

Contribution to
the Polychaete Family
Pholoidae Kinberg

MARIAN H. PETTIBONE

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ABSTRACT

Pettibone, Marian H. Contribution to the Polychaete Family Pholoidae Kinberg. *Smithsonian Contributions to Zoology*, number 532, 24 pages, 12 figures, 1992.—The family Pholoidae is reviewed and revised, based on reexamination of type material and published records, as well as on examination of new material. Two of the numerous species of *Pholoe* Johnston, 1839, are redescribed; four additional species of *Pholoe* and Genus A of Wolf, 1984a, are referred to three new genera; and two new interstitial species from New Zealand are described in one of the genera. *Pholoides* Pruvot, 1895 (including *Peisidice* Johnson, 1897, *Pareupholoe* Hartmann-Schröder, 1962, and *Parapholoe* Hartmann-Schröder, 1965), includes three species (and three synonyms). The aberrant neotenic *Metaxyssamma uebelackerae* Wolf, 1986, is removed from the family Sigalionidae and added to the Pholoidae, based on its close relationship to *Pholoe*. Unusual types of reproduction are described in the small interstitial species. They have relatively few large eggs developing in the body and within the elytra (viviparity) or with eggs and juveniles brooded under the elytra.

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Contribution to the Polychaete Family Pholoidae Kinberg

Marian H. Pettibone

Introduction

As part of a long-term study of aphroditoid species, some species referred to *Pholoe* Johnston, 1839, were found to be separable into four generic groups, which include three new genera. New genera added are: *Imajimapholoe*, for *Pholoe parva* Imajima and Hartman, 1964; *Laubierpholoe*, for *Pholoe antipoda* Hartman, 1967, *Pholoe swedmarki* Laubier, 1975, and two new species, *L. maryae* and *L. riseri*; and *Taylorpholoe*, for *Pholoe minuta hirsuta* Rullier and Amoureux, 1979. For comparison with the new genera, a diagnosis of *Pholoe* is provided and two of the numerous species are redescribed: *P. longa* (O.F. Müller, 1776) and *P. polymorpha* (Hartmann-Schröder, 1962). The aberrant, neotenic *Metaxypsamma uebelackerae* Wolf, 1986, originally placed in the Sigalionidae, is added to the Pholoidae, since it is close to *Pholoe*, except for having rudimentary elytra and lacking notopodia, and is similar to the larval stages of *Pholoe*, as shown by Cazaux (1968). The genus *Pholoides* Pruvot, 1895 (including *Peisidice* Johnson, 1897), represented by *P. dorsipapillatus* (Marenzeller, 1893), *P. asperus* (Johnson, 1897), and *P. mendeleevi* (Averincev, 1978), new combination, are retained in Pholoidae.

Small, interstitial species show unusual types of reproduction that were first reported for the interstitial polychaete *Pholoe swedmarki* by Laubier (1975). These include very few, large, yolky eggs; internal fertilization; and passage through the

elytrophores into the elytra, where gestation and development into embryos and juveniles take place (viviparity). Similar forms of reproduction were observed on specimens of *Pholoe antipoda* Hartman and two new species from New Zealand. All four interstitial species are referred herein to *Laubierpholoe*, new genus. A second unusual type of reproduction is shown by *Pholoe minuta hirsuta*, which broods its young under the elytra, as first noted by Wolf (1986). This taxon is raised to full species status and herein referred to the new genus *Taylorpholoe*.

The genera and species included herein in the Pholoidae Kinberg, 1858, have been variously placed under Sigalionidae Kinberg, 1856; Acoetidae Kinberg, 1858; Peisidicinae Darboux, 1900; Polyodontidae (Acoetidae) Augener, 1918; Peisidicidae Hartman and Fauchald, 1971; and Pholoididae Fauchald, 1977. In her Catalogue of the Polychaeta, Hartman (1959:112, 117) used Polyodontidae for *Peisidice* Johnson, 1897, and Sigalionidae for *Pholoe* Johnston, 1839, in which she included *Pholoides* Pruvot, 1895. In his review of the Polychaete Worms, Fauchald (1977:66, 70) used Pholoididae, based on *Pholoides* Pruvot, 1895, as a new name for Peisidicidae Darboux, 1900, in which he also included *Parapholoe* Hartmann-Schröder, 1965, and included *Pholoe* Johnston, 1839, in Sigalionidae Kinberg, 1856. In her Synopsis of the Polychaeta, Pettibone (1982:14) included two genera in the family Pholoidae Kinberg, 1858: *Pholoe* Johnston, 1839, and *Pholoides* Pruvot, 1895 (including *Peisidice* Johnson, 1897). *Pareupholoe* Hartmann-Schröder, 1962, and *Parapholoe* Hartmann-Schröder, 1965, are included herein under *Pholoides*. The latter arrangement, with the addition of three new genera indicated above and *Metaxypsamma* Wolf, 1986, is followed herein for the family.

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Reviewer: James Blake, Science Applications International Corp., Woods Hole, Massachusetts.

ABBREVIATIONS USED IN THE FIGURES

acL	acicular lobe
anC	anal cirrus
buC	buccal cirrus
dTc	dorsal tentacular cirrus
dTu	dorsal tubercle
el	elytron
elph	elytrophore
fr pa	frontal papilla
fTu	facial tubercle
lAn	lateral antenna
mAn	median antenna
no st	notopodial stylode
pa	palp
pap	papilla
tC	tentacular cirrus
uL	upper lip
vC	ventral cirrus
vTc	ventral tentacular cirrus

ACKNOWLEDGMENTS.—In addition to the collections in the Smithsonian Institution (USNM), material was obtained on loan or in exchange from the following sources: the former Allan Hancock Foundation, Los Angeles, now combined with the Natural History Museum of Los Angeles County (LACM-AHF), through S.J. Williams; the former British Museum (Natural History), London (BMNH) now renamed the Natural History Museum, London, through J.D. George and A.I. Muir; Muséum National d'Histoire Naturelle, Paris (MNHN), through J. Renaud-Mornant; Naturhistoriska Riksmuseet, Stockholm (NRS), through R. Oleröd; Zoological Museum, University of Copenhagen (ZMUC), through J.B. Kirkegaard and M.E. Petersen; Zoologisches Staatsmuseum, Hamburg

(ZMH), through G. Hartmann-Schröder. I am indebted to the above mentioned people for their cooperation and help and for allowing me to examine the material upon which this study is based. I particularly wish to thank Mary E. Petersen for her constructive help and advice, and Thomas H. Perkins for his careful review of the manuscript.

Family PHOLOIDAE Kinberg, 1858

PHOLOIDEA Kinberg, 1858:1 [corrected to Pholoidae by Pettibone, 1982:14].
 PEISIDICINAE Darboux, 1900:116.
 PEISIDICIDAE Hartman and Fauchald, 1971:28.
 PHOLOIDIDAE Fauchald, 1977:8, 66.

Members of the Pholoidae are small, with segments relatively few to moderate in number (19–90). The body is flattened, the dorsal surface with or without scattered adhesive tubercles and the ventral surface with or without papillae. The elytra are attached on nodular elytrophores on segments 2, 4, 5, 7, continuing on alternate segments to 23, then on every segment or continuing on alternate segments to the end of the body; or, instead of elytra, nodular lobes with few long papillae in similar position and distribution to that of the elytra (in the aberrant neotenic *Metaxyssamma*). The elytra are soft and delicate, with surface and marginal papillae, or stiff and rigid with concentric rings, and fringe of marginal papillae, the elytra covering the dorsum or leaving the middorsum uncovered. Dorsal tubercles are prominent and nodular, present on segments lacking elytra. Dorsal cirri and branchiae are lacking.

The prostomium is rounded, fused to the first or tentacular segment, and withdrawn into the anterior few segments; it bears a median antenna arising anteriorly or occipitally, with or without small or rudimentary lateral antennae, and usually has two pairs of eyes; the tentaculophores are lateral and anterior to the prostomium, with or without setae, and with one to two

COMPARISON WITH SIGALIONIDAE

The Pholoidae can be separated from the Sigalionidae in the following characters:

	Pholoidae	Sigalionidae
Body:	short, subrectangular, with segments few to moderate in number (up to 90); crawling forms	long, narrow, slender, with segments numerous (up to 300); burrowing forms
Branchiae:	without branchiae	with ciliated branchiae attached to lateral sides of elytrophores and dorsal tubercles
Tentaculophores of segment I:	project anteriorly, medial to palps	project anteriorly, dorsal to palps
Neuropodia:	without basal bracts and distal stylodes	with basal bracts and distal stylodes
Compound neurosetae:	blades short, falcate	blades short and long, multiarticled, falcigers or spinigers

pairs of tentacular cirri, the paired palps emerge ventral and lateral to the tentaculophores; the tentacular segment forms the anterior lip of the mouth and is with or without a digitiform facial tubercle. The second or buccal segment bears the first pair of elytra, biramous parapodia (uniramous in *Metaxypsamma*), and long ventral buccal cirri, and forms the lateral and posterior lips of the mouth. The eversible muscular pharynx bears nine dorsal and nine ventral border papillae and two pairs of hooked jaws.

The parapodia are biramous and supported by acicula (uniramous and with single neuroaciculum in *Metaxypsamma*). The notopodia are in the form of a conical acicular lobe, with or without a subdistal bract or projecting stylodes; the notosetae form fan-shaped bundles of simple, finely spinose capillary

notosetae; the neuropodia are usually larger and form a conical acicular lobe, with or without distal papillae. The neurosetae are stouter than the notosetae and compound, with the shafts smooth or spinose subdistally and blades short, falcate, and unidentate. The ventral cirri are short and tapered. The pygidium is small, with a pair of anal cirri.

The larvae of some pholoids may have a long planktonic existence, with planktotrophic or lecithotrophic development. Some of the interstitial species have relatively few, large eggs, with development of the embryos and juveniles in the body and within the elytra (viviparity) or under the elytra (brood care). The pholoids are crawling forms, found under rocks, in crevices, and on mud bottoms with shells and debris. Some are interstitial. They are found from the intertidal zone to great depths and are widely distributed.

Key to the Genera of Pholoidae

1. Prostomium subrectangular, with ceratophore of median antenna on anterior border, without lateral antennae; tentaculophores of segment 1 with notosetae and single tentacular cirrus [Figures 8A, 9A, 10A]. (Parapodia biramous [Figures 8F, 10I,]. Middorsum not covered by elytra, with scattered adhesive tubercles [Figure 10A]. Elytra on segments 2, 4, 5, 7, continuing on alternate segments, thick, with concentric rings and numerous long border papillae [Figures 8B, 10M]. Segments up to 48.) *Pholoides* Pruvot
- Prostomium oval, bilobed, with median antenna, with or without lateral antennae; tentaculophores of segment 1 achaetous, with dorsal and ventral tentacular cirri [Figures 1A,C, 3A,B, 6A, 7C-E, 12A] 2
2. Prostomium with ceratophore of median antenna in anterior notch [Figures 1A,B, 3A, 12A] 3
- Prostomium with median antenna occipital, on posterior border [Figures 6A, 7C,D]. (Notosetae of single type, slightly curved [Figures 6F, 7K].) 5
3. Tentaculophores with long dorsal and very short ventral tentacular cirri [Figures 3A, 5A,C]. (Notosetae of single type, slightly curved or straight. Segments up to 29.) *Laubierpholoe*, new genus
- Tentaculophores with dorsal and ventral tentacular cirri subequal in length [Figures 1A,B, 12A] 4
4. Dorsum with elytophores and elytra on segments 2, 4, 5, 7, and continuing on alternate segments to 23, then on every segment [Figure 1A,H-J]. Parapodia biramous, with setigerous notopodia and neuropodia [Figure 1D,E]. Notosetae of 2 types: short, strongly bent; longer, slightly curved [Figure 1F]. Segments up to 90. *Pholoe* Johnston
- Dorsum without elytra but with paired nodular lobes, each with 2-4 long filiform papillae on segments 2, 4, 5, 7, and continuing on alternate segments [Figure 12A,C,D]. Parapodia uniramous, without notopodia or notosetae [Figure 12D]. (Aberrant, neotenic, interstitial pholoid. Segments up to 24.) *Metaxypsamma* Wolf
5. Middorsum with scattered adhesive tubercles [Figure 7C,D]. Elytra with long border papillae [Figure 7G]. Notopodium with conical acicular lobe and rounded posterior lobe with projecting stylode [Figure 7G]. Segments up to 19 *Taylorpholoe*, new genus
- Middorsum without scattered tubercles [Figure 6A]. Elytra with small papillae on border and surface [Figure 6C]. Notopodium without projecting stylode [Figure 6D]. Segments up to 34 *Imajimapholoe*, new genus

Genus *Pholoe* Johnston, 1839

Pholoe Johnston, 1839:437. [Type species: *Pholoe inornata* Johnston, 1839, by monotypy. Gender: feminine.]

DIAGNOSIS.—Body small, linear, segments moderate in number (up to 90). Elytra and elytophores on segments 2, 4, 5, 7, and continuing on alternate segments to 23, then on every segment to end of body. Dorsal tubercles on segments lacking elytra. Elytra delicate, with border and surface papillae. Without dorsal cirri and branchiae. Prostomium and first or tentacular segment fused; ventrally forming anterior lip of mouth, with projecting facial tubercle. Prostomium rounded, bilobed; median antenna on ceratophore in anterior notch, without auricles; with or without lateral antennae lateral to ceratophore; 2 pairs of eyes, sometimes fused or absent. Tentaculophores achaetous, lateral to prostomium, each with subequal dorsal and ventral tentacular cirri; stout palps emerging ventral and lateral to tentaculophores. Second or buccal segment forming lateral and posterior lips of mouth, with first pair of large elytophores and elytra, biramous parapodia, and long ventral buccal cirri. Eversible muscular pharynx with 9 dorsal and 9 ventral border papillae, and 2 pairs of jaws. Parapodia biramous; notopodial lobe conical, acicular, with subdistal bract on dorsal face, neuropodial lobe larger, conical, acicular, sometimes with distal papillae. Notosetae simple, slender, capillary, finely spinose, of 2 types: shorter, strongly bent (geniculate), and longer, slightly curved or straight. Neurosetae stouter than notosetae, compound, with shafts spinose subdistally and blades short, spinose, falcate, and unidentate. Ventral cirri short, tapered, on all segments. Pygidium with pair of anal cirri. Reproduction by pelagic planktotrophic larvae.

REMARKS.—*Pholoe inornata* Johnston, 1839, from Berwick Bay, northeastern England, was referred to *Pholoe minuta* (Fabricius, 1780) by Malmgren (1865:89), and the latter species has generally been considered to be the type species of the genus (Hartman, 1959:117). *Aphrodita longa* O.F. Müller, 1776, from Greenland (probably based on information, rather than specimens, sent to Müller by Fabricius, with a very brief description) was also referred to *P. minuta* by Malmgren and has generally been considered a widely distributed species. Based on translations of the descriptions by Fabricius (1780:313–314) of both *Aphrodita longa* and *A. minuta* Fabricius, 1780, combined with the study of Fabricius' unpublished notes (in Danish) and additional material from western Greenland, the type locality of both species, and study of the description and material from northeastern England, the type locality of *Pholoe inornata*, Mary E. Petersen (in litt.) is convinced that the three species are distinct. Specimens from western Greenland, identified as *Pholoe longa* (Fabricius) by M.E. Petersen (ZMUC), are described below as a representative species of *Pholoe*.

Pholoe longa (O.F. Müller, 1776)

FIGURE 1

Aphrodita longa O.F. Müller, 1776:218.—Fabricius, 1780:313.

Pholoe minuta.—Malmgren 1865:89, pl. 11: fig. 13 [part].—Wesenberg-Lund, 1950:31 [part; not *Aphrodita minuta* Fabricius, 1780.]

MATERIAL EXAMINED.—WESTERN GREENLAND: Jakobshavn, 64 m, clay, 6 Aug 1870, Öberg collector, 8 specimens (NRS 507; USNM 59928). Upernavik Island, 10–30 m, 5 Jul 1936, Chr. Vibe collector, 7 specimens (ZMUC; USNM 62044). North of Upernavik, 20–30 m, F. Johansen collector, 7 specimens (ZMUC). Godhavn, between Udkiggen and Kødøen, 50 m, coarse gravel with clay, 19 Jul 1977, J. Just collector, 50 specimens (ZMUC; USNM 62046). Godhavn, Lyngmarksbugt, 35–38 m, clay, mud, detritus, 28 Aug 1959, G. Høpner Petersen collector, 70 specimens (ZMUC; USNM 62045). Bredefjord, 10–15 m, mud with gravel and dead algae, 26 Aug 1912, Stephensen collector, 5 specimens (ZMUC; USNM 62043). Egedesminde, 20 Oct 1890, Bergendal collector, 50 specimens (ZMUC; USNM 62041); 1892, Traustedt collector, 40 specimens (USNM 62042). Nordre Stromfjord, about 18 miles from mouth, 21–41 m, clay, sand, 1911, V. Nordmann collector, 3 specimens (ZMUC).

DESCRIPTION.—Length up to 22 mm, width up to 3.5 mm, segments up to 70. Body of uniform width, tapering markedly at both ends, flattened dorsoventrally (Malmgren, 1865, pl. 11: fig. 13); ventral surface of body and parapodia with globular papillae. Elytra nearly covering dorsum but leaving middorsum uncovered (Malmgren, 1865, pl. 11: fig. 13). Dorsal tubercles nodular. Elytra oval to oblong, first pair with papillae along most of border and on surface; papillae on following elytra mostly confined to posterior and lateral borders, with some on surface; papillae distinctly annulated (Figure 1H,I); posterior elytra with papillae only slightly annulated (Figure 1J).

Prostomium and tentacular segment fused; prostomium oval, bilobed; large ceratophore of median antenna in anterior notch, with short style; anterior papillar extensions of prostomium, or lateral antennae, more or less hidden by ceratophore of median antenna; 2 pairs of closely approximated large eyes, with some scattered dark pigment between them; tentaculophores lateral to prostomium, each with subequal dorsal and ventral tentacular cirri, longer than median antenna, with scattered papillae; palps stout, extending ventral and lateral to tentaculophores; digitiform facial tubercle emerging medial to bases of tentaculophores; anterior lip of mouth papillate (Figure 1A–C; Malmgren, 1865, pl. 11: fig. 13A,A'). Second or buccal segment with first pair of bulbous elytophores, biramous parapodia, and long ventral buccal cirri, similar to tentacular cirri, with large cirrophores (Figure 1B,C).

Notopodia with subdistal bract enclosing conical acicular lobe, with some long, tapered papillae in diagonal row on

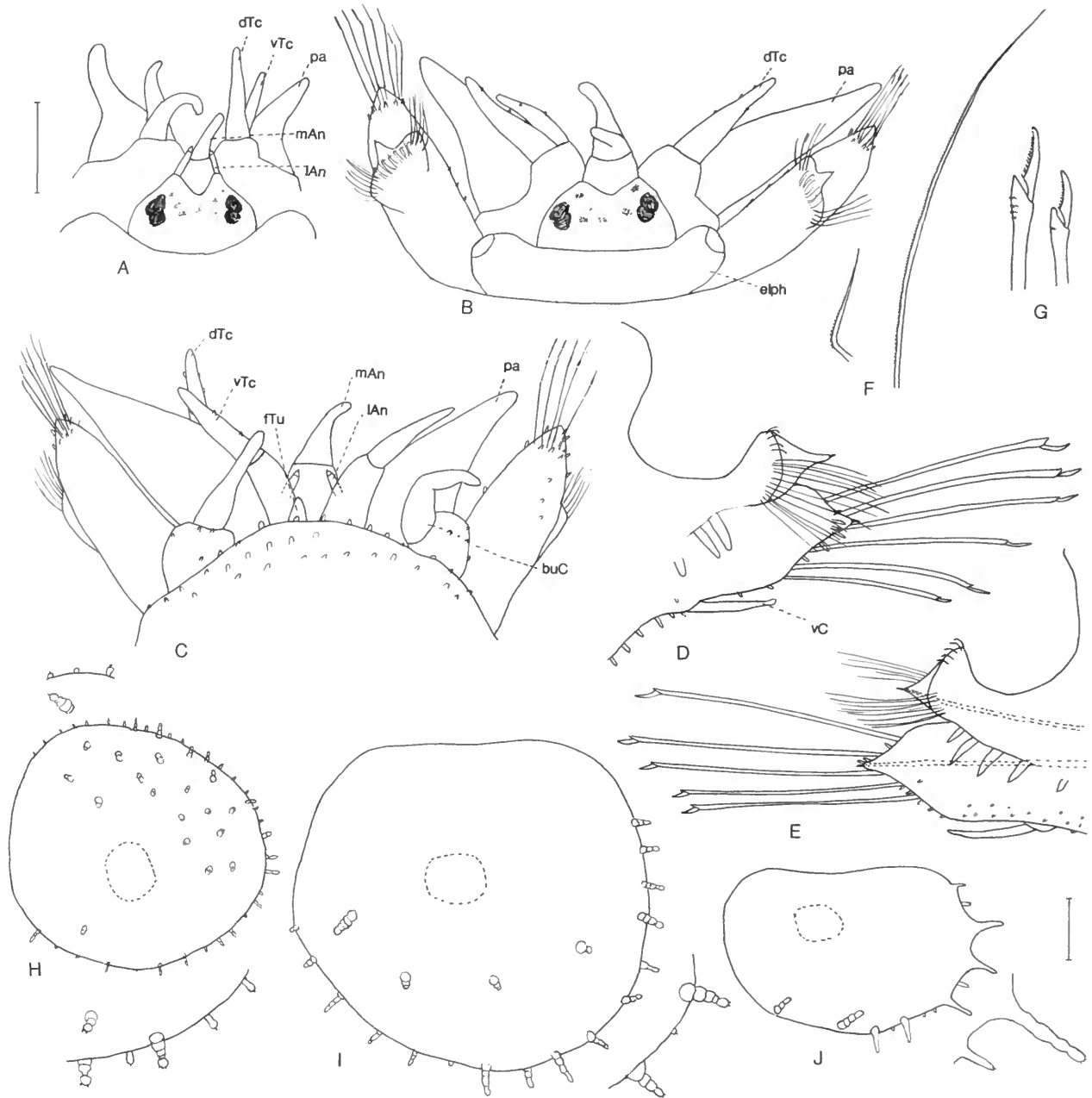


FIGURE 1.—*Pholoe longa*, Godhavn, West Greenland (USNM 62046): A, prostomium and tentacular segment, dorsal view, lateral antennae visible lateral to ceratophore of median antenna; B, dorsal view of anterior end, style of median antenna with extra branch, right ventral tentacular cirrus hidden from view; C, ventral view of anterior end of B, tips of lateral antennae and facial tubercle, between bases of tentaculophores, visible; D, right middle parapodium, anterior view; E, same, posterior view, acicula dotted; F, notosetae; G, upper and lower neurosetae; H, right 1st elytron from segment 2, with detail of papillae; I, right middle elytron, with detail of papillae; J, right posterior elytron, with detail of papillae. (Scales: A–G = 0.1 mm; H–J = 0.1 mm.)

anterior and posterior sides of neuropodium; neuropodia with conical acicular lobe with distal papillae and globular papillae on ventral side (Figure 1D,E). Notozetiae numerous, slender, finely spinose, of 2 types: dorsal group short, strongly bent, tapering abruptly to short capillary tips; ventral anterior and posterior groups longer, straight or slightly curved, tapering to capillary tips (Figure 1D-F; Malmgren, 1865, pl. 11: fig. 13Dr,r'). Neurosetae relatively few, compound, stouter than notozetiae, forming fan-shaped group; shafts with few spinose rows near distal tip; blades short, finely spinose, with entire, falcate tips; upper neurosetae with blades slightly longer than lower ones (Figure 1D,E,G; Malmgren, 1865, pl. 11: fig. 13Ds). Ventral cirri short, tapered (Figure 1D,E).

DISTRIBUTION.—Western Greenland, in 10–64 meters, on bottoms of gravel with clay, mud, sand, and detritus.

Pholoe polymorpha (Hartmann-Schröder, 1962)

FIGURE 2

Sthenelanelle polymorpha Hartmann-Schröder, 1962b:67, figs. 19–23 [part; not juveniles, not figs. 24, 25]; 1965:88.

Pholoe minuta.—Wesenberg-Lund, 1962:34 [not *Aphrodita minuta* Fabricius, 1780].

Pholoe antipoda Hartman, 1967:40 [part; sta 558, 969].

Pholoe polymorpha.—Orensanz, 1975:12.

MATERIAL EXAMINED.—CHILE: Mouth of Rio Andalien, medium sand, 10 Mar 1960, G. Hartmann collector, 8 paratypes (ZMH P-14074; USNM 60896). Seno Beloncari, 41°30'S, 42°58'W, tidal belt, Lund Univ. Chile Exp. sta M60, 29 Mar 1949, 1 specimen (ZMUC, as *P. minuta* by Wesenberg-Lund). Gulfo de Ancud, 41°49'S, 73°08'W, 45 m, sta M27, 31 May 1949, 2 specimens (ZMUC, as *P. minuta* by Wesenberg-Lund). Tierra del Fuego, 54°56'S, 65°03'W, 229–265 m, *Eltanin* sta 969, 10 Feb 1964, 1 specimen (USNM 55770, as *P. antipoda* by Hartman). Falkland Islands, 51°58'S, 56°38'W, 845–646 m, *Eltanin* sta 558, 14 Mar 1963, 1 specimen (USNM 55769, as *P. antipoda* by Hartman). Off Chile, 52°40'S, 74°58'W, 64 m, *Eltanin* sta 960, 6 Feb 1964, 2 specimens (USNM 126749).

DESCRIPTION.—Paratypes fragmented. Complete specimen from seno Beloncari (ZMUC) 5 mm long, 1.5 mm wide, 42 segments. Elytra oval to subrectangular, surface showing reticular pattern and some blackish pigmentation, with scattered short papillae on surface and longer, filamentous papillae on lateral border (Figure 2D,E; Hartmann-Schröder, 1962b, fig. 23a–c).

Prostomium and tentacular segment fused; prostomium oval, bilobed; ceratophore of median antenna bulbous, in anterior notch of prostomium, with short style; without lateral antennae; 2 pairs of closely approximated eyes; tentaculophores lateral and anterior to prostomium; subequal dorsal and ventral tentacular cirri, longer than median antenna, with scattered papillae; palps large, emerging ventral and lateral to tentaculophores; no facial tubercle observed (Figure 2A–C; Hartmann-

Schröder, 1962b, fig. 19). Second or buccal segment with first pair of bulbous elytraphores, biramous parapodia, and long ventral buccal cirri, similar to tentacular cirri (Figure 2A–C). Pharynx with 9 dorsal and 9 ventral border papillae and 2 pairs of hooked jaws.

Notopodia with subdistal bract encircling conical acicular lobe; neuropodia larger, each with conical presetal acicular lobe and shorter, rounded postsetal lobe; area between dorsal base of notopodium and elytraphore or dorsal tubercle ciliated (Figure 2F,G; Hartmann-Schröder, 1962b, fig. 20). Notozetiae numerous, simple, slender, of 2 types: dorsal group geniculate, with prominent spines and short capillary tips; anterior and posterior groups nearly straight, finely spinose, tapering to capillary tips (Figure 2H). Neurosetae stouter than notozetiae, compound; shafts with few distal spines; blades short, finely spinose, with tips falcate, entire; upper neurosetae with slightly longer blades (Figure 2I; Hartmann-Schröder, 1962b, fig. 22). Ventral cirri short, tapered, papillate (Figure 2F,G). Pygidium with pair of bottle-shaped anal cirri.

REMARKS.—Pettibone (1969:437) pointed out that the description of *S. polymorpha* did not agree with the diagnosis of *Sthenelanelle*. Orensanz (1975:12) referred the species to *Pholoe*. The small juveniles, mixed with the paratypes of *S. polymorpha*, are referred to *Pholoides* sp.

DISTRIBUTION.—South Pacific and South Atlantic, Chile, Tierra del Fuego, Falkland Islands, intertidal to 845 meters.

Laubierpholoe, new genus

TYPE SPECIES.—*Pholoe antipoda* Hartman, 1967.

DIAGNOSIS.—Body small, linear, with relatively few segments (up to 29). Elytra and elytraphores on segments 2, 4, 5, 7, continuing on alternate segments to 23, then on every segment to end of body. Dorsal tubercles on segments lacking elytra. Elytra delicate, with few short papillae on lateral border and on surface. Without dorsal cirri or branchiae. Prostomium and first or tentacular segment fused, ventrally forming anterior lip of mouth, without facial tubercle, with or without papillae. Prostomium rounded, bilobed; median antenna with ceratophore in anterior notch of prostomium; lateral antennae absent; with or without 2 pairs of eyes. Tentaculophores lateral to prostomium, achaetous, each with long dorsal and very short ventral tentacular cirrus; palps stout, very long, emerging ventral and lateral to tentaculophores. Second or buccal segment with first pair of large elytraphores and elytra, biramous parapodia, long ventral buccal cirri, and forming lateral and posterior lips of mouth. Muscular pharynx with 9 dorsal and 9 ventral border papillae and 2 pairs of jaws. Parapodia biramous; notopodial conical acicular lobe, without subdistal bract; neuropodial conical acicular lobe, without distal papillae. Notozetiae simple, slender, capillary, slightly curved and straight. Neurosetae stouter than notozetiae, compound, shafts with or without distal spinules; blades unidentate,

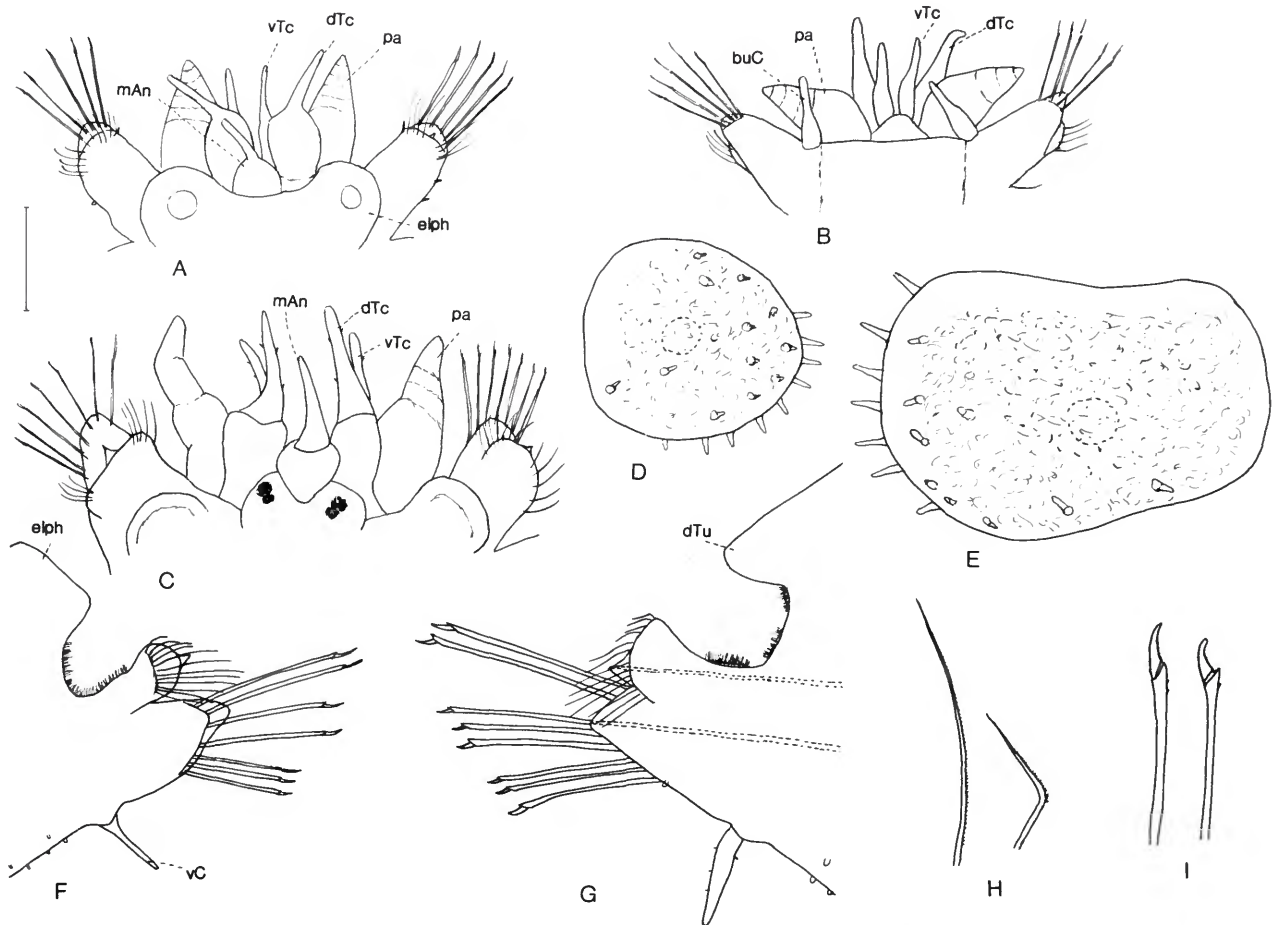


FIGURE 2.—*Pholoe polymorpha*, paratypes of *Sihenelanela polymorpha*, A,B (ZMH P-14074); C-I (USNM 60896): A, dorsal view of anterior end, prostomium and tentaculophores partially pulled back into segment 2; B, same, ventral view; C, dorsal view of anterior end; D, first right elytron from segment 2; E, left middle elytron; F, right elytrigerous parapodium, posterior view; G, right parapodium with dorsal tubercle, anterior view, acicula dotted; H, notosetae; I, upper and lower neurosetae. (Scale: A-I = 0.1 mm.)

falcate, or capillary. Ventral cirri short, tapering, on all segments. Pygidium with pair of anal cirri. Interstitial species with relatively few large eggs, and development of embryos and juveniles within elytra (viviparity).

ETYMOLOGY.—The genus is named for Lucian Laubier, who described the interstitial polychaete *Pholoe swedmarki*, with

developing young inside the elytra, and pointed out the differences from *Pholoe*. Gender: feminine.

REMARKS.—*Laubierpholoe* includes the following four species: *L. antipoda* (Hartman, 1967), new combination; *L. swedmarki* (Laubier, 1975), new combination; *L. maryae*, new species; and *L. riseri*, new species.

Key to the Species of *Laubierpholoe*

1. Bilobed prostomium rounded anteriorly, with small laterally projecting horns (Laubier, 1975, fig. 1A,B). Notopodia very small, with few (2-4) notosetae (Laubier, 1975, fig. 1A,B). (Prostomium with 2 pairs of eyes; style of median antenna shorter than dorsal tentacular cirri (Laubier, 1975, fig. 1A,B). Shafts of compound neurosetae spinose subdistally; blades short, falcate (Laubier, 1975, fig. 2D-F).) *L. swedmarki* (Laubier)

- Bilobed prostomium with anterior lobes projecting forward, lateral to ceratophore of median antenna [Figures 3A, 4A, 5A]. Notopodia well developed, with numerous notosetae [Figures 4C, 5D, 6D] 2
2. Notopodia smaller and shorter than neuropodia [Figure 3C]. Compound neurosetae all similar; shafts spinose subdistally; blades short, falcigerous [Figure 3E]. Anterior lip of mouth without papillae [Figure 3B]. Style of median antenna as long as or longer than dorsal tentacular cirri [Figure 3A]. (Prostomium with 2 pairs of large eyes.) *L. antipoda* (Hartman)
- Notopodia as long or longer than neuropodia [Figures 4D, 5D]. Blades of compound neurosetae of 2-3 kinds; shafts not spinose subdistally [Figures 4F,G, 5F,G]. Anterior lip of mouth with 2 rows of papillae [Figures 4B, 5C]. Style of median antenna shorter than dorsal tentacular cirri [Figures 4A, 5A] 3
3. Prostomium without eyes [Figure 4A]. Posterior lip of mouth without papillae [Figure 4B]. Blades of compound neurosetae of 3 types: long, tapered, supraacicular; shorter, supraacicular, with coarse serrations [Figure 4F]; short, falcate, subacicular [Figure 4G] *L. maryae*, new species
- Prostomium with 2 pairs of large eyes [Figure 5A]. Posterior lip of mouth with papillae [Figure 5C]. Blades of compound neurosetae of 2 types: supraacicular long, with capillary tips [Figure 5F]; subacicular short, falcate [Figure 5G] *L. riseri*, new species

***Laubierpholoe antipoda* (Hartman, 1967),
new combination**

FIGURE 3

Pholoe antipoda Hartman, 1967:40, pl. 7: figs. B,C [part; not sta 969, 558; = *Pholoe polymorpha*].

MATERIAL EXAMINED.—SOUTH ATLANTIC OCEAN: Drake Passage, 56°06'S, 66°19'W, 384-494 m, *Eltanin* sta 740, 18 Sep 1963, 17 syntypes (USNM 55500, 55501). Scotia Sea, *Isla Orcada* cruise 575, 1975: sta 73, 2 Jun, 56°16'S, 27°30'W, 208-375 m, 42 specimens (USNM 127216); sta 95, 9 Jun, 54°11'S, 37°41'W, 68-80 m, 1 specimen (USNM 127218); sta 98, 10 Jun, 54°11'S, 37°36'W, 57-79 m, 2 specimens (USNM 127217). South Shetland Islands, 61°25'S, 56°30'W, 300 m, *Eltanin* sta 993, 13 Mar 1964, 4 specimens (USNM 55896).

NEW ZEALAND: 49°49'S, 178°52'E, 86-95 m, *Eltanin* sta 2141, 26 Feb 1968, 1 specimen (USNM 127219).

DESCRIPTION.—Largest syntype 3 mm long, 1.5 mm wide, with 27 segments, with developing young in elytra; 2 smaller complete syntypes 2 mm long, 1-2 mm wide with 21 and 25 segments. Larger specimens from *Isla Orcada* sta 73, 2-3 mm long, 1.5 mm wide, with 26 segments; smaller specimens 1-2 mm long, 1.0-1.2 mm wide, with 13-21 segments.

Body small, depressed, truncate at both ends, with parapodia as long as body width; dorsal and ventral surfaces smooth, without papillae or tubercles. Elytra large, imbricated, covering dorsum and parapodia, with only tips of neurosetae visible. Elytra squarish to subreniform, smooth, with few (up to 7) papillae along lateral margin, sometimes few papillae on surface (Figure 3F; Hartman, 1967, pl. 7: fig. B). Some middle elytra with developing juveniles inside (Figure 3G,H). Dorsal tubercles nodular.

Prostomium and tentacular segment fused; prostomium oval, bilobed, median antenna with ceratophore in anterior notch, style enlarged basally, about twice as long as prostomium; 2 pairs of large eyes; tentaculophores anterior and lateral to prostomium, each with dorsal tentacular cirrus similar to median antenna and very small ventral tentacular cirrus nearly hidden in dorsal view; pair of long tapering palps lateral to tentaculophores; without facial tubercle (Figure 3A,B). Segment 2 with first pair of large bulbous elytraphores, biramous parapodia, and long ventral buccal cirri on bulbous cirrophores lateral to mouth (Figure 3A,B). Extended pharynx with 9 dorsal and 9 ventral border papillae and 2 pairs of jaws.

Notopodia subconical, smaller and shorter than neuropodia; neuropodia with long conical presetal acicular lobe and short rounded postsetal lobe (Figure 3C). Notosetae numerous, slender, slightly curved, with capillary tips, none strongly bent; upper ones shorter, more strongly curved, ventral anterior and posterior ones longer, slightly curved (Figure 3C,D). Neurosetae moderate in number, compound, with shafts distally oblique and with row of subdistal denticles; blades short, with row of minute denticles and entire, falcate tips; upper ones with blades slightly longer than lower ones (Figure 3C,E; Hartman, 1967, pl. 7: fig. C). Ventral cirri short, tapered (Figure 3C). Pygidium with pair of anal cirri.

DEVELOPMENT.—The largest complete syntype had 4 large developing eggs and embryos within segments 10-14, a developing juvenile in the 6th left elytron (on segment 11) (Figure 3G), and the additional large 7th left elytron (on segment 13) from which the juvenile had escaped. Fertilization must be internal because the ova develop into embryos, with no visible segmentation, then pass into the elytra, which have a delicate membrane, and develop into juveniles. The juvenile, which was removed from the elytron, showed evidence of up to

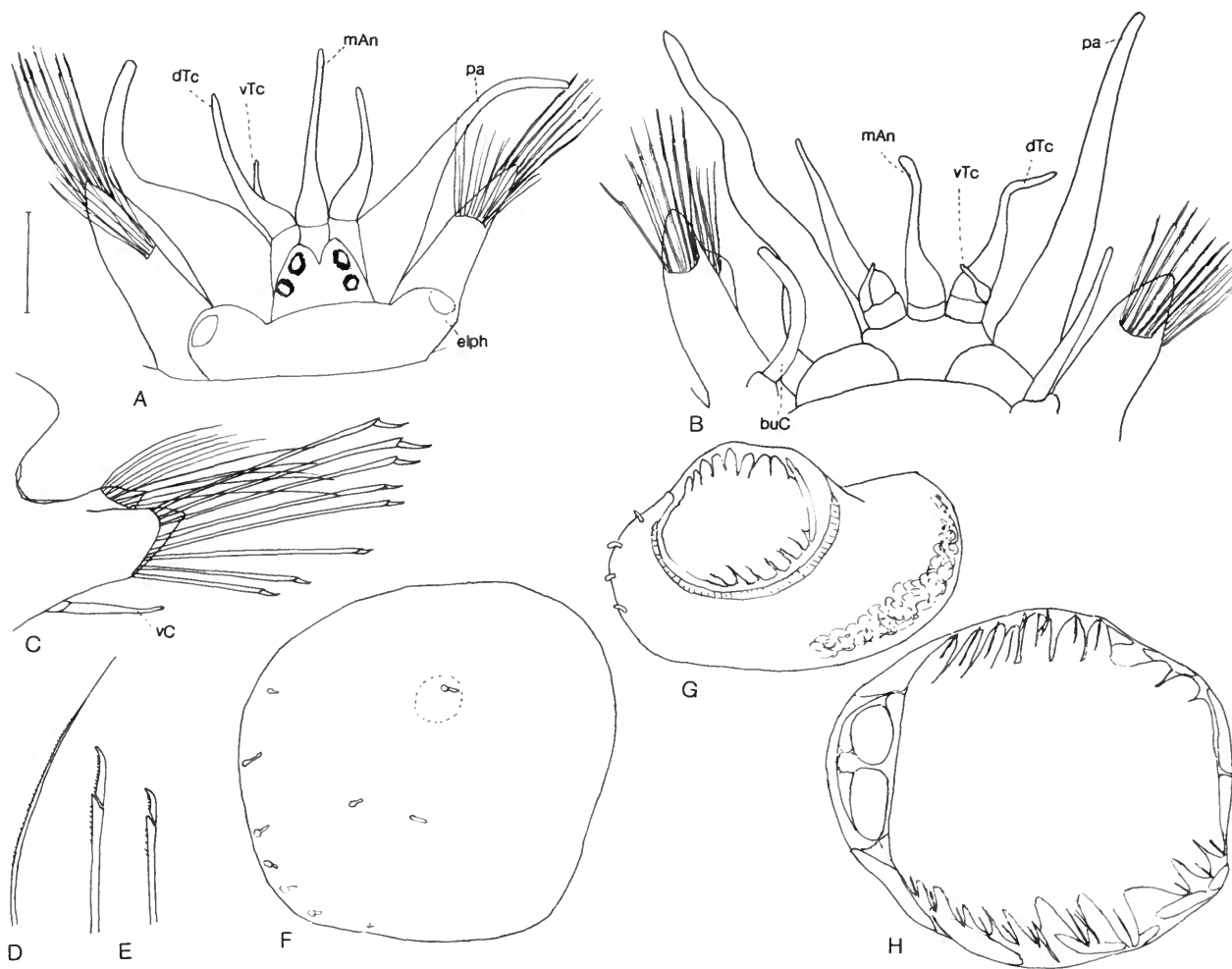


FIGURE 3.—*Laubierphloe antipoda*, syntypes of *Phloe antipoda* (USNM 55501): A, dorsal view of anterior end; B, ventral view of anterior end; C, right parapodium, posterior view; D, notoseta; E, upper and lower neurosetae; F, left elytron from anterior fragment; G, 6th left elytron, from segment 11, with developing juveniles; H, developing juvenile in delicate membrane, removed from elytron, ventral view. (Scale: A–H = 0.1 mm.)

11 setigerous segments, developing neuropodia with acicula, compound neurosetae, elytra, anal cirri, and head appendages (Figure 3H).

DISTRIBUTION.—South Atlantic Ocean off South America, in 57–494 meters; off New Zealand, in 86–95 meters.

Laubierphloe swedmarki (Laubier, 1975),
new combination

Phloe swedmarki Laubier, 1975:673–678, figs. 1, 2.

MATERIAL EXAMINED.—None. Figure references are to Laubier (1975).

DESCRIPTION.—Holotype 1.5 mm long, 0.4 mm wide, 27 segments. Body very small, linear, strongly flattened, slightly attenuated posteriorly, smooth dorsally, with scattered small

papillae with pointed tips on ventral side of body (figs. 1A,B, 2A). Color white, with 4 black eyes. Elytra on bulbous elytophores not covering middorsum. Elytra oval, transparent, with 5–8 simple papillae on external border and few on surface; some elytra enclosing developing embryos and juveniles (fig. 2A,B,G,H).

Prostomium and tentacular segment fused; prostomium rounded, bilobed, with lateral horns; median antenna with small ceratophore and short style in anterior notch of prostomium; 2 pairs of eyes near anterolateral border, anterior pair larger than posterior pair; tentaculophores lateral to prostomium, each with dorsal tentacular cirrus twice as long as median antenna, and very short ventral tentacular cirrus, half as long as median antenna and hidden from view dorsally; palps long and slender, with small papillae on lateral sides, emerging

lateral to tentaculophores; 4 small conical expansions on anterior lip of mouth (corresponding to facial tubercle?) (fig. 1A,B). Second segment with first pair of bulbous elytraphores and elytra, biramous parapodia, and ventral buccal cirri lateral to mouth and slightly longer than dorsal tentacular cirri (fig. 1A,B). Dorsal tubercles nodular (fig. 1A). Pharynx with 9 dorsal and 9 ventral border papillae, central 3 papillae in each row smaller, and 2 pairs of brown jaws.

Notopodia small, in form of small, conical acicular lobe on anterodorsal side of larger neuropodia; neuropodia with presetal conical acicular lobe and shorter rounded postsetal lobe (fig. 1A,B). Noto setae few (2-4), forming fan-shaped bundle, slender, tapering to fine tips, with series of small denticles (fig. 2B). Neurosetae stouter than notosetae, moderate in number (6-10), in single row, compound, with shafts diagonally truncate and with numerous distal and subdistal spines; blades short and falcate, with entire tips, upper blades longer, with more numerous spines, lower ones shorter with fewer, minute spines (fig. 2D-F). Ventral cirri short, tapered, with ovoid cirrophores (fig. 1B). Pygidium rounded, without anal cirri (?).

DEVELOPMENT.—Development was characterized by extreme reduction of egg number, internal fertilization, and extension of the reproductive period with gestation inside the elytra (viviparity). A mature animal had a single large ovum in the body of segment 13, and, in the same segment, a developing embryo in the left 7th elytron, and a developing juvenile with 6 setigerous segments, showing neurosetae, head appendages,

and jaws, in the right elytron (fig. 2A,G,H).

REMARKS.—This interstitial species was collected in Bermuda, in coral sand, from 2 to 8 meters. Neither the holotype, deposited in the Paris Museum (MNHN), nor the paratypes (in the author's collection) were available for examination. The above description is based on the original well-illustrated and detailed account.

DISTRIBUTION.—Northeast Atlantic Ocean, Bermuda, in 2-8 meters.

Laubierpholoe maryae, new species

FIGURE 4

MATERIAL EXAMINED.—NEW ZEALAND: South Island, Kaikoura Harbor, Rubies Reef, 42°24'S, 173°41'E, 12 m, coarse broken shell, 6 Feb 1983, N.W. Riser collector, holotype (USNM 126750); 4 paratypes (USNM 126751, 126752); paratype (ZMUC). Aquarium Point, Otago Harbor, intertidal, gravel, 18 Apr 1983, N.W. Riser collector, paratype (ZMUC).

DESCRIPTION.—Holotype 3 mm long, 1 mm wide, 27 segments; paratype 2.8 mm long, 1 mm wide, 29 segments. Elytra large, oval, covering dorsum, delicate, with few papillae on lateral border and few on surface; some with developing young inside (Figure 4H). Dorsal tubercles nodular.

Prostomium and tentacular segment fused; prostomium oval, bilobed, with anterior lobes lateral to large ceratophore of median antenna, projecting anteriorly; median antenna in notch

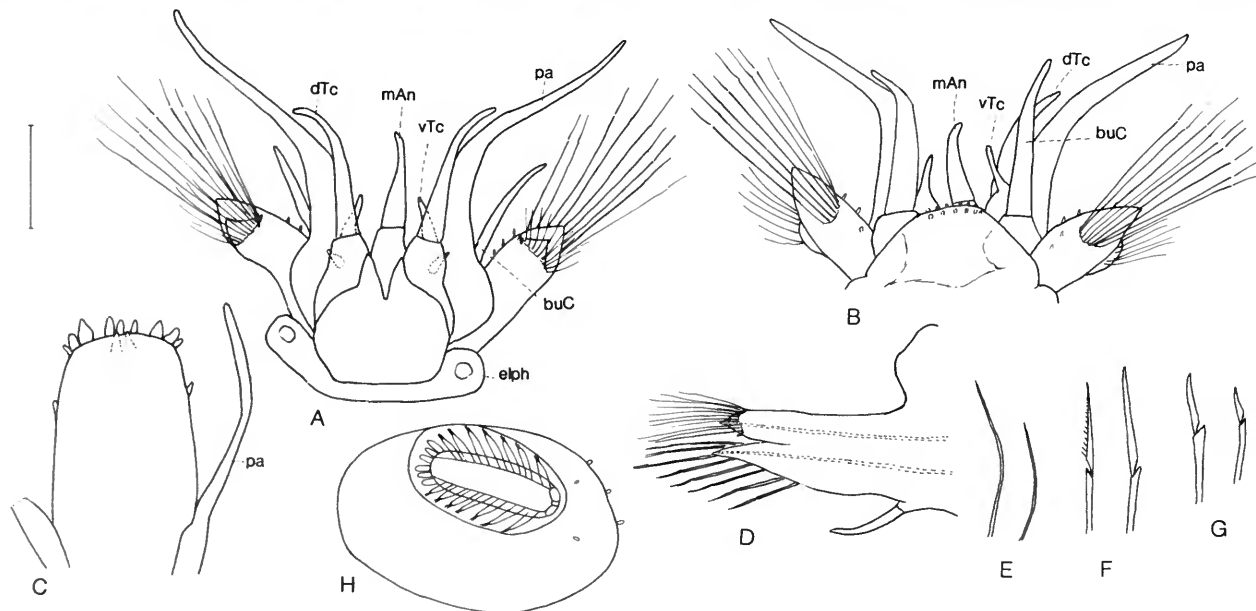


FIGURE 4.—*Laubierpholoe maryae*, paratypes, A,D-G (USNM 126751); B,C,H (USNM 126752): A, dorsal view of anterior end; B, ventral view of anterior end; C, dorsal view of extended pharynx and right palp; D, right middle elytragerous parapodium, anterior view, acicula dotted; E, notosetae; F, supraacicular neurosetae; G, subacicular neurosetae; H, elytron with developing juvenile. (Scale: A-H = 0.1 mm.)

of prostomium, with style about as long as prostomium; without eyes (Figure 4A). Tentaculophores lateral and anterior to prostomium, each with ventrolateral papilla and pair of tentacular cirri; dorsal tentacular cirrus longer than median antenna, ventral tentacular cirrus very small, nearly hidden from view dorsally; palps very long, stout, tapering, emerging lateral and ventral to tentaculophores; no facial tubercle; anterior lip of mouth with 2 rows of small papillae (Figure 4A,B). Segment 2 with first pair of large, bulbous elytraphores, biramous parapodia, with some papillae on anterior and ventral sides of neuropodia, and ventral buccal cirri as long as dorsal tentacular cirri (Figure 4A,B). Pharynx with 9 dorsal and 9 ventral border papillae, medial 3 pairs slightly smaller and separated from lateral pairs; pair of subdistal lateral papillae, and 2 pairs of jaws (Figure 4C).

Notopodium about as long as neuropodium, both conical acicular lobes (Figure 4D). Notosetae numerous, slender, slightly curved, with capillary tips (Figure 4E). Neurosetae stouter than notosetae, compound; shafts without distal spines, blades of 3 kinds: few supraacicular ones, one type with long, minutely spinose blade with blunt tip, other type shorter, coarsely serrated, tapering to sharp tip (Figure 4F); subacicular (8 or so), with blades shorter, falcate, minute spinose (Figure 4G). Ventral cirri short, tapered (Figure 4D). Pygidium with pair of long anal cirri.

DEVELOPMENT.—Holotype with 7 large eggs in segments 11–15; paratype with 4 large eggs in segments 13–16. Developing juvenile inside large elytron, consisting of 7 setigerous segments, with neurosetae and notosetae, 3 developing segments, pharynx, anterior appendages, and elytra (Figure 4H).

ETYMOLOGY.—The species is named for Mary E. Petersen, in recognition of her work on polychaetes.

DISTRIBUTION.—South Pacific Ocean, New Zealand, intertidal to 7 meters.

Laubierpholoe riseri, new species

FIGURE 5

MATERIAL EXAMINED.—NEW ZEALAND: North Island, Leigh, middle of Goat Island, 36°16'S, 174°48'E, 20 m, coarse broken shell in *Amphioxus* sand, 2 Nov 1982, N.W. Riser collector, holotype (USNM 126753), 7 paratypes (USNM 126754).

DESCRIPTION.—Holotype 1.8 mm long, 0.8 mm wide, 26 segments; paratypes 1–1.5 mm long, 0.8–1.0 mm wide, 19 segments plus growth zone. Elytra large, oval, covering dorsum, with few lateral papillae; elytra on posterior segment small, enclosing pygidium (Figure 5B). Dorsal tubercles nodular.

Prostomium and tentacular segment fused; prostomium oval, bilobed, anterior lobes lateral to small ceratophore of median antenna, extended anteriorly; style of median antenna short, with filamentous tip; 2 pairs of large eyes in anterior half of prostomium, anterior pair larger than posterior pair (Figure 5A). Tentaculophores lateral and anterior to prostomium, each with spherical glandular area inside; dorsal tentacular cirrus long, about as long as prostomium; ventral tentacular cirrus one-third as long as dorsal tentacular cirrus and nearly hidden in dorsal view; palps stout, long, about 4 times longer than dorsal tentacular cirri; facial tubercle absent; 2 rows of small papillae on anterior lip of mouth (Figure 5A,C). Segment 2 with first pair of bulbous elytraphores, biramous parapodia, and ventral buccal cirri longer than dorsal tentacular cirri; posterior lip of mouth papillate (Figure 5A,C). Pharynx with 9 dorsal and 9 ventral border papillae, medial 3 pairs slightly shorter than lateral pairs, and 2 pairs of jaws.

Notopodium with acicular lobe subconical, longer than subconical acicular lobe of neuropodium (Figure 5D). Notosetae numerous, slender, capillary (Figure 5E). Neurosetae

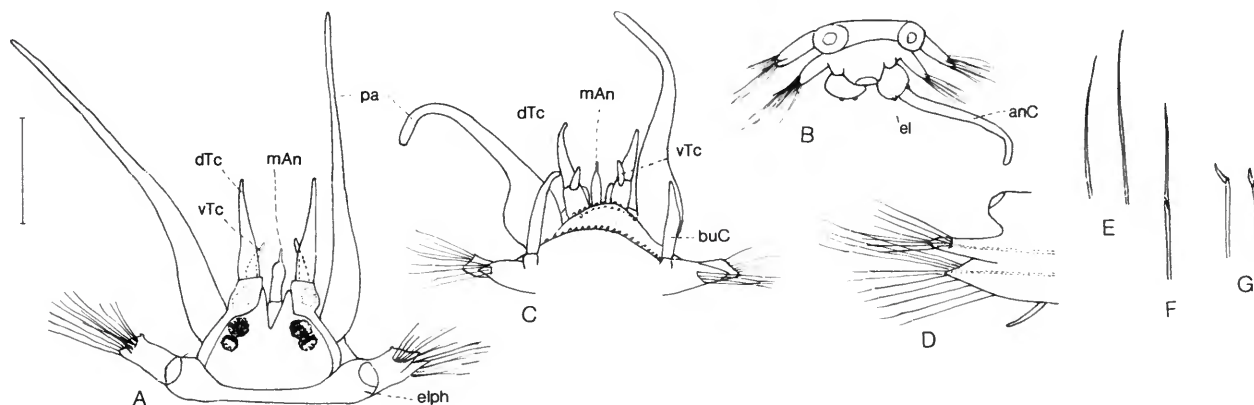


FIGURE 5.—*Laubierpholoe riseri*, A,B, holotype (USNM 126753); C–G, paratype (USNM 126754): A, dorsal view of anterior end; B, dorsal view of posterior end, left anal cirrus missing; C, ventral view of anterior end; D, right middle elytrigerous parapodium, anterior view, acicula dotted; E, notosetae; F, supraacicular neuroseta; G, subacicular neurosetae. (Scale: A–G = 0.1 mm.)

compound, slightly stouter than notosetae, of 2 types: supraacicular ones (4 or so) with blades long, tapering to capillary tips (Figure 5F); subacicular ones (about 20) with blades short, falcate (Figure 5G). Ventral cirri short, tapered (Figure 5D). Pygidium rounded, enclosed in parapodia of posterior segment (26), with small elytra and pair of long anal cirri (Figure 5B).

DEVELOPMENT.—Male (holotype) with sperm in segments 11–14; male (paratype) with sperm in segments 9–11, and large oval extensions on left side between segments 11–12 and on right side between 15–16. Female (paratype) with large yolk eggs in segments 9–15.

ETYMOLOGY.—The species is named for Nathan W. Riser, the collector of this interstitial species.

DISTRIBUTION.—South Pacific Ocean, New Zealand, in 20 meters.

Imajimapholoe, new genus

TYPE SPECIES.—*Pholoe parva* Imajima and Hartman, 1964.

DIAGNOSIS.—Body small, linear, relatively few segments (up to 34). Elytra and elytriphores on segments 2, 4, 5, 7, continuing on alternate segments to 23, then on every segment to end of body. Dorsal tubercles on segments lacking elytra. Elytra opaque, with papillae on lateral and posterior borders and on surface. Without dorsal cirri and branchiae. Prostomium and first or tentacular segment fused, ventrally forming anterior lip of mouth, without facial tubercle. Prostomium squarish, deeply bilobed; median antenna occipital, on indistinct cerato-

phore at posterior border; without lateral antennae; 2 pairs of eyes. Tentaculophores ventrolateral and anterior to prostomium, achaetous, each with long dorsal and shorter ventral tentacular cirrus; palps stout, long, emerging ventral and lateral to tentaculophores. Second or buccal segment with first pair of large elytriphores and elytra, biramous parapodia, long ventral buccal cirri, and forming lateral and posterior lips of mouth. Eversible muscular pharynx with cirlet of 9 dorsal and 9 ventral border papillae and 2 pairs of jaws. Parapodia biramous; notopodial conical acicular lobe, without subdistal bract; neuropodial conical acicular lobe, without distal papillae. Notosetae simple, slender, capillary, slightly curved. Neurosetae stouter than notosetae, compound, shafts with subdistal spines, blades short, unidentate, falcate. Ventral cirri short, tapering, on all segments. Pygidium with pair of anal cirri. Interstitial species with relatively few, large eggs, 1–2 per segment.

ETYMOLOGY.—The genus is named for Minoru Imajima, in recognition of his many contributions to our knowledge of the polychaetes of Japan. Gender: feminine.

Imajimapholoe parva (Imajima and Hartman, 1964), new combination

FIGURE 6

Pholoe parva Imajima and Hartman, 1964:44, pl. 8: figs. a–f.—Yamanishi, 1985:17, fig. 1A,B.

MATERIAL EXAMINED.—JAPAN: Shirikishinai, littoral

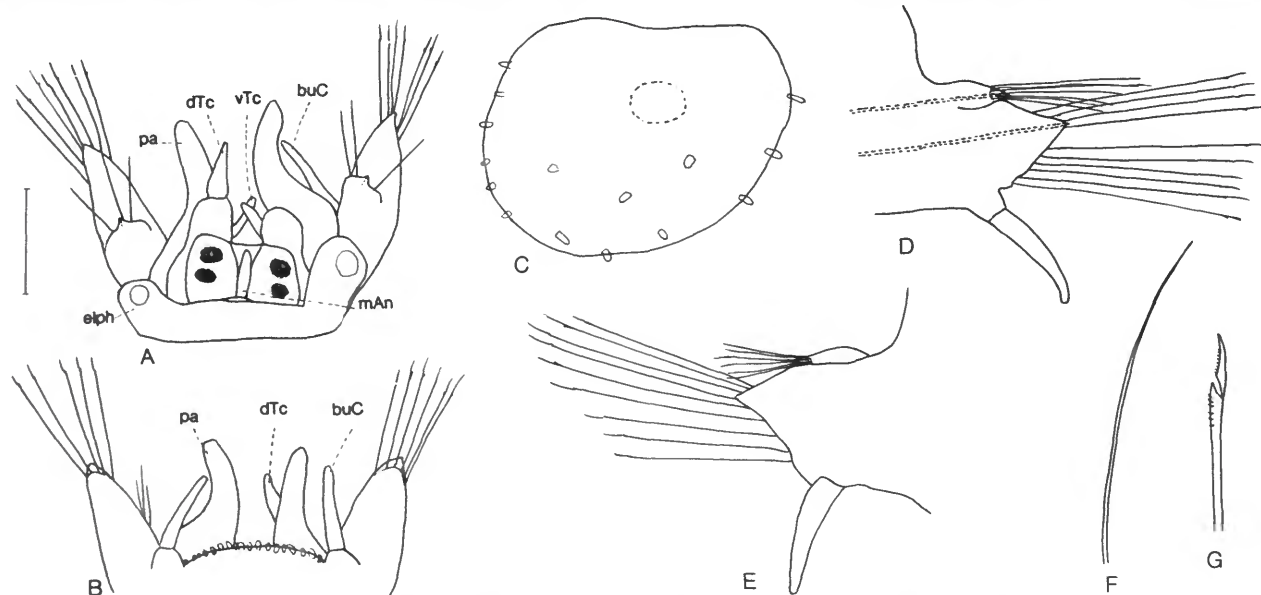


FIGURE 6.—*Imajimapholoe parva*, holotype of *Pholoe parva* (AHF Poly 0063): A, dorsal view of anterior end, right dorsal tentacular cirrus broken off; B, same, ventral view; C, left elytron; D, left parapodium, anterior view, acicula dotted; E, same, posterior view; F, notoseta; G, neuroseta. (Scale: A–G = 0.1 mm.)

zone, 13 Jul 1958, M. Imajima collector, holotype (AHF Poly 0063).

DESCRIPTION.—Holotype incomplete posteriorly, 3 mm long, 1.5 mm wide, 28 segments (up to 34 according to Imajima and Hartman). Yamanishi (1985) reported specimens 2.3–3.4 mm long, 0.9–1.3 mm wide, and 24–31 segments. Body small, flattened, smooth, with adhesive glands. Elytra large, oval, opaque, leaving middorsum uncovered, with short, indistinctly annulated papillae along posterior and lateral margins and on surface (Figure 6C; Imajima and Hartman, 1964, pl. 8: figs. a–c). Dorsal tubercles nodular.

Prostomium and tentacular segment fused. Prostomium squarish, deeply bilobed; median antenna occipital, on small indistinct ceratophore on posterior border of prostomium, short, about length of prostomium; 2 pairs of large eyes, anterior pair slightly larger than posterior pair; tentaculophores anterior and lateral to prostomium, and slightly shorter ventral tentacular cirrus (called lateral antennae by Yamanishi); palps thick, tapering, emerging lateral and ventral to tentaculophores; facial tubercle absent (Figure 6A,B; Imajima and Hartman, 1964, pl. 8: fig. a; Yamanishi, 1985, fig. 1A). Segment 2 with first pair of large elytophores, biramous parapodia, long ventral buccal cirri on bulbous cirrophores, lateral to mouth; posterior lip of mouth papillate (Figure 6A,B). Eversible muscular pharynx with 9 dorsal and 9 ventral border papillae and 2 pairs of jaws (Yamanishi, 1985, fig. 1A).

Parapodia biramous, smaller notopodial acicular lobe on anterodorsal side of larger neuropodial conical acicular lobe (Figure 6D,E; Imajima and Hartman, 1964, pl. 8: fig. d). Notosetae moderate in number, slender, capillary, slightly curved, with minute serrations (Figure 6F; Imajima and Hartman, 1964, pl. 8: fig. e). Neurosetae compound, stouter than notosetae; shafts with subdistal spinous rows; blades rather short, upper ones slightly longer, serrated, with hooked tips (Figure 6G; Imajima and Hartman, 1964, pl. 8: fig. f). Ventral cirri rather long, tapered (Figure 6D,E). Pygidium with pair of anal cirri (Yamanishi, 1985, fig. 1B).

DEVELOPMENT.—Holotype with large developing eggs in segments 10–22, 2 per segment. Yamanishi (1985) reported large eggs in segments 6–23, 1–2 per segment. He found living worms to be inactive and sluggish, with the body very sticky (adhesive glands), in very coarse sand in the beach slope above the waters' edge, associated with interstitial forms.

REMARKS.—Based on additional material from northern Japan and examination of the holotype of *P. parva*, Yamanishi (1985) supplemented the original description of this interstitial species.

DISTRIBUTION.—Northern Japan, intertidal.

Taylorpholoe, new genus

TYPE SPECIES.—*Pholoe minuta hirsuta* Rullier and Amoureux, 1979.

DIAGNOSIS.—Body small, linear, with relatively few seg-

ments (up to 19). Elytra and elytophores on segments 2, 4, 5, 7, continuing on alternate segments; dorsal tubercles on segments lacking elytra. Body with middorsum with scattered tubercles; elytra squarish, with fringe of numerous filiform papillae on 3 sides. Without dorsal cirri or branchiae. Prostomium and first or tentacular segment fused; ventrally forming anterior lip of mouth, with projecting filiform facial tubercle and pair of frontal papillae. Prostomium rounded, deeply bilobed, with lobes widely separated, with 3 filiform antennae: median antenna occipital, on conical base; lateral antennae on anterior border of prostomium; 2 pairs of large eyes. Tentaculophores lateral and anterior to prostomium, achaetous, each with subequal dorsal and ventral tentacular cirri; stout palps emerging ventral and lateral to tentaculophores. Second or buccal segment with first pair of large elytophores and elytra, biramous parapodia, long ventral buccal cirri, and forming lateral and posterior lips of mouth. Eversible muscular pharynx with circlet of 9 dorsal and 9 ventral border papillae and 2 pairs of jaws. Parapodia biramous; notopodium with conical acicular lobe, rounded anterior lobe and rounded posterior lobe with projecting stylode; neuropodial acicular lobe longer, conical. Notosetae slender, capillary, finely spinose, curved and slightly bent. Neurosetae stouter than notosetae, compound, with blades short, spinose, falcate, and unidentate. Ventral cirri short, tapering, on all segments. Pygidium with pair of anal cirri. Interstitial species with relatively few large yolky eggs, with early embryos developing in body cavity and later stages in sac under elytra.

ETYMOLOGY.—The genus is named for John L. Taylor, in recognition of his studies on polychaetes in the Florida area. Gender: feminine.

Taylorpholoe hirsuta (Rullier and Amoureux, 1979), new combination

FIGURE 7

Pholoe sp.—Taylor, 1971:111, fig. 3E–I.

Pholoe minuta hirsuta Rullier and Amoureux, 1979:154, fig. 3.—Amaral and Nonato, 1984:17.

Genus A.—Wolf, 1984a:25–10, figs. 25–7–25–8 [in Family Sigalionidae].—San Martín, Aquirre, and Baratech, 1986:9, fig. 5A,B.

MATERIAL EXAMINED.—BRAZIL: Between Santa Barbara and Siriba, *Calypso* sta 85, 28 Nov 1961, 2–5 m, sand, calcareous algae, holotype of *Pholoe minuta hirsuta* (MNHN).

GULF OF MEXICO: Florida, Lower Tampa Bay, sta 16–14, 25 Oct 1963, J.L. Taylor and C. Saloman collectors, 6 specimens (USNM 126755, as *Pholoe* sp. by Taylor, 1971). Eastern Gulf of Mexico, as Sigalionidae, Genus A, by Wolf, 1984a: SOFLA sta 20D, 25°17'N, 82°09'W, Jul 1981, 22 m, coarse sand, 2 specimens (USNM 86013); MAFLA sta 2317, 28°56'N, 84°06'W, Aug 1977, 29 m, silty, very fine sand, 1 specimen (USNM 86008); MAFLA sta 2852, 28°30'N,

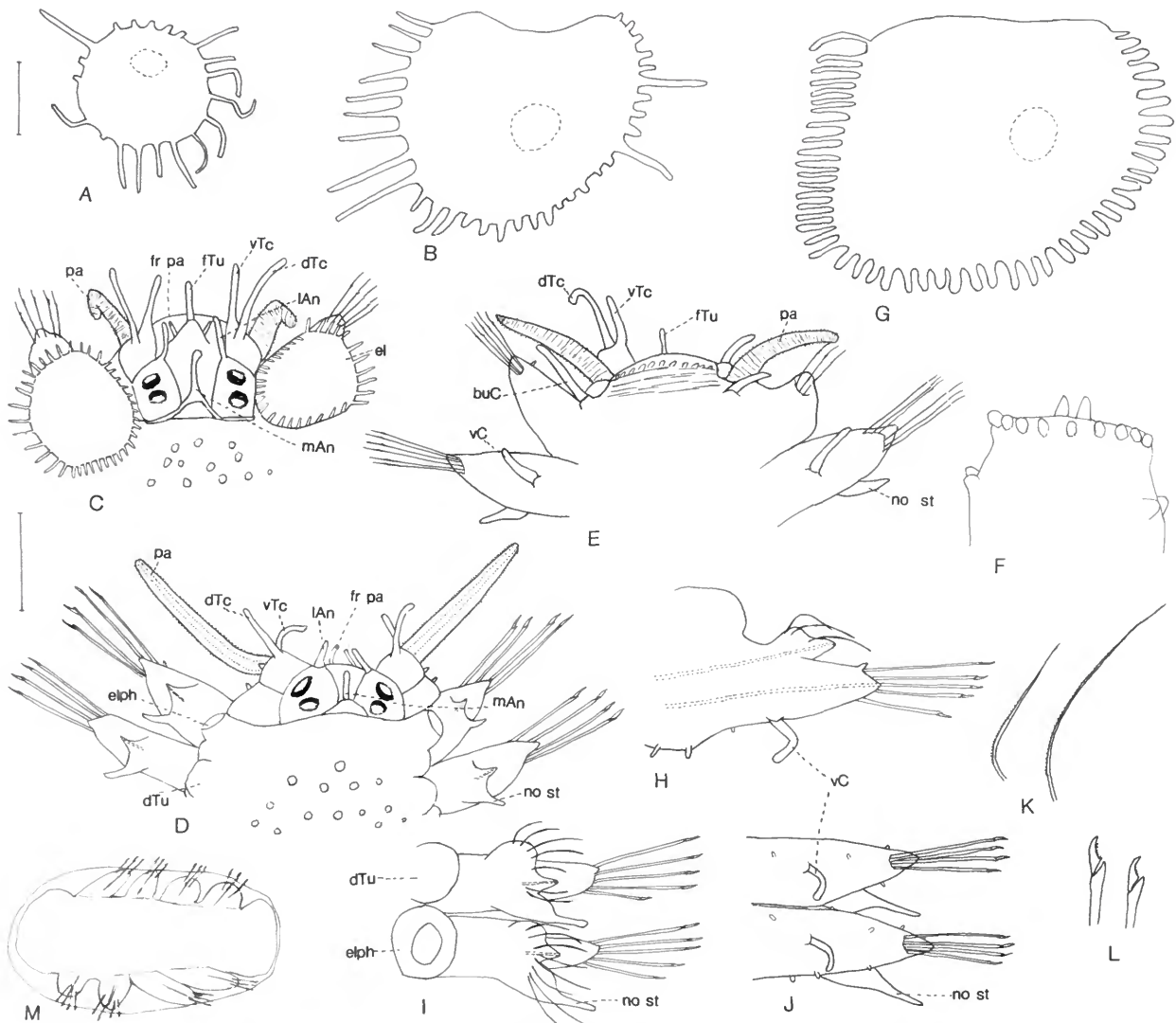


FIGURE 7.—*Taylorphloe hirsuta*, A,B, holotype of *Phloe minuta hirsuta* (MNHN); C-M, specimens from Florida (USNM 126755): A, first left elytron, some papillae broken; B, left middle elytron, some papillae broken; C, dorsal view of anterior end; D, dorsal view of anterior end, without elytra, notosetae missing; E, ventral view of anterior end; F, dorsal view of extended pharynx; G, left middle elytron; H, left elytrigerous parapodium, anterior view, acicula dotted; I, dorsal view of right middle parapodia; J, ventral view of same; K, notosetae; L, upper and lower neurosetae; M, developing juvenile removed from under side of elytron. (Scales: A,B, = 0.1 mm; C-M = 0.1 mm.)

83°30'W, Jul 1976, 22 m, medium sand, 1 specimen (USNM 86906).

BAHAMAS: North side of Tokas Cay, North Bimini, 26 Aug 1962, sandy, M.L. Jones collector, 16 specimens (USNM 126757). Bimini Lagoon, 25°43'N, 79°16'W, 1970-1971, from submerged plastic sponge, A. Schoener collector, 1 specimen (USNM 126756).

CUBA: Isle of Pines, Arena, 35 m, G. San Martín

collector, 1 young specimen (collection G. San Martín, as Genus A Wolf, by San Martín, et al., 1986).

BELIZE: East of Carrie Bow Cay, 30 Oct 1988, 4.5 m, well sorted, mainly coarse sand, D. Eibye-Jacobsen collector, 4 specimens (ZMUC).

SOUTH CAROLINA: Off shore, 32°13'N, 79°52'W, Feb 1977, G. Gaston collector, 1 specimen (USNM 56535).

DESCRIPTION.—Holotype from Brazil, male with sperm, 1.5

mm long, 1 mm wide, 19 segments. Specimens from Tampa Bay, Florida, some with developing embryos and juveniles under elytra, up to 3.5 mm long, 2 mm wide, 18 segments. Specimens from North Bimini up to 2.8 mm long, 2 mm wide, 16 segments. Specimens from Eastern Gulf of Mexico (MAFLA and SOFLA sta) 1 mm long, 0.8–1 mm wide, 15–16 segments. Specimens from Belize, with large yolky eggs under elytra, 1–1.5 mm long, 1 mm wide, 14–17 segments. Young specimen from Bimini Lagoon 1.5 mm long, 1 mm wide, 11 segments. Young specimen from Isle of Pines, Cuba, 1 mm long, 0.8 mm wide, 11 segments.

Body flattened, tapering slightly anteriorly and posteriorly. Middorsum not covered by elytra, with scattered tubercles and attached fine, foreign material (Figure 7C,D; Wolf, 1984a, fig. 25-8a); ventral surface with scattered minute globular papillae. First pair of elytra oval, with filiform papillae on border; following elytra squarish, with fringe of numerous papillae on 3 sides, covered with silty foreign material (Figure 7A–C,G; Taylor, 1971, fig. 3H,I; Rullier and Amoureux, 1979, fig. 3; Wolf, 1984a, fig. 25-8a,c; San Martín et al., 1986, fig. 5A). Dorsal tubercles nodular, on segments without elytra (Figure 7I).

Prostomium and first or tentacular segment fused; prostomium oval, deeply bilobed, with 3 antennae: lateral pair on anterior border; median antenna occipital, on posterior conical ceratophore; 2 pairs of large eyes; tentaculophores lateral and anterior to prostomium, rounded, achaetous, with subequal filiform dorsal and ventral tentacular cirri; palps rather long, finely papillate, ventral and lateral to tentaculophores; anterior lip of mouth with medial digitiform facial tubercle and slightly more dorsal pair of filiform frontal papillae (Figure 7C–E; Wolf, 1984a, fig. 25-8a,b). Second or buccal segment with first pair of elytophores, biramous parapodia, and long ventral buccal cirri lateral to mouth, similar to tentacular cirri (Figure 7C–E). Pharynx with 9 dorsal and 9 ventral border papillae, 2 pairs of strong jaws, and 2 pairs of subdistal lateral papillae (Figure 7F).

Biramous parapodia with notopodium shorter than neuropodium; notopodium in form of conical acicular lobe, rounded anterior lobe, and rounded posterior lobe with prominent cirriform process or stylode; neuropodium in form of conical acicular lobe with few scattered papillae (Figure 7D,E,H–J; Wolf, 1984a, fig. 25-8d). Notosetae slender, slightly curved to bent, finely spinose, with capillary tips (Figure 7K; Wolf, 1984a, fig. 25-8e,f). Neurosetae compound, shafts without subdistal spines, blades short, spinose, with entire, falcigerous tips, upper ones slightly longer than lower ones (Figure 7L; Taylor, 1971, fig. 3G; Wolf, 1984a, fig. 25-8g). Ventral cirri short, filiform, with slightly bulbous tips (Figure 7E,H,J). Pygidium with pair of basally inflated anal cirri (Wolf, 1984a, fig. 25-8h).

DEVELOPMENT.—Females were found with relatively few large yolky eggs and developing embryos in the body cavity, as

well as in a sac under the elytra, without any sign of segmentation; one specimen had a developing juvenile showing 4 setigerous segments in a sac under the elytra (Figure 7M). Wolf (1984a) observed one specimen with embryos developing within the body cavity and another specimen with four embryos developing two pairs of posterior elytra (= viviparous, brooding).

REMARKS.—The original description of *Pholoe minuta hirsuta* from Brazil is very brief, with only the characteristic elytron figured. Additional specimens from Florida and the Caribbean make it possible to supplement the description of this small interstitial species.

DISTRIBUTION.—Off South Carolina, Gulf of Mexico (Florida), Caribbean Sea from Belize, Cuba, Bahamas to Brazil, in coarse to medium sand, silty fine to very fine sand, low water to 32 meters.

Genus *Pholoides* Pruvot, 1895

Pholoides Pruvot, 1895:655. [Type species: *Pholoe dorsipapillata* Marenzeller, 1893, by monotypy. Gender: masculine. Rule of Nomenclature, Article 30b, ending of -oides.]

Peisidice Johnson, 1897:184. [Type species: *Peisidice aspera* Johnson, 1897, by monotypy. Gender: feminine.]

Pareupholoe Hartmann-Schröder, 1962a:110. [Type species: *Pareupholoe fimbriata* Hartmann-Schröder, 1962a, by original designation. Gender: feminine.]

Parapholoe Hartmann-Schröder, 1965:92. [Type species: *Parapholoe tuberculata* Hartmann-Schröder, 1965, by original designation. Gender: feminine.]

DIAGNOSIS.—Body small, linear, segments moderate in number (up to 48). Middorsum not covered by elytra, with scattered oval tubercles. Elytra and elytophores on segments 2, 4, 5, 7, continuing on alternate segments to end of body. Elytra thick, subrectangular, with concentric rings and numerous, long border papillae. Dorsal cirri and branchiae absent. Prostomium and first or tentacular segment fused, ventrally forming anterior lip of mouth, without facial tubercle. Prostomium subrectangular, median antenna with ceratophore on anterior border, with style enlarged and papillate subdistally; lateral antennae absent; 2 pairs of eyes. Tentaculophores anterior and lateral to prostomium, with notosetae and single pair of tentacular cirri, similar to median antenna; stout palps emerging ventral and lateral to tentaculophores. Second or buccal segment with first pair of elytophores and elytra, biramous parapodia, with long ventral buccal cirri, and forming lateral and posterior lips of mouth. Eversible muscular pharynx with 9 dorsal and 9 ventral border papillae and 2 pairs of jaws. Parapodia biramous; notopodium rounded, subconical; neuropodium larger, subconical. Notosetae simple, slender, capillary, finely spinose. Neurosetae stouter than notosetae, compound, with shafts smooth or spinose subdistally and blades short, falcate, smooth or faintly spinose. Ventral cirri short, subulate, papillate. Pygidium with pair of anal cirri. Reproduction with planktonic lecithotrophic larvae.

REMARKS.—Pruvot (1895:655) referred Marenzeller's spe-

cies, *Pholoe dorsipapillata*, to his new genus *Pholoides*, without any explanation. Katzmann (1973:110) and Laubier (1975:678) preferred to use the genus *Peisidice* Johnson, 1897. However, Pruvot's name has priority. Based on examination of

the type species of *Pareupholoe* and *Parapholoe*, the genera and species are referred herein to *Pholoides asperus* (Johnson).

The genus includes 3 species (1 doubtful, new combination, plus 3 synonyms).

Key to the Species of *Pholoides**

- Tentaculophore with projecting acicular lobe and prominent papilla on ventral side [Figure 10C,D]. Neuropodial presetal acicular lobe with 2 long papillae distally [Figure 10F,I,J] *P. asperus* (Johnson)
- Tentaculophore without projecting acicular lobe and ventral papilla [Figure 9B]. Neuropodial presetal acicular lobe with short papilla distally [Figure 9F] *P. dorsipapillatus* (Marenzeller)

**P. mendeleevi* (Averincev), new combination, incompletely described, not included in Key.

Pholoides dorsipapillatus (Marenzeller, 1893)

FIGURES 8, 9

Pholoe dorsipapillata Marenzeller, 1893:30, pl. 1: fig. 3A-D.—Fauvel, 1914:82; 1923:119, fig. 44n-q.—Day, 1963:389; 1967:100, fig. 1.18g-i.—Rullier, 1964:137.—Amoureux, 1972:71.—Campoy, 1982:92.

Pholoides dorsipapillata.—Pruvot, 1895:655.

Psammolyce fijiensis.—Rullier, 1964:138 [not McIntosh, 1885].

Peisidice bermudensis Hartman and Fauchald, 1971:30, pl. 2: figs. a-e.—Hartmann-Schröder, 1977:81, figs. 10-16; 1979:71, figs. 15, 16; 1981:26 [new synonymy].

Peisidice dorsipapillata.—Katzmann, 1973:111.—Laubier, 1975:678.—Hartman, 1975 ("1974"):210.

Pholoides bermudensis.—Uebelacker, 1984:23-1, figs. 23-1-23-2.—San Martín, Aquirre, and Baratech, 1986:9, fig. 6A-C.

Peisidice aspera.—Rosenfeldt, 1989:217 [not Johnson, 1897].

MATERIAL EXAMINED.—ADRIATIC SEA: Near Bari, mud bottom mixed with coarse sand, 220 m, 29 Sep 1970, W. Katzmann collector, 3 specimens (USNM 50551, as *Peisidice dorsipapillata* by Katzmann, 1973).

NORTH ATLANTIC: Off Cape Verde Islands, 14°53'N, 23°30'W, 10 m, rocky bottom, *Calypso* sta 29, 19 Nov 1959, 1 specimen (MNHN, as *Pholoe dorsipapillata* by Rullier, 1964). Off Cape Verde Islands, 2 miles SW of Punta Garbeiro, 120-170 m, *Calypso* sta 45, 22 Nov 1959, 1 specimen (MNHN, as *Psammolyce fijiensis* by Rullier, 1964).

WESTERN ATLANTIC: Off Bermuda rise, 32°19'N, 64°34'W, 1135-1153 m, *Atlantis* sta A118, 11 Aug 1966, holotype of *Peisidice bermudensis* (AHF 872). Off Georgia, 30°54' to 31°03'N, 79°44' to 80°26'W, 34-410 m, R/V *Pierce* sta 2E, 5H, 5L, Feb, May, Aug 1977, 5 specimens (USNM 59178-59182).

GULF OF MEXICO: 29°35'N, 87°20'W, 106 m, R/V *Columbus Iselin*, MAFLA sta 2645, Feb 1978, 6 specimens (USNM 56152, as *Pholoides bermudensis* by Uebelacker, 1984).

DESCRIPTION.—Length 5.5 mm, width 1.25 mm, segments 35 (Marenzeller, 1893). Specimens from Adriatic Sea (USNM 50551) 3-4.5 mm long, 1-1.5 mm wide, 29-30 segments.

Body depressed, with globular tubercles on middorsum not covered by elytra; ventral surface minutely papillate (Figure 9B; Marenzeller, 1893, pl. 1: fig. 3C; Uebelacker, 1984, fig. 23-2a). Elytra on bulbous elytophores on segments 2, 4, 5, 7, continuing on alternate segments to end of body; dorsal tubercles on segments without elytra, nodular, with small papilla distally (Figure 9F; Marenzeller, 1893, pl. 1: fig. 3A). Elytra large, thick, subtriangular, with faint concentric rings on surface and numerous long papillae on borders and few on surface (Figures 8B, 9I; Marenzeller, 1893, pl. 1: fig. 3Ba-c; Hartman and Fauchald, 1971, pl. 2b; Uebelacker, 1984, fig. 23-2a,b).

Prostomium and first or tentacular segment fused; prostomium globular, wider than long; 2 pairs of closely approximated eyes; median antenna with ceratophore on anterior border of prostomium, long style enlarged subdistally, with long papillae and filiform clavate tip; tentaculophores anterior and lateral to prostomium, each with curved aciculum, bundle of long capillary notosetae on inner side and long tentacular cirrus on outer side, similar to median antenna; stout palps lateral and ventral to tentaculophores (Figures 8A,C, 9A,B; Day, 1967, fig. 1.18h; Uebelacker, 1984, fig. 23-2a). Second or buccal segment with first pair of bulbous elytophores, biramous parapodia, and long, papillate, ventral buccal cirri on cirrophores lateral to mouth; notosetae numerous, curved, spinose, capillary; neurosetae compound, with rather long spinose blades and spinose stems; lower lip of mouth papillate (Figures 8A,D,E, 9A-E; Marenzeller, 1893, pl. 1: fig. 3Da,b). Pharynx with 9 dorsal and 9 ventral border papillae and 2 pairs of jaws.

Biramous parapodia with notopodium almost as long as neuropodium, rounded, subconical, with numerous long, curved, spinose capillary notosetae; neuropodium with conical presetal acicular lobe with distal digitiform process and shorter postsetal lobe; neurosetae stouter than notosetae, compound, shafts smooth or spinose subdistally; blades short, upper ones slightly longer, smooth or faintly spinose (Figures 8F-H, 9F-H; Marenzeller, 1893, pl. 1: figs. 3A,Dc; Hartmann-Schröder,

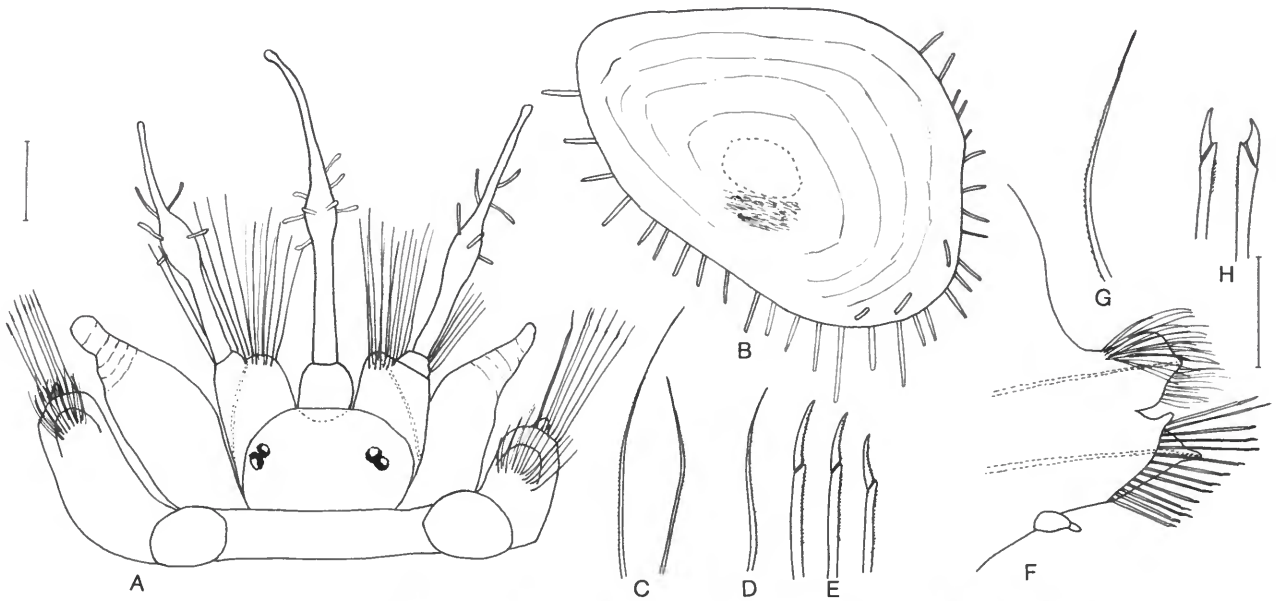


FIGURE 8.—*Pholoides dorsipapillatus* specimen from Adriatic Sea (USNM 50551): A, dorsal view of anterior end, with pharynx extended (not shown), acicula in tentaculophores dotted; B, right elytron; C, upper and lower notosetae from tentaculophore (segment 1); D, notosetae from segment 2; E, neurosetae from same; F, right parapodium, posterior view, acicula dotted; G, notoseta from same; H, upper and lower neurosetae from same. (Scales: A,B = 0.1 mm; C-H = 0.1 mm.)

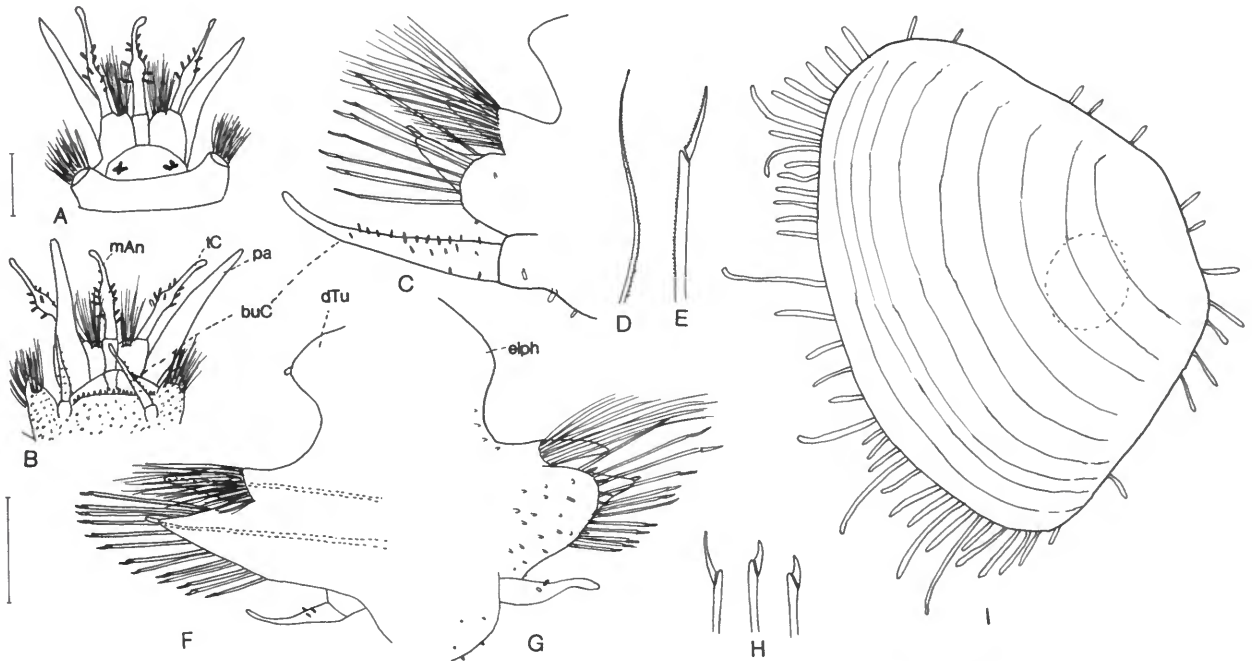


FIGURE 9.—*Pholoides dorsipapillatus*, holotype of *Peisidice bermudensis* (AHF 872): A, dorsal view of anterior end; B, same, ventral view; C, left elytrigerous parapodium from segment 2, posterior view; D, notoseta from same; E, upper neuroseta from same; F, right parapodium with dorsal tubercle, anterior view, acicula dotted; G, right elytrigerous parapodium, posterior view; H, upper and lower neurosetae; I, right elytron. (Scales: A,B = 0.5 mm; C-I = 0.1 mm.)

1979, figs. 15, 16; Uebelacker, 1984, fig. 23-2c-f). Ventral cirri short, subulate, with few papillae (Figures 8F, 9F,G). Pygidium with pair of long, papillate anal cirri.

DISTRIBUTION.—Mid-Atlantic from Bermuda, Cuba, Gulf of Mexico to Azores, Mediterranean and Adriatic Seas, Red Sea, Cape Verde Islands, North and South Africa, in 37–1153 meters, in coarse sand, sand and mud, pumice stone, and mud.

Pholoides asperus (Johnson, 1897)

FIGURES 10, 11

Peisidice aspera Johnson, 1897:184, pl. 9: figs. 56–59; pl. 10: fig. 63.—Moore, 1908:338; 1910:386.—Berkeley and Berkeley, 1941:24; 1942:189; 1948:23, fig. 28.—Hartman, 1939:7; 1948:14; 1968:147, figs. 1–3.—Pettibone, 1953:78, pl. 40: figs. 365–376.—Banse and Hobson, 1968:6.—Lie, 1968:286, 302, 303, 310, 317, 325, 370.—Hartmann-Schröder, 1977:81, figs. 17, 18.

Pareupholoe fimbriata Hartmann-Schröder, 1962a:110, pl. 1: figs. 5, 11, pl. 2: figs. 6, 7, 10, pl. 3: figs. 8, 9, 12 [new synonymy].

Parapholoe tuberculata Hartmann-Schröder, 1965:92, figs. 41–47 [new synonymy].

Peisidice tuberculata.—Hartman and Fauchald, 1971:29.—Hartmann-Schröder, 1977:81.

Pholoe minuta.—Blake, 1975:30, fig. 3A,B [not *Aphrodita minuta* Fabricius, 1780].

Pholoides aspera.—Fauchald, 1977:67, fig. 16A,B.

Pholoides tuberculata.—Carrasco and Gallardo, 1983:832.

MATERIAL EXAMINED.—SOUTHEAST ALASKA: Behm Canal, vicinity of Yes and Naha Bays, 75–353 m, *Albatross* sta 4228 and 4235, 1903, 2 specimens (USNM 5722, 5723). Alaska Peninsula, Cold Bay, Leonard Harbor and Canoe Bay, 37–73 m, Alaska King Crab Investigation sta 20–22, 60–61, 70, Sep, Oct 1940, 11 specimens (USNM 21417–21420).

BRITISH COLUMBIA: Nanoose Bay, Newcastle, Head of Princess Louise Inlet, 37 m, Aug 1934, E. and C. Berkeley collectors, 11 specimens (USNM 35015).

WASHINGTON: 48°37'N, 125°32'W, 121 m, *Albatross* sta 2878, 25 Sep 1888, 1 specimen (USNM 50550). Strait of Juan de Fuca, Washington and Puget Sounds, low water to 193 m, Jun–Aug 1935–1940, 1950, M.H. Pettibone collector, 86 specimens (USNM 25471–25490, 25492–25494, 32361; BMNH ZB 1986.54–56). Puget Sound, 47°10'N, 122°50'W, 22 m, 12 Feb 1963, K. Banse collector, 11 specimens (USNM 36436).

CALIFORNIA: Off Punta Gorda Rock, 22–26 m, D. Henry collector, Jul 1939, 3 specimens (USNM 25491). Santa Barbara Channel and Anacapa Passage, Channel Islands, 62–84 m, Feder and Roberts collectors, 2 Jul 1951, 4 specimens (USNM 50548, 50549). Monterey Bay, 101 m, *Albatross* sta 4460, May 1904, 6 specimens (USNM 17215). Monterey Bay, 29 m, G.E. MacGinitie collector, 27 Jun 1932, 1 specimen (USNM 35016).

GALAPAGOS ISLANDS: Elizabeth Bay, Albermarle Island, W.L. Schmitt collector, Roosevelt Presidential Cruise sta 20, 26 Jul 1938, 1 specimen (USNM 20507).

PERU: Isla Santa, Bahia Coisco, north of Chimbote, muddy, 9 m, W. Noodt collector, 24 Apr 1956, holotype of *Pareupholoe fimbriata* (ZMH P-14022).

CHILE: 37°08'S, 73°38'W, 58 m, sta 68, 10 Mar 1960, G. Hartmann-Schröder coll, 10 paratypes of *Parapholoe tuberculata* (ZMH P-438).

DESCRIPTION.—According to Johnson (1897), specimens from Monterey Bay, in 30 m, 7 mm long, 2 mm wide, 35–38 segments. Another specimen from Monterey Bay (USNM 35016) 8 mm long, 3 mm wide, 41 segments. Specimens from same area (USNM 17215) 4–10 mm long, 1.5–3 mm wide, 34–39 segments. Specimens from Washington (Pettibone, 1953) 5–11.5 mm long, 1.7–4 mm wide, 36–48 segments. Paratypes of *P. tuberculata* from Chile, 1.5–7 mm long, 0.7–2 mm wide, 17–38 segments. Holotype of *P. fimbriata* from Peru, 4 mm long, 1.5 mm wide, 27 segments.

Body subrectangular, tapering slightly anteriorly and posteriorly, flattened ventrally, convex dorsally; middorsum not covered by elytra with globular tubercles and embedded sand grains, forming roughened surface; ventral surface papillate (Johnson, 1897, pl. 9: fig. 56; Berkeley and Berkeley, 1948, fig. 28; Pettibone, 1953, pl. 40: fig. 365). Elytra on large, bulbous elytophores on segments 2, 4, 5, 7, continuing on alternate segment to end of body; dorsal tubercles on segments without elytra nodular, with small papilla distally (Figures 10A,I,J). Elytra oval to subtriangular, with apex directed toward median line, posterior 4 pairs arranged fanlike; elytra stiff, with concentric rings, thicker on medial side, forming diagonally raised ridge, with embedded sand grains medioposteriorly, thinner near posterior and lateral borders, with long fringes of knobbed papillae on medial, posterior, and lateral margins (Figure 10M; Johnson, 1897, pl. 9: figs. 56, 59; Pettibone, 1953, pl. 40: figs. 365, 368, 369; Hartmann-Schröder, 1965, figs. 41, 46, 47).

Prostomium and first or tentacular segment fused; prostomium subrectangular, wider than long; 2 pairs of closely approximated eyes, anterior pair slightly larger than posterior pair; median antenna with long cylindrical ceratophore on anterior border, long style bulbous subdistally, with long papillae and filiform clavate tip; tentaculophores anterior and lateral to prostomium, each with curved aciculum and projecting conical acicular lobe, 2 bundles of long capillary notosetae: outer dorsal and inner ventral, long tentacular cirrus, similar to median antenna, on dorsal side, and prominent papilla on ventral side (called rudimentary tentacular cirrus by Hartmann-Schröder, 1965); stout palps lateral and ventral to tentaculophores (Figure 10A–E; Johnson, 1897, pl. 9: fig. 56; Hartmann-Schröder, 1965, figs. 41, 42a). Second or buccal segment with first pair of bulbous elytophores, biramous parapodia, and long papillate ventral buccal cirri on papillate cirrophores lateral to ventral mouth; notosetae numerous, curved, spinose, capillary; neurosetae compound, with rather long spinose blades and spinose shafts; upper and lower lips of mouth papillate (Figure 10A,B,F–H; Hartmann-Schröder, 1965,

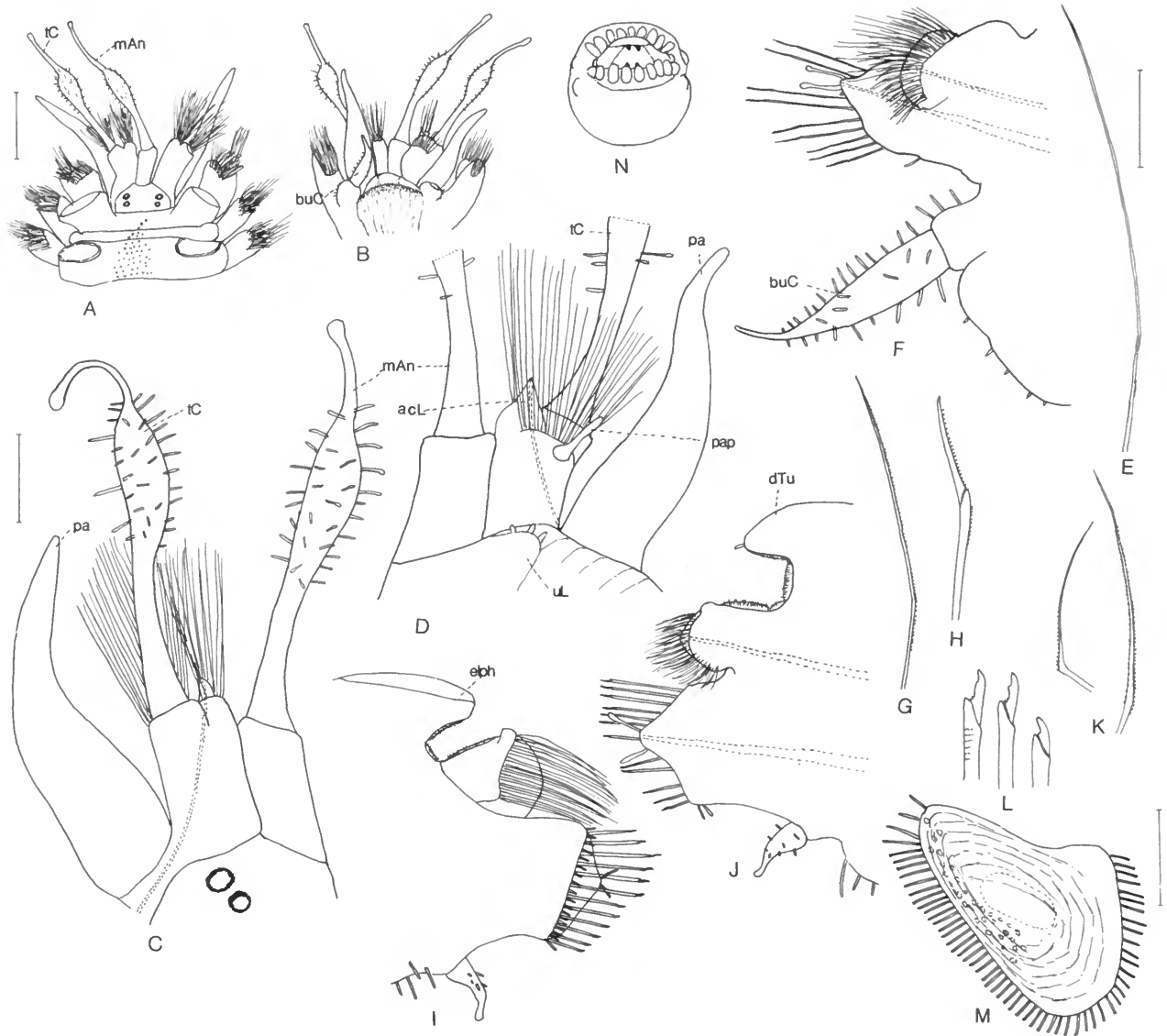


FIGURE 10.—*Pholoides asperus*, specimens from Washington, A–M (USNM 25476); N (USNM 32361): A, dorsal view of anterior end, right tentacular cirrus broken off; B, ventral view of anterior end, left buccal cirrus broken off; C, dorsolateral view of prostomium and left tentaculophore, aciculum dotted; D, inner view of same, distal tips of median antenna and tentacular cirrus not shown; E, notoseta from tentaculophore (segment 1); F, right parapodium from segment 2, anterior view, acicula dotted; G, notoseta from same; H, upper neuroseta from same; I, right middle elytragerous parapodium, posterior view; J, right middle parapodium with dorsal tubercle, anterior view, acicula dotted; K, upper and lower notosetae; L, upper, middle, and lower neurosetae; M, right middle elytron, thicker part with embedded sand grains; N, anterior view of extended pharynx. (Scales: A, B, N = 0.5 mm; C, D, F, I, J = 0.2 mm; E, G, H, K, L = 0.1 mm; M = 0.5 mm.)

figs. 41, 42b, 45a–c). Pharynx with 9 pairs of border papillae and 2 pairs of jaws (Figure 10N).

Parapodia with notopodium shorter than neuropodium; notopodium rounded, with low ciliated patches on dorsal side and continuing to ventral sides of elytraphores and dorsal tubercles, latter with small papilla distally; neuropodium with

subconical presetal acicular lobe with 2 long papillae distally, postsetal lobe truncate, with numerous short papillae; ventral cirri short, subulate, papillate (Figure 10I, J; Hartmann-Schröder, 1965, fig. 42c). Notosetae numerous, long, strongly curved dorsally changing to slightly curved below, spinose, capillary (Figure 10K; Hartmann-Schröder, 1965, fig. 43).

Neurosetae stouter than notosetae, compound, shafts smooth or spinose subdistally, blades short, upper ones slightly longer, smooth or faintly spinose (Figure 10L; Hartmann-Schröder, 1965, fig. 44; 1977, fig. 18). Ventral cirri short, subulate, with few papillae (Figure 10I,J). Pygidium with pair of anal cirri, similar to median antenna.

Young specimen from Peru (holotype of *Pareupholoe fimbriata*) 4 mm long, 1.5 mm wide, 27 segments. Middorsum with globular papillae (Figure 11A); elytra covered with foreign material and sand grains (Figure 11F; Hartmann-Schröder, 1962a, pl. 1: fig. 11a-d). Usual arrangement of elyrophores and dorsal tubercles (latter called dorsal cirri by Hartmann-Schröder); dorsal tubercles with small distal papilla (Figure 11B,C). Prostomium and tentacular segment fused; median antenna with ceratophore and distal papillate style; lateral tentaculophores with notosetae and single tentacular cirrus (called lateral antenna by Hartmann-Schröder), similar to median antenna (Figure 11A; Hartmann-Schröder, 1962a, pl. 1: fig. 5, pl. 2: fig. 6). Parapodia with notopodia about as long as neuropodia; neuropodial presetal conical acicular lobe with single distal papilla (Figure 11B,C; Hartmann-Schröder, 1962a, pl. 3: figs. 8, 9). Notosetae slender, spinose, capillary, sharply and gradually curved (Figure 11D); stouter compound neurosetae with blades, spinose, long to short, shafts with or without distal spinose rows (Figure 11E).

DEVELOPMENT.—Blake (1975:30) doubtfully referred two

planktonic larvae from Tomales Bay, California, a metatrochophore (fig. 3A) and a post-larva (fig. 3B), to *Pholoe minuta*. He pointed out some differences between his larvae and the larvae described by Cazaux (1968, figs. 1-5) for *Pholoe synophthalmica* from France. They also show differences from the larvae illustrate by Åkesson (1963, figs. 18, 19) for *Pholoe minuta* from the Isefjord, Denmark, and for the same species from Ireland illustrated by Heffernan and Keegan (1988, figs. 1-5). The latter group may be considered to be the typical planktotrophic larval forms for species of *Pholoe*.

The larvae described by Blake (1975:30) are referred herein to *Pholoides asperus*. The 8-setiger post-larva (800 μ long, 470 μ wide) showed a rounded prostomium, 3 pairs of eyespots, a median antenna with papillae; tentaculophores of the first segment, lateral to the prostomium, with capillary notosetae and a single papillate tentacular cirrus; 7 pairs of biramous parapodia with simple capillary notosetae and compound falcigerous neurosetae; 4 pairs of elytra on lateral side of body on segments 2, 4, 5, 7; a pair of papillate anal cirri similar to the tentacular cirri; pharynx in medial part of segment 2; and large gut filled with oil globules. Its sluggish behaviour and dense nature of the gut contents suggested that it was lecithotrophic and still subsisting on its yolk reserve (Blake, 1975:30).

The 5-setiger post-larva, figured by Sveshnikov (1967:134, fig. 2A) for *Pholoe minuta* from the Sea of Japan, resembles *Pholoides*, rather than *Pholoe*.

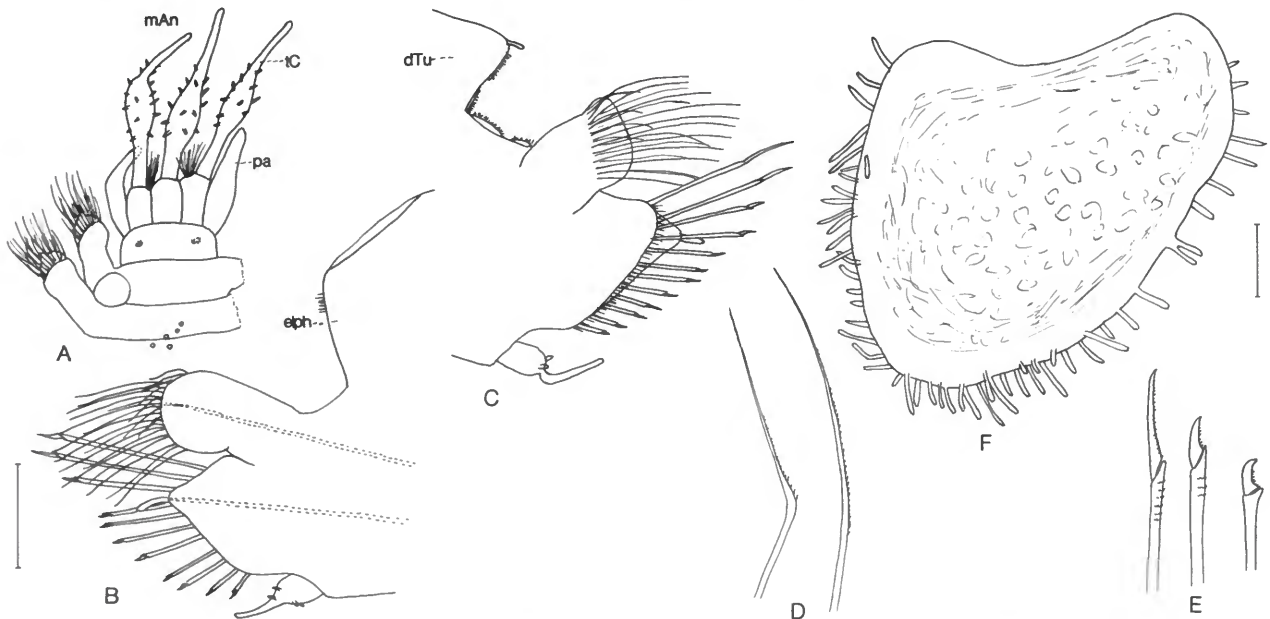


FIGURE 11.—*Pholoides asperus*, holotype (small) of *Pareupholoe fimbriata* (ZMH P-14022): A, dorsal view of anterior end, right parapodia of segments 2 and 3 missing; B, right elytrigerous parapodium, anterior view, acicula dotted; C, right parapodium with dorsal tubercle, posterior view; D, upper and lower notosetae; E, upper, middle, and lower neurosetae; F, left elytron with foreign material and sand grains on surface. (Scales: A, not scaled; B-E = 0.1 mm; F = 0.1 mm.)

REMARKS.—No types of *Peisidice aspera* Johnson from Monterey Bay, California are known to exist but abundant material, agreeing with the original description, was available. Through the kindness of Dr. Hartmann-Schröder, paratypes of *Parapholoe tuberculata* from Chile and the holotype of *Pareupholoe fimbriata* from Peru, were available for study. The latter species is considered herein to be the young of *Pholoides asperus*.

DISTRIBUTION.—Eastern Pacific from Southeast Alaska to California, the Galapagos Islands, and Chile, in low water to 353 meters, crawling on stones, crevices, and mixed bottoms.

***Pholoides mendeleevi* (Averincev, 1978),
new combination**

Pholoe mendeleevi Averincev, 1978:69, fig. 8:76–80.

REMARKS.—The single specimen from the western region of the Great Australian Gulf, in 730 meters, deposited in the Zool. Inst. Acad. Sci USSR, Leningrad, was incompletely described and figured. It agrees with *Pholoides*, rather than *Pholoe*, in having the tentaculophores with notosetae, in the shape and papillation of the single pair of tentacular cirri and the median antenna (fig. 8:76), and in details of the elytra (fig. 8:77), notosetae (fig. 8:80), and neurosetae (fig. 8:78, 79). However, the figure of the anterior end (fig. 8:76) shows two additional short papillate appendages (not mentioned in the text) arising from the medioventral sides of the tentaculophores. They could be ventral tentacular cirri (not yet known for *Pholoides*) or perhaps distal tips of the long buccal cirri of segment 2. This makes the new combination somewhat doubtful.

Genus *Metaxypsamma* Wolf, 1986

Metaxypsamma Wolf, 1986:79. [Type species: *Metaxypsamma uebelackerae* Wolf, 1986, by original designation. Gender: feminine.]

DIAGNOSIS.—Body linear, segments few (up to 24). With rudimentary elytra as paired nodular lobes with 2–4 long filiform papillae on segments 2, 4, 5, 7, continuing on alternate segments. Dorsal cirri and branchiae absent. Prostomium and first or tentacular segment fused; prostomium oval, bilobed; median antenna on ceratophore in anterior notch; lateral antennae absent; 2 pairs of eyes. Tentaculophores lateral and anterior to prostomium, achaetous, each with subequal dorsal and ventral tentacular cirri; long palps emerging ventral and lateral to tentaculophores; tentacular segment ventrally forming anterior lip of mouth, without facial tubercle. Second or buccal segment with first pair of papillate nodular lobes, uniramous parapodia, and ventral buccal cirri, and forming lateral and posterior lips of mouth. Eversible muscular pharynx with cirlet of 9 dorsal and 9 ventral border papillae and 2 pairs of jaws. Parapodia uniramous; notopodium and notosetae absent; neuropodium conical, with aciculum and few neurosetae (6–7). Neurosetae all similar, compound, with smooth shafts, and

short, falcigerous, unidentate blades. Aberrant, neotenic, interstitial pholoid with rudimentary elytra.

***Metaxypsamma uebelackerae* Wolf, 1986**

FIGURE 12

Genus A.—Wolf, 1984b:60-1, figs. 60-1–60-2 [In Family B].
Metaxypsamma uebelackerae Wolf, 1986:80, fig. 1a–h.

MATERIAL EXAMINED.—EASTERN GULF OF MEXICO: Off Florida; MAFLA sta 2959, Aug 1977, 60 m, silt, very fine sand, paratype (USNM 97801). MAFLA sta 2748, Jul 1978, 50 m, coarse sand, holotype (USNM 86846). SOFLA sta 5, Aug 1981, 91 m, coarse sand, 6 paratypes (USNM 86844, 86845).

DESCRIPTION.—Holotype 2.5 mm long, 0.5 mm wide with setae, 24 segments; 5 paratypes 1.2–2 mm long, 0.5–0.8 mm wide, 19–22 segments. Body flattened ventrally, arched dorsally; dorsum smooth, ventrum with minute papillae (Wolf, 1986, fig. 1a,c,f). Dorsum with paired nodular lobes, each with 2–4 long, filiform papillae with knobbed tips on segments 2, 4, 5, 7, continuing on alternate segments; other segments with small lobes (Figure 12A,C,D; Wolf, 1986, fig. 1a,b,f). Prostomium and first or tentacular segment fused; prostomium oval, bilobed, wider than long; 2 pairs of eyes, anterior pair larger; median antenna with ceratophore in anterior notch, style short, tapered; lateral antennae absent; tentaculophores lateral and anterior to prostomium, achaetous, each with pair of subequal dorsal and ventral tentacular cirri similar to median antenna; long palps emerging ventral and lateral to tentaculophores and extending far beyond median antenna and tentacular cirri; facial tubercle absent (Figure 12A,B; Wolf, 1986, fig. 1a). Segment 2 with first pair of papillate nodular lobes, uniramous parapodia, and ventral buccal cirri similar to tentacular cirri (Figure 12A,B). Eversible muscular pharynx with 9 pairs of border papillae, subdistal lateral papilla, and 2 pairs of subulate jaws; jaws with venom glands (Figure 12E; Wolf, 1986, fig. 1g,h). Parapodia uniramous; notopodia and notosetae absent; neuropodium conical, with neuroaciculum and 6–7 compound neurosetae; shafts smooth, blades all similar, short, falcigerous, unidentate, slightly longer on anterior few segments, with minute teeth on margin (Figure 12A–D; Wolf, 1986, fig. 1b,d,e). Ventral cirri short, 2 jointed (Figure 12D). Pygidium with terminal anus and pair of anal cirri, each with secondary branch, appearing as 2 pairs (Figure 12C; Wolf, 1986, fig. 1f).

BIOLOGY.—Females with large yolky eggs; males with numerous sperm. Interstitial species found in coarse to fine sand and silty very fine sand.

REMARKS.—As Wolf (1986:82) noted, *Metaxypsamma uebelackerae* is a neotenic, interstitial species, shown by the loss of elytra and notopodia, reduction in number of segments, and adaptation to the interstitial habitat. The distribution of the paired nodular lobes with filiform papillae is similar to that of the elytra of the elytragerous species of the family: on segments

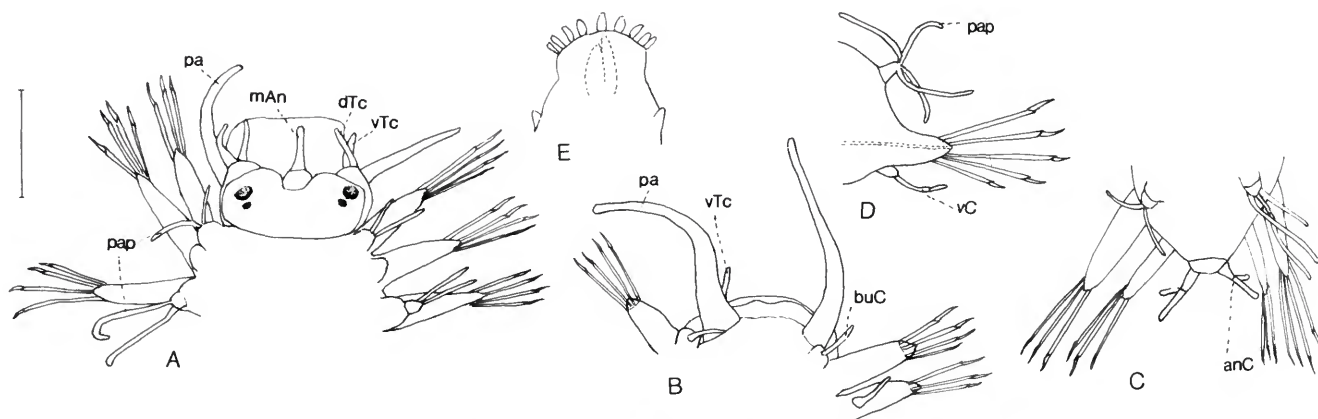


FIGURE 12.—*Metaxypsamma uebelackerae*, A, holotype (USNM 86846); B,C, paratype (USNM 86845); D,E, paratype (USNM 86844): A, dorsal view of anterior end, pharynx partially extended; B, ventral view of anterior end; C, dorsal view of posterior end; D, left parapodium from segment 13, anterior view, aciculum dotted; E, ventral view of extended pharynx, internal jaws dotted. (Scale: A-E = 0.1 mm.)

2, 4, 5, 7, continuing on alternate segments. Their presence in the adults of *M. uebelackerae* appears to be a retention of a character of the larval stage. In the study of the development of *Pholoe synopthalmica* Claparède by Cazaux (1968:529-534, pl. 16: figs. 1-4, pl. 17: figs. 1, 2), the 5-segmented metatrochophore II (pl. 16: fig. 4) showed 4 setigerous neuropodia and paired conical dorsal lobes (appendices dorsaux) on segments 2, 4, 5, and small papillae on segment 3; the 5-segmented nectochaete I (pl. 17: fig. 1) showed the dorsal lobes each with 2 distal branches; the 6-segmented nectochaete II (pl. 17: fig. 2) showed the dorsal lobes each with 3 distal filaments on segments 2, 4, 5, thus a similar pattern to the

nodular lobes and small lobes of *M. uebelackerae*. The presence of dorsal lobes with distal branches appears to be a stage in the development of elytraphores and elytra of *Pholoe* retained in the adult of *M. uebelackerae*.

Of the genera of Pholoidae, *Metaxypsamma* is most similar to *Pholoe*, by lacking lateral antennae, having a median antenna on the anterior border of the prostomium, achaetous tentaculophores with 2 pairs of subequal tentacular cirri, and compound neurosetae all similar, with short, falcigerous blades, and their small size.

DISTRIBUTION.—Eastern Gulf of Mexico, off Florida, in 50-120 meters.

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