

*POLYDORA AND BOCCARDIA SPECIES (POLYCHAETA:  
SPIONIDAE) FROM WESTERN MEXICO,  
CHIEFLY FROM CALCAREOUS HABITATS*

James A. Blake

*Abstract.*—Nine species of spionid polychaetes are reported from the Gulf of California. Most species are borers in various gastropod shells. The description of *Polydora nuchalis* is clarified and *P. heterochaeta* is redescribed. *Polydora barbilla* is new to science. *Polydora anophthalma* is transferred to *Boccardia* and redescribed.

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A list of polychaetes from the Gulf of California was provided by Reish (1968), who recorded 20 species of Spionidae. Additional species were added by Light (1970), Fauchald (1972), Kudenov (1973, 1975) and Blake (1979a) bringing the total number to about 30. In general, the shell boring spionids from the Gulf of California have not been studied. Recently, while conducting revisionary work on the Spionidae, it was possible to examine several gastropod shells from various localities in the Gulf of California. Spionids were recovered following dissolution of the shells in an acidified alcohol solution (70% isopropanol + HCl). These forms are reported herein along with some additional records from benthic habitats.

The collections are deposited in the Allan Hancock Foundation, University of Southern California (AHF), National Museum of Natural History, Smithsonian Institution (USNM) and the California Academy of Sciences (CAS).

The following spionid species from Mexico are included in this report: *Polydora barbilla*, new species; *Polydora convexa* Blake and Woodwick, 1972; *Polydora socialis* (Schmarda, 1861); *Polydora giardi* Mesnil, 1896; *Polydora nuchalis* Woodwick, 1953; *Polydora websteri* Hartman, 1943; *Polydora heterochaeta* Rioja, 1939; *Boccardia anophthalma* (Rioja, 1962), new combination; *Boccardia tricuspa* (Hartman, 1939).

*Polydora barbilla*, new species

Fig. 1

*Material examined.*—MEXICO, Gulf of California, 3-5 km west of Puerto Peñasco, 15 m, from shell of *Muricanthus nigrinus*, 20 March, 1971, coll. J. D. Kudenov, holotype (AHF Poly 1296), 10 paratypes (AHF Poly 1297) and 5 paratypes (USNM 58978).

*Description.*—A moderate sized species, up to 12 mm long and 0.5 mm



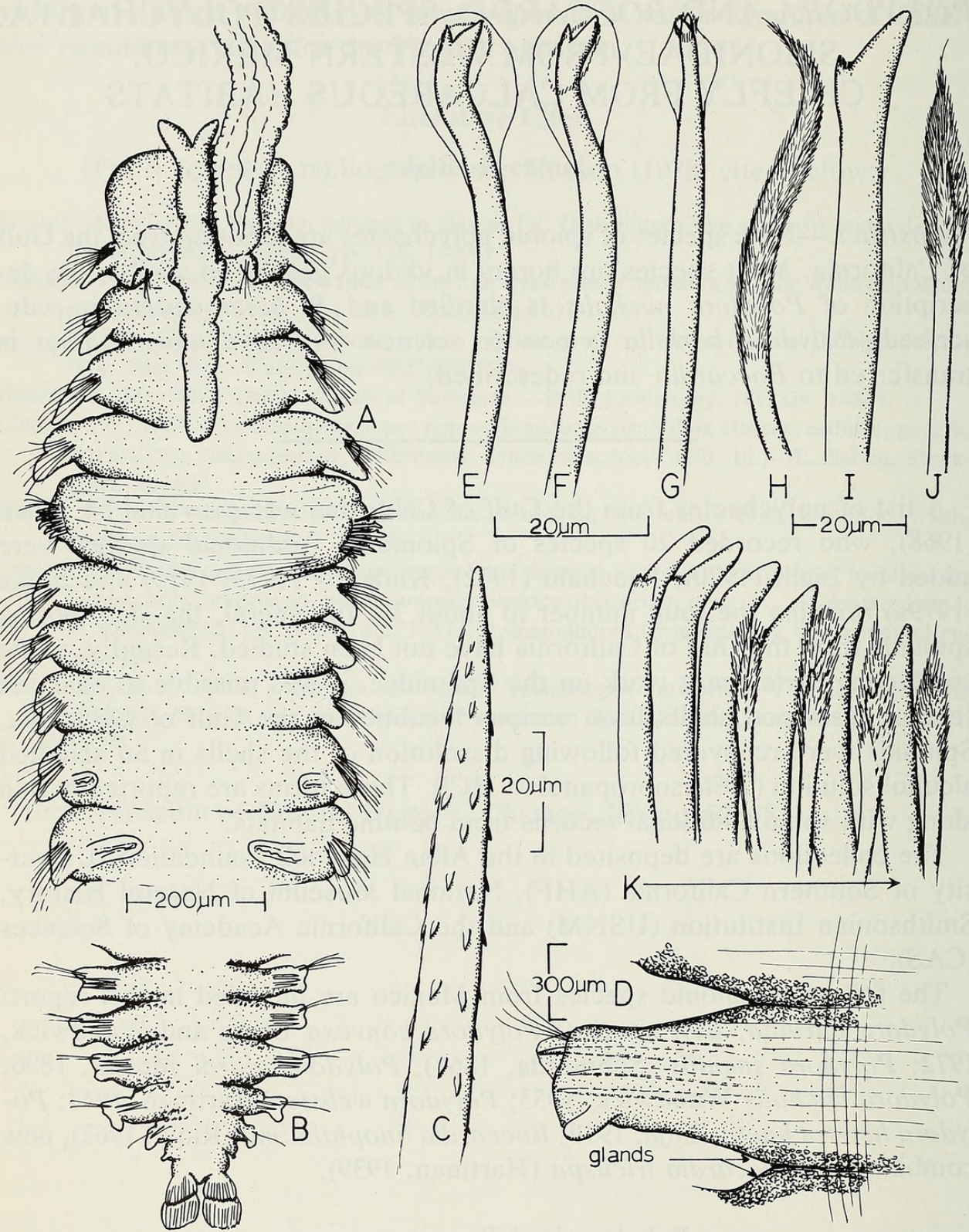


Fig. 1. *Polydora barbilla* (paratype, AHF Poly 1297): A, Anterior end in dorsal view; B, Posterior end in dorsal view; C, Notopodial acicular spine from posterior setiger showing basally directed barbs; D, Posterior parapodium in dorsal view showing location of acicular spines; E-G, Hooded hooks; H, Dorsal geniculate seta from setiger 5; I, Major spine from setiger 5; J, Companion seta from setiger 5; K, Fascicle of major spines and companion setae from setiger 5.



wide for about 130 segments. Color: light tan in alcohol, some specimens with dorsal intersegmental pigment bands. Intersegmental glands present in middle and posterior setigers (Fig. 1D).

Prostomium deeply incised on anterior margin (Fig. 1A), with caruncle extending to posterior margin of setiger 3; no occipital tentacle; eyes 0–4. Peristomium enlarged, truncate on anterior margin; palps long, thin, reaching posteriorly for about 20 segments.

Setiger 1 with long, fingerlike notopodial lobes; notosetae short, with two tiers of thin capillaries; setigers 2–4, 6 and subsequent setigers with notosetal fascicles of bilimbate capillaries arranged in two tiers, setae of anterior tier being shorter than posterior tier; posterior setigers with 3–4 emergent or imbedded acicular spines and 3–5 long capillaries (Fig. 1B–D), each spine with minute barbs basally directed on shaft (Fig. 1C). Neurosetae of setigers 1–4 and 6 with capillaries arranged in two tiers as described for notosetae; bidentate hooded hooks from setiger 7, numbering 4–6 throughout most of body, then diminishing to 2 in far posterior segments; hooks accompanied by capillaries for only 5 or 6 segments; hooks lacking constriction or manubrium on shaft, with angle between teeth being less than 90° but about 150° between main fang and shaft (Fig. 1E–F); apical tooth difficult to see in some angles (Fig. 1G), but always present; hood opening with fine bristles (Fig. 1E–G).

Setiger 5 modified, larger than either 4 or 6 (Fig. 1A); setae including superior dorsal fascicle of 5 or 6 finely bristled geniculate setae (Fig. 1H), curved row of major spines (Fig. 1I, K) with bilimbate companion setae (Fig. 1J–K) and ventral fascicle of bilimbate capillaries; major spines falcate with finely bristled collar on convex side.

Branchiae from setiger 9–10, small at first, reaching full-size by setigers 12–14, absent from posterior one-half of body.

Pygidium with 4 lobes, dorsal pair being distinctly smaller than ventral pair (Fig. 1B).

*Etymology*.—*barbilla*: Spanish for barb, as on a fish.

*Remarks*.—*Polydora barbilla* is closely related to *P. langerhansi* Mesnil, 1896, from Madeira, *P. convexa* Blake and Woodwick, 1972, from California and *P. pilocollaris* Blake and Kudenov, 1978, from Victoria, Australia in having a flange or collar on the convex side of the major spines of setiger 5. Only *P. barbilla* and *P. convexa*, however, have spines in posterior notopodia. In *P. barbilla*, these spines are of a unique acicular type bearing minute, basally directed barbs. *P. convexa*, on the other hand, has small posterior needles arranged in flattened packets. *P. barbilla* has branchiae from setiger 9–10 and bidentate hooded hooks occurring throughout, while *P. convexa* has branchiae from setiger 8 and unidentate hooded hooks in posterior neuropodia.

Rioja (1939) described a larval stage (*Polydora* sp.) from Acapulco having



similarly appearing major spines on setiger 5 as occur in *P. barbilla* and *P. convexa*. Since both species are now known to occur in the Gulf of California, it is not possible at this time to assign Rioja's record to either species until their larval morphologies are described.

*Distribution*.—Mexico: Gulf of California, boring into gastropod shells.

*Polydora convexa* Blake and Woodward, 1972

*Polydora convexa* Blake and Woodward, 1972:73–74, fig. 1.

*Material examined*.—MEXICO, Gulf of California, 3–5 km west of Puerto Peñasco, 15 m, from shell of *Muricanthus nigrinus*, 20 March 1971, coll. J. D. Kudenov, 1 specimen (AHF).

*Remarks*.—The Mexican specimen agrees with the description of specimens from California by Blake and Woodward (1972), except that the nature of the posterior spines was originally misconstrued. They were said to be tight fibril bundles, but are instead flattened packets of needles, similar to those reported for *Polydora flava* and *P. latispinosa* by Blake and Kudenov (1978). These structures glisten and shine in the posterior segments of the animal and make it possible to separate the species from others in a sample.

*Distribution*.—Mexico and California. A borer of mollusk shells; also reported from algal holdfasts, sponges, *Dodecaceria* colonies, and bryozoa by Blake and Woodward (1972).

*Polydora socialis* (Schmarda, 1861)

*Polydora socialis*.—Blake, 1971:20–23, fig. 13 [Synonymy]; 1979b:607–609.—Light, 1978:179–181, fig. 180a–l [Synonymy].—Rioja, 1947:207–208.

*Polydora socialis plena*.—Reish, 1968:82.

*Material examined*.—MEXICO, Bahía de Los Angeles, April 1962 and October 1963, coll. Beaudette Foundation, Sta. 3, 2 specimens (USNM 58983); Sta. 5, 1 specimen (USNM 58984); Sta. 9, 1 specimen (USNM 58985); Sta. 28, 1 specimen (USNM 58986); Sta. 36, 2 specimens (USNM 58987); Sta. 146, 1 specimen (USNM 58988). San Felipe, near mouth of Arroyo Estralla, boring in shell of *Muricanthus nigrinus* occupied by hermit crab, 12 April 1952, coll. L. O. Miles, 10+ specimens (AHF).

*Remarks*.—*Polydora socialis* is widespread and may prove to be cosmopolitan once sufficient material is examined. The species appears to be highly opportunistic and occupies benthic habitats as well as the shells of mollusks. The present specimens agree well with published descriptions.

*Distribution*.—East, west, and gulf coasts of North America; Chile; Australia.



*Polydora giardi* Mesnil, 1896

Fig. 2A–B

*Polydora giardi* Mesnil, 1896:195–202, pl. 13, figs. 1–12.—Fauvel, 1927:50–52, fig. 17h–m.—Hartman, 1941:309, pl. 48, fig. 43; 1961:29; 1969:135–136, figs. 1–6.—Rioja, 1941:727; 1943:230.—Rainer, 1973:560, fig. 9.—Read, 1975:413.—Blake and Kudenov, 1978:252, fig. 38i–k.

*Material examined*.—MEXICO, Sonora, off Cholla, 16.7 m, boring into shell of gastropod, 26 Dec. 1966, coll. T. A. Burch, 3 specimens (CAS 010131).

*Remarks*.—*Polydora giardi* is a small species, seldom exceeding 6–7 mm in length, and characterized by having an incised prostomium, a tooth on the major spines of setiger 5, branchiae usually from setiger 9, and by lacking a constriction on the hooded hooks and posterior notopodial spines. Its closest relative appears to be *P. tridenticulata* Woodward from the central Pacific, which differs only in having 2 distinct teeth on the major spines of setiger 5. Two undescribed species from the eastern Pacific have been discovered which appear to be closely related to *P. giardi* and *P. tridenticulata*. Both forms, however, have posterior notopodial spines.

The setal morphology of *P. giardi* and *P. tridenticulata* poses some interesting questions with regard to the consistency of having 1 or 2 accessory teeth on the major spines of setiger 5. Some specimens of *P. giardi* from the eastern Pacific appear to have a second spur on the opposite side from the large accessory tooth. The large accessory tooth is clearly seen with the scanning electron microscope (SEM) (Fig. 2A). The same figure also reveals a thin, closely adhering protuberance on the opposite side. This structure is difficult to detect, but appears to flare at its apex into several bristles. It is not known how common this structure is among *P. giardi* populations, or whether it is homologous to the large second accessory tooth of the related species, *P. tridenticulata*. Rice and Simon (1980) have observed that a small percentage of some Florida populations of *P. ligni* have an extra accessory tooth on the major spines of setiger 5. This suggests to me that such structures among species of *Polydora* may represent small scale genetic variation rather than wide scale species level morphological criteria. Whether or not such a system is operative in *P. giardi* and its relatives remains to be determined.

Figure 2A also reveals that the companion setae of setiger 5 are distinctly bristled. The hooded hooks are also bristled on their apical ends, with the teeth only barely protruding through the hood opening (Fig. 2B).

*Polydora nuchalis* Woodward, 1953

Figs. 2C–D, 3

*Polydora nuchalis* Woodward, 1953:381–383, fig. 1a–f; 1960:122–128, pls.



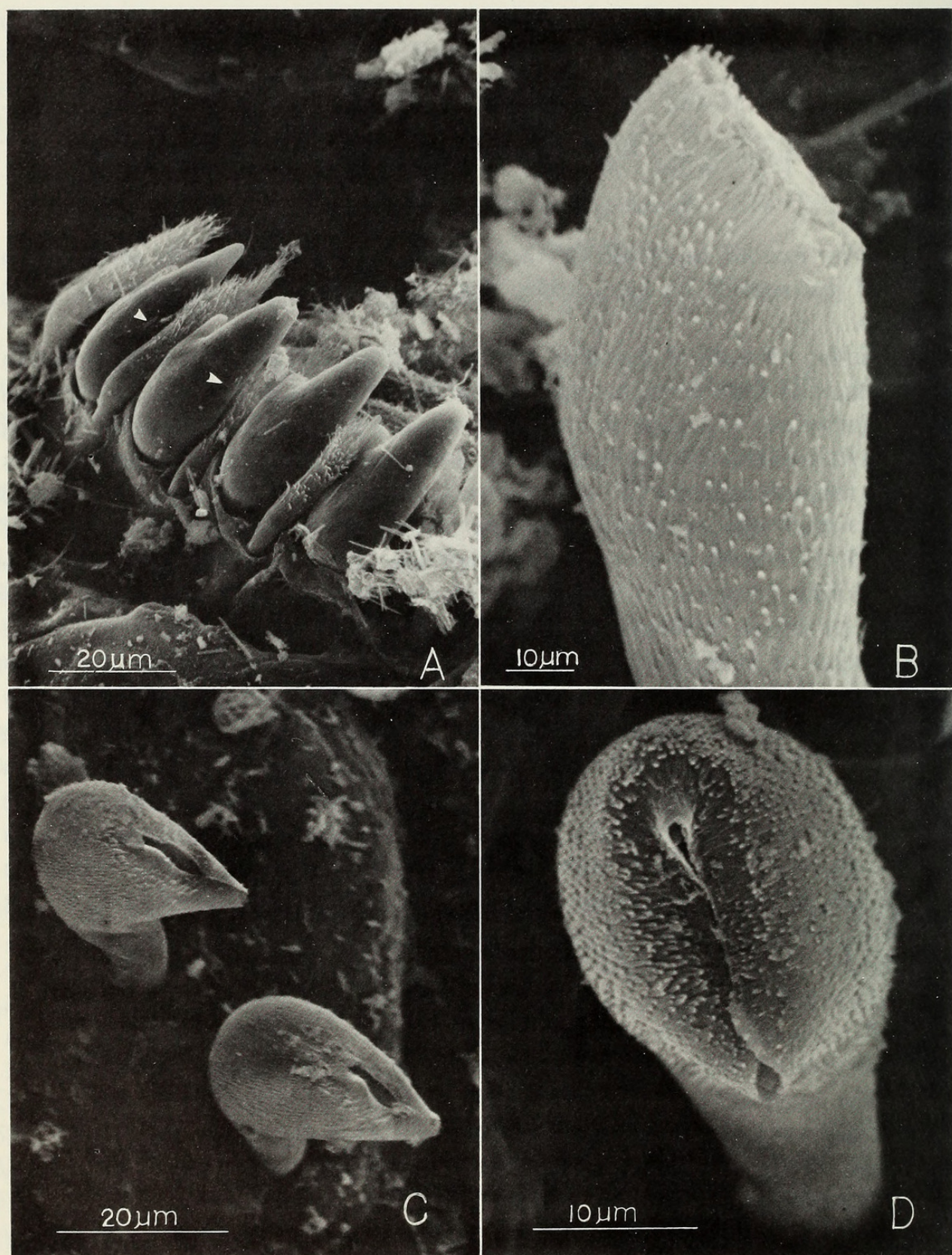


Fig. 2. *Polydora giardi*: A, Fascicle of major spines from setiger 5, arrows denotes locations of small adhering secondary spurs; B, Hooded hook.—*Polydora nuchalis*: C, Two hooded hooks in apical view; D, Hooded hook in dorsofrontal view. SEM micrographs.



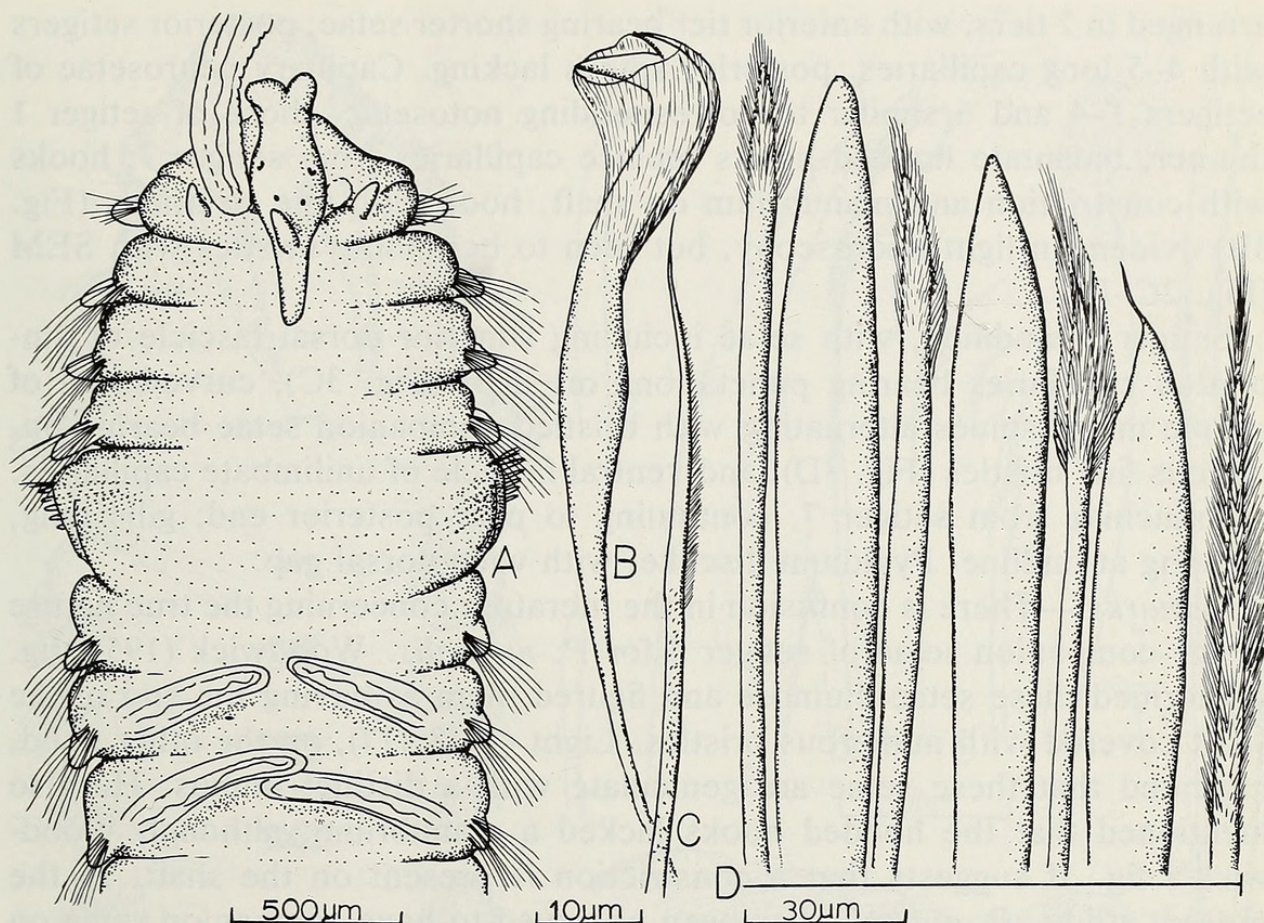


Fig. 3. *Polydora nuchalis*: A, Anterior end of Mexican specimen in dorsal view; B, Hooded hook; C, Fimbriated capillary notoseta from setiger 5; D, Group of companion setae and major spines from setiger 5.

1–3.—Hartman, 1961:29; 1969:143–144, figs. 1–5.—Blake, 1975:215.—Light, 1978:177.—Kudenov, 1973:116–117; 1975:206.

**Material examined.**—MEXICO, Puerto Peñasco, Bahía Cholla, high intertidal sand flats, occurring in dense mats, 19 Jan. 1972, coll. J. D. Kudenov, 2 specimens (AHF). CALIFORNIA, Duxbury Reef, near Bolinas, from high intertidal rock platform, in sand on bottom of pool, 2 Feb. 1978, coll. J. A. Blake (CAS 010130).

**Description.**—Specimens from Cholla Bay up to 19 mm long and 1 mm wide for approximately 110 segments. Color: light tan in alcohol, no pigment.

Prostomium incised on anterior margin, continuing posteriorly as caruncle to setiger 3 (Fig. 3A); two pairs of eyes: anterior pair cup-shaped, posterior pair oval-shaped and less widely spaced; occipital tentacle present posterior to eyes.

Setiger 1 with dorsally elevated, short notopodial lobes, notosetae absent; capillary notosetae of setigers 2–4, 6 and subsequent setigers unilimbate,



arranged in 2 tiers, with anterior tier bearing shorter setae; posterior setigers with 4–5 long capillaries, posterior spines lacking. Capillary neurosetae of setigers 1–4 and 6 similar to corresponding notosetae, those of setiger 1 thinner; bidentate hooded hooks replace capillaries from setiger 7; hooks with constriction and manubrium on shaft, hood with fine striations (Fig. 3B) evident in light microscopy, but seen to be minute bristles with SEM (Fig. 2C–D).

Setiger 5 modified, with setae including superior dorsal fascicle of fimbriated capillaries bearing punctations on shaft (Fig. 3C), curved row of simple major spines alternating with bristled companion setae bearing numerous fine bristles (Fig. 3D), and ventral fascicle of unilimbate capillaries.

Branchiae from setiger 7, continuing to near posterior end; gills long, meeting at midline. Pygidium disclike, with wide dorsal gap.

*Remarks.*—There is confusion in the literature concerning the true nature of the companion setae of setiger 5 for *P. nuchalis*. Woodwick (1953, fig. 1e) termed these setae plumose and figured them as having the end of the shaft covered with numerous bristles. Light (1978:177), on the other hand, indicated that these setae are geniculate with a distinct limbus. He also mentioned that the hooded hooks lacked a manubrium, although Woodwick's fig. 1f suggests that a constriction is present on the shaft. In the present study, *P. nuchalis* has been observed to have companion setae on setiger 5 which are very similar to those depicted by Woodwick. The ends of the shaft are covered with numerous fine bristles, observed both with the light microscope and SEM. At low magnifications (400 $\times$ ) with light microscopy, the setae appear to be bilimbate, with the bristles visible under oil immersion (1,000 $\times$ ). The hooded hooks have a manubrium and constriction on their shafts. The bristles observed on the hoods have not been described previously, but have been observed on most other spionids when examined under SEM.

*Distribution.*—Mexico: Gulf of California; California.

*Polydora websteri* Hartman, 1943

*Polydora websteri.*—Blake, 1971:6–8, fig. 3 [Synonymy].—Foster, 1971:26–27, figs. 30–36 [Synonymy].

?*Polydora ciliata.*—Rioja, 1943:229 [not Johnston, 1838].

*Material examined.*—MEXICO, Gulf of California, 3–5 km west of Puerto Peñasco, 15 m, from shell of *Muricanthus nigritus*, 20 March 1971, coll. J. D. Kudenov, 15 specimens (AHF); Sonora, off Cholla, 16.7 m, with bryozoa and shell fragments, 26 Dec. 1966, coll. T. A. Burch, 1 specimen (CAS 000114).

*Remarks.*—These specimens agree well with the published descriptions. It is probable that the record of *P. ciliata* by Rioja (1943) from Guymas may



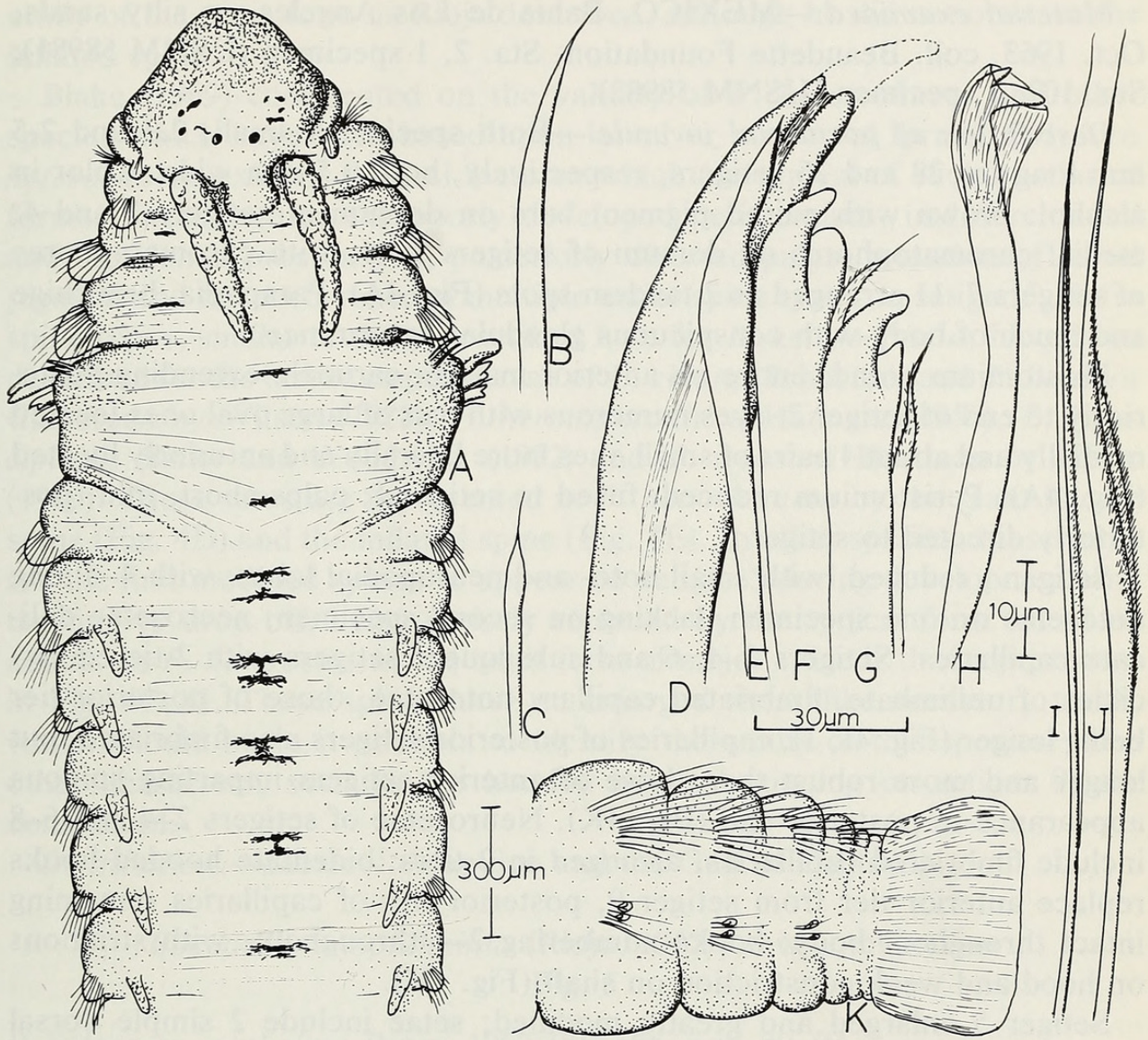


Fig. 4. *Polydora heterochaeta*: A, Anterior end in dorsal view; B, Dorsal capillary notoseta from setiger 5; C, Ventral capillary neuroseta from setiger 5; D, Giant falcate spine from setiger 5; E, Inflated spine from setiger 5; F-G, Normal major spines and hastate companion setae from setiger 5; H, Hooded hook; I, Capillary notoseta from anterior tier of anterior setiger; J, Capillary notoseta from posterior tier of same; K, Posterior end with pygidium in lateral view.

be *P. websteri*, but since Rioja's specimens are no longer available, new materials will need to be collected.

*Distribution*.—East, west, and gulf coasts of North America; Australia.

*Polydora heterochaeta* Rioja, 1939

Fig. 4

*Polydora heterochaeta* Rioja, 1939:308–309, figs. 6–10; 1962:185.—Reish, 1968:82.



*Material examined.*—MEXICO, Bahía de Los Angeles, in silty sands, Oct. 1963, coll. Beaudette Foundation, Sta. 2, 1 specimen (USNM 58981); Sta. 102, 1 specimen (USNM 58982).

*Description of postlarval juvenile.*—Both specimens small, 2.3 and 2.5 mm long for 28 and 26 setigers, respectively, both 0.5 mm wide. Color in alcohol: brown with paired pigment bars on dorsum of setigers 3 and 4, medial chromatophores on dorsum of setigers 5–11, with chromatophores of setigers 7–11 arranged as 2 tandem spots (Fig. 4A). Parapodia, branchiae and much of body with conspicuous glandular appearance.

Prostomium broad, entire on anterior margin; caruncle extending posteriorly to end of setiger 2; eyes numerous with pair of large oval ones located medially and about 4 pairs of small ones more laterally and anteriorly located (Fig. 4A). Peristomium reduced, fused to setiger 1; palps short, thin, posteriorly directed to setiger 5.

Setiger 1 reduced, with small noto- and neuropodial lobes; with 4–5 long notosetae on one specimen, lacking on second specimen; neurosetae delicate capillaries. Setigers 2–4, 6 and subsequent setigers with 2-tiered fascicles of unilimbate, fimbriated capillary notosetae, those of posterior tier being longer (Fig. 4I, J); capillaries of posterior setigers also fimbriated, but longer and more robust than those of anterior setigers imparting spinous appearance to posterior end (Fig. 4K). Neurosetae of setigers 2–4 and 6–8 include fimbriated capillaries, arranged in 2 tiers; bidentate hooded hooks replace anterior tier from setiger 9, posterior tier of capillaries remaining intact throughout body; hooks numbering 2–4 throughout, with striations on hood and weak constriction on shaft (Fig. 4H).

Setiger 5 enlarged and greatly modified; setae include 2 simple dorsal capillaries (Fig. 4B), 3 types of major spines with slender hastate companion setae (Fig. 4D–G) and a ventral fascicle of 2–3 inflated capillary neurosetae (Fig. 4C); major spines include a single giant falcate spine with long lateral groove (Fig. 4D) [tip end of this spine usually broken off, imparting bilobed appearance to end of shaft], a single pointed spine with subterminal inflated portion (Fig. 4E) and 2–3 falcate spines bearing a large accessory tooth (Fig. 4F, G), these accompanied by hastate companion setae.

Branchiae from setiger 7; gills slender, glandular, continuing for 10 segments. Pygidium cufflike, with distinct striations (Fig. 4K).

*Remarks.*—The fully developed adult form of *Polydora heterochaeta* has never been discovered and the present postlarval specimens from Bahía de Los Angeles differ somewhat from the original description of planktonic larvae by Rioja (1939) from Acapulco. In Rioja's form, the hooded hooks were said to begin on setiger 7 instead of 9 and the dorsal chromatophores were depicted as paired throughout the body, while the present specimens have paired chromatophores only on setigers 3 and 4, with medial chromatophores on subsequent segments. The major spines of setiger 5 are gen-



erally of the same form as Rioja described, although he did not observe the inflated spine.

Blake (1969) commented on the validity of *P. heterochaeta* and other species which have been based upon larval or postlarval forms. *Polydora heterochaeta* exhibits several features which are typical of such postlarval forms. These include the poorly developed peristomium, undifferentiated and broadened prostomium, posteriorly directed palps, retention of larval pigment and the occurrence of multiple major spine types on setiger 5. Extra spine types, similar to those described here for *P. heterochaeta*, have been described for the larvae or postlarvae of *P. ciliata* (Johnston) and *P. hoplura* Claparède by Wilson (1928), *P. hermaphroditica* Hannerz (1956), *P. biocipitalis* Blake and Woodwick (1972) and *P. websteri* Hartman by Blake (1969). These setae are represented in *P. heterochaeta* by the giant falcate spine (Fig. 4D) and the inflated spine (Fig. 4E). In other species, these setae are the first modified spines to appear on setiger 5 during development and the first to drop off, being entirely replaced by the typical form found on adults. In *P. heterochaeta* the adult form of major spine is that represented in Fig. 4F, G. These spines have an enlarged sheathlike accessory tooth, which should make it possible to identify the adults of this species when other characters, such as the hooded hooks beginning on setiger 9, are considered.

*Distribution*.—Mexico: Acapulco and the Gulf of California.

*Boccardia anophthalma* (Rioja, 1962), new combination  
Fig. 5

*Polydora anophthalma* Rioja, 1962:185–188, figs. 89–93.

*Material examined*.—MEXICO, Gulf of California, 3–5 km west of Puerto Peñasco, 15 m, from shell of *Muricanthus nigratus*, 20 March 1971, coll. J. D. Kudenov, 4 specimens (AHF).

*Description*.—A moderate-sized species, up to 14 mm long and 1.0 mm wide for 85 segments. Color in alcohol: light tan, pigment lacking.

Prostomium and first 5 setigers dorsoventrally compressed; subsequent body segments normal-appearing, oval to rounded in cross-section. Prostomium truncate on anterior margin (Fig. 5A); caruncle narrow, twisted, continuing posteriorly to end of setiger 4; no eyes; no occipital tentacle. Palps thin, short, extending posteriorly for 11 or 12 segments.

Setiger 1 reduced, with notopodial lobe, lacking notosetae; with short, thin capillary neurosetae. Setigers 2–4, 6 and subsequent segments with unilimbate capillary notosetae arranged in 2 tiers, first tier with short thickened setae, those of second tier longer and thinner; notosetae of posterior segments reduced to 5 or 6 simple capillaries; last 10 to 12 segments with elevated parapodia bearing 2–4 long capillaries and 1–2 stout recurved



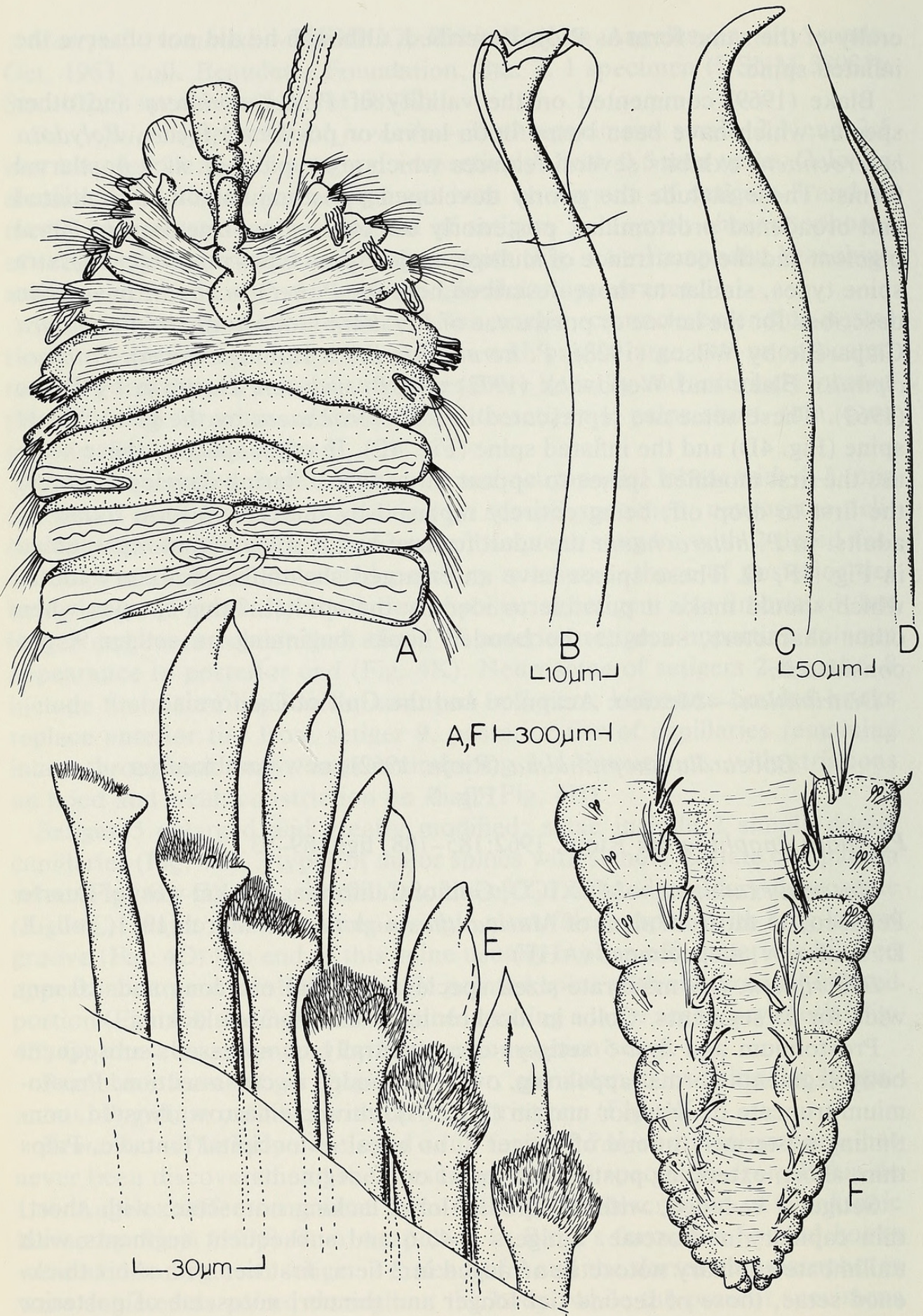


Fig. 5. *Boccardia anophthalma*: A, Anterior end in dorsal view; B, Hooded hook; C, Notopodial boathook from posterior setiger; D, Unilimbate capillary neuroseta from setiger 5; E, Group of major spines from setiger 5; F, Posterior end in dorsal view.



boathooks (Fig. 5C, F) projecting into shallow medial channel. Neuropodia of setigers 2–4, 6 with fascicles of unilimbate capillaries; bidentate hooded hooks from setiger 7 numbering 6–8 throughout most of body, then reduced to 2–3 in far posterior segments; accompanied by 1–3 inferior capillaries; hooks exhibiting wide angle between teeth (Fig. 5B).

Setiger 5 with ventral fascicle of 5–6 unilimbate capillaries (Fig. 5D); major spines of 2 types: (1) falcate with flange along curved edge (Fig. 5E); (2) bristle-topped with small tooth among bristles (Fig. 5E).

Branchiae on setigers 2–4, 6 and subsequent segments (Fig. 5A), continuing for most of body length, absent from those posterior segments having boathooks; gills short on setigers 2, 3, 4, and 6, reaching full-size on setiger 8, overlapping at midline, then becoming short again in posterior one-half of body.

Pygidium reduced to 4 minute lobes surrounding anal opening (Fig. 5F).

*Remarks.*—*Polydora anophthalma* Rioja (1962) was described and figured as having branchiae from setiger 8, but the posterior end was not described. In most respects, however, the present specimens agree well with Rioja's description. The major spines of setiger 5 are unique. There is no other example of a *Boccardia* species having an accessory structure on the falcate unbristled spines. The flange occurring on these spines in *B. anophthalma* was illustrated by Rioja for his specimens. Since the anterior branchiae are considerably smaller than those following setiger, it seems probable that Rioja overlooked them, as did Hartman (1939:16) for *B. tricuspa* (see Woodward, 1963:209). I strongly feel that the evidence indicates that the present specimens represent the form which Rioja described as *Polydora anophthalma*.

With the addition of *B. anophthalma*, *Boccardia*, as emended by Blake and Kudenov (1978) now has 17 species. *Boccardia anophthalma* is most closely related to *B. berkeleyorum* Blake and Woodward (1971) in having a small tooth on the bristle-topped spines of setiger 5, posterior notopodial spines and 4 small pygidial lobes. In *B. anophthalma*, however, the falcate spines of setiger 5 have an accessory flange and the posterior spines are recurved. *B. berkeleyorum*, on the other hand, has simple falcate spines on setiger 5 and posterior acicular spines. The unusual flattened appearance of the anterior end of *B. anophthalma* is caused by dorsal-ventral compression of the prostomium and first 5 setigers. The functional significance of this flattening is not understood, but it may be related to its shell-boring habit.

*Distribution.*—Mexico, Gulf of California; Asuncion Island, a borer into mollusk shells.

*Boccardia tricuspa* (Hartman, 1939)

*Polydora tricuspa* Hartman, 1939:16–17, fig. 3c–k; 1961:29.—Rioja, 1939:304–308, figs. 22–31; 1941:727; 1943:238; 1962:185.



*Boccardia tricuspa*.—Woodwick, 1963:209–212, fig. 1.—Hartman, 1969:99–100, figs. 1–5.

*Boccardia proboscidea*.—Carrasco, 1974:185–187, figs. 1–4 [not Hartman, 1940], *fide* Blake and Kudenov, 1978:238.

*Material examined*.—MEXICO, Gulf of California, 3–5 km west of Puerto Peñasco, 15 m, from shell of *Muricanthus nigratus*, 20 March 1971, coll. J. D. Kudenov, 1 specimen (AHF). Guadalupe Island, Melbomene Cove, intertidal in shell of *Haliotis* sp., Velero Sta. 1912–49, 17 Dec. 1949, 5 specimens (AHF). Guadalupe Island, Camp Arroyo, Lava Point, intertidal, 10 July 1975, coll. D. Sutton, 1 specimen (CAS 009331), 3 specimens (CAS 009371).

*Remarks*.—The major spines of setiger 5 of *B. tricuspa* have a more complex structure than previously believed. The spines are of 2 types: (1) a simple falcate spine, (2) a cusped spine generally noted by previous investigators to have 3 teeth. The end of the cusped spine is produced laterally to form a tooth at either end. Between these teeth is a narrow ridge which bears a thin curtain. This structure is what is generally considered to be a medial or third cusp. Being very thin and fragile, it is easily worn into different forms and configurations, but is usually gone from the oldest and most worn spines in a setal fascicle series. On the inner edge of the ridge between the lateral teeth are numerous fine bristles. These, too, are best seen on the youngest spines, being mostly worn away on the older ones. The presence of bristles on these teeth allies *B. tricuspa* more closely to other species of the genus which have the ends of their spines entirely covered with bristles. Detailed comparative studies of these spines of the various species is in progress, using the SEM, and it is expected that these studies will help clarify such relationships.

*Distribution*.—California, Mexico, Galapagos Islands, Chile.

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Battelle's New England Marine Facility, The William F. Clapp Laboratories, Inc., P.O. Drawer AH, Duxbury, Massachusetts 02332.





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