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SOME BATHYAL POLYNOIDS FROM CENTRAL AND NORTHEASTERN PACIFIC (POLYCHAETA: POLYNOIDAE)

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Polychaetes obtained from bathyal and abyssal regions are delicate and, thus, easily mutilated. Among the polynoids, the dorsal scales or elytra are usually missing; the styles of the antennae and the tentacular, dorsal, ventral, and anal cirri are often partly or completely missing; the setae and even the parapodia may be broken off; in addition, the body may be fragmented.

This study of some deepwater polynoids was prompted by the discovery of a single, somewhat mutilated specimen of polynoid collected in 900 fathoms off the mouth of the Columbia River, Oregon. It is herein described as a new species belonging to a new genus, *Bathyadmetella*. As the name indicates, it shows certain affinities to *Admetella* McIntosh.

The generic standing of Admetella, based on Polynoe (Admetella) longipedata McIntosh (1885), was first indicated by Darboux (1900). Darboux gave a diagnosis for the genus based on the incomplete description by McIntosh. The description of A. longipedata has been supplemented subsequently by other polychaete workers, particularly by Augener (1906), Ehlers (1908), and Ditlevsen (1917). Some speci-

mens of A. longipedata in the U.S. National Museum, from the Albatross collections, are in relatively good condition, enabling me to supplement further the previous descriptions and to give an emended diagnosis for the genus.

Chamberlin (1919) added 2 new species to Admetella McIntosh, A. dolichopus and A. hastigerens. The type specimens of both species in the U.S. National Museum have been examined and are herein referred to as A. longipedata. Hartman (1938) examined the type specimen of Polymoe(?) renotubulata Moore (1910) in the U.S. National Museum and referred it to Admetella. The specimen has been reexamined and is herein designated the type species for the new genus, Bathymoorea.

This study was aided in part by a grant from the National Science Foundation (NSF GB-1269).

Family Polynoidae Malmgren

Genus Admetella McIntosh, 1885; emended

Type species: Polynoe (Admetella) longipedata McIntosh, 1885, by monotypy. Gender: feminine.

Diagnosis: Polynoids with body large, oval, flattened; segments more than 50 (52-82). Prostomium with 2 long palps and 3 antennae; median antenna with large ceratophore inserted on middle third of prostomium; lateral antennae inserted on anterolateral extensions of prostomium (i.e., lepidonotoid); with paired antennal scales. Tentacular segment (I) achaetous, with 2 pairs tentacular cirri, with bulbous facial tubercle between bases of palps. Buccal segment (II) achaetous, with paired, long, ventral buccal cirri and first pair elytra; with dorsal, low, transverse nuchal fold. Elytra more than 20 pairs, arranged on segments 2, 4, 5, 7, then on alternate segments to 23, and then on every third segment to end of body. Parapodia very long, subbiramous; notopodia small; both rami with elongated digitiform acicular processes. Notosetae form small bundles. Neurosetae numerous, forming fan-shaped bundles. Both noto- and neurosetae long, slender, transparent, fragile, inflated, and flattened distally, with faint spinous rows and tapered tips.

$Admetella\ longipedata\ (McIntosh)$

FIGURES 1, 2

Polynoe (Admetella) longipedata McIntosh, 1885, p. 124, pl. 14, fig. 5; pl. 20, fig. 6; pl. 12A, fig. 17.

Admetella longipedata Darboux, 1900, p. 103.—Augener, 1906, p. 123.—Ehlers, 1908, p. 40, pl. 2, figs. 10, 11; pl. 3, figs. 1-5.—Horst, 1917, pp. 101, 140.—Ditlevsen, 1917, p. 37.—Fauvel, 1932, p. 27.—Eliason, 1951, p. 133.

Polynoe mirabilis Treadwell, 1906, p. 1149; 1920, p. 590. [Not McIntosh, 1885.]

Admetella hastigerens Chamberlin, 1919, p. 64, pl. 9, figs. 6-8.—Treadwell, 1923, p. 3.

Admetella dolichopus Chamberlin, 1919, p. 67, pl. 10, fig. 1.

Remarks: The following study is based on 12 specimens in the U.S. National Museum, collected from seven Albatross stations from the vicinity of Hawaii, Philippine Islands, and Lower California to off Central America. The specimens were identified by Treadwell as Polynoe mirabilis McIntosh (Treadwell, 1906, 1920) and Admetella hastigerens Chamberlin (Treadwell, 1923) and by Chamberlin (1919) as 2 new species of Admetella, A. hastigerens, and A. dolichopus. All of the above are herein referred to Admetella longipedata (McIntosh). Fauvel (1914, p. 39) questioned the identification by Treadwell (1906, p. 1149) of Polynoe mirabilis from off Hawaii. Uschakov (1950, p. 157) also questioned the identifications in both records of Treadwell (1906, 1920). Eliason (1951, p. 133) questionably referred A. hastigerens to A. longipedata.

Material examined: From seven Albatross stations, Sta. 2635 (Apr. 18, 1891), off Mexico, 20°47' N, 106°15' W, 2022 fms, dark green mud (USNM 19325, type of Admetella dolichopus Chamberlin); Sta. 4022 (June 21, 1902), vicinity of Kauai, Hawaiian Islands, 374-399 fms, coral, sand, foraminifera, rock (USNM 5458, identified by Treadwell as Polynoe mirabilis, 2 spec.); Sta. 4621 (Oct. 21, 1904), southwest coast of Central America, 6°36' N, 81°45' W, 581 fms, green sand (USNM 19326, type of Admetella hastigerens Chamberlin); Sta. 5114 (Jan. 20, 1908), Balayan Bay and Verde Island Passage, Philippine Islands, 13°36' N, 120°45' E, 340 fms, fine sand (USNM 17507, identified by Treadwell as Polynoe mirabilis, 5 spec.); Sta. 5122 (Feb. 2, 1908), east coast of Mindoro, Philippine Islands, 13°21' N, 120°30' E, 220 fms, green mud (USNM 17606, identified by Treadwell as Polynoe mirabilis, 1 spec.); Sta. 5677 (Mar. 17, 1911), between Ballenas Bay and Santa Maria Bay, Lower California, 25°23' N, 113°16′ W, 735 fms, green mud, fine sand (USNM 19149, by Treadwell as Admetella hastigerens, 1 spec.); Sta. 5685 (Apr. 22, 1911), south of Abrejos Point, Lower California, 25°42' N, 113°30' W, 645 fms, black sand, coral (USNM 19150, identified by Treadwell as Admetella hastigerens, 1 spec.).

Description: Length 50 to 100 mm; width, including parapodia (without setae), 16 to 35 mm; segments 64 to 82, last 4 to 6 very small. Body spindle shaped, widest in middle, tapering anteriorly and posteriorly, arched dorsally, flattened ventrally. Parapodia very long, as long as width of body, inflated and flattened transversely (fig. 1c). Elytra (usually missing) on large inflated elytrophores, 25 to 31 pairs, arranged on segments 2, 4, 5, 7, then alternate segments to 23, and

then on every third segment to end of body. Elytra missing on all specimens examined (according to Treadwell, 1923, elytra are large, delicate, gray to black in color). Dorsal tubercles on cirrigerous segments inflated, thin walled, continuous as inflated ridge to base of

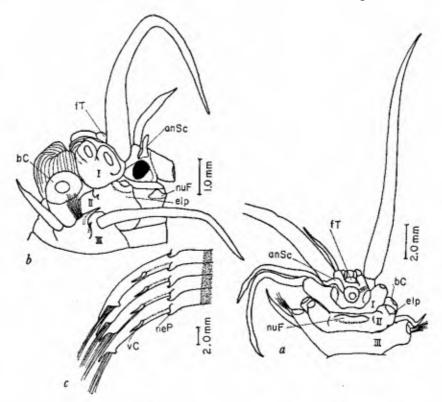


FIGURE 1.—Admetella longipedata: a, dorsal view anterior end (USNM 19150) with pharynx partially extended, ocular areas not pigmented, styles of median antenna and right lateral antenna and right antennal scale missing, styles of right tentacular cirri missing (I), elytra and styles of buccal cirri missing (II), styles of dorsal cirri missing (III); b, lateral view anterior end (USNM 17606) with pharynx partially extended, ocular area pigmented, style of median antenna missing, tentacular cirri missing (I), style of buccal cirrus and elytron missing (II); c, ventral view of several segments on right half in middle part of body. (I-III=segments, anSc=antennal scale, bC=cirrophore buccal cirrus, elp=elytrophore, fT=facial tubercle, neP=nephridial papilla, nuF=nuchal fold, vC= ventral cirrus.)

short cylindrical cirrophores of dorsal cirri; styles of dorsal cirri long, extending beyond the tips of neurosetae, delicate, with tapered tips.

Prostomium (figs. 1a,b) bilobed, much wider than long, with pair of very large rounded ocular areas, pigmented or colorless. Ceratophore of median antenna large, occupying middle third of prostomium and projecting dorsally; style usually missing (delicate, slender, extending

to about segment 9, according to Treadwell, 1923). Ceratophores of lateral antennae formed by continuations of anterolateral borders of prostomium; styles cylindrical, tapering distally to slender tips, with slight subterminal enlargements. Paired, thin, flattened, subtriangular processes or antennal scales attached between bases of ceratophores of lateral antennae and median antenna; antennal scales broad basally, tapering to blunt tips, tending to curl around basal parts of lateral antennae (antennal scales sometimes broken off but scars of attachment visible). Paired, very long, tapering, smooth palps.

First or tentacular segment (figs. 1a,b) dorsally forms short ring, projecting lateral to prostomium, achaetous, with 2 pairs tentacular cirri; cirrophores large, inflated; styles long, smooth, delicate, with attenuate tips; a bulbous facial tubercle between bases of palps, continuous with a longitudinal ridge on upper lip. Second or buccal segment with first pair elytrophores; parapodia rudimentary, achaetous; with dorsal, low, slightly bilobed, transverse nuchal fold between elytrophores; forms posterior lip of mouth ventrally; ventral or buccal cirri with large inflated cirrophores, with styles long, similar to tentacular cirri. Third segment with setigerous biramous parapodia not especially elongated. Beginning with segment 4, parapodia elongated. Ventral cirri on segments 3-5 extend beyond tips of neuropodia. On remaining segments, ventral cirri smaller, subulate, in middle of elongated neuropodia (figs. 2a,b).

Parapodia (figs. 2a,b) elongated, inflated, thin walled, flattened transversely, subbiramous. Notopodia small lobes on anterodorsal faces of elongated neuropodia, inflated basally with elongated digitiform acicular processes, with small bundles of notosetae (easily broken and may be overlooked). Notosetae somewhat more slender than neurosetae, transparent, flattened distally, tapered to rounded tips, with faint spinous rows (fig. 2c). Neuropodia elongated, somewhat flared distally, postsetal lobes subtriangular, presetal lobes extending as long digitiform acicular processes. Acicula of both rami yellowish, tapering distally to fine tips within the acicular processes. Neurosetae numerous, forming fan-shaped bundles. Neurosetae (fig. 2d) long, slender, flexible, transparent, iridescent, fragile (may be mostly broken), with long bare basal regions and flattened distal spinous regions consisting of transverse rows of low spines; tips very thin, bare, tapered (when broken, fracture in various ways, as indicated by pl. 12A, fig. 17 in McIntosh, 1885; pl. 3, figs. 1-5 in Ehlers, 1908; pl. 9, figs. 7, 8, in Chamberlin, 1919).

Anus dorsal, surrounded by small parapodia of last 4 to 5 segments. Anal cirri not noted. Nephridial papillae (figs. 1c,2b) on ventral bases of parapodia, begin on segment 6 and continue posteriorly, inflated basally, tapered distally to short tubes directed between parapodia.

Pharynx partially extended in most preserved specimens, thin walled, with conspicuous dorsal longitudinal ridge on basal part which is continuous with bulbous facial tubercle between bases of palps (figs. 1a,b). Pharynx reddish to blackish; distally with soft papillae and 2 pairs light-brown interlocking jaws. Color (according to Treadwell, 1920) livid flesh pink, some cirri showing violet color.

Remarks: Admetella longipedata is characterized particularly by the paired antennal scales on the prostomium. It may be distin-

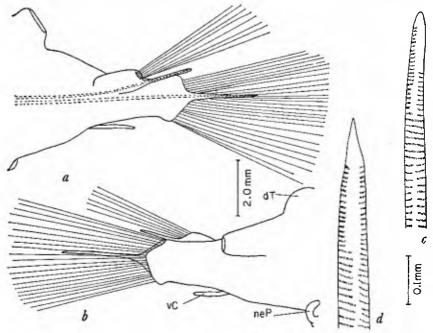


FIGURE 2.—Admetella longipedata: a, parapodium of elytragerous segment, anterior view, elytron missing, position of acicula shown in dotted lines; b, parapodium of cirrigerous segment, posterior view, lateral part of dorsal tubercle indicated, style of dorsal cirrus missing; c, tip of notoseta; d, tip of neuroseta. (dT=dorsal tubercle, neP=nephridial papilla, vC=ventral cirrus.)

guished from Bathyadmetella and Bathymoorea according to the key on page 13.

Distribution: Widely distributed deep-sea form, North and South Atlantic, Indian Ocean, North Central Pacific. In 220 to 2779 fms.

Bathyadmetella, new genus

Type species: B. commando, new species. Gender: feminine.

Diagnosis: Polynoids with body large, oval, flattened, segments more than 50 (58). Prostomium with 2 long palps and 3 antennae;

median antenna with ceratophore inserted on anterior part of prostomium; lateral antennae inserted on anterolateral extensions of prostomium (i.e., lepidonotoid); with paired long antennal sheaths dorsal to lateral antennae. Tentacular segment (I) achaetous, with 2 pairs tentacular cirri, with paired long tentacular sheaths between palps and tentacular cirri, with bulbous facial tubercle between bases of palps. Buccal segment (II) with parapodia rudimentary, achaetous, with paired, long, ventral buccal cirri and first pair dorsal elytrophores. With lamellar papillae on ventral lip and ventral bases of parapodia on segments 2 and 3. Elytra or elytrophores more than 20 pairs (23), arranged on segments 2, 4, 5, 7, then on alternate segments to 23, and then on every third segment to end of body. Parapodia very long, subbiramous; notopodia small, with digitiform acicular lobes, achaetous; neuropodia with elongated acicular processes. Neurosetae numerous, forming brushlike bundles, transparent, fragile, inflated and flattened distally, with faint spinous rows and tapered tips.

Bathyadmetella commando, new species

FIGURES 3, 4

Material examined: The species is represented by a single damaged specimen, collected in a trawl haul, southwest of the mouth of the Columbia River, Oregon, 45°45′ N, 125°09′ W, 900 fms, 2.6° C bottom temperature, 34.372°/00 salinity, May 29, 1964, M/V Commando, M. S. Alton, collector. The holotype is deposited in the U.S. National Museum (USNM 33419).

Description: Length 55 mm, width of body 6 mm; width including parapodia 24 mm, including setae 34 mm; segments 58, last few small. Body widest in middle, tapering gradually anteriorly and more so posteriorly; flattened dorsoventrally; with extremely long parapodia. Integument thin, delicate. Body reddish brown, darker on parapodia and distal halves of elytrophores, lighter ventrally. Elytra all missing; elytrophores elongated, inflated basally, 23 pairs, arranged on segments 2, 4, 5, 7, then on alternate segments to 23, and then on every third segment to end of body. Dorsal tubercles on cirrigerous segments thin walled, inflated, continuous as low ridges to cirrophores of dorsal cirri; styles of dorsal cirri all missing.

Prostomium (figs. 3a,b) bilobed, wider than long, with paired very large bulging eyes occupying most of posterior half of prostomium; eyes with semicircular, dark purplish pigmented cups basally. Ceratophore of median antenna short, cylindrical, on anterior border prostomium; style missing. Ceratophores of lateral antennae long cylindrical extensions of anterolateral borders of prostomium; styles long, slender, with slight subterminal enlargements and slender tips. Paired elongate antennal sheaths dorsal to the lateral antennae, wider

basally, tapering distally; sheaths may completely enclose lateral antennae. Paired palps very long, tapering, and smooth. Prostomium with triangular pigmented area around base of ceratophore of median antenna, extending posteriorly between the two large eyes.

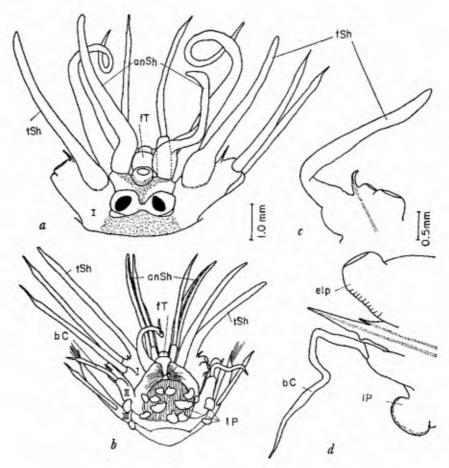


FIGURE 3.—Bathyadmetella commando, new species: a, dorsal view anterior end, styles of median antenna and left tentacular cirri missing, ceratophores of lateral antennae hidden by antennal sheaths (shown in dotted lines on right); b, same, ventral view; c, anterior view of achaetous parapodium of tentacular segment (I); styles of tentacular cirri missing; d, posterior view of left achaetous parapodium of buccal or first elytragerous segment (II). (anSh=antennal sheath, bC=buccal cirrus, elp=elytrophore, fT=facial tubercle, lP=lamellar papilla, tSh=tentacular sheath.)

First or tentacular segment (figs. 3a-c) forms short ring dorsally, projecting laterally to prostomium, achaetous, with 2 pairs long slender tentacular cirri similar to lateral antennae, cirrophores short, cylindrical, with a projecting acicular process. Paired long tentacular

sheaths attached basally on tentacular segment, wider basally, tapering distally, as long as tentacular cirri and may partially encircle the palps. A bulbous facial tubercle between bases of palps, continuous with a longitudinal ridge on upper lip. Second or buccal segment (figs. 3b, d) with first pair elytrophores; parapodia rudimentary, not elongated, with noto- and neuroacicular achaetous lobes; ventral or buccal cirri with inflated cirrophores and long styles; a lamellar papilla on ventral base of parapodium; ventral lip (fig. 3b) inflated, longitudinally grooved, with 11 lamellar papillae in three irregular rows. Setigerous parapodia elongated from third segment on. Lamellar papillae at ventral parapodial bases of segments 2 and 3;

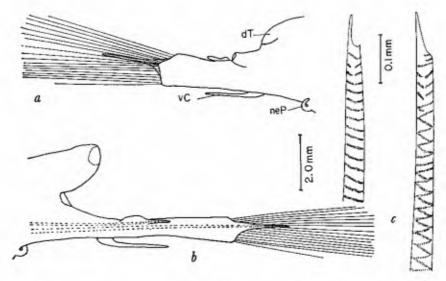


FIGURE 4.—Bathyadmetella commando, new species: a, cirrigerous parapodium, posterior view, style of dorsal cirrus missing; b, elytragerous parapodium, anterior view, elytron missing, position of acicula shown in dotted lines; c, tips of neurosetae. (dT=dorsal tubercle, neP=nephridial papilla, vC=ventral cirrus.)

ventral cirri on these 2 segments extra long, extending beyond the distal tips of the neuropodia (fig. 3b). Rest of ventral cirri short, subulate, in middle of elongated neuropodia (figs. 4a, b).

Parapodia (figs. 4a,b) elongated, subbiramous. Notopodia small lobes on anterodorsal faces of neuropodia, inflated basally, tapering to short digitiform acicular lobes, enclosing the slender tips of the notoacicula; notosetae lacking. Neuropodia flattened transversely, inflated subdistally, postsetal lobes subtriangular, presetal lobes with elongate acicular processes containing the neuroacicula. Neurosetae numerous, forming brushlike transparent bundles. Neurosetae with long, bare, basal regions, distally wider, flattened, with somewhat

spirally arranged fine spinous rows, tapered rather abruptly to very thin tips (fig. 4c).

Anus dorsal in position, surrounded by last few small segments (damaged somewhat in this area). Analcirri not observed. Nephridial papillae on ventral bases of parapodia, beginning on segment 4 and continuing posteriorly, small at first, becoming longer (shorter than ventral cirri), cylindrical and directed between the parapodia (fig. 4a). Pharynx not extended. The single specimen is ovigerous.

Remarks: Bathyadmetella commando is unique among the polynoids in having long antennal and tentacular sheaths and lamellar papillae on the ventral lip and ventral bases of the second and third segments. It is also unusual for its extremely large bulging eyes. It may be distinguished from Admetella and Bathymoorea according to the key on page 13.

Distribution: Northeastern Pacific (off Oregon). In 900 fms.

Bathymoorea, new genus

Type species: Polynoe(?) renotubulata Moore, 1910. Gender: feminine.

Diagnosis: Polynoids with relatively few segments (33). Prostomium with 2 long palps and 3 antennae; median antenna with ceratophore inserted in middle of prostomium; lateral antenna inserted on anterolateral extensions of prostomium (i.e., lepidonotoid). Tentacular segment (I) achaetous, with 2 pairs tentacular cirri, with bulbous facial tubercle between bases of palps. Buccal segment (II) with first pair elytra, setigerous parapodia, and long ventral buccal cirri. Elytra 14 pairs, arranged on segments 2, 4, 5, 7, then on alternate segments to 23, 26, 28, and absent on last 5 small segments. Parapodia elongated, subbiramous, with small notopodia; both rami with elongated, digitiform acicular processes. Notopodia with small tufts of setae. Notosetae delicate, finely spinous. Neuropodia with dense, brushlike bundles of transparent setae. Neurosetae distally expanded and flattened, with faint spinous rows and tapered tips. Nephridial papillae remarkably elongated, some extending to tips of neuropodia.

Bathymoorea renotubulata (Moore), new combination

FIGURE 5

Polynoe(?) renotubulata Moore, 1910, p. 368, pl. 31, figs. 59-64. Admetella renotubulata Hartman, 1938, p. 123.

Material examined: Holotype Polynoe(?) renotubulata (USNM 16878), Albatross Sta. 4397 (Apr. 1, 1904), off Santa Catalina Islands, southern California 33° 43′ N, 117° 42′ W, 2196 to 2228 fms, gray mud.

Description: Length 26 mm, width of body 3.6 mm; width including parapodia 13 mm, including setae 22 mm; segments 33, last few segments very small. Body subfusiform, widest in middle, tapering anteriorly and posteriorly. Elytra (usually missing) on large inflated elytrophores, 14 pairs, arranged on segments 2, 4, 5, 7, then on alternate segments to 23, 26, 28. First elytron (observed by Moore, now missing) suborbicular, of thick, soft, cushiony texture, thickly covered with soft dome-shaped papillae with single coarse filament at summit. Dorsal tubercles on cirrigerous segments inflated; cirrophores of dorsal cirri small; styles missing.

Prostomium (fig. 5a) bilobed, wider than long, with large pair, opaque ocular areas. Ceratophore of median antenna in middle of prostomium; style missing. Lateral antennae with short ceratophores formed by anterolateral extensions of prostomium; styles

tapered. Palps paired, thick, smooth, tapering.

First or tentacular segment projecting lateral to prostomium, achaetous, with 2 pairs tentacular cirri; styles long, slender, tapered. A bulbous facial tubercle between palps, continuous with longitudinal ridge on upper lip. Second or buccal segment with first pair elytrophores, notopodial acicular lobes, and neuropodial acicular lobes bearing bundles of neurosetae; cirrophores of ventral cirri large, styles missing. Ventral cirri on remaining segments short, subulate (fig. 5c).

Parapodia (figs. 5b, c) elongated, subbiramous, with tapering yellow acicula. Notopodia inflated basally, prolonged into long acicular processes, with small tufts of notosetae. Notosetae delicate, finely spinous (fig. 5d). Neuropodia with subconical postsetal lobes; presetal lobes prolonged into delicate acicular processes, with long, dense, brushlike bundles of neurosetae. Neurosetae transparent, distally expanded and flattened, with faint spinous rows, abruptly tapering to entire tips (may be split, appearing bifid, fig. 5e).

Anus dorsal, surrounded by small posterior segments. Anal cirri not observed. Nephridial papillae begin on segment 6 and continue posteriorly, becoming remarkably elongated, some extending beyond distal tips of neuropodia (figs. 5b, c). Pharynx not extended.

Remarks: Moore (1910) questionably placed this species in the genus *Polynoe*. Hartman (1938) referred it to *Admetella*; however, there is no trace of the triangular antennal scales characteristic of *Admetella*. Other differences are indicated in the key on page 13. As the specific name indicates, *B. renotubulata* is remarkable for the length of the nephridial papillae.

Distribution: Off southern California. In 2196 to 2228 fms.

The 3 bathyal genera, Admetella, Bathyadmetella, and Bathymoorea, have a number of characters in common, e.g., prostomia with paired

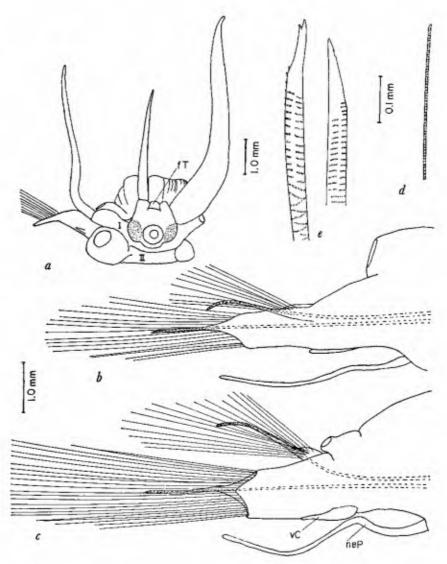


FIGURE 5.—Bathymoorea renotubulata: a, dorsal view anterior end, pharynx partially extended, opaque ocular areas stippled, left palp and styles of median and right lateral antennae missing, lower left and right tentacular cirri missing (I), right elytrophore and parapodium missing (II), b, elytragerous parapodium, anterior view, elytron missing, position of acicula shown in dotted lines; c, cirrigerous parapodium, posterior view, style of dorsal cirrus missing; d, tip of notoseta; e, tips of neurosetae. (I-II=segments, fT=facial tubercle, neP=nephridial papilla, vC=ventral cirrus.)

large eyes or ocular areas; ceratophores of lateral antennae formed by anterolateral continuations of prostomia (i.e., lepidonotoid); bulbous facial tubercle present and continuous with ridges on upper lips; long ventral cirri (buccal cirri) on segment II; parapodia very long, subbiramous, notopodia scarcely separated basally from the neuropodia, both rami with digitiform acicular processes; neurosetae all of one kind, numerous, long, transparent, flattened distally, distal tips very thin, entire (unless broken). The 3 genera may be distinguished according to the following key.

Key to Admetella, Bathyadmetella, and Bathymoorea

- Segments 33. Elytra (or elytrophores) 14 pairs, on segments 2, 4, 5, 7, then on alternate segments to 23, 26, 28, and absent from last 5 segments. Prostomium without antennal scales or sheaths. Ceratophore of median antenna in middle of prostomium. Without tentacular sheaths. Without nuchal fold. Buccal segment (II) with setigerous parapodia. Lower lip region bare, without papillae. Notopodia with long accular processes and small bundles of delicate notosetae. Nephridial papillae extremely long, may extend beyond neuropodial lobes Bathymoorea, new genus B. renotubulata (Moore)
- - Antennal sheaths long, digitiform, attached basally to and enclosing lateral antennae. Ceratophores of median antenna on anterior part of prostomium. With paired long digitiform tentacular sheaths between palps and tentacular cirri. Without nuchal fold. Lower lip region with series of lamellar papillae. Notopodia with short acicular processes, achaetous.

Bathyadmetella, new genus B. commando, new species

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