

A NEW SCALE-WORM COMMENSAL WITH DEEP-SEA  
MUSSELS IN THE SEEP-SITES AT THE FLORIDA  
ESCARPMENT IN THE EASTERN GULF OF MEXICO  
(POLYCHAETA: POLYNOIDAE: BRANCHIPOLYNOINAE)

Marian H. Pettibone

*Abstract.*—Some polynoid polychaetes found living commensally in mantle cavities of deep-sea mussels at the seep-sites near the Florida Escarpment, are described as a new species of *Branchipolynoe*, *B. seepensis*. They show some differences from the previously described *B. symmytilida*, commensal with deep-sea mussels in the Galapagos hydrothermal vents.

Among the abundant biological communities recently discovered in the abyssal eastern Gulf of Mexico near hypersaline seep-sites were large dense mats of mussels (Florida Escarpment Cruise Participants 1984, Paull et al. 1984, Turner and Lutz 1984, Denoux et al. 1985, Hecker 1985). They were collected in March 1984 during four dives of the submersible *Alvin* in 3266–3270 meters (26°02'N, 84°55'W). The mussels were found in dark iron-sulfide sediments at near-ambient temperatures in an area where dense hypersaline fluids seep out onto the sea floor. The communities were similar in many respects to the prolific communities found around the Galapagos hydrothermal vents and elsewhere in the Pacific.

Some polynoid polychaetes were found living commensally in the mantle cavities of these mussels. Six specimens were given to me for study by Dr. Barbara Hecker: five adults removed from the mussels by Dr. Ruth D. Turner, and a juvenile collected from washings of a clump of mussels.

It was of particular interest to compare these polynoids, commensal with the unnamed, non-hydrothermal, large, Gulf of Mexico mussels (to be described and named by Ruth Turner and Barry Wilson), with the polynoids commensal with the large mussels in the Galapagos hydrothermal vents,

recently described under the name *Bathymodiolus thermophilus* by Kenk and Wilson (1985). The Galapagos polynoids were referred earlier to a new genus and species, *Branchipolynoe symmytilida*, in a new subfamily of the Polynoidae, Branchipolynoinae (Pettibone 1984). The Gulf of Mexico commensals are referred herein to a new species of *Branchipolynoe*, *B. seepensis*.

The types are deposited in the National Museum of Natural History, Smithsonian Institution (USNM).

Branchipolynoinae Pettibone, 1984

*Branchipolynoe* Pettibone, 1984

*Type species.*—*Branchipolynoe symmytilida* Pettibone, 1984.

The generic diagnosis is emended to include *Branchipolynoe seepensis*, new species, commensal with deep-sea mussels in the Gulf of Mexico.

*Diagnosis, emended.*—Branchiae small to well developed, arborescent, on all parapodia from segment 2 or 3. Prostomium bilobed, with anterior lobes subtriangular or rounded, with or without minute frontal filaments; median antenna with ceratophore indistinct, style short; palps short to long. First or tentacular segment visible dorsally as short ring or fused to prostomium. Parapodia subbiramous or biramous; notopo-

dia small, nodular or conical with projecting acicular process; notosetae few (0–3) or moderate in number (5–20). Neuropodia with or without truncate lobes enclosing conical acicular lobes; neurosetae very numerous, upper ones much stouter or only slightly stouter than lower ones. Commensal with deep-sea mussels at hydrothermal vents or hypersaline seep-sites.

Key to the Species of *Branchipolynoe*

- 1. Elytra small, leaving greater part of dorsum uncovered (Pettibone 1984, figs. 1, 2A). Arborescent branchiae beginning on segment 2 (Pettibone 1984, figs. 2A, 3A). Anterior lobes of prostomium with minute frontal filaments (Pettibone 1984, fig. 2A). First or tentacular segment visible dorsally as small ring (Pettibone 1984, fig. 2A). Parapodia subbiramous, with notopodia small and 0 to few notosetae (Pettibone 1984, fig. 3F). Neuropodia with truncate lobes enclosing conical acicular lobes (Pettibone 1984, fig. 3F). Upper neurosetae much stouter than lower neurosetae (Pettibone 1984, fig. 3I, K). Ventral papillae on segments 11 and 12 short (Pettibone 1984, fig. 4C). Commensal with deep-sea mussels in Galapagos hydrothermal vents . . . . . *B. symmytilida* Pettibone, 1984
- Elytra large, leaving middle third of body uncovered (Fig. 1A). Arborescent branchiae beginning on segment 3 (Fig. 2B). Anterior lobes of prostomium without frontal filaments (Fig. 1A). Tentacular segment fused to prostomium, not visible dorsally as separate ring (Fig. 1A). Parapodia biramous, with notopodia large, conical, with moderate number of notosetae (Fig. 2C, D). Neuropodia without truncate lobes enclosing conical acicular lobes (Fig. 2D). Upper neurosetae only slightly stouter

than lower neurosetae (Fig. 2H, I). Ventral papillae on segments 11 and 12 long (Fig. 1D). Commensal with deep-sea mussels in hypersaline seeps in Gulf of Mexico . . . . .  
 . . . . . *B. seepensis*, new species

*Branchipolynoe seepensis*, new species  
 Figs. 1–4

*Material*.—Gulf of Mexico, from dives of *Alvin* in 1984, associated with mussels near hypersaline seeps at base of Florida Escarpment, in dark iron-sulfide sediment: Dive 1343, 9 Mar, 26°02'24"N, 84°54'48"W, 3266 m, from washings of clump of mussels, juvenile paratype (USNM 98782).—Dive 1344, 12 Mar, 26°02'N, 84°54' 48"W, 3270 m, from mantle cavities of mussels, holotype (USNM 98779), 2 paratypes (USNM 98780).—Dive 1346, same data, 2 paratypes (USNM 98791).

*Measurements*.—Holotype (USNM 98779) 31 mm long, 13 mm wide, including setae, with 21 segments. Two adult paratypes (USNM 98780) 27–28 mm long, 11–13 mm wide, with 21 segments. Two smaller adult paratypes (USNM 98781) 12–16 mm long, 5–7 mm wide, with 21 segments. Juvenile paratype (USNM 98782) 8 mm long, 3.5 mm wide, with 18 segments, last 2 very small.

*Description*.—Body short, spindle-shaped, slightly tapered anteriorly and posteriorly, flattened ventrally and strongly arched dorsally. Fully-developed worms having 21 segments, first achaetous, with 10 pairs of elytra attached on large, low elytophores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17 and 19. Elytra (Figs. 1A, E–G, 3A, B, 4C, D) moderately large, oval, covering lateral thirds of body on larger adults and nearly covering body on juvenile. Elytra oval, opaque, smooth, soft, and attached near middle on first pair and eccentrically attached near their anterior borders on following elytra, sometimes showing branched “veins.” Dorsal cirri on non-elytra-bearing

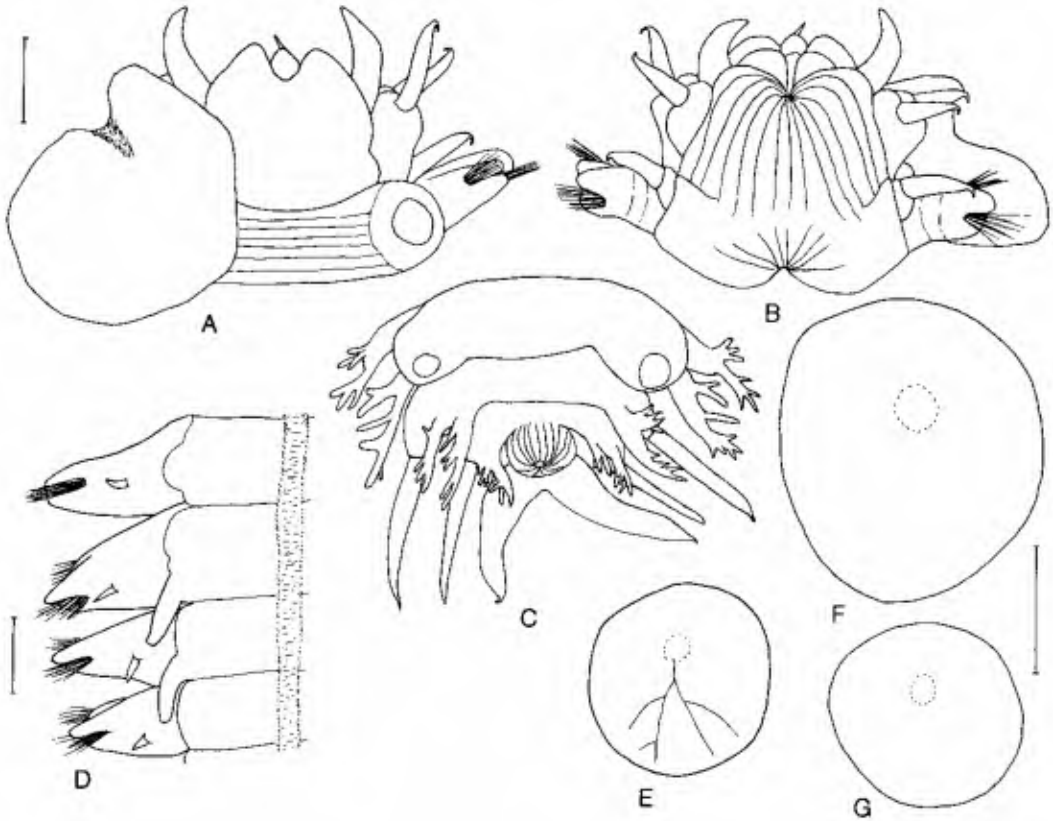
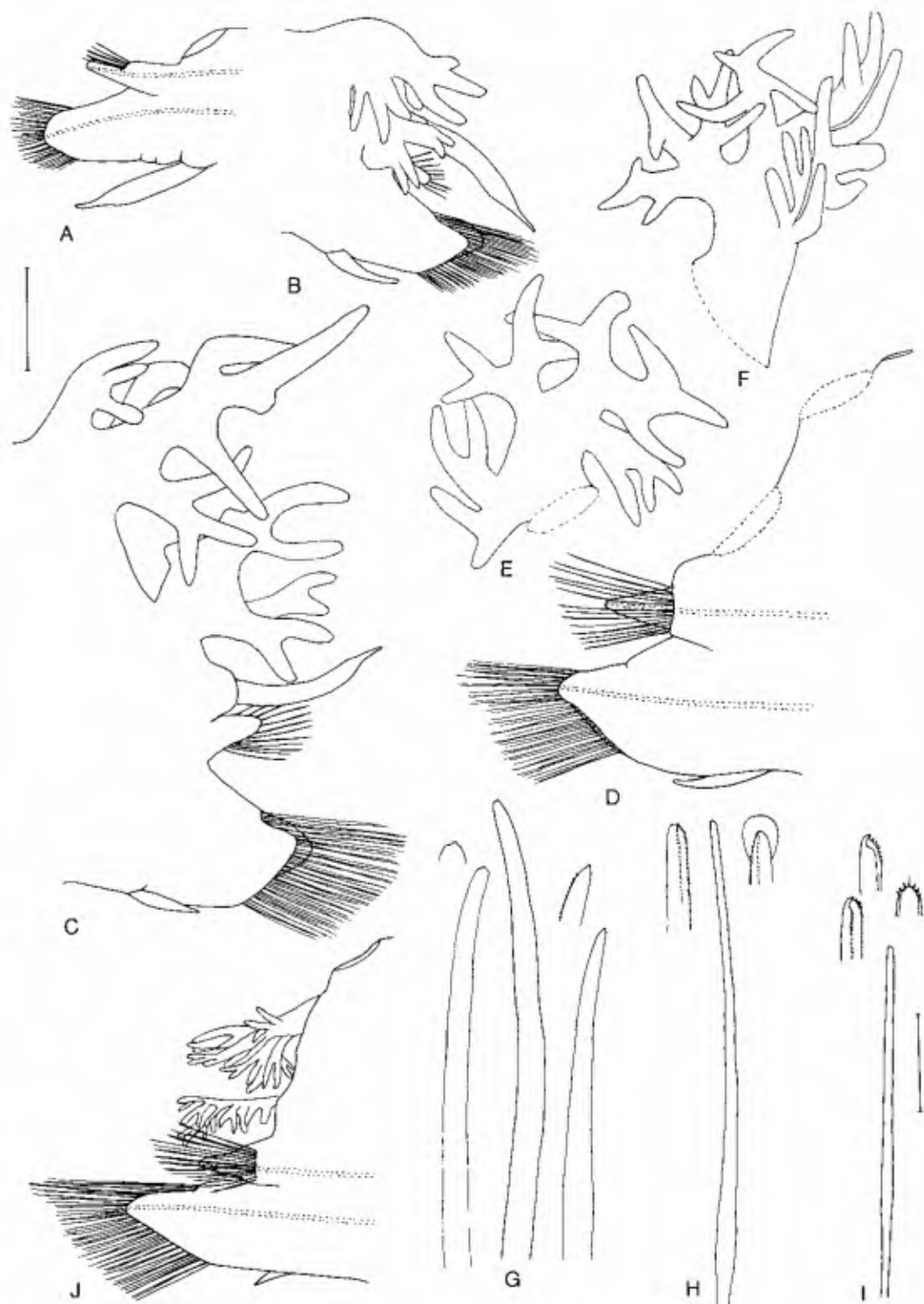


Fig. 1. *Branchipolynoe seepensis*, holotype (USNM 98779): A, Dorsal view of anterior end, right first elytron removed; B, Ventral view of anterior end; C, Dorsal view of posterior end showing segments 19 to 21 and pygidium, tenth elytra of segment 19 removed; D, Ventral view of right side of segments 10 to 13 showing elongate ventral papillae on segments 11 and 12; E, Right first elytron from segment 2, with "veins" indicated; F, Right fifth elytron from segment 9; G, Right tenth elytron from segment 19. Scales = 1.0 mm for A-C; 2.0 mm for D-G.

segments having short cylindrical cirrophores and short styles with slender tips, extending to about tips of neurosetae (Figs. 2B, E, 3D, 4E). Dorsal tubercles on cirriferous segments indistinct. Branchiae well developed, arborescent, with rather short

terminal filaments (Fig. 2B-F, J). Branchiae emerging from body in two short trunks, lower smaller group attached dorsal to bases of notopodia or cirrophores of dorsal cirri and upper larger one attached to lateral bases of elytriphores or dorsal tubercles.

Fig. 2. *Branchipolynoe seepensis*, holotype (USNM 98779): A, Right elytragerous parapodium from segment 2, anterior view, acicula dotted; B, Right cirriferous parapodium from segment 3, posterior view, cirrophore of dorsal cirrus hidden from view; C, Right cirriferous parapodium from segment 8, posterior view; D, Right elytragerous parapodium from segment 9, anterior view, acicula dotted, branchiae cut off; E, Lower branchia from same; F, Upper branchia from same; G, Three neurosetae from same, with detail of tips; H, Upper neuroseta from same, with detail of tips; I, Lower neuroseta from same, with detail of tips; J, Right elytragerous parapodium from segment 15, anterior view, acicula. Scales = 1.0 mm for A-F; 0.1 mm for G-I.



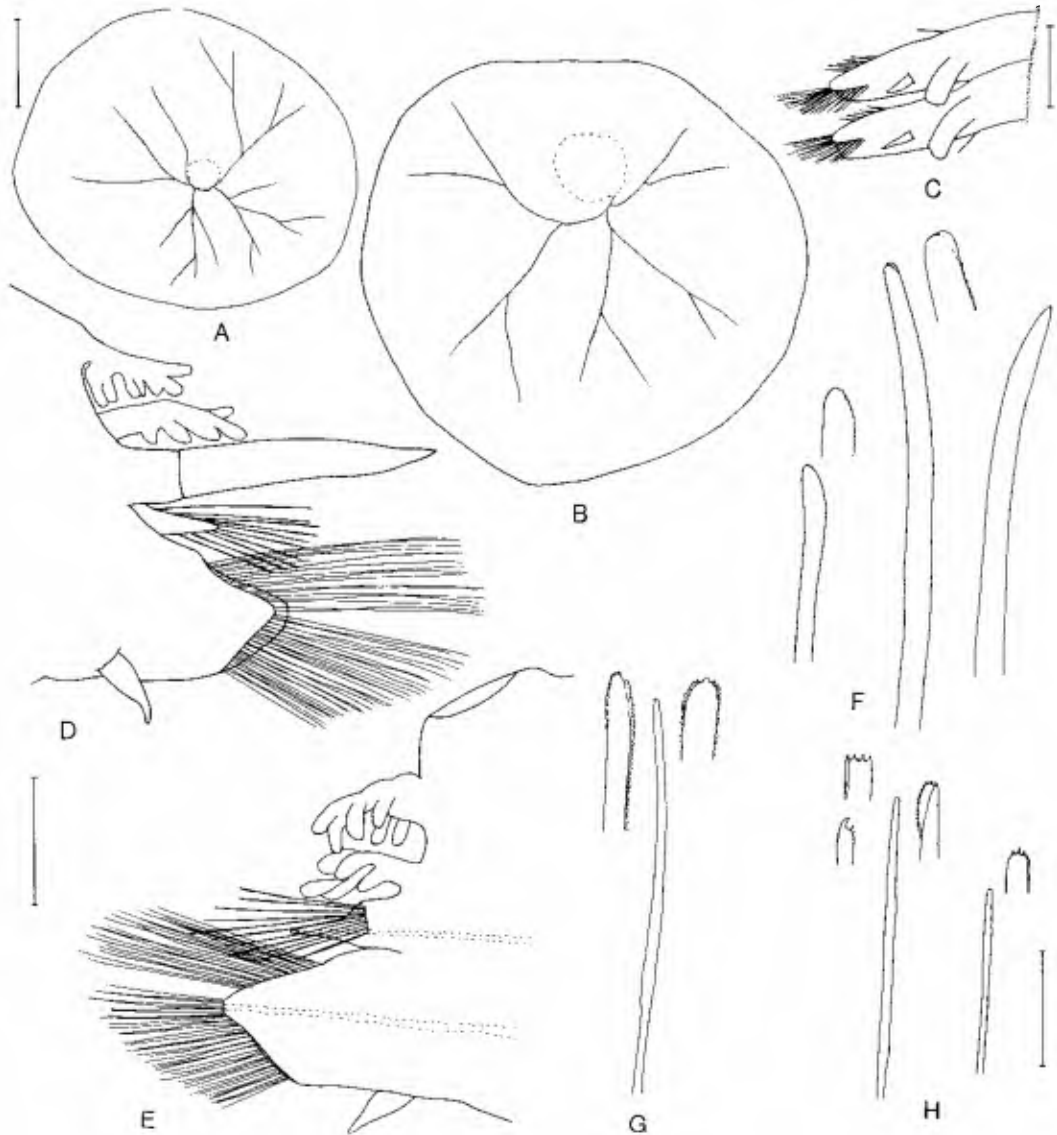


Fig. 3. *Branchipolynoe seepensis*, smaller adult paratype of  $12 \times 5$  mm (USNM 98781): A, First elytron, with "veins" indicated; B, Middle elytron; C, Ventral view of right side of segments 11 and 12, showing elongate ventral papillae; D, Right middle cirriferous parapodium, posterior view; E, Right middle elytragerous parapodium, anterior view, acicula dotted; F, Three notosetae from same, with detail of tips; G, Upper neuroseta from same, with detail of tips; H, Two lower neurosetae from same, with detail of tips. Scales = 0.5 mm for A, B; 1.0 mm for C; 0.5 mm for D, E; 0.1 for F-H.

Branches of branchiae somewhat flattened and spread anteriorly and posteriorly between parapodia. Branchiae beginning on segment 3 as 2 small groups (Fig. 2B), becoming larger with more numerous branch-

es in middle region (Fig. 2C), and smaller posteriorly (Figs. 1C, 2J). Branchiae smaller on smaller adults (Fig. 3D, E), very small and incompletely developed on juvenile (Fig. 4E, F).

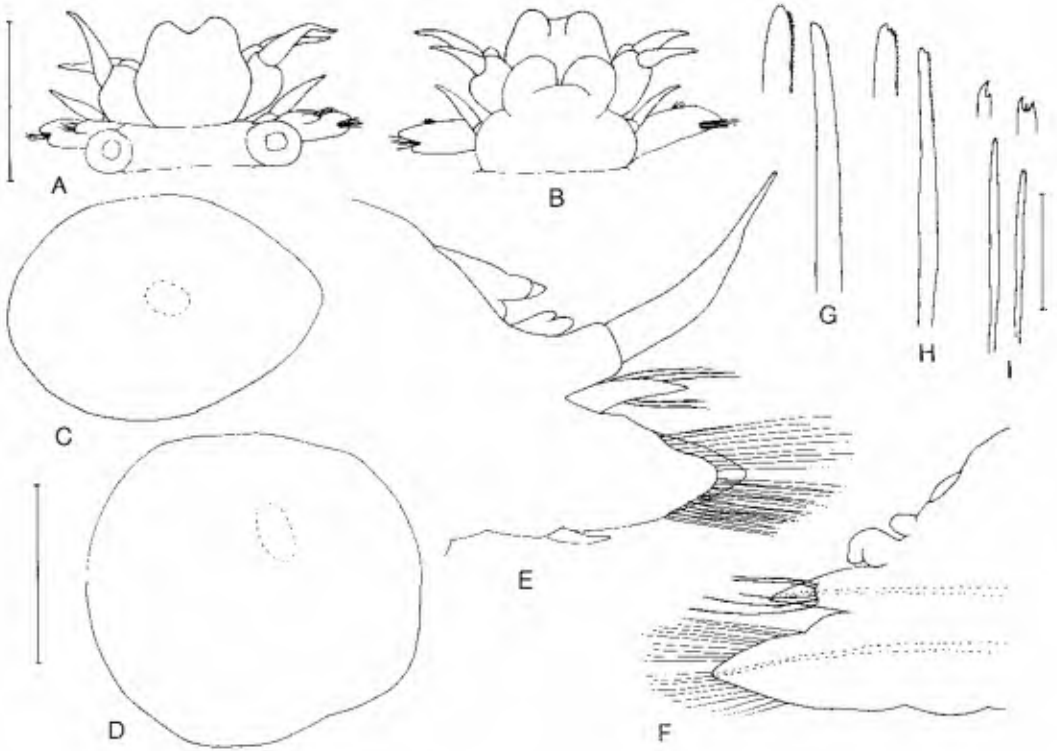


Fig. 4. *Branchipolynoe seepensis*, juvenile paratype, 8 × 3.5 mm, (USNM 98782): A, Dorsal view of anterior end, median antenna and palps missing; B, Ventral view of anterior end; C, Right first elytron; D, Right middle elytron; E, Right cirriferous parapodium, posterior view; F, Right elytragerous parapodium, anterior view, acicula dotted; G, Notoseta from same, with detail of tip; H, Upper neuroseta from same, with detail of tip; I, Two lower neurosetae from same, with detail of tips. Scales = 1.0 mm for A, B; 0.5 mm for C–F; 0.1 mm for G–I.

Prostomium (Figs. 1A, B, 4A, B) oval, bilobed, with rounded anterior lobes lacking frontal filaments. Median antenna, lacking distinct ceratophore, inserted in anterior notch; short, conical, with slender tip; ventrolateral palps rather short, thick, smooth, and tapered, extending beyond prostomium; lateral antennae and eyes lacking. First or tentacular segment fused to prostomium and not distinct dorsally; tentaculophores, lateral to prostomium, achaetous, short and bulbous, each with pair of short cirriform tentacular cirri with slender tips, about as long as palps (Figs. 1A, B, 4A, B). Second or buccal segment bearing first pair of large elytraphores and elytra, biramous parap-

odia with smaller conical notopodia with up to 9 notosetae, and larger rounded neuropodia with numerous slender neurosetae and lower buccal cirri attached basally, similar to tentacular cirri (Figs. 1A, B, 2A, 4A, B). Mouth ventral with lateral and posterior lips, enclosed in tentacular and buccal segments (Figs. 1B, 4B). Thick muscular pharynx extended on one of paratypes (USNM 98780), with opening pulled tightly together; when cut open, 5 pairs of small, delicate, oval papillae around opening and 2 pairs of small jaws, lacking denticulated bases (similar to that figured for *B. symmytilida*, Pettibone 1984, fig. 2F, G), revealed.

Biramous parapodia having short conical

notopodia and long conical neuropodia (Figs. 2B–D, J, 3D, E, 4E, F). Notosetae moderate in number (up to 20 on adults, up to 5 on juvenile), short to long, extending nearly to tips of neuropodia; stouter than neurosetae, acicular, smooth or slightly roughened distally, with tips rounded (Figs. 2G, 3F, 4G). Presetal acicular lobes of neuropodia slightly longer than postsetal lobes. Neurosetae very numerous, long, slender, separated by slight gap into upper supra-acicular and lower subacicular groups. Upper neurosetae slightly stouter than lower ones, minutely serrated, with blunt tips (Figs. 2H, 3G, 4H), some with terminal bulb (Fig. 2H, upper right). Lower neurosetae more slender and having hooked tips with some longer denticles (Figs. 2I, 3H, 4I). Ventral cirri, attached to middle of neuropodia, short, tapered, and not reaching tips of neuropodia (Fig. 2C, D).

Pygidium rather large and bulbous, with terminal anus and pair of stout anal cirri basally fused; enclosed in parapodia of last two posterior segments (20, 21) and their long dorsal cirri (Fig. 1C). Distinct segmental or nephridial papillae not present, except for 2 pairs of long ventral papillae on segments 11 and 12, projecting posteriorly (Fig. 1D). Papillae shorter on smaller adult paratype (Fig. 3C), absent on juvenile.

*Etymology.*—Neo-Latin adjective *seepensis*, formed from *seep*, in reference to the distribution of the species in the hypersaline seeps in the Gulf of Mexico.

*Remarks.*—According to the preliminary report by Denoux et al. (1985), the chemosynthetic vent-type taxa found in hypersaline, cold water, hydrocarbon seeps in the Gulf of Mexico are associated with an abundance of non-chemosynthetic species and this enhanced community diversity suggests the possibility that the oil seep communities may be the progenitors of those at the deep-water vent sites and, thus, more primitive. There are some indications that the Gulf of Mexico commensal, *B. seepensis*,

might very well be more primitive than the Galapagos commensal, *B. symmytilida*. In *B. seepensis*, the parapodia are biramous, with large notopodia and a moderate number of notosetae; the neuropodia have the form of conical acicular lobes, following the usual pattern in the Polynoidae. In *B. symmytilida*, the parapodia are subbiramous, with the notopodia small, nodular, and the notosetae few to none; the neuropodia have an extra truncate lobe enclosing the acicular lobe, thus, the development of a new structure. There is greater development of the arborescent branchiae in *B. symmytilida* than in *B. seepensis*.

#### Acknowledgments

I wish to thank the Florida Escarpment Cruise Participants and especially Drs. Barbara Hecker and Ruth Turner for the material on which this study is based. The manuscript benefited from the reviews of Drs. Meredith L. Jones, Nancy J. Maciolek, and James A. Blake.

#### Literature Cited

- Denoux, G. J., M. C. Kennicutt, II, R. R. Bidigare, J. M. Brooks, R. R. Fay, M. L. Jones, and R. D. Turner. 1985. Description of a hydrocarbon-seep community on the Louisiana slope.—*American Zoologist* 25(4):10A, Abstract 35.
- Florida Escarpment Cruise Participants. 1984. The seeps find at the Florida Escarpment.—*Oceanus* 27(3):32–33.
- Hecker, B. 1985. Fauna from a cold sulfur-seep in the Gulf of Mexico: Comparison with hydrothermal vent communities and evolutionary implications.—*Bulletin of the Biological Society of Washington* 6:465–473.
- Kenk, V. C., and B. R. Wilson. 1985. A new mussel (Bivalvia, Mytilidae) from hydrothermal vents in the Galapagos rift zone.—*Malacologia* 26(1–2):253–271.
- Paull, C. K., B. Hecker, R. Commeau, R. P. Freeman-Lynde, C. Neumann, W. P. Corso, S. Golubic, J. E. Hook, E. Sikes, and J. Curray. 1984. Biological communities at the Florida Escarpment resemble hydrothermal vent taxa.—*Science* 226:965–967.

- Pettibone, M. H. 1984. A new scale-worm commensal with deep-sea mussels on the Galapagos hydrothermal vent (Polychaeta: Polynoidae).—*Proceedings of the Biological Society of Washington* 97(1):226–239.
- Turner, R. D., and R. A. Lutz. 1984. Growth and distribution of mollusks at deep-sea vents and seeps.—*Oceanus* 27(3):54–62.

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