



A new species of *Poecilochaetus* (Polychaeta: Poecilochaetidae) from coastal waters off Southern California, USA

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Abstract

A new species of *Poecilochaetus* (Polychaeta: Poecilochaetidae) is described from coastal waters off Southern California. Much of the material was collected as part of the benthic infaunal survey work carried out by the Sanitation Districts of Los Angeles County as part of their ocean monitoring program. Numerous specimens of this new species have also been collected throughout the Southern California Bight during U.S. Environmental Protection Agency (EPA) regional surveys in 1994, 1998, and 2003. The distinct characters of this new species were first noted three decades ago, but a formal description was never published. These specimens have been reported frequently in survey data under the provisional name *Poecilochaetus* sp. A. The number of branchial filaments, the location of these filaments along the body, and the absence of a middorsal chitinous plate on setiger 9 make *Poecilochaetus martini* sp. nov. unique. This new species also has elongated interramal papillae on the branchiate setigers, a character only recently noted. *P. martini* sp. nov. is compared to other branchiate species in the genus that also have interramal structures.

Key words: taxonomy, Polychaeta, Poecilochaetidae, new species, California

Introduction

Prior to 1977 the only described species reported from the Southern California area was *Poecilochaetus johnsoni* Hartman, 1939. For more than three decades, polychaete taxonomists working in Southern California have reported another species in coastal waters often occurring in benthic sediment samples with *P. johnsoni*.

This second species is mainly distinguishable from *P. johnsoni* by the presence of branched, multilobed branchiae after setiger 14. Generally *P. johnsoni* is found in deeper water (greater than 100 m) while the branchiate form, *P. martini* sp. nov., is seen at shallower depths.

For many years this second species has been reported with the provisional name of *Poecilochaetus* sp. A in both EPA regional surveys and National Pollutant Discharge Elimination System (NPDES) permitted ocean monitoring surveys by Publicly Owned Treatment Works (POTWs) in southern California. It was never formally described due to a lack of complete, whole material, although numerous researchers have collected thousands of specimens in the Southern California Bight.

Poecilochaetids have very fragile bodies, especially their median and posterior setigers. They fragment easily during the collection process, even when extreme care is taken to relax them with magnesium chloride or propylene phenoxylol. While posterior fragments are often found in benthic

samples, they rarely include the pygidium or the last few setigers containing the specialized notochaetae. For this same reason many *Poecilochaetus* species have been described based on anterior fragments. In this study the same is true, although a few posterior ends were found and the distinct shape of the pygidium and posterior hooks are described below.

In 1992, de León-González described a species from Baja California, *P. multibranchiatus*, that also has multilobed branchiae but it differs from this new species in the number of branchial filaments and the first occurrence of these along the body. The description was based on only three incomplete specimens with anterior ends and a posterior fragment.

Materials and methods

Specimens off Palos Verdes, Huntington Beach, and Newport Beach were collected using a 0.1-m² tandem rigged modified Van Veen grab. Specimens from elsewhere were collected using a single 0.1-m² Van Veen grab sampler. Samples were screened through a 1.0-mm-mesh sieve and fixed in 10% formalin after being relaxed in a propylene phenoxylol or magnesium chloride solution. Samples were then washed and sorted under a stereomicroscope and preserved in 70% ethanol.

All digital photos were taken with a Sony CyberShot F717 camera fitted with a Martin microscope MM99 adapter S/N:1035. The images and backgrounds were enhanced for clarity using Adobe Photoshop and Photoshop Elements software.

Results

Family Poecilochaetidae Hannerz, 1956

Genus *Poecilochaetus* Claparède, 1875

Poecilochaetus martini sp. nov.

Figures 1–3

Material examined. Palos Verdes Peninsula, California, USA, 33°44.274'N, 118°25.398'W, coll. R.V. *Ocean Sentinel* Sta. 0C, 61 m, 21 July 1999. Holotype (LACM-AHF POLY2197), 15 paratypes (LACM-AHF POLY2198), all anterior fragments. Additional material from type locality, Sta. 0C rep. 3, 27 January 1978, 1 specimen with anterior and posterior fragments (LACM-AHF POLY2199).

Additional material from off Palos Verdes. 33°45.459'N, 118°26.453'W, 60 m (1); 33°41.598'N, 118°17.346' W, 30 m (1); 33°42.976'N, 118°20.916'W, 33 m (1); 33°45.435'N, 118°26.459'W, 61 m (1); 33°42.979'N, 118°20.917'W, 32 m (1); 33°45.435'N, 118°26.448'W, 61 m (1); 33°44.873'N, 118°25.749'W, 51 m (4); 33°48.432'N, 118°25.83'W, 61 m (1).

Other material from the Southern California Bight. Ventura, 34°1.49'N, 118°39.918'W, 22 m (1); off Malibu, 34°20.24'N, 119°26.80'W, 18 m (1); off Los Angeles Breakwater, 33°42.699'N, 118°11.075'W, 23 m (1); Los Angeles Harbor, 33°43.260'N, 118°14.640'W, 11 m (1); 33°43.560'N, 118°13.920'W, 17 m (1); 33°42.72'N, 118°15.54'W, 13 m (1); 33°42.78'N, 118°16.26'W, 13 m (1); Santa Monica Bay, 33°55.98'N, 118°30.06'W, 44 m (1), 33°52.968'N, 118°29.829'W, 58 m (1); off Alamitos Bay, 33°43.09'N, 118°9.61'W, 18 m (1); off Huntington Beach, 33°35.307'N, 118°02.944'W, 57 m (1); 33°34.749'N, 118°01.612'W, 59 m (1); off Newport Beach, 33°34.832'N, 117°57.369'W, 56 m (1); off Dana Point, 33°30.60'N, 117°46.2'W, 42 m (1); off San Diego, 32°43.426'N, 117°12.474'W, 9 m (1); 32°40.56'N, 117°7.929'W, 11 m (1); 32°33.416'N,

117°12.698'W, 38 m (2); 32°46.488'N, 117°18.264'W, 57 m (1).

Description. Holotype measured 2.7 mm in width including parapodia and 53 mm in length with 70 setigers. General body surface is smooth, not papillate. Triangular mid-dorsal chitinous “tooth-like” structure or plate on setiger 9 absent (Fig.1A, 3A). Dark, amber-colored conical tubercles present around mouth and on ventral surface of first setiger and setigers 7–9 (Fig.1B).

Prostomium globular or subspherical, with elongated facial tubercle projecting upward within cephalic cage (Fig.1A). Two pairs of eyes generally present on prostomium, those of anterior pair largest. Nuchal organ with elongate median lobe, reaching to at least setiger 4, and two discoid lateral lobes. Median lobe easily broken off, as in holotype (Fig.1A).

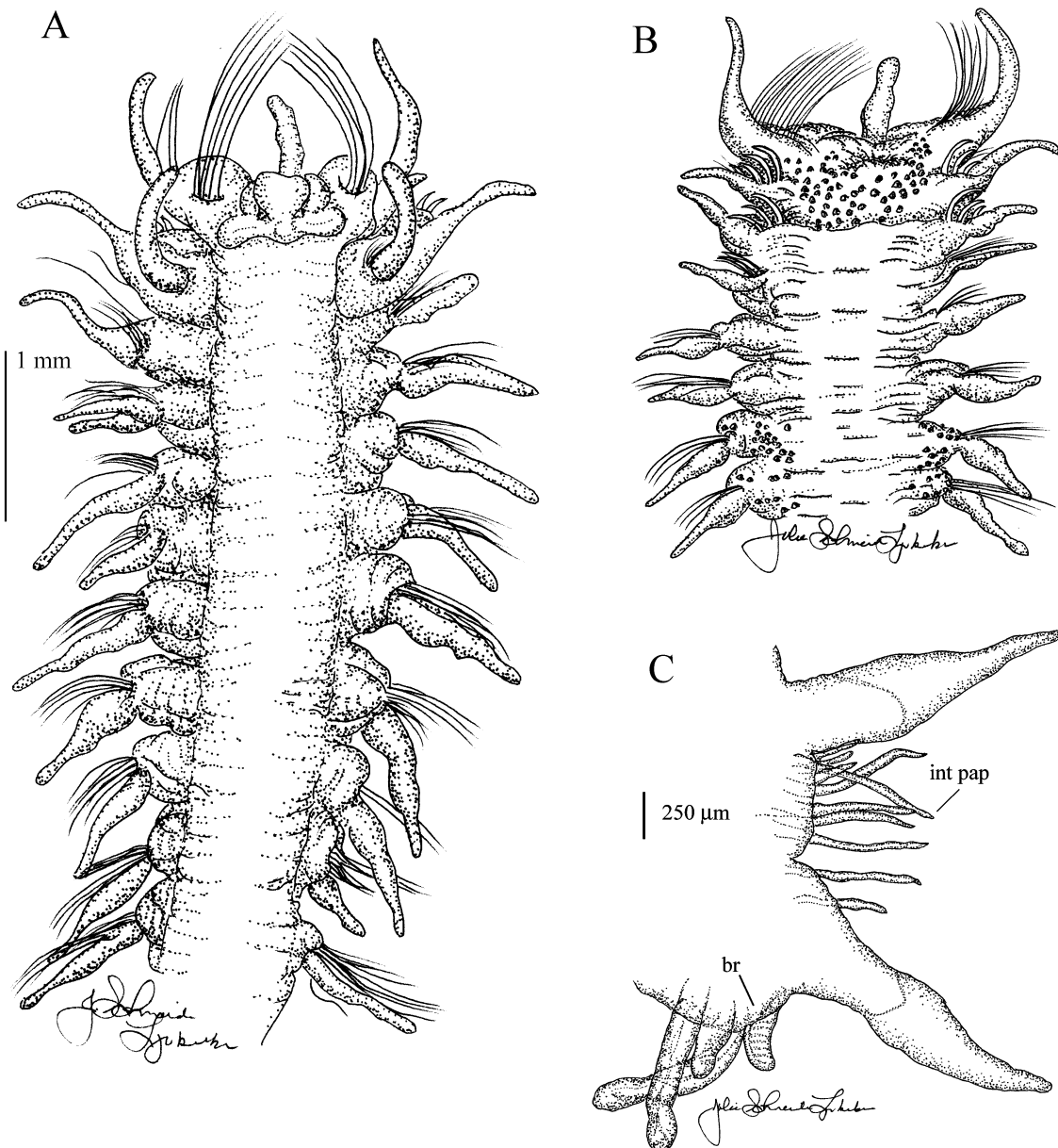


FIGURE 1. *Poecilochaetus martini* sp. nov. A, anterior end of holotype, dorsal view, median nuchal organ missing; B, ventral view of holotype, first 8 setigers (same scale); C, parapodium 26 with branchiae (br) and interramal papillae (int pap).

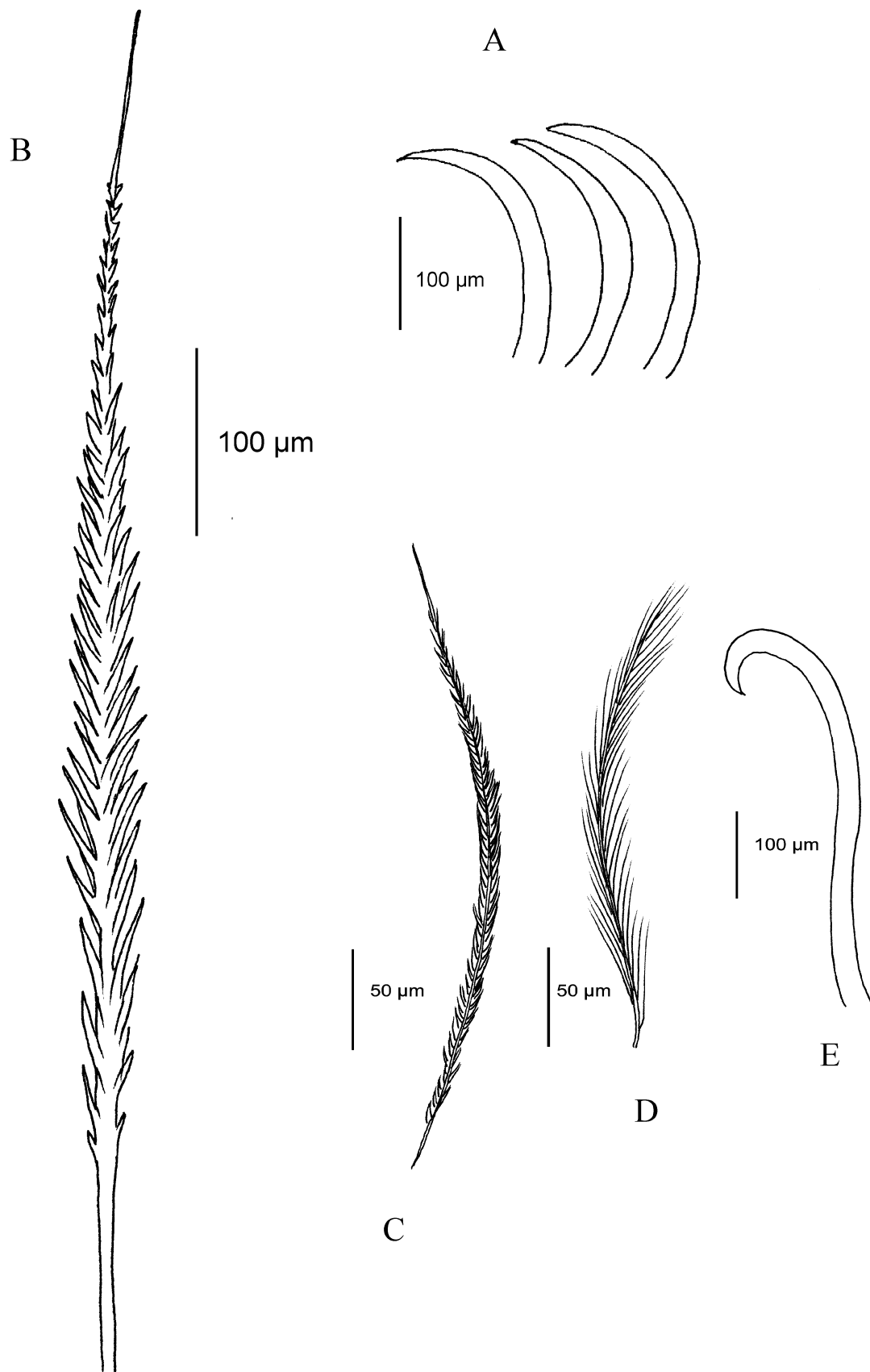


FIGURE 2. *Poecilochaetus martini* sp. nov. setal types. A, falcate spines from setigers 2 and 3 (from holotype); B, spinose seta from setiger 10; C, pilose seta from setiger 10; D, plumose seta from setiger 20 (B–D from paratype material); E, notopodial hook from posterior setiger of specimen collected off Dana Point at station 4290, July 2003.

All parapodia biramous. First parapodium enlarged, directed forward with long capillary setae forming a cephalic cage. Dorsal postsetal lobe on setiger 1 absent. Dorsal postsetal lobes of setiger 5 longer than those of setiger 4 or 6. Ampullaceous or “bottle shaped” postsetal lobes present on setigers 7–13. Branched branchia inserted on posterior face of neuropodia beginning on setiger 15 or 16 and continuing to setiger 70. Branchial filaments or lobes are partially retractable with a maximum number of 8 filaments.

Anterior surface of parapodia between noto- and neuropodia with elongated, cirriform interramal papillae beginning on setiger 16–18 to setiger 42 (Fig. 3B). Average number of elongated papillae is seven, with a maximum of 22. Rounded interramal sensory organs present from setigers 1–5 and from setiger 10 to first branchial segments.

Notosetae of setiger 1 longer than neurosetae. Large neuropodial falcate spines present on setigers 2–3, generally numbering four spines along with smooth capillary setae (Figs. 1B, 2A). Setigers 4–9 with smooth capillaries and pilose setae. Three types of setae from setiger 9; simple capillaries, pilose setae, and spinose setae (Fig. 2B–C), arranged in a mirror image with notopodial setae opposite neuropodial setae. Plumose setae present from setiger 17 (Fig. 2D) to end of fragment.

Posterior end tapers to pygidium with simple anal opening surrounded by three triangular cirri of equal size (Fig. 3D). Last 25 setigers before pygidium with large, curved notopodial hooks (Fig. 3C); generally four, sometimes five hooks in each notopodium (Fig. 2E). (Description of posterior end based on fragments of specimen from type locality, Palos Verdes, Sta. OC rep.3, 27 Jan 1978 and specimen from off Dana Point, Sta. 4290, July 2003).

Discussion

Poecilochaetus martini sp. nov. is distinguished from *P. johnsoni* Hartman, 1939 by the presence of branched, multilobed branchiae and the absence of a middorsal chitinous plate on the dorsum of setiger 9. Furthermore, *P. martini* sp. nov. possesses interramal papillae generally beginning on the setiger following the first occurrence of branchiae.

Interramal papillae are a diagnostic character that has not been described in detail by previous authors of the genus. Both Imajima (1989) and Mackie (1990) mentioned similar structures as “interramal cirri” in their respective descriptions of *Poecilochaetus clavatus* from Japan and *P. tricirratus* from Hong Kong. However, the structures were only noted to have a single projection or cirrus (*P. clavatus*) or up to four cirri (*P. tricirratus*) while *P. martini* has up to 22 elongated, cirriform-shaped interramal papillae beginning on the anterior face of setiger 16 between the dorsal and ventral parapodia. While Kitamori’s *P. japonicus* (1965) has an illustration, Fig. 1F, of three interramal projections there is no mention of the structures in the written description nor mention of any branchiae. A recently described intertidal species from southeastern Brazil, *P. polycirratus* Santos & Mackie, 2008, has even more cirri (10) described for the four specimens collected but still less than half as many as *P. martini* sp. nov. It seems more correct to refer to these structures as interramal papillae rather than cirri because it is unknown if these elongated projections are sensory structures. The term papilla also distinguishes these structures from the true dorsal and ventral cirri of aciculate polychaetes. The interramal papillae are not to be confused with the rounded interramal sensory organs that occur on the first five or six setigers of poecilochaetids and then again from setiger 10 or 11.

Currently there are three other smooth-bodied species of *Poecilochaetus* that have both branchiae and interramal papillae, *P. clavatus*, *P. polycirratus*, and *P. tricirratus* (Table 1). Of these, only one other species, *P. polycirratus*, lacks a middorsal chitinous plate on setiger 9. This is unusual for

smooth-bodied poecilochaetids and is more commonly seen in heavily papillated forms (Eibye-Jacobsen 2005).

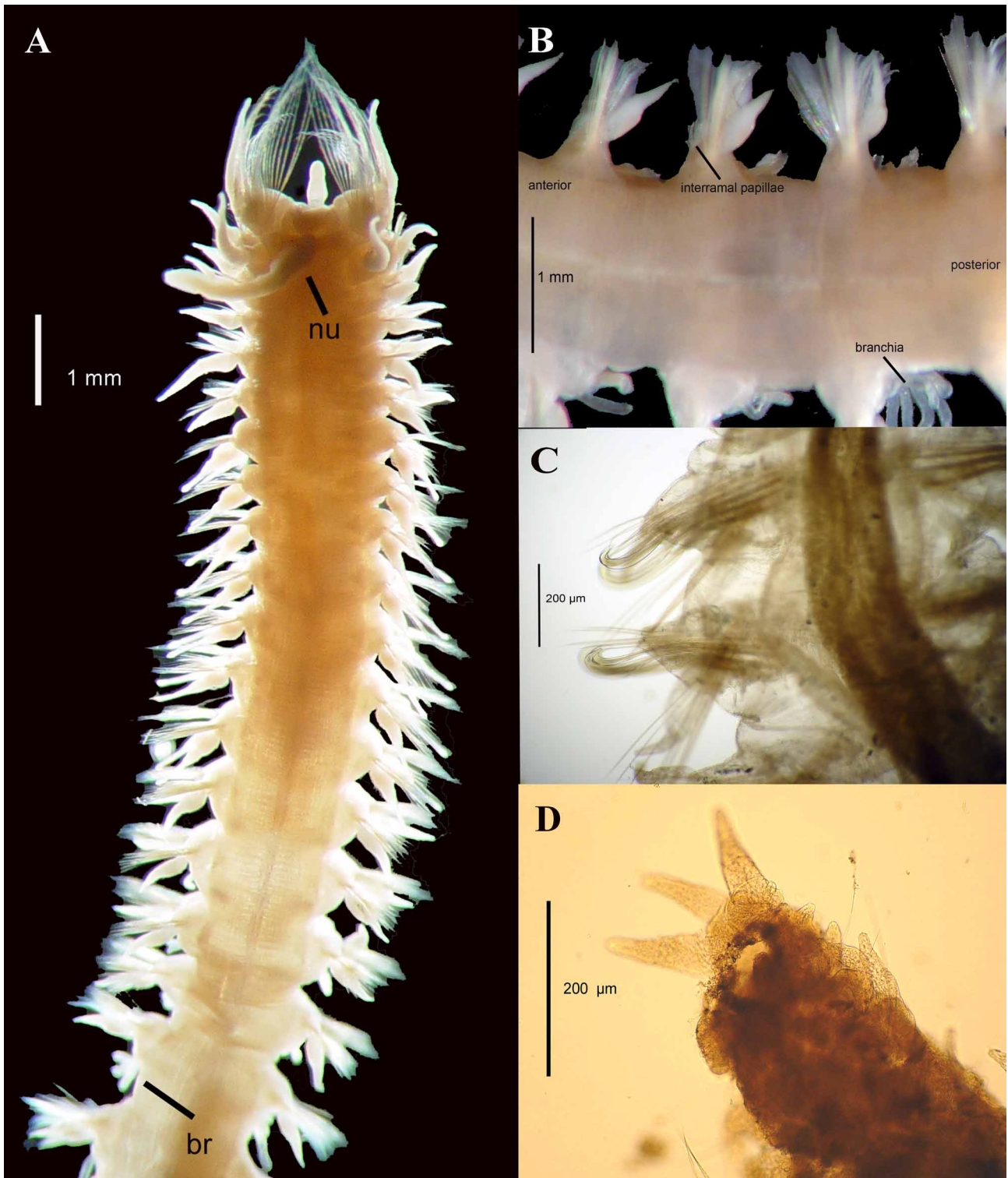


FIGURE 3. *Poecilochaetus martini* sp. nov. A, anterior end of paratype with branchiae (br) and median lobe of nuchal organ (nu) attached; B, median segments with interramal papillae and branchiae (same specimen as A); C, posterior end with hooked notosetae from specimen collected off Dana Point at station 4290, July 2003; D, pygidium with three anal cirri from specimen collected off Palos Verdes at Sta. 0C rep. 3, Jan. 1978.

TABLE 1. Comparison of closely related *Poecilochaetus* species.

| Diagnostic characters | <i>clavatus</i> Imajima 1989 | <i>polycirratu</i> Santos & Mackie 2008 | <i>tricirratu</i> Mackie 1990 | <i>martini</i> sp. nov. (n = 46) |
|---|------------------------------------|---|-------------------------------------|-------------------------------------|
| Ampullaceous postsetal lobes present on setigers | 7–10 | 7–13 | 7–11 | 7–13 |
| Branchiae first present on setiger | 20 | 17 | 13–17 | 15–16 |
| Max. no. branchial filaments | 2 | 5–6 | 3 | 8 |
| Placement of branchiae | ? | Posterior face of notopodia | Posterior face of both parapodia | Posterior face of neuropodia |
| Length of nuchal organ | To setiger 3 | To at least setiger 3 | To setiger 3 | To setiger 4 |
| Elongate interramal papillae beginning on setiger | 16 | 18 | 17 | 16 |
| Max. no. interramal papillae per parapodium | 1 | 10 | 4 | 22 |
| Shape of posterior notosetae | Straight, thick and slender spines | Slender spines and curved hooks | 4 curved hooks | 4–5 curved hooks |
| Middorsal chitinous plate on setiger 9 | Present | Absent | Present | Absent |

P. polycirratu is very similar to *P. martini* sp. nov. except for the number of branchial filaments and interramal papillae and the setiger of first occurrence for both of these structures. Also, the first occurrence of plumose setae is at setiger 19 rather than 17 for *P. martini* sp. nov. Since the holotype of *P. polycirratu* is complete, and the specimens are about the same size as most of the *P. martini* sp. nov. examined by this author, it would seem unlikely that the difference in number of branchial filaments and interramal papillae between these two species is due to just growth or size. Another interesting difference is the placement of the branchiae, which occurs on the notopodia in *P. polycirratu* and the neuropodia of *P. martini* sp. nov. The habitat and locality is certainly different too: *P. polycirratu* is an intertidal species from Brazil while *P. martini* sp. nov. is from subtidal and shelf depths in Southern California. However, it could be argued that the two similar species are just on either side of the Isthmus of Panama and have not yet been collected from other depth strata. This argument might be applied to other closely related species also separated by the Isthmus, like *P. johnsoni* from California and *P. australis* Nonato, 1963 from Brazil. This is a topic for another paper.

Based on locality and the presence of multiple-lobed branchia it would seem that *P. martini* sp. nov. could also be related to *P. multibranchiatus* León-González, 1992. However, *P. multibranchiatus* is not described as having either interramal cirri or papillae, nor is a mention made of the middorsal chitinous plate in the description. With only one holotype and two paratypes, these

characters could have been missed. However, the branchiae also begin forward of *P. martini* sp. nov. at setiger 12 and occur in both parapodia. Additionally, the ampullaceous postsetal lobes or cirri of *P. multibranchiatus* extend only from setigers 7–11.

Blake (1996) noted a few specimens of a provisional taxon (also reported as *Poecilochaetus* sp. A) from northern California that, like the organism described here, do not possess the dorsal chitinous structure on setiger 9. Blake's specimens differ from *P. martini* sp. nov. in lacking branchiae and in having flask-shaped postsetal lobes located on setigers 7–11 rather than 7–13. His specimens are not the same as *P. martini* sp. nov.

The combination of the following diagnostic characters: numerous, elongate interramal papillae; branchiae with up to eight filaments beginning on the neuropodia of setiger 15; and the absence of a middorsal chitinous plate on setiger 9 define *Poecilochaetus martini* as unique among other closely related species.

Distribution. Southern California Bight from 8 to 100 m depth in silty mud.

Etymology. This species is named for Michael Martin, the first invertebrate taxonomist and Southern California Association of Marine Invertebrate Taxonomist (SCAMIT) member to recognize the unique features of this polychaete more than three decades ago.

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