 21k): 2 processes present between upper lip and rod-shaped organ.

Y-Sclerite (Figure 21j): Typical for family.

Copulatory Organ (Figure 21j): Each limb elongate, lobate, with terminal process with marginal teeth.

REMARKS.—The male is assigned to *H. dayi* rather than to *H. bowenae*, because of the development of the caudal process, which more closely resembles that of *H. dayi* than it does that of *H. bowenae*, and also because of the number of bristles on the infold of the rostrum.

DESCRIPTION OF A-1 FEMALE (Figure 22c).—
Carapace: Absent on specimen examined (USNM 156958A).

First Antenna: Similar to that of adult female.

Second Antenna (Figure 22c): Similar to that of A-2? female described below except for being larger.

Remaining Appendages: Similar to those of adult female.

Genitalia: Absent.

DESCRIPTION OF A-2 OR A-3 FEMALE (Figure 22a,b).—

Carapace (Figure 22a): Similar in shape to that of adult female except dorsal margin more rounded.

Size: USNM 156947A, length 0.99 mm, height 0.53 mm.

First Antenna: Number of bristles on joints 2, 3, and 6 similar to those of adult female; joint 4 with 2 bristles (1 ventral, 1 dorsal); bristles of 7th and 8th joint not examined in detail, but, in general, similar to those of adult female.

Second Antenna: Protopodite and exopodial bristles similar in type and number to those of adult female. Except for having a terminal bristle on 2nd joint, endopodite similar to that of adult female (Figure 22b).

Mandible, Maxilla, and 5th Limb: Not examined in detail but, in general, similar to that of female. Dorsal claw of end joint of endopodite of mandible small.

Sixth Limb: Similar to that of adult female.

Seventh Limb: Could not be found on specimen examined.

Furca: Similar to that of adult female.

Rod-shaped Organ and Upper Lip: Similar to those of adult female.

DESCRIPTION OF A-1 MALE (Figure 22f,g).—
Carapace (Figure 22f): Similar in shape to that of adult female.

Size: USNM 156952A, length 1.22 mm.

First Antenna: Similar to that of adult female.

Second Antenna: Protopodite and exopodite similar to those of adult female. Endopodite 3-jointed (Figure 22g): 1st joint short with 3 short bristles; 2nd joint elongate with 3 ventral bristles (1 long, proximal and 2 short, near middle); 3rd joint elongate with 2 short terminal bristles.

Mandible, Maxilla, 5th Limb, 6th Limb: Similar to those of adult female.

Seventh Limb: Differs from that of adult female in having only 3 or 4 terminal bristles and no proximal bristles; bristles tapering distally and with only

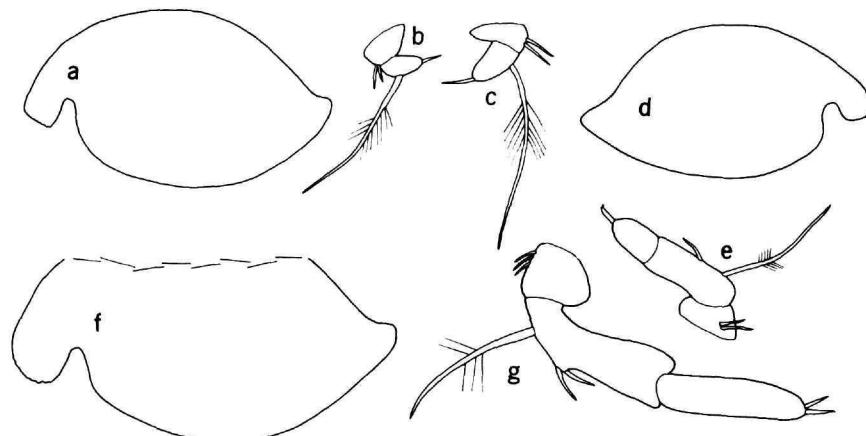


FIGURE 22.—*Harbansus dayi*, new species, A-2 or A-3 female, paratype, USNM 156947A, length 0.99 mm: *a*, outline of complete specimen; *b*, endopodite of right 2nd antenna, medial view. A-1 female, paratype, USNM 156953A: *c*, endopodite of left 2nd antenna, medial view. A-2 or A-3 male (instar III), paratype, USNM 156952B, length 0.93 mm: *d*, outline of complete specimen; *e*, endopodite of right 2nd antenna, medial view. A-1 male, USNM 156952A, paratype, length 1.22 mm: *f*, left valve, outside view (part of dorsal margin missing); *g*, endopodite of right 2nd antenna, medial view.

2 bells in addition to the marginal spines.

Furca, Rod-shaped Organ: Similar to those of adult female.

Eyes: Medial eye similar to that of adult female; lateral eyes not observed.

Upper Lip: Tip of lip with node seemingly separated from broader part of lip by suture; anterior tip of node with 2 or 3 minute processes.

Genitalia: None observed.

DESCRIPTION OF A-2 OR A-3 MALE (instar III) (Figure 22*d,e*).—*Carapace* (Figure 22*d*): posterior slightly more prolonged and dorsal margin more rounded than that of adult female.

Size: USNM 156952B, length 0.93 mm, height 0.45 mm.

First Antenna: 1st joint: 1 or no ventral bristle and 1 dorsal bristle. 2nd joint: 1 ventral and 2 dorsal bristles. 3rd joint: with 2 bristles (1 ventral, 1 dorsal). Remaining joints not examined in detail but, in general, similar to those of adult female.

Second Antenna: Protopodite and exopodite similar to those of adult female. Endopodite 3-jointed (Figure 22*e*): 1st joint short with 2 short bristles; 2nd joint elongate with 2 ventral bristles (1 long, proximal, 1 short, near middle); 3rd joint short with 1 short terminal bristle.

Mandible, Maxilla, 5th Limb, 6th Limb: Not examined in detail but, in general, similar to those of adult female.

Seventh Limb: Well developed but without bristles and with bare terminal end.

Furca: Similar to that of adult female.

Rod-shaped Organ: Elongate, more weakly segmented than organ of adult female.

Eyes: Medial eye similar to that of adult female; lateral eyes not observed.

Genitalia: None observed.

COMPARISONS.—With the exception of some specimens of *H. paucichelatus*, previously described species of *Harbansus* do not have a bare tip on the 2nd joint of the endopodite of the 2nd antenna. *H. dayi* differs from *H. paucichelatus* in not having horizontal ribs on the carapace. It is also larger than that species.

Harbansus bowenae, new species

FIGURES 23–26; PLATE 11

ETYMOLOGY.—The species is named for Ms. Marcia Bowen, Virginia Institute of Marine Science, who collected the specimens.

HOLOTYPE.—USNM 156664, undissected ovigerous female in alcohol, length 1.11 mm.

TYPE-LOCALITY.—Outer edge of continental shelf off New Jersey, R/V *Columbus Iselin*, sta F4-7, 183 m.

PARATYPES.—New Jersey, outer continental shelf, R/V *Columbus Iselin*: sta F4-7 (same sample as holotype): USNM 156912, 1 ovigerous female; USNM 156668, 42 specimens; USNM 156666A-C, 3 ovigerous females; sta A4-11: USNM 156948, 1 juvenile; USNM 156949, 1 adult female; USNM 156944, 1 juvenile female; USNM 156950, 15 specimens; sta A4-9: USNM 156955A,B, 2 A-1 males; USNM 156956, 1 juvenile male; USNM 156957, 1 2nd antenna of adult female.

DISTRIBUTION.—New Jersey shelf at depths of 136–196 m.

DESCRIPTION OF ADULT FEMALE (Figures 23–25; Plate 11).—**Carapace** (Figures 23, 24a): Elongate with fairly broad rostrum and very small caudal process, ribs absent.

Ornamentation: Surface with numerous shallow fossae (Plate 11a,b,d); long bristles abundant along ventral margin and on rostrum (Plate 11a), and widely scattered on valve surface (Plate 11d); 2 short bristles present on inner end of incisur (Figure 24c); inferior corner of rostrum with few minute nodes (Plate 11a,c); fossae with minute nodes with central pores (Plate 11b,d,e); area between fossae with similar nodes but having less relief than those in fossae (Plate 11d,f); surface between nodes with minute pustules (Plate 11e); areas not immediately surrounding nodes with peculiar surface structure (Plate 11f).

Infold: Rostral infold with 3 long bristles (Figure 24c); 1 bristle present near inner end of incisur; anteroventral infold with about 4 ribs, no bristles

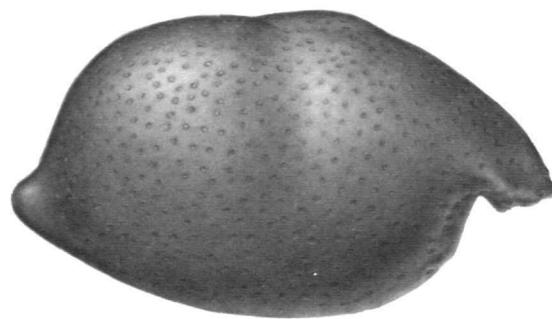


FIGURE 23.—*Harbansus bowenae*, new species, adult female, holotype, USNM 156664, length 1.11 mm, complete specimen.

observed; infold of caudal process with 6 setose bristles along anterior edge of pocket (Figure 24b); 6 small bristles present along inner edge of infold in vicinity of caudal process.

Selvage: Wide lamellar prolongation in vicinity of incisur, narrower along ventral margin; prolongation with fringed edge in vicinity of incisur and rostrum and along ventral margin.

Size: USNM 156912, length 0.92 mm, height 0.64 mm; USNM 156666A, length 1.12 mm, height 0.67 mm; USNM 156666B, length 1.14 mm, height 0.65 mm; USNM 156666C, length 1.14 mm, height 0.66 mm; USNM 156664, length 1.11 mm, height 0.59 mm.

First Antenna (Figure 24d): 1st joint: bare. 2nd joint: spines forming rows along dorsal and ventral margins and on medial surface, and 1 dorsal bristle. 3rd joint: short with spines on medial surface and ventral margin and 3 bristles (2 dorsal, 1 ventral). 4th joint: spines on lateral surface and ventral margin, and 4 bristles (1 dorsal, 3 ventral). 5th joint: bent upward at slight angle (right limb of USNM 156912 bent at greater angle than left limb), and with lateral spines; sensory bristle with 1 short filament proximal to middle, 3 distal filaments, and tip of stem with 2 minute spines. 6th joint: short spinous medial bristle. 7th joint: a-bristle with short marginal spines; b-bristle shorter than sensory bristle of 5th joint, with 3 terminal filaments including stem; c-bristle about same length as sensory bristle, with 1 short proximal filament, 3 distal filaments, and tip of stem with 2 minute spines. 8th joint: d- and e-bristle bare, about same length as sensory bristle; f-bristle slightly shorter than sensory bristle, with 2 short proximal filaments, 3 distal filaments, and tip of stem with 2 minute spines; g-bristle same length as sensory bristle, with 2 short proximal filaments, 3 distal filaments, and tip of stem with 2 minute spines; tips of all filaments and tip of stem of b-bristle with single minute spine.

Second Antenna: Protopodite without medial bristle. Endopodite 2-jointed (Figure 24f,g): 1st joint with 1 short anterior bristle; 2nd joint minute, with long spinous terminal bristle. Exopodite: 1st joint with long hairs along ventral margin and short, terminal, medial bristle; bristles of joints 2–8 with stout spines along ventral margin, no natatory hairs; 9th joint with 3 bristles, ventral bristle longer of 3 and with stout ventral spines, middle bristle and short dorsal bristle with short, slender, mar-

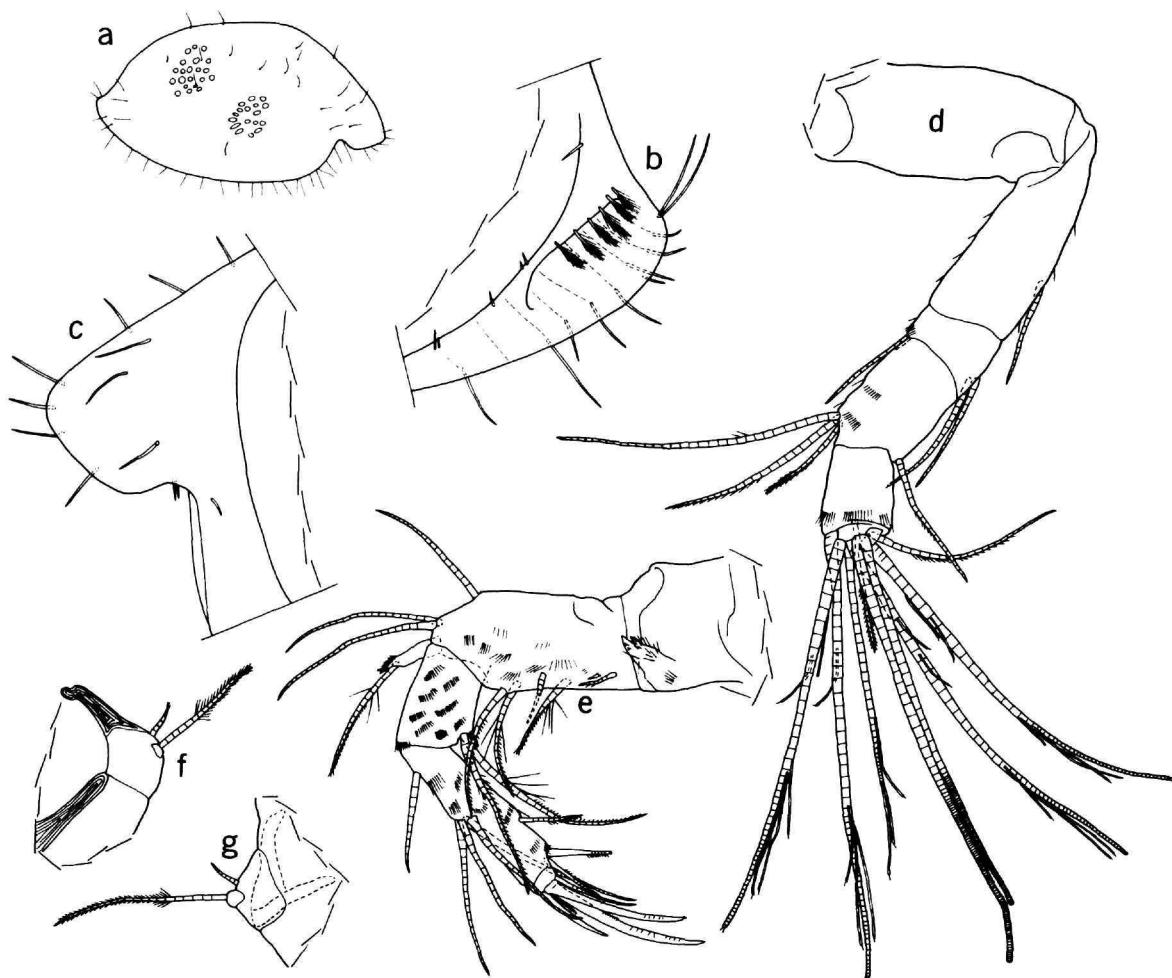


FIGURE 24.—*Harbansus bowenae*, new species, adult female, paratype, USNM 156912, length 0.92 mm: *a*, complete specimen showing central adductor muscle attachment scars and some fossae and hairs; *b*, caudal process of right valve, inside view; *c*, rostrum of right valve, inside view; *d*, right 1st antenna, lateral view; *e*, right mandible, medial view; *f*, *g*, endopodites of right and left 2nd antennae, lateral views.

ginal spines, none with natatory hairs; joints 2–8 with short spines forming row along distal margin; basal spines absent.

Mandible (Figure 24*e*): Coxale endite consisting of spinous bifurcate process, no bristle observed near base. Basale: dorsal margin with 1 bristle distal to middle and 2 terminal bristles; medial surface spinous, with 3 bristles near ventral margin (2 short, proximal, and 1 longer, near middle); ventral mar-

gin with 1 spinous terminal bristle; lateral surface with 2 spinous bristles near ventral margin (1 near middle, 1 subterminal). Exopodite one-half length of dorsal margin of 1st endopodial joint, hirsute near tip, with 1 subterminal bristle. Endopodite: 1st joint with 3 ventral bristles (1 of these minute); medial surface with spines forming oblique rows; ventral margin of 2nd joint with distal bristles forming 2 groups, proximal group with 1 bristle,



FIGURE 25.—*Harbansus bowenae*, new species, adult female, paratype, USNM 156912, length 0.92 mm: *a*, right maxilla, lateral view; *b*, distal end of right 5th limb, anterior view; *c*, 6th limb (endite I fragmented); *d*, distal end of 7th limb; *e*, right furcal lamella and right genital organ. Adult female, paratype, USNM 156666B, length 1.14 mm: *f*, anterior of body showing medial eye and rod-shaped organ, anterior process, and upper lip.

terminal group with 2; dorsal margin with 1 proximal bristle and 4 near middle; medial surface spinous; end joint with 3 claws and 2 bristles, dorsal claw about one-half length of other claws.

Maxilla (Figure 25a): Precoxale and coxale with fringe of dorsal hairs; coxale with stout spinous bristle near dorsal margin. Endite I with 6 spinous bristles; endite II with 5 bristles; endite III with 4 bristles; 1 proximal bristle present on margin between endites II and III (this bristle not observed on USNM 156666B). Basale with 2 long bristles. Exopodite with 3 bristles (1 short, 2 long). Endopodite: 1st joint with 1 α -bristle and 1 β -bristle; end joint with 2 stout, bare, unringed, clawlike bristles with blunt tips, 1 stout partly ringed bristle with few ventral teeth, and 4 slender ringed bristles. (Appendage examined was in twisted position on slide so that exact location of some of the bristles is uncertain).

Fifth Limb (Figure 25b): Endite I with 2 bristles; endites II and III each with about 5 bristles. Exopodite: main tooth of 1st joint consisting of 3 pronged tooth with short bristle at inner edge of base, and a 2nd large but poorly defined tooth inward from the 3-pronged tooth; outer edge of 1st joint with bulbous hirsute process; anterior distal margin of 1st joint with 2 bristles near outer edge of main 3-pronged tooth; 2nd joint with large squarish tooth; posterior side of 2nd joint with 3 bristles; outer lobe of 3rd joint with 2 bristles, inner lobe with 3; 4th and 5th joints with total of 5 bristles. Epipodial appendage with 38 bristles.

Sixth Limb (Figure 25c): 1 fairly long hirsute bristle in place of epipodial appendage; endite I with 2 bristles; endite II with 3 terminal bristles; endite III with 5 terminal bristles; endite IV with 4 terminal bristles; end joint not prolonged posteriorly, with 6 bristles (4 spinous anterior bristles and 2 hirsute posterior bristles), lateral surface of end joint hirsute except in vicinity of endites; medial surface of endites III and IV with faint spines forming rows.

Seventh Limb (Figure 25d): Each limb with 8 (rarely 7) bristles (2 (rarely 1) proximal, 6 terminal); each bristle with marginal spines and 2-4 bells; terminal comb with about 6 teeth opposite 2 pegs.

Furca (Figure 25e): Each lamella with 6 claws; claws 1, 2, and 4 stout; claws 3, 5, and 6 short slender; claw 3 shorter than claw 4; stout claws with teeth along posterior margin; claw 1 with 2 stout

distal teeth oriented anteriorly; slender claws with proximal spines on anterior and posterior margins; hairs present on lamella following claws.

Rod-shaped Organ (Figure 25f): Elongate with about 5 sutures in middle part and broadening distal part with tapering tip.

Eyes: Medial eye bare, unpigmented (Figure 25f); lateral eyes not observed.

Upper Lip and Anterior Process (Figure 25g): Hirsute, may have anterior processes. Sclerotized anterior process present between upper lip and medial eye.

Genitalia (Figure 25j): Sclerotized oval on each side proximal to furca.

Eggs: USNM 156912 with 1; USNM 156666A with 3; USNM 156666B with 4 large unextruded; USNM 156666C with 1.

DESCRIPTION OF A-1 FEMALE (Figure 26a).—*Carapace*: Similar in shape to that of adult female.

Size: USNM 156948, length 0.93 mm, height 0.53 mm.

First Antenna: Not examined in detail, but in general similar to that of adult female.

Second Antenna (Figure 26a): Similar to that of adult female.

Mandible, Maxilla, 5th Limb, 6th Limb: Not examined in detail but in general similar to that of adult female.

Seventh Limb: Not examined in detail but bristles tapering distally.

Furca: Similar to that of adult female.

Rod-shaped Organ: Similar to that of adult female.

Eyes: Medial eye similar to that of adult female; lateral eyes not observed.

Genitalia: None observed.

DESCRIPTION OF A-2 OR A-3 MALE (instar III) (Figure 26b,c).—*Carapace* (Figure 26b): Similar in shape to that of adult female, but slightly more produced posteriorly.

Size: USNM 156956, length 0.83 mm, height 0.44 mm.

First Antenna: 1st, 2nd, and 3rd joints similar to those of adult female; 4th joint with 1 dorsal and 1 ventral bristle; joints 6-8 not examined in detail but, in general, similar to those of adult female.

Second Antenna: Protopodite and exopodite similar to those of adult female. Endopodite 2-jointed with partly developed suture distally on end joint indicating future 3rd joint (Figure 26c):

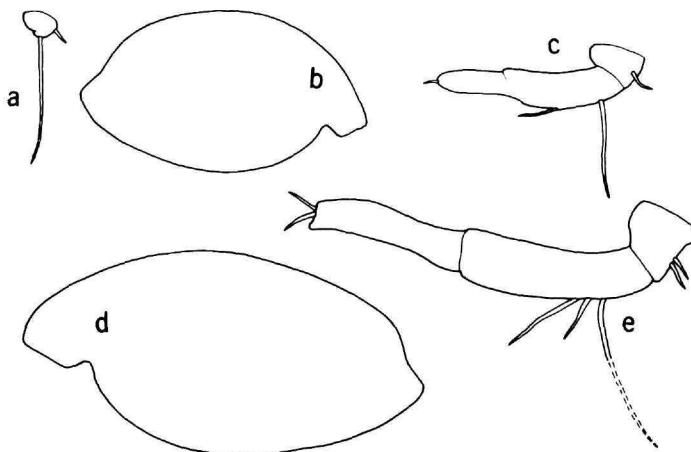


FIGURE 26.—*Harbansus bowenae*, new species. A-1 female, paratype, USNM 156948, length 0.93 mm: *a*, endopodite of left 2nd antenna, medial view. A-2 or A-3 male, USNM 156956, length 0.83 mm: *b*, outline of complete specimen; *c*, endopodite of left 2nd antenna, medial view. A-1 male, paratype, USNM 156955A, length 1.08 mm: *d*, outline of complete specimen; *e*, endopodite of left 2nd antenna, medial view.

1st joint short with 1 short ventral bristle; 2nd joint elongate with 2 ventral bristles proximal to incipient suture and 1 short terminal bristle.

Mandible, Maxilla, 5th Limb, 6th Limb: Not examined in detail but, in general, similar to those of adult female.

Seventh Limb: Fairly short without bristles.

Furca: Similar to that of adult female.

Rod-shaped Organ: Similar to that of adult female.

Eyes: Medial eye similar to that of adult female; lateral eyes not observed.

Genitalia: None observed.

DESCRIPTION OF A-1 MALE (Figure 26*d,e*).—**Carapace** (Figure 26*d*): Similar to that of adult female but more elongate.

Size: USNM 156955A, length 1.08 mm, height 0.57 mm.

First Antenna: Similar to that of adult female except with only 2 ventral bristles on 4th joint.

Second Antenna: Protopodite and exopodite similar to that of adult female. Endopodite 3-jointed (Figure 26*e*): 1st joint short, with 2 short ventral bristles; 2nd joint elongate, with 1 long and 2 short ventral bristles proximal to middle; 3rd joint elongate with 2 short terminal bristles and with squarish tip.

Mandible, Maxilla, 5th Limb, 6th Limb: Similar to those of adult female.

Seventh Limb: Each limb with 3 or 4 terminal bristles and 1 or no proximal bristles; each bristle tapering distally and with 2 bells in addition to marginal spines.

Furca: Similar to that of adult female.

Rod-shaped Organ: Similar to that of adult female except sutures appearing weaker.

Eyes: Medial eye similar to that of adult female; lateral eyes not observed.

Genitalia: Not examined under high magnification but consisting of 2 or 3 lobes.

COMPARISONS.—The short 2nd joint on the endopodite of the female 2nd antenna distinguishes *H. bowenae* from previously described species in the genus. *Harbansus bowenae* occurs together with *H. dayi*. It is smaller than that species, and its caudal process does not project backwards as far as that of *H. dayi*. *H. bowenae* is the only known species in the family Philomedidae with only 1 bristle on the exopodite of the mandible, but it is possible that a minute bristle is present at the tip of the exopodite but cannot be detected at the resolving power of the available compound microscope. The dorsal claw on the end joint of the mandible is about one-half the length of the other 2 claws; on most species

in the genus the dorsal claw is much smaller than that on *H. bowenae*. The distal ventral margin of the 2nd endopodial joint of the mandible bears only 3 bristles compared to 4 on other species in the genus.

Harbansus barnardi, new species

FIGURES 27-29; PLATE 12

ETYMOLOGY.—The species is named after J. Laurens Barnard, Smithsonian Institution, who collected the specimens.

HOLOTYPE.—USNM 156907, ovigerous female on slide and in alcohol.

TYPE-LOCALITY.—JLB Hawaii 10 (see Barnard, 1970), Sampan Pass, Kaneohe Bay, Oahu, 2 m.

PARATYPE.—USNM 156906, 1 A-1 male from same sample as holotype.

DISTRIBUTION.—Known only from the type-locality.

DESCRIPTION OF ADULT FEMALE (Figures 27-29d; Plate 12).—**Carapace** (Figures 27-28b): Elongate with prominent rostrum and caudal process.

Ornamentation: Ventral and anterior margins of rostrum with minute protuberances (Figures 27, 28a); posterodorsal corner of carapace with faint low ridge (Figures 27, 28b); surface of valve with abundant shallow fossae (Plate 12a,b); bristles scattered over valve surface (Plate 12a-d) and along ventral margin, also near outer edge of caudal process; 2 bristles present on edge of valve at inner end of incisur (Figure 28a); surface between shallow fossae with shallow pores (Plate 12b-f); minute nodes with central pit forming row around rim of fossae (Plate 12b,e).

Infold: Rostral infold with 7 or 8 long bristles; 1 short bristle on infold just ventral to inner end of incisur; anteroventral infold with 7 parallel ribs and 1 short bristle near ventral margin; posterior half of ventral infold anterior to caudal process with 4 or 5 small bristles; infold of caudal process with 7 setose bristles along anterior edge of pocket; 1 small bristle near inner edge of infold opposite dorsal end of caudal process.

Selvage: Wide lamellar prolongation with fringed edge present in vicinity of incisur, narrower along anterior and ventral margins.

Size: USNM 156907, length 1.01 mm, height 0.53 mm.

First Antenna (Figure 28c): 1st joint: spines on lateral surface. 2nd joint: spines along ventral and dorsal margins and on medial and lateral surfaces, and with 1 spinous dorsal bristle. 3rd joint: short, with spines on ventral margin and medial surface, and with 3 bristles (1 ventral, 2 dorsal). 4th joint: faint hairs along ventral and dorsal margins and with 5 bristles (3 ventral, 2 dorsal). 5th joint: sensory bristle with 2 short proximal filaments and 1 short and 2 long terminal filaments excluding stem (stem with 2 minute spines at tip, filaments with only 1). 6th joint: medial bristle about same length as 5th joint, with minute spine at tip. 7th joint: a-bristle slightly longer than bristle of 6th joint; b-bristle slightly shorter than sensory bristle of 5th joint, with 2 short subterminal filaments (stem with 2 minute spines at tip, filaments with only 1); c-bristle same length as sensory bristle, with 1 short proximal filament, 1 filament near middle, and 3 subterminal filaments (1 short, 2 longer) excluding stem (stem with 2 minute spines at tip, filaments with only 1). 8th joint: bare d- and e-bristles of equal length, same length as sensory bristle; f-bristle similar to c-bristle; g-bristle similar to f-bristle but slightly longer.

Second Antenna: Protopodite bare. Endopodite 2-jointed (Figure 28d): 1st joint with 3 short anterior bristles; 2nd joint elongate, with 1 long spinous ventral bristle and 1 short terminal bristle. Exopodite: 1st joint with short, recurved, terminal, medial bristle; 2nd joint with bristle reaching just past 9th joint, with about 12 stout ventral spines, no natatory hairs; bristles of joints 3-8 relatively short, with stout ventral spines but no natatory

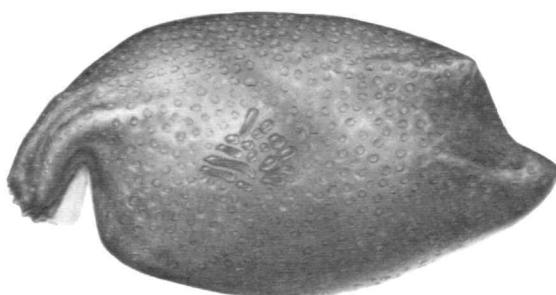


FIGURE 27.—*Harbansus barnardi*, new species, adult female, USNM 156907, length 1.01 mm, complete specimen.



FIGURE 28.—*Harbansus barnardi*, new species, adult female, holotype, USNM 156907, length 1.01 mm: *a*, anterior of left valve, outside view; *b*, posterior of left valve, outside view; *c*, left 1st antenna, medial view; *d*, endopodite of right 2nd antenna, medial view; *e*, left mandible, lateral view; *f*, distal end of right mandible showing 4 claws, medial view; *g*, left maxilla, lateral view; *h*, distal end of left 5th limb, posterior view.

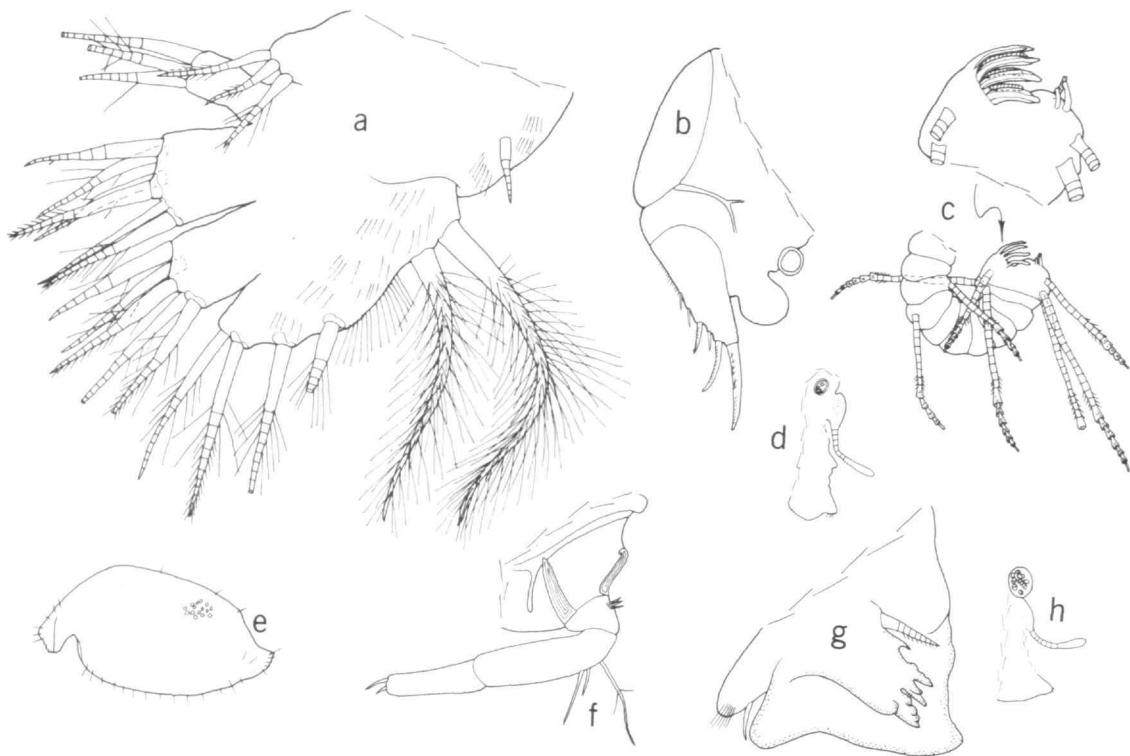


FIGURE 29.—*Harbansus barnardi*, new species, adult female, holotype, USNM 156907, length 1.01 mm: *a*, 6th limb; *b*, posterior of body showing right furcal lamella, right genital organ, and right Y-sclerite; *c*, distal part of 7th limb; *d*, anterior of body showing right lateral eye, medial eye and rod-shaped organ, anterior process and upper lip. A-1 male, paratype, USNM 156906, length 0.89 mm: *e*, complete specimen showing position of lateral eye as seen through shell (dotted circle) and some fossae and hairs; *f*, endopodite of left 2nd antenna, medial view; *g*, teeth of 1st and 2nd exopodial joints of right 5th limb, anterior view; *h*, anterior of body showing right lateral eye, medial eye and rod-shaped organ, and upper lip.

hairs; 9th joint minute, with 1 or 2 bristles (longest of these ventral, with slender ventral and dorsal spines; dorsal bristle when present very short, with minute dorsal spine); joints 2–8 with fairly long spines forming row along distal margin, but no basal spines.

Mandible (Figure 28*e,f*): Coxale endite spinous, bifurcate, no bristle observed near base. Basale: medial side with 3 short bristles in proximal ventral corner, 1 short bristle near middle close to ventral margin, and long hairs forming rows; lateral surface with 2 bristles close to middle of ventral margin, and few long hairs; ventral margin with 1 terminal bristle; dorsal margin with 1 midbristle and

2 terminal bristles. Exopodite hirsute, about two-thirds length of dorsal margin of 1st endopodite joint, with 1 long subterminal bristle and 1 short terminal bristle. Endopodite: 1st joint with ventral margin with 3 bristles (1 short, 2 long; short bristle not visible in Figure 28*e*); 2nd joint with ventral margin with bristles forming 2 distal groups (proximal group with 2 bristles, distal group with 3 bristles including 1 clawlike bristle), dorsal margin of joint with bristles forming 2 groups near middle (2 bristles in proximal group, 5 in distal group); end joint with 2 stout subequal claws, 1 minute dorsal claw, and 3 bristles.

Maxilla (Figure 28*g*): Coxale with dorsal margin

hirsute, with spinous dorsal bristle. Endite I with 5 or 6 bristles; endite II with 6 bristles; endite III with 9 terminal bristles and 1 proximal bristle. Basale with distal margin with 3 bristles. Exopodite with 2 long bristles (with long hairs near middle) and 1 short bare bristle. Endopodite: 1st joint with 1 α -bristle and 3 β -bristles; end joint with 2 stout claws and several bristles.

Fifth Limb (Figure 28h): Endite I with 1 short bristle; endites II and III indistinct but with total of about 10 bristles. Exopodite: 1st joint with main tooth with 3 constituent pectinate teeth and 1 proximal smooth tooth; spinous bristle present on edge proximal to constituent teeth; anterior side with 2 bristles at middle of distal edge; posterior side with 2 or 3 bristles; 2nd joint with large squarish tooth; 3rd joint with 2 bristles on outer lobe and 3 on inner lobe; 4th and 5th joints fused, hirsute, with total of 6 bristles.

Sixth Limb (Figure 29a): Endite I with 3 bristles; endite II with 3 bristles; endite III with 6 bristles; endite IV with 5 bristles; end joint with 4 spinous anterior bristles and 2 hirsute posterior bristles; limb hirsute in vicinity of posterior margin; 1 short bristle in place of epipodial bristle.

Seventh Limb (Figure 29c): 2 bristles in proximal group (1 on each side); 6 bristles in distal group (3 on each side); each bristle with distal marginal spines and up to 6 bells; terminus with comb of about 7 teeth opposite 3 spinous pegs.

Furca (Figure 29b): Each lamella with 6 claws: claws 1, 2, and 4 primary; claws 3, 5, and 6 secondary; claw 1 with stout teeth along proximal half of lateral and medial margins, and slender teeth distally; claws 2 and 4 with teeth along posterior margins; hairs present along lamella following claw 6.

Rod-shaped Organ (Figure 29d): Elongate with about 7 sutures in proximal half and with rounded tip.

Eyes (Figure 29d): Medial eye bare, lightly pigmented. Lateral eyes about one-half length of medial eye, with 3 minute ommatidia; lateral eye hidden behind protopodite of 2nd antenna when animal viewed laterally.

Upper Lip (Figure 29d): Hirsute, projecting anteriorly.

Y-Sclerite (Figure 29b): Normal for family.

Genitalia (Figure 29b): Oval sclerotized ring on each side of body.

Eggs: USNM 156907 with 2 eggs in marsupium.

DESCRIPTION OF A-1 MALE (Figure 29e-h).—*Carapace* (Figure 29e): Similar in shape to that of adult female.

Ornamentation: Surface of valve with abundant shallow fossae; minute protuberances with central pit forming row just within edge of fossae; surface of valve between fossae with minute pits with low raised rim; bristles emerging from closed pores with irregular raised rim scattered over valve surface and along ventral margin, also near outer edge of caudal process; 2 bristles present on edge of valve at inner end of incisor.

Infold: Rostral infold with 7 long bristles; 1 short bristle present near inner end of incisor; anteroventral infold with about 7 parallel ribs; ventral infold near caudal process with 5 short bristles forming row; infold of caudal process with 6 setose bristles along anterior edge of pocket.

Selvage: Similar to that of adult female.

Size: USNM 156906, length 0.89 mm, height 0.45 mm.

First Antenna, Mandible, Maxilla, 5th Limb (Figure 29g), 6th Limb, Furca: Similar to those of adult female.

Second Antenna: Protopodite similar to that of adult female. Endopodite 3-jointed (Figure 29f): 1st joint with 3 small anterior bristles; 2nd joint elongate with 3 proximal ventral bristles; 3rd joint elongate with 2 small terminal bristles. Exopodite with 2 bristles on 9th joint of both limbs, otherwise similar to that of adult female.

Seventh Limb: 4 bristles in distal group, each with distal marginal spines and 4 bells; bristles tapering distally (juvenile character); no proximal bristles; terminus with comb with 3 or 4 teeth opposite single spinous peg.

Rod-shaped Organ (Figure 29h): Similar to that of adult female.

Eyes (Figure 29h): Medial eye similar to that of adult female. Lateral eye about same size as medial eye, with about 9 minute ommatidia.

Upper Lip (Figure 29h): With minute anterior processes.

COMPARISONS.—The new species *Harbansus barnardi* differs from previously described species in having a terminal claw on the ventral margin of the 2nd endopodial joint of the mandible that is about three-fourths the length of the largest claw of the end joint.

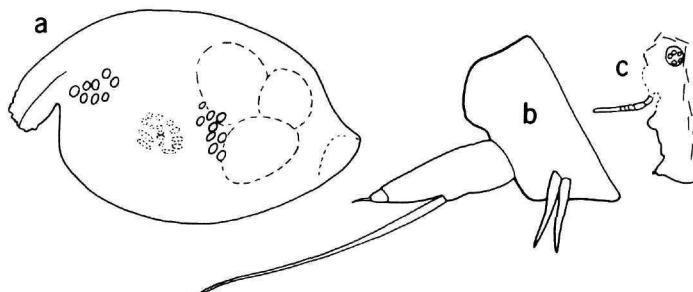


FIGURE 30.—*Harbansus* species A, adult female, USNM 157752, length 1.18 mm: a, complete specimen showing central adductor muscle attachment scars, some fossae, and location of eggs inside shell; b, endopodite of left 2nd antenna, medial view; c, anterior of body showing left lateral eye, medial eye (dashed) and rod-shaped organ, anterior process, upper lip.

Harbansus species A

FIGURE 30; PLATE 13

MATERIAL.—USNM 157752, 1 ovigerous female from off Guadalupe Island, Mexico, R/V *Velero III*, sta 1927, 73.2–102.4 m.

DESCRIPTION OF ADULT FEMALE (Figure 30; Plate 13).—*Carapace* (Figure 30a): Similar in shape to that of *Harbansus mayeri* but slightly larger.

Ornamentation: Surface without lateral ribs or posterior nodes; ventral half of rostrum with low lateral process; surface with shallow fossae (Plate 13a–c); anterior and ventral margins of rostrum with about 14 minute tubercles (Plate 13b); 2 bristles at inner edge of incisor; bristles scattered over valve surface and along ventral and anterodorsal margins, some with pore near base (Plate 13d); surface with few pores (Plate 13e) and minute pustules (Plate 13d,f).

Infold: Rostral infold with 4 bristles; single short bristle just below inner end of incisor; 7 short bristles along inner edge of posterior half of ventral infold; infold of caudal process with 6 or 7 frond-like bristles.

Selvage: Similar to that of *H. mayeri*.

Size: Length 1.18 mm, height 0.64 mm.

First Antenna, 2nd Antenna (Figure 30b), *Mandible, Maxilla, 5th Limb*: Similar to those of *H. mayeri*.

Sixth Limb: Endites I and II with 3 bristles; endites III and IV each with 5 bristles; end joint with 4 or 5 spinous anteroventral bristles separated by

space from 2 posterior hirsute bristles; 1 short bristle in place of epipodial bristle.

Seventh Limb: 2 bristles in proximal group (1 on each side); 4 bristles in distal group (2 on each side); each bristle with up to 4 bells and distal spines; terminal comb with 5 recurved teeth opposite smaller comb with about 3 short teeth.

Furca, Rod-shaped Organ (Figure 30c), *Genitalia, Brushlike Organ, Upper Lip* (Figure 30c) *Y-Sclerite, Posterior of Body*: Similar to those of *H. mayeri*.

Eyes (Figure 30c): Medial eye pigmented, bare; lateral eyes small, faint, unpigmented, with 5 ommatidia.

Eggs: Holotype with 5 eggs in brood chamber.

COMPARISONS.—The specimen designated herein *Harbansus* species A, may be conspecific with *Harbansus mayeri*. It is separated from that species because *Harbansus* species A has only 4 instead of 7–8 bristles on the rostral infold. Also the carapace of *H.* species A is slightly larger than known specimens of *H. mayeri*, and does not have posterior nodes such as those present on *H. mayeri*. Having only 1 specimen of *H.* species A, it was not possible to determine whether the differences noted between *H.* species A and *H. mayeri* could be intraspecific variation.

Harbansus species B

FIGURES 31, 32; PLATES 14, 15

MATERIAL.—USNM 157753, 1 ovigerous female from Santa Rosa Island, California, R/V *Velero III*, sta 23086, 140 m.

DESCRIPTION OF ADULT FEMALE.—*Carapace* (Figures 31, 32a; Plate 14a–c): Similar in shape to that of *Harbansus bradmyersi* but somewhat larger.

Ornamentation: Surface with lateral ribs (Figures 31, 32a; Plate 14a–c); rib dorsal to central muscle scar area angling upward posteriorly; rib passing through muscle scar area terminating posteriorly in vicinity of caudal process (Plate 14c); surface with shallow fossae (Plate 14a–e); bottom of fossae with small nodes with central pore (Plate 14c–e); central pore of nodes with minute inner teeth (Plate 14f); surface between fossae with pore fields (Plates 14d, e, 15c,d); surface between pore fields with minute pustules (Plate 15a,c,d); surface with widely scattered long bristles having pore near base (Plates 14d,e, 15a,b); minute nodes with central pore also present along dorsal margin in vicinity of 2 narrow dorsal ribs (Plate 15e); narrow ligament connecting dorsal edges of valves (Plate 15e,f).

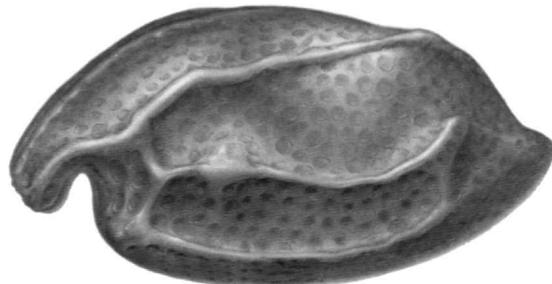


FIGURE 31.—*Harbansus* species B, adult female, USNM 157753, length 1.26 mm, complete specimen.

Infold and Selvage: Similar to those of *H. bradmyersi* except 4–6 bristles on rostral infold.

Size: Length 1.26 mm, height 0.71 mm.

First Antenna: Similar to that of *H. bradmyersi*.

Second Antenna: Similar to that of *H. bradmyersi* (Figure 32b).

Rod-shaped Organ, Eyes, Upper Lip (Figure 32c): Similar to those of *H. bradmyersi*.

Remaining Appendages: In general, similar to those of *H. bradmyersi*.

COMPARISONS.—This species differs from *H. bradmyersi* in having the upper lateral rib on carapace oriented at a distinct angle, not horizontal as on *H. bradmyersi*.

REMARKS.—No formal name is proposed for the species because at present there is only 1 specimen.

Harbansus species indeterminate

FIGURE 33

MATERIAL.—USNM 157755, 1 adult female from off west end of Santa Catalina Island, California, R/V *Valero III*, sta 24075, 414 m.

DESCRIPTION OF ADULT FEMALE.—*Carapace*: Of unique specimen decalcified, film-like, no lateral ribs apparent, but because of poor condition of specimen the possibility that they were once present cannot be excluded.

Size: Length of distorted shell 1.43 mm, height 0.83 mm.

Appendages: Not all appendages examined in detail, but in general similar to those of *H. mayeri*.

Second Antenna: Endopodite similar to that of *H. mayeri* (Figure 33a).

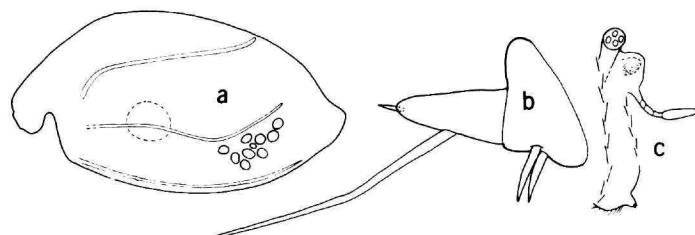


FIGURE 32.—*Harbansus* species B, adult female, USNM 157753, length 1.26 mm: a, complete specimen showing parts of lateral ribs, central adductor muscle attachment area (dashed circle) and some fossae; b, endopodite of left 2nd antenna, medial view; c, anterior showing right lateral eye, medial eye and rod-shaped organ, upper lip.

Rod-shaped Organ, Eyes (Figure 33b): Rod-shaped organ with about 8 sutures and pointed tip; medial eye pigmented, bare; lateral eye faint, unpigmented, with 5 ommatidia.

REMARKS.—The unique specimen is larger than previously described species from the coast of California. Although the carapace is decalcified and somewhat distorted, I think that the given measurements may be close to its natural size.

Streptoleberis Brady, 1890

Streptoleberis Brady, 1890:515.—Müller, 1893:381; 1894:213; 1906:30, 31; 1912:36, 51.—Brady and Norman, 1896:664.—Skogsberg, 1920:165, 166.—Rome, 1942:9.—Sylvester-Bradley, 1961:Q400.—Poulsen, 1962:339; 1965:144, 145.—Kornicker, 1967b:4.

TYPE-SPECIES.—*Streptoleberis crenulata* Brady, 1890, monotypy.

Brady (1890:515, pl. 4: figs. 3, 4) described and illustrated only the carapace of *Streptoleberis crenulata* Brady 1890. Because that carapace resembles those of some species of *Harbansus*, it was necessary to examine the appendages of *S. crenulata* to determine whether the species referred herein to *Harbansus* could be referred to *Streptoleberis*, thus eliminating the necessity to propose a new genus. Because critical appendages are missing from the specimen of *S. crenulata* studied, it is necessary to assign the species to "genus inquirendum and species inquirenda," a category similar to that to which it was previously referred by Müller (1912:51).

Three species have been referred to *Streptoleberis*: *S. crenulata* Brady, 1890, *S. favosa* Brady and

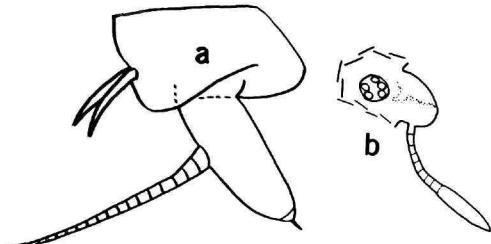


FIGURE 33.—*Harbansus* species indeterminate, adult female, USNM 157754, length 1.43 mm: a, endopodite of right 2nd antenna, medial view; b, right lateral eye, medial eye and rod-shaped organ.

Norman, 1896, and *S. rectirostris* Brady and Norman, 1896.

Streptoleberis crenulata Brady, 1890

FIGURES 34-36; PLATE 16

Streptoleberis crenulata Brady, 1890:515, pl. 4: figs. 3, 4; 1898:435.—Müller, 1912:51.—Skogsberg, 1920:380.—Sylvester-Bradley, 1961:Q400.—Poulsen, 1962:339; 1965:44.—Kornicker, 1967b:4.

HOLOTYPE.—Dry specimen (unique), length 1.05 mm (Brady, 1890:515).

TYPE-LOCALITY.—Noumea, 2-4 fathoms (Brady, 1890:515).

MATERIAL.—The Brady Collection, The Hancock Museum, New-Castle-upon-Tyne, Scotland, contains 2 slides with many dry ostracods belonging to many species. According to Dr. A. G. Long of that museum (in litt., 1976), Brady's book of species lists a specimen on each slide as "*Streptoleberis crenulata* type." One of the slides is labeled "Slide 8, off Cape Bon Louis, New Caledonia, 4 fathoms, weedy." The other slide is labeled "Slide 7, New Caledonia; Banc de L'aiguille, weedy bottom, 2-3 fathoms (H.B.B.)." 1 specimen on each slide resembles the specimen of *Streptoleberis crenulata* illustrated by Brady (1890: pl. 4: figs. 3, 4). Dr. Anthony Tynan of The Hancock Museum kindly permitted softening and dissection of 1 of the specimens.

REMARKS.—When Brady (1890:516) described *S. crenulata* he stated that only one example of the species was found in the Noumea dredging. The fact that 2 specimens of the species are labeled "type" in the Brady collection is not unusual, because Brady appears often to have labeled as "type," specimens collected near the type-locality even though they may not have been considered in the original description of the species. Brady (1890: 518) stated that he did not give precise localities of collections where the "depth and physical conditions do not present any great variety." Because of this it is not possible to be certain if either of the two available specimens (both from near Noumea) is the holotype.

The dried specimen from slide 8 upon which I worked is 0.95 mm long compared to a length of 1.05 mm given by Brady for the holotype. However, the presence of natatory hairs on the bristles of the

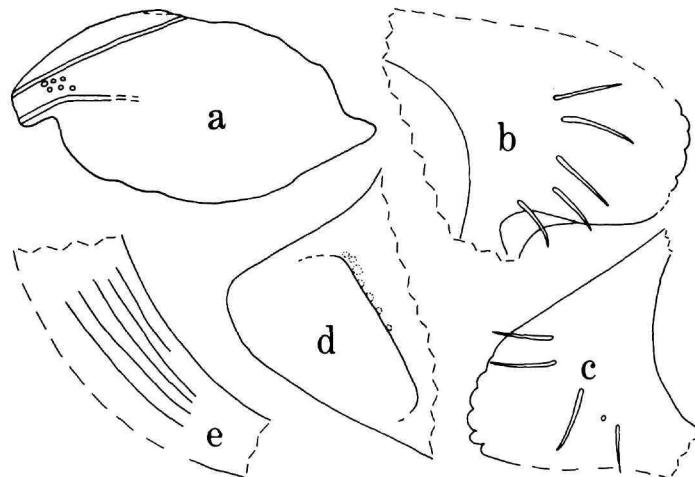


FIGURE 34.—*Streptoleberis crenulata* Brady, 1890, adult female, slide 8, length 0.95 mm, carapace: *a*, outline of complete specimen showing some surface features; *b*, *c*, inside views of left and right rostra; *d*, inside view of left caudal process (dotted circles represent sockets of missing bristles); *e*, ridges on anteroventral infold of right valve.

2nd antenna of my specimen indicates it to be an adult female, because bristles of juveniles of the Philomedidae are without hairs. The difference in lengths of the two specimens could be attributed to either intraspecific variation or the dried condition of my specimen.

DESCRIPTION OF ADULT FEMALE ON SLIDE 8 (Figures 34–36, Plate 16). *Carapace* (Figure 34*a–d*; Plate 16*a–c*): Elongate with prominent rostrum and projecting caudal process.

Ornamentation: Carapace of specimen with parts of shell missing. Longitudinal rib present near and approximately parallel to anterodorsal margin of valve (Plate 16*a,b*); 2nd longitudinal rib with anterior end near middle of rostrum and posterior end missing (Plate 16*a–c*). Surface of valve with large round fossae (Plate 16*a–d*), and with minute pores on surface between fossae (Plate 16*d–f*). Bristles emerging from small fossae sparsely distributed over valve surface (Plate 16*d,e*).

Infold: Rostral infold with 5 long bristles (Figure 34*b,c*); anteroventral infold with at least 5 ridges paralleling the anteroventral valve margin (Figure 34*e*); infold of caudal process obscure on right valve but left valve with about 7 sockets visible that prob-

ably once contained fairly large bristles (Figure 34*d*).

Size: Distorted dry specimen, length 0.95 mm, height 0.51 mm.

First Antenna (Figure 35*a,b*): 1st joint: few spines on medial and lateral surfaces. 2nd joint: long proximal hairs and 1 distal bristle on dorsal margin. 3rd joint: medial surface with faint spines forming rows; dorsal margin with 2 subterminal bristles; ventral margin with 1 short terminal bristle (bristle missing on left limb). 4th joint: dorsal margin with 1 terminal bristle; ventral margin with 3 terminal bristles. 5th joint: sensory bristle broken on both limbs, 3 short marginal filaments on remnant. 6th joint: minute, with short medial bristle. 7th joint: a-bristle slender, about three times length of bristle of 6th joint; b-bristle with tip missing on both limbs, remnant with 1 short distal filament; c-bristle with tip missing on both limbs, remnant with several marginal filaments. 8th joint: d- and e-bristles long, bare; f- and g-bristles with tips missing on both limbs, remnants with short marginal filaments.

Second Antenna (Figure 35*c–e*): Protopodite bare. Endopodite 2-jointed: 1st joint with 4 short ante-

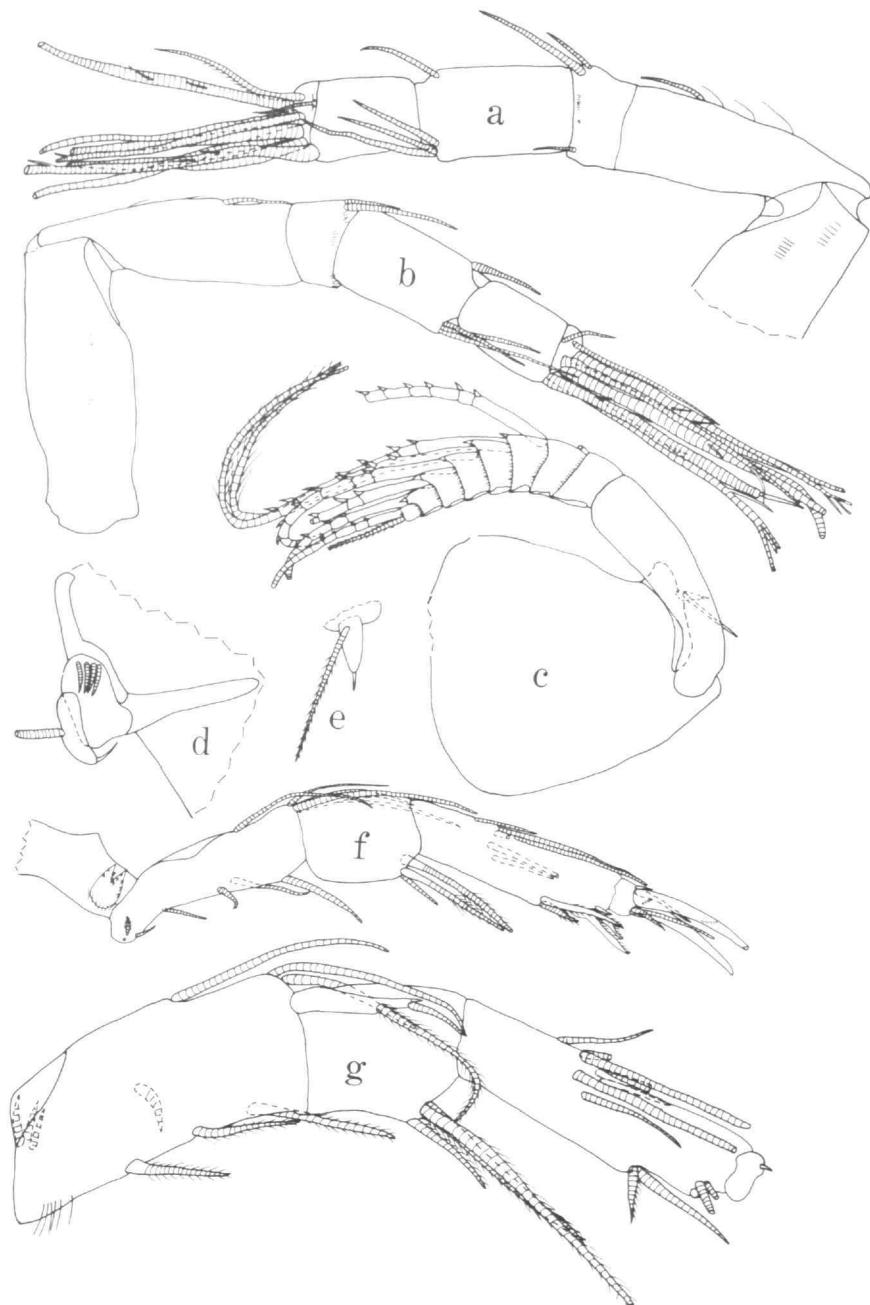


FIGURE 35.—*Streptoleberis crenulata* Brady, 1890, adult female, slide 8, length 0.95 mm: *a*, *b*, right and left 1st antennae, medial views; *c*, left 2nd antenna, lateral view; *d*, endopodite of right 2nd antenna, medial view; *e*, endopodite of left 2nd antenna, lateral view (basal part obscure and omitted from illustration); *f*, left mandible, medial view; *g*, right mandible, lateral view (coxale and bristles of 3rd endopodial joint missing).

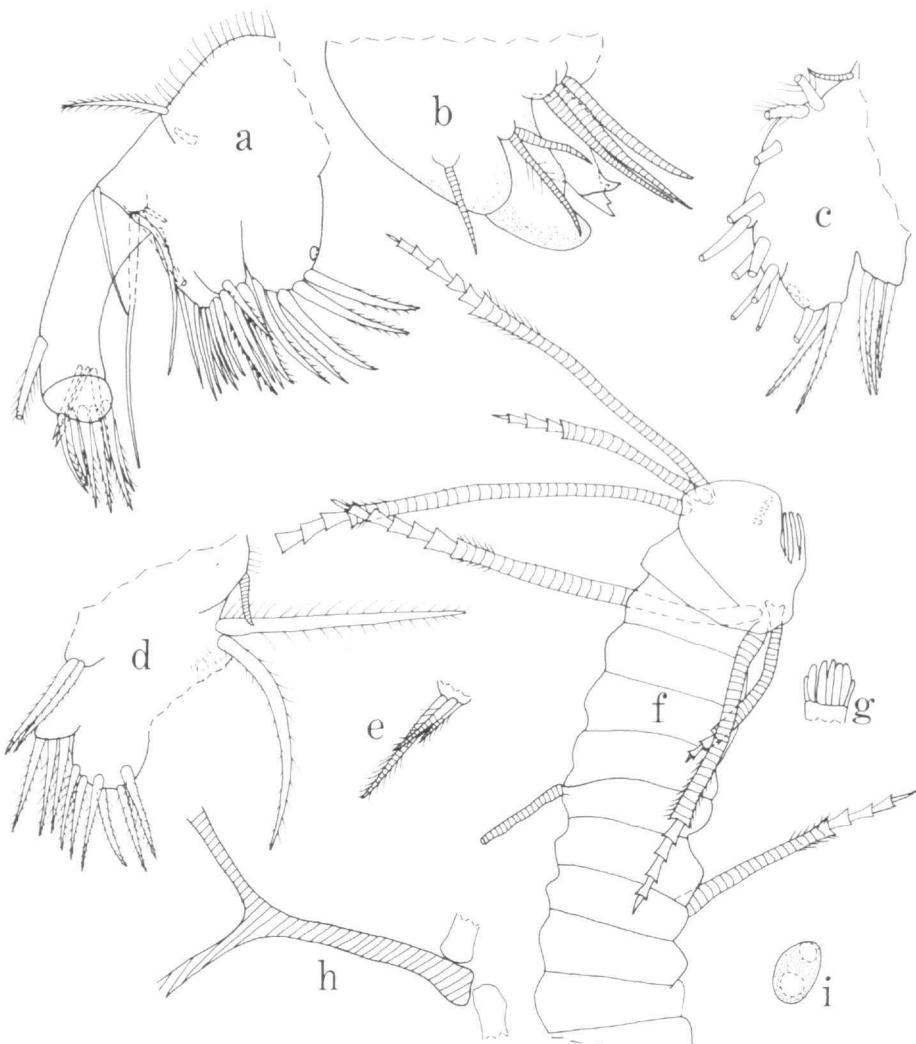


FIGURE 36.—*Streptocheleberis crenulata* Brady, 1890, adult female, slide 8, length 0.95 mm: a, right maxilla, medial view; b, distal part of 5th limb; c, fragment of 6th limb (1 endite missing); d, fragment of 6th limb (1 endite and anterior part of end joint missing); e, endite I of 6th limb (broken off one of the limbs); f, 7th limb; g, comb of 7th limb (belongs to 7th limb not shown in f); h, left Y-sclerite, anterior to left; i, lateral eye.

rior bristles; 2nd joint with 1 long spinous proximal bristle and 1 short terminal bristle. Exopodite: bristles of joints 2–8 with stout ventral spines; tips of bristles of joints 2, 3, 6–8 broken off on both limbs; bristles of joints 3 and 4 with distal natatory hairs; 9th joint with 2 bristles (ventral of these with

stout ventral spines, dorsal bristle short, slender, with minute marginal spines); joints 4–8 with stout basal spine; 9th joint with small lateral spine; joints 2–8 with spines forming row along distal margin.

Mandible (Figure 35f,g): Coxale endite bifurcate,

pectinate, with long hairs near base. Basale: medial side with 2 or 3 small proximal bristles near ventral margin; ventral margin with 4 bristles (some of these may have their bases on medial or lateral sides of joint); dorsal margin of 2nd joint with 1 bristle near middle and 2 terminal. Exopodite about two-thirds length of dorsal margin of 1st endopodial joint, with 2 distal ventral bristles. Endopodite: 1st joint with 3 ventral bristles; dorsal margin with bristles forming 2 groups near middle (1 bristle in proximal group; 5 or 6 in distal group, some with bases on lateral side of joint); ventral margin with bristles forming 2 distal groups (2 in proximal group, 3 in distal group); end joint with 2 stout terminal spinous claws, 1 minute dorsal claw, 1 lateral bristle near dorsal margin, and 2 medial bristles near ventral margin.

Maxilla (Figure 36a): Precoxale and coxale with long hairs fringing dorsal margin. Coxale with hirsute dorsal bristle. Endites I and II each with 6 spinous or pectinate bristles; endite III with about 7 bristles. Lateral side with 1 bristle near base of dorsal bristle of coxale. Basale with 3 bristles along distal margin. Exopodite with 3 bristles. Endopodite: 1st joint with 1 spinous subterminal α -bristle and 3 β -bristles; end joint with about 6 (possibly more) bristles.

Fifth Limb (Figure 36b): Bristles obscure but 3 endites appear to be present. Exopodite: main tooth of 1st joint with stout bifurcate tooth (additional smaller teeth may be present but area obscure on mounted limb); triangular tooth of 2nd joint with inner corner fairly short (not prolonged as on species of *Pseudophilomedes*).

Sixth Limb (Figure 36c-e): Both limbs fragmented. A single bristle in place of epipodial appendage. Endite I with 3 bristles; endite II with 2 or 3 bristles; endite III with 3-5 bristles; endite IV with 5 or 6 bristles. End joint not projecting posteriorly, with about 5 bristles (posterior 2 bristles long, hirsute).

Seventh Limb (Figure 36f,g): Limb with 2 proximal bristles (1 on each side) and 6 terminal bristles (3 on each side); each bristle with up to 6 bells and with marginal spines proximal to bells. Terminus consisting of 4 or 5 short pegs opposite comb with about 7 recurved teeth.

Furca: Missing on specimen.

Rod-shaped Organ: Not observed.

Eyes: Medial eye not observed. Lateral eye pig-

mented brown, small, with 2 large ommatidia (Figure 36i).

Y-Sclerite (Figure 36h): Typical for family.

DISCUSSION.—Unfortunately, the furcal lamellae were missing on the specimen. Also, the rod-shaped organ and medial eye were not observed, and it could not be determined whether they had been lost, or had never been present.

The available appendages show that the species is a member of the Philomedidae, not a male of the Sarsiellidae as thought possible by Müller (1912:51)

The presence of about 7 fairly large sockets on the caudal infold (Figure 34d), that probably once held stout bristles, combined with the morphology of the end joint of the 6th limb, which does not project posteriorly (Figure 36c), suggests that the species is a member of the subfamily Pseudophilomedinae rather than the subfamily Philomedinae.

The subfamily Pseudophilomedinae contains 4 genera: *Pseudophilomedes* Müller, 1893, *Paramekodon* Brady and Norman, 1896, *Tetragondon* Brady and Norman, 1896, and *Harbansus*, new genus. The morphology of the triangular tooth of the 2nd exopodial joint of the 5th limb of *Streptoleberis crenulata* (Figure 36b) indicates that the species is not closely related to members of either *Pseudophilomedes* or *Paramekodon*. The shape of the carapace suggests that *Streptoleberis crenulata* is closely related to members of the genus *Harbansus*. Indeed, it is quite possible that *Harbansus* is a junior synonym of *Streptoleberis*. However, because of the absence of knowledge concerning the morphology of the furca and rod-shaped organ of *Streptoleberis crenulata*, I cannot be certain of the relationship between *Harbansus* and *Streptoleberis*. Therefore, I assign *Streptoleberis crenulata* to the category "genus inquirendum and species inquirenda."

My description of *Streptoleberis crenulata* should permit recognition of the species when additional specimens are collected in the vicinity of Noumea.

Streptoleberis favosa Brady and Norman, 1896

FIGURE 37

Streptoleberis favosa Brady and Norman, 1896:665, pl. 59: figs. 16-18, pl. 62: figs. 20, 21.—Müller, 1912:51 [referred species to "Cypridinidarum genera dubia et species dubiae"].—Kornicker, 1967b:4.

HOLOTYPE.—None selected.

TYPE-LOCALITY.—None selected, but type-series from west coast of Morocco and off the coasts of Sudan, 836–2333 m (Brady and Norman, 1896:666).

MATERIAL.—Through the courtesy of Dr. Albert G. Long I received from the Brady Collection at The Hancock Museum, Newcastle-upon-Tyne, Scotland, 2 slides.

Slide 1: A cardboard slide with 4 whole dry specimens labeled "*Streptoleberis favosa* B&N, *Talisman*, Côte occ. du Maroc [Morocco] au large du Cap Canton, 836 meters, 17/6/83."

Slide 2: A glass slide containing a left and right valve and some appendages labeled "*Streptoleberis favosa* Brad. & Norm., off Marocco [Morocco], *Talisman*, Marquis de Folin, Hancock Museum, Newcastle-on-Tyne." The slide is not in good condition and little information can be derived from it.

REMARKS.—Kornicker and Caraion (1977) described many species of Philomedidae from the coast of West Africa but were unable to relate to *S. favosa* with certainty any species in their collection. Therefore, they left *S. favosa* in the category it was referred to by Müller (1912:51), "Cypridinidarum genera dubia et species dubiae."

Although the poor condition of the mounted syntype (slide 2) does not permit complete knowledge of the morphology of the specimen, examination of that and the dry specimens permits some conclusions.

1. The squarish shape of the 2nd exopodial joint of the 5th limb (Figure 37g,h) indicates that the species is not closely related to either *Pseudophilo-*

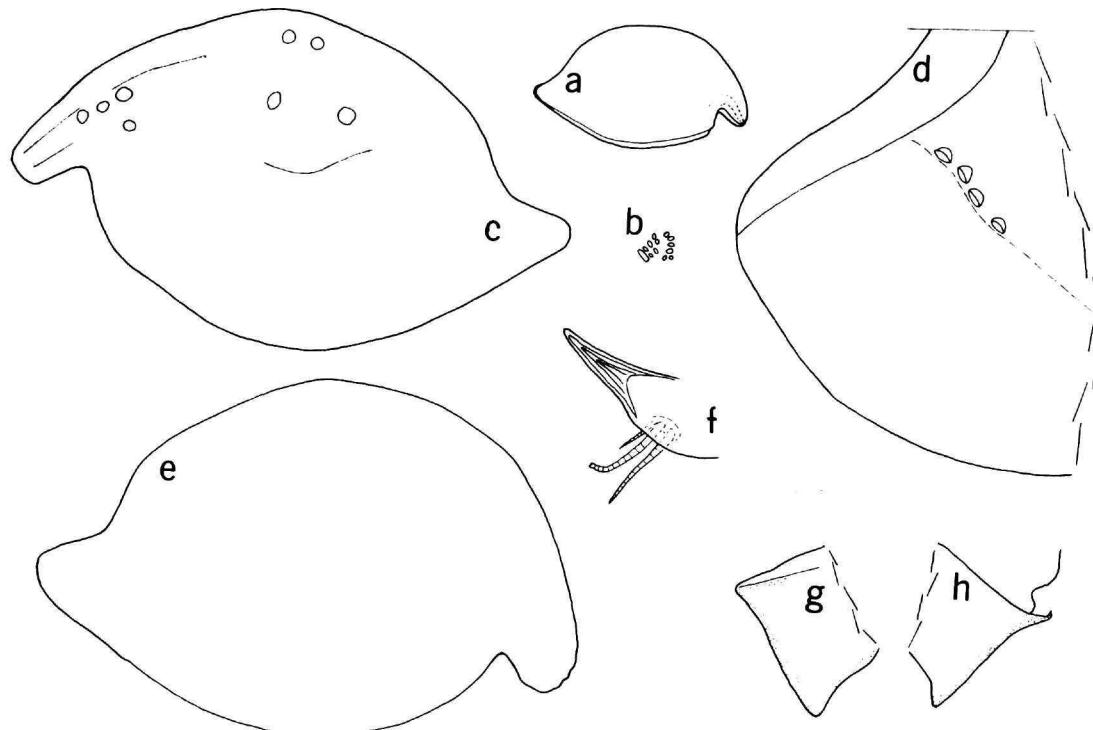


FIGURE 37.—*Streptoleberis favosa* Brady and Norman, 1896: a, dry complete specimen in middle of slide 1, length 1.32 mm; b, central adductor muscle attachment scars of left valve shown in e, outside view, anterior towards left; c, right valve on slide 2, length 1.38 mm, inside view (infold and infold bristles not shown); d, sockets of bristles of caudal process of valve shown in e, medial view; e, left valve on slide 2, length 1.37 mm, inside view (infold and infold bristles not shown); f, endopodite of 2nd antenna on slide 2; g, h, 2nd exopodial joints of 5th limbs on slide 2.

medes Müller, 1893, or *Paramekodon* Brady and Norman, 1896.

2. The endopodite of the 2nd antenna (Figure 37f) is obscure, but seems to consist of a single joint with 3 bristles (1 of these may be longer than others). I am not confident in the accuracy of the observation because of the poor condition of the specimen. One of the dry specimens should be chemically softened and appendages studied. The endopodite resembles somewhat that of *H. bowenae*, and less closely that of the aberrant juvenile female endopodite of *H. schornikovi* illustrated by Kornicker and Caraion (1977: fig. 31c).

3. The valves on slide 2 and the dry specimens on slide 1 vary in length from 1.32 mm to 1.38 mm. The A-1 male of *H. schornikovi* measures 0.96 mm in length. If that measurement is multiplied by 1.26, a growth factor not unreasonable for ostracodes, the adult may be predicted to be about 1.21 mm long. It is not known whether the syntypes of *S. favosa* are adult, but the relative lengths of the syntypes and the hypothetical length of the adult *H. schornikovi* suggest that *S. favosa* is larger than *H. schornikovi*.

4. The anterior edge of the valve medial to the rostrum of the specimen of *S. favosa* on slide 2 is parallel to the edge of the rostrum, not oblique to it as in *H. schornikovi*. However, because of the poor condition of the slide I could not be absolutely certain of this.

5. The bristles on the infold of the caudal process of valves of *S. favosa* on slide 2 are of the type typical of species of *Harbansus*.

6. The number and distribution of claws on the furca illustrated by Brady and Norman (1896: pl. 62: fig. 20) show it to be of the type typical of *Harbansus*, and indicates that *S. favosa* is not closely related to *Tetragonodon* Brady and Norman, 1896.

From the above I have tentatively concluded that *S. favosa* is more closely related to *Harbansus* than to other genera of Philomedidae. Available data indicate that it is not conspecific with *H. schornikovi*, but I do not rule out the possibility that additional study may prove this premise false. Therefore, I favor leaving *S. favosa* in the category to which it was referred by Müller (1912:51), "Cypridinidarum genera dubia et species dubiae."

SUPPLEMENTARY DESCRIPTION.—*Carapace:* Similar in outline to that of *H. schornikovi*, but edge of

valve medial to distal end or rostrum not oblique (so far as I could determine from examination of slide 2, Figure 37a-e), surface with numerous shallow fossae.

Infold: Infold of rostrum with bristles (exact number could not be ascertained because of poor condition of slide 2); infold of caudal process with at least 4 stout bristles (only sockets visible on slide 2, Figure 37d).

Size: Right valve on slide 2, length 1.38 mm, height 0.80 mm; left valve on side 2, length 1.37 mm, height 0.87 mm; dry specimen in middle of slide 1, length 1.32 mm, height 0.82 mm (remaining 3 dry specimens on slide 1 about same size as measured specimen).

Second Antenna: Endopodite obscure but seeming to consist of single joint with 3 bristles (Figure 37f).

Fifth Limb: 2nd exopodial joint with squarish tooth similar to that of *H. schornikovi* (Figure 37g,h).

Furca: Only 3 disarticulate claws observed on slide 2. Furcal lamella illustrated by Brady and Norman (1896: pl. 62: fig. 20) is similar to that of *E. schornikovi*.

Streptoleberis rectirostris Brady and Norman, 1896

Streptoleberis rectirostris Brady and Norman, 1896:666, pl. 59: figs. 11-13.—Müller, 1912:52 [referred species to "Cypridinidarum genera dubia et species dubiae"]—Kornicker, 1967b:4 [concurred with Müller, 1912:52].

HOLOTYPE.—None selected.

TYPE-LOCALITY.—None selected but the 2 specimens upon which the species was based came from the Bay of Biscay and off the coast of Sudan (Mauritania) from depths of 2794 m and 2333 m, respectively.

MATERIAL.—I have a bathyal sample (*Atlantis II*, cruise 31, station 167) from off Brazil that contains specimens that have a carapace with a shape similar to that of *S. rectirostris*. I plan to describe these at a later date. Preliminary study indicates that the species is more closely related to the genus *Philomedes* than to other genera in the family. Until the appendages of *S. rectirostris* are known, the species should remain where it was referred by Müller, "Cypridinidarum genera dubia et species dubiae."

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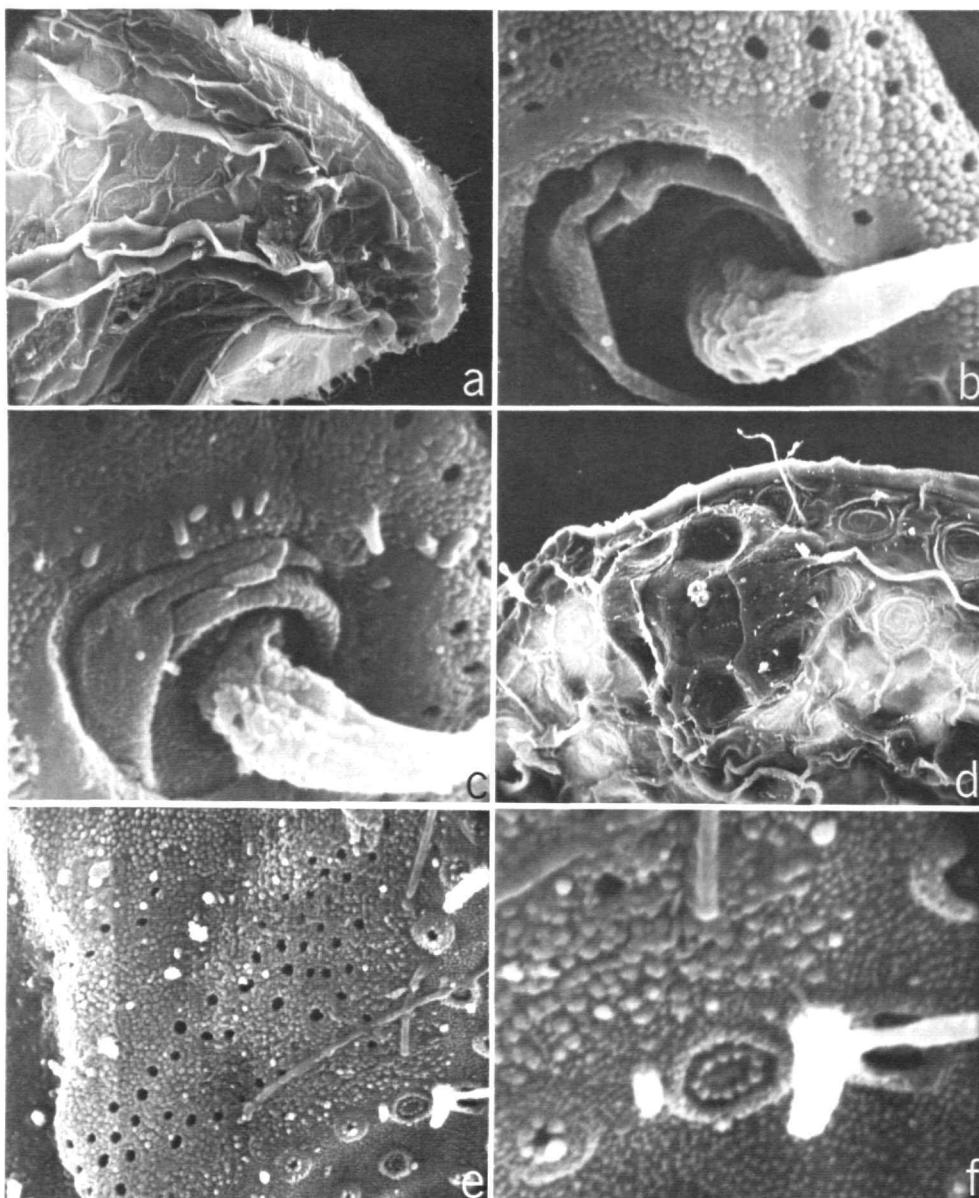


PLATE 1.—*Harbansus paucichelatus* Kornicker, 1958, adult female, USNM 150107, length 0.91 mm, right valve, lateral view: *a*, rostrum, showing fossae, ribs, and lamellar prolongation of selvage, $\times 500$; *b*, detail from near middle of *a* showing pore with emerging bristle, minute open pores and pustules, $\times 10,000$; *c*, detail from lower edge of rostrum in *a* showing pore with emerging bristle, open pores, pustules, and short blunt spines, $\times 10,000$; *d*, posterodorsal corner of valve showing fossae and long bristles, $\times 500$; *e*, detail from middle of *d* showing open pores, pustules, and flat-bottomed pits with minute pustules on bottom, long rods may be bristles, $\times 5000$; *f*, detail from lower right of *e* showing flat-bottomed pits with ring of minute pustules, and short blunt spines, $\times 15,750$. (Micrographs reduced to 70%).

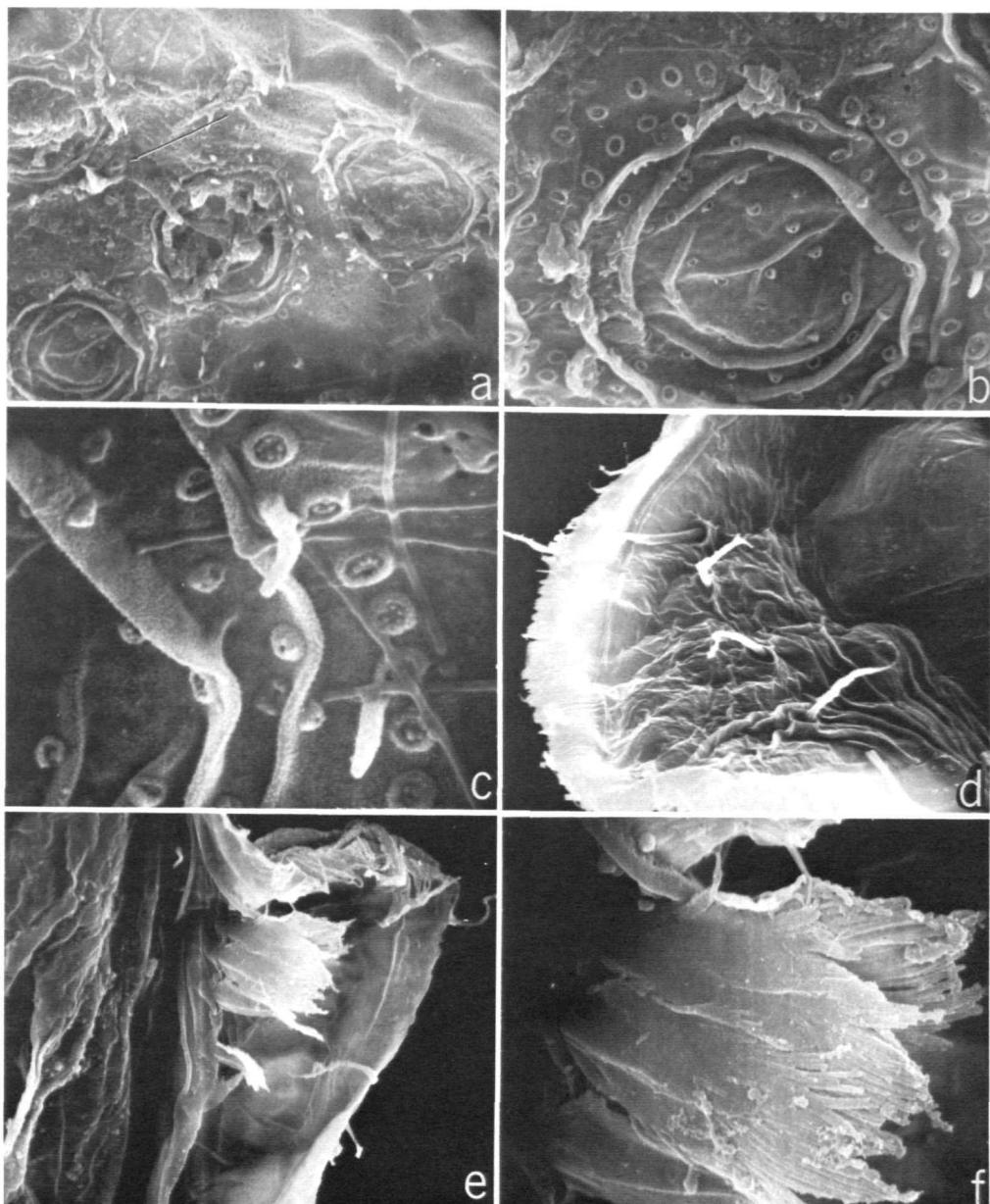


PLATE 2.—*Harbansus paucichelatus* Kornicker, 1958, adult female, USNM 150107, length 0.91 mm, right valve: *a*, lateral surface showing fossae (arrow points to minute coccolith in upper left of middle of photo), $\times 1300$; *b*, fossa on lower left of *a*, showing small nodes with central pit on bottom of fossa and flat-bottomed pits, open pores, and short blunt spines outside of fossa, $\times 3350$; *c*, from *b* showing flat-bottomed pits containing pustules, and short blunt spines, $\times 8000$; *d*, inside view of rostrum showing bristles and lamellar prolongation of selvage, $\times 900$; *e*, inside view of caudal process showing frondlike bristles, $\times 900$; *f*, bristles shown in *e*, $\times 2900$. (Micrographs reduced to 71%)

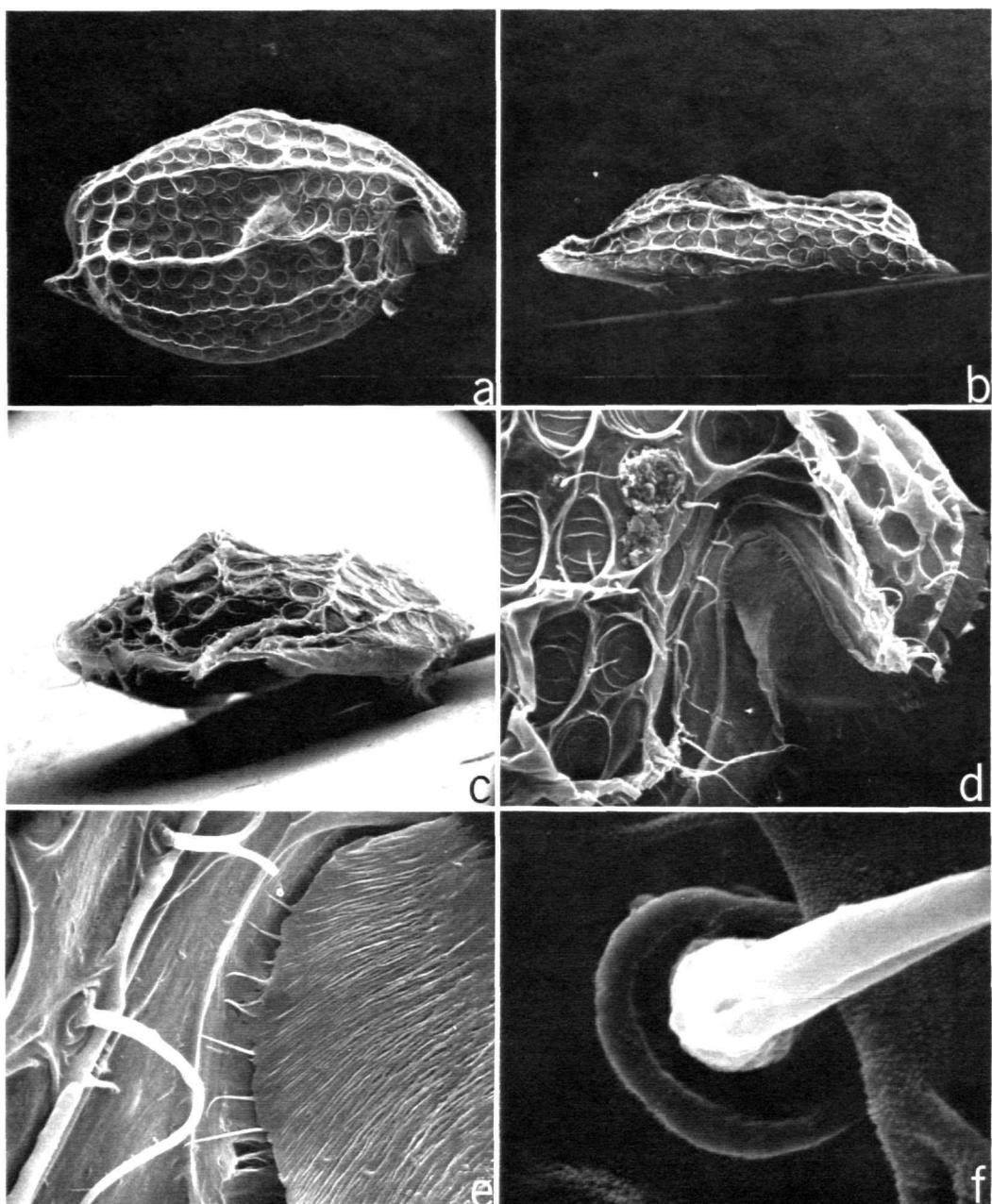


PLATE 3.—*Harbansus bradmyersi*, new species, adult female, paratype, USNM 156688, length 0.93 mm, right valve, outside view: *a*, complete valve, $\times 100$; *b*, dorsal view, anterior to left, $\times 100$; *c*, anterior view, venter to left, $\times 175$; *d*, rostrum and incisor, $\times 400$; *e*, posterior edge of incisor showing fringed edge of lamellar prolongation of selvage and 2 bristles of valve, $\times 2000$; *f*, pore on caudal process with emerging bristle (note pit near base of bristle), $\times 14,000$. (Micrographs reduced to 74%.)

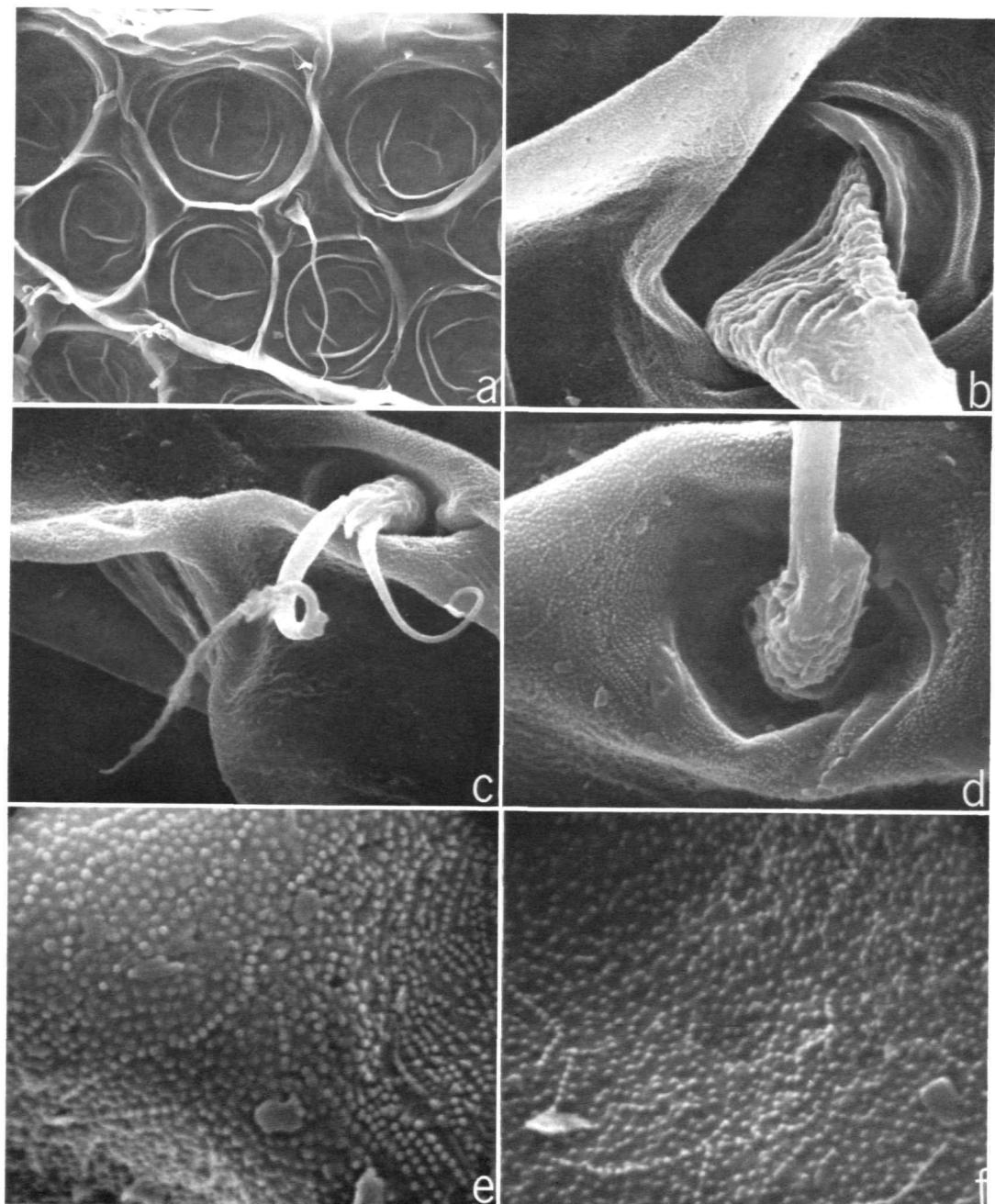


PLATE 4.—*Harbansus bradmyersi*, new species, adult female, paratype, USNM 156688, length 0.98 mm, right valve, outside view: *a*, shallow fossae and bristles $\times 2500$; *b*, detail of base of bristle and pore near middle of *a*, $\times 7500$; *c*, bifurcate bristle on lower left of *a*, $\times 7500$; *d*, base of bristle on rostrum, $\times 10,000$; *e*, *f*, pustules on valve surface, $\times 25,000$. (Micrographs reduced to 76%)

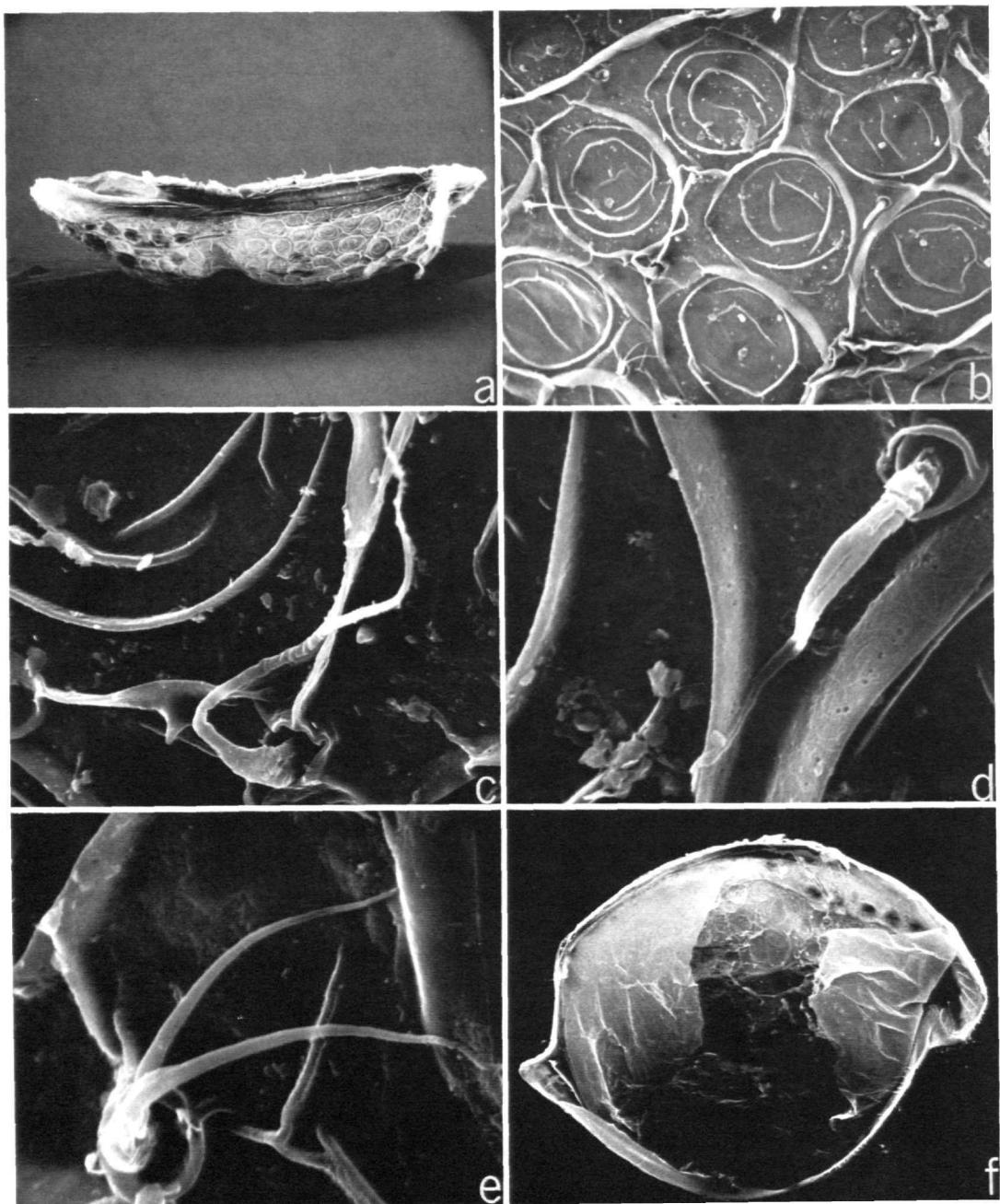


PLATE 5.—*Harbansus bradmyersi*, new species, adult female, paratype, USNM 156688, length 0.93 mm, left valve: *a*, dorsal view, anterior to left, $\times 115$; *b*, fossae and bristles, $\times 750$; *c*, single bristle and pore left of middle of *b*, $\times 2800$; *d*, bifurcate bristle to right of middle of *b*, $\times 5000$; *e*, bifurcate bristle on lower left of *b*, $\times 6400$; *f*, inside view of valve, $\times 115$. (Micrographs reduced to 77%)

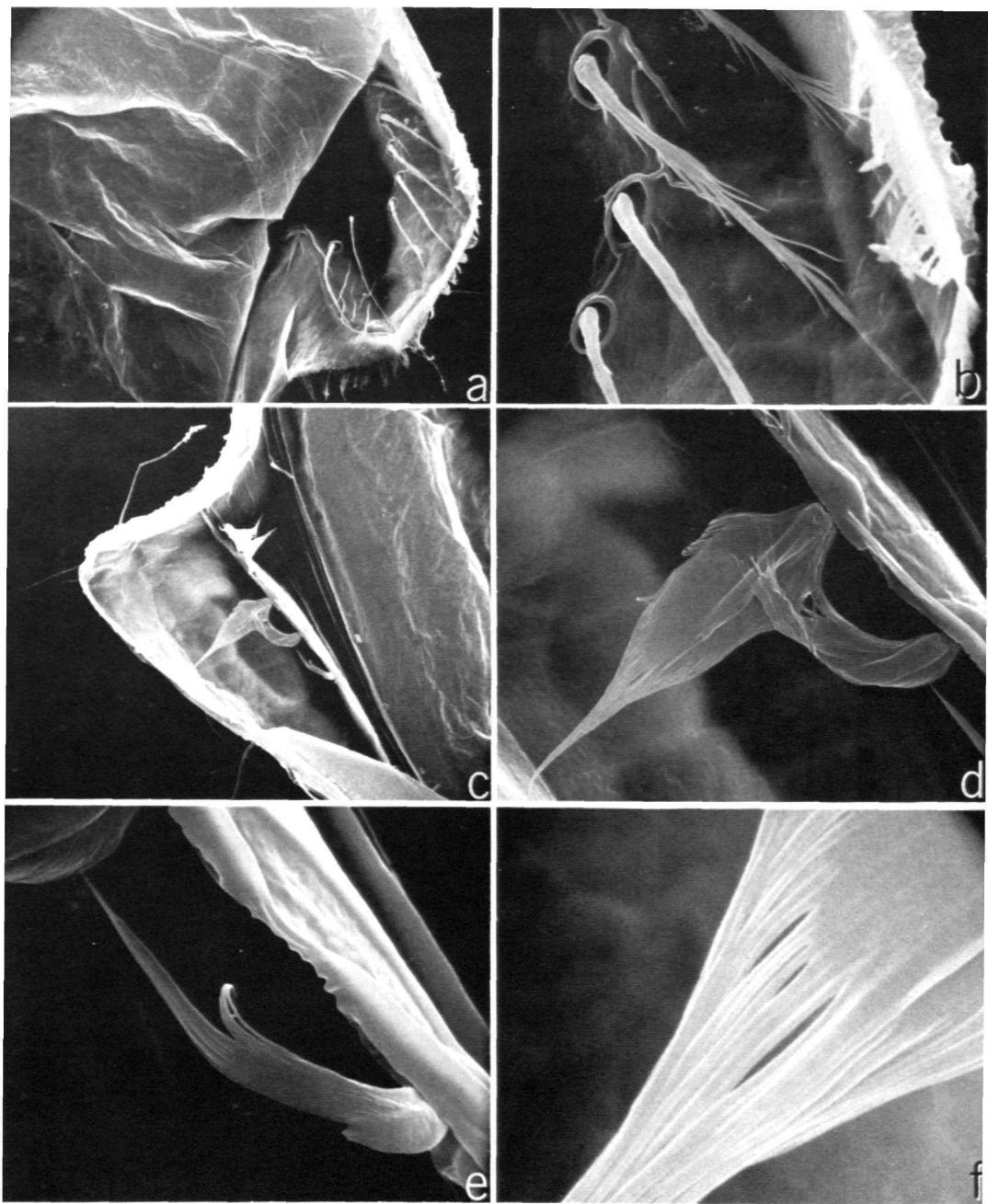


PLATE 6.—*Harbansus bradmyersi*, new species, adult female, paratype, USNM 156688, length 0.93 mm, left valve, inside view: *a*, rostrum showing bristles and fringed margin of lamellar prolongation of selvage, $\times 410$; *b*, bristles of rostrum, from *a*, $\times 1825$; *c*, caudal process showing frondlike bristles, $\times 575$; *d*, bristle in *c*, $\times 2150$; *e*, lower bristle in *c*, $\times 5000$; *f*, distal part of bristle in *d*, $\times 11,500$. (Micrographs reduced to 77%.)

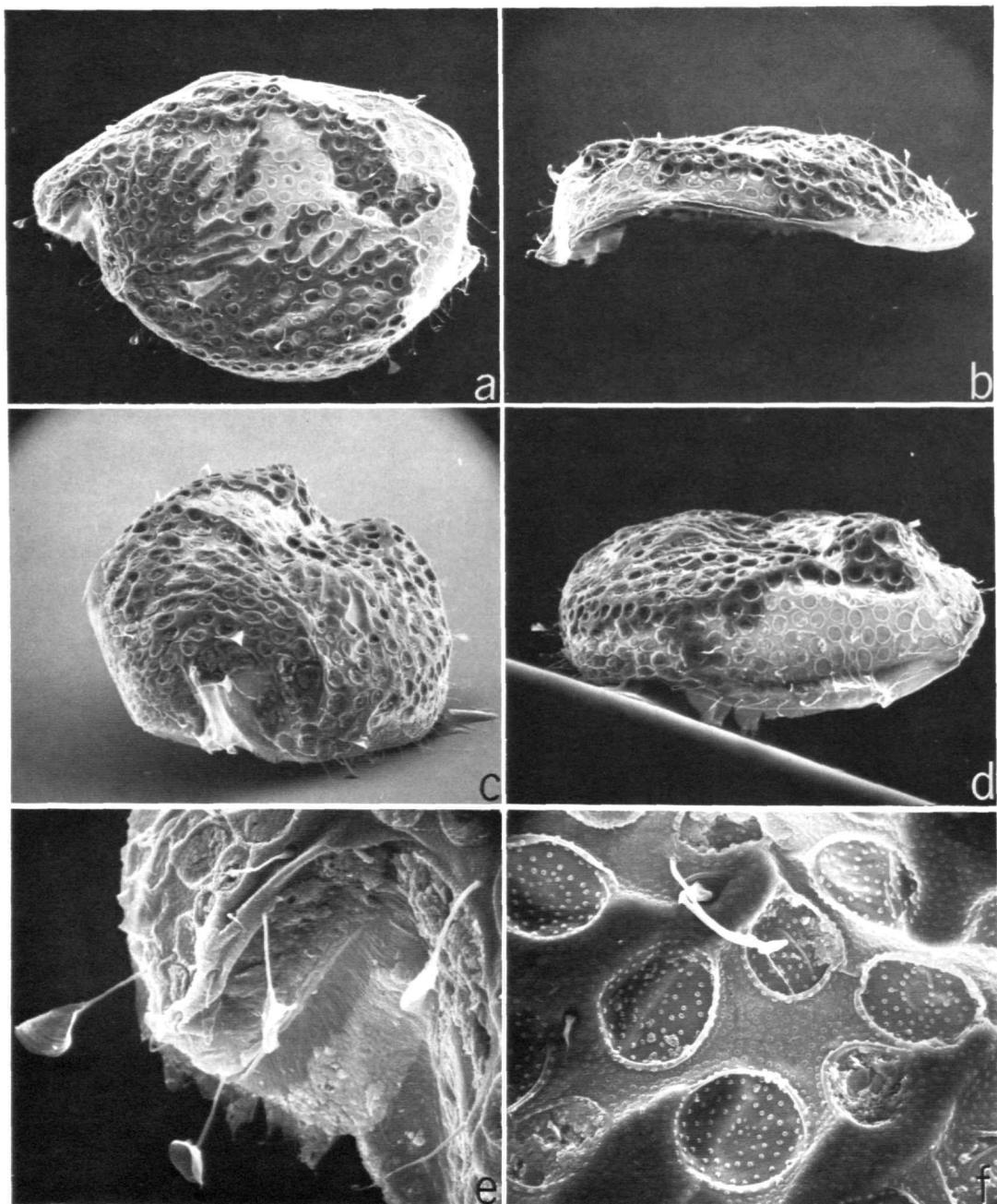


PLATE 7.—*Harbansus mayeri*, new species, adult female, holotype, USNM 156694, length 0.96 mm, left valve (distorted), outside view; *a*, complete valve, lateral view, $\times 95$; *b*, dorsal view, anterior to right, $\times 95$; *c*, oblique view of anterior, $\times 120$; *d*, oblique posterior view, venter to left, $\times 120$; *e*, incisur and tip of rostrum in *a*, note stalked protistans, $\times 500$; *f*, fossae and bristles in *a*, $\times 775$. (Micrographs reduced to 77%).

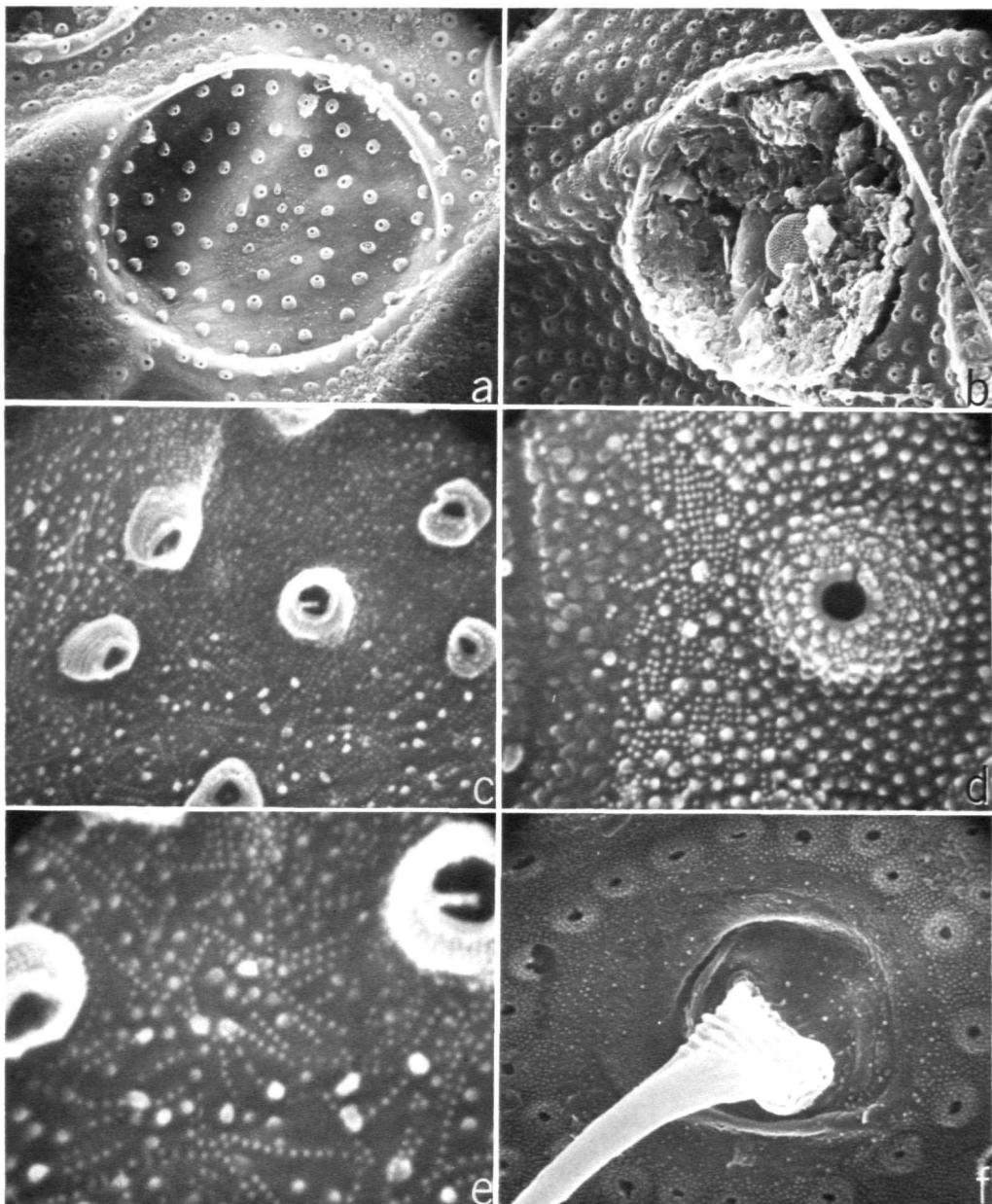


PLATE 8.—*Harbansus mayeri*, new species, adult female, holotype, USNM 156694, length 0.96 mm, left valve, outside view: *a*, fossa from lower middle of Plate 7*f* showing nodes with central pit on bottom of fossa, and lower nodes with central pit outside of fossa, $\times 2000$; *b*, fossa filled with debris and diatom, $\times 2300$; *c*, nodes on bottom of fossa in *a* showing peripheral lip around pit of node, $\times 14,000$; *d*, papillae covering low nodes and surface between nodes, from valve surface between fossae in *f*, $\times 20,000$; *e*, detail of *c* showing papillae on, and between, nodes, $\times 30,000$; *f*, low nodes, papillae, and bristle emerging from closed pore, $\times 5250$. (Micrographs reduced to 72%.)

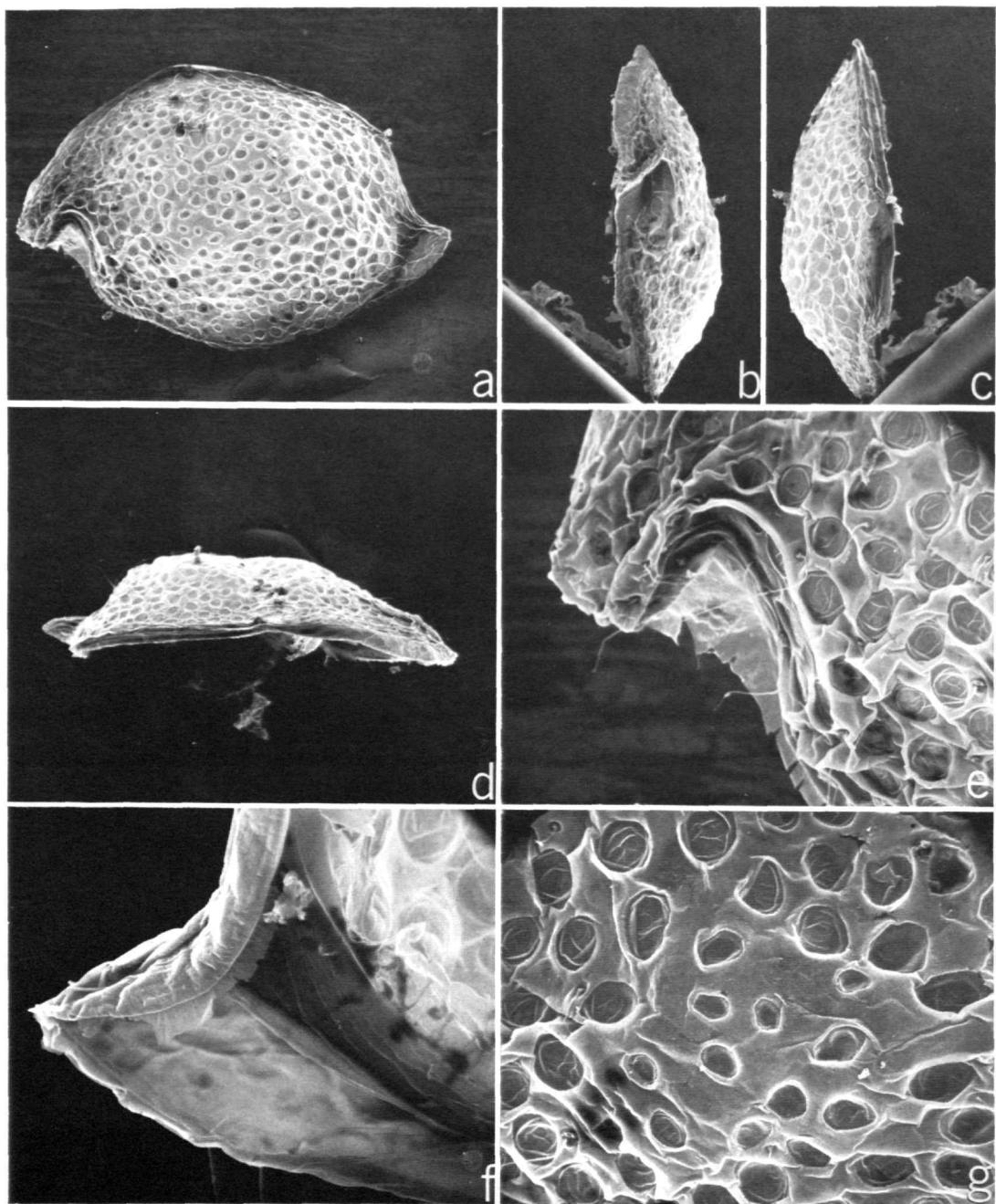


PLATE 9.—*Harbansus dayi*, new species, adult female, paratype, USNM 156776, length 1.36 mm, left valve: *a*, complete valve, lateral view, $\times 70$; *b*, anterior view, $\times 400$; *c*, posterior view, $\times 80$; *d*, dorsal view, anterior to right, $\times 70$; *e*, incisor and rostrum in *a*, $\times 250$; *f*, caudal process, inside view, $\times 400$; *g*, fossae and bristles near middle of *a*, $\times 280$. (Micrographs reduced to 77%.)

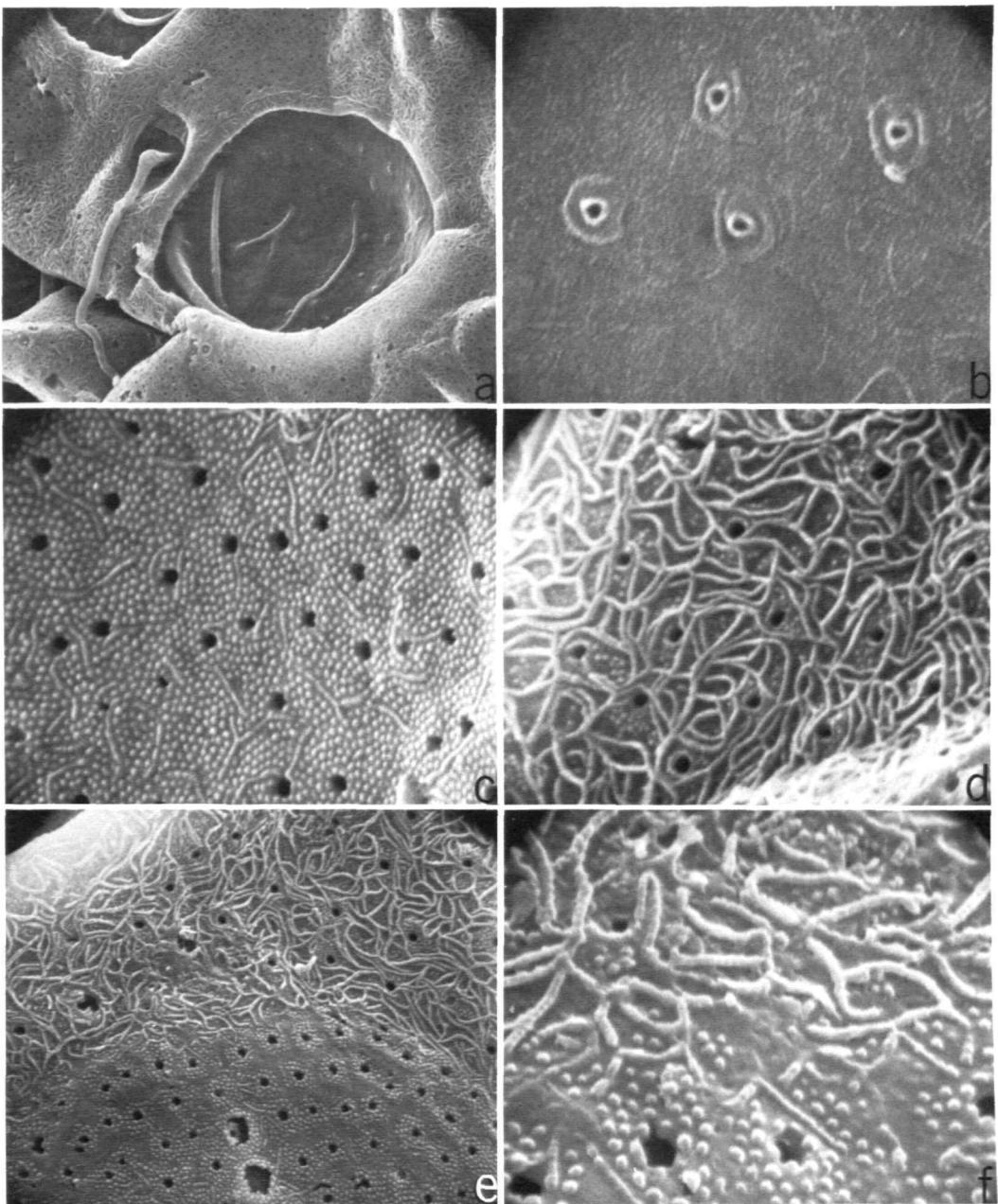


PLATE 10.—*Harbansus dayi*, new species, adult female, paratype, USNM 156776, left valve, outside view: a, fossae and bristle in left of middle of Plate 9g, $\times 1500$; b, nodes with central pore at bottom of fossa in a, $\times 10,000$; c, simple pores and pustules near top of a, $\times 10,000$; d, pores and spaghetti-like structure in lower right of a, $\times 10,000$; e, part of valve with and without spaghetti-like structure, $\times 5,000$; f, detail from e, $\times 20,000$. (Micrographs reduced to 74%.)

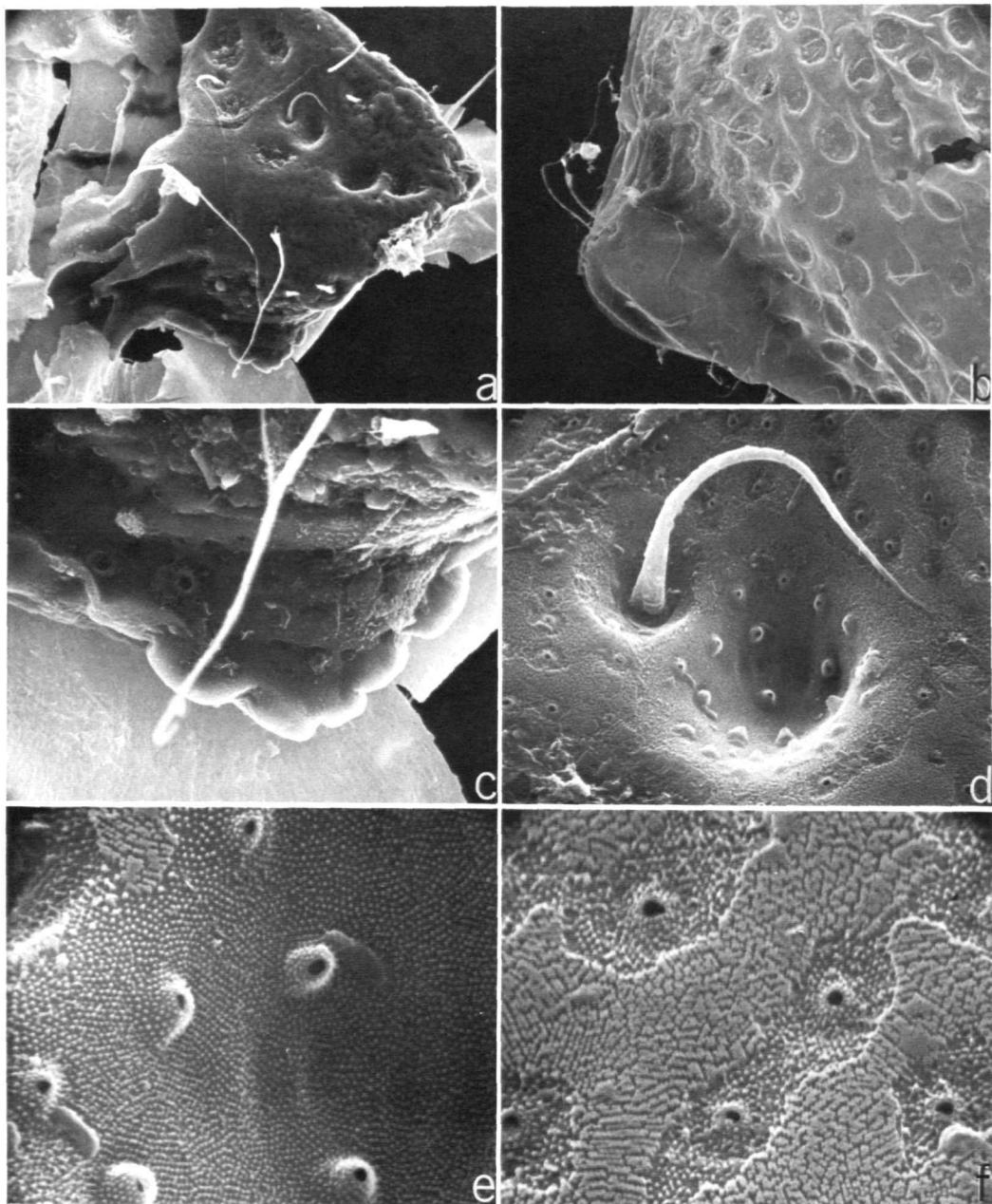


PLATE 11.—*Harbansus bowenae*, new species, adult female, paratype, USNM 156912, length 0.92 mm, right valve, lateral view: *a*, rostrum with shallow fossae and bristles, $\times 520$; *b*, caudal process, $\times 340$; *c*, nodes on posterior corner of rostrum, $\times 2100$; *d*, valve surface showing bristle, fossa, and nodes with central pore, $\times 3200$; *e*, detail from *d* showing nodes with central pore and pustules, (note peculiar surface structure on upper left), $\times 10,700$; *f*, pores and peculiar surface structure in *d*, $\times 10,700$. (Micrographs reduced to 75%.)

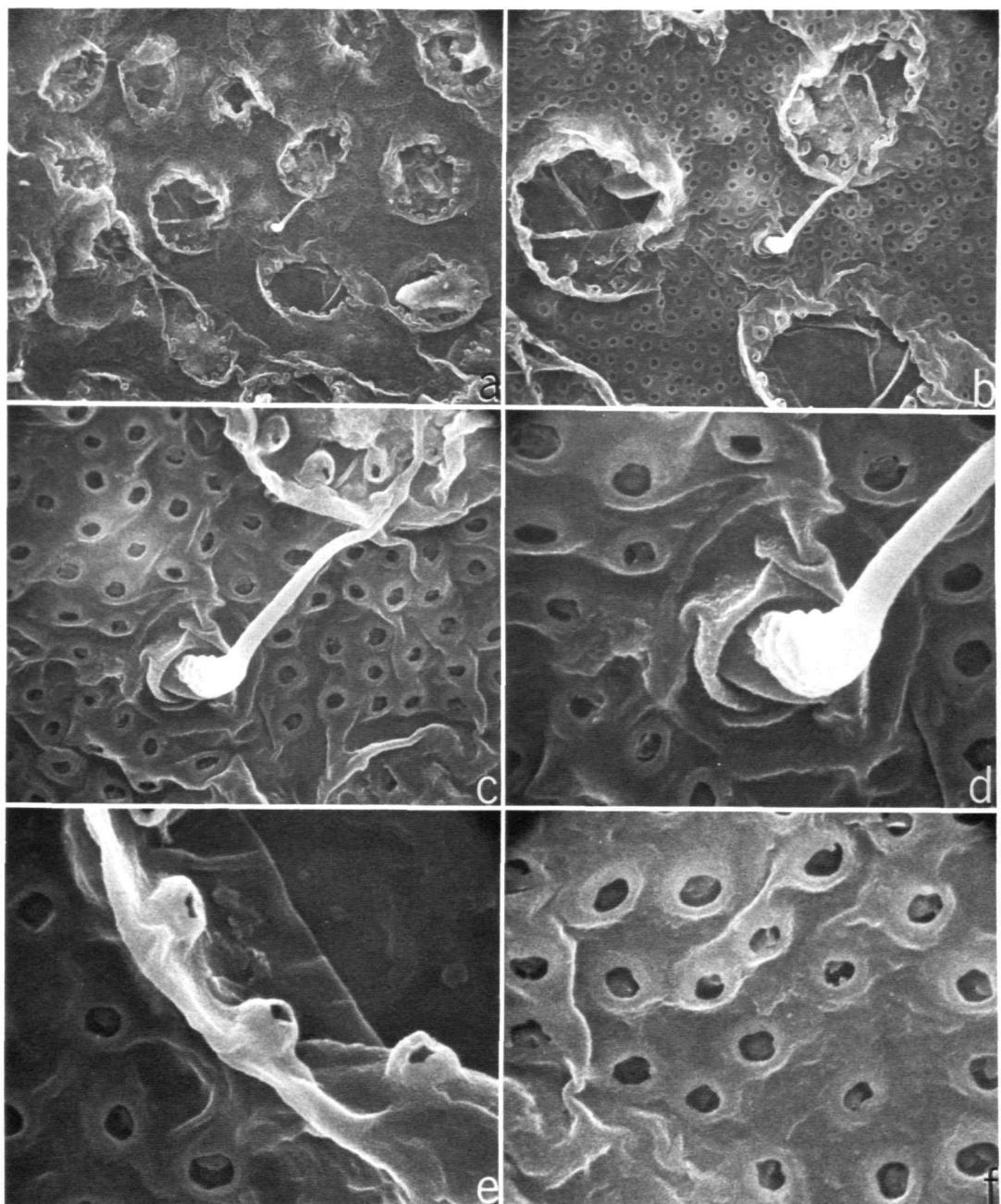


PLATE 12.—*Harbansus barnardi*, new species, adult female, holotype, USNM 156907, length 1.01 mm, right valve: *a*, fossae and bristles near valve middle, $\times 1070$; *b*, detail of fossae and bristle near middle of *a*, $\times 2100$; *c*, detail from near middle of *b*, $\times 5300$; *d*, base of bristle and shallow pores in *c*, $\times 10,000$; *e*, nodes with central pit forming row around rim of fossa in lower right of *b*, $\times 10,000$; *f*, shallow pores in *c*, $\times 10,000$. (Micrographs reduced to 77%.)

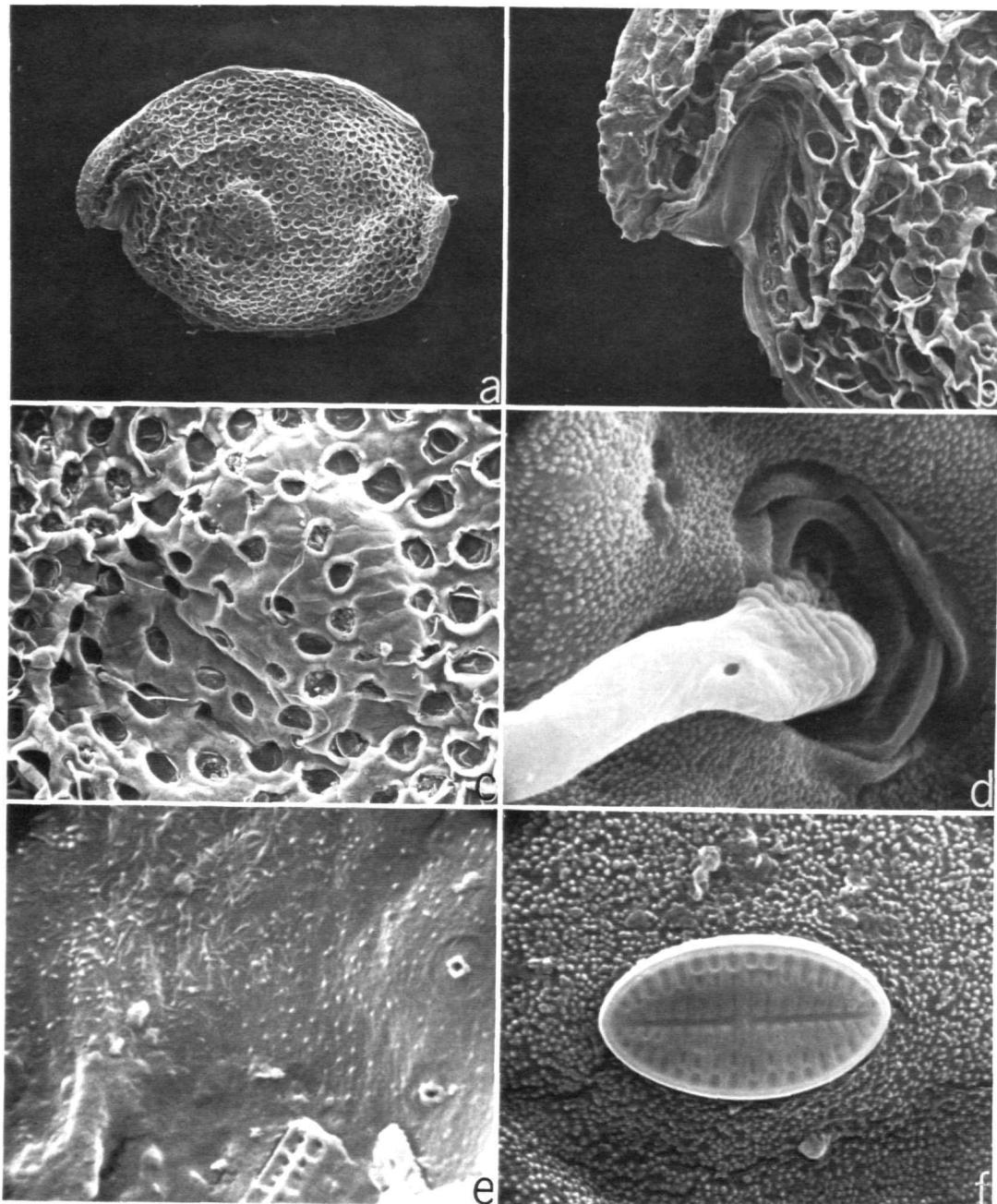


PLATE 13.—*Harbansus* species A, adult female, USNM 157752, length 1.18 mm, distorted left valve, lateral view: *a*, complete valve, $\times 85$; *b*, anterior, from *a*, $\times 300$; *c*, fossae and bristles in vicinity of adductor muscle scar area in *a*, $\times 360$, *d*, bristle in *b* (note pore near base of bristle), $\times 8600$; *e*, bottom of fossa showing 2 pores, from right end of *c*, $\times 10,500$; *f*, diatom attached to valve, $\times 7500$. (Micrographs reduced to 77%.)

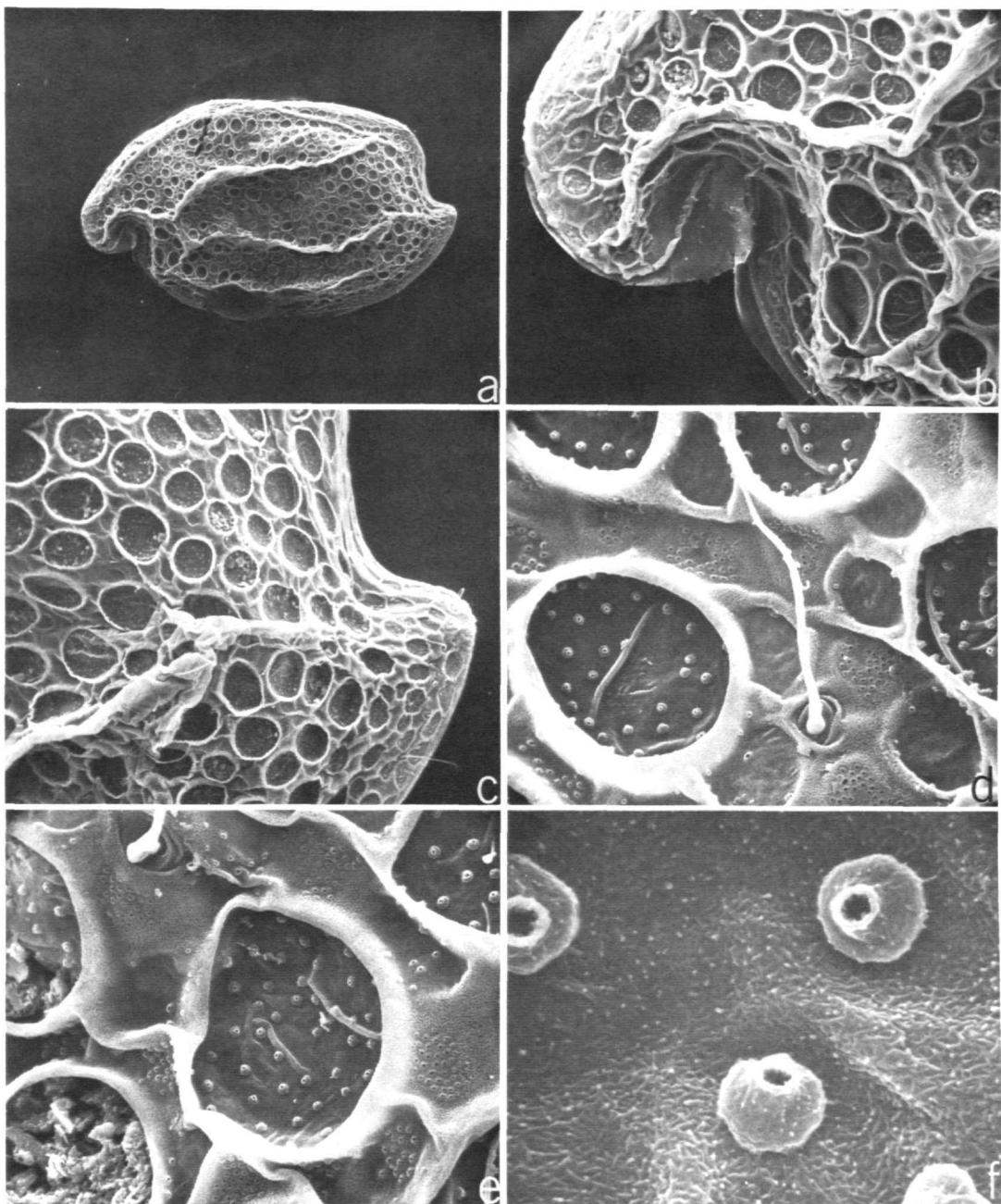


PLATE 14.—*Harbansus* species B, adult female, USNM 157753, length 1.26 mm, left valve, lateral view: *a*, complete valve, $\times 75$; *b*, anterior of *a*, $\times 300$; *c*, posterior of *a*, $\times 300$; *d*, fossae, nodes with central pore, pore fields, and long bristle, from *b*, $\times 1500$; *e*, fossae, nodes with central pore, pore fields, and proximal part of bristle, from *b*, $\times 1500$; *f*, nodes with central pore containing minute inner teeth, from bottom of fossa near middle of *e*, $\times 15,000$. (Micrographs reduced to 77%.)

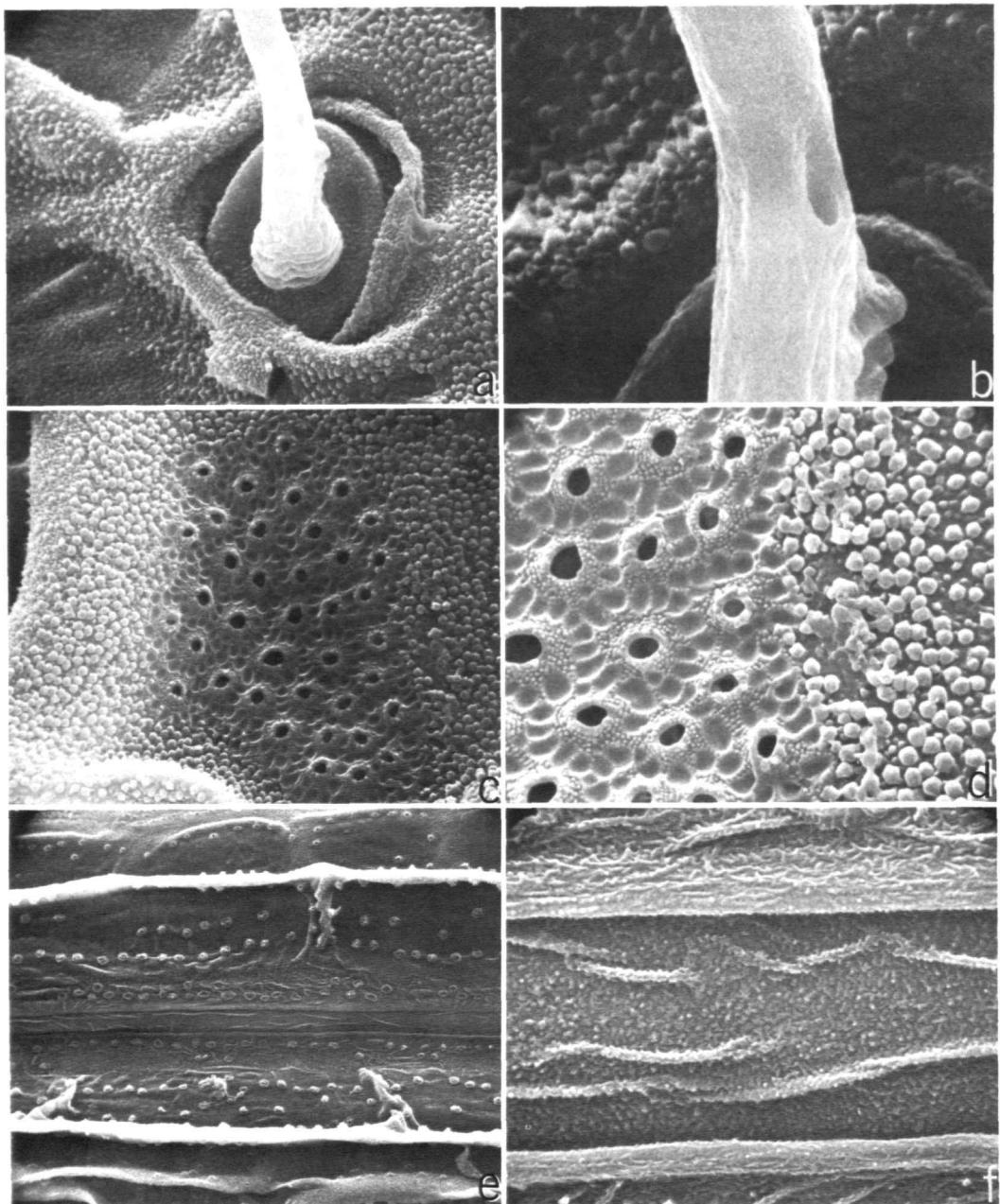


PLATE 15.—*Harbansus* species B, adult female, left valve, USNM 157753, length 1.26 mm: a, proximal part of bristle emerging from closed pore, and valve surface showing minute pustules, from Plate 14d, $\times 7500$; b, pore near base of bristle in a, $\times 20,000$; c, pore field to right of fossa near middle of Plate 14e, $\times 7500$; d, detail of c, $\times 15,000$; e, dorsal view of left valve with part of right valve attached, narrow horizontal band in middle of photo is ligament, $\times 1500$; f, detail of ligament in e, $\times 15,000$. (Micrographs reduced to 75%.)

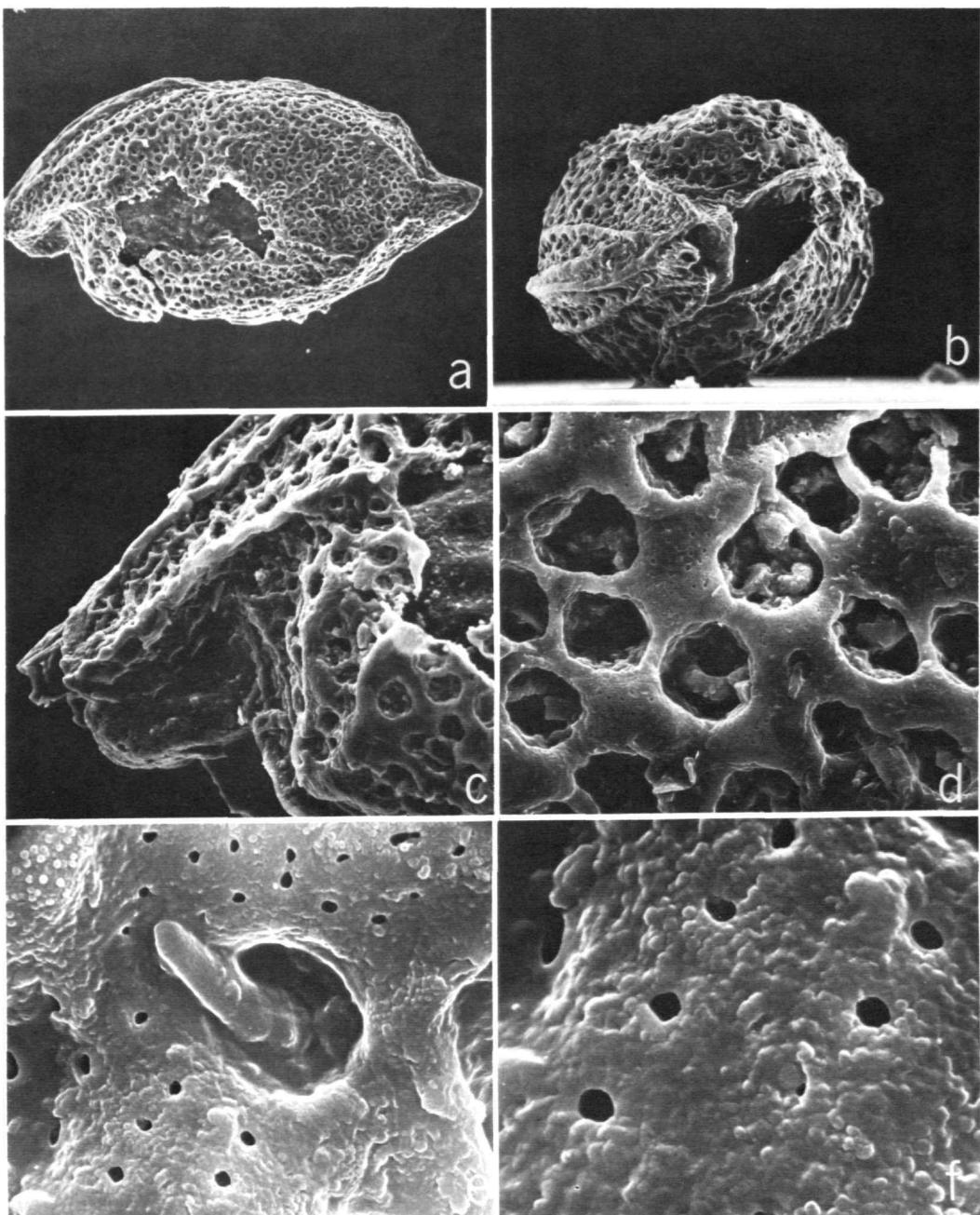


PLATE 16.—*Streptoleberis crenulata* Brady, 1890, adult female, slide 8, length 0.95 mm, carapace: *a*, complete specimen from left side, anterior to left, $\times 100$; *b*, anterior view of specimen on right side, venter to right, $\times 130$; *c*, detail of rostrum, from *a*, $\times 280$; *d*, detail of surface showing fossae and scattered bristles, $\times 1000$; *e*, detail showing bristle and pores, from upper left of *d*, $\times 5000$; *f*, detail of pores in lower left of *e*, $\times 10,000$. (Micrographs reduced to 81%.)

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