

LUMBRINERIDAE, ARABELLIDAE, AND  
DORVILLEIDAE (POLYCHAETA),  
PRINCIPALLY FROM FLORIDA,  
WITH DESCRIPTIONS OF  
SIX NEW SPECIES

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*Abstract.*—The genus *Lumbrinerides* is summarized. *Lumbrinerides jonesi*, *Lumbrineris ernesti*, *Lumbrineris verrilli*, *Protodorvillea bifida*, and *Schistomeringos pectinata*, n. spp., from Florida, *Lumbrinerides dayi*, n. sp., from North Carolina, and *Lumbrineris crosslandi*, n. sp., from the Red Sea, are described. *Lumbrineris dubeni* (Kinberg), *L. tenuis* (Verrill), *L. hebes* (Verrill), *L. testudinum* (Augener), *Arabella mutans* (Chamberlin), *A. multidentata* (Ehlers), and *A. maculosa* Verrill are redescribed. Supplemental descriptions are provided for *Dorvillea sociabilis* (Webster) and *Protodorvillea kefersteini* (McIntosh) from Florida.

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Introduction

This report is based primarily on specimens collected during an environmental baseline study of nearshore marine fauna near the Florida Power and Light Co., Inc., nuclear power plant at Hutchinson Island, St. Lucie County, southeastern Florida. Some specimens from other areas were examined to clarify taxonomic problems and are also included. A complete report on the Polychaeta of the Hutchinson Island study is in preparation.

The study area was characterized and methods of collection were described by Gallagher and Hollinger (1977). Sediments were described by Gallagher (1977), and other aspects of the physical and chemical environment were reported by Worth and Hollinger (1977). Brief descriptions of benthic sampling stations and methods are given below.

Station I (27°21.3'N, 80°14.1'W): seaward margin of beach terrace, about 0.5 km offshore; mean depth about 8.4 m; gray, hardpacked, moderately well sorted, very fine to fine quartose sands.

Station II (27°21.6'N, 80°13.2'W): shallow trough ENE of Station I, approximately midway between beach terrace and Pierce Shoal, an offshore bar; mean depth about 11.2 m; poorly sorted, coarse to very coarse calcareous sands, with some shell fragments in granule class and minute amounts of silts and clays.

Station III (27°22.0'N, 80°12.4'W): Pierce Shoal, 3 km FNE of Station I;

mean depth about 7.1 m; well sorted, clean, medium calcareous sands containing less than 2% large shell particles.

Station IV (27°20.7'N, 80°12.8'W): 1.6 km SSE of Station II in shallow trough about 0.6 km W of southern tip of Pierce Shoal; mean depth about 10.9 m; poorly sorted calcareous sands, predominantly in coarse category; large shell particles accounting for less than 20% sediment weight, minute amounts of fine sands always present.

Station V (27°22.9'N, 80°13.9'W): 2.2 km NNW of Station II; mean depth about 10.9 m; poorly sorted, coarse to very coarse calcareous sands; granule-sized particles consistently more than 25% sediment weight, fine to very fine quartz particles comprising 3–11% sediment weight, mud (clay) fraction less than 1% total weight always present.

Samples were taken bimonthly for two years from September 1971 through July 1973 using a Shipek grab and consisted of five replicates covering a total bottom area of about 0.20 m<sup>2</sup>. Lighter specimens were elutriated on a 0.71 mm screen after return to shore. Remaining sediment was also screened, and specimens were removed under a dissecting microscope. These procedures resulted in collection of many small specimens. Specimens were sorted to phyla and transmitted to the Florida Department of Natural Resources Marine Research Laboratory at St. Petersburg for identification.

Types and additional specimens available for study are deposited in the following institutions: Allan Hancock Foundation, University of Southern California (AHF); British Museum (Natural History) (BMNH); Florida Department of Natural Resources Marine Research Laboratory (FSBC 1); Museum of Comparative Zoology, Harvard University (MCZ); Naturhistoriska Riksmuseet, Stockholm (NRS); National Museum of Natural History, Smithsonian Institution (USNM); Peabody Museum of Natural History, Yale University (YPM); Smithsonian Institution, Ft. Pierce, Florida (SIFP); Zoologisches Museum, Berlin (ZMB); and Zoologisches Museum, Hamburg (ZMH).

Maxillae I–V are abbreviated to M I–V in descriptions.

Family Lumbrineridae Malmgren, 1867

Genus *Lumbrinerides* Orensanz, 1973

*Type-species*.—*Lumbrinerides gesae* Orensanz, 1973, by original designation.

*Diagnosis*.—Prostomium long, distally pointed. Peristomium divided into 2 short rings. Anterior parapodia very small, almost vestigial. Setae including simple bidentate hooded hooks and simple limbate setae. Pygidium terminating in flattened sucker-like lobe, without anal cirri. Branchiae absent. Mandibles with posterior rami completely fused into a median appendage

and distally contiguous. Maxillary supports relatively large. M I broad, with inner borders sinuous or dentate. M II with imperfectly dentate borders or with short, blunt teeth. M III unidentate. M IV in form of more or less rounded adentate plate [after Orensanz, 1973b].

*Remarks.*—Orensanz (1973b) referred six species to *Lumbrinerides*; all but the poorly known *L. nasuta* (Verrill, 1900) from Bermuda are summarized, and five additional species are added below, including two new combinations, two new species and one indeterminable to species. Features of some added species amend the variation of characters known for the genus. Maxillae I of two added species are adentate; mandibles of one are distinctly divided posteriorly; and two are reported to have only one visible peristomial segment. Specific diagnostic characters among the species are presently difficult to define, consisting principally of size, number of visible peristomial segments, range of appearance of hooded hooks and details of mouthparts. As a result, some biological species are apparently clearly distinguishable from others only on a zoogeographic basis.

The original description of *L. nasuta* (Verrill, 1900:651) stated that uncini are "terminated by two small strongly incurved apical hooks, with a large, stout blunt ventral hook," a character indicating the species should be assigned to *Lumbrineriopsis* Orensanz, 1973.

#### KEY TO SPECIES OF *LUMBRINERIDES*

1. One visible peristomial segment ..... 2
  - Two visible peristomial segments ..... 3
2. M I with 1 rounded accessory tooth; M II with 3 rounded teeth; lateral supports absent or reduced ..... *L. carpinei*
  - M I with 1–2 very small teeth; M II with 2–3 small pointed teeth; lateral supports long, prominent ..... *L. crassicephala*
3. M I without accessory teeth ..... 4
  - M I with accessory teeth ..... 5
4. Mandibles with small posterior notch; M II with 3 molar-like teeth ..... *L. jonesi*, n. sp.
  - Mandibles widely divided posteriorly; M II with 3 rounded teeth .. *Lumbrinerides* sp.
5. M I with 1 accessory tooth ..... 6
  - M I with 2 accessory teeth ..... 7
6. Accessory tooth of M I as large as distal tooth; hooks beginning in middle of body ..... *L. acuta*
  - Accessory tooth small; hooks beginning on setiger 1 ..... *L. aberrans*
7. Accessory teeth of M I near tip ..... *L. platypygos*
  - Accessory teeth of M I near middle ..... 8



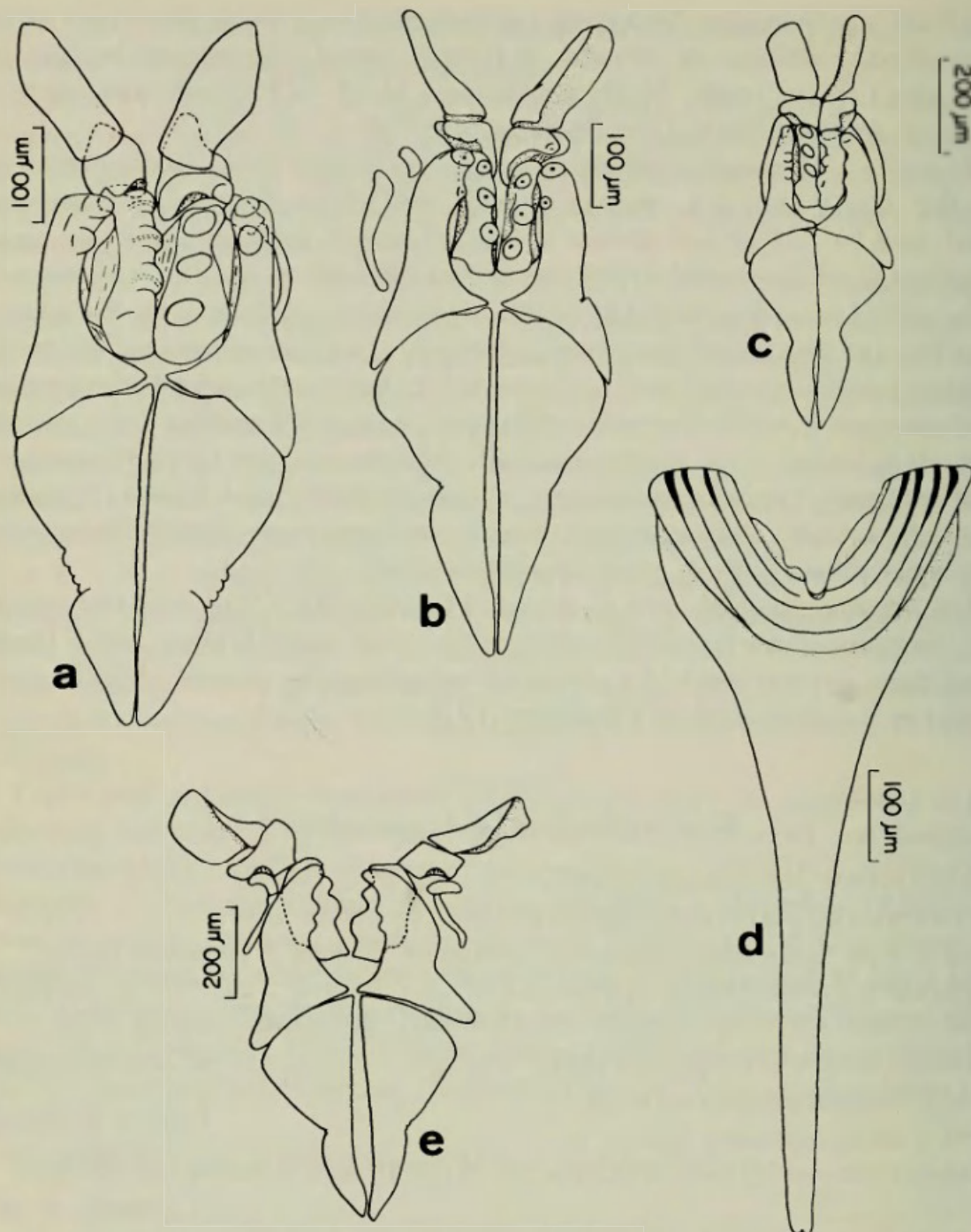


Fig. 1. *Lumbrinerides acuta* (syntype USNM 12895): a, Maxillae. *Lumbrinerides aberrans* (holotype BMNH ZB 1963.1.86): b, Maxillae. *Lumbrinerides dayi*: c, Maxillae of juvenile; d, Mandibles, ventral view; e, Maxillae of large specimen.

8. Accessory teeth of M 1 small; mandibles 3 times longer than broad  
 ..... *L. acutiformis*  
 - Accessory teeth of M 1 large, as broad as tip; mandibles 2.2–2.3  
 times longer than broad ..... 9

9. M II with irregular subequal teeth; mandibles posteriorly tapered, pointed ..... *L. gesae*  
 – Basal tooth of M II twice as broad as others; sides of mandibles parallel posteriorly, with small posterior notch ..... *L. dayi*, n. sp.

*Lumbrinerides acuta* (Verrill, 1875)

Fig. 1a

*Lumbriconereis acuta* Verrill, 1875:39, pl. 3, fig. 5.

*Lumbrineris acuta*.—Hartman, 1942a:114, figs. 10a–d.

*Lumbrinerides acuta*.—Orensanz, 1973b:371.—Gardiner, 1976:203, figs. 26i–l [in part, New England specimens].

*Material examined*.—RHODE ISLAND: Off Block Island, 26 m, August 1874, U.S. Fish Comm.; syntype (USNM 13392), 4 syntypes (USNM 12895).

*Diagnosis*.—Two apodus peristomial segments; hooded hooks beginning in middle segments; maxillae delicate, symmetrical: M I (2 + 2) with large accessory tooth near blunt tip subequal to distal tooth; M II (3 + 3) long, with 3 rounded, intermeshing teeth; lateral supports beginning at outer borders of M I, continuing to bases of M III; mandibles about as long as maxillary apparatus, anterior ends flared, posterior ends entire (Hartman, 1942a).

*Lumbrinerides aberrans* (Day, 1963)

Fig. 1b

*Lumbrineris aberrans* Day, 1963:411, figs. 8a–f; 1967:439, figs. 17, 17a–e.—Ramos, 1976:108.

*Lumbrinerides aberrans*.—Orensanz, 1973b:373.

*Material examined*.—SOUTH AFRICA: Cape Province, 33°58.8'S, 25°42.2'E, 26 m; holotype (BMNH ZB 1963:1:86).

*Diagnosis*.—Two apodus peristomial segments; hooded hooks beginning on setiger 1 (Ramos, 1976); M I with accessory tooth near blunt tip, much smaller than primary tooth; M II relatively long, with 3 rounded, intermeshing teeth, anterior tooth half diameter of others; lateral supports beginning at about middle of outer edges of M I, continuing to bases of M III; mandibles with posterior ends completely united (Day, 1967).

*Lumbrinerides crassicephala* (Hartman, 1965)

*Lumbrineris crassicephala* Hartman, 1965:117, pl. 20, figs. c–f.—Ramos, 1976:109.

*Lumbrinerides crassicephala*.—Orensanz, 1973b:373.

*Type-locality*.—Bermuda, in 1000 m.

*Diagnosis*.—One apodus peristomial segment; hooded hooks beginning on setiger 6; M I with acute tip and 1–2 very small accessory teeth; M II short, with 2–3 small, pointed teeth; lateral supports very long, beginning at posterolateral edges of M I, continuing to bases of M III; mandibles nearly as long as maxillary apparatus, 2.4 times longer than broad, posteriorly pointed [after Hartman, 1965].

*Lumbrinerides platypygos* (Fauchald, 1970)

*Lumbrineris platypygos* Fauchald, 1970:106, pl. 18, figs. a–d.

*Lumbrinerides platypygos*.—Orensanz, 1973b:373.

*Type-locality*.—Baja California, in shallow subtidal depths.

*Diagnosis*.—Two apodus peristomial segments; hooded hooks beginning on setigers 7–8; maxillae long, delicate; M I with 2 accessory teeth near acute tip; M II of medium size, with 3 rounded, subequal teeth; presence of lateral supports not determined [after Fauchald, 1970].

*Lumbrinerides acutiformis* (Gallardo, 1968), new combination

*Lumbrineris acutiformis* Gallardo, 1968:82, pl. 29, figs. 2–8.—Ramos, 1976:107.

*Type-locality*.—Nha Trang Bay, Viet Nam, in shallow depths.

*Diagnosis*.—Two apodus peristomial segments; hooded hooks beginning on setiger 1 (setigers 1 or 4 *vide* Ramos, 1976:107); M I with blunt tip and 2 very small accessory teeth near middle; M II with 3 small, rounded teeth, basal one perhaps smaller than others; lateral supports between middle of outer edges of M I and bases of M III; mandibles almost as long as maxillary apparatus, 3 times longer than broad, sides parallel posteriorly, with rounded tip [after Gallardo, 1968].

*Lumbrinerides gesae* Orensanz, 1973

*Lumbrinerides gesae* Orensanz, 1973b:373, pl. 12.

*Type-locality*.—Off Mar del Plata, Province of Buenos Aires, Argentina, in 13 m.

*Diagnosis*.—Two apodus peristomial segments; hooded hooks beginning on setiger 1; M I with blunt tip and 2 accessory teeth near middle, stout, as broad or broader than primary tooth; M II with 3 rounded teeth (irregularly and imperfectly toothed *vide* Orensanz, 1973b); triangular supports on bases of M III but lateral supports not determined; mandibles about as long as maxillary apparatus, 2.3 times longer than broad, tapered posteriorly, with pointed tip [after Orensanz, 1973b].

*Lumbrinerides carpinei* (Ramos, 1976), new combination*Lumbrineris carpinei* Ramos, 1976:109, figs. 5, 6.*Localities*.—Catalonian Spain and off Monaco in the Mediterranean Sea, in 290–600 m.*Type-locality*.—Bathyl "Etage" of the Mediterranean Sea.*Diagnosis*.—One long apodus peristomial segment; hooded hooks beginning on setiger 1; maxillae delicate; M I each with blunt tip and single accessory tooth, near tip on left and near middle on right; M II long, with 3 rounded teeth; lateral supports between M I and M III absent, possibly overlooked; mandibles not visible [after Ramos, 1976].*Lumbrinerides* sp.*Lumbrineris acuta*.—Ramos, 1976:105, figs. 1–3 [not *Lumbriconereis acuta* Verrill, 1875].*Locality*.—Golfo de Rosas, Spain, in shallow depths.*Diagnosis*.—Two apodus peristomial segments; hooded hooks beginning on setiger 16; maxillae delicate; M I with blunt tip, without accessory teeth; M II of medium length, with 3 rounded teeth; lateral supports between middle of outer edges of M I and bases of M III; mandibles about as long as maxillary apparatus, 3.1 times longer than broad, widely divided posteriorly.*Remarks*.—This is apparently an unnamed species, but the wide posterior division of the mandibles may be an artifact of the dissection process.*Lumbrinerides dayi*, new species

Figs. 1c–e

*Lumbrineris aberrans*.—Day, 1973:59 [not Day, 1963].*Lumbrinerides acuta*.—Gardiner, 1976:203, figs. 26f–h [in part, North Carolina specimens] [not *Lumbriconereis acuta* Verrill, 1875].*Material examined*.—NORTH CAROLINA: off Beaufort, 34°34'N, 78°25'W, 20 m, sand and broken shell, J. H. Day, col.; holotype (USNM 51145), 17 paratypes (USNM 55598; FSBC I 18478).—FLORIDA: off Panama City, 29°48'N, 86°09'W, 47 m, coarse carbonate sand, BLM Sta. 2531; R/V *Colombus Iselin*, Nov. 1977; 1 paratype (USNM 55875).—PUERTO RICO: off Barceloneta (EPA Oceanogr. Study, R. S. Mayo, col.) 18°29'51"N, 66°33'W, 27 m; 7 Aug. 1974; 3 paratypes (USNM 52186).—18°29'45"N, 66°32'09"W, 30 m; 11 Sept. 1974; 1 paratype (USNM 52187).—18°29'49"N, 66°32'43"W, 28 m; 12 Sept. 1974; 1 paratype (USNM 52188).—18°29'51"N, 66°33'W, 23–28 m; 12 Sept. 1974; 5 paratypes (USNM 52189).—



18°29'41"N, 66°31'35"W, 34 m; 8 Nov. 1974; 1 paratype (USNM 52190).—18°29'51"N, 66°33'W, 28 m; 9 Nov. 1974; 4 paratypes (USNM 52191; FSBC I 18962).—18°29'53"N, 66°33'17"W, 27 m; 10 Nov. 1974; 6 paratypes (USNM 52192).—18°29'51"N, 66°33'W, 23–28 m; 6–8 Aug. 1974; 8 paratypes (USNM 52209).

*Description.*—Colorless in alcohol. All specimens from type-locality posteriorly incomplete; longest anterior piece 40 mm long, 0.84 mm wide, 80 segments; anterior piece of 13 setigers, 1.16 mm wide at about setiger 10. Specimen from Gulf of Mexico (USNM 55875) 42 mm long, about 0.8 mm wide, 70 segments. Seven complete specimens from Puerto Rico from 12 mm long, 0.25 mm wide, 75 segments to 33 mm long, 0.5 mm wide, 190 segments. Prostomium 1.2 to more than 3 times longer than wide depending upon state of contraction; lip either acutely pointed (relaxed) or acuminate (contracted); eyes absent. Peristomium with 2 equal apodus segments, together equal in length to setiger 1. Parapodia of first 6 segments small, with rounded setal lobes and small, rounded postsetal lobes, gradually increasing in length posteriorly from about setiger 7, fully developed by setiger 10–12; setal lobes short, blunt, conical, slightly longer than wide, about  $\frac{1}{10}$  as long as body width; postsetal lobes rounded, about as long as setal lobes. Anterior parapodia with 3–4 broadly limbate setae, usually single in posterior parapodia. Simple bidentate hooded hooks beginning on setigers 1–6, continuing to posterior end, 2 hooks at about setiger 10, usually 3 hooks in posterior parapodia. Pygidium as usual in genus, flattened, rounded, about as wide as long, with dorsal anus.

Mandibles (Fig. 1d) light to dark brown, 2.3 times longer than broad, delicate, widely flared anteriorly, posteriorly long, narrow, sides almost parallel, about twice as thick as wide, fused, with small posterior notch; length about equal to maxillary apparatus. Maxillary carriers broadly triangular, with conspicuously constricted lateral borders much shorter than middle ones, much darker than rest of maxillae. M I lateral borders much longer than medial ones, tips blunt, with 2 rounded accessory teeth near middle, widely separated from tips. M II stout, with 3 rounded, intermeshing teeth, basal one about twice as broad as others. M III relatively stout, with broad, posterior borders. M IV thin, elongate-oval, with narrow posterior borders. Lateral accessory supports from middle of M I to bases of M III; triangular supports at bases of M III.

*Remarks.*—Day (1973) indicated that the number of accessory teeth on Maxilla I might vary among members of *L. aberrans*, but this was not the case for all of his North Carolina specimens and others I examined; juveniles have the same number and arrangement of teeth on Maxillae I and II as adults (Figs. 1c, e). Hooded hooks first appear on North Carolina specimens from setigers 3–6, while on all other specimens, including a relatively large



one from the Gulf of Mexico, hooks begin on the first setiger. The range of first appearance of hooded hooks on anterior setigers may depend on specimen size, with hooks first appearing on more posterior segments of larger specimens, or the range may vary between populations from different geographic areas. Hooks may also be broken off anterior ends of dissected specimens. However, mouthpart configurations are constant among all specimens of *L. dayi*, as well as among specimens of other *Lumbrinerides* species I have examined.

*Lumbrinerides dayi* is similar to *L. acutiformis*, *L. platypygos* and *L. gesae* and separable from the latter three species as indicated in the key. Additionally, mandibles of *L. gesae* are posteriorly entire, and, according to Fauchald (1970), postsetal lobes of *L. platypygos* are always shorter than setal lobes.

*Etyymology*.—The species is named in honor of Professor J. H. Day, who collected and first reported the specimens from North Carolina.

*Lumbrinerides jonesi*, new species

Fig. 2

*Material examined*.—FLORIDA: Hutchinson Island, Sta. II, 27°21.6'N, 80°13.2'W, about 11 m, coarse calcareous sand; holotype (R. Gallagher, col., Jan. 1972; USNM 57435); 26 paratypes (USNM 57437; AHF POLY 1268; ZMH P-15535-15537; FSBC I 20434-20444).—Sta. IV, 27°20.7'N, 80°12.8'W, about 11 m, coarse calcareous sand; 9 paratypes (USNM 57436; FSBC I 20445-20450).—Sta. V, 27°22.9'N, 80°13.9'W, about 11 m, coarse calcareous sand; 1 paratype (AHF POLY 1267).

*Description*.—Generally colorless or pink in alcohol; thoracic region occasionally indistinctly rose-colored. Length up to 50 mm, width 1.0 mm excluding parapodia. Prostomium acutely pointed, usually more than twice longer than wide, without eyespots. Peristomium distinctly wider than prostomium, composed of 2 apodus segments, their total length about equal to that of setiger 1. Parapodia of anterior 10 setigers reduced, with small postsetal lobes. Parapodia becoming larger, with small presetal lobes becoming evident and postsetal lobes elongate, subconical, slightly longer than setal lobes (Fig. 2e), continuing to posterior end with presetal lobe becoming reduced. Anterior parapodia of adults with 5-6 broadly winged capillary setae; simple bidentate hooded hooks (Fig. 2f) beginning on setiger 23-27 of adults and on setiger 3 of juvenile; setae of middle segments about 5, 2-3 capillaries, 2-3 hooks; hooks gradually replacing capillaries in posterior segments, usually 3 per parapodium. Pygidium somewhat flattened, bulbous, with dorsal anus, without anal cirri.

Mouthparts relatively massive for size of worm, easily visible through integument. Mandibles (Fig. 2d) brown, about as long as maxillary carriers

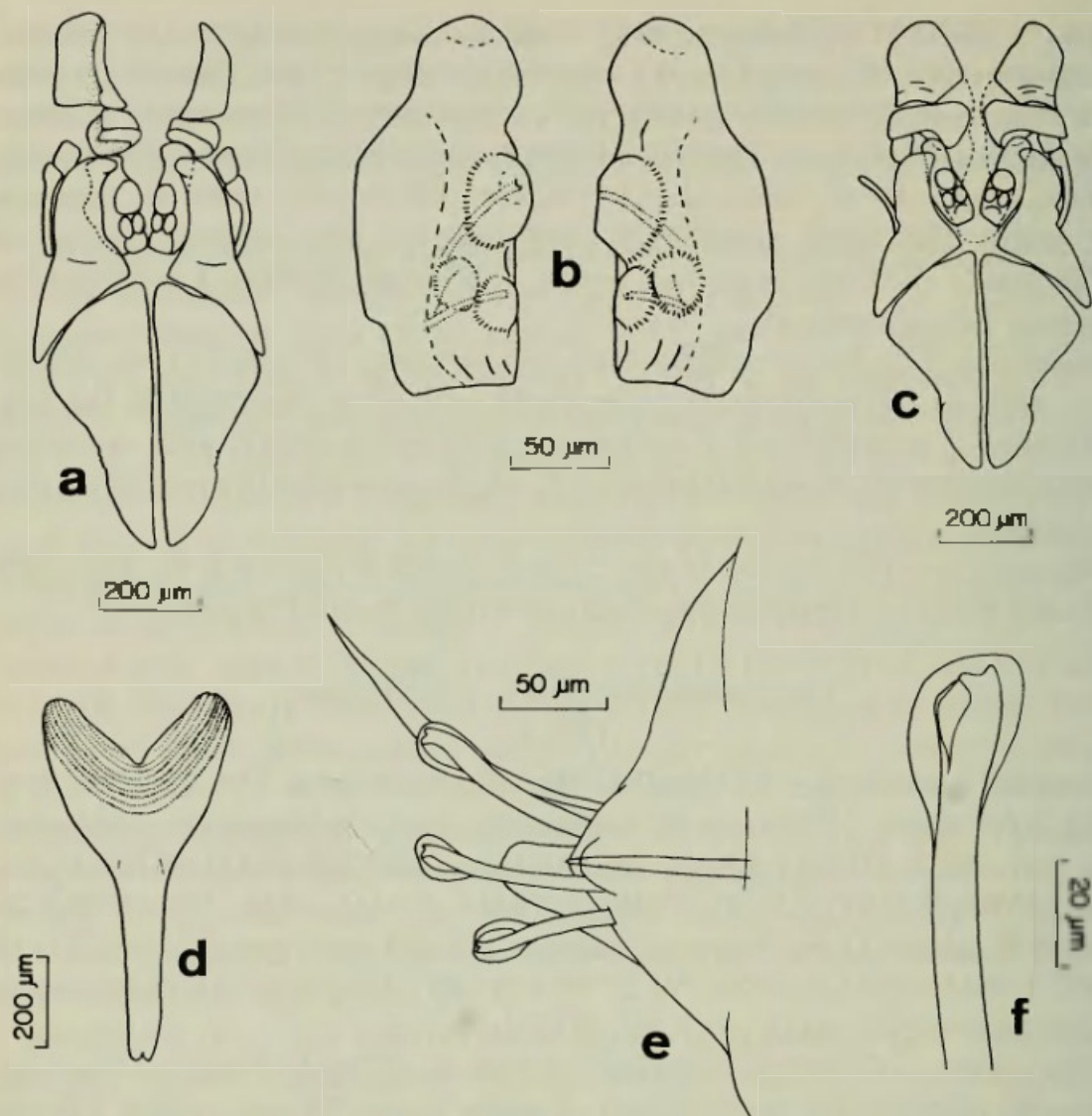


Fig. 2. *Lumbrinerides jonesi*: a, Maxillae, dorsal view; b, M II; c, Maxillae, dorsal view, with M III and M IV somewhat flattened; d, Mandibles, ventral view; e, Parapodium from midregion, anterior view; f, Bidentate hooded hook from same.

and M I–III, about twice as long as broad, anteriorly broadly notched and flared, posterior half fused, with minute posterior notch; anterior end with several semicircular lines ventrally, dorsally with lines darkened near anterior edge and converging posteriorly toward middle; posterior end thickened, about twice as thick as wide. Maxillae (Figs. 2a–c) with broad, stout subtriangular carriers together forming obtuse angle open to posterior, more or less constricted posteriorly. M I stout, flared posterolaterally, without accessory teeth; strong, iridescent ligament between their bases. M II (Fig. 2b) broad, stout, with 3 rounded teeth on posterior  $\frac{2}{3}$ , larger one near middle, smaller ones more posteriad, with posterior elevation; tips of M I dorsally overlying depressed anterior third of each M II. M III with wide,

sharp, posterior borders, stout, transversely elongate, about same width as length of M II, probably oriented dorsoventrally when maxillae not everted, with round-tipped, conical tooth. M IV longer than wide, thin, with posterior borders about half as long as those of M III. Maxillary pieces held together by stout ligament-like membrane. Lateral supports extending from middle of M I to M III; M III with small, triangular, ventral supports; M I and M II somewhat calcified.

*Remarks.*—*L. jonesi* differs from others in the genus principally in structure of Maxillae I and II. The former lack accessory teeth; the latter have 3 molar-like teeth. The specimen referred by Ramos (1976:105) to *Lumbrineris acuta*, referred herein to *Lumbrinerides* sp., is similar to *L. jonesi* but differs in the dentition of Maxillae II and in shape of the posterior end of the fused mandibles.

*Etymology.*—The species is named in honor of Dr. Meredith L. Jones, who assisted in identification of certain taxa and whose research has contributed greatly to knowledge of the Polychaeta.

Genus *Lumbrineris* Blainville, 1828

*Lumbrineris dubeni* (Kinberg, 1865)

*Lumbriconereis dubeni* Kinberg, 1865:570.

*Lumbriconereis heteropoda*.—Crossland, 1924:4, text-figs. 2–4 [in part, Suez Bay specimens] [not Marenzeller, 1879].

*Lumbrineris dubeni*.—Hartman, 1948:96.

*Material examined.*—MOZAMBIQUE: Düben, col., 1845; type-specimen(s), anterior and 3 middle fragments (NRS 382).—SUEZ BAY: 8.2 m; mud; C. Crossland, col., 1904; anterior and 3 middle fragments (BMNH 1923:11:12:7–9).

*Description.*—Colorless in alcohol. Anterior end about 100 segments, middle fragments about 170 segments, together about 250 mm long. Anterior piece 4 mm wide including parapodia. Prostomium longer than wide, blunt-tipped, conical. Peristomium composed of 2 apodus segments, each about as long as setiger 1. Parapodia sub-biramous, with notopodial rudiment at upper border of setal lobe supported by slender internal acicula. Anterior parapodia with short presetal lobe, relatively short, rounded setal lobe having 4 neuroacicula, notopodial rudiment having 12 notoacicula, and postsetal lobe extending about twice as far as setal lobe. Setal and postsetal lobes lengthening posteriorly; postsetal lobes tapered, becoming more elevated to about 45° angle or bent posteriorly, slightly flattened, with tips extending well past setae by setiger 50; presetal lobes of same short, rounded; setal lobes bluntly conical. All parapodial lobes similar after setigers 50–60 (similar to those figured by Crossland, 1924:8, text-fig. 6). Anterior parapodia



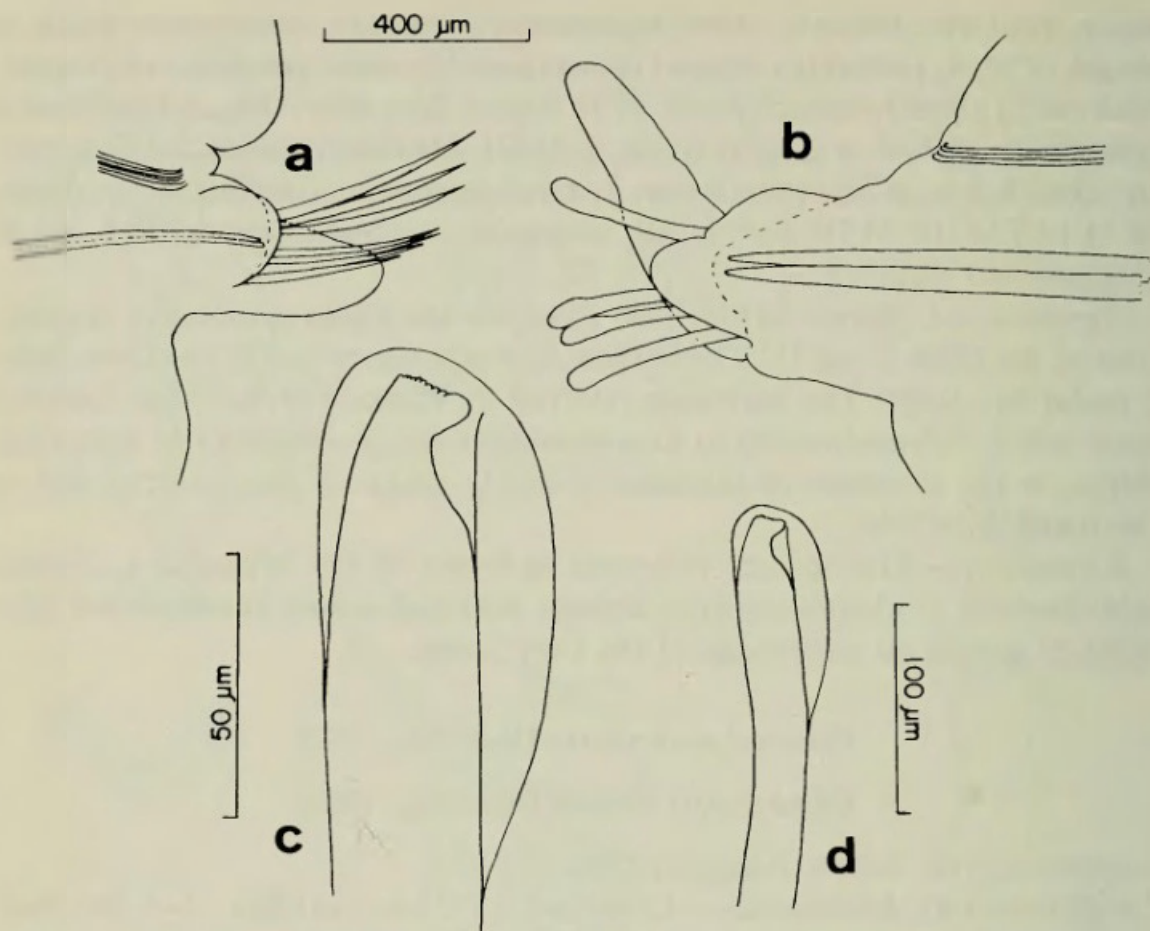


Fig. 3. *Lumbrineris crosslandi* (holotype BMNH ZB 1979: 1): a, Parapodium of setiger 5, anterior view; b, Parapodium of setiger 150, anterior view; c, d, Hooded hooks from middle parapodium.

with about 12 winged capillaries, gradually reduced to about 5 on setiger 36 and to 1 by about setiger 50, continuing to posterior end of anterior piece (about setiger 100), absent from all segments of middle fragments. Hooded hooks beginning on setiger 36, rapidly replacing all but 1 capillary posteriorly. Middle parapodia with 3-4 hooks, 2 neuroacicula, about 4 slender notoacicula in notopodial rudiment. Middle fragment of 38 segments apparently from near posterior end, with single neuroaciculum in posterior part. Acicula yellow.

Mandibles as figured by Crossland (1924:6, text-figs. 3, 4), with broad ligament-like membrane attached to anterolateral edges. Maxillae as figured by Crossland (1924:5, text-fig. 2); M I falcate hooks reaching to anterior ends of M II; M II subsymmetrical, straight, thin pieces with 4 teeth, right with broad space between distal and subdistal tooth, left with distal tooth slightly reduced; M III with 2 pointed teeth, posterior about half length of anterior; M IV with 1 pointed tooth. Maxillary carriers about as long as M II, constricted slightly anterior to middle. Lateral supports between poste-

rior third of M I and M III; supports opposite toothed edge of M II subrectangular, without anterior papilliform projection; brown reinforced area dorsolateral to M III and IV.

*Remarks.*—The specimen(s) from Suez Bay is apparently *L. dubeni*. Mouthparts, figured by Crossland (1924:5, text-figs. 2–4), are absent, but those of the type specimen(s) are the same as his illustrations of the Suez specimen(s). Winged capillaries occur on all 160 setigers of the anterior fragment, on two of the middle fragments and on most of the third fragment. There are at most 2 hooks on middle and posterior segments of the Suez Bay specimen(s) and up to 4 on the type-specimen(s). The latter are not accompanied by winged capillaries on posterior segments. However, these differences appear to be subspecific.

Specimens of *L. dubeni* may be included in Day's account of *L. heteropoda heteropoda* from southern Africa (Day, 1967:440). Day's description is not in agreement with that given for *L. heteropoda* (Marenzeller) by Imajima and Higuchi (1975:30) from Japan. Other possible synonyms of *L. dubeni* are discussed by Hartman (1948).

*Lumbrineris crosslandi*, new species

Figs. 3, 4

*Lumbriconereis heteropoda*.—Crossland, 1924:4, figs. 1, 5–7 [in part, Red Sea and Zanzibar specimens] [not Marenzeller, 1879].

*Material examined.*—RED SEA: Agig Bay, 8.2 m; among Polyzoa; C. Crossland, col., 1904–1905; holotype, complete specimen in 3 pieces (BMNH ZB 1979:1).—Reefs of Shubuk Suakin, 16.5 m, mud (Crossland, 1924:6); C. Crossland, col., 1904–1905; 2 paratypes, 2 anterior and 9 middle fragments (BMNH 1923:11:12:13–20).—ZANZIBAR: Chuaka Bay, inshore, sand; C. Crossland, col., 1901–1902; 2 paratypes, 2 anterior and 2 middle fragments (BMNH 1924:3:1:55–57).

*Description.*—One specimen (BMNH 1923:11:12:13–20) possibly greater than 200 mm long, 6 mm wide including parapodia; holotype apparently complete in 3 pieces, 160 mm long, 4 mm wide, 275 segments. Prostomium somewhat flattened, bluntly conical, slightly longer than wide, without eyes. Peristomium of 2 apodus segments, anterior longer, posterior shorter than setiger 1. Anterior few setigers about 10 times wider than long, lengthening to 5 times wider than long at about setiger 30, continuing to near pygidium with segments again becoming very short. Parapodia sub-biramous with notopodial rudiment on upper side supported by slender acicula. Anterior parapodia including postsetal lobes about  $\frac{1}{20}$  as long as segmental width, setal and postsetal lobes increasing in length to about  $\frac{1}{3}$  as long as segmental width at beginning of middle third of body, continuing about as long to

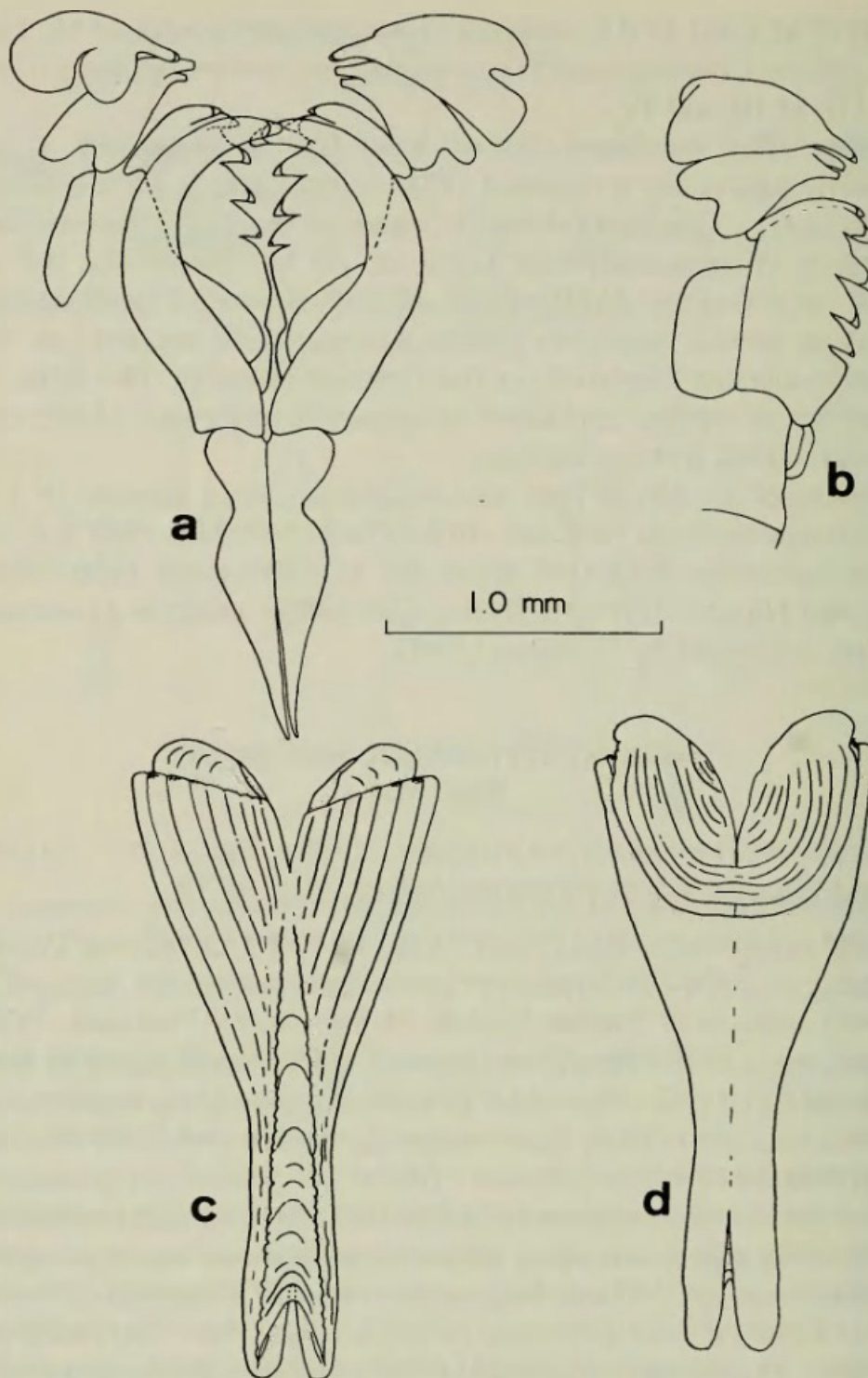


Fig. 4. *Lumbrineris crosslandi* (holotype BMNH ZR 1979:1): a, Maxillae, dorsal view; b, Right maxillae II-IV, ventral view; c, Mandibles, dorsal view; d, Same, ventral view.

posterior end. Setiger 5 parapodium (Fig. 3a) with 6 notoacacula; setal lobe short, about as long as wide, supported by 2 relatively slender yellow acicula; presetal lobe rounded, relatively well developed; postsetal lobe slightly longer, more slender than setal lobe. Setiger 150 parapodium (Fig. 3b) with



notopodial rudiment supported by 4 slender notoacicula; setal lobe subconical, supported by 2 stout acicula; presetal lobe well developed; postsetal lobe elongate, elevated at about 45° angle or bent posteriorly. Only winged capillaries in about anterior 40 setigers (37–45); transitional region containing both winged capillaries and simple hooded hooks extending to about setiger 90 (54–93, setiger 54 on holotype, but almost all setae broken off in midregion, thus possibly extending farther posteriorly); posterior ⅓ of body with hooks only (Figs. 3c, d). Anterior parapodia with 7–8 limbate setae; about 4 hooks on parapodia of posterior ⅓. Pygidium cylindrical, slightly longer than wide, with terminal anus surrounded by 4 long, conical anal cirri.

Mandibles (Figs. 4c, d) broad anteriorly, gradually reduced to less than ⅓ total width on posterior third, narrowly divided anteriorly and posteriorly, with ventral anterior edge broadly rounded, without attaching ligaments. Maxillae symmetrical (Figs. 4a, b). M I long, falcate, not reaching to anterior borders of M II; M II strongly curved around anterior ends of M I, with 5 teeth, anterior one very small, and anterior rounded boss opposite toothed edge; M III with 2 teeth, anterior tooth longer than posterior but both relatively well developed (tips apparently broken off); M IV with single tooth. Tips of teeth of M II–IV clear in glycerin, probably calcified in life. Lateral support from M I to base of M III; rounded support between M I and M II; support opposite edge of M II subrectangular, without anterior papilliform projection.

*Remarks.*—Crossland's text-figures 1–7 suggest that his specimens comprised 2 species. Mouthparts of his identified specimens in the British Museum are now missing. However, included in a lot of 2 *Lumbrineris* specimens from among Crossland's unworked material from the Red Sea was a complete specimen that agreed with his other specimens from the Red Sea and Zanzibar and is herein designated the holotype. The other species in Crossland's identified material is *L. dubeni* (Kinberg). Specimens of *L. crosslandi* may also be included with specimens of *L. dubeni* in Day's (1967) account of *L. heteropoda heteropoda* from southern Africa.

*Etymology.*—The species is named in honor of Dr. Cyril Crossland, who collected and reported the specimens from the Red Sea and tropical East Africa.

*Lumbrineris ernesti*, new species

Figs. 5, 6

*Lumbrineris heteropoda.*—Monro, 1933a:258, fig. 8 [not *Lumbriconereis heteropoda* Marenzeller, 1879].

*Lumbrineris erecta.*—Taylor, 1971:354.—Hall and Saloman, 1975:14 [list] [not *Lumbriconereis erecta* Moore, 1904].

*Material examined.*—FLORIDA: Anclote Anchorage, Tarpon Springs, 28°12'39"N, 82°47'39"W, 3.5 m, mixed seagrasses, fine sand; R. Ernest and

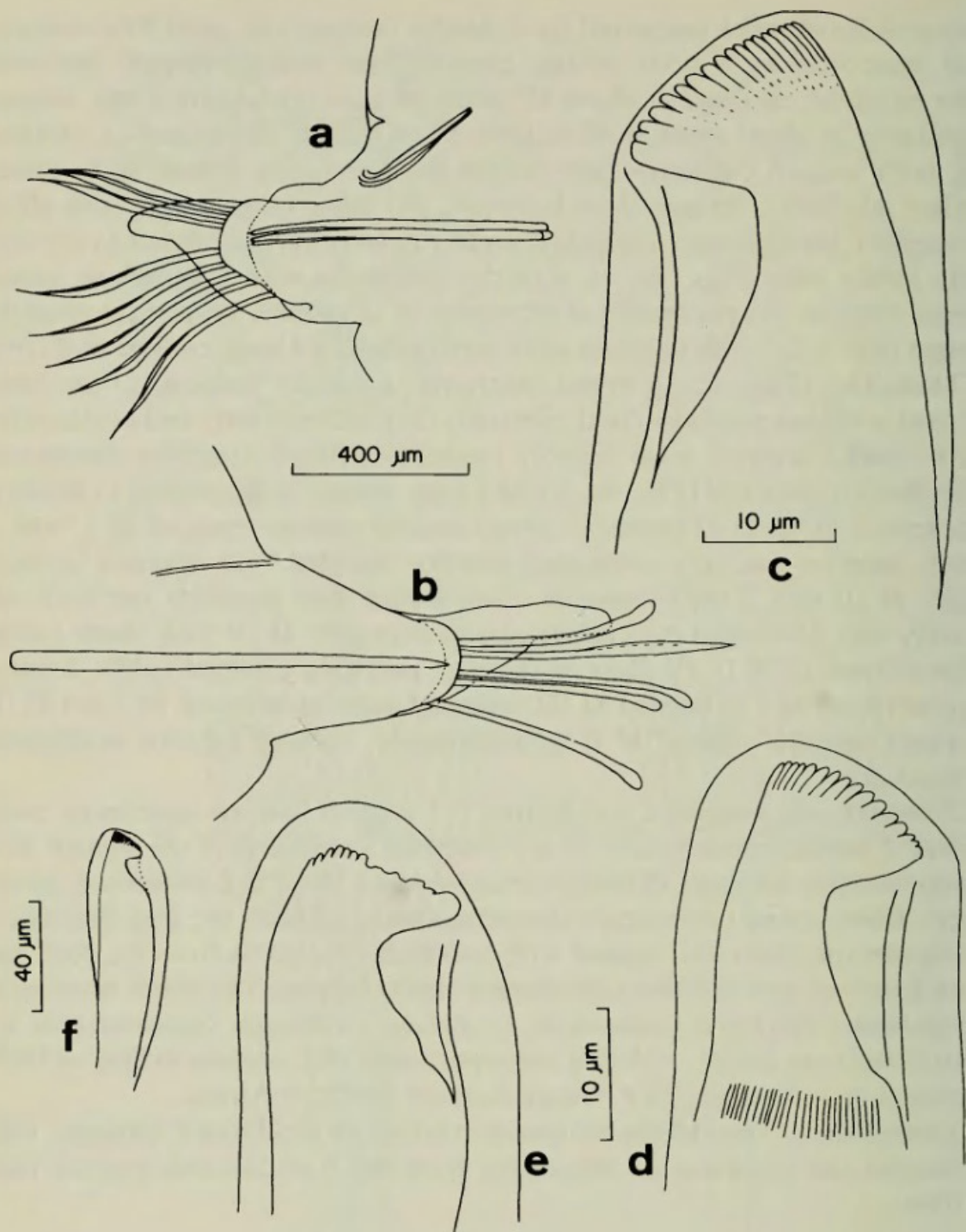


Fig. 5. *Lumbrineris ernesti*: a, Parapodium of setiger 20, anterior view; b, Parapodium from near pygidium, anterior view; c, Largest hooded hook of middle parapodium; d, Middle hook from same; e, Hook with broken tip; f, Hook from setiger 35 showing hoods and curvature.

J. Studt, cols., 5 Dec. 1975; holotype (USNM 57438); 2 paratypes (AHF POLY 1269; FSBC I 20451).—Hutchinson Island, Sta. I, 27°21.3'N, 80°14.1'W, about 8 m, fine quartose sand; 2 paratypes (FSBC I 20452, 20453).—Sta. IV, 27°20.7'N, 80°12.8'W, about 11 m, coarse calcareous

sand; 2 paratypes (FSBC I 20454, 20455).—Dry Tortugas Ecological Survey Station 153; Coleman and Tandy, cols.; 1 paratype (BMNH 1932:12:22:44–45).—Lower Tampa Bay, 27°35'26"N, 82°45'26"W, 3 m; J. Taylor and C. Saloman, cols., 1963; 2 paratypes (ZMH P-15538; FSBC I 13183).—Tampa Bay, J. Taylor, col., 1963; 7 paratypes (USNM 45598).—MISSISSIPPI: 29°55'N, 88°43.5'W, 15 m, fine sand, silt, BLM Sta. 1 F; R/V *Colombus Iselin*, May 1974; 1 paratype (USNM 55878).—NORTH CAROLINA: off Beaufort, 34°29'N, 76°13'W, about 33 m; F. Grassle, col.; 1 paratype (USNM 54280).

*Description*.—Colorless in alcohol. Length up to 105 mm, width 5 mm including parapodia, 270 segments. Prostomium somewhat flattened, sub-conical, slightly longer than wide. Peristomium with 2 apodus segments. Body tapered anteriorly for about first 20 segments; segments about 8 times wider than long at setiger 20; parapodia sub-biramous with notopodial rudiment; setal lobe cylindrical; postsetal lobes about as long as setal lobes in anterior segments (Fig. 5a); 3 yellow acicula; notopodial rudiment with 5–6 slender notoacacula. Parapodial lobes becoming more elongate in middle and posterior segments (Fig. 5b). Capillary setae only for first 42–47 setigers of larger specimens, first 17–18 setigers of small specimens; maximum of 11 per parapodium in anterior region; capillary setae continuing to posterior end, except on 2 juveniles lacking such after setiger 40. Hooded hooks beginning on setiger 18–19 of juveniles, on setiger 47 of largest specimens, continuing to posterior end; parapodia of posterior segments with 3–4 hooks, 1 capillary, 2–3 notoacacula, single neuroaciculum. Hooks with large main tooth and 12–16 secondary teeth decreasing in width and increasing in length toward apex (Figs. 5c, d); tips of hooks of large specimens often damaged or worn; shafts only slightly bent (Figs. 5b, f). Pygidium cylindrical, short, with terminal anus surrounded by 4 conical anal cirri about twice as long as postsetal lobes.

Mandibles flared anteriorly, medially concave; broad ligament-like membranes attached to anterolateral edges; mandibles broadly divided for short distance posteriorly. Maxillae (Figs. 6a–c) symmetrical with carriers almost as long as M I, about twice as long as broad, strongly constricted near anterior end, acutely pointed posteriorly; anterior margins nearly perpendicular to long axis. M I strongly falcate, round-tipped, reaching to anterior end of M II; M II (4 + 4 – 5), right with broad space between distal and subdistal tooth of adults, broad space replaced by small tooth in small specimens, large gravid specimen (USNM 55878) with additional incipient small tooth basally, left with distal tooth often reduced; calcified areas often on anterior edges of teeth (clear in glycerin), pieces almost straight, not particularly curved around anterior borders of M I; M III with 2 teeth, distal one pointed, proximal one rounded, often reduced to right-angular corner; M IV with single, acutely pointed tooth and small calcified areas slightly below



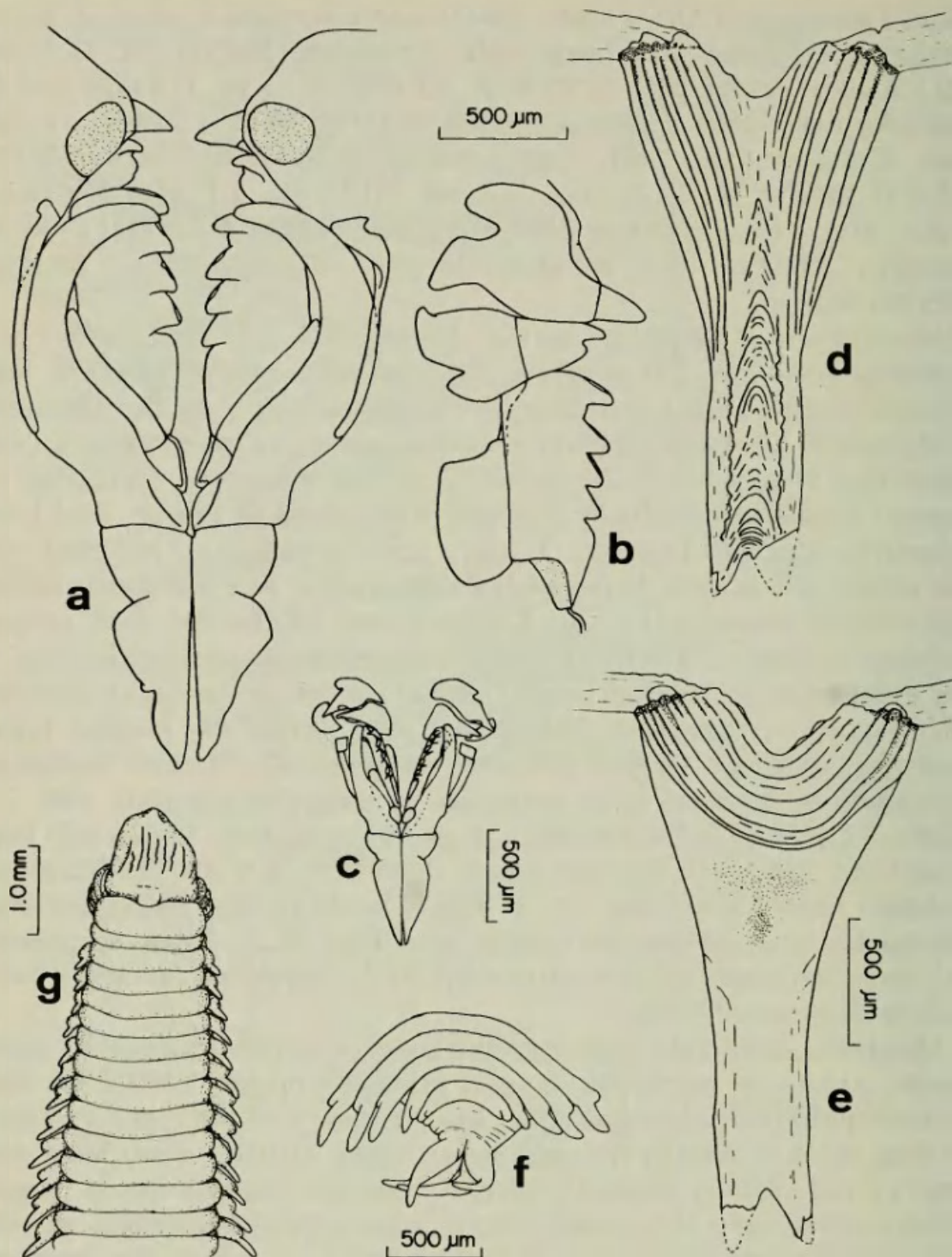


Fig. 6. *Lumbrineris ernesti*: a, Maxillae, flattened, dorsal view; b, Right maxillae II-IV, ventral view; c, Maxillae, slightly flattened, dorsal view; d, Mandibles, dorsal view; e, Same, ventral view; f, Posterior end, dorsal view; g, Anterior end.

tip (clear in glycerin). Maxillae with several auxillary supports, lateral one apparently articulated near anterior end, extending from about posterior third of M I to M III; support opposite toothed edge of M II semi-oval, extending almost full length with anterior papilliform extension; support

between posterior half of M I and posterior third of M II flattened, anteriorly rounded; brown, suboval area dorsolateral to M III and M IV; calcified area often visible posterior to M II.

*Remarks.*—The specimen from Tortugas, Florida (BMNH 1932:12:22:44–45), reported by Monro (1933a) as *L. heteropoda*, agrees with *L. ernesti*. Monro (1933b) reported *L. heteropoda* from the Galapagos and Pacific Panama (Balboa); they appear to be a different species; the Balboa specimen was referred to *L. erecta* by Fauchald (1977). *L. heteropoda* (Marenzeller, 1879) has almost completely divided mandibles, symmetrical maxillae with M III having 2 subequal teeth, and parapodia with short postsetal lobes in the midregion and short, elevated postsetal lobes in the posterior region (Imajima and Higuchi, 1975).

Specimens from Tampa Bay, Florida, reported by Taylor (1971) and Hall and Saloman (1975) as *Lumbrineris erecta* (Moore, 1904), also agree with *L. ernesti*. *L. erecta* is a similar species, but differs from *L. ernesti* in having erect postsetal lobes in posterior segments, and in the shape and dentition of the hooded hooks (see Moore, 1904, and Fauchald, 1970).

*Lumbrineris ernesti* as defined herein is similar to *L. dubeni*, differing primarily in the shapes of M II and III. M III of *L. dubeni* have 2 pointed teeth, and those of *L. ernesti* have 1 pointed tooth and 1 rounded tooth which is often only a right-angular corner. M II of *L. ernesti* have a rounded papilliform extension on supports opposite the toothed edge which is absent on *L. dubeni*. Hooded hooks of both species are very similar.

*Etymology.*—The species is named for Mr. Robert G. Ernest, who collected some of the specimens.

*Lumbrineris tenuis* (Verrill, 1873)

Fig. 7

*Lumbriconereis tenuis* Verrill, 1873:594.

*Lumbrineris tenuis.*—Hartman, 1942b:54; 1944b:340, pl. 49, figs. 3–5.—Pettibone, 1963:264 [in part], figs. 70a–e, ?f.—Day, 1973:62.—Gardiner, 1976:199, figs. 26p–r.

*Lumbrineris bassi* Hartman, 1944a:150, pl. 10, figs. 217–223; 1951:58.—Taylor, 1971:347.—Hall and Saloman, 1975:14 [list].

*Material examined.*—CONNECTICUT: Stony Creek, E of New Haven; A. E. Verrill, col., May 1872; syntype, anterior end and 2 middle fragments (YPM 2733).—MASSACHUSETTS: Vineyard Sound; U.S. Fish Comm., 1883; 12 specimens (USNM 13121).—NEW YORK: Long Island Sound; U.S. Fish Comm., 1874; 2 specimens (USNM 13123).—NORTH CAROLINA: off Beaufort, 34°34'N, 76°25'W, 19 m, sand and shell; I. H. Day, col., 4 June 1965; 84 specimens (USNM 55173).—White Oak River, Swansboro, intertidal, muddy sand; H. Lee, col., Aug. 1972; 1 specimen (USNM

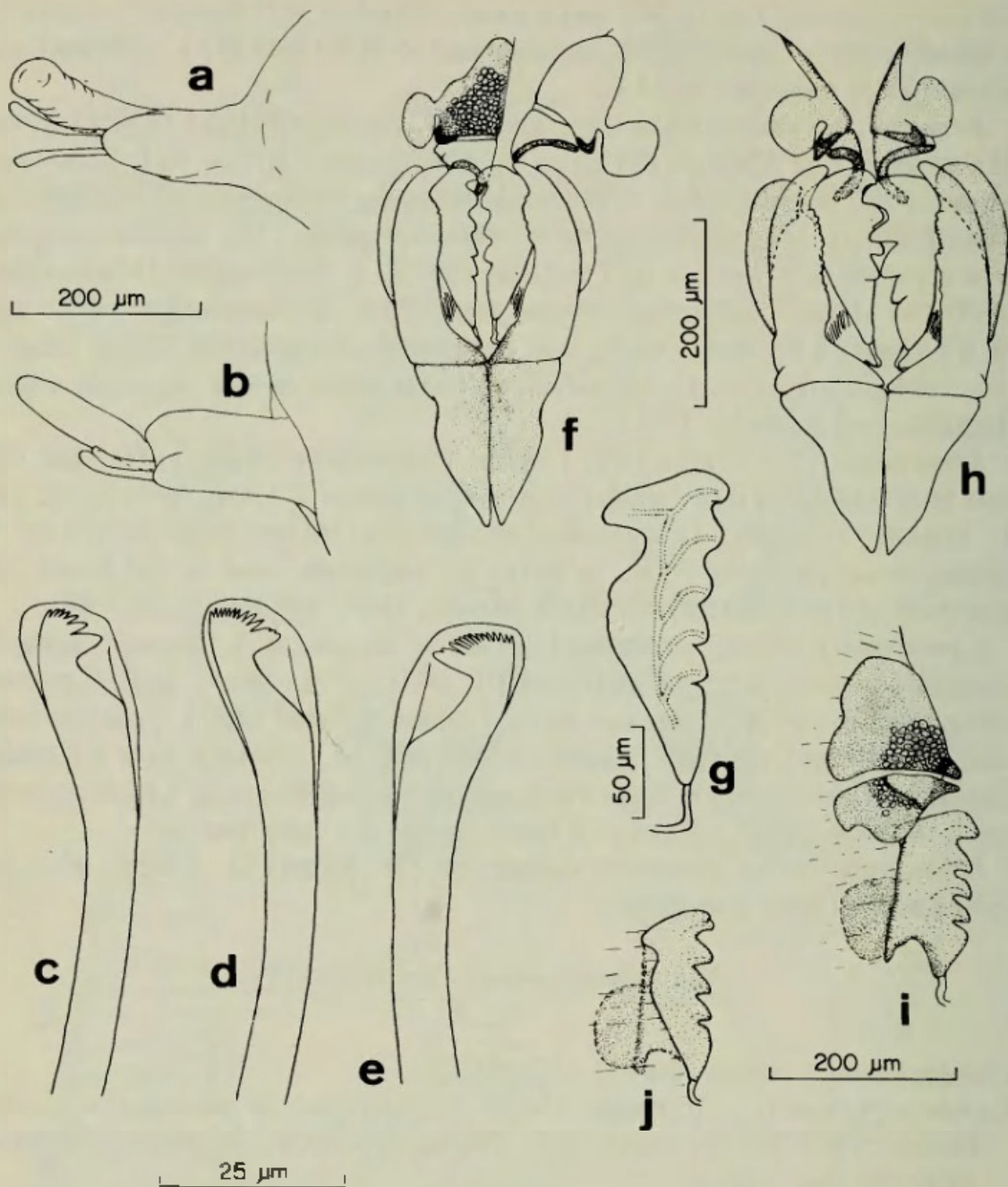


Fig. 7. *Lumbrineris tenuis*: a, Posterior parapodium, anterior view (USNM 13121); b, Same (FSBC 1 18972); c-e, Hooded hooks; c, Setiger 14 (USNM 13121); d, Same, posterior parapodium; e, Posterior parapodium (FSBC 1 18972); f, Maxillae (USNM 51465); g, Left M II of same, lateral view; h, Maxillae (FSBC 1 18972); i, Right M II-M IV of another specimen, medial view (FSBC 1 18972); j, Left M II of same, lateral view.

53016).—FLORIDA: Biscayne Bay, Miami; R. Rosenberg, col., 1974; 1 specimen (USNM 51465).—Tampa Bay, 27°45'40"N, 82°44'26"W, 1 m, sand, algae and seagrass cover; J. Taylor and C. Saloman, cols., 23 Sept. 1963; 1 specimen (FSBC 1 13330).—27°43'26"N, 82°43'47"W, 1 m, sand, algae and



seagrass cover; J. Taylor and C. Saloman, cols., 1 Oct. 1963; 26 specimens (USNM 57439; FSBC I 18972).—27°41'34"N, 82°44'03"W, 1 m, sand, algae and seagrass cover; J. Taylor and C. Saloman, cols., 15 Oct. 1963; 1 specimen (FSBC I 18929).—Anclote Anchorage, Tarpon Springs, 28°12.5'N, 82°46.5'W, 0.5 m, sand, J. Studt and R. Ernest, cols., 5 Dec. 1975; 4 specimens (FSBC I 17384).

*Description*.—Generally uncolored, occasionally with scattered brown pigment on prostomium and anterior segments. Maximum length 350 mm (in life), 1 mm wide, 200 segments (Verrill, 1873; Pettibone, 1963). Prostomium slightly flattened, bluntly conical, about as long as wide. Peristomium of 2 apodus segments, each about as long as first setiger. Parapodia uniramous, with 3 slender yellow acicula in setal lobes of anterior parapodia, single stouter one in posterior parapodia. Setal lobes short on anterior few segments, longer on setigers 8–15, bluntly conical, gradually shorter toward middle, gradually lengthening on posterior half and becoming subcylindrical. Presetal lobes short, rounded throughout. Postsetal lobes of anterior segments extending about twice as far as setal lobes, subtriangular to auricular, becoming slightly elevated, shorter, more slender toward middle, gradually lengthening, becoming digitiform to club-shaped near pygidium (Figs. 7a, b), often elevated dorsally or bent anteriorly or posteriorly. About 10–17 anterior setigers with up to 10 limbate capillary setae; simple hooded hooks (Figs. 7c, e) gradually replacing capillaries by about setiger 30; 2–3 hooks on middle and posterior parapodia. Capillary setae longer, broader on anterior segments, becoming shorter, more slender after appearance of hooks. First hooded hooks with longer shafts, fewer apical teeth, otherwise similar to more posterior hooks. Tips of hooks of anterior segments with pointed primary tooth, 5–6 secondary teeth decreasing in length and thickness apically; hooks of middle and posterior segments slightly stouter, more strongly curved, often with irregular primary tooth and 10–12 secondary teeth decreasing in length and thickness. Pygidium with 2 pairs of digitiform to conical anal cirri about as long as width of pygidium.

Mandibles thin, almost translucent in glycerin, anteriorly flared, posteriorly divided up to about half total length as figured by Verrill in Hartman (1944b, pl. 49, fig. 5b). Maxillae as figured (Figs. 7f–j). Carriers brown, shorter than M I, subtriangular, slightly concave laterally. M I light brown, broad, thin, with denticulate border below short, falcate tip; M II light brown, not particularly stout, with 4–6 teeth, left often with one more tooth than right; M III brown, with single, dark, upper tooth extending as broad, dark, posterior border below; M IV with dark, conical to somewhat rounded tooth. Light brown lateral support from M I to anterior base of M II and base of M III; area of dark brown cells between bases of M I and M II; short, suboval, dark brown support on medial border of M II opposite teeth;

dark support below medial border of M III; larger, dark support on antero-medial border of M IV connected by narrow isthmus to light brown dorso-lateral support.

*Remarks.*—The syntype material contains an anterior end of about 25 segments of *L. tenuis* and 2 middle pieces which may be the same species. However, the greater part of the material consists of middle pieces of a *Drilonereis*. The latter probably accounts for Hartman's statement (1942b:54) that "parapodial lobes are short throughout, inconspicuous."

Verrill (1873) described slender hooded hooks beginning on setiger 9 [probably a large specimen?], changing to stouter, recurved hooks with 2 or 3 hook-like denticles on the end beginning at setiger 17. The latter may possibly be the same as figured by Pettibone (1963:264, fig. 70f), but hooded hooks appear at setiger 15 on the syntype I examined (YPM 2733) and are the same as I have figured from other specimens (Figs. 7c–e). Posterior segments are absent on the syntype, but those figured by Verrill in Hartman (1944b:pl. 49, fig. 3a") are not dissimilar from parapodia of most specimens I have examined, and are in fact quite similar to those of specimens from off Beaufort, North Carolina (USNM 55173). Posterior parapodia of the latter are slightly shorter than those figured (Figs. 7a, b). Maxillae II of a large specimen from off Beaufort have 6 teeth on the left and 5 on the right. This is also the case on the syntype, and is the opposite of the number of teeth on left and right pieces given by Hartman (1942b).

No hooded hooks were found before setiger 11 on any specimen, including many very small ones, and it is my opinion that they do not occur before setiger 9 or 10 in the species. Further, anterior hooded hooks do not differ greatly in shape from those farther back. This is in disagreement with the description and figures of Pettibone (1963:264, figs. 70h–j), probably resulting from her inclusion of *L. hebes* as a synonym of *L. tenuis*.

Day (1973) stated that mandibular shafts were in contact throughout, but I cannot confirm his observation.

*Lumbrineris hebes* (Verrill, 1879)

Figs. 8, 9a–c

*Lumbriconereis obtusa* Verrill, 1874:383 [not Kinberg, 1865].

*Lumbrineris hebes* Verrill, 1879:174.

*Lumbrineris hebes*.—Hartman, 1942b:9.

*Lumbrineris tenuis*.—Pettibone, 1963:264 [in part, not *Lumbriconereis tenuis* Verrill, 1873], figs. 70g–j.

*Material examined.*—MAINE: Casco Bay, 13 m; U.S. Fish Comm., 7 Aug. 1873; 6 syntypes (USNM 15814).—MASSACHUSETTS: Quincy Bay, mid-way between West Head and Sunken Ledge, 5–6 m; J. Clark and class, cols., 8 May 1967; 1 specimen (USNM 50542).

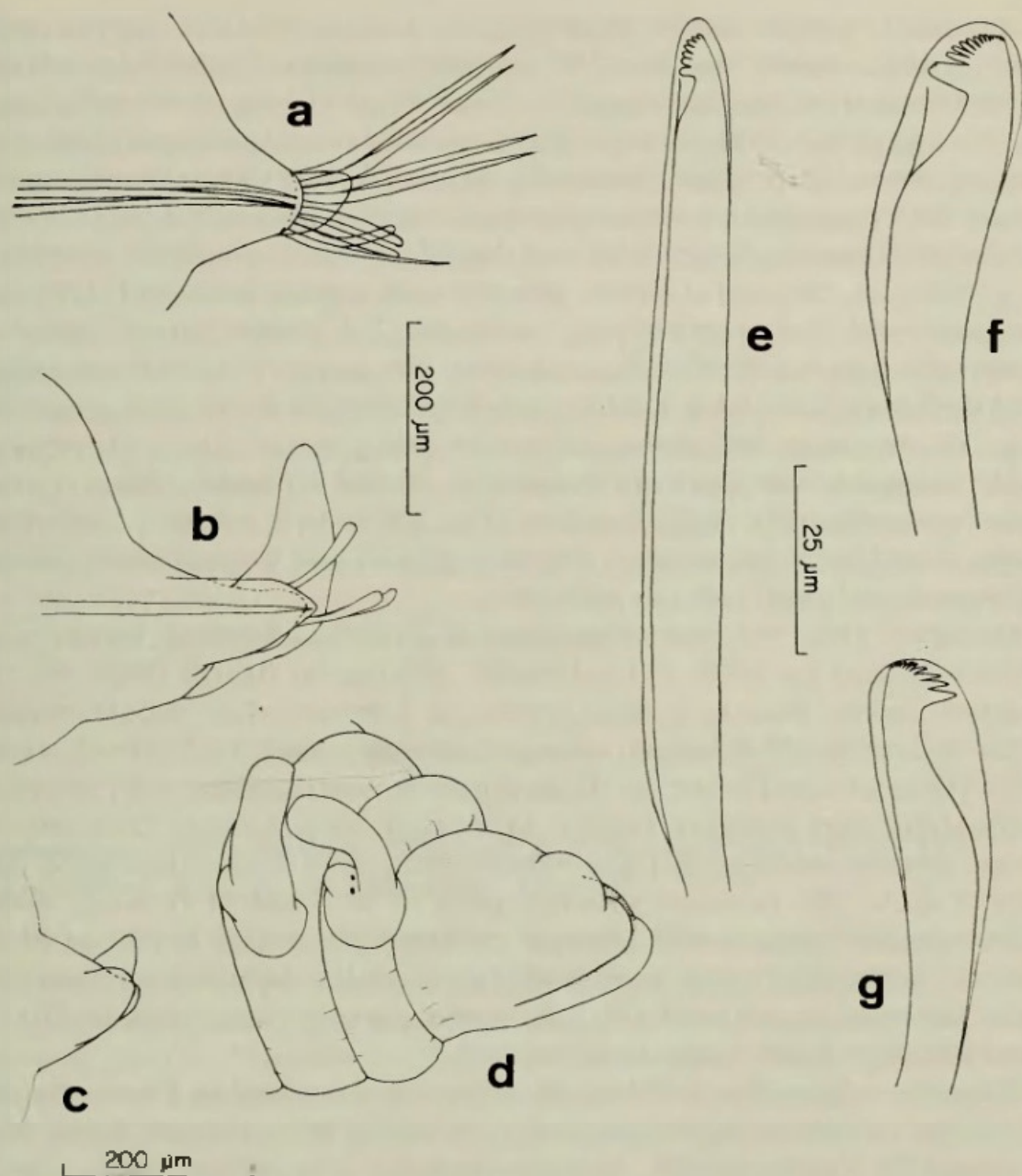


Fig. 8. *Lumbrineris hebes*: a–c, Parapodia, anterior view (USNM 50542): a, Setiger 5; b, Setiger 125; c, Setiger 22; d, Pygidium, ventrolateral view, syntype (USNM 15814); e–g, Hooded hooks (USNM 50542): e, Setiger 6; f, Setiger 22; g, Posterior setiger.

**Description.**—Syntypes colorless; other specimen with numerous irregularly arranged pigment spots dorsally and ventrally on prostomium and anterior segments. Length about 25 mm, width about 0.75 mm (Verrill, 1874); largest specimen (USNM 50542) incomplete posteriorly, 32 mm long, 1.3 mm wide including parapodia, with about 130 segments. Prostomium about as long as wide, slightly flattened, bluntly conical. Peristomium of 2 apodus segments, each slightly shorter than setiger 1. Parapodia uniramous



(Figs. 8a–c), with 3 slender yellow acicula in setal lobes of anterior segments, single stouter aciculum in posterior segments. Setal lobes short, bluntly conical on anterior segments, about twice as long on posterior segments, subconical. Presetal lobes short, rounded on anterior parapodia, becoming pointed on posterior parapodia. Postsetal lobes of anterior segments broad, with rounded tips extending about twice as far as setal lobes; lobes on middle segments shorter, elevated dorsally; lobes on posterior segments long, flattened, elevated at greater than 45° angle or bent backward. Anterior parapodia with 2–4 upper limbate capillaries, 2–4 slender, simple, hooded hooks with long hoods (Fig. 8e), and short, slender lower limbate capillary; hooks gradually becoming stouter, with shorter hoods after about setiger 10 (Fig. 8f), replacing limbate capillaries by about setiger 25; 2–4 subequal hooks on middle and posterior parapodia, stouter on middle than on posterior parapodia (Fig. 8g). Pygidium (Fig. 8d) with 4 rounded, posterior lobes, dorsolateral pair shorter, broader, ventral pair longer; anus opening between dorsolateral pair; no anal cirri.

Mandibles (Fig. 9b) thin, translucent in glycerin, anteriorly flared, posteriorly divided for about  $\frac{1}{2}$  total length. Maxillae as figured (Figs. 9a, c). Carriers shorter than M I, thin, brown; M I brown, with smooth border below falcate tip; M II brown, subequal, straight, stout, with 4 teeth, right one with stout distal tooth; M III dark brown, subtriangular, with rounded tooth above dark posterior border; M IV dark conical tooth. Dark brown lateral support between M I and anterior base of M II and base of M III; area of dark cells between posterior parts of M I and M II; long, dark, subrectangular support with anterior extension on medial border of M II opposite teeth; dark support medially below M III; dark brown, subtriangular support anterior to M IV; light brown support dorsolateral to M IV, separated from tooth and anterior support.

*Remarks.*—*Lumbrineris hebes* was originally described as *Lumbriconereis obtusa*, a homonym preoccupied by Kinberg, 1865; the new name was proposed by Verrill in 1879. *Lumbrineris hebes* was referred to *L. tenuis* by Pettibone (1963) but it differs from *L. tenuis* in having: 1) hooded hooks which begin on the first setiger and which differ in shape from those of middle and posterior setigers; 2) a pygidium with four rounded lobes and no anal cirri; 3) M I with a smooth border below the falcate tip; 4) prominent supports lateral to M I; 5) longer and darker supports opposite the toothed border of M II; and 6) M IV with a large anterior support separated from the dorsolateral support. Specimens of *L. hebes* do not appear to be juveniles of *L. tenuis*. Many smaller specimens of *L. tenuis* were examined; none had hooks appearing before setiger 10, while all specimens of *L. hebes* had hooks appearing on setiger 1. The seta described by Verrill (1874) as "long and slender, with a very slender setiform tip" may be the lower capillary seta of anterior parapodia.

*Lumbrineris hebes* was also reported from Noank Harbor, Connecticut by Verrill (1875), Eastport, Maine by Webster and Benedict (1887), and Labrador by Moore (1909). However, specimens originally identified by Verrill as *Lumbriconereis obtusa* and *Lumbrinereis hebes* from south of Cape Cod (USNM 13121, 13123) have proven to be *L. tenuis*, and remains of Webster and Benedict's and Moore's specimens deposited in the Smithsonian Institution are middle pieces (Dr. Pettibone, personal communication) insufficient to confirm their records.

Moore (1911:290) indicated that the "jaws" of *L. hebes* were similar to those of *L. inflata* (Moore, 1911). However, M III of *L. inflata* are multi-dentate and M IV are bidentate, demonstrating that *L. inflata* is certainly a different species. Fauchald (1970:215) apparently followed Moore's description of the maxillae but also incorrectly attributed the composite hooks of *L. inflata* to *L. hebes*. A species which may be the same as that reported by Moore (1909) was reported from 40–200 m off Beaufort, North Carolina, by Day (1973:60) as *Lumbrineris* sp. (USNM 51147). The latter has tri- and quadri-dentate M III and uni- and bidentate M IV.

*Lumbrineris testudinum* (Augener, 1922)

Figs. 9d–h

*Lumbriconereis testudinum* Augener, 1922:46.—Hartman, 1959:331.

*Lumbrineris testudinum*.—Hartman, 1959:337.

*Material examined*.—FLORIDA: Tortugas, Southwest Channel; Hartmeyer, col.; holotype, possibly sexually mature male (ZMB 6399).

*Description*.—Colorless in alcohol. About 14 mm long, slender, 93 setigerous segments. Prostomium about as wide as long, almost globular. Peristomium of 2 apodus segments, each about as long as setiger 1. Parapodia uniramous, with about 3 yellow acicula in setal lobes of anterior segments, single stouter aciculum in posterior segments. Setal lobes of anterior segments (Fig. 9d) bluntly conical, short on first few segments, slightly longer on setiger 10, gradually reduced in length and about as wide as long posteriorly. Presetal lobes short, rounded throughout. Postsetal lobes subtriangular, extending almost twice as far as setal lobes on anterior segments; short, rounded, only slightly longer than presetal lobes on middle and posterior parapodia. Simple hooded hooks and limbate capillary setae beginning with first setiger; about 3 hooks on middle and posterior parapodia. Hooks of anterior segments (Fig. 9f) stout, with 4–5 subequal teeth; hooks of middle and posterior segments (Fig. 9g) similar to anterior hooks in general shape, with primary tooth surmounted by 8–10 secondary teeth decreasing in length and stoutness apically. Pygidium with pair of long, conical dorsal cirri and pair of short, conical ventral cirri surrounding anus.

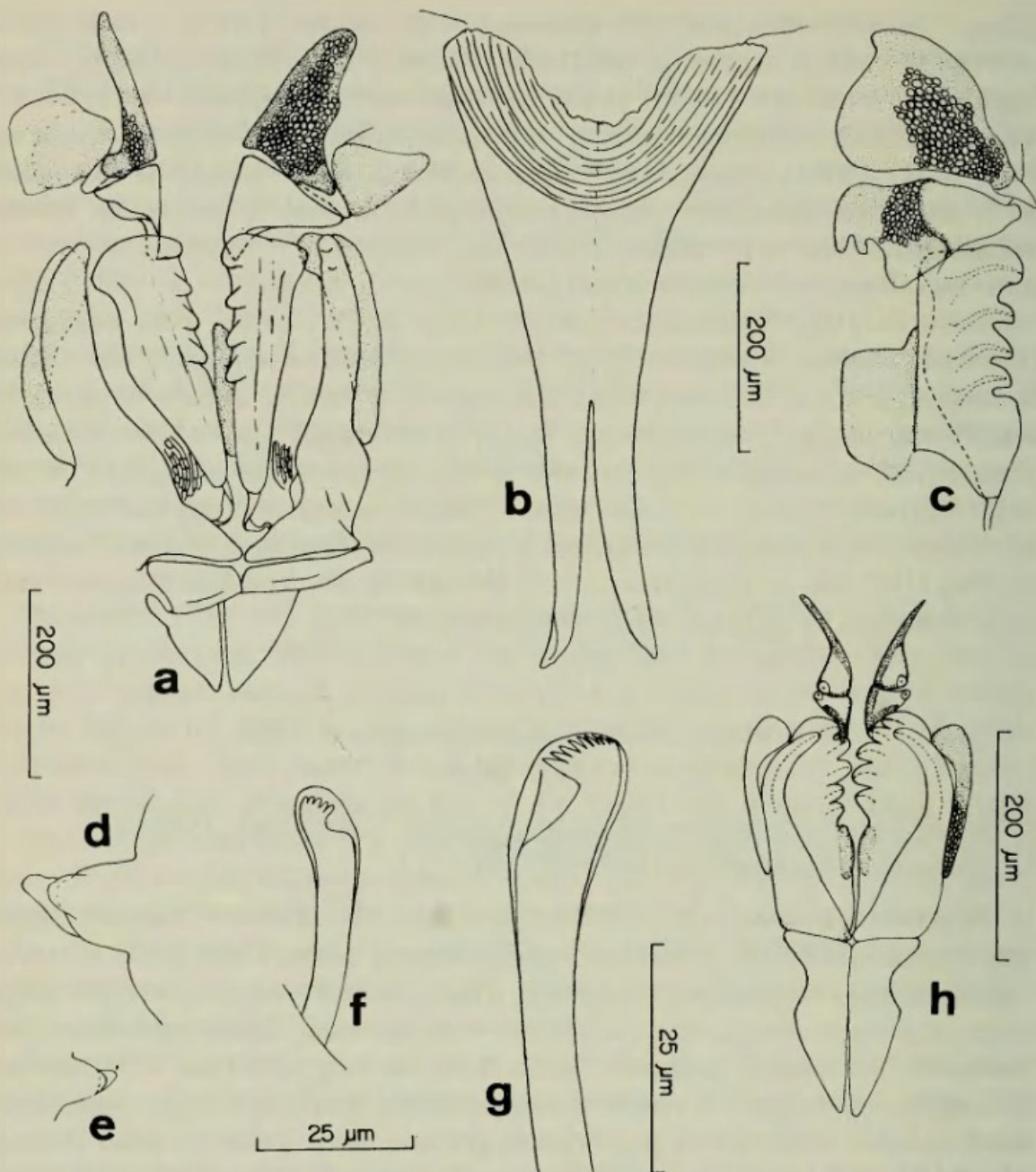


Fig. 9. *Lumbrineris hebes* (USNM 50542): a, Maxillae; b, Mandibles, ventral view; c, Right M II-M IV, medial view. *Lumbrineris testudinum*, holotype (ZMB 6399): d, Anterior parapodium, anterior view; e, Posterior parapodium, anterior view (not scaled); f, Hooded hook, setiger I; g, Hooded hook, posterior parapodium; h, Maxillae.

Mandibles thin, translucent, anteriorly flared, with dark lateral corners; posterior ends not examined. Maxillae as figured (Fig. 9h). Carriers brown, constricted laterally, shorter than M I. M I very light brown, long, thin, falcate, with smooth border; M II very light brown, thin, laterally curved anteriorly around tip of M I, with 5 teeth; M III light brown, with distinct pointed tooth above broad, posterior, dark brown border; M IV with round-



ed brown tooth above darker posterior border. Lateral support between M I and anterior base of M II and base of M III large, similar to those described for *I. hebes*, formed of distinct, dark brown cells on posterior part; area of dark brown cells between bases of M I and M II; dark brown support on medial side opposite toothed border of M II; support medial to tooth of M III; single brown support anterior to tooth of M IV, with dorsolateral support, if present, very indistinct.

*Remarks.*—Stout, simple hooded hooks beginning on the first setiger distinguish the species from other similar small, slender species with uniramous parapodia and short parapodial lobes reported herein. Additionally, M III has a single pointed tooth; *I. parvapedata* (Treadwell, 1901), a much larger species, has similar parapodia and setae, but has 2 teeth on M III.

*Lumbrineris verrilli*, new species

Figs. 10, 11

*Lumbrineris* sp. Taylor, 1971:363, figs. 7a, b.—Hall and Saloman, 1975:14 [list].

*Material examined.*—FLORIDA: Lower Tampa Bay (National Marine Fisheries Service Tampa Bay Study; J. Taylor and C. Saloman, cols.), 27°33'27"N, 82°42'36"W, 5 m, sand; 4 Nov. 1963; holotype (USNM 57440), 28 paratypes (USNM 57441).—27°39'19"N, 82°42'10"W, 4 m, sand; 15 Oct. 1963; 2 paratypes (FSBC I 20459).—27°37'55"N, 82°41'30"W, 4 m, sand; 18 Oct. 1963; 1 paratype (FSBC I 20460).—27°34'34"N, 82°39'58"W, 4 m, sand; 28 Oct. 1963; 5 paratypes (FSBC I 20461).—27°34'04"N, 82°39'42"W, 5 m, sand; 28 Oct. 1963; 13 paratypes (FSBC I 20462).—27°33'03"N, 82°39'12"W, 4 m, sand; 6 Nov. 1963; 29 paratypes (FSBC I 20463).—27°34'54"N, 82°43'01"W, 7 m, sand; 30 Oct. 1963; 24 paratypes (AHF POLY 1270).—27°34'24"N, 82°42'53"W, 6 m, sand; 4 Nov. 1963; 4 paratypes (SIFP 50:0781).—27°33'57"N, 82°42'46"W, 5 m, sand; 4 Nov. 1963; 89 paratypes (FSBC I 20464).—27°32'53"N, 82°42'27"W, 3 m, sand; 4 Nov. 1963; 21 paratypes (ZMH P-15539).—27°31'41"N, 82°42'10"W, 3 m, sand; 19 Nov. 1963; 1 paratype (FSBC I 20465).—27°41'46"N, 82°43'34"W, 7 m, sand; 18 Nov. 1963; 1 paratype (FSBC I 20466).—Tampa Bay; J. Taylor, col., 1963; 10 paratypes (USNM 45701).—Hutchinson Island, Sta. IV, 27°20.7'N, 80°12.8'W, about 11 m, coarse calcareous sand; 1 paratype (FSBC I 18860).—Sta. V, 27°22.9'N, 80°13.9'W, about 11 m, coarse calcareous sand; 11 paratypes (USNM 57443; FSBC I 18861, 18863–6).—Biscayne Bay, Miami; R. Rosenberg, col., 1974; 39 paratypes (USNM 57442).

*Description.*—Many specimens in thin, mucoid tubes covered with detritus. Body white to light reddish-orange in alcohol. Largest specimen (USNM 57442) 45 mm long, 0.7 mm wide including parapodia, about 110 segments, incomplete; holotype 20 mm long, 0.4 mm wide including parapodia, 160

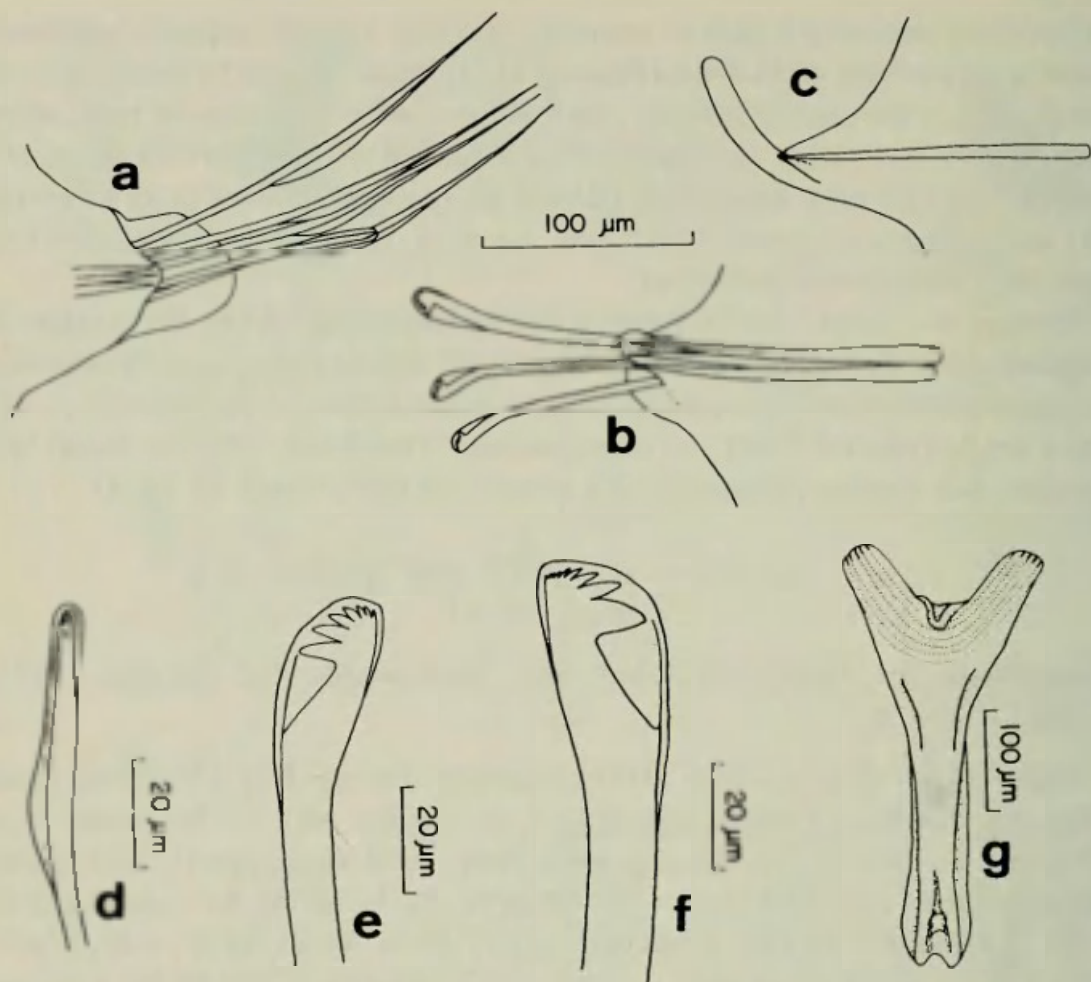


Fig. 10. *Lumbrinens verrilli*, a-f, Hutchinson Island specimens: a, Anterior parapodium, anterior view; b, Parapodium of midregion, anterior view; c, Posterior parapodium, anterior view; d, Hooded hook, anterior parapodium; e, Lower hooded hook, middle parapodium; f, Upper hooded hook, middle parapodium; g, Biscayne Bay specimen (USNM 57442), mandibles, ventral view.

segments, with regenerating pygidium. Prostomium acorn-shaped to bluntly conical, about as long as wide, tip often slightly acuminate. Peristomium of 2 well-marked apodus segments, each about as long as setiger 1. First few segments slightly narrower and shorter than those following; segments widest at about setiger 10, gradually decreasing in width posteriorly; middle segments half to about as long as wide; segments gradually shortening posteriorly. Parapodia uniramous, well separated, short, conical, truncate, about as thick as long on anterior and middle segments, slightly longer posteriorly; 3 yellow acicula in parapodia of anterior and middle segments, single aciculum in posterior parapodia. First few pairs of parapodia slightly smaller than following, with short, rounded postsetal lobes; presetal lobes

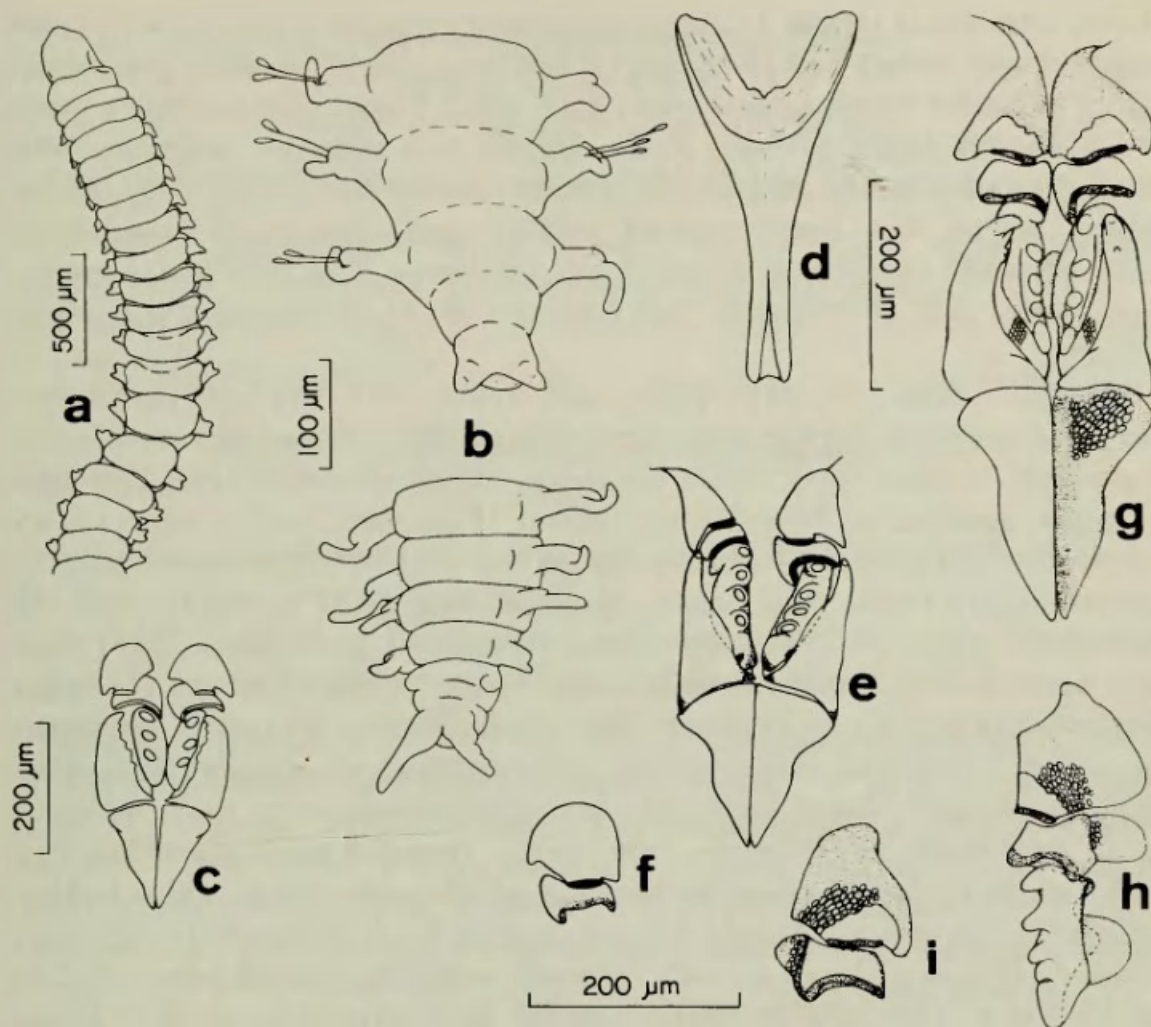


Fig. 11. *Lumbrineris verrilli*, a-c, Hutchinson Island specimens: a, Anterior end, dorsal view; b, Posterior ends, dorsal view; c, Maxillae from whole mount; d-f, Tampa Bay specimens: d, Mandibles, ventral view; e, Maxillae of small specimen; f, Right M III, M IV of e, flattened; g-i, Biscayne Bay specimen (USNM 57442): g, Maxillae of large specimen; h, Left M II-M IV, medial view; i, Right M III, M IV, flattened.

absent or reduced. Anterior parapodia largest on about setiger 10, with long, broad postsetal lobes, gradually reduced posteriorly, with short presetal lobes developing on about setiger 15. Parapodia of midregion shorter than anterior parapodia, with short, rounded presetal lobes, slightly longer, digitiform, somewhat elevated postsetal lobes. Parapodia gradually lengthening in posterior region, with reduced presetal lobes and narrow, cylindrical, slightly elevated postsetal lobes extending to about apices of hooks. Anterior segments with 3-4 upper winged capillary setae, 1-2 simple hooded hooks beginning on setiger 1, and single lower capillary; winged capillaries often shorter on anterior 4 setigers, reduced in number after setiger 10,



absent after about setiger 25; hooded hooks of anterior segments with much longer hoods, about half thickness of following hooks, slightly geniculate; apices of hooks forming acute angle with about 5 subequal secondary teeth above slightly larger primary tooth. Middle and posterior segments with about 3 hooded hooks, uppermost stouter than others; hooks with shorter hoods, stouter tips, large, pointed primary tooth and about 8 secondary teeth gradually decreasing in length and thickness. Pygidium with terminal anus; single pair of divergent, tapering cirri about as long as width of pygidium.

Mandibles (Figs. 10g, 11d) fragile, light brown with dark anterior borders and clear posterior sides in larger specimens, almost completely translucent in glycerin in smaller specimens, anteriorly flared, posteriorly fused, at least in larger specimens. Maxillae as figured (Figs. 11c, e-i). Carriers dark brown, formed in part of distinct hexagonal cells in larger specimens, together slightly longer than broad, about as long as M I, slightly rounded anteriorly, slightly constricted laterally, pointed posteriorly. M I light brown, often with darker posterior corners and tip, relatively stout in larger specimens (Fig. 11g), with broad, thin interior border in smaller specimens (Figs. 11c, e); interior border occasionally denticulate, possibly from damage or wear, with short, falcate tip; M II light brown, very stout, with 3-4 dark, stout teeth; M III brown, with single, rounded tooth extending ventrally as dark, broad posterior border; M IV with single, dark brown, straight, broad posterior tooth. Lateral support from M I to M III extremely reduced; area of dark brown cells between posterior bases of M I and M II; small, brown, semi-oval support on medial side opposite teeth of M II and M III; single large, semi-oval support anterior to tooth of M IV, not divided into dorsolateral and anteromedial areas, with uniformly brown area proximal to tooth and cellular area distally in larger specimens, almost uniformly brown in smaller specimens.

*Remarks.*—*Lumbrineris verrilli* resembles *L. tenuis*, *L. hebes* and *L. testudinum* in being small and slender and in having a similar prostomium and parapodia. It differs from *L. tenuis* by having slender hooded hooks on the first setiger, anterior hooded hooks different from those of middle and posterior setigers, a single pair of anal cirri, a broad, straight tooth with a single support on M IV, and very reduced lateral supports between M I and the base of M III. *L. hebes* has prominent lateral supports from M I to M III, a pointed tooth on M IV, and no anal cirri. Stout hooded hooks beginning on the first setiger of *L. testudinum* are similar to those of middle and posterior setigers; M II are thin, with 5 teeth; lateral supports are prominent; and there are 2 pairs of anal cirri.

*Etymology.*—The species is named in honor of Prof. A. E. Verrill, who described many polychaete species during his extensive career.

Family Arabellidae Hartman, 1944  
 Genus *Arabella* Grube, 1850  
 Subgenus *Cenothrix* Chamberlin, 1919

KEY TO SPECIES OF *ARABELLA* (*CENOTHRIX*) OF THE WESTERN ATLANTIC

1. Maxillae symmetrical, both M II long ..... *A. multidentata*  
 – Maxillae asymmetrical, left M II short, right M II long ..... 2  
 2. Left M I with bifid tip ..... *A. mutans*  
 – Left M I with simple tip ..... *A. maculosa*

*Arabella* (*Cenothrix*) *mutans* (Chamberlin, 1919)

Fig. 12

*Cenothrix mutans* Chamberlin, 1919:330, pl. 61, figs. 2–9, pl. 62, fig. 1.

*Arabella mutans*.—Crossland, 1924:71.

*Arabella* (*Cenothrix*) *asymmetrica*.—Orensanz, 1974:387, fig. 2 [not *Arabella novecrinita* var. *asymmetrica* Crossland, 1924].

*Material examined*.—EASTER ISLAND: shore; holotype (USNM 19740).—FLORIDA: Hutchinson Island, Sta. II, 27°21.6'N, 80°13.2'W, about 11 m, coarse calcareous sand; 2 specimens (USNM 54694, 54695).—Sta. IV, 27°20.7'N, 80°12.8'W, about 11 m, coarse calcareous sand; 2 specimens (USNM 54696; FSBC I 18867).—Sta. V, 27°22.9'N, 80°13.9'W, about 11 m, coarse calcareous sand; 1 specimen (FSBC I 18868).—Florida Middle Ground, 28°35.0'N, 84°14.9'W, 31 m, on coral; 1 specimen (FSBC I 18869).—NORTH CAROLINA: off Beaufort, 130 m, mud and sand; J. H. Day, col. and det., 1965; 8 specimens (USNM 51155).

*Description*.—Anterior and posterior ends yellow, other segments with yellowish-orange to dark reddish-brown transverse bands near middle of each segment, areas near segmental constrictions usually colorless or yellow; large specimen from Florida Middle Ground uniformly very light brown or colorless. Largest Hutchinson Island specimen posteriorly incomplete, longer than 110 mm, 480 segments. Prostomium bluntly conical, with 4 dorsal, posterior eyes. Peristomium of 2 apodus segments shorter than following segments. Parapodia similar throughout body, sub-biramous; setal lobes usually with 3 stout, sharply pointed acicula; tips broken off or very thin, projecting through integument; notopodial rudiment of 1–2 small, rounded lobes on dorsal side of setal lobe, with 2–3 slender internal acicula. Postsetal lobe projecting from basal half of setal lobe, dorsoventrally about half as wide and about twice as long as setal lobe, often slightly curved dorsally. Setae of anterior segments winged capillaries. Setae of middle and posterior segments 4–5 of 4 types: 1) upper seta winged capillary with wings smooth or lightly serrate (Fig. 12g); 2) transversely serrate seta below upper

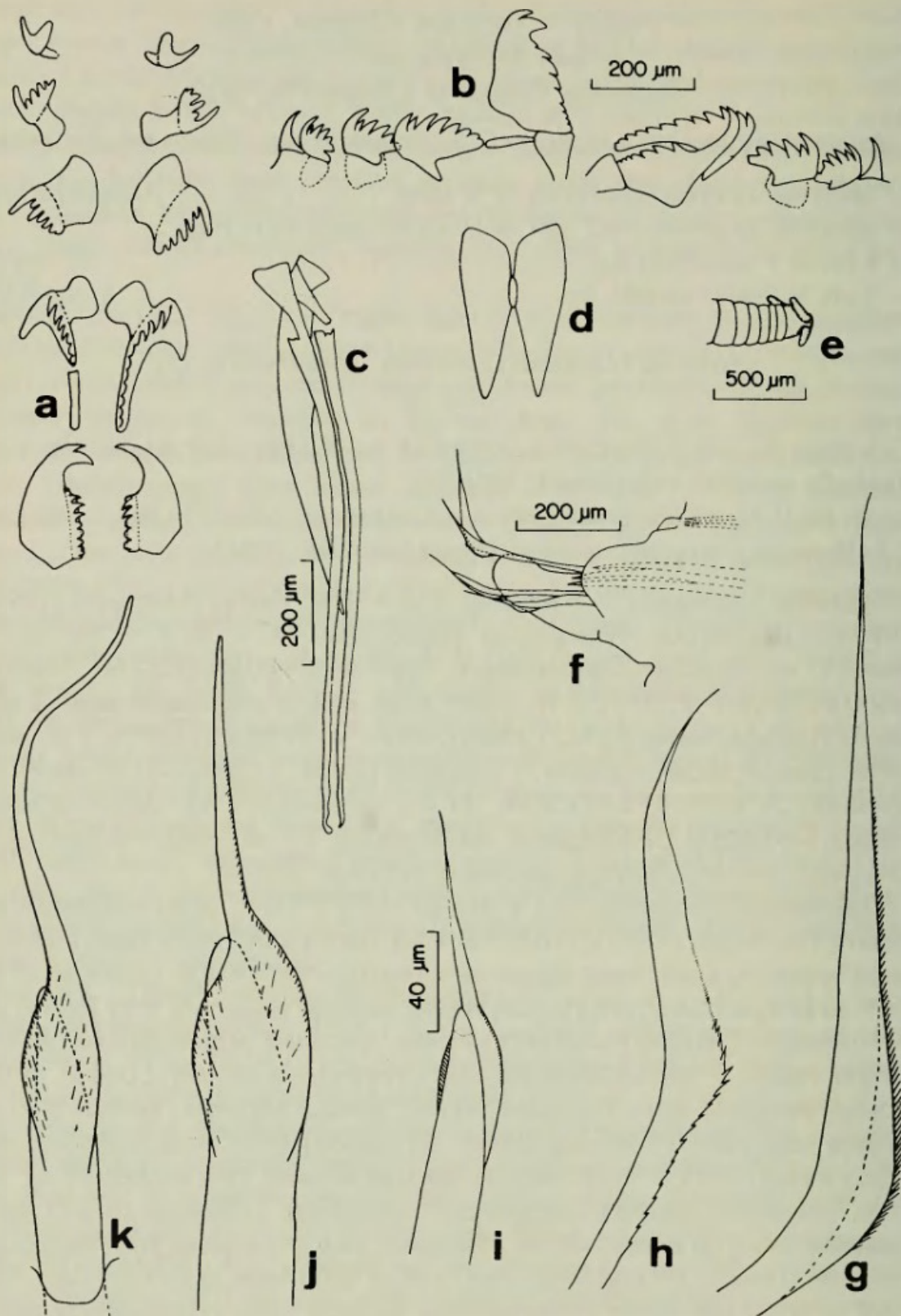


Fig. 12. *Arabella mutans*: a, Maxillae, somewhat schematic; b, Maxillae, flattened; c, Maxillary supports; d, Mandibles; e, Posterior end, lateral view; f, Parapodium of middle segment, anterior view; g, Upper winged capillary seta from middle segment; h, Transversely serrated seta from same; i, Asymmetrically hooded acicular seta from same, posterior view; j, Asymmetrically hooded acicular seta from Hutchinson Island specimen, anterior view; k, Same from holotype, anterior view. (a, d, g, h, j, and k not scaled).



winged capillary with several transverse rows of prominent serrations (Fig. 12h); 3) winged capillary seta below transversely serrated setae, shorter, with wings more strongly serrated than upper winged capillary; 4) lower seta stouter than others, acicular, with tip projecting from asymmetrical hood and with hoods visible on both sides of seta (Figs. 12i-k). Pygidium truncate conical, with 4 subequal anal cirri about as long as posterior width of pygidium (Fig. 12c).

Maxillae I and II asymmetrical (Figs. 12a, b): M I (2 + 9 - 8) + (1 + 5 - 6); M II (7 + 11); M III-V symmetrical: M III (1 + 4 - 5); M IV (1 + 4); M V 1. Maxillary carriers about twice as long as maxillae; median unpaired rod extending posteriorly for slightly more than half length of paired carriers, anterior end truncated, apparently joining ligaments or membranes attached to bases of M II. Mandibles (Fig. 12d) about as long as maxillae, dark, attached by short ligament anterior to mid-transverse line.

*Remarks.*—The holotype of *Cenothrix mutans* appears indistinguishable from Hutchinson Island specimens in most respects. Color is not as prominent on the former, shape and length of the median maxillary carrier could not be determined without damaging the specimen, and mandibles are about 1.3 times longer than maxillae. Chamberlin stated that eyes were absent on the holotype; they are present but covered by the first peristomial segment. Maxillae I were incorrectly figured by Chamberlin; the left M I has a bifid falcate tip, and the right M I has a simple falcate tip. At least the 4 larger specimens from North Carolina (USNM 51155) are the same species. The species may also have been partly described and figured by Crossland (1924:82, specimen no. W.9.2 only) as a variant specimen of *Arabella novecrinita* var. *asymmetrica*, but I have not examined the specimen.

As presently defined, the species is known from the type-locality (Easter Island), and the western Atlantic from North Carolina to Florida, the Gulf of Mexico, Argentina (Orensanz, 1974) and possibly from the Cape Verde Islands (Crossland, 1924) in depths from intertidal to 130 m.

*Arabella (Cenothrix) multidentata* (Ehlers, 1887)

Fig. 13

*Aracoda multidentata* Ehlers, 1887:112, pl. 34, figs. 8-10, pl. 35, figs. 1-4.

*Arabella maculosa*.—Treadwell, 1921:114, pl. 9, figs. 12, 13, text-figs. 424-428 [not Verrill, 1900].

*Arabella iricolor*.—Fauvel, 1923:438 [in part].—Hartman, 1938:12 [not *Nereis iricolor* Montagu, 1804].

*Arabella novecrinita* Crossland, 1924:71, text-figs. 89-95.—Monro, 1933a:260.—Gallardo, 1968:89, pl. 37, figs. 1-5.

*Arabella multidentata*.—Hartman, 1938:12.

*Material examined.*—FLORIDA: Blake Sta. 26, 24°37.5'N, 83°36'W, 201 m, holotype (MCZ 825).—Hutchinson Island, Sta. II, 27°21.6'N, 80°13.2'W,

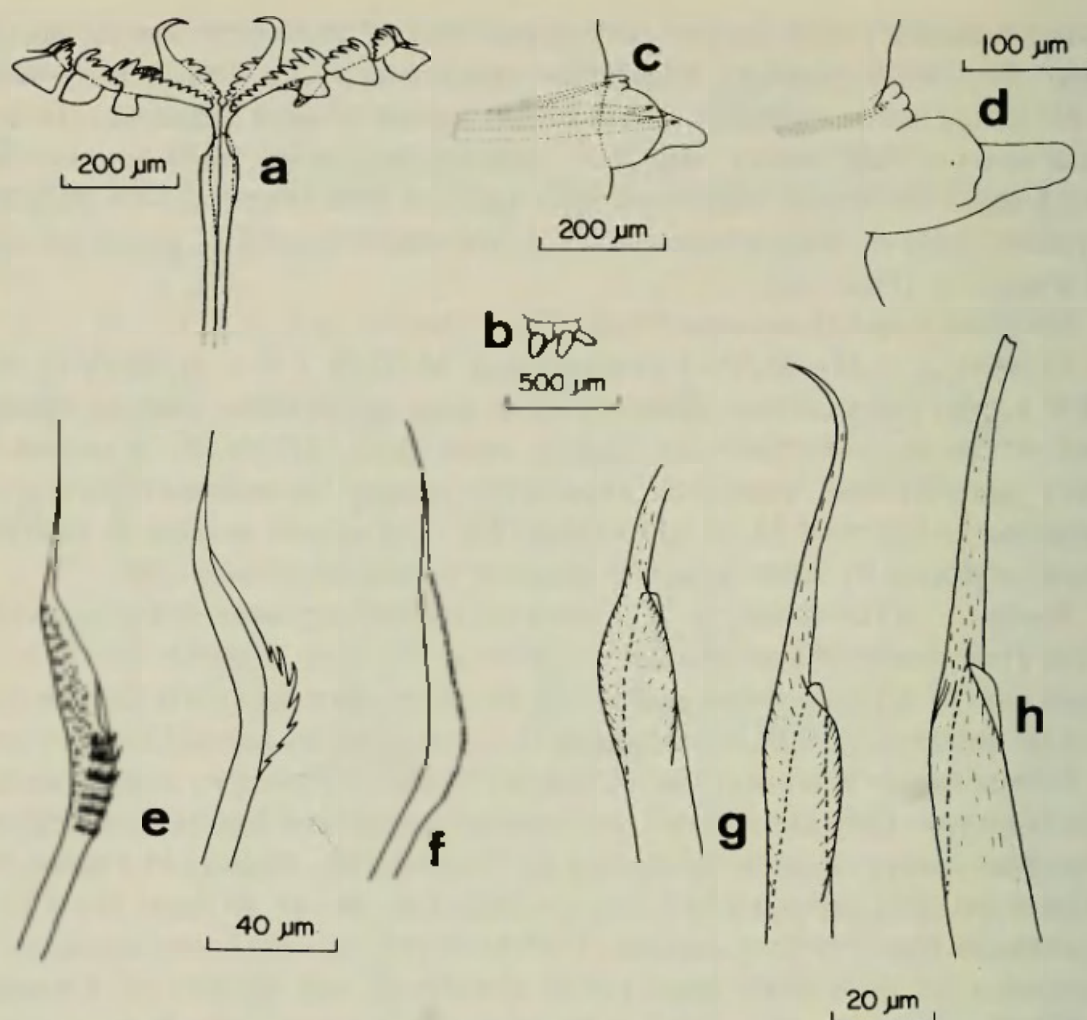


Fig. 13. *Arabella multidentata*: a, Maxillae; b, Pygidium, dorsal view; c, d, Parapodia from middle segments, anterior view; e, Transversely serrated setae of middle segment; f, Lower winged capillary seta of middle segment; g, Asymmetrically hooded acicular setae from middle segments of Hutchinson Island specimen, anterior view; h, Same from holotype of *Aracoda multidentata*, anterior view.

about 11 m, coarse calcareous sand; 1 specimen (USNM 54700).—Sta. V, 27°22.9'N, 80°13.9'W, about 11 m, coarse calcareous sand; 1 specimen (USNM 54699).—BIKINI: ½ mi W of SE point, 11–13 m; J. E. Morrison, col., 23 April 1946; 10+ specimens (USNM 23933, O. Hartman, det. as *A. novecrinita*).

*Description*.—Holotype light yellowish-orange, iridescent; Hutchinson Island specimens red. Holotype relatively large, probably less than half complete, 33 mm long, 114 segments (Ehlers, 1887); Hutchinson Island specimens much smaller. Prostomium rounded, conical, with 4 dorsal posterior eyes. Peristomium of 2 apodus segments. Parapodia generally similar throughout body, sub-biramous, with about 2 fine notoacacula extending

into lobed notopodial rudiment; setigerous lobe relatively short in anterior segments, longer posteriorly, with about 3 acicula often extending through integument in long, fine points; postsetal lobe about as long as setal lobe or slightly longer, extending nearly laterally from lower  $\frac{2}{3}$  of setal lobe. Anterior setae winged capillaries. Middle and posterior setae 4-5 of 4 general types: 1) upper seta winged capillary with wings smooth under high magnification; 2) seta below winged capillary with 6-7 prominent transverse rows of serrations (Fig. 13e); 3) winged capillary seta below transversely serrate seta shorter than upper winged capillary and with lightly serrate wings (Fig. 13f); 4) lower seta acicular, with relatively long, narrow, asymmetrical hood (Figs. 13g, h). Pygidium short, dorsally divided into 2 lobes, with 4 subequal anal cirri slightly longer than half width of pygidium.

Mandibles anteriorly flared, fused along anterior half, widely divided and tapered posteriorly. Maxillae subsymmetrical: M I (1 + 6 - 7); M II (0 + 10 - 11); M III (1 + 4 - 5); M IV (1 + 3 - 4); M V 1. Paired carriers about twice as long as maxillae; unpaired rod anteriorly rounded.

*Remarks.*—The specimen from Tortugas, Florida, referred to *Arabella novecrinita* by Monro (1933a) is undoubtedly *Arabella multidentata*, the type-locality of which is near Tortugas in 201 m. Monro suggested the possible synonymy of *A. novecrinita* Crossland and *A. multidentata* (Ehlers). He also suggested that *A. maculosa* Verrill, 1900, was the same, but the latter is a different species.

Attempts by Fauvel (1923) and Hartman (1938) to synonymize *A. multidentata* with *A. iricolor* (Montagu) are incorrect, as the latter completely lacks acicular setae.

The specimens from Easter Island, referred to *A. mutans* by Kohn and Lloyd (1973), were examined. Mouthparts are missing from one of the specimens (USNM 49534), apparently the one they described, but it appears to be *A. multidentata*. The other specimen (USNM 57434) is neither *A. mutans* nor *A. multidentata* but is apparently an undescribed species; formula for symmetrical maxillae of the latter specimen is: M I (2 + 7); M II (6 - 7); M III (1 + 5 - 6); M IV (1 + 3 - 4); and M V 1. Maxillae II of this specimen are symmetrical but are otherwise similar to those with 7 teeth on *A. mutans* (Chamberlin). Additionally, specimens reported as *A. mutans* by Day (1967:446) from southern Africa are probably *A. multidentata*.

Based on references cited above, descriptions given for specimens incorrectly referred to *Arabella mutans* (Chamberlin) by Kohn and Lloyd (1973), Gardiner (1976), and Day (1967), and material reported herein, *A. multidentata* is known from South Africa, Zanzibar, the Maldives Islands, Bikini Atoll, Easter Island and the east coast of North America from North Carolina to Tortugas, Florida. *Arabella multidentata* has also been reported from southwest Australia and Amboina by Augener (*vide* Crossland, 1924).



*Arabella (Cenothrix) maculosa* Verrill, 1900

Fig. 14

*Arabella maculosa* Verrill, 1900:651.*Arabella novecrinita* var. *atlantica* Crossland, 1924:78, text-figs. 96, 99–101, 105.*Arabella iricolor*.—Hartman, 1942b:55 [not *Nereis iricolor* Montagu, 1804].*Material examined*.—BERMUDA: The Flats Inlet; A. E. Verrill, col., 1898; syntype (YPM 2716).*Description*.—Uncolored in alcohol. Body about 95 mm long, about 1 mm wide. Prostomium long, bluntly conical, with 4 posterior dorsal eyes, outer eyes larger. Peristomium of two relatively long apodus segments. Setal lobes relatively short, rounded, supported by 2 acicula in middle segments, with notopodial rudiment at upper edge supported by fine notoacicula; postsetal lobes subtriangular, about as long as setal lobes. Anterior setae winged capillaries; middle and posterior parapodia with 4–5 setae of 4 general types: 1) upper seta long, geniculate, winged capillary, finely denticulate proximally (Fig. 14c); 2) shorter seta below winged capillary with 5–6 prominent transverse rows of serrations proximally and fine denticles laterally (Fig. 14d); 3) setae below transversely serrate seta similar to upper seta but shorter, with longer region of slightly more prominent denticles (Fig. 14e); and 4) lower, asymmetrically hooded, acicular seta (Fig. 14f). Pygidium with indistinct pair of lateral, rounded lobes without anal cirri (Fig. 14a).

Maxillae II asymmetrical: M I (1 + 6 – 7); M II (6 – 8) + (1 + 10 – 12); M III (1 + 3 – 5); M IV (1 + 3 – 4); M V 1.

*Remarks*.—Hoods of acicular setae of *A. maculosa* are much more obviously asymmetrical than are those of *A. multidentata* and *A. mutans*. These acicular setae were apparently overlooked by Hartman (1942b), who attempted to combine the species with *A. iricolor* (Montagu). The original description of *A. maculosa* was brief and lacked most important characters. My examination of Verrill's syntype indicates no apparent differences from *A. novecrinita* var. *atlantica* described by Crossland (1924) from the Cape Verde Islands. *A. novecrinita* var. *logani* Crossland, 1924, from Suez, apparently differs in having parapodia with a larger number of setae and acicula. Crossland's text-fig. 96, attributed to be maxillae of *A. novecrinita* var. *logani*, apparently was actually of *A. novecrinita* var. *atlantica*, because he indicated that the specimen from which it was drawn was from Cape Verde Islands. The species is known only from localities indicated above.

## Family Dorvilleidae Chamberlin, 1919

I am following the revision of this family by Jumars (1974), with one exception: *Papilliodorvillea* Pettibone, 1961 is retained rather than referred

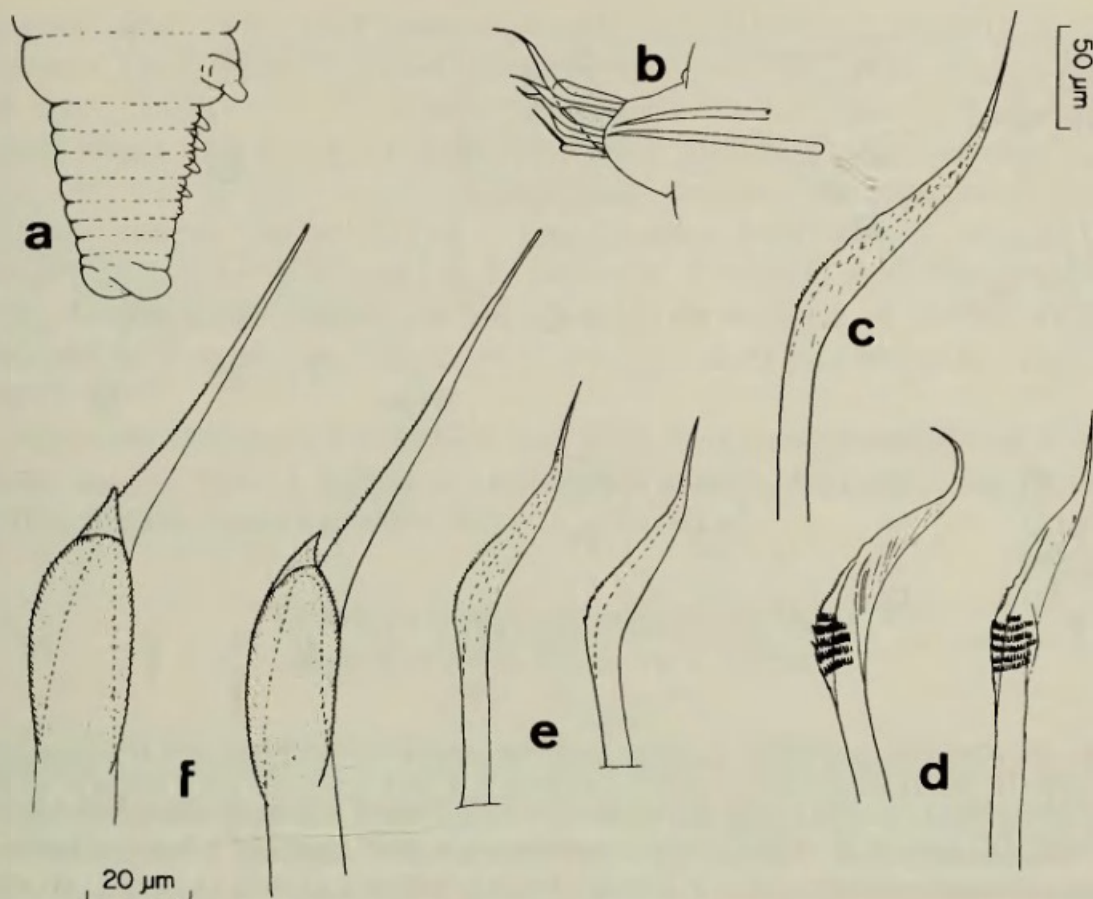


Fig. 14. *Arabella maculosa* (syntype, YPM 2716): a, Posterior end, lateral view; b, Parapodium from middle segment, anterior view; c, Upper winged capillary seta of middle parapodium; d, Transversely serrated setae of same; e, Lower winged capillary setae from same; f, Asymmetrically hooded acicular setae from same, anterior view. (a, b, d, and e not scaled).

to *Dorvillea*. Nomenclature of mouthparts follows Jumars. Free denticles are numbered sequentially from basal plates.

Genus *Dorvillea* Parfitt, 1866  
*Dorvillea sociabilis* (Webster, 1879)  
 Fig. 15

*Staurocephalus sociabilis* Webster, 1879:243, pl. 7, figs. 89–91.

*Dorvillea sociabilis*.—Hartman, 1945:27, pl. 5, figs. 1, 4, 5; 1951:66, pl. 8, figs. 3, 5.—Rullier, 1974:52.—Gardiner, 1976:215, figs. 291–n.

*Material examined*.—FLORIDA: Hutchinson Island, Sta. II, 27°21.6'N, 80°13.2'W, about 11 m, coarse calcareous sand; 1 specimen (FSBC 1 18873).—Sta. IV, 27°20.7'N, 80°12.8'W, about 11 m, coarse calcareous sand; 3 specimens (FSBC 1 18870, 18871).—Sta. V, 27°22.9'N, 80°13.9'W, about 11 m, coarse calcareous sand; 3 specimens (USNM 54705, 54706; FSBC 1 18872).

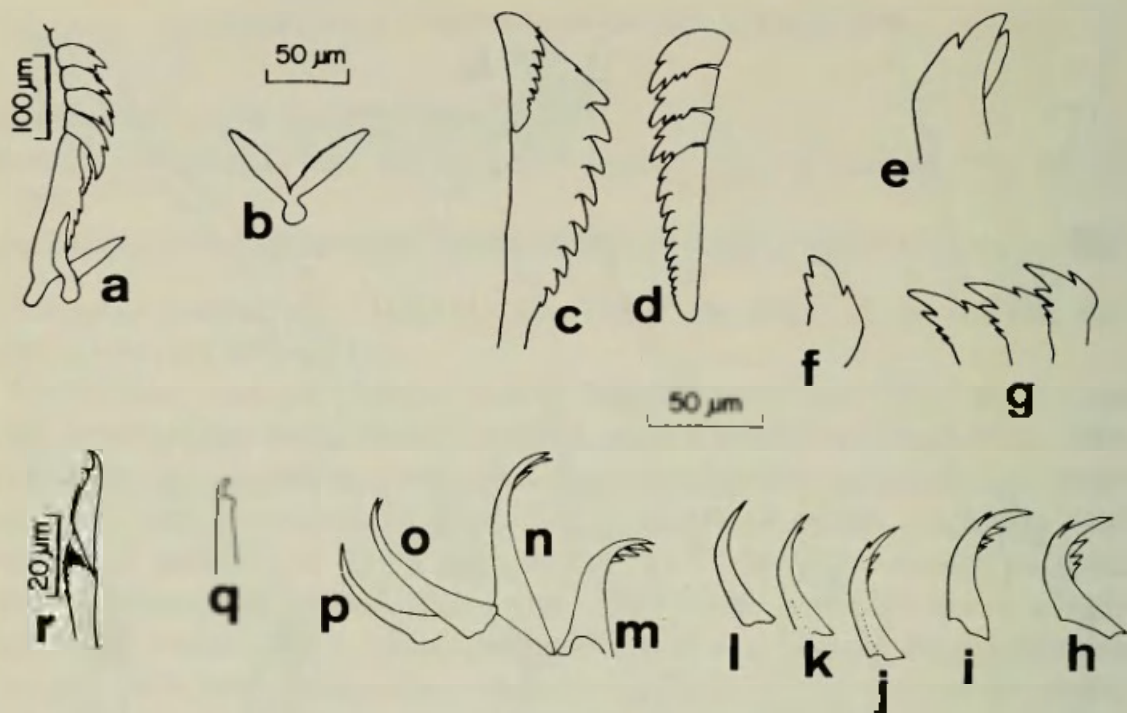


Fig. 15. *Dorvillea sociabilis*: a, Fused maxillary carriers, basal plates and posterior free denticles (D 1–D 4) of right upper row of maxillae; b, Fused upper maxillary carriers, dorsal view; c, Right basal plates of upper and lower rows of maxillae; d, Left basal plate and posterior free denticles (D 1–D 3) of lower row of maxillae; e–l, Free denticles from upper row of maxillae (total number 18): e, D 1; f, D 2; g, D 3–D 5; h, D 9; i, D 10; j, D 15; k, D 17; l, D 18; m–p, Free denticles from lower row of maxillae (total number 26): m, Middle denticle (D 13); n, D 21; o, D 24; p, D 26; q, Tip of long simple seta; r, Compound falciger (q, r not scaled).

**Description.**—Maxillae with pair of carriers and 4 rows of denticles with accompanying basal plates. Upper carriers fused, with posterior knob and 2 anterior wing-like pieces attached to basal plates of upper maxillary rows; wings minutely serrate on attachment border; lower carriers small, fused medially to basal plates of upper and lower rows of maxillae. Upper rows with stout subequal basal plates, with 9 teeth on left and 10 on right, with 17–18 free denticles; first (D 1) with 3 teeth, stouter main tooth, smaller lateral and medial teeth (Fig. 15e); D 5 with stout recurved tooth, 1 lateral and 3 medial (Fig. 15g); D 15 with long, sharply pointed main tooth, 1 lateral and 2 medial (Fig. 15j); anterior denticles slender, hollow, with 1–2 points (Figs. 15k, l). Lower row of maxillae with asymmetrical basal plates, shorter right one with 7 teeth, longer left one with 10 teeth; proportional lengths of left and right basal plates 3:2 (Figs. 15c, d); proportional lengths of right lower and upper basal plates 2:5; 23–27 free denticles anterior to lower basal plates (Figs. 15d, m–p); D 1 with 1 main tooth, 1 lateral, 2 medial; D 3 with main tooth, 1 lateral, 3 medial; D 14 with 2 main teeth of similar size and 2 small (Fig. 15m); D 23 with 2 large teeth and 1 small (Fig. 15n); D 24 with



2 equal teeth (Fig. 15o); anterior denticle (D 26) with 1 tooth (Fig. 15p); anterior teeth (about D 20–26) long, slender, hollow. Teeth of basal plates of upper and lower rows increasing in size anteriorly; those of upper row much larger than lower. One specimen with maxillae completely duplicated (i.e., 8 rows of maxillae), indicating that maxillae are replicated. Supracicular simple setae of 2 types: 1) long, slender, finely serrate on basal half; and 2) short, stout, serrate up to tip; both flattened, with bifid tips (Fig. 15q). Subacicular compound hooks with distal ends of shafts strongly toothed on longest part; blades with toothed edges and bidentate tips (Fig. 15r).

*Remarks.*—*Dorvillea sociabilis* was described from Virginia, and is presently known from Virginia to Hutchinson Island, Florida, Cuba (Rullier, 1974) and the eastern Gulf of Mexico in 0–160 m.

Genus *Protodorvillea* Pettibone, 1961

*Protodorvillea bifida*, new species

Figs. 16, 17a–f

*Material examined.*—FLORIDA: Hutchinson Island, Sta. IV, 27°20.7'N, 80°12.8'W, about 11 m, coarse calcareous sand; holotype (USNM 57471, R. Gallagher, col., March 1972); 4 paratypes (AHF POLY 1272; FSBC I 20474–20476).—Sta. II, 27°21.6'N, 80°13.2'W, about 11 m, coarse calcareous sand, 9 paratypes (AHF POLY 1271; ZMH P-15540; FSBC I 20467–20473).—Sta. V, 27°22.9'N, 80°13.9'W, about 11 m, coarse calcareous sand, 3 paratypes (USNM 57472; FSBC I 20477).—Lower Tampa Bay, 27°36'15"N, 82°43'22"W, 8 m, sand; J. Taylor and C. Saloman, cols., 29 October 1963; 3 paratypes (USNM 57473; ZMH P-15541; FSBC I 20478).

*Description.*—Colorless in alcohol; eyes red. Largest specimen about 10 mm long, 0.25 mm wide, about 80 segments. Prostomium about as long as wide, generally flattened dorsoventrally, bluntly conical anteriorly, slightly convex laterally, slightly convex to concave posteriorly. Antennae originating on posterior half of prostomium, about half as long as greatest prostomial width, usually biarticulate. Palps originating laterally, slightly anterior to middle of prostomium, about equal in length to first 10 segments. Eyes usually 2 pairs; posterior pair larger, with lens, anterior and slightly lateral to origins of antennae; anterior pair much smaller, apparently subdermal, anterior and medial to origins of palps, not visible in mature specimens (Figs. 16a, b). Peristomium of 2 apodus segments, each slightly narrower and about as long as following segments. Parapodia uniramous, without notoacicula, supported by single neuroaciculum, subcylindrical, with digitiform dorsal and ventral cirri near tips, with indistinct presetal and postsetal lobes, with subacicular setal lobe often more elongate than supracicular lobe. Setae of 6 types: 1) 1–2 upper simple serrate capillaries; 2)

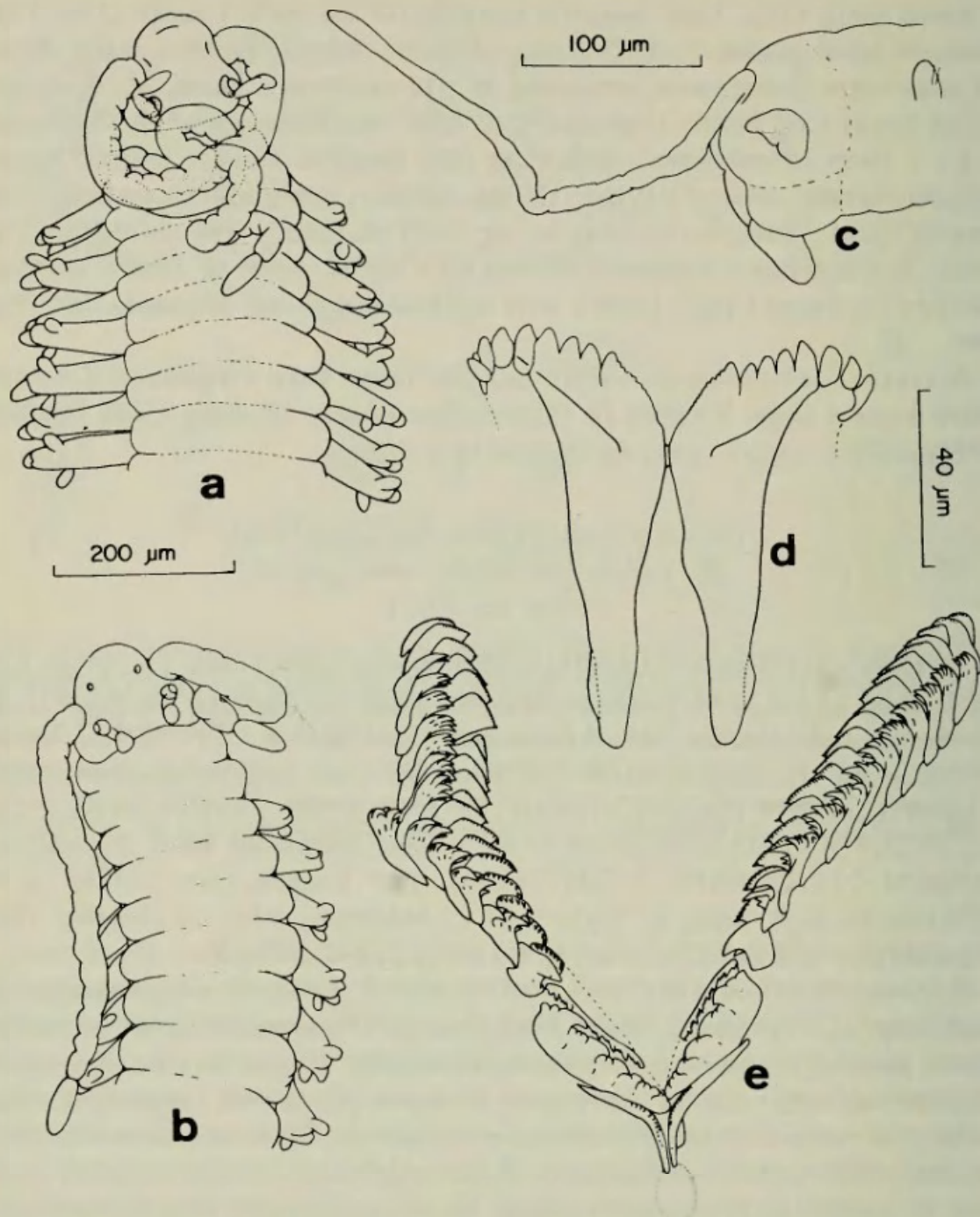


Fig. 16. *Protodorvillea bifida*: a, Anterior end of mature specimen, dorsal view; b, Anterior end of immature specimen, dorsal view; c, Posterior end, ventrolateral view; d, Mandibles; e, Maxillae.

furcate seta; 3) cultriform seta replacing furcate seta in few posterior segments; 4) subacicular compound falcigers with bidentate tips, 4-5 in anterior parapodia, 2-3 in posterior; 5) lower simple seta in posterior few segments; 6) 2-6 natatory often originating posterior to compound falcigers in gravid

segments of sexually mature specimens. Furcate setae smooth-sided, with tips of unequal length; longer tine slightly winged, with papilliform tip; shorter tine not winged, with bifid tip. Upper falcigerous blades longer, lower blades shorter; greatest length about 50  $\mu\text{m}$ ; bidentate tips with secondary tooth subequal to primary tooth. Cultriform setae serrate, with short, stout subequal teeth, bidentate tips similar to those of falcigers. Pygidium somewhat obliquely truncate, with 2 pairs of anal cirri, long, filiform, non-articulated dorsal pair and short, stout ventral pair. Sexually mature specimens with sex products beginning in setigers 10–13, continuing to near posterior end.

Mandibles (Fig. 16d) anteriorly flared, with 4–5 fused and 3–5 free teeth on each side; inner teeth with small denticles on elongate median edge; mandibles fused posterior to denticles of inner teeth, posteriorly elongate. Maxillae with pair of carriers, 2 pairs of basal plates, 2 paired rows of free denticles continuous with basal plates (Fig. 16e); upper carriers toothed on anterior dorsal parts, adnate to posterior halves of basal plates of upper row of maxillae, ending posteriorly within brownish area of maxillary ligament; lower carriers appearing as reinforced area of maxillary membrane; ligament in area of carriers only slightly thickened. Basal plates of upper row relatively massive, with 4–5 main teeth, about twice as many secondary teeth; teeth decreasing in size posteriorly; 12–13 free denticles; D 1 very stout, with 2 teeth, large lateral, small medial; D 2 with 5–6 teeth, 1–2 small medial ones, 1 large hook, 2 small hooks, 1 large lateral tooth; next 4 denticles with additional small lateral tooth, larger teeth becoming smaller; denticles on anterior end with teeth gradually reduced in number, becoming subequal in size, less strongly hooked; anterior denticle of one side with 2 teeth, that of opposite side with 4; free denticles of upper row stout, thickened. Lower row of maxillae with thin, narrow, asymmetrical basal plates with about same number and arrangement of teeth as upper row; teeth smaller, more sharply pointed; 19 free denticles on each side; D 1 with about seven small, acutely pointed, posteriorly directed teeth, middle tooth appearing slightly larger; thereafter, teeth of denticles becoming more numerous, smaller, gradually disappearing except median tooth which continues anteriorly, possibly absent from anteriormost 1–2 denticles; free denticles of lower row thin, flattened.

*Remarks.*—Furcate setae with one bifid tine have not been noted previously for species of *Protodorvillea*. The bidentate blades of the compound falcigers with subequal teeth differ from *P. kefersteini*, in which the blades show a minute secondary tooth. To my knowledge the upper cultriform and lower simple setae observed on *P. bifida* and *P. kefersteini* from Hutchinson Island have not been previously reported for *Protodorvillea*.

*Etymology.*—The specific name is derived from the Latin and refers to the single bifid tine of the furcate setae.



*Protodorvillea kefersteini* (McIntosh, 1869)

Figs. 17g–m

*Staurocephalus kefersteini* McIntosh, 1869:417, pl. 16, fig. 11.*Protodorvillea kefersteini*.—Pettibone, 1961:179.—Hartman-Schröder, 1971:262, figs. 87a–g.—Hobson, 1971:542, fig. 8.—Orensanz, 1973a:335, pl. 4, figs. 1–9.—Gardiner, 1976:214, figs. 29h–k.

*Material examined*.—FLORIDA: Hutchinson Island, Sta. IV, 27°20.7'N, 80°12.8'W, about 11 m, coarse calcareous sand; 1 specimen (FSBC I 18874).—Sta. V, 27°22.9'N, 80°13.9'W, about 11 m, coarse calcareous sand; 6 specimens (USNM 54707–54709; FSBC I 18875, 18876).—MASSACHUSETTS: Cape Cod Bay, 15.5 m, gravelly sand; D. C. Grant, col., Kay Hobson, det.; 8 specimens (USNM 42027).

*Description*.—Prostomium with 2 pairs of eyes on most specimens; anterior pair medial to origins of palps; posterior pair slightly larger, medial to origins of antennae. Blades of compound falcigers (Figs. 17j, k) with secondary tooth much smaller than primary, as figured by Hartman-Schröder (1971:fig. 87e). Forked setae with tines slightly asymmetrical in size and shape. Modified simple, cultriform setae (Fig. 17l) replacing forked setae in posterior few segments, moderately curved near tip, with teeth on convex border longer basally, shorter near tip; simple setae (Fig. 17m) smooth, slender, with slightly curved, unidentate tips in lower part of posterior few parapodia.

Mouthparts as figured by Orensanz (1973a:pl. 4, figs. 3, 4) and Hartman-Schröder (1971:figs. 87f, g). Maxillae replicated in 1 of 2 specimens dissected.

*Remarks*.—*Protodorvillea kefersteini* was described originally from Scotland and is presently known from Ireland, the English Channel and North Sea, Mediterranean Sea, Black Sea, Argentina and Atlantic coast of North America from Massachusetts to Florida. Cultriform setae are absent from New England specimens examined.

Genus *Schistomeringos* Jumars, 1974*Schistomeringos pectinata*, new species

Figs. 18–20

*Material examined*.—FLORIDA: Hutchinson Island, Sta. IV, 27°20.7'N, 80°12.8'W, about 11 m, coarse calcareous sand; holotype (USNM 57474, R. Gallagher, col., July 1972), 9 paratypes (ZMH P-15543; FSBC I 20496–20503).—Sta. II, 27°21.6'N, 80°13.2'W, about 11 m, coarse calcareous sand; 10 paratypes (USNM 57475; AHF POLY 1273, 1274; FSBC I 20484–20494).—Sta. III, 27°22.0'N, 80°12.4'W, about 7 m, medium calcareous sand; 1 paratype (FSBC I 20495).—Sta. V, 27°22.9'N, 80°13.9'W, about 11

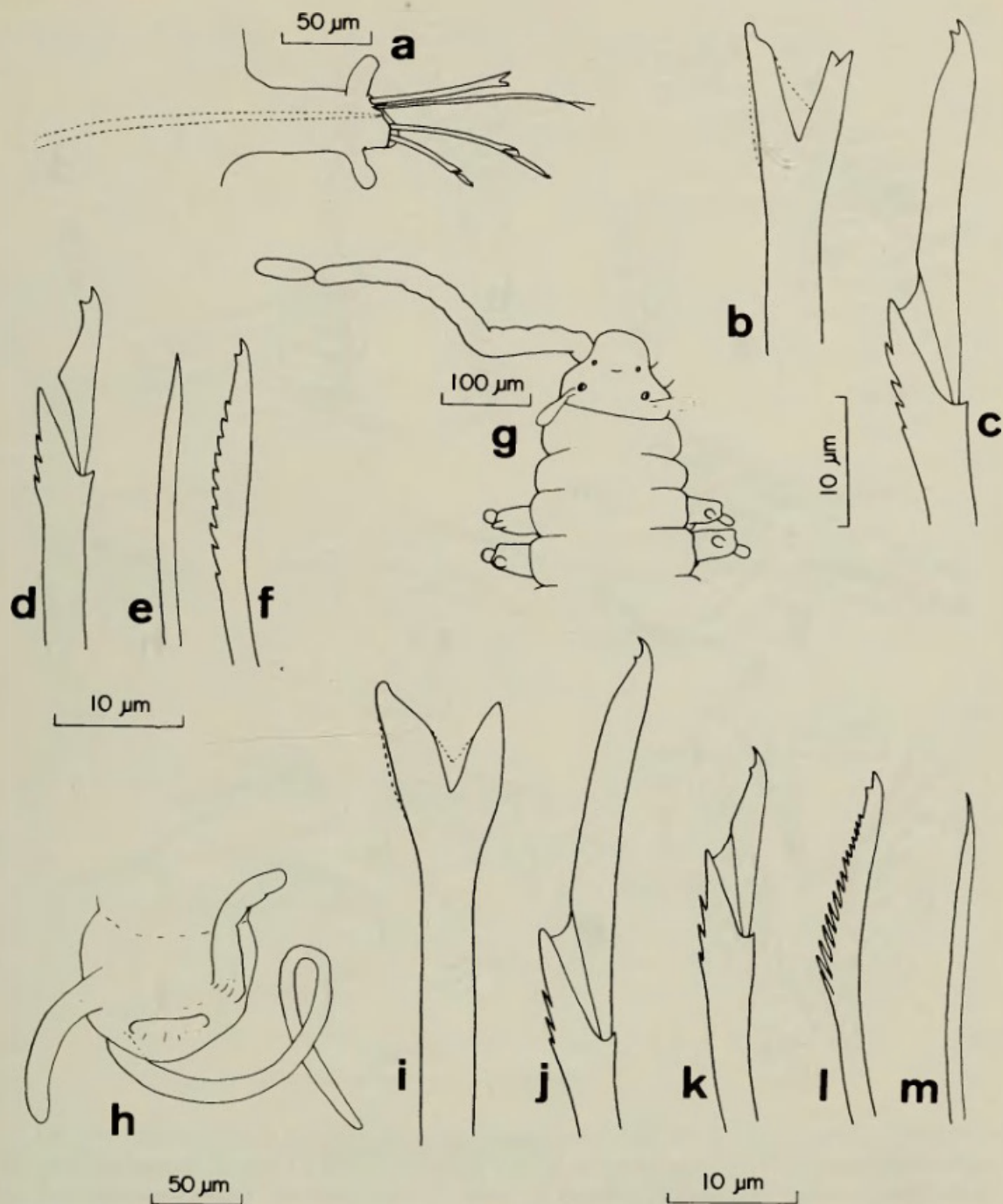


Fig. 17. *Protodorvillea bifida*: a, Parapodium of middle segment, anterior view; b, Forked seta from same; c, Upper compound falciger from same; d, Middle compound falciger from same; e, Lower simple seta; f, Cultriform seta. *Protodorvillea kefersteini*: g, Anterior end, dorsal view; h, Pygidium, ventral view; i, Forked seta; j, Upper compound falciger; k, Lower compound falciger; l, Cultriform seta; m, Lower simple seta.

m, coarse calcareous sand; 2 paratypes (ZMH P-15542; FSBC I 20504).—Lower Tampa Bay, J. Taylor and C. Saloman, cols., Oct. 1963; 1 paratype (USNM 57476).

*Description*.—Colorless in alcohol; eyes red. Largest specimen about 15

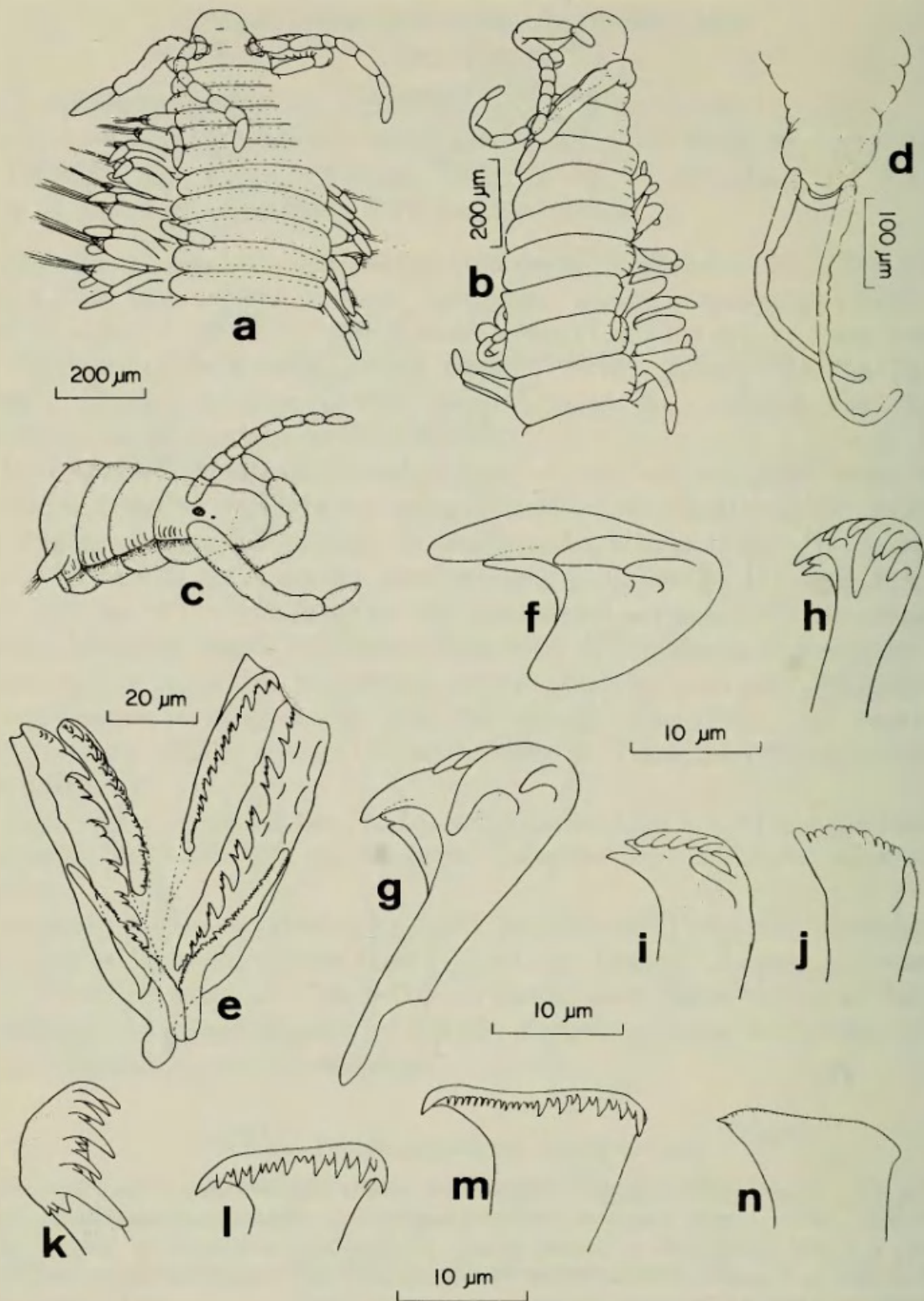


Fig. 18. *Schistomeringos pectinata*: **a**, Anterior end (holotype), dorsal view; **b**, Anterior end of immature specimen, dorsal view; **c**, Same, lateral view; **d**, Posterior end, dorsal view; **e**, Maxillary basal plates and carriers of upper and lower rows of maxillae; **f**-**k**, Free denticles of upper row of maxillae (total number 25): **f**, D 1; **g**, D 3; **h**, D 7; **i**, D 21; **j**, D 24; **k**-**n**, Free denticles of lower row of maxillae (total number 30): **k**, D 1; **l**, D 4; **m**, D 10; **n**, D 28.



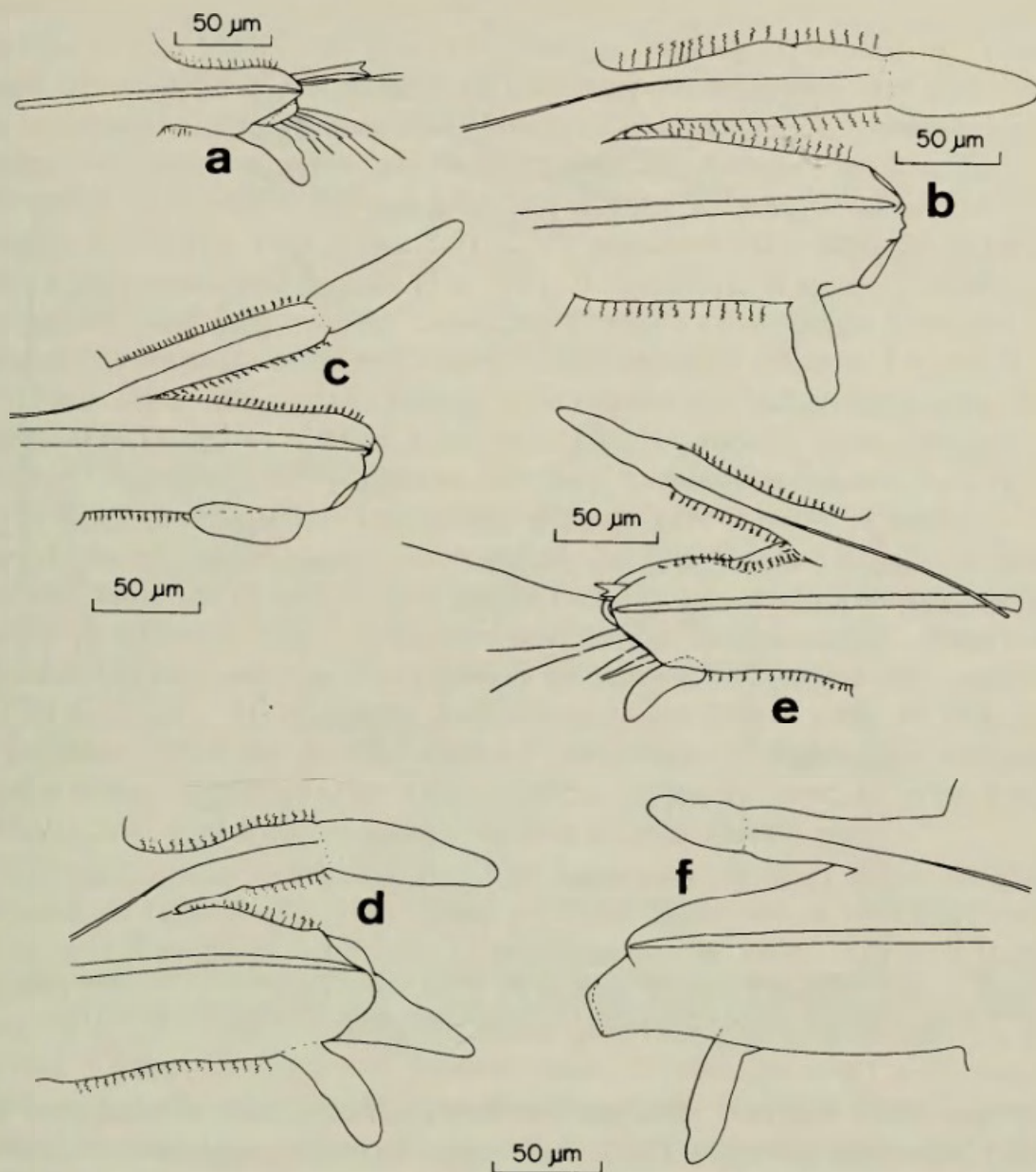


Fig. 19. *Schistomeringos pectinata*: **a**, Parapodium of setiger 1 of holotype, posterior view; **b**, Parapodium of setiger 12 of immature specimen, anterior view; **c**, Parapodium of setiger 20 of immature specimen, anterior view; **d**, Same of holotype, posterior view; **e**, Parapodium of middle segment of immature specimen, anterior view; **f**, Parapodium of middle segment, sub-acicular setal lobe partially extended, anterior view.

mm long, slender, about 90 segments. Prostomium flattened, bluntly conical; generally straight posteriorly, sides slightly concave. Antennae originating dorsolaterally and slightly posterior to middle of prostomium, equal in length to palps when fully developed, with 8–9 articles. Palps originating laterally and slightly anterior to antennae, biarticulate, with long, stout, tapered, generally wrinkled palpophores and elongate, oval palpostyles. Eyes of ma-

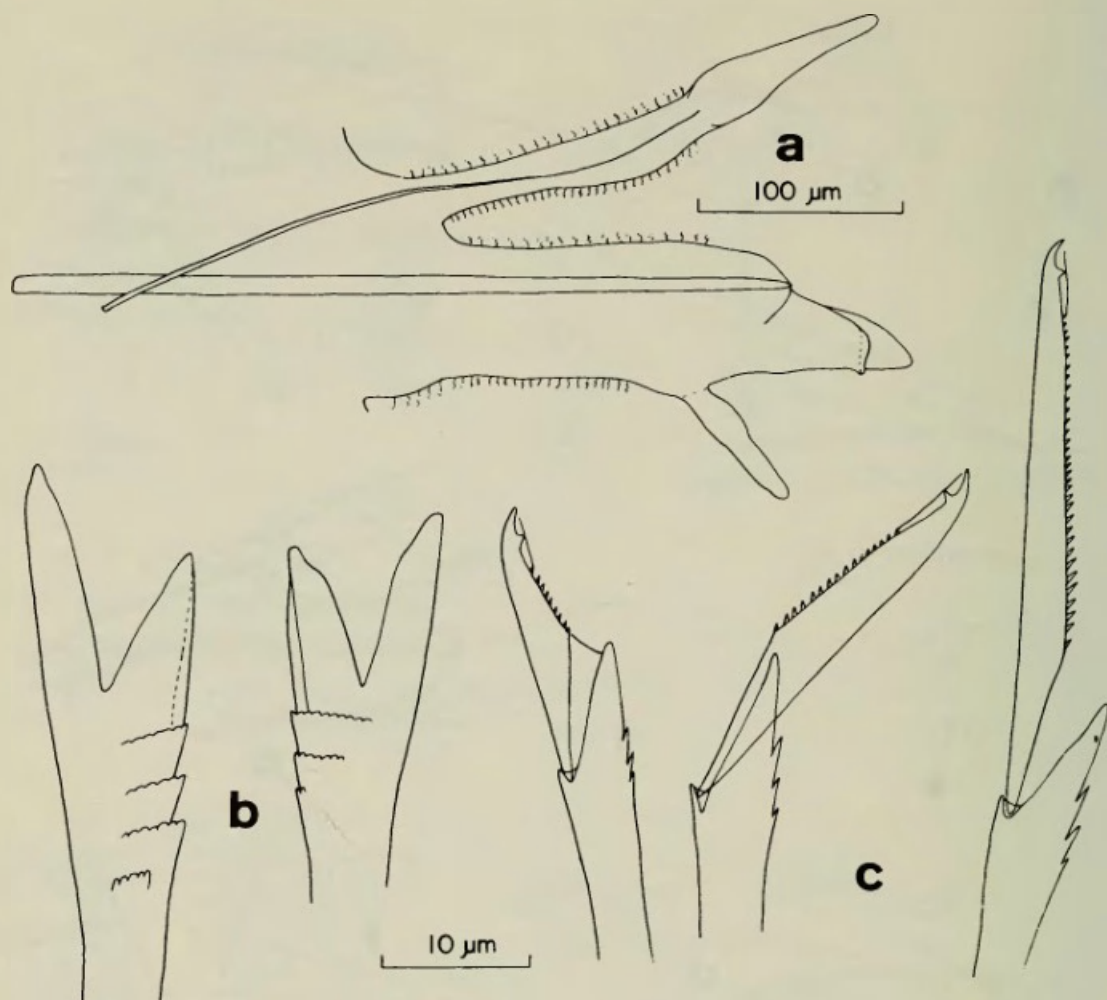


Fig. 20. *Schistomeringos pectinata*: a, Parapodium of middle segment, posterior view; b, Forked setae, opposite views (holotype); c, 3 compound setae of setiger 20 (holotype).

ture specimens one pair, enlarged, reniform, covering almost total area between palps and antennae (Fig. 18a); eyes of immature specimens 2 pairs (Figs. 18b, c) or none; larger pair slightly anterolateral to antennae; smaller pair medial to palps (Fig. 18c). Peristomium of 2 apodus segments, anterior one often slightly longer, narrower than following segments. Parapodia of setiger 1 (Fig. 19a) uniramous, without dorsal cirri; remainder sub-biramous, with slender notoaciculum extending into cirrophores of dorsal cirri. Dorsal cirri generally longer than setal lobes in anterior segments, slightly shorter posteriorly; proportional lengths of cirrophores and cirrostyles varying from slightly greater than 1:1 to slightly less than 2:1; separation of cirrophores and cirrostyles often indistinct (Fig. 20a). Setal lobes with long, slender aciculum in upper part; supra-acicular setal lobe rounded, dorsally broad; subacicular setal lobe in anterior segments separated from supra-acicular lobe, broadly rounded in anterior view; distinct presetal and postsetal lobes extending from above supra-acicular lobe and ending at ventral cirrus; pre-

setal lobe less developed than postsetal; subacicular setal lobes in middle and posterior segments (Figs. 19d, 20a), extending from ventral edge as long, thin triangular processes, with obscure presetal lobe in similar position as in anterior segments and more prominent postsetal lobe. Immature specimens with supra-acicular setal lobe longest and subacicular setal lobe not extended, with short presetal lobe and slightly longer postsetal lobe both visible in anterior view (Figs. 19b, c, e); specimen with partially extended subacicular setal lobe figured (Fig. 19f). Ventral cirri originating subdistally on parapodial lobes, usually extending about to tips. Single aciculum colorless; tip abruptly narrowed, acute. Supra-acicular setae of 2 types: 1) 1–2 forked setae, and 2) 1–6 (usually 2–3) capillaries. Subacicular setae 6–10 compound falcigers. Forked setae with slightly unequal tines; shorter tine cusped (Fig. 20b), with 4 cusps on one side, 3 extending to edge, 2 extending to opposite side; shorter tine faintly limbate above cusps. Capillary setae serrate on one edge. Blades of compound falcigers serrate; lengths of blades varying between 18 and 64  $\mu\text{m}$ , longer ones dorsal; tips bidentate, hooded; shafts of falcigers with 3 serrations below tip of long extension. Supra-acicular cultriform setae on parapodia of first setiger of Tampa Bay specimen (USNM 57476). All segments with 2 transverse dorsal rows of cilia continuing on dorsal and ventral sides of cirrophores of dorsal cirri and parapodial lobes. Pygidium (Fig. 18d) rounded, obliquely truncate, with 2 pairs of anal cirri, long filiform dorsal pair and stouter ventral pair.

Mandibles with 3–6 fused and 3–5 free teeth on each side. Maxillary supports as figured (Fig. 18e). Basal plates of upper row of maxillary structures with 7 principal teeth, 17–20 secondary teeth; up to 27 free denticles, usually 20–25; D 1 with 4 teeth, 1 principal tooth, 2 lateral and 1 medial teeth (Fig. 18f); free denticles thereafter gradually changing anteriorly, first having 2 principal teeth with smaller teeth, 3 principal teeth with smaller teeth and nearly subequal teeth near anterior end; D 3 with 7 teeth, 2 large, 5 smaller (Fig. 18g); D 7 with 10 teeth, 3 large, 7 smaller (Fig. 18k); D 21 with 10 rounded teeth, lateral and medial ones somewhat separated from others, falcate except for lateral one (Fig. 18i); D 24 with about 10 subequal, rounded teeth. Basal plates of lower row with 10–11 principal teeth, about 25 secondary teeth, plates asymmetrical in length in some specimens and  $\frac{1}{2}$ – $\frac{2}{3}$  as long as those of upper row with smaller teeth; up to 37 free denticles, usually about 30. On lower row, D 1 with 1 larger tooth, 3–5 medium teeth, several smaller teeth (Fig. 18k); D 4 with 9 large and 10 small teeth, with medial tooth pointed obliquely toward midline, others hooked posteriorly; denticles beginning with about D 7 or more anteriorly, with medially directed hook and numerous small, posteriorly curved hooks on nearly straight edge (Figs. 18m, n); teeth on anterior denticles easily broken, often absent. Maxillae in various stages of replication in more than 10% of specimens.



*Remarks.*—Species of *Schistomeringos* were summarized by Jumars (1974:104) and Westheide (1977:380). Adults of *S. pectinata* resemble *S. neglecta* (Fauvel, 1923:447, figs. 179i–q) in having one pair of eyes and parapodia with an extended subacicular neuropodial lobe. However, the forked setae have no serrations below the shorter tine. Mouthparts of *S. neglecta* were insufficiently described to allow comparison with *S. pectinata*.

*S. pectinata* resembles *S. pacifica* (Westheide, 1977:379) from the Galapagos Islands in having similar mouthparts and parapodia. The latter species lacks eyes and has well defined nuchal organs on the anterior border of the first segment, and stout, bidentate-tipped supra-acicular, simple cultriform setae on posterior parapodia.

*S. mossambica* (Hartman-Schröder, 1974:30) from Mozambique has a similar prostomium, eyes and parapodia to *S. pectinata*. However, the parapodia of *S. mossambica* are much shorter compared to body width than are those of *S. pectinata*. Details of maxillae and presence of dorsal ciliary bands were not described for *S. mossambica*.

*Etymology.*—The specific name, derived from the Latin, means comb-shaped and refers to shape of the free denticles of Maxillae II.

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