Revision of the Aphroditoid Polychaetes of the Family Acoetidae Kinberg (= Polyodontidae Augener) and Reestablishment of *Acoetes* Audouin and Milne-Edwards, 1832, and *Euarche* Ehlers, 1887

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ABSTRACT

Pettibone, Marian H. Revision of the Aphroditoid Polychaetes of the Family Acoetidae Kinberg (= Polyodontidae Augener) and Reestablishment of *Acoetes* Audouin and Milne-Edwards, 1832,and *Euarche* Ehlers, 1887. *Smithsonian Contributions to Zoology*, number 464, 138 pages, 96 figures, 1989.— The family Acoetidae is reviewed and revised, based on reexamination of type material and published records, as well as on examination of new material. A chronological synopsis of the family, genera, and species, as well as a summary of the general characteristics of the family are included. According to the present study, the family includes 8 genera and 46 species, of which 13 are described as new, as well as one doubtful subspecies. Particularly interesting features in this group include the gigantic sizes of the specimens, tube-dwelling habits and formation of tubes from parapodial spinning glands, the large stalked eyes or ommatophores, and large eversible pharynx or proboscis with denticled jaws and long papillae in connection with a carnivorous life style.

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Contents

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Marian H. Pettibone

Introduction

In connection with an extended study on the scaled polychaetous annelids of the Superfamily Aphroditacea, the species that can be referred to the Family Acoetidae are reviewed and revised, based on reexamination of the type-specimens, where possible, and additional published records, as well as new material.

According to the present revisionary study, the Family Acoetidae is represented by 8 genera (including 2 synonyms), 46 species (3 doubtful, plus 16 synonyms), 13 new species, 9 new combinations, and 1 doubtful subspecies. The genera *Acoetes* and *Euarche* are reinstated herein. Listed chronologically, the genera are as follows.

Polyodontes Renieri, 1828, type species: *P. maxillosus* (Ranzani, 1817); with 12 species (plus 4 synonyms), 3 new species.

Acoetes Audouin and Milne-Edwards, 1832, type species: *A. pleei*; synonym *Eupompe* Kinberg, 1856, type species: *E. grubei;* with 12 species (1 doubtful, plus 4 synonyms), 4 new species, 7 new combinations.

Panthalis Kinberg, 1856, type species: *P. oerstedi:* with 6 species (plus 3 synonyms), 3 new species, 1 new combination, plus 1 doubtful subspecies.

Eupanthalis McIntosh, 1876, type species: *E. kinbergi*; synonym *Restio* J. Moore, 1903, type species: *R. aenus;* with 4 species (1 doubtful), 2 new combinations.

Euarche Ehlers, 1887, type species: *E. tubifex;* with 3 species (plus 2 synonyms), 1 new species.

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Eupolyodontes Buchanan, 1894, type species: *E. cornishii;* with 7 species (1 doubtful, plus 1 synonym), 2 new species.

Neopanthalis Strelzov, 1968, type species: *N. pelamida;* with 1 species.

Zachsiella Buzhinskaja, 1982, type species: *Z. nigromaculata* (Grube, 1878); with 1 species (plus 2 synonyms).

ABBREVIATIONS USED IN THE FIGURES

br	branchia
buC	buccal cirrus
ce mAn	ceratophore median antenna
dBr	dorsal or anterodorsal bract
dC	dorsal cirrus
dTc	dorsal tentacular cirrus
elph	elytrophore
lAn	lateral antenna
mAn	median antenna
ne	neuropodium
no	notopodium
noS	notoseta
pa	palp
prBr	prostomial branchia
sl	slit
spF	spinning fibers
vBr	ventral or anteroventral bract
vC	ventral cirrus
vTc	ventral tentacular cirrus

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Chronological Synopsis of Family Acoetidae, Genera, and Species

1817. Ranzani (1817:1452–1456, pl. 11: figs. 2–9), under *Eumolpe maxima* included the description and figures by Ranzani for *Phyllodoce maxillosa* from the Adriatic.

1828. Blainville (1828:461, pl. 12), in his *Dictionaire des Sciences Naturelles*, listed the manuscript name *Polyodontes*, Renieri for *Phyllodoce maxillosa* Ranzani, 1817:1456, pl. 11: figs. 2–9. Thus the type species of the genus *Polyodontes* Renieri, in Blainville, 1828, is *P. maxillosus* (Ranzani, 1817), from the Adriatic, the oldest genus and species in the Family.

1832. Audouin and Milne-Edwards (1832:437–438, pl. 10: figs. 7–14; 1834:99–102, pl. 2: figs. 7–14), under "Aphrodisiens Vermiformes," established the new genus and species *Acoetes Pleei*, based on a specimen from Martinique, West Indies, collected by M. Plée. The description is deficient in some respects. For the most part, the genus has not been used and the species has been ignored. The type in the Paris Museum (MNHNP) was available for study. Based on the type specimen and additional material collected near the type locality, it is now possible to reestablish the genus and species. Some species that have been described under *Panthalis*, *Eupompe*, and *Polyodontes* are referred herein to *Acoetes*.

1855. Grube (1855:83–90, pl. 3: fig. 2) included *Polyodontes gulo* (= *Cydippe gulo* Rüppel) from the Red Sea. It was incompletely described and figured. No types are known to exist. Buchanan (1894:438) referred the species to *Eupolyodontes* in the same publication in which she established the genus and described *E. cornishii*. Malaquin and Dehorne (1907:357) listed it as a questionable species of *Eupolyodontes*. Fauvel (1947:21) included both *E. cornishii* and *E. mitsukurii* (Izuka) as synonyms of *E. gulo*. For the present, it seems best to consider *E. gulo* (Grube) as a questionable species of *Eupolyodontes*.

1856. Stimpson (1856:116–117) described *Acoetes lupina* from Charleston Harbor, South Carolina. No types exist. It was referred to *Polyodontes lupina* by Hartman (1945:10) and herein corrected to *Polyodontes lupinus*.

1856. Kinberg (1855 [1856]:386–387) established the Family Acoetea for the new genera and species *Panthalis Oerstedi* from Western Sweden and *Eupompe Grubei* from Guayaquil, Ecuador, with preliminary descriptions and without figures. Types in NRS.

1858. Kinberg (1858:24–26, pls. 6, 10), under Aphroditea Savigny, included a diagnosis for the Family Acoetea and included four genera: *Acoetes* Audouin and Milne-Edwards, *Polyodontes* Renieri, and his genera *Panthalis* and *Eupompe*. He included full descriptions and good figures for *Eupompe grubei* (herein referred to *Acoetes grubei*, new combination), and *Panthalis oerstedi*. A third species was added: *Panthalis gracilis* from Rio de Janeiro, Brazil, with incomplete description and without figures except for the pharynx with jaws and papillae. The type material in NRS is unsatisfactory and the species indeterminable (Hartman, 1948 [1949]:31, and personal observation).

1867. Malmgren (1867:139) was the first to use the correct spelling of the Family Acoetidae for Acoetea Kinberg, 1856, and included the then single species of the family *Panthalis oerstedi* Kinberg from Norway and Sweden.

1868. Claparède (1868:392–396, pl. 3: figs. 2A–K), in his

description of the large *Polyodontes maxillosus* (Ranzani) from the Mediterranean, was the first to describe the biramous parapodia and the characteristic neurosetae of the species. He also noted the presence in the cavity of each parapodium a prolonged sinuous cord varying from 10–15 mm in length with a width of 3/4 mm, distinguished by a beautiful green-gold iridescence. This cord was found to be made up of very numerous, extremely fine golden hairs, an important and unique feature of the Acoetidae.

1868. Baird (1868:31–32), in his "Monograph of the Aphroditacea" under Family Acoetidae, included a brief diagnosis of the family with a list of the previously described four genera and seven species.

1876. McIntosh (1876:404. pl. 72: figs. 12–15) established the new genus *Eupanthalis* for *E. kinbergi* from the Mediterranean. Type in BMNH. It was confused with *Euarche tubifex* Ehlers, 1887, by Fauvel (1914b:80–81) and others. The latter records of *Eupanthalis kinbergi* are referred herein to *Euarche tubifex* Ehlers, 1887.

1876. Grube (1876:70–72), under Family Aphroditeen and Group Acoetea, listed the previously named genera and species and included preliminary descriptions for two new species (types not located):

Eupompe aurorea, from unknown locality in Museum Godeffroy. The description is very brief, without figures. It was classified as incertae sedis by Fauvel (1914a:473) and indeterminable by Hartman (1939b:82). Strelzov (1968:140; 1972:283, fig. 2A–K) referred some specimens from the Gulf of Tonkin to *Polyodontes aurorea* and included *Polyodontes atromarginatus* Horst in synonymy, the latter a well-described species for which types are available. Horst's species is recognized herein.

Panthalis melanonotus, from the Philippine Islands. The description was supplemented by Grube (1878:48–54, pl. 4: fig. 1, 1a, b). It was referred to *Polyodontes* by Fauvel (1919:339) and is included herein under *Acoetes melanonota*, new combination.

1877. Grube (1877:517–519) described *Panthalis bicolor* from the *Gazelle* Expedition to the Belgian Congo, West Africa. Syntypes in ZMB and USNM. Lectotype and paralectotypes selected herein and referred to *Acoetes bicolor* (Grube), new combination, and holotype and paratypes to *A. congoensis*, new species.

1878. Grube (1878:50–51, pl. 4: fig. 2), under Family Aphroditea, Group Acoetea, described *Panthalis nigromaculata* from the Philippines. Type in ZMB. It was referred to *Eupanthalis* by Horst (1917:134) and designated the type species for the new genus *Zachsiella* by Buzhinskaja (1982:36).

1885. McIntosh (1885:135–139, pl. 21: figs. 4,5, pl. 23: fig. 8, pl. 24: fig. 4, pl. 13A: fig. 26) described *Eupompe australiensis* from Cape York, Australia. Type in BMNH. It was referred to *Polyodontes* by Buchanan (1894:446–447).

1887. Eisig (1887:324–331, pl. 36: figs. 4–25) described in great detail the iridescent green-gold sinuous cords found in the parapodia of *Polyodontes maxillosus* (noted earlier by Claparède, 1868), describing their location, composition, place of passage to the outside, their contribution to tube formation, and giving them the name "spinning glands" and their products "spinning fibers."

1887. Ehlers (1887:53–56, pl. 12: figs. 1–7, pl. 13: fig. 1) established the genus *Euarche* for *E. tubifex* from off Florida. Type in MCZ. The genus was referred to *Eupanthalis* McIntosh, 1876, by Buchanan (1894:442) and others. As indicated above, it was confused with *Eupanthalis kinbergi* McIntosh, 1876. It is covered herein under the original designation, *Euarche tubifex*.

1889. Beddard (1889:256–258, pl. 21: figs. 1,3) described *Eupompe indica* from Mergui Archipelago, India. The description and figures are not detailed enough to distinguish it and the type has not been located. It was classified as incertae sedis by Fauvel (1914a:473).

1894. Buchanan (1894:433–450, pl. 27) established the new genus *Eupolyodontes* for *E. cornishi* from off the mouth of the Congo River West Africa. Type in BMNH. She also reviewed the characteristics of the Subfamily Acoetidae [sic] of the Family Polynoidae and enumerated the previously described species under three genera: *Eupolyodontes*, *Polyodontes*, and *Eupanthalis*.

1895. Pruvot and Racovitza (1895:428), under Family Aphroditea, described two new species from Banyuls, France (types not located).

Panthalis lacazii (1895:428–441, pl. 19: figs. 84–104), which was referred to *Polyodontes maxillosus* by Fauvel (1914b:74).

Panthalis marenzelleri (1895:442–452, pl. 19: fig. 105, pl. 20: figs. 106–110), which was referred to *Panthalis oerstedi* by Marenzeller (1904:301).

1895. Watson (1895:169-188, pls. 9, 10) made detailed observations on the tube-forming habits of specimens of *Panthalis oerstedi* Kinberg from off the Isle of Man.

1900. Darboux (1899 [1900]:116), in his monographic study on the Aphroditiens, established the Tribe Peisidicinae for two genera: *Peisidice* Johnson, 1897, for *P. aspera* Johnson, 1897, and the new genus *Haswellia* for *Thalenessa microceras* Haswell, 1883.

The type of *Thalenessa microceros* Haswell, 1883, from Port Molle, Australia, in the AMS was examined by Pettibone (1970:12) and referred to *Euthalenessa festiva* (Grube), in the Sigalionidae.

Peisidiceaspera Johnson, 1897, from California, was referred to the Family Polyodontidae by Hartman (1939a:7). This was followed by Pettibone (1953:78–80, pl. 40) and others. *Peisidice* was placed in the

Family Peisidicidae Darboux by Hartman and Fauchald (1971:28-29). Fauchald (1977b:68) referred *Peisidice* Johnson, 1897, to *Pholoides* Pruvot, 1895, and placed them in the Family Pholoididae, new name for Peisidicidae. Pettibone (1982:14–15) placed *Pholoe* Johnston, 1839, and *Pholoides* Pruvot, 1895, (including *Peisidice* Johnson, 1897) in the Family Pholoidae Kinberg, 1858 (as Pholoidea).

1901. Treadwell (1901:188–189, figs. 14–18) described *Panthalis oculea* from Puerto Rico. Types in USNM. Monro (1928:572) referred the species to *Polyodontes*.

1903. Moore (1903:423–426, pl. 24: figs. 21–24), under Family Acoetidae, established the new genus *Restio* for *R. aenus* from Suruga Bay, Japan. Type in USNM. The prostomium is defective with all appendages missing. Moore indicated that the setae in general resembled those of *Eupanthalis*. Based on Moore's description, Strelzov (1972:320) suggested that it was possibly a defective specimen of *Eupanthalis kinbergi* McIntosh. *Restio* is referred herein to *Eupanthalis* McIntosh and *R. aenus* to *E. aena*, new combination, a doubtful species.

1904. Izuka (1904:23–29, pl. 1: figs. 1–8), under Family Aphroditidae, described *Panthalis mitsukurii* from Sagama Bay, Japan. No types are known to exist. It was referred to *Eupolyodontes* Buchanan by Malaquin and Dehorne (1907:357).

1906. Treadwell (1906) described two new species from Hawaii, collected from the same *Albatross* station.

Polynoe mutilata (1906:1152–1153, figs. 12–15), under Polynoidae. Types in USNM and AMNH.

Eupanthalis oahuensis (1906:1155–1156, figs. 19–23), under Acoetidae. Type in USNM not found.

Based on the descriptions of the two species and examination of the types of *P. mutilata* in the USNM and the now missing type of *E. oahuensis*, Hartman (1938b:123–124, fig. 40a–f) referred both species to *Eupanthalis mutilata* (Treadwell). They are referred herein to *Panthalis mutilata* (Treadwell), new combination.

1907. Malaquin and Dehorne (1907:345–357, pl. 51: figs. 1, 3, 4, pl. 52: figs. 5–14), under Tribe Acoetines, described *Eupolyodontes amboinensis* from Amboina, Malay Archipelago. Types not located. In addition to providing a good description and excellent figures, the authors added to the diagnosis of the Genus *Eupolyodontes* Buchanan, and discussed related species in the genus.

1910. Potts (1910:345–346, pl. 19: fig. 19, pl. 21: figs. 56, 57), under Acoetidae, described *Panthalis edriophthalma* from the Maldives, Western Indian Ocean. Types in BMNH. It was referred to *Eupanthalis* by Augener (1922:10).

1912. Izuka (1912:68–71, pl. 2: fig. 6, pl. 8: figs. 1–6) described *Panthalis jogasimae* from Sagama Bay, Japan. Types not found. It was referred to *Panthalis oerstedi* by Fauvel (1932:39) and herein to *Acoetes jogasimae* (Izuka), new combination.

1914. Treadwell (1914:184–186, pl. 11: figs. 1–7), under Sigalionidae, described *Panthalis pacifica* from off San Diego, Southern California. Types in AHF and AMNH. It is referred herein to *Acoetes pacifica* (Treadwell), new combination.

1914. Fauvel (1914a:468–473), at the ninth International Congress of Zoology in Monaco, gave a critical account of the classification of the Tribe Acoetines of the Family Aphroditiens and included a review of the previous studies on the group.

Fauvel (1914b:80–81) included *Euarche tubifex* Ehlers, 1887, under *Eupanthalis kinbergi* McIntosh, 1876. The genera and species are considered herein to be distinct.

1917. Horst (1917:129–135), based on the collections of the *Siboga* Expedition in Indonesia, included a short diagnosis of the Subfamily Acoetinae and descriptions of two new species and two additional species.

Polyodontes sibogae (1917:131–133, pl. 28: figs. 4–10). Types in ZMA and RNHL.

Polyodontes atromarginatus (1917:133-134, pl. 29: figs. 5–7). Types in ZMA and RNHL.

Polyodontes amboinensis Malaquin and Dehorne, including the description of the proboscis which was not previously described.

Eupanthalis nigromaculata (Grube), covered herein under *Zachsiella nigromaculata*.

1918. Augener (1918:119–129, text-fig. 4, pl. 2: figs. 20, 28, pl. 3: fig. 47), in his study on the polychaetes from West Africa under the Family Polyodontidae (Acoetidae), identified two species:

Polyodontes bicolor (Grube). Specimens in ZMH. Referred herein to *Acoetes bicolor* (Grube), new combination, and *A. bataensis*, new species.

Epanthalis tubifex (Ehlers). Specimen in ZMB. Referred herein to *Euarche tubifex* Ehlers.

Thus, Augener was the first one to use the name Polyodontidae for the Family Acoetidae, but without providing any discussion.

1919. Chamberlin (1919:86–89, pl. 11: figs. 4–8, pl. 12: figs. 1–6, under Acoetidae, described *Panthalis panamensis* from the Pacific side of Panama. Type in USNM. It was referred to *Polyodontes panamensis* by Berkeley and Berkeley (1939:326) and Hartman (1939b:84).

1920. Hoagland (1920:606–607, pl. 46: figs. 9–14) described *Panthalis adumbrata* from the Philippine Islands. Types in USNM. It was referred to *Polyodontes* by Hartman (1939b:82, 87) and is synonymized herein under *Polyodontes atromarginatus* Horst.

1924. McIntosh (1924b:10-12; 1925:31-33) described, without figures, *Panthalis oerstedi* var. *capensis* from South Africa, based on a single incomplete specimen. Type

not located (not in BMNH). Day (1967:97) elevated the variety to a subspecies but without providing additional information. It is considered to be a doubtful species of *Panthalis*.

1924. Treadwell (1924:7–9, figs. 10–15), under Family Acoetidae, described *Panthalis pustulata* from English Harbor, Antigua, West Indies. Type not found. It is referred herein to *Acoetes pleei*.

1926. Treadwell (1926:186–188, figs. 6–12), under Family Acoetidae, described *Eupanthalis evanida* from the Philippine Islands. The type in the USNM was examined by Hartman (1938b:127) who referred it to *Panthalis;* herein it is recognized as *Panthalis mutilata* (Treadwell).

1928. Monro (1928:569–572, figs. 19–24) described *Polyodontes mortenseni* from the Pacific side of Panama. Syntypes in UZMC and BMNH, a mixture of two species: lectotype (UZMC) and paralectotype (BMNH) referrred herein to *Acoetes mortenseni* (Monro), new combination; the other syntype (UZMC) from Melones, Panama is referred to *Polyodontes panamensis* (Chamberlin).

1929. Treadwell (1929:1–4, figs. 1–7) described *Acoetes magnifica* from Jamaica, West Indies. Type in AMNH. It was referred to *Panthalis pustulata* Treadwell, 1924, by Hartman (1939b:83) and herein to *Acoetes pleei*.

1931. Treadwell (1931:313–317) described two new species from the Philippine Islands under genera of the Polynoidae, types in USNM.

Macellicephala maculosa (1931:313–315, fig. 1a–g). The type was examined by Hartman (1938b:125) who referred it to *Eupanthalis* and by Pettibone (1976:68) who referred it to *Euarche maculosa* (Treadwell).

Iphionella elongata (1931:315–317, fig. 2a–d). The type was examined by Hartman (1938b:125–126, fig. 4a–d) who referred it to *Eupolyodontes elongata;* Strelzov (1972:303) referred it to *Eupanthalis kinbergi;* herein it is referred to *Eupanthalis elongata* (Treadwell), new combination.

1932. Pflugfelder (1932a:281), under Subfamily Acoetinae, described three new species from Indonesia; types not located.

Eupolyodontes sumatranus (1932a:282–286, figs. 1–5) from the east coast of Sumatra. Referred herein to *E. amboinensis* Malaquin and Dehorne, 1907.

Polyodontes tidemani (1932a:286–288, figs. 6, 7) from the Moluccas.

Polyodontes gracilis (1932a:288–290, fig. 8a–c) from the east coast of Sumatra. It was included under *P. melanonotus* (Grube) by Strelzov (1968:140) and referred herein to *Acoetes melanonota* (Grube), new combination.

Pflugfelder (1932a:290–295, figs. 9–13) also reported on a study of the epidermal sensory bulbs and cupolas found on *E. sumatranus*.

1934. Pflugfelder (1934:351–365, figs. 1–12), under Family Polyodontidae, reported on his study of the spinning glands and excretory organs of three new species he described in 1932.

1934. Holly (1934:148–149, figs. 1, 2), under Subfamily Acoetinae, described *Panthalis helleri* from the Philippine Islands. Type not located. It was referred to *P. adumbrata* Hoagland, 1920, by Hartman (1938b:126) and included herein under *Polyodontes atromarginatus* Horst, 1917.

1938. Hartman (1938a:5), under Family Polyodontidae, examined the type of *Euarche tubifex* Ehlers in MCZ and referred it to *Eupanthalis kinbergi* McIntosh. It is covered herein under the original designation.

1939. Hartman (1939b:80–89, pls. 24–26), in her study of the representatives of the Polydontidae in the collections of the Allan Hancock Expeditions, emended the genera *Polyodontes* Renieri and *Panthalis* Kinberg and listed the species included in each genus, following her revisions. She described two new species (types in AHF).

Polyodontes frons (1939b:84–86, pl. 25: figs. 300–308) from Pacific side of Panama.

Panthalis marginata (1939b:88–89, pl. 26: figs. 313–318) from Guatemala, Central America. It is referred herein to *Acoetes grubei* (Kinberg).

1941. Treadwell (1941:20–21, figs. 9–12), under Family Sigalionidae, described *Polyodontes californicus* from Chamela Bay, Western Mexico. Type in AMNH. It was referred to *P. panamensis* Chamberlin by Hartman (1956:274) and herein is referred to *P. lupinus* (Stimpson).

1944. Hartman (1944:11–12, pl. 1: figs. 5–8, pl. 2: fig. 12), under Polyodontidae, described *Eupanthalis oculata* from Columbia, South America. Type in AHF. It was referred to *Zachsiella oculata* by Buzhinskaja (1982:35) and herein is referred to *Z. nigromaculata* (Grube).

1949. Hartman (1948 [1949]:4, 30–32) examined Kinberg's type specimens in NRS. She added to the description of *Eupompe grubei* and referred the genus *Eupompe* to *Panthalis* and *E. grubei* to *Panthalis grubei,* herein referred to *Acoetes*. She also commented on the poor condition of the fragmented type specimens of *Panthalis gracilis* and noted that the species was indeterminable.

1949. Wesenberg-Lund (1949:261–263, figs. 4–6), in Subfamily Acoetinae, described *Polyodontes flagelliformis* from the Iranian Gulf. Type in UZMC. It is referred herein to *Acoetes flagelliformis* (Wesenberg-Lund), new combination.

1958. Fauvel (1958:16–19, figs. 1–3), in Subfamily Acoetinae, established *Pseudeupanthalis eylathae* from the Gulf of Akaba. The type has not been located; it is not in the Paris Museum or in the Hebrew University of Jerusalem (correspondence with J. Renaud-Mornant

and Prof. F.D. Por). Based on the original description, it appears that *P. eylathae* should be referred to the family Sigalionidae, close to *Sthenelanella* J. Moore, 1910, as revised by Pettibone (1969:431). According to a taxonomic note by Fauchald (1977b:66), *Pseudeupanthalis* Fauvel appears to be synonymous with *Sthenelanella*.

1959. Hartman (1959:109–114), in her "Catalogue of the Polychaetous Annelids of the World," listed the known genera and species, with cross references, for the family Polyodontidae Pflugfelder, 1934, including Acoetea Kinberg, 1855 [1856]; Acoetidae Malmgren, 1867; Acoetinae Horst, 1917; and Peisidicinae Darboux 1899 [1900].

As indicated above (see "1918"), Augener (1918:119) was the first one to use the family name Polyodontidae, not Pflugfelder (1934). However, Acoetidae Kinberg, 1856 (as Acoetea) was the first family name to be established for these species, based on the type genus *Acoetes* Audouin and Milne-Edwards, 1832, and should, therefore, be used.

Hartman included in Polyodontidae: Peisidicinae Darboux, with *Haswellia microceras* (Haswell) and *Peisidice aspera* Johnson. As noted above under Darboux (see "1900"), however, they are referred elsewhere.

1960. Knox (1960:81–82, figs. 7–10), under Polyodontidae, described *Panthalis novaezealandiae* from the Chatham Rise, New Zealand. Type in CMC.

1963. Åkesson (1963:128–134, figs. 1–4) described the external morphology of the cerebral region and the internal morphology of the brain of *Panthalis oerstedi*.

1968. Strelzov (1968:143–148, figs. 3–4), under Family Polyodontidae, established the new genus *Neopanthalis* for *N. pelamida* from the Gulf of Tonkin. Type in ZIASL (not available). He included a preliminary report on the collections of this family from the area.

1972. Strelzov (1972:277–328, figs. 1–22) studied the polychaetes of the family Polyodontidae collected in the Gulf of Tonkin and additional specimens in the collections of the Zoological Institute Academy of Sciences in Leningrad. He contributed a monographic study of the family, covering four genera and nine species, with comments on additional genera and species not covered in his report.

1977. Fauchald (1977a:7–8, fig. 2a–f) described *Eupanthalis perlae* from the Perlas Islands, Pacific Panama. Type in UZMC. It is referred herein to *Euarche tubifex* Ehlers, 1887.

Fauchald (1977b:65–66, fig. 15B), under Order Phyllodocida, Suborder Aphroditiformia, Superfamily Aphroditacea, Family Polyodontidae Buchanan, 1894 [Buchanan used Acoetinae under Polynoidae], included short diagnoses of the family and six genera, with a list of four invalid genera, including *Acoetes* Audouin and Milne-Edwards and *Euarche* Ehlers, both reestablished herein. He referred *Pseudeupanthalis* Fauvel, 1958, to *Sthenelanella* J. Moore, 1910, in the Family Sigalionidae.

1982. Buzhinskaja (1982:34–36, fig. 6a–h), under Polyodontidae, established the new genus *Zachsiella* for *Panthalis nigromaculata* Grube, 1878, from the Philippines. She also included in the genus *Eupanthalis oculata* Hartman, 1944, from Colombia, and a new species *Z. striata* from the South China Sea. Type in ZIASL. The latter two species are referred herein to *A. nigromaculata*.

1982. Pettibone (1982:14), under Order Phyllodocida and Superfamily Aphroditacea, included a short description of Family Polyodontidae.

1982. Muir (1982:173–174), under his notes on the higher classification of scale-worms (Aphroditacea), placed the Polyodontidae as a subfamily under Polynoidae.

1984. Amaral and Nonato (1984:14, figs. 1–11) described *Eupanthalis rudipalpa* from southern Brazil off Rio Grande do Sul in 195 meters. Types in ZUEC. It is referred herein to *Euarche tubifex* Ehlers.

1986. Wolf (1986:83) reported on the presence of venom glands associated with the piercing-type jaws of two species of Polyodontidae: *Polyodontes lupinus* and *Euarche tubifex* (as *Eupanthalis*).

1988. Ibarzábal (1988:4–8, fig. 2A-I) described *Eupolyodontes batabanoensis* from the Gulf of Batabanó, southwestern shelf of Cuba, in 2 meters. Two types in Instituto de Oceanologia, Academia Ciencias, Cuba, and Instituto de Zoologia, Academia Ciencias, USSR (not available for study). The species predates a planned new species of *Eupolyodontes*, based on specimens from the Bahamas, Cuba, British Virgin Islands, Dry Tortugas, Florida, and Honduras, in low water to 5 meters.

Family ACOETIDAE Kinberg, 1858

As indicated in the above synopsis, species in this family have been variously included under Acoetidae; Aphroditidae; Aphroditidae: Acoetinae; Polynoidae; Polynoidae: Acoetinae; Signalionidae; Polyodontidae; and Polynoidae: Polyodontinae. Earlier, they were placed mostly in Acoetidae or Aphroditidae: Acoetinae, and more recently in Polyodontidae. Acoetidae Kinberg, 1856, based on *Acoetes* Audouin and Milne-Edwards, 1832, has priority and is not preoccupied, whereas Polyodontidae Augener, 1918, based on *Polyodontes* Renieri in Blainville, 1828, is preoccupied in Fishes by Polyodontidae Bonaparte, 1837, based on *Polydon* Schneider, 1801.

Acoetidae agrees with Polynoidae and Aphroditidae in having only simple rather than compound setae, and having dorsal cirri present on the nonelytragerous segments, thus differing from the Sigalionidae. The Acoetidae and Polynoidae

have well-developed piercing-type jaws, whereas the Aphroditidae has broad, plate-like jaws (Wolf, 1986:83). The unique spinning glands that form permanent tubes in the Acoetidae are found also in an aberrant genus of the Sigalionidae, *Sthenelanella* Moore. *Sthenelanella* has notopodial spinning glands, which form notopodial threads that contribute to their tough fibrous tubes (Pettibone, 1969:437). Fauvel (1958) also described short sac-like "web glands" for *Pseudeupanthalis eylathae,* now considered to be a species of *Sthenelanella* (following Fauchald, 1977b:66). These glands differ from the very long, coiled, and colored spinning glands in the Acoetidae in being short, cylindrical, sac-like, and colorless (Fauvel, 1958, fig. 3; Pettibone, 1969, fig. 5a). The development of the great stalked eyes in Acoetidae is found to a lesser degree in some members of the Aphroditidae, such as *Laetmonice.* The jaws with denticled bases, found in all members of the Acoetidae, are also found in a few members of the Polynoidae, such as Macellicephalinae: *Bathyvitizia* (Pettibone, 1976, fig. 20c) and Iphioninae: *Iphione* (Pettibone, 1986, fig. 3C).

General Characteristics of the Family Acoetidae (= Polyodontidae)

Morphology

The body is long, vermiform, flattened dorsoventrally, with numerous setigerous segments (up to 300 or more). Acoetids may reach gigantic sizes and are among the largest of the known polychaetes, having a considerable width of up to 40 mm and length up to 1 meter or more. However, they are mostly known only from anterior fragments. They live in long tubes of their own making, up to a meter or more in length, deeply embedded in the bottom substrata. The parapodia have specialized organs, the so-called web or spinning glands, that produce fine threads used to form the wall of the tubes. The threads are sometimes mixed with mud, clay, or sand particles, resulting in tubes of considerable thickness.

There is an extreme development of the head region. The prostomium and first, or tentacular, segment are more or less fused and bear well-developed sense organs in the form of long palps, antennae, tentacular cirri, and eyes. Very large stalked eyes or ommatophores may be present in some species. The strongly armed muscular pharynx is eversible, with a circlet of sensory papillae, some very long, and two pairs of strong jaws with denticled bases. Acoetids are carnivorous; they extend from their tubes, grab their prey, and pull back into their tubes.

The dorsum is partially covered with elytra, which begin on segment 2 and alternate regularly with dorsal cirri, except for the second and third pairs which are found on consecutive segments 4 and 5. The dorsal surface of the body is generally transversely grooved, the grooves being very fine and close together, often nearly obliterating the segmental boundaries. The ventral surface is smooth, not papillate. There is a median, ventral, longitudinal ridge protecting the nerve cord, bounded on each side by a narrow furrow that widens anteriorly just behind the ventral mouth. Short ventral cirri are present on all setigerous segments; longer cirri occur on the second or buccal segment lateral to the mouth. Nephridial papillae are lacking. The pygidium has a pair of anal cirri. The parapodia are biramous but appear superficially as uniramous due to the close alignment of the rami. Both rami are supported by acicula. The setae are all simple, with capillary notosetae and stouter neurosetae, which include acicular and aristate forms.

Elytra and Elytrophores.—The elytra are attached to prominent bulbous elytrophores on segments 2, 4, 5, 7, and continue on alternate segments to the end of the body (Figures 1B, 2A, 3B). The elytra are relatively small compared to the size of the worms. They are round to oval and smooth, and are attached eccentrically near their lateral borders to the elytrophores. The anterior few elytra may be overlapping and cover the anterior end; the following elytra are more lateral, scarcely imbricated, leaving the middorsum uncovered. The more posterior elytra may have a lateral pouch (Figures 1B,E–G; 11D; 20C–G; 44D–F; 87C–I).

Dorsal Cirri, Dorsal Tubercles, and Ventral Cirri.—The dorsal cirri, located on the nonelytragerous segments, have short cylindrical cirrophores on the posterodorsal sides of the parapodia; the styles are short, smooth, and do not project beyond the tips of the neurosetae except for the cirri of the first few anterior segments. The dorsal tubercles, corresponding in position to the elytrophores on the elytragerous segments, are indistinct. The ventral cirri are short, subulate, and are attached near the basal parts of the parapodia; the ventral buccal cirri of segment 2, lateral to the mouth, are longer (Figures 2A,E,G,I; 3A,B).

Prostomium and Tentacular Segment.—The prostomium and first or tentacular segment are intimately joined; the latter is distinct dorsally, sometimes with a medial raised ridge. The tentaculophores that bear the dorsal and ventral tentacular cirri are lateral or ventral to the prostomium; they are supported by 1 or 2 acicula. The prostomial appendages include a pair of ventral palps and a pair of lateral antennae, and may include a median antenna. There are 4 types of prostomia associated with the varying development of the unique ommatophores or stalked eyes.

The simplest type, as found in some members of the Polynoidae, are represented here in species of *Euarche* (Figure 1A–C) and *Eupanthalis* (Figure 11A,B). The prostomium is oval or slightly bilobed and has 2 pairs of sessile eyes (rarely lacking). The palps are long, tapering, and usually papillate. The lateral antennae are attached anteriorly and are not hidden by ommatophores; a median occipital antenna is present in *Euarche* and absent in *Eupanthalis.* The tentacular segment is distinct dorsally, with the tentaculophores lateral to the prostomium, with or without a few capillary notosetae.

The second type of prostomium is represented by *Zachsiella* (Figure 18A–C,F) and *Eupolyodontes* (Figure 20A,B). Large ommatophores occupy most of the lateral parts of the prostomium and project anteriorly. The lateral antennae are

attached anteriorly, medial to the ommatophores. *Zachsiella* shows a more primitive development: in addition to the ommatophores, a pair of small sessile eyes is present on the posterior part of the prostomium; the ventral palps are long; a well-developed median occipital antenna is present; and the tentaculophores are lateroventral to the prostomium. In *Eupolyodontes*, the ommatophores are greatly enlarged and the posterior sessile eyes are lacking; the palps are very short and do not extend beyond the ommatophores or only slightly beyond; the median occipital antenna is very small or lacking; the tentaculophores are ventral to the greatly enlarged ommatophores. Fleshy appendages, referred to as prostomial branchiae, develop on some species of *Eupolyodontes* (Figures 23A–C; 26A,B; 30A,B).

The third type of prostomium is represented by *Panthalis* (Figure 32A,C), *Acoetes* (Figure 47B,E), and *Polyodontes* (Figure 70A,B). The paired ommatophores on the prostomium extend anteriorly nearly meeting in the midline. The lateral antennae are attached ventrally on the ommatophores with only the tips visible dorsally; the well-developed median antenna has the ceratophore attached on the middle of the prostomium. The palps are long and tapering. The tentaculophores, which usually have a few notosetae, are lateral to the prostomium. In *Panthalis* the ommatophores are colorless and are not set off by a narrow neck; sessile eyes are absent. In *Acoetes* and *Polyodontes*, the ommatophores are bulbous, colored, stalked, and set off by a narrow neck; paired sessile eyes are present on the middle of the prostomium. Åkesson (1963:128–134, figs. 1–4) made a detailed study of the anterior end of *Panthalis oerstedi*, including the external morphology of the cerebral region, the internal morphology of the brain, and connections to the ommatophores, vestigial eyes, antennae, and palps.

The fourth type of prostomium is represented by *Neopanthalis*, described by Strelzov (1968, fig. 3A; specimen not available for study). The ommatophores are extended anteriorly and are completely fused medially up to the distal tip, where a pair of short lateral antennae are attached; sessile eyes are absent; a well-developed median occipital antenna and a pair of long tapering palps, as found in *Euarche*, are present. The tentaculophores, with a few notosetae, are lateral to the prostomium.

FINE STRUCTURE OF THE EYES OF ACOETIDAE.—Pflugfelder (1932a:287, fig. 6; 1932b:559, figs. 10, 13–15) described both the paired, sessile, nonstalked eyes and the paired, stalked eyes of *Polyodontes tidemani* (Figure 79A). The sessile eyes consist of an optic vesicle under a rather thick cuticle and epithelium. The proximal retina of the vesicle consists of a row of sensory cells with yellow-brown pigment enclosed in support cells with dark brown pigment; next, a row of colorless rods is present. The central cavity with vitreous humor forms a gelatinous ground mass, with connective fibrils and a lens formed of a felt-like reticular substance of support fibers. In the stalked eyes, the pigmented sensory and support cells reach a considerable length, the former with a large basal nucleus, the plasma with bulbous homogeneous gelatinous masses, perhaps connected with refraction, parallel nerve fibrils extending distally into the colorless rods and basally to the optic nerve. The support cells are slender, wider distally, due to the nucleus and a thickened concentration of pigment; the support fibers form the walls of the rods and extend into the lens area.

Pflugfelder (1932a:283, figs. 2, 3; 1932b:560, figs. 11, 12, 16–19) also studied the stalked eyes of *Eupolyodontes sumatranus* (referred herein to *E. amboinensis*). Species of *Eupolyodontes* are noted for the immense size of their stalked eyes and the absence of sessile eyes (Figures 20A,B; 23A–C; 28A,B; 30A,B). The optic vesicle consists of a thin-walled curved cornea enclosing an anterior chamber, an iris-like diaphragm with a pupil-like break in the anterior part of the lens. A large posterior chamber is almost completely occupied by a large lens formed of uniform concentric layers and unstratified area next to the retina. The pigmented sensory cells of the retina are bottle-shaped, wider proximally due to the nucleus, narrower distally forming a neck, then widening suddenly, forming lamellar-like projections on the rod wall. These cells have a gelatinous consistency and are woven together in various ways forming large numbers of closed chambers and are covered with fine-grained plasma containing fine nerve fibrils. The support cells, enclosing the sensory cells, are wider distally, with a nucleus and concentration of pigment, with support fibers extending into the rod area. A basal layer of considerable size is found above the epidermis and thick cuticle; it is formed of syncytial connective tissue cells and intermingles with the proximal bases of the sensory and support cells, as well as with the optic nerve.

SPINNING GLANDS AND EXCRETORY SYSTEM.—Claparède (1868:395) first noted this unique anatomical character in a specimen of *Polyodontes maxillosus* from the Gulf of Naples. In this specimen the cavity of each foot contained a sinuous cord that was prolonged into the body cavity almost to the median line. The cord varied in length from 10 to 15 mm by a width of 3/4 mm, was covered by peritoneum, and was distinguished by a beautiful golden green color with metallic reflection. When viewed under the microscope, the cord could be separated into a skein of very fine golden threads.

Eisig (1887:324–331, pl. 36: figs. 4–25) made a more detailed study of this feature on a specimen of the same species. He referred to these structures as segmental spinning glands. In this large species, the yellow strands or spinning glands were very long in the anterior region near the pharynx, where they were coiled into tight bundles. More posteriorly, the strands were shorter with fewer coils. Eisig noted that the glands opened externally through an ectodermal inversion or slit about 1 mm wide in the notopodial part of the parapodium near the dorsal cirrus or elytrophore. The rami of the biramous parapodia were almost completely fused, with the notopodium anterodorsal to the neuropodium, each ramus with a supporting aciculum, the notoaciculum being very reduced compared to the well-developed neuroaciculum. The spinning gland was closely fused for some distance to the notoaciculum and, since the latter received the parapodial protractor muscles from the

neuroaciculum, conditions were provided for the protrusion of the spinning gland. The spinning gland was composed of homogeneous threads that were enclosed in homogeneous sheaths within a peritoneal covering and were capable of being teased apart. On an anterior fragment of a living specimen, Eisig noted that after a relatively short time, the body was surrounded along its total length by a large number of membranous particles. When examined under the microscope, these particles proved to be formed of masses of closely interwoven chitinous threads about 2 micrometers thick.

Based on his study of three species of Acoetidae collected by the Sunda-Expedition in Indonesia, Pflugfelder (1934:351–365, figs. 1–12) found that the paired segmental spinning glands ended in the rudimentary notopodium (a slit on the underside), then ran nearly parallel with the weakly developed notoaciculum almost to the middle of the body, turned 180° and ended in a smaller end-piece between the parapodial musculature where it was free in the coelom. The main part of the spinning gland consisted of numerous fine silk-like shiny golden threads tightly packed into a rope-like structure; the smaller closed end contained excretory cells and loose connective tissue. The term spinning gland was really a misnomer, since the process involved typical setal formation with trichogenic cells secreting large numbers of fine fibers held together by setal coats. The setal threads were woven into tight masses, sticking to each other. Just above the place of exit of the setal threads or spinning fibers were some glandular tubes in the enlarged epidermis of the notopodium. Their secretion would perhaps aid in the separation of the compact spinning gland into the spinning fibers. Pflugfelder also noted that near the exit for the spinning fibers, there was a preformed fracture zone, presumably for the exit of the sex products from the body cavity. Pflugfelder found the excretory organs or nephridia to be closely tied to the lower part of the spinning gland, closed blindly to the coelom, and concerned with excretion only to a small degree. The nephridia were composed of follicles filled with granules of golden-yellow color and enclosed in a tight chitin-like skin, along with some additional interfollicular granules. The nephridia, relatively small in comparison to the size of the animal, serve as a permanent excretory storage, their color contributing to the striking colors of the spinning glands. Excretion, the deposition of metabolic end products, is presumably carried out mainly in the general body epithelium. Pfugfelder noted additional excretory granules in small vacuoles in the epithelium of the longitudinal folds of the intestinal caecum, in the connective tissue of the peritoneum, between the parapodial musculature, and in the epidermal cells of the body integument.

SECOND SEGMENT, MOUTH, PHARYNX, AND JAWS.—The parapodia of the second segment bear the first pair of elytra and long ventral buccal cirri lateral to the mouth; these parapodia are biramous or subbiramous, the rami closely allied, with smaller notopodia anterodorsal to larger neuropodia. The notopodia are supported by a slender notoaciculum, and may have a bundle of capillary notosetae; the neuropodia are supported by a stout neuroaciculum and usually have only slender spinous lanceolate neurosetae tapering to slender tips (Figures 2A–D; 13A,C,D). In species of *Eupolyodontes*, additional stout acicular neurosetae are found on segment 2 (Figure 21A,B–D). Extra lobes may be developed on the neuropodia; such lobes include anteroventral bracts (Figures 32D; 37C; 71B) and ruffled presetal and postsetal lobes (Figures 54C,D; 66F,G; 92F). The parapodia of segment 2 show important differences in the species of Acoetidae. On a living specimen of *Panthalis oerstedi* placed in an aquarium, Watson (1895) observed that the parapodia of the second segment, which he referred to as weaving feet, were used to manipulate the spinous fibers forming its tube (described more fully below under *P. oerstedi*).

The large muscular pharynx is eversible, with the distal border encircled by a row of papillae, the middorsal and midventral ones on wide, somewhat lobulated, bases. There are 13 pairs of papillae, none extra large, in *Euarche* and *Eupanthalis* (Figures 1D; 11C; 15B); 15 pairs with the middorsal one much longer in *Panthalis* and *Acoetes* (Figures 32B; 47A); 19 pairs with both middorsal and midventral ones longer in *Polyodontes* (Figure 70C,D); up to 39 pairs of close-set papillae with both the middorsal and midventral ones very long and tapered in *Eupolyodontes* (Figures 26C; 28C). The pharynx is armed with 2 pairs of strong hooked jaws, each with 7 to 17 lateral teeth. Wolf (1986:83) reported the presence of venom glands associated with the piercing-type jaws in two acoetid species, *Polyodontes lupinus* and *Euarche tubifex* (as *Eupanthalis*).

THIRD TO EIGHTH SEGMENTS.—The dorsal cirri on segments 3, 6, and 8 have short cylindrical cirrophores on the posterodorsal sides of the notopodia, with tapering styles extending beyond the neurosetae on segment 3, becoming shorter more posteriorly (Figure 2E,G). The parapodia of these segments change gradually, with the notopodia becoming smaller and the capillary notosetae (when present) becoming fewer and shorter; the neuropodia becoming larger, with slightly bilobed presetal acicular lobes and truncate postsetal lobes, and with more-or-less developed anteroventral bracts (Figures 2E,G; 4C,G,H; 18G,M; 19A; 32E,I). The neuropodia are provided with three groups of neurosetae: lower bundle (group 1) within the more-or-less developed anteroventral bract, slender, slightly curved, with larger spines basally and close-set spinous rows distally, tapering to slender tips (Figures 4F,K; 18L; 24C; 32H); middle row (group 2) stout, acicular, with tips rounded or slightly hooked, smooth or with few hairs, with or without aristae (Figures 2F; 4E,J; 18K; 24B; 32G); upper few (group 3, may be absent) lanceolate, spinous, tapering to fine tips (Figures 2H; 4I; 18J; 32F).

PARAPODIA BEGINNING WITH SEGMENT 9.—The notopodium becomes larger, occcupying the anterodorsal half of the larger neuropodium, with a slender notoaciculum and sometimes a short row of capillary notosetae. The internal notopodial cavity is occupied by the spinning gland in the form of a rope of closely packed chitinous threads that may be coiled

and extend to about the middle of the body; the spinning gland is enlarged distally and ends in a slit on the underside of the notopodium (Figures 2I; 3B; 34F). Some of the spinning fibers may be exposed (Figures 31I; 74A,B; 94A,F). The neuropodia, with their stout neuroacicula, are similar in shape to but somewhat larger than, the parapodia of the anterior segments. The upper group of neurosetae emerge from a low anterodorsal bract on the neuropodium, opposite the place of exit of the spinning fibers, suggesting that they may function in aiding in the separation of the spinning fibers. The neurosetae are of two types: (3a) stouter, longer and (3b) shorter, more slender. In species of *Euarche, Eupanthalis, Neopanthalis,* and *Polyodontes,* the type 3a neurosetae are long, lanceolate, with lateral spines, and taper to fine tips (Figures 3Ca; 12Ca,Ha; 71Ia; 72Ca). In *Zachsiella,* type 3a neurosetae are long, acicular, spinous, and aristate (Figure 19Fa,Ka). In *Eupolyodontes,* they are long, with double brush-shaped tips (Figures 22Ba; 24Ga,Ka; 25Fa). In *Panthalis,* they are long and plumose, with distal long hairs and subdistal short spinous rows (Figures 34Ca,Ha; 35Oa). In *Acoetes,* they are tapered abruptly to slender tips, with long spines subdistally and short spinous rows basally (Figure 48Da,Ka). The type 3b neurosetae are shorter and usually hidden from view by the notopodium; they are slender and taper to sharp tips, with widely spaced whorls of spines (Figures 5Bb,Hb; 29Cb) or bipinnate (Figures 12Cb; 19Fb,Kb; 34Cb). The middle acicular neuroseta on the middle and posterior parapodia may show some modifications, such as subdistal spines along one side or a row of transverse subdistal spines (Figures 5I; 12M; 34D; 53J; 55P). The cirrophores of the dorsal cirri are wider, somewhat inflated, with the styles short and subulate or wide and conical (Figures 3A; 5F; 27R; 36B; 48I; 77R). The parapodia of the far posterior region may be somewhat modified, with the absence of spinning glands (Figures 12L,K; 36F,G).

PARAPODIAL BRANCHIAE AND BRANCHIAL AREAS.—When present, the branchiae have a rather thick cuticle and are nonvascular, papilliform, filamentous, or arborescent coelomic extensions on the anterior, dorsal, and posterior sides of the parapodia and bases of the elytrophores. They are well developed in larger species, such as *Eupolyodontes* (Figures 21F,G; 22A,D; 25A,B; 27H,I,M,N), and *Polyodontes lupinus* (Figure 88A,B,F,G,K,L,N,O). Branchiae may be few or lacking in some of the smaller species where the integument is delicate and thin-walled, such as species of *Euarche, Eupanthalis, Zachsiella, Neopanthalis,* and *Panthalis.* There may be bulbous, inflated, thin-walled areas medial to the ventral cirri (Figures 29J,K; 48I,J). An unusual feature in some species of *Eupolyodontes* is the development of a pair of large branchiae on the prostomium (Figures 23A–C; 26A,B; 30A).

TUBES.—The tubes of the Acoetidae are unique among the Polychaeta for their general construction and the absence of any membranous lining. Acoetids manufacture a felted tube from chitinous silken fibers, which appear to be homologous with the fibers composing the dorsal feltage of *Aphrodita.* These silken fibers are actually modified setae, which issue from the dorsal ramus or notopodium of the parapodium and are contained in a convoluted sac intruding into the body cavity. The long fibers are skillfully woven into a criss-cross spiral forming the tube that may extend up to a meter or more in length and up to 4 cm in width, and may be very tough.

The tubes of *Polyodontes lupinus* (as *Acoetes lupina*) from South Carolina were described by Stimpson (1856). They were up to 2.5 feet (76 cm) in length, black in color, and composed of a tough glutinous structure, several layers thick, with the exterior mixed with mud. The tubes were found in sand and mud, descending perpendicularly for a depth equal to the length of the worm. Its extremity was noted by a small aperture, which did not project above the surface.

Watson (1895) collected tubes of *Panthalis oerstedi* off the Isle of Man in 110 meters. These tubes were long, very soft, easily torn apart, and composed of many thin parallel layers in which mud was loosely entangled, resembling "mud sausages." The tubes were open at both ends with loose mucus-like extensions, thus concealing the entrances (described more fully below under *P. oerstedi*). Lindroth (1941) observed that on freshly dredged material the tubes of this same species had only a single functional opening that was elevated on a small crater on the muddy surface; the other end was black and reduced.

According to Pflugfelder (1932a), the tubes of *Polyodontes tidemani* from the Moluccas extended above the bottom about 5–10 cm and were clearly visible. The tubes had a fine uniform structure. It was difficult to collect the worms, which pulled back into the deeper parts of their tubes.

In species of *Eupolyodontes,* the anterior part of the large, thick tubes extends above the surface of the substratum and often has foreign material attached, such as large sponges, algae, or branched bryozoans. The anterior part may be narrower and annulated, formed of parchment-like material. The tubes go straight down and are closed on the deep end. The upper part of the tube may be thicker and somewhat annulated, where it appears to be formed of many layers, mixed with coral sand; the outer surface is rough and the inner surface is smooth with a preponderance of spinning fibers. J.C. Britton (in litt.) collected large *Eupolyodontes* tubes that extended 10–15 cm above the sandy surface by grasping the tubes a few centimeters below the sand and gently pulling. Here the substrate consisted of loose unconsolidated sand to a depth of at least a meter. P.A. Shave (in litt.) collected the same species by snorkeling in water about 8 feet (2.4 m) deep.

Under the name *Polyodontes,* McIntosh (1924a:603–610, pl. 30: figs. 1–8; 1925:33–36, pl. 4: figs. 1–5) described and figured two large empty tubes, one from off the Cape of Good Hope, South Africa, in 205 meters on bottom of mud and sand, and one from Bathabana Isle, Cuba, in 5.5 meters (originally labeled "Tube of *Ceriathus*"). Numerous setae remain in the wall of the complete tube from Cuba, including the types characteristic of *Eupolyodontes.* This tube is reviewed herein under *E. batabanoensis.* The anterior fragment of the larger tube from the Cape is 14 inches (35 cm) long and is divided

into two regions. The anterior region is 6 inches (15 cm) in length and 2 inches (5 cm) in diameter, and is formed of silky, glistening fibers of pale straw color. The fibers are arranged longitudinally as a series of transverse ribs or collars (the part that would protrude above the sediment). Microscopically, the fibers are yellowish, of great length, smooth, and highly elastic. The more posterior narrower region is composed of smoothly felted fine fibers, marked by transverse wrinkles, firmer, more leathery and devoid of the silky aspect seen in the anterior region. The internal surface of the tube is smoothly felted, and resembles finely prepared soft sheep skin. Very few setae were obtained from the tube, but among them are neurosetae with terminal enlargements and brush-like tips (McIntosh, 1924a, pl. 30: figs. 3,4; 1925, pl. 4; fig. 3), characteristic of *Eupolyodontes*. Thus, both large tubes described by McIntosh are considered herein to be tubes of *Eupolyodontes* rather than of *Polyodontes*.

Biology

Members of the Acoetidae are comparatively long-lived, and reach large sizes. They live in permanent tubes of their own making. As such, they may harbor various commensal animals, such as solitary marine entoprocts. As Nielsen (1964:72) pointed out in his study of the Loxosomatidae, they are associated with long-lived host species, not species that have an annual life cycle. They are also associated with animals that produce water currents either for respiration or for their intake of food. The loxosomatids are so situated on their hosts that they are capable of directly utilizing the water currents to filter food particles. (See "Associated Animals").

Stimpson (1856:117) noted that specimens of *Polyodontes lupinus* (as *Acoetes lupina*) are frequently captured with their heads downward and their tails at the aperture of the tube, a position they seem to assume when disturbed. In taking prey, they do not completely leave the tube but suddenly dart out from the anterior end, seize the small crustaceans with their powerful jaws, and pull them back into the tube.

Watson (1895:169) observed that *Panthalis oerstedi* lies on its back with the head end and two long palps protruding from the tube, ready to seize passing prey. In addition, the long middorsal tentacular papilla of the proboscis sometimes protrudes from the mouth. Watson also observed a constant rising and falling of the elytra, thus facilitating the passage of water for the purpose of respiration.

According to Eisig (1887:325) specimens of *Polyodontes maxillosus* were collected at about 30 meters in the Bay of Naples by fishermen with long lines baited with worms or smaller fishes. *Polyodontes*, with its strong proboscis and strong jaws took the bait as well as various fishes caught on the hooks. The specimens were only anterior fragments of the long worms, the posterior ends presumably pulled back in their tubes to regenerate new anterior ends.

Saint-Loup (1889:412) reported on a large (2 m long) specimen of this same species collected at a depth of 50 meters in the Gulf of Marseilles. The specimen was caught on a fisherman's hook on a deep-sea line baited with the abdomen of a large hermit crab. The extensible proboscis reached a length of 30 mm with a diameter greater than that of the body. The aperture, with its four denticulate jaws, had a diameter of 30 mm, presenting the aspect of a viper's head. The delicate papillae on the tip of the proboscis contained ultramarine-blue granules, which were phosphorescent at night.

The sexes are separate. Sperm or large yolky eggs have been observed in the body cavities, but their development has not been observed. In this study, juveniles of *Panthalis alaminosae* (Figures 44–46), *Acoetes pleei* (Figure 51), and *Polyodontes lupinus* (Figure 91) were found.

Associated Animals

ENTOPROCTA: LOXOSOMATIDAE.—Solitary, marine entoprocts have been found associated with three species of Acoetidae.

Horst (1917:113) mentioned that the parapodia in the anterior ventral region of a specimen of *Polyodontes atromarginatus* from Sumbawa, Indonesia were thickly covered with "some strange organisms." My examination of the syntype of this species (ZMA 1169.4) revealed that they were loxosomatid entoprocts.

Franzén (1962:311) described *Loxosomella glandulifera* from some tubes of *Panthalis oerstedi* from the West coast of Sweden. These were also reported from Denmark by Nielsen (1964:45). The entoprocts were anchored by their long peduncles in deep pockets on the inner layers of the soft mud tubes making use of the food-bearing current in the respiratory chamber of the host.

Nielsen (1966:255) described two species of *Loxosomella* associated with *Polyodontes lupinus* from Miami, Florida: *L. worki*, fastened by its stalk to the fine threads on the inner wall of the tube, and *L. bioculata*, found on the tips of the acicular aristate neurosetae of the host, as well as attached to the inner wall of the tube in deep pockets where they were able to fully withdraw.

MOLLUSCA: GASTROPODA: VITRINELLIDAE.—Stimpson (1858:307) found several specimens of a minute blood-red gastropod living under the scales of the giant scale worm that he had earlier described as *Acoetes lupina* (later referred to *Polyodontes lupinus*). He gave a preliminary description of the gastropods as *Cochliolepis parasiticus*, considering them to be parasitic. Based on abundant material from Tampa Bay, Florida, D.R. Moore (1972:100) found that each worm had several specimens of *Cochliolepis* under its scales. He included a full description of the gastropods and referred *C. parasiticus* to the family Vitrinellidae. He found that the gastropods were herbivores or detritus-feeders, living as commensals with the host scale worms, rather than parasitic. They apparently feed

on fine particulate organic material drawn into the tube by the worm's respiratory and feeding current. The gastropods were found on the surface of the worms and possibly performed a cleaning function. This polychaete is the only known habitat for this unique gastropod.

MOLLUSCA: BIVALVIA: MONTACUTIDAE.—Small bivalve molluscs of the famly Montacutidae were found between the parapodia of specimens of *Euarche tubifex* (as *Eupanthalis kinbergi*) from West Africa by Rullier (1965b:17) and by Intes and Le Loeuff (1975:283).

POLYCHAETA: POLYNOIDAE.—Fox and Ruppert (1985:299) reported a polynoid polychaete, Harmothoinae sp., commensal in the tube of *Polyodontes lupinus* in South Carolina.

Distribution

Members of the Acoetidae are widely distributed, from low intertidal to moderate depths (up to 1500 meters), in Western Atlantic from North Carolina to Florida, Bahamas, Gulf of Mexico, West Indies and Caribbean Sea, south to Brazil and Argentina, Eastern Atlantic from Norway, Sweden, south to Mediterranean and Adriatic Seas, West and South Africa, Red Sea, Arabian Sea, British East Africa, Madagascar, Maldives, Ceylon, Bay of Bengal, Gulf of Thailand, Australia, New Zealand, Indonesia, South China Sea, Yellow Sea, Japan, Solomon Islands, Philippines, Hawaiian Islands, Eastern Pacific from Southern and Lower California, Gulf of California, Panama, Western Mexico to Ecuador.

Key to the Genera of Acoetidae

1. Prostomium oval or bilobed, with 2 pairs of sessile eyes or eyes lacking; lateral antennae anterior, not hidden by ocular peduncles or ommatophores [Figures 1A,B; 8A; 11A]. Acicular neurosetae from segment 3 [Figures 2E,F; 11G,I]. Upper neurosetae (type a) from segment 9 long, lanceolate, with lateral spines [Figures 5Ba,Ha; 13Pa]. Without parapodial branchiae. Pharynx with up to 15 pairs of border papillae, none especially long; jaws each with up to 8 lateral teeth [Figures 1D; 11C] 2

   Prostomium bilobed, with pair of enlarged ocular peduncles or ommatophores [Figures 18A,B; 20A; 35A; 47B; 71A] 3

2. With well-developed occipital median antenna [Figures 1A,B; 6A]. Parapodia of segment 2 biramous, with notoaciculum and numerous capillary notosetae [Figures 2A; 9A] . . . . . ***Euarche*** Ehlers

   Without median antenna [Figures 11A,B; 15A]. Parapodia of segment 2 subbiramous, with notoaciculum, with or without few notosetae [Figures 11E; 15D] . . . . . ***Eupanthalis*** McIntosh

3. Lateral prostomial antennae medial to large, colored ommatophores, visible dorsally; palps smooth [Figures 18A,B; 20A] 4

   Lateral prostomial antennae dorsal to completely fused ommatophores, with well-developed median occipital antenna; palps long, extending far beyond prostomium, papillate (Strelzov, 1968, fig. 3A). Acicular neurosetae from segment 3 (Strelzov, 1968, Figs. 3B, 4C). Upper neurosetae (type a) from segment 9 long, lanceolate, with lateral spines (Strelzov, 1968, fig. 4A). Without parapodial branchiae . . . . . ***Neopanthalis*** Strelzov

   Lateral prostomial antennae attached ventrally on ommatophores, with only tips visible dorsally; palps long, extending far beyond prostomium; well-developed median antenna with ceratophore near middle of prostomium [Figures 32A; 41A; 47B; 70A,B]. Pharynx with up to 19 pairs of border papillae, middorsal and sometimes midventral ones longer; jaws with up to 12 lateral teeth [Figures 32B; 47A; 70C,D] 5

4. With well-developed occipital median antenna; palps long, extending far beyond prostomium [Figure 18A,B]. Tentaculophores lateral to prostomium; acicular neurosetae from segment 3 [Figure 18A–C,I,K]. Upper neurosetae (type a) from segment 9 acicular, spinous, aristate [Figure 19Fa,Ka]. Without parapodial branchiae. Pharynx with 13 pairs of border papillae, middorsal and midventral papillae somewhat longer; jaws each with up to 7 lateral teeth . . . . . ***Zachsiella*** Buzhinskaja

Bilobed nuchal organ with or without minute median antenna; palps short, scarcely surpassing prostomium; with or without fleshy prostomial branchiae [Figures 20A,B; 26A,B]. Tentaculophores ventral to prostomium; acicular neurosetae from segment 2 [Figures 20A,B, 21A,C]. Upper neurosetae (type a) from segment 9 with double brush-shaped tips [Figures 22Ba, 27Ja,Oa]. With parapodial branchiae [Figures 21F,G; 27H,I,M,N]. Pharynx with up to 39 pairs of border papillae, middorsal and midventral papillae very long and tapered; jaws each with up to 17 lateral teeth [Figures 26C; 28C] . . . . . ***Eupolyodontes*** Buchanan

5. Upper neurosetae of type a from segment 9 long, slender, plumose either distally or subdistally; type b neurosetae very short and hidden by notopodium [Figures 34B,C; 48B,D]. Acicular neurosetae from segment 3 [Figures 32E,G; 52I,K] . 6

Upper neurosetae of type a from segment 9 long, tapering to fine tips, thickly spinous, not plumose; type b neurosetae shorter than type a but not completely hidden by notopodia [Figures 71H,I; 76G,H]. Ommatophores bulbous, colored, stalked, with lateral pair of small sessile eyes; palps smooth or papillate [Figures 70A; 73A; 75A]. Acicular neurosetae from segment 3 or later. With or without parapodial branchiae [Figure 72A] . . . . . ***Polyodontes*** Renieri

6. Upper neurosetae (type a) from segment 9 long, distally plumose [Figures 34Ca, 35Oa]. Ommatophores usually colorless, not set off by narrow neck, usually without small lateral sessile eyes; palps smooth [Figures 32A; 35A; 37A]. Without parapodial branchiae . . . . . ***Panthalis*** Kinberg

Upper neurosetae (type a) from segment 9 long, abruptly tapering to slender tips, plumose subdistally and short spinous rows basally [Figures 48Da,Ka; 53Da]. Ommatophores bulbous, colored, stalked, with pair of small lateral sessile eyes; palps smooth or papillate [Figures 47B; 63A]. With or without parapodial branchiae . . . . . ***Acoetes*** Audouin and Milne-Edwards

Genus *Euarche* Ehlers, 1887

Euarche Ehlers, 1887:53. [Type-species: *Euarche tubifex* Ehlers, 1887, by monotypy. Gender: feminine.]

DIAGNOSIS.—Prostomium oval or bilobed, with 2 pairs of sessile eyes or eyes lacking, without enlarged ommatophores; 2 anterior and median occipital antennae; pair of long papillate palps. First or tentacular segment distinct dorsally, with medial nuchal lobe; tentaculophores lateral to prostomium, each with 1 or 2 acicula, pair of tentacular cirri, with or without few setae. Second or buccal segment with first pair of elytra and long ventral buccal cirri; parapodia biramous with notoaciculum and numerous capillary notosetae; neurosetae slender, lanceolate, spinous. Acicular neurosetae present from segment 3. Elytra delicate, transparent, on segments 2, 4, 5, 7, continuing on alternate segments. Dorsal cirri with short cirrophores and short styles on nonelytragerous segments. Notopodium from segment 9 with notoaciculum, internal spinning glands, and few notosetae; upper group of neurosetae of 2 types: (a) longer, lanceolate, tapered, with lateral spines and (b) shorter, with widely spaced whorls of spines; middle row of neurosetae stout, acicular, with slightly hooked aristate tips; lower group of neurosetae numerous, spinous, lanceolate. Without parapodial branchiae. Pharynx with 11–15 pairs of border papillae, none especially long; 2 pairs of hooked jaws, each with 3–8 lateral teeth.

The genus comprises 3 species (including 2 synonyms), one of which is a new species.

Key to the Species of *Euarche*

1. Prostomium oval, with 2 pairs of sessile eyes; palps papillate on distal two-thirds [Figures 1A,B; 6A]. Upper neurosetae of type 3b short, with few whorls of widely spaced spines [Figures 2J; 3C; 5B,H; 7F] 2

Prostomium bilobed, without eyes; palps papillate along entire length [Figure 8A,B]. Upper neurosetae of type 3b long, with numerous whorls of widely spaced spines [Figure 10D,H]. Neuropodia with well-developed anteroventral bracts [Figures 9G,H,K; 10A,B,F,G] . . . . . ***E. mexicana,*** new species

2. Notopodia of segment 2 with bundle of very long capillary notosetae [Figure 2A]. Neuropodia with anteroventral bracts only slightly developed [Figures 2E,G,I; 3A,B] . . . . . ***E. tubifex*** Ehlers

Notopodia of segment 2 with fewer and shorter capillary notosetae [Figure 6F]. Neuropodia with anteroventral bracts well developed [Figure 7A,D,E,I] . . . . *E. maculosa* (Treadwell)

Euarche tubifex Ehlers, 1887

FIGURES 1–5

Euarche tubifex Ehlers, 1887:54, pl. 2: figs. 1–7, pl. 13: fig. 1.

Eupanthalis kinbergi.—Fauvel, 1914b:80; 1923:100, fig. 38i–q; 1936:14.—Monro, 1928:568.—Hartman, 1938a:5; 1974 [1975]:209.—Paris, 1954:501, figs. 8, 9b–d.—Fauvel and Rullier, 1959:152, figs. 1–3.—Rullier, 1965b:17.—Day, 1973:9.—Intes and Le Loeuff, 1975:283.—Rullier and Amoureux, 1979:153.—Campoy, 1982:83. [Not *Eupanthalis kinbergi* McIntosh, 1876.]

Eupanthalis tubifex.—Augener, 1918:125, pl. 2: fig. 20.—Monro, 1930:69.—Hartman, 1951:20; 1959:110.—Strelzov, 1972:302 [part].—Wolf, 1986:83.

Eupanthalis perlae Fauchald, 1977a:7, fig. 2a–f. [New synonym.]

Eupanthalis sp.—Wolf, 1984:10, figs. 5, 6a–s.

Eupanthalis rudipalpa Amaral and Nonato, 1984:14, figs. 1–11. [New synonym.]

MATERIAL EXAMINED.—CARIBBEAN. 11°34'N, 69°02'W, 223 m, *Albatross* sta 2124. 18 Feb 1884, 6 specimens (USNM 1683).

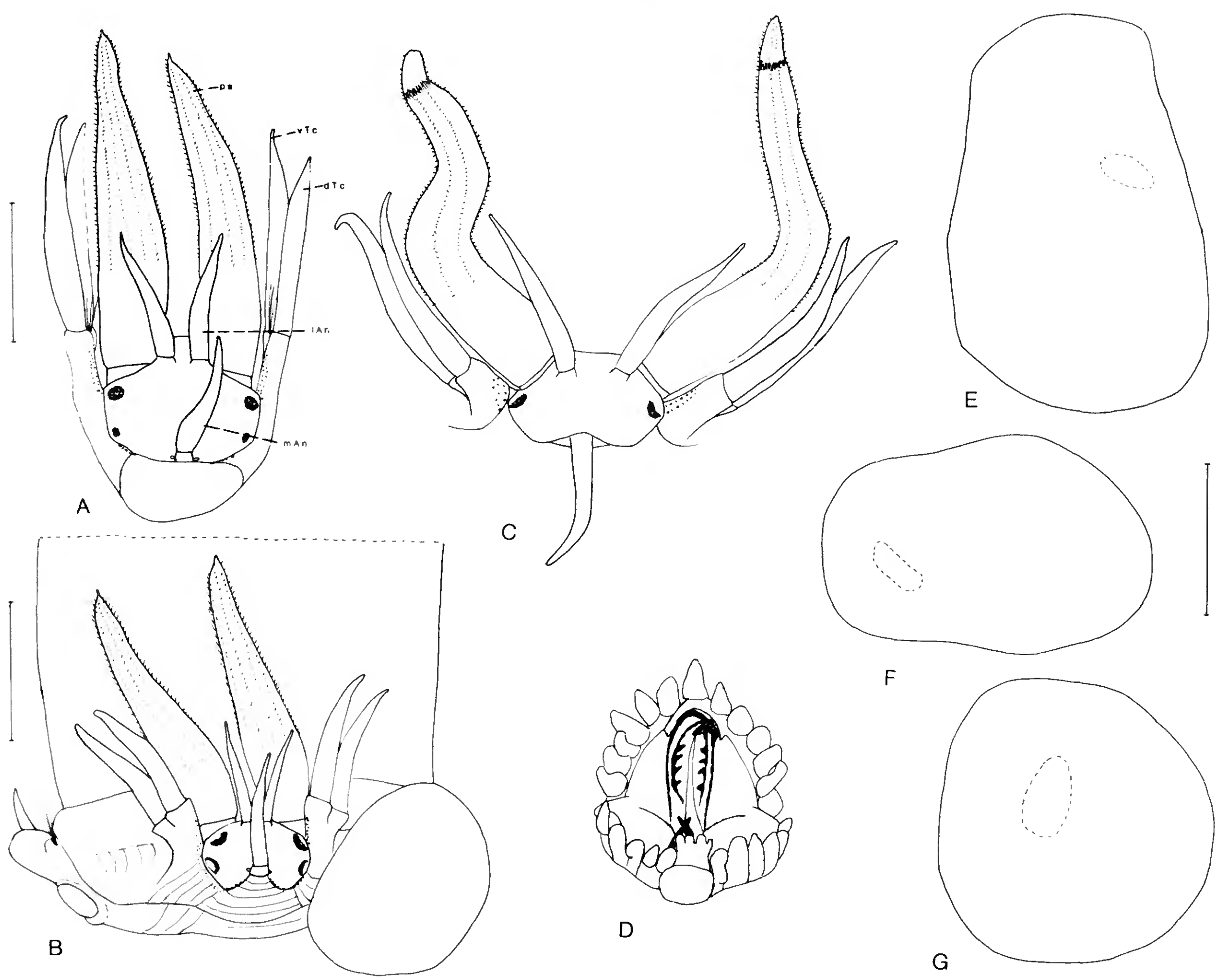


FIGURE 1.—*Euarche tubifex* (A, specimen from North Carolina (USNM 50694); B, specimen from Belgian Congo (USNM 51979); C–G, specimen from North Carolina (USNM 50692)): A, dorsal view of prostomium and tentacular segment; B, dorsal view of anterior end, pharynx fully extended, only basal part indicated; C, anterior view of prostomium and tentacular segment, pharynx fully extended (not shown); D, distal end of pharynx showing jaws and border papillae; E, right 1st elytron from segment 2; F, left 5th elytron from segment 9; G, left 15th elytron from segment 29. (Scales: A,C = 1.0 mm; B,D, = 2.0 mm; E–G = 1.0 mm.)

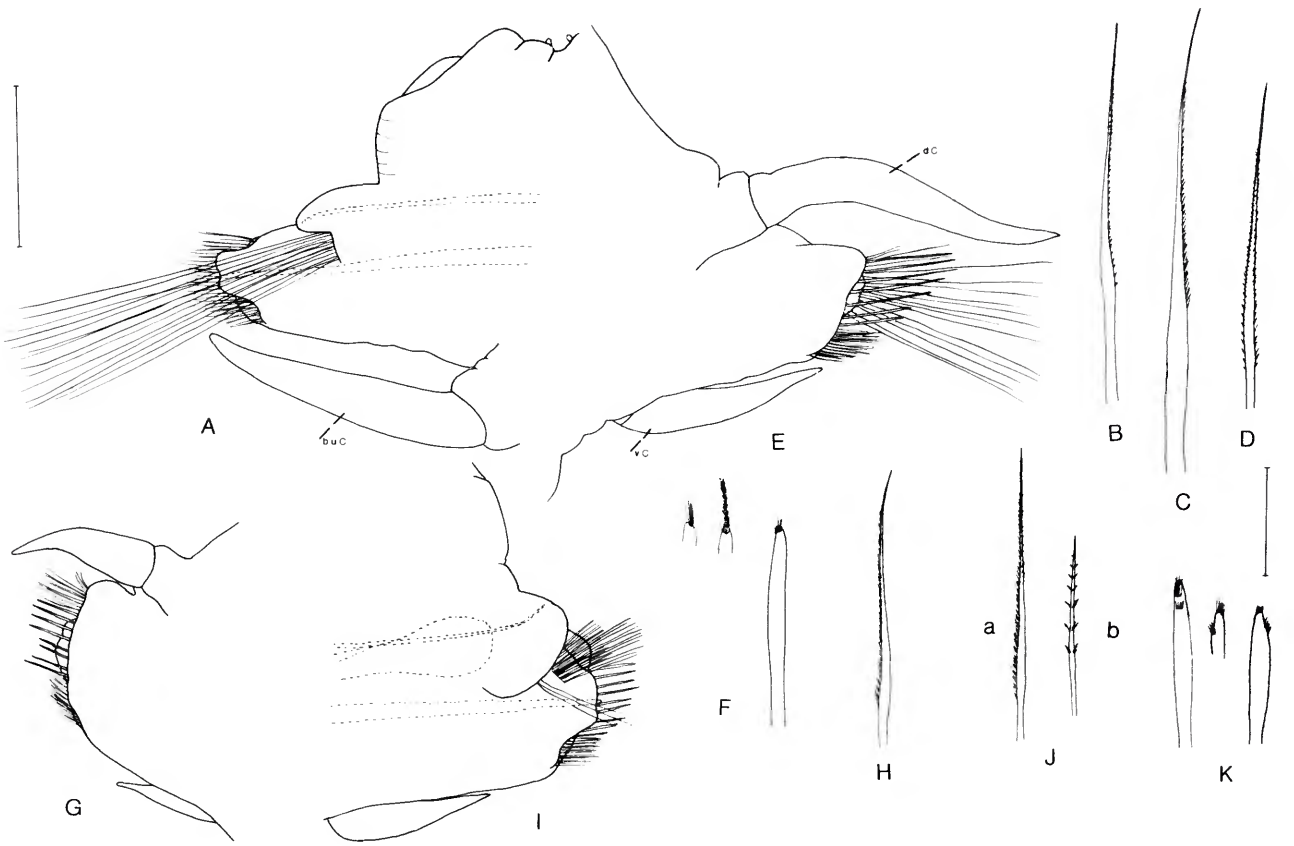


FIGURE 2.—*Euarche tubifex*, specimen from North Carolina (USNM 50692): A, right elytragerous parapodium from segment 2, anterior view, acicula dotted; B–D, upper, middle, and lower neurosetae from same; E, right cirrigerous parapodium from segment 3, posterior view; F, middle neurosetae from same; G, left cirrigerous parapodium from segment 8, posterior view; H, upper neuroseta from same; I, left elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; J,K, upper and middle neurosetae from same. (Scales: A,E,G,I = 0.5 mm; B–D,F,H,J.K = 0.1 mm.)

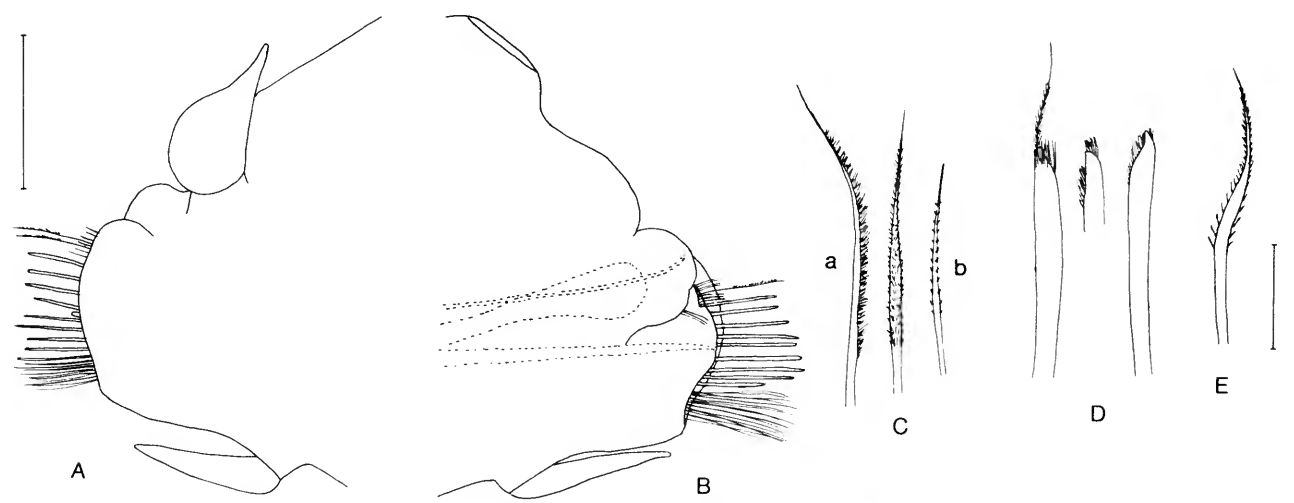


FIGURE 3.—*Euarche tubifex*, specimen from North Carolina (USNM 50692): A, left cirrigerous parapodium from segment 28, posterior view; B, left elytragerous parapodium from segment 29, anterior view, acicula and spinning gland, dotted; C–E, upper, middle, and lower neurosetae from same. (Scales: A,B = 0.5 mm; C–E = 0.1 mm.)

FLORIDA. 28°51′N, 89°01′W, 216 m, *Blake* sta 49, 1877–1878, holotype of *E. tubifex* (MCZ 659). 29°28′N, 80°57′W, R/V *Pierce* sta 7B, 27 Nov 1977, 20 m, 1 specimen (USNM 59173).

SOUTH CAROLINA. 32°23′N, 80°09′W, R/V Pierce sta 3B, 17 Feb 1977, 13 m, 1 specimen (USNM 59172); 32°13′N, 79°52′W, sta 3C, 23 Aug 1977, 22 m, 1 specimen (USNM 59174).

NORTH CAROLINA. Off Beaufort, 450 m, J.H. Day, collector, 1 specimen (USNM 50692, as *Eupanthalis kinbergi* by Day, 1973). Off Cape Hatteras, M. Cerame-Vivas, collector: 35°14′N, 75°06′W, 10 Sep 1962, 73 m, 1 specimen (USNM 50693); 34°56′N, 75°26′W, 19 Dec 1962, 84 m, 1 specimen (USNM 50694); 35°16′N, 75°03′W, 4 Mar 1962, 55 m, 1 specimen (USNM 50695).

GULF OF MEXICO. 25°N, 84°W, 128 m, M.L. Jones, collector, 14 Jul 1965, 1 specimen (USNM 50712). R/V *Alaminos* cruises, W.E. and L.H. Pequegnat, collectors: cr 64A1. sta 13C,D, Jun 1964, 27°52′N, 94°56′W, 121–181 m, 21 specimens (USNM 71450); cr 69A, sta 11, lots 56, 60, 76, Aug 1969, 19°00′ to 21°16′N, 95°31′ to 96°57′W, 183–201 m, 18 specimens (USNM 71451–71453); cr 71A, sta 7, lots 17 and 32, sta 8, lot 20, Jul, Aug 1971, 23°52′ to 27°55′N, 92°48′ to 97°16′W, 134–204 m, 27 specimens (USNM 71454–71456). South Texas Outer Continental Shelf Study (STOCS): sta I-6, 27°39′N, 96°12′W, 100 m, silty clay, spring 1976, 1 specimen (USNM 86164); sta III-4, 26°58′N, 97°01′W, 27 m, clayey sand, winter 1976, juvenile (USNM 86862); sta IV-4, 26°10′N, 97°08′W, 15 m, sand, fall 1976, Dec 1980, 3 specimens (USNM 86860, 86861, 86863). Mississippi-Alabama-Florida Outer Continental Shelf Study (MAFLA), sta 2427, 28°49′59″N, 85°37′01″W, 175 m, clayey, sandy silt, Sep 1977, 1 specimen (USNM 55798) (as *Eupanthalis* sp. A, by Wolf, 1984). Mississippi Sound, Army Corp. of Engineers, sta 589, 30°09′16″N, 88°11′08″W, 15.2 m, sand/silty sand, 30 Oct 1980, adult and juvenile (USNM 75624, 75625); sta 477, 30°09′53″N, 88°27′38″W, 23.8 m, sand, 2 Nov 1980, 1 specimen (USNM 75626).

PANAMA (Pacific). San José Island, Perlas Island, 46 m, mud and shells, Mortensen, collector holotype of *Eupanthalis perlae* (UZMC; as *E. kinbergi* by Monro, 1928).

WEST AFRICA. Belgian Congo, *Gazelle* Expedition 5 specimens (ZMB 882; USNM 51979, as *Eupanthalis tubifex* by Augener, 1918). Off St. Paul de Loanda, Angola, 08°40′15″S,

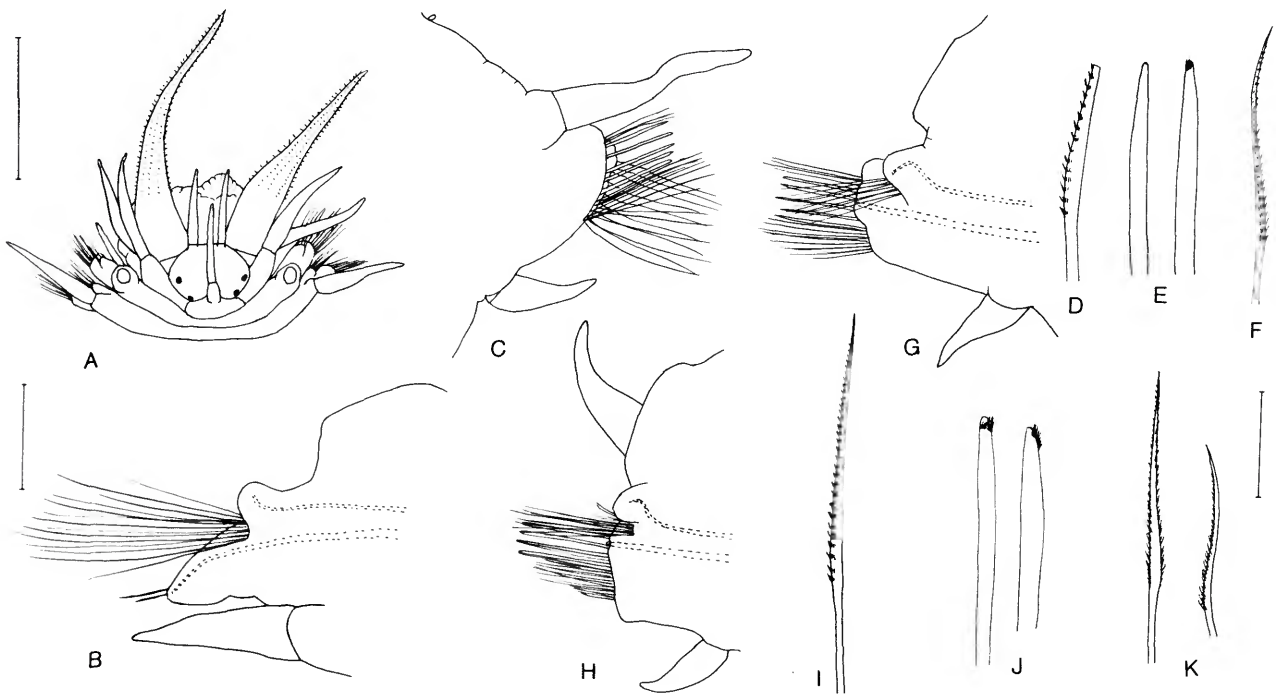


FIGURE 4.—*Euarche tubifex*, holotype of *Eupanthalis perlae* from Pacific Panama (UZMC): A, dorsal view of anterior end; B, right elytragerous parapodium from segment 2, anterior view, acicula dotted, neurosetae mostly broken; C, right cirrigerous parapodium from segment 3, posterior view; D–F, upper (tip broken), middle, and lower neurosetae from same; G, right elytragerous parapodium from segment 4, anterior view, acicula dotted; H, right cirrigerous parapodium from segment 8, anterior view, acicula dotted; I–K, upper, middle, and lower neurosetae from same. (Scales: A = 2.0 mm; B,C,G,H = 0.5 mm; D–F,I–K = 0.1 mm.)

13°13′45″E, 64–65 m, gray mud, *Discovery* sta 274, 4 Aug 1927, 1 specimen (BMNH 1930.10.8.1778, as *E. tubifex* by Monro, 1930).

NORTHWEST AFRICA. Off Morocco, 33°56′N, 07°25′W, 125 m, mud, *Vanneau* sta 15, 20 Jul 1923, J. Liouville and Ph. Dollfus, collectors, 1 specimen (BMNH 1928.4.26.354, as *E. kinbergi* by Fauvel, 1936).

ARABIAN SEA. 25°35′N, 57°09′E, 256 m, sta 254B, 30 Nov 1963, 2 specimens (AHF, as *E. kinbergi* by Hartman, 1974 [1975]).

TYPE MATERIAL.—The holotype of *Euarche tubifex* Ehlers (MCZ), from off Florida in 216 meters, is in poor condition, having been dry. Part of the thick leathery tube remains. According to Ehlers, the worm was 130+ mm long, 5 mm in greatest width in the anterior part, with 160+ segments, and the posterior end broken off.

The holotype of *Eupanthalis perlae* Fauchald (UZMC), from the Perlas Islands on the Pacific side of the Isthmus of Panama, is 19+ mm long, 7 mm wide with setae, with 44+ segments; it is a female massed with large yolky eggs in the body cavity.

DESCRIPTION.—Largest complete specimen examined from off West Africa (BMNH 1930.10.8.1778) 310 mm long, 11 mm wide with setae, 176 segments (♀ with large yolky eggs). Complete specimen from Arabian Sea (AHF) 120 mm long, 5 mm wide with setae, with 177 segments (♀ with large yolky eggs). Widths of other incomplete specimens 5 to 16 mm with setae.

Elytra delicate, transparent, first pair largest, elongate-oval,

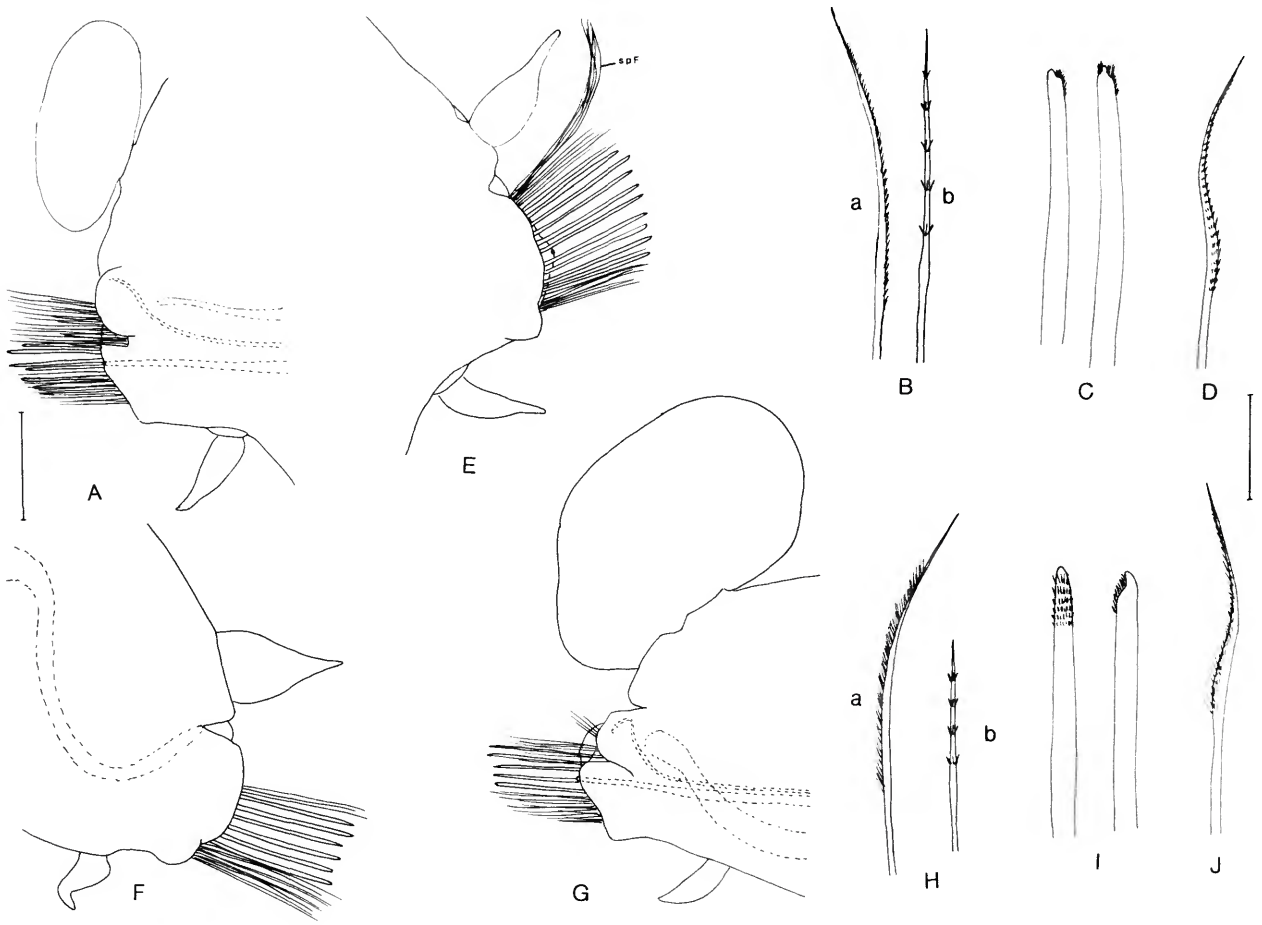


FIGURE 5.—*Euarche tubifex*, holotype of *Eupanthalis perlae* from Pacific Panama (UZMC): A, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; B–D, upper, middle, and lower neurosetae from same; E, right cirrigerous parapodium from segment 10, posterior view, with strand of spinning fibers exposed; F, right cirrigerous parapodium from segment 34, posterior view, spinning gland dotted; G, right elytragerous parapodium from segment 35, posterior view, acicula and spinning gland dotted; H–J, upper, middle, and lower neurosetae from same. (Scales: A,E–G = 0.5 mm; B–D,H–J = 0.1 mm.)

following pairs smaller, rounded, leaving middorsum uncovered (Figures 1B,E–G, 5A,G; Ehlers, 1887, pl. 12: fig. 1).

Prostomium oval, with 2 pairs of eyes subequal or anterior pair larger than posterior pair; median occipital antenna on small ceratophore on posterior part of prostomium, with small lateral papilla, with style extending slightly beyond prostomium; lateral antennae on short ceratophores on anterior border of prostomium, with styles similar to median antenna; palps stout, long, tapered with longitudinal rows of short papillae on distal two-thirds (Figures 1A–C, 4A; Ehlers, 1887, pl. 12: fig. 1; Fauchald 1977a, fig. 2b).

Tentacular segment distinct dorsally, with median nuchal lobe forming attachment for ceratophore of occipital antenna; tentaculophores lateral to prostomium and palps, usually with few rows of papillae on inner dorsal part, with or without few capillary setae; dorsal and ventral tentacular cirri longer and stouter than antennae, subequal in length or ventral ones slightly longer than dorsal ones (Figures 1A–C, 4A).

Second or buccal segment with first pair of elytrophores and biramous parapodia; notopodium conical, on anterodorsal side of larger neuropodium, with bundle of long, finely spinous, capillary notosetae extending far beyond neurosetae; neuropodium with conical or slightly bilobed presetal acicular lobe and shorter rounded postsetal lobe; row of short neurosetae all spinous, with capillary tips, middle ones stouter; ventral buccal cirri similar to tentacular cirri, longer than following ventral cirri (Figures 2A–D, 4A,B).

Large eversible muscular pharynx with circle of 11–15 (usually 13) pairs of papillae, median dorsal one slightly longer than others, on enlarged base; median ventral one 2- to 4-lobed, on enlarged base; 2 pairs of stout dark-colored hooked jaws each with 4–6 lateral teeth (Figure 1D; Ehlers, 1887, pl. 12: figs. 1–3).

Dorsal cirri of segment 3 with short cylindrical cirrophores on dorsoposterior sides of notopodia; style tapering, extending beyond neurosetae, longer than following dorsal cirri (Figures 2E, 4C). Parapodia of segments 3 to 8 gradually changing; notosetae becoming fewer and shorter (Figures 2E,G, 4C,G,H); upper neurosetae few, spinous, tapering to fine tips (Figures 2B,H, 4I); middle neurosetae stout, acicular, with blunt tips and few hairs, with or without aristae (Figures 2F, 4E); lower neurosetae slender, slightly curved, spinous, with larger spines basally and close-set spines distally, tapering to slender tips (Figures 2D, 4F).

Beginning with segment 9, notopodia forming rounded flattened lobes on anterodorsal sides of neuropodia, with development of internal spinning glands, with spinning fibers emerging through slit on inner side of notopodium (Figures 2I, 3B, 5A,G). Neuropodia with slightly bilobed anterior acicular lobes and diagonally truncate postsetal lobes, with only slightly developed lower bracts. Lower neurosetae similar to more anterior ones (Figures 3E, 5D,J; Ehlers, 1887, pl. 12: fig. 6; Fauchald, 1977a, fig. 2d). Middle neurosetae stouter, acicular, tips slightly hooked with subdistal hairs, with or without aristae (Figures 2K, 3D, 5C,I; Ehlers, 1887, pl. 12: fig. 7; Fauchald, 1977a, fig. 2e). Upper neurosetae emerging from small bract on upper anterior side of neuropodium (Figure 2I, 3B), of 2 types: (a) longer, tapering to slender tips, with continuous row of hairs perpendicular to stem; (b) shorter, more slender, tapering to sharp tips, with widely spaced groups of spines (Figures 2J, 3C, 5B,H; Fauchald, 1977a, fig. 2a,c,f). Dorsal cirri shorter, inflated basally; ventral cirri short, subulate (Figures 3A, 5E,F; Ehlers, 1887, pl. 12: fig. 5).

Pygidium small, between small posterior parapodia. No distinct branchial vesicles except for thin-walled, somewhat inflated areas medial to ventral cirri.

TUBE.—The tube was described and figured by Ehlers (1887:56, pl. 13: fig. 1). It is 280 mm long, about twice as long as the worm, neatly annulated on its anterior narrower end (7 mm wide), where it forms black muddy tubes of unequal width pushed into one another, then becomes wider (16 mm) and thicker on its posterior closed end. In cross-section the thick muddy wall, of weak leathery consistency, has a stratified structure with a smooth inner surface. Part of a tube is present with a specimen from North Carolina (USNM 50693). It is thick, felt-like, and appears indistinctly annulated.

BIOLOGY.—Hartman (1951:20) reported specimens, collected in November, from the Gulf of Mexico off Texas in 139 meters, as having the body cavities filled with sperm bundles or ova abruptly after segments 30–34. A large female from the Belgian Congo (USNM 51979) has large yolky eggs in the body cavity from about segment 47.

COMMENSALS.—Rullier (1965b:17) and Intes and Le Loeuff (1975:283) reported small bivalve mollusks of the family Montacutidae between the parapodia of specimens of *E. tubifex* (as *Eupanthalis kinbergi*) from Dahomey and the Ivory Coast, West Africa.

DISTRIBUTION.—Caribbean, Northwest Atlantic from Florida to North Carolina, Gulf of Mexico, Panama (Pacific), Southwest Atlantic to South Brazil, Northeast Atlantic from West to Northwest Africa, Mediterranean, Arabian Sea. In 13 to 450 meters.

Euarche maculosa (Treadwell, 1931)

FIGURES 6, 7

Macellicephala maculosa Treadwell, 1931:313, fig. 1a–g.

Panthalis nigromaculata.—Willey, 1905:255, pl. 1: figs. 28–32. [Not *Panthalis nigromaculata* Grube, 1878].

Eupanthalis maculosa.—Hartman, 1938b:125.—Strelzov, 1968:141; 1972:307, figs. 3E, 14A–E, 15A–G [part].

Euarche maculosa.—Pettibone, 1976:68.

MATERIAL EXAMINED.—PHILIPPINE ISLANDS. Marinduque Island off Tayabas Light, 13°48′N, 121°43′E, 194 m, black sand, *Albatross* sta D5379, 24 Feb 1901, holotype (USNM 19543).

TYPE MATERIAL.—The holotype, with the pharynx fully extended and the right palp missing, is incomplete posteriorly, with 63+ segments, 50+ mm long and 5 mm wide with setae.

It was examined by Hartman (1938b:125) and referred to *Eupanthalis*.

DESCRIPTION.—Strelzov (1972:307) reported specimens from Gulf of Tonkin up to 86+ segments, with maximal width 7 mm including parapodia without setae.

Elytra delicate, transparent, rounded to elongate-oval, first few pairs larger, rest leaving middorsum uncovered (Figure 6C–E; Willey, 1905, pl. 1: figs. 28,31,32).

Prostomium oval, with 2 pairs of subequal eyes or anterior pair larger than posterior pair; short ceratophore of median antenna, with small lateral papilla, attached to posterior part of prostomium, with short style extending to tip of prostomium; lateral antennae with short ceratophores attached on anterior part of prostomium with styles similar to those of median antenna; palps long, stout, tapered, with longitudinal rows of papillae on distal two-thirds (Figure 6A; Treadwell, 1931, fig. 1a; Willey, 1905, pl. 1: figs. 28, 29; Strelzov, 1972, fig. A).

Tentacular segment distinct dorsally, with median nuchal lobe forming attachment for median antenna. Tentaculophores lateral to prostomium, with single aciculum, row of few papillae on inner dorsal side, and usually without setae; tentacular cirri longer and stouter than antennae, ventral ones slightly longer than dorsal ones (Figure 6A,B).

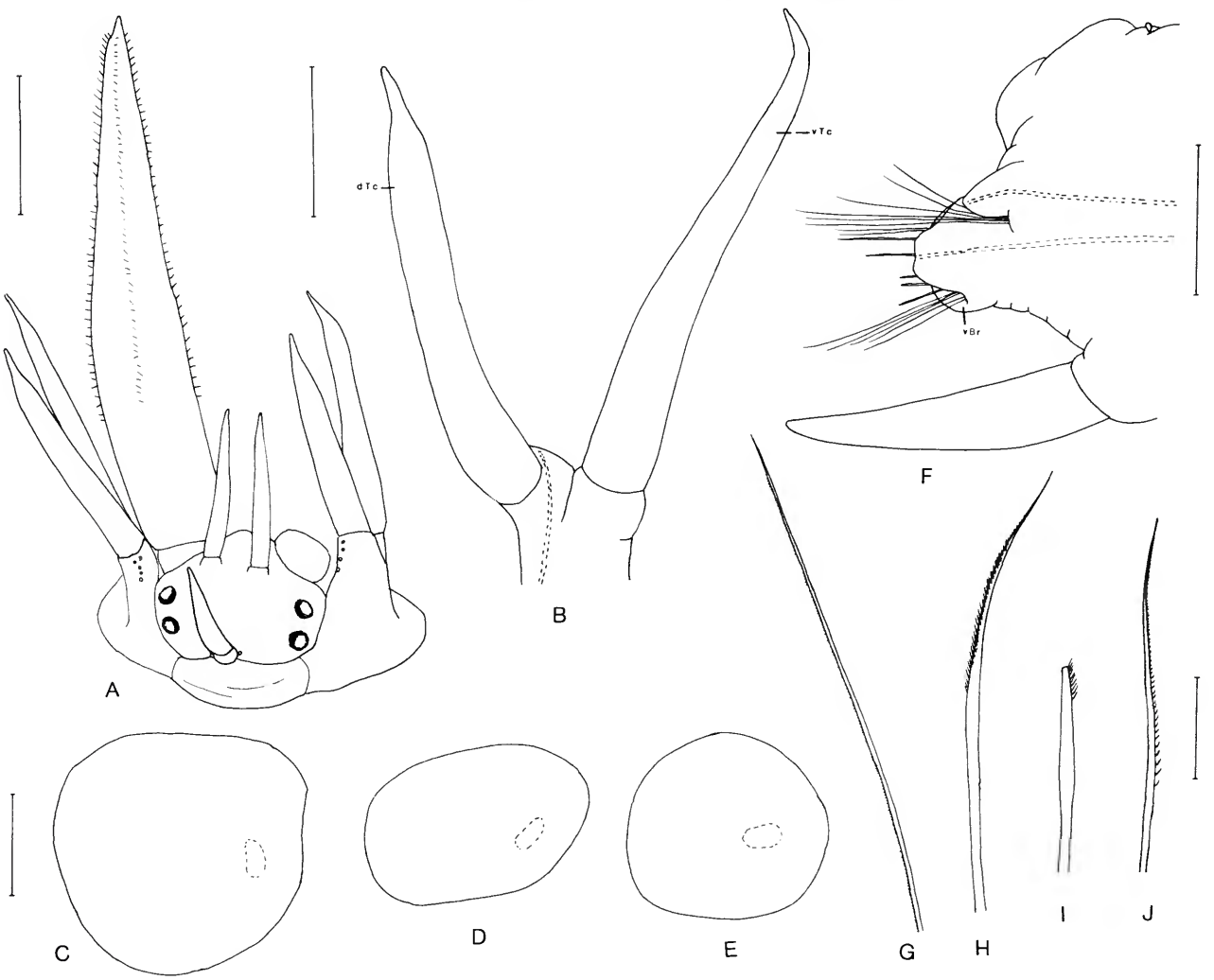


FIGURE 6.—*Euarche maculosa*, holotype (USNM 19543): A, dorsal view of prostomium and tentacular segment, pharynx fully extended (not shown), right palp missing; B, left tentaculophore with tentacular cirri, inner view, aciculum dotted; C, right 1st elytron from segment 2; D, right 5th elytron from segment 9; E, right 15th elytron from segment 29; F, right elytragerous parapodium from segment 2, anterior view, acicula dotted; G, notoseta from same; H–J, upper, middle (tip broken), and lower neurosetae from same. (Scales: A = 1.0 mm; B,F = 0.5 mm; C–E = 1.0 mm; G–I = 0.1 mm .)

Segment 2 with first pair of elytrophores, biramous parapodia, and ventral buccal cirri similar to tentacular cirri, longer than following ventral cirri; notopodia conical, with small bundle of finely spinous capillary notosetae extending to about tips of neurosetae; neuropodium with slightly bilobed presetal acicular lobe and rounded postsetal lobe, with slightly developed lower bract; row of neurosetae finely spinous, tapering to fine tips, middle ones somewhat stouter (Figure 6F–J; Strelzov, 1972, figs. 14B, 15G).

Pharynx with 13 (Strelzov, 1972) to 15 (type) pairs of distal papillae, with middorsal one only slightly larger than others, attached to large base, midventral one similar to others (type) or may be 3 or 4 lobed (Strelzov, 1972), also attached to large base: 2 pairs of stout hooked dark jaws with 3–6 lateral teeth (Willey, 1905, pl. 1: figs. 28, 30; Strelzov, 1972, fig. 14A).

Parapodia of cirrigerous segments 3, 6, and 8 with dorsal cirri on short cirrophores on posterior side of notopodia, with styles long, tapered, extending beyond setae (Figure 7A,D); conical notopodia with small bundle of long capillary notosetae on segment 3, fewer and shorter on following parapodia; neuropodia with distinct lower bract; few upper neurosetae lanceolate, spinous (Figure 6H); middle stout, acicular neurosetae with tips rounded, slightly hooked, with distal hairs and arista (Figure 7B); lower neurosetae curved, tapering to fine tips, spinous, with large spines basally and close-set spinous rows distally (Figure 7C).

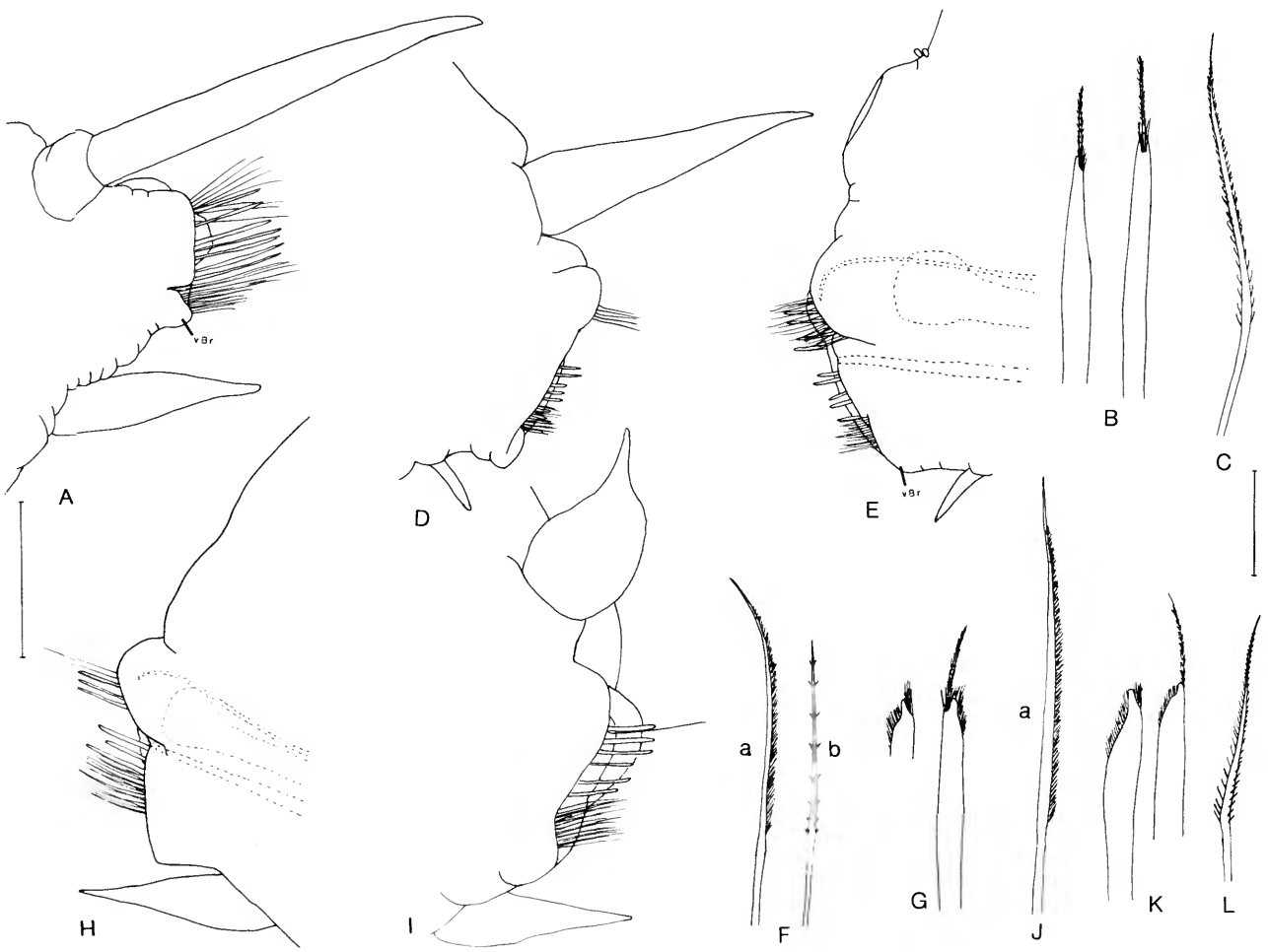


FIGURE 7.—*Euarche maculosa*, holotype (USNM 19543): A, right cirrigerous parapodium from segment 3, posterior view; B,C, middle and lower neurosetae from same; D, right cirrigerous parapodium from segment 8, posterior view; E, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; F,G, upper and middle neurosetae from same; H, right elytragerous parapodium from segment 29, anterior view, acicula and spinning gland dotted; I, right cirrigerous parapodium from segment 30, posterior view; J–L, upper, middle, and lower neuroseta from same. (Scales: A,D,E,H,I = 0.5 mm; B,C,F,G,J–L = 0.1 mm.)

Beginning with segment 9, notopodia wide, flat, on anterodorsal sides of large neuropodia, with developing spinning glands and only few short notosetae; neuropodia with slightly bilobed presetal acicular lobe and diagonally truncate postsetal lobe, with more or less distinct lower bract (Figure 7E,H,I; Willey, 1905, pl. 1: fig. 32; Strelzov, 1972, fig. 14D). Lower group of neurosetae similar to anterior ones (Figure 7C,L; Treadwell, 1931, fig. 1f; Strelzov, 1972, fig. 15E); middle stout acicular neurosetae with slightly hooked tips and subdistal hairs, with or without aristae (Figure 7G,K; Treadwell, 1931, fig. 1g; Strelzov, 1982, fig. 15B); upper group of neurosetae of 2 types: (a) slender, wider basally, lanceolate, tapering to slender tips, with rather long fine hairs; (b) shorter, pinnate, tapering abruptly to slender tips, with whorls of widely spaced spines (Figure 7F,J; Treadwell, 1931, fig. 1d,e; Strelzov, 1982, fig. 15A,F). Dorsal cirri short, inflated basally, ventral cirri short, subulate (Figure 7H,I). No distinct branchial vesicles.

TUBE.—The tube was described and figured by Strelzov (1972:311, fig. 14E). It resembled the tube described by Ehlers for *E. tubifex*. The anterior part of the tube is narrower and annulated, formed of parchment-like material, becoming wider posteriorly (maximal width 25 mm), with the compact wall formed of a thick layer of hairs cemented with muddy and

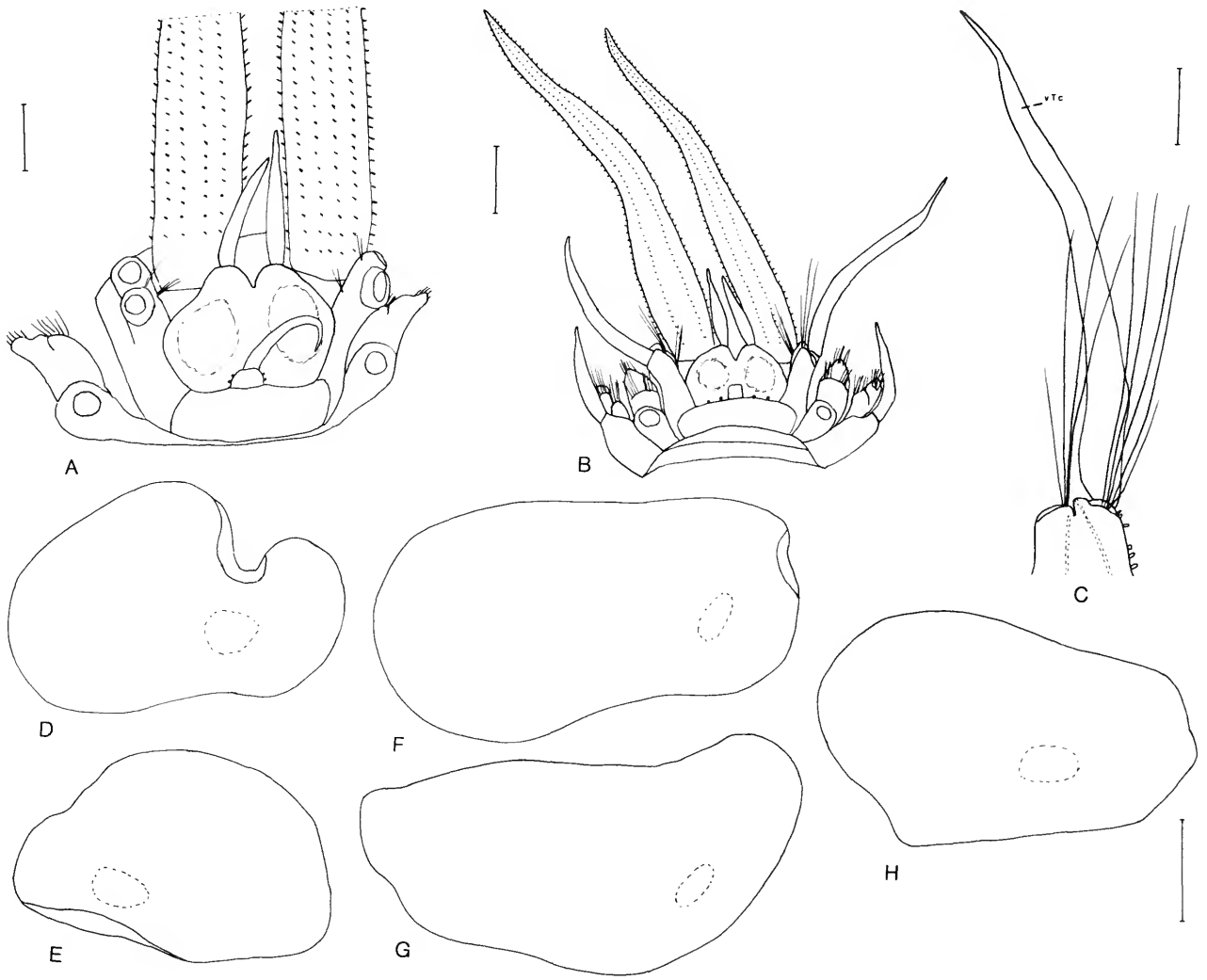


FIGURE 8.—*Euarche mexicana* (A, paratype, USNM 98794; B–H, holotype, USNM 98793): A, dorsal view of anterior end, tentacular cirri missing, only bases of palps shown; B, dorsal view of anterior end (styles of median antenna, left ventral and right dorsal tentacular cirri missing); C, right tentaculophore, inner view (dorsal tentacular cirrus broken off), acicula dotted; D, right 1st elytron from segment 2; E, left 2nd elytron from segment 4; F, right 5th elytron from segment 9; G, right 11th elytron from segment 21; H, right elytron from segment 35. (Scales: A = 0.5 mm; B = 1.0 mm; C = 0.5 mm; D–H = 1.0 mm.)

sandy particles.

Willey (1905:259) indicated that the body of the worm he examined was quite flaccid and collapsed after segment 31; it was full of glistening silken coils and was firmly attached to the posterior end of the tube. The anterior part of the tube was mostly free from the body of the worm, although slightly connected by loose silken strands. This would explain why anterior fragments removed from their tubes are so common in collections.

DISTRIBUTION.—Indo-Pacific: Philippines, Ceylon, Gulf of Tonkin. In 17 to 194 meters.

Euarche mexicana, new species

FIGURES 8–10

MATERIAL EXAMINED.–GULF OF MEXICO. SE and NW Gulf, R/V *Alaminos* cruises, from L.H. Pequegnat: sta A9-15, 11 Jun 1965, 23°00′N, 86°48′W, 604 m, holotype (USNM 98793); sta A13-4, 12 Nov 1968, 25°38.4′N, 96°18.3′W, 512 m, paratype (USNM 98794); sta A13-15, 18 Nov 1968, 27°34.5′N, 95°10.5′W, 658–860 m, paratype (USNM 98795); sta A13-24, 20 Nov 1968, 27°29.5′N, 95°31′W, 878 m, paratype (USNM 98796).

DESCRIPTION.—Length 32–84+ mm, width with setae 8–12 mm, with 41–90+ segments. Elytra delicate, transparent, transversely elongate-oval, attached eccentrically on lateral side, leaving middorsum uncovered (Figure 8D–H).

Prostomium oval, bilobed, without eyes but with pair of large oval whitish areas; ceratophore of median antenna, with few lateral papillae, attached on posterior part of prostomium, with style extending slightly beyond prostomium; lateral antennae attached on anterior part of prostomium, similar to median antenna; palps stout, long, tapered, with longitudinal rows of papillae extending most of their length (Figure 8A,B).

Tentacular segment distinct dorsally, with raised nuchal ridge to which ceratophore of median antenna is attached; tentaculophores lateral to prostomium, with 2 acicula, small

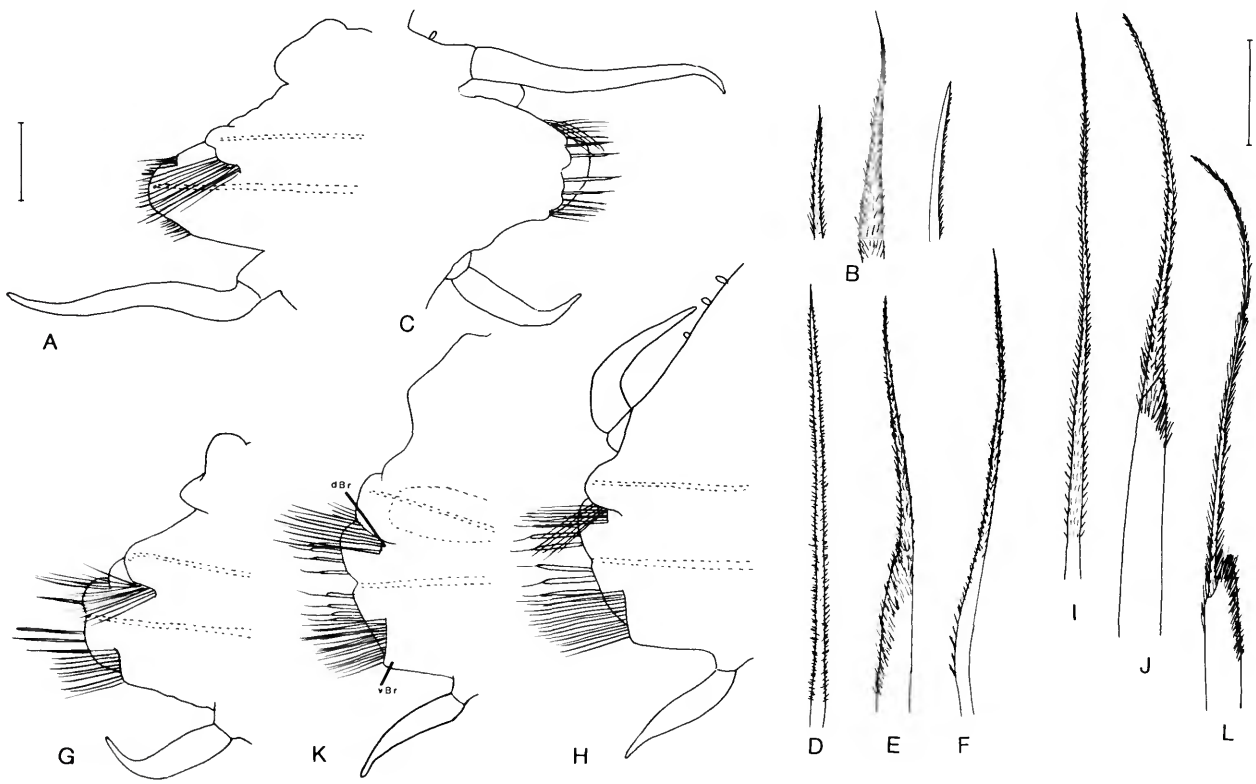


FIGURE 9.—*Euarche mexicana*, holotype (USNM 98793): A, right elytragerous parapodium from segment 2, anterior view, acicula dotted; B, upper, middle, and lower neurosetae from same; C, right cirrigerous parapodium from segment 3, posterior view; D–F, upper, middle, and lower neurosetae from same; G, right elytragerous parapodium from segment 4, anterior view, acicula dotted; H, right cirrigerous parapodium from segment 8, anterior view, acicula dotted; I–J, upper and middle neurosetae from same; K, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; L, middle neuroseta from same. (Scales: A,C,G,H,K = 0.5 mm; B,D–F,I,J,L = 0.1 mm.)

nuchal lobe, and 2 groups of few long capillary setae; tentacular cirri longer and stouter than antennae, ventral tentacular cirri slightly longer than dorsal ones (Figure 8A–C).

Second segment with first pair of elytrophores and biramous parapodia; notopodia small, conical, with bundle of finely spinous capillary notosetae on lower part, extending slightly beyond tip of neuropodium; neuropodia rounded with hairy tapered neurosetae; ventral buccal cirri longer than following ventral cirri (Figures 8A,B, 9A,B).

Pharynx (not extended, cut open on paratype, USNM 98795) with 13 pairs of border papillae, middorsal one longer than others, on wide base; midventral one short (damaged?), on wide base; 2 pairs of stout hooked jaws with 6–8 lateral teeth.

Notopodia of segments 3 to 8 similar to those of segment 2 (Figure 9C,G,H), with bundle of short capillary setae; dorsal cirri on segments 3, 6, and 8 with short cirrophores and tapered styles extending beyond neuropodia (Figure 9C,H); neuropodia with slightly bilobed presetal acicular lobes and truncate postsetal lobes, with short upper anterior bracts enclosing upper group of slender, spinous, tapering neurosetae (Figure 9D,G–I) and ventroanterior bracts enclosing lower group of curved neurosetae, with large spines basally and close-set spines distally (Figure 9F–H); middle neurosetae stouter, acicular, with subdistal hairs and long hairy aristae (Figure 9E,H,J).

From segment 9 on, notopodia larger, flattened, on anterodorsal side of neuropodia, with development of internal spinning glands, with few short capillary notosetae (Figures 9K, 10B,C,G); lower group of neurosetae enclosed in anteroventral bracts, similar to more anterior ones (Figure 10J); middle acicular neurosetae with subdistal spines and long hairy aristae (Figures 9L, 10E,I); upper group of neurosetae enclosed in upper anterior bract, of 2 types: (a) long, slender, hairy,

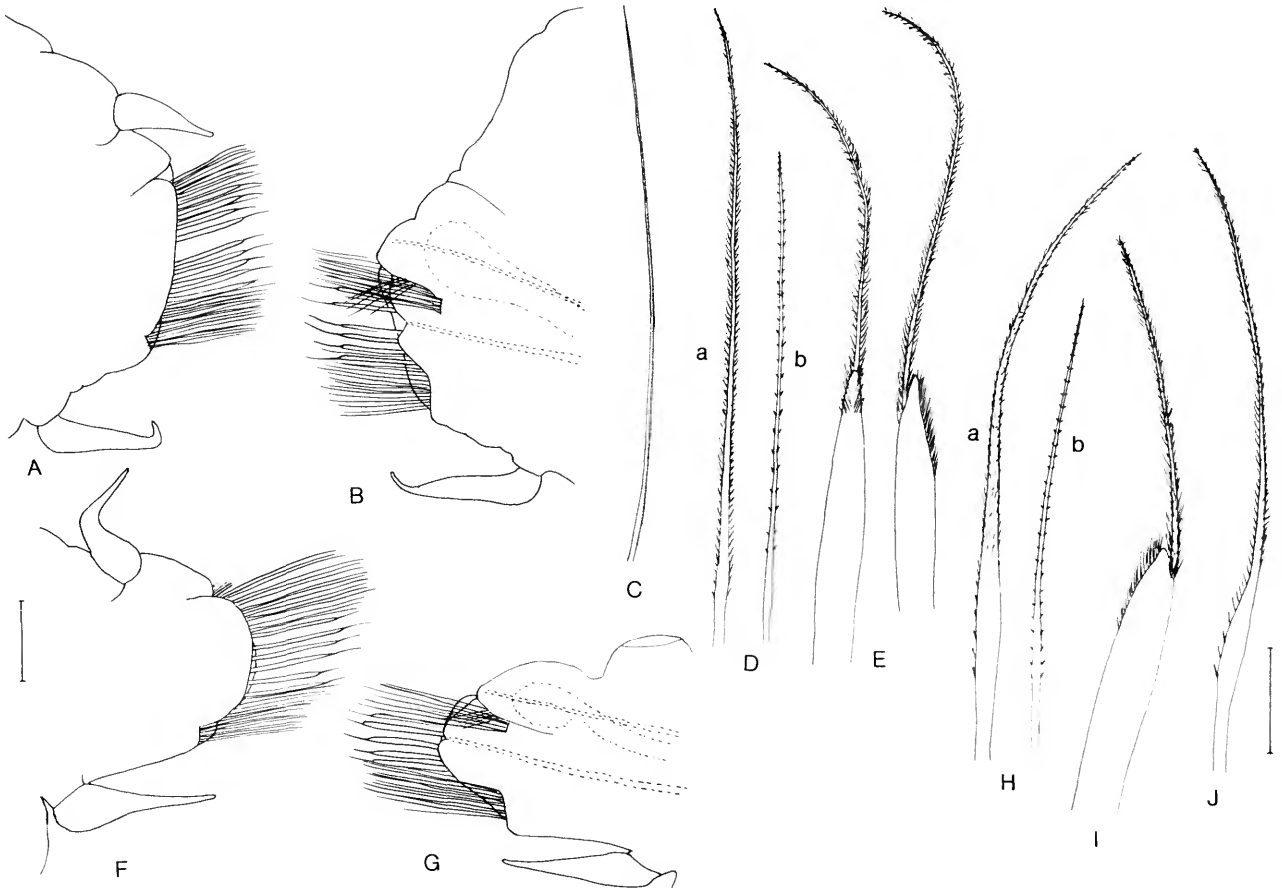


FIGURE 10.—*Euarche mexicana*, holotype (USNM 98793): A, right cirrigerous parapodium from segment 18, posterior view; B, right elytragerous parapodium from segment 19, anterior view, acicula and spinning gland dotted; C, notoseta from same; D,E, upper and middle neurosetae from same; F, right cirrigerous parapodium from segment 38, posterior view; G, right elytragerous parapodium from segment 39, anterior view, acicula and spinning gland dotted; H–J, upper, middle, and lower neurosetae from same. (Scales: A,B,F,G = 0.5 mm; C–E, H–J = 0.1 mm.)

tapering to slender tips; (b) shorter, more slender, with whorls of widely spaced spines (Figure 10D,H). Dorsal cirri short, subulate, about same size as ventral cirri (Figure 10A,F). No distinct branchial vesicles, although parts of body and parapodia delicate, transparent.

DISTRIBUTION.—Gulf of Mexico. In 512 to 878 meters.

REMARKS.—*Euarche mexicana* differs from *E. tubifex* and *E. maculosa* in lacking eyes on the prostomium, in having the palps papillate throughout, instead of only on the distal two-thirds, and the upper neurosetae of type 3b much longer, with more numerous whorls of widely spaced spines.

Genus *Eupanthalis* McIntosh, 1876

Eupanthalis McIntosh, 1876:404–405. [Type-species: *Eupanthalis kinbergi* McIntosh, 1876, by monotypy. Gender: feminine.]

Restio J. Moore, 1903:423. [Type-species: *Restio aenus* Moore, 1903, by monotypy. Gender: masculine. (= *Eupanthalis aena* (Moore)).]

DIAGNOSIS.—Prostomium oval or bilobed, with 2 pairs of sessile eyes, without enlarged ommatophores; 2 anterior antennae, without occipital median antenna; pair of long palps, smooth or papillate. First or tentacular segment distinct dorsally, with or without small nuchal lobe; tentaculophores lateral to prostomium, each with aciculum and pair of tentacular cirri, without setae. Second or buccal segment with first pair of elytra and long ventral buccal cirri; parapodia subbiramous, with notoaciculum, with or without few notosetae; neurosetae slender, lanceolate, spinous. Acicular neurosetae present from segment 3. Elytra on segments 2, 4, 5, 7, continuing on alternate segments, delicate, transparent. Dorsal cirri with short cirrophores and short styles on nonelytragerous segments. Notopodium from segment 9 with notoaciculum and internal spinning glands, with or without few notosetae; upper group of neurosetae of 2 types: (a) longer, lanceolate, tapered, with lateral spines, and (b) shorter, with widely spaced whorls of spines; middle row of neurosetae stout, acicular, with slightly hooked aristate tips; lower group of neurosetae numerous, spinous, lanceolate. Without parapodial branchiae. Pharynx with 13 pairs of border papillae, none extra long; 2 pairs of hooked jaws each with 3–5 lateral teeth.

The genus includes 4 species (one doubtful), 2 of which are new combinations.

Key to the Species of *Eupanthalis**

1. Palps with longitudinal rows of papillae on distal half; tentacular cirri longer and stouter than lateral antennae, shorter than palps; with small nuchal lobe [Figure 11A] . . . . . ***E. kinbergi*** McIntosh

   Palps smooth; tentacular cirri longer than lateral antennae, about as long as palps; without nuchal lobe [Figures 13A, 15A] 2

2. Neurosetae of segment 2 slender, lanceolate, finely spinous [Figure 13C,D]. Lateral antennae only slightly longer than prostomium [Figure 13A] . . . . . ***E. edriophthalma*** (Potts)

   Neurosetae of segment 2 stout, tapering to fine hairy tips [Figure 15D,E]. Lateral antennae more than twice as long as prostomium [Figure 15A] . . . . . ***E. elongata*** (Treadwell), new combination

**Eupanthalis aena* (Moore), new combination, is not included in the key due to the defective anterior end of the holotype.

Eupanthalis kinbergi McIntosh, 1876

FIGURES 11, 12

Eupanthalis kinbergi McIntosh, 1876:404, pl. 72: figs. 12–15. [Not sensu Strelzov, 1972:303.]

Polyodontes maxillosus.—Paris, 1954:503, fig. 9e. [Not *Polyodontes maxillosus* Ranzani, 1817.]

MATERIAL EXAMINED.—MEDITERRANEAN. Adventure Bank, SW of Sardinia, approx. 37°20′N, 12°10′E, 168 m, *Porcupine* sta, 1870, Dr. Carpenter, collector, holotype (BMNH 1921.5.1.570). Naples, A.M. Norman, by purchase, 1 specimen (BMNH 1898.5.6.93).

TYPE MATERIAL.—Holotype a complete specimen with pharynx fully extended, tapered posterior end in rather poor shape, 30 mm long, 6 mm wide with setae, with 62 segements, last few small; only few elytra remain on middle and posterior segments; palps broken off from prostomium.

DESCRIPTION.—Large, almost complete specimen from Naples 230+ mm long, 12 mm wide with setae, with 224+ segments. Elytra elongate-oval, thin, delicate, first pair covering prostomium, rest leaving middorsum uncovered; posterior elytra with deep lateral pouch (on holotype, Figure 11D; absent on specimen from Naples).

Prostomium oval, bilobed, with median longitudinal groove, with 2 pairs of sessile eyes, anterior pair much larger or only slightly larger than posterior pair; lateral antennae with very short ceratophores on anterior side of prostomium, with styles long, tapered; palps (missing on holotype) long, stout, tapered, with longitudinal rows of papillae on distal half (Figure 11A,B). Tentacular segment distinct dorsally, with small

nuchal lobe; tentaculophores lateral to prostomium, without setae; dorsal and ventral tentacular cirri subequal in length, longer and stouter than lateral antennae (Figure 11A,B).

Second segment with first pair of elytrophores and ventral buccal cirri similar to tentacular cirri, longer than following ventral cirri; notopodium small, rounded acicular lobe on anterodorsal side of larger neuropodium, without notosetae (on holotype) or with bundle of long capillary notosetae (on specimen from Naples); neuropodium with bilobed presetal acicular lobe; neurosetae slender, tapered, spinous (Figure 11A,B,E,F). Distal border of extended pharynx with 13 pairs of conical papillae, middorsal and midventral ones not especially enlarged, both on wide bases with lateral curved tips; 2 pairs of strong, dark, hooked jaws, each with 3–5 lateral teeth (Figure 11C).

Dorsal cirri on segment 3 with short cirrophore on posterodorsal side of notopodium, with long tapered style; upper few neurosetae slender, spinous, lanceolate; numerous lower neurosetae similar, slightly curved; middle neurosetae stout, acicular, with hairy rounded tips and hairy aristae (Figure 11G–J).

Beginning with segment 9, notopodium wider, rounded, flattened, on anterodorsal side of neuropodium, with internal spinning glands; upper group of neurosetae numerous, of 2 types: (a) longer, lanceolate, spinous (Figure 12Ca,Ha); (b) shorter, slender, with circlets of widely spaced spines (Figure 12Cb,Hb; McIntosh, 1876, pl. 72: fig. 12); middle row of neurosetae stout, acicular, with tips slightly hooked, with subdistal spines along one side and distal aristae (Figure 12D,I; McIntosh, 1876, pl. 72: fig. 13); numerous lower neurosetae slightly curved, lanceolate, with larger spines basally and close-set spines distally (Figure 12E,J; McIntosh, 1876, pl. 72: figs. 14, 15). Some parapodia with small bundle of capillary notosetae emerging from lower side of notopodium (Figure 12F); dorsal cirri short, subulate; ventral cirri short, tapered (Figure 12B–J).

Parapodia of far posterior region with neuropodia more elongate, narrower, with dorsal cirri tapering to filamentous tips; upper neurosetae of type b missing (Figure 12L,M). Pygidium small, rounded, between few posterior small segments. Integument of parapodia delicate, but without distinct branchial vesicles.

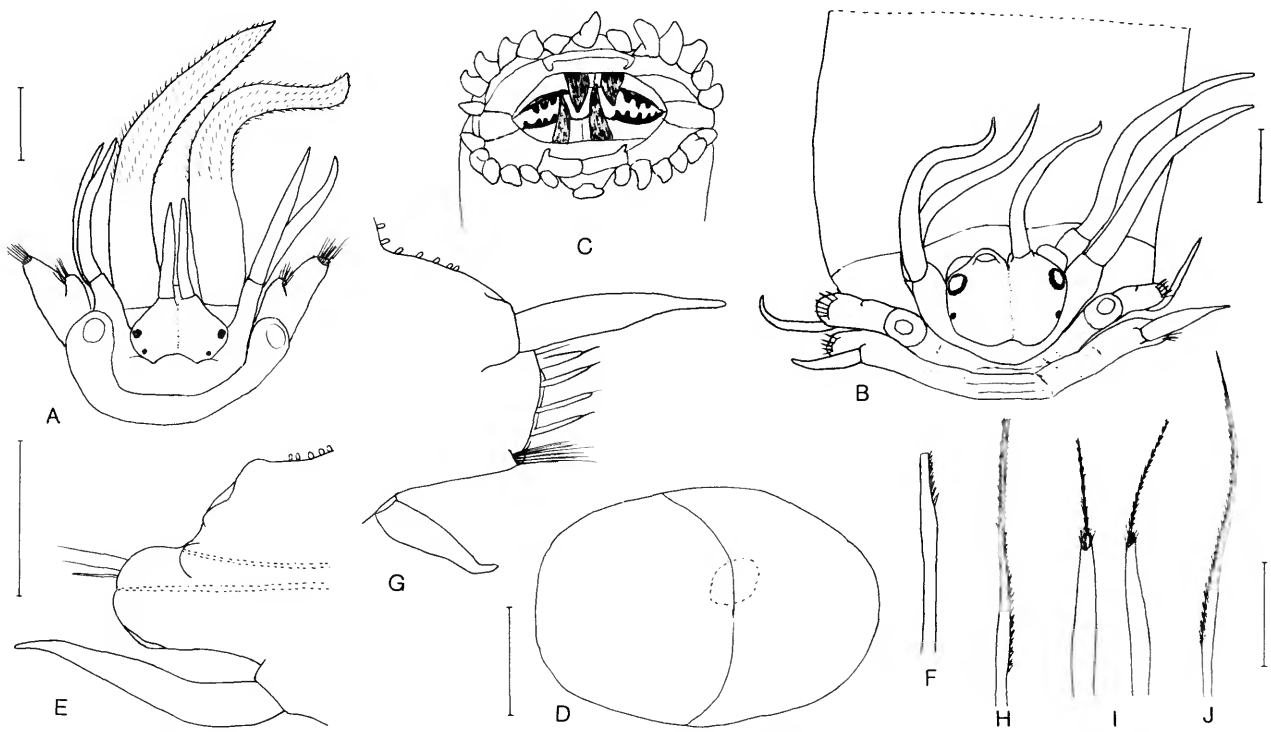


FIGURE 11.—*Eupanthalis kinbergi* (A, specimen from Naples, BMNH 1895.5.6.93; B–J, holotype, BMNH 1921.5.1.570): A, dorsal view of anterior end; B, dorsal view of anterior end, pharynx fully extended (only basal part shown), palps missing; C, end view of extended pharynx; D, right elytron from segment 47; E, right elytragerous parapodium from segment 2, anterior view, acicula dotted, setae mostly broken off; F, neuroseta from same (tip broken); G, right cirrigerous parapodium from segment 3, posterior view; H–J, upper (tip broken), middle, and lower neurosetae from same. (Scales: A,C = 1.0 mm; B = 0.5 mm; D = 0.5 mm; E,G = 0.5 mm; F,H–J = 0.1 mm.)

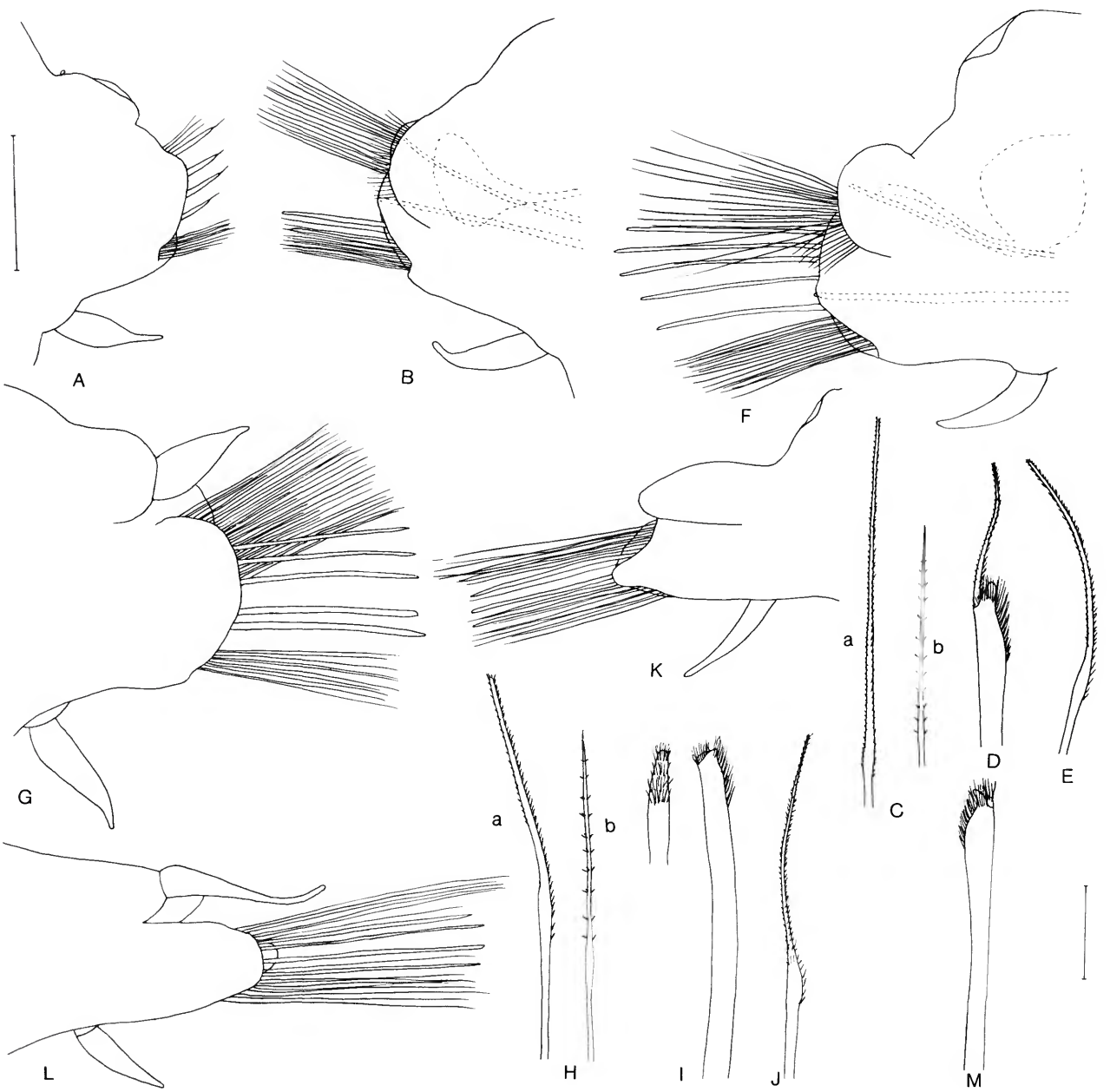


FIGURE 12.—*Eupanthalis kinbergi*, holotype (BMNH 1921.5.1.570): A, right elytragerous parapodium from segment 4, posterior view; B, right elytragerous parapodium from segment 9, anterior view, middle acicular setae mostly broken off, acicula and spinning gland dotted; C–E, upper, middle, and lower neurosetae from same; F, right elytragerous parapodium from segment 19, anterior view, acicula and spinning gland dotted; G, right cirrigerous parapodium from segment 20, posterior view; H–J, upper, middle, and lower neurosetae from same; K, right elytragerous parapodium from segment 47, anterior view; L, right cirrigerous parapodium from segment 48, posterior view; M, neuroseta from same. (Scales: A,B,F,G,K,L = 0.5 mm; C–E,H–J,M = 0.1 mm.)

DISTRIBUTION.—Mediterranean. In 168 meters.

Eupanthalis edriophthalma (Potts, 1910)

FIGURES 13, 14

Panthalis edriophthalma Potts, 1910:345, pl. 19: fig. 19, pl. 21: figs. 56, 57.
Eupanthalis edriophthalma.—Augener, 1922:10 [footnote].—Hartman, 1959:110, 111.

MATERIAL EXAMINED.—WESTERN INDIAN OCEAN. Maldives, Saya de Malha, 86 m, mud with little shell material, Percy Sladen Trust Exp. 1905, 2 syntypes (BMNH 1924.3.1.71–72).

TYPE MATERIAL.—Both syntypes females with large yolky eggs in body cavity, incomplete posteriorly, 11–14+ mm long, 5–6 mm wide with setae, with 29–42+ segments.

DESCRIPTION.— Elytra oval, nearly covering dorsum, delicate, transparent, sometimes somewhat inflated, others with small lateral pouch (Figure 13B).

Prostomium oval, with faint median longitudinal groove, with 2 pairs of lateral sessile eyes, anterior pair twice as large as posterior pair; lateral antennae with short ceratophores on

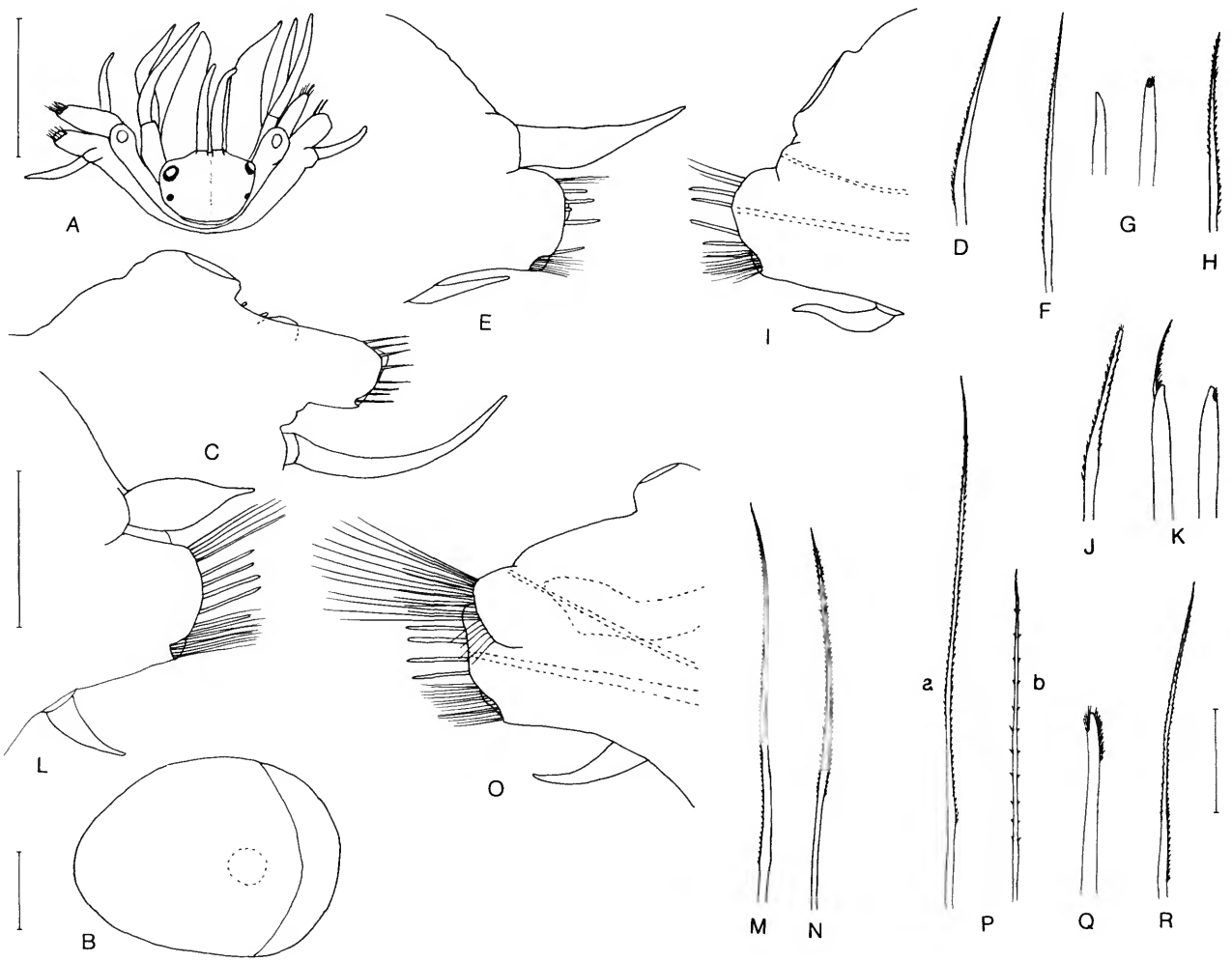


FIGURE 13.—*Eupanthalis edriophthalma*, syntype (BMNH 1924.3.1.71–72): A, dorsal view of anterior end, anterior segments crowded; B, right elytron from segment 19; C, right elytragerous parapodium from segment 2, posterior view; D, neuroseta from same; E, right cirrigerous parapodium from segment 3, posterior view; F–H, upper, middle, and lower neurosetae from same; I, right elytragerous parapodium from segment 4, anterior view, acicula dotted; J,K, upper (tip broken) and middle neurosetae from same; L, right parapodium from segment 8, posterior view; M,N, upper and lower neurosetae from same; O, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; P–R, upper, middle, and lower neurosetae from same. (Scales: A = 1.0 mm; B = 0.5 mm; C,E,I,L,O = 0.5 mm; D,F–H,J,K,M,N,P–R = 0.1 mm.)

anterior border of prostomium, with styles longer than prostomium; palps stout, tapered, smooth, without papillae (Figure 13A; Potts, 1910, pl. 19: fig. 19). Tentacular segment distinct dorsally (nearly hidden when crowded); tentaculophores lateral to prostomium, without setae; dorsal and ventral tentacular cirri subequal in length, longer than lateral antennae, about as long as palps (Figure 13A; Potts, 1910, pl. 19: fig. 19).

Second segment with first pair of elytrophores and ventral buccal cirri similar to tentacular cirri, longer than following ventral cirri; notopodium small, rounded acicular lobe on anterodorsal side of larger neuropodium, without notosetae; neuropodium rounded, with neurosetae all similar, spinous, lanceolate (Figure 13A,C,D). Pharynx not extended (not examined).

Notopodia of segments 3–8 similar to notopodia of segment 2, without notosetae; dorsal cirri of segments 3, 6, and 8 with short cirrophores on posterodorsal sides of notopodia, with styles longer, subulate on segment 3 and shorter, basally inflated on segment 8 (Figure 13E,I,L): few upper neurosetae slender, lanceolate (Figure 13F,M); numerous lower neurosetae slightly curved, lanceolate, with close-set spines distally (Figure 13H,N); middle row of neurosetae stout, acicular, with distal hairs, with or without aristae (Figure 13G,K).

Notopodia from segment 9 larger, rounded, flattened, on anterodorsal sides of larger neuropodia, with development of internal spinning glands, and row of short capillary notosetae on lower side; neuropodia with presetal subconical acicular lobes and truncate postsetal lobes, with slightly developed lower bracts (Figures 13O, 14A,B,E). Upper group of neurosetae, emanating from upper anterior bract nearly hidden by notopodium, of 2 types: (a) longer, slender, spinous, lanceolate (Figures 13Pa, 14Ca,Fa; Potts, 1910, pl. 21: fig. 56); (b) shorter, slender, with whorls of widely spaced spines (Figure 13Pb). Middle row of stout acicular neurosetae with slightly hooked tips with distal spines and subdistal spines along one side, with hairy aristae (Figures 13Q, 14D,G; Potts, 1910, pl. 21: fig. 57). Lower group of neurosetae, within lower bract, similar to anterior ones (Figures 13R; 14H). Dorsal cirri

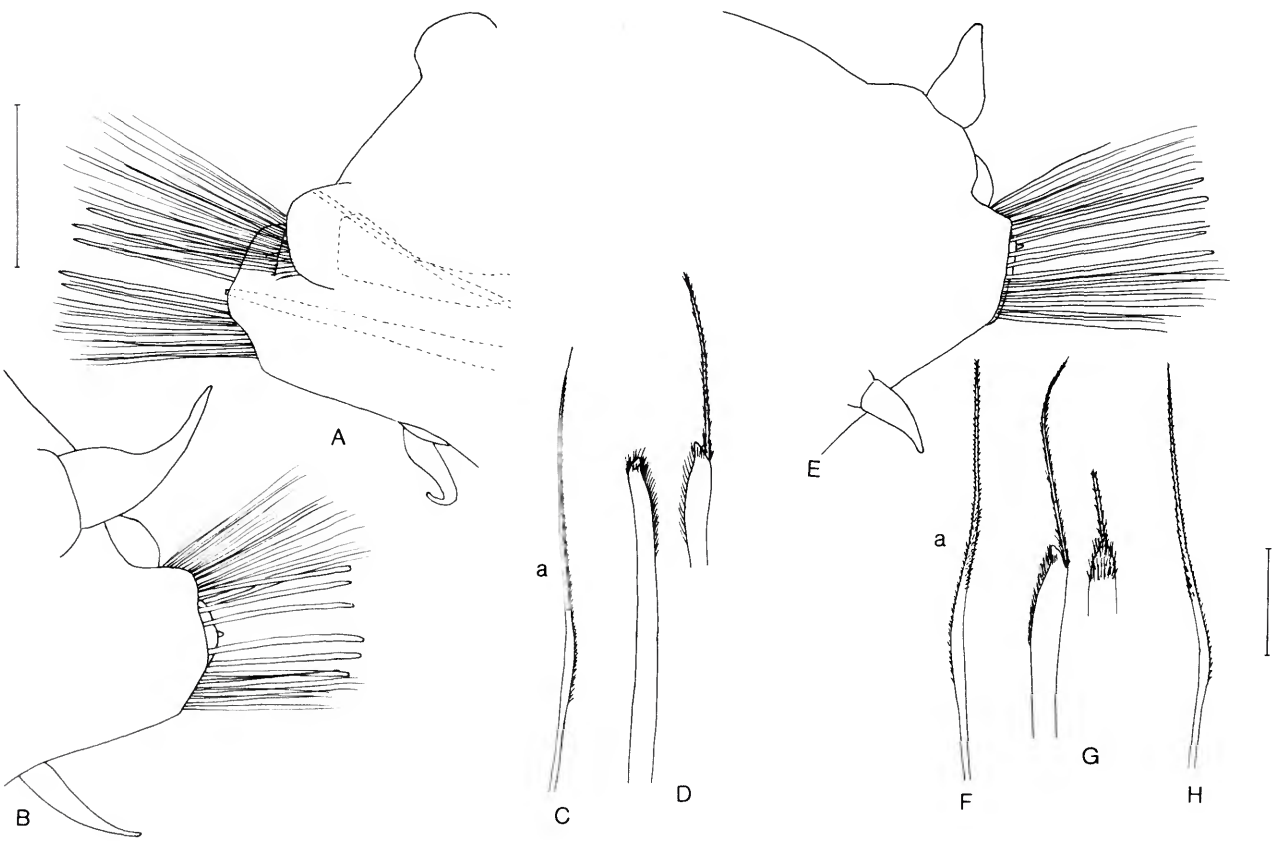


FIGURE 14.—*Eupanthalis edriophthalma*, syntype (BMNH 1924.3.1.71–72): A, right elytragerous parapodium from segment 19, anterior view, acicula and spinning gland dotted; B, right cirrigerous parapodium from segment 20, posterior view; C,D, upper and middle neurosetae from same; E, right cirrigerous parapodium from segment 28, posterior view; F–H, upper, middle, and lower neurosetae from same. (Scales: A,B,E = 0.5 mm; C,D,F–H = 0.1 mm.)

with short wide cirrophores, with styles short, inflated basally; ventral cirri short, tapered (Figure 14B,E). No distinct branchial vesicles but parapodial integument delicate, transparent, with internal organs visible.

DISTRIBUTION.—Indian Ocean (Maldives). In 86 meters.

Eupanthalis elongata (Treadwell, 1931), new combination

FIGURES 15, 16

Iphionella elongata Treadwell, 1931:315, fig. 2a–d.
Eupolyodontes elongata.—Hartman, 1938b:125, fig. 41 a–d; 1959:82, 111.
Eupanthalis kinbergi.—Strelzov, 1972:303, figs. 3D,12A–F,13A–G [part]. [Not *Eupanthalis kinbergi* Mcintosh, 1876.]

MATERIAL EXAMINED.—PHILIPPINE ISLANDS: Marinduque Island, off Tayabas Light, 52–291 m, *Albatross* sta, 24 Feb 1909, holotype of *Iphionella elongata* (USNM 19544).

TYPE MATERIAL.—The holotype is an anterior fragment of 46+ segments, 40+ mm long, and 10 mm wide with setae; the pharynx is completely extended. It was previously examined by Hartman (1938b).

DESCRIPTION.—Elytra oval, delicate, transparent, attached

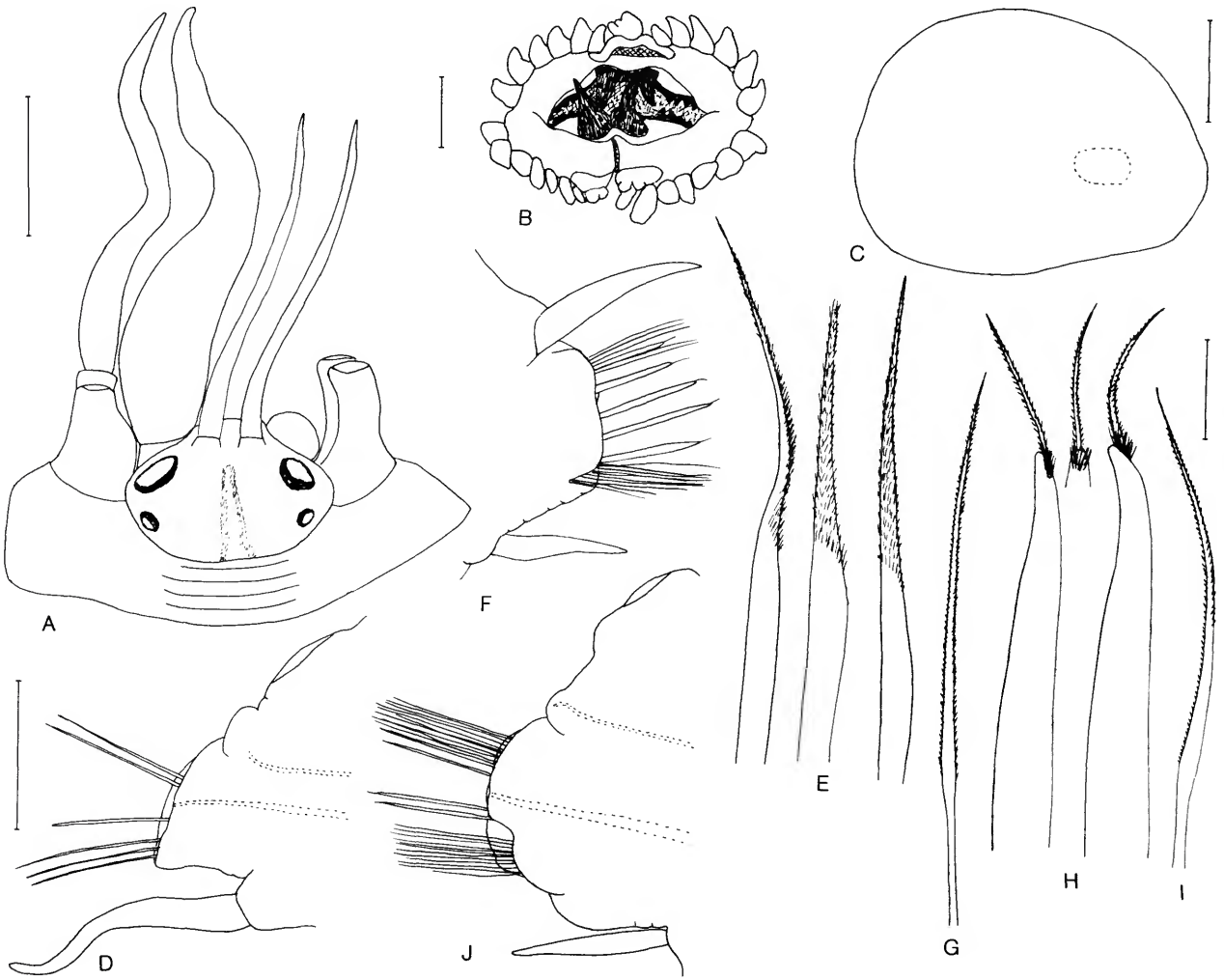


FIGURE 15.—*Eupanthalis elongata*, holotype of *Iphionella elongata* (USNM 19544): A, dorsal view of anterior end, pharynx fully extended (not shown) (right palp, left dorsal and right dorsal and ventral tentacular cirri missing); B, end view of extended pharynx; C, right elytron from segment 23; D, right elytragerous parapodium from segment 2, anterior view, acicula dotted; E, upper, middle and lower neurosetae from same; F, right cirrigerous parapodium from segment 3, posterior view; G–I, upper, middle, and lower neurosetae from same; J, right elytragerous parapodium from segment 4, anterior view, acicula dotted. (Scales: A = 1.0 mm; B = 2.0 mm; C = 1.0 mm; D,F,J = 1.0 mm; E,G–I = 0.1 mm.)

eccentrically to elytrophores, leaving middorsum uncovered (Figure 15C).

Prostomium oval, with rather deep longitudinal groove, with 2 pairs of lateral eyes, anterior pair much larger than posterior pair; lateral antennae on short ceratophores attached to anterior margin of prostomium, with styles more than 2 times length of prostomium; palps stout, long, tapered, smooth (Figure 15A; Treadwell, 1931, fig. 2a; Hartman, 1938b, fig. 41a; Strelzov, 1972, fig. 12A). Tentacular segment distinct dorsally with tentaculophores lateral to prostomium, without setae; dorsal and ventral tentacular cirri subequal in length, longer and stouter than lateral antennae (Figure 15A; Strelzov, 1972, fig. 12A).

Notopodium of segment 2 small, rounded, acicular lobe on anterodorsal side of larger truncate neuropodium, without notosetae; ventral buccal cirri similar to tentacular cirri, longer than following ventral cirri; neurosetae all same type, stout, tapering to fine hairy tips (Figure 15D,E; Strelzov, 1972, fig. 12B). Distal border of extended pharynx with 13 pairs of papillae, middorsal one lobulated, on wide base, midventral one split and irregularly papillate, on wide base, neither one extra long; 2 pairs of dark hooked jaws, each with 4 or 5 lateral teeth (Figure 15B).

Parapodia of segments 3–8 with small rounded notopodia, without notosetae, as on 2nd parapodia; dorsal cirri on segments 3, 6, and 8 with short cirrophores on posterodorsal

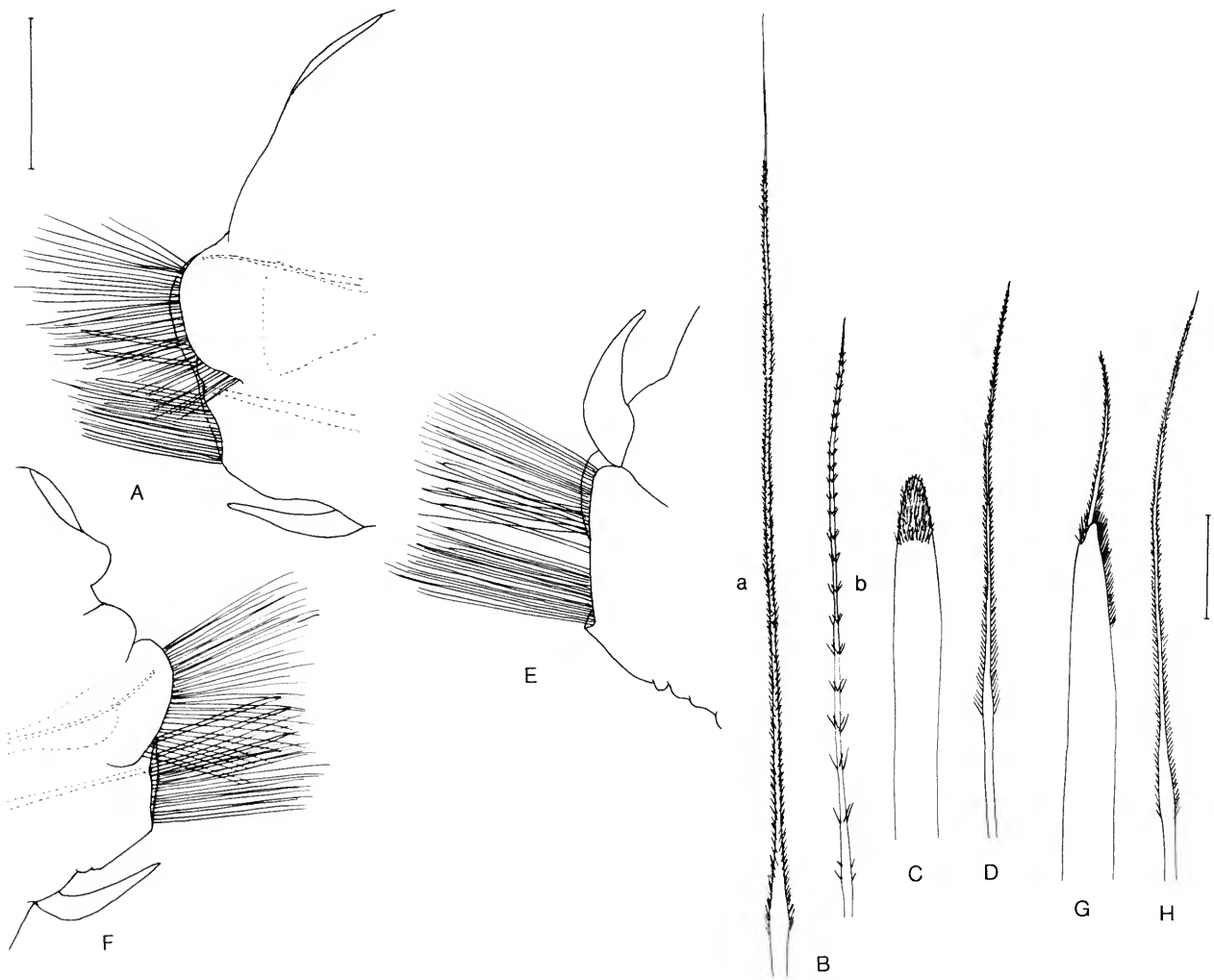


FIGURE 16.—*Eupanthalis elongata*, holotype of *Iphionella elongata* (USNM 19544): A, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; B–D, upper, middle, and lower neurosetae from same; E, left cirrigerous parapodium from segment 20, posterior view; F, left elytragerous parapodium from segment 23, anterior view, acicula and spinning gland dotted; G,H, middle and lower neurosetae from same. (Scales: A,E,F = 1.0 mm; B–D,G,H = 0.1 mm.)

sides of notopodia, with styles tapered, extending beyond setae; upper group of neurosetae slender, lanceolate, spinous; middle acicular neurosetae stout, with slightly hooked tips with distal spines and hairy aristae; lower neurosetae slender, slightly curved, lanceolate, spinous (Figure 15F–J).

Notopodia from segment 9 wide, rounded, flattened, on anterodorsal half of larger neuropodia, with spinning glands (Figure 16A,F). Upper group of numerous neurosetae of 2 types: (a) wider basally, tapering to fine tips, with close-set spinous rows (Figure 16Ba); (b) shorter, with whorls of widely spaced spines (Figure 16Bb); middle stout acicular neurosetae with slightly hooked hairy tips, with or without hairy aristae, with subdistal spines along one side (Figure 16C,G; Treadwell, 1931, fig. 2c; Hartman, 1938b, fig. 41c); numerous lower neurosetae similar to anterior ones (Figure 16D,H). Dorsal cirri with wide short cirrophores with styles not extending beyond setae (Figure 16E). No distinct branchial vesicles except for somewhat inflated thin-walled areas on body.

DISTRIBUTION.—Philippine Islands, Gulf of Tonkin. In 27 to 291 meters.

Eupanthalis aena (Moore, 1903), new combination

FIGURE 17

Restio aenus J. Moore, 1903:423, pl. 24: figs. 21–24.

MATERIAL EXAMINED.—JAPAN. Off Ose Zaki, Suruga

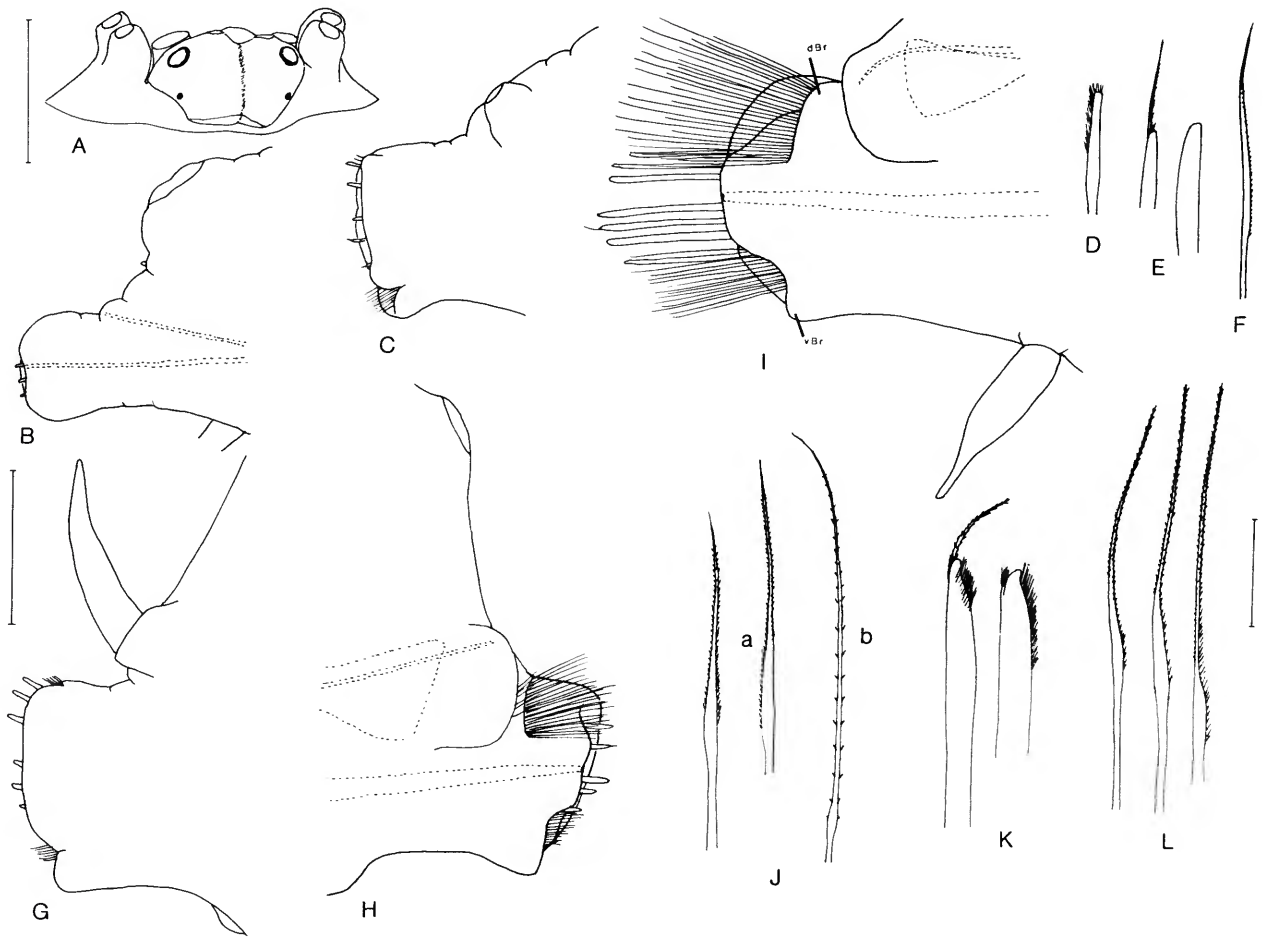


FIGURE 17.—*Eupanthalis aena*, holotype of *Restio aenus* (USNM 15718): A, dorsal view of prostomium and tentacular segment (all appendages missing); B, left elytragerous parapodium from segment 2, posterior view, acicula dotted, (neurosetae and tip of buccal cirrus broken); C, left cirrigerous parapodium from segment 3, posterior view (style of dorsal cirrus missing); D–F, upper (tip broken), middle, and lower neurosetae from same; G, left cirrigerous parapodium from segment 8, posterior view, ventral cirrus missing (tips of neurosetae broken); H, left elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; I, right elytragerous parapodium from segment 21, anterior view, acicula and spinning gland dotted; J–L, upper, middle, and lower neurosetae from same. (Scales: A = 1.0 mm; B,C,G–I = 0.5 mm; D–F,J–L = 0.1 mm.)

Bay, Honshu Island, 115–137 m, sand and gravel, *Albatross* sta 3707, 8 May 1900, holotype (USNM 15718).

TYPE MATERIAL.—Holotype is an anterior fragment of 41+ segments, 32+ mm long, and 6 mm wide with setae; it is a male filled with sperm in posterior segments. It is in poor condition, with all appendages of the prostomium and tentacular segment missing; most of the setae are broken.

DESCRIPTION.—Elytra all missing (circular, delicate, leaving middorsum uncovered, according to J. Moore, 1903:423). Prostomium bilobed, wider than long, with median depression, with 2 pairs of lateral eyes, anterior pair much larger than posterior pair; scars only of lateral antennae on anterior margin of prostomium (overlooked by Moore, 1903); large oval bases of missing palps on ventral side of prostomium (Figure 17A). Tentacular segment distinct dorsally, with tentaculophores lateral to prostomium, showing scars for 2 pairs of tentacular cirri, without setae (Figure 17A).

Second segment with small notopodium represented by notoaciculum, without notosetae; neuropodium rounded, with neuroaciculum and few neurosetae with tips broken, with base only of ventral buccal cirrus (Figure 17B). Pharynx not extended but cut open. Distal margin with 13 pairs of papillae, middorsal one about twice as large as others, on large lobulated base; midventral one wide, truncate, on large lobulated base; 2 pairs of large hooked jaws, each with 4 or 5 lateral teeth.

Parapodia of segments 3–8 with small conical notopodia, without notosetae; neuropodia wide, truncate, with well-developed ventral bract enclosing lower group of neurosetae; upper group of neurosetae lanceolate, spinous (with tips broken); middle acicular neurosetae with tips rounded, few terminal spines, with or without aristae; lower group of neurosetae slender, lanceolate, spinous; dorsal cirri with short cirrophores on posterior sides of notopodia, with styles extending beyond neuropodia (Figure 17C–G).

Parapodia from segment 9 with notopodia large, rounded, flattened, on anterodorsal half of neuropodium, with spinning glands, sometimes with few short capillary notosetae (mostly hidden by notopodium); neuropodium large, with slightly bilobed conical presetal lobe and truncate postsetal lobe, with anteroventral bract enclosing lower group of neurosetae and anterodorsal bract enclosing upper group of neurosetae (Figure 17H,I). Upper neurosetae of 2 types: (a) stouter, with enlarged basal part, lanceolate, spinous, tapering to fine tips (Figure 17Ja; J. Moore, 1903, pl. 24: fig. 22); (b) slender, with enlarged basal part, fine tips, and whorls of widely spaced spines (Figure 17Jb; J. Moore, 1903, pl. 24: fig. 24). Middle stout acicular neurosetae with slightly hooked tips, with or without aristae, and dense brush of hairs subdistally along one side (Figure 17K; J. Moore, 1903, pl. 24: fig. 21). Lower group of neurosetae slender, slightly curved, lanceolate, spinous (Figure 17L; J. Moore, 1903, pl. 24: fig. 23). Ventral cirri short, subulate. Without branchial vesicles.

DISTRIBUTION.—Japan. In 115 to 137 meters.

REMARKS.—Strelzov (1972:320), based on J. Moore's (1903) description, suggested that *Restio aenus* was possibly a defective specimen of *Eupanthalis kinbergi* McIntosh. It should perhaps be referred to *E. elongata* (Treadwell, 1931), except that Moore's name would have priority. This action does not seem to be advisable considering the defective type and incomplete description of *R. aenus*.

Genus *Zachsiella* Buzhinskaja, 1982

Zachsiella Buzhinskaja, 1982:34–36. [Type-species: *Panthalis nigromaculata* Grube, 1878, by original designation. Gender: feminine. (= *Zachsiella nigromaculata* (Grube)).]

DIAGNOSIS.—Prostomium bilobed, with large colored ommatophores occupying lateral parts of prostomium and projecting anteriorly forming transparent lenses or lateral horns; pair of small posterior eyes; 3 antennae: 2 on anterior margin medial to lateral horns, median one with ceratophore on posterior border; pair of long smooth palps. First or tentacular segment distinct dorsally, with medial nuchal lobe; tentaculophores lateral to prostomium, each with single aciculum, pair of short tentacular cirri, without setae. Second or buccal segment with first pair of elytra and long ventral buccal cirri; parapodium subbiramous, with notoaciculum, without notosetae; neurosetae slender, lanceolate, spinous. Acicular neurosetae from segment 3. Elytra on segments 2, 4, 5, 7, continuing on alternate segments, delicate, transparent. Dorsal cirri with short cirrophores and short styles on nonelytragerous segments. Notopodium from segment 9 wide, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum and internal spinning glands, without notosetae; upper group of neurosetae of 2 types: (a) longer, spinous, aristate and (b) shorter, more slender, bipinnate; middle row of neurosetae stout, acicular, with or without aristae; lower group of neurosetae numerous, slender, tapered abruptly with aristate tips. Without parapodial branchiae. Pharynx with 13 pairs of border papillae, middorsal and midventral ones somewhat longer; 2 pairs of hooked jaws, each with 4–7 lateral teeth.

The genus includes a single species (plus 2 synonyms).

Zachsiella nigromaculata (Grube, 1878)

FIGURES 18, 19

Panthalis nigromaculata Grube, 1878:50, pl.4: fig. 2.—Potts, 1910:345, pl. 19: fig. 18, pl. 21: figs. 53–55. [Not sensu Willey, 1905:255; = *Euarche maculosa* (Treadwell).]

Eupanthalis nigromaculata.—Horst, 1917:134, pl. 29: figs. 1–4.—Strelzov, 1968:142; 1972:312, figs. 3F,16A–D,17A–F.—Hartman, 1974 [1975]:210.

Eupanthalis oculata Hartman, 1944:11, pl. 1: figs. 5–8, pl. 2: fig. 12. [New synonym.]

Zachsiella nigromaculata.—Buzhinskaja, 1982:36.

Zachsiella oculata.—Buzhinskaja, 1982:36.

Zachsiella striata Buzhinskaja, 1982:36, fig. 6A–H. [New synonym.]

MATERIAL EXAMINED.—PHILIPPINES. Pandanon, Semper, collector, holotype of *Panthalis nigromaculata* (ZMB 3254).

INDONESIA. Kwandang Bay entrance, North Celebes,

00°58'N, 122°55'E, 75 m, *Siboga* sta 114, 8 Jul 1899, 1 specimen (ZMA 268, identified by Horst, 1917:134).

MALDIVES. Goidu, Goifurfehendu Atoll, Percy Sladen Trust Expedition, 1905, 1 specimen (BMNH 1924.3.1.100, identified by Potts, 1910:345).

ARABIAN SEA. Southwest of Bangkok, 09°54'N, 97°42'E, International Indian Ocean Expedition, sta 21, 24 Mar 1963, 70 m, 1 specimen (AHF, identified by Hartman, 1974 [1975]:210).

COLOMBIA, SOUTH AMERICA. South of Cape la Vela, Allan Hancock Atlantic Expedition, sta A14, Apr 1939, 34–40 m, holotype of *Eupanthalis oculata* (AHF 50).

TYPE MATERIAL.—The holotype of *Panthalis nigromaculata* is an anterior fragment of 83+ segments, 30+ mm long, 5 mm wide with setae. It is dark, somewhat shrunken; the elytra show a single pigment spot. The holotype of *Eupanthalis oculata* is an anterior fragment of 45+ segments, 20+ mm long, 5 mm wide with setae; the pharynx is completely extended.

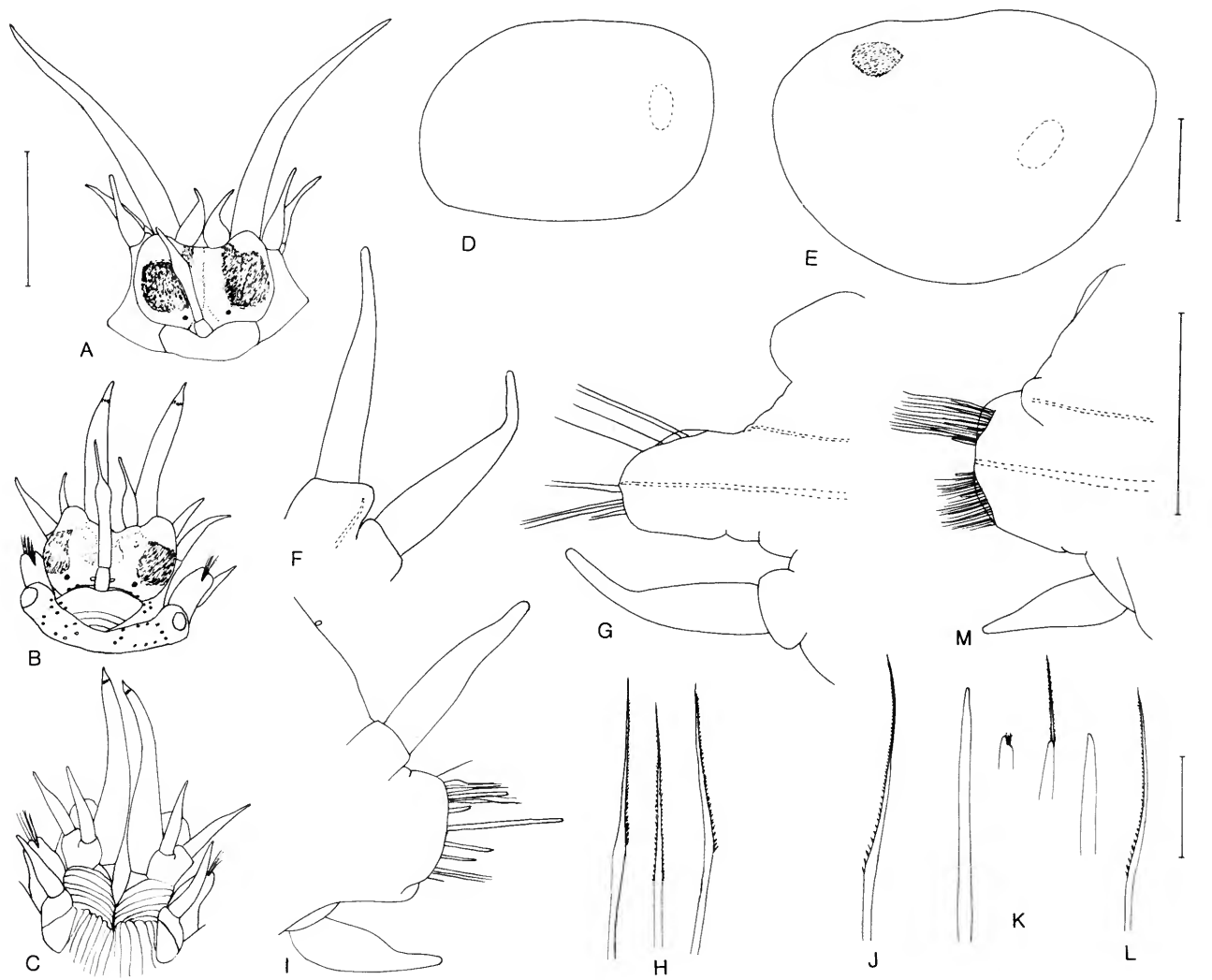


FIGURE 18.—*Zachsiella nigromaculata* (A, holotype of *Eupanthalis oculata*, AHF 50; B–M, specimen from Indonesia, ZMA 268): A, dorsal view of prostomium and tentacular segment; B, dorsal view of anterior end (left lateral antenna missing); C, ventral view of anterior end; D, right 5th elytron from segment 9; E, right middle elytron (shaded circle = dark pigment spot); F, right tentaculophore with tentacular cirri, outer view, aciculum dotted; G, right elytragerous parapodium from segment 2, anterior view, acicula dotted; H, upper, middle, and lower neurosetae from same; I, right cirrigerous parapodium from segment 3, posterior view; J–L, upper, middle, and lower neurosetae from same; M, right elytragerous parapodium from segment 4, anterior view, acicula dotted. (Scales: A–C = 1.0 mm; D,E = 0.5 mm; F,G,I,M = 0.5 mm; H,J–L = 0.1 mm.)

DESCRIPTION.—Elytra oval, thin, delicate, smooth, attached eccentrically near external border, first few covering anterior end, rest leaving middorsum uncovered; most of elytra with dark spot or narrow brown crescent near inner border (Figure 18D,E; Grube, 1878, pl. 4: fig. 2; Strelzov, 1972, fig. 3F; Buzhinskaja, 1982, fig. 6C).

Prostomium bilobed, transversely elongated, with large ommatophores occupying lateral parts of prostomium as diffused black patch, with anterior part colorless, bluntly rounded, forming transparent 'lens' or frontal horns, with pair of small eyespots near posterior border; ceratophore of median antenna attached on posterior border, style extending beyond prostomium, with subdistal enlargement and filamentous tip; lateral antennae attached on frontal margin, medial to frontal horns, subulate, shorter than median antenna; palps long, stout, tapered, smooth, sometimes with subdistal dark ring (Figure 18A,B; Potts, 1910, pl. 19: fig. 18; Horst, 1917, pl. 29: fig. 1; Hartman, 1944, pl. 2: fig. 12; Strelzov, 1972, fig. 16A; Buzhinskaja, 1982, fig. 6A). Tentacular segment distinct dorsally forming raised nuchal lobe and attachment of medial occipital antenna; tentaculophores lateral and ventral to enlarged ommatophores of prostomium, each with aciculum and pair of dorsal and ventral tentacular cirri, similar to lateral antennae, without setae; ventrally forming lateral lips of ventral mouth (Figure 18A–C,F; Horst, 1917, pl. 29: fig. 1).

Second segment with first pair of elytrophores and long ventral buccal cirri, similar to tentacular cirri, longer than following ventral cirri; notopodium represented by notoaciculum, without notosetae; neuropodium rounded, with neurosetae all similar, lanceolate, spinous, tapering to slender tips;

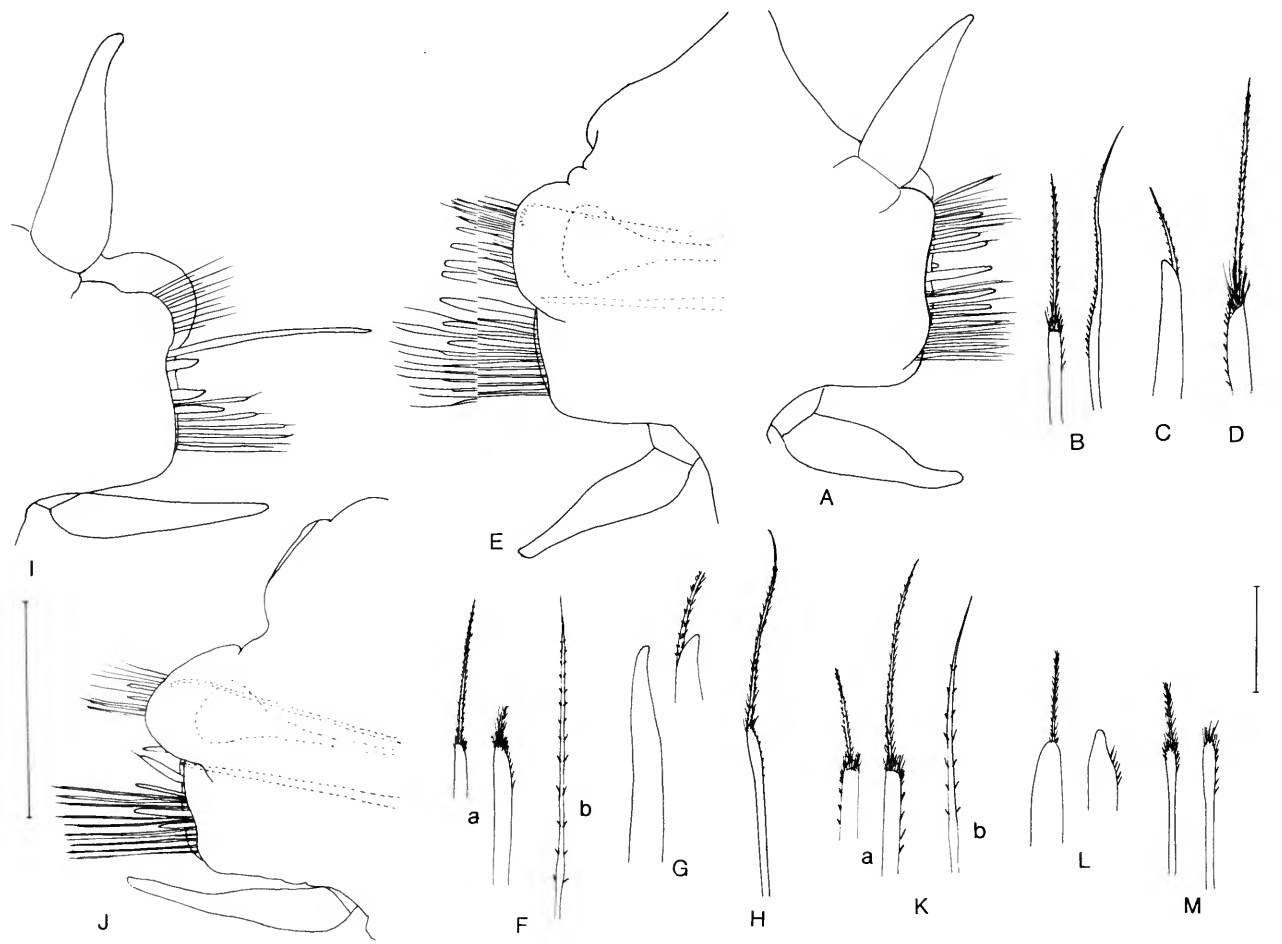


FIGURE 19.—*Zachsiella nigromaculata*, specimen from Indonesia (ZMA 268): A, right cirrigerous parapodium from segment 8, posterior view; B–D, upper, middle, and lower neurosetae from same; E, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; F–H, upper, middle, and lower neurosetae from same; I, right cirrigerous parapodium from segment 20, posterior view; J, right elytragerous parapodium from segment 21, anterior view, acicula and spinning gland dotted; K–M, upper, middle, and lower neurosetae from same. (Scales: A,E,I,J = 0.5 mm; B–D,F–H,K–M = 0.1 mm.)

ventrally forming posterior lip of ventral mouth (Figure 18B,C,G,H; Strelzov, 1972, figs. 16C, 17B). Pharynx (cut open on specimen from North Celebes, fully extended on type of *Eupanthalis oculata*) with 13 pairs of papillae on distal border, middorsal and midventral ones both longer than others and attached on enlarged crescent-shaped bases; 2 pairs of strong hooked jaws, each with 4–7 lateral teeth.

Parapodia of segments 3–5 with small rounded notopodium, without notosetae; neuropodium with slightly bilobed conical presetal acicular lobe and truncate postsetal lobe; upper and lower neurosetae similar to those of segment 2; middle neurosetae stout, acicular, with blunt tips, with or without slender hairy arista; dorsal cirri on segment 3 with short cirrophore on posterior side of notopodium, with style extending beyond neurosetae (Figure 18I–M). Parapodia of segments 6–8 with upper and lower neurosetae enlarged basally and tapering abruptly to slender finely spinous aristate tips, with longer spines on transitional part and subdistal spines along one side (Figure 19A–D).

Beginning with segment 9, notopodium large, rounded, flattened, on anterodorsal half of large neuropodium, with internal spinning glands (Figure 19E,J; Horst, 1917, pl. 29: fig. 2; Strelzov, 1972, fig. 16B). Upper neurosetae of 2 types: (a) similar to upper neurosetae of segments 6–8, stout, spinous distally, aristate (Figure 19Fa,Ka; Potts, 1910, pl. 21: fig. 54; Horst, 1917, pl. 29: fig. 4b; Hartman, 1944, pl. 1: fig. 6; Strelzov, 1972, fig. 17A; Buzhinskaja, 1982, fig. 6G); (b) slender, slightly wider basally, tapering to capillary tips, with whorls of widely spaced spines (Figure 19Fb,Kb; Potts, 1910, pl. 21: fig. 53; Horst, 1917, pl. 29: fig. 4a; Hartman, 1944, pl. 1: fig. 8; Strelzov, 1972, fig. 17F; Buzhinskaja, 1982, fig. 6H). Middle stout acicular neurosetae with slightly hooked tips, with or without hairy aristae, with subdistal spines along one side on far posterior parapodia (Figure 19G,L; Potts, 1910, pl. 21: fig. 55; Strelzov, 1972, fig. 17C,D; Buzhinskaja, 1982, fig. 6E,F). Lower neurosetae similar to those of anterior segments 6–8 (Figure 19H,M; Horst, 1917, pl. 29: fig. 3b; Strelzov, 1972, fig. 17E). Dorsal and ventral cirri similar, short, subulate (Figure 19E,I,J). Parapodia without branchial vesicles.

TUBE.—A part of a tube was present with the specimen from the Arabian Sea. It was soft, flabby but tough.

DISTRIBUTION.—Philippines, Indonesia, Gulf of Tonkin, South China Sea, Maldives, Arabian Sea, Northwest South America (Colombia). In 35 to 75 meters.

Genus *Eupolyodontes* Buchanan, 1894

Eupolyodontes Buchanan, 1894:438. [Type-species: *Eupolyodontes cornishii* Buchanan, 1894, indicated by Hartman (1959:110). Gender: masculine.]

DIAGNOSIS.—Prostomium wide, bilobed, with large colored ommatophores occupying lateral sides of prostomium, projecting anteriorly forming transparent lenses; lateral antennae on anterior margin of prostomium, medial to ommatophores; occipital median antenna on posterior margin rudimentary or absent; with or without pair of large prostomial branchiae; ventral palps short; first or tentacular segment distinct dorsally, fused to prostomium, with raised bilobed nuchal lobe; tentaculophores ventral to ommatophores, each with single aciculum, few to no setae and pair of short dorsal and ventral tentacular cirri. Second or buccal segment with first pair of elytra and long ventral buccal cirri; notopodium with notoaciculum and few to no notosetae; neuropodium with row of stout acicular neurosetae and lower slender spinous lanceolate neurosetae within anteroventral bract. Elytra on segments 2,4,5,7, continuing on alternate segments, delicate, transparent. Dorsal cirri with short cirrophores and short styles on nonelytragerous segments; ventral cirri short, tapered. Notopodium from segment 9 wide, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum and internal spinning glands, without notosetae; neuropodium with lower group of numerous neurosetae within lower anteroventral bract, curved, spinous, lanceolate; middle row of neurosetae within lower anteroventral bract, curved, spinous, lanceolate; middle row of neurosetae stout, smooth, acicular; upper group of neurosetae, emanating from low dorsoanterior bract, of 2 kinds: (a) longer, with double brush-shaped tips and (b) shorter (hidden by notopodium), with widespread spinous rows. With parapodial branchiae. Distal border of large muscular pharynx with up to 38 pairs of papillae, middorsal and midventral ones very long and tapered, on large lobulated bases, lateral ones low, ridge-like; 2 pairs of hooked jaws, each with up to 17 lateral teeth.

REMARKS.—Buchanan (1894) established *Eupolyodontes* for two species: *E. gulo* (Grube, 1855) and her new species *E. cornishii*. In her catalogue, Hartman (1959:110, 111) indicated that the former species was indeterminable and the latter species was designated as the type species. The main features separating *Eupolyodontes* from the other genera in the family are the position of the large peduncles of the eyes or ommatophores arising laterally from the base of the prostomium and fused with it on either side, paired short antennae on the anterior margin of the prostomium, and short ventral palps. On *E. cornishii*, there is a rudimentary prostomial occipital median antenna, which is absent on the figure of *E. gulo* by Grube (1855, pl. 3: fig. 2).

An unusual feature in the family, a pair of large prostomial branchiae, was first described for *E. amboinensis* by Malaquin and Dehorne (1907:348, pl. 52: fig. 5). This feature divides the species of *Eupolyodontes* into two groups: those with prostomial branchiae present, as in *E. amboinensis*, *E. hartmanae*, new species, and *E. batabanoensis*; and those with prostomial branchiae absent, as in *E. cornishii*, *E. mitsukurii*, and *E. thomassini*, new species.

The pharynx and jaws were missing on the holotype of *E. cornishi* when collected.

The genus includes 7 species (1 doubtful, plus 1 synonym), with 2 new species.

Key to the Species of *Eupolyodontes**

1. With prostomial branchiae and small occipital median antenna on bilobed nuchal lobe [Figures 23A,B, 26A, 30A] 2
   Without prostomial branchiae [Figures 20A, 28A; Izuka, 1904, pl. 1: fig. 2] . . . 4
2. Prostomial branchiae short, anterior to pair of small eyespots [Figure 26A] . . . . . ***E. amboinensis*** Malaquin and Dehorne
   Prostomial branchiae long, without small eyespots [Figures 23A,B, 30A] 3
3. Prostomial branchiae fused medially [Figure 30A]. Parapodial branchiae larger and fewer, not branched, on dorsal sides of parapodia [Figure 31D,E,H,I] . . . . . ***E. hartmanae,*** new species
   Prostomial branchiae not fused medially [Figure 23A,B]. Parapodial branchiae more numerous, smaller, some branched, on anterior, dorsal and posterior sides of parapodia [Figures 24A,D,I, 25A,B) . . . . . ***E. batabanoensis*** Ibarzábal
4. With small occipital median antenna [Figure 20A; Izuka, 1904, pl. 1: fig. 2] . . . 5
   Without occipital median antenna [Figure 28A].. ***E. thomassini,*** new species
5. Ventral palps short, not extending beyond ommatophores [Figure 20B]. Branchiae numerous, on anterior, dorsal, and posterior sides of parapodia [Figure 22A,B] . . . . . ***E. cornishii*** Buchanan
   Ventral palps long, extending beyond ommatophores [Izuka, 1904, pl. 1: fig. 2]. Branchiae confined to dorsal sides of parapodia [Izuka, 1904, pl. 1: figs. 4, 5] . . . . . ***E. mitsukurii*** (Izuka)

*E. *gulo* (Grube, 1855) not included in key; considered to be a doubtful species.

Eupolyodontes cornishii Buchanan, 1894

FIGURES 20–22

Eupolyodontes cornishii Buchanan, 1894:438, pl. 27: figs. 1–8. [?Not sensu Fauvel, 1897:88; not sensu Andrew and Andrew, 1953:2 (= *E. batabanoensis* Ibarzábal, 1988).]

MATERIAL EXAMINED.—WEST AFRICA. 35 miles (56 km) off mouth of River Congo, 79–86 m, mud and weed, V.H. Cornish, collector, holotype (BMNH 1893.12.8.1).

TYPE MATERIAL.—The large holotype, now in two pieces, with the posterior end missing, is somewhat mutilated, with 90+ segments, 335+ mm long, and 44 mm wide with setae. The long pharynx was extended but broken distally, with the jaws and distal papillae missing (also missing when collected).

DESCRIPTION.—Dorsal surface of body very finely transversely rugose, with segmental boundaries obliterated (Buchanan, 1894, pl. 27: figs. 1, 3). Elytra large, oval, smooth, attached eccentrically on lateral sides to short cylindrical elytrophores, first pair covering prostomium, rest leaving middorsum uncovered (Figure 20C–E; Buchanan, 1894, pl. 27: figs. 1, 3, 5).

Prostomium bilobed, with very large ommatophores occupying lateral sides of prostomium, darkly pigmented with anterior oval transparent part; lateral antennae short, subulate, on short ceratophores on anterior border of prostomium, medial to ommatophores; tentacular segment fused to prostomium, with medial raised nuchal lobe forming attachment of rudimentary median occipital antenna, with rounded ceratophore and minute style; 2 pairs of tentacular cirri with distinct cirrophores attached ventrally on large ommatophores, without setae; styles longer than lateral antennae; paired ventral palps very short, not extending beyond tip of prostomium (Figure 20A,B; Buchanan, 1894, pl. 27: figs. 1, 2).

Segment 2 with first pair of large elytrophores and ventral buccal cirri similar to tentacular cirri, longer than following ventral cirri; small conical acicular notopodium on anterodorsal side of larger neuropodium, with small bundle of finely spinous capillary notosetae; row of stout, smooth, amber-colored acicular neurosetae and, within ventral neuropodial bract, numerous slender, curved, lanceolate neurosetae, wider basally with larger spines and close-set spines distally, tapering to capillary tips (Figures 20A,B, 21A–D). Dorsal cirrus on segment 3 with short cylindrical cirrophore on posterior side of notopodium, with short tapering style extending to tip of neuropodium; ventral cirrus shorter; parapodium similar to segment 2 (Figure 21E). Few notosetae on segments 3 and 4, absent from segment 5 on. Ventrally, segment 2 contributing to lateral lips of ventral mouth, and segments 3–5 to posterior lip (Buchanan, 1894, pl. 27: fig. 2). Pharynx missing on holotype.

Parapodial branchiae beginning on posterior side of segment 6, becoming more numerous on anterior, dorsal, and posterior sides of parapodia and bases of elytrophores; branchial vesicles filamentous, arborescent with 1–3 branches; best developed on segments 15–50, then decreasing in number and size, continuing to end of fragment (Figures 21F,G, 22A,D; Buchanan, 1894, pl. 27: figs. 1, 3–7).

Beginning with segment 9, large truncate flattened notopodium on anterodorsal half of larger neuropodium, with internal

spinning glands, with slit on underside of notopodium for emergence of spinning fibers; neuropodium with slightly bilobed presetal acicular lobe and truncate postsetal lobe, with small upper anterodorsal bract (sometimes hidden by notopodium) and lower anteroventral bract (Figures 21F,G, 22A,D). Upper group of neurosetae, emerging from anterodorsal bract, of 2 types: (a) longer, lanceolate, tapering to fine tips, with spinous rows, distal ones longer forming double brush-shaped tips (Figures 21Ha, 22Ba; Buchanan, 1894, pl. 27: fig. 8A); (b) shorter, more slender, tapering to fine tips, with widespread spinous rows (Figures 21Hb, 22Bb; overlooked by Buchanan). Middle row of neurosetae (6–8 in number) stout, smooth, acicular; some in posterior parapodia with subdistal row of short hairs (Figures 21I, 22C,E; Buchanan, 1894, pl. 27: fig. 8B). Lower group of neurosetae numerous, enclosed in anteroventral bract, slender, curved, lanceolate, tapering to fine tips, with larger spines basally and close-set spinous rows distally (Figure 21J; Buchanan, 1894, pl. 27: fig. 8C). Dorsal cirri with short bulbous cirrophores and subulate styles, shorter than neurosetae; ventral cirri tapered, shorter than neuropodia

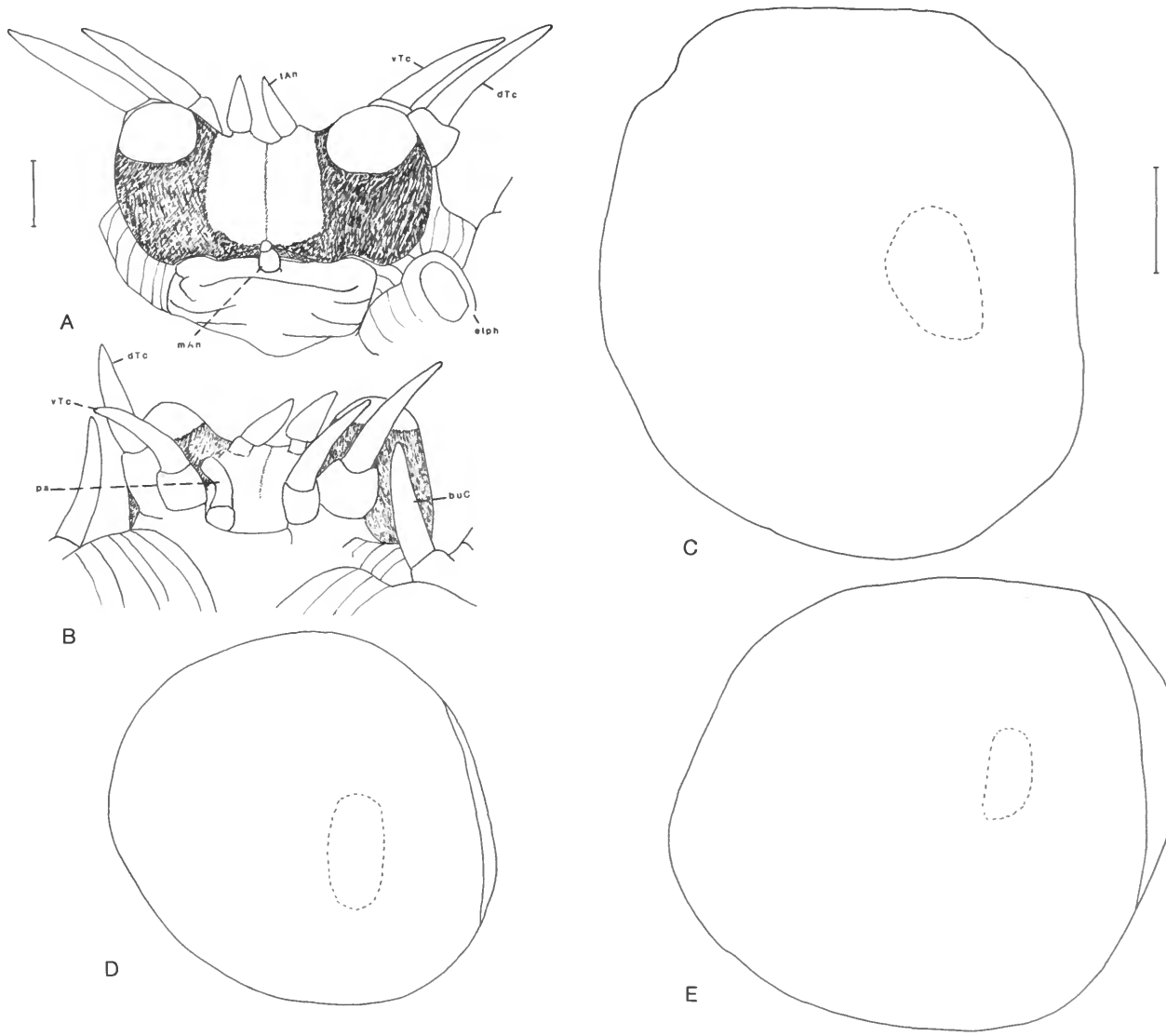


FIGURE 20.—*Eupolyodontes cornishii*, holotype (BMNH 1893.12.8.1): A, dorsal view of prostomium, tentacular segment, and right elytrophore of segment 2 (palps not visible); B, ventral view of A, including buccal cirri of segment 2 (left palp removed); C, right 1st elytron from segment 2: D, right 5th elytron from segment 9; E, right 14th elytron from segment 27. (Scales: A,B and C–E = 2.0 mm.)

FIGURE 21.—*Eupolyodontes cornishii*, holotype (BMNH 1893.12.8.1): A, right elytragerous parapodium from segment 2, anterior view, acicula dotted; B, notoseta from same; C,D, middle and lower neurosetae from same; E, right cirrigerous parapodium from segment 3, posterior view; F, right cirrigerous parapodium from segment 8, posterior view; G, right elytragerous parapodium from segment 9, anterior view, neuroaciculum and spinning gland dotted; H–J, upper (tip of "b" broken), middle, and lower neurosetae from same. (Scales: A,E–G = 2.0 mm; B–D,H–J = 0.1 mm for.)

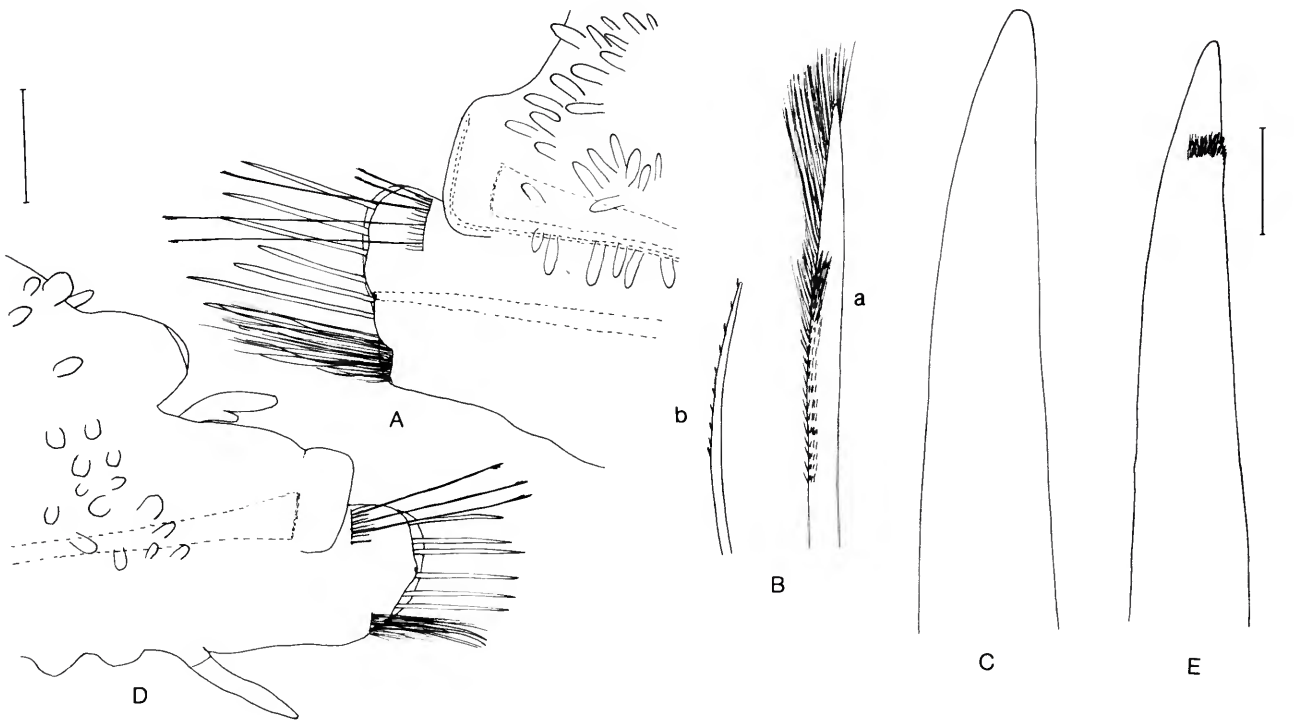


FIGURE 22.—*Eupolyodontes cornishii*, holotype (BMNH 1893.12.8.1): A, right elytragerous parapodium from segment 27, anterior view, acicula and spinning gland dotted; B,C, upper (tip of "b" broken) and middle neurosetae from same; D, left elytragerous parapodium from about segment 80, anterior view, spinning gland dotted; E, middle neuroseta from same. (Scales: A,D = 2.0 mm; B,C,E = 0.1 mm.)

(Figures 21F; 22D; Buchanan, 1894, pl. 27: fig. 4).

DISTRIBUTION.—West Africa. In 79 to 86 meters.

REMARKS.—The specimen from New Caledonia, identified by Fauvel (1897) as *E. cornishii* and deposited in the Paris Museum, was examined; it is fragmented, in poor condition, and lacks the head end. The identification is considered to be doubtful.

Eupolyodontes batabanoensis, Ibarzábal, 1988

FIGURES 23–25

Eupolyodontes cornishii.—Andrew and Andrew, 1953:2. [Not *Eupolyodontes cornishii* Buchanan, 1894.]

Eupolyodontes batabanoensis Ibarzábal, 1988:4, fig. 2A–L

MATERIAL EXAMINED.—BAHAMAS. North Bimini, "the flat," low tide, Aug 1951, W. and N. Andrew, collectors, specimen with tube (USNM 24541, as *E. cornishii*).

CUBA. Punta Colorado, 3–5 m, shell and grass bottom, Tomas Barrera Expedition, sta 10, May 1914, Henderson and Bartsch, collectors, paratype with tube (USNM 16707).

BRITISH VIRGIN ISLANDS. *Thalassia* bed, 2 m, Mar 1982, P.A. Shave, collector, 1 specimen with tube (collection P.A. Shave).

FLORIDA. Bird Key, Dry Tortugas, 18 Aug 1932, W.L. Schmitt, collector, paratype with tube (USNM 71502).

HONDURAS. Roatan, Port Royal Harbor, east of Fort Key, on shallow (1–1.5 m depth) sand and *Thalassia* beds, 1980, J.C. Britton, collector, paratype with tube (USNM 71503). Belize, off South Water Caye, in back-reef *Thalassia* beds, Feb 1985, P.A. Shave, collector, 1 specimen (USNM 98809).

REMARKS.—The above-mentioned specimens had been studied, figured, and described by me as a new species of *Eupolyodontes* when this original manuscript was submitted to the Smithsonian Institution Press. While in press, the publication of Ibarzábal (1988) came to my attention. It included the description of a new species of *Eupolyodontes* from Cuba. The description and figures are deficient in a number of respects, but I have no doubt that the specimens examined by me need to be referred to the new species of Ibarzábal. The two types of *E. batabanoensis*, new species, deposited in the Institute of Oceanologia, Cuba, and the Institute of Zoologia, USSR, were not available for study. They were collected in the Gulf of Batabanó, southwestern shelf of Cuba, in 2 meters, where they occupied a very thick, spongy tube, overhanging the surface of the sediment by 1 or 2 cm. The types, incomplete posteriorly, consist of 235 and 246 segments, with lengths of 35 and 40 cm and widths of 2

and 2.5 cm, respectively (Ibarzábal, 1988:4).

DESCRIPTION.—Specimen from Bahamas incomplete, with 280+ segments, 650+ mm long and 25 mm wide with setae. Specimen from Cuba with 318 segments, 330 mm long and 18 mm wide. Specimen from British Virgin Islands 140+ mm long, 25 mm wide (segments not counted). Specimen from Dry Tortugas with 282+ segments, 900+ mm long, and 23 mm wide. Specimen from Roatan with 400 segments, 500 mm long and 25 mm wide. Specimen from Belize with 390+ segments, 800+ mm long and 30 mm wide.

Body elongate, flattened, widest in segments 10 to 35, tapering slightly anteriorly and gradually posteriorly. Integument with minute sensory papillae, on body and parapodia. Body darkly pigmented dorsally and ventrally. Elytra gray dark brown medially and around margin. Elytra large, oval, attached eccentrically near lateral side to large elytrophores, first pair covering prostomium, following ones leaving large part of middorsum uncovered, especially on widest anterior part of body; lateral parts of elytra usually with shallow pocket (Figure 23D–G).

Prostomium bilobed, with large ommatophores occupying lateral parts of prostomium, darkly pigmented with crescent-shaped transparent anterior part; central part of prostomium with pair of large prostomial branchiae, attached on basal two-thirds, with free terminal part; lateral antennae with short ceratophores attached on anterior part of prostomium medial to ommatophores, with short styles; tentacular segment fused to prostomium, medial dorsal part forming raised papillate nuchal lobe with rudimentary median occipital antenna with rounded ceratophore and minute style; papillate tentaculophores lateral and ventral to large ommatophores, each with single aciculum, small acicular lobe, and pair of dorsal and ventral tentacular cirri, with styles longer than lateral antennae; paired short palps medial to tentaculophores extending slightly

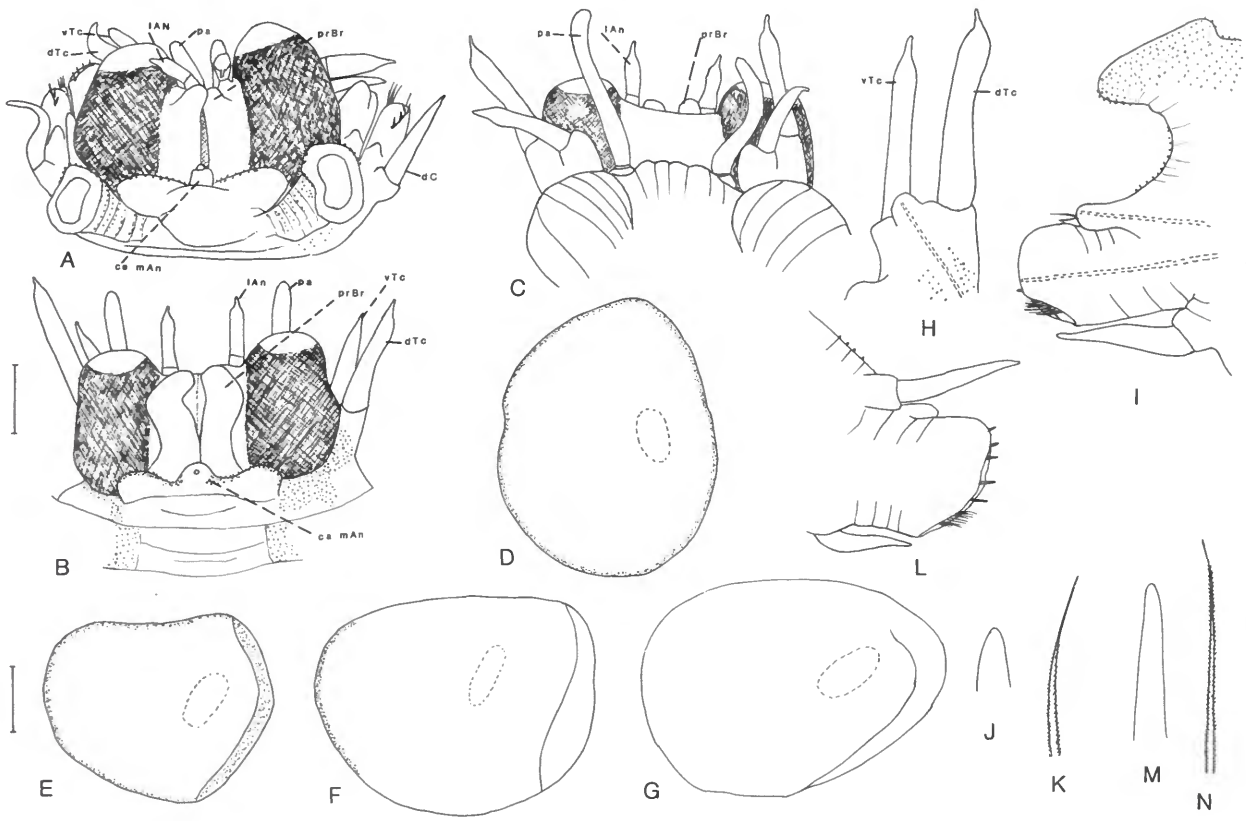


FIGURE 23.—*Eupolyodontes batabanoensis* (A, specimen from Honduras, USNM 71503; B–N, specimen from Bahamas, USNM 24541): A, dorsal view of anterior end, including 3 anterior segments (somewhat crowded); B,C, dorsal and ventral views of prostomium and tentacular segment; D, right 1st elytron from segment 2; E, right 5th elytron from segment 9; F, right elytron from segment 29; G, right elytron from segment 69; H, tentaculophore with tentacular cirri, inner view, aciculum dotted; I, right elytragerous parapodium from segment 2, anterior view, acicula dotted; J,K, middle and lower neurosetae from I; L, right cirrigerous parapodium from segment 3, posterior view; M,N, middle and lower neurosetae from same. (Scales: A–C; D–G; and H,I,L = 2.0 mm; J,K,M,N = 0.1 mm.)

beyond prostomium (Figure 23A–C,H; Ibarazábal, 1988, fig. 2A,B,).

Segment 2 with first pair of large papillate elytrophores and ventral buccal cirri longer than following ventral cirri; notopodium small digitiform acicular lobe on anterodorsal side of larger neuropodium, with few short capillary notosetae; neuropodium rounded, with 5 stout, nonemergent, acicular neurosetae and lower group of tapered spinous capillary neurosetae (Figure 23A,I–K). Pharynx (cut open on paratype from Dry Tortugas, fully extended on specimens from British Virgin Island and Belize) with 35–40 pairs of papillae around opening, middorsal and midventral ones very long, tapered and pointed, both with wide lobulated bases; 2 pairs of strong hooked jaws, each with 11–14 lateral teeth.

Parapodia of following few segments similar to those on segment 2; notopodial segments 3 and 4 with few short notosetae, setae absent from segment 5; dorsal cirri on segment 3 with short cylindrical cirrophores on posterior sides of

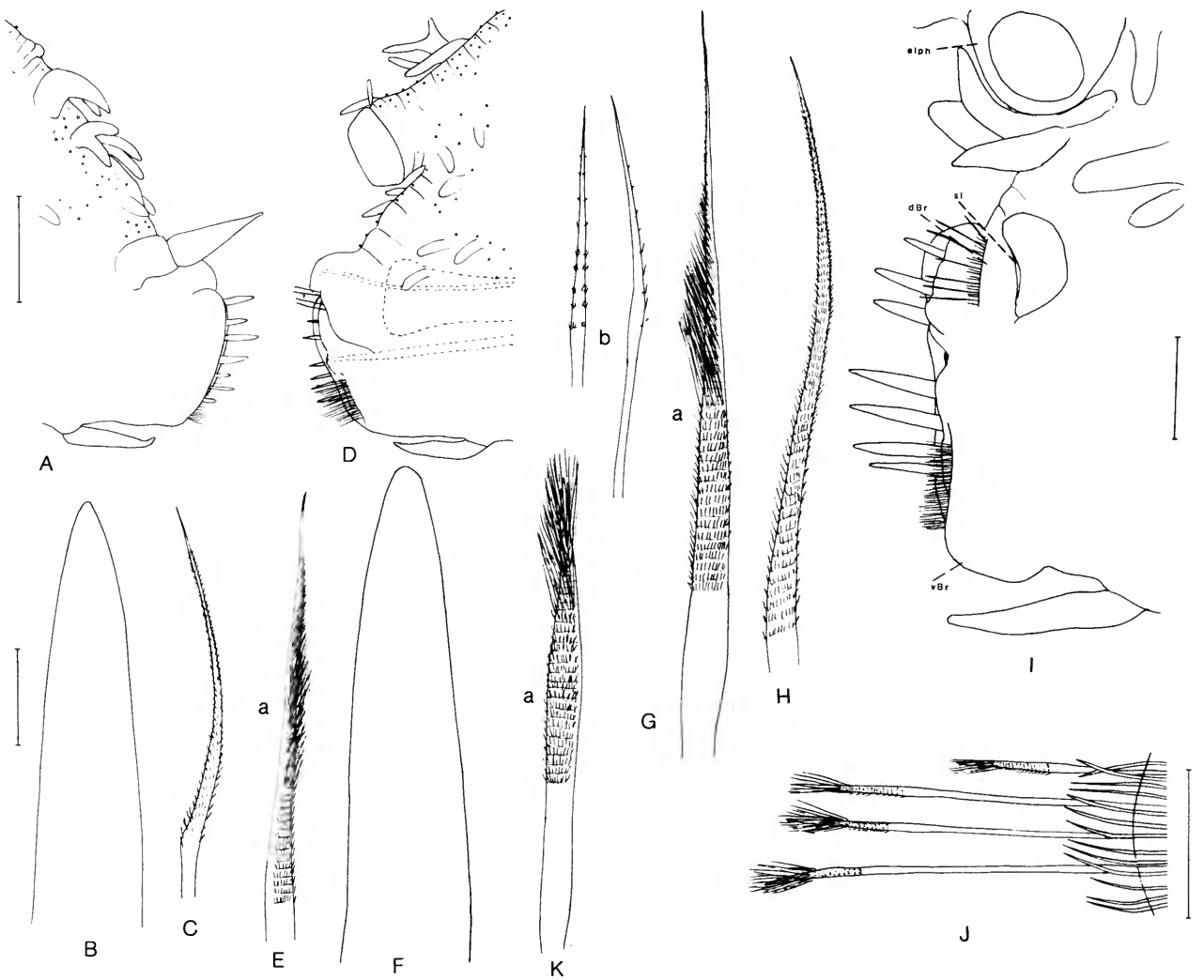


FIGURE 24.—*Eupolyodontes batabanoensis* (A–H, specimen from Bahamas, USNM 24541; I–K, specimen from Bird Key, USNM 71502): A, right cirrigerous parapodium from segment 8, posterior view; B,C, middle and lower neurosetae from segment 8; D, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; E,F, upper and middle neurosetae from segment 9; G,H, upper and lower neurosetae from segment 11; I, right elytragerous parapodium from segment 15, with notopodium pulled back showing slit for emergence of spinning fibers and position of upper neurosetae of group 3a and b; J, upper group of neurosetae from segment 15; K, upper neuroseta from segment 15. (Scales: A,D = 2.0 mm; B,C,E–H,K = 0.1 mm; ; I = 1.0 mm; J = 0.5 mm.)

notopodia, with styles extending slightly beyond neuropodia; tips of acicular neurosetae exposed (Figure 23L–N).

Parapodial branchiae beginning on segment 6, few at first, numerous on widest part of body, absent from about segment 40; branchial vesicles on anterior, dorsal and posterior sides of parapodia and bases of elytrophores, filamentous, arborescent, with 1–4 branches (Figures 24A,D,I, 25A,B,D,E, Ibarzábal, 1988, fig. 2C,D,I). Notopodia from segment 9 large, truncate, flattened, on anterodorsal half of large neuropodia, with internal spinning glands and slit on underside for emergence of spinning fibers; neuropodia with truncate or slightly bilobed presetal lobes and truncate postsetal lobes, with anterodorsal bract under notopodium and crescent-shaped anteroventral bract (Figure 24I). Upper group of neurosetae, emerging from anterodorsal bract, of 2 kinds: (a) stout basally, tapering to sharp tips (unless broken), with rows of short spines basally and long spines subdistally (Figures 24Ea,Ga,J, 25Fa; Ibarzábal, 1988, fig. 2E,F); (b) short (hidden by notopodium), slender, bipinnate, tapering to sharp tips (Figure 24Gb,J). Middle neurosetae (up to 7) stout, acicular, smooth (Figures 24B,F, 25C,G; Ibarzábal, 1988, fig. 2G). Lower neurosetae within anteroventral bract, numerous, lanceolate, curved, wider basally, tapering to capillary tips, with larger spines basally and close-set spines distally (Figure 24C,H; Ibarzábal, 1988, fig. 2H). Dorsal cirri with wide inflated cirrophores and short tapered styles; ventral cirri short, tapered (Figure 25B,D). Posterior segments tapering posteriorly with wide terminal anus.

TUBES.—The tube of the specimen from the Bahamas is grayish white, thick and felty. According to the collectors (Andrew and Andrew, 1953:2), the long, tough tube of parchment-like consistency was collected on 'the flats' at low tide; on the upper end of the long tube a green algal plant was growing in abundance on its wall, forming a crown of cylindrical moss-like structures. The terminal 3 cm of the tube is narrower, about 3 cm in diameter, with a soft silky wall; on the next, wider, part of about 10 cm, 5 cm in diameter, the wall is thicker, irregularly annulated and covered with algae and branched bryozoans; on the narrower basal part, about 3 cm in diameter, the wall is thinner.

The tube with the specimen from the Dry Tortugas (90+ x 2.3 cm with 282+ segments) is 80+ cm long, 4.5 cm in diameter in the upper part and 3.5 cm in the lower part. The upper 30 cm is thicker, somewhat annulated. The thick wall appears to be laid down in many layers, mixed with coral sand, the outer surface rough, the inner surface smooth with a preponderance of spinning fibers.

According to J.C. Britton (in litt.), the collector of the

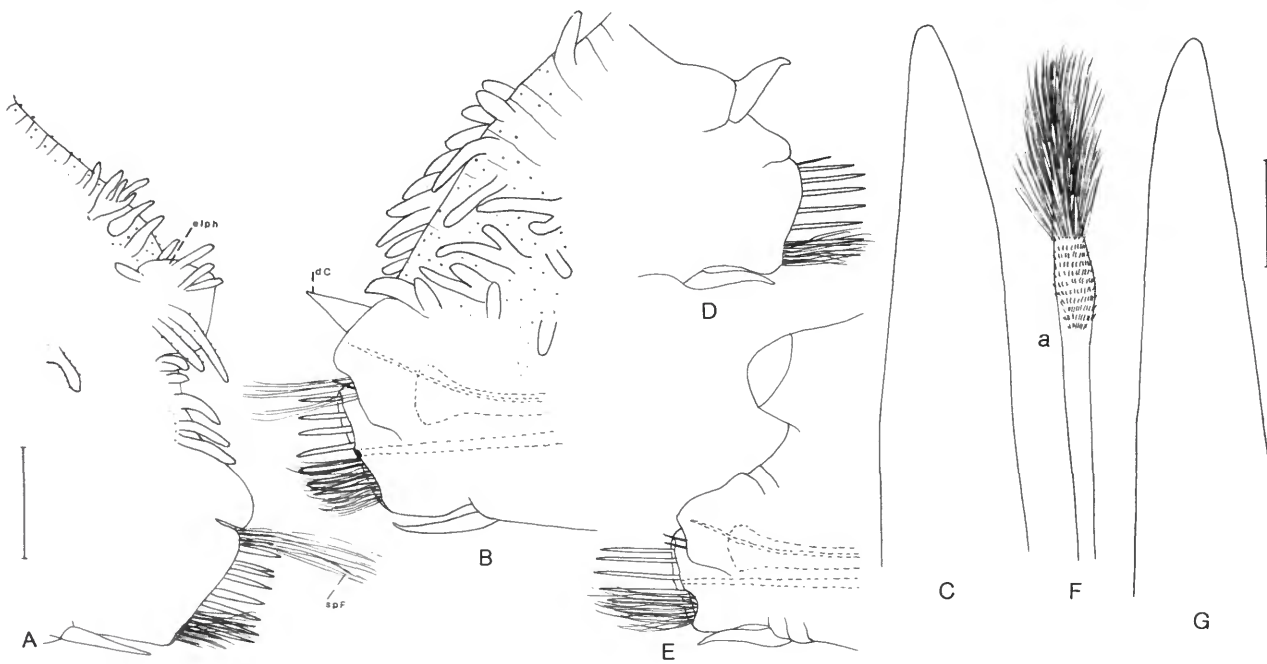


FIGURE 25.—*Eupolyodontes batabanoensis*, specimen from Bahamas, USNM 24541: A, right elytragerous parapodium from segment 29, posterior view; B, right cirrigerous parapodium from segment 30, anterior view, cirrophore of dorsal cirrus hidden from view, acicula and spinning gland dotted, some of spinning fibers exposed; C, middle neuroseta from same; D, right cirrigerous parapodium from segment 68, posterior view; E, right elytragerous parapodium from segment 69, anterior view, acicula and spinnng gland dotted; F,G, upper and middle neurosetae from same. (Scales: A,B,D,E = 2.0 mm; C,F,G = 0.1 mm.)

specimen from Roatan, Honduras, the tubes were located on bare sand adjacent to patchy *Thalassia* beds. The tubes extended 10–15 cm above the sandy surface with the orifice of the tube usually collapsed. Britton obtained them by grasping the tube a few centimeters below the sand and pulling gently. The substratum consisted of loose unconsolidated sand to a depth of at least a meter. Intact tubes were at least 1.5 m in length. The specimen (50 x 2.5 cm with about 400 segments) has a tube 200 cm long with a broken posterior end. The distal 30 cm is particularly thick, holding its shape. The tube is about 5 cm in diameter at the open distal part, 3 cm in the middle collapsed part, and 2.5 cm in the posterior part.

P.A. Shave (in litt.) collected specimens from Belize in a bed of *Thalassia* or turtle grass. The tubes were collected by snorkeling in water about 3 meters deep. The tube, with some attached branched bryozoans on the surface, extended some 15–22 cm above the substratum, their tops loosely closed. The tubes went straight down and were closed on the deep end. Shave observed long hair-like filaments extending from the parapodia to the inner wall of the tube.

McIntosh (1924a:605-606, pl. 30: figs. 2–8) described and figured an empty tube of *Polyodontes* collected in 3 fathoms off Bathabana Islet, Cuba. It was 4 feet 6 inches (135 cm) in length, 1 3/8 inches (2.5 cm) in width. A large globular mass of sponge was attached and surrounded the tube near the anterior end. The thick anterior region (about a foot in length) was firm, slightly elastic, the exterior transversely ribbed and the lining a pale brown felted tissue. Behind the rounded anterior region the tube was flat, narrower (3/4 inch; 1.8 cm) and thinner toward the posterior closed end. Mingled with the surface fibers were calcarous particles, Foraminifera, and coral sand. The felt-like tissue in the wall of the tube was pale brown, similar in consistency to fine cotton, with the looped and coiled fibers laying flat on each other. Numerous setae were obtained from the wall of the tube (McIntosh, 1924a, pl. 30: figs. 3–6, 8): these setae agree with the 3 types of neurosetae characteristic of *Eupolyodontes* but not *Polyodontes*. There is a good chance that the former inhabitant of the tube was *E. batabanoensis*.

DISTRIBUTION.—Bahamas, Cuba, British Virgin Islands, Dry Tortugas, Florida, Honduras. In low water to 5 meters.

COMPARISONS.—*Eupolyodontes batabanoensis* agrees with *E. amboinensis* Malaquin and Dehorne and *E. hartmanae*, new species, in having prostomial branchiae and a rudimentary occipital median antenna attached to a bilobed nuchal lobe. It differs from *E. amboinensis* in having longer prostomial branchiae and in lacking a posterior pair of small eyespots. It differs from *E. hartmanae*, new species, in having more numerous and smaller parapodial branchiae.

Eupolyodontes amboinensis Malaquin and Dehorne, 1907

FIGURES 26, 27

Eupolyodontes amboinensis Malaquin and Dehorne, 1907:345, pl. 51: figs. 1, 3, 4, pl. 52: figs. 5–11.—Horst, 1917:130, pl. 38: figs. 1–3.—Thomassin, 1970:52, fig. 5a–g.

Eupolyodontes sumatranus Pflugfelder, 1932a:282, figs. 1–5; 1932b:561, figs. 11, 12, 16–19; 1934:351 figs, 1, 2, 5, 6.—Strelzov, 1972:317, figs. 19A–E,

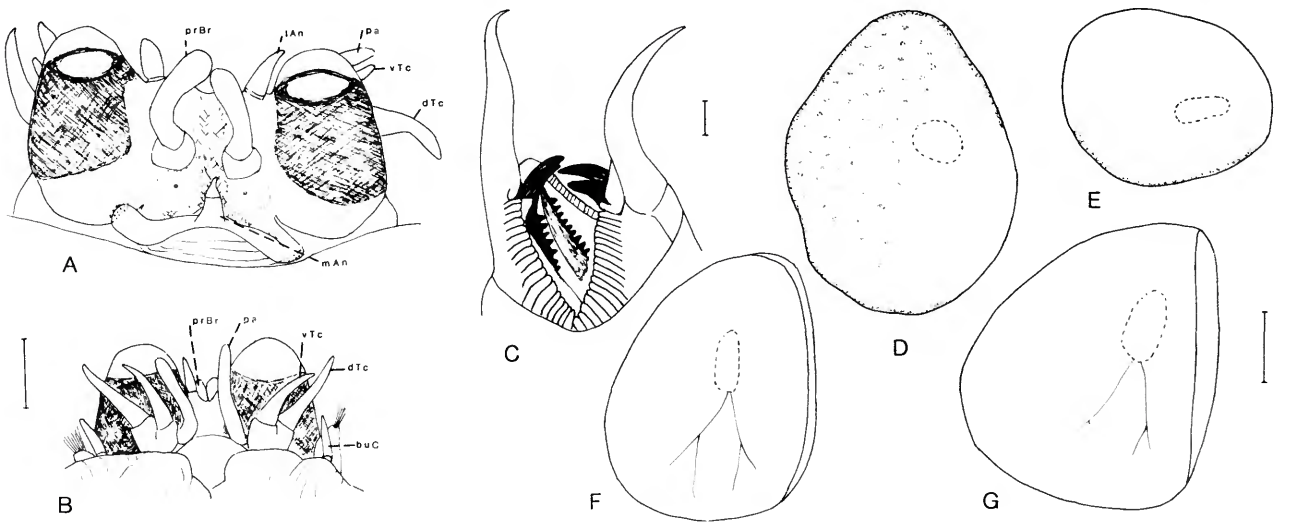


FIGURE 26.—*Eupolyodontes amboinensis* (A,D–G, specimen from Ambon anchorage, RNHL 1269; B, specimen from Tulear, MNHNP; C, specimen from Ambon anchorage, ZMA 287): A, dorsal view of prostomium and tentacular segment; B, ventral view of anterior end of smaller specimen; C, lateral view of distal end of extended pharynx; D, right 1st elytron from segment 2, showing scattered pigmentation; E, right 5th elytron from segment 9; F, right elytron from segment 29, showing "veins"; G, right elytron from segment 91, showing "veins." (Scales: A,B; C; and D–G = 2.0 mm.)

20A–E. [Not sensu Hartman, 1975:210 (= *E. hartmanae*, new species).] [New synonym.]

MATERIAL EXAMINED.—INDONESIA. Ambon anchorage, reef, *Siboga* sta 231, 14 and 18 Nov 1899, 2 specimens (ZMA 287, RNHL 1269).

MADAGASCAR. Tulear, 2–6 m, fine sand, sta 79, no date, B. Thomassin, collector, 1 specimen with tube (MNHNP).

TYPES.—Types of *E. amboinensis* and *E. sumatranus* were not located.

MEASUREMENTS.—Malaquin and Dehorne (1907) based their full description and figures of *E. amboinensis* on two

FIGURE 27.—*Eupolyodontes amboinensis*, specimen from Ambon anchorage (RNHL 1269): A, right tentaculophore with tentacular cirri, inner view, aciculum dotted; B, right elytragerous parapodium from segment 2, anterior view, acicula dotted; C,D, middle and lower neurosetae from same; E, right cirrigerous parapodium from segment 3, posterior view; F,G, middle and lower neurosetae from same; H, right cirrigerous parapodium from segment 8, posterior view; I, right elytragerous parapodium from segment 9, posterior view; J–L, upper, middle, and lower neurosetae from same; M, right elytragerous parapodium from segment 29, anterior view, acicula and spinning gland dotted; N, right cirrigerous parapodium from segment 30, posterior view; O,P, upper and middle neurosetae from same; Q, right elytragerous parapodium from segment 91, anterior view, acicula and spinning gland dotted; R, right cirrigerous parapodium from segment 92, posterior view; S,T, upper and middle neurosetae from same. (Scales: A,B,E,H,I,M,N,Q,R = 2.0 mm; C,D,F,G,J–L,O,P,S,T = 0.1 mm.)

specimens: one incomplete with 305+ segments, 720+ mm long, 19 mm wide with parapodia; the other complete, with a regenerating posterior end, with 214 segments, 630 mm long, and 21 mm wide. Pflugfelder (1932a) based his description of *E. sumatranus* on an anterior fragment 180+ mm long, 12 mm wide without parapodia. Two specimens from Ambon anchorage are incomplete with 203+ and 330+ segments, 430+ and 680+ mm long, 22 and 23 mm wide with setae, respectively. Incomplete small specimen from Tulear is 103+ mm long, 12 mm wide, with 94+ segments. Strelzov (1972) described a small specimen from the Gulf of Tonkin with 20+ segments, 12+ mm long, 4 mm wide with parapodia.

Elytra large, oval, delicate, transparent, attached eccentrically to large elytrophores near lateral sides, leaving middorsum uncovered; first pair with scattered pigment and concentrated along margin, some with branched 'veins'; most of posterior elytra with shallow lateral pockets (Figure 26D–G; Malaquin and Dehorne, 1907, pl. 51: figs. 1, 4, pl. 52: figs. 5, 8).

Prostomium bilobed, with median longitudinal depression; large ommatophores occupying most of lateral sides of prostomium, darkly pigmented with anterior rounded clear part, with pair of small eyespots near posterior border; tentacular segment fused to prostomium with occipital transverse ridge forming attachment for small median occipital antenna with small ceratophore and style; small subulate lateral antennae on anterior border of prostomium with short ceratophores medial to ommatophores; pair of cylindrical fleshy appendages or branchiae on medial part of prostomium; tentaculophores ventral to ommatophores, each with single aciculum, small acicular lobe and pair of tentacular cirri with styles longer than lateral antennae, nearly hidden by large ommatophores; palps short, cylindrical, inserted medial to tentaculophores and extending to tips of ommatophores (Figures 26A,B, 27A; Malaquin and Dehorne, 1907, pl. 52: figs. 5–7; Pflugfelder, 1932a, figs. 2, 3; Thomassin, 1970, fig. 5a,b; Strelzov, 1972, fig. 19A,B).

Second segment with first pair of large elytrophores and ventral buccal cirri longer than following ventral cirri; notopodium small digitiform acicular lobe on anterodorsal side of larger rounded neuropodium, without notosetae; few stout acicular neurosetae and numerous lower slender, curved, spinous, lanceolate neurosetae within ventral bract (Figure 27B–D). Segments 1–3 forming upper, lateral and posterior lips of ventral mouth (Malaquin and Dehorne, 1907, pl. 52: fig. 7; Thomassin, 1970, fig. 5b). Pharynx (fully extended on large specimen from Ambon; cut open on smaller specimen from Tulear) with 37 pairs (31 pairs on smaller specimen) of papillae around opening, middorsal and midventral ones long, tapering to pointed tips, on wide lobulated bases, rest of papillae low, ridge-shaped; 2 pairs of strong hooked jaws each with 11–13 lateral teeth (7 or 8 on smaller specimen) (Figure 26C).

Parapodia of following few segments similar to those of segment 2; dorsal cirri of segment 3 with cylindrical cirrophores on posterodorsal sides of notopodia, with short subulate styles extending beyond neurosetae (Figure 27E–G).

Branchiae simple, tubular, beginning on segment 6, few at first, becoming more numerous on anterior, dorsal and posterior sides of parapodia and on bases of elytrophores, absent from about segment 40, except for few thin-walled pustules (Figure 27H,I,M,N,Q,R; Malaquin and Dehorne, 1907, pl. 52: fig. 8; Pflugfelder, 1932a, fig. 4). Branchiae absent on small specimen of 20+ segments, according to Strelzov (1972:319).

Beginning with segment 9, notopodia larger, rounded, flattened, on anterodorsal half of neuropodia, with internal spinning glands, without notosetae; neuropodia with rounded presetal acicular lobes and truncate postsetal lobes, with slightly developed anteroventral bracts and small anterodorsal bracts under notopodia (Figure 27I,M,N,O,Q,R; Strelzov, 1972, fig. 19E). Upper group of neurosetae, emerging from anterodorsal bracts, of 2 types: (a) longer, tapering to blunt tips (sometimes with slender tips on smaller specimens), with long spines distally and short rows of spines subdistally (Figure 27Ja,Oa,Sa; Malaquin and Dehorne, 1907, pl. 52: fig. 10; Horst, 1917, pl. 38: figs. 1, 2; Pflugfelder, 1932a, fig. 5c; Thomassin, 1970, fig. 5d; Strelzov, 1972, fig. 19E); (b) shorter (hidden by notopodium, easily overlooked), slender, tapering to sharp tips, with whorls of widely spaced spines (Figure 27Ob). Middle stout acicular neurosetae smooth, without aristae (some with aristae in smaller specimen); some in posterior parapodia or in small specimen with subdistal spines on one side (Figure 27K,P,T; Malaquin and Dehorne, 1907, pl. 52: fig. 9; Horst, 1917, pl. 38: fig. 1; Pflugfelder, 1932a, fig. 5a; Thomassin, 1970, fig. 5e,f; Strelzov, 1972, fig. 20B,C). Lower group of neurosetae, within anteroventral bracts, numerous, slender, curved, spinous, lanceolate, tapering to slender tips, with larger spines basally and close-set spines distally (Figure 27L; Malaquin and Dehorne, 1907, pl. 52: fig. 11; Pflugfelder, 1932a, fig. 5b; Thomassin, 1970, fig. 5g; Strelzov, 1972, fig. 20E). Dorsal cirri with short inflated cirrophores and short styles; ventral cirri short, tapered (Figure 27N,R).

TUBES.—The two specimens described by Malaquin and Dehorne (1907) were found in tubes of 1 meter and 750 mm. Pflugfelder (1932a) described a tube reaching more than a meter, breaking in the deeper part buried in the mud. The part above the surface averaged 21 mm. At about 30–35 cm below the surface the tube forked and, at even greater depth, it forked again. The tube accompanying the small specimen from Tulear was 1+ m long and 18 mm wide. The distal end of 10 mm was composed of silky fibers, the rest was brown, tough, felt-like, with sand, especially in the part that would be buried.

DISTRIBUTION.—Indonesia (Malay Archipelago, Ambon, Sumatra), Gulf of Tonkin, Madagascar (Tulear). In low water to 25 meters.

Eupolyodontes thomassini, new species

FIGURES 28, 29

MATERIAL EXAMINED.—MADAGASCAR. Grand Récif de Tuléar, inner rim of reef flat, A. Maugé, collector, 7 Sep 1971, sta 989 of B. Thomassin, holotype (MNHNP).

DESCRIPTION.—Holotype incomplete posteriorly, 124+ segments, 332+ mm long, 39 mm wide with setae. Body large, flattened, tapered slightly anteriorly, without color. Elytra oval to subcordiform, rather thick, opaque, attached eccentrically to large elytrophores near lateral sides, first pair covering prostomium, rest leaving middle third of body uncovered, with shallow lateral pocket on most of elytra (Figure 28D–G).

Prostomium wide, slightly bilobed, with faint middorsal depression, without cephalic branchiae; large ommatophores occupying lateral sides of prostomium, projecting anteriorly forming transparent lenses; pair of small, oval, lateral antennae on anterior side of prostomium medial to ommatophores; tentacular segment fused to prostomium with slightly raised, bilobed, nuchal lobe, minutely papillate, without median

FIGURE 28.—*Eupolyodontes thomassini*, holotype (MNHNP): A, dorsal view of anterior end; B, ventral view of anterior end; C, inner view of distal end of pharynx, cut midventrally; D, right 1st elytron from segment 2; E, right 5th elytron from segment 9; F, right elytron from segment 29; G, right elytron from about segment 99; H, tentaculophore with tentacular cirri, inner view, aciculum dotted; I, right elytragerous parapodium from segment 2, anterior view, acicula dotted; J, notoseta from same; K,L, middle and lower neurosetae from same; M, right cirrigerous parapodium from segment 3, posterior view; N, middle neurosetae from same. (Scales: A,B,D–I,M = 2.0 mm; C = 2.0 mm; J–L,N = 0.1 mm.)

antenna or posterior eyespots; tentaculophores ventral to ommatophores, each with single aciculum, few capillary setae, small acicular lobe, and pair of dorsal and ventral tentacular cirri with styles longer than lateral antennae; paired palps medial to tentaculophores extending slightly beyond prostomium (Figure 28A,B,H).

Second segment with first pair of large elytrophores and ventral buccal cirri similar to tentacular cirri, larger than

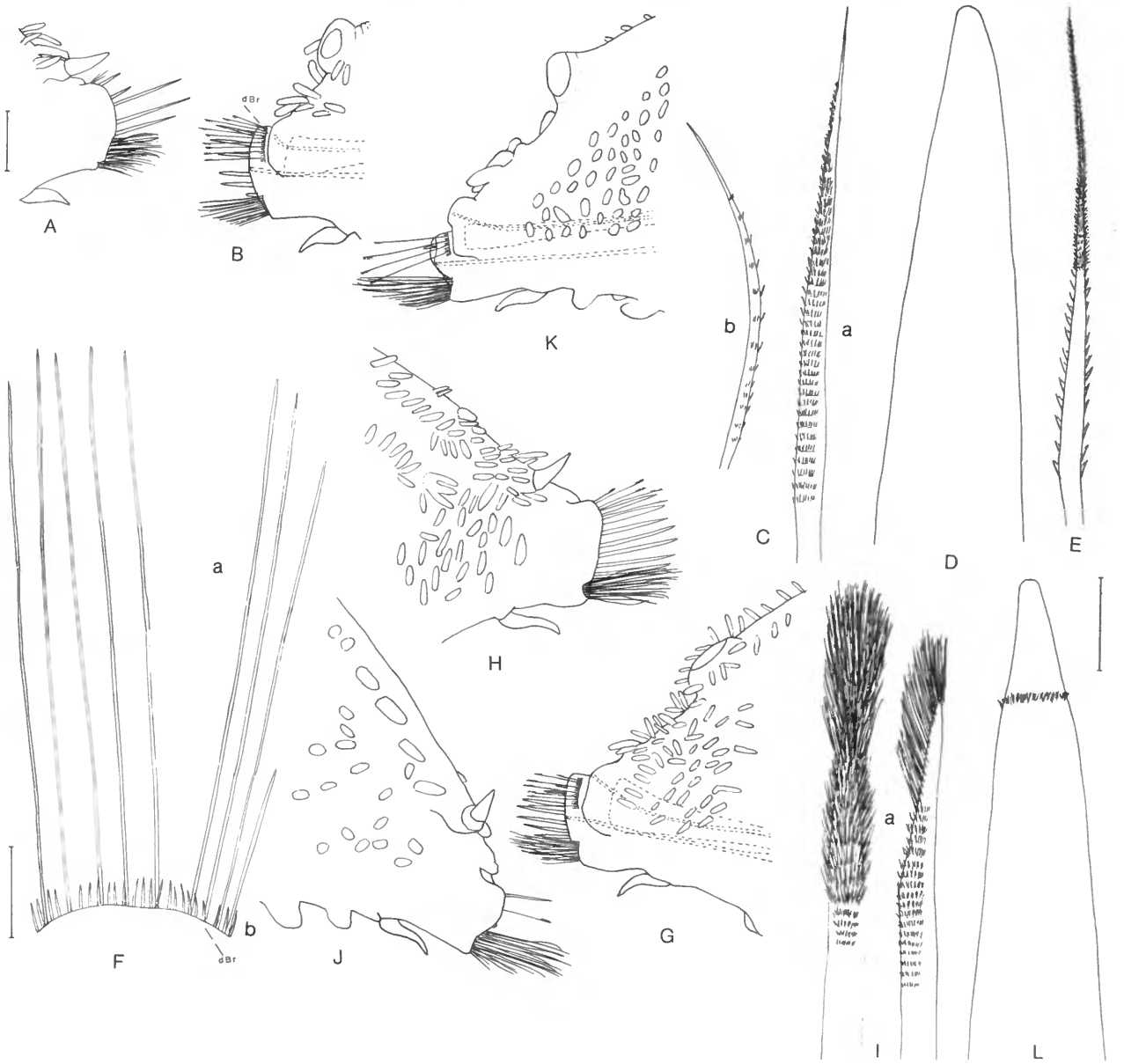


FIGURE 29.—*Eupolyodontes thomassini*, holotype (MNHNP): A, right cirrigerous parapodium from segment 8, posterior view; B, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; C–E, upper, middle, and lower neurosetae from same; F, sketch showing arrangement of upper group of neurosetae on anterior side of 9th neuropodium; G, right elytragerous parapodium from segment 29, anterior view, acicula and spinning gland dotted; H, right cirrigerous parapodium from segment 30, posterior view; I, upper neurosetae (2 views) from same; J, right cirrigerous parapodium from about segment 100, posterior view; K, right elytragerous parapodium from about segment 99, anterior view, acicula and spinning gland dotted; L, middle neurosetae from same. (Scales: A,B,G,H,J,K = 2.0 mm; F = 0.5 mm; C–E,I,L = 0.1 mm.)

following ventral cirri; notopodium short acicular lobe on anterodorsal side of larger neuropodium, with small bundle of finely spinous capillary notosetae; neuropodium with few (4) stout acicular neurosetae and numerous lower neurosetae within anteroventral bract, curved, lanceolate, with widely spaced large spines basally and close-set spinous rows distally, with fine tips (Figure 28A,B,I–L). Pharynx (not extended but cut open) large, muscular, with strong chitinous lining; distal border with 35 pairs of papillae, middorsal and midventral ones long, tapered, on wide bases with thin frilly margins, other papillae short, plate-like; 2 pairs of strong hooked jaws, each with 14 or 15 lateral teeth (Figure 28C).

Following few parapodia similar to those on segment 2, with few capillary notosetae (continue through segment 8); dorsal cirri of segment 3 with short cirrophores on posterior side of notopodium, with short style extending to tips of neurosetae (Figure 28M,N). First 3 segments forming anterior, lateral and posterior lips of ventral mouth (Figure 28B). Branchiae

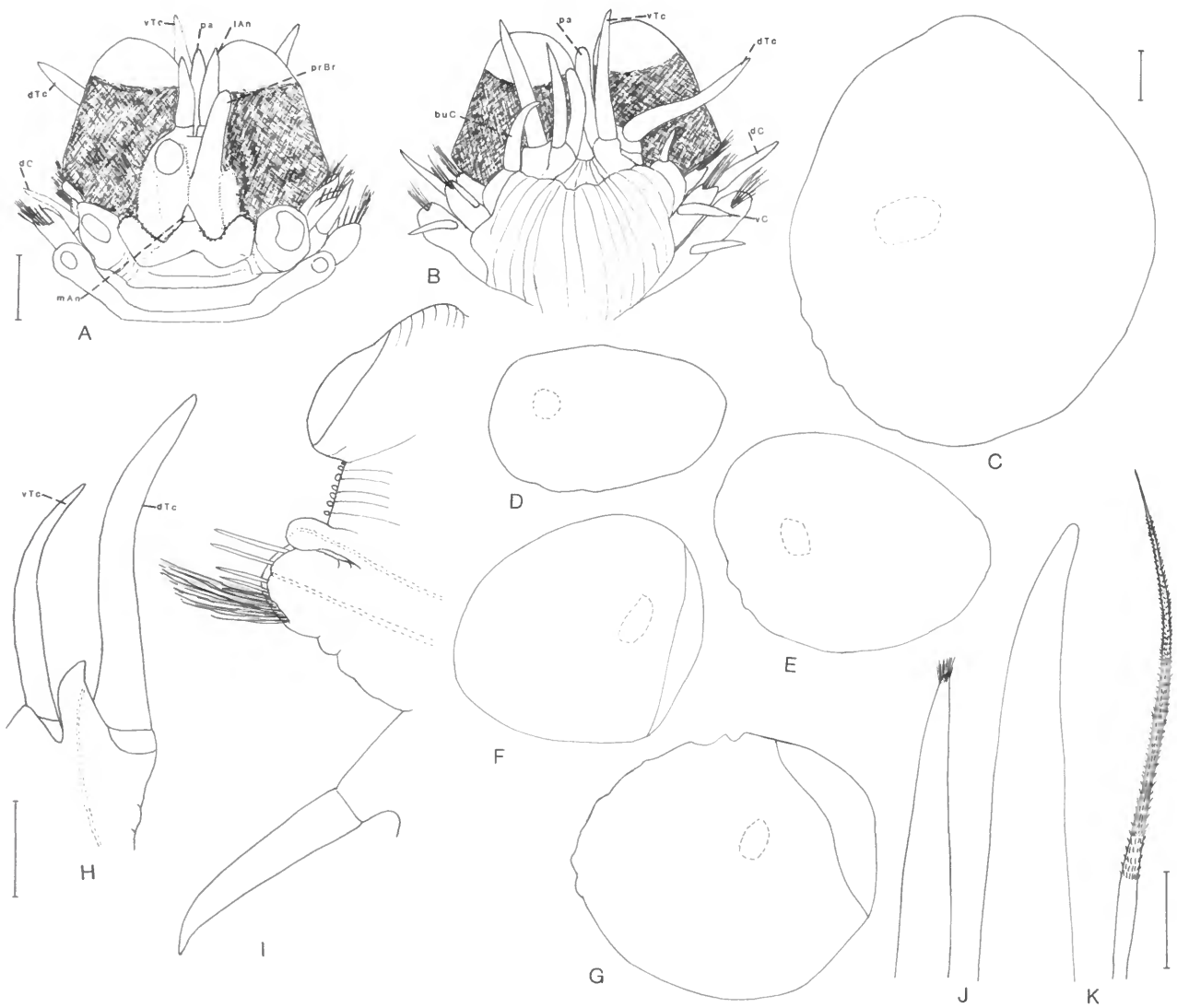


FIGURE 30.—*Eupolyodontes hartmanae*, holotype (AHF 1372): A, dorsal view of anterior end (left prostomial branchia cut off); B, ventral view of anterior end, left buccal cirrus small, regenerating; C, left 1st elytron from segment 2; D, left 2nd elytron from segment 4; E, left 3rd elytron from segment 5; F, right 5th elytron from segment 9; G, right 15th elytron from segment 29; H, right tentaculophore with dorsal and ventral cirri, inner view, aciculum dotted; I, right elytragerous parapodium from segment 2, anterior view, acicula dotted; J,K, middle and lower neurosetae from same. (Scales: A,B = 2.0 mm; C–G, and H,I = 1.0 mm; J,K = 0.1 mm.)

beginning on posterior side of segment 8, few at first, becoming more numerous, digitiform to oval, on anterior, dorsal and posterior sides of parapodia, fewer on posterior parapodia with addition of 2 or 3 thin-walled projections on ventral side medial to ventral cirri (Figure 29A,B,G,H,J).

Beginning with segment 9, notopodia larger, rounded, flattened, on anterodorsal half of neuropodia, with spinning glands, without notosetae; neuropodium with slightly rounded presetal acicular lobe and rounded postsetal lobe, with slightly developed anteroventral bract enclosing numerous neurosetae, similar to more anterior segments (Figure 29B,E); middle neurosetae (about 6) stout, acicular (Figure 19D); upper group of neurosetae emanating from low anterodorsal bract, of 2 types: (a) stout, with long bare stems, with spinous rows tapering to slender tips and some (in posterior parapodia) ending in blunt tips with long spines distally (Figure 29Ca,F,Ia); (b) slender, short, tapering to slender tips, with widely spaced spinous rows (Figure 29Cb,F); stout acicular neurosetae in more posterior segments with subdistal hairs (Figure 29L). Dorsal cirri with short inflated cirrophores and short styles; ventral cirri short, tapered (Figure 29H,J).

ETYMOLOGY.—The species is named for Bernard A. Thomassin in recognition of his studies on the polychaetes in Tulear and who kindly allowed me to describe this interesting specimen.

DISTRIBUTION.—Madagascar (Tulear). Low intertidal.

REMARKS.—*Eupolyodontes thomassini* agrees with *E. cornishii* and *E. mitsukurii* in lacking prostomial branchiae. It differs from them in lacking a medial occipital antenna.

Eupolyodontes hartmanae, new species

FIGURES 30, 31

Eupolyodontes sumatranus.—Hartman, 1974 [1975]:210. [Not *Eupolyodontes sumatranus* Pflugfelder, 1932a.]

MATERIAL EXAMINED.—ARABIAN COAST. Gulf of Oman, 25°37′N, 56°34′E, 79 m, green muddy sand, International Indian Ocean Exp. sta 262A, 1 Dec 1963, holotype (AHF 1372).

DESCRIPTION.—Holotype anterior fragment of 35+ segments, 44+ mm long, 16 mm wide with setae. Dorsum brown. Elytra oval to round, delicate, first pair large, covering dorsum, 2nd pair smaller, 3rd pair larger, following elytra leaving middorsum uncovered; elytra from segment 5 with shallow lateral pocket (Figure 30C–G).

Prostomium bilobed, with narrow longitudinal depression and pair of cylindrical prostomial branchiae, joined medially on basal part; pair of large ommatophores occupying lateral part of prostomium, darkly pigmented, projecting anteriorly, forming transparent lenses; pair of short, tapered lateral antennae with short ceratophores on anterior part of prostomium, medial to ommatophores; tentacular segment fused to prostomium with wing-like papillate nuchal lobe with attached small, conical, median occipital antenna; tentaculophores ventral to ommatophores, each with single aciculum and prominent acicular lobe, without setae, and pair of dorsal and ventral tentacular cirri, dorsal longer than ventral, both longer than lateral antennae; palps medial to tentaculophores, short, not extending beyond ommatophores (Figure 30A,B,H).

Second segment with first pair of large elytrophores and ventral buccal cirri longer than following ventral cirri, similar to but shorter than tentacular cirri; notopodium small, clavate, acicular lobe dorsal to larger rounded neuropodium, with 5–7 stout, smooth, acicular neurosetae (lower 2 with frayed tips) and numerous lower neurosetae, curved, lanceolate, with large spinous rows basally and short, close-set spinous rows with fine tips distally (Figure 30A,B,I–K). Pharynx not extended (not examined). Segments 1–3 involved in forming anterior, lateral, and posterior lips of ventral mouth (Figure 30B).

Parapodia of segment 3 similar to those of segment 2; dorsal cirri with short cirrophores on posterior side of notopodia, with styles extending beyond neurosetae (Figure 31A–C). Branchiae beginning on segment 6, on dorsal side of parapodia, continuing to end of fragment (segment 35), simple, tubular, fewer posteriorly; some thin-walled areas ventrally, medial to ventral cirri (Figure 31D,E,H,I).

Beginning with segment 9, notopodia large, truncate, flattened, on anterodorsal half of larger neuropodia, with spinning glands, without notosetae, sometimes some spinning fibers exposed; neuropodia with rounded presetal acicular lobe and truncate postsetal lobe, with lower anteroventral bract and upper anterodorsal bract (hidden by notopodia) (Figure 31E,H,I). Upper group of neurosetae, emanating from anterodorsal bract, of 2 types: (a) long, tapering to blunt or capillary tips, with long hairs distally and shorter hairs subdistally (Figure 31Fa,Ja); (b) short, hidden from view, slender, tapered to slender tips, with few widely spaced spinous rows (Figure 31Fb). Middle stout, acicular neurosetae, 5–7 in number, smooth, without aristae (Figure 31G,K). Lower group of neurosetae, within anteroventral bract, numerous, curved, lanceolate, with longer spinous rows basally and shorter, close-set rows distally (Figure 31L). Dorsal cirri with short bulbous cirrophores and short styles; ventral cirri short, tapered (Figure 31H).

ETYMOLOGY.—The species is named for the late Olga Hartman, in recognition of her many contributions on the Polychaeta.

DISTRIBUTION.—Arabian Coast (Gulf of Oman). In 79 meters.

REMARKS.—*Eupolyodontes hartmanae* agrees with *E. amboinensis* and *E. batabanoensis* in having prostomial branchiae and a rudimentary occipital median antenna attached to a bilobed nuchal lobe. It differs from *E. amboinensis* in having longer prostomial branchiae and lacking posterior eyespots. It differs from *E. batabanoensis* in having larger and fewer parapodial branchiae confined to the dorsal sides of the parapodia.

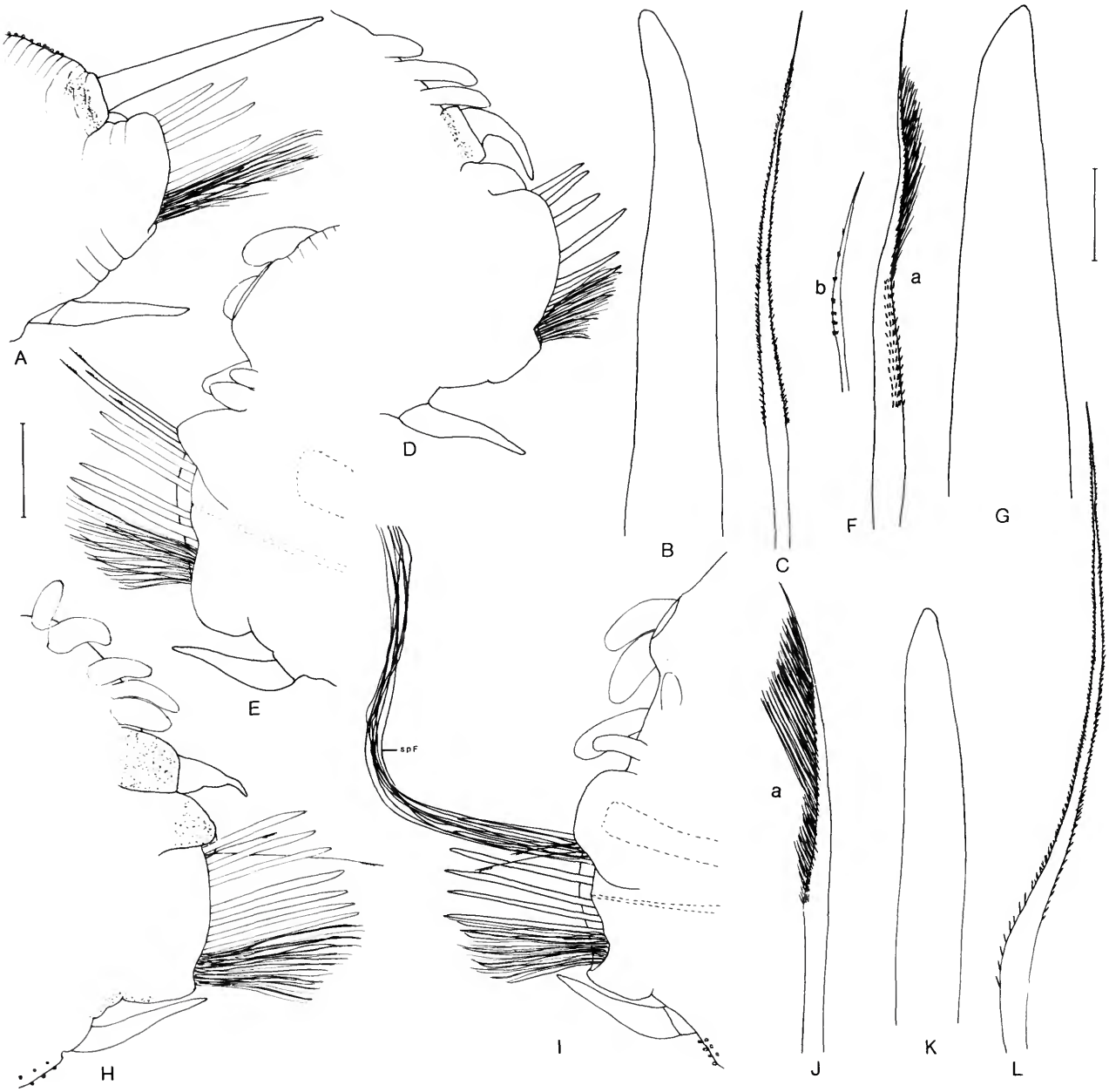


FIGURE 31.—*Eupolyodontes hartmanae*, holotype (AHF 1327): A, right cirrigerous parapodium from segment 3, posterior view; B,C, middle and lower neurosetae from same; D, right cirrigerous parapodium from segment 8, posterior view; E, right elytragerous parapodium from segment 9, anterior view, neuroaciculum and spinning gland dotted; F,G, upper and middle neurosetae from same; H, right cirrigerous parapodium from segment 26, posterior view; I, right elytragerous parapodium from segment 27, anterior view, neuroaciculum and spinning gland dotted, stand of spinning fibers exposed; J–L, upper, middle, and lower neurosetae from same. (Scales: A,D,E,H,I = 1.0 mm; B,C,F,G,J–L = 0.1 mm.)

Eupolyodontes mitsukurii (Izuka, 1904)

Panthalis mitsukurii Izuka, 1904:23, unnumbered fig., pl. 1: fig. 1–8; 1912:66, pl. 8: fig. 7–9.
Eupolyodontes mitsukurii.—Malaquin and Dehorne, 1907:356.—Imajima and Hartman, 1964:41.—Strelzov, 1972:316.

REMARKS.—No types are known to exist and no material was available for study. Izuka based his rather complete description and good figures on 4 large specimens, incomplete posteriorly, from Sagama Bay, Japan, in 70–183 m; the largest 120+ segments, 525+ mm long, 44 mm wide with setae; the smallest 73+ segments, 170+ mm long, 24 mm wide, with the pharynx fully extended. Except for the head end and anterior few segments, the elytra leave the middorsum uncovered (Izuka, 1907, fig. on p. 24). Prostomium and tentacular segment fused, with large ommatophores occupying lateral sides of prostomium, paired lateral antennae (= paired tentacula) on anterior side of prostomium medial to ommatophores; small median occipital antennae (= median tentacula) on posterior part of prostomium (raised nuchal lobe not clearly shown); tips of dorsal and ventral tentacular cirri (= tentacula) anterior and lateral to ommatophores; paired ventral palps (= subtentacula) extending beyond ommatophores and transversely banded; no prostomial branchiae visible (Izuka, 1904, pl. 1: fig. 2).

Segment 2 with first pair of elytra and ventral buccal cirri longer than following ventral cirri. Region around ventral mouth with strong radial folds on margin. Anterior border of extended pharynx or proboscis showing dorsal and ventral lips each with long tapered middle papilla and row of tooth-like papillae on each side (about 17 in number?); 2 pairs of strong jaws each with row of 17 small teeth (Izuka, 1904, pl. 1: figs. 1, 3). Filamentous branchiae (= branchial tubercles) on dorsal sides of parapodia on segments 23 and 38 (Izuka, 1904, pl. 1: figs. 4, 5).

Parapodia appearing uniramous, each with single aciculum and only remnant of upper ramus or notopodium (flattened notopodium from segment 9 and notoaciculum evidently overlooked). Dorsal cirrus on segment 3 with short cirrophore on posterior side of notopodium, with style extending beyond parapodium. Dorsal cirri in posterior parapodia nearly hidden by numerous parapodial branchiae; ventral cirri with short cirrophores and tapered styles, extending to about tips of neuropodia (Izuka, 1904, pl. 1: figs. 4, 5). Neurosetae of 3 kinds (upper neurosetae of type 3b probably overlooked): (a) numerous, serrulated, in lower part of parapodium; (b) strong, spine-like, light yellow-brown, 5–6 in row on segment 2, increasing to 10 posteriorly, without terminal appendages; (c) bipennato-penicillate, in upper half of truncate parapodium, beginning on segment 9, few at first, more numerous in posterior parapodia; long soft hairs of golden-yellow color emanating from upper part of parapodium, product of spinning glands (Izuka, 1904, pl. 1: figs. 4–8).

DISTRIBUTION.—Japan. In 70–183 meters.

Eupolyodontes gulo (Grube, 1855)

Polyodontes gulo Grube, 1855:83, pl. 3: fig. 2 [= *Cydippe gulo* Rüppel, ms].
Eupolyodontes gulo—Buchanan, 1894:438.—Malaquin and Dehorne, 1907:357.—Strelzov, 1972:316. [Not sensu Fauvel, 1947:21, fig. 17a–f.]

REMARKS.—Grube's species from the Red Sea was incompletely described and figured. No types are known to exist. It was included under *Eupolyodontes* by Buchanan (1894) and listed as a questionable species of *Eupolyodontes* by Malaquin and Dehorne (1907) and Strelzov (1972). Fauvel (1947:21, fig. 17a–f) described and figured a specimen from New Caledonia as *E. gulo* (Grube), a questionable identification. He included in synonymy *E. cornishii* Buchanan, 1894, and *E. mitsukurii* (Izuka, 1904). For the present, it seems best to consider *E. gulo* (Grube) as a questionable species of *Eupolyodontes*.

Genus *Neopanthalis* Strelzov, 1968

Neopanthalis Strelzov, 1968:143–144. [Type-species: *Neopanthalis pelamida* Strelzov, 1968, by original designation and monotypy. Gender: feminine.]

DIAGNOSIS.—Prostomium with large ommatophores completely fused medially, small rounded distal part with pair of transparent lenses, with posterior pair of small eyespots; 3 antennae: 2 small ones inserted dorsally near tip of fused ommatophores; long occipital median antenna on posterior part; pair of long papillated ventral palps. First or tentacular segment distinct dorsally, with medial nuchal lobe; long tentaculophores lateral to prostomium, each with pair of long tentacular cirri and 2 bundles of short capillary setae. Elytra on segments 2, 4, 5, 7, continuing on alternate segments; elytra delicate, transparent. Dorsal cirri with short cirrophores and short styles on nonelytragerous segments. Notopodia from segment 9 wide, flattened, with internal spinning glands; upper group of neurosetae of 2 types: (a) long, stout, lanceolate, pilose; and (b) short, slender, bipinnate. Without parapodial branchiae.

Neopanthalis pelamida Strelzov, 1968

Neopanthalis pelamida Strelzov, 1968:144, figs. 3, 4; 1972:321, figs. 21, 22.

REMARKS.—Two incomplete specimens were collected in 1961 by the R/V *Pelamyde* in the Gulf of Tonkin, in 86–113 meters (type in ZIASL, not available for study). The following description is based on Strelzov (1968, 1972).

DESCRIPTION.—Length 18–19+ mm, width with parapodia 6.5–8 mm, with 40–44+ segments. Elytra attached eccentrically on elytrophores, not very large, leaving middorsum uncovered.

Prostomium subconical, wider basally, with large ommatophores completely fused medially, with pair of small transparent lenses and pair of short lateral antennae on dorsal side of tip of ommatophores; long occipital median antenna and pair of very small black eyespots on posterior part; paired ventral palps long, about 3 times longer than prostomium, with

3 longitudinal rows of papillae and transverse rows of pigmented broken bands (Strelzov, 1968, fig. 3A). Tentacular segment visible dorsally, with crescent-shaped dorsal nuchal lobe; long tentaculophores lateral to prostomium, each with dorsal and ventral tentacular cirri, similar in length to median antenna, 2 bundles of short capillary setae, and longitudinal row of papillae on inner dorsal side (Strelzov, 1968, fig. 3A).

Segment 2 with first pair of elytrophores and papillae around base, long ventral buccal cirri, and biramous parapodia; notopodium short, digitiform, with few short capillary notosetae; neuropodium larger, conical, with lanceolate, spinous neurosetae (Strelzov, 1968, figs. 3D, 4B). Pharynx withdrawn (not examined).

Parapodia of segment 3 with dorsal cirri extending beyond neurosetae; notopodium without notosetae; neuropodium with row of stout acicular neurosetae and lower group of curved spinous neurosetae within anteroventral bract (Strelzov, 1968, fig. 3B).

Beginning with segment 9, notopodium large, rounded, flattened, on anterodorsal side of larger neuropodium, without notosetae, with internal spinning glands. Neuropodium with neurosetae of 3 groups (Strelzov, 1968, fig. 3C): lower group within anteroventral bract, curved, with larger spines basally and close-set small spines distally (Strelzov, 1968, fig. 4E); middle row (4–6 in number) stout, acicular, with pilose tip and fine terminal appendage (Strelzov, 1968, fig. 4C,D); upper group of 2 types: (a) few, longer, lanceolate, pilose (Strelzov, 1968, fig. 4A); (b) more numerous, short, with wide-spread whorls of short spines (Strelzov, 1968, fig. 4F, referred to as notosetae). Dorsal cirri extending to distal tips of setae; ventral cirri short, tapering. Without branchial vesicles.

DISTRIBUTION.—Gulf of Tonkin. In 86–113 meters.

Genus *Panthalis* Kinberg, 1856

Panthalis Kinberg, 1855 [1856]:386–387. [Type-species: *Panthalis oerstedi* Kinberg, 1856, by monotypy. Gender: feminine.]

DIAGNOSIS.—Prostomium oval, bilobed, with pair of large colorless ommatophores on anterior border, not set off by narrow neck, with 3 antennae: median antenna with ceratophore attached near middle of prostomium; lateral antennae inserted ventrally on ommatophores, with tips visible dorsally; pair of long smooth ventral palps. First or tentacular segment visible dorsally; tentaculophores lateral to prostomium, directed anteriorly, each with 1 or 2 acicula, 0–few capillary setae and pair of tentacular cirri. Second or buccal segment with first pair of elytra and long ventral buccal cirri; biramous parapodia with bundle of notosetae; neurosetae slender, spinous, lanceolate. Acicular neurosetae from segment 3. Elytra on segments 2, 4, 5, 7, continuing on alternate segments, delicate, transparent. Dorsal cirri with short cirrophores and short styles on nonelytragerous segments; ventral cirri short, tapered. Notopodium from segment 9 wide, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum and internal spinning glands, without notosetae; neuropodium with lower group of numerous neurosetae within lower anteroventral bract, curved, spinous, lanceolate; middle row of stout, acicular neurosetae with tips spinous, aristate; upper group of neurosetae, emanating from low anterodorsal bract hidden by notopodium, of 2 types: (a) longer, with plumose tips and (b) shorter, bipinnate (hidden by notopodium). Without parapodial branchiae. Pygidium with pair of anal cirri. Distal border of large muscular pharynx with up to 15 pairs of papillae, middorsal one much longer than others, midventral one slightly longer, both on wide bases; 2 pairs of hooked jaws, each with up to 18 lateral teeth.

The genus includes 6 species (plus 3 synonyms), of which 3 are new species and 1 new combination (plus 1 doubtful subspecies).

Key to the Species of *Panthalis**

1. Ommatophores globular, anteriorly about equal in width to posterior part of prostomium [Figures 35A, 39A] 2
   Ommatophores not as wide as posterior part of prostomium [Figures 32A, 37A, 41A, 42A] 3
2. Ceratophore of median antenna with lateral papillae; tentaculophores with row of papillae on inner side; tips of lateral antennae sur passing ommatophores by only short distance [Figure 35A] . . . . . ***P. fauveli,*** new species
   Ceratophore of median antenna and tentaculophores without papillae; tips of lateral antennae surpassing ommatophores by distance equal to length of prostomium [Figure 39A] . . . . . ***P. mutilata*** (Treadwell), new combination
3. Ommatophores wide, cylindrical [Figure 32A] . . . . . ***P. oerstedi*** Kinberg
   Ommatophores small, globular or bulbous [Figures 37A, 41A, 42A] 4
4. Ommatophores bulbous, with short "neck"; tips of lateral antennae extending only slightly beyond ommatophores [Figure 37A] . . . ***P. zanzibarensis,*** new species

Ommatophores globular, without "neck"; lateral antennae extending well beyond ommatophores [Figures 41A, 42A] 5

5. Styles of median antenna and tentacular cirri subulate, inflated basally [Figure 41A] . . . . . ***P. novaezealandiae*** Knox

Styles of median antenna and tentacular cirri tapered [Figure 42A] . . . . . ***P. alaminosae,*** new species

**Panthalis oerstedi capensis* McIntosh, 1924, not included in the key.

Panthalis oerstedi Kinberg, 1856

FIGURES 32–34

Panthalis oerstedi Kinberg, 1855 [1856]:387; 1858:25, pl. 7: fig. 34A–H, pl. 10: fig. 60.—Malmgren, 1865:85.—Marenzeller, 1893:28, pl. 1: fig. 2A–C; 1904:299.—Watson, 1895:169, pls. 9, 10 [tube-building].—McIntosh, 1900:400, pl. 25A: fig. 20, pl. 27: fig. 16, pl. 30: fig. 8, pl. 34: figs. 3–5, pl. 41: figs. 15–18.—Fauvel, 1914b:78; 1923:98, fig. 38a–h.—Åkesson, 1963:128, figs. 1–4 [brain, cerebral region].

Panthalis marenzelleri Pruvot and Racovitza, 1895:442, pl. 19: fig. 105, pl. 20: figs. 106–110 [fide Marenzeller, 1904:299].

Panthalis oerstedii.—Ditlevsen, 1917:52.

Not *Polyodontes oerstedi* sensu Strelzov, 1972:297 [= *Acoetes* sp.].

MATERIAL EXAMINED.—WESTERN SWEDEN: Bohuslän, 1839, S. Loven, collector, holotype of *Panthalis oerstedi* (NRS 5795). Northern Bohuslän, Iddefjorden, 11 m, 1863, Hj. Widegren, collector, 1 specimen (NRS 5792). Bohuslän, Kosterfjorden, 1865, A. Ljungman, collector, 1 specimen (NRS 5793, identified by Malmgren).

SHETLAND. 36 miles (58 km) off the Skerries, 137 m, 1867, J. Gwyn Jeffreys, collector, 2 specimens (BMNH 1921.5.1.568, identified by McIntosh).

TYPE MATERIAL.—Holotype of *Panthalis oerstedi*, now in three pieces, with pharynx extended (jaws had been cut out and present in vial), with 84 segments, 98 mm long, 15 mm wide with setae. Type of *Panthalis marenzelleri* not available (referred to *Panthalis oerstedi* by Marenzeller, 1904). The description was based on an anterior fragment of a mature female of 25 segments, 16 mm long, 2 mm wide, including setae. It was collected in the Mediterranean in the region of Lacase-Duthiers in 560 meters.

DESCRIPTION.—Body elongate, vermiform, flattened dorsoventrally, tapered slightly anteriorly and moreso posteriorly, with numerous pairs of elytra leaving middorsum uncovered (Kinberg, 1858, pl. 7: fig. 34A; McIntosh, 1900, pl. 26A: fig. 20). Elytra rounded to oval, delicate, pearly white, semitransparent, attached eccentrically near lateral sides to elytrophores; anterior 3 pairs flat, covering dorsum; elytra from segment 9 campanulate with lateral pockets (Figure 33C–E).

Bilobed prostomium with wide, cylindrical, colorless ommatophores on anterior half of prostomium, with transparent lenses; median antenna with short ceratophore near anterior notch, with style extending beyond ommatophores; lateral antennae arising ventrally close together below ommatophores, with styles similar to median antenna, their tips visible well beyond ommatophores; palps stout, long, tapered, smooth (Figures 32A, 33A,B). Tentacular segment distinct dorsally; tentaculophores lateral to and fused basally to prostomium, each with single aciculum, few capillary setae, few papillae on inner side, and dorsal and ventral tentacular cirri similar to but longer than antennae (Figures 32A,C, 33A,B; Kinberg, 1858, pl. 7: fig. 34B; Watson, 1895, pl. 9: fig 3; McIntosh, 1900, pl. 27: fig. 16; pl. 10: fig. 2; Pruvot and Racovitza, 1895, pl. 19: fig. 105).

Second segment with first pair of elytrophores, long ventral buccal cirri, and biramous parapodia; notopodium short, digitform, with bundle of long capillary finely spinous neurosetae; neuropodium larger, rounded, with anteroventral bract; neurosetae lanceloate (Figures 32D, 33A,F–I; Watson, 1895, pl. 9: fig. 3, pl. 10: fig. 2; Pruvot and Racovitza, 1895, pl. 20: fig. 107). Distal border of extended pharynx with 13 or 15 pairs of border papillae, middorsal and midventral ones on wide lobulated bases, middorsal one extra long and tapered (sometimes protruding from closed mouth), midventral one somewhat shorter than middorsal one; 2 pairs of strong hooked jaws, each with 6–8 lateral teeth (Figure 32B; Kinberg, 1858, pl. 7: fig. 34A,E, pl. 10: fig. 60; Watson, 1895, pl. 10: fig. 6; Pruvot and Racovitza, 1895, pl. 19: fig. 105; McIntosh, 1900, pl. 34: figs. 3, 4).

Third segment with first pair of dorsal cirri, with short cirrophores and styles extending about to tips of neurosetae; notopodia with fewer notosetae than on 2nd segment; upper and lower neurosetae similar, spinous, lanceolate; middle neurosetae stout, acicular with tips hairy, aristate (Figure 32E–H). Following parapodia similar through segment 8, with notosetae lacking (Figures 32I, 34A).

Beginning with segment 9, notopodium wide, rounded, flattened, anterodorsal to upper half of neuropodium, with notoaciculum and spinning glands; neuropodium with slightly bilobed presetal acicular lobe, truncate postsetal lobe and lower anteroventral bract; three groups of neurosetae: lower group numerous, within ventral bract, curved, with large spines basally, finely spinous distally, tapering to capillary tips; middle row (4–6 in number) stout, acicular, amber-colored, frayed distally along one side with aristate tips; upper group, emerging from low dorsoanterior bract, of 2 types: (a) longer, fewer, slender, with brush-like tips; (b) shorter (hidden by notopodium), more numerous, bipinnate (Figures 32J, 34B–H; Kinberg, 1858, pl. 7: fig. 34F,G; Watson, 1895, pl. 10: figs. 1, 3–5; Pruvot and Racovitza, 1895, pl. 20: figs. 108, 110; McIntosh, 1900, pl. 41: figs. 15–18). Dorsal cirri short,

subulate, ventral cirri short, tapered (Figure 34G). Without parapodial branchiae. Pygidium with pair of long anal cirri (McIntosh, 1900, pl. 26A: fig. 20).

TUBES.—The tubes and their formation were well described by Watson (1895:169–188, pls. 9, 10). *Panthalis oerstedi*, collected off the Isle of Man in 110 meters, formed long, very soft muddy tubes, easily torn apart, composed of many thin parallel layers in which mud was loosely entangled, resembling "mud sausages." One of the tubes had a length of about 90 mm, 32–39 mm in external diameter, 9 mm in internal diameter, with the wall in the middle of the tube about 6 mm thick. The tubes were open at both ends with loose mucus-like extensions concealing the entrances. Watson had the opportunity to observe the worms alive in an aquarium where a layer of mud was placed and to watch the formation of the tubes. The parapodia of the second or buccal segment, called the weaving feet, were used in manipulating the spinning fibers and forming cobwebs; fine mud was swept into the tube when the weaving feet moved backward. At intervals, the tube was enlarged by greatly expanding the anterior region of the body, thereby enlarging the diameter of the tube and pulling in additional mud through the collapsed opening. Layers were added internally from cobwebs of the spinning fibers and mud. Watson demonstrated how the tips of the brush-like neurosetae, composed of a central shaft and flexible distal bristles forming a minute brush, helped in separating the spinning fibers, formed from the long bronze rope-like coils found in all parapodia except for the anterior eight pairs. The

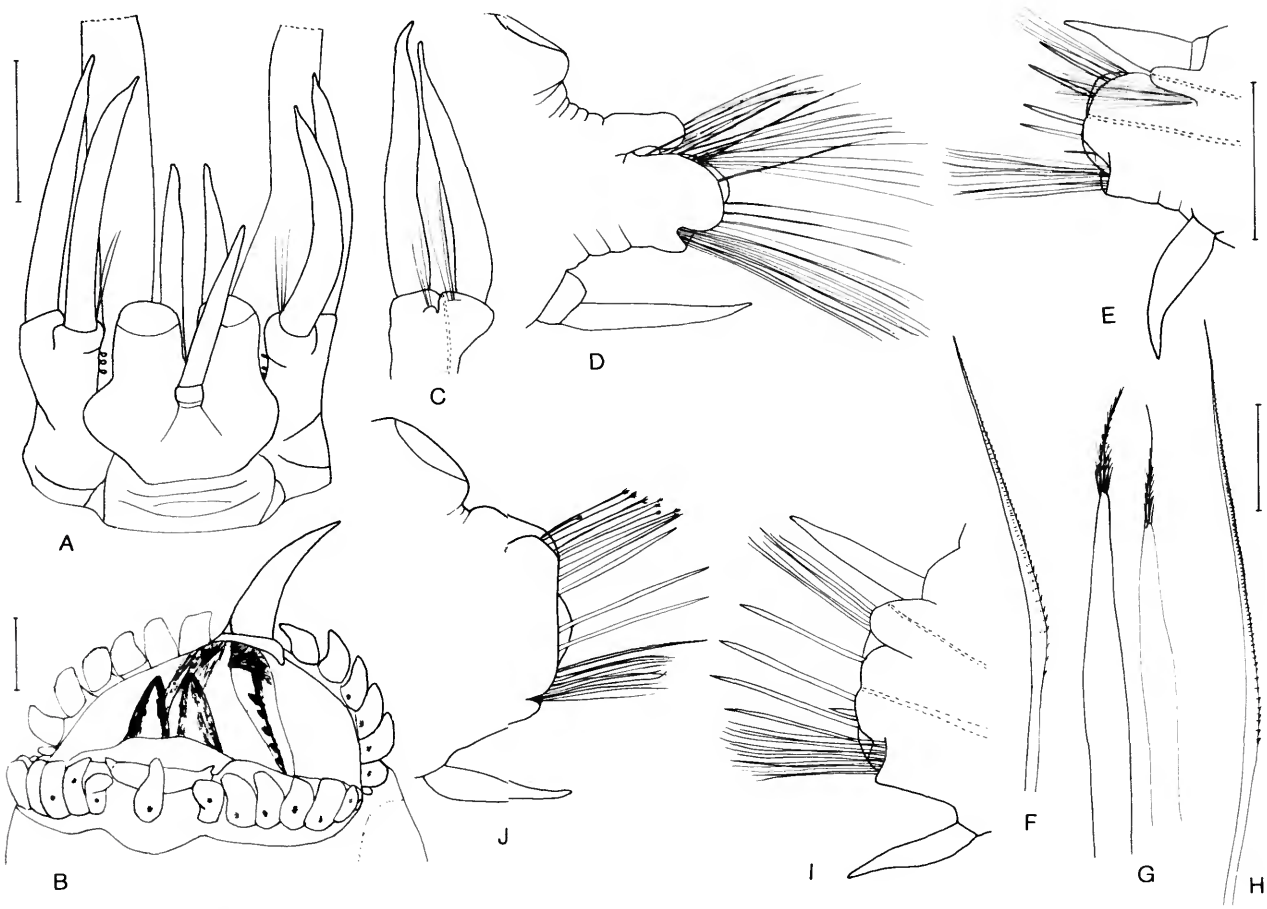


FIGURE 32.—*Panthalis oerstedi*, specimen from Idefjorden (NRS 5792): A, dorsal view of prostomium and tentacular segment, only bases of palps shown, pharynx fully extended (not shown); B, ventral view of distal end of pharynx showing jaws and border papillae; C, right tentaculophore with dorsal and ventral tentacular cirri, inner view, aciculum dotted; D, right elytragerous parapodium from segment 2, posterior view; E, right cirrigerous parapodium from segment 3, anterior view, acicula dotted; F–H, upper, middle, and lower neurosetae from same; I, right cirrigerous parapodium from segment 8, anterior view, acicula dotted; J, right elytragerous parapodium from segment 9, posterior view. (Scales: A = 1.0 mm; B = 1.0 mm; C–E,I,J = 1.0 mm; F–H = 0.1 mm.)

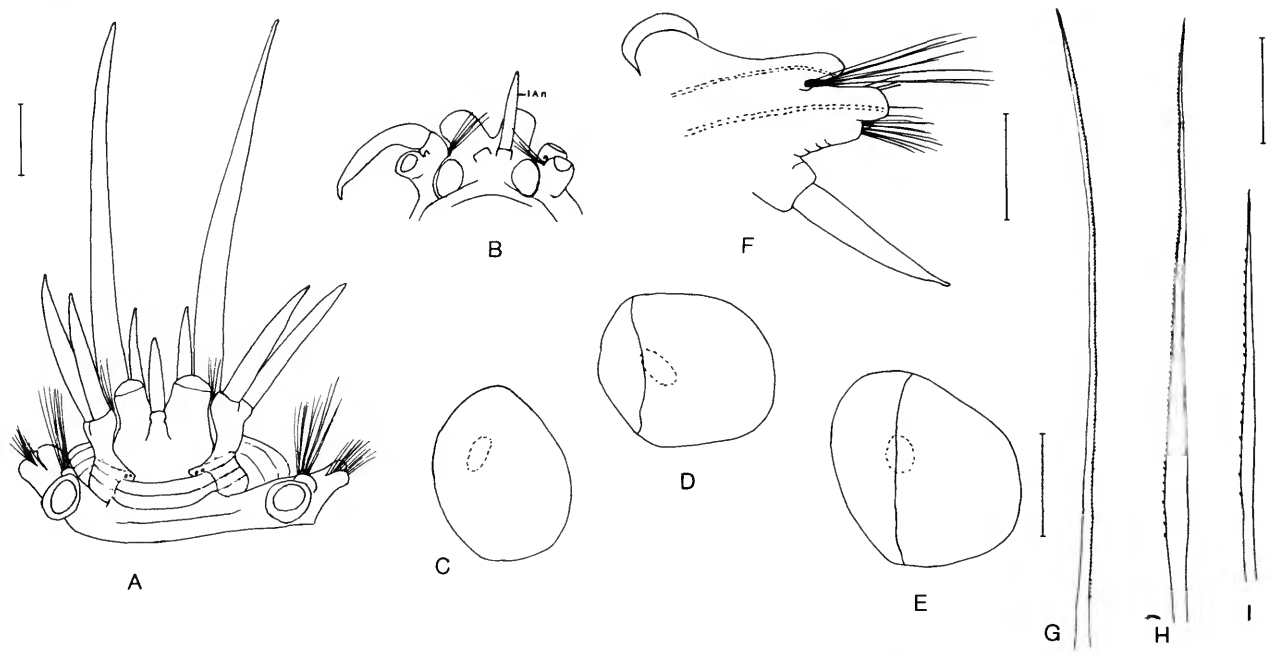


FIGURE 33.—*Panthalis oerstedi*, specimen from Kosterfjorden (NRS 5793): A, dorsal view of anterior end, pharynx partially extended; B, ventral view of prostomium and tentacular segment (appendages mostly not shown); C, left 1st elytron from segment 2; D, left 5th elytron from segment 9; E, left 11th elytron from segment 21; F, left elytragerous parapodium from segment 2, anterior view, acicula dotted; G, notoseta from same; H,I, middle and lower neurosetae from same. (Scales: A,B and F = 1.0 mm; C–E = 2.0 mm; G–I = 0.1 mm.)

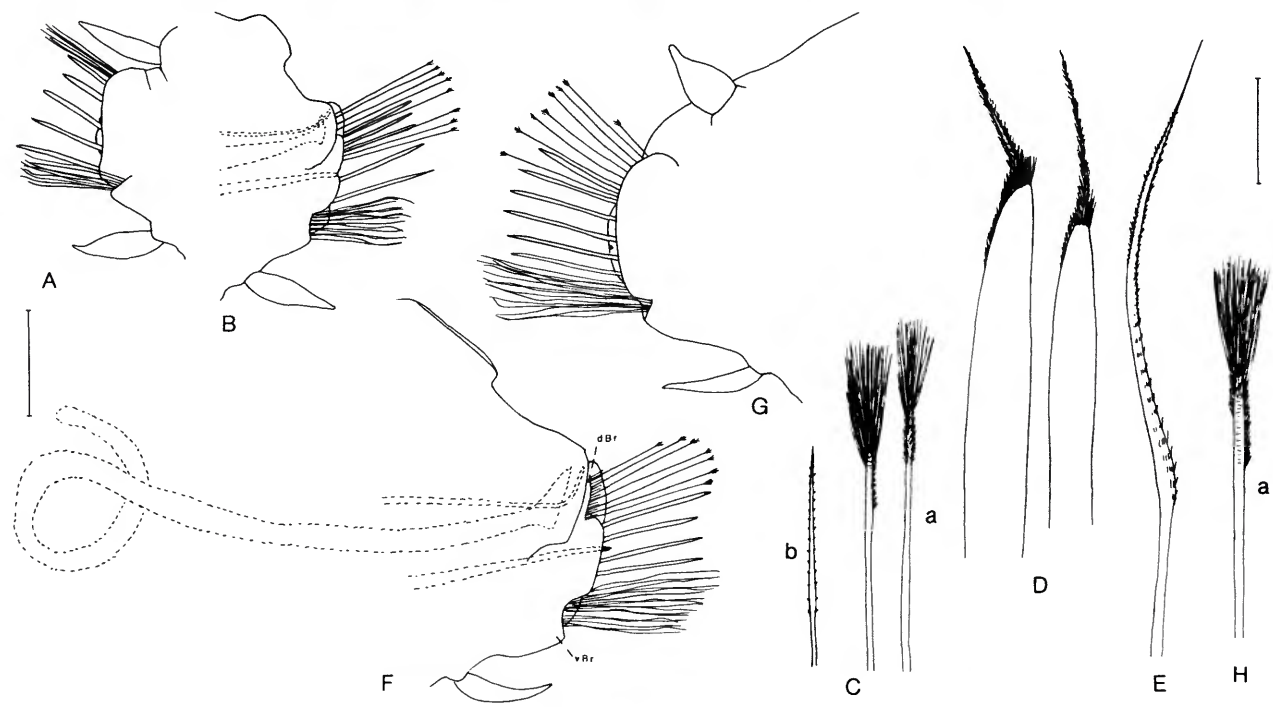


FIGURE 34.—*Panthalis oerstedi*, specimen from Kosterfjorden (NRS 5793): A, left cirrigerous parapodium from segment 8, posterior view; B, left elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; C–E, upper, middle, and lower neurosetae from same; F, left elytragerous parapodium from segment 21, anterior view, acicula and spinning gland dotted; G, left cirrigerous parapodium from segment 22, posterior view; H, upper neuroseta from same. (Scales: A,B,F,G = 1.0 mm; C–E,H = 0.1 mm.)

fibers emerged from a cleft on the underside of the notopodia, just opposite to the upper group of brush-like neurosetae.

Lindroth (1941:498) observed that on freshly dredged material the tubes of *Panthalis oerstedi* had only a single functional opening that was elevated on a small crater on the muddy surface; the other end was black and reduced.

BIOLOGY.—Watson (1895) observed that *P. oerstedi*, at rest, lies on its back with its head end and two long palps protruding from the tube, ready to seize passing prey. In addition, the long middorsal tentacular papilla of the proboscis was sometimes protruding from the mouth. Watson observed a constant rising and falling of the campanulate elytra, which facilitates the passage of water for the purpose of respiration.

ASSOCIATIONS.—Tubes containing specimens of *Panthalis oerstedi*, collected by Franzén (1962:311–317, figs. 1A–C, 2A–C, pl. 1: figs. 1–5, pl. 2: fig. 1) in the Gullmar Fjord, Sweden in depths of 50–70 meters, and by Nielsen (1964:45, fig. 32A–D), in Kristineberg, Sweden, and the Kattegat, were found to contain colonies of epizoic entoprocts, *Loxosomella glandulifera* Franzén. The loxosomatids were anchored by their long peduncles in deep pockets on the inner layers of the soft mud tube. Each tube generally contained large numbers of individuals, up to 150, according to Nielsen (1964:45). Presumably, they were making use of the food-bearing current in the respiratory chamber of the host.

DISTRIBUTION.—Sweden, Norway, North Atlantic to Mediterranean, Northwest Africa. In 11 to 760 meters.

Panthalis oerstedi capensis McIntosh, 1924

Panthalis oerstedi var. *capensis* McIntosh, 1924b:10; 1925:31.
Panthalis oerstedi capensis.—Day, 1967:97.

REMARKS.—The description of the variety *capensis* from 46 meters off South Africa was based on a single incomplete specimen. The description, without figures, is deficient in some respects. The type specimen has not been located (not in BMNH). Day (1967:97) elevated the variety to a subspecies but without additional information. It is considered to be doubtful.

Panthalis fauveli, new species

FIGURES 35, 36

Panthalis oerstedi.—Fauvel, 1932:39, fig. 7a–c. [Not *Panthalis oerstedi* Kinberg, 1856.]

MATERIAL EXAMINED.—ARABIAN SEA. *Investigator* sta 362, 897 m, holotype (MNHNP, as *Panthalis oerstedi* by Fauvel). BAY OF BENGAL, 749 m, *Investigator*, paratype (BMNH 1938.5.7.6, as *Panthalis oerstedi* by Fauvel).

TYPE MATERIAL.—Holotype with 61+ segments, 33+ mm long, 8 mm wide with setae. Paratype with 80 segments, last few small, 45 mm long, 9 mm wide, a female with large yolky eggs.

DESCRIPTION.—Elytra delicate, smooth, elongate-oval, with eccentric attachment near lateral side, with deep lateral pocket from 5th elytra (Figure 35B).

Bilobed prostomium with large ovate colorless ommatophores on anterior half of prostomium; median antenna with small ceratophore in middle of prostomium, papillate along lateral sides, with short style extending to tip of ommatophores (variable in length, according to Fauvel, 1932:39); lateral antennae arising ventral to ommatophores with tips extending beyond ommatophores; ventral palps missing on types (long, tapered, smooth, according to Fauvel, 1932:39). Tentacular segment distinct dorsally, with middorsal anterior extension; tentaculophores lateral to and fused basally to prostomium, each with single aciculum, 2 bundles of few capillary setae, long row of papillae on inner side, dorsal and ventral tentacular cirri similar to but longer than lateral antennae (Figure 35A,C).

Second segment with first pair of elytrophores, long ventral buccal cirri, similar to tentacular cirri, and biramous parapodia; notopodium short, digitiform, with bundle of long, finely spinous, capillary notosetae; neuropodium larger, subconical, with anteroventral bract; upper and middle neurosetae long, finely spinous, with capillary tips; lower ones short, with widely spaced spines tapering to fine tips (Figure 35D–F). Distal border of extended pharynx with 13 pairs of papillae, middorsal and midventral ones on wide lobulated bases, middorsal one extra long and tapered (extending from mouth when pharynx partially extended), midventral one about 2 times longer than lateral papillae, about one-fourth as long as middorsal one. Two pairs of strong hooked jaws, each with 7–10 lateral teeth.

Third segment with first pair of dorsal cirri, with short cirrophores and styles extending slightly beyond neuropodia; notopodia short, digitiform, with small bundle of long notosetae; neuropodium with upper and lower neurosetae similar, lanceolate, spinous; middle row of neurosetae short, acicular, terminating in fine spines and aristae (Figure 35G–J). Following few parapodia similar, with few notosetae on fourth and fifth notopodia, lacking from segment 6 on. Cirrigerous parapodium of segment 8 with notopodium larger, rounded; upper neurosetae short, curved, with larger spines basally and close-set spines distally, similar to lower group of neurosetae; middle acicular neurosetae aristate, with subdistal spines along one side (Figure 35K–M; Fauvel, 1932, fig. 7b,c).

Beginning with segment 9, notopodium wide, rounded, flattened, anterodorsal to upper half of neuropodium, with notoaciculum and spinning glands; neuropodium with conical presetal acicular lobe, short upper anterior bract under notopodium, anteroventral bract, and truncate postsetal lobe; three groups of neurosetae: lower group numerous, within anteroventral bract, curved, with large spines basally, fine spines distally, tapering to capillary tips; middle row (4–6 in number) stout, acicular, hairy distally and subdistally along one side, with or without aristae; upper group, emerging from low anterodorsal bract, of 2 types: (a) longer, fewer (up to 8 in number), slender, with brush-like tips; (b) short, more

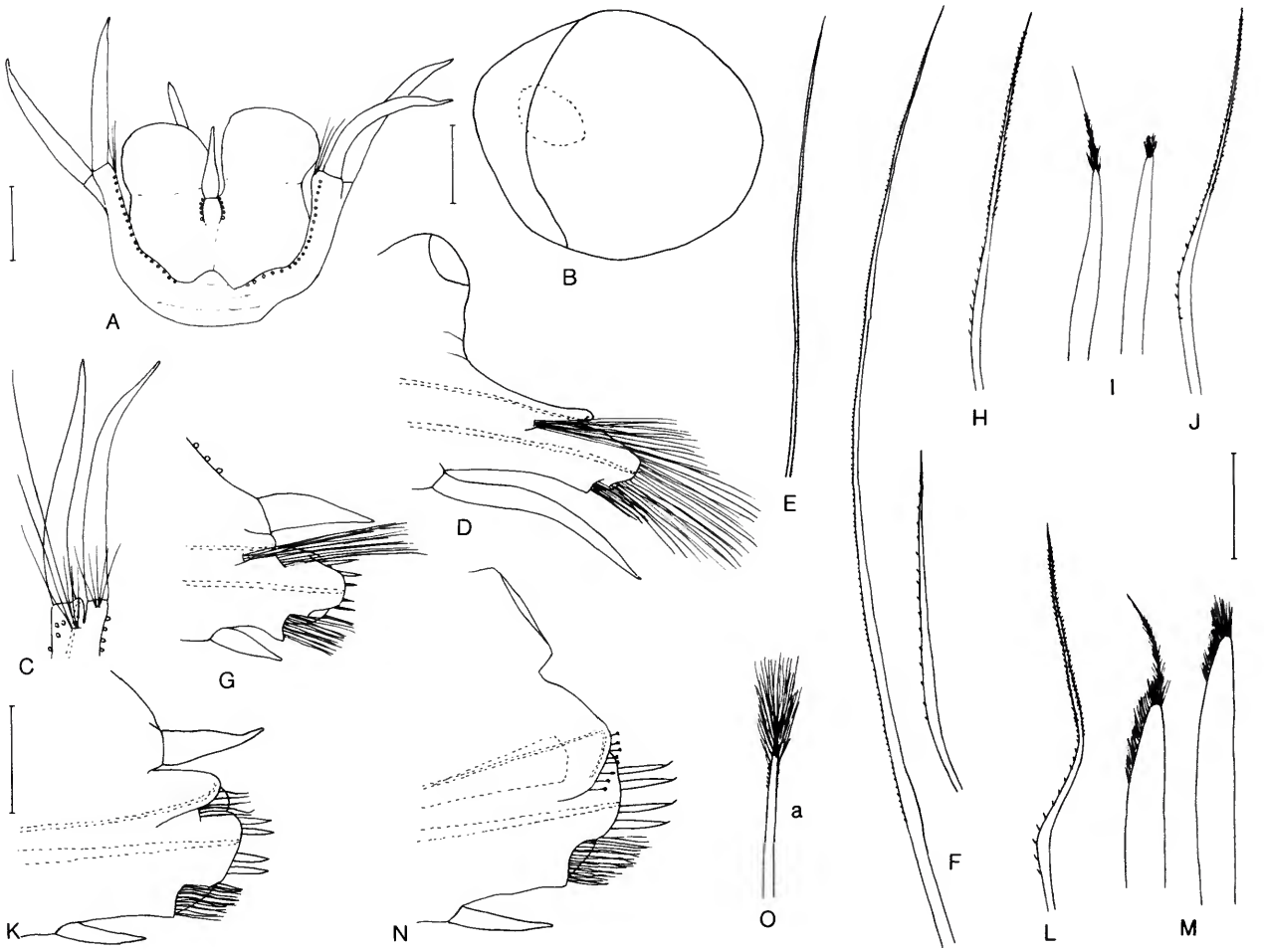


FIGURE 35.—*Panthalis fauveli*, holotype (MNHNP): A, dorsal view of prostomium and tentacular segment, pharynx partially extended (not shown), (palps and right lateral antenna missing); B, right 5th elytron from segment 9; C, inner view of right tentaculophore with dorsal and ventral tentacular cirri, aciculum dotted; D, left elytragerous parapodium from segment 2, anterior view, acicula dotted; E, notoseta from same; F, middle and lower neurosetae from same; G, right cirrigerous parapodium from segment 3, anterior view, acicula dotted; H–J, upper, middle, and lower neurosetae from same; K, right cirrigerous parapodium from segment 8, anterior view, acicula dotted; L,M, upper and middle neurosetae from same; N, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; O, upper neuroseta from same. (Scales: A; B; and C,D,G,K,N = 0.5 mm; E,F,H–J,L,M = 0.1mm.)

numerous, with widely spaced spines and fine tips (Figures 35N,O, 36A–E; Fauvel, 1932, fig. 7a). Dorsal cirri short, subulate; ventral cirri short, subulate; ventral cirri short, tapered (Figure 36B). Without parapodial branchiae.

TUBE.—According to Fauvel (1932:39), the tubes were felt-like, secreted by the spinning glands and coated with mud.

ETYMOLOGY.—The species is named for the well-known polychaete worker, Pierre Fauvel.

DISTRIBUTION.—Arabian Sea and Bay of Bengal. In 60 to 1480 meters.

Panthalis zanzibarensis, new species

FIGURES 37, 38

Panthalis oerstedi.—Monro, 1937:264. [Not *Panthalis oerstedi* Kinberg, 1856.]

MATERIAL EXAMINED.—British East Africa: Zanzibar, 05°38′S, 39°15′E, 183–194 m, green mud, John Murray Exp. sta 106, 12 Jan 1934, holotype (BMNH 1937.9.2.75, as *Panthalis oerstedi* by Monro).

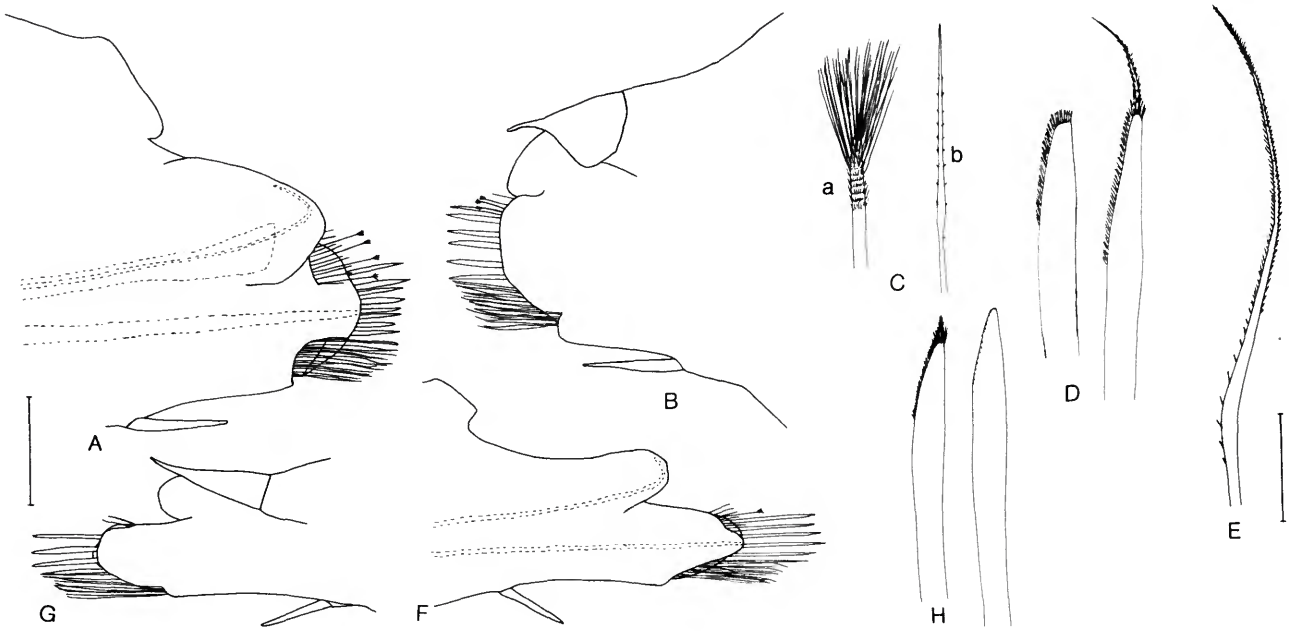


FIGURE 36.—*Panthalis fauveli*, holotype (MNHNP): A, left elytragerous parapodium from segment 29, anterior view, acicula and spinning gland dotted; B, left cirrigerous parapodium from segment 30, posterior view; C–E, upper, middle, and lower neurosetae from same; F, left elytragerous parapodium from segment 59, anterior view, acicula dotted; G, left cirrigerous parapodium from segment 60, posterior view; H, middle neurosetae from same. (Scales: A,B,F,G = 0.5 mm; C–E,H = 0.1 mm.)

TYPE MATERIAL.—Holotype with 44 segments, last 3 small, regenerating, 17 mm long, 5 mm wide with setae.

DESCRIPTION.—Elytra delicate, smooth, opaque, oval, with eccentric attachment near lateral side, with shallow lateral pocket on more posterior elytra (Figure 37B).

Bilobed prostomium with colorless, rounded, short-necked ommatophores on anterior half; median antenna with small nonpapillated ceratophore on middle of prostomium, style missing; lateral antennae inserted ventral to ommatophores, with tips barely extending beyond ommatophores; ventral palps long, tapered, smooth (according to Monro, 1937:264, ommatophores ringed with reddish brown, with reddish eyespots behind bases). Tentacular segment visible dorsally; tentaculophores lateral to prostomium, without setae, with 2 pairs of tentacular cirri, only right ventral tentacular cirrus remaining, longer than lateral antenna (Figure 37A).

Second segment with first pair of elytrophores, long ventral buccal cirri, similar to tentacular cirri, and biramous parapodia; notopodium long, digitiform, with numerous long capillary notosetae extending beyond neurosetae; neuropodium larger, subconical, with prominent anteroventral bract; neurosetae long, finely spinous, with capillary tips, lower ones short, tapering to fine tips (Figure 37A,C,D). Pharynx not extended (not examined).

Third segment with pair of dorsal cirri with short cirrophores and styles extending to tips of neurosetae; notopodium short, rounded, with long capillary notosetae; neuropodium with upper and lower neurosetae similar, lanceolate, spinous; middle row of neurosetae stout, acicular, with tips broken; ventral cirri tapered, almost as long as dorsal cirri (Figure 37A,E–H). Parapodia from segment 4 without notosetae. Parapodia of segment 8 with upper neurosetae similar to those of anterior parapodia, lower neurosetae curved, with prominent spines basally and close-set spines distally; middle stout acicular neurosetae frayed distally, aristate (Figure 37I–L).

Beginning with segment 9, notopodium wide, rounded, flattened, anterodorsal to upper half of neuropodium, with notoaciculum and spinning glands; neuropodium with slightly bilobed presetal acicular lobe, short anterodorsal bract under notopodium, anteroventral bract and truncate postsetal lobe; three groups of neurosetae: lower group numerous, within anteroventral bract, similar to more anterior neurosetae; middle row stout, acicular, hairy distally and subdistally along one side, aristate; upper group, emerging from anteroventral bract, of 2 types: (a) longer, fewer (up to 5 in number), slender with brush-like tips, with or without slender tip; (b) short, more numerous, with widely spaced spines and fine tips (Figures 37M–P, 38A–I). Dorsal cirri short, subulate, shorter than neurosetae; ventral cirri short, tapered, nearly as long as dorsal cirri (Figure 38B,G). Without parapodial branchiae.

ETYMOLOGY.—The species is named for the collection site of Zanzibar.

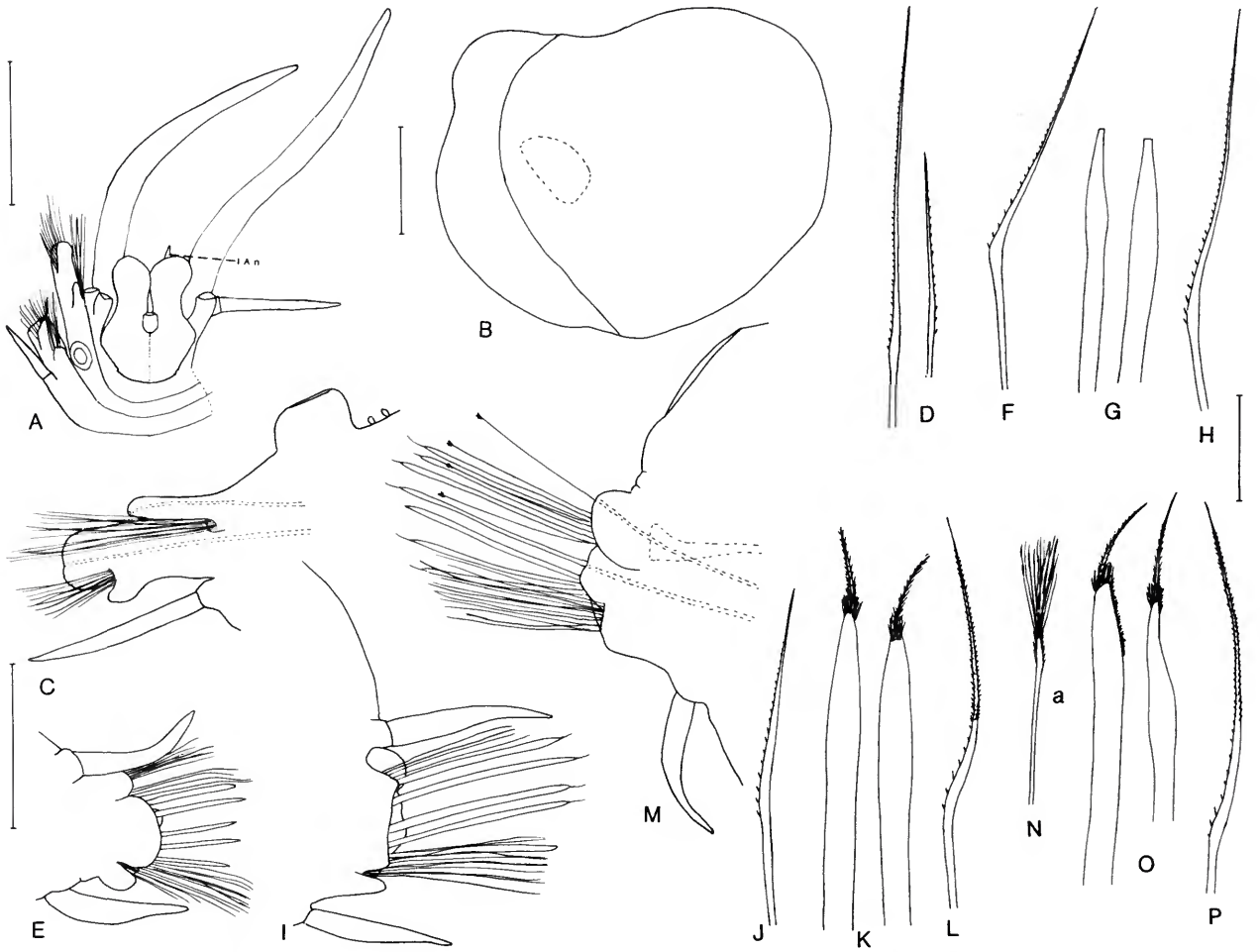


FIGURE 37.—*Panthalis zanzibarensis*, holotype (BMNH 1937.9.2.75): A, dorsal view of anterior end (right parapodia of segments 2 and 3 cut off, styles of left dorsal and ventral and right dorsal tentacular cirri and left lateral median antennae missing); B, left 15th elytron from segment 29; C, right elytragerous parapodium from segment 2, anterior view, acicula dotted; D, middle and lower neurosetae from same; E, right cirrigerous parapodium from segment 3, posterior view; F–H, upper, middle (tips broken), and lower neurosetae from same; I, right cirrigerous parapodium from segment 8, posterior view; J–L, upper, middle, and lower neurosetae from same; M, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; N–P, upper, middle, and lower neurosetae from same. (Scales: A = 1.0 mm; B and C,E,I,M = 0.5 mm; D,F–H,J–L,N–P = 0.1 mm.)

DISTRIBUTION.—British East Africa. In 183–190 meters.

Panthalis mutilata (Treadwell, 1906)

FIGURES 39, 40

Polynoe mutilata Treadwell, 1906:1152, figs. 12–15.
Eupanthalis oahuensis Treadwell, 1906:1155, figs. 19–23.
Eupanthalis evanida Treadwell, 1926:186, figs. 6–12.
Eupanthalis mutilata.—Hartman, 1938b:123, fig. 40a–f; 1966a:177.
Panthalis evanida.—Hartman, 1938b:127.
Panthalis mutilata.—Bailey-Brock, 2987:239, fig. 33.II.10a–c.

MATERIAL EXAMINED.—HAWAIIAN ISLANDS. North coast of Molokai Island, Mokapu Inlet, 600 m, fine gray sand, *Albatross* sta D3892, 18 Apr 1902, 3 paratypes and part of tube of *Polynoe mutilata* (AMNH 343). Vicinity of Kauai Island, Ukula Point, 584 m, fine gray sand, rocks, *Albatross* sta D4027, 24 Jun 1902, holotype of *Polynoe mutilata* (USNM 5204).

PHILIPPINE ISLANDS. Balicasag Island, 09°12′45″N, 123°45′30″E, 1472 m, green mud, globigerina, *Albatross* sta D5526, 11 Aug 1909, holotype of *E. evanida* (USNM 19208).

TYPE MATERIAL.—Holotype of *Polynoe mutilata* consists of anterior and middle fragments, with 73+ segments, 54+ mm long, 6 mm wide with setae; the prostomium is in very

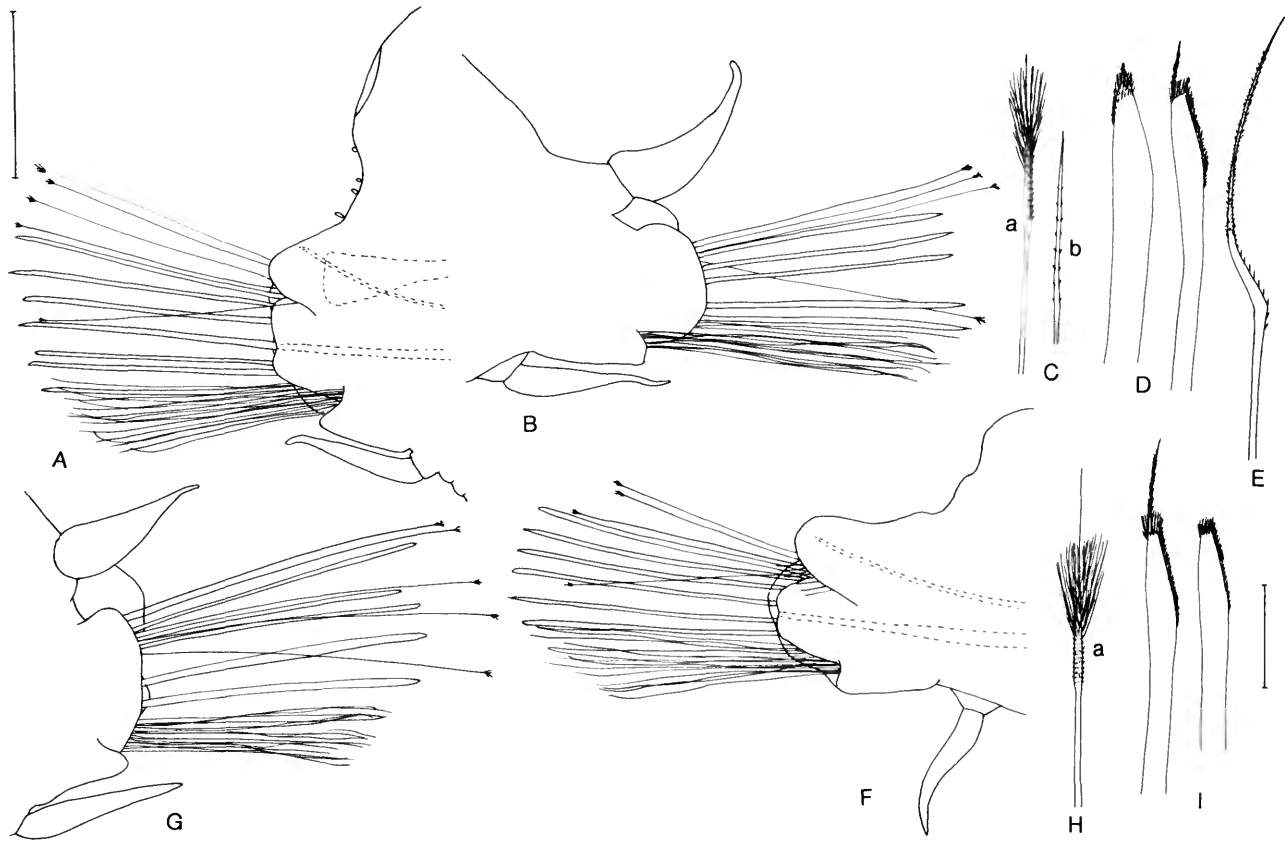


FIGURE 38.—*Panthalis zanzibarensis*, holotype (BMNH 1937.9.2.75): A, right elytragerous parapodium from segment 15, anterior view, acicula and spinning gland dotted; B, right cirrigerous parapodium from segment 16, posterior view; C–E, upper, middle, and lower neurosetae from same; F, right elytragerous parapodium from segment 31, anterior view, acicula dotted; G, right cirrigerous parapodium from segment 32, posterior view; H,I, upper and middle neurosetae from same. (Scales: A,B,F,G = 0.5 mm; C–E,H,I = 0.1 mm.)

poor condition; the pharynx was fully extended, the right lower jaw had been cut out. The three paratypes of *P. mutilata* are in rather poor condition; a complete female with large yolky eggs has 122 segments, measures 56 mm long, 6 mm wide. The holotype of *Eupanthalis evanida* consists of an anterior fragment of 44+ segments, 25+ mm long, 12 mm wide; the elytra are mostly missing, the remaining ones soft and crumpled. The type of *Eupanthalis oahuensis* is missing; it is not in the USNM collections where it was supposed to have been deposited. It was reported from the same *Albatross* sta D3892 as the 3 paratypes of *P. mutilata;* based on the description of *E. oahuensis*, it was referred to *E. mutilata* by Hartman (1938b:123) when she examined the types in the USNM collections and found *E. oahuensis* missing.

DESCRIPTION.—Elytra delicate, smooth, oval, with lateral pouch, leaving middorsum uncovered.

Bilobed prostomium with colorless globular ommatophores on anterior half of prostomium; median antenna with small ceratophore on middle of prostomium, with style extending beyond ommatophores; lateral antennae inserted ventrally on ommatophores, with tips extending far beyond ommatophores; ventral palps long, tapered, smooth. Tentacular segment visible dorsally; tentaculophores lateral to prostomium, with small bundle of capillary setae and 2 pairs of dorsal and ventral tentacular cirri, longer and thicker than lateral antennae (Figure 39A; Treadwell, 1926, fig. 6).

Second segment with first pair of elytrophores, long ventral buccal cirri similar to tentacular cirri, and biramous parapodia; notopodium long, digitiform, with numerous long, finely spinous, capillary notosetae extending beyond neurosetae; neuropodium larger, subconical, with prominent anteroventral bract; neurosetae long, spinous, with capillary tips, lower ones shorter with more prominent spines (Figure 39B–D; Treadwell, 1906, figs. 19, 20; Treadwell, 1926, fig. 7). Distal border of extended pharynx with 15 pairs of papillae, middorsal one much longer than others, midventral one slightly longer; two pairs of jaws, each with about 18 lateral teeth (Hartman, 1938b, fig. 40e).

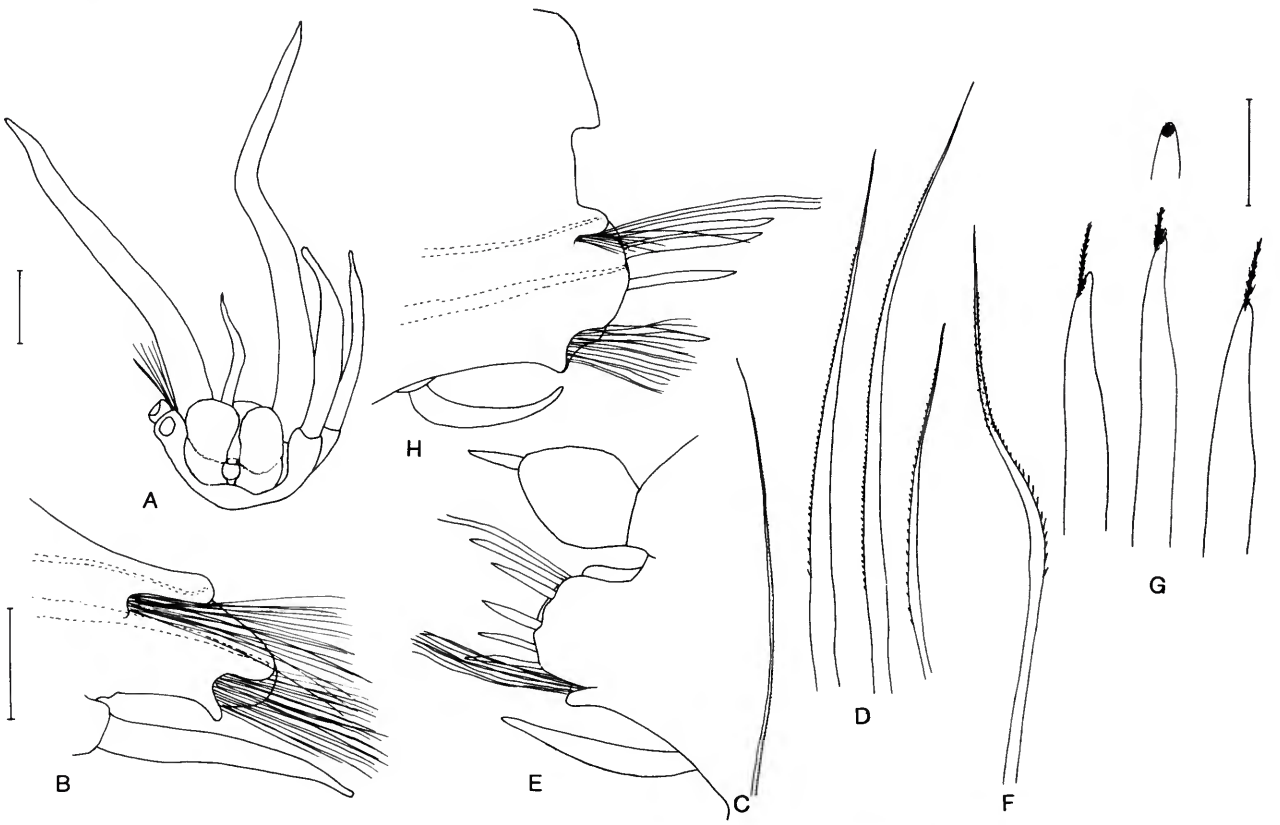


FIGURE 39.—*Panthalis mutilata*, holotype of *Eupanthalis evanida* (USNM 19208): A, dorsal view of prostomium and tentacular segment (styles of left tentacular cirri and right lateral antenna missing; style of median antenna broken near base); B, left elytragerous parapodium from segment 2, anterior view, acicula dotted; C, notoseta from same; D, two longer middle and shorter lower neurosetae from same; E, left cirrigerous parapodium from segment 3, posterior view; F,G, upper and middle neurosetae from same; H, left elytragerous parapodium from segment 4, anterior view, acicula dotted. (Scales: A = 1.0 mm; B,E,H = 0.5 mm; C,D,F,G = 0.1 mm.)

Third segment with pair of dorsal cirri with short cirrophores and styles extending to tips of neurosetae, inflated basally; notopodium short, rounded, with few short notosetae; neuropodium with upper and lower neurosetae similar, lanceolate, spinous; middle row of neurosetae stout, acicular, aristate; ventral cirri tapered, almost as long as dorsal cirri (Figure 39E–G; Treadwell, 1906, figs. 12, 13, 21, 22; Treadwell, 1926, fig. 8–11). Parapodia of segment 4 with few short notosetae, absent more posteriorly (Figure 39H). Segment 8 with dorsal and ventral cirri about equal in length; upper few neurosetae slender, with large spines basally, fine spines distally on tapering curved tip; middle acicular neurosetae with slightly hooked tip with distal hairs, with or without aristae (Figure 40A–C).

Beginning with segment 9, notopodium wide, rounded, flattened, anterodorsal to upper half of neuropodium, with notoaciculum and spinning glands; neuropodium with slightly bilobed presetal acicular lobe, prominent anteroventral bract, and truncate postsetal lobe; three groups of neurosetae: lower group numerous, within anteroventral bract, curved, longer spines basally, tapering to capillary, finely spinous tips; middle group stout acicular neurosetae with slightly hooked tips, hairy distally and subdistally on one side, aristate; upper group, emerging from low anterodorsal bract hidden by notopodium, of 2 types: (a) few (3–5), long, slender, with brush-like tips; (b) more numerous, short, slender, with widely spaced spines and tapered tips (Figure 40D–K; Treadwell, 1906, figs. 14, 15, 23; Treadwell, 1926, fig. 12; Hartman, 1938b, fig. 40a–d,f). Without parapodial branchiae.

TUBE.—The tube is soft, flabby, composed of several layers forming a fibrous mat. According to Treadwell (1906:1153) the outer surface of the thick-walled mud tubes were covered with deposits of thick brown mud.

DISTRIBUTION.—Hawaiian and Philippine Islands. In 584 to 1472 meters.

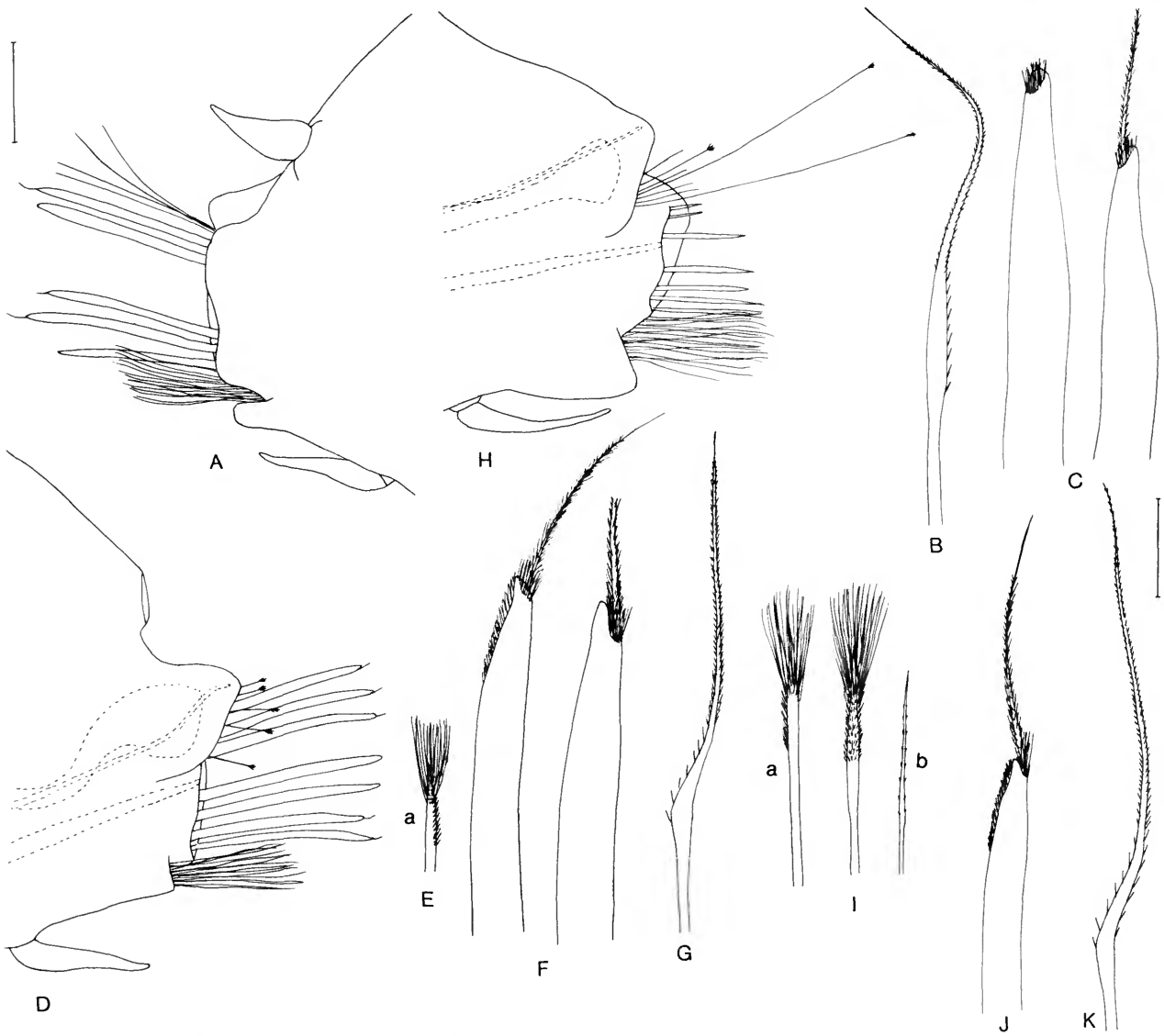


FIGURE 40.—*Panthalis mutilata*, holotype of *Eupanthalis evanida* (USNM 19208): A, left cirrigerous parapodium from segment 8, posterior view; B,C, upper and middle neurosetae from same; D, left elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; E–G, upper, middle, and lower neurosetae from same (with detail of tip); H, left elytragerous parapodium from segment 25, anterior view, acicula and spinning gland dotted; I–K, upper, middle, and lower neurosetae from same. (Scales: A,D,H = 0.5 mm; B,C,E–G,I–K = 0.1 mm.)

Panthalis novaezealandiae Knox, 1960

FIGURE 41

Panthalis novaezealandiae Knox, 1960:81, figs. 7–14.

MATERIAL EXAMINED.—NEW ZEALAND. Chatham Rise, 43°32′S, 178°38′E, 549 m, fine green sand, CIE sta 5, 1954, paratype and tube (CMC).

TYPE MATERIAL.—Paratype with 29+ segments, 22+ mm long, 9 mm wide with setae. According to Knox (1960:81), holotype with 22+ segments, 7.5 mm long, 5 mm wide.

DESCRIPTION.—Elytra delicate, smooth, showing "veins," rounded to oval, anterior few pairs covering dorsum, rest leaving middorsum uncovered, with eccentric place of attachment near lateral side, with lateral pouch beginning on 9th elytra (Figure 41B,C; Knox, 1960, fig. 9).

Bilobed prostomium with colorless ovoid ommatophores on anterior half of prostomium; median antenna with small

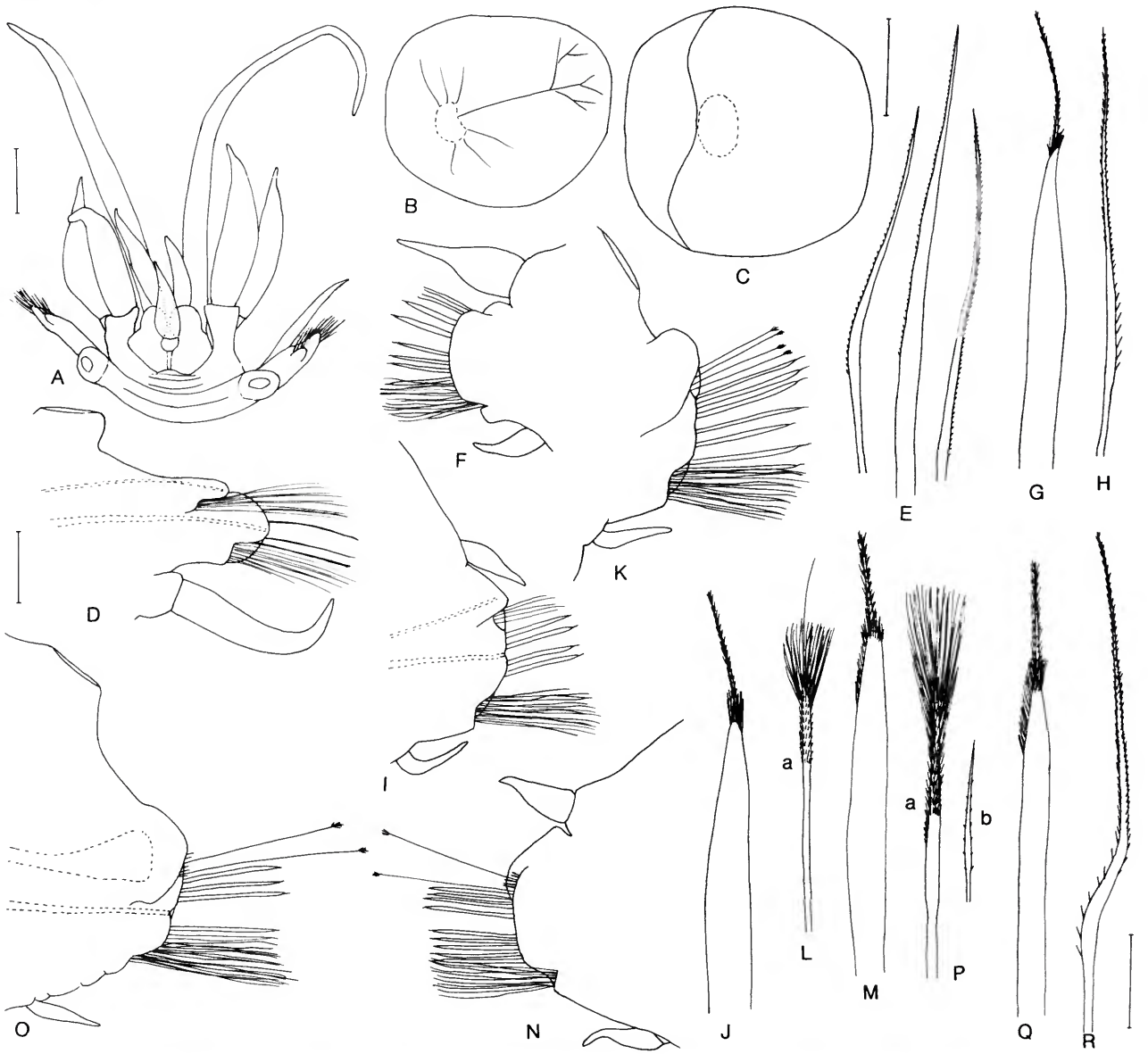


FIGURE 41.—*Panthalis novaezealandiae*, holotype (CMC): A, dorsal view of anterior end; B, left 5th elytron from segment 9, showing "veins"; C, left 12th elytron from segment 23; D, left elytragerous parapodium from segment 2, anterior view, acicula dotted; E, upper, middle and lower neurosetae from same; F, left cirrigerous parapodium from segment 3, posterior view; G,H, middle and lower neurosetae from same; I, left cirrigerous parapodium from segment 8, anterior view, acicula dotted, style of dorsal cirrus regenerating, smaller than usual; J, middle neuroseta from same; K, left elytragerous parapodium from segment 9, anterior view; L,M, upper and middle neurosetae from same; N, left cirrigerous parapodium from segment 22, posterior view; O, left elytragerous parapodium from segment 23, anterior view, neuroaciculum and spinning gland dotted; P–R, upper, middle, and lower neurosetae from same. (Scales: A and B,C = 1.0 mm; D,F,I,K,N,O = 0.5 mm; E,G,H,J,L,M,P–R = 0.1 mm.)

ceratophore on middle of prostomium, with style subulate, inflated basally, longer than prostomium; lateral antennae inserted ventrally on ommatophores, similar to median antenna; paired palps long, smooth (longitudinally ridged on holotype, according to Knox, perhaps shrunken?). Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with or without few setae and pair of dorsal and ventral tentacular cirri, inflated basally, longer and thicker than

lateral antennae (Figure 41A; Knox, 1960, figs. 7, 8).

Second segment with first pair of elytrophores, long ventral buccal cirri similar to tentacular cirri, and biramous parapodia; notopodium digitiform, with bundle of long capillary notosetae; neuropodium larger, subconical, with anteroventral bract; neurosetae long, tapering, finely spinous, middle ones stouter (Figure 41A,D,E; Knox, 1960, fig. 10). Pharynx not extended and not examined.

Third segment with dorsal cirri with short cirrophores and styles extending beyond tips of neurosetae, inflated basally, longer than ventral cirri; notopodium conical with few notosetae; upper and lower neurosetae similar, long, lanceolate, spinous, slightly curved; middle neurosetae stout, acicular, aristate (Figure 41F–H). Parapodia of segment 8 with dorsal and ventral cirri nearly equal in length, extending to tip of parapodium; notopodium conical, without notosetae; neurosetae similar to those on preceding neuropodia.

Beginning with segment 9, notopodium wide, rounded, flattened, on dorsoanterior half of neuropodium, with notoaciculum and spinning fibers, without notosetae; neuropodium with slightly bilobed presetal acicular lobe, anteroventral bract, and truncate postsetal lobe; three groups of neurosetae; lower group numerous, within anteroventral bract, curved, lanceolate, with large spines basally and close-set small spines distally; middle group of stout acicular neurosetae, hairy distally and subdistally on one side, aristate; upper group, emerging from low anterodorsal bract hidden by notopodium, of 2 types: (a) few (2–4), long, slender, with brush-like tips; (b) more numerous (about 13), short, slender, with widely spaced spines and tapered tips (called notosetae by Knox) (Figure 41K–R; Knox, 1960, figs. 9, 11–14). Dorsal and ventral cirri short, about equal in length (Figure 41N). Without parapodial branchiae.

TUBE.—The tube was soft, felt-like, mixed with mud.

DISTRIBUTION.—Chatham Rise, New Zealand. In 229 to 549 meters.

Panthalis alaminosae, new species

FIGURES 42–46

Polyodontes sp. A.—Wolf, 1984:5 [part].

MATERIAL EXAMINED.—GULF OF MEXICO. R/V *Alaminos* cruises, 1967, 1968, from L.H. Pequegnat: 67 A5–9A, 19 Jul, 29°27′N, 86°57′W, 752 m, 7 paratypes (USNM 98800); 68 A7–2A, 26 Jul, 28°56′N, 88°42′W, 408 m, 2 paratypes (USNM 98801). 68 A7–9A, 4 Aug, 29°27.6′N, 86°45.5′W, 389 m, 5 paratypes (USNM 98802); 68 A7–10A, 4 Aug, 29°15.5′N, 86°55′W, 566 m, paratype (USNM 98803); 68 A13–4, 12 Nov, 25°38.4′N, 96°18.3′W, 512 m, holotype (USNM 98797), 11 paratypes (USNM 98798–9); 68 A13–18, 19 Nov, 27°45′N, 95°16′W, 439 m, 4 paratypes (USNM 98804); 68 A13–19, 19 Nov, 27°44.9′N, 95°20′W, 338–384 m, 6 paratypes (USNM 98805). Mississippi-Alabama-Florida Outer Continental Shelf Study (MAFLA) sta 2312D, Jul 1976, 28°23′59.3″N, 85°15′03″W, 177 m, clayey sandy silt, 1 specimen (BAV, as *Polyodontes* sp. A by Wolf, 1984). South Texas Outer Continental Shelf Study (STOCS) sta 3/II-2, Fall 1976, 27°30′N, 96°45′W, 49 m, silty clay, juvenile (USNM 86850, as *Polyodontes* sp. A by Wolf, 1984).

WEST INDIES. Puerto Rico, San Juan, Interstate Electronic Corp. sta 004–006, 25 Feb 1980, 18°30′27″N, 66°109′12″W, 259 m, juvenile (USNM 98806).

TYPE MATERIAL.—Holotype incomplete, with 39+ segments, 26+ mm long, 8 mm wide with setae. Largest paratype complete, with 57 segments, last 2 very small, 47 mm long, and 8 mm wide.

DESCRIPTION.—Body elongate, flattened dorsoventrally, tapered slightly anteriorly and more so posteriorly. Elytra delicate, smooth, oval, first 2 pairs covering prostomium, rest leaving middorsum uncovered, attached eccentrically to elytrophores near lateral side, with shallow lateral pocket beginninig with 4th elytra on segment 7 (Figure 42C–F).

Bilobed prostomium with pair of small rounded colorless ommatophores on anterior part of wider prostomium, with some scattered pigment spots but without distinct posterior eyes; median antenna with short ceratophore on middle of prostomium, with style longer than prostomium; lateral antennae inserted slightly ventral on anterior part of ommatophores, about as long as median antenna, fully visible dorsally; palps very long, smooth, tapered, extending to tip of fully extended pharynx. Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with 2 acicula, small bundle of capillary setae, and pair of dorsal and ventral tentacular cirri, longer than antennae (Figure 42A,B,G).

Second segment with first pair of elytrophores, long ventral buccal cirri, similar to but shorter than tentacular cirri, and biramous parapodia; notopodium short, digitiform, with small bundle of long, finely spinous, capillary notosetae; neuropodium with rounded presetal and postsetal lobes and anteroventral bract; neurosetae numerous, long, slender, spinous, tapering to capillary tips (Figure 42A,B,H–J). Ventral mouth enclosed in segments 1–3 (Figure 42B). Distal border of extended pharynx with 15 pairs of papillae, lateral pairs very small and easily overlooked; middorsal one very long and tapered, midventral one only slightly longer than lateral ones; 2 pairs of hooked jaws each with 7–12 lateral teeth.

Third segment with dorsal cirri with short cirrophores and subulate styles, inflated basally, about same length as ventral cirri, both extending to tips of neurosetae; notopodium small, rounded, with few notosetae; upper and lower neurosetae similar, long, lanceolate, spinous, with capillary tips; middle neurosetae stout, acicular, with tips blunt, hairy, aristate (Figure 42K–N). Parapodia of segment 8 with short dorsal and ventral cirri, without notosetae; neurosetae similar to those of more anterior parapodia (Figure 43A–D).

Beginning with segment 9, notopodium wide, rounded, flattened, on dorsoanterior half of neuropodium, with notoaciculum and spinning glands, without notosetae; neuropo-

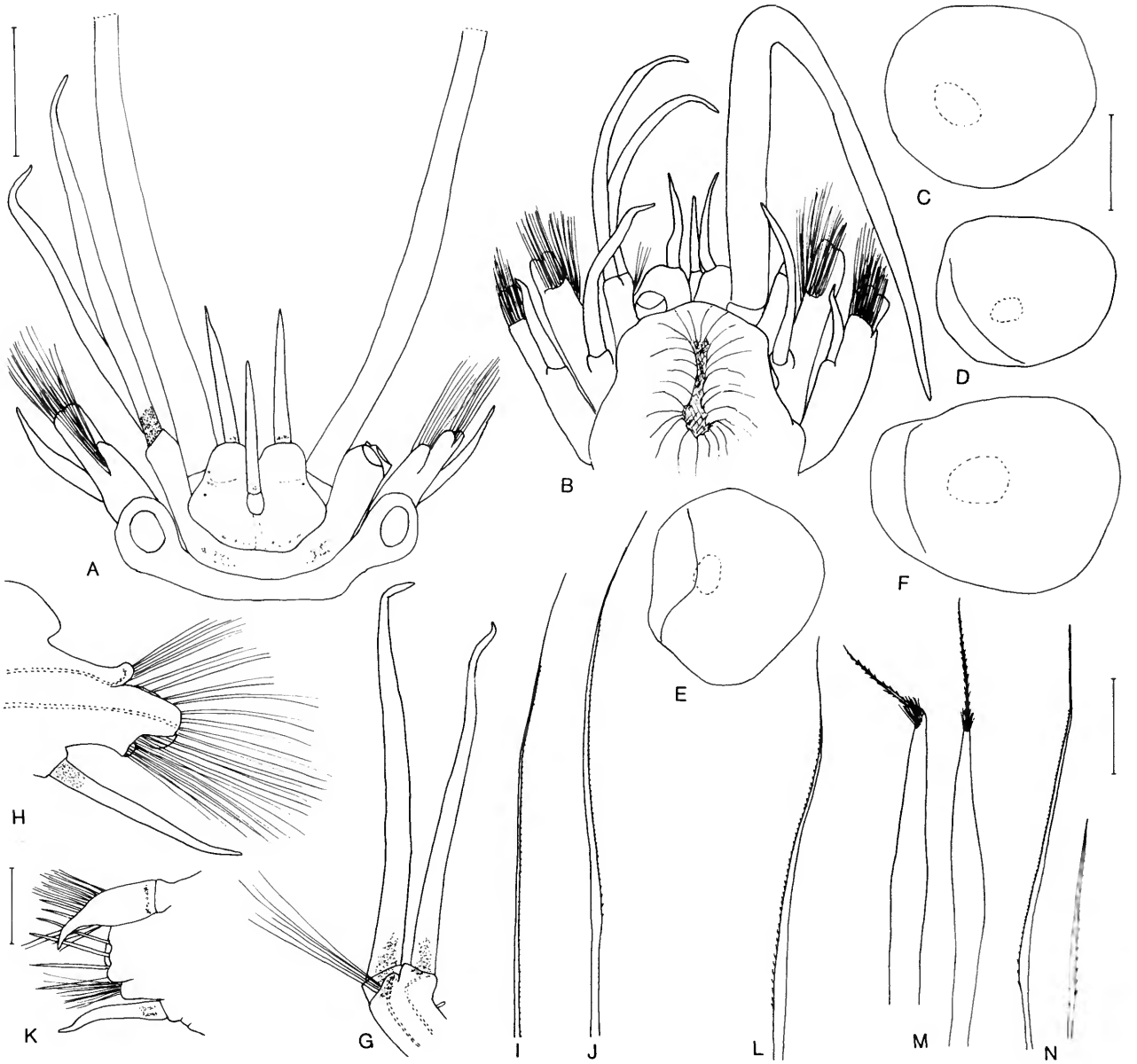


FIGURE 42.—*Panthalis alaminosae* (A,C–N, holotype, USNM 98797; B, paratype, USNM 98798): A, dorsal view of anterior end, pharynx fully extended (not shown), (styles of right tentacular cirri missing, palps only partially shown); B, ventral view of anterior end (right palp broken off, left tentacular cirri not shown); C, left 1st elytron from segment 2; D, left 4th elytron from segment 7; E, left 5th elytron from segment 9; F, left 11th elytron from segment 21; G, left tentaculophore with dorsal and ventral tentacular cirri, inner view, acicula dotted; H, left elytrageroous parapodium from segment 2, anterior view, acicula dotted; I, notoseta from same; J, neuroseta from same; K, left cirrigerous parapodium from segment 3, posterior view; L–N, upper, middle, and lower neurosetae from same. (Scales: A,B and C–F = 1.0 mm; G,H,K = 0.5 mm; I,J,L–N = 0.1 mm.)

dium with rounded presetal acicular lobe, anteroventral bract, and truncate postsetal lobe; three groups of neurosetae: lower group, within anteroventral bract, numerous, curved, lanceolate, with larger spines basally and small close-set spines on tapering capillary tips; middle group stout, acicular, with tips blunt, aristate, hairy distally and subdistally along one side; upper group, emerging from low anterodorsal bract hidden by notopodium, of 2 types: (a) few (3–6), long, slender, with brush-like tips; (b) more numerous, short, slender, with widely spaced spines and tapered tips (Figure 43E–O). Dorsal cirri subulate, inflated basally, ventral cirri tapering, both short, about equal in length (Figure 43F,K). Without parapodial branchiae.

JUVENILES (Figures 44–46).—Three juveniles are provisionally referred to this species, 2 from the Gulf of Mexico with 27+ and 43+ segments, 10+ and 19+ mm long, 5.5 and 6 mm wide with setae; a smaller juvenile from Puerto Rico with 35+ segments, 8+ mm long and 3 mm wide. The elytra are large, oval, nearly covering the dorsum, with large lateral pockets (Figure 44D–F). The prostomium differs from the adults in having rounded pigmented ommatophores and small eyespots in line with the ceratophore of the median antenna (Figures 44A, 46A). The pharynx has 13 pairs of border papillae, the middorsal one extra long and tapering, the midventral one not extra long; the jaws each have 5–8 lateral teeth (Figure 44B,C). The anterior parapodia of segments 2 to 8 are similar to the adults (Figures 44G–K, 45A–D). Beginning with segment 9, the parapodia have the spinning glands and the neurosetae characteristic of the adults (Figures 45E–N, 46B–F).

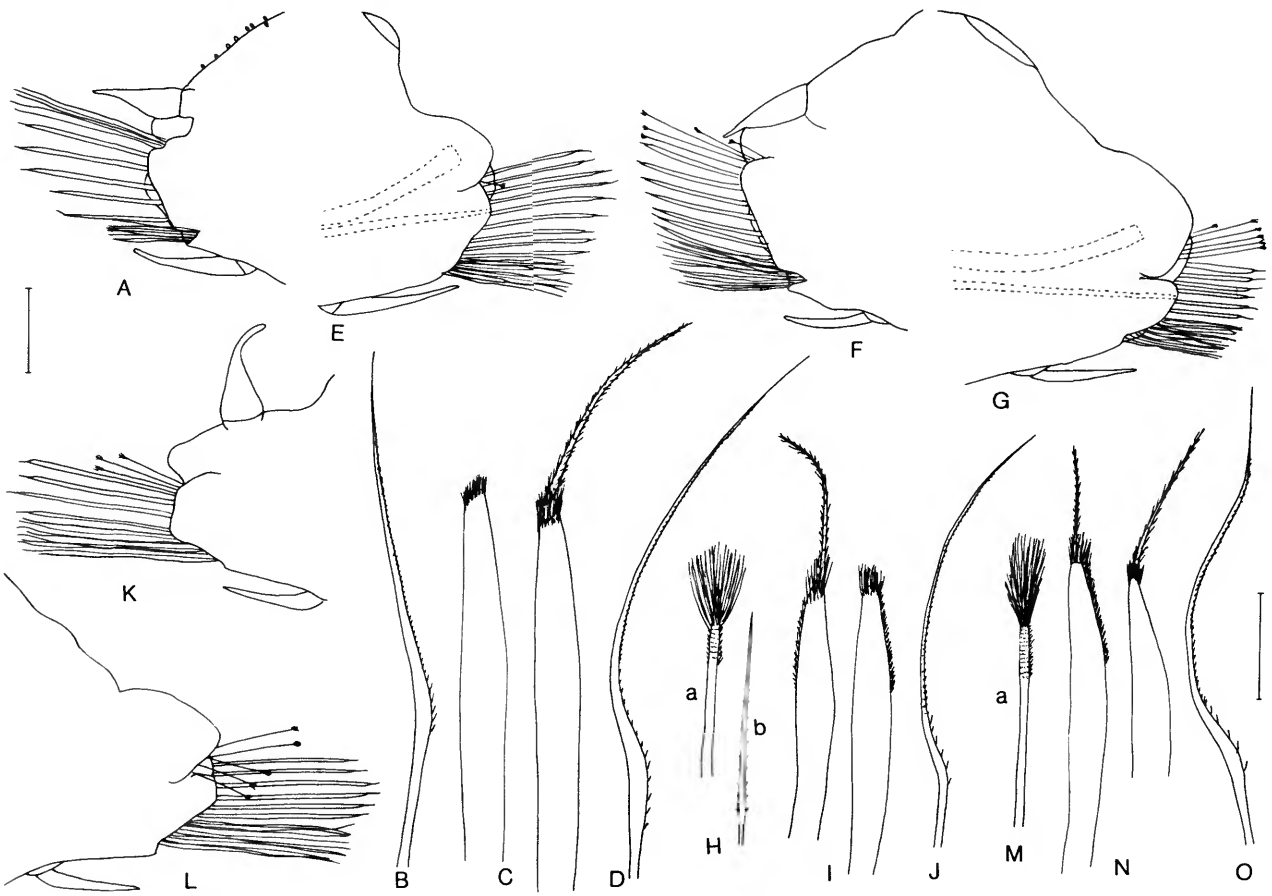


FIGURE 43.—*Panthalis alaminosae*, holotype (USNM 98797): A, left cirrigerous parapodium from segment 8, posterior view; B–D, upper, middle, and lower neurosetae from same; E, left elytragerous parapodium from segment 9, anterior view, neuroaciculum and spinning gland dotted; F, left cirrigerous parapodium from segment 20, posterior view; G, left elytragerous parapodium from segment 21, anterior view, neuroaciculum and spinning gland dotted; H–J, upper, middle, and lower neurosetae from same; K, left cirrigerous parapodium from segment 36, posterior view; L, left elytragerous parapodium from segment 37, anterior view; M–O, upper, middle, and lower neurosetae from same. (Scales: A,E–G,K,L = 0.5 mm; B–D,H–J,M–O = 0.1 mm for.)

ETYMOLOGY.—The species is named for the collecting ship, R/V *Alaminos*.

DISTRIBUTION.—Gulf of Mexico, Puerto Rico. In 338–752 m for adults, 49–259 m for juveniles.

Genus *Acoetes* Audouin and Milne-Edwards, 1832

Acoetes Audouin and Milne-Edwards, 1832:435–437. [Type-species: *Acoetes pleei* Audouin and Milne-Edwards, 1832, by monotypy. Gender: feminine.]
Eupompe Kinberg, 1855 [1856]:387. [Type-species: *Eupompe grubei* Kinberg, 1855 [1856], by monotypy. Gender: feminine.]

DIAGNOSIS.—Prostomium bilobed, with pair of bulbous stalked ommatophores directed anteriorly and pair of small eyes; median antenna with ceratophore in middle of prostomium, lateral antennae inserted ventrally below ommatophores, with tips visible dorsally; pair of long palps, smooth or papillated. First or tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with 2 acicula, 2–4 groups of capillary setae and pair of tentacular cirri. Second segment with first pair of elytra and long ventral buccal cirri; biramous parapodia with bundle of notosetae; neurosetae slender, spinous, lanceolate. Acicular neurosetae from segment 3. Elytra on segments 2, 4, 5, 7, continuing on alternate segments. Dorsal cirri with short cirrophores and short styles on nonelytragerous segments; ventral cirri short, subulate. Notopodium from segment 9 wide, flattened, anterodorsal to

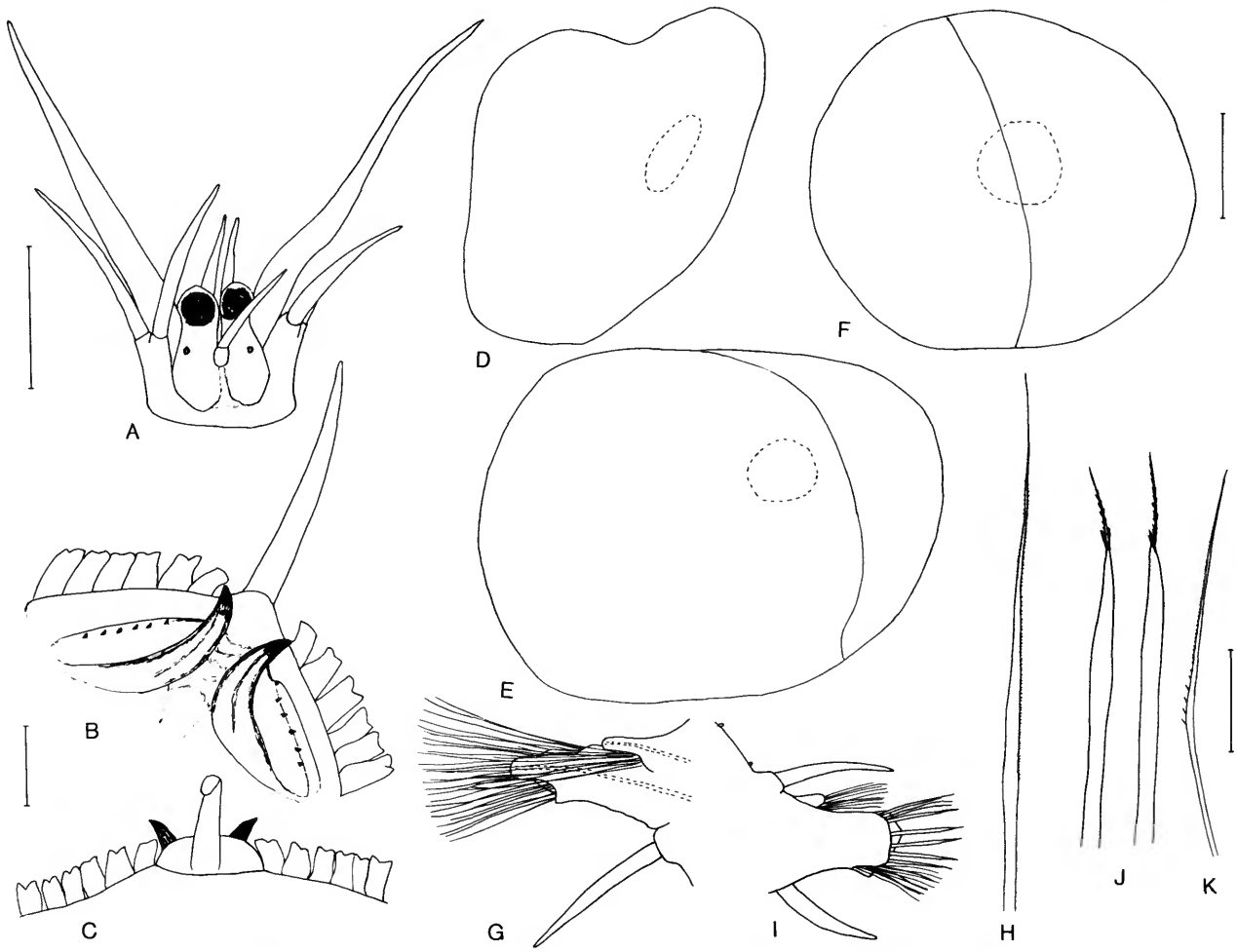
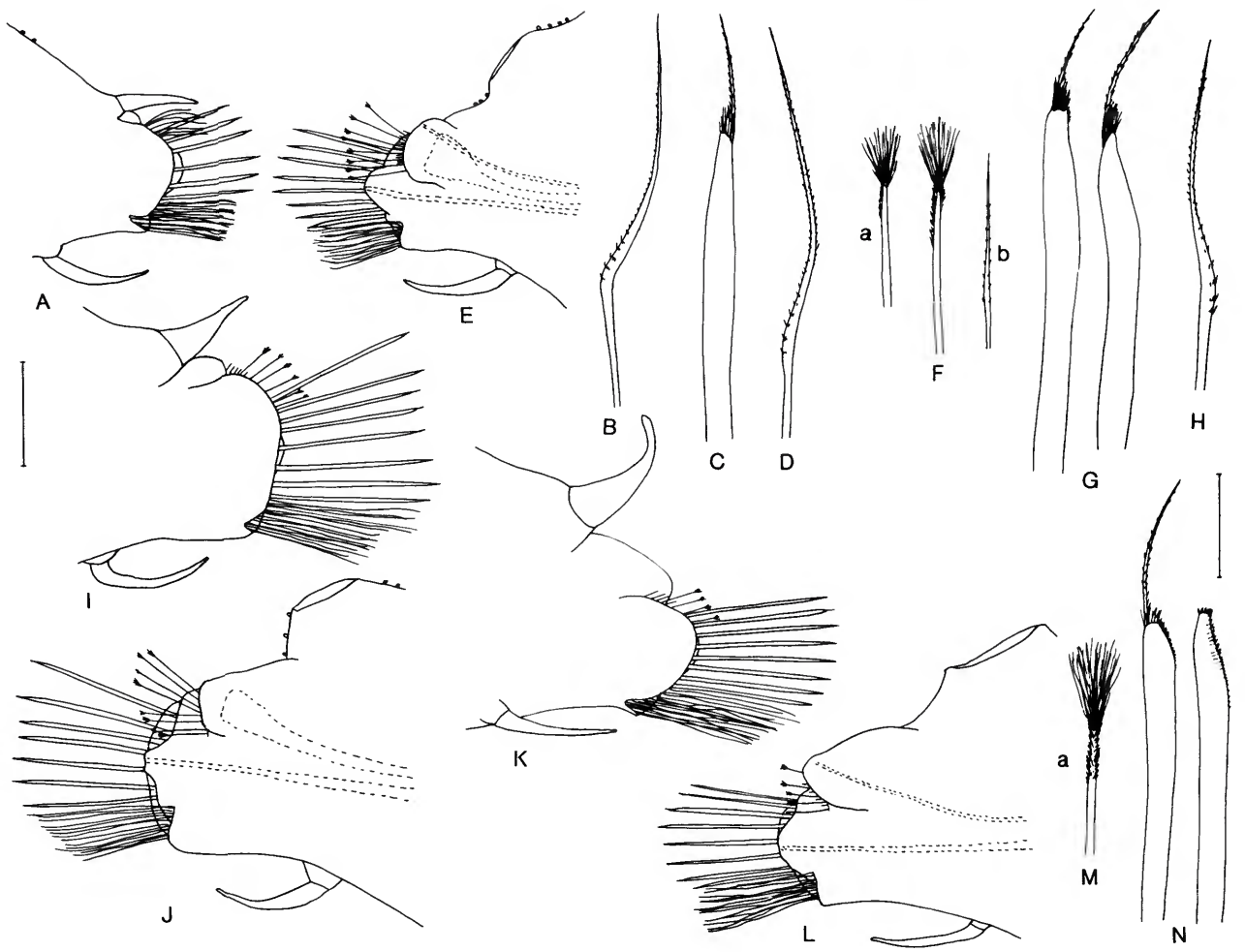


FIGURE 44.—*Panthalis alaminosae*, juvenile from Port Aransas (USNM 86850): A, dorsal view of prostomium and tentacular segment, pharynx completely extended (not shown), (right ventral tentacular cirrus broken off); B, inner view of distal end of pharynx showing upper jaws and border papillae; C, outer view of tips of lower jaws and border papillae; D, right 1st elytron from segment 2; E, right 5th elytron from segment 9; F, right 22nd elytron from segment 43; G, right elytragerous parapodium from segment 2, anterior view, acicula dotted; H, middle neuroseta from same; I, right cirrigerous parapodium from segment 3, posterior view; J,K, middle and lower neurosetae from same; (Scales: A = 1.0 mm; B,C and D–G,I = 0.5 mm; H,J,K = 0.1 mm.)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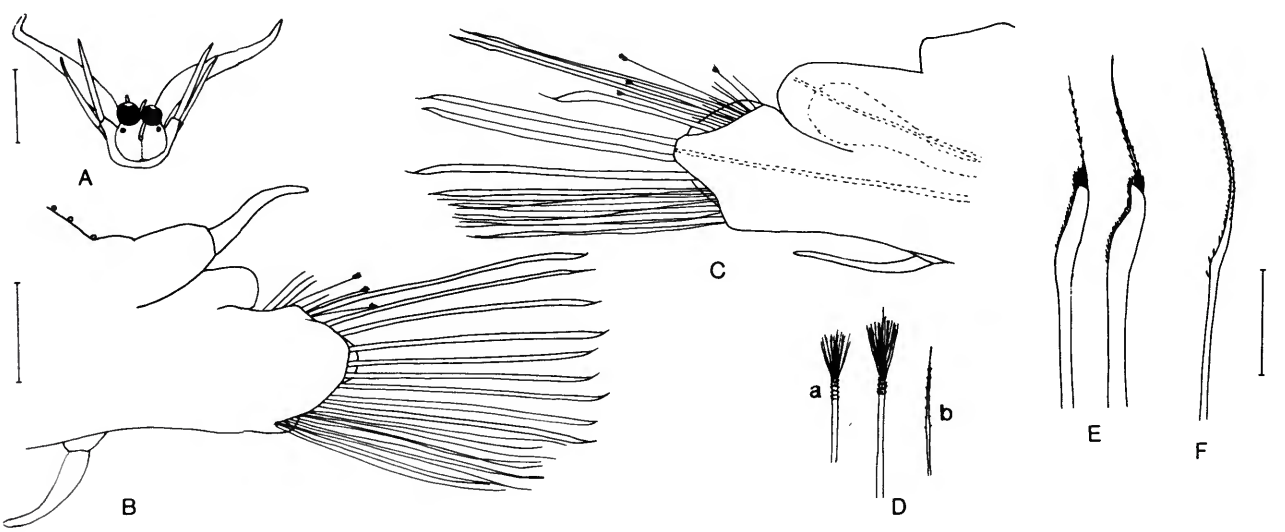
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FIGURE 45.—*Panthalis alaminosae*, juvenile from Port Aransas (USNM 86850): A, right cirrigerous parapodium from segment 8, posterior view; B–D, upper, middle, and lower neurosetae from same; E, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; F–H, upper, middle, and lower neurosetae from same; I, right cirrigerous parapodium from segment 20, posterior view; J, right elytragerous parapodium from segment 21, anterior view, neuroaciculum and spinning gland dotted; K, right cirrigerous parapodium from segment 42, posterior view; L, right elytragerous parapodium from segment 43, anterior view, acicula dotted; M,N, upper and middle neurosetae from same. (Scales: A,E,I–L = 0.5 mm; B–D, F–H,M,N = 0.1 mm.)

neuropodium, with notoaciculum, internal spinning glands, and small row of delicate notosetae; neuropodium with lower group of neurosetae within anteroventral bract, neurosetae curved, spinous, lanceolate; middle row of stout acicular neurosetae, with or without aristae; upper group of neurosetae, emanating from low anterodorsal bract (hidden by notopodium), of 2 types: (a) longer, abruptly tapered to slender spinous tips, long spines subdistally and short spinous rows basally, (b) short (hidden by notopodium), bipinnate. With or without parapodial branchiae. Distal border of large muscular pharynx with 13–15 pairs of papillae, middorsal and midventral ones on wide lobulated bases, middorsal one longer than others; 2 pairs of hooked jaws, each with 5–9 lateral teeth.

The genus includes 12 species (plus 4 synonyms), of which 4 are new and 7 new combinations (one a doubtful species).

Key to the Species of *Acoetes**

1. Parapodia of segment 2 extra large, with neuropodia somewhat ruffled or lobed distally, both notosetae and neurosetae very numerous, forming continuous fan-shaped bundles [Figures 54C,D,G, 60E, 66F,G]. Parapodia with branchiae [Figures 55M,N,R, 61B,G, 67K]. Ommatophores of prostomium with long necks [Figures 54A, 60A, 66A,B] 2

   Parapodia of segment 2 not extra large, notosetae and neurosetae not forming continuous fan-shaped bundles [Figure 47G] 4

2. Neuropodia of segment 2 distally lobed, with rounded ventral bract [Figure 60E]. Palps papillate [Figure 60A]. Stout acicular neurosetae slightly hooked distally, without hairs near bases of aristae [Figure 61D,I,U] . ***A. mohammadi***, new species

   Neuropodia of segment 2 ruffled distally [Figures 54C,D,G, 66F,G] 3

3. Neuropodia of segment 2 with long digitiform ventral bract [Figure 54C,D,G]. Palps papillate [Figure 54A]. Middle stout acicular neurosetae tapered distally, with hairs near bases of aristae [Figure 55K,P,T] . ***A. bicolor*** (Grube), new combination

   Neuropodia of segment 2 with truncate ventral bract [Figure 66F,G]. Palps smooth, not papillate [Figure 66A,B]. Middle stout acicular neurosetae slightly hooked distally, without hairs near bases of aristae [Figure 67I,M] . . . . ***A. grubei*** (Kinberg), new combination

4. Tentacular cirri short, bulbous, with short filamentous tips [Figure 68A,B]. Ommatophores of prostomium with short necks [Figure 68A]. Parapodia with branchiae [Figure 69A,B,F,G]. Stout acicular neurosetae slightly hooked, without distal hairs [Figure 69D,I] . . . . ***A. southcarolinensis***, new species

   Tentacular cirri tapered or subulate, not bulbous [Figures 47B, 52A] 5

5. Neuropodia of segment 2 rounded or conical, without prominent ventral bracts [Figures 47G, 52F, 58E,F]. Palps with papillae [Figures 47B, 52A, 58A] . . . 6

   Neuropodia of segment 2 with prominent ventral bracts [Figures 56E,F, 62E, 63E, Monro, 1982, fig. 19] 8

6. Ommatophores of prostomium with long necks [Figure 52A]. Middle stout acicular neurosetae with distal hairs near bases of aristae [Figure 53E,J]. Neuropodia of

FIGURE 46.—*Panthalis alaminosae*, juvenile from Puerto Rico (USNM 98806): A, dorsal view of prostomium and tentacular segment, pharynx extended (not shown); B, right cirrigerous parapodium from segment 20, posterior view; C, right elytragerous parapodium from segment 21, anterior view, acicula and spinning gland dotted; D–F, upper, middle, and lower neurosetae from same. (Scales: A = 0.5 mm; B,C = 0.2 mm; D–F = 0.1 mm.)

segment 2 wide, conical [Figure 52F]. Tentacular cirri longer than median antenna [Figure 52A] . . . . . ***A. melanonota*** (Grube), new combination

Ommatophores of prostomium with short necks [Figures 47B, 58A]. Middle stout acicular neurosetae without distal hairs [Figures 48E,L, 59E,T] 7

7. Neuropodia of segment 2 rounded [Figure 47G]. Tentacular cirri similar in length to median antenna [Figure 47B] . . . . . ***A. pleei*** Audouin and Milne-Edwards

Neuropodia of segment 2 wide, conical [Figure 58E]. Tentacular cirri shorter than median antenna [Figure 58A] . . . . . ***A. bataensis,*** new species

8. Ommatophores of prostomium cylindrical, without distinct necks; palps smooth, without papillae [Figures 63A, 64A,B]. Stout acicular neurosetae with hairs on distal tips near bases of aristae; more posterior neurosetae with numerous subdistal spinous rows on one side [Figures 63M,T, 64M,S] . . . . . ***A. pacifica*** (Treadwell), new combination

Ommatophores of prostomium with distinct necks; palps with papillae [Figures 56A,B, 62A, 65A] 9

9. Stout acicular neurosetae without hairs on distal tips near bases of aristae [Figure 65O,S]. Ommatophores of prostomium with short necks [Figure 65A] . . . . . ***A. mortenseni*** (Monro), new combination

Stout acicular neurosetae with hairs on distal tips near bases of aristae [Figures 57J, 62K,P] 10

10. Ommatophores of prostomium with long necks [Figure 56A,B]. More posterior stout acicular neurosetae with single row of subdistal spines on one side [Figure 57J] . . . . . ***A. congoensis,*** new species

Ommatophores of prostomium with short necks [Figure 62A]. More posterior stout acicular neurosetae with numerous rows of subdistal spines on one side [Figure 62P] . . . . . ***A. flagelliformis*** (Wesenberg-Lund), new combination

**Acoetes jogasimae* (Izuka, 1912), new combination, is not included in the key.

Acoetes pleei Audouin and Milne-Edwards, 1832

FIGURES 47–51

Acoetes pleei Audouin and Milne-Edwards, 1832:437, pl. 10: figs. 7–14; 1834:99, pl. 2A: figs. 7–14.—Quatrefages, 1865 [1866]:215.
Polyodontes pleei.—Grube, 1855:90.—Strelzov, 1972:281 [part].
Panthalis oculea Treadwell, 1901:188 [part].
Panthalis pustulata Treadwell, 1924:7, figs. 10–15.—Hartman, 1939b:83, 87.—Renaud, 1956:3, fig. 3A–G. [New synonym.]
Acoetes magnifica Treadwell, 1929:1, figs. 1–8.
Polyodontes pustulata.—Nonato and Luna, 1969 [1970]:70, pl. 6: figs. 73–82.
Polyodontes sp. A.—Wolf, 1984:5, figs. 1, 2a–u [part].

MATERIAL EXAMINED.—WEST INDIES. Martinique, M. Plée, collector, holotype of *A. pleei* (MNHNP). Montego Bay, Jamaica, muddy bottom, Jul 1921, A.L. Treadwell, collector, holotype of *A. magnifica* (AMNH 1694). Mayaguez Harbor, Puerto Rico, 139 m, rock, sand, coral, *Fish Hawk* sta 6063, 20 Jan 1899, 2 specimens (USNM 50717, mixed with *Panthalis oculea* Treadwell, 1901).

PANAMA (Atlantic). Pico Feo, San Blas, *Thalassia* substrate, sta 93-1, 19 Apr 1972, M.L. Jones, collector, 1 specimen (USNM 50724).

FLORIDA. St. Lucie County, Hutchinson Island, 27°22′N, 80°13′W, 11.5 m, sta 5, 1 Mar 1972, Florida Marine Research Lab., juvenile (USNM 54224).

GULF OF MEXICO. Alligator Harbor, Florida, Franklin County, Bay Mouth Bar, *Thalassia* bed in *Diplanthera* association, 28 Feb, 30 Apr, 2 Aug 1960, 2 Apr 1961, P.T. Paine, M.L. Jones, A.J. Kohn, collectors, 6 specimens (USNM 50722, 50723, 50725–50727). St. Theresa, Wilson's Beach, Franklin County, subtidal turtle-grass beds and intertidal eelgrass bar, in mud and mucous cemented Y-shaped tubes, 31 Dec 1964, 1 Jan 1965, J. Rudloe, collector, 3 specimens (USNM 50728, 58197). Seahorse Key, 3 May 1958, M.L. Jones collector, 2 specimens (USNM 30024, 32363). Off Sombrero Light, 91–110 m, 6 Jun 1960, Thomson and McGinty, collectors, 1 specimen (USNM 50721). Off Louisiana 28°27.5′N, 91°46′W, 51 m, *Pelican* sta 83-8, 12 Jul 1938, caught on trawl board, 1 specimen (USNM 50718). South of Grand Isle, 27 and 37 m, 13 Mar, 20 Jun 1959, C.E. Dawson, collector, 2 specimens (USNM 50719, 50720). Northwest Gulf of Mexico, *Alaminos* stations, from L.H. Pequegnat: sta 64A10-13, 28 Jun 1964, 27°52′N, 94°56′W, 121–181 m, 2 specimens (USNM 98814, 98815); sta 68A3-11A, 24 Mar 1968, 26°18′N, 96°22′W, 90 m, 1 specimen (USNM 98813). Gulf of Mexico, from Barry A. Vittor and Associates (BAV, as *Polyodontes* sp. A by Wolf, 1984): Mississippi-Alabama-Florida Outer Continental Shelf (MAFLA) sta 2211C,D,J, Aug, Nov 1977, 27°56′N, 83°53′W, 43 m, coarse sand, 3 specimens (USNM 86852, 98817, BAV); sta 2639A, May 1975, 29°53′N, 88°12′W, 32 m, sandy silt, 1 specimen (USNM 98816). Mississippi Sound off Alabama, Army Corp of

Engineers sta 471-6, 2 Nov 1980, 30°03′N, 88°14′W, 21 m, sand, juvenile (USNM 75627). Southwest Florida Shelf Ecosystem Study (SOFLA) sta 8E, Nov 1980, 26°16′N, 83°12′W, 48 m, fine sand, juvenile (USNM 86851).

TYPE MATERIAL.—The holotype of *Acoetes pleei* (MNHMP) is an incomplete specimen of about 120+ segments, 150+ mm long. The type of *Panthalis pustulata* has not been found; it is not in the USNM, where specimens from the Museum of the State University of Iowa were transferred. The holoptype of *Acoetes magnifica* (AMNH) consists of anterior and middle fragments of 64+ segments, 102+ mm long, and 18 mm wide with setae; the palps are missing and the right tentacular cirri has been cut off.

DESCRIPTION.—Two largest complete specimens from Gulf of Mexico (USNM 50728) with 136–156 segments, 210–220 mm long, 13–15 mm wide with setae. Anterior 4 pairs of elytra overlapping and covering dorsum, more posteriorly, elytra usually leaving middorsum uncovered. Elytra oval, delicate, transparent, with 'veins,' attached eccentrically near lateral side; posterior elytra with shallow lateral pouch (Figures 47C,D, 49B–E).

Prostomium bilobed, rounded, with globular ommatophores projecting anteriorly, with short necks and distal lenses; ceratophore of median antenna attached on middle of prostomium, with or without minute lateral papillae, with style projecting beyond ommatophores; pair of small eyes lateral to ceratophore; lateral antennae inserted ventral to ommatophores, extending anteriorly and visible dorsally, similar to median antenna; palps long, tapering, with longitudinal rows of papillae, sometimes lightly pigmented or transversely banded with brownish pigmentation. Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with 2

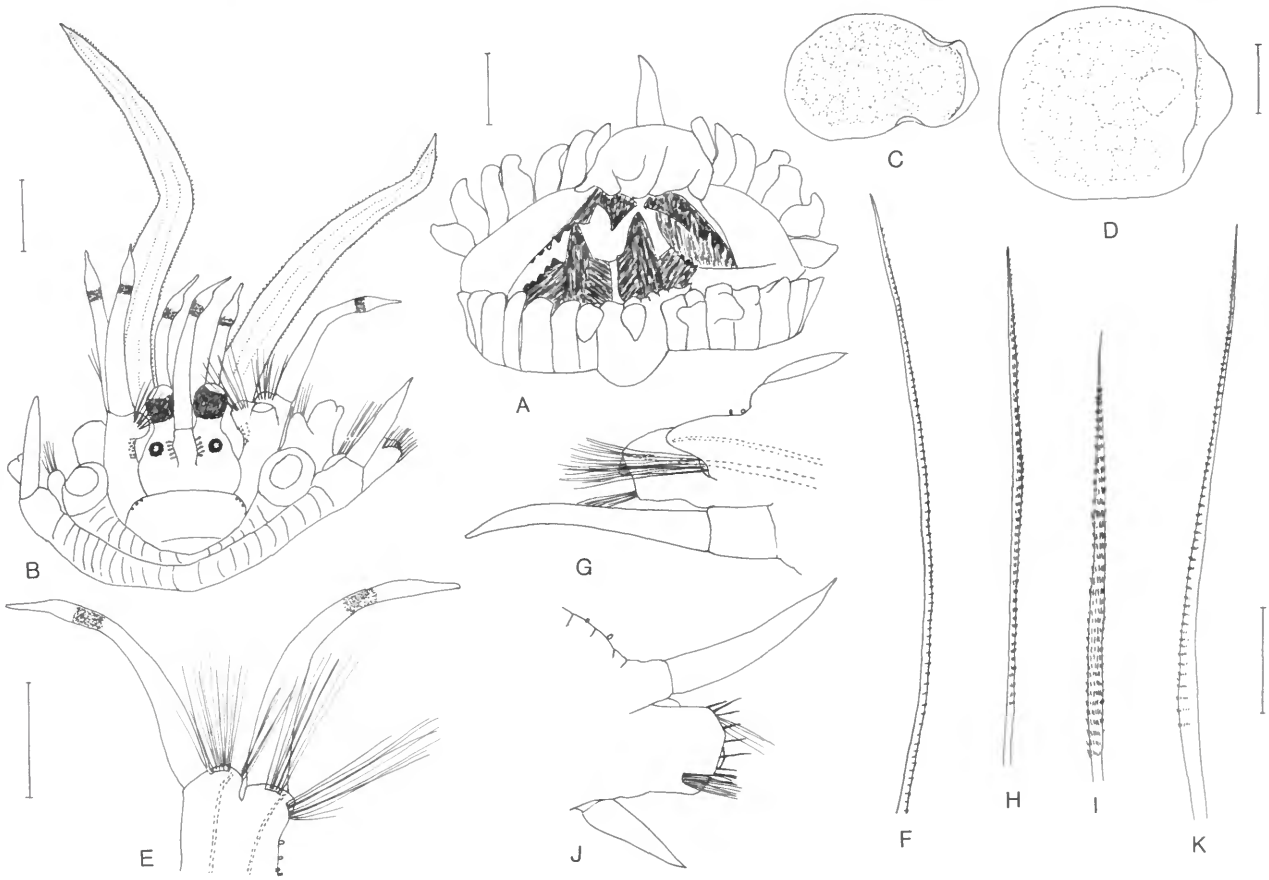


FIGURE 47.—*Acoetes pleei* (A, holotype, MNHNP; B–K, specimen from Alligator Harbor, Florida, USNM 50723): A, end view of extended pharynx showing jaws and border papillae; B, dorsal view of anterior end (right dorsal tentacular cirrus missing); C, right 5th elytron from segment 9; D, right 23rd elytron from segment 45; E, right tentaculophore with tentacular cirri, acicula dotted; F, notoseta from same; G, right elytrageroous parapodium from segment 2, anterior view, acicula dotted; H,I, upper and lower neurosetae from same; J, right cirrigerous parapodium from segment 3 (tips of stout middle neurosetae broken); K, upper neuroseta from same. (Scales: A and C,D = 2.0 mm; B and E,G,J = 1.0 mm; F,H,I,K = 0.1 mm.)

acicula, slightly projecting acicular lobes and row of papillae on inner side, with numerous slender, finely spinous notosetae, pair of dorsal and ventral tentacular cirri, similar to median antenna (Figures 47B,E,F, 49A,F).

Second segment with first pair of elytrophores and long ventral buccal cirri, similar to tentacular cirri; notopodium conical, with bundle of long notosetae; neuropodium rounded, with neurosetae slender, lanceolate, with fine tips (Figures 47B,G–I, 49A,G–J). Distal border of muscular pharynx with 15 pairs of papillae, middorsal one on wide lobulated base and longer than others; 2 pairs of hooked jaws each with 6 lateral teeth (Figure 47A).

Third segment with first pair of dorsal cirri with short cirrophores and tapered styles extending beyond setae;

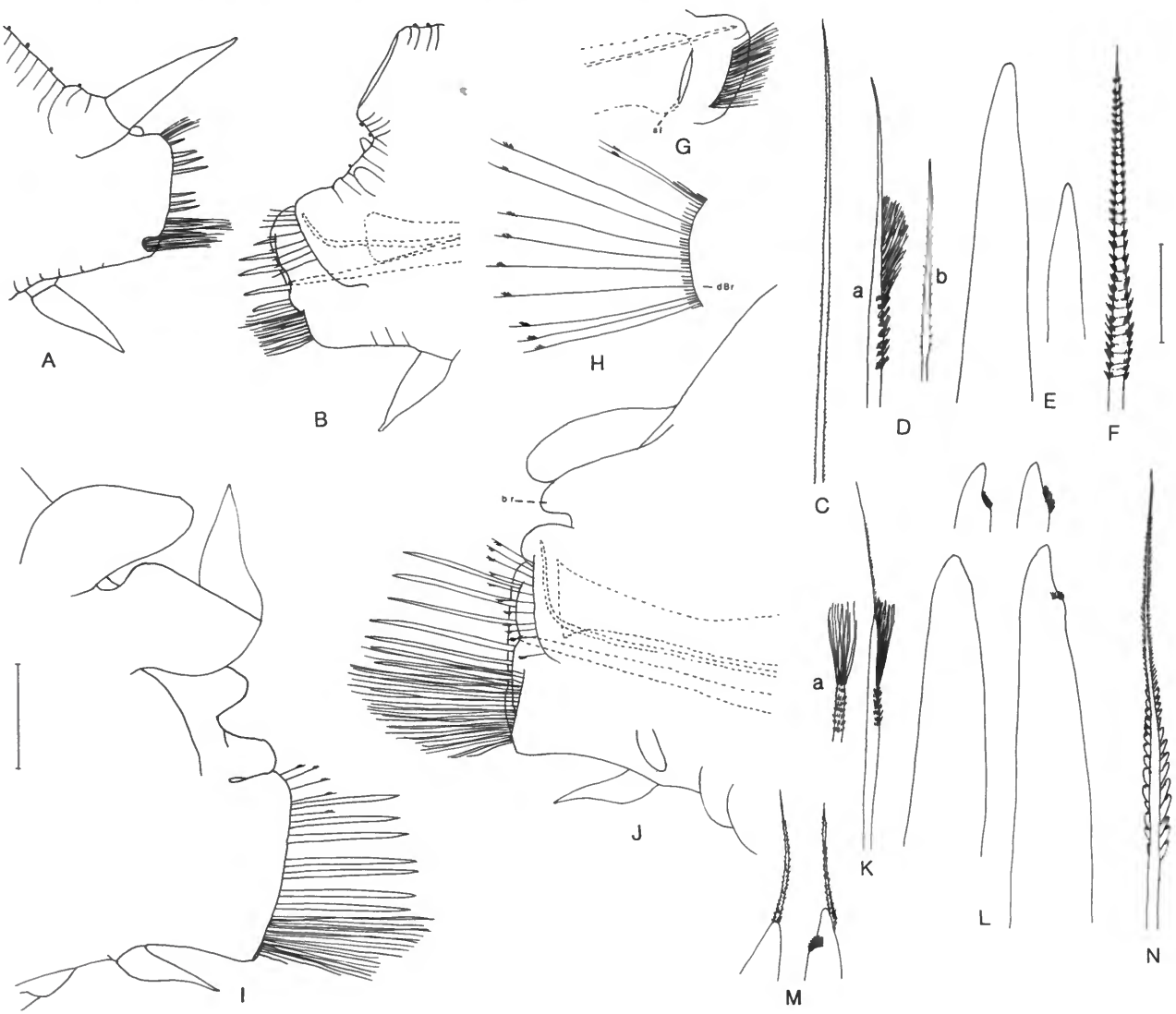


FIGURE 48.—*Acoetes pleei*, specimen from Alligator Harbor, Florida (USNM 50723): A, right cirrigerous parapodium from segment 8, posterior view; B, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; C, notoseta from same; D–F, upper, middle, and lower neurosetae from same; G, underside of notopodium showing position of notoaciculum, row of notosetae, and slit for emergence of spinning fibers (not to scale); H, part of neuropodium showing position of upper group of neurosetae: long exposed type a and short type b hidden by notopodium (not to scale); I, right cirrigerous parapodium from segment 44, posterior view; J, right elytragerous parapodium from segment 45, anterior view, acicula and spinning gland dotted; K,L,N, upper, middle, and lower neurosetae from same; M, another set of short, newly formed middle neurosetae from same. (Scales: A,B,I,J = 1.0 mm; C–F,K–N = 0.1 mm.)

notopodium small, conical, with fewer and shorter notosetae; upper and lower neurosetae slender, spinous, lanceolate; middle neurosetae stout, acicular; ventral cirri short, subulate (Figures 47B,J,K, 49 K–N). Parapodia of segment 8 similar, with dorsal cirri shorter (Figures 48A, 50A,B).

Beginning with segment 9, notopodium wide, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning glands, and row of short notosetae; neuropodium with slightly bilobed presetal acicular lobe and truncate postsetal lobe, with more-or-less developed anteroventral bract enclosing lower group of numerous neurosetae, curved, with larger spines basally, and close-set spinous rows distally, tapering to capillary tips; middle row of neurosetae stout, acicular; upper group of neurosetae emerging from low anterodorsal bract, hidden by notopodium unless pulled back, of 2 types: (a) longer, abruptly narrowing to long slender tip, with subdistal group of long hairs and basal rows of short spines; (b) short, more slender, bipinnate (Figures 48B–F, 50C–E). Acicular neurosetae of posterior parapodia with or without aristae and subdistal hairs on one side (Figures 48I–N, 50F–N). Parapodial branchiae beginning about segment 9 on bases of elytrophores and cirrophores; up to 10 small bulbous branchiae, becoming fewer and larger posteriorly; ventrally, medial to ventral cirri, diagonally elongate pustules beginning

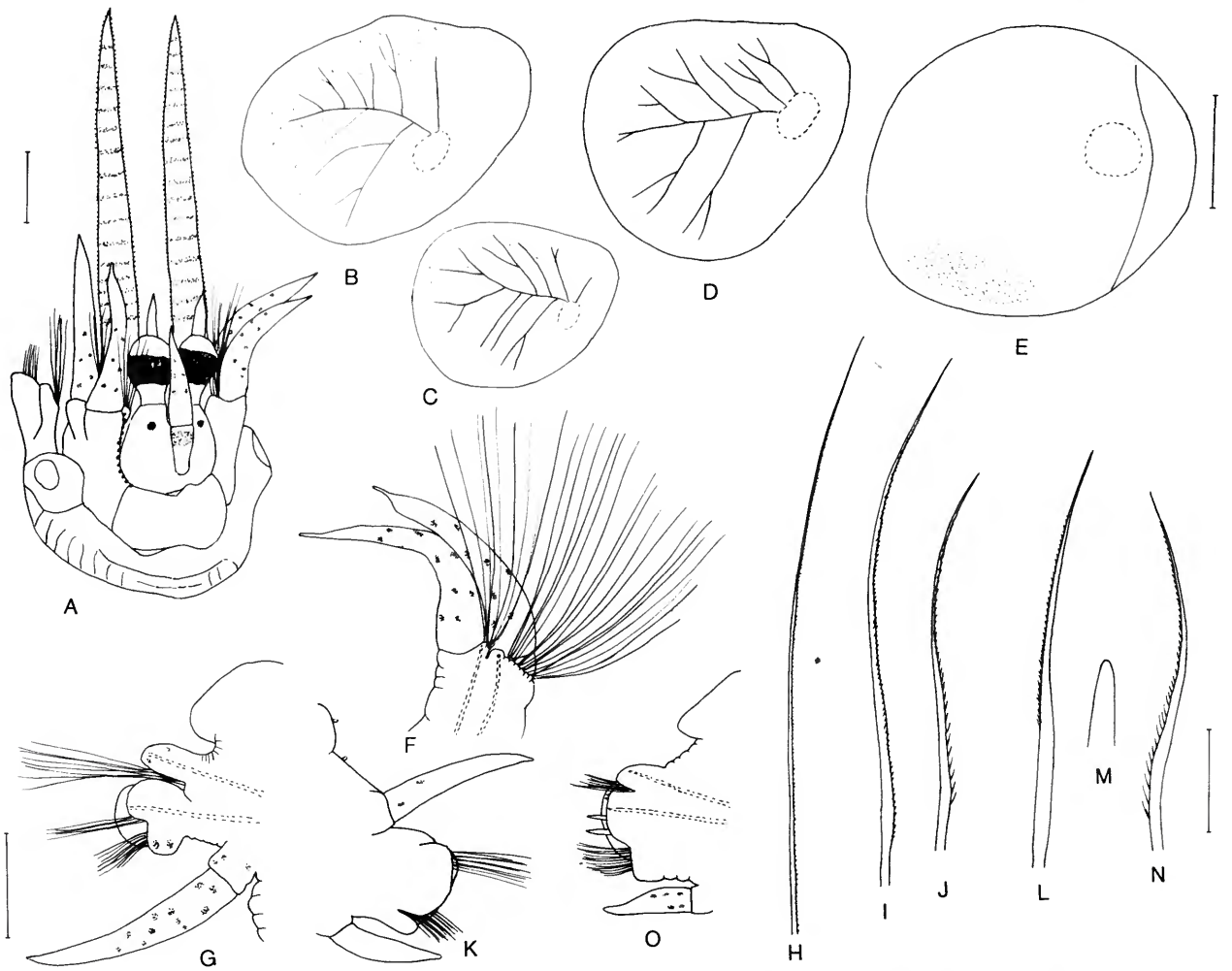


FIGURE 49.—*Acoetes pleei*, specimen from NW. Gulf of Mexico (USNM 98814): A, dorsal view of anterior end; B, right 1st elytron from segment 2; C, right 2nd elytron from segment 4; D, right 3rd elytron from segment 5; E, right 17th elytron from segment 33; F, right tentaculophore with dorsal and ventral tentacular cirri, inner view, acicula dotted; G, right elytragerous parapodium from segment 2, anterior view, acicula dotted; H, notoseta from same; I,J, upper and lower neurosetae from same; K, right cirrigerous parapodium from segment 3, posterior view; L–N, upper, middle, and lower neuroseta from same; O, right elytragerous parapodium from segment 4, anterior view, acicula dotted. (Scales: A and F,G,K,O = 1.0 mm; B–E = 2.0 mm; H–J,L–N = 0.1 mm.)

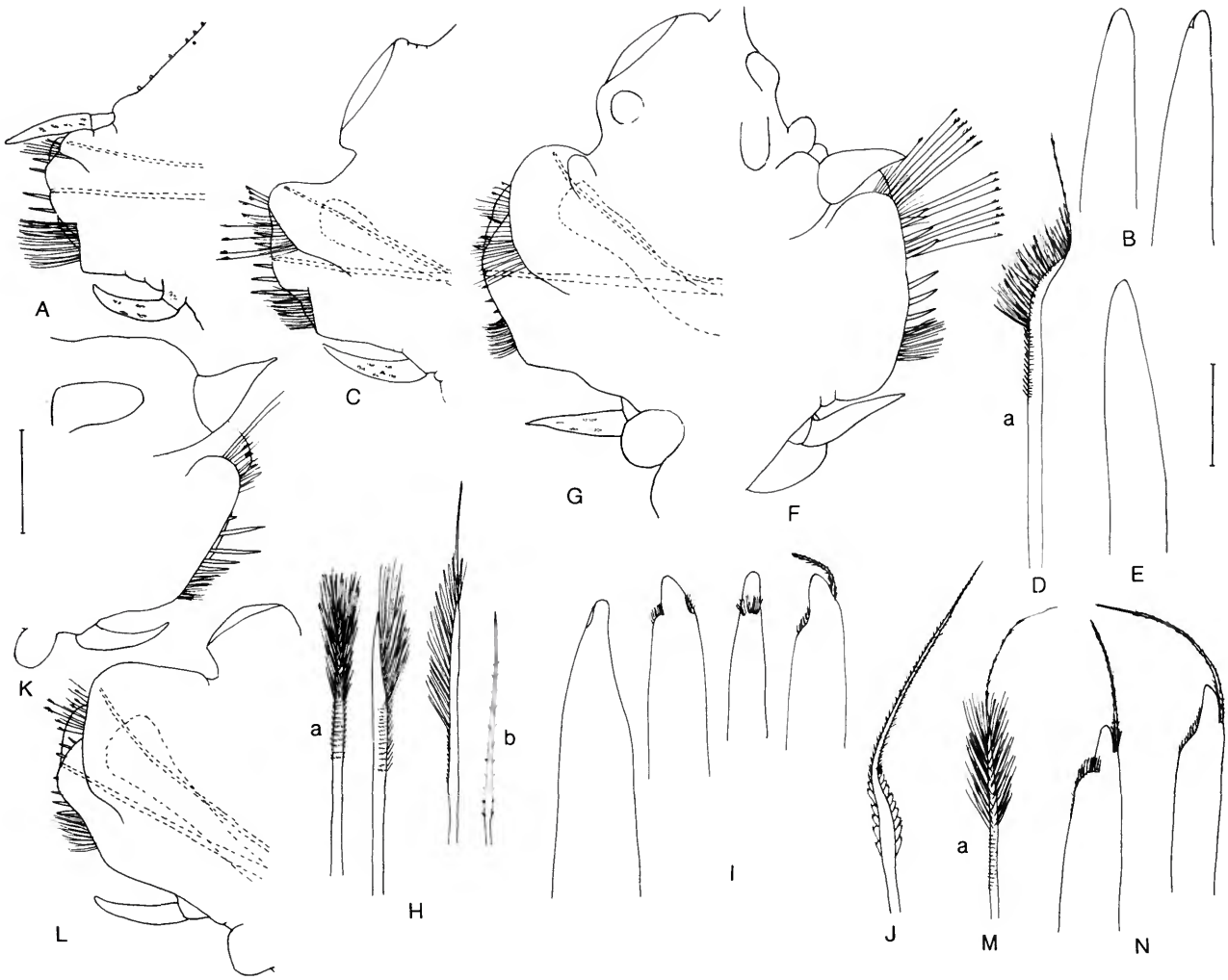


FIGURE 50.—*Acoetes pleei*, specimens from NW Gulf of Mexico (USNM 98814, 98815): A, right cirrigerous parapodium from segment 8, anterior view, acicula dotted; B, middle neurosetae from same; C, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; D,E, upper and middle neurosetae from same; F, right cirrigerous parapodium from segment 18, posteror view; G, right elytragerous parapodium from segment 19, anterior view, acicula and spinning gland dotted; H–J, upper, middle, and lower neurosetae from same; K, right cirrigerous parapodium from segment 32, posterior view; L, right elytragerous parapodium from segment 33, anterior view, acicula and spinning gland dotted; M,N, upper and middle neurosetae from segment 51. (Scales: A,C,F,G,K,L = 1.0 mm; B,D,E,H–J,M,N = 01. mm.)

about segment 11, one at first, increasing to about 6; cirrophores of dorsal cirri wide, inflated, with styles short, conical (Figures 48B,I,J, 50F,G,L). Pygidium with terminal bulbous anus and pair of long anal cirri.

Juvenile from Gulf of Mexico (USNM 86851) with 40+ segments, 15+ mm long, 2.5 mm wide with setae, showing general features of adults; notosetae fewer in number; acicular neurosetae all aristate (Figure 51A–R).

TUBE.—The tube is thick, muddy, leathery, smooth internally, somewhat roughened externally. Two worms (USNM 50728) occupied a mud and mucous cemented Y-shaped tube about 3 feet (91 cm) long in the Gulf of Mexico, according to the collector, J. Rudloe.

DISTRIBUTION.—West Indies, NE Brazil, Panama, Florida, Gulf of Mexico. In low water to 181 meters.

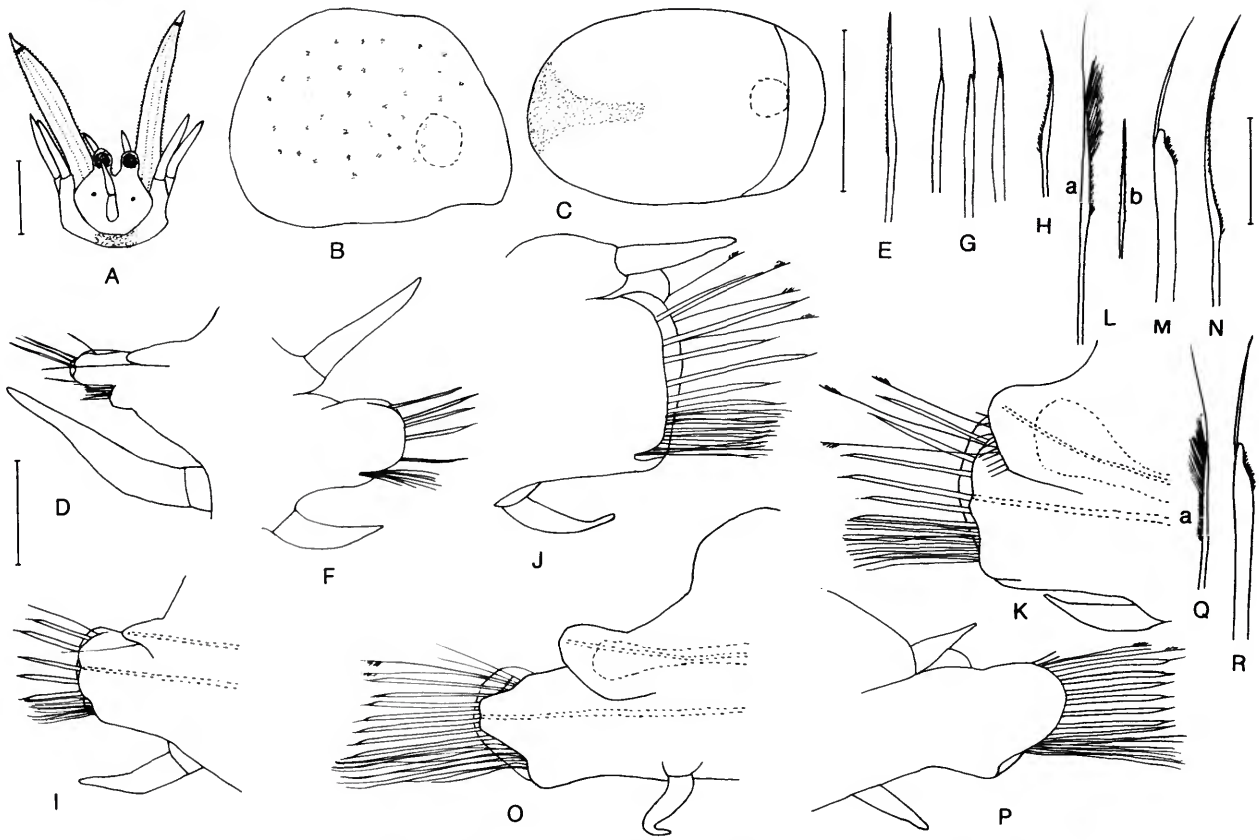


FIGURE 51.—*Acoetes pleei*, juvenile from Gulf of Mexico off Florida (USNM 86851): A, dorsal view of prostomium and tentacular segment; B, right 1st elytron from segment 2; C, right 10th elytron from segment 19; D, right elytragerous parapodium from segment 2, anterior view; E, middle neuroseta from same; F, right cirrigerous parapodium from segment 3, posterior view; G,H, middle and lower neurosetae from same; I, right elytragerous parapodium from segment 4, anterior view, acicula dotted; J, right cirrigerous parapodium from segment 18, posterior view; K, right elytragerous parapodium from segment 19, anterior view, acicula and spinning gland dotted; L–N, upper, middle, and lower neurosetae from same; O, right elytragerous parapodium from segment 39, anterior view, acicula and spinning gland dotted; P, right cirrigerous parapodium from segment 40, posterior view; Q,R, upper and middle neurosetae from same; (Scales: A and B,C = 0.5 mm; D,F,I–K,O,P = 0.2 mm; E,G,H,L–N,Q,R = 0.1 mm.)

Acoetes melanonota (Grube, 1876), new combination

FIGURES 52, 53

Panthalis melanonotus Grube, 1876:71; 1878:48, pl. 4: fig. 1a,b.—Willey 1905:254, pl. 1: figs. 21–27.—Hoagland, 1920:606. [Not sensu Mohammad, 1973:24; (= *Acoetes mohammadi*, new species).]

Panthalis melanotus [sic].—Ehlers, 1918:235.

Polyodontes melanonotus.—Fauvel, 1919:339, pl. 15: figs. 1–3, pl. 17: figs. 70–75; 1932:37, fig. 6a–c; 1953:72, fig. 33c–g.—Monro, 1934:359.—Day, 1951:19; 1962:634; 1967:96, fig. 1.17.g–h.—Uschakov and Wu, 1959:16, 37, pl. 10A,B; 1965:175, fig. 12A–C; 1979:35, fig. 12A–C.—Gibbs, 1971:127.—Strelzov, 1972:287, figs. 5,6 [part]. [Not sensu Monro, 1931:8 (= *Polyodontes atromarginatus* Horst); 1937:264 (= *Polyodontes* sp.).]

Polyodontes gracilis Pflugfelder, 1932a:288, fig. 8A–C; 1934:351, figs. 7–9.—Gallardo, 1967 [1968]:49, pl. 3: figs. 6–7, pl. 4: figs. 1–4.

Panthalis panamensis.—Treadwell, 1936:265. [Not *Panthalis panamensis* Chamberlin, 1919.]

Polyodontes melanotonus [sic].—Thomassin, 1970:52.

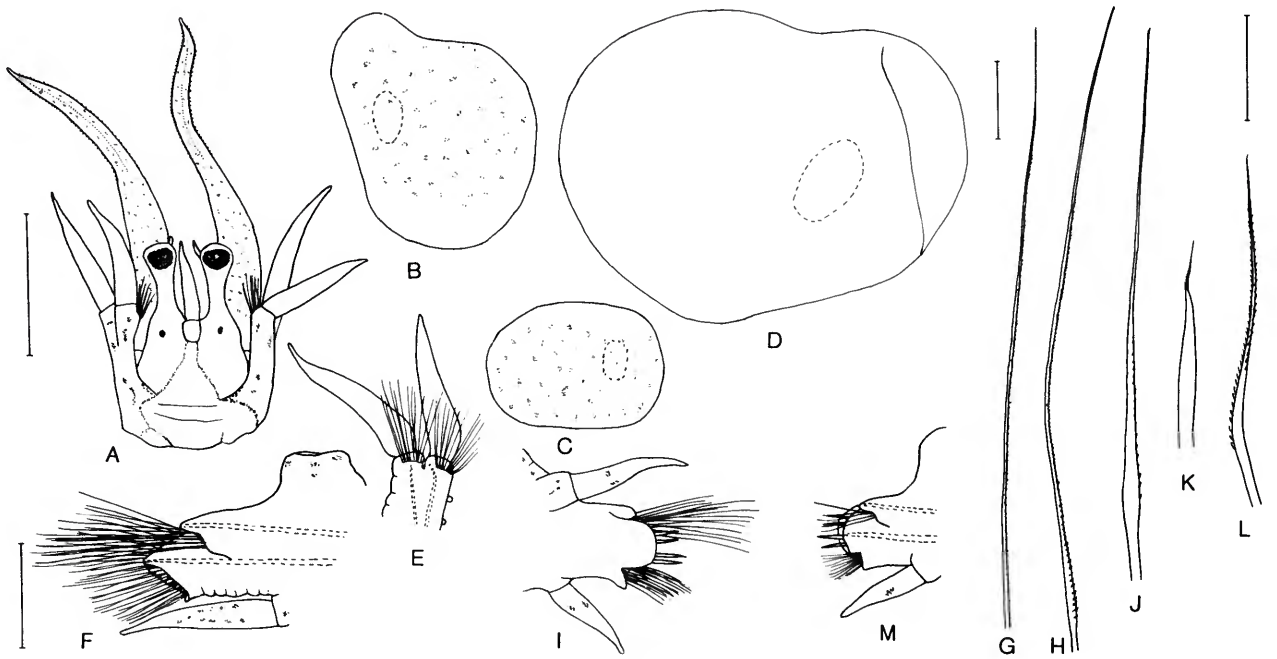
MATERIAL EXAMINED.—PHILIPPINES. Tartara Island, off Western Samar, 37 m, *Albatross* sta D5209, 14 Apr 1908, 1 specimen (USNM 18973, identified by Hoagland, 1920).

CHINA. Amoy, T.Y. Chen, collector, 1 specimen (BMNH 1932.3.2.9, identified by Monro, 1934) and 1 specimen (USNM 21983, as *Panthalis panamensis* by Treadwell, 1936).

SOUTH VIETNAM. Sta 317, 323, 4 Jan, 4 Apr 1960, 14 m, mud and sandy mud, 2 specimens (AHF, as *Polyodontes gracilis* by Gallardo, 1967 [1968]).

THAILAND. Ang Hin, Cholburi Province, 13°20′N, 100°55′E, 5–10 m, G.M. Moore, 11 Mar 1959, 6 specimens, in muddy mucous tubes (USNM 71500). Entrance to Trat Bay, Gulf of Thailand, 11°58′N, 102°44′E, 5 m, George Vanderbilt Foundation sta 26, 29 Oct 1957, R.R. Rofen, 1 specimen, in muddy mucous tube (USNM 71499).

INDONESIA. Aru Islands, Pulu-Bambu, 12 m, mud, Dr.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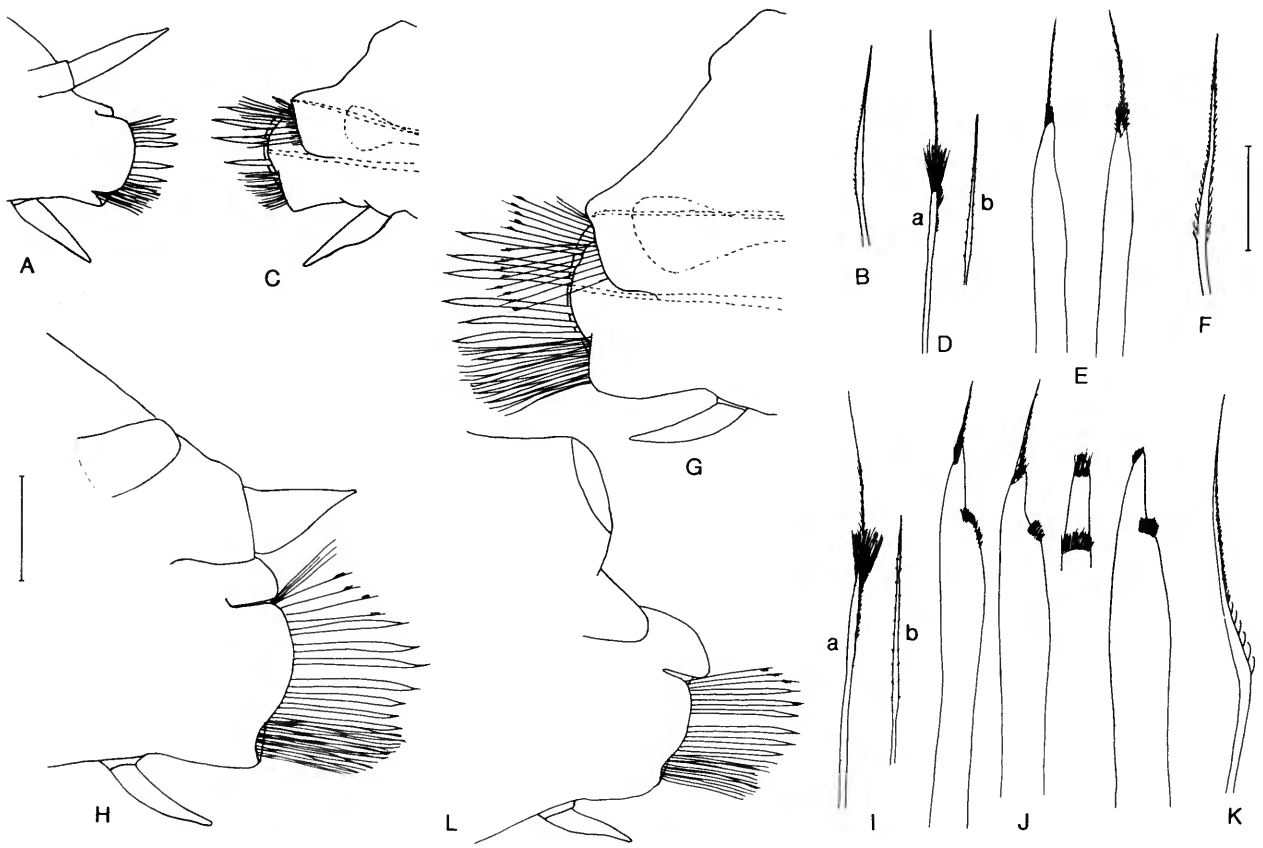
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FIGURE 52.—*Acoetes melanonota*, specimen from Thailand (USNM 71500): A, dorsal view of prostomium and tentacular segment; B, left 1st elytron from segment 2; C, right 5th elytron from segment 9; D, right 16th elytron from segment 31; E, right tentaculophore with dorsal and ventral tentacular cirri, inner view, acicula dotted; F, right elytragerous parapodium from segment 2, anterior view, acicula dotted; G, notoseta from same; H, neuroseta from same; I, right cirrigerous parapodium from segment 3, posterior view; J–L, upper, middle, and lower neurosetae from same; M, right elytragerous parapodium from segment 4, anterior view, acicula dotted. (Scales: A = 1.0 mm; B–D and E,F,I,M = 0.5 mm; G,H,J–L = 0.1 mm.)

Merton, 11 Apr 1908, 2 specimens (ZMH P-E 193, identified by Ehlers, 1918).

SOLOMON ISLANDS. Marovo Lagoon, New Georgia, 11 m, mud, sta ML 194, 2 Nov 1965, P. Gibbs, 1 specimen (BMNH 1970.163, identified by Gibbs, 1971).

MADAGASCAR. Tulear, sta 6 and 28, B. Thomassin, 2 specimens (MNHNP, as *Polyodontes melanotonus* [sic] by Thomassin, 1970).

TYPES.—Type material of *Panthalis melanonotus* Grube from the Philippine Islands and *Polyodontes gracilis* Pflugfelder from the East Coast of Sumatra not located.

DESCRIPTION.—Largest complete figured specimen from Thailand (USNM 71500) with 108 segments, 75 mm long, 6 mm wide with setae. First pair of elytra cordiform, larger than following few pairs, covering prostomium; following elytra oval, leaving small area of middorsum uncovered. Elytra rather thick, gelatinous, anterior few pairs with irregular flecks of black pigment, with lateral pouch on more posterior elytra (Figure 52B–D).

Prostomium bilobed, rounded, with globular ommatophores with slender neck; median antenna with ceratophore in middle of prostomium, extending posteriorly as indistinct triangular ridge, with style extending to tips of ommatophores; lateral antennae attached ventrally on ommatophores, with only tips visible dorsally; pair of small posterior eyespots lateral to ceratophore of median antenna; ventral palps stout, long, tapered, with longitudinal rows of short papillae on distal half, with irregular flecks of black pigment or pigment in bands. Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with 2 acicula, 2 bundles of capillary setae, and pair of tentacular cirri, longer and stouter than median antenna (Figure 52A,E; Strelzov, 1972, fig. 5A).

Second segment with first pair of elytrophores and long ventral buccal cirri, similar to tentacular cirri; biramous parapodia larger than following few parapodia; conical notopodium with bundle of long capillary notosetae; large triangular neuropodium with numerous slender neurosetae, wider basally, finely spinous, tapering to capillary tips (Figure 52F–H; Strelzov, 1972, figs. 5B, 6C). Distal border of muscular pharynx with 13–15 pairs of papillae, middorsal one much larger and longer than others; 2 pairs of hooked jaws each with 4–7 lateral teeth.

Third segment with first pair of dorsal cirri, with short cirrophores and subulate styles extending beyond neurosetae; notopodium with bundle of long notosetae; neuropodium with rounded presetal acicular lobe, truncate postsetal lobe and distinct anteroventral bract enclosing numerous lower neurosetae, curved, with larger spines basally and close-set spinous rows distally; middle row of neurosetae short, stout, acicular, aristate; upper neurosetae long, slender, lanceolate, finely spinous; ventral cirri tapered, almost as long as dorsal cirri (Figure 52I–L). Parapodia of segments 4 to 8 similar (Figures 52M, 53A,B).

Beginning with segment 9, notopodium wide, flattened, truncate, on anterodorsal half of larger neuropodium, with notoaciculum, spinning glands and row of short notosetae; neuropodium, lower and middle groups of neurosetae similar to more anterior parapodia; upper group of neurosetae of 2 types: (a) longer, tapering abruptly to long slender spinous tip, with subdistal long spines and short spinous rows basally; and (b) shorter, more slender, with widely spaced spines, nearly hidden by notopodium (Figure 53C–F; Strelzov, 1972, figs. 5D, 6A,G,J). Parapodia of more posterior segments with aristate neurosetae with subdistal rows of spines on one side; dorsal cirri with wider cirrophores and triangular styles; single wide digitiform branchia near cirrophores and elytrophores on some parapodia (Figure 53G–L; Willey, 1905, pl. 1: figs. 22–27; Pflugfelder, 1932a, fig. 8a–c). Additional thin-walled, low, branchial areas medial to ventral cirri. Pygidium with terminal anus and pair of anal cirri.

TUBES.—Rather soft, flabby, muddy mucous tubes, not compact.

DISTRIBUTION.—Philippine Islands, Solomon Islands, Yellow Sea, South China Sea, Gulf of Thailand, Indonesia, Indian Ocean, Madagascar. Low water to 421 meters.

FIGURE 53.—*Acoetes melanonota*, specimen from Thailand (USNM 71500): A, right cirrigerous parapodium from segment 8, posterior view; B, upper neuroseta from same; C, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; D–F, upper, middle, and lower neurosetae from same; G, right elytragerous parapodium from segment 31, anterior view, acicula and spinning gland dotted; H, right cirrigerous parapodium from segment 32, posterior view; I–K, upper, middle, and lower neurosetae from same; L, right elytragerous parapodium from segment 69, posterior view. (Scales: A,C,G,H,L = 0.5 mm; B,D–F,I–K = 0.1 mm.)

Acoetes bicolor (Grube, 1877), new combination

FIGURES 54, 55

Panthalis bicolor Grube, 1877:517 [part].—Hartman, 1939b:86.—Tebble, 1955:74, fig. 1a–c.—Fauvel and Rullier, 1957:50, fig. 1 [part?].—Rullier, 1964b:1077.

Polyodontes bicolor.—Augener, 1918:119, pl. 2: fig. 28, pl. 3: fig. 47, text-fig. 4a–d [part; not specimen from Bata (= *Acoetes bataensis*, new species)].

MATERIAL EXAMINED.—WEST AFRICA. Mouth of Congo, Belgian Congo, *Gazelle* Expedition, lectotype (ZMB 848a) and 2 paralectotypes (ZMB 848b, USNM 50713). West Africa, Hupfer, collector, as *Polyodontes bicolor* by Augener (1918): Accra, British Gold Coast, 2 specimens (ZMH 597, 598); Seestown, Liberia, 1 specimen (ZMH 600). Gold coast, off

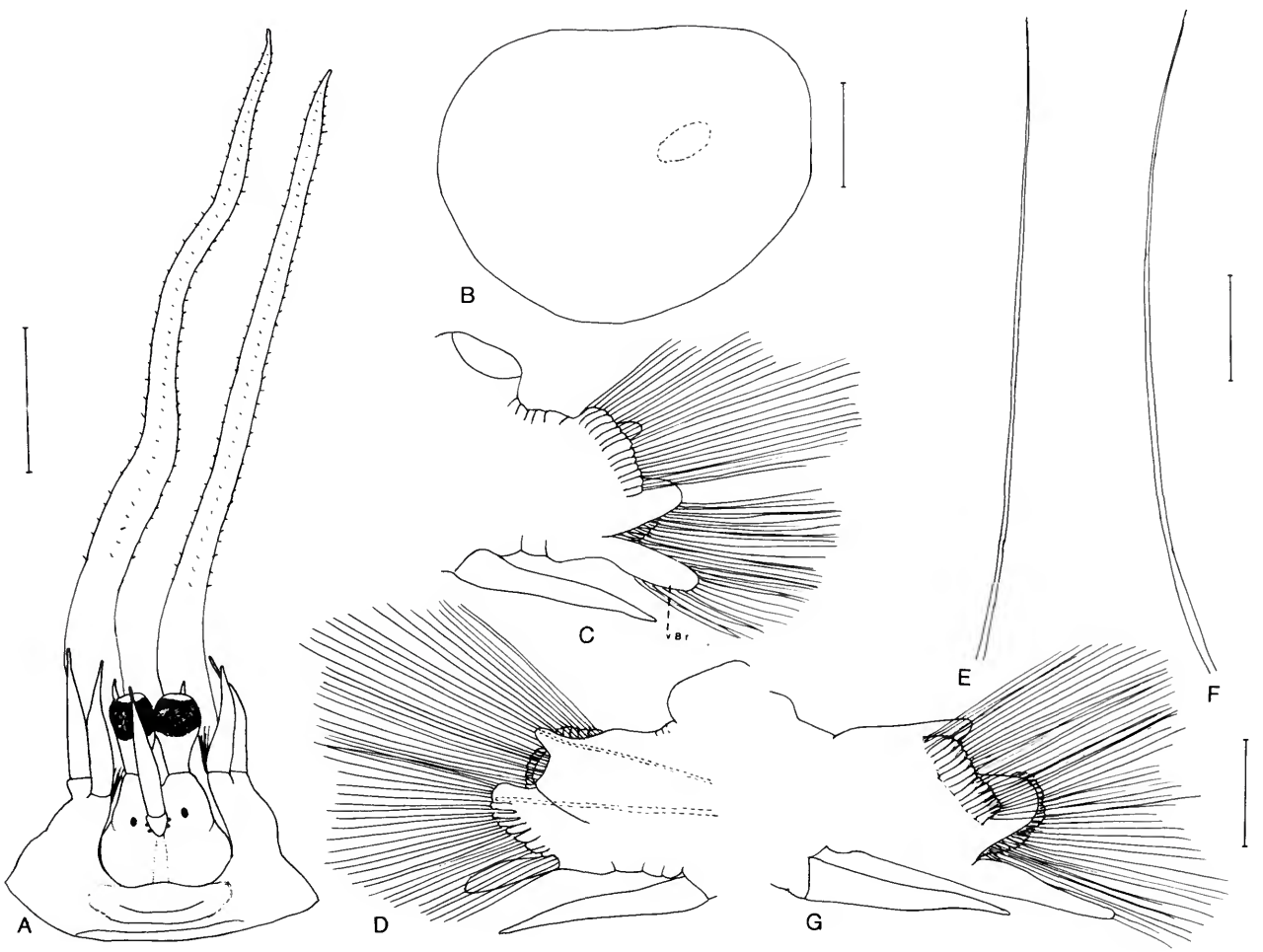


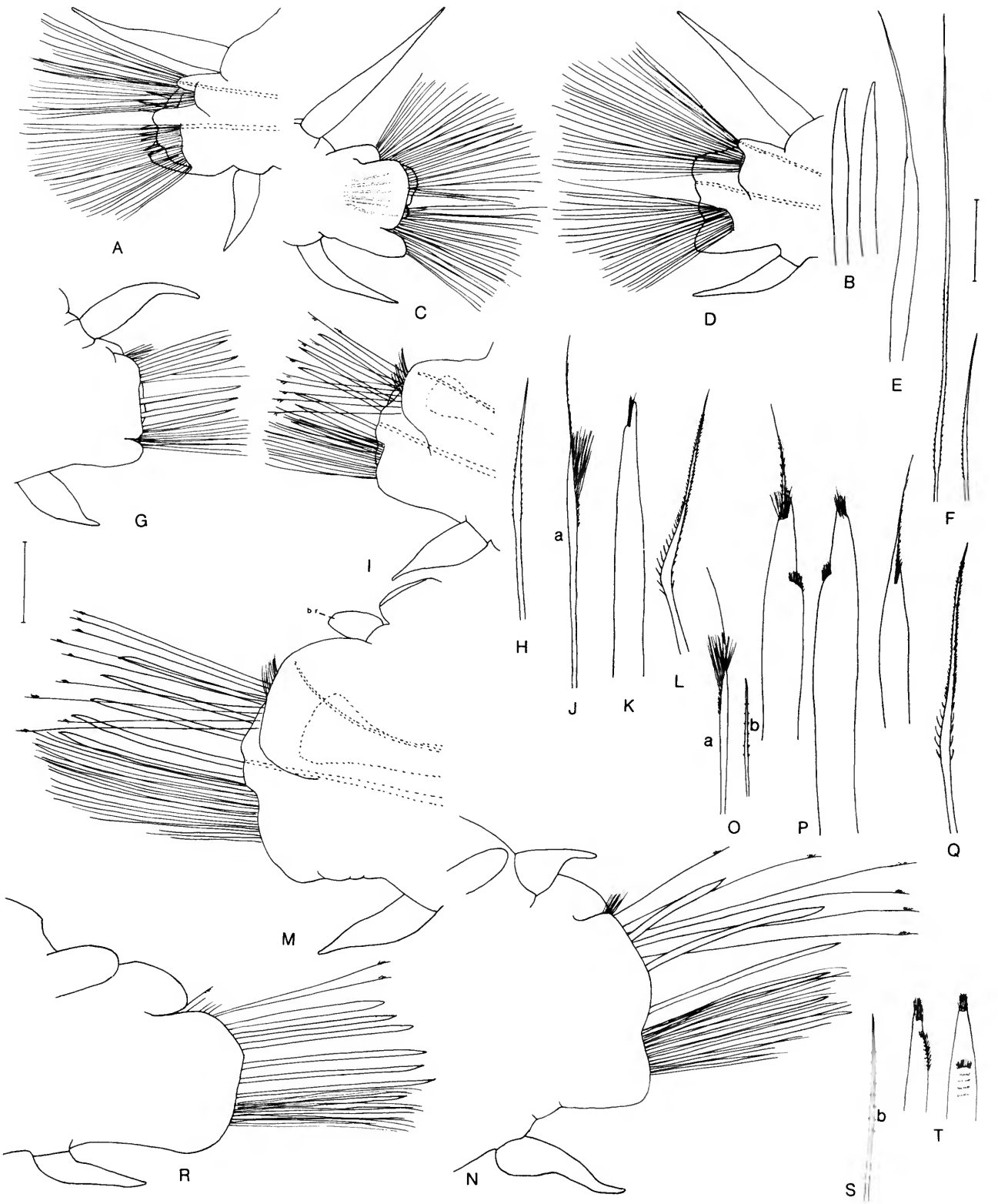
FIGURE 54.—*Acoetes bicolor* (A, lectotype of *Panthalis bicolor*, ZMB 848a; B–F, paralectotype of *Panthalis bicolor*, USNM 50713; G, paralectotype of *Panthalis bicolor*, ZMB 848b): A, dorsal view of anterior end, pharynx fully extended (not shown); B, right elytron; C, right elytragerous parapodium from segment 2, posterior view; D, same as C, anterior view, acicula dotted; E, notoseta from same; F, neuroseta from same; G, right elytragerous parapodium from segment 2, posterior view. (Scales: A and B = 1.0 mm; C,D,G = 0.5 mm; E,F = 0.1 mm.)

Accra, Ghana, identified by Tebble; sta 33, 30 Dec 1950, 28 m, R. Bassindale, collector, 1 specimen (BMNH 1953.3.1.84); Buchanan Survey 3.6–11 m, 1 specimen (BMNH 1953.3.1.85).

TYPE MATERIAL.—The six syntypes of *Panthalis bicolor* Grube from the Belgian Congo are deposited in the Berlin Museum. The syntypes consisted of a mixture of two species: 3 from ZMB 848 were selected as lectotype and paralectotypes; 2 from ZMB 840 and 1 from ZMB 3252 were selected as types of a new species, *Acoetes congoensis*.

Lectotype (ZMB 848a) with 42+ segments, 27+ mm long, 9 mm wide with setae, with pharynx completely extended; paralectotype (ZMB 848b) with 78+ segments 65+ mm long,

FIGURE 55.—*Acoetes bicolor* (A,B,R–T, paralectotype of *Panthalis bicolor*, ZMB 848b; C–Q, paralectotype of *Panthalis bicolor*, USNM 50713): A, right cirrigerous parapodium from segment 3, anterior view, acicula dotted; B, stout neurosetae from same (tips broken); C, right cirrigerous parapodium from segment 3, posterior view; stout internal neurosetae, not extended; D, same as C, anterior view, acicula dotted; E,F, stout internal neuroseta and slender neurosetae from segment 3; G, right cirrigerous parapodium from segment 8, posterior view; H, upper neuroseta from same; I, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; J–L, upper, middle, and lower neurosetae from same; M, right elytragerous parapodium from segment 29, anterior view, acicula and spinning gland dotted; N, right cirrigerous parapodium from segment 30, posterior view; O–Q, upper, middle, and lower neurosetae from same; R, right elytragerous parapodium from segment 75, posterior view; S,T, upper and middle neurosetae from same. (Scales: A,C,D,G,I,M,N,R = 0.5 mm; B,E,F,H,J–L,O–Q,S,T = 0.1 mm.)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10 mm wide, with pharynx partially extended; paralectotype (USNM 50713) with 38+ segments, 25+ mm long, 11 mm wide.

DESCRIPTION.—Elytra oval, delicate, with rather large areolae, without color, without lateral pouch on posterior elytra (Figure 54B; Augener, 1918, pl. 2: fig. 28). Prostomium bilobed, oval, with pair of bulbous ommatophores with distinct neck; ceratophore of median antenna on middle of prostomium, with few lateral papillae, with tapered style extending slightly beyond ommatophores; lateral antennae attached ventral to ommatophores with only tips visible dorsally; posterior pair of small eyespots lateral to ceratophore of median antenna; ventral palps long, tapered, more than 3 times length of prostomium, with longitudinal rows of short papillae (Figure 54A). Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with bundle of slender setae on inner side and pair of dorsal and ventral tentacular cirri, similar to median antenna (Figure 54A).

Second segment with first pair of elytrophores, ventral buccal cirri longer than following ventral cirri, and biramous parapodia; notopodium as large as neuropodium, with projecting presetal digitiform acicular lobe and wide truncate ruffled postsetal lobe, with fan-shaped bundle of very numerous, long, minutely spinous capillary notosetae; neuropodium with ruffled presetal acicular lobe, rounded postsetal lobe and elongate tapered to rounded ventral bract; neurosetae numerous, slightly wider basally, tapering to long, finely spinous, capillary tips (Figure 54C–G; Augener, 1918, pl. 3: fig. 47, text-fig. 4d). Distal border of extended pharynx with 15 pairs of papillae, middorsal one much larger than others, midventral one only slightly larger or equal in size; 2 pairs of hooked jaws, each with 4–9 lateral teeth.

Third segment with first pair of dorsal cirri with short cirrophores and long styles extending about to tips of setae; ventral cirri short, tapering; parapodia similar to, but not as large as on, segment 2; numerous long notosetae; neurosetae similar to segment 2 with addition of few stout middle acicular ones with long slender tips (Figure 55A–F). Parapodia of segment 8 with small conical notopodium and few short notosetae; upper neurosetae few, short, spinous, lanceolate; rest of neurosetae similar to following parapodia (Figure 55G,H).

Beginning with segment 9, notopodium rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning glands and row of short notosetae emerging from inner side of notopodium; neuropodium with slightly bilobed presetal acicular lobe, truncate postsetal lobe and slightly distinct anteroventral bract; lower neurosetae numerous, within anteroventral bract, slender, slightly curved, with large spines basally and close-set short spines distally; middle row of stout aristate acicular neurosetae; upper group of neurosetae, emerging from low anterodorsal bract, hidden by notopodium, of 2 types: (a) slender, long, tapering abruptly to slender tip, with long subdistal hairs on one side and rows of short spines basally; (b) short, more slender, bipinnate, hidden by notopodium (Figure 55I–L). Posterior parapodia larger; acicular aristate neurosetae with subdistal spinous region on one side; dorsal cirri with wider short cirrophores and short styles; branchiae few, bulbous, on bases of cirrophores and elytrophores (Figure 55M–T; Augener, 1918, text-fig. 4a–c; Fauvel and Rullier, 1957, fig. 1).

DISTRIBUTION.—West Africa. In 3 to 38 meters.

Acoetes congoensis, new species

FIGURES 56, 57

Panthalis bicolor Grube, 1877:517 [part].

Polyodontes mortenseni.—Monro, 1930:69. [Not *Polyodontes mortenseni* Monro, 1928 (= *Acoetes mortenseni* (Monro), new combination).]

MATERIAL EXAMINED.—WEST AFRICA. Belgian Congo, *Gazelle* Expedition, holotype (ZMB 3252, as syntype of *Panthalis bicolor*); 2 paratypes (ZMB 840, as syntype of *Panthalis bicolor*). French Congo, off Cape Lopez, 58–67 m, mud and fine sand, *Discovery* sta 279, 10 Aug 1927, paratype (BMNH 1930.10.8.1176, as *Polyodontes mortenseni* by Monro, 1930).

TYPE MATERIAL.—Holotype (ZMB 3252) with 42+ segments, 30+ mm long, 13 mm wide with setae. Two paratypes (ZMB 840) with 39+, 33+ segments, 26+, 32+ mm long, 13, 15 mm wide. Paratype (BMNH 1930.10.8.1176) with 36+ segments, 23+ mm long, 8 mm wide.

DESCRIPTION.—Elytra oval, delicate, compactly areolate on most of surface, without lateral pocket (Figure 56C). Prostomium bilobed, oval, with pair of bulbous ommatophores with distinct neck; ceratophore of median antenna in middle of prostomium, with few lateral papillae, with tapered style not extending to tips of ommatophores; lateral antennae attached ventral to ommatophores and hidden from view dorsally; posterior pair of small eyespots lateral to ceratophore of median antenna; ventral palps stout, long, tapered, up to 2 times length of prostomium, with longitudinal rows of short papillae (Figure 56A,B). Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with 2 acicula, bundle of slender setae on inner side, and pair of dorsal and ventral tentacular cirri, similar to median antenna (Figure 56A,B,D).

Second segment with first pair of elytrophores, ventral buccal cirri longer than following ventral cirri and biramous parapodia; notopodia bilobed with longer upper digitiform acicular lobe and shorter rounded lower lobe, with bundle of long finely spinous capillary notosetae; neuropodia larger, conical, with prominent ventral bract; neurosetae long, finely spinous, slender, slightly wider basally, tapering to capillary tips, lower ones shorter (Figure 56A,E–H). Distal border of extended pharynx with 15 pairs of papillae, middorsal one largest, on somewhat lobulated base, midventral one only slightly larger than others; 2 pairs of hooked jaws, each with 4–5 lateral teeth.

Third segment with first pair of dorsal cirri with short cirrophores and styles extending almost to tips of setae; ventral

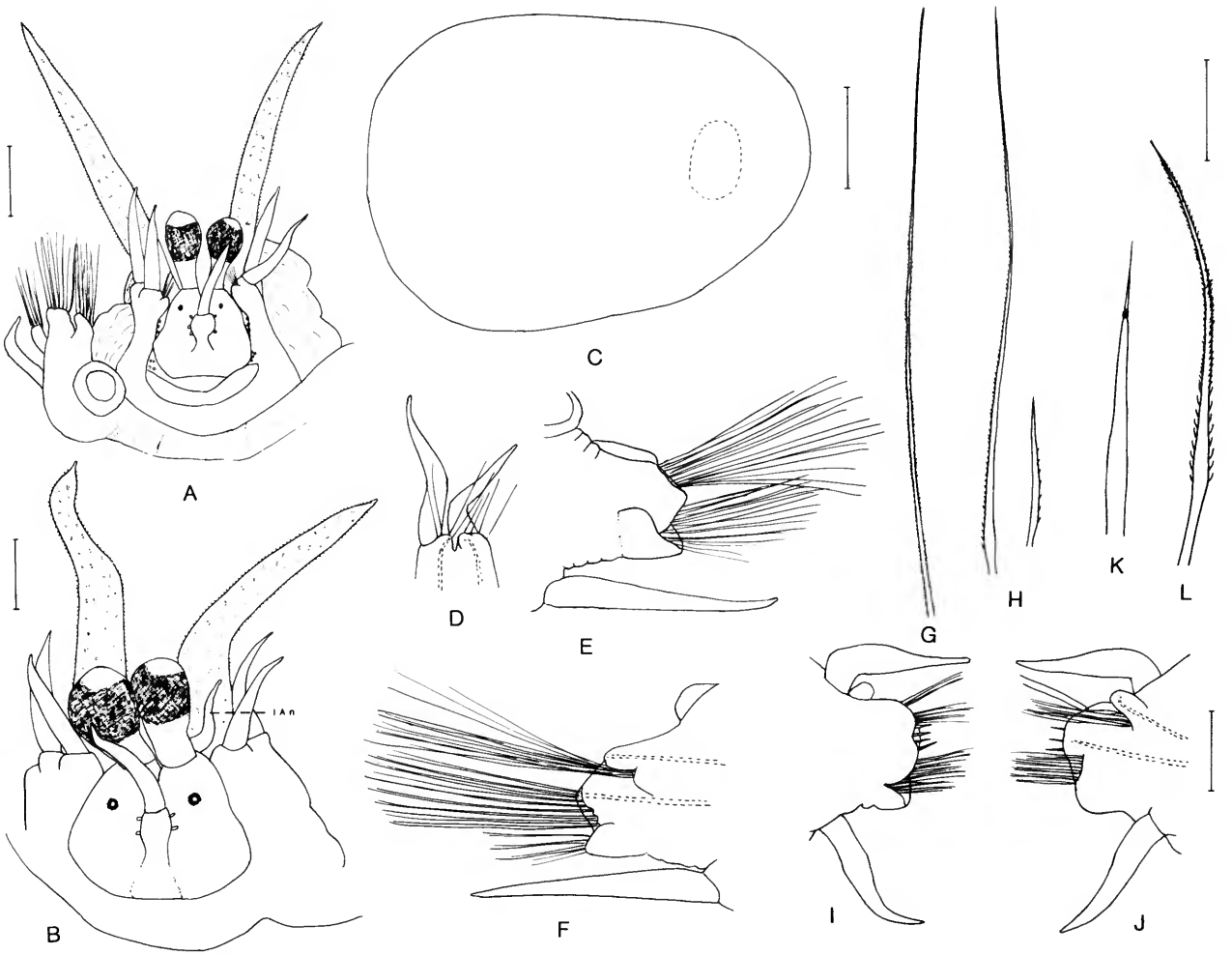


FIGURE 56.—*Acoetes congoensis* (A, paratype, ZMB 840; B–L, holotype, ZMB 3252): A, dorsal view of anterior end, pharynx partially extended (right parapodium of segment 2 cut off); B, dorsal view of prostomium and tentacular segment, pharynx fully extended (not shown); C, right elytron; D, right tentaculophore with dorsal and ventral tentacular cirri, inner view, acicula dotted; E, right elytragerous parapodium from segment 2, posterior view; F, same as E, anterior view, acicula dotted; G, notoseta from same; H, middle and lower neurosetae from same; I, right cirrigerous parapodium from segment 3, posterior view; J, same as I, anterior view, acicula dotted; K,L, middle and lower neurosetae from same. (Scales: A and C = 1.0 mm; B and D–F,I,J = 0.5 mm; G,H,K,L = 0.1 mm.)

cirri similar in length; notosetae fewer and shorter; upper neurosetae similar to those of segment 2, middle ones stout, aristate, lower ones slightly curved, with prominent spines basally and close-set spines distally, with capillary tips (Figure 56I–L). Parapodia of segment 8 larger, with tapering dorsal cirri, short notosetae, and similar but stouter neurosetae (Figure 57A–D).

Beginning with segment 9, notopodium rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning gland and row of short notosetae emerging from inner side of notopodium; neuropodium truncate, with slightly distinct anteroventral bract; lower neurosetae numerous, within anteroventral bract, similar to those of more anterior parapodia; middle row of stout acicular aristate neurosetae, some with subdistal spines on one side; upper group of neurosetae, emerging from low anterodorsal bract, hidden by notopodium, of 2 types: (a) slender, long, tapering abruptly to slender tip with subdistal long hairs on one side and short spines basally; (b) short, more slender, bipinnate, hidden by notopodium (Figure 57F–J). Ventral cirri short, subulate (Figure 57E,G,H). Branchiae indistinct, anterior and posterior borders of parapodia thin-walled; thin-walled inflated areas ventrally medial to ventral cirri.

ETYMOLOGY.—The species is named for the type locality,

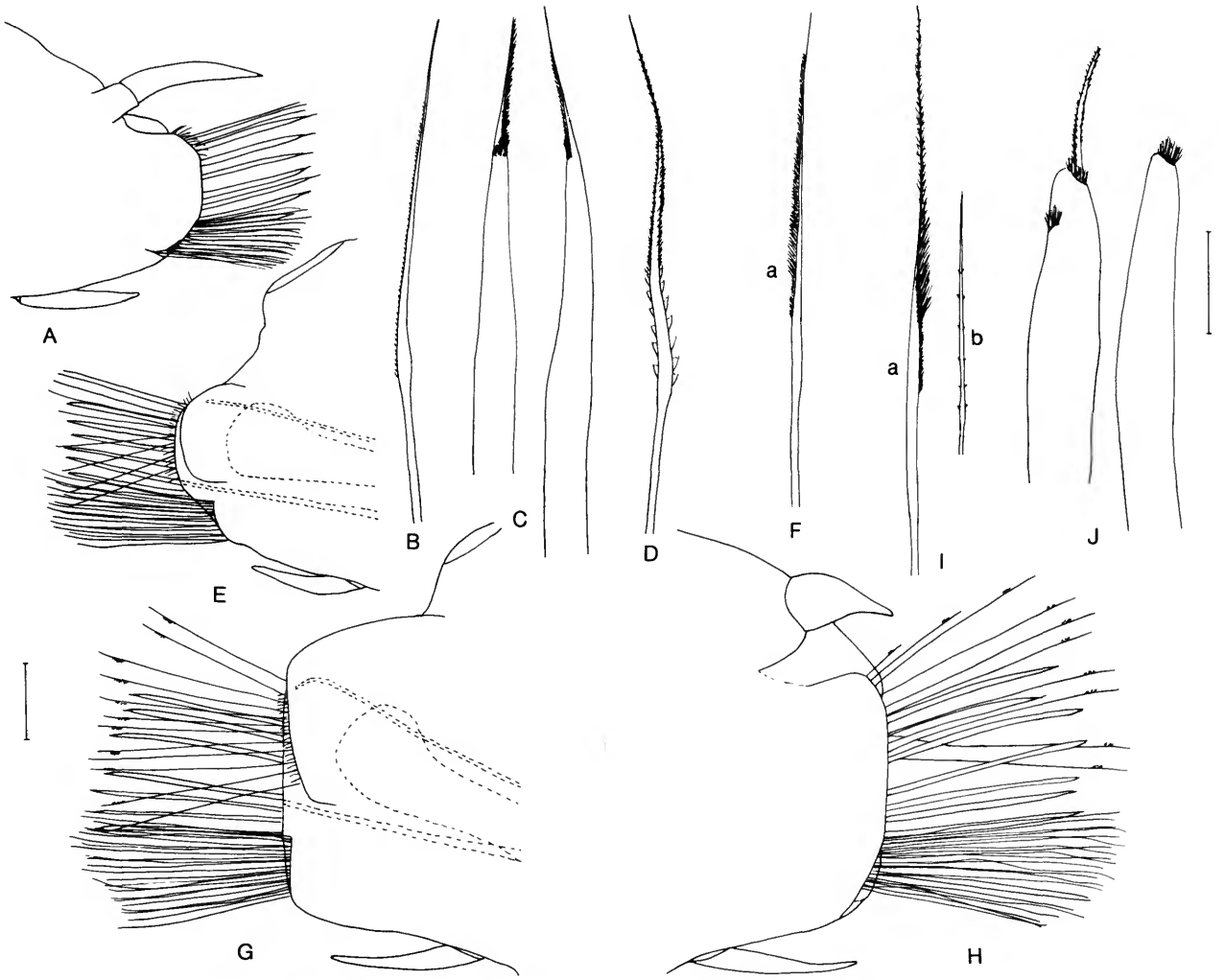


FIGURE 57.—*Acoetes congoensis*, holotype (ZMB 3252): A, right cirrigerous parapodium from segment 8, posterior view; B–D, upper, middle, and lower neurosetae from same; E, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; F, upper neuroseta from same; G, right elytragerous parapodium from segment 29, anterior view, acicula and spinning gland dotted; H, right cirrigerous parapodium from segment 30, posterior view; I,J, upper and middle neurosetae from same. (Scales: A,E,G,H = 0.5 mm; B–D,F,I,J = 0.1 mm.)

that of the Belgian Congo.

DISTRIBUTION.—West Africa. Up to 67 meters.

Acoetes bataensis, new species

FIGURES 58, 59

Polyodontes bicolor.—Augener, 1918:119 [part]. [Not *Polyodontes bicolor* Grube, 1877 (= *Acoetes bicolor* (Grube), new combination.]

MATERIAL EXAMINED.—WEST AFRICA. Bata, Spanish Guinea, A. Hupfer, collector, holotype (ZMH 599, as *Polyodontes bicolor* by Augener, 1918).

DESCRIPTION.—Holotype with 36+ segments, 23+ mm long, 12 mm wide with setae. Elytra rounded to oval, leaving middorsum uncovered, with dark border all around and fine network of areolae nearly throughout, with shallow external pouch beginning on segment 19 (Figure 58B–D). Prostomium bilobed, oval, with pair of bulbous ommatophores with short neck; ceratophore of median antennae on middle of prostomium, continued posteriorly as wide ridge, with style extending slightly beyond ommatophores; lateral antennae on distinct short ceratophores ventral to ommatophores, with styles extending slightly beyond ommatophores; small posterior pair of eyes lateral to ceratophore of median antenna; palps

FIGURE 58.—*Acoetes bataensis*, holotype (ZMH 599): A, dorsal view of prostomium and tentacular segment; B, right 1st elytron from segment 2; C, right 2nd elytron from segment 4; D, right 5th elytron from segment 9; E, right elytragerous parapodium from segment 2, anterior view, acicula dotted; F, same as E, posterior view; G, notoseta from same; H, neuroseta from same; I, right cirrigerous parapodium from segment 3, anterior view, acicula dotted; J, same as I, posterior view; K,L, middle and lower neurosetae from same. (Scales: A and B–D = 1.0 mm; E,F,I,J = 0.5 mm; G,H,K,L = 0.1 mm.)

stout, long, tapered, about 2 times longer than prostomium, with longitudinal rows of short papillae and irregular transverse bands of black pigment (Figure 58A). Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with row of papillae on inner side, aciculum, bundle of few capillary setae, and pair of dorsal and ventral tentacular cirri, slightly shorter than median antenna (Figure 58A).

Second segment with first pair of elytrophores, ventral buccal cirri longer than following ventral cirri, and biramous parapodia; notopodium with conical acicular lobe on anterodorsal side of larger neuropodium, with bundle of long, finely spinous, capillary notosetae; neuropodium conical, without distinct ventral bract, with row of long, finely spinous, capillary neurosetae (Figure 58E–H). Pharynx not extended and not examined.

Third segment with first pair of dorsal cirri with short cirrophores and subulate styles extending to about tips of notosetae; ventral cirri slightly shorter; notopodia and notosetae similar to those of second segment; neuropodium with distinct ventral bract; upper neurosetae similar to those of second segment; middle neurosetae stout, acicular, some with aristae; lower neurosetae slender, slightly curved, wider basally with long spines and close-set spines distally, with capillary tips (Figure 58I–L). Parapodia of segments 4–8 with smaller conical notopodia and fewer and shorter notosetae (Figure 59A,B).

Beginning with segment 9, notopodium rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning glands and row of short notosetae emerging from inner side of notopodium; neuropodium with slightly bilobed presetal acicular lobe, truncate postsetal lobe and anteroventral bract; lower neurosetae numerous, within anteroventral bract, similar to setae of more anterior parapodia; middle row of stout acicular aristate neurosetae; upper group of neurosetae, emerging from low anterodorsal bract, hidden by notopodium, of 2 types: (a) long, slender, tapering abruptly to slender tips

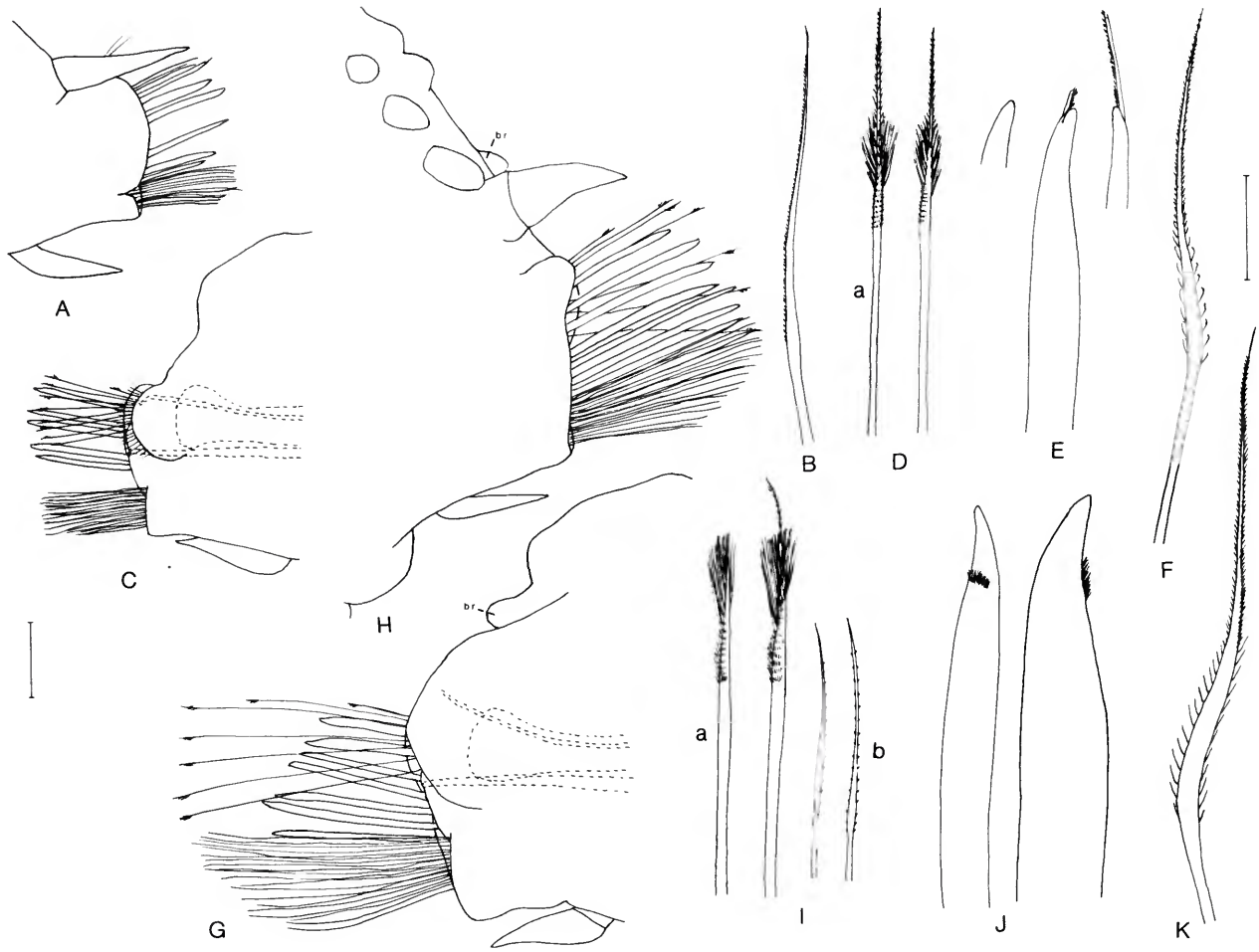


FIGURE 59.—*Acoetes bataensis*, holotype (ZMH 599): A, right cirrigerous parapodium from segment 8, posterior view; B, upper neuroseta from same; C, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; D–F, upper, middle, and lower neurosetae from same; G, right elytragerous parapodium from segment 31, anterior view, acicula and spinning gland dotted; H, right cirrigerous parapodium from segment 32, posterior view; I–K, upper, middle, and lower neurosetae from same. (Scales: A,C,G,H = 0.5 mm; B,D–F,I–K = 0.1 mm.)

(tips sometimes broken off), with subdistal long plumose hairs and short spinous rows more basally; (b) short, very slender, bipinnate, mostly hidden by notopodium with only tips showing Figure 59C–F). Posterior parapodia similar, with some stout acicular neurosetae with subdistal spines on one side, often without aristae (Figure 59G–K). Parapodial branchiae beginning about segment 12, 1 to few oval pustules on bases of elytrophores and dorsal cirri (Figure 59G,H). Inflated bulbous areas medial to ventral cirri beginning about segment 22.

ETYMOLOGY.—The species is named for the type locality, that of Bata in Spanish Guinea.

DISTRIBUTION.—West Africa.

Acoetes mohammadi, new species

FIGURES 60, 61

Panthalis melanonotus.—Mohammad, 1973:24. [Not *Panthalis melanonotus* Grube, 1876.]

MATERIAL EXAMINED.—ARABIAN GULF. Hawalli, Kuwait, near low tide mark, M. Mohammad, collector, holotype (BMNH 1971.40, as *Panthalis melanonotus* by Mohammad, 1973).

DESCRIPTION.—Holotype with 39+ segments, 25+ mm long, 10 mm wide with setae. Elytra large, oval, delicate, leaving middorsum uncovered, some with outer margin rolled dorsally,

with small areolae on medial part and flecks of dark pigment on surface (Figure 60C,D). Prostomium bilobed, oval, with pair of bulbous ommatophores with distinct neck; ceratophore of median antenna on middle of prostomium, continuing posteriorly as raised ridge, with tapered style projecting slightly beyond ommatophores; lateral antennae inserted ventral to ommatophores with only tips visible dorsally; posterior pair of small sessile eyes lateral to ridge of median antenna, with few pigment spots nearby; ventral palps stout, tapering, about 1.5 times length of prostomium, covered with minute papillae and irregularly banded with black pigment (Figure 60A). Tentacular segment visible dorsally forming raised occipital fold with groups of papillae on lateral sides; tentaculophores lateral to prostomium, each with few capillary setae, dorsal and ventral tentacular cirri slightly longer than median antenna, with scattered pigment spots (Figure 60A).

Second segment with first pair of elytrophores, ventral buccal cirri longer than following ventral cirri, and biramous parapodia; notopodium smaller than neuropodium, bilobed, with digitiform acicular lobe and shorter, rounded lower part,

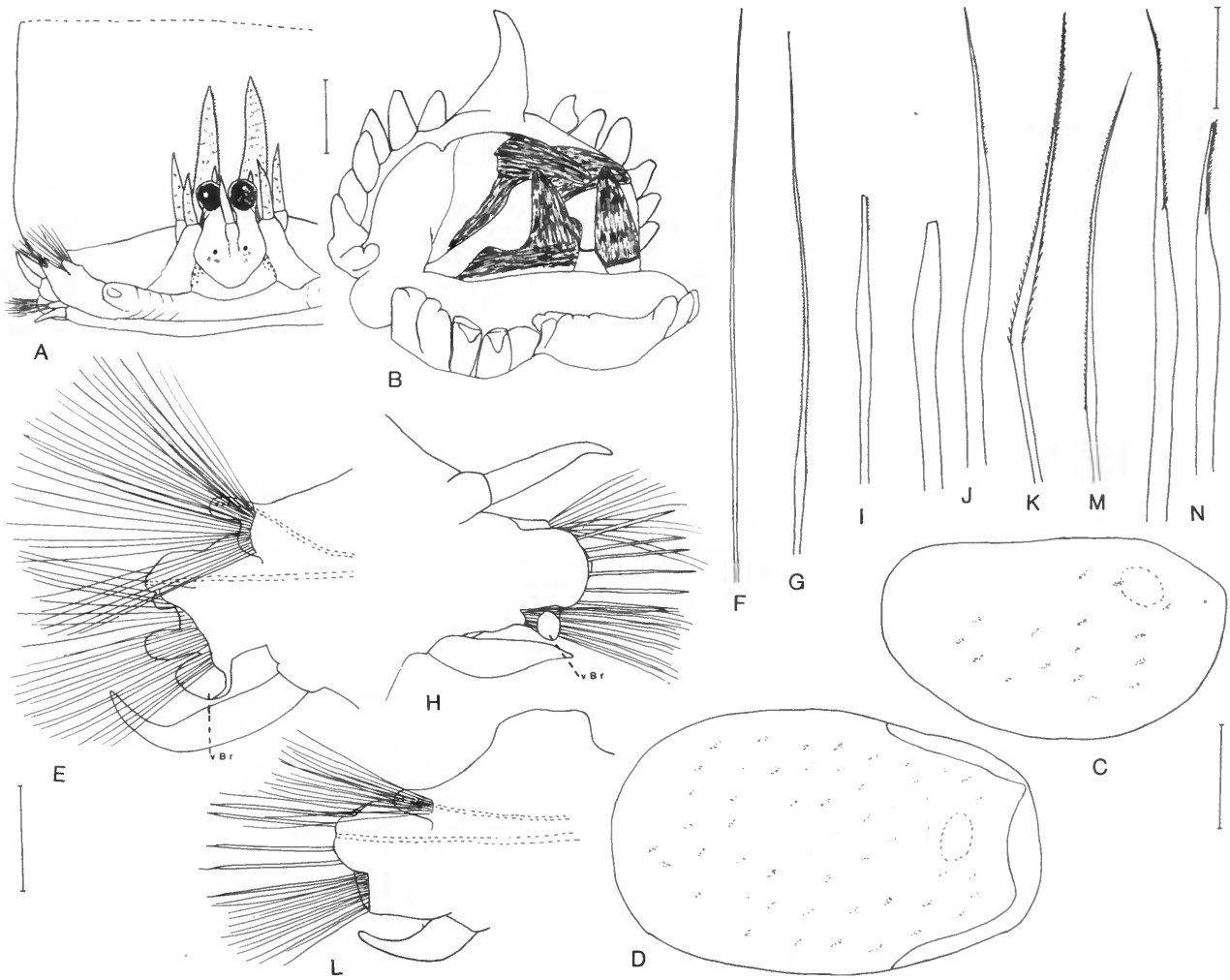


FIGURE 60.—*Acoetes mohammadi*, holotype (BMNH 1971.40): A, dorsal view of anterior end, pharynx fully extended (only basal part shown), (right side omitted); B, anteroventral view of distal end of pharynx showing jaws and border papillae; C, right 3rd elytron from segment 5; D, right 8th elytron from segment 15; E, right elytragerous parapodium from segment 2, anterior view, acicula dotted; F, notoseta from same; G, neuroseta from same; H, right cirrigerous parapodium from segment 3, posterior view; I–K, upper (tip broken), middle, and lower neurosetae from same; L, right elytragerous parapodium from segment 5, anterior view, acicula dotted; M,N, upper and middle neurosetae from same. (Scales: A,B and C,D = 1.0 mm; E,H,L = 0.5 mm; F,G,I–K,M,N = 0.1 mm.)

with numerous slender, capillary, finely spinous notosetae forming radiating bundle as long and large as neurosetae; neuropodium with conical presetal acicular lobe, postsetal lobe flared, bilobed on right side, entire on left side, with well-developed ventral bract; numerous long, slender neurosetae, wider basally, finely spinous, with capillary tips (Figure 60A,E–G). Distal border of extended pharynx with 15 dorsal papillae, middle one on wide base, tapered, much longer than others, and 12 ventral papillae, midventral one with wide base but without distinct papilla; 2 pairs of claw-like jaws without lateral teeth (perhaps worn) (Figure 60B).

Third segment with first pair of dorsal cirri with short cirrophores and styles extending to tips of setae; ventral cirri about as long as dorsal cirri; parapodium smaller than on second segment, with smaller bundle of long capillary notosetae; neuropodium with truncate postsetal lobe and ventral bract; middle aristate neurosetae somewhat modified, tapering gradually to spinous distal tips; lower neurosetae, within ventral bract, wider basally with longer spines, tapering to capillary tips with short close-set spines (Figure 60A,H–K). Following parapodia of segments 4 to 8 similar (Figure 60L–N).

From segment 9 on, parapodia larger, with notopodium rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning glands, and few short notosetae emerging from inner side of notopodium; neuropodium with wide conical presetal acicular lobe, truncate postsetal lobe, and more or less distinct anteroventral bract; lower neurosetae, within anteroventral bract, numerous, similar to neurosetae of more anterior parapodia; middle neurosetae stout, acicular,

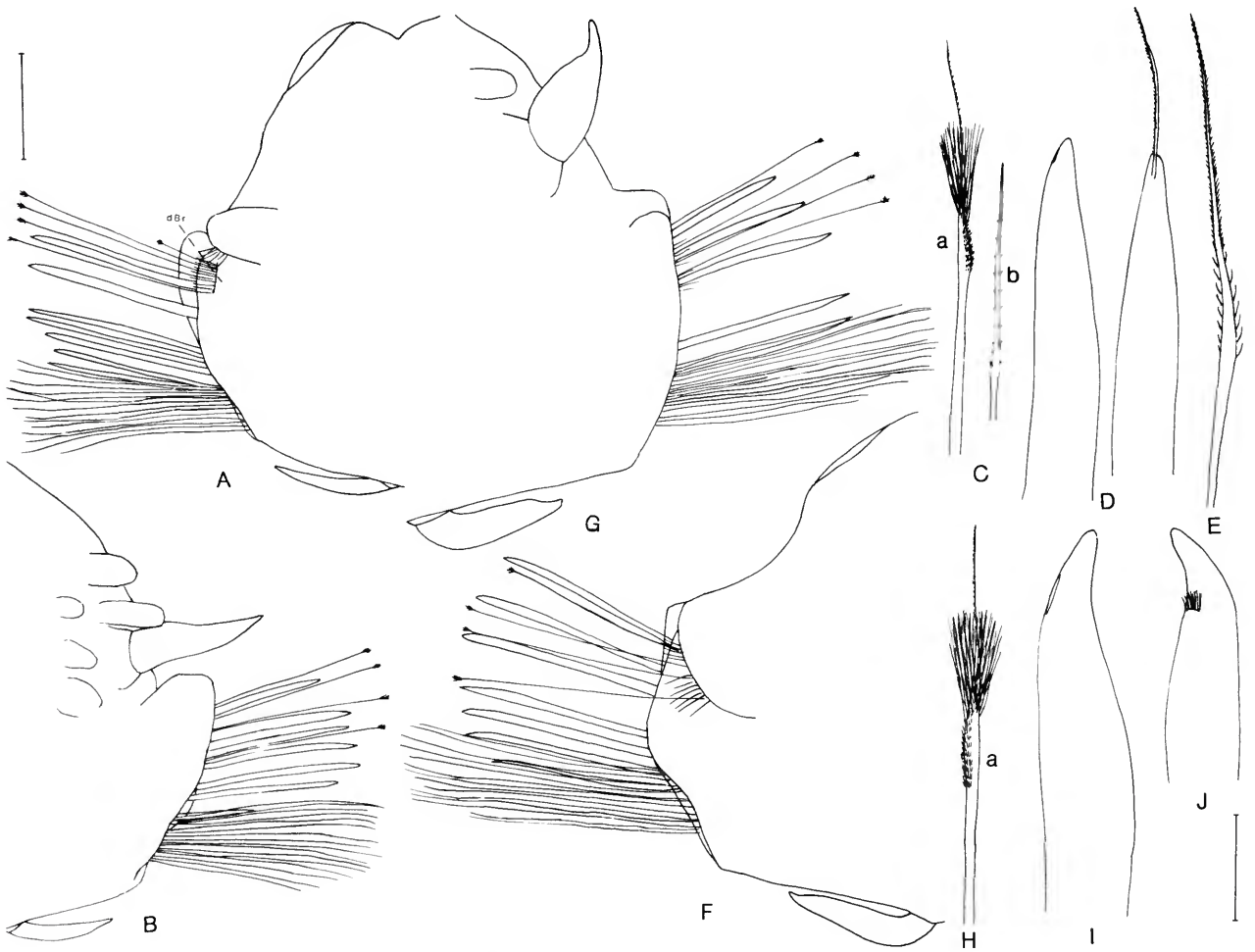


FIGURE 61.—*Acoetes mohammadi*, holotype (BMNH 1971.40): A, right elytragerous parapodium from segment 13, anterior view, notopodium pulled back; B, right cirrigerous parapodium from segment 14, posterior view; C–E, upper, middle, and lower neurosetae from same; F, right elytragerous parapodium from segment 25, anterior view; G, right cirrigerous parapodium from segment 26, posterior view; H,I, upper and middle neurosetae from same; J, middle neuroseta from segment 40. (Scales: A,B,F,G = 0.5 mm; C–E,H–J = 0.1 mm.)

with or without aristae, some in more posterior parapodia with subdistal spines on one side; upper group of neurosetae, emanating from low dorsoanterior bract, hidden from view unless notopodium pulled back, of 2 types: (a) longer, slender, tapering abruptly to slender tip, with subdistal long bushy hairs and short spinous rows more basally; (b) shorter, slender, bipinnate, hidden by notopodium (Figure 61A–J). Few bulbous branchiae, beginning about segment 10, on bases of dorsal cirri and elytrophores (Figure 61B,G). Thin-walled branchial areas medial to ventral cirri.

TUBE.—According to Mohammad, the collector, the animal was found in a membranous tube coated with a very thick layer of mud.

ETYMOLOGY.—The species is named for M.-B.M. Mohammad, the collector of the holotype and specialist on the polychaetes in the Arabian Gulf.

DISTRIBUTION.—Arabian Gulf. Intertidal.

Acoetes flagelliformis (Wesenberg-Lund, 1949), new combination

FIGURE 62

Polyodontes flagelliformis Wesenberg-Lund, 1949:261, figs. 4–6.

MATERIAL EXAMINED.—GULF OF IRAN. 13 miles (21 km) S of Bustani, 27°00′N, 53°08′E, 65 m, soft gray-brown mud, sta 50B, 6 Apr 1937, G. Thorson, collector, holotype (UZMC).

TYPE MATERIAL.—Holotype with pharynx fully extended, with 35+ segments, 18+ mm long (30+ mm with pharynx), 7 mm wide with setae.

DESCRIPTION.—Elytra rounded to oval, leaving middorsum uncovered, delicate, with fine network of areolae nearly throughout, without lateral pocket (at least to segment 35) (Figure 62B,D; Wesenberg-Lund, 1949, fig. 4a). Prostomium bilobed with bulbous ommatophores with short neck; median antenna with ceratophore on middle of prostomium, with style extending to tips of ommatophores; lateral antennae inserted ventrally on ommatophores with tips visible dorsally; posterior pair of small sessile eyes anterolateral to ceratophore of median antenna; stout ventral palps tapered, about 1.5 times length of prostomium, with longitudinal rows of short papillae and transversely banded with brown pigment (Figure 62A). Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with globular papillae on upper side, 2 acicula, 2 bundles of capillary setae and pair of dorsal and ventral tentacular cirri, slightly longer than median antenna (Figure 62A,D).

Second segment with first pair of elytrophores, ventral buccal cirri longer than following ventral cirri, and biramous parapodia; notopodium small, conical, with bundle of long, finely spinous capillary notosetae; neuropodium larger, with conical presetal acicular lobe, truncate postsetal lobe, and distinct ventral bract; neurosetae slender, capillary (tips broken) (Figure 62E). Distal border of extended pharynx with 15 pairs of border papillae, middorsal and midventral ones on wide bases, much longer than others, dorsal one longer than ventral one; 2 pairs of hooked jaws each with 5–7 lateral teeth (Wesenberg-Lund, 1949, fig. 4a–c).

Third segment with first pair of dorsal cirri, with styles extending to tips of setae; ventral cirri short, subulate; parapodia similar to second segment; upper and lower neurosetae slender, lanceolate, finely spinous; middle neurosetae stout, acicular, aristate (Figure 62F–H). Parapodia of segment 8 larger, with dorsal and ventral cirri about equal in length; upper group of neurosetae slender, lanceolate, finely spinous; lower neurosetae similar to following parapodia; middle acicular neurosetae stout with distal hairs on bases of aristae (Figure 62I–K).

Beginning with segment 9, notopodium wide, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning glands, and fan-shaped bundle of short notosetae extending slightly beyond notopodium; neuropodium with slightly bilobed presetal acicular lobe, truncate postsetal lobe, and anteroventral bract; lower group of neurosetae, within anteroventral bract, slender, wider basally, slightly curved, with longer spines basally and close-set shorter spines distally, with capillary tips; middle row of stout acicular aristate neurosetae with distal hairs and subdistal spines in several rows on one side; upper group of neurosetae, emanating from low anterodorsal bract, hidden by notopodium, of 2 types: (a) long, slender, tapering abruptly to more slender tips, with subdistal long bushy hairs and short spinous rows basally; (b) short (hidden by notopodium), slender, bipinnate (Figure 62L–O; Wesenberg-Lund, 1949, figs. 5, 6a–f). Cirrophores of dorsal cirri wide, inflated, with style wider basally, about as long as ventral cirri; small branchiae on posterior side of parapodia, beginning about segment 6; inflated branchial areas medial to ventral cirri (Figure 62N).

DISTRIBUTION.—Gulf of Iran. In 65 meters.

Acoetes pacifica (Treadwell, 1914), new combination

FIGURES 63, 64

Panthalis pacifica Treadwell, 1914:184, pl. 11: figs. 1–7.—Hartman, 1939b:87, pl. 26: figs. 309–312 [not sensu Hartman, 1942:95 (off Cuba, specimen not found)].—Berkeley and Berkeley, 1941:24.—Emerson, 1971:137.—Fauchald, 1972:29; 1977a:9.

Panthalis jogasimae.—Monro, 1928:568. [Not *Panthalis jogasimae* Izuka, 1912.]

MATERIAL EXAMINED.—SOUTHERN CALIFORNIA. off San Diego, 32°50.7′N, 117°21.5′W, 91–163 m, holotype (AHF 52), 2 paratypes (AMNH 769, 771). Off Corona del Mar, 22–27 m, 8, 15 Aug 1933, G.E. MacGinitie, collector, 3 specimens (USNM 35018). 34°06′N, 120°02′W, 97 m, fine gray sandy mud, *Albatross* sta 2902, 7 Jan 1889, 4 specimens (USNM 50709). 34°18′N, 119°41;W, 110 m, *Albatross* sta 2972, 11 Feb 1889, 2 specimens (USNM 50710). 34°19′N, 119°44′W, 124 m, green mud, *Albatross* sta 2973, 11 Feb 1889, 1 specimen (USNM 50711).

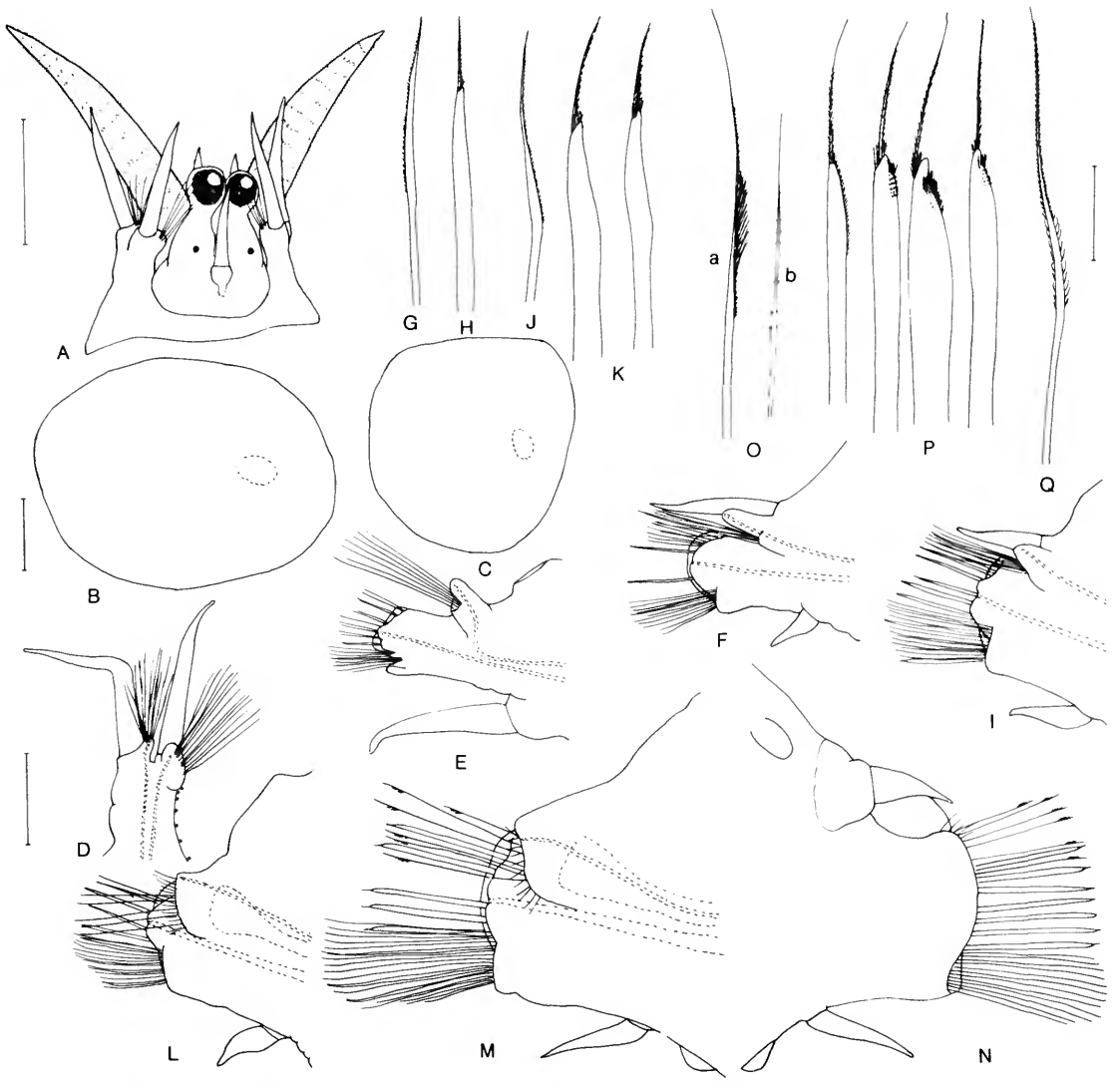


FIGURE 62.—*Acoetes flagelliformis*, holotype of *Polyodontes flagelliformis* (UZMC): A, dorsal view of prostomium and tentacular segment, pharynx fully extended (not shown); B, right 1st elytron from segment 2; C , right middle elytron; D, right tentaculophore with dorsal and ventral cirri, inner view, acicula dotted; E, right elytragerous parapodium from segment 2, anterior view, acicula dotted; F, right cirrigerous parapodium from segment 3, anterior view, acic ula dotted; G,H, upper and middle neurosetae from same; I, right cirrigerous parapodium from segment 8, anterior view, acicula dotted; J,K, upper and middle neurosetae from same; L, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; M, right elytragerous parapodium from segment 29, anterior view, acicula and spinning gland dotted; N, right cirrigerous parapodium from segment 30, posterior view; O–Q, upper, middle, and lower neurosetae from same. (Scales: A = 1.0 mm; B,C and D–F,I,L–N = 0.5 mm; G,H,J,K,O–Q = 0.1 mm.)

PANAMA (Pacific). Bahia Honda, 55–64 m, *Velero* sta 244–34, 21 Feb 1934, 1 specimen (AHF). Gorgona Island, 37–55 m, fine sand and shell, C. Crossland, collector, 3 specimens (BMNH 1928.9.13.41–42, as *Panthalis jogasimae* by Monro, 1928, as *Panthalis pacifica* by Fauchald, 1977a).

GULF OF MEXICO. 28°45′N, 86°26′W, 415 m, gray mud, *Albatross* sta 2398, 14 Mar 1885, 1 specimen (USNM 50708). 28°44′N, 86°18′W, 358 m, gray mud, sta 2399, 14 Mar 1885, 1 specimen (USNM 1937). 28°36′N, 85°33′W, 203 m, gray mud, *Albatross* sta 2402, 14 Mar 1885, 2 specimens (USNM 3369). Cruises of R/V *Alaminos*, 1964, 1965, 1968, 1969, W.E. and L.H. Pequegnat, collectors: 27°52′N, 94°56′W, 121–181 m, sta 64A10-13C, 28 Jun, 1 specimen (USNM 71494); 27°40′N, 94°45′W, 240 m, sta 65A3–8, 12 Mar, 1

specimen (USNM 68647); 3 miles (4.8 km) off Galveston Harbor, Texas, 10 m, sta 65A3–8, 12 Mar, 1 specimen (USNM 71495); 26°12′N to 27°50′N, 95°12′W to 96°19′W, 183–640 m, stas 68A13-5, 68A13-17, 68A13-19, 68A13-21, 15–19 Nov, 5 specimens (USNM 68648–50, 71496); 29°11′N, 88°12′W, 311 m, sta 69A13-41, 15 Oct, 1 specimen (USNM 68652); 19°25′N to 21°24′N, 95°57′W to 96°57′W, 182–384 m, stas 69A11-60, 69A11-64, 69A11-76, 69A11-77, 20–23 Aug, 10 specimens (USNM 68651, 68653, 71497, 71498).

TYPE MATERIAL.—Holotype (AHF 52) with pharynx fully extended, with 26+ segments, 10+ mm long, 7 mm wide with setae. Paratype (AMNH 769) with 28+ segments,, 15+ mm long, 9 mm wide. Paratype (AMNH 771) female with large eggs, 53+ segments, 40+ mm long, 10 mm wide.

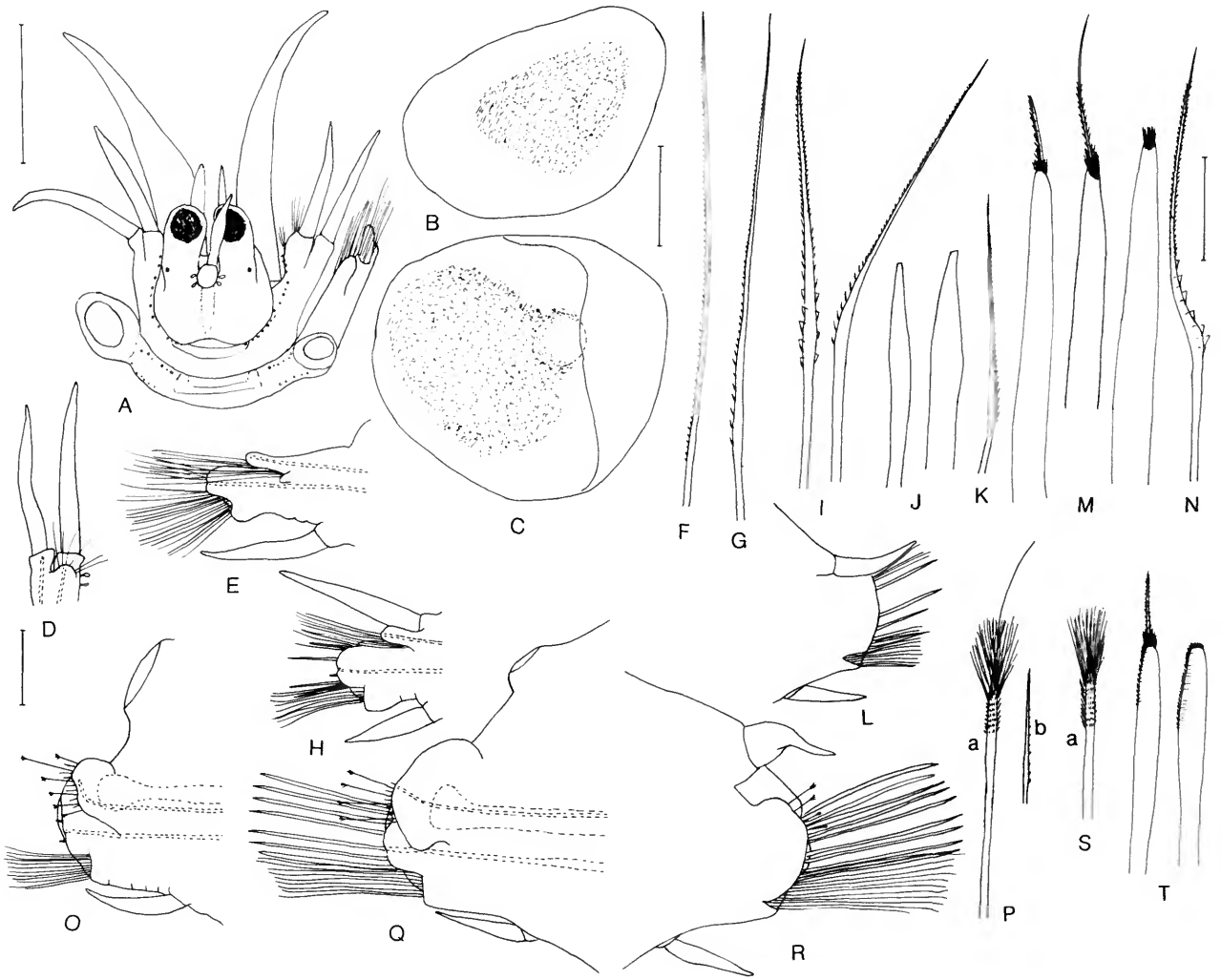


FIGURE 63.—*Acoetes pacifica*, paratype of *Panthalis pacifica* from Southern California (AMNH 769): A, dorsal view of anterior end (left parapodium of segment 2 not shown); B, right 1st elytron from segment 2; C, right 13th elytron from segment 25; D, right tentaculophore with dorsal and ventral tentacular cirri, inner view, acicula dotted; E, right elytragerous parapodium from segment 2, anterior view, acicula dotted; F, notoseta from same; G, neuroseta from sa me; H, right cirrigerous parapodium from segment 3, anterior view, acicula dotted; I–K, upper, middle (tips broken), and lower neurosetae from same; L, right cirrigerous parapodium from segment 8, posterior view; M,N, middle and lower neurosetae from same; O, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; P, upper neurosetae from same; Q, right elytragerous parapodium from segment 25, anterior view, acicula and spinning gland dotted; R, right cirriger ous parapodium from segment 26, posterior view; S,T, upper and middle neurosetae from same. (Scales: A and B,C = 1.0 mm; D,E,H,L,O,Q,R = 0.5 mm; F,G,I–K,M,N,P,S,T = 0.1 mm.)

Anterior few pairs of elytra large, oval, covering dorsum, following ones leaving middorsum uncovered; elytra delicate, more or less pigmented with brown on medial part, with lateral pouch from about segment 9 (Figure 63B,C). Prostomium bilobed with pair of rounded ommatophores, without distinct neck; ceratophore of median antenna on middle of prostomium, with or without few lateral papillae, with tapered style extending slightly beyond ommatophores; lateral antennae

FIGURE 64.—*Acoetes pacifica*, specimen from Gulf of Mexico (USNM 68653): A, dorsal view of anterior end (right dorsal tentacular cirrus broken off); B, ventral view of anterior end (left parapodia of segments 1–3 not shown, only bases of palps shown); C, right tentaculophore with dorsal and ventral tentacular cirri, inner view; D, right elytragerous parapodium from segment 2, anterior view, acicula dotted; E, notosetae from same; F, neuroseta from same; G, right cir rigerous parapodium from segment 3, posterior view; H–J, upper, middle, and lower neurosetae from same; K, right cirrigerous parapodium from segment 8, posterior view; L–N, upper, middle, and lower neurosetae from same; O, right elytragerous para podium from segment 9, anterior view, acicula and spinning gland dotted; P, right elytragerous parapodium from segment 23, anterior view; acicula and spinning gland dotted; Q, right cirrigerous parapodium from segment 24, posterior view; R–T, upper, middle, and lower neurosetae from same; (Scales A,B = 1.0 mm; C,D,G,K,O–Q = 0.5 mm; E,F,H–J,L–N,R–T = 0.1 mm.)

attached ventral to ommatophores, with tips extending beyond ommatophores; posterior pair of small eyespots lateral to ceratophore of median antenna; ventral palps long, tapered, 2 to 3 times longer than prostomium, smooth, without papillae (Figures 63A, 64A,B; Treadwell, 1914, pl. 11: fig. 1). Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with 2 acicula, bundle of slender setae on inner side, row of globular papillae, and pair of dorsal and ventral tentacular cirri, longer than median antenna (Figures 63A,D, 64A–C).

Second segment with first pair of elytrophores, ventral buccal cirri longer than following ventral cirri, and biramous parapodia; notopodium small digitiform acicular lobe with bundle of long, slender, finely spinous notosetae; neuropodium with longer presetal acicular lobe, shorter, rounded postsetal lobe, and ventral bract; neurosetae slender, wider basally, tapering to finely spinous, capillary tips (Figures 63A,E–G, 64A,B,D–F; Treadwell, 1914, pl. 11: fig. 2). Distal border of extended pharynx with 13 or 15 pairs of papillae, middorsal one much longer than others, midventral one longer than others but shorter than middorsal one; 2 pairs of hooked jaws, each with 6–8 lateral teeth.

Third segment with first pair of dorsal cirri, with short cirrophore and style extending beyond setae; parapodia similar to segment 2 except presetal neuropodial lobe shorter and middle neurosetae stout, acicular, aristate (Figures 63H–K, 64G–J). Parapodia of segments 4–8 with fewer, shorter notosetae; upper neurosetae similar to anterior parapodia; lower neurosetae slender, with larger spines more basally and close-set spinous rows distally on tapered capillary tips; middle stout acicular neurosetae with distal hairs on bases of aristae (Figures 63L–N, 64K–N).

Beginning with segment 9, notopodium large, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning glands, and few short notosetae; neuropodium with slightly bilobed presetal acicular lobe, truncate postsetal lobe and distinct anteroventral bract; lower neurosetae numerous, similar to anterior parapodia; middle row of stout acicular aristate neurosetae with distal hairs on bases of aristae, some in more posterior parapodia with additional subdistal spines along one side; upper group of neurosetae, emerging from low anteroventral bract, hidden by notopodium, of 2 types: (a) long, slender, abruptly tapered to slender tip, with subdistal long hairs and rows of shorter spines more basally; (b) short, slender, aristate, hidden by notopodium (Figures 63O–T, 64O–T; Hartman, 1939b, pl. 26: figs. 310–312). Without branchiae.

DISTRIBUTION.—Southern and Lower California, Panama (Pacific), Gulf of Mexico. In 10 to 640 meters.

Acoetes mortenseni (Monro, 1928), new combination

FIGURE 65

Polyodontes mortenseni Monro, 1928:569, figs. 19–24 [part] [not sensu Monro, 1930:69 (= *Acoetes congoensis*, new species).]

Panthalis mortenseni.—Hartman, 1939b:83; 1959:112, 113; 1968:143, figs. 1–3.—Fauchald, 1977a:8 [part].

REMARKS.—The syntype of *Polyodontes mortenseni* from Melones, Panama (UZMC) does not agree with the two syntypes from Taboga, Panama (UZMC; BMNH). The former syntype is referred herein to *Polyodontes panamensis* (Chamberlin, 1919); the latter two syntypes are designated as lectotype (UZMC) and paralectotype (BMNH) and referred to *Acoetes mortenseni* (Monro), new combination.

MATERIAL EXAMINED.—PANAMA (Pacific). Taboga, muddy sand, 5 Feb 1916, Th. Mortensen, collector, lectotype (UZMC) and paralectotype (BMNH 1928.9.13.62).

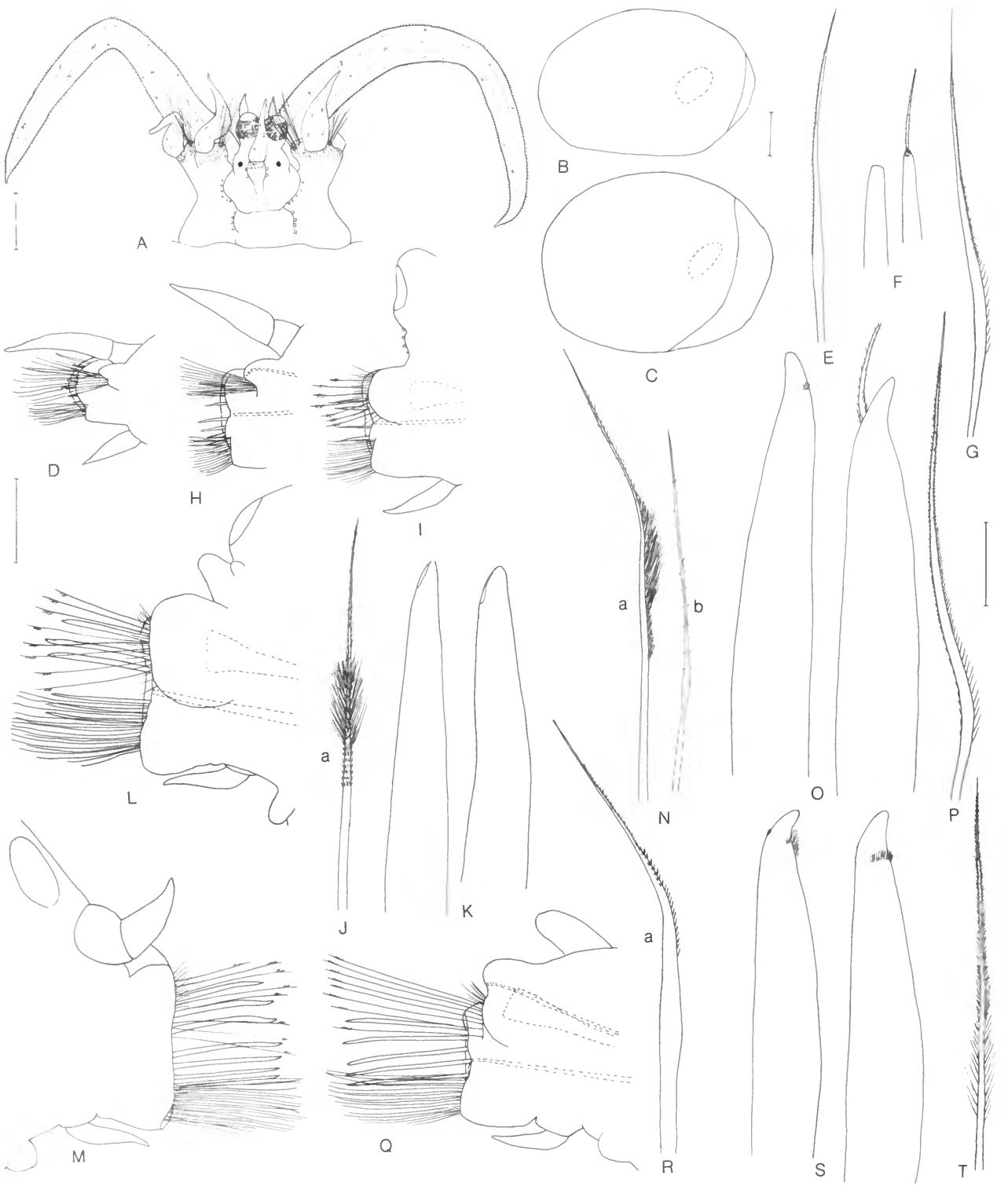
TYPE MATERIAL.—Lectotype anterior fragment with pharynx extended, with 49+ segments, 46+ mm long, 12 mm wide with setae. Paralectotype complete, with about 130 segments, 150 mm long, 13 mm wide.

DESCRIPTION.—Elytra oval, delicate, anterior few with scattered black spots, most of surface areolate, with shallow lateral pouch on more posterior elytra (Figure 65B,C). Prostomium bilobed, with bulbous ommatophores and short neck; median antenna with ceratophore on middle of prostomium with pigmented band and few lateral papillae, with style stout, subulate, extending beyond tips of ommatophores; lateral antennae inserted ventrally on ommatophores and extending slightly beyond; posterior pair of small eyespots lateral to ceratophore of median antenna; stout tapering palps about 3 times longer than prostomium, with longitudinal rows of short papillae and dotted with black pigment (Figure 65A). Tentacular segment distinct dorsally with slightly raised nuchal fold with lateral papillae; tentaculophores lateral to prostomium, each with 2 bundles of setae, medial row of papillae, pair of dorsal and ventral tentacular cirri, similar to but wider and longer than median antenna (Figure 65A).

Second segment with first pair of elytrophores, ventral buccal cirri longer than following ventral cirri, and biramous parapodia; notopodium small digitiform acicular lobe with bundle of long finely spinous notosetae; larger conical neuropodium and distinct ventral bract; neurosetae slender, wider basally, tapering to long finely spinous tips (Monro, 1928, figs. 19–21). Distal border of extended pharynx with 15 pairs of papillae, middorsal one larger than others, on wide base; 2 pairs of jaws each with 5 or 6 lateral teeth.

Third segment with first pair of dorsal cirri, with short cirrophores and styles extending to tips of neurosetae; parapodia similar to segment 2, except for stout, acicular, aristate middle neurosetae (Figure 65D–G). Following few parapodia with somewhat larger neuropodia (Figure 65H).

Beginning with segment 9, notopodium rounded, flattened, on anterodorsal side of larger neuropodium, with notoaciculum, spinning glands and vertical row of short capillary notosetae; neuropodium with bilobed presetal acicular lobe, truncate postsetal lobe, and indistinct anteroventral bract; lower neurosetae numerous, within anteroventral bract, slender, slightly curved, with larger spines basally and close-set spinous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rows distally; middle row of stout acicular aristate neurosetae, aristae often broken off; acicular neurosetae of more posterior parapodia with subdistal spines on one side; upper group of neurosetae, emerging from low anteroventral bract, hidden by notopodium, of 2 types: (a) long, slender, tapering abruptly to long slender tip, with subdistal long hairs and shorter spinous rows more basally; (b) short, slender, bipinnate, hidden by notopodium; dorsal and ventral cirri about equal in length. Bulbous branchiae on bases of elytrophores and dorsal cirri, branchiae few (1–5), beginning on segment 8, with single large one from about segment 27 (Figure 65I–T; Monro, 1928, figs. 22–24). Pygidium with pair of anal cirri.

DISTRIBUTION.—Panama (Pacific), low tide.

Acoetes grubei (Kinberg, 1856), new combination

FIGURES 66, 67

Eupompe Grubei Kinberg, 1855 [1856]:387; 1858:24, pl. 7: fig. 35, pl. 10: fig. 59.

Panthalis grubei.—Hartman, 1939b:87; 1948 [1949]:30, pl. 4: figs. 1–4.

Panthalis marginata Hartman, 1939b:88, pl. 26: figs. 313–318. [New synonym.]

MATERIAL EXAMINED.—ECUADOR. Guajaquil, about 46 m, *Eugenie* Expedition, 4 syntypes of *Eupompe grubei* (NRS 2613).

MEXICO. El Golfo, Sonora, M. Crezee, collector, Apr 1968, 1 specimen (USNM 50731).

GUATEMALA. off San Jose Light, 13–20 m, sand, shell, mud, sta 770-38, 11 Jan 1938, holotype of *P. marginata* (AHF 51).

PANAMA (Pacific). Venado Beach, sieving in sand spit, sta 132-2, 4 Apr 1973, M.L. Jones, collector, 1 small specimen (USNM 71501).

TYPE MATERIAL.—Syntypes of *Eupompe grubei* consisting of 4 anterior fragments, 3 with pharynx fully extended (jaws of one had been cut out), with 56–85+ segments, 50–100+ mm long, 11–12 mm wide with setae; also some middle and posterior fragments; according to Kinberg, complete worm of about 185 segments, 220 mm long, 12.5 mm wide. Holotype of *Panthalis marginata*, along with portion of tube, consisting of anterior fragment of 48+ segments, 20+ mm long, 5 mm wide.

DESCRIPTION.—Elytra oval, delicate, leaving middorsum uncovered, without lateral pouch, brownish on medial part with light border, with net-like areolate areas (Figure 66C–E; Kinberg, 1858, pl. 7: fig. 33A,H). Prostomium bilobed, with globular ommatophores and long neck; median antenna with ceratophore in middle of prostomium, with lateral papillae, continuing posteriorly as more or less distinct posterior crest, with style extending almost to tips of ommatophores; lateral antennae inserted ventrally on ommatophores, similar to median antenna; posterior pair of small eyespots lateral to ceratophore of median antenna; palps stout, tapered, smooth, about twice as long as prostomium, irregularly banded with brown pigment (Figure 66A,B; Kinberg, 1858, pl. 7: fig. 35B). Tentacular segment visible dorsally with slightly raised nuchal ridge; tentaculophores lateral to prostomium, each with 2 bundles of setae, pair of dorsal and ventral tentacular cirri, similar to median antenna, all with subdistal brown bands (Figure 66B).

Second segment with first pair of elytrophores, ventral buccal cirri longer than following ventral cirri and biramous parapodia; notopodium with upper projecting acicular lobe and truncate lower part, with numerous finely spinous capillary notosetae; neuropodium wide, subconical, with subacicular anterior and supraacicular posterior parts somewhat digitate, and lower bract, with numerous finely spinous capillary neurosetae (Figure 66A,F–I; Hartman, 1939b, pl. 26: fig. 314). Distal border of extended pharynx with 15 pairs of border papillae, middorsal and midventral ones larger than others, upper one longer than lower one; 2 pairs of hooked jaws each with 4–6 lateral teeth (Kinberg, 1858, pl. 7: fig. 35A,E, pl. 10: fig. 59).

Third segment with first pair of dorsal cirri, with short cirrophores and styles extending beyond parapodia; ventral cirri short, subulate; notopodium and notosetae similar to those of segment 2; neuropodium somewhat smaller, with middle neurosetae stout, acicular with tapering spinous tips (Figure 66J–M; Hartman, 1939b, pl. 26: fig. 315). Parapodia of segments 4–8 with fewer and shorter notosetae (Figure 67A,B).

Beginning with segment 9, notopodium rounded, flattened, on anterodorsal side of larger neuropodium, with notoaciculum, spinning glands, and few short notosetae; neuropodium with truncate presetal acicular and postsetal lobes and anteroventral bract; lower neurosetae numerous, within anteroventral bract, slender, slightly curved, with larger spines on enlarged basal part and close-set short spines on tapering capillary part; middle row of stout acicular aristate neurosetae; upper group of neurosetae, emerging from low anterodorsal bract, hidden by notopodium, of 2 types: (a) slender, tapering abruptly to slender tip, with long hairs subdistally and shorter spines more basally; (b) short, slender, bipinnate, hidden by

FIGURE 65.—*Acoetes mortenseni*, lectotype of *Polyodontes mortenseni* from Taboga, Panama (UZMC): A, dorsal view of prostomium and tentacular segment, pharynx completely extended (not shown), (right ventral tenta cular cirrus broken); B, right 5th elytron from segment 9; C, right 15th elytron from segment 29; D, right cirrigerous parapodium from segment 3, anterior view; E–G, upper, middle, and lower neurosetae from same; H, right cirrigerous parapodium from segment 8, anterior view, acicula dotted (ventral cirrus not shown); I, right elytragerous parapodium from segment 9, anterior view, neuroaciculum and spinning gland dotted; J,K, upper and middle neurosetae from same; L, right elytragerous parapodium fro m segment 31, anterior view, neuroaciculum and spinning gland dotted; M, right cirrigerous parapodium from segment 32, posterior view; N–P, upper, middle, and lower neurosetae from same; Q, right elytragerous parapodium from segment 47, anterior view , acicula and spinning gland dotted; R–T, upper, middle, and lower neurosetae from same. (Scales: A; B,C; and D,H,I,L,M,Q = 1.0 mm; E–G,J,K,N–P,R–T = 0.1 mm.)

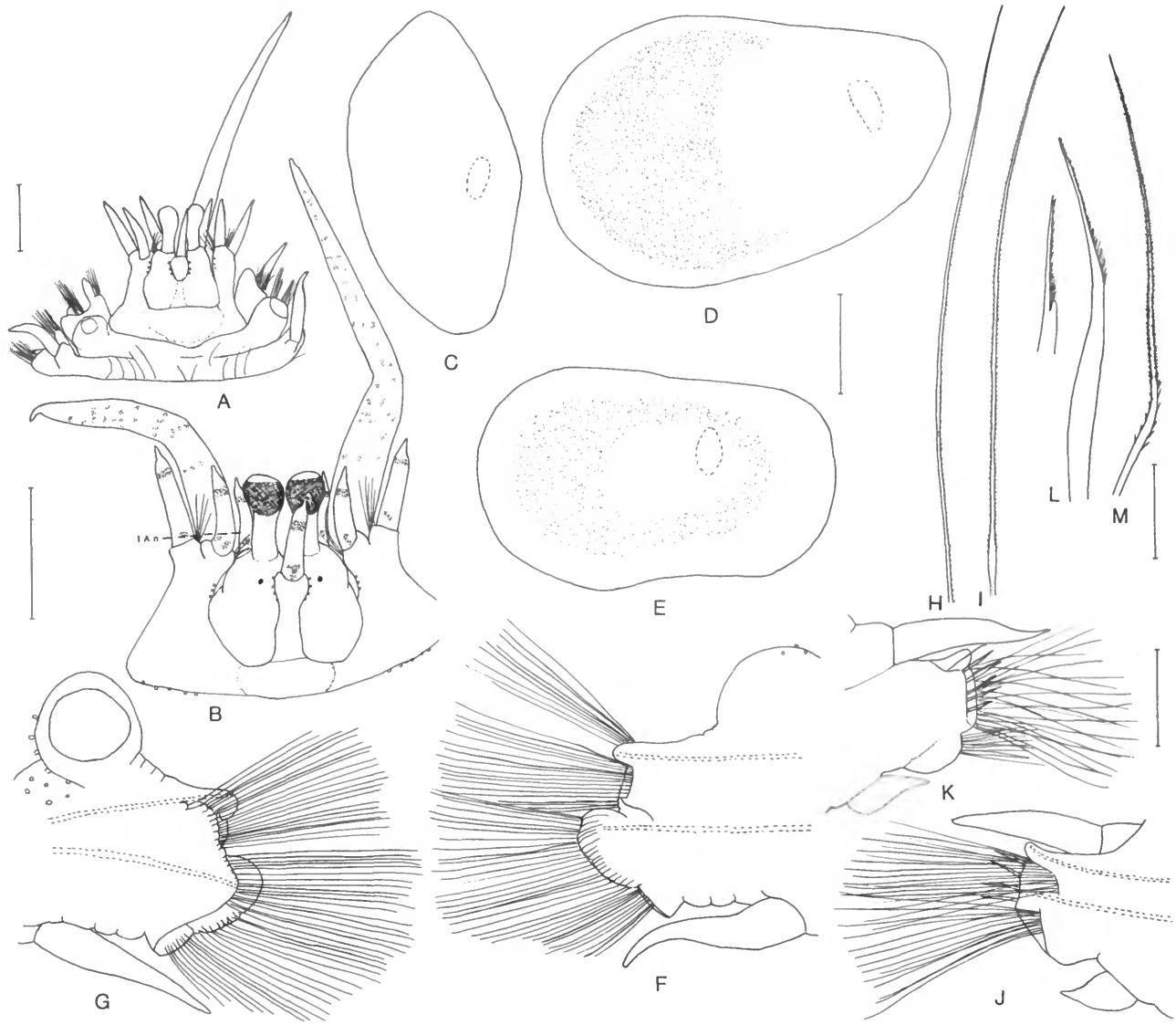

FIGURE 66.—*Acoetes grubei* (A, syntype of *Eupompe grubei* from Ecuador, NRS 2613; B–M, specimen from Sonora, Mexico, USNM 50731): A, dorsal view of anterior end (left palp missing); B, dorsal view of prostom ium and tentacular segment, pharynx fully extended (not shown); C, right 1st elytron from segment 2; D, right 5th elytron from segment 9; E, right 20th elytron from segment 39; F, right elytragerous parapodium from segment 2, anterior view, acicula dotte d; G, same as F, anterior view, acicula dotted; H, notoseta from same; I, neuroseta from same; J, right cirrigerous parapodium from segment 3, anterior view, acicula dotted; K, same as J, posterior view; L,M, middle and lower neurosetae from same. (Scale s: A; B; and C–E = 1.0 mm; F,G,J,K = 0.5 mm; H,I,L,M = 0.1 mm.)

notopodium (Figure 67C–F; Kinberg, 1858, pl. 7: fig. 35G; Hartman, 1939b, pl. 26: figs. 316–318; Hartman, 1948 [1949], pl. 4: figs. 2–4). Posterior parapodia larger, with some acicular neurosetae with subdistal spines on one side; cirrophores of dorsal cirri wide, inflated, with style short, conical; ventral cirri short, tapered (Figure 67G–M). Branchiae beginning about segment 10 as several small digitiform pustules on anterior and posterior bases of elytrophores and dorsal cirri; more posteriorly, single large one (Figure 67K; Kinberg, 1858, pl. 7: fig. 35F).

TUBE.—Fragment with holotype of *Panthalis marginata* a soft felty mucous tube.

DISTRIBUTION.—Eastern Pacific from Mexico to Ecuador. Low water to 46 meters.

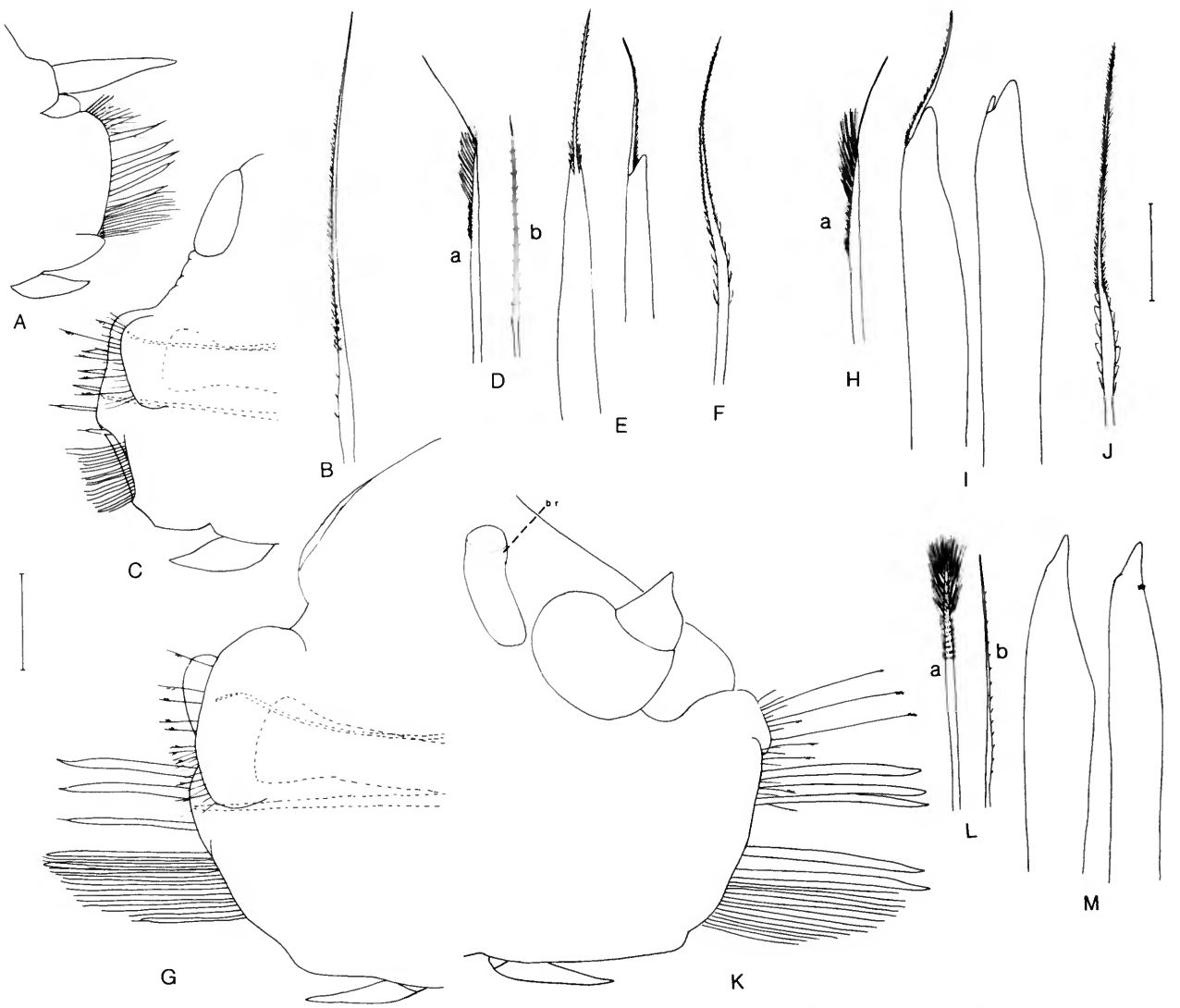

FIGURE 67.—*Acoetes grubei*, specimen from Sonora, Mexico (USNM 50731): A, right cirrigerous parapodium from segment 8, posterior view; B, upper neuroseta from same; C, right elytragerous parapodium from segment 9, anteri or view, acicula and spinning gland dotted; D–F, upper, middle, and lower neurosetae from same; G, right elytragerous parapodium from segment 21, anterior view, acicula and spinning gland dotted; H–J, upper, middle, and lower neurosetae from same ; K, right cirrigerous parapodium from segment 40, posterior view; L,M, upper and middle neurosetae from same. (Scales: A,C,G,K = 0.5 mm; B,D–F,H–J,L,M = 0.1 mm.)

Acoetes southcarolinensis, new species

FIGURES 68, 69

MATERIAL EXAMINED.—North Atlantic off South Carolina, 32°40′N, 78°47′W, 37 m. R/V *Pierce* sta 2E, 13 May 1977, holotype (USNM 60949).

TYPE MATERIAL.—Holotype somewhat damaged, consisting of anterior and two middle fragments, totaling 70+ segments, 66+ mm long, 9 mm wide with setae.

DESCRIPTION.—Elytra (anterior ones missing) oval, with shallow lateral pouch, attached eccentrically on lateral side, leaving middorsum uncovered, with small areolae on most of surface and reddish brown pigmentation except on border (Figure 68C,D). Dorsum pigmented with wide transverse bands. Prostomium bilobed, with globular ommatophores with short neck; median antenna with ceratophore on middle of

prostomium, with few lateral papillae, continuing posteriorly as raised ridge, with short, wide style (deformed?); lateral antennae attached ventrally on ommatophores, short, subulate, not visible dorsally; posterior pair of small eyespots lateral to ceratophore of median antenna; palps broken off, their position medial to tentaculophores indicated ventrally (Figure 68A,B). Tentacular segment distinct dorsally as raised ridge; tentaculophores lateral to prostomium, each with 2 acicular lobes, without setae (broken off?), and pair of dorsal and ventral tentacular cirri, bulbous, inflated, with filamentous tips and brown pigment spots (Figure 68A,B).

Second segment with first pair of elytrophores, ventral buccal cirri inflated basally, longer than following ventral cirri, and biramous parapodia; notopodium conical, on anterior side of larger rounded neuropodium, without notosetae (broken off?) and only single neuroseta with broken tip (Figure 68A,B,E). Pharynx not extended and not examined. Upper lip between ventral side of tentaculophores of first segment, with row of sensory papillae on anterior side and scattered pigment spots; lateral lips between segments 2–5 (Figure 68B).

Third segment with first pair of dorsal cirri with short cirrophores and tapered styles extending to tips of neuropodia, slightly longer than ventral cirri; notopodium short, conical, with few notosetae extending to tip of neuropodium; neuropodium rounded, with all neurosetae missing (Figure 68F). Parapodia of segment 8 larger, with subequal dorsal and ventral cirri; notopodium with small bundle of notosetae; neuropodium with anteroventral bract enclosing neurosetae similar to

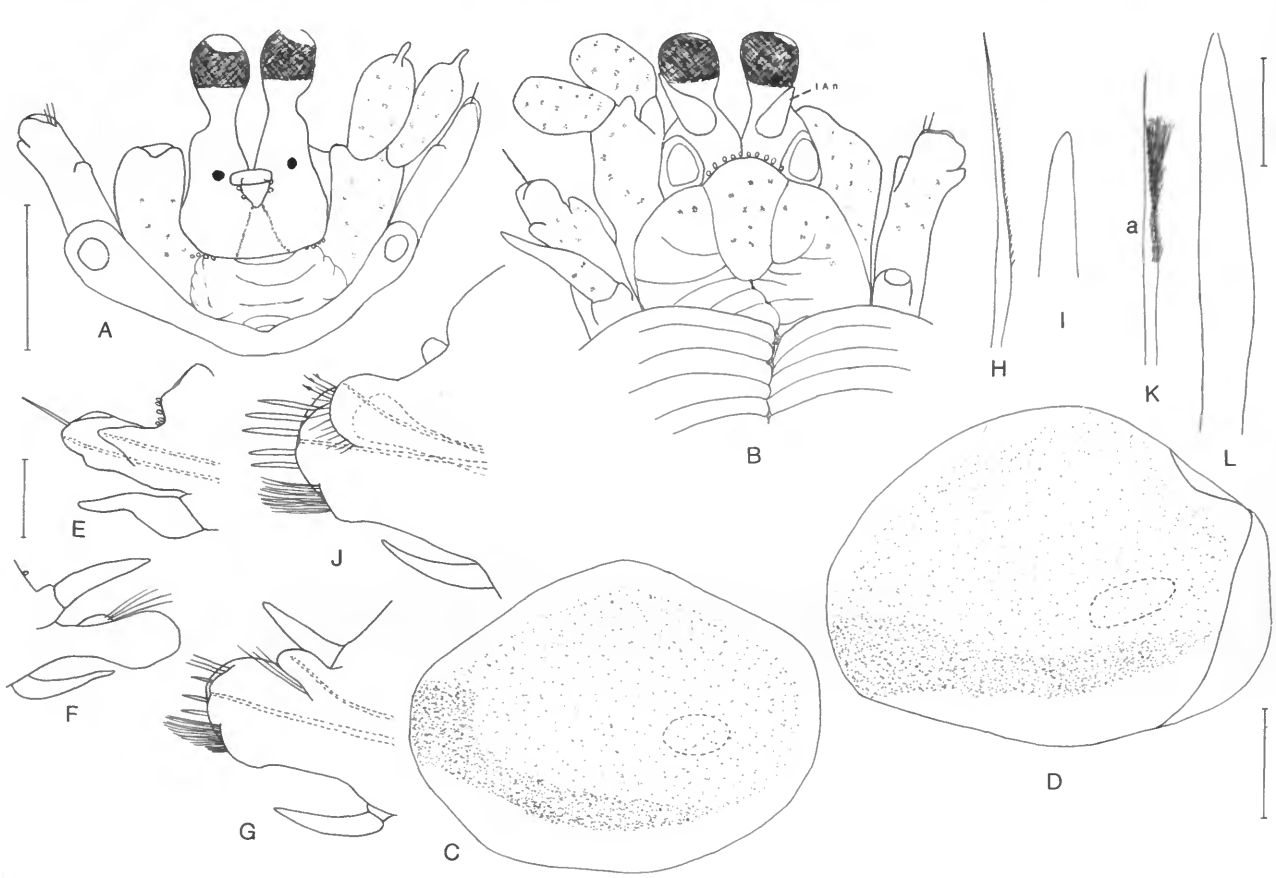

FIGURE 68.—*Acoetes southcarolinensis*, holotype (USNM 60949): A, dorsal view of anterior end (palps and left tentacular cirri missing, lateral antennae hidden from view); B, ventral view of anterior end (position of miss ing palps indicated, left buccal cirrus missing); C, right 10th elytron from segment 19; D, right elytron from middle fragment; E, right elytragerous parapodium from segment 2, anterior view, acicula dotted, only single incomplete neuroseta remains; F, r ight cirrigerous parapodium from segment 3, posterior view, only few capillary notosetae remain; G, right cirrigerous parapodium from segment 8, anterior view, acicula dotted; H,I, upper and middle neurosetae from same; J, right elytragerous parapodium f rom segment 9, anterior view, acicula and spinning gland dotted; K,L, upper and middle neurosetae from same. (Scales: A,B and C,D = 1.0 mm; E–G,J = 0.5 mm; H,I,K,L = 0.1 mm.)

following ones, few middle stout acicular neurosetae without aristae (probably begin on segment 3), and few upper lanceolate spinous neurosetae (Figure 68G–I).

Beginning with segment 9, notopodium rounded, flattened, on anterodorsal side of larger neuropodium, with notoaciculum, spinning gland, and row of short capillary notosetae extending slightly beyond notopodium; neuropodium with slightly bilobed presetal acicular lobe, truncate postsetal lobe, and slightly distinct anteroventral bract; lower neurosetae numerous, within anteroventral bract, slender, slightly curved, with larger spines on enlarged basal part and close-set smaller spines distally; middle row of stout smooth acicular neurosetae without aristae; upper group of neurosetae, emerging from low dorsoanterior bract, hidden by notopodium, of 2 types: (a) long, slender, tapering abruptly to slender tip, with long plumose hairs subdistally and short rows of spines more basally; (b) short, slender, bipinnate, hidden by notopodium (Figure 68J–L). More posterior parapodia larger, with similar parapodia and setae; some of stout acicular neurosetae with subdistal spines on one side and some with aristae; dorsal cirri with styles wide, subtriangular; single bulbous branchia on anterior and posterior sides of parapodia on bases of elytrophores and dorsal cirri, beginning on segment 8 (Figure 69A–J).

TUBE.—Fragment of tube with holotype is collapsed, flaccid, fibrous, with some sand and shell fragments.

ETYMOLOGY.—The species is named for the type locality, off South Carolina.

DISTRIBUTION.—North Atlantic, off South Carolina. In 37 meters.

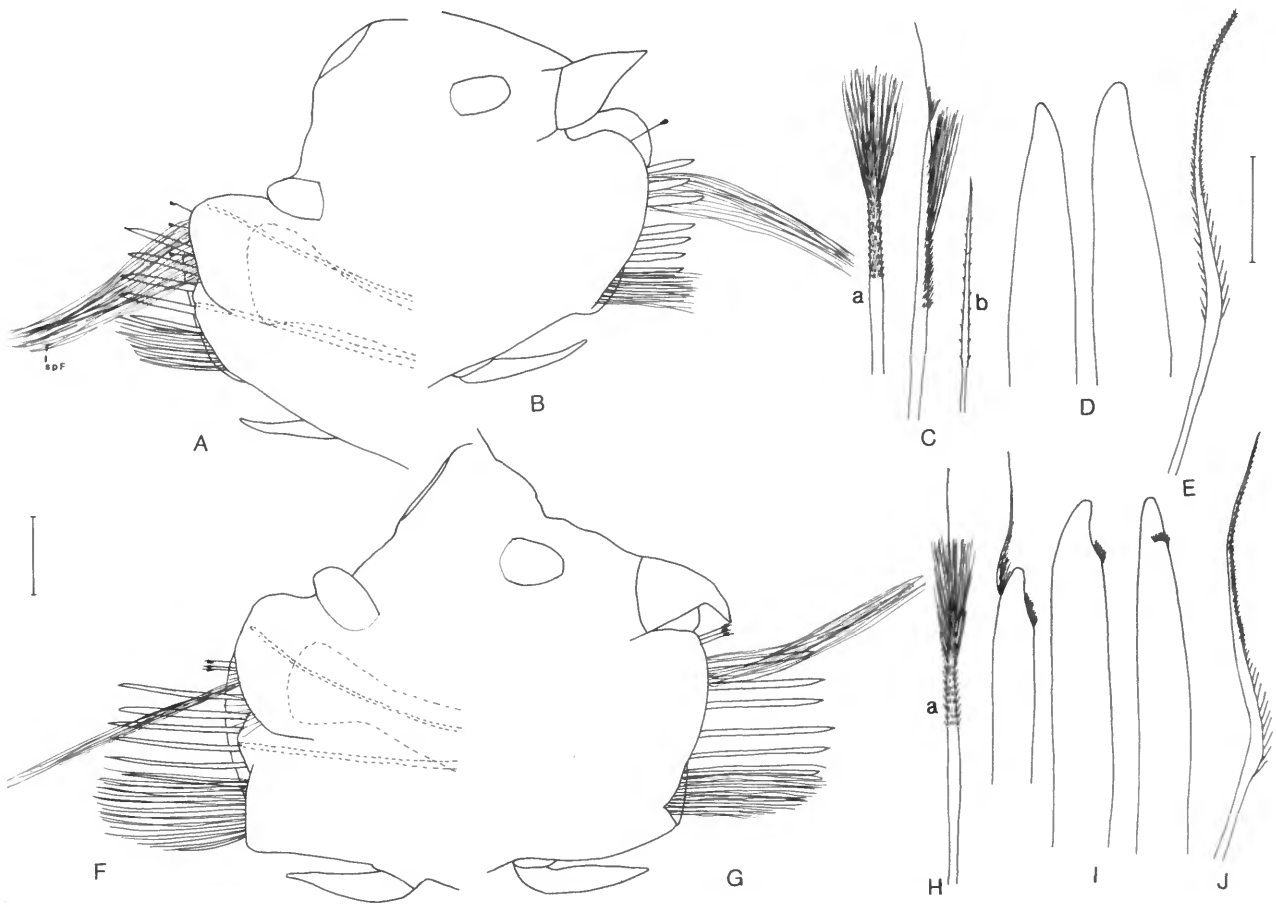

FIGURE 69.—*Acoetes southcarolinensis*, holotype (USNM 60949): A, right elytragerous parapodium from segment 19, anterior view, acicula and spinning gland dotted, some spinning fibers exposed; B, right cirrigerous parapod ium from segment 20, posterior view, some spinning fibers exposed; C–E, upper, middle, and lower neurosetae from same; F, right elytragerous parapodium from middle fragment, anterior view, acicula and spinning gland dotted, few fibers exposed; G, rig ht cirrigerous parapodium from middle fragment, posterior view, some spinning fibers exposed; H–J, upper, middle, and lower neurosetae from same. (Scales: A,B,F,G = 0.5 mm; C–E,H–J = 0.1 mm.)

Acoetes jogasimae (Izuka, 1912), new combination

Panthalis jogasimae Izuka, 1912:68, pl. 2: fig. 6, pl. 8: figs. 1–6.—Hartman, 1939b:87 [list]; 1959:112 [catalog].—Imajima and Hartman, 1964:41 [after Izuka].—Wu, Sun, and Chen, 1980:114. [Not sensu Monro, 1928:568 (= *Acoetes pacifica* (Treadwell), new combination.]

REMARKS.—The description of *Panthalis jogasimae* was based on a single specimen from Sagami Bay, Japan, in 530 meters. No type is known to exist. The description and figures are sufficient to refer it to *Acoetes*, but the anterior parapodia were not described and cannot be compared with other species in the genus. Izuka (1912:70) indicated that the spinning glands were not observed, which is difficult to believe unless they were hidden by the large yolky eggs shown in his figure of the 40th parapodium (Izuka, 1912, pl. 8: fig. 2). *Panthalis jogasimae* was incorrectly included in synonymy under *Panthalis oerstedi* Kinberg by Fauvel (1932:32) and under *Polyodontes oerstedi* (Kinberg) by Strelzov (1972:297).

Genus *Polyodontes* Renieri, 1828

Polyodontes Renieri in Blainville, 1828:461. [Type species: *Phyllodoce maxillosa* Ranzani, 1817, by monotypy. Gender: masculine. (= *Polyodontes maxillosus* (Ranzani, 1817)).]

DIAGNOSIS.—Prostomium bilobed, with pair of large ommatophores on anterior part of prostomium and pair of small eyespots; median antenna with ceratophore on middle of prostomium, lateral antennae inserted ventrally below ommatophores, with tips visible dorsally; pair of long palps, smooth or papillated. First or tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with 2 acicula, 2 groups of capillary setae and pair of tentacular cirri. Second segment with first pair of elytra and long ventral buccal cirri; biramous parapodia with bundle of capillary notosetae; neurosetae both stout and slender, spinous, tapering to slender tips. Stout acicular neurosetae, with or without aristae, beginning on segment 3 or more posteriorly. Elytra present on segments 2, 4, 5, 7, continuing on alternate segments. Dorsal cirri on nonelytragerous segments, cirri with short cirrophores and short styles; ventral cirri short, subulate. Notopodium from segment 9 wide, flattened, anterodorsal to neuropodium, with notoaciculum, internal spinning glands, and small bundle of short capillary notosetae on inner side of notopodium; neuropodium truncate, with lower group of neurosetae within more or less distinct anteroventral bract; middle row of stout acicular neurosetae; upper group of neurosetae, emanating from low anterodorsal bract (hidden by notopodium), of 2 types: (a) long, stout, thickly spinous, tapering to fine tips and (b) short, slender, tapering to sharp tips, bipinnate. With or without parapodial branchiae. Distal border of large muscular pharynx with 13 to 19 pairs of papillae, middorsal and midventral ones on wide lobulated bases, longer than others; 2 pairs of hooked jaws each with 2 to 10 lateral teeth.

The genus includes 12 species (plus 4 synonyms), of which 3 are new species.

Key to the Species of *Polyodontes*

1. Ommatophores of prostomium without distinct necks; palps smooth, without papillae [Figures 70A, 93A]. Parapodia with branchiae, beginning about segment 10 [Figures 72A, 94A,B]. Neurosetae of segment 2 of 2 types: (a) stout, tapering to slender tips and (b) slender, tapering to capillary tips [Figures 71B–D, 93F,G]. Middle neurosetae of segment 3 stout, not acicular, with tapered spinous tips [Figures 71E,F, 93A,H,I]. Upper neurosetae (type a) from segment 9 with numerous rows of short spines [Figures 71Ia, 72Ca, 94Ca] 2

   Ommatophores of prostomium with long necks [Figures 75A, 78A, 83A, 85A]. Neurosetae of segment 2 all similar, slender, finely spinous with capillary tips [Figures 75D,F, 78C,E, 83E,G]. Acicular neurosetae beginning on segment 3 [Figures 75G,I, 78F,G, 83H,J] 3

   Ommatophores of prostomium with short necks; small lateral eyespots lateral to ceratophore of median antenna [Figures 73A, 77A, 80A, 82A, 89A, 92A, 95A] 5

2. Small lateral eyespots posterior to ceratophore of median antenna, lateral to raised ridge [Figure 70A]. Tentaculophores with numerous papillae on inner dorsal side [Figures 70A, 71A]. Neuropodia of segment 2 rounded, with projecting ventral bract [Figure 71B] . . . . . ***P. maxillosus*** (Ranzani)

   Small lateral eyespots lateral to ceratophore of median antenna [Figure 93A]. Tentaculophores with few papillae [Figure 93E]. Neuropodia of segment 2 rounded, without projecting ventral bract [Figure 93F] . ***P. texanus***, new species

3. Palps without papillae [Figures 83A, 85A]. Parapodia without branchiae or single branchia beginning about segment 30 [Figures 84H, 86F]. Small lateral eyespots

of prostomium lateral to ceratophore of median antenna; tentaculophores with few papillae, without distinct acicular lobes [Figures 83A, 85A,F]. Neuropodia of segment 2 flared distally, with ventral bract [Figure 83E]. Acicular neurosetae on segment 3 aristate [Figures 83J, 85K]. Upper neurosetae (type a) from segment 9 with numerous rows of short spines [Figures 84Da,Ia] . . . ***P. frons*** Hartman

Palps with papillae. Neuropodia on segment 2 subconical [Figures 75D, 78C] . . 4

4. Palps with longitudinal rows of long papillae [Figure 78A]. Small lateral eyespots of prostomium lateral to ceratophore of median antenna; tentaculophores without papillae, with 2 pointed acicular lobes and few long setae [Figures 78A,B]. Parapodia with branchiae beginning about segment 10 [Figure 79G,J]. Acicular neurosetae on segment 3 not aristate [Figure 78G]. Upper neurosetae (type a) from segment 9 with numerous rows of short spines [Figure 79Da,Ha] . . . . . ***P. tidemani*** Pflugfelder

   Palps with both short minute and long papillae [Figure 75A]. Small lateral eyespots of prostomium anterolateral to ceratophore of median antenna; tentaculophores with few papillae, small rounded acicular lobes and numerous long setae [Figure 75A,C]. Parapodia without branchiae. Acicular neurosetae on segment 3 aristate [Figure 75I]. Upper neurosetae (type a) from segment 9 with long spines along one side [Figure 76Da,Ha] . . . . . ***P. atromarginatus*** Horst

5. Palps with minute papillae [Figure 92A]. Parapodia without branchiae. Neuropodia of segment 2 with bifid presetal lobe, fringed postsetal lobe, and free lamella on lower postsetal distal part; neurosetae slender, finely spinous [Figure 92F,H]. Middle neurosetae of segment 3 stout, smooth, tapering rather abruptly to sharp tips, not acicular [Figure 92I,J]. Middle acicular neurosetae of middle parapodia aristate, with distal spines and long series of fine spines subdistally on one side [Figure 92R] . . . . . ***P. oculeus*** (Treadwell)

   Palps smooth, without papillae 6

6. Parapodia without branchiae or few branchiae from about segment 20–30. Neuropodium of segment 2 subconical, with projecting ventral bract; neurosetae slender, finely spinous [Figures 82B,D, 95I,J]. Acicular aristate neurosetae of middle segments with subdistal spines on one side [Figures 82S, 96L] 7

   Parapodia with branchiae beginning about segment 10 [Figures 74A,B,E, 77Q,R, 81D,I,J, 88A,B,F,G]. Neurosetae of segment 2 all similar, slender, finely spinous [Figures 73J, 77H, 80K, 87L] 8

7. Neuropodia of middle segments with protruding anteroventral bracts [Figure 96I,J,N]. Upper neurosetae (type a) of parapodia from segment 9 with numerous spinous rows, tapering to fine tips [Figure 96Fa,Ka] . . . . . ***P. frankenbergi,*** new species

   Neuropodia of middle segments without protruding anteroventral bracts [Figure 82P,Q). Upper neurosetae (type a) of parapodia from segment 9 with rather long spines on one side [Figure 82NaRa] . . . . . ***P. panamensis*** (Chamberlin)

8. Anterior margins of anterior elytra ruffled or lobulated [Figures 73C, 80B,C]. Parapodia of middle segments with protruding ventral bracts [Figures 74A,D,E, 81D,I,J]. Neuropodia of segment 3 with prominent ventral bract, with middle stout acicular neurosetae missing [Figures 73K, 80L] 9

   Anterior margins of anterior elytra entire [Figures 77C, 87C,D]. Parapodia of middle segments without protruding ventral bracts [Figures 77M,O,R, 88A,B,F,G]. Neuropodia of segment 2 flared distally, with distinct ventral bract [Figures 77F, 87K]. Acicular neurosetae beginning on segment 3, aristate [Figures 77J, 87N] 10

9. Neuropodia of segment 2 thick, truncate, with slit-like openings [Figure 73H,I]. Upper neurosetae (type a) from segment 9 with rather long spinous rows [Figures 73Ua, 74Ca]. Stout acicular neurosetae of middle segments with or without subdistal spines [Figure 74F]. Parapodial branchiae relatively few [Figure 74A,B]. Tentaculophores without papillae [Figure 73A,G] . . ***P. australiensis*** (McIntosh)

Neuropodia of segment 2 subconical [Figure 80I]. Upper neurosetae (type a) from segment 9 with short spinous rows [Figure 81Fa]. Stout acicular neurosetae of middle segments without subdistal spines [Figure 81G]. Parapodial branchiae numerous [Figure 81D,I,J]. Tentaculophores with numerous papillae [Figure 80A,H] . . . . . ***P. jolli,*** new species

10. Tentaculophores with few papillae [Figure 77A]. Upper lip of ventral mouth with 2 pairs of extra lobes medial to bases of palps [Figure 77B]. Parapodial branchiae few [Figure 77Q,R]. Upper neurosetae (type a) from segment 9 with numerous long spines on one side [Figure 77Na]. Stout neurosetae of middle segments aristate, with subdistal spines on one side [Figure 77S] . . . . . ***P. sibogae*** Horst

Tentaculophores with numerous papillae [Figure 87A,J]. Without extra lobes medial to bases of palps [Figure 87B]. Parapodial branchiae numerous [Figure 87A,B]. Upper neurosetae (type a) from segment 9 with numerous short spinous rows [Figures 87Ua, 88Ca]. Stout acicular neurosetae of middle segments aristate, without subdistal spines [Figure 88D,I] . . . . . ***P. lupinus*** (Stimpson)

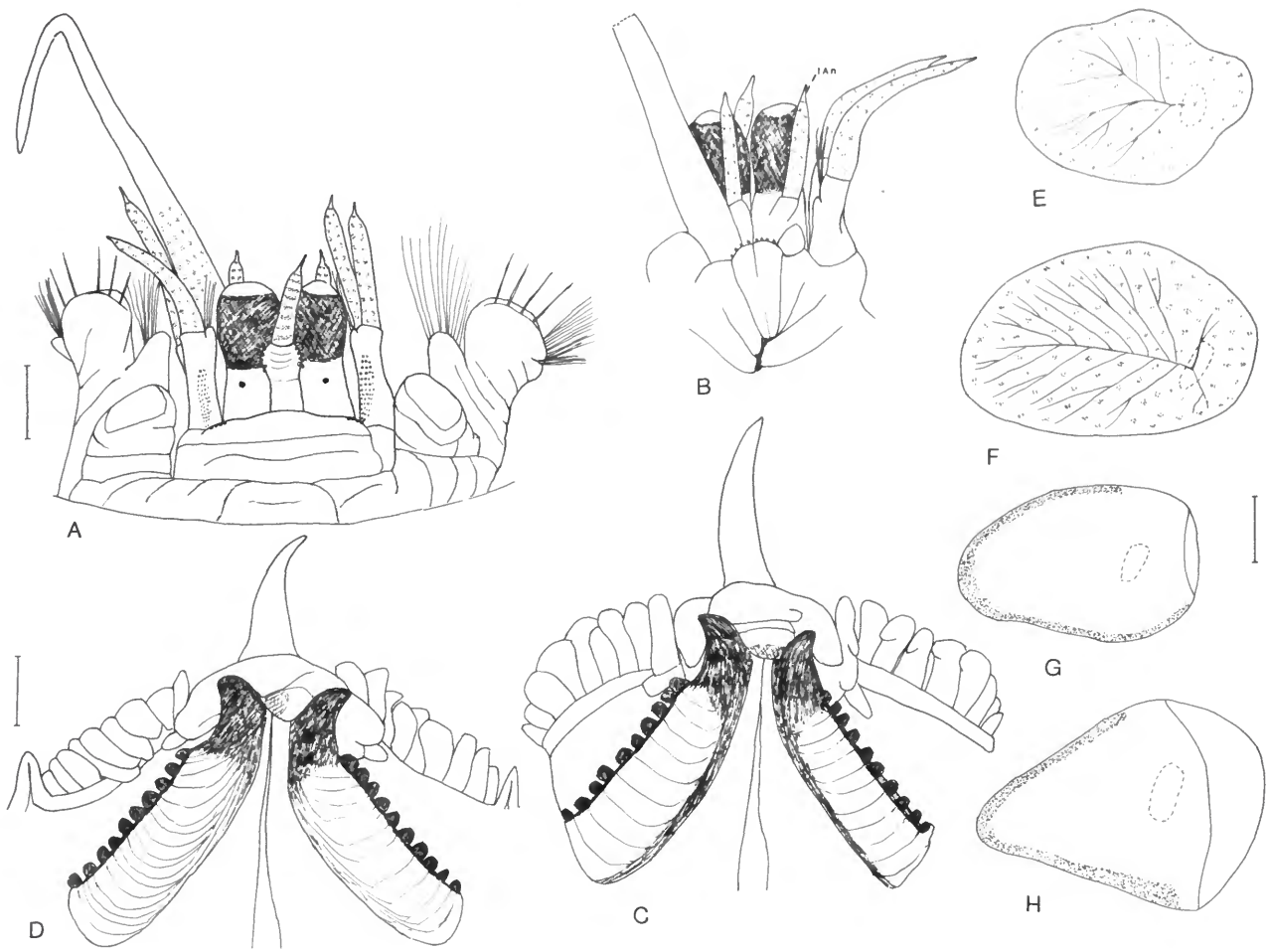

FIGURE 70.—*Polyodontes maxillosus*, specimen from Naples (USNM 5114): A, dorsal view of anterior end (left palp missing; right palp appearing on left side); B, ventral view of prostomium and left side of tentacular segme nt, (left palp missing, only basal part of right palp shown); C, inner view of dorsal side of distal end of cut pharynx showing jaws and border papillae; D, same as C, ventral side; E, right 1st elytron from segment 2, showing "veins"; F, rig ht 5th elytron from segment 9, "veins"; G, right 15th elytron from segment 29; H, right posterior elytron from segment 201. (Scales: A,B = 1.0 mm; C,D and E–H = 2.0 mm.)

Polyodontes maxillosus (Ranzani, 1817)

FIGURES 70–72

Phyllodoce maxillosa Ranzani, 1817:1456, pl. 11: figs. 2–9.—Blainville, 1828:461, pl. 12.

Eumolpe maxima Oken, 1817:1452.

Polyodontes maxillosus.—Audouin and Milne-Edwards, 1832:432.—Claparède, 1868:392, pl. 3: fig. 2.—Eisig 1887:324, pl. 36: figs. 4–25.—Saint-Loup, 1889:412.—Fauvel, 1914b:74 [synonymy]; 1923:97, fig. 37a–n.—Rioja, 1918:22, fig. 5a–f.—Fishelson and Rullier, 1969:55.—Campoy, 1982:85. [Not sensu Gibbs, 1971:127 (= *Polyodontes atromarginatus*. ?Not sensu Strelzov, 1972:292.]

Polyodontes maxillosa.—Delle Chiaje, 1841:57, 61, pl. 99: figs. 1–5.

Panthalis lacazii Pruvot and Racovitza, 1895:428, pl. 19: figs. 84–104.

MATERIAL EXAMINED.—ITALY. Bay of Naples, from Zoological Station, 1 specimen (USNM 5114).

MEASUREMENTS.—Type material was not available. Pruvot and Razovitza (1895) based their description of *Panthalis lacazii* from France on an anterior fragment of 76 segments,

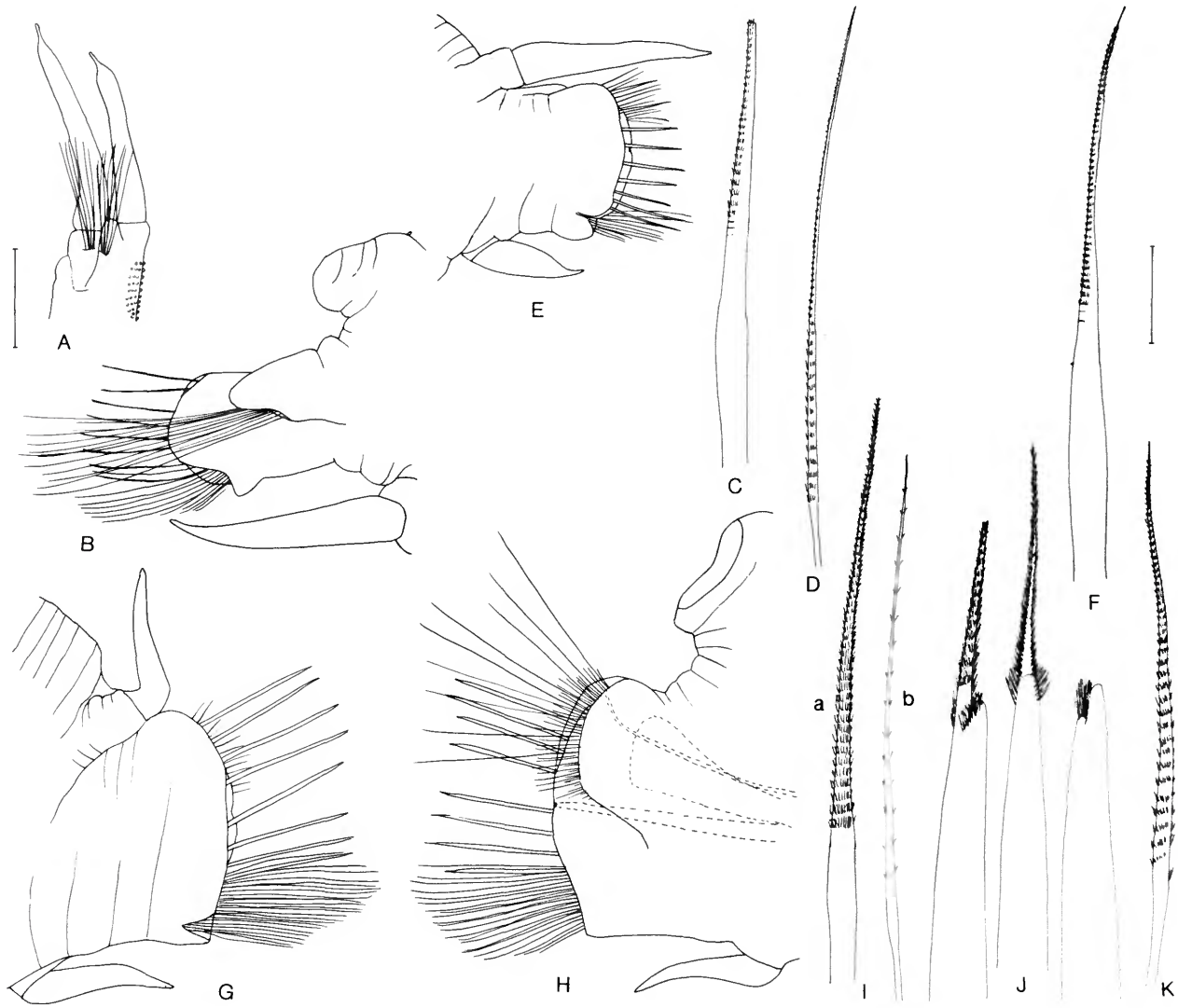

FIGURE 71.—*Polyodontes maxillosus*, specimen from Naples (USNM 5114): A, right tentaculophore with dorsal and ventral tentacular cirri, inner view; B, right elytragerous parapodium from segment 2, anterior view; C,D, mid dle (tip broken) and lower neurosetae from same; E, right cirrigerous parapodium from segment 3, posterior view; F, middle neuroseta from same; G, right cirrigerous parapodium from segment 8, posterior view; H, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; I–K, upper, middle, and lower neurosetae from same. (Scales: A,B,E,G,H = 1.0 mm; C,D,F,I–K = 0.1 mm.)

155 mm long, and 22 mm wide with setae. *Polyodontes maxillosus* is considered to be one of the largest polychaetes. The specimen from the Bay of Naples (USNM 5114) is incomplete posteriorly, with 220 segments, 210 mm long, and 26 mm wide with setae. Fauvel (1923:97) gives the length of about a meter, 20–25 mm wide, with several hundred segments. For a freshly caught specimen, Saint-Loup (1889:413) gave the length of 2 meters and a width of 20 mm.

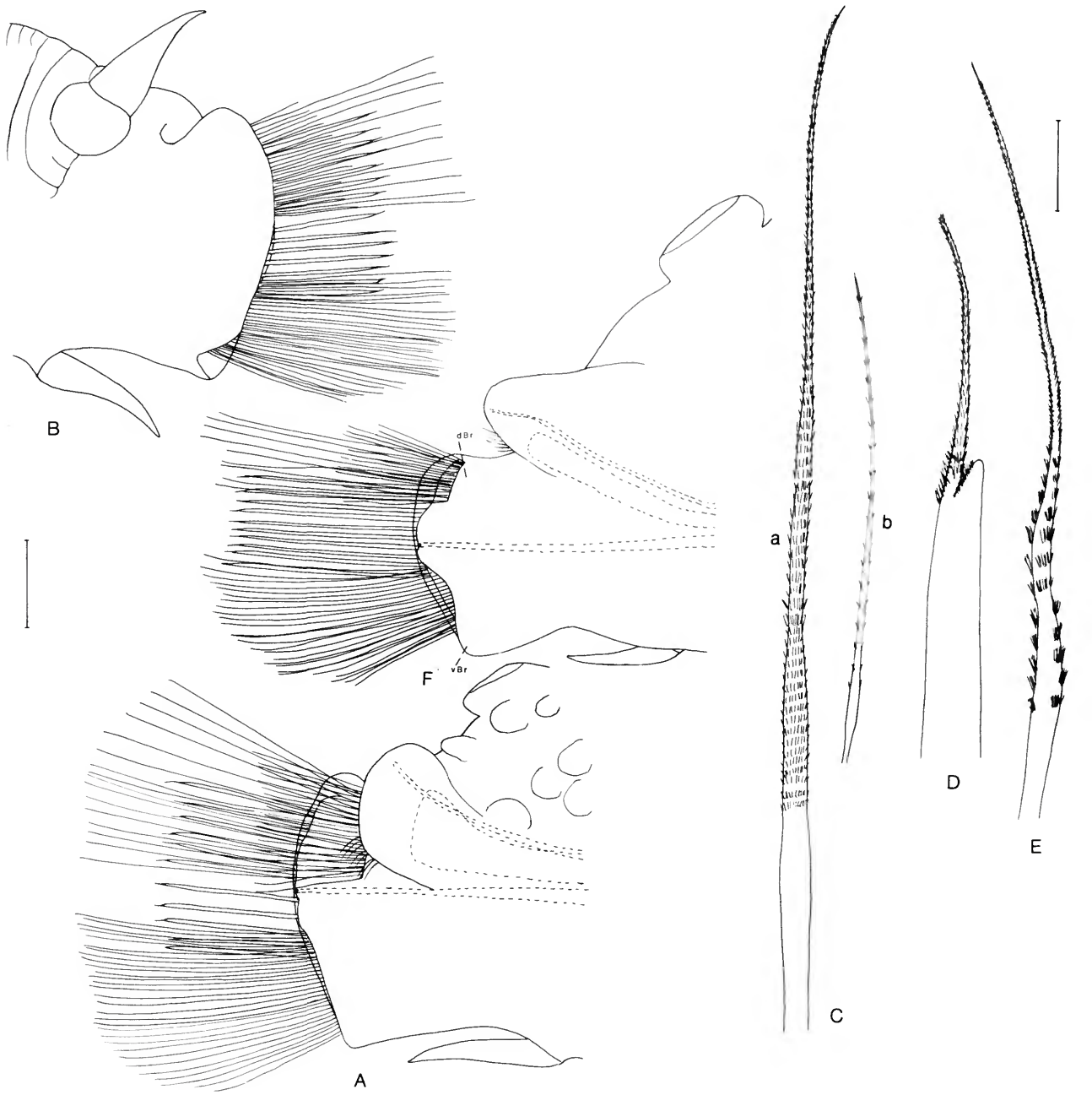

FIGURE 72.—*Polyodontes maxillosus*, specimen from Naples (USNM 5114): A, right elytragerous parapodium from segment 29, anterior view, acicula and spinning gland dotted; B, right cirrigerous parapodium from segment 30, p osterior view; C, upper neurosetae from same; D,E, middle and lower neurosetae from same; F, right elytragerous parapodium from segment 201, anterior view, acicula and spinning gland dotted. (Scales: A,B,F = 1.0 mm; C–E = 0.1 mm.)

DESCRIPTION.—Body long, vermiform. Dorsum transversely banded with reddish brown or brownish violet pigmentation. Anterior 6 pairs of elytra large, rounded, covering dorsum, following elytra elongate, oval to subtriangular, leaving middorsum uncovered; anterior elytra splotched with brownish pigmentation, showing venation; posterior elytra with dark anterior, median and posterior borders and showing closely packed areolations, with shallow lateral pouch (Figure 70E–H).

Prostomium bilobed, with large black oval ommatophores occupying anterior border, with white domes on tips; median antenna with rounded ceratophore attached on medial sides of ommatophores, papillate on external and ventral sides, and extending posteriorly as raised ridge, with short style extending slightly beyond ommatophores; pair of small sessile eyespots lateral to medial ridge; lateral antennae inserted ventrally on bases of ommatophores with tips of styles visible dorsally; ventral palps long, tapered, smooth (Figure 70A,B). Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, with papillae on dorsal and inner sides, each with 2 acicula, small projecting acicular lobe, 2 bundles of capillary setae on inner side, and pair of dorsal and ventral tentacular cirri, similar to but longer than lateral antennae (Figures 70A,B, 71A).

Second segment with first pair of elytrophores, ventral buccal cirri much longer than following ventral cirri and biramous parapodia; notopodium wide, conical, on anterodorsal side of larger neuropodium, with bundle of long, finely spinous capillary notosetae; neuropodium with rounded presetal acicular and postsetal lobes and projecting ventral bract, with row of stout spinous neurosetae tapering to slender tips and lower group of more slender neurosetae (Figures 70A, 71B–D; Pruvot and Racovitza, 1895, pl. 19: figs. 95–97). Row of papillae on anterior border of upper lip (Figure 70B). Extended pharynx with 19 pairs of border papillae, middorsal and midventral ones much longer than others, on large lobulated bases; 2 pairs of hooked jaws each with 10 lateral teeth (Figure 70C,D; Pruvot and Racovitza, 1895, pl. 19: figs. 84, 93, 94; Rioja, 1918, fig. 5a,b).

Third segment with first pair of dorsal cirri with short cirrophores and tapering styles extending slightly beyond setae; ventral cirri short, subulate; parapodia and setae similar to those of segment 2 (Figure 71E,F; Pruvot and Racovitza, 1895, pl. 19: figs. 90, 98). Parapodia of segments 4–8 with stout neurosetae changing gradually, becoming smooth basally and spinous near tips, forming transitional aristae; notopodia becoming smaller and neuropodia larger (Figure 71G).

Beginning with segment 9, notopodium wide, rounded, flat, on anterodorsal half of larger neuropodium, with notoaciculum, spinning glands and small bundle of short capillary notosetae emerging from lower side of notopodium; neuropodium with presetal acicular and postsetal lobes and more or less distinct anteroventral bract; lower neurosetae numerous, within anteroventral bract, slender, slightly curved, enlarged basally with larger spinous rows, tapering to fine tips with close-set spinous rows; middle row of stout, smooth acicular neurosetae with spinous aristae; upper group of neurosetae, emerging from low dorsoanterior bract, hidden by notopodium, of 2 types: (a) long, stout, wide basally, tapering to thickly spinous slender tips; (b) short, slender, with widely spaced bipinnate spines, tapering to fine tips (Figure 71H–K).

Middle parapodia becoming larger, with more numerous neurosetae of same types (Figure 72A–E; Pruvot and Racovitza, 1895, pl. 19: figs. 92, 102–104). Spinning fibers extremely elongated, forming coils and occupying large part of coelom (Eisig, 1887, pl. 36: figs. 4–6, 8). Dorsal cirri with inflated cirrophores and short, wide styles extending to tips of neuropodia (Figure 72B). Bulbous branchiae near bases of elytrophores and dorsal cirrophores, beginning about segment 10 and continuing to about segment 30 (Figure 72A; Pruvot and Racovitza, 1895, pl. 19: fig. 91). From about segment 100, notopodia smaller, subconical, dorsal to neuropodia, with dorsoanterior bract enclosing upper group of neurosetae clearly visible; no distinct branchiae but parapodia markedly thin-walled (Figure 72F).

DISTRIBUTION.—North Atlantic off Spain, Mediterranean, Adriatic, Red Sea. Low water to 280 meters.

Polyodontes australiensis (McIntosh, 1885)

FIGURES 73, 74

Eupompe australiensis McIntosh, 1885:135, pl. 21: figs. 4, 5, pl. 23: fig. 8, pl. 24: fig. 4, pl. 13A: figs. 2–6.—Benham, 1915:202.

Polyodontes (Eupompe) australiensis.—Buchanan, 1894:446, pl. 27: fig. 11A,B.

Polyodontes australiensis.—Hartman, 1939b:82; 1966:361, pl. 36a,b.—Hutchings and Murray, 1984:17, fig. 5.1–5.

MATERIAL EXAMINED.—AUSTRALIA. Near Wednesday Island, NW of Cape York, Queensland, 10°30′S, 142°18′E, 15 m, coral sand, *Challenger* sta 186, 8 Sep 1874, holotype (BMNH 1885.12.1.107). The Basin, Pittwater, Port Jackson, New South Wales, attached to baited fish hook, Jun 1962, Mrs. C.J. Mom, collector, 1 specimen (AMS 3754, identified by O. Hartman).

TYPE MATERIAL.—Holotype consisting of anterior fragment of 30 segments and small fragment of 3 segments, with total length of 44 mm, and 22 mm wide with setae; setae mostly broken; pharynx not extended and not examined by McIntosh. Specimen from New South Wales consisting of anterior fragment of about 100 segments, 150 mm long, 38 mm wide examined and figured (AMS 3754).

DESCRIPTION.—Body long, tapered anteriorly, dorsally arched in anterior region, flattened ventrally. Dorsum brownish, not banded. Anterior few pairs of elytra covering dorsum, following ones leaving middorsum uncovered; first pair of elytra with anterolateral part extended and lobulated; elytra rather delicate, transversely elongate, with shallow lateral fold, opaque, brownish, minutely areolate (Figure 73C–F; McIntosh, 1885, pl. 21: fig. 4).

Prostomium bilobed, with bulbous ommatophores having

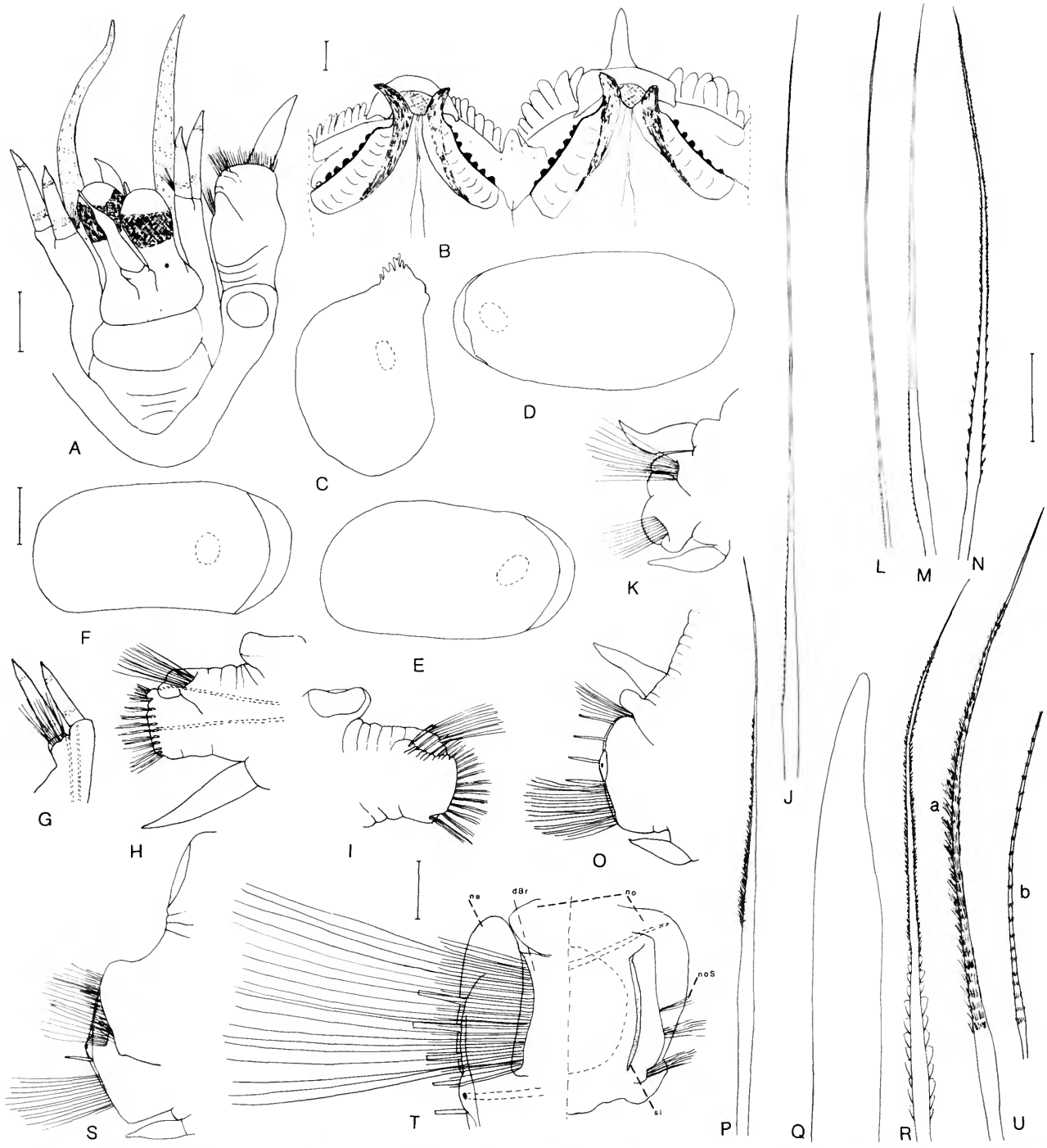

FIGURE 73.—*Polyodontes australiensis*, specimen from New South Wales (AMS 3754): A, dorsal view of anterior end (left 2nd parapodium not shown, right lateral antenna smaller, regenerating); B, inner view of distal end of pharynx, cut along left lateral side (ventral on left, dorsal on right); C, right 1st elytron from segment 2; D, left 5th elytron from segment 9; E, right 15th elytron from segment 29; F, right posterior elytron from about segment 75; G, right tentacul o phore with dorsal and ventral tentacular cirri, inner view, acicula dotted; H, right elytragerous parapodium from segment 2, anterior view, acicula dotted; I, same as H, posterior view; J, middle neuroseta from same; K, right cirrigerous parapodium fro m segment 3, anterior view (stout middle neurosetae broken off); L, notoseta from same; M,N, upper and lower neurosetae from same; O, right cirrigerous parapodium from segment 8 anterior view; P–R, upper, middle, and lower neurosetae from same; S, r igh t elytragerous parapodium from segment 9, anterior view; T, detail of S (enlarged) with upper half of neuropodium and notopodium cut back, showing positions of neurosetae, notosetae, and slit for exit of spinning fibers, acicula and spinning gland do tted ; U, upper neurosetae from same. (Scales: A,G–I,K,O,S = 1.0 mm; B and C–F =2.0 mm; T = 0.5 mm; J,L–N,P–R,U = 0.1 mm.)

slightly narrower neck and distal lenses; median antenna with ceratophore attached near anterior notch, extending posteriorly as slightly raised ridge, style with filamentous tip extending to tips of ommatophores; posterior pair of small eyespots lateral to ceratophore; lateral antennae inserted ventral to ommatophores with only distal tips visible dorsally; palps elongate, tapered, smooth, splotched with pigment on dorsal sides (Figure 73A). Tentacular segment visible dorsally; tentaculophores lateral to prostomium, each with 2 acicula, bundle of capillary setae, and pair of dorsal and ventral tentacular cirri, with styles similar to median antenna, with basal and subdistal rings of pigment (Figure 73A,G).

Second segment with first pair of elytrophores, ventral buccal cirri larger and longer than following ventral cirri, and biramous parapodia; notopodium conical, with bundle of long, finely spinous, capillary notosetae; neuropodium rather thick, truncate, with arched vertical row of neurosetae; neurosetae emerging in groups from series of slit-like openings; neurosetae all similar, slender, finely spinous, tapering to capillary tips, lower ones more slender (Figure 73H–J). Distal border of pharynx with 15 pairs of papillae, middorsal one longer than others, on wide base, midventral one represented by wide base; 2 pairs of hooked jaws, each with 6 or 7 lateral teeth (Figure 73B). Ventral upper lip medial to 2nd parapodia, lateral and lower lips medial to parapodia of segments 3–8 (McIntosh, 1885, pl. 21: fig. 5).

Third segment with first pair of dorsal cirri with short cirrophores and styles extending to tips of setae; notopodium and notosetae similar to those of segment 2; neuropodium with few upper slender neurosetae similar to those of segment 2,

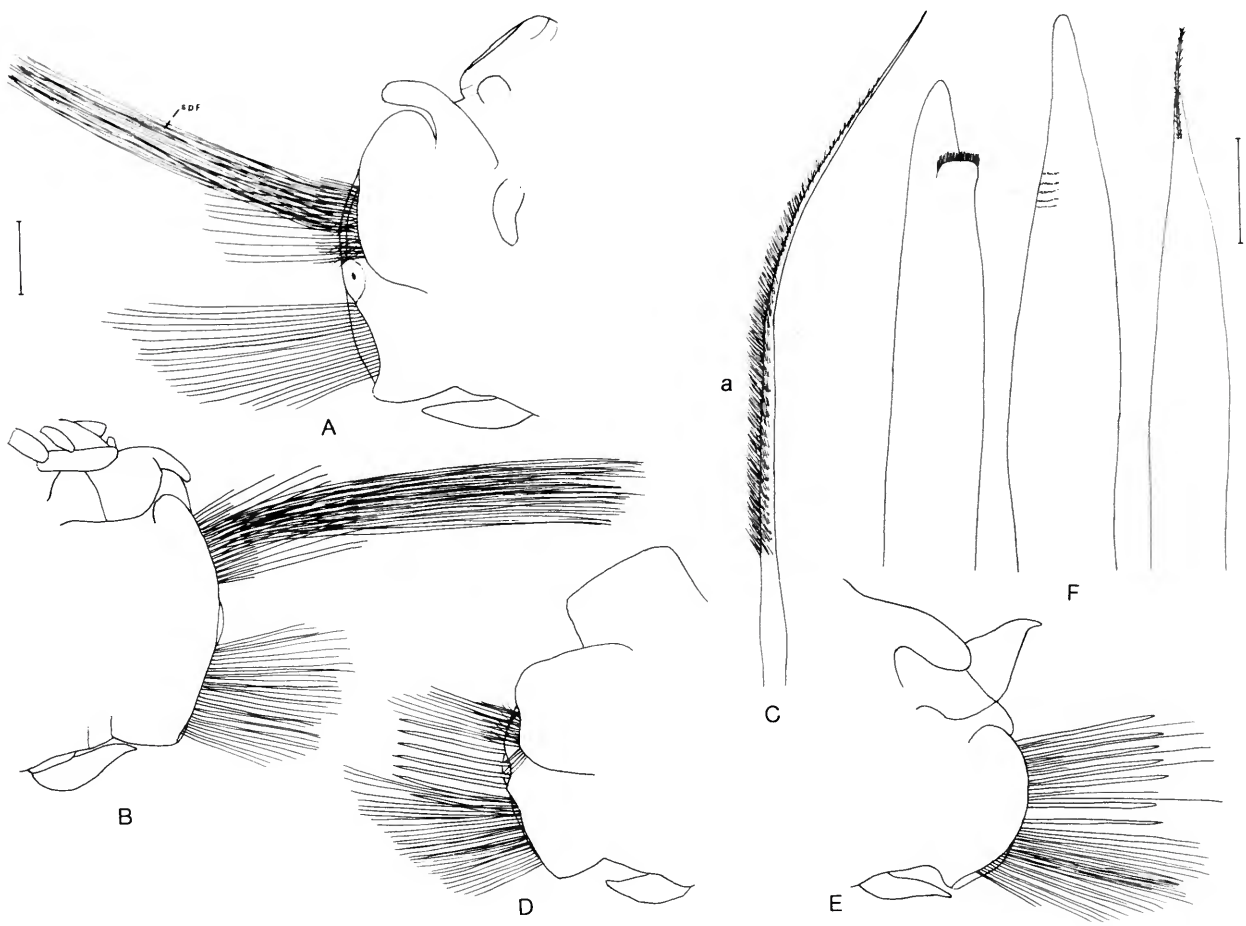

FIGURE 74.—*Polyodontes australiensis*, specimen from New South Wales (AMS 3754): A, right elytragerous parapodium from segment 29, anterior view (stout neurosetae all broken, some spinning fibers exposed); B, right cirri gerous parapodium from segment 30, posterior view (stout middle neurosetae all broken, some spinning fibers exposed); C, upper neuroseta from same; D, right elytragerous parapodium from about segment 75, anterior view; E, right cirrigerous parapodium fro m about segment 76, posterior view; F, middle neurosetae from same. (Scales: A,B,D,E = 1.0 mm; C,F = 0.1 mm.)

middle stout neurosetae missing, lower group of neurosetae, within prominent ventral bract, with prominent spinous rows basally and close-set finely spinous rows on tapering distal tips (Figure 73K–N). Parapodia of segments 4–8 with smaller notopodia and larger neuropodia, with 3 groups of neurosetae, middle stout acicular ones with slightly hooked smooth tips (Figure 73O–R).

Beginning with segment 9, notopodium wide, truncate, flattened, on anterodorsal side of larger neuropodium, with notoaciculum, spinning glands, short notosetae emerging from inner lower side of notopodium, and slit for emergence of spinning fibers (hidden from view unless notopodium pulled back); lower group of neurosetae, within anteroventral bract, numerous, similar to more anterior neurosetae; middle group of neurosetae stout, acicular; upper group of neurosetae, emanating from low dorsoanterior bract, hidden by notopodium, of 2 types: (a) long, wide basally, with numerous spinous rows on tapering capillary tips; (b) shorter, extending only slightly beyond notopodium, more numerous, slender, with widely-spaced spinous rows, tapering to fine tips (Figure 73S–U).

Middle parapodia becoming larger, with more numerous neurosetae of same types; dorsal cirri with wide cirrophores and short, wide styles extending slightly beyond neuropodia (Figure 74A–C; McIntosh, 1885, pl. 23: fig. 8, pl. 13A: figs. 2–6). Digitiform branchiae on anterior and posterior bases of elytrophores and dorsal cirrophores, beginning about segment 10, more numerous on segments 12–30 or so, then fewer and larger more posteriorly (Figure 74A,B,E). Ventrally, up to 3 or 4 oval branchial areas medial to ventral cirri beginning on segment 11. Some of stout acicular neurosetae in more posterior parapodia with aristae and subdistal spines on one side (Figure 74D–F).

DISTRIBUTION.—Australia–Queensland, New South Wales, Victoria (Bass Strait). In 10 to 119 meters.

Polyodontes atromarginatus Horst, 1917

FIGURES 75, 76

Polyodontes atro-marginatus Horst, 1917:133, pl. 29: figs. 5–7.

Panthalis melanotus [sic].—Ehlers, 1920:22. [Not *Panthalis melanotus* Grube, 1876.]

Panthalis adumbrata Hoagland, 1920:606, pl. 46: figs. 9–14.—Hartman, 1938b:126 [includes *Panthalis helleri* in synonymy]. [Not sensu Treadwell, 1937:147 (= *Polyodontes panamensis*).]

Polyodontes melanonotus.—Monro, 1931:8. [Not *Polyodontes melanonotus* (Grube, 1876) (= *Acoetes melanonota*).]

Panthalis helleri Holly, 1934:148, figs. 1, 2.

Polyodontes adumbrata.—Hartman, 1939b:82, 87.

Polyodontes maxillosus.—Gibbs, 1971:127. [Not *Polyodontes maxillosus* (Ranzani, 1817).]

Polyodontes aurorea.—Strelzov, 1972:283, figs. 2A–K, 3A. [Not *Eupompe aurorea* Grube, 1876.]

MATERIAL EXAMINED.—INDONESIA. Six syntypes of *P. atromarginatus* from 6 *Siboga* stations: Bay of Labuan Tring, Lombok, 08°44.5′S, 116°02.5′E, 18–27 m, sta 19 (RNHL 1290); Bima Anchorage, 13–31 m, sta 47 (ZMA 1169.1); Makassar, up to 32 m, sta 71 (ZMA 1169.2); between Loslos and Broken Islands, west off Salawatti, 18 m, sta 162 (ZMA 1169.3); Banda Anchorage, 9–45 m, sta 240 (RNHL 1291; Sapeh Bay, east coast of Sumbawa, up to 36 m, sta 311 (ZMA 1169.4). Amboina, Brach, collector, 1 specimen (ZMH 192, as *Panthalis melanotus* [sic] by Ehlers, 1920).

PHILIPPINE ISLANDS. Tinakta Island, Sulu Archipelageo, 05°12′N, 119°54′E, 18–33 m, coral sandy and fine sandy bottoms, *Albatross* sta 5157–5159, 21 Feb 1908, holotype and 4 paratypes of *Panthalis adumbrata* (USNM 18944–18946).

SOLOMON ISLANDS. Guadalcanal, Graham Point, silty sand with shell and coral fragments, low water, P.E. Gibbs, collector, 1 specimen (BMNH 1970:159, as *Polyodontes maxillosus* by Gibbs, 1971). New Georgia, Marovo Lagoon, coarse sand, sta ML 204, 3 Nov 1965, P.E. Gibbs, collector, 1 specimen (BMNH 1970:162, as *P. maxillosus* by Gibbs, 1971).

AUSTRALIA. Great Barrier Reef, west side of Low Isles, 15 m, mixed bottom, 1 specimen (BMNH 1931.7.1.16, as *Polyodontes melanonotus* by Monro, 1931).

TYPE MATERIAL.—All six syntypes of *Polyodontes atromarginatus* consist of anterior fragments, 3 with pharynx extended, the largest, from *Siboga* station 311 (ZMA 1169.4), with 80 segments, 55 mm long, and 12 mm wide with setae; the parapodia in the anterior ventral region were thickly covered with entoprocts (referred to as "strange organisms" by Horst, 1917:134). The smallest syntype, from station 162 (ZMA 1169.3), has 36 segments, 20 mm long, and 10 mm wide with setae; it appears to be the specimen figured by Horst and the one figured here.

The holotype and four paratypes of *Panthalis adumbrata* (USNM) are all incomplete posteriorly: holotype with 51 segments, 47 mm long, and 9 mm wide with setae; larger paratype with 55 segments, 58 mm long, and 13 mm wide. The type of *P. helleri* Holly from the Philippines was not available; it was referred to *P. adumbrata* by Hartman (1938b:136). A specimen from the Solomon Islands, collected by P.E. Gibbs (BMNH), is complete, with 113 segments, 120 mm long, and 8 mm wide with setae.

DESCRIPTION.—Body long, vermiform, transversely banded dorsally with brown pigmentation. Anterior 3 elytra rounded, covering dorsum, following ones transversely elliptical, with shallow lateral pouch, leaving middorsum uncovered; elytra dotted with black pigmentation, with darker band on posterior and medial borders, with surface compactly areolate (Figure 75B; Horst, 1917, pl. 29: fig. 6; Hoagland, 1920, pl. 46: fig. 10; Holly, 1934, fig. 1a,b).

Prostomium bilobed, with bulbous ommatophores with long necks and small distal lenses; median antenna with rounded ceratophore on middle of prostomium, with 1–2 minute lateral papillae, extending posteriorly as middorsal ridge, with style extending to tips of ommatophores; posterior pair of small eyes anterolateral to ceratophore of median antenna; lateral antennae inserted ventrally with tips extending slightly beyond ommatophores; palps stout, long, tapered, with 2 rows of

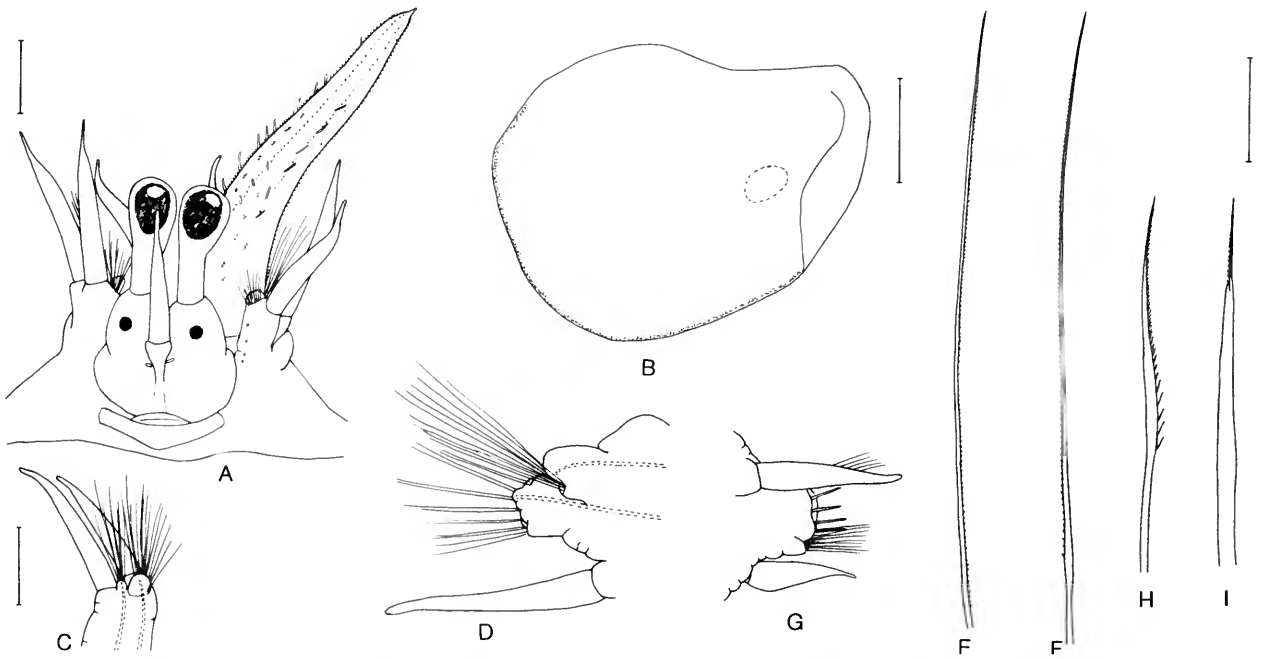

FIGURE 75.—*Polyodontes atromarginatus*, syntype (ZMA 1169.3): A, dorsal view of prostomium and tentacular segment, left palp missing, pharynx extended (not shown); B, right 9th elytron from segment 17; C, right tentaculo phore with dorsal and ventral tentacular cirri, inner view, acicula dotted; D, right elytragerous parapodium from segment 2, anterior view, acicula dotted; E, notoseta from same; F, neuroseta from same; G, right cirrigerous parapodium from segment 3, pos terior view; H,I, upper and middle neurosetae from same. (Scales: A and C,D,G = 0.5 mm; B = 1.0 mm; E,F,H,I = 0.1 mm.)

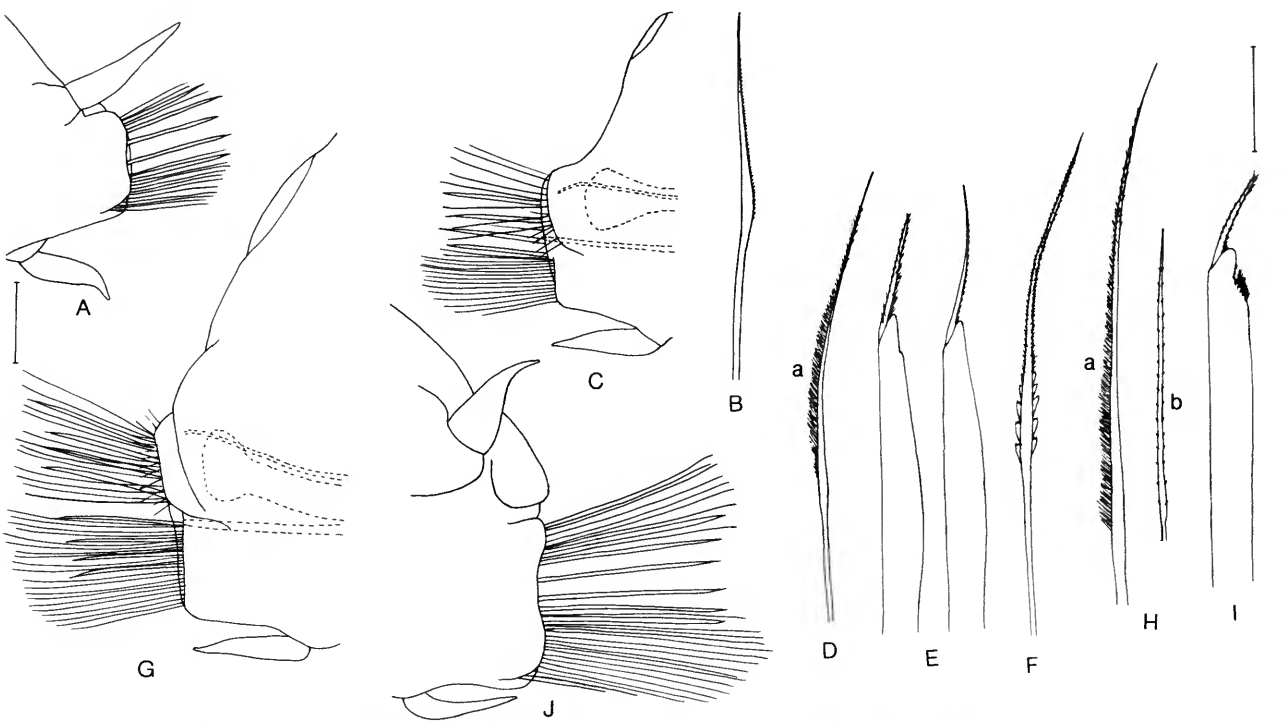

FIGURE 76.—*Polyodontes atromarginatus*, syntype (ZMA 1169.3): A, right cirrigerous parapodium from segment 8, posterior view; B, upper neuroseta from same; C, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; D–F, upper, middle, and lower neurosetae from same; G, right elytragerous parapodium from segment 17, anterior view, acicula and spinning gland dotted; H,I, upper and middle neurosetae from same; J, right cirrigerou s parapodium from segment 34, posterior view. (Scales: A,C,G = 0.5 mm; B,D–F,H,I = 0.1 mm.)

brown spots or transversely banded, with small papillae and longitudinal rows of extra long curved papillae (Figure 75A; Horst, 1917, pl. 29: fig. 5; Hoagland, 1920, pl. 46: fig. 9; Strelzov, 1972, fig. 2A). Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with row of papillae on inner side, 2 acicula, 2 small rounded projecting acicular lobes, 2 bundles of capillary setae, and pair of dorsal and ventral tentacular cirri, similar to but slightly longer than median antenna (Figure 75A,C).

Second segment with first pair of elytrophores, ventral buccal cirri much longer than following ventral cirri, and biramous parapodia; notopodium conical, on anterodorsal side of larger neuropodium, with bundle of long, finely spinous, capillary notosetae; neuropodium rounded, with ventral bract; neurosetae slender, slightly enlarged basally, tapering to long finely spinous capillary tips (Figure 76D–F; Strelzov, 1972, fig. 2B). Distal border of extended pharynx with 13, 15, or 17 pairs of border papillae, middorsal and midventral ones on broad bases and longer than other papillae, midventral one sometimes not as elongated as dorsal one; 2 pairs of hooked jaws, each with 3–6 lateral teeth (Horst, 1917, pl. 29: fig. 5).

Third segment with first pair of dorsal cirri, with short cirrophores and tapered styles extending beyond setae; ventral cirri about half as long; notopodium and notosetae similar to those of segment 2; neuropodium with 3 groups of neurosetae: upper ones lanceolate, spinous, with tapered tips; middle ones stouter, acicular, aristate; lower ones curved, lanceolate, with large spines basally and closely packed smaller ones distally, with fine tips (Figure 75G–I). Parapodia of segments 4–8 becoming larger, with fewer and shorter notosetae (Figure 76A,B).

Beginning with segment 9, notopodium wide, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning glands, and few short notosetae emerging from lower side of notopodium; neuropodium with truncate presetal acicular and postsetal lobes, and more or less developed anteroventral bract; lower group of neurosetae, within anteroventral bract, numerous, similar to more anterior neurosetae; middle row of stout acicular aristate neurosetae; upper group of neurosetae, emanating from low anterodorsal bract, hidden by notopodium, of 2 types: (a) long, lanceolate, with very long hairs basally, tapering to fine hairy tips; (b) short, slender, bipinnate, with sharp tips (Figure 76C–F; Strelzov, 1972, fig. 2C,G).

Middle parapodia becoming larger, with more numerous neurosetae of same types; dorsal cirri with wide, inflated cirrophores and short subulate styles; some of middle stout acicular aristate neurosetae with subdistal spines on one side (Figure 76G–J; Horst, 1917, pl. 29: fig. 7; Hoagland, 1920, pl. 46: figs. 11–14; Holly, 1934, fig. 2a–d; Strelzov, 1972, fig. 2D,I,K). Some indication of blister-like branchiae on few anterior segments, indistinct posteriorly; ventrally, with 2 or 3 translucent bulbous extensions medial to ventral cirri, beginning on segment 12.

DISTRIBUTION.—Indonesia, Philippines, Gulf of Tonkin, Solomon Islands, Australia (Queensland). In low water to 45 meters.

REMARKS.—For this species, Strelzov (1972) used the older name, *Eupompe aurorea* Grube, 1876, and included the species of Horst, Hoagland, and Holly in synonymy. The description of *E. aurorea* by Grube, from an unknown locality, is very incomplete. The type is not available. Strelzov based his synonymy on the characteristic long papillae of the palps. It should be pointed out that other species of this family also possess palps with long papilae. Until such a time as Grube's type can be found and reexamined, it would seem better to use Horst's name of *atromarginatus* and to consider Grube's name of *aurorea* as indeterminable.

Polyodontes sibogae Horst, 1917

FIGURE 77

Polyodontes sibogae Horst, 1917:131, pl. 28: figs. 4–10.

REMARKS.—*Polyodontes sibogae* was referred to *Polyodontes melanonotus* (Grube) by Fauvel (1919:339; 1932:37; 1953:72), concurred in by Uschakov and Wu (1959:16, 37; 1965:175; 1979:35) and by Strelzov (1968:140; 1972:287), and redesignated to *Panthalis melanonotus* Grube by Hartman (1959:113).

MATERIAL EXAMINED.—INDONESIA. Anchorage off Atjatuning, west coast of New Guinea, 57 m, *Siboga* sta 169, syntype of *P. sibogae* (RNHL 1289). North of Aru Islands, 05°28.2′S, 134°53.9′E, 57 m, *Siboga* sta 274, syntype of *P. sibogae* (ZMA 1170).

TYPE MATERIAL.—Both syntypes consist of anterior fragments, with 33 and 34 segments, 14 mm long, and 8 mm wide with setae. The syntype from *Siboga* sta 274 (ZMA 1170) had the left parapodia of segments 2–5, 8–10, 20 cut off and placed on slides, evidently the figured specimen by Horst. The other syntype from *Siboga* sta 169 (RNHL 1289) is figured here.

DESCRIPTION.—First few elytra covering dorsum, following elytra leaving middorsum uncovered; elytra oval to transversely elongate, without lateral pouch, translucent, faintly dotted with brown pigment, closely areolate (Figure 77C,D; Horst, 1917, pl. 28: fig. 6).

Prostomium rounded, bilobed, with globular ommatophores with distal lenses and short necks; median antenna with ceratophore on middle of prostomium, with few pairs of lateral papillae, continuing posteriorly as slightly raised ridge, with short style extending slightly beyond ommatophores; posterior pair of small eyes lateral to ceratophore of median antenna; lateral antennae inserted ventrally, short, not extending to tips of ommatophores; ventral palps long tapered, smooth (Figure 77A,B; Horst, 1917, pl. 28: figs. 4, 5). Tentacular segment distinct dorsally, with few papillae on anterolateral side; tentaculophores lateral to prostomium, each with few papillae on inner side, 2 acicula and 2 small acicular lobes, 2 bundles

of capillary setae and pair of dorsal and ventral tentacular cirri, similar to median antenna (Figure 77A,B,E; Horst, 1917, pl. 28: figs. 4, 5).

Second segment with first pair of elytrophores, ventral buccal cirri much longer than following ventral cirri, and biramous parapodia; notopodium short, conical, on anterodor-

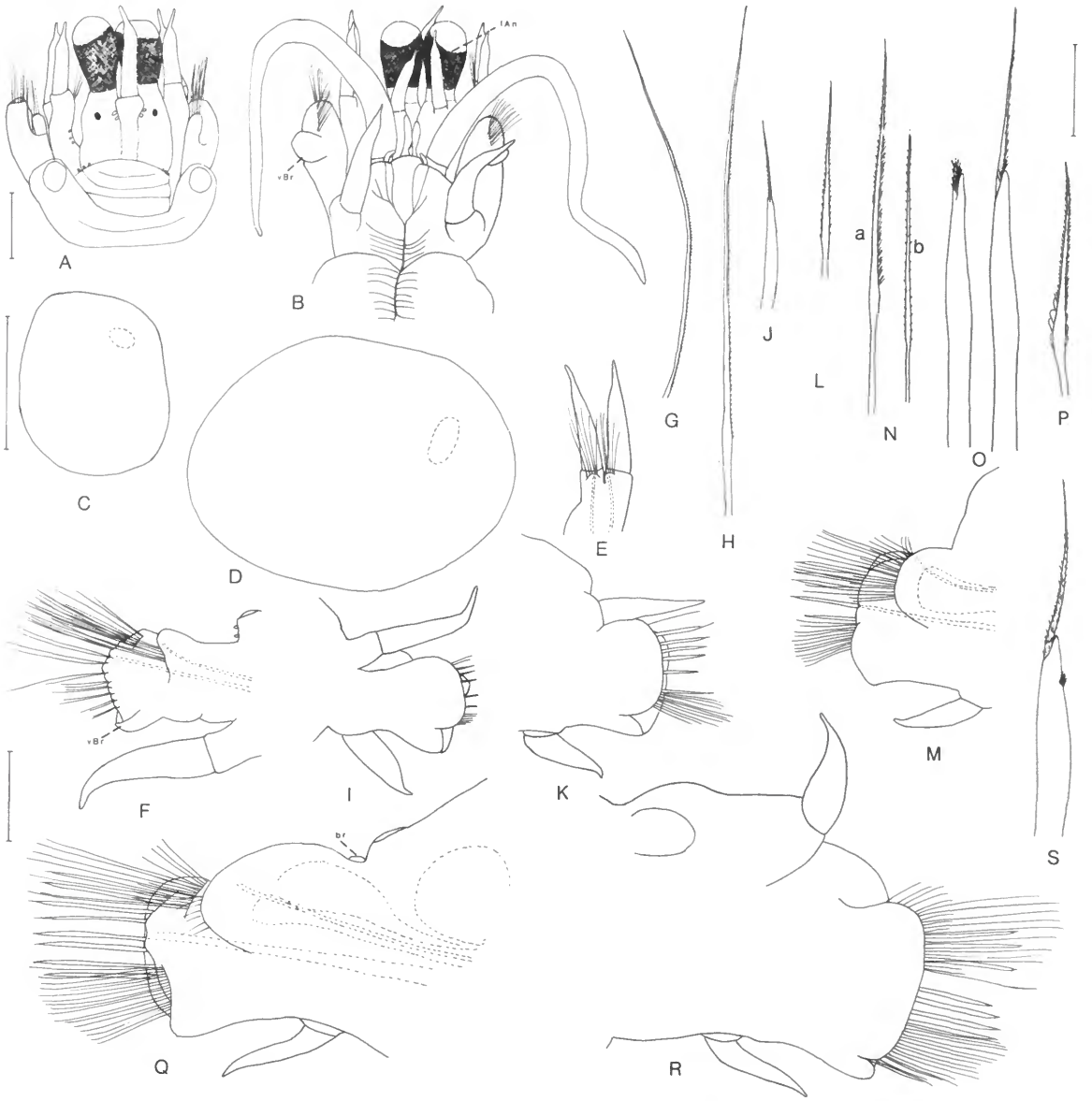

FIGURE 77.—*Polyodontes sibogae*, syntype (RNHL 1289): A, dorsal view of anterior end (palps not shown); B, ventral view of anterior end; C, right 2nd elytron from segment 4; D, right 16th elytron from segment 31; E, righ t tentaculophore with dorsal and ventral tentacular cirri, inner view, acicula dotted; F, right elytragerous parapodium from segment 2, anterior view, acicula dotted; G, notoseta from same; H, middle neuroseta from same; I, right cirrigerous parapodium f rom segment 3, posterior view; J, middle neuroseta from same; K, right cirrigerous parapodium from segment 8, posterior view; L, upper neuroseta from same; M, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; N–P, upper, middle, and lower neurosetae from same; Q, right elytragerous parapodium from segment 31, anterior view, acicula and spinning gland dotted; R, right cirrigerous parapodium from segment 32, posterior view; S, middle neuroseta from same. (Scales: A,B and E,F,I,K,M,Q,R = 0.5 mm; C,D = 1.0 mm; G,H,J,L,N–P,S = 0.1 mm.)

sal side of larger neuropodium, with bundle of long capillary, finely spinous notosetae; neuropodium with wide, rounded, presetal acicular lobe, with margin scalloped, with shorter rounded postsetal lobe, and prominent lower bract; neurosetae slender, slightly enlarged basally, tapering to finely spinous capillary tips; anterior to upper lip of ventral mouth with 2 pairs of extra lobes medial to bases of palps, inner pair elongate, digitiform, smaller outer pair short, curved (Figure 77A,B,F–H; Horst, 1917, pl. 28: figs. 4, 5, 7). Pharynx not extended and not examined.

Third segment with first pair of dorsal cirri, with short cirrophores and styles extending beyond setae; notopodium with few short notosetae; middle neurosetae stout, acicular, aristate (Figure 77I,J). Parapodia of segments 4–9 somewhat larger but similar; upper neurosetae lanceolate, spinous (Figure 77K,L).

Beginning with segment 9, notopodium short, wide, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning glands, and few short notosetae from underside of notopodium; neuropodium with truncate presetal acicular and postsetal lobes and indistinct anteroventral bract; lower group of neurosetae, within anteroventral bract, numerous, slightly curved, with large spines more basally and close-set spinous rows distally, with capillary tips; middle group of neurosetae stout, acicular, aristate; upper group of neurosetae emanating from low anterodorsal bract, hidden by notopodium, of 2 types: (a) long, slender, lanceolate, with rather long hairs along tapering tips; (b) short, slender, bipinnate, with sharp tips (Figure 77M–P). Posterior parapodia becoming larger, with setae of same types; dorsal cirri with cirrophores inflated with shorter styles, wide basally; some acicular aristate neurosetae with subdistal spines on one side; several branchial papillae on bases of elytrophores and dorsal cirrophores beginning about segment 10, with single large branchia posteriorly; bulbous inflated areas medial to ventral cirri (Figure 77Q–S; Horst, 1917, pl. 28: figs. 8–10).

DISTRIBUTION.—Indonesia. In 57 meters.

Polyodontes tidemani Pflugfelder, 1932

FIGURES 78, 79

Polyodontes tidemani Pflugfelder, 1932a:286, figs. 6, 7; 1932b:559, figs. 10, 13–15; 1934, figs. 3, 4, 10–12.

MATERIAL EXAMINED.—INDONESIA. S.E. of Rumadan Island, 05°30′S, 132°46′E, 46–51 m, mud, Muriel King Memorial Expedition to Moluccas, L.M. Joll, collector, 12 Jun

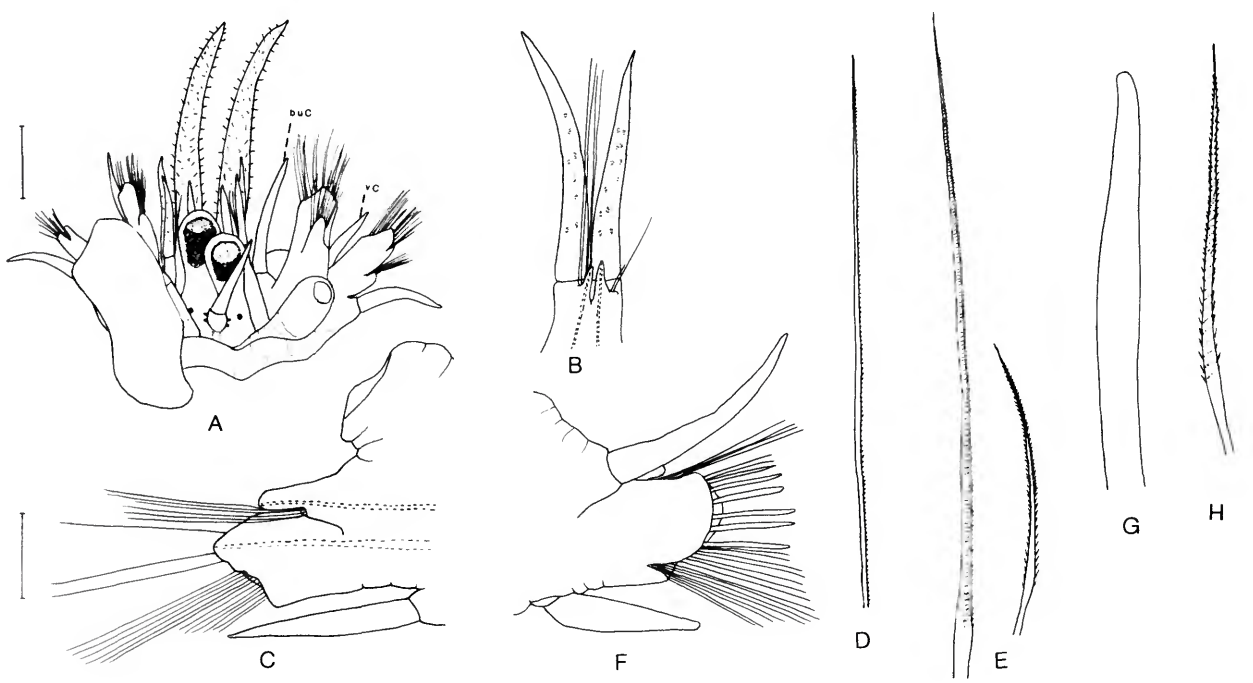

FIGURE 78.—*Polyodontes tidemani*, specimen from Moluccas (WAM 63-86): A, dorsal view of anterior end (head end pulled back into anterior segments, left 1st elytron rolled aside); B, right tentaculophore with dorsal and v entral tentacular cirri, acicula dotted; C, right elytragerous parapodium from segment 2, anterior view, acicula dotted; D, notoseta from same; E, middle and lower neurosetae from same; F, right cirrigerous parapodium from segment 3, posterior view; G,H, middle and lower neurosetae from same. (Scales: A = 1.0 mm; B,C,F = 0.5 mm; D,E,G,H = 0.1 mm.)

1970, 1 specimen (WAM 63–86).

TYPE MATERIAL.—The type of *Polyodontes tidemani* from the Moluccas was not available. The specimen collected by L.M. Joll seems to agree with the description and figures by Pflugfelder and is described here. It consists of an anterior fragment of 25 segments, 18 mm long, and 11 mm wide with setae; the pharynx was not extended but was cut open.

DESCRIPTION.—Only left first elytron remaining, large, smooth, finely areolate; 2nd pair of elytra shown on figure by Pflugfelder, leaving middorsum uncovered (Figure 78A; Pflugfelder, 1932a, fig. 6). Prostomium bilobed, with bulbous ommatophores with distal lenses and long necks; median antenna with ceratophore in middle of prostomium, with few lateral papillae, continuing posteriorly as raised ridge, with style extending almost to tips of ommatophores; posterior pair of small eyes lateral to ceratophore of median antenna; lateral antennae inserted ventrally, with tips extending beyond ommatophores and visible dorsally, ventral palps stout, tapering, about 3 times longer than median antenna, with 4 or 5 longitudinal rows of long papillae (Figure 78A; Pflugfelder, 1932a, fig. 6). Tentacular segment distinct dorsally (hidden from view on Figure 78A due to partial withdrawal of head end into anterior segments); tentaculophores lateral to prostomium, each with 2 acicula, 2 sharply projecting acicular lobes, 2 bundles of capillary setae, and pair of dorsal and ventral tentacular cirri, similar to median antenna (Figure 78A,B; Pflugfelder, 1932a, fig. 6).

Second segment with first pair of elytrophores, ventral buccal cirri longer than following ventral cirri, and biramous parapodia; notopodium with digitiform acicular lobe on

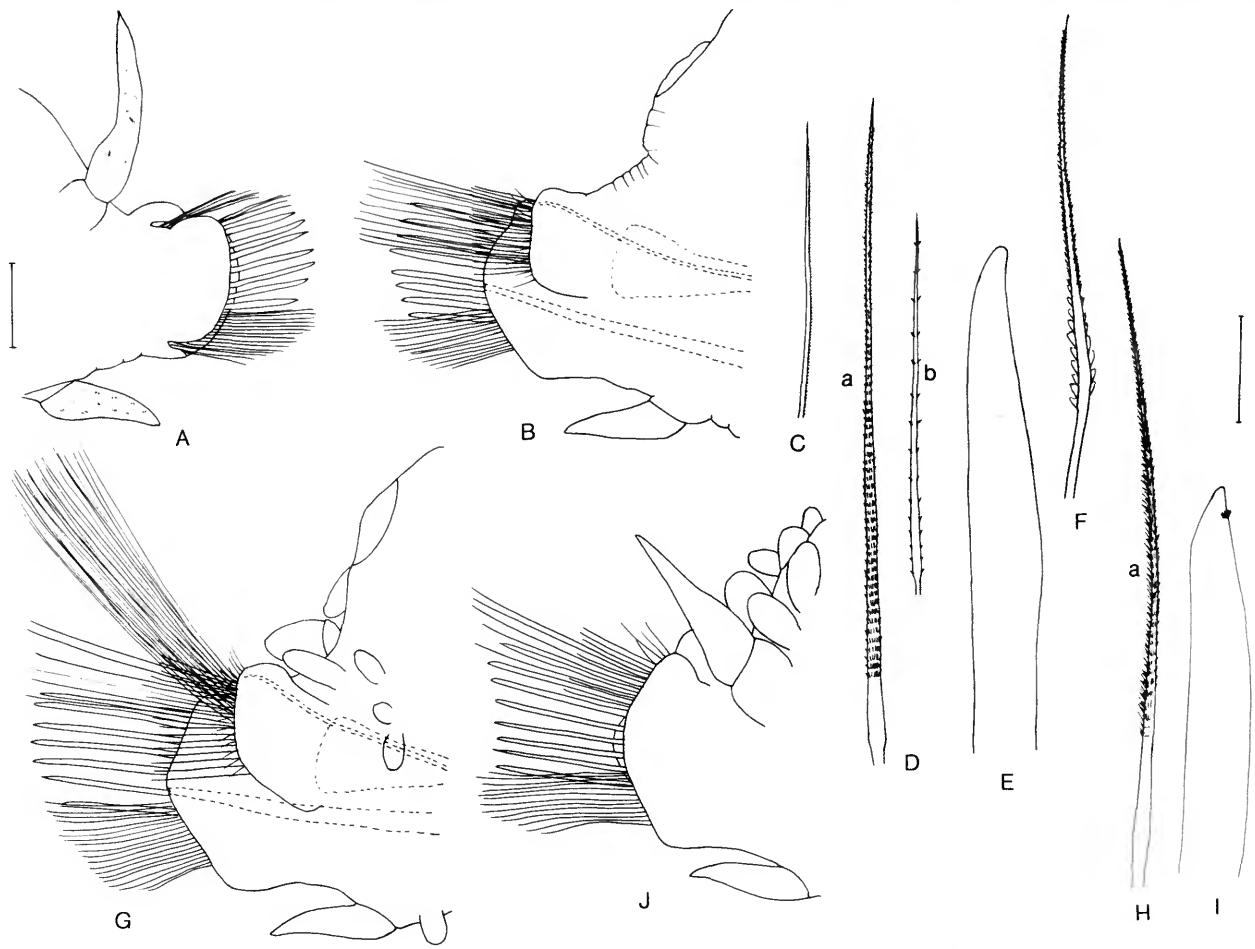

FIGURE 79.—*Polyodontes tidemani*, specimen from Moluccas (WAM 63-86): A, right cirrigerous parapodium from segment 8, posterior view; B, right elytragerous parapodium from segment 9, anterior view, acicula and spinning g land dotted; C, notoseta from same; D–F, upper, middle, and lower neurosetae from same; G, right elytragerous parapodium from segment 15, anterior view, acicula and spinning gland dotted; H,I, upper and middle neurosetae from same; J, left cirrigerou s parapodium from segment 22, posterior view. (Scales: A,B,G,J = 0.5 mm; C–F,H,I = 0.1 mm.)

anterodorsal face of larger neuropodium, with bundle of long, finely spinous capillary notosetae; neuropodium wide, subconical with anteroventral bract; neurosetae slightly enlarged basally, with spinous rows, tapering to capillary tips, lower ones shorter, with more prominent spines (Figure 78A,C–E). Pharynx (cut open) with 17 pairs of border papillae, middorsal and midventral ones on wide lobulated bases, middorsal one much longer than others, midventral one only slightly longer; 2 pairs of hooked jaws each with 5–7 lateral teeth.

Third segment with first pair of dorsal cirri with short cirrophores and styles extending beyond setae; parapodia similar to segment 2 except for appearance of middle stout acicular neurosetae (Figure 78F–H). Following parapodia of segments 4–8 with notopodia becoming smaller and shorter notosetae (Figure 79A).

Beginning with segment 9, notopodium wide, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning glands, and row of short capillary notosetae; neuropodium with slightly rounded presetal acicular lobe and truncate postsetal lobe, with slightly developed anteroventral bract; lower group of neurosetae numerous, rather slender, curved, enlarged basally with larger spines, tapering to capillary tips with close-set spinous rows; middle stout acicular neurosetae with slightly hooked tips, without aristae; upper group of neurosetae, emanating from low anterodorsal bract, hidden by notopodium, of 2 types: (a) long, slender, wider basally, tapering to slender tips, thickly spinous; (b) shorter, more slender, wider basally, tapering to shart tips, with widely spaced bipinnate spines (Figure 79B–F).

Middle parapodium becoming larger, with more numerous setae of same types; dorsal cirri with wider cirrophores and shorter styles; some acicular neurosetae with subdistal spines on one side; digitiform branchiae in region of elytrophores and dorsal cirrophores beginning on segment 10 and continuing to end of fragment (segment 25); inflated branchial areas medial to ventral cirri beginning about segment 13 (Figure 79G–I; Pflugfelder, 1932a, fig. 7a–d).

TUBES.—According to Pflugfelder (1932a:286), the tubes extended above the bottom by about 5–10 cm and were plainly visible in the clear water. It was difficult to collect the worms, which pulled back into the deeper parts of their tubes. The tubes had a fine uniform structure.

DISTRIBUTION.—Indonesia (Moluccas). In low water to 51 meters.

Polyodontes jolli, new species

FIGURES 80, 81

MATERIAL EXAMINED.—INDONESIA. North of Du Roma, 05°32′S, 132°41′E, Muriel King Memorial Exp. to Moluccas, sta KRVI/3–10, 1 Jun 1970, 27–37 m, sand and rubble, L.M. Joll, collector, holotype (WAM 62–86).

TYPE MATERIAL.—The holotype consists of an anterior fragment of 28 segments, 30 mm long, 15 mm wide with setae. The pharynx was not extended (cut open).

DESCRIPTION.—Body slightly brownish dorsally. Anterior few pair of elytra colorless, suboval, with anterior margins somewhat ruffled, delicate, showing veins; from 4th elytra on, elongate oval, with reddish brown pigmented areas on medial half, minutely areolate, without lateral pouch, leaving middorsum uncovered (Figure 80B–G).

Prostomium bilobed, with bulbous ommatophores and short necks; medial antenna with ceratophore medial to bases of ommatophores, with 5 pairs of lateral sensory papillae, extending posteriorly as slightly raised ridge, style with subterminal bulbous enlargement and filamentous tip, extending slightly beyond ommatophores; pair of small eyes lateral to ceratophore of median antenna; lateral antennae inserted ventral to ommatophores and extending slightly beyond, similar to median antenna; palps long, wider basally, tapering to slender tips, smooth, irregularly spotted with brown (Figure 80A). Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with longitudinal rows of papillae on inner side, 2 acicula, small rounded acicular lobe, pair of dorsal and ventral tentacular cirri, similar to median antenna, with subterminal pigmented bands (Figure 80A,H).

Second segment with first pair of elytrophores, ventral buccal cirri much longer than following ventral cirri, and biramous parapodia; notopodium digitiform acicular lobe on anterodorsal part of neuropodium, with bundle of long, finely spinous capillary notosetae; neuropodium subconical, somewhat flared distally, with lower bract; neurosetae long, slender, slightly wider basally, tapering to finely spinous capillary tips, lower ones shorter, with more distinct spines (Figure 80I–K). Distal border of pharynx (cut open) with 15 dorsal and 13 ventral papillae, middorsal and midventral ones on wide lobulated bases, much longer than others; 2 pairs of hooked jaws each with 8–10 lateral teeth.

Third segment with first pair of dorsal cirri with short cirrophores and styles extending about to tips of notosetae; neuropodium with rounded acicular lobe and distinct ventral bract, with middle stout acicular neurosetae missing (Figure 80L). Parapodia of segments 4 to 8 with notopodia becoming smaller and notosetae becoming shorter; neuropodia with distinct anteroventral bract enclosing lower group of neurosetae, slender, slightly curved, with longer spines basally and close-set spines dlstally, tapering to slender tips; middle stout acicular neurosetae with slightly hooked tips, smooth, with or without aristae; upper group of neurosetae slender, wider basally, with short spinous rows, tapering to capillary tips (Figures 80M–P, 81A).

Beginning with segment 9, notopodium wide, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning gland, and row of short notosetae emerging from underside of notopodiuim; upper group of neurosetae, emerging from low anterodorsal bract, hidden by notopodium, of 2 types: (a) long, slender, tapered, with thick spinous rows; (b) shorter, more slender, with widely spaced spinous rows (Figure 81B,C,E,F). More posterior parapodia becoming larger; dorsal cirri with inflated cirrophores and

wider subulate styles; numerous digitiform branchiae, lateral to elytrophores and medial to dorsal cirrophores, beginning on segment 10 and continuing to end of fragment (segment 28) (Figure 81C–J).

ETYMOLOGY.—The species is named for the collector of the holotype, Lindsay M. Joll.

DISTRIBUTION.—Indonesia (Moluccas). In 27–37 meters.

REMARKS.—*Polyodontes jolli*, new species, is closest to *P. australiensis* (McIntosh). They may be separated according to the key to the species of *Polyodontes*.

Polyodontes panamensis (Chamberlin, 1919)

FIGURE 82

Panthalis panamensis Chamberlin, 1919:86, pl. 11: figs. 4–8, pl. 12: figs. 1–6. [Not sensu Treadwell, 1936:265 (= *Acoetes melanonota* (Grube, 1870), new combination).]

Polyodontes mortenseni Monro, 1928:569 [part].

Panthalis adumbrata.—Treadwell, 1937:147. [Not *Panthalis adumbrata* Hoagland, 1920 (= *Polyodontes atromarginatus* Horst).]

Polyodontes panamensis.—Berkeley and Berkeley, 1939:326.—Hartman, 1939b:84.—Emerson, 1971:139.—Fauchald, 1972:30.

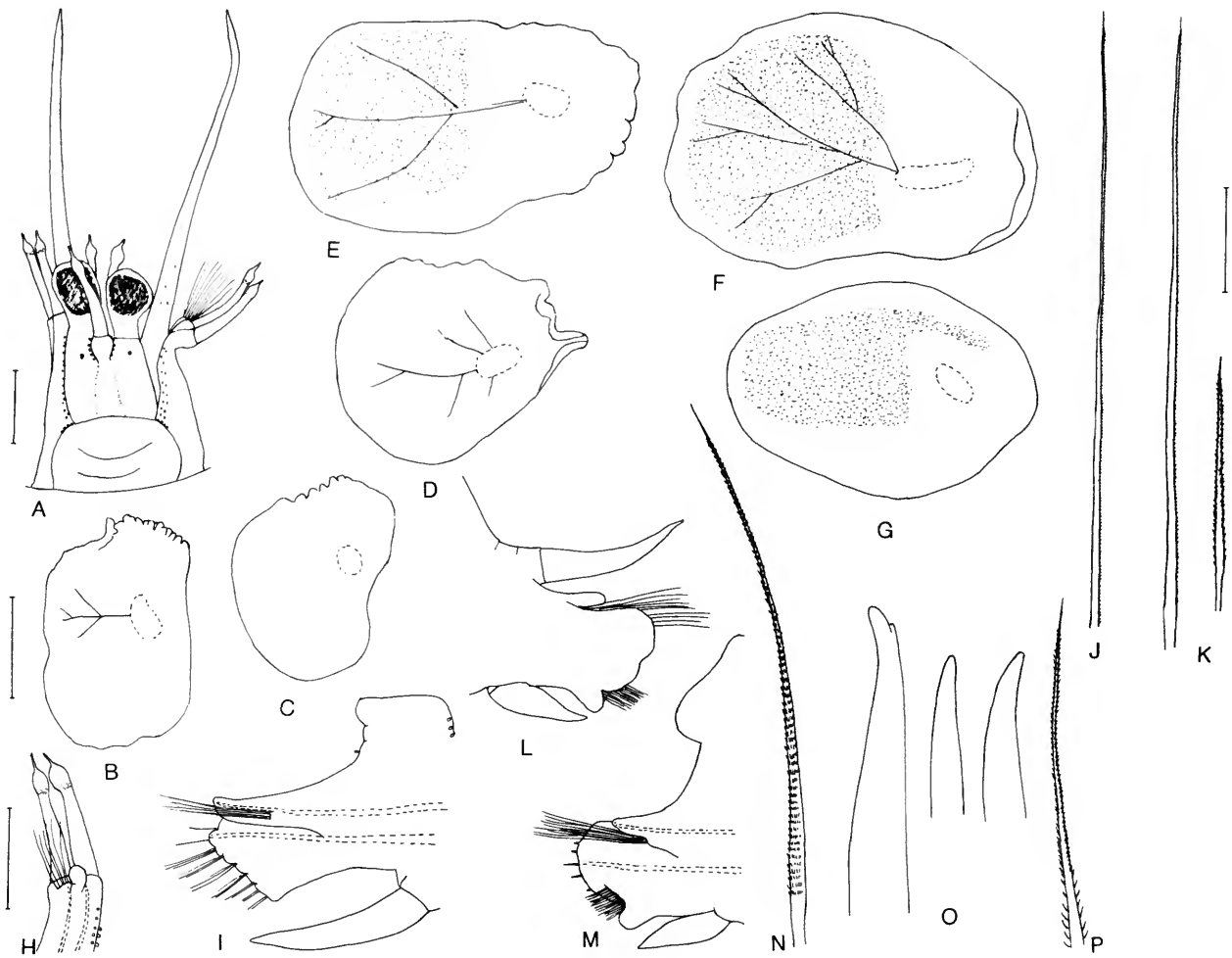

FIGURE 80.—*Polyodontes jolli*, holotype (WAM 62-86): A, dorsal view of prostomium and tentacular segment; B, right 1st elytron from segment 2; C, right 2nd elytron from segment 4; D, right 3rd elytron from segment 5; E, right 4th elytron from segment 7; F, right 5th elytron from segment 9; G, right 7th elytron from segment 13; H, right tentaculophore with dorsal and ventral tentacular cirri, inner view, acicula dotted; I, right elytrageous parapodium from segment 2, an terior view, acicula dotted; J, notoseta from same; K, middle and lower neurosetae from same; L, right cirrigerous parapodium from segment 3, posterior view; M, right elytrageous parapodium from segment 4, anterior view, acicula dotted; N–P, upper, middle, and lower (basal part hidden) neurosetae from same. (Scales: A and H,I,L,M = 1.0 mm; B–G = 2.0 mm; J,K,N–P = 0.1 mm.)

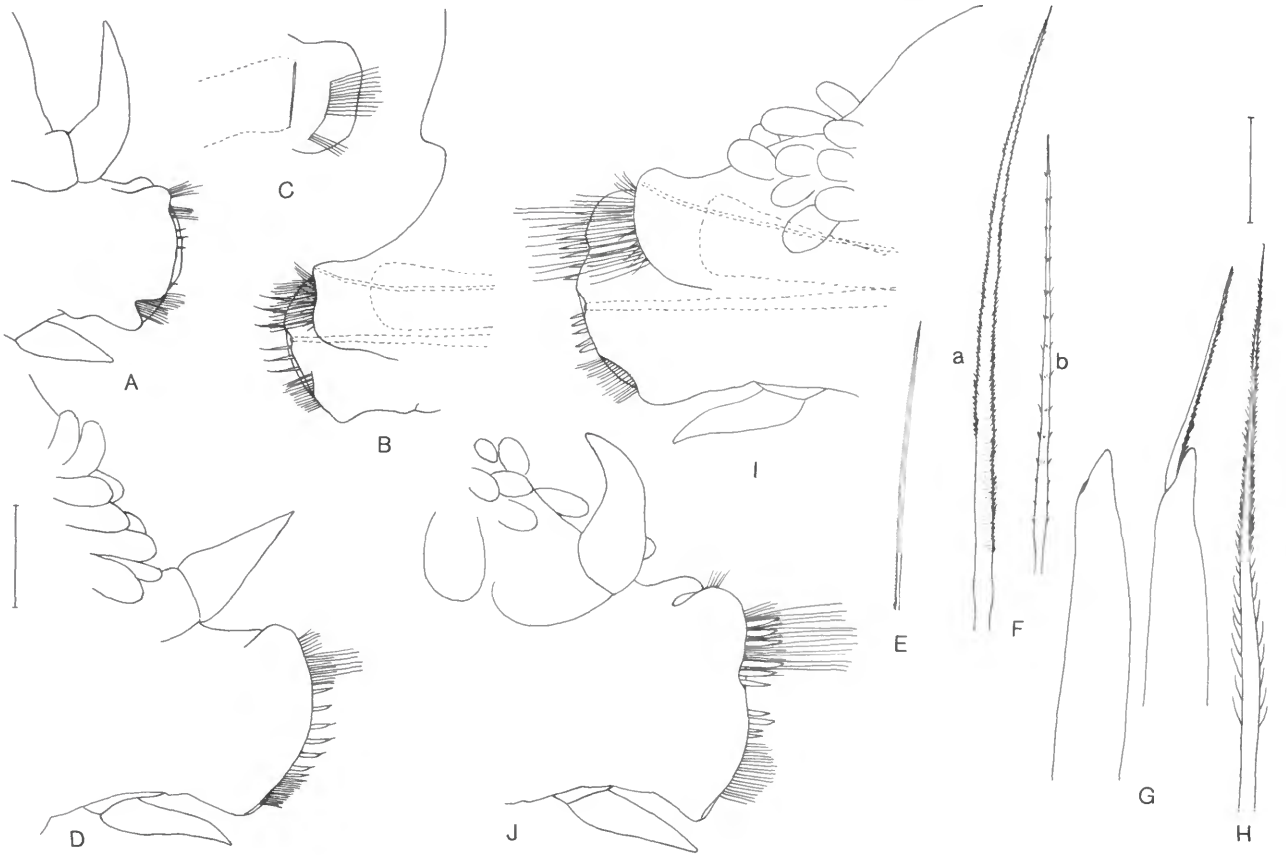

FIGURE 81.—*Polyodontes jolli*, holotype (WAM 62-86): A, right cirrigerous parapodium from segment 8, posterior view; B, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; C, n otopodium from segment 13, pulled back showing position of notosetae and slit for emergence of spinning fibers, spinning gland dotted; D, right cirrigerous parapodium from segment 14, posterior view; E, notoseta from same; F–H, upper, middle, and low er neurosetae from same; I, right elytragerous parapodium from segment 17, anterior view, acicula and spinning gland dotted; J, right cirrigerous parapodium from segment 18, posterior view. (Scales:A–D,I,J = 1.0 mm; E–H = 0.1 mm.)

MATERIAL EXAMINED.—PANAMA (Pacific). Panama, shore, *Albatross* sta, 30 Mar 1900, holotype of *P. panamensis* (USNM 19431). Melones, 6–9 m, 15 Dec 1915, Th. Mortensen, collector, syntype of *Polyodontes mortenseni* (UZMC, not same as lectotype and paralectotype from Taboga).

LOWER CALIFORNIA. Arena Bank, 101 m, 19 Apr 1936, Wm. Beebe, collector, 1 specimen (AMNH 3937, as *P. adumbrata* by Treadwell, 1937).

MEXICO. Acapulco, 16°51′N, 99°54′W, dredged at anchorage, sand and shell, 6 Apr 1937, F.E. Lewis, collector, MS *Stranger*, 2 specimens (USNM 35019, 50701).

TYPE MATERIAL.—Holotype, a female with eggs in body cavity, is an anterior fragment of 61 segments, 30 mm long, and 6 mm wide with setae; the pharynx is fully extended.

DESCRIPTION.—Anterior few pairs of elytra covering dorsum, rest leaving middorsum uncovered; elytra elongate, oval, thin, delicate, transparent, showing closely packed areolate pattern, brownish on medial half, with shallow to rather deep lateral pockets (Chamberlin, 1919, pl. 12: figs. 5, 6; Hartman, 1939b, pl. 24: fig. 291).

Prostomium bilobed with pair of bulbous ommatophores with short necks; median antenna with ceratophore on middle of prostomium, with 2 pairs of lateral papillae, extending posteriorly as slightly raised ridge, style extending slightly beyond tips of ommatophores; pair of small eyes lateral to ceratophore of median antenna; lateral antennae inserted ventral to ommatophores and extending slightly beyond; palps stout, tapered, smooth, about twice as long as prostomium (Figure 82A; Chamberlin, 1919, pl. 11: fig. 4). Tentacular segment visible dorsally; tentaculophores lateral to prostomium, each with longitudinal row of papillae on inner side, 2 acicula, few setae, and pair of dorsal and ventral tentacular cirri, similar to median antenna (Figure 82A; Chamberlin, 1919, pl. 11: fig. 4).

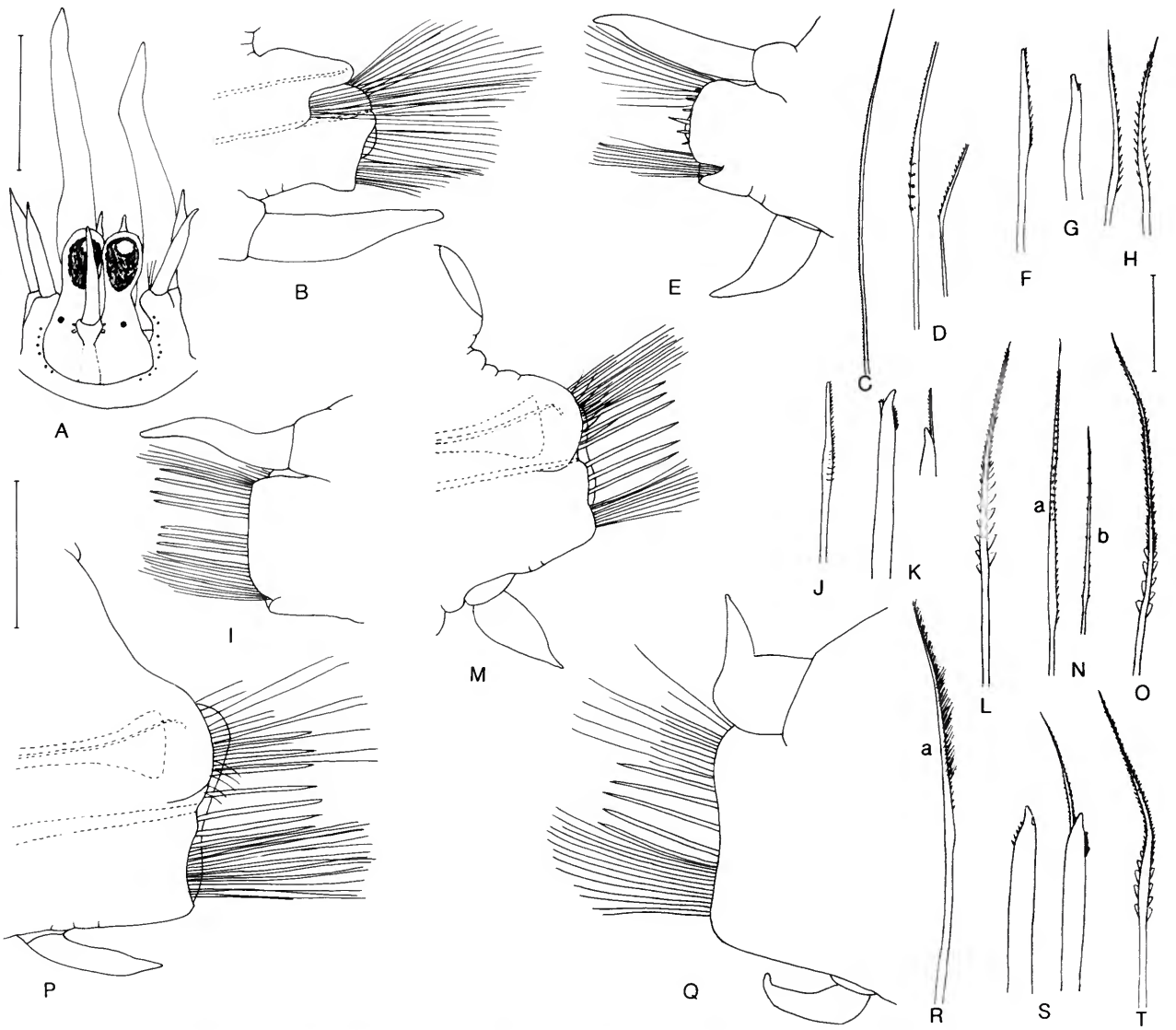

FIGURE 82.—*Polyodontes panamensis*, holotype (USNM 19431): A, dorsal view of prostomium and tentacular segment, pharynx fully extended (not shown); B, left elytragerous parapodium from segment 2, anterior view, acicula d otted; C, notoseta from same; D, middle and lower neurosetae from same (tips broken); E, left cirrigerous parapodium from segment 3, posterior view; F–H, upper (tip broken), middle, and lower neurosetae from same; I, left cirrigerous parapodium from segment 8, posterior view (ventral cirrus not shown); J–L, upper (tip broken), middle, and lower neurosetae from same; M, left elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; N,O, upper and lower neurosetae f rom same; P, left elytragerous parapodium from segment 31, posterior view, acicula and spinning gland dotted; Q, left cirrigerous parapodium from segment 32, posterior view; R–T, upper (tip broken), middle, and lower neurosetae from same. (Scales: A = 1.0 mm; B,E,I,M,P,Q = 0.5 mm; C,D,F–H,J–L,N,O,R–T = 0.1 mm.)

Second segment with first pair of elytrophores, ventral buccal cirri much longer than following ventral cirri, and biramous parapodia; notopodium long, subconical, with bundle of long capillary notosetae; neuropodiuim with slightly bilobed presetal acicular lobe and truncate postsetal lobe, with slightly developed ventral bract; neurosetae numerous, slender, slightly enlarged basally, tapering to spinous capillary tips, lower ones shorter (Figure 82B–D; Chamberlin, 1919, pl. 12: fig. 1; Hartman, 1939b, pl. 24: fig. 290). Extended pharynx with 13 pairs of border papillae, middorsal and midventral ones on wide lobulated bases, middorsal one much longer than others, midventral one only slightly longer; 2 pairs of hooked jaws,

each with 2–5 lateral teeth (Chamberlin, 1919, pl. 11: fig. 4).

Third segment with first pair of dorsal cirri with short cirrophores and styles extending about to tips of setae; notopodium and notosetae similar to those of segment 2; neuropodium with distinct ventral bract; upper neurosetae lanceolate, spinous; middle neurosetae stout, acicular, aristate; lower neurosetae slightly curved, spinous (Figure 82E–H; Chamberlin, 1919, pl 11: figs. 5, 6). Parapodia of segments 4–8 with notopodia smaller, with few and short notosetae; upper neurosetae lanceolate, spinous; middle neurosetae stout, acicular, aristate, with slightly hooked tips, some with subdistal rows of spines on one side; lower neurosetae, within anteroventral bract, slightly curved, with larger spines basally and close set spinous rows distally (Figure 82I–L).

Beginning with segment 9, notopodium wide, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning gland, and row of short notosetae from underside of notopodium; neuropodium with lower and middle neurosetae as in more anterior parapodia; upper group of neurosetae of 2 types: (a) longer, stouter, lanceolate, spinous; (b) shorter, more slender, bipinnate, with short sharp tips (Figure 82M–O).

More posterior parapodia larger; cirrophores of dorsal cirri inflated, with styles wider and shorter; upper neurosetae with long spines subdistally (Figure 82P–T; Chamberlin, 1919, pl.11: figs. 7, 8; Hartman, 1939b, pl. 24: figs. 289, 292, 293). Holotype without distinct parapodial branchiae; with single digitiform branchiae beginning about segment 30 on some specimens.

DISTRIBUTION.—Southern California (Santa Barbara Channel), Panama (Pacific), Lower California, Gulf of California, to Mexico (Acapulco). In low water to 280 meters.

Polyodontes frons Hartman, 1939

FIGURES 83–86

Panthalis oculea Treadwell, 1901:188 [part].

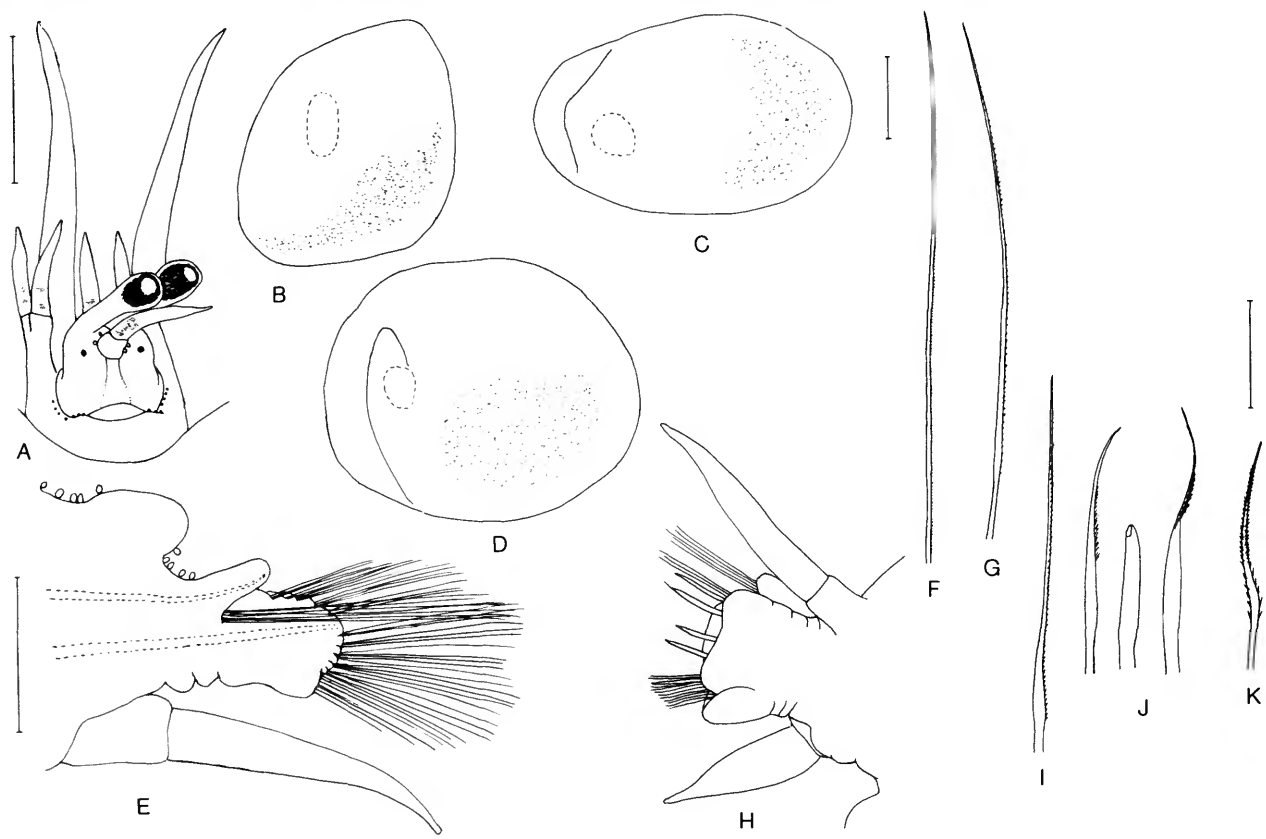

FIGURE 83.—*Polyodontes frons*, holotype (AHF 54): A, dorsal view of prostomium and tentacular segment (tentacular cirri on right side hidden from view); B, left 1st elytron from segment 2; C, left 5th elytron from segmen t 9; D, left 15th elytron from segment 29; E, left elytragerous parapodium from segment 2, anterior view, acicula dotted; F, notoseta from same; G, neuroseta from same; H, left cirrigerous parapodium from segment 3, posterior view; I–K, upper, middle , and lower neurosetae from same. (Scales: A = 1.0 mm; B–D and E,H = 0.5 mm; F,G,I–K = 0.1 mm.)

Polyodontes frons Hartman, 1939b:84, pl. 25: figs. 300–308; 1942:96.
Polyodontes lupina.—Day, 1973:9. [Not *Polyodontes lupinus* (Stimpson, 1856).]

MATERIAL EXAMINED.—PANAMA (Pacific). Piñas Bay, NNE of Pt. Isla, 37 m, mud, sta 443–35, 29 Jan 1935, holotype of *P. frons* (AHF 54).

GULF OF MEXICO. Off Sombrero Light, 128 m, gray sandy marl, A.R. Thompson and P.L. McGinty, collectors, 5 Jun 1950, 1 specimen (USNM 50702). 25°N, 84°W, 128m, M.L. Jones, collector, 14 Jul 1965, 1 specimen (USNM 50730). 27°52′N, 94°56′W, 121–181 m, *Alaminos* sta 65A10-13C, 28 Jun 1964, 1 specimen (USNM 71436).

SOUTH ATLANTIC. East coast of South America off Argentina, 36°43′S, 56°23′W, 19 m, sand, broken shells, *Albatross* sta 2765, 12 Jan 1888, 1 specimen (USNM 50729).

NORTH CAROLINA. 34°23′N, 75°54′W, 160 m, J.H. Day, collector, 30 Nov 1965, 1 specimen (USNM 50706, as *Polyodontes lupina* by Day, 1973).

PUERTO RICO. Mayaguez Harbor, 13 and 139 m, USS *Fish Hawk* sta 6059 and 6063, 19, 20 Jan 1899, 2 specimen (USNM 15679, 15962, as *Panthalis oculea* by Treadwell, 1901). Puerto Rico, 23 m, N. Hulings and D. Feray, collectors, 1963, 1 specimen (USNM 42752). Barceloneta, 18°30′41″N, 66°11′26″W, Interstate Electronic Corp sta 731–010–003, 10 Jan 1980, 293 m, 1 specimen (USNM 98808).

TYPE MATERIAL.—Holotype with 40 segments, last 2 small, regenerating, 17 mm long, and 6 mm wide with setae; pharynx

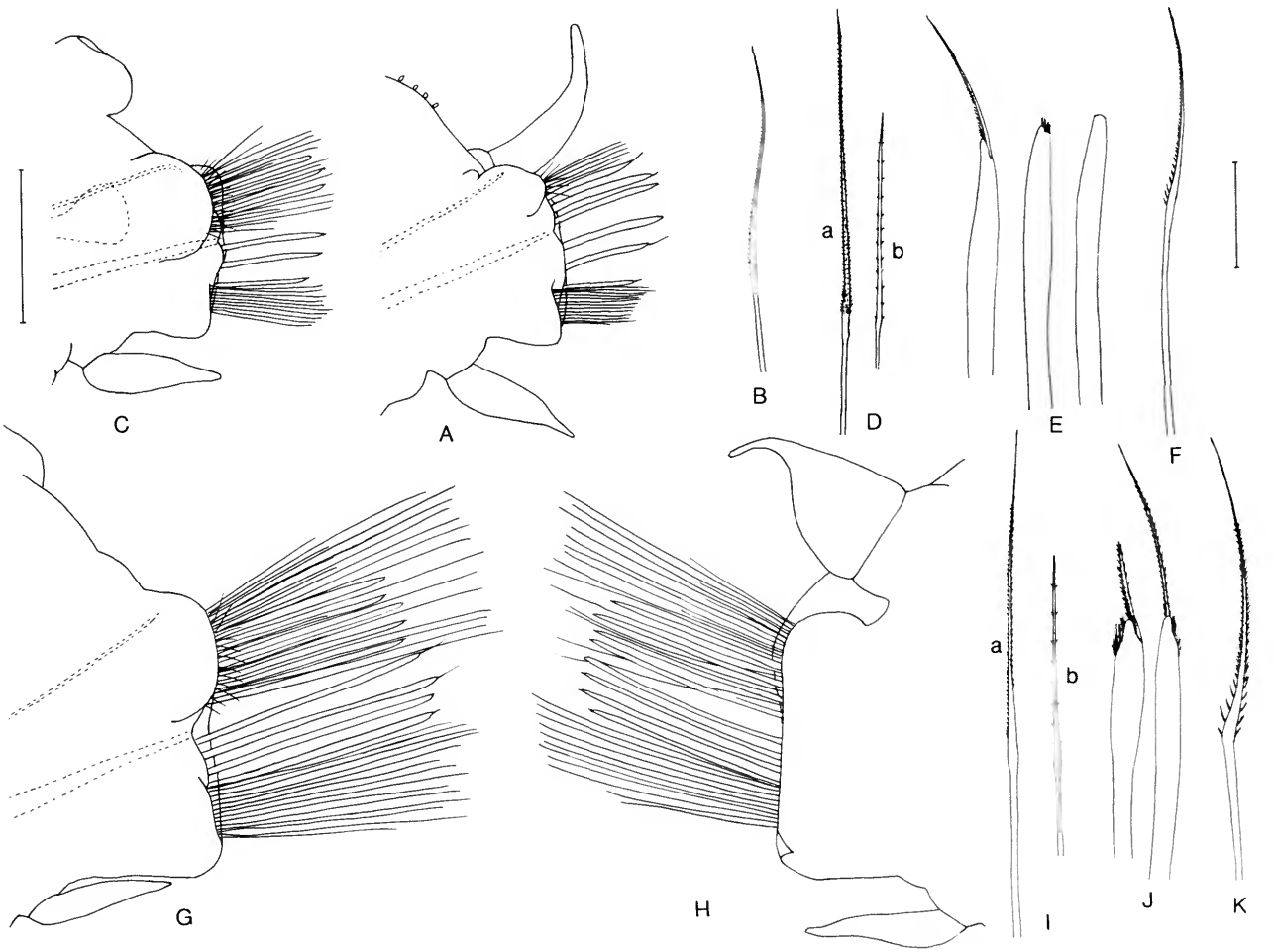

FIGURE 84.—*Polyodontes frons*, holotype (AHF 54): A, left cirrigerous parapodium from segment 8, anterior view, acicula dotted; B, upper neuroseta from same; C, left elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; D–F, upper, middle, and lower neurosetae from same; G, left elytragerous parapodium from segment 29, anterior view, acicula dotted; H, left cirrigerous parapodium from segment 30, posterior view; I–K, upper, mi ddle, and lower neurosetae from same. (Scales: A,C,G,H = 0.5 mm; B,D–F,I–K = 0.1 mm.)

completely extended. Figured specimen from Gulf of Mexico anterior fragment of 38 segments, 36 mm long, and 9 mm wide with setae.

DESCRIPTION.—Elytra round to oval, leaving middorsum uncovered, delicate, translucent, with flecks of pigment or dusty crescents of inner sides of elytra, with lateral pouch from 4th elytra (Figures 83B–D, 85B–E; Hartman, 1939b, pl. 25: fig. 304).

Prostomium bilobed, with bulbous ommatophores and long necks; median antenna with rounded ceratophore in middle of prostomium, with 2–3 pairs of lateral papillae, continuing posteriorly as raised ridge, with tapering style extending about to tips of ommatophores; pair of small eyes lateral to ceratophore of median antenna; lateral antennae inserted ventral to ommatophores, similar to median antenna; ventral palps stout, long, tapering, smooth (Figures 83A, 85A; Hartman, 1939b, pl. 25: fig. 300). Tentacular segment distinct dorsally, tentaculophores lateral to prostomium, each with row of papillae on inner side, 2 acicula, with or without few setae, and pair of dorsal and ventral tentacular cirri, similar to median antenna (Figures 83A, 85A,F; Hartman, 1939b, pl. 25: fig. 300).

Second segment with first pair of elytrophores, ventral buccal cirri much longer than following ventral cirri, and biramous parapodia longer than parapodia of segment 3; notopodium with digitiform acicular lobe and bundle of long

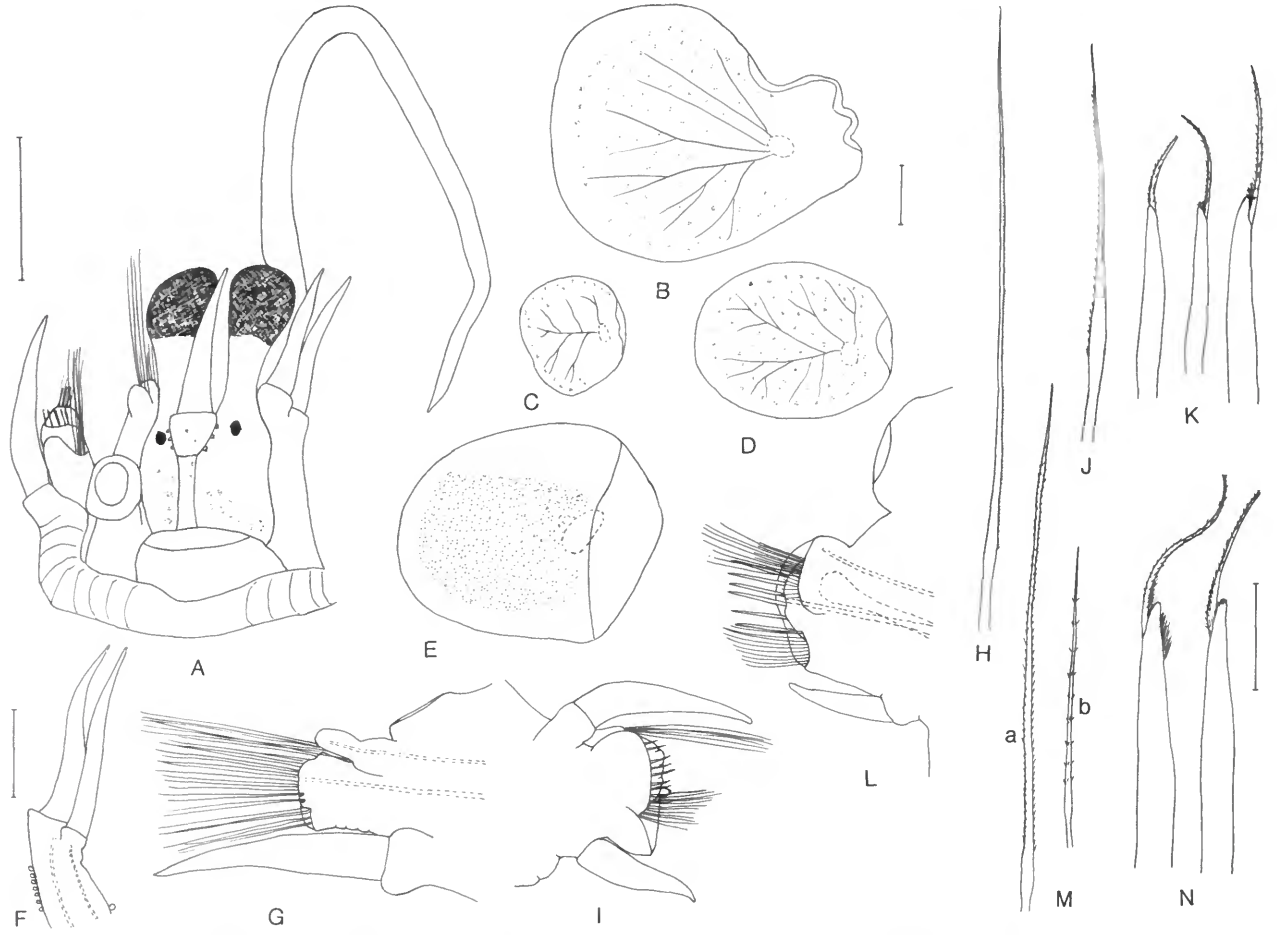

FIGURE 85.—*Polyodontes frons*, specimen from Gulf of Mexico (USNM 71436): A, dorsal view of anterior end (left tentacular cirri and lateral antennae not visible, left palp missing, right parapodia of segments 2 and 3 cut off); B, right 1st elytron from segment 2; C, right 2nd elytron from segment 4; D, right 3rd elytron from segment 5; E, right 13th elytron from segment 23; F, right tentaculophore with dorsal and ventral tentacular cirri, inner view, acicula dotted; G, right elytragerous parapodium from segment 2, anterior view, acicula dotted; H, neuroseta from same; I, right cirrigerous parapodium from segment 3, posterior view, J,K, upper and middle neurosetae from same; L, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; M,N, upper and middle neurosetae from same. (Scales: A and B–E = 1.0 mm; F,G,I,L = 0.5 mm; H,J,K,M,N = 0.1 mm.)

capillary, finely spinous notosetae; neuropodium rounded, flared distally, with ventral bract; neurosetae numerous, slender, slightly wider basally, tapering to finely spinous capillary tips (Figures 83E–G, 85G,H; Hartman, 1939b, pl. 25: fig. 302). Distal border of extended pharynx with 13–15 pairs of papillae, middorsal and midventral ones on wide lobulated bases, middorsal one much longer than others, midventral one about one-third as long as middorsal one; 2 pairs of hooked jaws, each with 4–7 lateral teeth.

Third segment with first pair of dorsal cirri with short cirrophores and styles extending beyond setae; notopodium and notosetae similar to those of segment 2; neuropodium truncate with well-developed ventral bract; upper neurosetae slender, lanceolate, finely spinous; middle neurosetae stout, acicular, aristate; lower neurosetae slightly curved, with larger spines basally and close-set spinous rows distally (Figures 83H–K, 85I–K; Hartman, 1939b, pl. 25: fig. 303). Parapodia of segments 4–8 with smaller rounded notopodia and fewer short notosetae; neuropodia becoming larger, with more numerous neurosetae of same types (Figure 84A,B).

Beginning with segment 9, notopodium wide, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning gland, and row of short capillary notosetae; neuropodium with slightly bilobed presetal acicular lobe, truncate postsetal lobe, and anteroventral bract; lower neurosetae, within anteroventral bract, similar to more anterior parapodia; middle neurosetae stout, acicular, aristate, with slightly hooked tips, some with subdistal spines on one side; upper neurosetae of 2 types: (a) longer, lanceolate, with numerous spinous rows, tapering to capillary tips; (b) short, more slender, bipinnate, with short sharp tips (Figures 84C–F; 85L–N). More posterior parapodia larger with more numerous neurosetae; dorsal cirri with cirrophores inflated, with wider, shorter styles; stout acicular aristate neurosetae with more

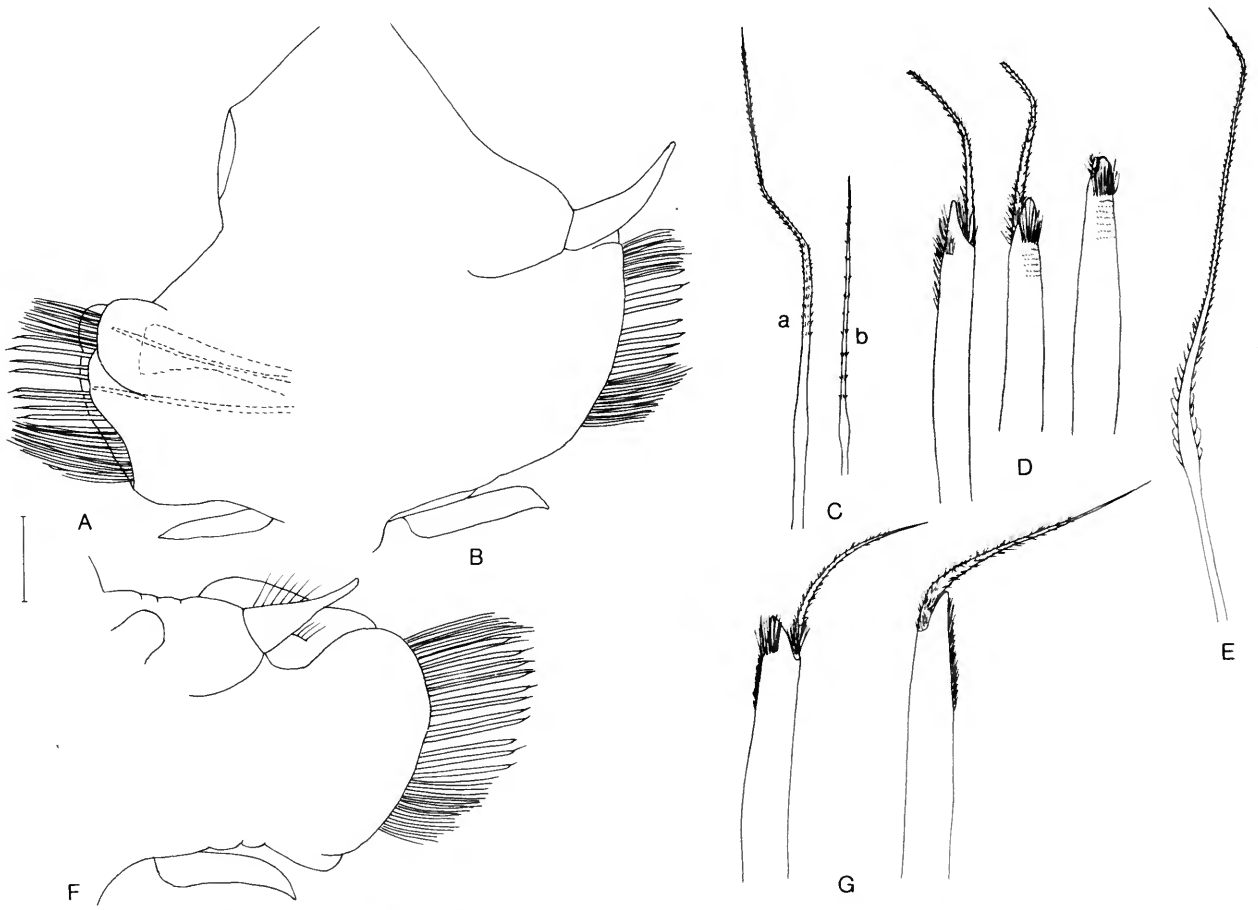

FIGURE 86.—*Polyodontes frons*, specimen from Gulf of Mexico (USNM 71436): A, right elytragerous parapodium from segment 23, anterior view, acicula and spinning gland dotted; B, right cirrigerous parapodium from segment 2 4, posterior view; C–E, upper, middle, and lower neurosetae from same; F, right cirrigerous parapodium from segment 36, posterior view; G, middle neurosetae from same. (Scales: A,B,F = 0.5 mm; C–E,G = 0.1 mm.)

numerous subdistal spines on one side (Figures 84G–K, 86A–G; Hartman, 1939b, pl. 25: figs. 301, 305–308). Parapodial branchiae absent on type; single branchia present on some posterior parapodia of some specimens (Figure 86F).

DISTRIBUTION.—Panama (Pacific), North Atlantic off North Carolina, Caribbean (off Cuba, Puerto Rico), Gulf of Mexico, South Atlantic off Argentina. In 13 to 914 meters.

Polyodontes lupinus (Stimpson, 1856)

FIGURES 87–91

Acoetes lupina Stimpson, 1856:116.—Andrews, 1891:280.

Polyodontes maxillosus.—Berkeley and Berkeley, 1941:24. [Not *Polyodontes maxillosus* (Ranzani, 1817).]

Polyodontes californicus Treadwell, 1941:20, figs. 9–12.

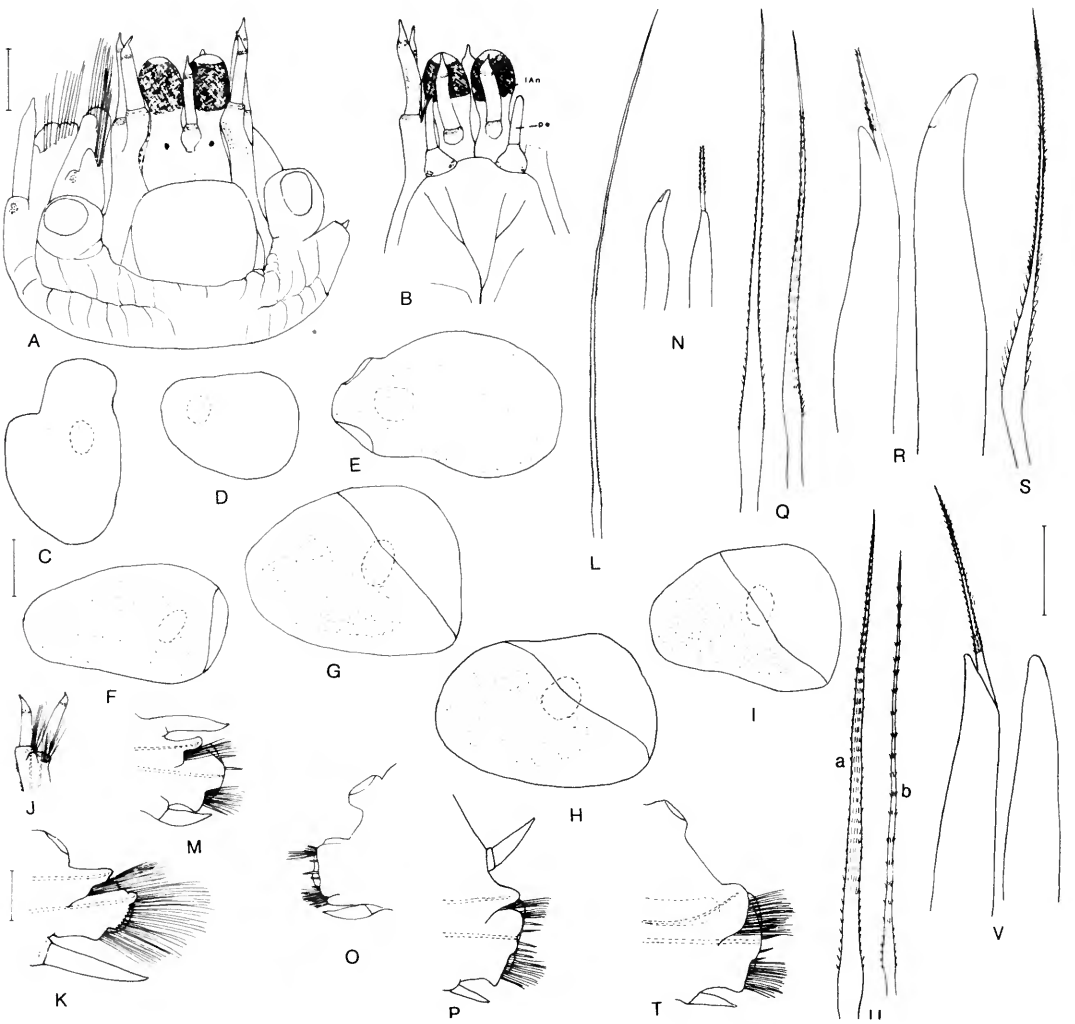

FIGURE 87.—*Polyodontes lupinus*, specimen from North Carolina (USNM 52853): A, dorsal view of anterior end, right parapodium of segment 2 hidden, right dorsal cirrus of segment 3 small, regenerating; B, ventral view of p rostomium and tentacular segment, palps small, regenerating (left tentaculophore cut off); C, right 1st elytron from segment 2; D, left 2nd elytron from segment 4; E, left 9th elytron from segment 17; F, right 13th elytron from segment 25; G, right elytr on from segment 71; H, right elytron from segment 145; I, right elytron from segment 250; J, left tentaculophore with dorsal and ventral tentacular cirri, inner view, acicula dotted; K, left elytragerous parapodium from segment 2, anterior view, acicula dotted; L, neuroseta from same; M, left cirrigerous parapodium from segment 3, anterior view, acicula dotted; N, middle neurosetae from same; O, left elytragerous parapodium from segment 4, posterior view; P, left cirrigerous parapodium from segment 8, a nterior view, acicula dotted; Q–S, upper, middle, and lower neurosetae from same; T, left elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; U,V, upper and middle neurosetae from same. (Scales: A,B and J,K,M,O,P ,T = 1.0 mm; C–I = 2.0 mm; L,N,Q–S,U,V = 0.1 mm.)

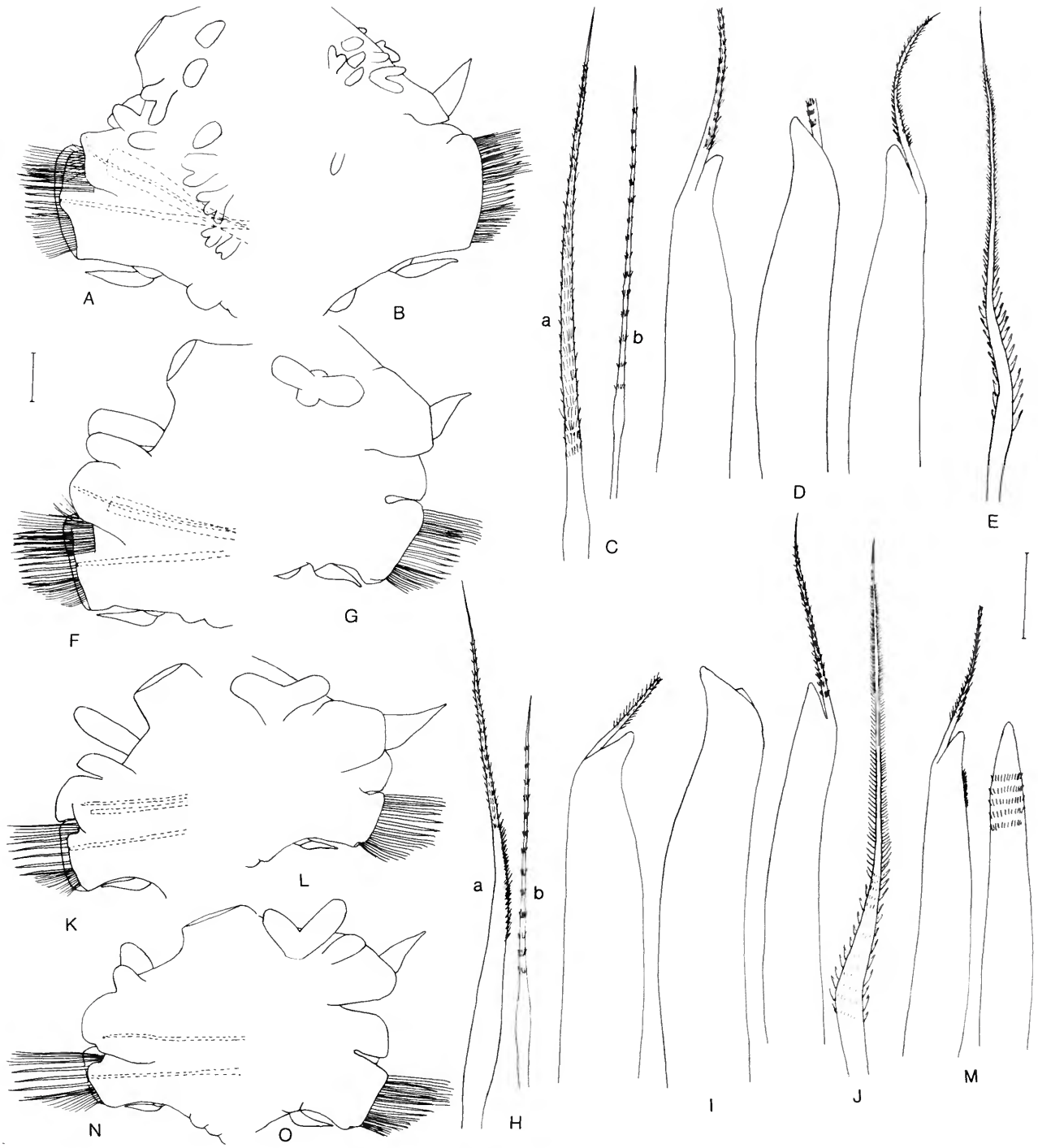

FIGURE 88.—*Polyodontes lupinus*, specimen from North Carolina (USNM 52853): A, right elytragerous parapodium from segment 23, anterior view, acicula and spinning gland dotted; B, right cirrigerous parapodium from segment 24, posterior view; C–E, upper, middle, and lower neurosetae from same; F, right elytragerous parapodium from segment 71, anterior view, acicula and spinning gland dotted; G, right cirrigerous parapodium from segment 72, posterior view; H–J, upp er, middle, and lower neurosetae from same; K, right elytragerous parapodium from about segment 145, anterior view, acicula and spinning gland dotted; L, right cirrigerous parapodium from about segment 146, posterior view; M, middle neurosetae from same; N, right elytragerous parapodium from about segment 249, anterior view, acicula dotted; O, right cirrigerous parapodium from about segment 250, posterior view. (Scales: A,B,F,G,K,L,N,O = 1.0 mm; C–E,H–J,M = 0.1 mm.)

Polyodontes lupina.—Hartman, 1945:10; 1951:19.—Behre, 1950:11.—Renaud, 1956:11.—Carpenter, 1956:94, 99.—Taylor, 1971:96.—Moore, 1972:100.—Dörjes, 1977:414, 417.—Howard and Frey, 1975a: 12; 1975b:47, 54.—Dörjes and Howard, 1975:174, fig. 15Pl. [Not sensu Day, 1973:9 (= *Polyodontes frons*).]

Polyodontes panamensis.—Hartman, 1956:274. [Not *Polyodontes panamensis* (Chamberlin, 1919).]

Polyodontes sp.—Taylor, 1971:100, fig. 3A–D.

Polyodontes lupinus.—Gardiner, 1975 [1976]:91, fig. 3f–j.—Wolf, 1984:7, figs. 3, 4a–q; 1986:83.—Fox and Ruppert, 1985:50, 195, 254, 299.

MATERIAL EXAMINED.—NORTH CAROLINA. Beaufort, 1885, E.A. Andrews, collector, 1 specimen and tube (USNM 4854, 4855). Banks Channel, Wrightsville Beach, intertidal, muddy sand, soft mud mixed with shell fragments, J. Green, S.L. Gardiner and C. Jenner, collectors, 10 Jun 1972, 8 Mar, 6 Apr and 20 Jul 1974, 17 Apr 1976, 7 specimens and tube (USNM 52851–52855, 61729, 61730).

GULF OF MEXICO. Seahorse Key, Florida, SE shore and Deadman's Channel, E.L. Pierce, 23 Sep 1960, Mar 1961, 2

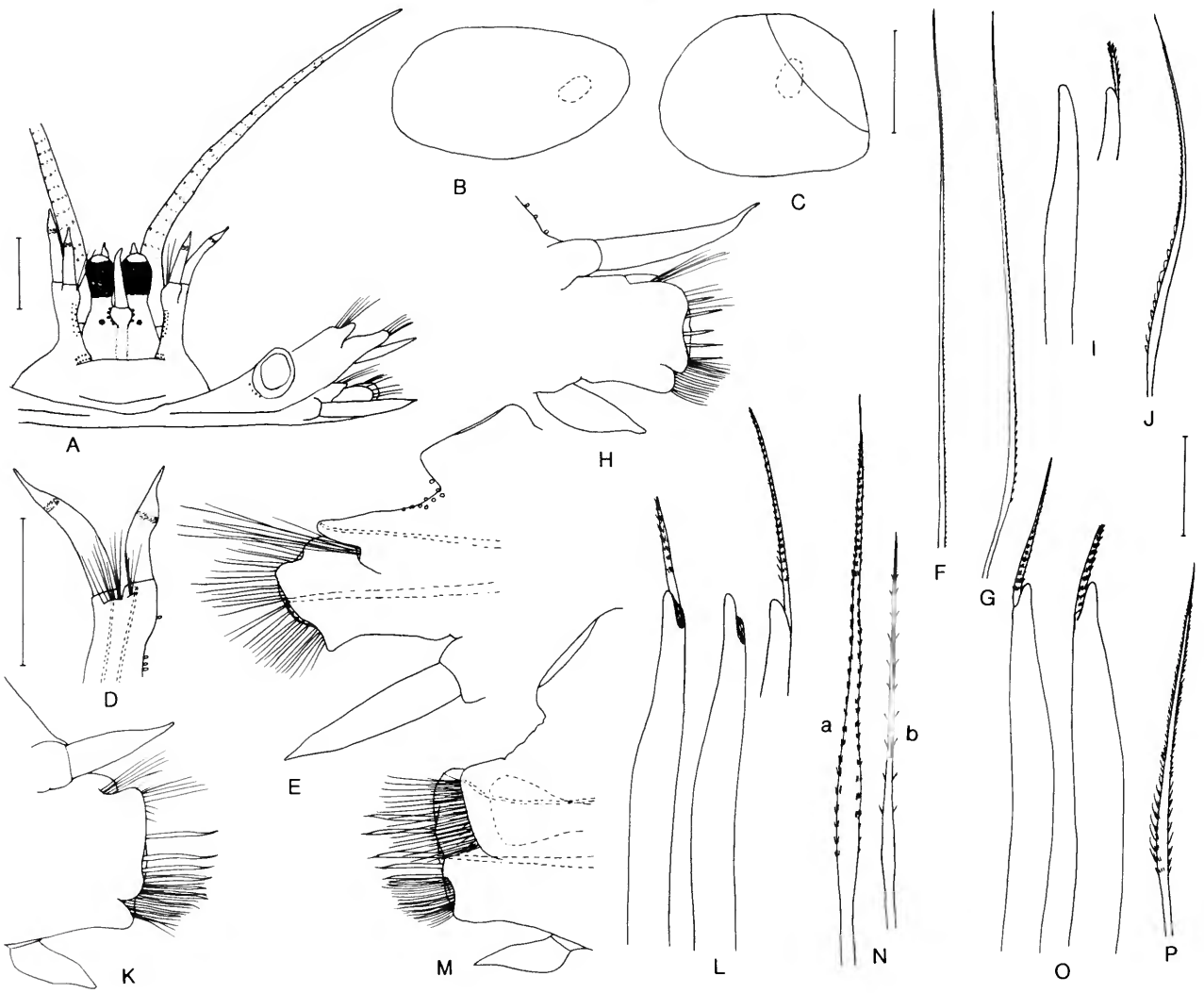

FIGURE 89.—*Polyodontes lupinus*, specimen from Alligator Harbor, Florida (USNM 50704): A, dorsal view of anterior end, pharynx fully extended (not shown), (left side not completely shown); B, right 5th elytron from segme nt 9; C, right elytron from segment 69; D, right tentaculophore with dorsal and ventral tentacular cirri, inner view, acicula dotted; E, right elytragerous parapodium from segment 2, anterior view, acicula dotted; F, notoseta from same; G, neuroseta from same; H, right cirrigerous parapodium from segment 3, posterior view; I,J, 2 middle and 1 lower neurosetae from same; K, right cirrigerous parapodium from segment 8, posterior view; L, 3 middle neurosetae from same; M, right elytragerous parapodium from segment 9, anterior view, acicula and spinning gland dotted; N–P, upper, middle, and lower neurosetae from same. (Scales: A and D,E,H,K,M = 1.0 mm; B,C = 2.0 mm; F,G,I,J,L,N–P = 0.1 mm.)

specimens (USNM 32357, 32358). Tampa Bay, Florida, J.L. Taylor, 1963, 3 specimens (USNM 45518, 45519). Alligator Harbor, Bay Mouth Bar, Franklin County, Florida, L. Oglesby, 10 Apr 1959, 1 specimen (USNM 50703); R.T. Paine, 1960, 1 specimen (USNM 50704). Mississippi Sound, D.H. Moore, 7 Mar 1956, 1 specimen (USNM 71437). Belle Fountaine Buoy on Intercoastal waterway, 30°17′N, 88°44′W, W.W. Langley, 23 Jul 1968, 1 specimen (USNM 43088). Three miles (4.8 km) off Galveston Harbor, Texas, 10 m, *Alaminos* sta 65A3–8, 12 Mar 1965, 2 specimens (USNM 71438). About 3 miles (4.8 km) SE of Dauphin Island, Alabama, 30°11′N, 88°07′W, Continental Shelf Assoc. Inc. sta 12, 18 Sep 1981, juvenile (USNM 71151).

Gulf of Mexico, from Barry A. Vittor and Associates: Mississippi-Alabama-Florida Outer Continental Shelf (MAFLA) sta 2528, Jul 1976, 29°54′N, 80°04′W, 37 m, coarse sand, juvenile (USNM 55799). Central Gulf (CTGLF) sta 3, Jan 1979, South Timbalier Bay, Louisiana, 28°40′N, 90°14′W, 30 m, silty clayey sand, 1 specimen (USNM 86858). South Texas Outer Continental Shelf (STOCS) sta I-1, no. 2, spring 1976, off Port Orchard, 28°12′N, 96°72′W, 18 m, silty clayey sand, juvenile (USNM 86855); sta III-4, no. 4 & 6, spring 1976, 26°58′N, 97°20′W, 15 m sand, 2 specimens (USNM 86854, 86857); sta IV-4, no. 5 & 6, winter 1976, Nov 1979, off Port Isabel, 26°10′N, 97°08′W, 15 m, sand, 2 juveniles (USNM 86853, 86856). Mississippi Sound, Army Corps of Engineers (ACE) sta 25, 22 Oct 1980, 30°18′N, 88°47′W, 3.2 m, juvenile (USNM 75628); sta 364, 6 Nov 1980, 30°10′N, 88°38′W, 11.9 m, 1 specimen (USNM 75629). Off Tampa Bay, Florida, Interstate Electronic Corp. (IEC) site 713, sta 003–5–6, 1 Oct 1979, 27°37′N, 82°54′W, 12 m, 2 specimens (USNM 98812); site 723, sta 002–008, 26 Jan 1980, 27°38′N, 82°54′W, 12 m, 1 specimen (USNM 98810); site 723, sta 014–006–7, 26 Jan 1980, 27°36′N, 82°53′W, 12 m, 2 specimens (USNM 98811).

PANAMA (Pacific). Fort Amador, Canal Zone, 08°54′N, 79°31′W, sta 26–2, 27 Apr 1971, sandy mud, M.L. Jones, 1 specimen (USNM 50707).

WESTERN MEXICO. Chamela Bay, sta 182D–4, 29 m, 17

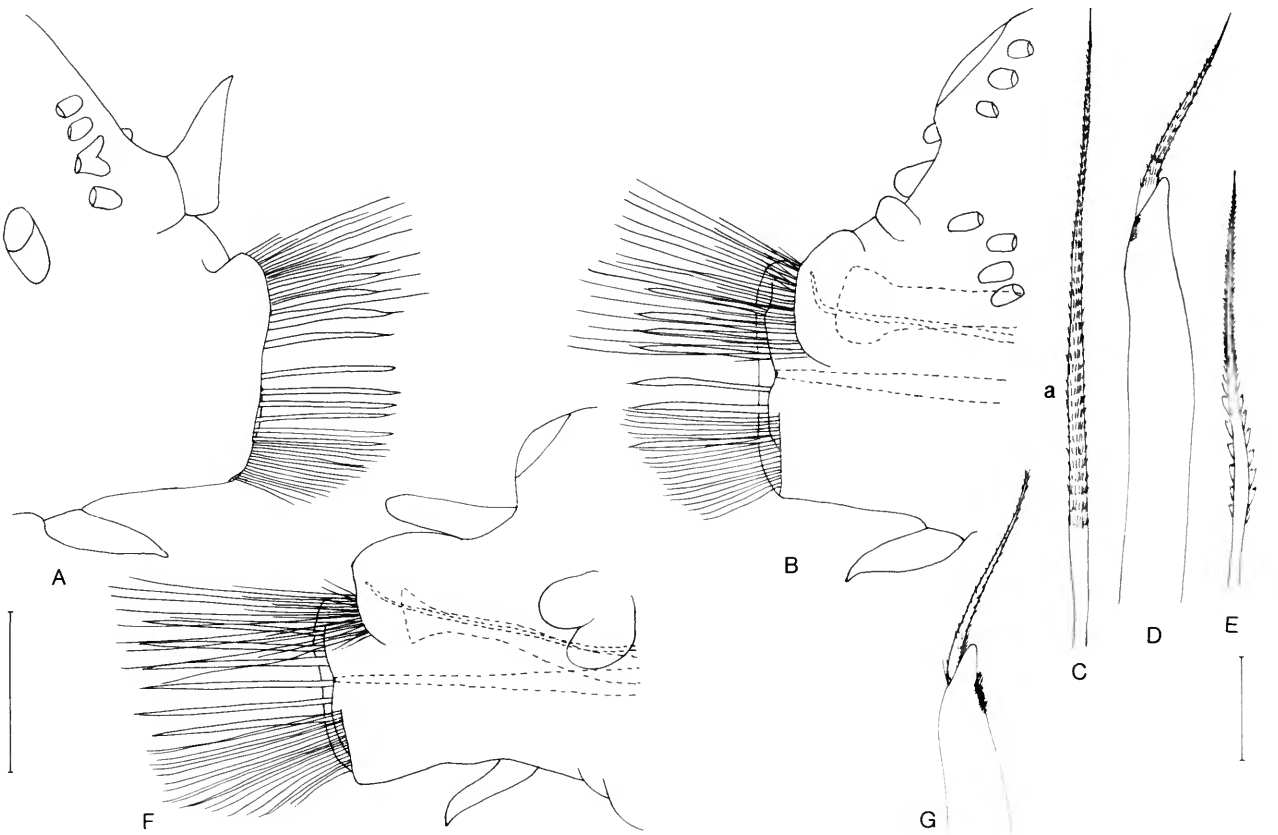

FIGURE 90.—*Polyodontes lupinus*, specimen from Alligator Harbor, Florida (USNM 50704): A, right cirrigerous parapodium from segment 24, posterior view; B, right elytragerous parapodium from segment 25, anterior view, aci cula and spinning gland dotted; C–E, upper, middle, and lower neurosetae from same; F, right elytragerous parapodium from segment 69, anterior view, acicula and spinning gland dotted; G, middle neuroseta from same. (Scales: A,B,F = 1.0 mm; C–E,G = 0.1 mm.)

Nov 1937, holotype of *P. californicus* (AMNH 3552).

SOUTHERN CALIFORNIA. Off Corona del Mar, 13–15 m, 10 May 1937, G.E. MacGinitie, 1 specimen (USNM 35017, as *P. maxillosus* by E. & C. Berkeley, 1941). Newport Bay, Corona del Mar, 13 Dec 1953, brought up by suction dredge, P. Milburn, 1 specimen (USNM 27074).

TYPE MATERIAL.—Type of *A. lupina* from Charleston Harbor, South Carolina, no holotype designated or known to exist. Specimen (Figure 87) from North Carolina (USNM 52853) complete, with about 280 segments, 460 mm long, 18 mm wide with setae. Specimen (Figure 89) from Alligator Harbor, Florida (USNM 50704) anterior fragment with 77 segments, 55 mm long, 12 mm wide; pharynx fully extended. Juvenile (Figure 91) from Tampa Bay, Florida (USNM 45519) anterior fragment of 30 segments, 8 mm long, 4 mm wide.

Holotype of *P. californicus* from Western Mexico (AMNH 3552) anterior fragment of 44 segments, 30 mm long, 12 mm wide with setae; pharynx fully extended.

DESCRIPTION.—Body long, thick, vermiform, flattened ventrally, convex dorsally. Dorsum reddish brown, elytra light brown, dotted with black, with bright sulphur yellow margins. Elytra elongate oval, with eccentric lateral attachment, leaving middorsum uncovered; surface with compact areolate pattern; more posterior elytra with lateral pocket (Figures 87C–I, 89B,C, 91A).

Prostomium bilobed, with bulbous ommatophores and short necks; median antenna with rounded ceratophore on middle of prostomium, with or without lateral papillae, extending posteriorly as slightly raised ridge, with style extending to tips of ommatophores; posterior pair of small eyes lateral to ceratophore of median antenna; lateral antennae similar to median antenna, inserted ventral to ommatophores, with only tips visible dorsally; stout ventral palps long, tapered, smooth, with transverse dotted pigmented brands or only subterminal band (Figures 87A,B, 89A; Treadwell, 1941, fig. 9; Gardiner, 1975 [1976], fig. 3f; Wolf, 1984, fig. 4a). Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with papillae on inner side, 2 acicula, 2 bundles of short setae, pair of dorsal and ventral tentacular cirri similar to median antenna (Figures 87A,B,J; 89A,D; Gardiner, 1975 [1976], fig. 3f; Wolf, 1984, fig. 4a,b).

Second segment with first pair of elytrophores, ventral buccal cirri longer than following ventral cirri, and biramous parapodia; notopodium conical acicular lobe anterodorsal to neuropodium, with bundle of long, finely spinous capillary notosetae; neuropodium flared distally, with ventral bract;

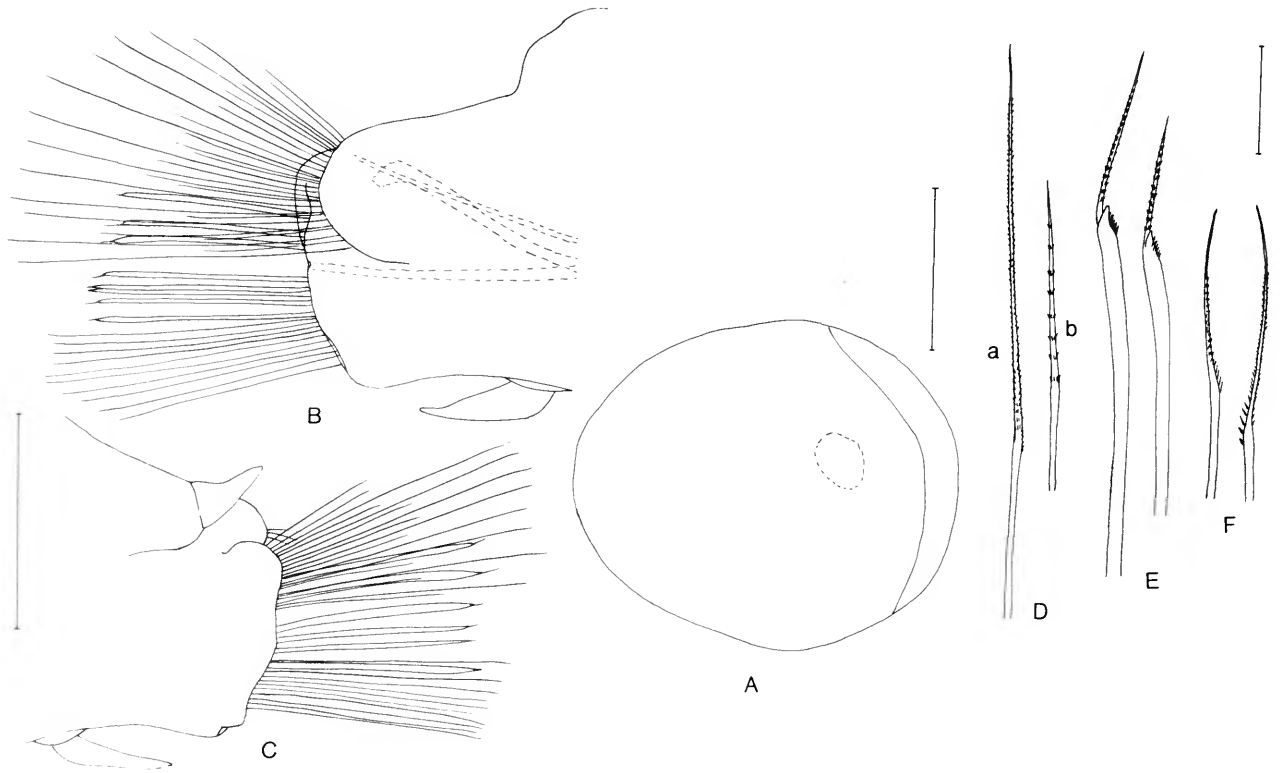

FIGURE 91.—*Polyodontes lupinus*, juvenile from Tampa Bay, Florida (USNM 45519): A, right 12th elytron from segment 23; B, right elytragerous parapodium from segment 23, anterior view, acicula and spinning gland dotted; C , right cirrigerous parapodium from segment 24, posterior view; D–F, upper, middle, and lower neurosetae from same. (Scales: A = 0.5 mm; B,C = 0.5 mm; D–F = 0.1 mm.)

neurosetae slender, slightly wider basally, tapering to finely spinous capillary tips (Figures 87A,K,L, 89A,E–G; Wolf, 1984, fig. 4a,c,i,j). Distal border of extended pharynx with 15 pairs of papillae, middorsal and midventral ones on wide lobulated bases, middorsal one much longer than others, midventral papilla slightly smaller than middorsal one; 2 pairs of hooked jaws, each with 4–7 lateral teeth.

Third segment with first pair of dorsal cirri with short cirrophores and styles extending to tips of setae; notopodium similar to that on 2nd, but with shorter notosetae; neuropodium truncate with distinct ventral bract; upper neurosetae similar to but stouter than those on 2nd; middle neurosetae stout, acicular, with or without aristae; lower neurosetae wider basally, slightly curved, with distinct spines basally and close-set spinous rows distally (Figures 87A,M,N, 89A,H–J; Wolf, 1984, fig. 4a,d,k–n). Parapodia of segments 4–8 with notopodia becoming smaller and notosetae becoming shorter; neuropodia larger with neurosetae of same types; ventral cirri short, subulate (Figures 87O–S, 89K,L).

Beginning with segment 9, notopodium wide, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning gland, and short vertical row of notosetae; neuropodium with truncate presetal and postsetal lobes and anteroventral bract; lower group of neurosetae, within anteroventral bract, similar to neurosetae of anterior segments; middle stout acicular aristate neurosetae with slightly hooked tips; upper group of neurosetae of 2 types: (a) longer, slender, wider basally, tapering to slender tips with close-set spinous rows; (b) shorter, more slender, with widely spaced spines and short sharp tips (Figures 87T–V, 89M–P).

Middle parapodia becoming larger with more numerous neurosetae of same types; some middle acicular aristate neurosetae in more posterior segments with subdistal spines on one side; dorsal cirri with inflated cirrophores and short wide styles; numerous elongate oval branchiae on anterior and posterior sides of elytrophores and dorsal cirrophores beginning about segment 10, replaced by few digitiform branchiae from about segment 34; several bulbous transparent elevations medial to ventral cirri (Figures 88A–M, 90A–G; Treadwell, 1941, figs. 10–12; Gardiner, 1976, fig. 3g–j; Wolf, 1984, fig. 4f,g,o–q).

Juveniles with elytra, parapodia and setae similar to adults; all middle acicular aristate neurosetae with subdistal spines on one side (Figure 91A–F; Taylor, 1971, fig. 3A–D, as *Polyodontes* sp.).

TUBE.—The tubes of *P. lupinus*, found at low-water on the flats in Charleston Harbor, South Carolina, were described by Stimpson (1856:117). The tubes were up to 2.5 feet (76 cm) in length, seven-eighths of an inch in width, blackish, of a tough glutinous structure, very thick, and composed of several layers, with the exterior mixed with mud. The tubes were found in sand or mud, descending perpendicularly into the sediment for a depth equal to the length of the worm. The extremity did not project above the surface, only a small aperture was visible. The diameter of each tube was much greater than the thickness of the worm, thus allowing the animal to turn end over end. The worms were frequently captured with their heads downward and their tails at the apertures of the tubes, a position they apparently assumed when disturbed. In taking their prey, the worms did not completely leave their tubes, but would suddenly dart out from the anterior end, seize their prey with their powerful jaws, and pull back into the tubes. Dörjes and Howard (1975:174, fig. 15P1) sketched the tube of *P. lupinus* from the shelf off Sapelo Island, Georgia, as a vertical tube not extending above the surface, with the anterior end of the worm at the opening of the tube. Howard and Frey (1975b:54) reported the recovery of worms in the same area from large, unbranched, thick-walled, vertical, felted tubes, strongly resembling those of the anemone *Ceriatheopsis americanus*.

ASSOCIATIONS.—Stimpson (1858:307–309) found several specimens of minute blood-red gastropod mollusks living under the scales of the giant worm that he had described earlier as *Acoetes lupina* (= *Polyodontes lupinus*) from Charleston Harbor, South Carolina (Stimpson, 1856:116). He considered the snails to be parasitic and gave a preliminary description under the name *Cochliolepis parasiticus*. Based on numerous tubes of *P. lupinus* collected in shallow muddy bottom areas in Tampa Bay, Florida, D. Moore (1972:100–105) found that each worm had several specimens of *Cochliolepis* under its scales. He included a full description of the gastropods and referred *C. parasiticus* to the Family Vitrinellidae. He found that the gastropods were herbivores or detritus-feeders living as commensals with the host scale worm, rather than parasitic. They apparently feed on fine particulate organic material drawn into the tube by the worm's respiratory and feeding current. The gastropods were found on the surface of the worms and possibly perform a cleaning function. Moore found *P. lupinus* and *C. parasiticus* living together in Beaufort, North Carolina, Charleston Harbor, South Carolina, and Tampa Bay, Florida. Several individuals of the small red gastropods were reported by Hartman (1945:10) in Beaufort, North Carolina; some were found under the scales of a specimen examined from Banks Channel, Wrightsville Beach (USNM 52853); some were found under elytra of *P. lupinus* in South Carolina by Fox and Ruppert (1985:299). This is the only known habitat for this unique gastropod, *Cochliolepis parasiticus* Stimpson, 1856.

Nielsen (1966:255–265, figs. 6–8) described two species of epizoic entoprocts of the family Loxosomatidae associated with *Polyodontes lupinus* in 0–3 m, in Miami, Florida: *Loxosomella worki*, found fastened by its stalk to the fine mucous threads on the inner wall of the tubes of the host, and *L. bilocata*, found in two locations: attached near the tips of the stout acicular aristate neurosetae of *P. lupinus* (Nielsen, 1966, fig. 6A,B) and attached to the inner wall of the tube, with the foot hidden in a deep pocket between the fine threads of the muddy mucous tube; they are able to withdraw fully in the pocket and are easily overlooked. *Loxosomella bilocata* was also collected from the tube of *P. lupinus* from Bird Shoal off Beaufort, North Carolina.

Fox and Ruppert (1985:299) reported a polychaete, Harmot-

hoinae sp. A, commensal in the tube of *P. lupinus* in South Carolina.

DISTRIBUTION.—North Carolina to Florida, Gulf of Mexico, Panama (Pacific), Southern California to Western Mexico. In low water to 37 meters.

Polyodontes oculeus (Treadwell, 1901)

FIGURE 92

Panthalis oculea Treadwell, 1901:188, figs. 14–18 [part].

Polyodontes oculea.—Monro, 1928:572, figs. 25-30.—Hartman, 1939b:83, pl. 24: figs. 294–299.—Jones, 1962:174.—Fauchald, 1977a:9. [?Not sensu Nonato and Luna, 1969 [1970]:69, pl. 7: figs. 83–84.]

MATERIAL EXAMINED.—PUERTO RICO. Mayaguez Harbor, Custom House, 13 m, sticky mud, *Fish Hawk* sta 6059, 19 Jan 1899, 2 syntypes of *P. oculea* (USNM 15961). Puerto Rico, 16 m, mud, 1963, N. Hulings and D. Feray, collectors, 1 specimen (USNM 42953). Guayanilla, 18°59′N, 66°46′W, 13 m, 13 Oct 1977, P. Yoshioka, collector, 1 specimen (USNM 55638).

TRINIDAD. Caroni swamp, dredged in mud bank, P.R. Bacon, collector, 19 Aug 1965, 1 specimen (USNM 53154). Port of Spain Roadstead, 7–9 m, thin mud, C. Crossland, collector, 1923–1924, 5 specimens (BMNH 1928.9.14.19–29; USNM 79924, identified by C. Monro).

EQUADOR. Cape San Francisco, 27 m, muck, *Velero* sta 216–34, 11 Feb 1934, 1 specimen (AHF, identified by O. Hartman).

GULF OF CALIFORNIA. 24°18′N, 110°22′W, 48 m, *Albatross* sta 2823, 30 Apr 1888, 1 specimen (USNM 50714). Choya, Mexico, 12 Apr 1968, G. Avery, collector, 1 specimen (USNM 50715).

PANAMA (Pacific). Taboga, Panama Bay, about 18 m, mud, Th. Mortensen, collector, 10 Dec 1915, 1 specimen (BMNH 1928.9.13.57–58, identified by C. Monro). Farfan Beach, sieving on slope of Canal Channel, sta 134-2, 6 Apr 1973, M.L. Jones, collector, 2 specimens (USNM 71504). West of Canal Channel, SW of Changame Island and between Cocoviceta Rock and Bruga Point, 08°53′N, 79°33′W, 4 m, mud, sta 150-A and C, 19 Apr 1973, M.L. Jones, 4 specimens (USNM 50716, 71505). Between Cocovi and Tortola Islands, 08°51′N, 79°35′W, sta 161-4, 9 Nov 1973, M.L. Jones, 1 specimen (USNM 71506).

TYPE MATERIAL.—The syntypes of *Panthalis oculea*, collected from 2 *Fish Hawk* stations in Puerto Rico, consist of a mixture of 3 species: 2 of 3 specimens from sta 6059 agree with the description of *P. oculea*, the third is referred to *Polyodontes frons;* of the 3 specimens from sta 6063, one is referred to *P. frons* and the other 2 specimens to *Acoetes pleei*.

The 2 syntypes of *P. oculea* are anterior fragments of 25 and 26 segments, 8 and 10 mm long, 5 and 7 mm wide with setae, respectively; the pharynx was completely extended on one of the two. A complete specimen from Puerto Rico (USNM 55638) with 78 segments is 45 mm long, 9 mm wide with setae.

Based on material from Trinidad and Panama, Monro (1928:572–575, figs. 25–30) supplemented the deficient description by Treadwell and referred the species to *Polyodontes*. The largest complete specimen from Trinidad (USNM 53154), with 95 segments, is 50 mm long and 10 mm wide. The largest specimen from Panama (BMNH 1928.9.13.57–58) is incomplete with 74 segments, 46 mm long and 9 mm wide.

DESCRIPTION.—Elytra moderately large, oval, nearly covering dorsum, some with lateral pouch; surface areolate, with brown or black pigmentation concentrated along medial and posterior borders (Figure 92B–E).

Prostomium bilobed, with globular ommatophores and short necks; median antenna with oval ceratophore on middle of prostomium, with lateral papillae, continuing posteriorly as slightly raised ridge, with style short, tapering and extending slightly beyond ommatophores; posterior pair of small eyes lateral to ceratophore of median antenna; lateral antennae inserted ventral to ommatophores, similar to median antenna, with only tips visible dorsally; palps long, tapered, with minute papillae, flecked with transverse pigmented bands (Figure 92A; Treadwell, 1901, fig. 14; C. Monro, 1928, fig. 25). Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with papillae on inner side, 2 acicula, few setae, and pair of dorsal and ventral tentacular cirri, similar to and slightly longer than median antenna (Figure 92A; C. Monro, 1928, fig. 25).

Second segment with first pair of elytrophores, ventral buccal cirri much longer than following ventral cirri, and biramous parapodia; notopodium digitiform acicular lobe with bundle of long finely spinous capillary notosetae; neuropodium wide, with presetal acicular lobe bifid, postsetal lobe fringed distally, with free oval lamellar bract on upper posterior side, neurosetae numerous, slender, wider basally, finely spinous, tapering to capillary tips (Figure 92A,F–H; C. Monro, 1928, fig. 26; Hartman, 1939b, pl. 24: fig. 294). Distal border of extended pharynx with 13 pairs of border papillae, middorsal and midventral ones on wide lobulated bases, middorsal one much longer than others, midventral one somewhat shorter than middorsal; 2 pairs of hooked jaws each with 4–8 lateral teeth.

Third segment with first pair of dorsal cirri with short cirrophores and styles extending to tips of setae; notopodium and notosetae similar to those of segment 2; neuropodium truncate with prominent ventral bract; middle neurosetae stout, smooth, tapering rather abruptly to sharp tips (Figure 92A,I,J). Parapodia of segments 3–8 with small notopodia and few notosetae; neuropodia similar to those of following segments (Figure 92K; C. Monro, 1928, fig. 27).

Beginning with segment 9, notopodium wide, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning gland and short row of notosetae emanating from underside of notopodium; neuropodium with slightly bilobed presetal acicular lobe, truncate postsetal lobe and anteroventral bract; lower group of neurosetae, within anteroventral bract, slender, curved, with larger spines on basal

enlarged part, close-set spinous rows on tapering slender tips; middle stout acicular neurosetae with sharp tips; upper group of neurosetae, emanating from low anterodorsal bract hidden by notopodium, of 2 types: (a) longer, lanceolate, finely spinous; (b) shorter, more slender, with widely spaced spines and sharp tips (Figure 92L–O).

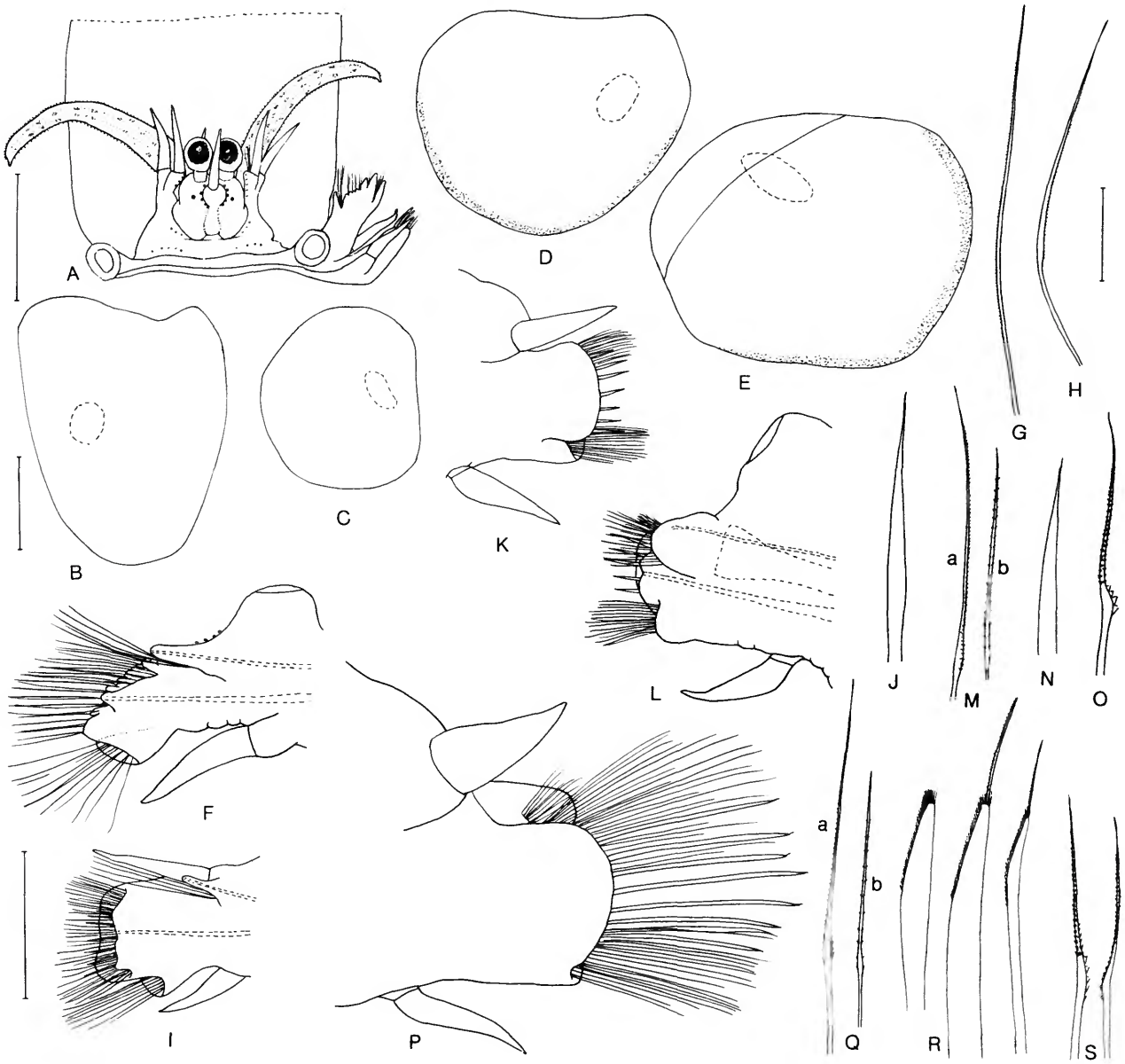

FIGURE 92.—*Polyodontes oculeus*, syntype of *Panthalis oculea* (USNM 15961): A, dorsal view of anterior end, pharynx fully extended (only basal part shown, left side only partially shown); B, left 1st elytron fro m segment 2; C, right 2nd elytron from segment 4; D, right 5th elytron from segment 9; E, left 9th elytron from segment 17; F, right elytragerous parapodium from segment 2, anterior view, acicula dotted; G, notoseta from same; H, neuroseta from same; I, right cirrigerous parapodium from segment 3, anterior view, acicula dotted (tips of stout neurosetae mostly broken); J, middle neuroseta from same; K, right cirrigerous parapodium from segment 8, posterior view; L, right elytragerous parapodium from segm ent 9, anterior view, acicula and spinning gland dotted; M–O, upper, middle, and lower neurosetae from same; P, right cirrigerous parapodium from segment 20, posterior view; Q–S, upper, middle, and lower neurosetae from same. (Scales: A = 1.0 mm; B–E and F,I,K,L,P = 0.5 mm; G,H,J,M–O,Q–S = 0.1 mm.)

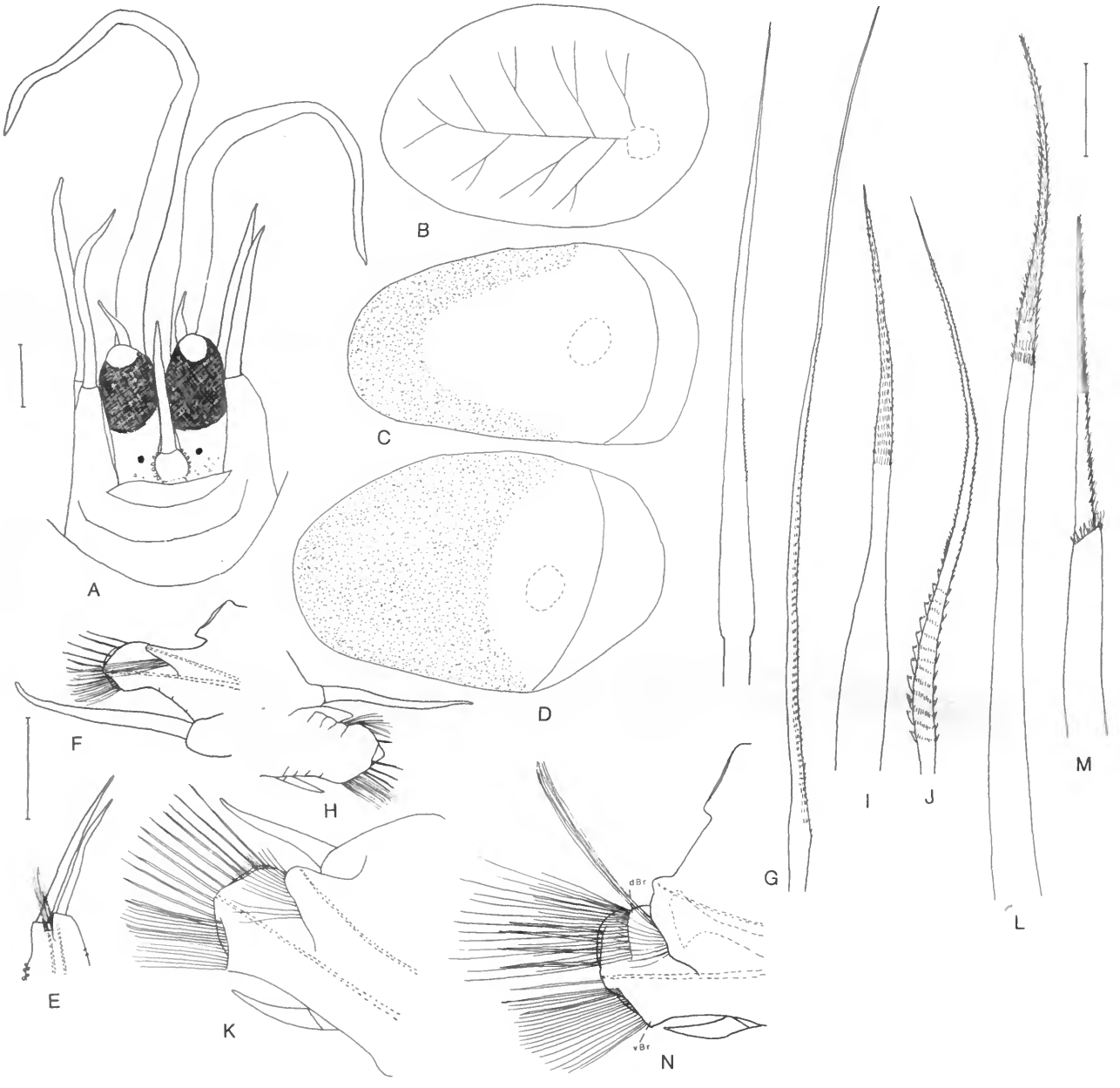

FIGURE 93.—*Polyodontes texanus*, holotype (USNM 98807): A, dorsal view of prostomium and tentacular segment; B, right 1st elytron from segment 2, showing "veins"; C, right 13th elytron from segment 25; D, rig ht 22nd elytron from segment 43; E, right tentaculophore with dorsal and ventral tentacular cirri, inner view, acicula dotted; F, right elytragerous parapodium from segment 2, anterior view, acicula dotted; G, middle and lower neurosetae from same; H, ri ght cirrigerous parapodium from segment 3, posterior view; I,J, middle and lower neurosetae from same; K, right cirrigerous parapodium from segment 8, anterior view, acicula dotted; L,M, upper and middle neurosetae from same; N, right elytragerous parapo dium from segment 9, anterior view, acicula and spinning gland dotted, some spinning fibers exposed. (Scales: A = 1.0 mm; B–F,H,K,N = 2.0 mm; G,I,J,L,M = 0.1 mm.)

Middle parapodia becoming larger, with more numerous neurosetae of same types except middle stout acicular neurosetae with or without aristae, with distal spines and spinous rows along one side; dorsal cirri with cirrophores inflated and with styles wide, short; ventral cirri short, subulate (Figure 92P–S; Treadwell, 1901, figs. 15–18; C. Monro, 1928, figs. 28–30; Hartman, 1939b, pl. 24: figs. 295, 297–299). Branchiae in form of small bladder-like structures on dorsal side of parapodia, beginning about segment 20, absent on specimens with integument very delicate and transparent.

DISTRIBUTION.—Caribbean, Panama (Pacific), Gulf of California, Ecuador. In low water to 48 meters.

Polyodontes texanus, new species

FIGURES 93, 94

MATERIAL EXAMINED.—GULF OF MEXICO. Northwestern part, 27°50′N, 95°12.5′W, 183 m, *Alaminos* sta 68A 13–17, 19 Nov 1968, L.H. Pequegnat, holotype (USNM 98807).

DESCRIPTION.—Holotype incomplete, with 49 segments, 112 mm long, 34 mm wide with setae. Dorsum rusty brown, also brownish on upper, lateral, and lower lips of mouth, enclosed in segments 3–7. Elytra oval, with eccentric attachment on lateral sides, leaving middorsum uncovered; reddish brown on medial part and with shallow lateral pockets on more posterior elytra (Figure 93B–D).

Prostomium and tentacular segment pulled back into anterior segments and enclosed in parapodia of segment 2. Prostomium bilobed, with large black oval ommatophores occupying anterior border, with white domes on tips, without distinct necks; median antenna with oval ceratophore, papillate laterally, with style extending slightly beyond tips of ommatophores; posterior pair of small eyes lateral to ceratophore, plus some extra pigment spots; lateral antennae inserted ventrally on bases of ommatophores, with tips extending slightly beyond ommatophores; palps long, tapered, smooth (Figure 93A). Tentacular segment distinct dorsally; tentaculophores lateral to prostomium, each with 2 acicula, 2 groups of capillary setae and pair of dorsal and ventral tentacular cirri, ventral cirri slightly longer than dorsal ones (Figure 93A,E).

Second segment with first pair of elytrophores, ventral buccal cirri much longer than following ventral cirri, and biramous parapodia; notopodium short digitiform lobe with bundle of long capillary notosetae; neuropodium larger, with rounded presetal acicular and postsetal lobes, upper and middle neurosetae stouter, tapering to fine tips; lower neurosetae more slender (Figure 93F,G). Pharynx not extended and not examined.

Third segment with first pair of dorsal cirri with short cirrophores and tapering styles extending beyond setae; notopodium and notosetae similar to those of segment 2; upper and middle neurosetae stout, tapering to spinous tips; lower neurosetae more slender, curved, with larger spinous rows more basally and close-set spinous rows on tapering tips, similar to lower neurosetae of following segments (Figure 93H–J).

Parapodia of segments 4–8 becoming larger, with stout neurosetae changing gradually, becoming smooth basally, and forming transitional aristae distally (Figure 93K–M). Beginning with segment 9, notopodium wide, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning gland, and short row of notosetae emerging from lower side of notopodium; neuropodium with presetal acicular and postsetal lobes and more or less distinct anteroventral bract; lower neurosetae numerous, within anteroventral bract, similar to more anterior parapodia; middle row of stout smooth acicular neurosetae with spinous aristae; upper group of neurosetae, emerging from low dorsoanterior bract, hidden by notopodium, of 2 types: (a) wider basally, with long spinous tips; (b) shorter, slender, with widely spaced spines (Figures 93N, 94C–E).

Middle parapodia becoming larger, with more numerous neurosetae of same types; dorsal cirri with inflated cirrophores and short, wide styles extending to tips of neuropodia (Figure 94A–H). Numerous round branchiae on anterior, dorsal and posterior sides of parapodia, beginning on segment 10 and continuing to about segment 36; ventrally, bulbous extensions between ventral cirri and bases of parapodia, beginning on about segment 10 (Figure 94A,B,F,G).

ETYMOLOGY.—The species is named for the collection site, off Texas.

DISTRIBUTION.—Gulf of Mexico. In 183 meters.

REMARKS.—*Polyodontes texanus*, new species, is closest to *P. maxillosus* (Ranzani). They may be separated according to the Key to the Species of *Polyodontes*.

Polyodontes frankenbergi, new species

FIGURES 95, 96

MATERIAL EXAMINED.—NORTH ATLANTIC, OFF GEORGIA. About 35 miles (56 km) off Sapelo Island, 31°20′N, 80°48′W, 18 m, 21 Oct 1964, D. Frankenberg, paratype (USNM 50705). R/V *Pierce*, 1977: 31°53′N, 80°46′W, 12 m, sta 4B, 25 Aug, paratype (USNM 61001); 31°45′N, 80°28′W, 16 m, sta 4C, 25 Aug, 2 paratypes (USNM 61009); 31°12′N, 81°08′W, 11 m, sta 5B, 21 Feb, paratype (USNM 61033); 31°08′N, 80°50′W, 14 m, sta 5C, 16 May, holotype (USNM 61052) and 31 Aug, 3 paratypes (USNM 61053–61055).

DESCRIPTION.—Specimens all incomplete posteriorly, holotype (USNM 61052) with 60 segments, 38 mm long, and 7 mm wide with setae. Middorsum of anterior region darker. Anterior few pairs of elytra covering dorsum, rest leaving middorsum uncovered. Elytra oval, first pair with scattered dark spots, with small closely packed areolae on most of elytra, with lateral pockets on more posterior elytra (Figure 95B–G).

Prostomium bilobed, with pair of large black oval ommatophores and short narrower necks occupying anterior border,

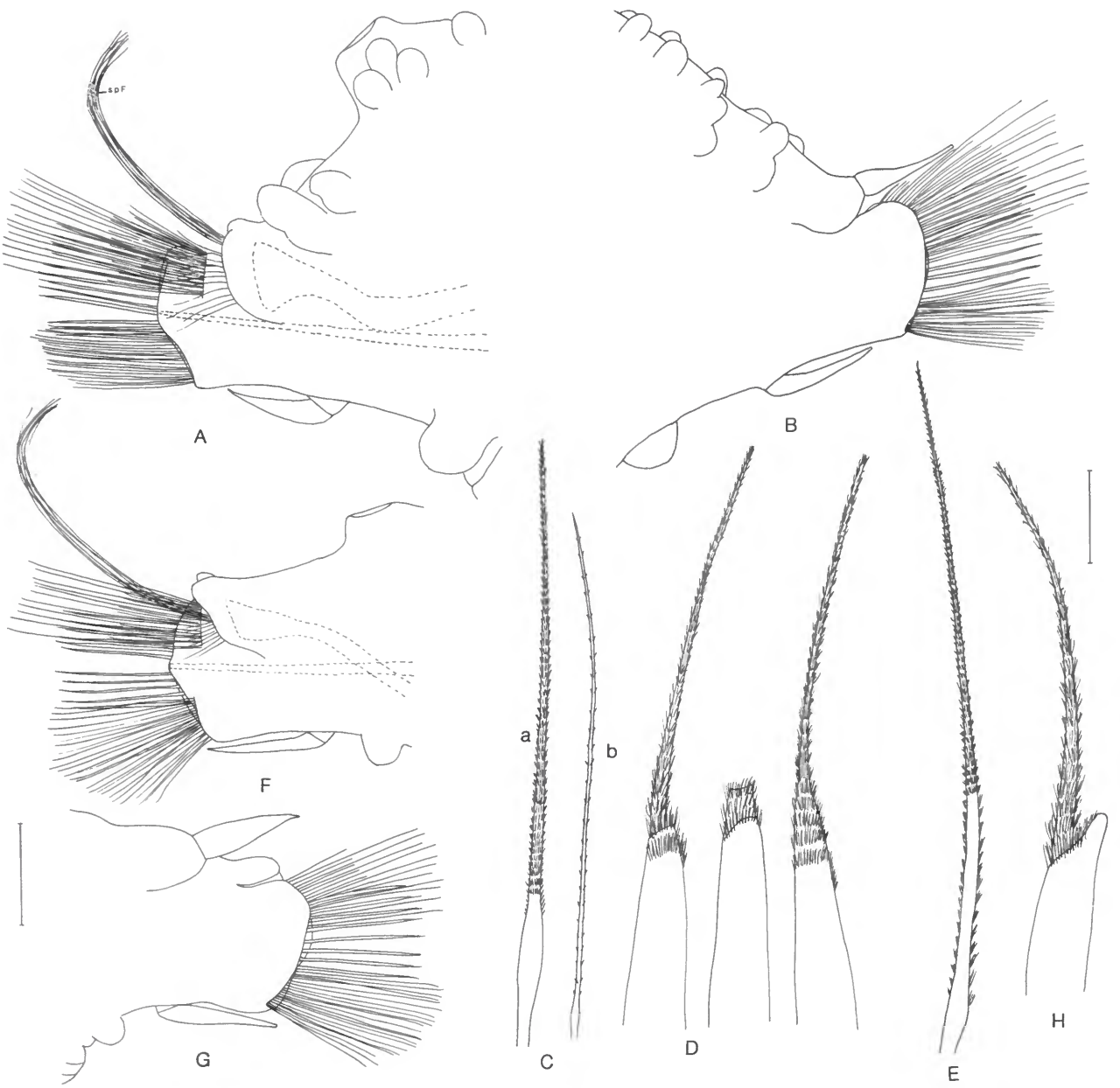

FIGURE 94.—*Polyodontes texanus*, holotype (USNM 98807): A, right elytragerous parapodium from segment 25, anterior view, neuroaciculum and spinning gland dotted, some spinning fibers exposed; B, right cirrigerous parapod ium from segment 26, posterior view; C–E, upper, middle, and lower neurosetae from same; F, right elytragerous parapodium from segment 43, anterior view, neuroaciculum and spinning gland dotted, some spinning fibers exposed; G, right cirrigerous para podium from segment 44, posterior view; H, middle neuroseta from same. (Scales: A,B,F,G = 2.0 mm; C–E,H = 0.1 mm.)

with white domes on tips; median antenna with oval ceratophore on middle of prostomium and lateral papillae, extending posteriorly as raised ridge, with short subulate style not extending beyond ommatophores; pair of small eyespots lateral to ceratophore; lateral antennae inserted ventral to ommatophores and extending only slightly beyond or sometimes hidden from view; palps long, stout, tapered, smooth, about 3 times longer than prostomium (Figure 95A). Tentacular segment distinct dorsally, with raised medial part and few lateral papillae; tentaculophores lateral to prostomium, each

FIGURE 95.—*Polyodontes frankenbergi,* holotype (USNM 61052): A, dorsal view of anterior end; B, right 1st elytron from segment 2; C, right 2nd elytron from segment 4; D, right 3rd elytron from segment 5; E, right 5th ely tron from segment 9; F, right 13th elytron from segment 25; G, right elytron from segment 59; H, right tentaculophore with dorsal and ventral tentacular cirri, inner view, acicula dotted; I, right elytragerous parapodium from segment 2, anterior view, ac icula dotted; J, middle and 2 lower neurosetae from same; K, right cirrigerous parapodium from segment 3, posterior view; L,M, upper and middle neurosetae from same. (Scales: A = 1.0 mm; B–I,K = 0.5 mm; J,L,M = 0.1 mm.)

with few papillae on dorsal side, 2 acicula, few capillary setae, and pair of short dorsal and ventral tentacular cirri, similar to median antenna (Figure 95A,H).

Second segment with first pair of elytrophores, ventral buccal cirri much longer than following ventral cirri, and biramous parapodia; notopodium conical acicular lobe on

anterodorsal side of larger neuropodium, with bundle of long capillary notosetae; neuropodium with rounded presetal acicular and postsetal lobes and prominent lower bract; neurosetae both long and short, slender, wider basally, tapering to finely spinous slender tips (Figure 95I,J). Extended pharynx with 13 pairs of border papillae, middorsal and midventral ones longer than others; 2 pairs of hooked jaws, each with 3–5 lateral teeth. Third segment with first pair of dorsal cirri, with short cirrophores and styles extending slightly beyond setae; middle neurosetae stout, acicular, aristate (Figure 95K–M). Parapodia of segments 4–8 becoming larger, with few, short notosetae; lower neurosetae numerous, within prominent anteroventral bract, with prominent spines on basal enlarged part and close-set spinous rows on tapering curved distal part; middle row of stout acicular aristate neurosetae; upper few neurosetae slender, lanceolate, spinous (Figure 96A–D).

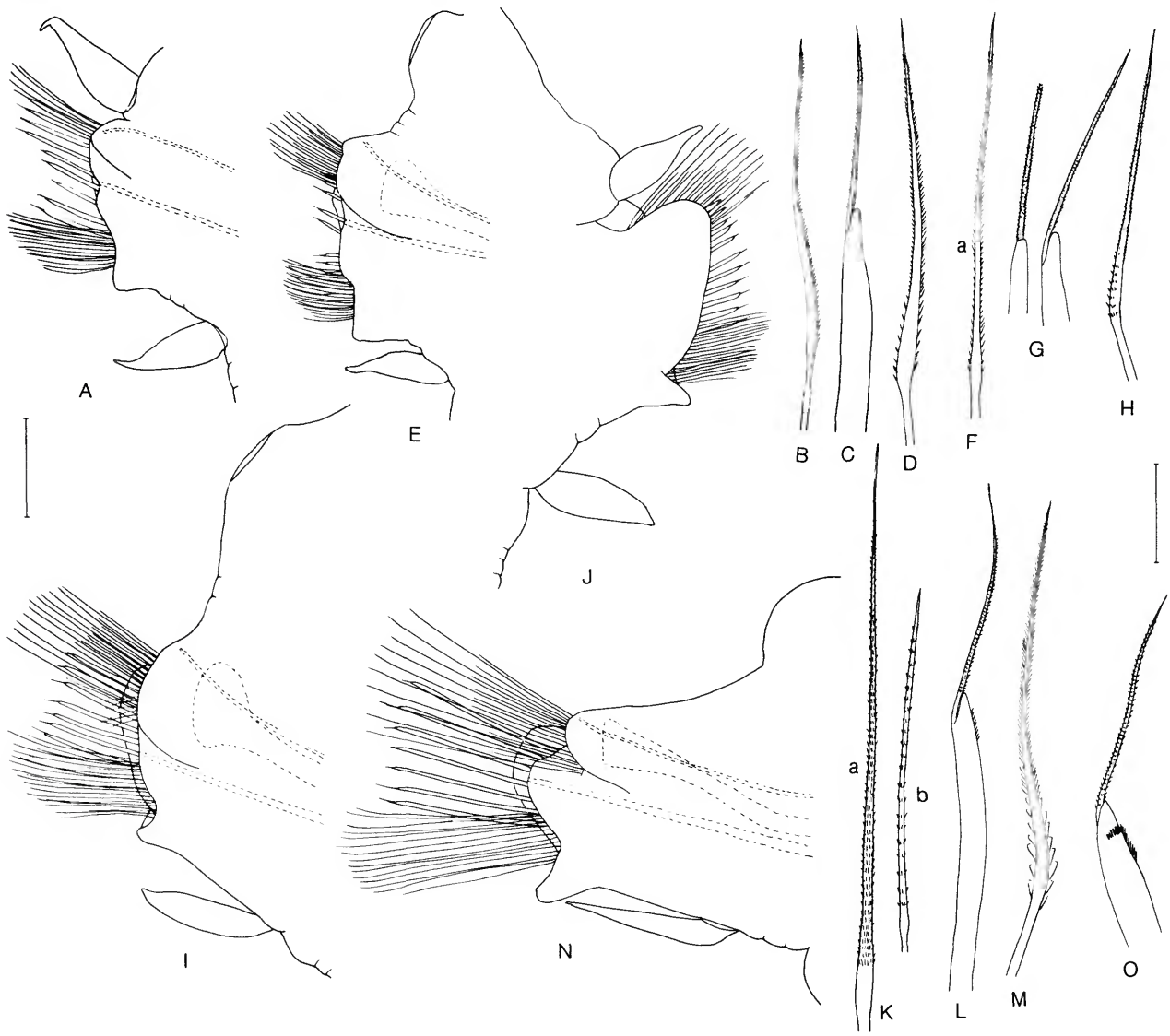

FIGURE 96.—*Polyodontes frankenbergi*, holotype (USNM 61052): A, right cirrigerous parapodium from segment 8, anterior view, acicula dotted; B–D, upper, middle, and lower neurosetae from same; E, right elytragerous pa rapodium from segment 9, anterior view, acicula and spinning gland dotted; F–H, upper, middle, and lower neurosetae from same; I, right elytragerous parapodium from segment 25, anterior view, acicula and spinning gland dotted; J, right cirrigerous pa rapodium from segment 26, posterior view; K–M, upper, middle, and lower neurosetae from same; N, right elytragerous parapodium from segment 59, anterior view, acicula and spinning gland dotted; O, middle neuroseta from same. (Scales: A,E,I,J,N = 0.5 mm; B–D,F–H,K–M,O = 0.1 mm.)

Beginning with segment 9, notopodium wide, rounded, flattened, on anterodorsal half of larger neuropodium, with notoaciculum, spinning gland, and small bundle of short capillary notosetae on lower side; lower and middle neurosetae similar to those of more anterior parapodia; upper group of neurosetae of 2 types: (a) longer, stouter, with close-set spinous rows and slender tips; (b) shorter, more slender, with fewer, widely spaced spinous rows and tapered tips (Figure 96E–H,K).

Middle parapodia becoming larger, with more numerous neurosetae of same types; neuropodia with especially prominent anteroventral bracts enclosing lower group of neurosetae; dorsal cirri with inflated cirrophores and short, subulate styles about as long as ventral cirri; middle acicular neurosetae of more posterior segments with subdistal spines on one side (Figure 96I–O). Without distinct branchiae.

ETYMOLOGY.—The species is named for Dirk Frankenberg, one of the collectors of the new species.

DISTRIBUTION.—North Atlantic off Georgia. In 11–16 meters.

REMARKS.—*Polyodontes frankenbergi* is closest to *P. panamensis* (Chamberlin). They may be separated according to the key to the species of *Polyodontes*.

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