Zootaxa 4537 (1): 001–130
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Monograph

ISSN 1175-5326 (print edition)
ZOOTAXA
ISSN 1175-5334 (online edition)

https://doi.org/10.11646/zootaxa.4537.1.1
http://zoobank.org/urn:lsid:zoobank.org:pub:169CBE5C-3A6E-438B-8A81-0491CBFBAC85

ZOOTAXA

4537

Bitentaculate Cirratulidae (Annelida, Polychaeta) collected chiefly during cruises of the R/V *Anton Bruun*, USNS *Eltanin*, USCG *Glacier*, R/V *Hero*, RVIB *Nathaniel B. Palmer*, and R/V *Polarstern* from the Southern Ocean, Antarctica, and off Western South America

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Magnolia Press
Auckland, New Zealand

Accepted by J. Williams: 26 Oct. 2018; published: 21 Dec. 2018
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Bitentaculate Cirratulidae (Annelida, Polychaeta) collected chiefly during cruises of the R/V *Anton Bruun*, USNS *Eltanin*, USCG *Glacier*, R/V *Hero*, RVIB *Nathaniel B. Palmer*, and R/V *Polarstern* from the Southern Ocean, Antarctica, and off Western South America

(*Zootaxa* 4537)

130 pp.; 30 cm.

21 Dec. 2018

ISBN 978-1-77670-566-5 (paperback)

ISBN 978-1-77670-567-2 (Online edition)

FIRST PUBLISHED IN 2018 BY

Magnolia Press

P.O. Box 41-383

Auckland 1346

New Zealand

e-mail: magnolia@mapress.com

http://www.mapress.com/j/zt

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ISSN 1175-5326 (Print edition)

ISSN 1175-5334 (Online edition)

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Abstract

Forty-one species in five genera of bitentaculate cirratulids are reported from new collections from South America, the Southern Ocean, and seas around Antarctica. Twenty-seven species are new to science; one new genus is described to deal with some species formerly identified as *Chaetozone*. New records, synonymies, and new combinations are reported. Previous records are reviewed with type specimens of most species reexamined and redescribed. The sub-Antarctic species *Aphelochaeta cincinnata* (Ehlers, 1908) does not occur in Antarctica: the numerous published records of this species instead belong to several new species. The types of *Tharyx epitocus* Monro, 1930, and *Tharyx fusiformis* Monro, 1939, have spines in posterior setigers and are referred to other genera. Among the 41 species treated in this study, 11 belong to *Aphelochaeta*, eight are new; eight species belong to *Caulleriella*, six are new; six species belong to *Chaetocirratulus* **n. gen**., three are new; 12 species belong to *Chaetozone*, seven are new; and four species belong to *Tharyx,* three are new. Numerous samples come from slope and abyssal depths, expanding our knowledge of the distribution of Southern hemisphere deep-sea cirratulids.

Key words: Annelida, benthos, new species, *Aphelochaeta*, *Caulleriella*, *Chaetocirratulus*, *Chaetozone*, *Tharyx*, Ecuador, Peru, Chile, Patagonia

Introduction

The Cirratulidae from Antarctic seas and western South America have been previously reviewed and treated by Hartmann-Schröder (1962, 1965, 1986), Hartman (1966, 1967, 1978), Carrasco (1977), Hartmann-Schröder & Rosenfeldt (1989, 1990), and Blake (2016). From these works and others, approximately 15 species including both bi- and multitentaculates are known. In addition, several species recently described from off Costa Rica by Dean & Blake (2009, 2016) have been encountered from off South America.

Recent revisionary works on the bitentaculate cirratulids by Blake (1991, 1996, 2015, 2016) have refined definitions of the five genera presently recognized. However, the Antarctic literature is complicated because species were described and assigned to genera that were based on different definitions. Hartman (1967, 1978) defined bitentaculate cirratulids according to her own criteria (Hartman 1961): *Caulleriella* included species with bidentate hooks; *Chaetozone* included species with simple spines; and *Tharyx* included species having all capillary setae. Hartmann-Schröder & Rosenfeldt (1989, 1990) apparently defined these genera according to Fauvel (1927) and Day (1967): *Caulleriella* included species with hooks not in cinctures; *Chaetozone* included species with hooks in cinctures; and *Tharyx* included species having all capillaries. Further confusion exists because some species described earlier by Monro (1930, 1939) were placed in *Tharyx* and thought to have only capillary setae, have been found here to have short spines in posterior parapodia.

Blake (1991) established that the type species of the genus *Tharyx, T. acutus* Webster & Benedict, 1887, had knob-tipped hooks or spines in addition to capillaries. This discovery differed from Hartman's (1961) concept of the genus, which was based on specimens having all capillaries. Blake (1991) restricted *Tharyx* to species having knob-tipped spines and established a new genus, *Aphelochaeta*, for those former species of *Tharyx* having simple, non-serrated capillary setae. *Tharyx monilaris* Hartman, 1960, originally described from off California, was designated as the type species of this new genus. Species of *Tharyx* having serrated or denticulated capillaries were referred to the genus *Monticellina* Laubier, 1961. Blake (1996) further refined the definitions of these genera and re-assigned several species from the Eastern Pacific. He also redefined the genera *Caulleriella* and *Chaetozone*. Among other characters, *Caulleriella* species were observed to have the noto- and neuropodia widely separated from one another and to have very distinct bidentate hooks in contrast to the knob-tipped hooks of *Tharyx* species. Blake (2015) provided an updated diagnosis of *Chaetozone* that essentially limited species of this genus to those that possess posterior noto- and neuropodial spines and companion capillaries arranged in distinct projecting cinctures. Blake (2016) established and defined the genus *Kirkegaardia* as a replacement for *Monticellina,* which was found to be pre-occupied in the Rhabdocoela; he also reviewed the known species and described 16 new species, several of which were from South America and Antarctica.

The literature associated with the generic definitions of the bitentaculate cirratulids is a problem for the Southern Ocean species because several species that have been identified and listed in various benthic ecology papers have been found either to consist of multiple closely related species or to have been misconstrued. In the present study the most common bitentaculate species previously reported from Antarctic waters, *Aphelochaeta*

cincinnata (Ehlers, 1908), originally described from the sub-Antarctic Kerguelen Islands, most likely does not occur in Antarctica; specimens identified as this species have been found to consist of several closely related undescribed taxa. Another example of a problem encountered with Antarctic bitentaculate cirratulids lies with *Caulleriella antarctica* Hartman, 1978. The holotype, paratypes, and other identified specimens of this species in the collections of the USNM contained *C. antarctica,* another and possibly undescribed *Caulleriella* species, and species of *Chaetozone* and *Aphelochaeta*. Since each of the specimens must be carefully examined under a compound microscope in order to see the tips of acicular spines, the amount of effort needed to clarify identities from the earlier collections is considerable. There is the further problem that stages in the growth of *Chaetozone* species may influence the ultimate starting point for the acicular spines. Blake (1996, 2015) reported some examples of this problem.

Additional problems addressed in the present study involved species with posterior acicular spines that depart from the current definitions of *Chaetozone* and *Tharyx*. As treated and discussed in more detail below, it has been necessary to establish a new genus, *Chaetocirratulus* **n. gen.**, for species formerly referred to *Chaetozone* that do not have spines organized into the distinctive posterior cinctures. Although some of these species have been known for some time, the presence of several of these species in this study necessitated a review and establishment of the new genus.

The difficulties of interpreting literature-based identifications can only be overcome by examining relevant type material. As part of this study, type and non-type specimens of species reported by Ehlers (1908), Augener (1932), Monro (1930, 1939), Hartman (1967, 1978), Hartmann-Schröder (1962, 1965), and Hartmann-Schröder & Rosenfeldt (1989, 1990) have been examined, redescribed, and, in some cases, illustrated. The work is divided so that the present paper treats the bitentaculate genera; the genus *Kirkegaardia* was previously treated (Blake 2016). The multitentaculate genera and *Dodecaceria* species will be treated separately.

In the present study, 41 species in five genera are reported; 27 species are new to science. One new genus, one new synonym, and six new combinations are proposed. The following species are included in this study (synonym in brackets):

1 *Aphelochaeta antelonga* Dean & Blake, 2016
2 *Aphelochaeta aubreyi* **n. sp.**
3 *Aphelochaeta bimaculata* **n. sp.**
4 *Aphelochaeta brandtae* **n. sp.**
5 *Aphelochaeta cincinnata* Ehlers, 1908
6 *Aphelochaeta dearborni* **n. sp.**
7 *Aphelochaeta hormosa* **n. sp.**
8 *Aphelochaeta longisetosa* (Hartmann-Schröder, 1965)
9 *Aphelochaeta magellanica* **n. sp.**
10 *Aphelochaeta palmeri* **n. sp.**
11 *Aphelochaeta spectabilis* **n. sp.**
12 *Caulleriella antarctica* Hartman, 1978
13 *Caulleriella ecuadoriana* **n. sp.**
14 *Caulleriella eltaninae* **n. sp.**
15 *Caulleriella fimbriata* **n. sp.**
16 *Caulleriella fucata* **n. sp.**
17 *Caulleriella kacyae* **n. sp.**
18 *Caulleriella magnaoculata* Hartmann-Schröder, 1962
19 *Caulleriella suroestense* **n. sp.**
20 *Chaetocirratulus andersenensis* (Augener, 1932) **n. comb.**
[*Tharyx fusiformis* Monro, 1930]
21 *Chaetocirratulus abyssalis* **n. sp.**
22 *Chaetocirratulus epitocus* (Monro, 1930) **n. comb.**
23 *Chaetocirratulus furvus* **n. sp.**
24 *Chaetocirratulus neogracilis* **n. sp.**
25 *Chaetocirratulus pinguis* (Hartman, 1978) **n. comb.**

26 *Chaetozone australosetosa* **n. sp.**
27 *Chaetozone biannulata* **n. sp.**
28 *Chaetozone bransfieldiensis* (Hartmann-Schröder & Rosenfeldt, 1989) **n. comb.**
29 *Chaetozone castanea* **n. sp.**
30 *Chaetozone corona* Berkeley & Berkeley, 1941
31 *Chaetozone cristata* **n. sp.**
32 *Chaetozone curvata* Hartmann-Schröder, 1965
33 *Chaetozone gesae* **n. sp.**
34 *Chaetozone homosetosa* (Hartmann-Schröder & Rosenfeldt, 1989) **n. comb.**
35 *Chaetozone reticulata* **n. sp.**
36 *Chaetozone shackletoni* **n. sp.**
37 *Chaetozone spinosa* Moore, 1903
38 *Tharyx coloris* **n. sp.**
39 *Tharyx moniliformis* **n. sp.**
40 *Tharyx obtusus* (Hartmann-Schröder & Rosenfeldt, 1990) **n. comb.**
41 *Tharyx tierralobos* **n. sp.**

Material and methods

Materials examined as part of this study. The former Smithsonian Oceanographic Sorting Center (SOSC) provided extensive collections of cirratulid and other polychaetes taken by the United States Antarctic Research Program (USARP) and the Southeastern Pacific Biological and Oceanographic Program (SEPBOP) in the 1960s, 1970s, and early 1980s. USARP scientists using the R/V *Hero*, USNS *Eltanin*, and the USCG *Glacier* collected these materials as part of various research cruises around Antarctica and off South America. The SEPBOP scientific team used the R/V *Anton Bruun* for several surveys in 1965–1966 from sites offshore Ecuador, Peru, and Chile including the Galápagos Islands and Juan Fernandez Islands. Dr. Brigitte (Hilbig) Ebbe provided additional Antarctic cirratulids, mostly from the Weddell Sea and off the South Shetland Islands, collected during the EASIZ II expedition on the R/V *Polarstern* in 1998. I collected some materials at McMurdo Station in January 2000 and along the East Antarctic Peninsula and the Weddell Sea in May 2000 during a cruise on the RVIB *Nathaniel B. Palmer* to the Prince Gustav Channel and the site of the former Larsen Ice shelf A. I was also able to participate in the ANDEEP I–III surveys on the R/V *Polarstern* in 2002 and 2005 where deep-sea collections were obtained, mostly from the Drake Passage and the Weddell Sea. A few samples from the Lund University Chile Expedition (LUCE) (1948–1949) were provided by the Swedish Museum of Natural History (SMNH), Stockholm. The late Dr. Meredith Jones provided both identified and unidentified cirratulids from the collections of the National Museum of Natural History, Smithsonian Institution (USNM) including specimens previously identified by Hartman (1967, 1978). The available collection includes over 4850 specimens and represents more than 14 times the number of bitentaculate Cirratulidae available to Hartman (1967) from earlier USARP surveys.

In order to understand the relationships of previously described species, type specimens were obtained from the British Museum of Natural History (BMNH), National Museum of Natural History, Smithsonian Institution (USNM), Zoological Museum of Hamburg (ZMH), Zoological Museum of Berlin (ZMB), and Zoological Museum, Oslo (ZMO). Types and non-type materials of the new collections are deposited in the USNM, Senckenberg Research Institute and Natural History Museum, Frankfurt (SMF), Los Angeles County Museum of Natural History (LACM-AHF) and the Museum of Comparative Zoology, Harvard University (MCZ). Specimens labeled with JAB have been retained by the author.

Morphological observations. All specimens were examined and identified with light microscopy using a Wild M-5 stereomicroscope and a Zeiss RA research compound microscope equipped with phase contrast and Nomarski differential interference optics. Photomicrographs were taken with a Nikon D7100 camera mounted on both the stereo- and compound microscopes. Some specimens were initially stained with a solution of Shirlastain A in water to highlight difficult-to-see surficial morphology. Some specimens were further stained with a saturated solution of Methyl Green (MG) in 70% ethyl alcohol (ETOH) in order to elucidate distinct staining patterns evident on some species. Both stains dissipate completely in ETOH. Line drawings were developed in pencil using a

drawing tube or *camera lucida* on the Zeiss RA and later transferred to drawing paper and inked. Using facilities of the Marine Biological Laboratory (MBL) in Woods Hole, Massachusetts, specimens were prepared for observation with the scanning electron microscope (SEM) by taking dehydrated specimens from 100% ETOH to critical point drying and then sputter-coating them with gold-palladium after mounting them on stubs. Specimens were observed and photographed using the digital Zeiss Gemini at the MBL. Other specimens were prepared and scanned at Hofstra University by Dr. Jason Williams as part of a collaborative NSF PEET grant where specimens were similarly prepared for SEM by dehydrating in an ascending ethanol series of 70–95% ETOH for 10 min each, followed by three changes of 100% ETOH for 15 min each. Specimens were critical-point dried with a Samdri 795 Critical Point Dryer, mounted on aluminum stubs, coated with gold using an EMS-550 Sputter coater, and viewed with a Hitachi S-2460N SEM.

Habitat and biological observations. Apart from depth distributions, type of gear, and rarely type of sediment for individual samples collected from the various expeditions cited in this study, there is little or no habitat information available. Exceptions include the Larsen A ice shelf survey on the RVIB *Nathaniel B. Palmer* (May 2000) where several publications on the sediments are available and the ANDEEP I–III surveys on the R/V *Polarstern* (January to March 2002 and January to April 2005) where various publications on supporting sediment and environmental data are available.

Gear type used to collect samples. Where possible, the type of gear used to collect the samples is indicated: multiple grab (MG) on the EASIZ II survey; 0.25m^2 box corer (ANDEEP surveys); multicore (MUC) with 10–12 individual core tubes of 25.5 cm^2 (ANDEEP surveys); 0.1m^2 Smith-McIntyre grab (SM grab) and megacore (10 cm diameter core tubes) on the Larsen Ice Shelf survey, R/V *Nathaniel B. Palmer*; Blake and Menzies trawls on various SEPBOP and USARP surveys; various types of grabs including the Petersen grab, Van Veen grab (VV grab), Orange peel grab on various USNS *Eltanin* and R/V *Hero* surveys.

Abbreviations used on figures: anC, anal cirrus; anPap, anal papilla; br, branchiae; dCr, dorsal crest; dGr, dorsal groove; dT, dorsal tentacle; eso, esophagus; gl, gland(s); hB, heart body; int, intestine; MG, Methyl Green; mo, mouth; neS, neurosetae; noS, notosetae; nuO, nuchal organ; per, peristomium; phx, pharynx; pig, pigment; pr, prostomium; prob, proboscis; pyg, pygidium; Seg, segment; Set, setiger; sO, sense organ; sto, stomach; vGr, ventral groove.

Systematic account

Family Cirratulidae Ryckholt, 1851

Diagnosis. Body elongate with numerous short segments; not divided into distinct regions, but anterior and/or posterior segments sometimes expanded with crowded segments. Prostomium narrow and conical or broad and wedge-shaped, without appendages; eyespots present or absent; paired dorsolateral nuchal organs present. Peristomium achaetous, smooth or with two or more distinct annuli. Grooved dorsal tentacles arise as single pair or as multiple groups of filaments on posterior margin of peristomium or on one or more anterior chaetigerous segments. Branchiae long, filamentous, usually occurring over numerous segments. Parapodia biramous with rudimentary podial lobes. Chaetae simple, including capillaries, acicular spines, or bidentate hooks. Pygidium a simple lobe sometimes with sub-anal disk, or terminal cirrus. Pharynx ventral, unarmed. Sexual and asexual reproduction may occur.

Remarks. During preparation of the 1996 publication on cirratulid polychaetes (Blake 1996) for the "Taxonomic Atlas of the Santa Maria Basin and Western Santa Barbara Channel," the late Dr. Mary E. Petersen informed me that the authorship for the Cirratulidae should be Ryckholt, 1851, rather than Carus, 1863, as was then in usage. Her position was based on a publication by Rosenberg & Petit (1987) who reviewed the little known and seldom cited monographs on fossil invertebrates by Baron Philippe de Ryckholt entitled "Mélanges Paléontologiques," published in three volumes between 1851 and 1862. These authors noted that Ryckholt's work had been largely unavailable because only six copies were known to exist; they listed the locations of these copies. They also noted that Ryckholt's monographs contained numerous new taxa, mostly Mollusca, at the genus level, which they demonstrated were well described and available according to the International Code of Zoological Nomenclature (ICZN). These authors also attributed several non-molluscan taxa including the family-level

polychaete name Cirratulidae to Ryckholt with a publication date of 1851. This predated the better-known reference by Carus (1863). Following the initial usage of Ryckholt, 1851 as the author of Cirratulidae in Blake (1996), the change has been widely used and was recently reviewed and accepted by the World Register of Marine Species (WoRMS) (Read & Fauchald 2018a).

The diagnosis of the Family Cirratulidae presented here, encompasses characters as understood *sensu stricto*. At present, there are three major groups of Cirratulidae with 12 genera currently recognized:

The multitentaculate species are those cirratulids with a wedge-shaped prostomium and numerous dorsal tentacles that occur in two groups on the anterior part of the body; setae include capillaries and spines, with *Protocirrineris* species having only capillaries. The multitentaculate species are more common in intertidal and nearshore habitats and are rarely encountered in deep water. There are five genera currently assigned to this category: *Cirratulus, Cirriformia, Fauvelicirratulus, Protocirrineris*, and *Timarete*.

The bitentaculate sediment-dwelling species are those cirratulids with a pre-setigerous region consisting of a distinct prostomium and peristomium; a single pair of long dorsal tentacles usually arises from the posterior margin of the peristomium; branchiae are present along most of the body. The bitentaculate species occur from the intertidal to abyssal depths. There are five genera currently assigned to this category: *Aphelochaeta, Caulleriella, Chaetozone, Kirkegaardia*, and *Tharyx*. A sixth genus, *Chaetocirratulus* **n. gen.,** is described as part of this study.

The bitentaculate shell- or rock-boring species belong to a single genus, *Dodecaceria*. These cirratulids bore into or otherwise inhabit burrows in calcareous substrates; the paired tentacles are lateral rather than dorsal and branchiae are limited to a few anterior segments. Most species of *Dodecaceria* are limited to nearshore habitats.

This diagnosis excludes several closely related taxa currently included in the Acrocirridae, Ctenodrilidae, and Cossuridae. However, recent phylogenetic studies strongly suggest that the ctenodrilids are closely related to *Dodecaceria* (Weidhase *et al*. 2016; Blake & Magalhães 2017).

Bitentaculate cirratulids in general do not have distinct body regions. However, the pre-setiger area, anterior or thoracic segments, middle or abdominal segments, and the posterior segments differ in appearance from one another and are usually characterized separately.

The pre-setiger area includes the prostomium, peristomium, and usually the dorsal tentacles. The peristomium may be divided into annular rings and may be surmounted by a dorsal crest. The last peristomial ring may sometimes be interpreted as separate achaetous segment. The first pair of branchiae often occurs in close proximity to the dorsal tentacles on the peristomium, or on setiger 1.

An expanded anterior segmental region often called the thorax is best developed in the genera *Aphelochaeta* and *Kirkegaardia.* In species of those genera, the anterior segments are often expanded, individually crowded, narrow, and bear expanded parapodia that are variously developed into prominent shoulders that in some cases, are elevated over the dorsum producing a mid-dorsal channel or groove. Ventrally, conspicuous yellow glands often occur across individual anterior segments; these may stain intensely with Methyl Green. In other genera, however, the anterior segments are not overly expanded and are not readily differentiated from middle body segments. In contrast to *Aphelochaeta* and *Kirkegaardia*, species of *Caulleriella* and *Chaetocirratulus* **n. gen**., have little or no difference in the appearance of anterior and middle body setigers.

Middle body or abdominal segments are typically longer and sometimes moniliform in shape. In a few species, the middle body segments are expanded, usually due to the presence of gametes or to an enlarged stomach between the esophagus and intestine. Far posterior segments of *Aphelochaeta* species are sometimes expanded or inflated; other species have narrow or tapering posterior ends.

The present study is limited to five of the six sediment-dwelling bitentaculate genera; the genus *Kirkegaardia* was treated earlier (Blake 2016). The multitentaculate genera and *Dodecaceria* will be treated in a separate contribution. A recent review of the Cirratulidae including diagnoses of the genera is found in Blake & Magalhães (2017). The following key to all genera of Cirratulidae is provided to help readers and users of this study better orient themselves in the family.

Key to the genera Cirratulidae

lA. Anterior end with single pair of long, grooved dorsal tentacles or tentacular filaments 2
lB. Anterior end with 2 groups of tentacles or a series of numerous tentacular filaments 8
2A. Setae all smooth or denticulate capillaries; modified acicular spines or hooks absent 3

2B. Setae include smooth capillaries, acicular spines, bidentate hooks, spines with knob or irregular tipped setae, and other types of modified spines 4
3A. Capillary setae smooth, sometimes with fibrils splayed or spread out along edge . . . . . Genus *Aphelochaeta*
3B. Capillaries include both smooth capillaries and others with broad, basally flattened blades having fine to coarse denticles or serrations along one edge . . . . . .Genus *Kirkegaardia*
4A. Segmental branchiae limited to few anterior setigers; modified setae with expanded tips and either heavily serrated, chisel-like, or spatulate with distal excavation; body usually dark green or brown in life or blackish or brown in alcohol; sometimes regenerating anterior or posterior sections of body . . . . . Genus *Dodecaceria*
4B. Segmental branchiae numerous, extending over anterior and middle parts of body, sometimes to posterior end; modified setae never with expanded or excavated tip; body color sometimes dark, but usually light tan or brown in alcohol; regenerates rare 5
5A. Parapodia with noto- and neuropodia widely separated from one another; modified setae only include bidentate hooks with or without closely applied hood or sheath associated with one or both teeth . . . . . .Genus *Caulleriella*
5B. Parapodia with noto- and neuropodia set close to one another; modified setae include acicular spines, rarely with 1–2 bidentate hooks accompanying larger spines 6
6A. Acicular spines typically thin, slender, with sub-bidentate knobby or irregularly blunted tips, not bidentate, usually geniculate and grading into similarly shaped capillaries, never arranged in cinctures; body typically elongate, slender . . . . .Genus *Tharyx*
6B. Acicular spines typically large, straight or sigmoid shaped, with tips pointed or rounded but not knob-tipped; bidentate hooks rare; bodies typically robust, thick, with anterior or middle segments often expanded 7
7A. Acicular spines of posterior setigers, numerous, arranged in cinctures arising from elevated parapodia, providing distinctive, often conspicuous armature; spines elongate distally entire, sigmoid-shaped, rarely with 1–2 additional bidentate hooks in cinctures; prostomium typically conical or triangular shaped, tapering to narrow apex . . . . . .Genus *Chaetozone*
7B. Acicular spines of posterior setigers few, usually inconspicuous, not arranged in cinctures; notopodial spines present or absent; spines usually straight, not sigmoid-shaped; prostomium broad, wedge-shaped . . . . . Genus *Chaetocirratulus* **n. gen.**
8A. Setae all capillaries; tentacular filaments of each side arranged in longitudinal rows over multiple segments . . . . . Genus *Protocirrineris*
8B. Setae include capillaries and acicular spines; tentacular filaments of each side usually forming a transverse series 9
9A. Tentacular filaments arising from setiger 1; first branchiae on same setiger as tentacular filaments 10
9B. Tentacular filaments arising from two or more segments posterior to setiger 1; first branchiae arising from segments anterior to tentacular filaments 11
10A. Acicular spines stout, sigmoid-shaped; branchiae single, arising dorsal to notosetae . . . . . Genus *Cirratulus*
10B. Acicular spines straight, tapering to apex; multiple branchiae arising on anterior segments from several separate lobes. . . . . Genus *Fauvelicirratulus*
11B. Branchiae arising close to notopodium in anterior setigers, shifting toward mid-dorsum of body in middle setigers; some species with multiple branchiae on individual parapodia. . . . . Genus *Timarete*
11B. Branchiae arising just dorsal to notopodium throughout, not shifting dorsally along body; all branchiae single on individual parapodia . . . . . Genus *Cirriformia*

Genus *Aphelochaeta* Blake, 1991

Type species: *Tharyx monilaris* Hartman, 1960. Original designation by Blake (1991).

Diagnosis. (emended, Dean & Blake 2016). Prostomium conical to rounded; peristomium elongate with pair of grooved dorsal tentacles arising either on or anterior to setiger 1. Anterior segments often expanded, crowded or uncrowded; abdominal segments sometimes beaded or moniliform in appearance; setae simple capillaries lacking distinct serrations using light microscopy but distinct fibrils may be visible using SEM; posterior end frequently expanded, tapering to a simple pygidial lobe.

Remarks. Blake (1991) assigned bitentaculate cirratulid species having only simple, non-serrated capillary setae to the genus *Aphelochaeta*. The species belonging to *Aphelochaeta* are among the most enigmatic and difficult to identify of all cirratulids because of the lack of obvious variability in setal morphology. However, there is considerable variation in body shape, details of the prostomium and peristomium, placement of the dorsal tentacles and anterior branchiae, presence or absence of dorsal and ventral grooves and ridges, form of the posterior end and pygidium, and Methyl Green staining patterns. Sometimes the capillaries do differ in thickness and length among species, but this is difficult to quantify and depict in a manner that enables readers of descriptions to distinguish one species from another. Additionally, the capillaries often exhibit numerous fibrils along the shaft, but these are best seen with SEM and difficult to observe in light microscopy. Despite the specific nature of different combinations of these characters, closely related species are usually difficult to distinguish from one another. Blake (1996) pointed out that it is usually only at the local or regional level that keys to species have any utility.

Hartman (1966, 1967) referred all bitentaculate cirratulids having only capillary setae and previously reported from Antarctica to *Tharyx* according to definitions then in use. Types of all the Antarctic species and most of the western South American species have been examined. *Tharyx fusiformis* Monro, 1939, originally understood to have only capillary setae has been found to have spines in posterior setigers and is referred to a new genus *Chaetocirratulus* **n. gen.** and to synonymy with *Heterocirrus andersenensis* Augener, 1932. The syntypes of *Tharyx epitoca* Monro, 1930, were examined and also found to have spines in far posterior parapodia; the species is also referred to *Chaetocirratulus* **n. gen.** The holotype of *Heterocirrus cincinnatus* Ehlers, 1908, has been examined. This species was originally described from the sub-Antarctic Kerguelen Islands in the Indian Ocean, and has been reported widely from Antarctica by numerous authors (usually as *Tharyx cincinnatus* or *Aphelochaeta cincinnata*). However, it appears that this species is limited to subantarctic locations and the records from the high Antarctic belong to other species, mostly described herein. Due to errors in the original descriptions or misinterpretation of the published descriptions, each of the three species cited above have been misconstrued in the Antarctic ecological literature. As such, the published records of these species most certainly refer to other species described in the present study. These issues illustrate some of the problems with interpreting previous records of Antarctic bitentaculate cirratulids.

In the present study, 11 species of *Aphelochaeta* from South America and Antarctica are treated; eight are new to science. Other undescribed species are also present in the South American and Antarctic collections but the specimens are few, incomplete, and not in sufficiently good condition to be described.

All seven species of *Aphelochaeta* from Antarctica reported herein are new to science and have proven to be especially difficult to separate from one another despite the availability of large numbers of specimens. Most specimens are incomplete, have lost tentacles and branchiae, and the morphology of the anterior and posterior ends has proven to be highly variable largely due to different methods of collection, handling, and damage or contraction during preservation. Contraction of the peristomium compresses the region where the dorsal tentacles and first branchiae are located, making these structures sometimes difficult to locate and to correctly define as being on the peristomium or first setiger. Shirlastain A or SEM is needed to better highlight the scars or stumps of these structures and careful study of the specimens is time consuming. The shape and size of the posterior end is often diagnostic, but this part of the body is usually missing. The presence of separated posterior ends in the samples is helpful, however. Only three species, *A. brandtae* **n. sp.**, *A. hormosa* **n. sp.**, and *A. spectabilis* **n. sp**., have a prominent and distinctive MG staining pattern on the pre-setiger region and/or the venter of anterior segments. *Aphelochaeta dearborni* **n. sp.** and *A. palmeri* **n. sp.** each have a weak, diffuse staining pattern on the pre-setiger region, but other species have little or no staining pattern. Methyl Green does stain the thoracic segments of several species to differing degrees, but except for the prominent bands on the venter of *A. brandtae* **n. sp.**, this is of itself usually only a supporting character. Finally, the lack of distinctive setal morphology in species of *Aphelochaeta* presents challenges in this genus and adds to the difficulty of distinguishing between the various Antarctic species in particular.

Aphelochaeta antelonga Dean & Blake, 2016

Figure 1

Aphelochaeta antelonga Dean & Blake, 2016: 102–104, figs. 1A, 2A–B, 3A.
Monticellina sp. Soto *et al*. 2016: Table 2.

Material examined. Off Ecuador, SEPBOP, R/V *Anton Bruun* Cr. 18B, Sta. 768-D, 10 Sep 1966, 03°36′S, 80°38′W, ca. 50 m (1, USNM 1490699).—**Chile, Valparaiso Bay**, USNS *Eltanin* Cr. 18, Sta. 1437, 25 May 1965, 33.00°S, 71.67°W, 119 m (7, USNM 1490700); University of Valparaiso, coll. E.H. Soto, Dec. 2012: Sta. 1, 32.909°S, 71.546°W, 22 m (14, MCZ 14986); Sta. 2, 32.909°S, 71.597°W, 50 m, (6, MCZ 149877); Sta. 3, 32.909°S, 71.596°W, 80 m, (7, MCZ 149877); LUCE, near Puerto Montt, Estero Reloncavi, Bahía Ralún, Sta. M29B, 01 Apr 1949, 41.408°S, 72.329°W, 35–40 m in sand (1, SMNH).

Description. An elongate, threadlike species with narrow thoracic setigers and elongate abdominal segments, but these not moniliform (Fig. 1A). Largest specimens 8–10 mm long, 0.2–0.3 mm wide across expanded anterior segments, with about 40 segments; most specimens incomplete, complete specimens with weakly expanded posterior region with segments again becoming narrow and terminating in simple pygidial lobe (Fig. 1C). Shallow

ventral groove present in anterior thoracic setigers of some specimens, best developed in posterior thoracic and anterior abdominal segments (Fig. 1B); absent in middle and posterior segments. Dorsal grooves or ridges not apparent. Color in alcohol opaque white, some specimens transparent; no pigment apparent.

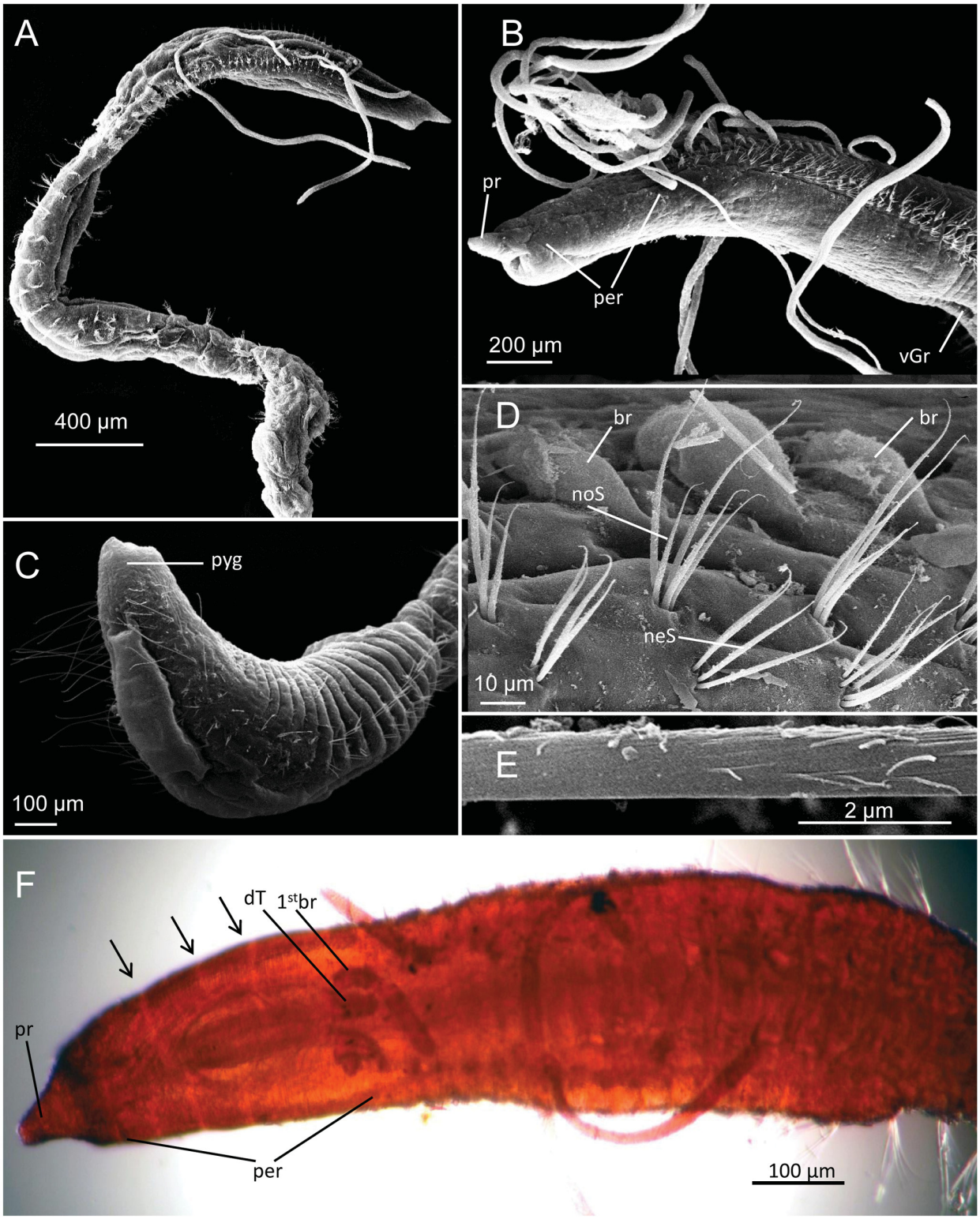

FIGURE 1. *Aphelochaeta antelonga* Dean & Blake, 2016. Specimens from Valparaiso Bay, Chile**:** A, anterior and middle body segments in right lateral view; B, anterior end, left ventrolateral view; C, posterior end, ventrolateral view; D, anterior segments, L to R, with branchial scars; E, detail of capillary seta showing fibrils; F, anterior end, dorsal view. A–E, SEMs of specimens collected by E.H. Soto from Valparaiso Bay; F, photomicrograph of specimen from *Eltanin* Sta. 1437 (USNM 1490700) stained with Shirlastain A. Arrows denote location of weakly developed peristomial grooves revealed after staining.

Prostomium conical, narrowing to rounded tip (Fig. 1B, F); eyespots absent; nuchal organs narrow transverse slits at posterior margin, dorsal to mouth. Peristomium elongate, narrow, up to 2.5 times as long as wide (Fig. 1A–B, F); surface relatively smooth, crossed by several grooves, best seen when stained with Shirlastain A (Fig. 1F) or viewed with SEM (Fig. 1B). Some specimens with two weakly developed annular rings apparent; first about one-third along peristomium. Peristomium with weakly developed mid-dorsal ridge or crest. Dorsal tentacles arising close to one another from posterior margin of peristomium (Fig. 1F). First pair of branchiae also on peristomial margin, lateral to tentacles (Fig. 1F). Second pair of branchiae on setiger 1, dorsal to notosetae. Subsequent branchiae in a similar location on following segments (Fig. 1D). Branchial scars not evident in posterior half of body.

Parapodia reduced, with setae emerging directly from body wall (Fig. 1D). Setae all capillaries with fine fibrils along shaft (Fig. 1E). Setae of anterior segments or thoracic region number 4–5 in notopodia and 3–4 in neuropodia, arranged as a group or in a weakly developed double row (Fig. 1D); notosetae of anterior abdominal segments increasing to 10–15 in two rows; neuropodia with 8–12 setae in two rows; setae of posterior abdominal segments reduced to 2–4 per fascicle. Long natatory-like setae generally not present, however, far posterior segments with a few long capillaries present on some specimens (Fig. 1C).

Methyl Green stain. Three specimens from E.H. Soto's Sta. 1 in Valparaiso with tip of prostomium retaining weak stain; dorsum of posterior part of peristomium with weak stain; one specimen with a few green speckles on anterior end of parapodia and venter of middle segments. Otherwise no distinctive pattern observed.

Remarks. The elongate peristomium of *A. antelonga* is relatively smooth compared with other species where the grooves cut deeply and divide the peristomium into prominent annular rings (see other species reported below). The present specimens differ slightly from the original account from Costa Rica in that *A. antelonga* was described as having two peristomial rings in addition to numerous shallow transverse annulations or grooves. The same numerous annulations or grooves are present in the Chilean specimens but the separation into two rings is vague; in some specimens one can count 3–4 weakly defined rings if the grooves are more prominent, which would likely be due to contraction during preservation. *Aphelochaeta antelonga* appears to be most similar to *A. elongata* Blake, 1996, from California and *A. striata* Dean & Blake, 2016, from off Costa Rica. All three species have a pre-setigerous region 2–3 times as long as wide and relatively smooth rather than divided into prominent annular rings. Both *A. elongata* and *A. striata* have the first pair of branchiae on setiger 1; *A. striata* also has a second pair present on setiger 1. In contrast, *A. antelonga* has the first pair of branchiae lateral to the dorsal tentacles on the peristomium. *Aphelochaeta antelonga* also has a longitudinal dorsal crest on the peristomium that is lacking in *A. elongata* and *A. striata*.

The overall appearance of the elongate, narrow peristomium and thoracic region is reminiscent of some species of the genus *Kirkegaardia* (see Blake 2016). However, those species have distinctly serrated or denticulate capillaries and the thoracic parapodia are typically elevated over the dorsal surface producing a furrow that may have a separate dorsal crest.

Habitat. According to Soto *et al.* (2016), *A. antelonga* (as *Monticellina* sp.) was the fifth most abundant polychaete species encountered as part of a survey of Valparaiso Bay, Chile, over quarterly seasonal sampling from December 2012 to December 2013 with an average density of 193.8 individuals m^{-2}. Sediments at stations where *A. antelonga* was collected consisted of sand (~33%) and mud (~67%).

Distribution. Costa Rica, 11–18 m; Ecuador, 50 m; Chile, 20–119 m.

Aphelochaeta aubreyi new species

Figures 2–3

Aphelochaeta sp. 2: Hilbig 2001: 540 (in part); Hilbig *et al.* 2006: 715, 717, 719 (in part).
Aphelochaeta cf. *epitoca*: Hilbig 2001: 540 (in part); Hilbig *et al.* 2006: 717 (in part). **Not** Monro 1930.
Aphelochaeta cincinnata: Hilbig 2001: 540 (in part); Hilbig *et al.* 2006: 715, 717, 719 (in part). **Not** Ehlers 1908.

Material Examined: East Antarctic Peninsula, Prince Gustav Channel, RVIB *Nathaniel B. Palmer* Cr. 2000-03, coll. J.A. Blake, SM grab, Sta. 01, 14 May 2000, 64°17.625′S, 058°34.678′W, 768 m, 12 **paratypes** (LACM-AHF Poly 10202); Sta. 03, 15 May 2000, 64°53.533′S, 059°30.694′W, 385 m, 18 **paratypes**, some juveniles (MCZ 149879); Sta. 35A, 25 May 2000, 64°10.471′S, 058°28.505′W, 651 m, **holotype** (LACM-AHF Poly 10200) and 9

paratypes (LACM-AHF Poly 10201); Sta. 27, 23 May 2000, 64°22.934′S, 058°36.976′W, 684 m (10, MCZ 149833); Sta. 28, 23 May 2000, 64°22.018′S, 058°30.942′W, 794 m (5, MCZ 149884); Sta. 29, 24 May 2000, 64°21.361′S, 058°26.637′W, 690 m (2, MCZ 149885); Sta. 30, 24 May 2000, 64°16.875′S, 058°26.985′W, 843 m (2, JAB); Sta. 33, 24 May 2000, 64°11.959′S, 058°41.857′W, 587 m (14, MCZ 1498819); Sta. 34, 24 May 2000, 64°10.995′S, 058°34.140′W, 865 m (4, MCZ 149882); Sta. 35, 25 May 2000, 64°10.471′S, 058°28.505′W, 651 m (2, JAB); **off Cape Longing,** Sta. 02, 15 May-2000, 64°18.387′S, 058°37.911′W, 504 m, (6, MCZ 149880); **Former Larsen A Ice Shelf area**, Sta. 04, 16 May 2000, 64°49.209′S, 060°32.033′W, 668 m (1, JAB); Sta. 21, 20 May 2000, 64°45.827′S, 060°19.450′W, 912 m (2, JAB); Sta. 26, 23 May 2000, 64°39.564′S, 059°13.226′W, 564 m (3, MCZ 149886).—**Weddell Sea**, **South of Cape Norvegia**, R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-091, 4 Feb 1998, MG, 1510 m, 73°28.4′S, 22°48.8′W, 1510 m (1, SMF 24879); Sta. 48-136, 09 Feb 1998, 74°33.0′S, 27°12.7′W, MG, 2012 m (1, SMF 24881).—**Drake Passage**, R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-345, 20 Mar 1998, 61°53.3′S, 59°06.9′N, MG, 218 m (5, SMF 24880).—**South Shetland Islands, King George Island,** R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-299, 14 Mar 1998, 62°15.8′S, 58°42.7′W, MG, 207 m, (1, SMF 24875); Sta. 48-300, 14 Mar 1998, 62°16.8′S, 58°42.1′W, MG, 423 m (3, SMF 24876); Sta. 48-326, 17 Mar 1998, 62°20.1′S, 58°38.8′W, MG, 606 m (3, SMF 24877); Sta. 48-330, 18 Mar 1998, 61°20.6′S, 58°15.1′W, MG, 2009 m, (2, SMF 24878).—**West Antarctic Peninsula, Anvers Island, off Palmer Station**, R/V *Hero* Sta. 731-1912, 06 Mar 1973, 64°46′52″S, 064°03′35″W, 25–55 m, (1, USNM 1490701); **off Melchior Islands**, R/V *Hero* Sta. 824-16-2, 22 Mar 1982, 64°19.50′S, 62°59.58′W, 85 m, 18 **paratypes** (USNM 1490702). **Biscoe Islands, Grandidier Channel, Larrouy Island,** R/V *Hero* Sta. 824-5-1, 65.94°S, 65.297°W, 16 Mar 1982, 246–270 m (5, USNM 1490703).

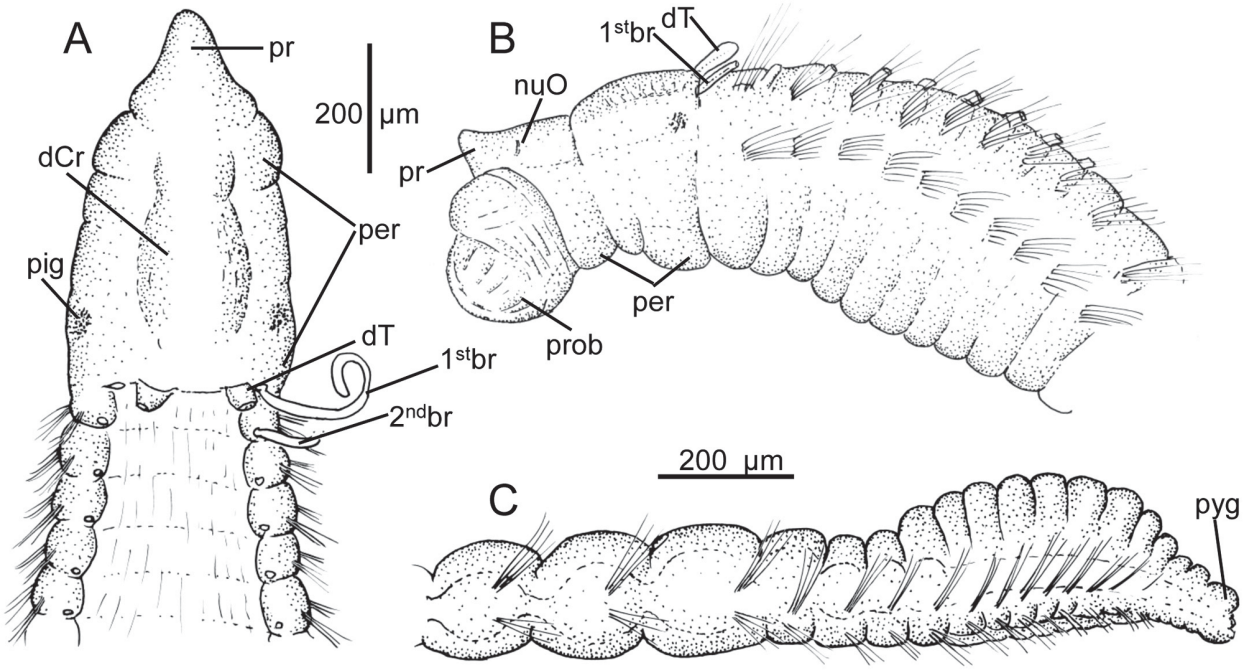

FIGURE 2. *Aphelochaeta aubreyi* **n. sp.** Anterior end, dorsal view, paratype (USNM 1490702); B, anterior end, left lateral view, paratype (LACM-AHF Poly 10201); C, posterior end, left lateral view paratype, (MCZ 149879).

Description. A small to moderate-sized species, holotype complete, body coiled, approximately 10 mm long, 0.5 mm wide across anterior and posterior segments (Fig. 3A–B), 0.3 mm across middle segments, with 85 setigerous segments; large paratypes from Sta. 35A (LACM-AHF Poly 10201) up to 10 mm long, 0.5 mm wide with about 110 segments. Body elongate, more or less cylindrical in cross section; anterior segments expanded laterally and ventrally with anterior 15–20 segments narrow (Figs. 2B, 3A), each segment six times wider than long. Segments becoming longer and rounded in middle and posterior body regions (Figs. 2C, 3A–B), each about as wide as long, some oval or weakly to strongly moniliform (Fig. 2C), but variable; posterior 12–15 segments

again becoming weakly to moderately inflated, with venter flat or weakly grooved, tapering to pygidium consisting of terminal anus and ventral lobe (Figs. 2C, 3B). Dorsal groove narrow, inconspicuous and weakly developed, limited to posterior thoracic segments and first few abdominal segments. Color in alcohol tan; small black pigments spots normally visible on posterior lateral margins of peristomium (Fig. 2A–B). Anterior thoracic segments with mid-ventral glands visible across a few middle segments.

Prostomium triangular, rounded on anterior margin (Fig. 2A–B); eyespots absent; nuchal organs narrow slits on posterior margin (Fig. 2B), difficult to observe; proboscis or ventral pharynx, consisting of 2–4 lobes everted on some specimens (Fig. 2B). Peristomium relatively smooth, elongate, with one short annular ring posterior to prostomium followed by longer second ring (Fig. 2A–B), sometimes incised by 2–3 thin furrows producing 2–3 additional rings when contracted, these best observed laterally and when stained with Shirlastain A; weak dorsal crest or ridge present over peristomium extending to near posterior margin (Fig. 2A), not observed on all specimens unless stained with Shirlastain A. Dorsal tentacles arise from posterior margin of peristomium (Fig. 2A–B); first pair of branchiae lateral to dorsal tentacles; second pair of branchiae on setiger 1, dorsal to notosetae (Fig. 2A); subsequent branchiae in same position.

Parapodia reduced to low mounds with setae emerging directly from body wall. All setae capillaries with notosetae of anterior segments long, up to 10–12 per fascicle, reduced to about six setae in middle body segments, and 3–4 setae in far posterior segments. Neurosetae always shorter than notosetae, with about 8–9 per fascicle in anterior segments and 3–4 posteriorly. Natatory setae not observed.

Methyl Green stain. Pre-setiger area not retaining stain; stain concentrated in intersegmental grooves of thoracic and anterior abdominal segments, mainly on venter; stain dissipates rapidly.

Etymology. This species is named for my late colleague, Mr. Stephen B. Aubrey, who left us too soon. Steve was one of the best at-sea field scientists I have ever known, with expertise ranging from the application of sophisticated electronic data gathering to the collection of water column and benthic biology samples. Steve was also an Antarctic veteran, having participated in research on the ecology of the Dry Valley lakes.

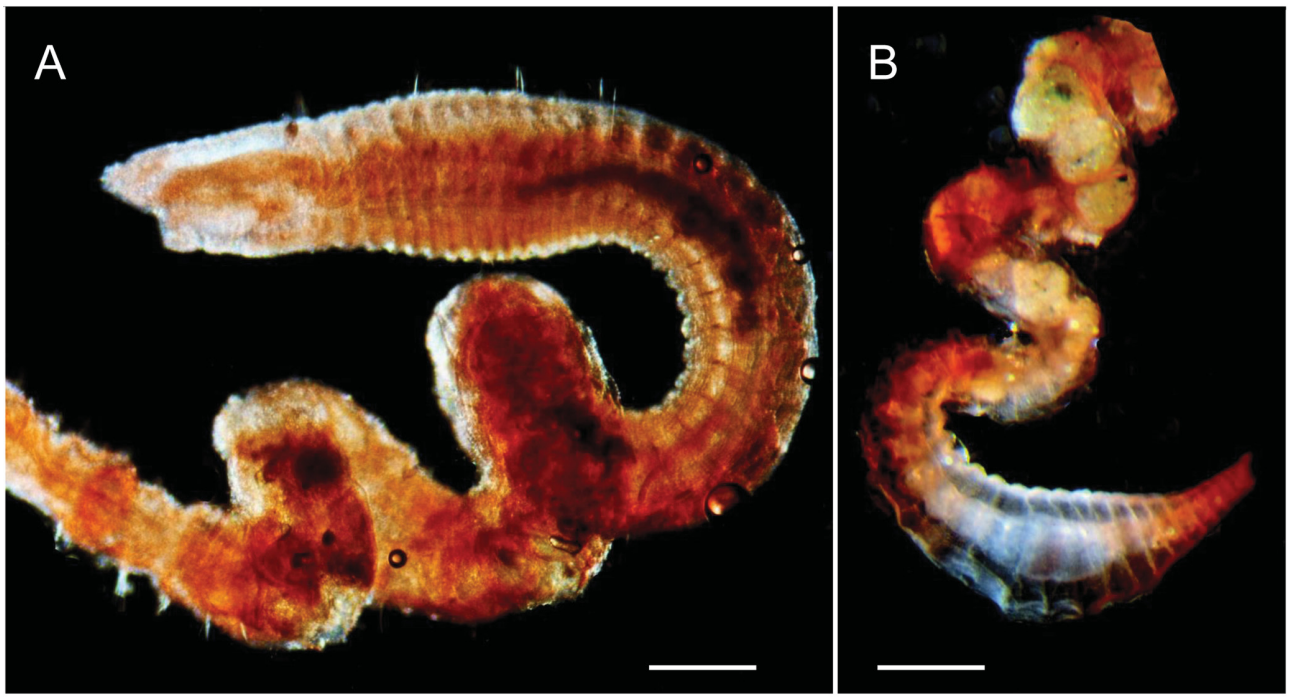

FIGURE 3. *Aphelochaeta aubreyi* **n. sp.** Photomicrographs of holotype (LACM-AHF Poly 10200): A, anterior end, left lateral view B, posterior end, right lateral view. Stained with Shirlastain A. Scales 500 µm.

Remarks. *Aphelochaeta aubreyi* **n. sp.** has dorsal tentacles arising from the posterior margin of the peristomium and the first pair of branchiae located lateral to the dorsal tentacles; the second pair of branchiae are on setiger 1. This pattern is typical for most of the Antarctic species of *Aphelochaeta*. The characters that define *A. aubreyi* **n. sp.** are the relatively smooth nature of the elongate peristomium with only two weakly developed

annular rings, the first of which is short, followed by a long second ring; the presence of black pigment spots on the dorsolateral margins of the peristomium; the enlarged, rounded, and weakly moniliform setigers in the middle and posterior segments; a weak to moderately expanded posterior end; and a nearly complete lack of any MG staining reaction. Among Antarctic species, *A. aubreyi* **n. sp.** is most closely related to *A. hormosa* **n. sp.** in having an expanded thoracic region, moniliform abdominal segments, and lateral black spots on the posterior lateral margins of the peristomium. The two species differ in that *A. hormosa* **n. sp.** has a strong and distinctive MG staining pattern and prominent lateral grooves on the peristomium that produce two distinct partial annular rings. In addition, the posterior segments of *A. aubreyi* **n. sp.** are enlarged dorsally and flattened ventrally; whereas, in *A. hormosa* **n. sp.** the posterior segments, while rounded dorsally and flattened ventrally, are not enlarged dorsally.

Aphelochaeta aubreyi **n. sp**. is similar to *A. monilaris*, the type-species from off California (Hartman 1960), in having expanded anterior and posterior body regions joined by a long section with narrow, rounded, or moniliform segments. The two species differ most importantly in that *A. monilaris*, when stained with MG, has prominent transverse bands across the venter of anterior segments (Blake 1996) that are lacking in *A. aubreyi* **n. sp**.

Habitat. Seafloor sediments in the vicinity the former Larsen-A ice shelf area were collected together with biological samples in May 2000 (Domack *et al.* 2001). Due to the glacial cover formerly overlying the area, the surficial sediments contained high concentrations of sand (20–40%) from particles dropped to the seafloor (Gilbert & Domack 2003). The sample from R/V *Hero* Sta. 824-5-1 (USNM 1490703) in the Grandidier Channel was collected on a rocky bottom.

Distribution. Drake Passage, South Shetland Islands, West Antarctic Peninsula, 25–606 m; East Antarctic Peninsula, 385–912 m; Weddell Sea, 1500 m.

Aphelochaeta bimaculata new species

Figures 4–5

Chaetozone sp.: Hartman 1978: 166 (in part).

Material examined. Weddell Sea, E of Antarctic Peninsula. *Glacier* Sta. 69-11, 05 Mar 1969, 77.15°S, 38.97°W, 851 m **holotype** (USNM 1490704) and 12 **paratypes** (USNM 1490705).

Description. An elongate, threadlike species, with narrow pre-setiger region (Figs. 4A–B, 5C–D), expanded anterior segmental region, becoming narrow again in posterior segments (Fig. 5A, D). All specimens incomplete; holotype narrow pre-setiger region becoming wider by setiger 3, then narrowing again by setiger 12 (Figs. 4B, 5C–D), 6.25 mm long, 0.45 mm wide across peristomium, 0.87 mm wide across expanded anterior segments, with 31 setigers.

Body with distinctive pigmentation; all specimens with black spots on posterior lateral margin of peristomium (Fig. 4A–B), one paratype with black pigment on lower lip of mouth; all specimens with black pigment spots on middle and anterior margins of parapodia (Figs. 4A–B; 5A–B), variable between specimens, best developed on holotype on all segments, other specimens with these spots reduced or limited to middle body segments. All specimens with distinctive paired black spots within ventral groove on each segment (Fig. 5A–B); sometimes with additional spots in groove (Fig. 5B). Overall color in alcohol, light tan, with black pigment spots conspicuous or faint.

Anterior expanded segments narrow, about 10 times wider than long (Fig. 4A–B); posterior segments becoming longer (Fig. 5A, D). One posterior fragment with last setigers about as long as wide. Dorsum without groove, weakly rounded on posterior portion of each segment; venter with narrow shallow groove extending along entire body.

Pre-setiger region very long, narrow, about 2.2 times as long as wide (Figs. 4A–B; 5C–D), relatively smooth. Prostomium conical to triangular, narrowing to rounded tip; eyespots absent; nuchal organs not observed. Peristomium elongate, weakly divided into three annular rings, with grooves observed only laterally, not crossing dorsum; with dorsal surface slightly elevated, but without distinct dorsal crest (Fig. 4A). Dorsal tentacles arising medially on posterior margin of peristomium (Fig. 4B). First pair of branchiae lateral to dorsal tentacles on peristomium; second pair of branchiae on setiger 1 in line with first pair and medial to notosetae (Fig. 4A). Branchial scars only evident on first 12–15 setigers.

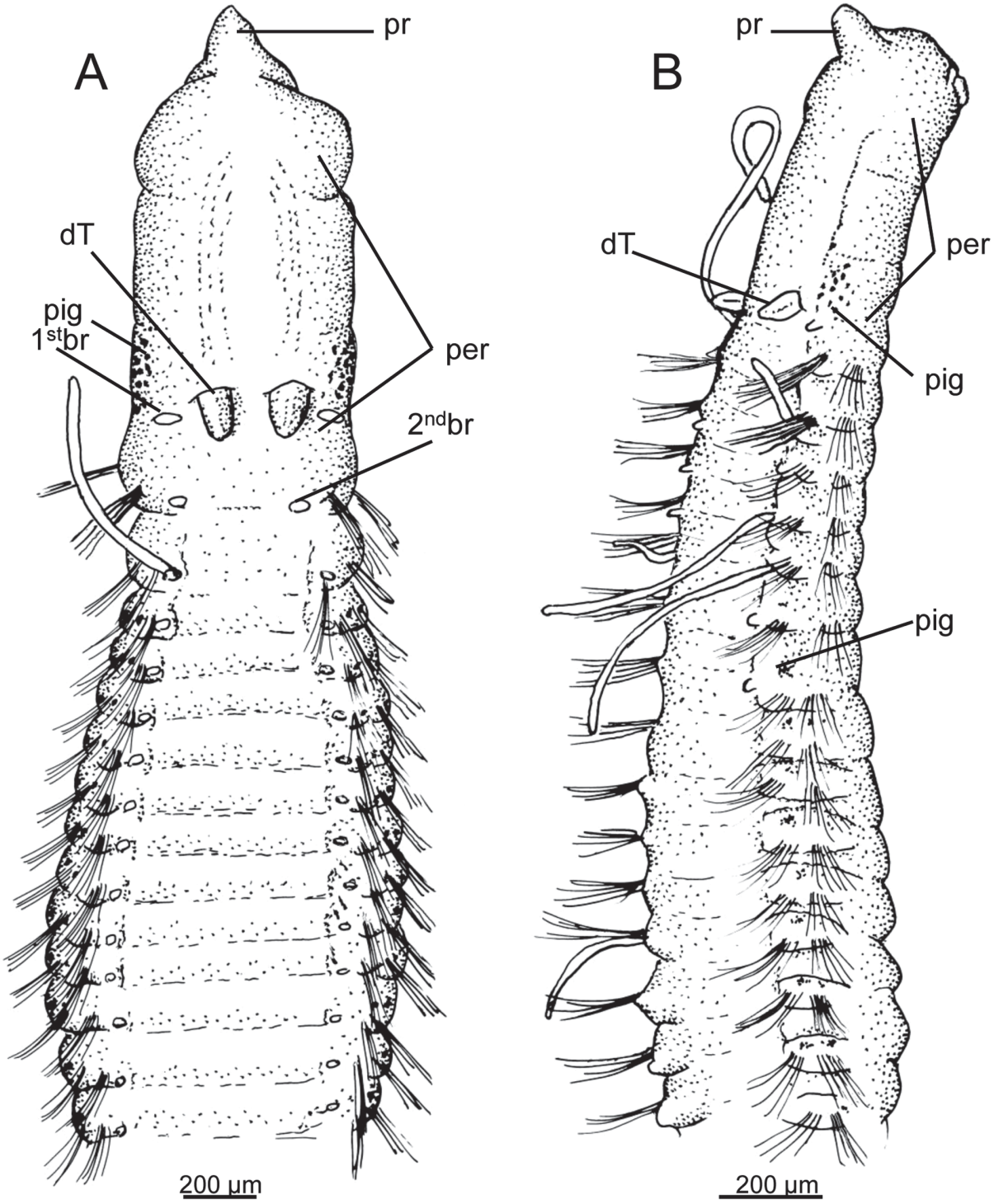

FIGURE 4. *Aphelochaeta bimaculata* **n. sp.** A, paratype (USNM 1490705), anterior end, dorsal view; B, holotype (USNM 1490704), anterior end, right lateral view.

Anterior parapodia with elevated longitudinal ridge or lamella posterior to origin of noto- and neurosetae (Fig. 4A–B); from about setigers 12–15, parapodia reduced to low mounds from which setae arise. Setae all capillaries, numbering 6–8 per fascicle through about 15 segments, then reduced to 3–4 per fascicle to end of fragments. Noto- and neurosetae similar in number and length. All setae simple capillaries.

One posterior fragment narrowing posteriorly, but pygidium not present.

Methyl Green stain. Distinctive MG pattern: holotype with heaviest stain on prostomium and ventral lip of

the mouth (Fig. 5C). Entire peristomium retaining stain with each annular ring denoted by grooves that do not stain; first two rings stain more intensely than third ring, which has a lighter speckled pattern. Anterior parapodia with strong staining reaction, extending across venter as distinct bands, variable in width and intensity (Fig. 5C); dorsal bands also present across anterior segments, but not as pronounced.

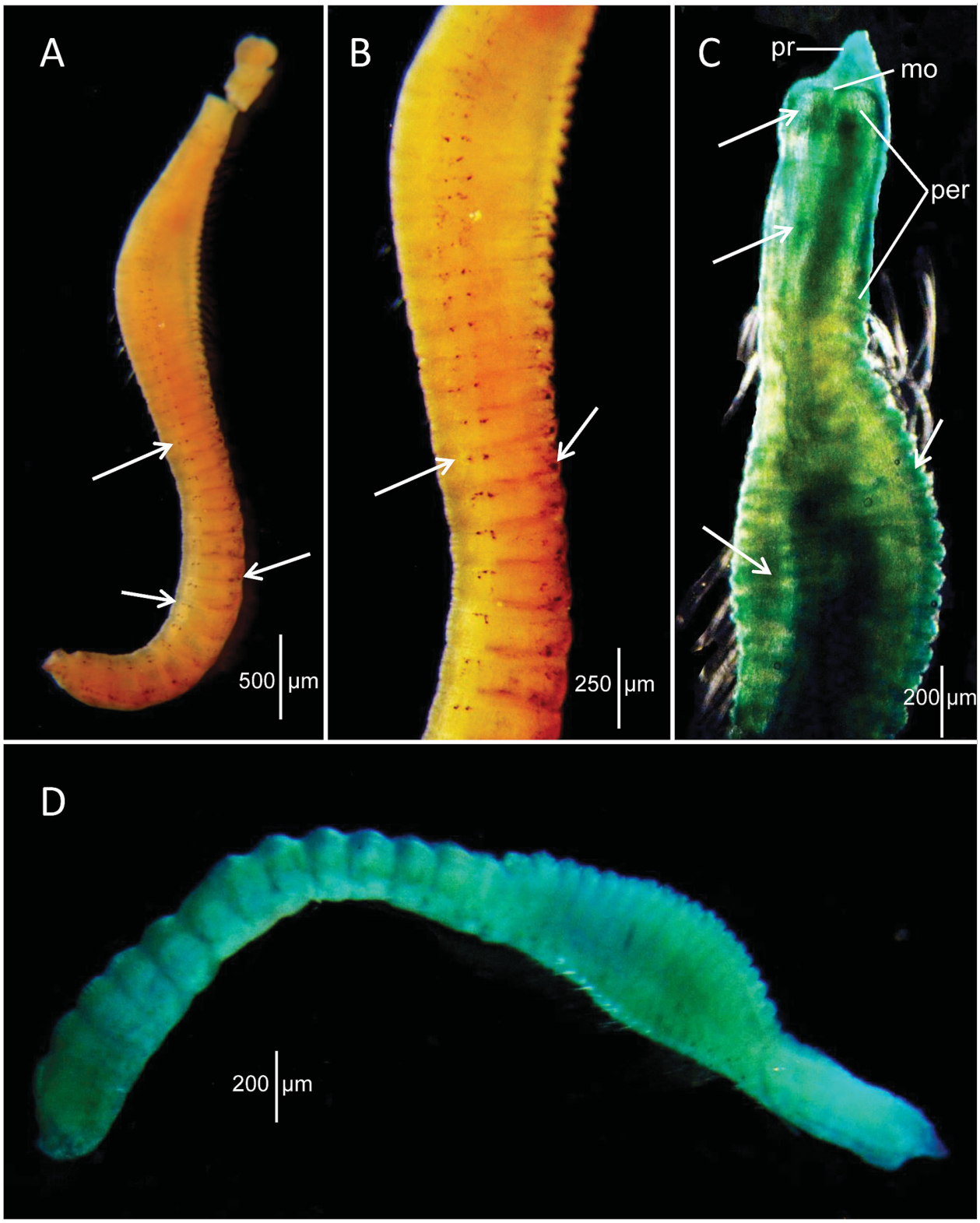

FIGURE 5. *Aphelochaeta bimaculata* n**. sp.** A–B, paratype (USNM 1490705): A, entire worm, ventrolateral view (pre-setiger region partially detached); B, detail of middle body segments (arrows denote location of pigment spots). C–D, holotype (USNM 1490704); C, anterior end, ventral view, with location of Methyl Green stain indicated (arrows); D, entire specimen, right lateral view. A–B, stained with Shirlastain A; C–D, stained with Methyl Green.

Etymology. The epithet, *bimaculata*, is derived from the Latin *bis*, for two, and *macula*, for spot; referring to the distinctive paired pigment spots along the venter.

Remarks. *Aphelochaeta bimaculata* **n. sp.** is unique in having a distinctive pattern of black pigment spots in various locations, but consistently with paired spots in the mid-ventral channel. In addition, the species has a prominent and distinctive MG staining pattern that, together with the pigmentation and the long, relatively smooth pre-setiger region, makes this species easy to recognize.

Aphelochaeta bimaculata **n. sp.** is similar to *A. antelonga* from Costa Rica and Chile (see above) in having a long, smooth, narrow pre-setiger region and having dorsal tentacles arising from the posterior margin of the peristomium and the first pair branchiae lateral to them. In *A. bimaculata* **n. sp.**, however, the peristomium has three distinct annular rings with a narrow ring following the prostomium and a long second ring continuing to setiger 1; in contrast, *A. antelonga* has one or two thin lines that cross the peristomium, but no distinct grooves that divide the peristomium into separate rings. In addition, *A. bimaculata* **n. sp.** has a prominent MG staining pattern, whereas A. *antelonga* has only a weak staining response or none at all.

Distribution. Weddell Sea, east of the Antarctic Peninsula, 851 m.

Aphelochaeta brandtae new species

Figures 6–7

Material examined. Weddell Sea, E of Antarctic Peninsula, R/V *Polarstern*, ANDEEP II (ANT-XIX/4), Sta. PS61/133-5, 07 Mar 2002, 65°20.27′S, 54°12.54′W, MUC, 1166 m, **holotype** (SMF 24954); Sta. PS61/132-6, 07 Mar 2002, 65°17.77′S, 54°0.00′W, box corer, 2086 m, 1 **paratype** (MCZ 1439888).—**Weddell Sea, off Coats Land**, USCG *Glacier*, Sta. 69-20, 12 Mar 1969, 73.823°S, 31.682°W, 2288 m (1, USNM 1490706).—**Drake Passage, North of South Shetland Islands**, R/V *Polarstern*, ANDEEP I (ANT-XIX/3), Sta. PS61/43-2, 29 Jan 2002, 60°26.95′S, 56°4.96′W, box corer, 3957 m, 3 **paratypes** (SMF 249556).—**Scotia Sea,** R/V *Polarstern*, ANDEEP I (ANT-XIX/3), Sta. PS61/46-3, 01 Jan 2002, 60°37.92′S, 53°57.17′W, box corer, 2888 m, 8 **paratypes** (SMF 24956); Sta. PS61/46-5, 01 Jan 2002, 60°38.13′S, 53°57.68′W, box corer, 2894 m, 2 **paratypes** (SMF 24957).

Description. A small species, all specimens incomplete; holotype an ovigerous female, mostly complete, 6.4 mm long, 0.4 mm wide across anterior segments, with 39 setigers; paratype from Sta. 46-3, 5.9 mm long, 0.44 mm wide across expanded anterior setigers, with 31 segments. Anterior 7–10 segments narrow, about eight times wider than long (Fig. 6A–B), then narrowing to 12–20 middle rounded segments about as wide as long, not moniliform (Fig. 7B); last 7–10 segments narrow, elongate. Anterior expanded segments with prominent parapodial shoulders and low rounded dorsum slightly elevated over parapodia (Fig. 6A–B), without longitudinal groove. Venter weakly rounded, typically without ventral groove, specimen from *Glacier* Sta. 69-20 (USNM 46797) with narrow ventral groove from middle segments to end of fragment; each anterior segment with broad band of glandular tissue across venter, that stains with MG (Fig. 7A–B). Holotype with large oblong eggs protruding from body in pairs (Fig. 7D–E), four per segment; individual eggs approximately 280 x 150 µm. Color in alcohol light tan; no accessory pigment.

Prostomium triangular, narrowing to pointed tip on anterior margin (Fig. 6A–B); eyespots absent; nuchal organs narrow slits located laterally just anterior to peristomium (Fig. 6B). Peristomium with two annular rings, second twice as long as first, best seen laterally (Fig. 6A–B); second ring sometimes subdivided into a third ring; annular grooves lateral, not extending over dorsum; dorsal surface with prominent dorsal crest extending from end of first annular ring to anterior margin of setiger 1 (Fig. 6A–B). Dorsal tentacles arising at posterior margin of peristomium lateral to dorsal ridge (Fig. 6A–B). First pair of branchiae posterior and lateral to dorsal tentacles on posterior margin of peristomium; second pair of branchiae arising from posterior margin of setiger 1, posterior to notosetae (Fig. 6B).

Anterior parapodial shoulders elevated over dorsum, prominent on setigers 7–10, depending on size of specimen (Fig. 6A–B); holotype with eight anterior setigers (Fig. 6B); paratype with 10 (Fig. 6A); anterior setae arising from low podial lobes; noto- and neurosetae arising close together along entire body. Setae all capillaries, some long but not natatory, with about 11–13 per notopodia and 8–10 in neuropodia in expanded anterior setigers, reduced to 4–5 in middle and posterior segments. Capillaries all thin, appearing smooth in light microscopy.

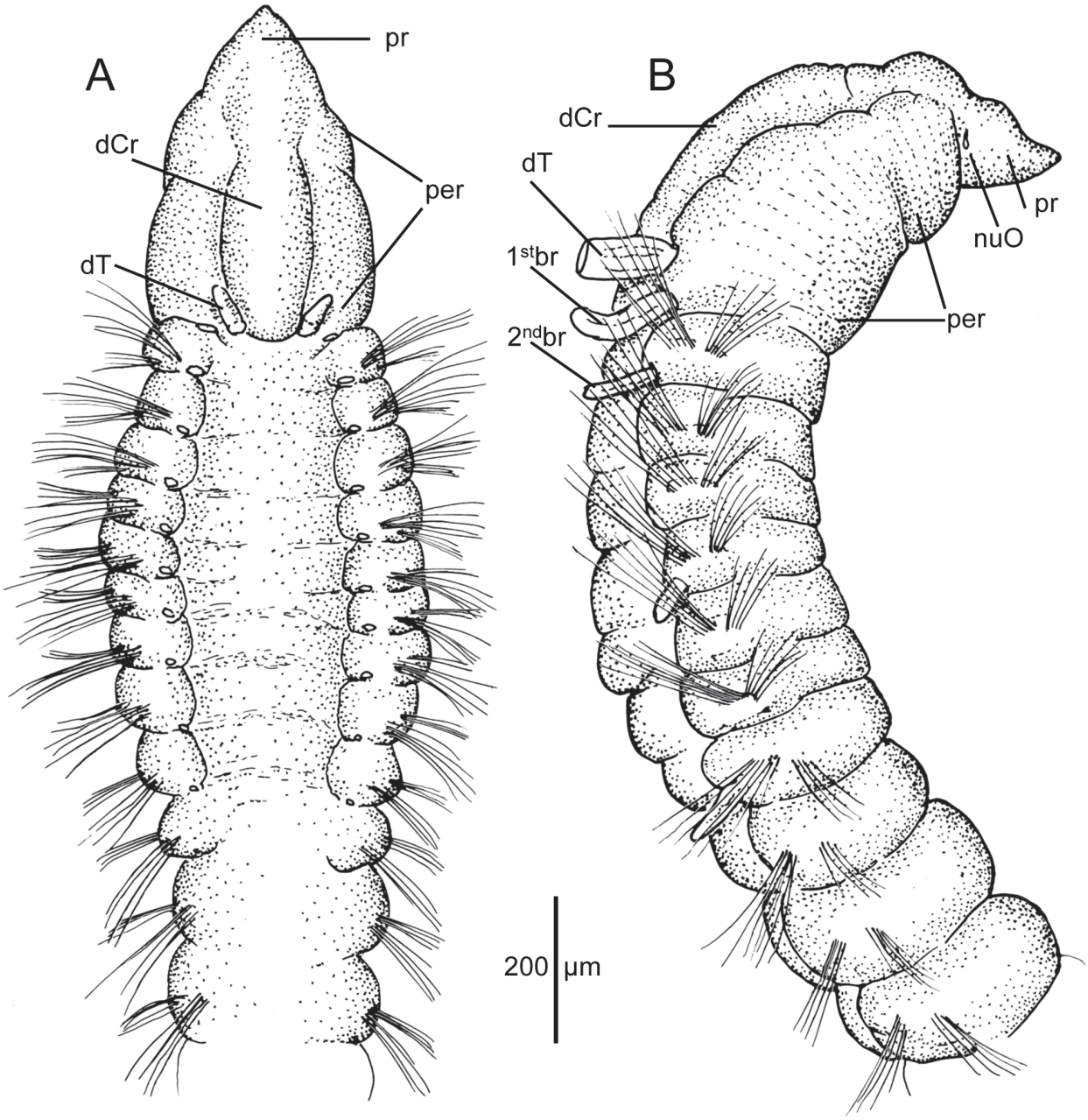

FIGURE 6. *Aphelochaeta brandtae* **n. sp.** A, paratype (SMF 24956), anterior end, dorsal view; B, holotype (SMF 24954), anterior end, right lateral view.

Methyl Green stain. Prominent and distinctive MG pattern present; some specimens staining strongly, others lightly. Prostomium and peristomium with distinct pattern dorsally, separated by unstained area (Fig. 7A, C); dorsally stained area terminating abruptly at posterior margin of peristomium (Fig. 7C); peristomial stain continuing around to ventral side, but not as prominent and limited to posterior half of peristomium. Holotype with strong prostomial stains dorsally and ventrally, but with peristomial stain lighter, reduced to a speckled pattern. Stain concentrated in dorsal segmental grooves on a few anterior segments. Ventrally, broad glandular bands of anterior segments staining intensely producing broad dark blue stripes across venter of anterior segments (Fig. 7A–B), some specimens with ventral stripes on most anterior segments, others limited to 2–4 segments, but these very intense and distinctive; ventral stripes extending laterally up and onto neuropodia, but not crossing dorsum.

Etymology. This species is named for Prof. Dr. Angelika Brandt, prominent pericarid specialist, deep-sea ecologist, and friend. Dr. Brandt was the expedition leader for the ANDEEP surveys of deep-sea habitats in Antarctica. She is currently Head of the Department of Marine Zoology at the Senckenberg Research Institute and Natural History Museum Frankfurt, Germany.

Remarks. *Aphelochaeta brandtae* **n. sp.** is a relatively small deep-sea cirratulid that is readily distinguished from its congeners in having a smooth pre-setiger region, short expanded anterior thoracic region, and a distinctive MG staining pattern. Anterior setigers transition abruptly to more or less rounded or oval abdominal segments with reduced parapodia; these segments are not moniliform.

The large, paired oblong eggs that protrude from the body wall of this species (Fig. 7D–E) are unusual and suggest a modified type of reproduction with direct development and possible brood protection.

The MG stain is distinctive with a defined pre-setiger staining pattern on prostomium and peristomium and with a clear ocular area between them, similar to that of *A. spectabilis* **n. sp.** However, the very intensely stained broad transverse MG stripes on the venter are unique among Antarctic bitentaculate cirratulids. In addition, *A. spectabilis* **n. sp.** does not have rounded abdominal segments.

Habitat. Sediments from the Drake Passage and Scotia Sea samples were typical deep-sea silt-clay with some cobble; samples from the Weddell Sea were greenish grey, silt-clay with some sand and pebbles (Diaz 2004; Howe *et al.* 2004).

Distribution. Antarctica: Drake Passage, Scotia Sea, Weddell Sea; slope and abyssal depths, 1166–3957 m.

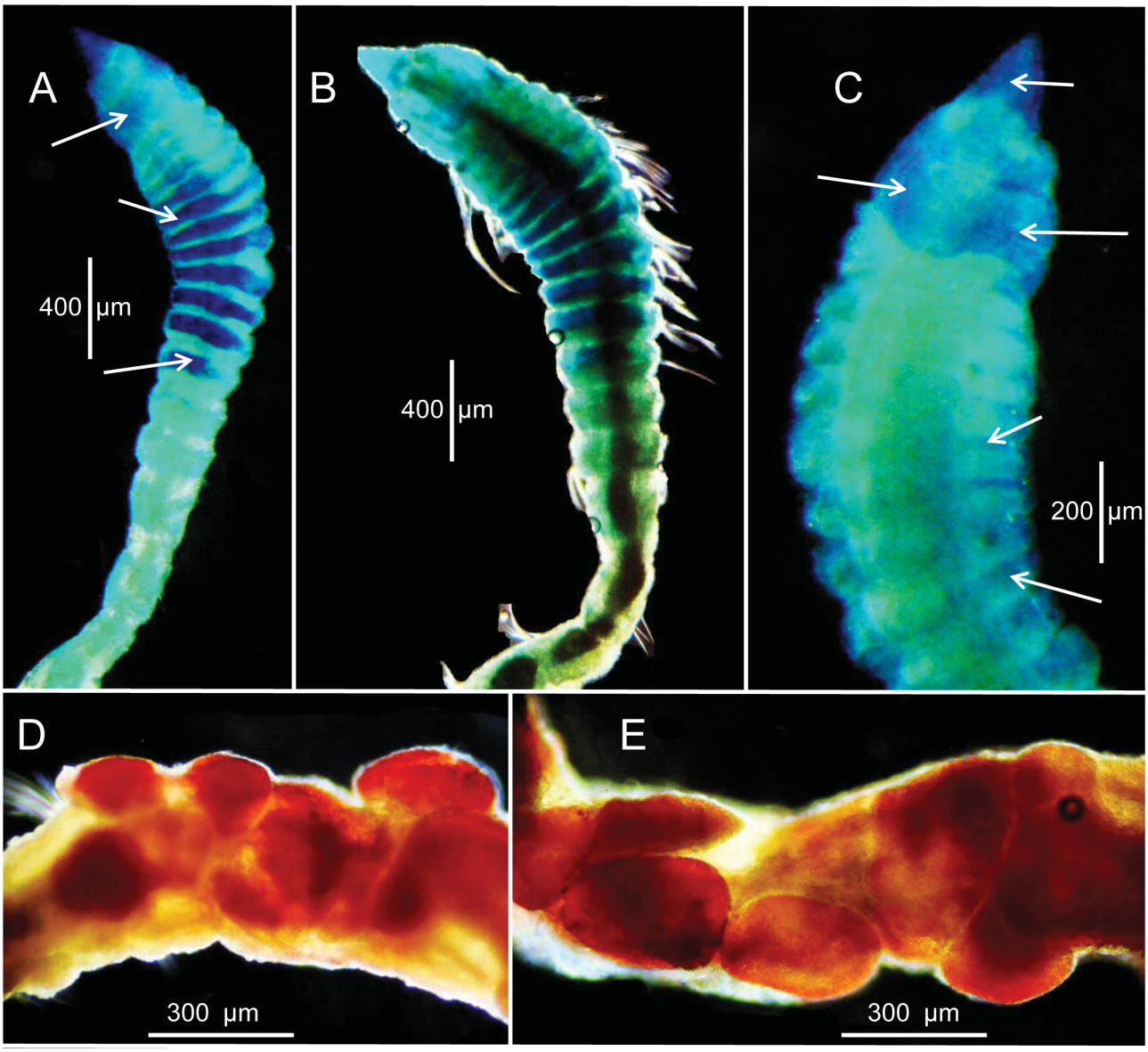

FIGURE 7. *Aphelochaeta brandtae* **n. sp.** A–C, paratype (SMF 24956): A, ventrolateral view of anterior and middle body segments; B, same, ventral view; C, anterior end, dorsal view. D–E, mid-body segments of holotype, (SMF 24954) with large eggs, stained with Shirlastain A. Arrows denote concentrations of Methyl Green stain.

***Aphelochaeta cincinnata* (Ehlers, 1908)**
Figure 8

Heterocirrus cincinnatus Ehlers, 1908: 129, pl. 17, fig. 15.
Tharyx cincinnatus: Bellan 1974:791; Hartman 1966: 31, pl. 8, fig. 8.
Not *Chaetozone cincinnata* Augener, 1923. New Zealand, Auckland Islands. Unresolved homonym.
Not *Tharyx cincinnatus*: Richardson & Hedgpeth 1977: 185–185; Hartman 1978: 167; Hartmann-Schröder 1986: 83–84; Hartmann-Schröder & Rosenfeldt 1989: 71; 1990, 115; Cantone & Sanfilippo 1992: 375; Cantone 1994: 40–41; Gambi *et al.* 1997: 199, 201–202, 207–209; Knox & Cameron 1998: 70–71, fig. 136; Cattaneo-Vietti, R. *et al*. 2000: 509; Cantone *et al*. 2000: 551, 554; San Martin *et al*. 2000: 87; Siciński 1986: 71–73, Table 2; 2000: 163; 2004: 82; Siciński *et al.* 2012: 355, 359–365; Pabis & Siciński 2010: Table 2; 2012: 188, 190, 192; Angulo-Preckler *et al*. 2017: 68–69.
Not *Tharyx* cf. *cincinnatus*: Bromberg *et al.* 2000: 179, 182.
Not *Aphelochaeta cincinnata*: Parapar *et al.* 1997: 509; Hilbig 2001: 540; Cantone & Di Pietro 2001: Table 1; Hilbig *et al*. 2006: 711–725; Souza Barbosa *et al.* 2010: Table 1; Parapar *et al.* 2011: 719–724; Paiva *et al*. 2015: 1348–1351; Pabis & Sobczyk 2015: 117–118: 722–728; Montiel *et al*. 2016: 1238–1240, Appendix 1.

Material Examined. Kerguelen Islands, Östlich Bank, collected by trawl from 88 m; Deutsche Tiefsee Expedition, Sta. 161, 48°57′S, 70°0′E, 88 m, **holotype** of *Heterocirrus cincinnatus* Ehlers, 1908 (ZMB 4491).—**Off Argentina, Staten Island**, South end of Puerto Cook, R/V *Hero* Sta. 712-668, 54.772°S, 64.048°W, Petersen Grab, 23 m (1, USNM 1013887).

Description of the holotype. Holotype of *Aphelochaeta cincinnata* (originally described as a species of *Heterocirrus*) light brown in color, exhibiting evidence of having been partially dry at some time. Specimen posteriorly incomplete, precluding any confirmation of posterior spines. Some areas of body, especially prostomium considerably shrunken and distorted, likely due to drying.

Prostomium and peristomium together relatively long and narrow, smooth, with no evidence of two ventrolateral peristomial grooves as originally figured by Ehlers (1908). First pair of branchiae originates slightly anterior to setiger 1 with second pair slightly more medial and directly on setiger 1. Dorsal tentacles arise from a medial position just posterior to first branchial pair on posterior border of peristomium. Tentacles thick, larger than branchiae. Each subsequent pair of branchiae arises dorsal to notosetae, continuing on subsequent segments. Most anterior setigers with branchiae or a scar of one.

All setae simple capillaries, although posterior most segments missing. Setae number up to eight in anterior fascicles, relatively long suggesting a natatory condition. Eggs, however, not observed anywhere along body. Parapodia reduced to low setal tori, best developed in anterior segments.

Methyl Green stain. No effort to stain this specimen with Methyl Green was made owing to its age and somewhat deteriorated state. However, given the relatively long prostomial/peristomial region, the position of the first branchiae and dorsal tentacles, it should be relatively easy to identify additional specimens of this species should they be encountered in new collections.

Description of a specimen from Staten Island, off Argentina. Specimen small, mostly complete with 32 setigers, ovigerous, measuring 5 mm long, 0.4 mm wide across anterior setigers, and 0.9 mm wide across expanded middle segments. Anterior 10–12 setigers narrow not expanded. Middle body segments expanded, filled with eggs (Fig. 8B) measuring 100–125 µm in largest diameter. Color in alcohol: tan.

Prostomium and peristomium not distinctly separated, forming an elongate pre-setiger region lacking any annuli or evidence of peristomial rings (Fig. 8A); anterior end narrow, bluntly rounded on anterior margin. Peristomium posteriorly forming dorsal wedge onto setiger 1 (Fig. 8A); eyespots absent; nuchal organs not observed. First pair of branchiae anterior to dorsal tentacles along angular wedge at juncture of peristomium and setiger 1; dorsal tentacles medial and posterior to first pair of branchiae; second pair of branchiae on posterior margin of setiger 1 dorsal to notosetae; subsequent branchiae from setiger 2 and those following in same location.

Parapodia well developed in thoracic setigers, set off from dorsal and ventral surfaces by grooves (Fig. 8A), forming low shoulders; middle and posterior parapodia less distinct. Each parapodium with simple setal tori bearing fascicles of smooth bladed capillaries; setal fascicles with 5–7 setae throughout.

Methyl Green stain. No pattern.

Remarks. The original description of *Aphelochaeta cincinnata* was based on a single specimen, redescribed here, from 88 m in the Kerguelen Archipelago at latitude of approximately 49°S. Thus, the original specimen was from a low-latitude subantarctic locality, not the high Antarctic (i.e., about 59–60°S or higher).

Ehlers (1908) was very specific in stating that the first pair of branchiae occurs on the peristomium anterior to the dorsal tentacles and not on setiger 1. This agrees with my examination of the holotype. The second pair of branchiae occurs on the posterior border of setiger 1 dorsal to the notosetae. The specimen collected as part the R/V *Hero* Station 712-668 (USNM 1013887) from Staten Island off Argentina agrees well with the original description of *A. cincinnata* and my observations of the holotype.

Based on the geographic location of the original collection by Ehlers (1908) and after examining hundreds of specimens of *Aphelochaeta* as part of the present study, no specimens among the very extensive *Hero, Eltanin, Nathaniel B. Palmer,* and *Polarstern* collections at my disposal as well as the earlier collections identified by Hartman (1967, 1978) that I have reexamined agree with the branchial and tentacle placement that were originally reported by Ehlers (1908) and that are present on the type specimen of *Aphelochaeta cincinnata*. I am, therefore, of the opinion that *A. cincinnata* does not occur in the high Antarctic despite numerous reports to the contrary (e.g., Bellan 1972; Hartman 1978; Hartmann-Schröder & Rosenfeldt 1989, 1990; Cantone & Sanfilippo 1992; Knox & Cameron 1998; Siciński 2000, 2004; Hilbig 2001; Hilbig *et al.* 2006; and many others). The single specimen from Staten Island off Argentina, a subantarctic location, is the only one that agrees with the original concept of *A. cincinnata*. It is likely that the record of Bellan (1974) from Kerguelen is a correct identification because the position and depth (61 m) are nearly identical with that of the type locality.

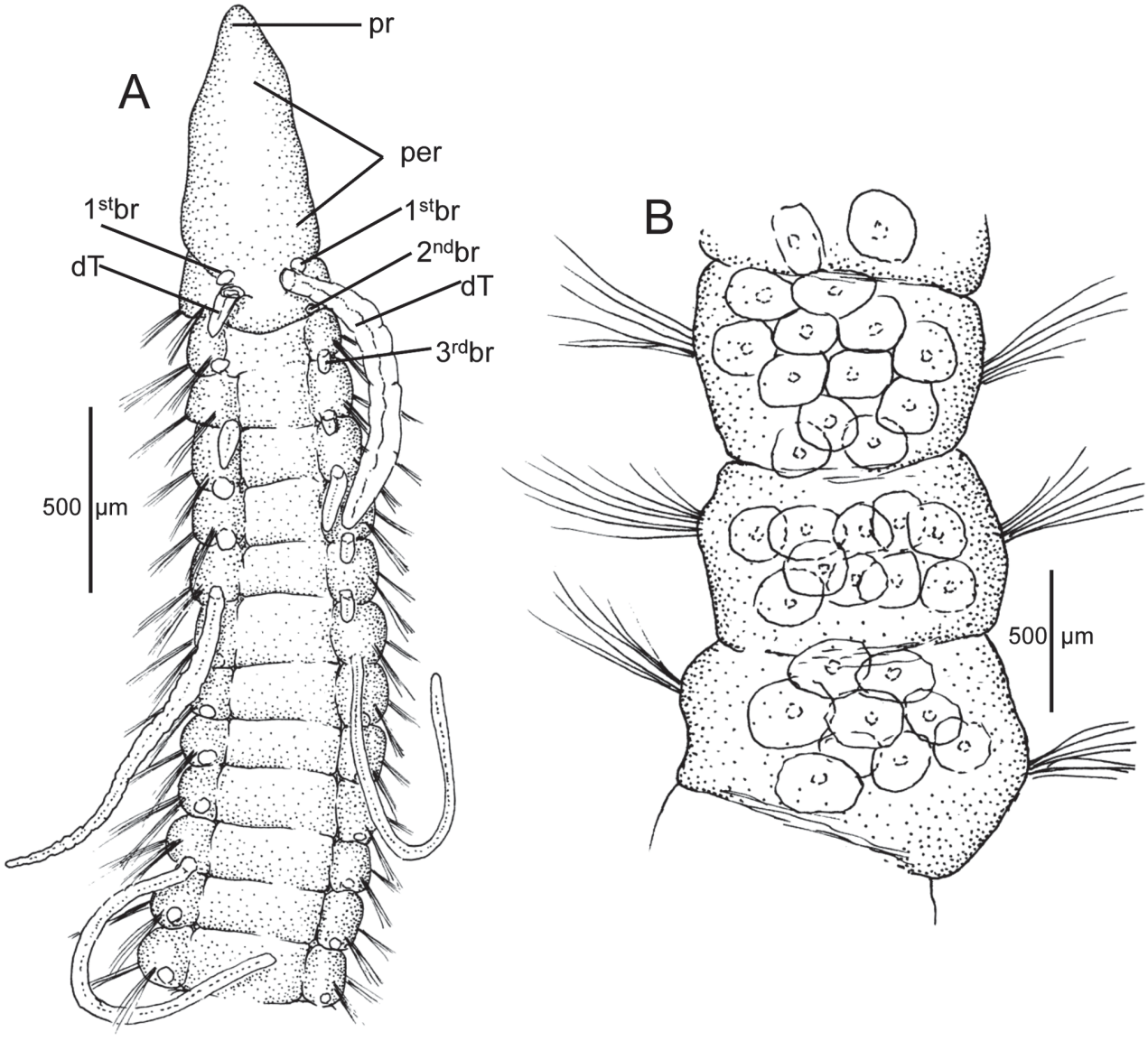

FIGURE 8. *Aphelochaeta cincinnata* (Ehlers, 1908**)**. Specimen from Staten Island, off Argentina (USNM 1013887): A, anterior end, dorsal view; B, middle body segments with eggs.

Benthic surveys in Antarctica have typically recorded *Aphelochaeta cincinnata* (or *Tharyx cincinnatus*) as among the most abundant cirratulid polychaetes in their collections (see references in synonymy lists above). It is now obvious that these numerous records of *A. cincinnata* actually refer to several of the new species described in this study, with *A. cincinnata* not being present. For example, the collections from the EASIZ II survey provided by Dr. B. (Hilbig) Ebbe and identified as *A. cincinnata*, have been re-identified as *A. aubreyi* **n. sp.**, *A. dearborni* **n. sp.**, *A. palmeri* **n. sp.**, and *A. spectabilis* **n. sp.**, all of which are difficult to separate from one another if the specimens are fragmented. The most abundant species of *Aphelochaeta* in the EASIZ II materials that had been identified as *A. cincinnata* is *A. palmeri* **n. sp**. from samples off King George Island.

Distribution. Indian Ocean, Kerguelen Islands, 88 m; Staten Island off Argentina, 23 m; possibly other sub-Antarctic islands, shallow water.

Aphelochaeta dearborni new species

Figures 9–10

Tharyx sp. Hartman 1967: 118 (in part).
Chaetozone sp.: Hartman 1978: 166 (in part).
Aphelochaeta cf. *epitoca*: Hilbig 2001: 540 (in part); Hilbig *et al.* 2006: 717 (in part). **Not** Monro 1930.
Aphelochaeta sp. 2: Hilbig 2001: 540 (in part); Hilbig *et al.* 2006: 715, 717, 719 (in part).
Aphelochaeta cincinnata: Hilbig 2001: 540 (in part); Hilbig *et al.* 2006: 715, 717, 719 (in part). **Not** Ehlers 1908.

Material Examined. South Shetland Islands: West of Elephant Island, USNS *Eltanin* Cr. 6, Sta. 428, 1 Jan 1963, 61.30°S, 56.142°W, 662–1120 m, **holotype** (USNM 1013879); USNS *Eltanin* Cr. 6, Sta. 410, 1 Jan 1963, 61.30°S, 56.142°W, 220–240 m (1, USNM 56080); **King George Island, King George Bay,** R/V *Hero* Sta. 721-705, 22 Dec 1971, 62.1067°S, 57.9733°W, 39 m (1, USNM 1013920); **King George Island, Martel Inlet**, R/V *Hero* Sta. 721-813, 15 Jan 1972, 62.152°S, 58.422°W, 452 m, 1 **paratype** (USNM 1013883); R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta.48-325, 17 Mar 1998, 62°21.9′S, 58°42.6′W, MG, 805 m (33, SMF 24882); Sta. 48-326, 17 Mar 1998, 62°20.1′S, 58°38.8′W, MG, 606 m (11, SMF 24883); **Deception Island, Foster Bay**, R/V *Hero* Sta. 721-1048, 17 Dec 1971, 62.975°S, 60.720°W, 24 m (20, USNM 1013919).—**Antarctic Peninsula: Anvers Island, Arthur Harbor**, R/V *Hero* Sta. 721-1077, 23 Feb 1972, 64.792°S, 64.113°W, 73–128m, 1 **paratype (**USNM 1013880); Sta. 721-5444, 29 Mar 1972, 64.7742°S, 64.0817°W, grab, 40 m, 1 **paratype** (USNM 1013881); **Melchior Islands,** R/V *Hero* Sta. 824-16-4, 22 Mar 1982, 64.326°S, 62.993°W, 87 m (2, USNM 1490707); **Wilhelm Archipelago, Grandidier Channel**, R/V *Hero* Sta. 731-1887, 3 Mar 1973, 65.048°S, 64.917°W, 340–370 m, 1 **paratype** (USNM 1013882); **Adelaide Island**, R/V *Hero* Sta. 824-7-1, 17 Mar 1982, 66.678°S, 67.523°W, 510–730 m (1, USNM 1490708).—**East Antarctic Peninsula, Prince Gustav Channel**, RVIB *Nathaniel B. Palmer*, coll. J.A. Blake, 24 May 2000, 64°21.361´S, 058°26.637´W, SM grab, 690 m (1, JAB).—**Weddell Sea**, **east of Antarctic Peninsula,** USCG *Glacier*, Sta. 69-8, 02 Mar 1969, 77.603°S, 42.50°W, 585 m (5, USNM 46815); Sta. 69-11, 05 Mar 1969, 77.15°S, 38.97°W, 851 m (1, USNM 1490709); R/V *Polarstern*, ANDEEP II (ANT XIX/3), Sta. 61-133-6, coll. J.A. Blake, 07 Mar 2002, 65°20.18′S, 54°143.6′W, MUC, 1120 m, 1 **paratype** (SMF 24884); **South of Cape Norvegia**, R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-091, 4 Feb 1998, 73°28.4′S, 22°48.8′W, MG, 1510 m (1, SMF 24885); **off Halley Bay**, R/V *Polarstern*, EASIZ II, (ANT-XV/3), coll. B. Hilbig, Sta. 48-136, 9 Feb 1998, 74°33.0′S,27°13.1′W, MG, 2012 m (4, SMF 24886); Sta. 48-146, 10 Feb 1998, 74° 39.4′S, 27° 08.0′W, MG, 1021 m (2, SMF 24887).—**East Antarctica, Leopold and Astrid Coast, Davis Station**, coll. Australian Antarctic Division, Sta. STP7-P2R4, 01 Mar 2010, 68.5767°S, 77.9450°E, diver cores, 16–19 m (1, AM).

Description. A small to moderate-sized species, holotype complete, 7.65 mm long, 0.5 mm wide across anterior setigers, 0.6 mm wide across middle segments, 0.2 mm wide across posterior segments for 60 setigers; paratype from King George Island (USNM 1013883) 21.2 mm long for ca. 100 setigers; ovigerous specimen from EASIZ II, Sta. 48-326 (SMF 24883), 8 mm long, 0.38 mm across anterior segments, 0.63 across expanded ovigerous segments, 55 setigerous segments. Anterior or thoracic region consisting of 9–10 setigers in small specimens, up to 15–20 in larger ones; anterior segments expanded, then narrowing in middle segments (Fig. 9B); posterior region narrow, cylindrical in cross-section (Figs. 9C, 10A–C), weakly expanded on some specimens (Fig. 10G) with rounded pygidium bearing simple ventral lobe (Figs. 9C, 10A–B, G). Ovigerous specimens with

enlarged segments in anterior and middle abdominal segments (Fig. 10A, G). Thoracic segments short, crowded (Fig. 9A–B), becoming longer in middle abdominal segments; segments of far posterior region about as long as wide. Ventral groove absent; shallow dorsal groove present or absent on anterior segments. Ventral glands visible on mid-ventral surface of thoracic segments (Fig. 9B). Color in alcohol: tan to brown; most specimens with distinct transverse lines of black pigment spots on ventral surface of last peristomial annulus (Fig. 10E–F).

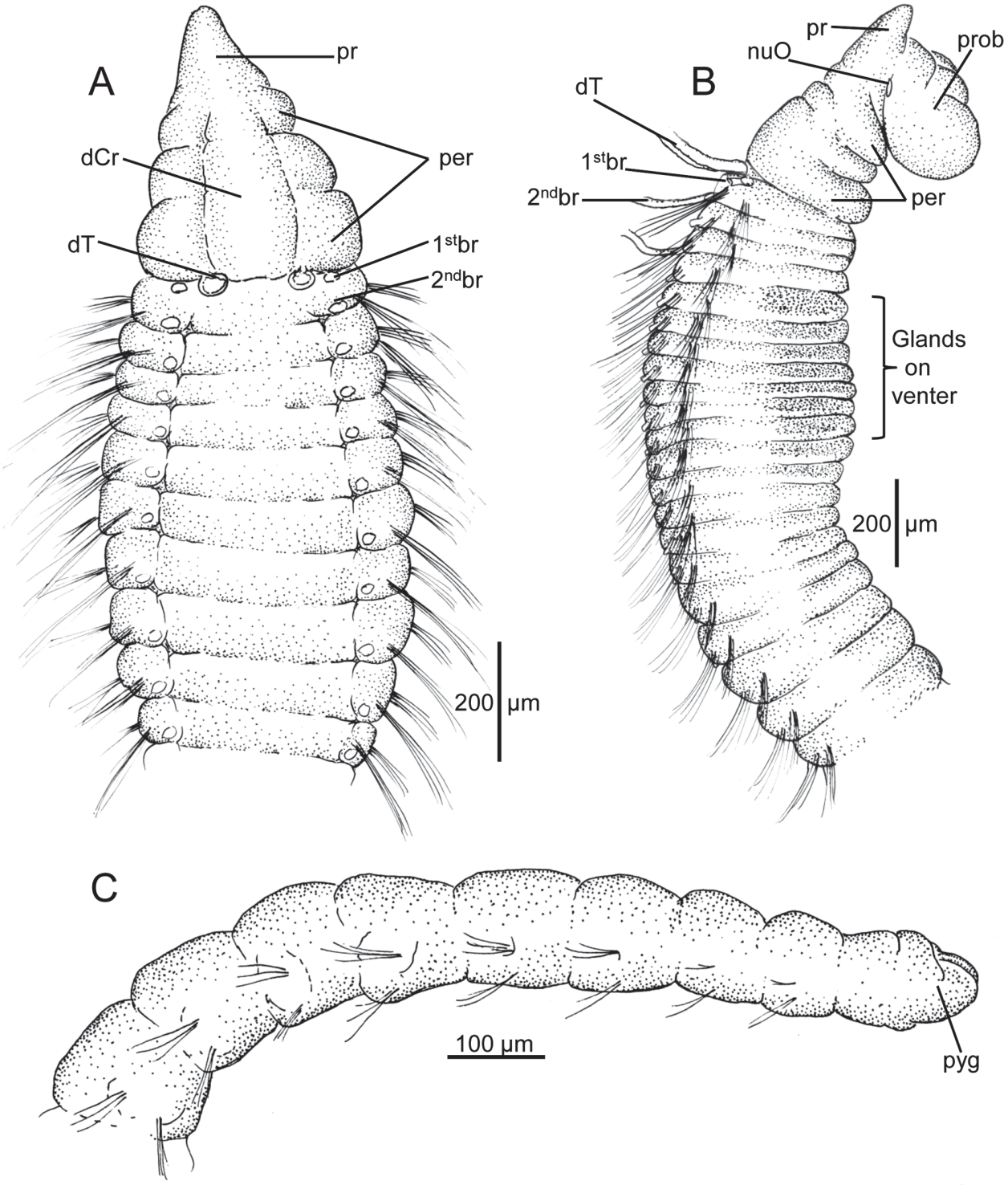

FIGURE 9. *Aphelochaeta dearborni* **n. sp.** A, anterior end, dorsal view; B, anterior end, right lateral view; C, posterior end, left lateral view. A, C, Holotype (USNM 1013879); B, specimen from Sta. 48-325 (SMF 24882).

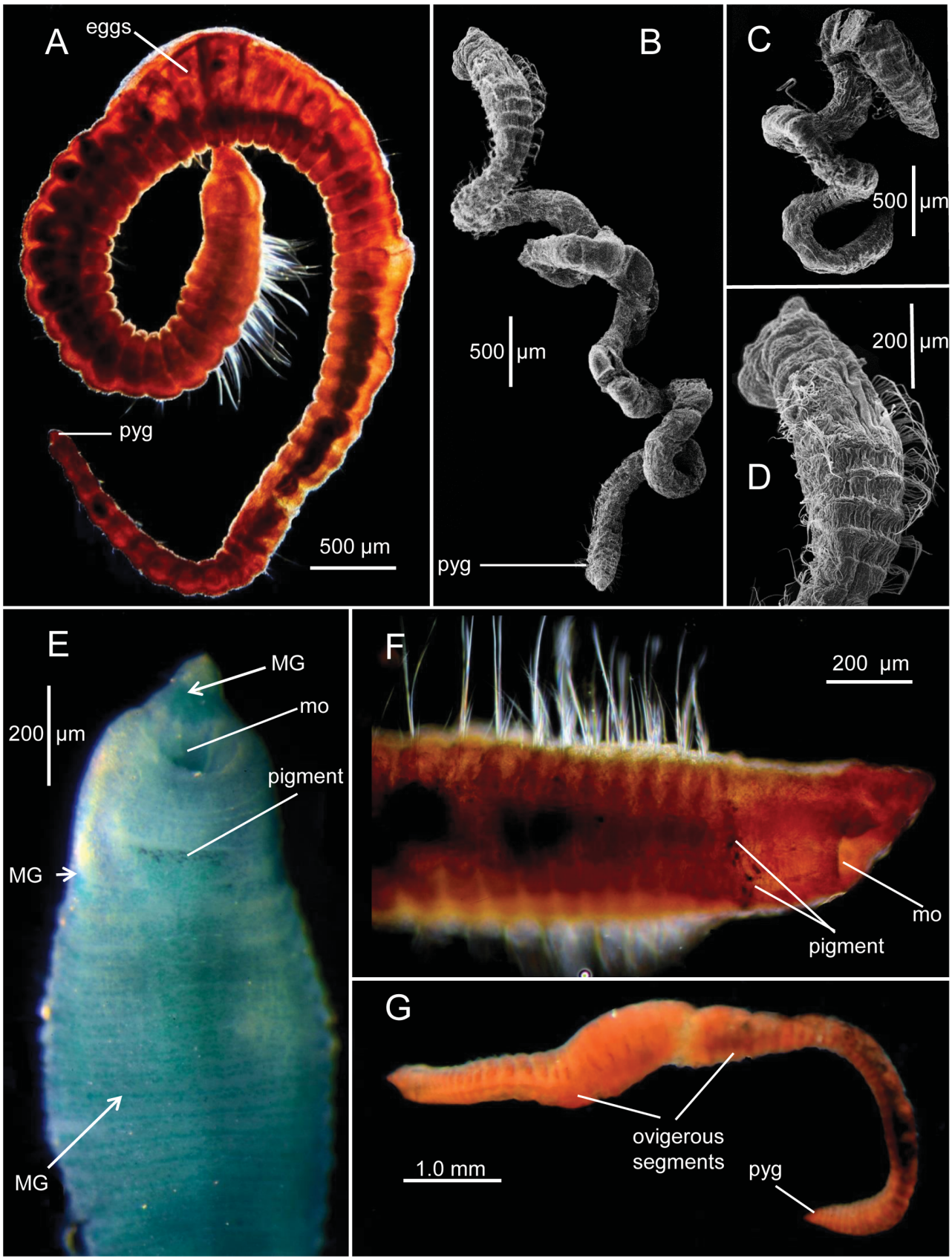

FIGURE 10. *Aphelochaeta dearborni* **n. sp.** A, entire worm, lateral view (holotype USNM 1013879). B–G, (SMF 24882): B–C, SEMs of two complete specimens; D, detail of anterior end, dorsal view; E, anterior end, ventral view with pigment and Methyl Green stain; F, anterior end, ventrolateral view; G, entire ovigerous specimen left lateral view. A, F–G stained with Shirlastain A; E, stained with MG.

Prostomium triangular, about as long as width of base, rounded on anterior margin (Fig. 9A–B); eyespots absent; nuchal organs simple slits on posterior lateral margins, difficult to see in light microscopy; proboscis (ventral pharynx) everted with three lobes in one specimen (Fig. 9B, D). Peristomium compressed, elongate, with three annuli visible to variable degrees, surmounted with low dorsal crest, with narrow extension onto setiger 1. Dorsal tentacles arising medially on posterior margin of peristomium at interface with setiger 1. First pair of branchiae lateral to dorsal tentacles, positioned either at interface of peristomium and setiger 1 or on anterior margin of setiger 1 (Fig. 9A–B); second pair of branchiae at posterior margin of setiger 1, dorsal to notosetae (Fig. 9A); subsequent segments also with branchiae arising from posterior margin, continuing on each segment for about 30 setigers, thereafter becoming fewer and irregularly distributed.

Parapodia well developed in thoracic setigers, with low shoulders set off from dorsal surfaces by longitudinal grooves (Fig. 9A); middle and posterior parapodia less distinct. Each parapodium with simple setal tori bearing fascicles of smooth-bladed capillaries; notosetae of first 9–10 setigers numbering 6–8 long capillaries; neurosetae similar but shorter. Noto- and neurosetae of mid-body numbering 5–7 per fascicle, reduced to 3–5 in posterior segments. Ovigerous specimens with long notopodial natatory-like capillaries in mid-body.

Methyl Green stain. Pattern consisting of distinct speckles from the prostomium to setiger 1, stain concentrated in small subdermal cells or glands on pre-setigerous region, providing a light green cast; ventral surface of prostomium often deeply stained (Fig. 10E); on anterior segments, narrow bands of stained speckles concentrated on posterior edge of individual segments including intersegmental groove, these narrow bands extending completely around body from dorsum to venter (Fig. 10E). In some specimens, segmental staining reaction strong, with distinct narrow transverse stripes prominent on both surfaces along body (Fig. 10E); in other specimens staining reaction weak, perhaps due to prolonged preservation in alcohol.

Etymology. This species is named for the late Professor John H. Dearborn of the University of Maine, former teacher, member of my doctoral committee, and prominent Antarctic marine biologist. Professor Dearborn introduced me to the unique biology of the Antarctic fauna. We were both part of a University of Maine team on the shakedown cruise of the R/V *Hero* to the eastern Canadian Arctic in August 1968.

Remarks. *Aphelochaeta dearborni* **n. sp.** is closely related to *A. palmeri* **n. sp.** (see below) in having a pear-shaped prostomium, elongated peristomium formed of three weak annular rings, expanded thoracic region, and the presence of ventral glandular bands on the anterior segments. The main difference between the two species is that the posterior region of the body of *A. dearborni* **n. sp.** is narrow and not expanded as in *A. palmeri* and that *A. dearborni* **n. sp.** typically has lines of black pigment spots on the lower lip of the mouth. *Aphelochaeta dearborni* **n. sp.** also lacks the distinct ventral groove that is present in *A. palmeri* **n. sp**.

Habitat & Biology. Little information is available for the samples. The R/V *Hero* Sta. 824-7-1 sample (USNM 1490708) from Adelaide Island was collected from a bottom of rock and mud.

Holotype ovigerous, with eggs 140–190 μm across widest diameter (Fig. 10A). Gravid specimens from EASIZ II Sta. 48-326 (SMF 24883) with large mature eggs, up to 305 μm in largest diameter. Eggs of this size suggest direct development, likely in burrows of adults.

Distribution. Widespread in Antarctica, mainly shelf depths, 24–1510 m.

Aphelochaeta hormosa new species

Figures 11–12

Material examined. East Antarctica, Budd Coast, Wilke's Station, coll. Virginia Institute of Marine Science, 03 Dec 1961, 66.354°S, 110.468°E to 66.354°S, 110.471°E, dredged, 238 m**, holotype** (USNM 1490710) and 2 **paratypes** (USNM 1490711).

Description. Holotype complete, broken into three parts, 16.4 mm long, 0.45 mm wide across expanded thoracic region, 0.145 mm across middle segments, with 97 setigerous segments. Holotype with anterior or thoracic segments expanded both dorsally and ventrally (Figs. 11A, 12A), more or less oval in cross section with narrow crowded segments; abdominal region with moniliform segments each about 1.5 times long as wide (Figs. 11B, 12B); posterior segments becoming narrow, wider than long, producing weakly expanded posterior end rounded dorsally, flattened ventrally with low ridge, then tapering to simple rounded pygidial lobe (Figs. 11C, 12C). Body tan in color; holotype with black pigment spots on dorso-lateral margins of peristomium (Fig. 11A).

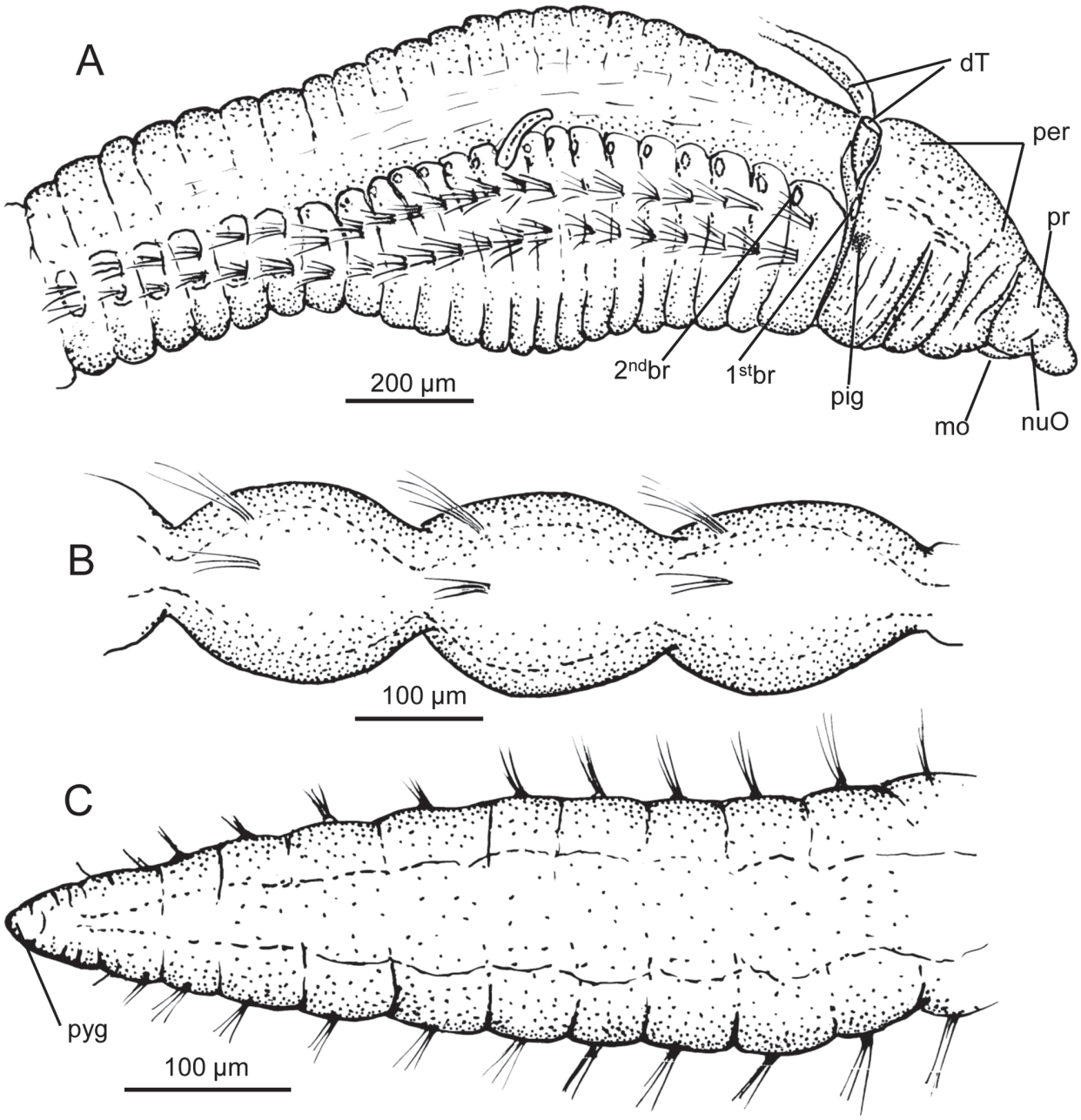

FIGURE 11. *Aphelochaeta hormosa* **n. sp**. Holotype (USNM 1490710): A, anterior end, right lateral view; B, middle body segments, right lateral view; C, posterior end, dorsal view.

Prostomium conical, tapering to narrow rounded tip (Figs. 11A, 12A); eyespots absent, nuchal organs narrow lateral slits; dorsal crest not apparent. Peristomium broad, with three annular rings best seen laterally on holotype (Figs. 11A, 12A), only weakly observed on paratypes; relatively smooth dorsal surface not cut with annular rings, ventrally forming lips around of mouth. Pair of dorsal tentacles arising medially in notch on posterior margin of peristomium (Fig. 11A); first pair of branchiae arising lateral and slightly posterior to dorsal tentacles (Fig. 11A); subsequent branchiae on setiger 1 and following segments dorsal to notosetae, continuing through expanded thoracic segments, not observed on abdominal segments.

Parapodia best developed in thoracic segments, inflated but weakly developed, consisting of low setal tori bearing fascicles of 8–10 thin, smooth capillaries in single row; parapodia of abdominal segments not evident, with 3–4 capillaries arising directly from body wall (Fig. 11B); notosetae longer than neurosetae, but long natatory-like setae not observed.

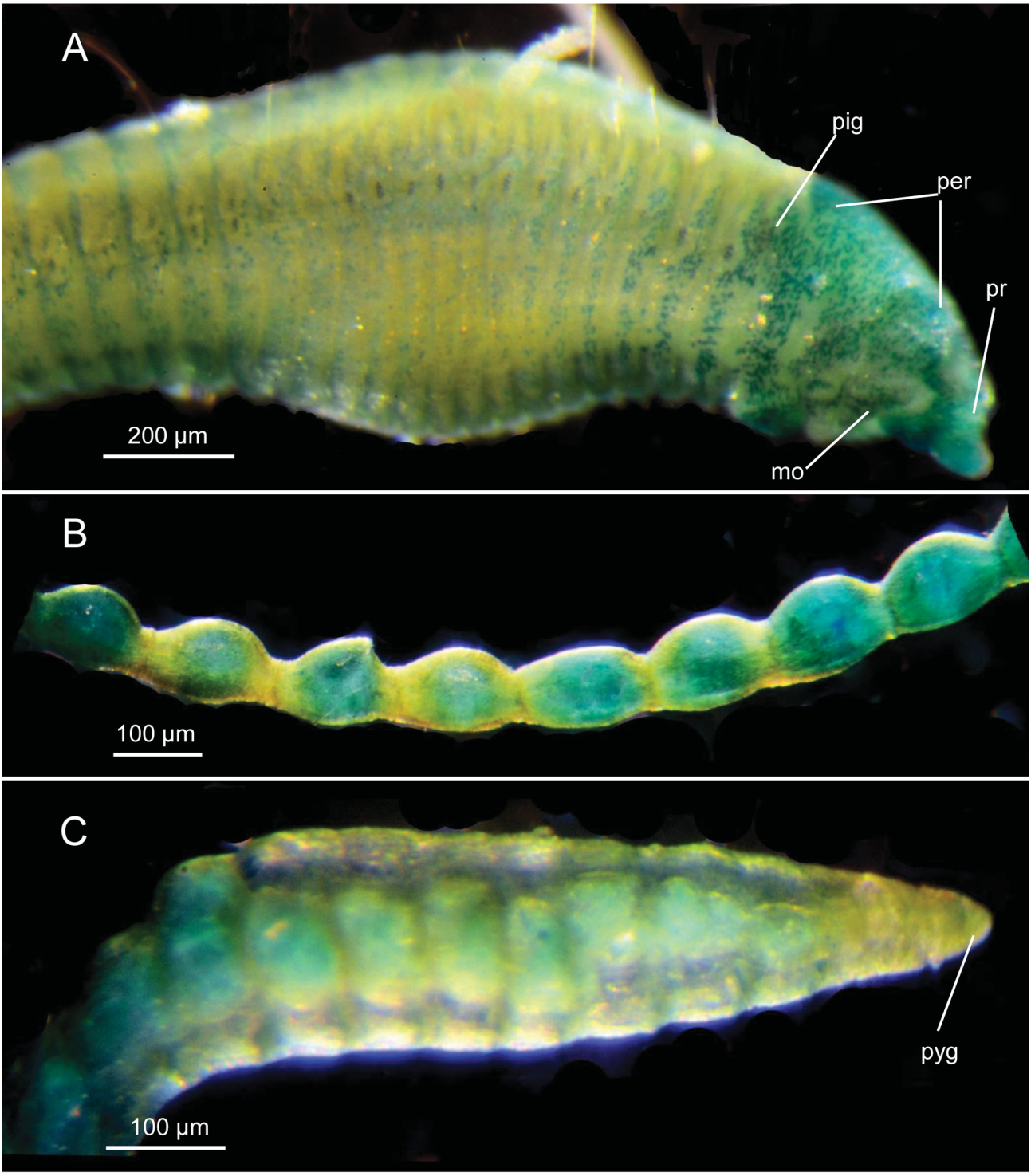

FIGURE 12. *Aphelochaeta hormosa* **n. sp**. Photomicrographs of holotype (USNM 1490710) stained with Methyl Green: A, anterior end, right lateral view; B, middle body segments, right lateral view; C, posterior end, dorsolateral view.

Methyl Green stain. Most of body with prominent subdermal glands that stain darkly, producing distinctive pattern; dorsal and lateral areas of pre-setiger area stain intensely on both prostomium and peristomium (Fig. 12A). Each segment with heavy stained band extending laterally, ventrally, and up on opposite side of each thoracic segment, encircling body from middle thoracic segments, strongest on parapodia (Fig. 12A); parapodial staining present on post-thoracic segments until moniliform segments begin, then generally reduced to staining intestine (Fig. 12B–C).

Etymology. The epithet *hormosa* is derived from the Greek, *hormos*, for a chain or necklace, referring to the bead-like nature of the body segments of this species.

Remarks. *Aphelochaeta hormosa* **n. sp.** is similar to the type species, *A. monilaris*, from the eastern Pacific (Hartman 1960; Blake 1996) in having moniliform abdominal segments and a distinctive MG staining pattern. However, in *A. monilaris*, while MG stains the tip of the prostomium, it only weakly stains the peristomium; MG does produce broad stripes on the anterior margins of thoracic segments but these do not encircle the body as in *A. hormosa* **n. sp**. The two species further differ in that *A. monilaris* has a prominently expanded posterior end, whereas the posterior segments of *A. hormosa* **n. sp.** are only weakly expanded.

Among Antarctic species of *Aphelochaeta*, *A. hormosa* **n. sp.** is most similar to *A. aubreyi* **n. sp.** in having an expanded thoracic region, black spots on the posterior-lateral margin of the peristomium, and moniliform segments. However, *A. hormosa* **n. sp.** has a distinctive MG staining pattern that is lacking in *A. aubreyi* **n. sp.** and the prominent lateral peristomial grooves present in *A. hormosa* **n. sp.** are only weakly developed in *A. aubreyi* **n. sp**. In addition, the posterior segments of *A. aubreyi* **n. sp.** are enlarged dorsally and flattened ventrally, whereas, in *A. hormosa* **n. sp.** the posterior segments are not enlarged dorsally.

Despite these differences, there is no question that *A. aubreyi* **n. sp.** and *A. hormosa* **n. sp.** are closely related. Except for the prominent and distinctive MG staining pattern of *A. hormosa* **n. sp.** other differences could be attributed to variability. However, despite having samples from throughout Antarctica, *A. aubreyi* **n. sp.** appears to be limited to sites around the Antarctic Peninsula and Weddell Sea, whereas *A. hormosa* **n. sp.** has been collected only from the opposite side of Antarctica off Wilkes Land.

Distribution. East Antarctica, Budd Coast near Wilkes Station, 238 m.

Aphelochaeta longisetosa (Hartmann-Schröder, 1965)

Figure 13

Tharyx longisetosa Hartmann-Schröder, 1965: 222–223; Carrasco 1977: 81–82, figs. 32–33; Rozbaczylo 1985: 155.
Tharyx spp. Hartman 1967: 118.

Material examined. Off Ecuador, SEPBOP, R/V *Anton Bruun*, Cr. 18B, Sta. 770-C, 10, coll. 10 Sep 1966, 03.267°S, 81.15°W, Menzies trawl, 932 m, 5 specimens (USNM 1490782).—**Off central Chile**, **Valdivia,** 39°58′S, 73°44.8′W, 15 Mar 1960, 84 m, **holotype** (ZMH P-15068); **off Valparaiso**, USNS *Eltanin* Cr. 9, Sta. 752, 26 Sep 1963, 33.23°S, 71.78°W, 209 m (2, USNM 56085); Sta. 753, 26 Sep 1963, 33.27°S, 71.78°W, 192 m (1, USNM 56081).—**Central Chile**, LUCE, Bahia San Vicente, Punta Liles, Sta. 121, 09 Jun 1949, 36.727°S, 73.136°W, intertidal, rock pools, by hand (1, SMNH); near Puerto Montt, Estero Reloncavi, Bahía Ralún, Sta. M88, 01 Apr 1949, 41.408°S, S, 72.316°W, 12 m coarse sand (5, SMNH).—**Southern Chile**, LUCE, Piedra Azul, NW of Punta Quillaipe, Sta. M16E, 04 Dec 1948, 41.525°S, 72.804°W, 40–50 m, coarse sand, trawl (3, SMNH); Canal Caicaen, W of Calbuco, Sta. M46, 24 Jan 1949, 41.771°S, 73.15°W, 13 m, coarse sand, grab (2, SMNH).

Descriptive remarks. This species was described but not illustrated by Hartmann-Schröder (1965) from samples collected from central Chile in sandy sediments in 26–260 m. Carrasco (1977) collected the species from several stations in Bahia de Concepcion from low water to ca. 20 m and provided a brief description with illustrations of the anterior and posterior end. The specimens from off Valparaiso in 209 m from the *Eltanin* collection and the various shallow-water specimens from the LUCE agree well with Hartmann-Schröder's original description and the holotype as well as the descriptions and the illustrations by Carrasco (1977).

The holotype is large, measuring 35 mm long and 1.5 mm wide for about 200 segments. The three specimens from the USNS *Eltanin* stations 752 and 753 are each broken into two parts: the largest from Sta. 752 is 14 mm long and 5.5 mm wide across the anterior or thoracic region for about 185 setigerous segments. The segments are short and crowded along the entire body as illustrated by Carrasco (1977: figs. 3–4). The anterior region is wide but narrows moderately in the abdominal segments (Fig. 13A–B). The dorsum is broadly rounded throughout, with parapodial shoulders evident on either side (Fig. 13A, C). A shallow ventral groove begins in anterior abdominal segments, becoming a deep narrow groove in middle and posterior segments (Fig. 13B). The large inflated posterior end reported by both Hartmann-Schröder (1965) and Carrasco (1977) is missing from each of the new specimens.

The pre-setiger region is about as wide as long; the prostomium is triangular, narrowing anteriorly to a nearly

pointed tip (Fig. 13A–C). The peristomium has three rings, each progressively longer and extending dorsally to the mid-point of setiger 1; dorsal tentacles are positioned on the boundary between the peristomium and setiger 1; the first pair of branchiae are on setiger 1 dorsal to the notosetae, and continue on subsequent segments.

Parapodia are lateral to a broadly elevated and rounded dorsum; parapodia have prominent shoulders and the noto- and neuropodia close together; setae emerge from a low torus. The numerous setae of both noto- and neuropodia are long, silky capillaries.

Methyl Green stain. No pattern evident after differentiation.

Remarks. *Aphelochaeta longisetosa* is distinctive in the relatively large body, expanded anterior and far posterior regions, the very numerous and crowded short segments throughout bearing dense fascicles of long, silky capillary setae. The ventral groove is newly reported. The prominent parapodial shoulders are distinctive. The dorsal midline is not interrupted by a dorsal groove, although a weak mid-dorsal ridge may be present.

This species, originally described as *Tharyx longisetosa*, was transferred to *Aphelochaeta* by Blake (1991) as part of his revision of the genus *Tharyx*. At the same time, Blake (1991) referred *Caulleriella longisetosa* Hutchings & Murray, 1984 to *Tharyx*. Thus, two different species have carried the name *T. longisetosa*. However, these are not homonyms because they currently reside in different genera.

Distribution. Ecuador to southern Chile, intertidal to 932 m.

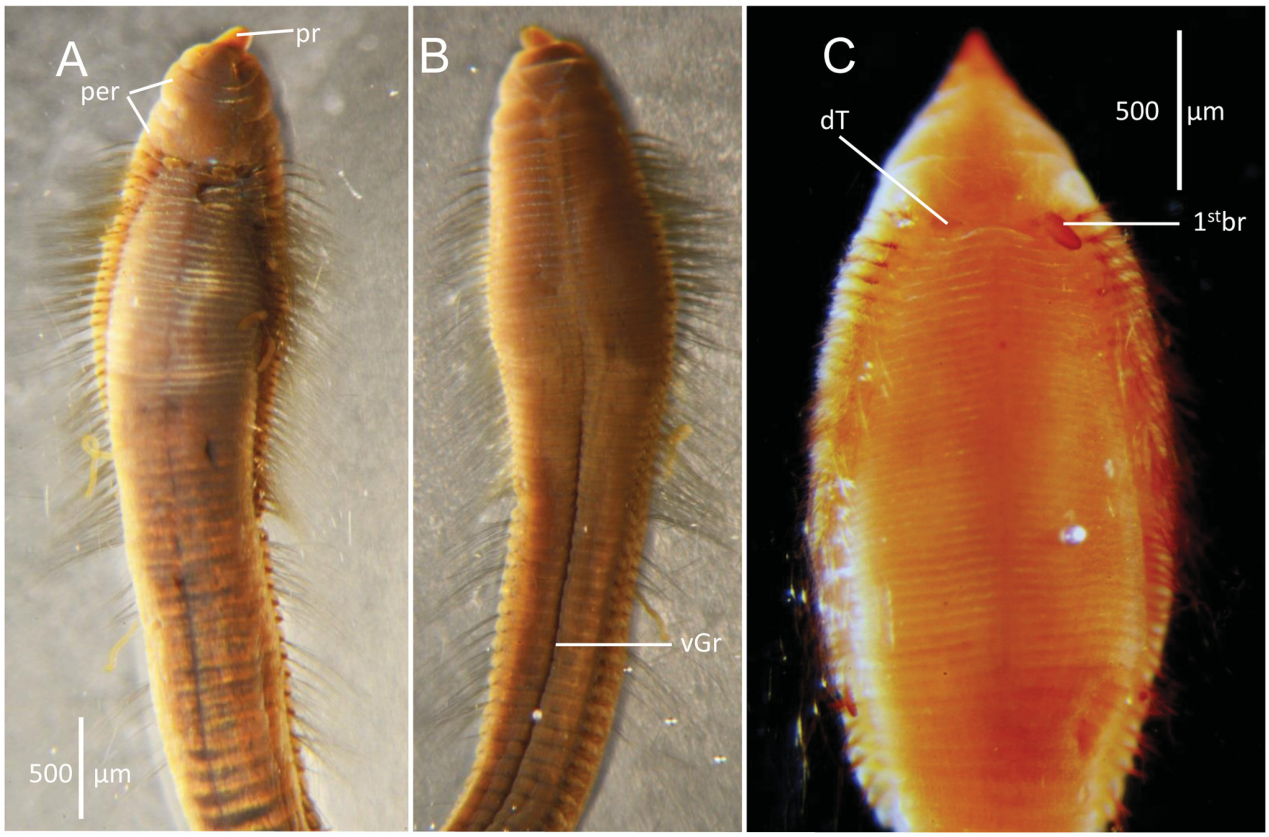

FIGURE 13. *Aphelochaeta longisetosa* (Hartmann-Schröder, 1965). Photomicrographs of specimens from off Valparaiso, Chile. Specimen from LUCE Sta. M-121: A, anterior end, dorsal view; B, anterior end, ventral view. Specimen from USNS *Eltanin* Sta. 752 (USNM 56085); C, anterior end dorsal view, stained with Shirlastain A.

Aphelochaeta magellanica new species

Figure 14

Material examined. Southern Chile, Straits Of Magellan, Cape Forward, USNS *Eltanin* Cr. 11, Sta. 962, 6 Feb 1964, 53.93°S, 71.25°W, 256–320 m, **holotype** (USNM 1490712).

Description. Holotype complete, moderately sized, 9.6 mm long, 0.7 mm wide across anterior segments at widest point and with about 140 setigerous segments. Segments short throughout body, about six times wider than

long, narrowest in anterior and far posterior segments. Anterior or thoracic segments only slightly wider than middle and posterior segments, anterior segments flattened ventrally, with glandular-appearing segments, not pigmented; rest of body round in cross section, with dorsal groove beginning about two-third distance along body, continuing to end. Ventral groove not apparent. Far posterior segments narrow, not expanded as in most related species, somewhat flattened ventrally, grooved dorsally, with crowded segments narrowing to pygidium with terminal anus and simple rounded ventral lobe (Fig. 14B). Color in alcohol: brown.

Prostomium short, triangular, narrowing to blunt-tipped anterior margin (Fig. 14A); eyespots absent; nuchal organs not observed. Peristomium with three distinct annular rings, of similar length, not extending across dorsum; narrow dorsal crest present (Fig. 14A); posterior margin extending posteriorly and on to setiger 1 mid-dorsally; dorsal tentacles arising near posterior margin; (Fig. 14A); first pair of branchiae lateral to dorsal tentacles on anterior margin of setiger 1; second pair of branchiae on posterior margin of setiger 1 dorsal to notosetae (Fig. 14A); subsequent segments with branchiae in same location as second pair; branchial segments continuing well into second half of body.

Parapodia reduced to low mounds; thoracic parapodia forming broad shoulders with smooth dorsum between left and right sides; parapodial shoulders of posterior segments shifted ventrally down body wall (Fig. 14B). Notosetae longer than neurosetae throughout; natatory like setae not present on holotype; all setae thin smooth capillaries with narrow shafts tapering to long, fine tips; limbate margins not evident; marginal fibrils not evident in light microscopy. Setae numbering 7–10 in anterior fascicles, reduced to 4–5 in posterior segments.

Methyl Green stain. Strong staining reaction on prostomium and peristomium, with most of pre-setiger area staining dark green; a clear unstained gap separates prostomium from peristomium; dorsally, stain ends abruptly at margin of setiger 1; ventrally first 5–8 setigers retain stain, mostly concentrated laterally, but also extending across the venter. Stain not retained on middle and posterior segments.

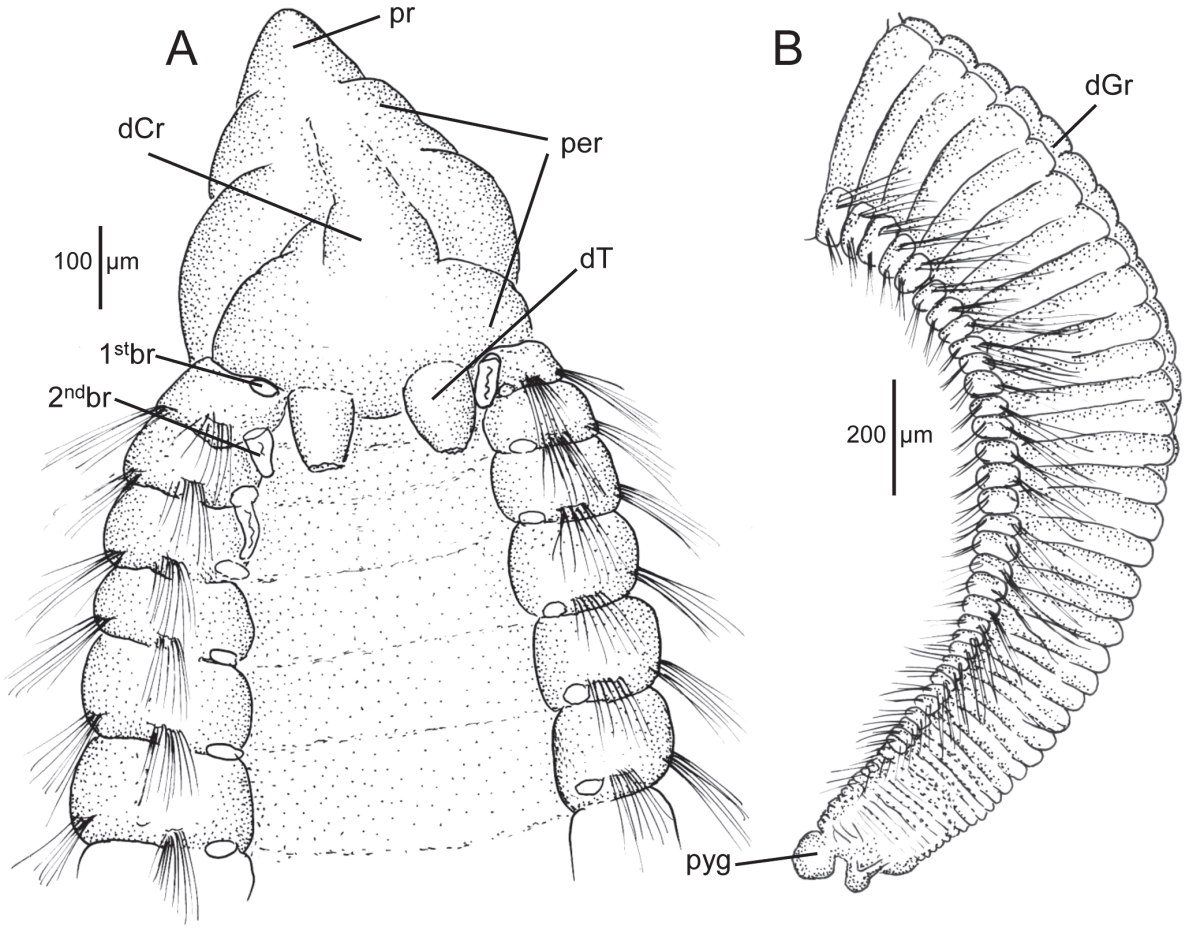

FIGURE 14. *Aphelochaeta magellanica* **n. sp.** Holotype (USNM 1490712): A, anterior end, dorsal view; B, posterior end, left lateral view.

Etymology. The species name, *magellanica*, is taken from the sample location in the Straits of Magellan.

Remarks. *Aphelochaeta magellanica* **n. sp.** belongs to a large group of species in which the dorsal tentacles are shifted posteriorly to the level of setiger 1. However, there are only a few species known with two pairs of branchiae on setiger 1. *Aphelochaeta magellanica* **n. sp.** resembles *A. dearborni* **n. sp.** in having three incomplete peristomial rings with a dorsal crest and a narrow posterior end but differs significantly in having a prominent MG staining pattern on the prostomium and peristomium, short segments throughout, distinct parapodial shoulders that are shifted ventrally on the posterior segments, and a dorsal groove on the narrow posterior segments.

Distribution. Known only from the Magellan region South America, 200–300 m.

Aphelochaeta palmeri new species

Figures 15–16

Aphelochaeta cincinnata: Hilbig 2001: 540 (in part); Hilbig *et al.* 2006: 715, 717, 719 (in part); Montiel *et al.* 2005: 197, 2016: Appendix 2 (in part). **Not** Ehlers 1908.

Material examined. West Antarctic Peninsula: Anvers Island, R/V *Hero* Sta. 824-38-1, 29 Mar 1982, 64.757° S, 64.144°W, 193 m, **holotype, (**USNM 1013884) and 15 **paratypes** (USNM 1013885); **off Anvers Island**, R/V *Hero* Sta. 824-34-1, 26 Mar 1982, 64.788°S, 63.500°W, 305–320 m, 5 **paratypes** (USNM 1013886); **Anvers Island, Ryswyck Point,** R/V *Hero* Sta. 824-32-1, 25 Mar 1982, 64.617°S, 62.833°W, 640–670 m (6, USNM 1490716); **Anvers Island, Bismarck Strait**, R/V *Hero* Sta. 824-41-1, 29 Mar 1982, 64.807°S, 64.12°W, 88–112 m (1, USNM 1013940); **Gerlache Strait**, R/V *Hero* Sta. 824-25-2, 24 Mar 1982, 64.348°S, 61.592°W, VV grab, 92 m (2, USNM 1490714); **Doumer Island**, SE of island, R/V *Hero* Sta. 731-1937, 16 Dec. 1971, 64.8744°S, 63.5503°W, Blake trawl, 96 m (1, USNM 1013935); **Wiencke Island, Port Lockroy**, USCG *Staten Island*, Sta. 66-63, coll. W.L. Schmidt, 1 Mar 1963, 64.8°S, 63.5°W, 62 m, (2, USNM 56073); R/V *Hero* Sta. 721-970, 07 Dec 1971, 64.8172°S, 63.5467°W, Petersen grab, 102 m (10, USNM 1013921); **Bransfield Strait**, USNS *Eltanin*, Cr. 6, Sta. 416, 2 Jan 1963, 63.67°S, 56.22°W, 494–507 m (2, USNM 56007); **South of Bransfield Strait**, USNS *Eltanin*, Cr. 6, Sta. 418, 3 Jan 1963, 62.68°S, 57.85°W, 3 Jan 1963, Blake trawl, 311–426 m (1, USNM 56008); **Graham Land, Alcock Island**, R/V *Hero* Sta. 721-1034, 16 Dec 1971, 64.2167°S, 61.09°W, Petersen grab, 118 m (1, USNM 1013938); Sta. 721-1035, 16 Dec 1971, 64.2167°S, 61.09°W, 118 m (2, USNM 1013936); **Anvers Island, Arthur Harbor**, R/V *Hero* Sta. 721-1070, 28 Jan 1972, 64.795°S, 64.123°W, 100 m (2, USNM 1013922); **off Bonaparte Point**, R/V *Hero* Sta. 721-5442, 29 Mar 1972, 64.7811°S, 64.0925°W, Petersen grab, 118 m (1, USNM 1013938); Palmer Station anchorage, USCG *Glacier*, Sta. Palmer II, 17 Mar 1968, 64.77°S 64.07°W, 40 m (4, USNM 1013930); **Brabant Island, Minot Point**, R/V *Hero* Sta. 824-30-1, 25 Mar 1982, 64.236°S, 62.560°W, 90–135 m (2, USNM 1013927).—**Greenwich Island, Anchorage Off Yankee Harbor**, USCG *Staten Island*, Sta. 44-63, coll. W.L. Schmidt, 55 m (1, USNM 56071).—**South Orkney Islands**, S of Coronation, Island, USNS *Eltanin* Cr. 7, Sta. 496, 20 Feb 1963, 61.17°S,45.18°W, 234 m (3, USNM 56075).—**Drake Passage**, R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-334, 19 Mar 1998, 61°26.7′S. 58°06.6′W, MG, 1028 m (4, SMF 24888); Sta. 48-341, 19 Mar 1998, 61°34.5′S, 58°07.0′W, MG, 429 m, (35, SMF 24889); Sta. 48-345, 20 Mar 1998, 218 m, 61°53.3′S, 59°06.9′N, MG, 218 m (45, SMF 24890); Sta. 48-356, 20 Mar 1998, 130 m, 62°00.3′S, 59°4.9′W, MG, 130 m (343, SMF 24891).—**South Shetland Islands: King George Island**, R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-299, 14 Mar 1998, 62°15.8′S, 58°42.7′W, MG, 207 m, (130, SMF; 24892; 20, JAB); Sta. 48-300, 14 Mar 1998, 62°16.8′S, 58°42.1′W, MG, 423 m (343, SMF 24893); Sta. 48-325, 17 Mar 1998, 62°21.9′S, 58°42.6′W, MG, 805 m (217, SMF 24894); Sta. 48-326, 17 Mar 1998, 62°20.1′S, 58°38.8′W, MG, 606 m (11, SMF 24895); R/V *Hero* Cr. 721, Sta. 810, 15 Jan 1972, 62.095°S, 58.385°W, 177 m (2, USNM 1013932); Sta. 721-817, 16 Jan 1972, 62.35°S, 58.808°W, 82 m (3, USNM 1490713); USCG *Staten Island*, Sta. 64-63, coll. W.L. Schmidt, 86 m, (13, USNM 56072); **Martel Inlet**, R/V *Hero* Cr. 721, Sta. 811, 15 Jan 1972, 62°05.7′S, 058°22.5′W, Petersen grab, 208 m (3, USNM 1490715).—**East Antarctic Peninsula, Prince Gustav Channel**, RVIB *Nathaniel B. Palmer* Cr. 2000-03, coll. J.A. Blake, SM grab, Sta. 01, 14 May 2000, 64°17.625′S, 058°34.678′W, 768 m, (22, LACM-AHF Poly 10205); Sta. 02, near Cape Longing, 15 May 2000, 64°18.387′S, 058°37.911′W, 504 m (12, LACM-AHF Poly 10206); Sta. 27, 23 May 2000, 64°22.934′S, 058°36.976′W, 684 m (7, LACM-AHF Poly 10207); Sta. 28, 23 May 2000, 64°22.018′S, 058°30.942′W, 794 m (23, LACM-AHF Poly 10208); Sta. 29, 24 May 2000, 64°21.361′S, 058°26.637′W, 690 m (8, LACM-AHF Poly 10209); Sta. 30, 24 May

2000, 64°16.875′S, 058°26.985′W, 843 m (9, MCZ 149890); Sta. 33, 24 May 2000, 64°11.959′S, 058°41.857′W, 587 m (10, MCZ 149891); Sta. 34, 24 May 2000, 64°10.995′S, 058°34.140′W, 865 m (18, MCZ 149892); Sta. 35, 25 May 2000, 64°10.471′S, 058°28.505′W, 651 m (17, MCZ 149893); Sta. 35A, 25 May 2000, 64°10.471′S, 058°28.505′W, 651 m (17, JAB); Sta. 35B, 25 May 2000, 64°10.471′S, 058°28.505′W, 651 m (16, JAB).—**East Antarctic Peninsula, N of Larsen Ice Shelf A Area, off Lindenberg Island,** RVIB *Nathaniel B. Palmer* Cr. 2000-03, coll. J.A. Blake, SM grab, Sta. 03, 15 May 2000, 64°53.533′S, 059°30.694′W, SM grab, 385m (16, MCZ 149894).—**East Antarctic Peninsula, former Ice Shelf A, Area, Greenpeace Trough**, RVIB *Nathaniel B. Palmer* Cr. 2000-03, coll. J.A. Blake, SM grab, Sta. 7A, 18 May 2000, 64°43.523′S, 060°04.771′W, SM grab, 839 m (4, MCZ 149895); Sta. 7B, 18 May 2000, 64°43.523′S, 060°04.771′W, 839 m (6 JAB); Sta. 16, 19 May 2000, 64°43.897′S, 059°55.745′W, 713 m (8, MCZ 149896); Sta. 17, 19 May 2000, 64°39.793′S, 060°07.662′W, 719 m (5, MCZ 149820); Sta. 18, 20 May 2000, 64°39.381′S, 059°59.498′W, 665 m (28, MCZ 149821); Sta. 19, 20 May 2000, 64°42.778′S, 060°20.846′W, 879 m (4, MCZ 149822); Sta. 20, 20 May 2000, 64°44.984′W, 060°22.345′E, 899 m (3, MCZ 149823); Sta. 21, 20 May 2000, 64°45.827′S, 060°19.450′W, 912 m (1, MCZ 149824); Sta. 22, 20 May 2000, 64°46.632′S, 060°21.557′W, 868 m (3, MCZ149825); Sta. 23, 21 May 2000, 64°47.144′S, 060°21.566′W, 901 m (3, MCZ 149826).—**East Antarctic Peninsula, former Ice Shelf A Area, border with Larsen B,** RVIB *Nathaniel B. Palmer* Cr. 2000-03, coll. J.A. Blake, SM grab, Sta. 10, 18 May 2000, 64°57.368′S, 060°13.392′W, SM grab, 332 m (4, MCZ 149827); Sta. 11, 18 May 2000, 64°56.669′S, 060°19.281′W, 350 m (8, MCZ 149828); Sta. 12, 19 May 2000, 64°55.101′S, 060°24.459′W, 317 m (7, MCZ 149829); Sta. 13, 19 May 2000, 64°53.517′S, 060°28.836′W, 323 m (12, MCZ 149830); Sta. 14, 19 May 2000, 64°51.818′S, 060°33.438′W, 419 m (11, MCZ 149831).—**Weddell Sea, east of former Larsen Ice Shelf A Area**, RVIB *Nathaniel B. Palmer* Cr. 2000-03, coll. J.A. Blake, Sta. 25, 22 May 2000, 64°43.314′S, 059°38.459′W, SM grab, 628 m (4, MCZ 149832); Sta. 26, 23 May 2000. 64°39.564′S, 059°13.226′W, 564 m (4, MCZ 149833).—**Weddell Sea**, USCG *Glacier*, Sta. 68-1, 06 Feb 1968, 70.117°S, 39.633°W, 650 m (3, USNM 46805); Sta. 69-4, 26 Feb 1969, 77.092°S, 35.007°W, 743 m (6, USNM 46813); Sta. 69-5, 27 Feb 1969, 77.33°S, 36.6883°W, 1079 m (3, USNM 46801); Sta. 69-8, 02 Mar 1969, 77.603°S, 42.50°W, 585 m (1, USNM 1490718); Sta. 69-11, 05 Mar 1969, 77.15°S, 38.97°W, 851 m (5, USNM 46803); **Off Halley Bay**, R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-146, 10 Feb 1998, 74°39.4′S, 27°08.0′W, MG, 1021 m (2, SMF 24896).—**Ross Sea**, USNS *Eltanin* Cr. 27, Sta. 1890, 06 Feb 1967, 65.00°S, 160.92°E, plankton sampler, 100 m, (1, USNM 1013929); **Victoria Land**, USNS *Eltanin* Cr. 32, Sta. 2020, 15 Jan 1968., 74.10°S, 179.18°E, 256 m (1, USNM 1490717); Sta. 2034, 15 Jan 1968, 74.10°S, 179.18°E, 256 m (1, USNM 1013925); **McMurdo Sound, SW Tent Island**, Deep-Freeze II, USCG *Glacier* Sta. 9, 29 Dec 1956, 77.718°S, 166.358°E, 421 m, grab on bottom of hard volcanic cinder (1, USNM 1013923); **McMurdo Sound, off McMurdo Station**, coll. S. Kim & J.A. Blake, scuba, 11 Jan 2000, 77°51.067′S, 66°39.880′E, 20 m, in sand and silt (11, LACM-AHF Poly 10203); same location, 15 Jan 2000, 77°51.067′S, 66°39.880′E, 30 m, in sponge mat (18, LACM-AHF Poly 10204).—**East Antarctica**, **Vincennes Bay, Casey Station**, coll. Australian Antarctic Division, O'Brien Bay-5, Sta. S1P2R1, 03 Dec 2005, 66.2949°S, 110.5365°E, diver cores, 15–25 m (20, AM); **Budd Coast, Wilke's Station**, coll. Virginia Institute of Marine Science, 24 Dec 1961, 66.2657°S, 110.5683°E, trawl, 73 m (1, USNM 1013924).

Description. A moderate- to large-sized species, holotype 18 mm long, 0.5 mm across anterior or thoracic setigers and 0.8 mm across posterior end, with 90 setigers; 20 setigers in expanded anterior or thoracic region, segments then narrowing (Fig. 15A), and expanding again in far posterior region for another 20 setigers (Fig. 15C). Segments of anterior and posterior regions short, crowded (Figs. 15A, 16A), segments of middle 50 segments about as long as wide, but not moniliform, posterior segments again short, but not as short as anterior segments (Fig. 15C). Anterior segments with dorsum broadly rounded, without mid-dorsal groove (Figs. 15A, 16A, C); venter similar but with shallow mid-ventral groove typically first present in anterior segments (Fig. 16D) continuing posteriorly; sometimes groove not apparent until posterior thoracic or anterior abdominal segments. Mid-ventral groove with line of low mounds along mid-line, these mounds continuing posteriorly, but not well developed in some specimens. Posterior expanded region somewhat fusiform (Fig. 15C), greatly expanded dorsally in some specimens; ventrally flattened or with weak groove (Fig. 15C) with mid-ventral line of mounds; small specimens with posterior end narrow, only weakly expanded, flattened ventrally. Weak ventral glandular bands apparent on peristomial annuli; prominent ventral bands of glands across anterior or thoracic segments (Fig. 16D). Color in alcohol: tan to brown; ventral thoracic glands yellow to golden in color, forming pigmented rows across venter (Fig. 16D). A few specimens exhibit some dusky pigment in anteriormost setigers.

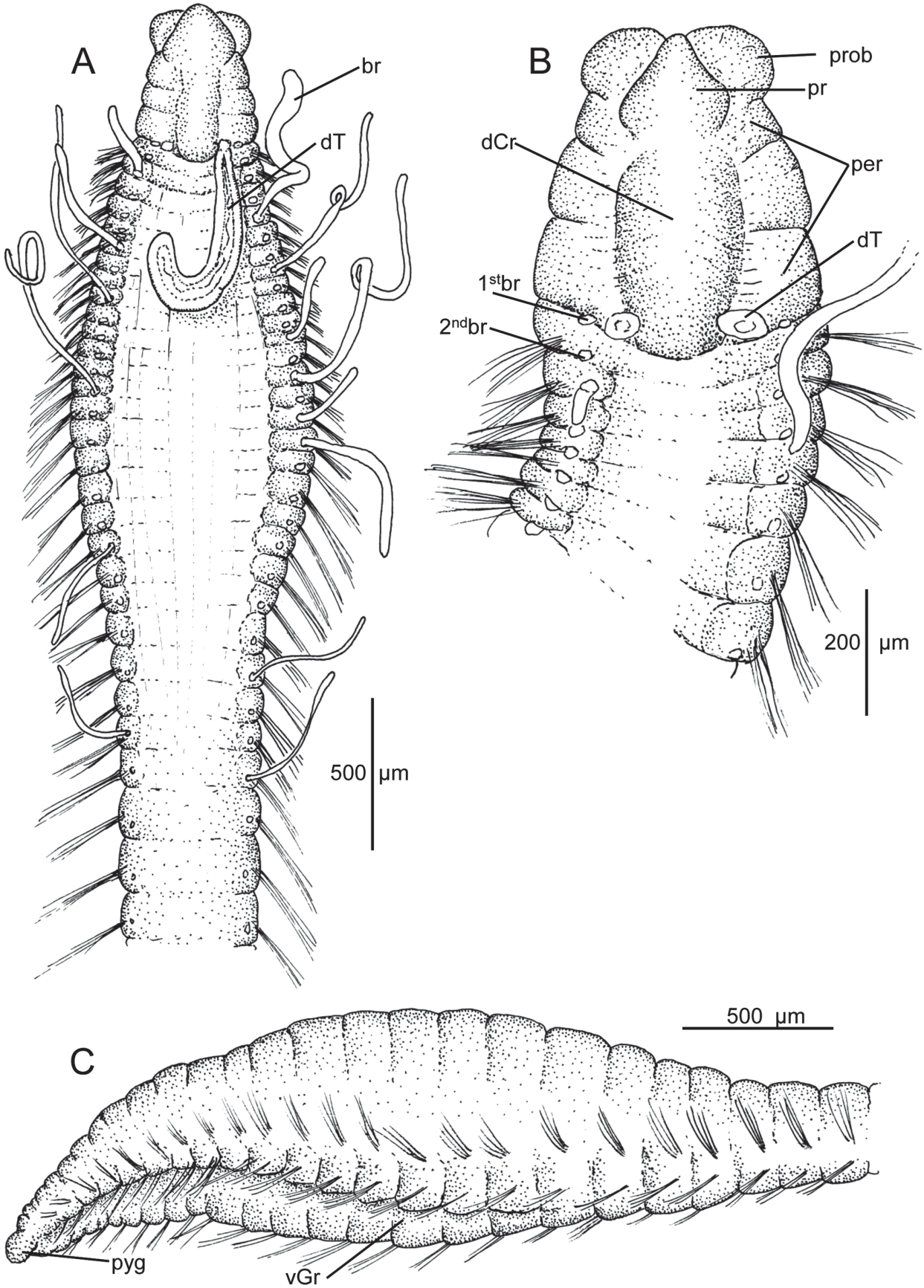

FIGURE 15. *Aphelochaeta palmeri* **n. sp.** A, anterior end, dorsal view; B, anterior end, dorsal view of another specimen; C, posterior end, right lateral view. A, C (USNM 1013937); B (USNM 1013929).

Prostomium pear-shaped, about as long as wide, narrowing anteriorly to rounded lobe on anterior margin (Fig. 15A–B); eyespots absent; nuchal organs circular openings at posterior lateral margin of prostomium. Peristomium elongate, with three obvious annular rings surmounted by distinct dorsal crest extending to anterior margin of setiger 1; proboscis everted in some specimens, soft, smooth, without lobes (Figs. 15B, 16A). Dorsal tentacles arising medially on posterior margin of peristomium (Fig. 15A–B, 16A–B); in large specimens, last peristomial ring enlarged, extending posteriorly over dorsum forming a wedge between setigers 1–2 and carrying dorsal tentacles posteriorly between those segments (Fig. 16C). First pair of branchiae arising lateral and in close proximity to dorsal tentacles and appearing to arise from the very posterior edge of the peristomium (Figs. 15A–B, 16A–B), but in some specimens first branchiae appear to arise from a notch between peristomium and setiger 1 or actually on setiger 1; subsequent branchiae from setiger 1, in more lateral position, dorsal to notosetae (Figs. 15B, 16A–B), continuing on each segment for about 30 setigers, thereafter becoming fewer, thinner, and irregularly distributed.

Parapodia weakly developed, producing low parapodial shoulders in anterior segments; capillary setae arising from low setal tori. Notosetae usually longer, thicker than neurosetae; setal fascicles with 7–12 setae anteriorly, reduced to 5–7 in middle and posterior segments. All capillaries with smooth blades visible with light microscopy. Notosetae of middle body segments usually elongated, suggesting possible natatory function, these setae longest on gravid specimens. Expanded posterior end fusiform, narrowing to pygidial segment bearing lobe ventral to anal opening (Fig. 15C).

Variability. Due to the large number of specimens available for study, considerable variability has been observed, some of which is likely due to having specimens at all growth stages and affected by different modes of preservation.

Three peristomial rings typically prominent, but in smaller specimens not as distinct; some specimens with evidence of an additional narrow ring anteriorly. Mid-dorsal crest on peristomium usually prominent but may be too low in smaller specimens to discern without staining. Peristomium typically ends at anterior margin of setiger 1, but in large specimens may extend posteriorly to level of setiger 1; thus carrying dorsal tentacles posteriorly and medial to level of setiger 1 or rarely 2. First pair of branchiae always lateral to dorsal tentacles, but actual placement on posterior edge of peristomium not always clear and on some specimens branchiae appear to arise on leading edge of setiger 1 or in groove between first setiger and peristomium.

Mid-ventral segments of anterior or thoracic region typically broadly rounded across each segment and may become interrupted by development of a shallow groove that continues posteriorly. This groove varies from a narrow depression that may widen in post-thoracic segments and continue posteriorly to the expanded posterior end where it forms either a flat or shallow-grooved venter. In the anterior segments, the groove appears as a channel between two lateral mounds.

Expanded posterior end varies from a weakly fusiform-shaped expansion of the posterior segments to a larger, more inflated structure. In all instances, however, lateral and dorsal sides rounded with venter being either flattened or having a shallow groove, usually with a row of segmental mounds along midline. Some specimens from Casey Station of East Antarctica with a shallow dorsal groove on the expanded posterior end.

Methyl Green stain. Strong staining reaction limited mainly to body segments; prostomium and peristomium staining weakly; speckles visible after differentiation on posterior half of peristomium, or not staining at all; tip of prostomium sometimes staining dark or not all, when stained most evident on ventral side. When stained, prominent transverse bands produced on venter and dorsum (Fig. 16D–E). Dorsally, glands staining on anterior medial margin of parapodial shoulders; glands on posterior margin of each segment producing transverse dorsal band (Fig. 16E). Ventrally, stain produces transverse bands on posterior margin and furrows between segments. Ventral golden areas of venter not staining with MG but appearing broad and dark in photographs and contrasting with MG stained area (Fig. 16D).

Etymology. This species is named after Nathaniel B. Palmer, American whaler, who is reputed to be among the first to sight the Antarctic continent.

Remarks. *Aphelochaeta palmeri* **n. sp.** is the most common and widely distributed shallow-water species of the genus in Antarctica. It is distinguished from other Antarctic congeners by the pear-shaped prostomium, the elongate peristomium formed of three prominent annuli, the expanded thoracic and posterior regions, and the presence of yellow to golden glandular bands on the venter of the thorax. It is likely that most of the *A. cincinnata* identifications by authors of benthic surveys refer to this species.

A diffuse speckled MG staining pattern occurs on the posterior half of the peristomium but may not be evident in many specimens; the stain is strong on the dorsal and ventral posterior margins of individual anterior body segments producing prominent transverse bands; glands on the leading edge of anterior parapodia also stain prominently. In larger specimens, the segmentally stained bands may continue along the entire body including the posterior end.

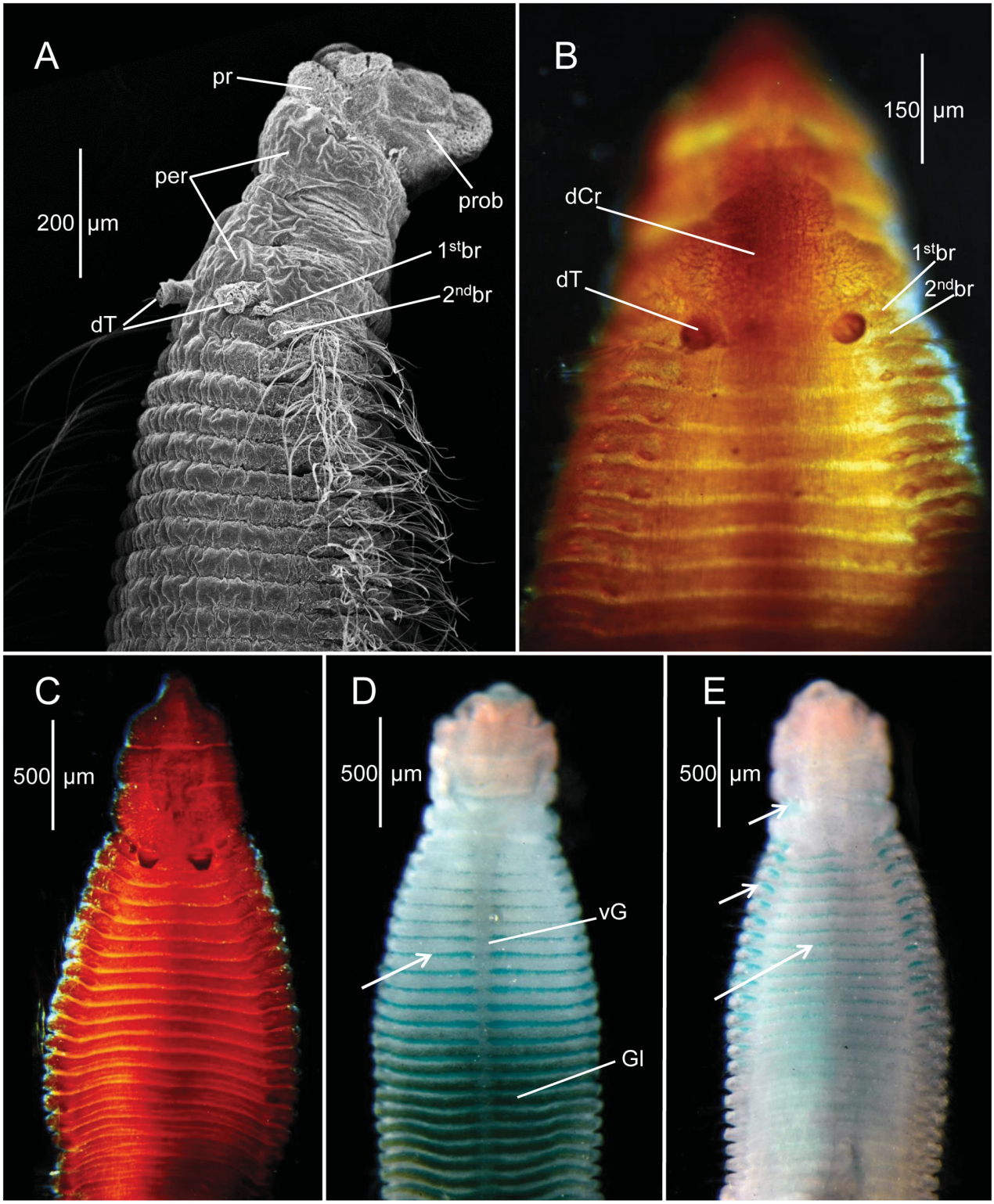

FIGURE 16. *Aphelochaeta palmeri* **n. sp.** A, SEM, anterior end, right dorsolateral view; B–E, Photomicrographs: B, anterior end, dorsal view; C, anterior end, dorsal view; D, anterior end, ventral view; E, anterior end, dorsal view. A–B, D–E, NBP Station 1 (LACM-Poly 10205); C, NBP Station 18 (MCZ 149821). B–C stained with Shirlastain A; D–E, stained with Methyl Green.

On the largest specimens, the posterior peristomial ring is enlarged medially on the dorsum and forms a wedge that extends posteriorly and carries the dorsal tentacles to a position between setigers 1 and 2. It appears as if contraction during preservation where the peristomium is compressed anterior to posteriorly also assists in shifting the dorsal tentacles back over the dorsum. Initially these specimens with the dorsal tentacles shifted posteriorly were thought to represent a separate species, but after examination of hundreds of specimens are now believed to represent a single, variable species. In addition, the size and shape of the posterior end is variable, ranging from a thickened narrow shape to one that is greatly inflated. However, in all instances, the ventral surface of the posterior end is distinctly flattened or weakly grooved; at the same time, lateral and dorsal sides are rounded, sometimes with a weak dorsal groove.

Aphelochaeta palmeri **n. sp**. is distinguished with difficulty from other Antarctic congeners such *A. aubreyi* **n. sp.**, *A. dearborni* **n. sp.**, and *A. spectabilis* **n. sp.** All four species have a pre-setiger region that is about 1.5 times as long as wide, incised with lateral grooves that produce 2–3 annular rings, and a dorsal crest that is variously developed. *Aphelochaeta dearborni* **n. sp.** has a narrow posterior region whereas *A. palmeri* **n. sp.** and *A. spectabilis* **n. sp.** have one that is enlarged and fusiform; the posterior end of *A. aubreyi* **n. sp.** is narrow but inflated dorsally. *Aphelochaeta aubreyi* **n. sp.** has rounded to moniliform middle body segments, whereas the other species have narrower segments that are not rounded. *Aphelochaeta spectabilis* **n. sp.** is the only one of these four to have a strong, distinctive MG pattern in the pre-setiger region. *Aphelochaeta dearborni* **n. sp.** and *A. palmeri* **n. sp.** have a lightly speckled pattern on part of the peristomium, or no staining pattern. *Aphelochaeta aubreyi* **n. sp.** has no obvious MG pattern except in intersegmental grooves on the venter. Black pigment spots or lines are present on the posterior lateral peristomial margins of *A. aubreyi* **n. sp.** and on the lower of the lip of the mouth on *A. dearborni* **n. sp**. Similar black pigment is absent in *A. palmeri* **n. sp.** and *A. spectabilis* **n. sp.** although some dusky pigment may be present on the peristomium and anterior segments of *A. palmeri* **n. sp.** These characters and others are discussed separately for each of these four species and, together with other species in Table 1, in the Discussion section of this paper (see below).

Habitat & biology. Surficial sediments in the Prince Gustav Channel and vicinity of the former Larsen Ice Shelf A where *Aphelochaeta palmeri* **n. sp.** was dominant contained 20–40% sand at the time of the May 2000 survey (Gilbert & Domack 2003).

Some specimens had ova in the coelom, up to 165 μm in diameter. Gut with sand and silt particles.

Distribution. Widespread in Antarctic seas, Antarctic Peninsula to the Ross Sea, in shelf and slope depths, 20–1100 m.

Aphelochaeta spectabilis new species

Figures 17–18

Aphelochaeta sp. 1: Hilbig 2001: 540 (in part); Hilbig *et al*. 2006: 715–719 (in part); Montiel *et al.* 2005: 197, 2016: Appendix 2 (in part).
Aphelochaeta sp. 3: Hilbig 2001: 540 (in part); Hilbig *et al*. 2006:717 (in part).
Aphelochaeta cincinnata: Hilbig 2001: 540 (in part); Hilbig *et al*. 2006: 715–719 (in part). **Not** Ehlers 1908.
Aphelochaeta cf. *epitoca*: Hilbig 2001: 540 (in part); Hilbig *et al.* 2006: 717 (in part). **Not** Monro 1930.

Material examined. **West Antarctic Peninsula**, **Biscoe Islands, Grandidier Channel, Larrouy Island,** R/V *Hero* Sta. 824-5-1, 65.94°S, 65.297°W, 16 Mar 1982, 246–270 m, **holotype** (USNM 1490719) and 15 **paratypes** (USNM 1490720); **Palmer Archipelago, Melchior Island**, R/V *Hero* Sta. 16-2, 22 Mar 1982, 64.325°S, 62.993°W, 85 m, 2 **paratypes** (USNM 1490721); Sta. 16-3, 22 Mar 1982, 64.326°S, 62.993° W, 85 m, 3 specimens (USNM 1490722).—**South Shetland Islands, off King George Island**, R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-299, 14 Mar 1998, 62°15.8′S, 58°42.7′W, MG, 207 m, (~75, SMF 24897); Sta. 48-300, 14 Mar 1998, 62°16.8′S, 58°42.1′W, MG, 423 m (~80, SMF 24898); Sta. 48-325, 17 Mar 1998, 62°21.9′S, 58°42.6′W, MG, 805 m (18, SMF 24899); Sta. 48-326, 17 Mar 1998, 62°20.1′S, 58°38.8′W, MG, 606 m (11, SMF 24900).—**Drake Passage**, R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-334, 19 Mar 1998, 61°26.7′S, 58°06.6′W, MG, 1028 m (1, SMF 24901); Sta.48-341, 19 Mar 1998, 61°34.5′S, 58°07.0′W, 429 m (3, SMF 24902); Sta. 48-345, 20 Mar 1998, 61°53.3′S, 59°06.9′W, MG, 218 m (23, SMF 24903); Sta. 48-356, 20 Mar 1998, 62°00.3′S, 59°14.9′W, MG, 130 m (24, SMF 24904).—**East Antarctic Peninsula, Prince Gustav Channel**,

RVIB *Nathaniel B. Palmer* Cr. 2000-03, coll. J.A. Blake, SM grab, Sta. 01, 14 May 2000, 64°17.625′S, 058°34.678′W, 768 m, (22, JAB); Sta.02, near Cape Longing, 15 May 2000, 64°18.387′S, 058°37.911′W, 504 m (1, MCZ 149834); Sta. 27, 23 May 2000, 64°22.934′S, 058°36.976′W, 684 m (3, MCZ 149835); Sta. 28, 23 May 2000, 64°22.018′S, 058°30.942′W, 794 m (1, LACM-AHF Poly 10210); Sta. 29, 24 May 2000, 64°21.361′S, 058°26.637′W, 690 m (2, LACM-AHF Poly 10211); Sta. 33, 24 May 2000, 64°11.959′S, 058°41.857′W, 587 m (3, LACM-AHF Poly 10212).—**Weddell Sea, off Halley Bay**, R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-137, 09 Feb 1998, 74°36.2′S, 27°12.7′W, MG, 1521 m (6, SMF 24906).

Description. Holotype an ovigerous female, complete but broken into two parts, 18 mm long, 0.9 mm wide across anterior setigers, with 105 setigers. Anterior setigers wide, expanded, crowded, about ten times wider than long (Figs. 17A–B, 18A), setigers of middle body becoming longer, about as wide as long, some becoming rounded, but not moniliform; about 20–30 posterior segments forming expanded region with individual segments again becoming wider (Figs. 17D, 18B–C). Dorsal surface without distinct grooves or ridges; anterior venter with narrow mid-ventral ridgeline formed of bulge where left and right sides meet, this absent in middle and posterior segments. Color in alcohol light tan with no separate pigment markings.

Prostomium triangular, narrowing anteriorly to rounded tip (Figs. 17A–C, 18A–C, F–G); eyespots absent; nuchal organs narrow slits at lateral margins. Peristomium with three weakly developed annular rings, best seen laterally as lines separating annuli (Fig. 17A–C); with broad dorsal crest extending posteriorly from prostomium to anterior margin of setiger 1 (Fig. 17A–C); in a few specimens, dorsal crest extending mid-dorsally over setiger 1. Dorsal tentacles arising medially from posterior margin of peristomium (Figs. 17A–C, 18 A). First pair of branchiae lateral to dorsal tentacles but on anterior margin of setiger 1 (Fig. 17A–C); second pair of branchiae on posterior margin of setiger 1 dorsal to notosetae; branchiae on following segments in a similar position (Fig. 17A–C). Branchiae continuing to about mid body.

Anterior setigers expanded with lateral parapodia and broadly rounded mid-dorsal and ventral surfaces. Individual anterior parapodia with distinct shoulders, best developed dorsally, with noto- and neuropodia close together (Fig. 17A). Parapodia of middle and posterior setigers reduced to low tori from which setae emerge directly from body wall. Setae all capillaries arranged in single rows of 8–10 in anterior expanded segments, reduced to 3–6 in middle and posterior segments. Long natatory notosetae present on holotype from middle of anterior expanded region (Fig. 17B) to near posterior end of body; natatory setae up to five times as long as normal capillaries.

Posterior end expanded, terminating in simple pygidium with rounded lobe ventral to anal opening (Figs. 17D, 18B–C).

Variability. The most conspicuous variable is the degree to which MG stains the pre-setigerous region (see below). In most instances, the stain is sufficiently strong to highlight two clear oval areas between the prostomium and peristomium (Fig 18D–F). In some specimens, however, the stained areas are weaker or the stain is broken up as a speckled pattern. The ventral side of the prostomium typically stains more consistently than the dorsal side, which does not stain at all or only weakly.

There are generally three weak grooves on the peristomium producing three annular rings that are only apparent in lateral view and after staining with Shirlastain A or MG (Fig. 18E–F). When specimens are contracted, probably due to preservation, the three rings may be more apparent and extend dorsally. However, the typically weak nature of the annular rings shown in Fig. 17A–B is the normal feature of this species. The anterior thoracic segments are not as swollen in smaller specimens. The dorsal and ventral thoracic surfaces are broadly elevated and rounded with no prominent grooves or ridges. However, a narrow, shallow line consisting of a bulge at the junction of each segment extends mid-ventrally along the anterior thoracic segments; this is best seen when stained with Shirlastain A or MG. The middle body segments may become somewhat rounded dorsally and ventrally but are not moniliform as in some other species. The enlarged posterior segments range from narrowly fusiform to greatly expanded and bulbous.

Methyl Green stain. *Aphelochaeta spectabilis* **n. sp.** has the most prominent and distinctive MG pattern of any species of *Aphelochaeta* encountered in this study. On the pre-setigerous region, the stain is heaviest on the dorsal surface where a type of mask develops that includes stain concentrated on the prostomium and peristomium with a pair of large, oval-shaped clear areas between them (Fig. 18A, D–F); the peristomial annuli are defined by unstained lines; the low dorsal crest is sometimes highlighted. The stain extends laterally to the ventral side leaving the lower lips of the mouth unstained; a prominent triangular-shaped darkly stained patch is present between the

mouth and first setiger (Fig. 18D, F–G). Segmentally, each of the anterior noto- and neuropodia stain prominently (Fig. 18D–G), with the stain continuing across the venter as a striped pattern. A similar stripe occurs on the dorsal surface of the anterior segments. The parapodia that are reduced in size in middle body segments are also stained, but the stain is less noticeable due to the smaller size.

Etymology. The epithet is from the Latin, s*pectabilis*, for showy, denoting the conspicuous Methyl Green staining patterns that characterize this species.

Remarks. Among the Antarctic species, the swollen anterior thoracic segments, weakly defined annular rings on the peristomium, and an expanded posterior region make *Aphelochaeta spectabilis* **n. sp**. readily recognizable. In addition, the distinctive and prominent MG staining pattern on the pre-setigerous region, parapodia, and transverse bands across the dorsal and ventral surfaces are distinctive for this species. The peristomial rings are only weakly developed with the annuli usually limited to thin lateral lines best seen when stained. The first pair of branchiae occurs on the anterior border of setiger 1 rather than the posterior margin of the peristomium as in related species and with the second pair on the posterior border of setiger 1, this species has two pairs of branchiae on the first setiger.

The MG staining pattern of the pre-setiger region and ventral transverse bands of *A. spectabilis* **n. sp**. are similar to those of *A. brandtae* **n. sp.** However, in *A. brandtae* **n. sp**. the ventral transverse bands are very broad and stain intensely across the entire segment in contrast to *A. spectabilis* **n. sp.** where the stained bands are narrow and generally limited to the middle of each segment; further the segmental bands extend up, on to and across the dorsal surface of *A. spectabilis* **n. sp**. instead of being limited to the venter and neuropodia as in *A. brandtae* **n. sp**. The abdominal segments of *A. brandtae* **n. sp.** are rounded, almost moniliform and with some mature females observed with large protruding eggs; similar segments of *A. spectabilis* **n. sp.** are narrow not rounded and eggs of females are not especially large and protruding.

The posterior end of *A. spectabilis* **n. sp.** is expanded as in most specimens of *A. aubreyi* **n. sp.** and *A. palmeri* **n. sp.**, but the ventral surface is usually rounded, not flattened or grooved as in the other species.

Habitat & biology. Surficial sediments in the Prince Gustav Channel where *Aphelochaeta spectabilis* **n. sp.** occurred contained 20–40% sand at the time of the May 2000 survey (Gilbert & Domack 2003). The holotype is a mature female with eggs measuring 150–165 μm in the longest dimension.

Distribution. East and west Antarctic Peninsula, 85–1028 m; Weddell Sea, 1021–1521 m.

Genus *Caulleriella* Chamberlin, 1919

Type species: *Cirratulus viridis* Langerhans, 1881, original designation by Chamberlin 1919.

Diagnosis. Prostomium elongate; peristomium elongated to short, dorsal tentacles usually beginning anterior to setiger 1. Middle body segments not beaded; parapodia with noto- and neuropodia widely separated from one another laterally. Modified setae including bidentate, crotchet-like hooks, not arranged into modified cinctures.

Remarks. Blake (1996) revised the definition of *Caulleriella* to include bitentaculate cirratulid species having only bidentate, crotchet-like hooks and with the noto- and neuropodia widely separated from one another.

The genera *Caulleriella* and *Tharyx* are similar and separated with difficulty. Both genera have modified spines that are more or less bidentate. In *Caulleriella* these spines have two well-developed teeth, both sharply pointed and sometimes hooded. Species of *Tharyx*, on the other hand, have poorly developed teeth on the hooks; these are usually reduced to rounded knobs or stumps, or not apparent at all. *Caulleriella* and *Tharyx* also differ considerably in the manner in which the setal fascicles arise along the body. In species of *Caulleriella*, there is a wide lateral gap between the noto- and neuropodial setal fascicles. This separation of the fascicles of noto- and neurosetae is so wide that, in some species in cross section, the setae occur in four separate corners of the body. In contrast, the points of origin of noto- and neurosetae of *Tharyx* species are typically close together or, if separated, the gap is not wide.

Hartmann-Schröder & Rosenfeldt (1989, 1990) reported four species of *Caulleriella* from Antarctica. Of these, only *C*. aff. *zetlandica* is likely a true *Caulleriella* (Hartmann-Schröder & Rosenfeldt, 1989) and is here referred to *C. eltaninae* **n. sp**. (see below). Three other species described by these authors do not belong to *Caulleriella* and are referred elsewhere. *Caulleriella bransfieldensis* Hartmann-Schröder & Rosenfeldt, 1989 is referred to

Chaetozone because it has simple spines formed into partial cinctures in posterior setigers. *Caulleriella homosetosa* Hartmann-Schröder & Rosenfeldt, 1989 is also referred to *Chaetozone* because it has simple, blunt-tipped spines in posterior noto- and neuropodia that are organized into partial cinctures. *Caulleriella obtusa* Hartmann-Schröder & Rosenfeldt, 1990 is referred to *Tharyx* because it has blunt, knobby-tipped spines and the rami of the parapodia are not widely separated. Types of these species were examined during a brief visit to the ZMH in 2002; numerous additional specimens have been identified during this study, thus adding to details about these species.

Four new species from the Antarctic collections that agree with the definition of *Caulleriella* provided by Blake (1996) have been discovered as part of this study: *Caulleriella eltaninae* **n. sp.**, *C. fucata* **n. sp.**, *C. kacyae* **n. sp.**, and *C. fimbriata* **n. sp.** These, together with *C. antarctica* previously described by Hartman (1978) from the Weddell Sea brings the total to five species of this genus in Antarctic waters. Two additional new species have been discovered from off western South America: *C. ecuadoriana* **n. sp.** from shallow water off Ecuador and *C. suroestense* **n. sp.** from the Juan Fernandez Islands off Chile. In addition, the holotype of *C. magnaoculata* described from off Peru by Hartmann-Schröder (1962) has been examined and redescribed.

Caulleriella antarctica Hartman, 1978

Figure 19

Caulleriella antarctica Hartman, 1978:164–166, fig. 17; Rozbaczylo 1985: 151.
Tharyx antarcticus: Blake & Narayanaswamy 2004: 1806, 1813 (in part).

Material Examined. Antarctica, Weddell Sea, USCG *Glacier* Sta. 69-1, 24 Feb 1969, 74°28.1′S, 30°31.7′W, 513 m, **holotype** (USNM 46777) and 14 **paratypes** (USNM 46778); Sta. 69-2, 25 Feb 1969, 75°31′S, 30°08′W, 412 m (2, USNM 46781); Sta. 68-1, 06 Feb 1968, 70°07′S,39°38′W, 650 m (8, USNM 46779); Sta. 68-5, 09 Feb 1968, 76°00′S, 55°00′W, 400 m (10, USNM 46780).—**Weddell Sea, E of Antarctic Peninsula**, R/V *Polarstern*, ANDEEP II (ANT XIX/4), Sta. PS61/133-6, 07 Mar 2002, 65°20.18′S, 54°143.6′W, MUC, 1120 m (1, SMF 24907).—**Ross Sea, McMurdo Sound**, Ross Island, Cape Evans, coll. ca. 10 m in gravelly sand, scuba, by Stacy Kim, 1 specimen (USNM 1013671).

Description. A small, threadlike species, holotype complete, 4.8 mm long, 0.2 mm wide for 33 setigers; one paratype 6 mm long, 0.2 mm wide for 43 setigers. Peristomium and first 3–5 setigers inflated with segments wider than long (Fig. 19A–B), thereafter segments becoming longer, beadlike; posterior end tapering to narrow, blunted pygidium; a complete Weddell Sea specimen with one lobe on pygidial segment; Ross Island and ANDEEP II specimens with two distinct cirri (Fig. 19C). Body segments with noto- and neuropodia widely separated. Color in alcohol: light tan.

Prostomium short, triangular, as wide at base as long (Fig. 19A), bluntly pointed on anterior margin, eyespots absent; peristomium elongate, about as long as wide, weakly divided into two rings (Fig. 19A–B). Paired dorsal tentacles arising from medial position at posterior margin of peristomium; first pair of branchiae arising lateral and posterior to tentacles at border of peristomium and setiger 1 (Fig. 19B); second pair of branchiae on posterior margin of setiger 1 dorsal to notosetae; branchiae on following segments in a similar position.

Notosetae of setigers 1–7(8) all long, thin capillaries, ca. 6–8 per fascicle; acicular hooks from setiger 8–9, 1–2 hooks at first accompanied by 2–3 thin capillaries, reduced to a single capillary in posterior segments or absent. Neurosetae of setigers 1–5 long capillaries, 5–8 setae per fascicle; bifid acicular hooks mostly replacing capillaries from setiger 6, continuing posteriorly; hooks accompanied by 1–2 thin, hair-like capillaries through middle body segments with these reduced to a single capillary in posterior setigers (Fig. 19D), or entirely absent. Hooks numbering 2–5 per fascicle, each with blunt, bifid tips. Posterior fascicles with noto- and neuropodial hooks curving toward lateral midline (Fig. 19D). Notopodial hooks thinner, longer than neuropodial hooks, with rounded or angular tips (Fig. 19E), a few with weakly bifid tips only in far posterior setigers. Neuropodial hooks with emergent end of shaft geniculate, sigmoidally curved, with tip bearing a blunt-tipped tooth on concave side of shaft and a narrow apical tooth on convex side of shaft as extension of sheath producing a bidentate appearance (Fig. 19F).

Methyl Green stain. No staining reaction.

Remarks. During the initial study of the Weddell Sea collections taken as part of the ANDEEP program, Blake & Narayanaswamy (2004) referred specimens of this species to the genus *Tharyx*. However, further study indicated

that although all specimens were small and threadlike, two separate species were actually present: *Caulleriella antarctica* and *Tharyx moniliformis* **n. sp.** *Caulleriella antarctica* has typical bidentate neuropodial hooks in posterior parapodia; whereas, *T. moniliformis* **n. sp.** has the sub-bidentate knobby hooks typical for species of *Tharyx*. In addition, the pygidium of *C. antarctica* has two anal cirri; whereas, the pygidium of *T. moniliformis* **n. sp.** has only a simple lobe lacking cirri. Both species occur in the Weddell Sea, but *T. moniliformis* **n. sp.** occurs over a greater depth range.

Among species of *Caulleriella* occurring in deep-water sediments of Antarctica, *C. antarctica*, *C. fimbriata* **n. sp.**, and *C. kacyae* **n. sp**. all have elongate, threadlike bodies. *Caulleriella antarctica* has two peristomial rings instead one or three, has the first pair of branchiae lateral to the dorsal tentacles on the peristomium instead of on setiger 1, and there is sheath on the convex side of the neuropodial hooks that extends as an apical tooth above the main fang. A similar sheath occurs in *C. kacyae* **n. sp**., but in that species, the sheath produces a pair of apical teeth.

Globally, *C. antarctica* with both straight and sigmoidally curved hooks in noto- and neuropodia is reminiscent of *C. cordiformia* described by Magalhães & Bailey-Brock (2013) from offshore Oahu, Hawaii. However, the types and distribution of these hooks in the Hawaiian species differ in that all are bidentate. Posterior elongate notopodial hooks alternate with capillaries and short curved neuropodial hooks alternate with long, narrow, straight bidentate hooks. In addition, while the first pair of branchiae of *C. cordiformia* occurs posteriorly on the peristomium as in *C. antarctica*, they occur directly posterior to the dorsal tentacles instead of lateral to them.

Habitat. Weddell Sea sample PS61/133-6 from the ANDEEP II survey was collected from surficial sediments having greenish grey silt-clay, with some sand and pebbles (Diaz 2004; Howe *et al.* 2004).

Distribution. Weddell Sea, 400–1120 m; McMurdo Sound, 6 m.

Caulleriella ecuadoriana new species

Figures 20–21

Material examined. Ecuador, Bahia de Santa Elena, off Salinas, SEPBOP, R/V *Anton Bruun*, Cr. 16, Sta. 6670, 08 May 1966, scuba, 02°11′28″S, 80°56′31″W, 8–9 m, **holotype** (USNM 1490723); off Golfo de Guayaquil, Cr. 18B, Sta. 773, 11 Sep 1966, bottom trawl, 02°43′S, 80°33′W, 20 m, 2 **paratypes** (USNM 1490724).

Description. A small species, holotype 5.1 mm long, 0.21 mm wide across anterior setigers and 0.3 mm wide across middle segments; with about 75 setigerous segments. Both paratypes complete, largest 3.5 mm long with about 76 setigerous segments. Body elongate, narrow, with all segments wider than long; anterior segments about 12 times as wide as long, middle body segments about six times as wide as long. Posterior segments becoming narrower, tapering to pygidium bearing a rounded lobe ventral to anal opening (Figs. 20B, 21B). Prominent darkly pigmented heart body visible internally in setigers 3–13 (Fig. 21A). Venter of body generally flattened, weakly grooved along entire length including posterior end; low mid-ventral ridge present within groove along most of length; dorsum generally rounded throughout, becoming weakly flattened in far posterior segments. Holotype pale in alcohol, with no separate body pigmentation except darkly pigmented heart body and other blood vessels (Fig. 21A). Smaller paratype with numerous darkly pigmented lines, believed to be blood vessels; some within branchiae.

Prostomium triangular, tapering to rounded tip (Figs. 20A, 21A); eyespots absent; nuchal organs not observed. Peristomium with three annular rings, best observed laterally, not crossing low dorsal crest (Figs. 20A, 21A). Dorsal tentacles arising mid-dorsally on posterior margin of peristomium (Fig. 20A). First pair of branchiae lateral to dorsal tentacles, also arising from posterior margin of peristomium (Fig. 20A); second pair of branchiae on setiger 1 dorsal to notosetae; branchiae of subsequent segments in same position (Fig. 20A); branchiae continuing segmentally to posterior end. Location of first branchiae on peristomium in relation to setiger 1 difficult to discern due to close proximity of second pair of branchiae on setiger 1.

Noto- and neuropodia widely separated from one another laterally. Parapodia all low tori from which setae arise. Notopodia with capillaries throughout, numbering 5–6 in anterior segments; bidentate hooks from setiger 20, numbering 3–4 per fascicle with 2–3 capillaries through middle segments, reduced to 2–3 hooks and 1–2 capillaries in far posterior setigers. Neuropodia with six hooks from setiger 1 accompanied by 2–3 capillaries; hooks reduced to 3–4 in middle and posterior segments with 1–3 capillaries. Hooks with distinctly curved shafts, with large main fang surmounted by small, but sharply pointed apical tooth (Figs. 20C, 21C); hood or sheath absent.

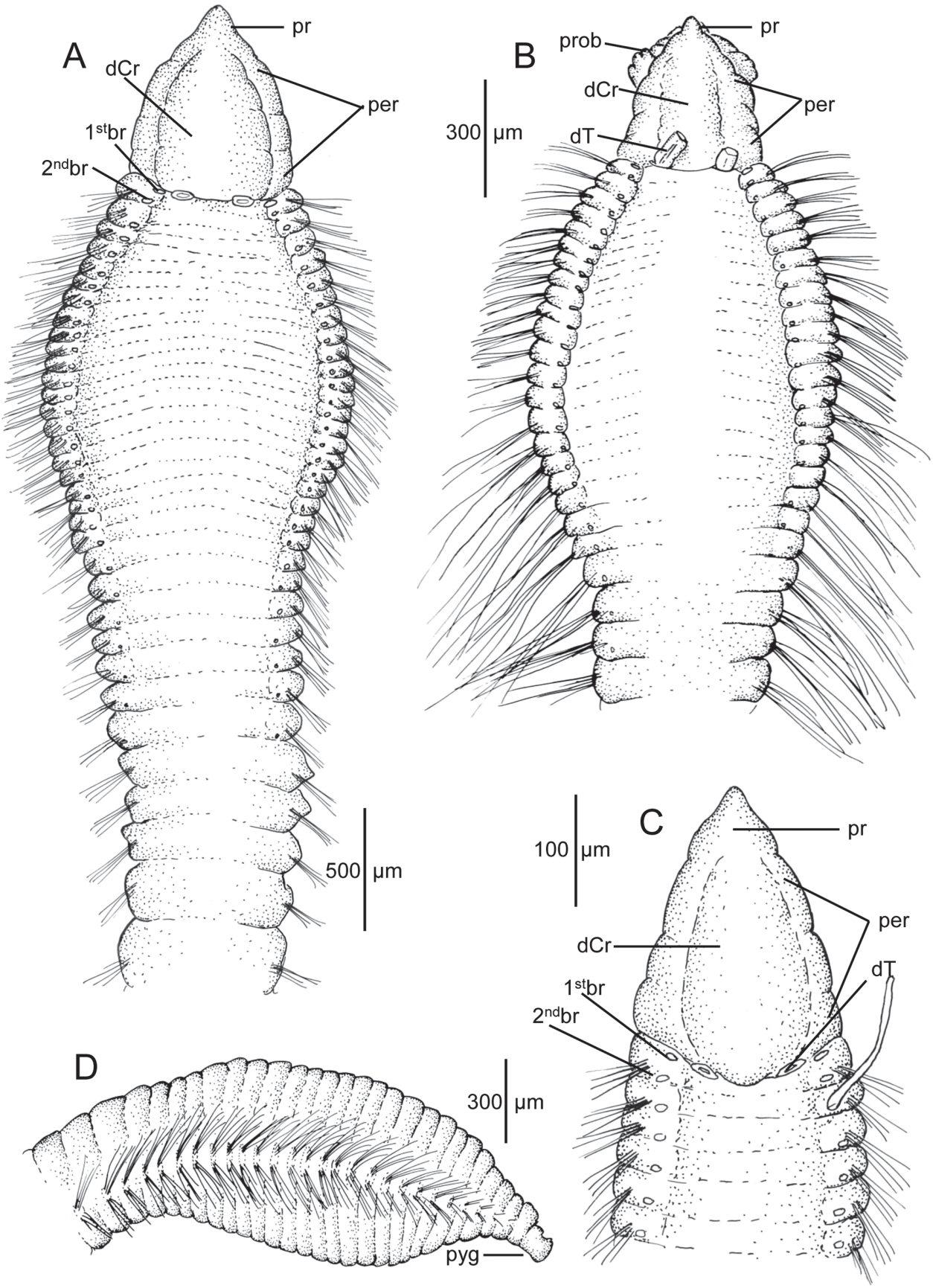

FIGURE 17. *Aphelochaeta spectabilis* **n. sp.** A, anterior end, dorsal view, specimen from EASIZ II, Sta. 299 (SMF 24897); B, anterior end, dorsal view of holotype, R/V *Hero* Sta. 824-5-1 (USNM 1490720); C, anterior end, dorsal view of small specimen, EASIZ II, Sta. 299 (SMF 24897); D, posterior end, left lateral view of holotype (USNM 1490719).

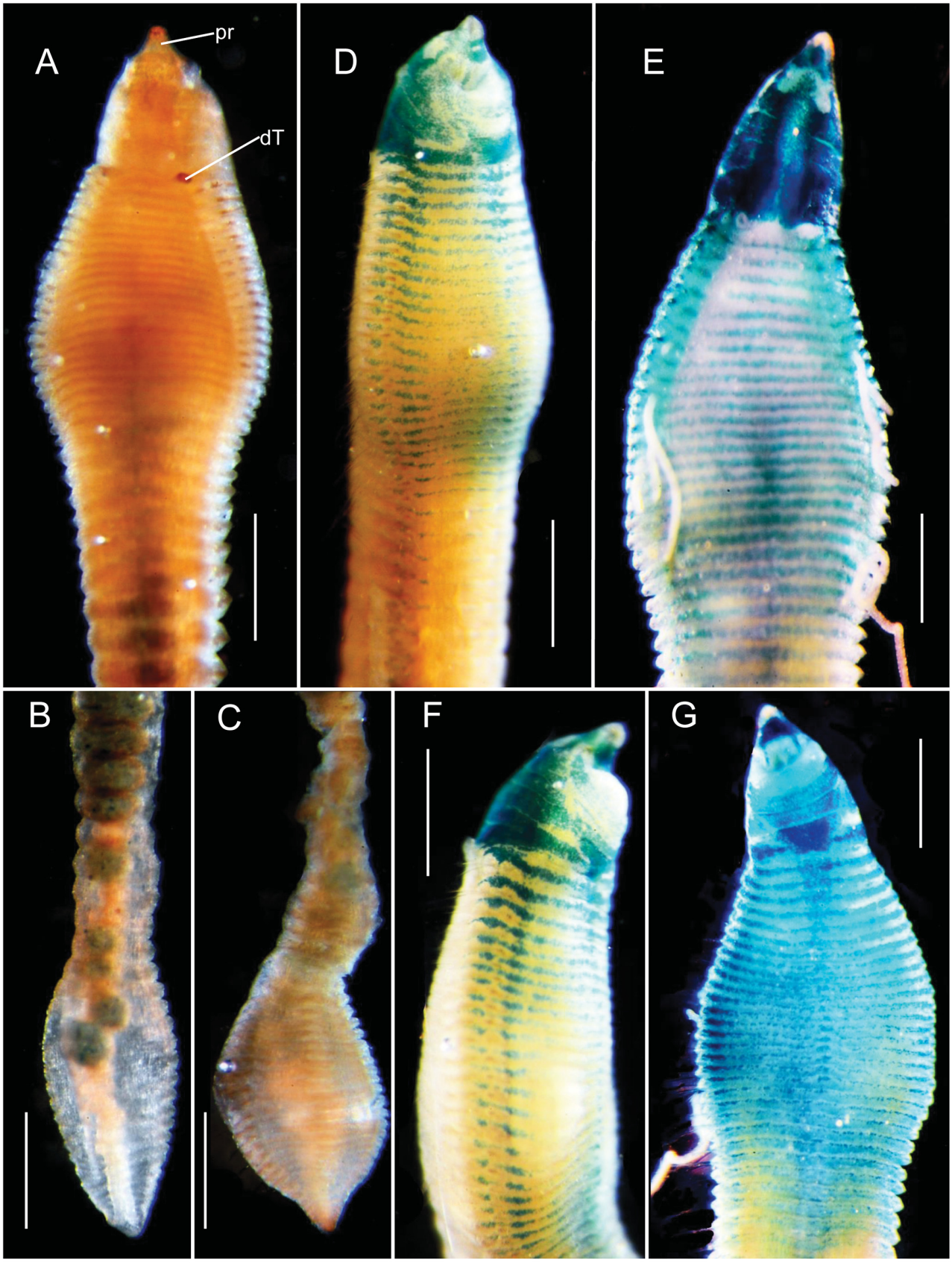

FIGURE 18. *Aphelochaeta spectabilis* **n. sp.** Photomicrographs of specimens from the EASIZ II Sta. 48-299 (SMF 24897): A, anterior end, dorsal view; B–C, posterior ends, dorsal view of two different specimens; D–G, two specimens showing anterior ends, in ventrolateral, (D) dorsal (E), right lateral (F), and ventral (G) views exhibiting Methyl Green staining patterns. A–C stained with Shirlastain A; D–G stained with Methyl Green. All scales 500 µm.

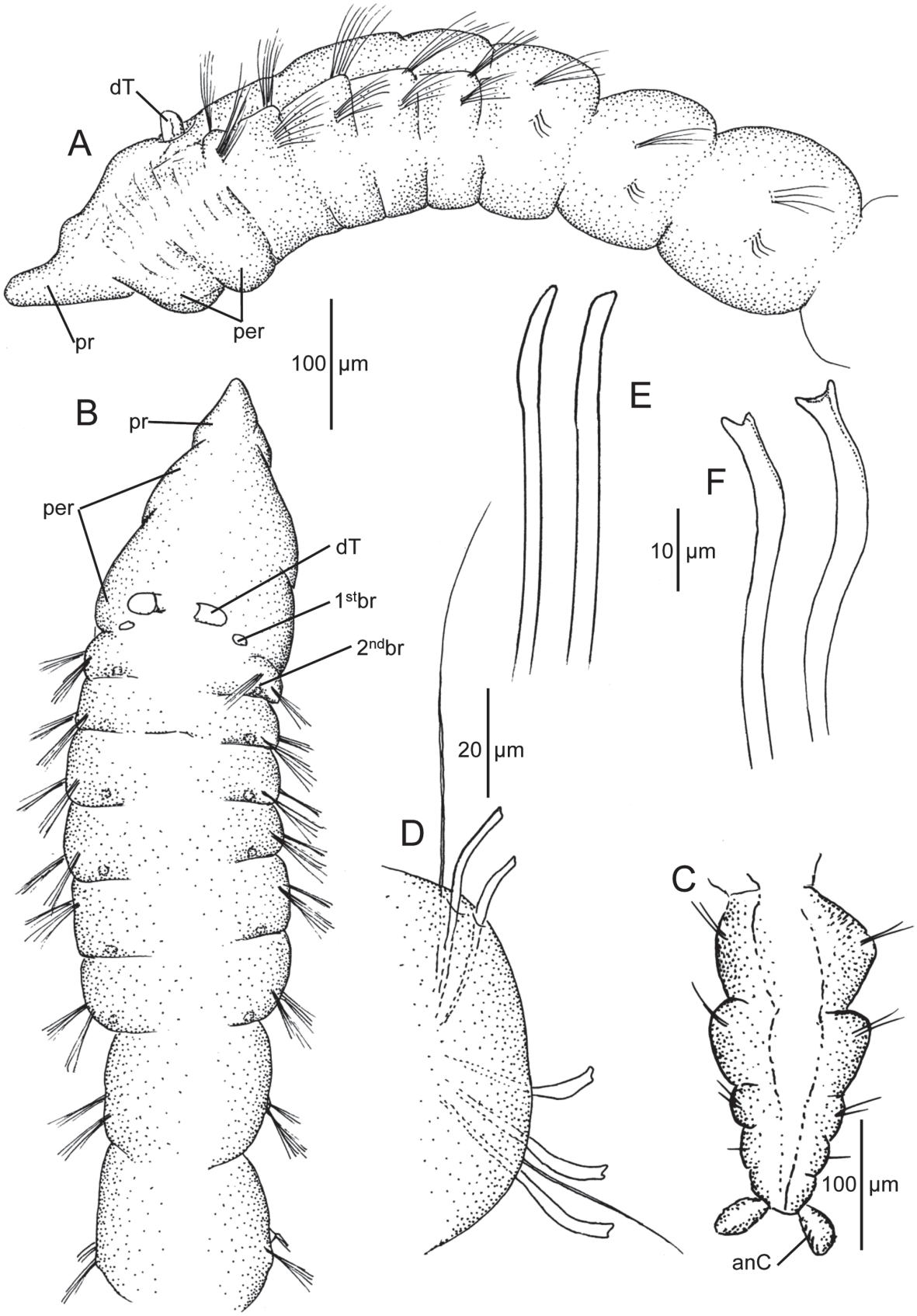

FIGURE 19. *Caulleriella antarctica* Hartman, 1978. A, anterior end, left lateral view; B, anterior end, dorsal view; C, posterior end, dorsal view; D, posterior parapodium, left anterior view; E, posterior notopodial hooks; F, posterior neuropodial hooks. A–B, D–F, Holotype (USNM 46777); C, ANDEEP II, Sta. 133-6 (SMH 24907).

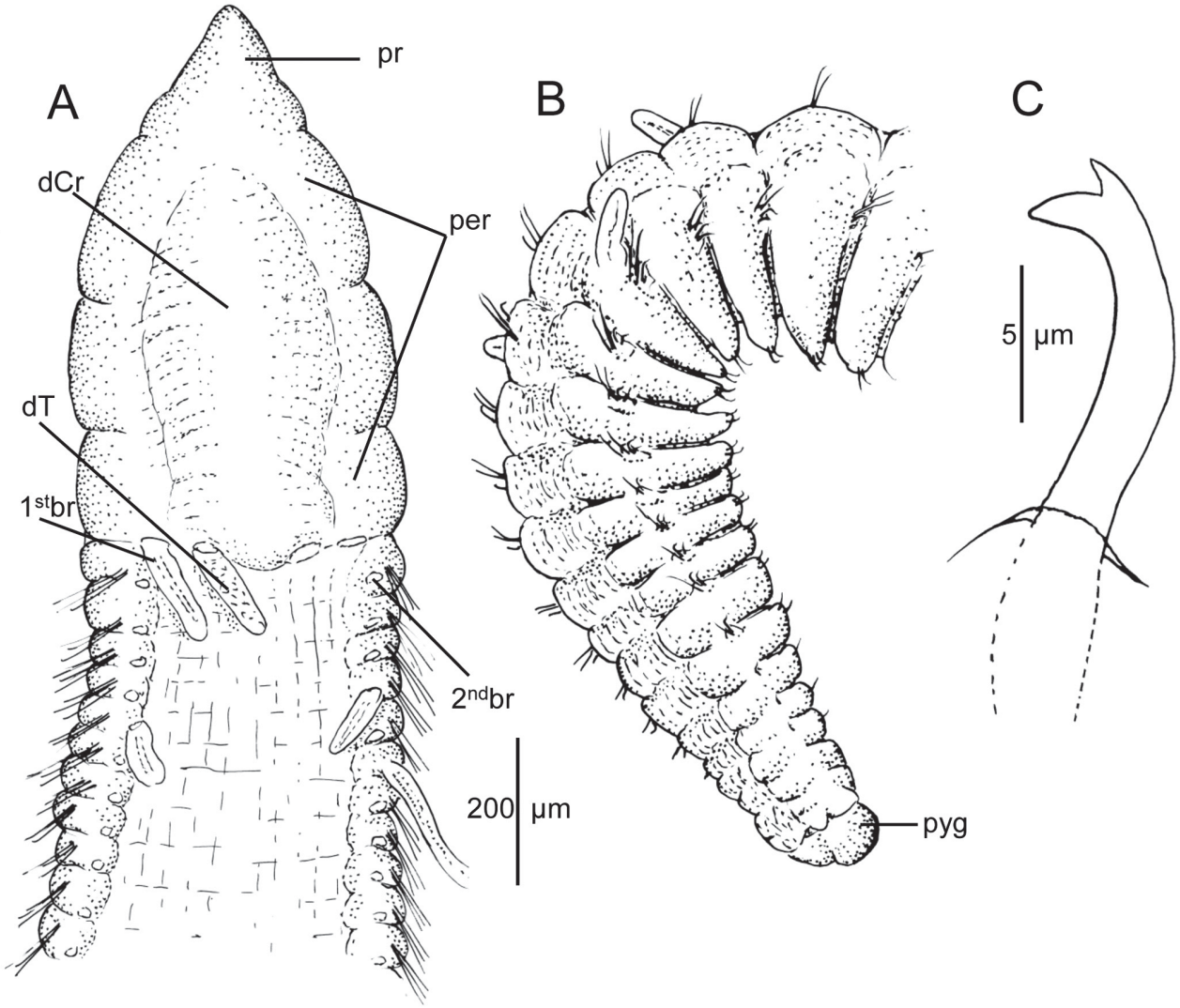

FIGURE 20. *Caulleriella ecuadoriana* **n. sp.** Holotype (USNM 1490723): A, anterior end, dorsal view; B, posterior end, left lateral view; C, neuropodial bidentate hook.

Methyl Green stain. Body more or less staining uniformly; prostomium staining lightly with numerous small speckles. Grooves of peristomial annular rings staining.

Etymology. The species name is derived from its collection from low water offshore Ecuador.

Remarks. Six species of *Caulleriella* with neuropodial hooks from setiger 1 and lacking eyespots have now been reported from the eastern Pacific (Blake 1996, Dean & Blake 2007) plus *C. suroestense* **n. sp.** and *C. ecuadoriana* **n. sp.** reported in the present study. *Caulleriella ecuadoriana* **n. sp.** differs from all the others by having the first pair of branchiae on the posterior margin of the peristomium lateral to the dorsal tentacles instead of near the posterior border of setiger 1 dorsal to the notosetae.

Distribution. Known only from off Ecuador in shallow water, 8–20 m.

***Caulleriella eltaninae* new species**
Figure 22

Caulleriella aff. *zetlandica*: Hartmann-Schröder & Rosenfeldt, 1989: 66–67, figs. 1–2. **Not** McIntosh 1911.

Material Examined. Antarctic Peninsula, NE of Joinville Island: USNS *Eltanin* Cr. 12, Sta. 1003, 15 Mar 1964, 62.68°S, 54.72°W, trawl, 210–220 m, **holotype** (USNM 1013888).—**South Shetland Islands**, **NE of Clarence**

Island, USNS *Eltanin* Cr. 12, Sta. 1089, 17 Apr 1964, 60.78°S, 53.50°W, trawl, 641m, **paratype** (USNM 1013889).—**Ross Sea, off Victoria Land**, USNS *Eltanin* Cr. 32, Sta. 2005, 73.033°S, 176.857°E, trawl, 864–874 m, **paratype** (USNM 1013890).

Description. A moderately sized species, holotype complete but in two pieces, 9.5 mm long, 0.5 mm wide for approximately 145 setigers. Body generally thick throughout, anterior segments widest, narrowing in posterior setigers. Individual segments always wider than long. Ventral groove present for entire length of body (Fig. 22A). Color in alcohol: light tan to brown, without pigment.

Prostomium short, triangular, rounded on anterior margin (Fig. 22A–B); one paratype with a single small faded eyespot on dorsolateral surface, otherwise eyespots not apparent; nuchal organs not observed. Peristomium longer than wide, tapering anteriorly, divided into three rings by weak grooves, best seen laterally (Fig. 22A–B); dorsal surface smooth, crest absent. Peristomium followed by narrow achaetous segment from which dorsal tentacles arise from wide laterally spaced locations (Fig. 22A); tentacle scars large, wider than long. First pair of branchiae on posterior border of setiger 1, subsequent branchiae in similar position dorsal to notosetae continuing through middle segments (Fig. 22B).

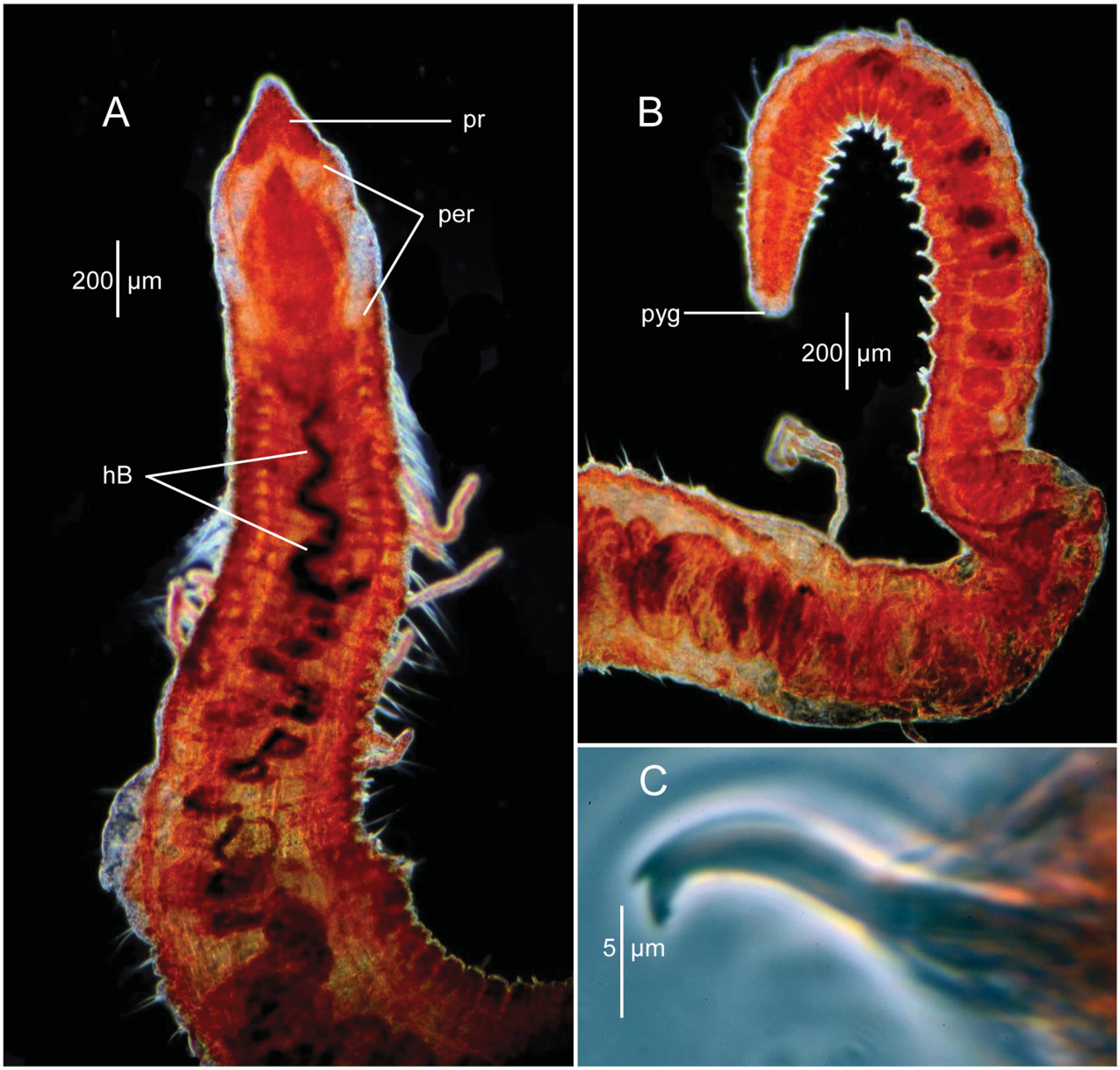

FIGURE 21. *Caulleriella ecuadoriana* **n. sp.** Photomicrographs of holotype (USNM 1490723): A, anterior and middle setigers, dorsal view; B, middle and posterior setigers, dorsal view; C, neuropodial bidentate hook. Stained with Shirlastain A.

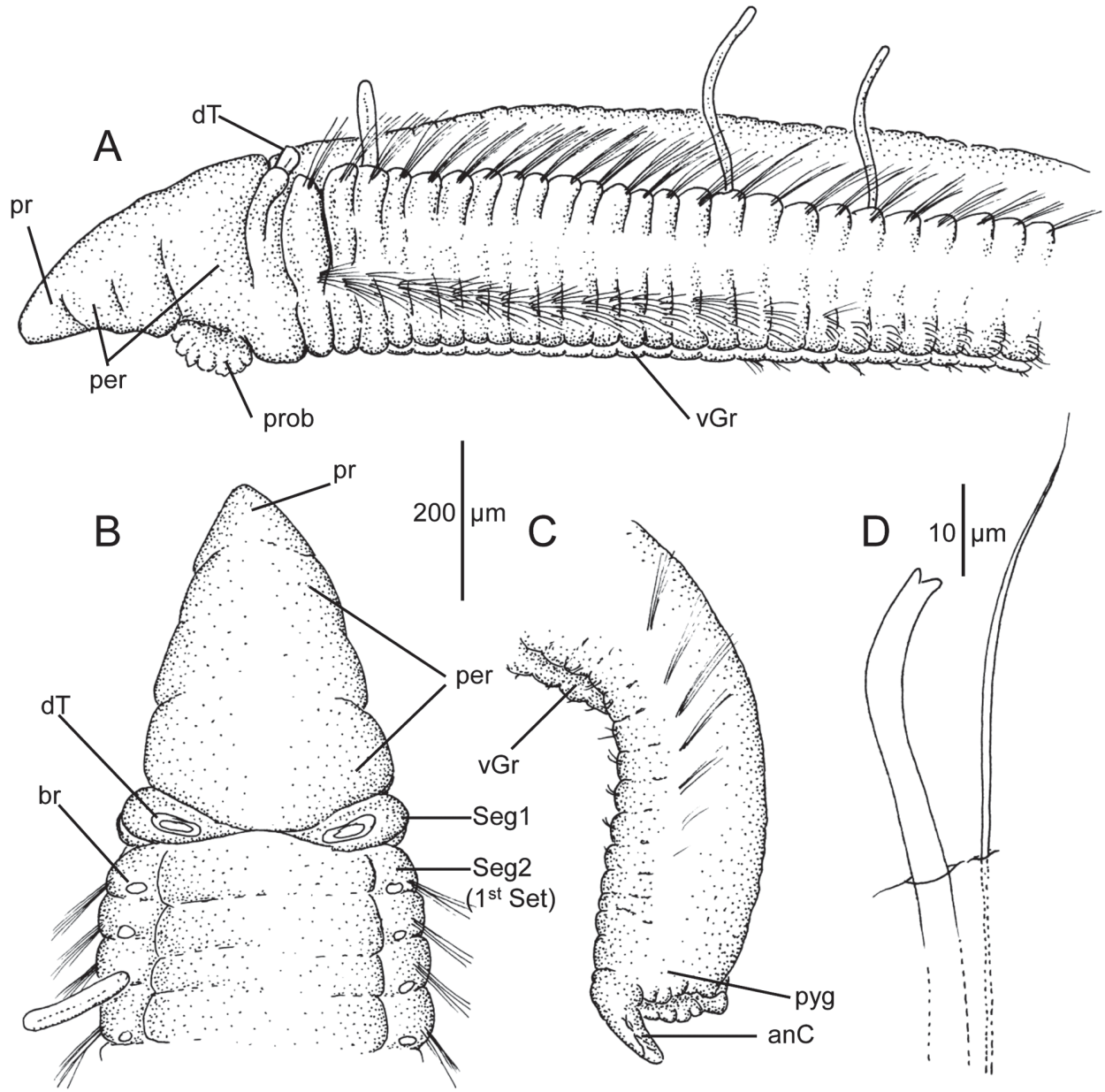

FIGURE 22. *Caulleriella eltaninae* **n. sp.** Holotype (USNM 1013888): A, anterior end, left lateral view; B, anterior end, dorsal view; C, posterior end, left lateral view; D, neuropodial hook and capillary seta.

Noto- and neuropodia well developed, widely separated as typical for *Caulleriella* species (Fig. 22A). Notopodia set off from elevated domed dorsal surface by grooves; neuropodia with setae directed toward mid-ventral groove.

Notosetae all capillaries, with 8–10 long setae per fascicle in anterior setigers, reduced to 3–5 in middle and posterior setigers. Neurosetae of setigers 1–19 or 20 with capillaries similar to those of notopodia; 2–3 curved bidentate hooks first present from setiger 19–21, accompanied by 3–4 capillaries, hooks increasing to 6–7 over following setigers; capillaries reduced to 1–2 thin setae, usually in superior position for remaining setigers; hooks arranged in single row with teeth directed ventrally toward mid-ventral groove. Hooks with blunt, thick main fang and thinner, more pointed apical tooth (Fig. 22D); hood or sheath not apparent.

Pygidium with at least one short ventral cirrus apparent on holotype (Fig. 22C); anus surrounded by several short papillae.

Etymology. This species is named for the USNS *Eltanin*, former research vessel of the United States Antarctic Research Program.

Remarks. *Caulleriella eltaninae* **n. sp.** joins *C. fucata* **n. sp.**, its Antarctic congener, in having bidentate hooks limited to neuropodia. Other species currently referred to *Caulleriella* have hooks in both noto- and neuropodia. *Caulleriella eltaninae* **n. sp.** differs from *C. fucata* **n. sp.** in lacking distinctive pigment markings, in having neuropodial hooks first present from setigers 20–21 instead of 5–6, in having these same hooks accompanied by a few capillaries throughout instead of lacking capillaries entirely, and by having an anal cirrus instead of lacking one. *Caulleriella* aff. *zetlandica* reported by Hartmann-Schröder & Rosenfeldt (1989) from the Antarctic Peninsula is likely this species.

Distribution. Antarctic Peninsula, South Shetland Islands; Ross Sea, Victoria Land; 210–870 m.

Caulleriella fimbriata new species

Figure 23

Material examined. Southern Ocean, Powell Basin, R/V *Polarstern*, ANDEEP III (ANT-XXII/3), Sta. 67/150-8, 20 Mar 2005, 61°48.56′S, 47°27.48′W, MUC, 1884 m, **holotype** (SMF 24908).

Description. Holotype small, threadlike, complete in three pieces, 3.4 mm long, 0.1 mm wide, with 60 setigerous segments. Body cylindrical throughout, without dorsal and ventral grooves; anterior segments to about setiger 14 wider than long (Fig. 23A), then becoming rounded, moniliform in middle body, becoming narrow again in far posterior segments; body tapering to triangular pygidium bearing a single anal cirrus (Fig. 23B). Parapodia of first four setigers close to one another, then these separating with noto- and neuropodia becoming widely separated from one another along rest of body (Fig. 23A). Color in alcohol tan with diffuse brown pigment on a few anterior segments.

Prostomium triangular, tapering to rounded tip; with rounded dome-like dorsal crest with glandular band on posterior margin (Fig. 23A); eyespots absent; nuchal organs narrow slits anterior to band of glands (Fig. 23A). Peristomium enlarged, inflated, about as long as first three setigers, without annular rings (Fig. 23A); with two short lobes representing stumps of dorsal tentacles near posterior margin (Fig. 23A). First pair of branchiae on setiger 1 posterior to notosetae; subsequent branchiae from same location, continuing to about setiger 20.

Parapodia reduced to simple mounds from which setae arise. Notosetae include 4–6 simple capillaries on first 15–20 setigers; bidentate hooks from setiger 23, with 3–4 hooks and 1–2 thin capillaries per notopodium continuing to posterior end; last 1–2 notopodia with hooks long, acicular, lacking apical tooth. Neurosetae include 3–4 capillaries on setigers 1–5, with bidentate hooks from setiger 6; hooks 2–3 per neuropodium accompanied by 1–2 capillaries. Hooks gently curved, with short, pointed apical tooth surmounting sharply pointed main fang (Fig. 23C); hooks without hood or crest on shaft.

Etymology. The epithet is from *fimbria*, Latin for thread, referring to the threadlike body of this species.

Remarks. *Caulleriella fimbriata* **n. sp.**, *C. antarctica*, and *C. kacyae* **n. sp.** are three small, threadlike species that all occur in deep-water Antarctic sediments. *Caulleriella fimbriata* **n. sp.** is distinguished from the other two species in having only a single peristomial ring instead of two or three, and a single anal cirrus instead of two. Additional details that differ between these three species and others are found in Table 2 in the Discussion.

Habitat. The Powell Basin is known as a dynamic environment based on currents and sedimentation patterns. Surficial sediments collected as part of the ANDEEP III survey at a site near the type-locality of *Caulleriella fimbriata* **n. sp.** consisted of dark greyish brown, poorly sorted mud with sand (3%), silt (66%), and clay (31%) (Howe *et al.* 2007).

Distribution. Southern Ocean, Powell Basin, 1884 m.

Caulleriella fucata new species

Figure 24

Material Examined. Antarctic Peninsula, Palmer Archipelago, Anvers Island, Arthur Harbor, dock at Palmer Station, R/V *Hero* Sta. 721-5446, 29 Mar 1972, 64.775°S, 64.0683°W, 11m, holotype (USNM 1013891 and 4 **paratypes** (USNM 1013892); Sta. 731-1751, 16 Feb 1973, 64.775°S, 64.0683°W, 12 m, (1, USNM 1013941).

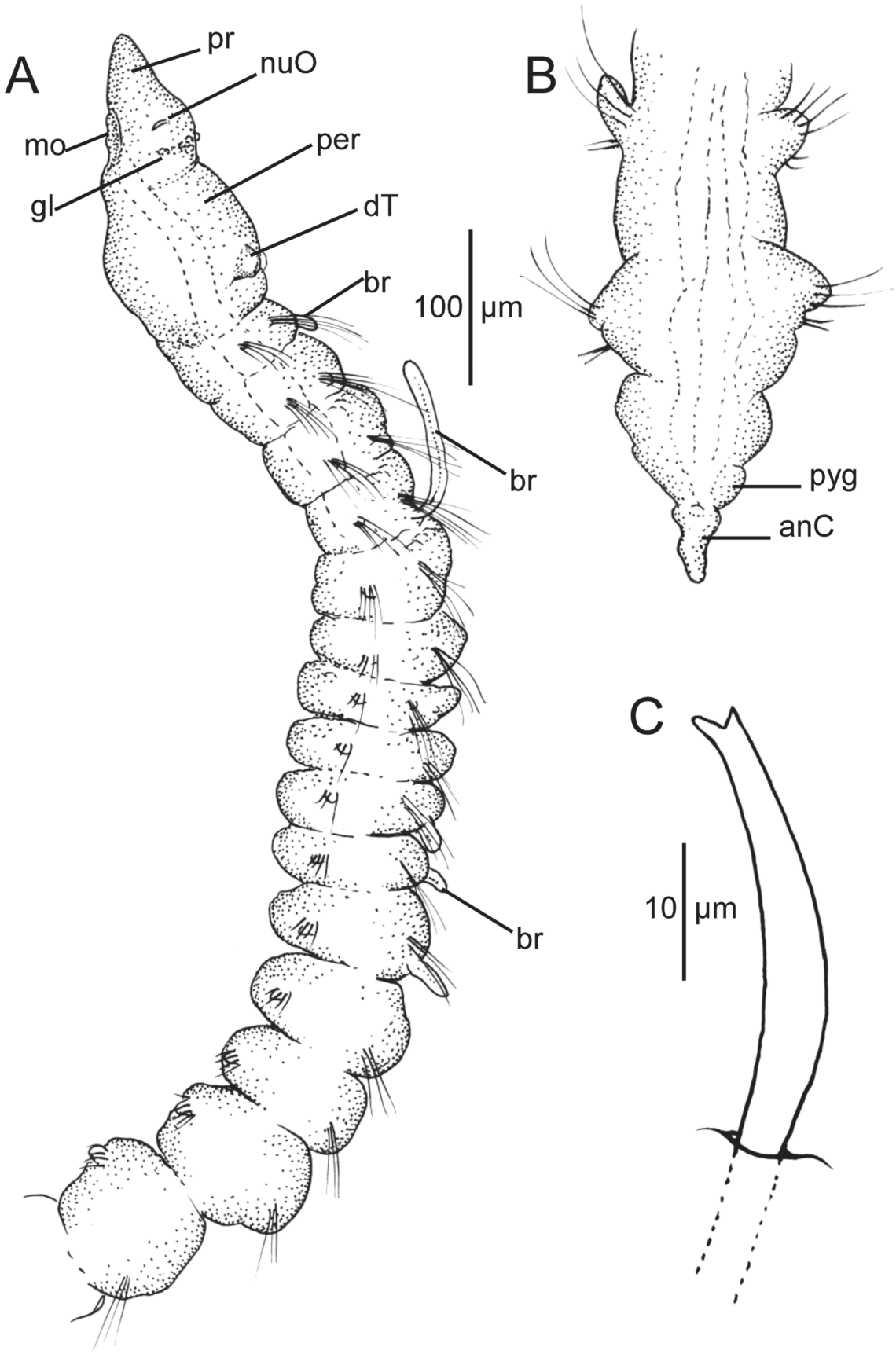

FIGURE 23. *Caulleriella fimbriata* **n. sp.** Holotype (SMF 24908): A, anterior one-fourth of body, left lateral view; B, posterior end, dorsal view; C, neuropodial hook.

Description. A moderate-sized species, holotype 6.4 mm long, 0.5 mm wide across thickest part of middle body for 85 setigerous segments. Body generally thick throughout, with segments wider than long; posterior end sometimes expanded, but never narrower than middle body segments. Venter flattened, with shallow groove. Dorsal surface rounded or domed throughout. Entire body rust-colored, with dusky pigment on each segment; darker pigment on pygidium.

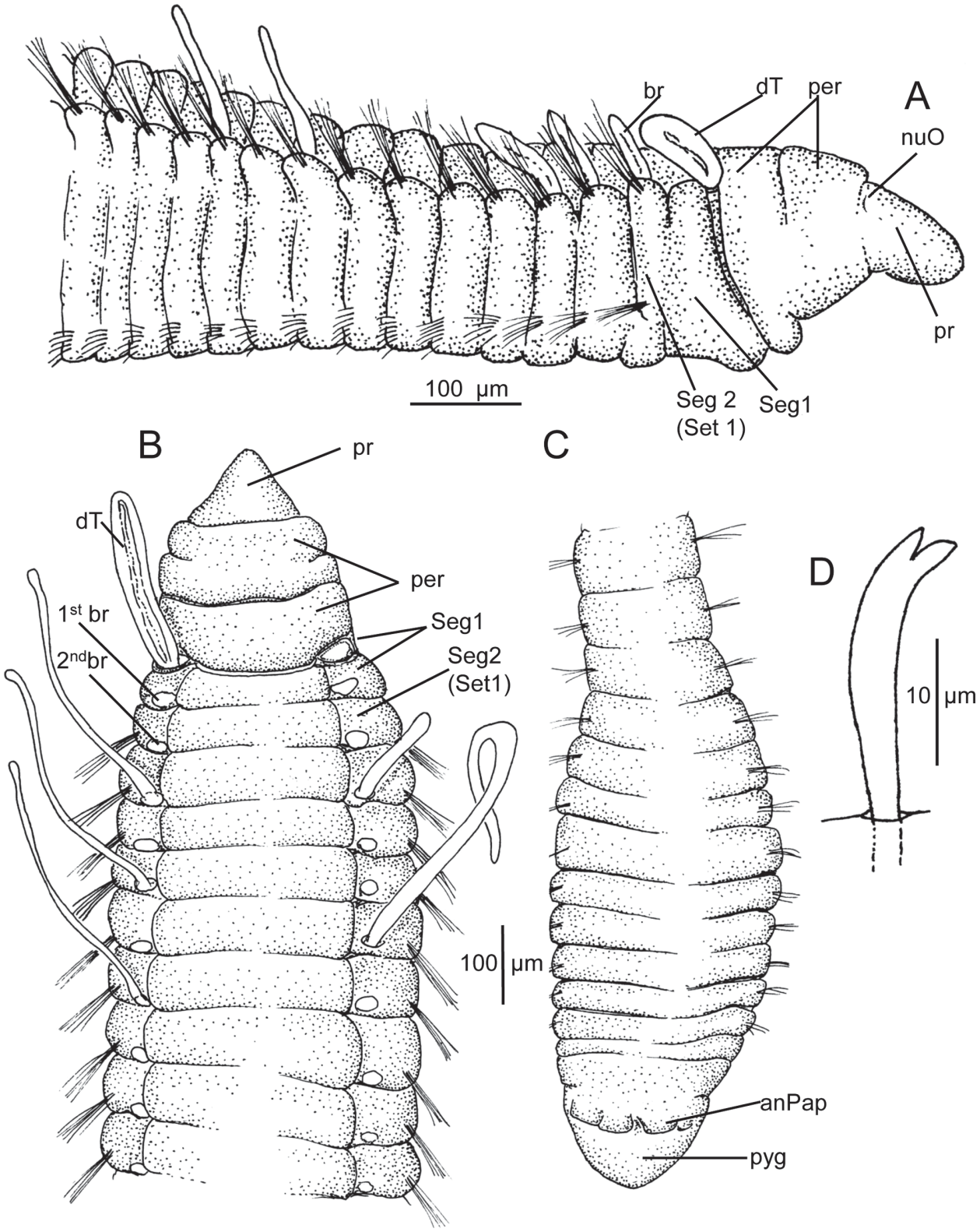

FIGURE 24. *Caulleriella fucata* **n. sp.** A, anterior end, right lateral view; B, anterior end, dorsal view; C, posterior end, dorsal view; D, neuropodial hook. A, paratype (USNM 1913892); B–D holotype (USNM 1013891).

Prostomium short, triangular, bluntly rounded on anterior margin (Fig. 24A–B); eyespots absent; nuchal organs elongate slits on posterior border with peristomium (Fig. 24A). Peristomium about as wide as long, tapering, merging anteriorly with prostomium to form conical pre-setigerous region or head; divided into two large rings by horizontal groove in middle (Fig. 24A–B); dorsal crest absent. Peristomium followed by an achaetous segment (Fig. 24A–B). Dorsal tentacles widely spaced, in groove on anterior edge of achaetous segment and posterior border of peristomium. First pair of branchiae immediately posterior to dorsal tentacles on posterior border of achaetous segment (Fig. 24B); subsequent branchiae in similar position dorsal to notosetae.

Noto- and neuropodia well developed, widely separated as typical of *Caulleriella* species (Fig. 24A). Notopodia set off from domed dorsal surface by grooves (Fig 24B); neuropodia with setae directed toward mid-ventral groove. Notosetae all long capillaries, 8–10 per fascicle in anterior setigers, reduced to 3–5 in middle and posterior setigers; neurosetae of setigers 1–4(6) capillaries similar to those of notopodia, completely replaced by 8–10 short, curved bidentate hooks from setiger 5–7; hooks with blunt, thick main fang and thinner, more pointed apical tooth (Fig. 24D); hood or sheath not apparent.

Pygidium with 2–3 papillae on dorsal side of anus, and broad lobe ventrally (Fig. 24C).

Methyl Green stain. No stain retained.

Etymology. The specific name, *fucata,* is derived from the Latin *fuco*, for color, in reference to the pigmentation found on these worms.

Remarks. *Caulleriella fucata* **n. sp.** should not be mistaken for any other cirratulid species in Antarctic seas owing to its widely separated noto- and neuropodia, bidentate hooks, and darkly pigmented body. The species is most closely related to *C. eltaninae* **n. sp.** (see above) in having bidentate hooks limited to the neuropodia and by having the dorsal tentacles arising from a distinct achaetous segment. The two species differ in that the neuropodial hooks of *C. fucata* **n. sp.** begin on setigers 5–7 instead of 20–21 and the branchiae of *C. fucata* **n. sp.** begin on an achaetous segment instead of setiger 1. On a global basis, *C. fucata* **n. sp.** approaches *C. zetlandica* described by McIntosh (1911) in lacking dorsal hooks, but this species, recently redescribed by Woodham & Chambers (1994) does not have widely separated parapodial rami. This fact, plus the much-reduced nature of the teeth on the hooks and the lack of cinctures on the posterior end suggests that *C. zetlandica* should be referred to *Tharyx*.

Distribution. Antarctic Peninsula, 11–12 m.

Caulleriella kacyae new species

Figure 25

Material examined. Weddell Sea, off Cape Norvegia, R/V *Polarstern*, ANDEEP III (ANT-XXII/3), Sta. 67/74-5, 20 Feb 2005, 71°18.11′S, 13°56.33′W, MUC, 1035 m, **holotype** (SMF 24909).

Description. A moderate-sized species, holotype complete, but fragile, broken into five pieces, totaling 10.7 mm long and up to 0.4 mm wide across middle segments; with about 135 setigerous segments. Body elongate, consistent in width throughout. A deep mid-ventral groove present from setiger 1 to end of body (Fig. 25B); first few anterior segments also with distinct ridge arising from floor of groove. Dorsum smooth, elevated above notopodia, without longitudinal groove or ridge (Fig. 25A). Noto- and neuropodia widely separated from each other with neuropodia located on each side of ventral groove (Fig. 25A–B). All segments short, about nine times wider than long. Color in alcohol light tan with no separate body pigment.

Prostomium narrow, conical tapering to rounded apex (Fig. 25A); eyespots absent; nuchal organs oval, located at posterior lateral margins. Peristomium with three separate rings best seen laterally (Fig. 25A), dorsally elevated with rounded crest; dorsal tentacles widely spaced, arising from posterior end of last ring (Fig. 25A). First pair of branchiae on setiger 1 dorsal to notosetae; subsequent branchiae from same location; branchiae continuing segmentally to near posterior end.

All segments with notopodia dorsally elevated as shoulders above smooth, broad dorsum (Fig. 25A). Parapodia reduced to simple mounds from which setae arise. Notosetae include 8–10 simple capillaries on the first 60–70 setigers, fewer capillaries posteriorly; capillaries joined by 1–2 simple acicular spines from about setiger 105. Anterior neuropodia with 7–8 capillaries; 1–2 acicular spines first present from setiger 18, continuing to posterior end, increasing to six spines in posterior half of body entirely replacing capillaries (Fig. 25C). Notopodial spines thin, relatively straight, with simple blunt tips. Neuroacicular spines short, curving to narrow, blunt-tipped main fang or tooth; this tooth surmounted by sheath split medially forming two sharply pointed teeth (Fig. 25E–F), these appearing as a single tooth in certain lateral views (Fig. 25D).

Pygidium with anus surrounded dorsally by five rounded papillae and ventrally by broad cushion with two long lateral cirri (Fig. 25B).

Methyl Green stain. No stain retained.

Etymology. This species is named in memory of my beautiful little cat Kacy, whose companionship over many years is greatly missed.

Remarks. *Caulleriella kacyae* **n. sp.** is unusual in the genus by having neuropodial acicular spines with two side-by-side apical teeth suggesting a tridentate structure. However, careful observation at 1500x suggests that the apical structure is likely a broad sheath that is divided into two parts. The true nature of the teeth on the hooks, however, is beyond the resolution of light microscopy. Given that only a single specimen is available, SEM observations will have to await the collection of additional specimens. The notopodial acicular spines are slender, straight, and do not appear to have any accessory teeth.

Caulleriella kacyae **n. sp.** and two other similar-appearing threadlike species of *Caulleriella, C. antarctica and C. fimbriata* **n. sp.**, occur in Antarctic deep-sea sediments. *Caulleriella kacyae* **n. sp.** differs from the other two species in having three peristomial rings instead of two or one, respectively, in having the noto- and neuropodial hooks first present from setigers 105 in notopodia and setiger 18 in neuropodia instead of setigers 8–9 or 23 in notopodia and setiger 6 in neuropodia, and in having the bidentate hooks with a unique apical sheath or hood that appears to be divided into two parts instead of a single apical tooth. Details separating these three species and others from *C. kacyae* **n. sp.** are listed in Table 2 in the Discussion.

Habitat. Surficial sediments collected as part of the ANDEEP III survey at a site near the type-locality of *Caulleriella kacyae* **n. sp.** in the Weddell sea off Cape Norvegia consisted of poorly sorted olive grey sandy mud with sand (9%), silt (72%), and clay (19%) (Howe *et al.* 2007).

Distribution. Southern Weddell Sea, 1035 m.

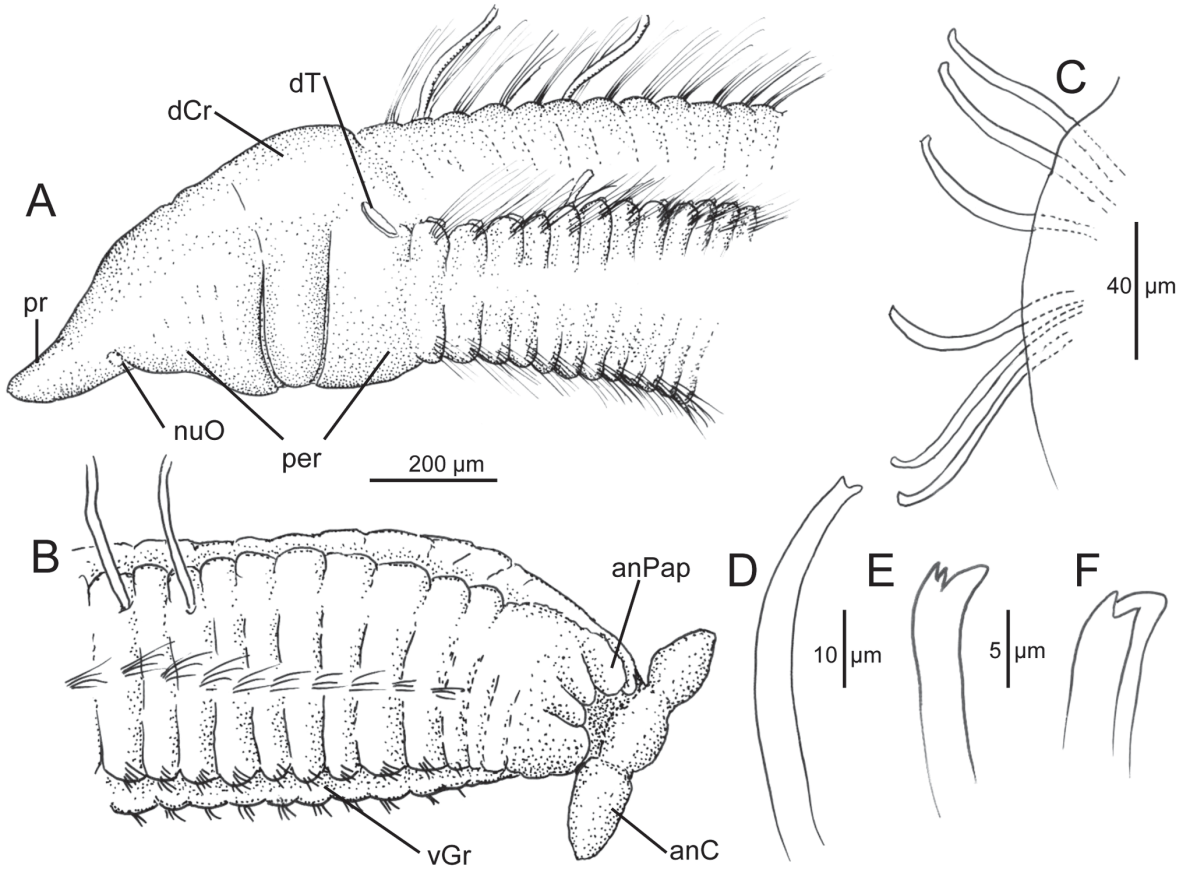

FIGURE 25. *Caulleriella kacyae* **n. sp.** Holotype (SMF 24909): A, anterior end, left lateral view; B, posterior end, dorsolateral view; C, far posterior parapodium, anterior view; D, neuropodial hook; E–F, detail of neuropodial hooks with different views of apical tooth or sheath.

***Caulleriella magnaoculata* Hartmann-Schröder, 1962**
Figure 26

Caulleriella magnaoculata Hartmann-Schröder, 1962: 139–140, figs. 107–109.

Material examined. Peru, Isla Santa, Bahia Coisco, north of Ghimbote, 9 m in muddy shell sediment, **holotype** (ZMH-P-15040).

Description. Holotype 9.5 mm long, 0.8 mm wide for 125 setigerous segments; posteriormost segments appears to be regenerating (Fig. 26C). Body surface at a higher magnification densely covered with prominent granular spots, most likely subdermal glands.

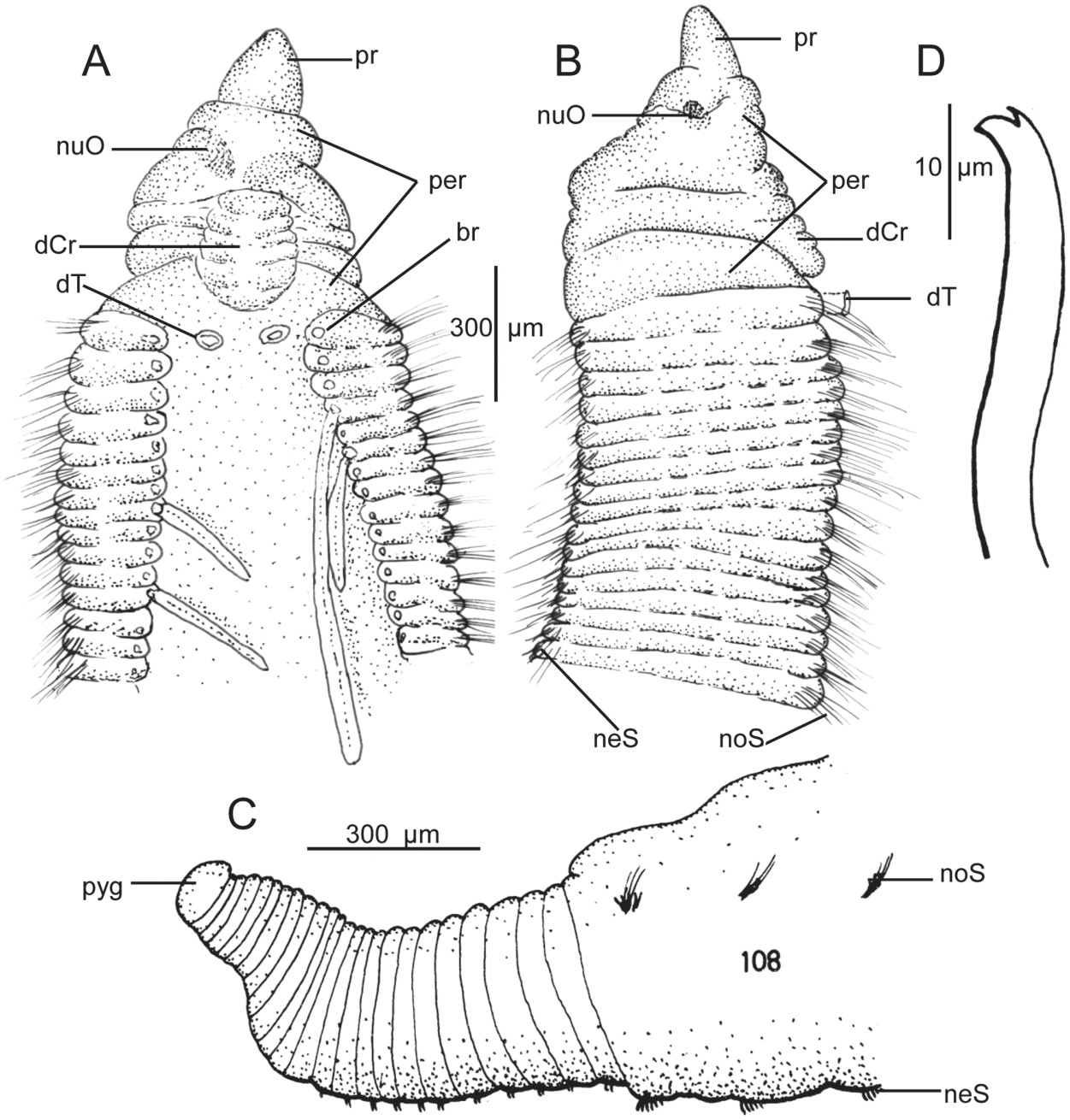

FIGURE 26. *Caulleriella magnaoculata* Hartmann-Schröder, 1962. Holotype (ZMH-P-15040): A, anterior end, dorsal view; B, anterior end, right lateral view; C, posterior end, right lateral view; D, neuropodial hook. C–D after Hartmann-Schröder (1962).

Prostomium conical, tapering to rounded apex (Fig. 26A–B); two large pigmented nuchal organs present, best seen ventrally (Fig. 26A–B), these not eyespots. Peristomium with three annular rings best seen laterally (Fig. 26A–B); first ring encompassing mouth and extending dorsally; second ring with secondary grooves across dorsum (Fig. 26A); third ring merging indistinctly with dorsum between parapodia of first setiger and carrying dorsal tentacles posteriorly (Fig. 26A); dorsal tentacles therefore arising more or less at same level as first pair of branchiae on setiger 1 (Fig. 26A–B); second and third peristomial rings with oval-shaped dorsal crest crossed by 5–6 narrow grooves (Fig. 26A).

Setiger 1 and following segments of anterior and middle segments short, with notopodia dorsally elevated as shoulders above smooth, broad dorsum. Branchiae located on medial edge of parapodia well separated from notosetae fascicles (Fig. 26A). Branchiae or their scars easily observed on anterior segments to about setiger 30, thereafter none observed. Neuropodia widely separated from notopodia (Fig. 26B–C), with two notopodia and two neuropodia located at four corners of body as observed in cross section. Posteriorly, individual segments not as short, but not rounded or moniliform.

Parapodia reduced to simple mounds from which setae arise. Notosetae include 8–10 simple capillaries on the first 35–36 setigers; following notopodia with additional 1–2 hooks; in posterior notopodia capillaries reduced to three and with hooks increasing to five per notopodia. The first nine neuropodia with up to eight capillaries; acicular hooks begin on setiger 10, with three hooks, increasing to five per neuropodium in middle and posterior segments; in far posterior segments hooks increase to nine per neuropodium accompanied by only 1–2 capillaries. Individual hooks with bidentate tips with a thick main fang and short, pointed apical tooth (Fig. 26D).

Posteriormost 23 segments appear to be regenerating with the last 12 segments bearing only 1–2 bidentate hooks; notosetae entirely absent. Pygidium short, rounded, without appendages (Fig. 26C).

Remarks. *Caulleriella magnaoculata* is readily recognized by the shape and arrangement of the pre-setiger region, the large pigmented nuchal organs (not eyespots as reported in the original description), and the form and distribution of the hooks. In having three annular rings on the peristomium and large "eyespots", *C. magnaoculata* is similar to *C. chilensis* Carrasco, 1977 from Concepción Bay, Chile. The two species differ significantly in that *C. chilensis*, here raised to full species status, has no peristomial dorsal crest, no capillaries among the posterior neuropodial hooks and there is a distinct sheath on the convex side of the shaft of the hooks that extends forward forming the apical tooth. In contrast, *C. magnaoculata* has a well-developed peristomial dorsal crest, 1–2 capillaries occur with the posterior neuropodial hooks, and the apical tooth of the hooks is an extension of the shaft, not a separate sheath. It is likely that the large "eyespots" of *C. chilensis*, like those of *C. magnaoculata*, are actually pigmented nuchal organs; this cannot be confirmed, however, without examining specimens.

Distribution. Off Peru, 9 m.

Caulleriella suroestense new species

Figure 27

Material examined. Off Chile, Juan Fernandez Islands, Robinson Crusoe Island, the embayment behind Punta Suroeste, SEPBOP, R/V *Anton Bruun*, Cr. 12, Sta. DRAB 134, 13 Dec 1965, 33.623°S, 78.906°W, diving, **holotype** (USNM 1490725) and 3 **paratypes** (USNM 1490726).

Description. Small species with thick, tumid body and numerous crowded segments. All four type-specimens complete with curved or coiled bodies. Holotype 6.1 mm long, 0.45 mm wide across anterior segments, 0.65 mm wide across middle and posterior segments, with about 85 setigerous segments; paratypes similar, but smaller. Body with dorsum rounded, elevated over lateral parapodia throughout (Fig. 27A–B), venter with broad groove along most of body (Fig. 27C). Color in alcohol tan, heavily pigmented with numerous black subdermal cells; pigment scattered in patches over most of body, concentrated in parapodia of middle and posterior segments.

Prostomium triangular, tapering to narrow tip (Fig. 27A–B); eyespots absent; nuchal organs small oval openings on posterior of prostomium, lateral and dorsal to mouth opening (Fig. 27A). Peristomium thick, with one short anterior ring and one large posterior ring incised with indistinct folds and grooves (Fig. 27A–B); broad dorsal crest present. Dorsal tentacles close to one another on posterior margin of peristomium (Fig. 27B). First branchiae on setiger 1 dorsal to notosetae (Fig. 27A–B); following segments with branchiae in similar position; branchiae long, narrow anteriorly; short, thick posteriorly, continuing to near end of body.

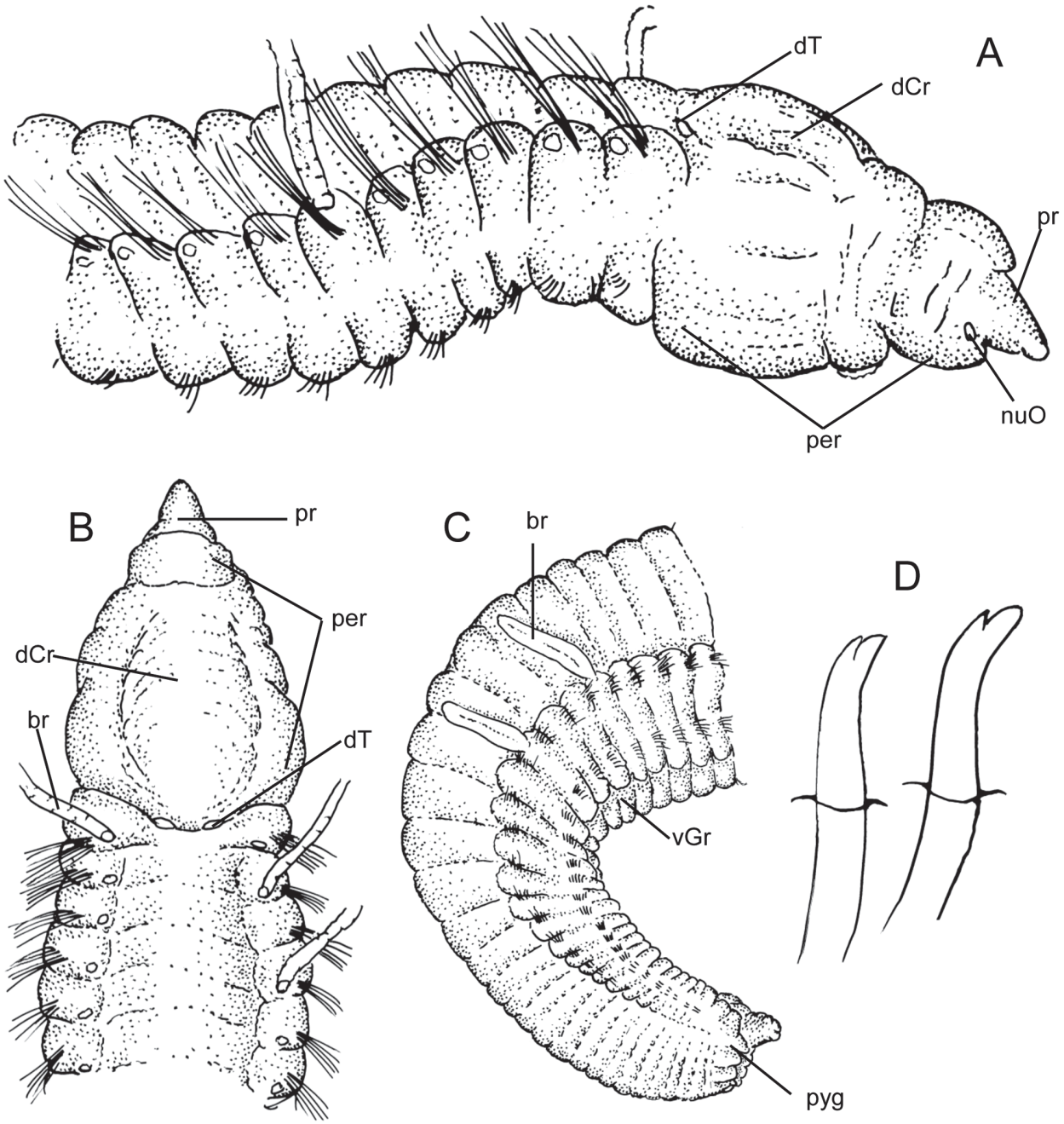

FIGURE 27. *Caulleriella suroestense* **n. sp.** Holotype (USNM 1490725): A, anterior end, right lateral view; B, anterior end, dorsal view; C, posterior end, right lateral view; D, neuropodial hooks.

Parapodia with noto- and neuropodia widely separated from one another throughout, forming prominent shoulders both dorsally and ventrally (Fig. 27A, C). Notosetae include about 12 long capillaries on first 15 setigers, then reduced to 8–10 capillaries with first hooks appearing by setigers 27–28; hooks 1–2 at first with 3–4 thin capillaries, increasing to 4–5 hooks and 2–3 thin capillaries, continuing to near posterior end. Neurosetae with hooks from setiger 1, numbering four per neuropodium at first, increasing to five hooks along most of body; no capillaries in neuropodia throughout. Hooks short, thick, weakly sigmoid in shape with thick main fang surmounted by short, closely applied secondary tooth (Fig. 27D); hooks without hood or sheath.

Posterior end terminating in pygidial segment with anal opening surrounded by about eight short papillae and ventral lobe (Fig. 27C).

Methyl Green stain. Stain not retained.

Etymology. This species is named for the collection site near Punta Suroestense, Juan Fernandez Islands.

Remarks. The short curved body with thick, crowded segments and the distinctive overall pigmentation caused by numerous black pigmented cells readily distinguishes *Caulleriella suroestense* **n. sp.** from other congeners. The five species of *Caulleriella* described by Dean & Blake (2007) from intertidal and shallow sediments off Costa Rica, *C. ecuadoriana* **n. sp.** described in the present study from shallow water off Ecuador, and *C. suroestense* **n. sp.** are the only species having two peristomial rings instead of three and up to eight papillae on the pygidium dorsal to the anus plus a ventral lobe. However, *C. suroestense* **n. sp**., *C. dulcei* Dean & Blake, 2007, and *C. murilloi* Dean & Blake, 2007 each have neuropodial hooks from setiger 1 and lack capillaries in posterior neuropodia; *C. murilloi* has a hood covering the teeth of the bidentate hooks that is lacking in both *C. suroestense* **n. sp**. and *C. dulcei*. Although morphological differences are present between these shallow water species from Central and South America, great care must be taken to ensure that all relevant morphology is observed when identifying *Caulleriella* species from these locations.

Distribution. Off Chile, Juan Fernandez Islands, shallow subtidal depths.

Chaetocirratulus new genus

Type species: *Heterocirrus andersenensis* Augener, 1932. Original designation.

Diagnosis. Prostomium broadly rounded anteriorly or wedge-shaped; eyespots absent; with a pair of small nuchal slits or depressions at posterior edge. Peristomium with a single pair of grooved dorsal tentacles arising from posterior margin or interface with setiger 1. First pair of branchiae arising from posterior margin of peristomium, an achaetous segment, or setiger 1. Body typically thick and fusiform over many segments, rarely with middle or posterior body segments beaded or moniliform; individual segments short, numerous. Setae include capillaries on most setigers and thick, pointed acicular spines in neuropodia and a few in notopodia or spines in neuropodia only; spines few, often small and inconspicuous, not forming cinctures. Individual spines straight to weakly sigmoid. Pygidium with a simple ventral lobe.

Etymology. The name *Chaetocirratulus* is derived from the Greek *chaeto* for hair or bristle and the Latin *cirrus* for curl or tendril and is a combination of the generic names *Chaetozone* and *Cirratulus* emphasizing the close similarity of these bitentaculate cirratulids with their multitentaculate relatives.

Remarks. *Chaetocirratulus* **n. gen.** is established to accommodate several bitentaculate cirratulids having few acicular spines that do not produce the distinct posterior armature formed of cinctures of numerous sigmoid spines typical of species of *Chaetozone*. As will be seen, in some Antarctic species, the spines are so inconspicuous that some species were originally described as lacking them and as such, have been misidentified in recent studies when only the characteristics from the original descriptions or those restated by Hartman (1966) were cited. In addition, species of *Chaetocirratulus* **n. gen.** typically have a prostomium that is enlarged, broad, or wedge-shaped and an enlarged thickened body, where segments are short and often swollen, producing a fusiform shape that is not divided into obvious anterior and posterior regions. Petersen (1991) recognized that some cirratulids with these characteristics were more closely aligned with multitentaculate cirratulids and referred at least one of these, *Chaetozone gayheadia* Hartman, 1965, to the multitentaculate genus *Cirratulus* Lamarck, 1818; she also emended the definition of *Cirratulus* to include species with two or more dorsal tentacles.

In the present study, the types of four Antarctic species, *Heterocirrus andersenensis*, *Tharyx fusiformis*, *Tharyx epitocus*, and *Chaetozone pinguis* have been examined and are all referred to the new genus *Chaetocirratulus* **n. gen**. *Heterocirrus andersenensis* and *Tharyx fusiformis* are considered the same species, referred to here as *Chaetocirratulus andersenensis* **n. comb**. Both have short, inconspicuous straight spines in posterior segments. The same situation exists for *Tharyx epitocus*, which after examination of both syntypes has been found to have posterior spines and is also referred to *Chaetocirratulus* **n. gen**. *Chaetozone pinguis* was originally described with neuropodial spines from setiger 1 and agrees with the definition of *Chaetocirratulus* **n. gen**. In addition to these three species, three new species of *Chaetocirratulus* **n. gen** have been discovered from deep water off South America and the Ross Sea. The following six species are here assigned to *Chaetocirratulus* **n. gen**:

1 *Chaetocirratulus abyssalis* **n. sp.** Ross Sea Antarctica, slope depths.
2 *Chaetocirratulus andersenensis* (Augener, 1932) **n. comb.** Antarctica, shelf depths.
[*Tharyx fusiformis* Monro, 1939 **new syn.** Antarctica.]
3 *Chaetocirratulus epitocus* (Monro, 1930) **n. comb.** Antarctica, shelf depths.
4 *Chaetocirratulus furvus* **n. sp.** Off Peru, slope depths.
5 *Chaetocirratulus neogracilis* **n. sp.** Peru-Chile Trench, abyssal.
6 *Chaetocirratulus pinguis* (Hartman, 1978) **n. comb.** Antarctica, shelf depths.

Three other species, *Chaetozone benthaliana* McIntosh, 1885, *C. gayheadia*, and *C. gracilis* (Moore, 1923), all from deep water off North America are also believed to belong to *Chaetocirratulus* **n. gen.** and are noted in the Discussion Section (below); these species will be treated in a separate publication.

Chaetocirratulus andersenensis (Augener, 1932), new combination

Figures 28–29

Heterocirrus andersenensis Augener, 1932: 46–47, fig. 3a–e.
Caulleriella andersenensis: Hartman, 1959: 401.
Chaetozone andersenensis: Hartman 1966: 26–27, pl. 7, figs. 1–3; 1967: 116–117; Cantone *et al.* 2000: 554; Hilbig *et al.* 2006: 724.
Tharyx fusiformis Monro, 1939: 129–130, fig. 18a–b. Hartman 1966: 32, pl. 8, figs. 5–6. **New synonymy.**

Material Examined. Antarctic Peninsula, Western sector, Off Peter I Island, 68°50′S, 90°35′W, 226–380 m, **syntypes** of *Heterocirrus andersenensis*: **lectotype** (ZMO C668), 2 **paralectotypes (**ZMO C669), and 1 **paralectotype** (ZMH V-11882).—**Scotia Sea, Burdwood Bank**, USNS *Eltanin*, Cr. 6. Sta. 344, 4 Dec 1962, 54.07°S, 58.75°W, Menzies trawl, 119 m (7, USNM 187626).—**Drake Passage off South Shetland Islands,** R/V *Polarstern*, ANDEEP I (ANT-XIX/3), Sta. 114-6, 18 Feb 2002, 61°43.55′S, 60°43.87′W, box corer, 2905 m (1, SMF 24914).—**South Shetland Islands: King George Island,** R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 299, 14 Mar 1998, 62°15.8′S, 58°42.7′W, MG, 207 m, (6, SMF 24911); Sta. 300, 14 Mar 1998, 62°16.8′S, 58°42.1′W, MG, 423 m (1 SMF 24912); Sta. 325, 17 Mar 1998, 62°21.9′S, 58°42.6′W,MG, 805 m (1, SMF 24913).—**West Antarctic Peninsula**, **Marguerite Bay**, USCG *Eastwind* Sta. 4A, 24 Jan 1966, 67°53′S, 69°10.5′W, 300 m, coll. D. Pawson and Squires (13, USNM 1490727); **Palmer Archipelago**, Wiencke Island, Port Lockroy, R/V *Hero* Sta. 721-969, 7 Dec 1971, 64.8183°S, 63.53672°W, Petersen grab, 100 m, (2, USNM 187646); Sta. 721-970 7 Dec 1971, 64.8172°S, 63.5467°W, Petersen grab, 102 m (4, USNM 187634); Gerlache Strait, Two Hummock Island, R/V *Hero* Sta. 824-24-1, 23 Mar 1982, 64.248°S, 61.445°W, trawl, 540–605 m (1, USNM 1490731); Lion Island, Gerlache Strait, R/V *Hero* Sta. 721-729, 27 Dec 1971, 64.6967°S, 63.0417°W, Petersen grab, 318 m (1, USNM 187604); **Graham Land**, Paradise Harbor, *Hero* Sta. 731-1946, 11 Mar 1973, 64.88389°S, 62.88222°W, Blake trawl, 262–274 m (1, USNM 187983); off Graham Land, R/V *Hero* Sta. 721-1075, 23 Feb 1972, 64.790°S, 64.370°W, Blake Trawl, 91–110m (1, USNM 1490728); Argentine Islands, Penola Strait, R/V *Hero* Sta.; 824-13-1, 19 Mar 1982, 65.23°S, 64.20°W, Blake trawl, 310–360 m (3, USNM 1490729); Biscoe Islands, Grandidier Channel, Larrouy Island, R/V *Hero* Sta. 824-5-1, 16 Mar 1982, 65.94°S, 65.297°W, Blake trawl, 246–270 m (1, USNM 1490730).—**East Antarctic Peninsula, Prince Gustav Channel**, RVIB *Nathaniel B. Palmer* Cr. 2000-03, coll. J.A. Blake, Sta. 35A, 25 May 2000, 64°10.471′S, 058°28.505′W, SM grab, 651 m (2, LACM-AHF Poly 10213).—**Ross Sea, Victoria Land, west of McMurdo Station**, USNS *Eltanin* Cr. 32, Sta. 2059, 25 Jan 1968, 77.97°S 178.08°E, trawl, 655 m (1 USNM 1490732)—**East Antarctica**, off Mac Robertson Land, R/V *Discovery* Sta. 107, coll. 16 Feb. 1931, 66°45′S, 62°03′E, dredged, 219 m, 2 **syntypes** of *Tharyx fusiformis* (BMNH ZK 1941.3.3.97-98).

Description. Body large, a robust species, with smaller specimens distinctly fusiform (Fig. 28A), larger specimens more elongate but thickened, expanded in middle segments. Lectotype (ZMO C668) complete, twisted, about 33 mm long, with about 80 setigers (Fig. 28C). Largest paralectotype (ZMH V-11882) about 36 mm long, 4 mm wide at chaetiger 8, with about 80 setigers; one specimen from USCG *Eastwind* Sta. 4A, 14 mm long, with first 2 mm narrow, consisting of 10–12 setigers, followed by a 10 mm section up to 4 mm wide and with 22 setigers, then narrowing in last 2 mm (ca. 12 setigers) (Fig. 28A). Larger specimens elongate, one from *Eltanin* Sta.

32-2059 (USNM 1490732) 34 mm long, 2.2 mm wide along anterior and middle segments, narrowing posteriorly with about 80 setigers; similar specimens from EASIZ II, Sta. 299 (SMF 24911), about 35 mm long (Fig. 29A–B). Some elongate specimens with venter flattened with shallow groove in middle segments replaced by low mid-ventral ridgeline in posterior segments. Specimens with most robust and fusiform appearance usually filled with ova averaging 150 µm in diameter. Color in alcohol light tan or greyish brown; no additional body pigment observed.

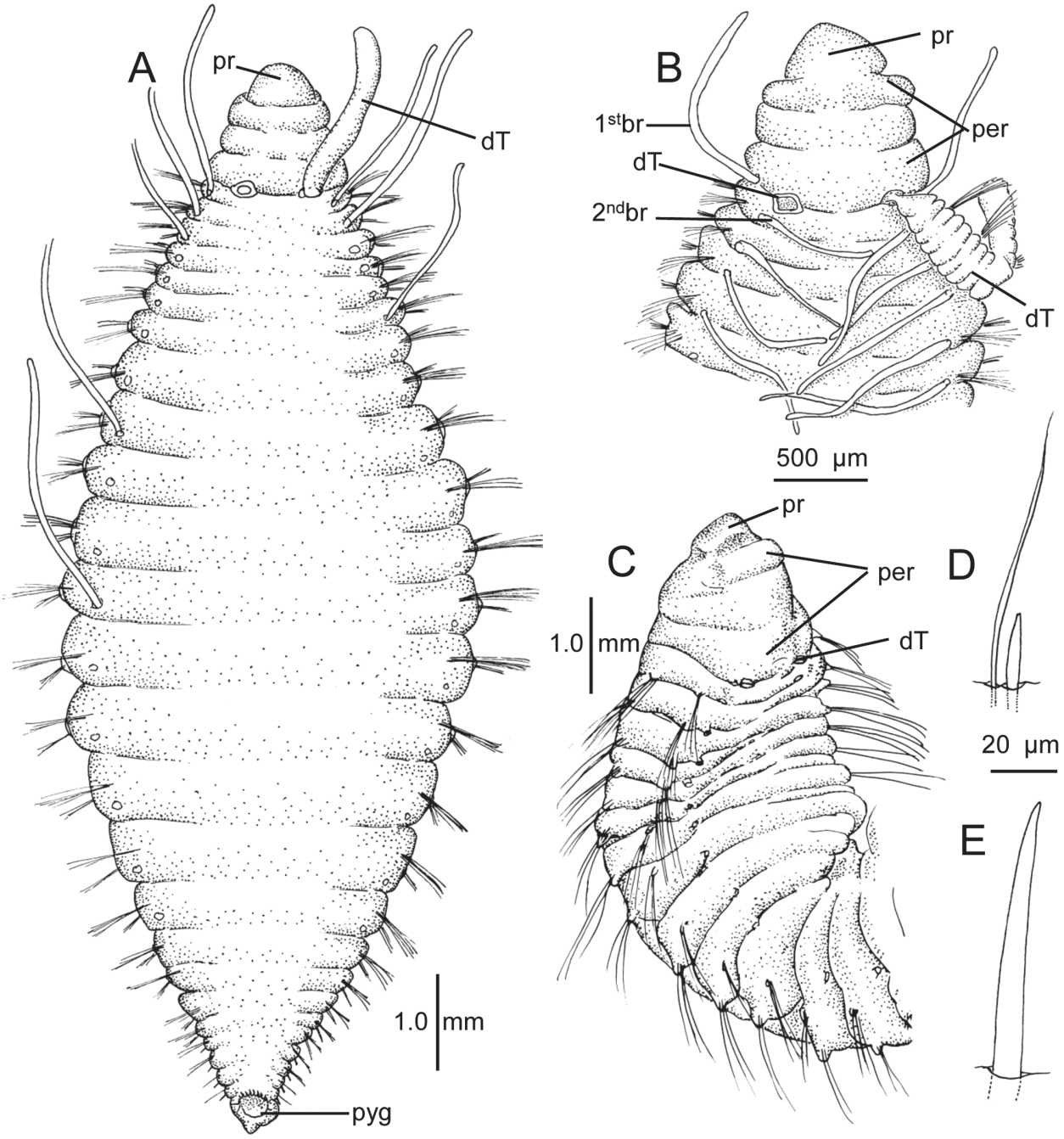

FIGURE 28. *Chaetocirratulus andersenensis* (Augener, 1932). A, entire worm, dorsal view (USNM 187633); B, anterior end, dorsal view (USNM 187626); C, anterior end, dorsolateral view of lectotype (ZMO C668); D–E, neuropodial acicular spines, D, with capillary (USNM 187633). C, based on pencil sketch prepared by the late Dr. Mary E. Petersen.

Prostomium broadly triangular or wedge-shaped, rounded on anterior margin, wider than long (Figs. 28A–C, 29C–E), sometimes with nuchal organs emergent, visible at lateral, posterior edges. Large peristomium with two distinct lateral grooves following prostomium resulting in three subequal annular rings (Figs. 28A–C, 29C–D);

dorsal tentacles dorsomedial in location, arising from groove between peristomium and setiger 1; tentacles thick, short in preservation (Fig. 28A–B). First pair of branchiae lateral to dorsal tentacles on posterior margin of peristomium; subsequent branchiae on setiger 1 and following, arising dorsal to setal fascicles, continuing through first half of body (Fig. 28A–C).

Parapodia simple, slightly expanded ridges with narrow podial lobes from which setae arise (Fig. 28C); smaller specimens with better development of parapodia in first few, non-expanded segments. Setae of anterior setigers all long, thin, simple capillaries, numbering 6–8 per fascicle in largest specimens. Neuropodia of the last 5–20 or fewer setigers bearing 1–4 heavy, straight acicular spines (Fig. 28E) and a few accompanying capillaries (Fig. 28D); spines clear or opaque, not colored; largest specimens also with few short spines in some posterior notopodia. Pygidium an expanded saucer or conical structure, sometimes pointed posteriorly, surrounding dorsally directed anal opening (Figs. 28A, 29B).

Variability. The shape of the body varies from a distinctly fusiform shape where the individual segments are short and crowded to more elongate thickened bodies that are widest in the middle and have more elongate segments that are not tightly crowded. The first appearance of neuropodial spines begins in posterior segments and may include the last 1–5 segments or up to the last 20 segments in large specimens. In all specimens, however, regardless of body shape and size, the distinctive MG staining pattern is evident.

Methyl Green stain. Specimens identified as *C. andersenensis* exhibit a defined staining pattern. The anterior end, including the posterior half of the prostomium, the peristomium, setiger 1, and the dorsum and interparapodial areas of 5–10 anterior setigers, takes up stain (Fig. 29D–E). The anterior half of the prostomium is a narrow clear crescent (Fig. 29C–E); anterior parapodia stain on their anterior and posterior borders and extend on to the venter as weak transverse bands of speckles; these are sometimes best developed in posterior segments. The middle expanded and fusiform part of the body is largely unstained or only stained weakly; the posterior segments take up stain similarly to those of the anterior segments. Some specimens exhibit a speckling of the branchiae, but in others, the branchiae do not take up stain. The dorsal clear crescent on the prostomium would appear to be diagnostic and should be evident in specimens that might be questionable or posteriorly incomplete. There is variability however; a specimen from *Eltanin* Sta. 344 (USNM 187626) lacked the clear crescent, with the stain on the prostomium extending all the way to the anterior end.

Remarks. Syntypes of *Heterocirrus andersenensis* were discovered in two different museums: Zoological Museum of Hamburg (1, ZMH V-11882) by me and the Zoological Museum, Oslo (1, ZMO C668 and 2, ZMO C669) by the late Dr. Mary E. Petersen. I was able to briefly examine the Oslo specimens during a visit with Dr. Petersen in 1997. I had previously examined the Hamburg specimen on loan from Dr. Gesa Hartmann-Schröder in 1986 and again during a visit to ZMH in May 2000. In correspondence dated 01 May 2001, Dr. Petersen convinced me that the specimen from Sta. 129 in 270 m (ZMO C668) was the one Augener referred to in his description and that should be designated as the lectotype, despite the specimen from ZMH being larger. Thus, the syntype (ZMO C668) is a complete specimen and is here designated the lectotype, the other syntypes are designated as paralectotypes.

Examination of the syntypes of *Tharyx fusiformis* reveals that short acicular spines are present in posterior neuropodia, indicating synonymy with *Chaetocirratulus andersenensis.* Monro (1939) had indicated that all setae were capillaries, an error that was perpetuated by Hartman (1966) resulting in misidentifications by subsequent workers. The overall Methyl Green staining pattern is more or less the same for all specimens examined, including a syntype of *T. fusiformis* (BMNH ZK 1941.3.3.97-98). The unstained crescent on the anterior border of the prostomium is definitely present on one paralectotype of *C. andersenensis* (ZMH V-11882). The ZMO specimens were not tested. The form of the prostomium, shape and degree of segmentation of the peristomium, placement of the dorsal tentacles, and the presence of short spines on posterior setigers are diagnostic for this species. The largest specimens have posterior spines in both noto- and neuropodia; whereas, smaller ones appear to have spines limited to the neuropodia.

There is considerable variability in the body form of this species, probably owing to the modification of body shape at times of sexual maturity. It appears that sexually mature specimens attain the greatest degree of expansion and elaboration of the fusiform shape. Atokous specimens are less extreme in expansion of the body, but all are thick and robust in appearance.

Habitat & biology. Little habitat data is available for the samples associated with *Chaetocirratulus andersenensis*. R/V *Hero* Stations 824-7-1, 13-1, and 24-1 from the West Antarctic Peninsula are from rocky seafloors containing pebbles, sponges and mud.

The size of the ova (ca. 150 µm) and the large number of these that fill the coelom suggest that this species spawns directly into seawater. It is likely that the resulting larvae disperse at some point in the water column. Larger eggs would be required for prolonged brood protection or direct development.

Distribution. Widespread around Antarctica, in shelf depths, 120–840; Drake Passage, 2905 m.

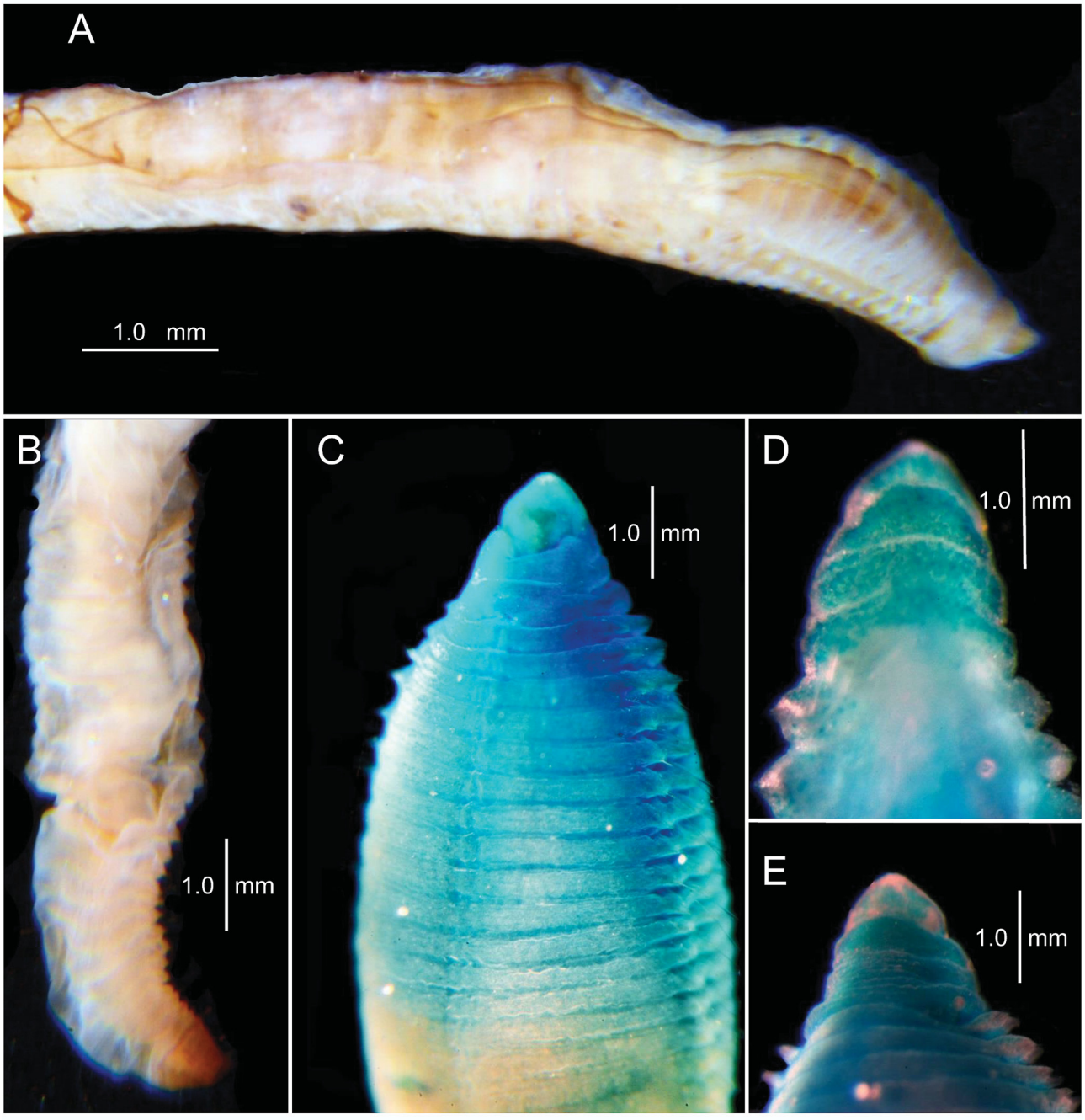

FIGURE 29. *Chaetocirratulus andersenensis* (Augener, 1932). Photomicrographs: A, anterior end, in right lateral view; B, posterior end in left lateral view; C, anterior end, ventral view; D–E, anterior ends in dorsal view showing Methyl Green staining patterns. A–B, stained with Shirlastain A; C–E stained with Methyl Green. All from EASIZ II Sta. 299 (SMF 24911).

***Chaetocirratulus abyssalis* new species**

Figure 30

Material Examined. Ross Sea, off Cape Adare, USNS *Eltanin* Cr. 27, Sta. 1869, 13 Jan 1967, 71.267°S, 171.667°E, trawl, 1565–1674 m, **holotype** (USNM 60691).

Description. Holotype small, complete, 4 mm long and 0.3 mm wide for 17 setigerous segments. Anterior end narrow, middle body segments inflated, tapering posteriorly to narrow pygidium (Fig. 30E). Oocytes present in posterior segments. Color in alcohol: light brown.

Prostomium large, bluntly conical; eyespots lacking; nuchal organs not observed (Fig. 30A). Peristomium with two achaetous rings, incomplete dorsally; dorsal tentacles inserted in groove between peristomium and anterior edge of setiger 1 (Fig. 30A). A single pair of short branchiae lateral to dorsal tentacles on posterior margin of peristomium (Fig. 30A); segmental branchiae, scars, or stubs not observed.

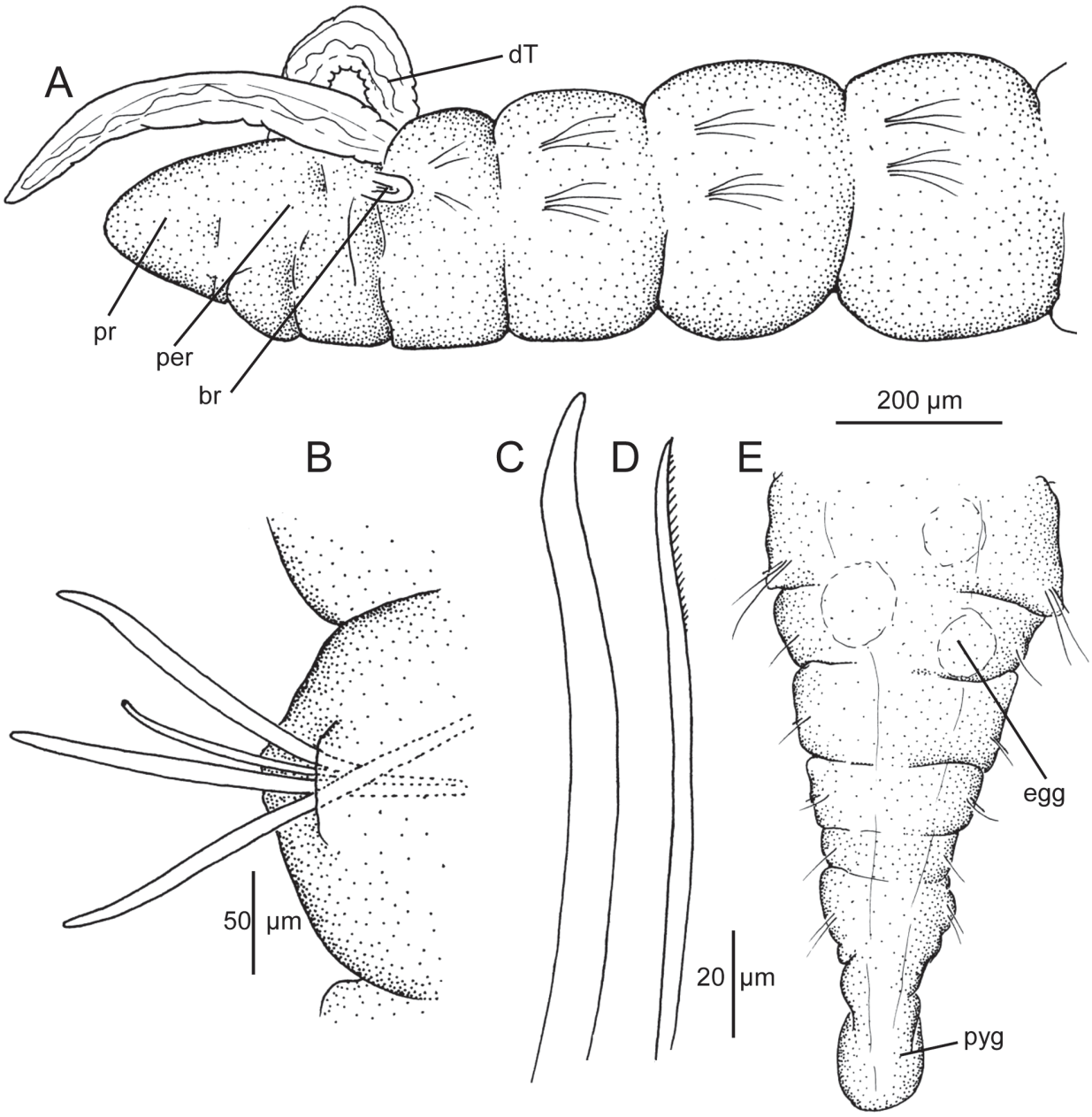

FIGURE 30. *Chaetocirratulus abyssalis* **n. sp.** Holotype (USNM 60691): A, anterior end, left lateral view; B, mid-body setiger, showing neurosetae; C, smooth acicular neuropodial spine from same segment; D, narrow acicular spine from same segment; E, posterior end, dorsal view.

Parapodia reduced, lacking parapodial lobes. Setiger 1 with two setae in noto- and neuropodia: one a simple capillary, the other a narrow curved spine; heavy acicular spines (Fig. 30B–C), numbering 3–4 per fascicle present from setiger 2, these sometimes accompanied by 1–2 narrow spines having a fimbriated edge (Fig. 30D), and a single long capillary seta. Pygidium a simple flattened lobe (Fig. 30E).

Etymology. The epithet is from the Latin, *abyss* for deep sea.

Remarks. *Chaetocirratulus abyssalis* **n. sp.** has acicular spines from setiger 1 in both noto- and neuropodia. In this respect the species approaches *C. pinguis*, but otherwise differs in body shape and by having up to four spines per neuropodium instead of 1–2.

Distribution. Ross Sea, Antarctica, 1565–1674 m.

Chaetocirratulus epitocus (Monro, 1930), new combination

Figures 31–32

Tharyx epitoca Monro, 1930: 157–158, fig. 62; Hartman 1953: 47–48; 1966: 31–32, Plate VIII, fig 4.

Not: *Tharyx epitoca*: Lowry 1975: 9–10, 12; Richardson & Hedgpeth 1977: Table 2; Cantone & Sanfilippo 1992: Table 1; Siciński & Janowska 1993: 161–166; Cantone 1994: 40; Gambi *et al.* 1997: Table 1; Cantone *et al*. 2000: 554; Pabis & Siciński 2010: Table 2.

Not *Aphelochaeta epitoca*: Cantone & DiPietro 2001: Table 1; Parapar *et al.* 2011: 728.

Not *Aphelochaeta* cf. *epitoca*: Hilbig 2001: 540; Montiel *et al.* 2005: 197, 2016: Appendix 2 (in part).

Material examined. Antarctic Peninsula. **Bismarck Strait**, R/V *Discovery* Sta. 190, coll. 24 Mar 1927, 64.933°S, 65.583°W, dredged 93–126 m, stones, mud and rocks, **lectotype** (BMNH 1930.10.8.2116).—**Schollaert Channel**, R/V *Discovery* Sta. 181, coll. 12 Mar 1927, 64.333°S, 63.333°W, Otter trawl, 160–335 m, mud, **paralectotype** (BMNH 1930.10.8.2089).

Description. Both specimens elongate, with thick, robust bodies, weakly fusiform, thickest in middle segments, narrower anteriorly and posteriorly (Fig. 32A). Lectotype complete, 19 mm long, 1 mm wide across anterior setigers, 1.5 mm wide across middle segments, with 50 setigers; paralectotype also complete, but prostomium to end of setiger 2 separated from rest of body; in total measuring 24.5 mm long, with 50 setigers. Body generally cylindrical in cross section; dorsal groove absent; weakly developed mid-ventral line extending along most of body. Individual segments best defined laterally; segmental grooves not crossing dorsum or venter.

Pre-setigerous region elongate, narrow, relatively smooth, as long as first four setigers (Figs. 31A, 32A–C). Prostomium broadly triangular, narrowing to rounded tip; eyespots absent; nuchal organs prominently everted oval mounds in lectotype at posterior lateral margin (Fig. 31A). Peristomium elongate, about as long as first three setigers; dorsally with long smooth anterior section followed by narrow section with narrow elongate grooves bearing pair of widely separated dorsal tentacles (Fig. 31A); ventrally, peristomium forming upper and lower lips of mouth (Fig. 32C). First pair of branchial scars lateral to dorsal tentacles on posterior section of peristomium (Fig. 31A). Second pair of branchiae on setiger 1 dorsal to notosetae (Fig. 31A); branchiae of subsequent segments in same location.

Parapodia low mounds or tori from which setae emerge. Noto- and neurosetae of type specimens with capillaries of normal length and long, natatory capillaries along most of body. Last 4–6 setigers with 1–2 unidentate spines in both noto- and neuropodia; each spine simple, weakly curved at tip, colorless (Fig. 31C).

Pygidium with curved rounded lobe ventral to anal opening bordered with small papillae (Figs. 31B, 32D).

Methyl Green stain. Not retaining stain.

Remarks. The syntype from the Bismarck Strait is here designated the lectotype; the second syntype from the nearby Schollaert Channel is designated the paralectype. In the original description, Monro (1930) stated that spines or hooks were absent in this species. However, 1–2 short, straight unidentate spines are present in the last 4–6 noto- and neuropodia of both specimens. These spines are small and cannot be seen clearly among the capillaries unless the specimens are mounted under a coverslip with glycerin. Both type specimens are mature females swollen with eggs that measure 135–150 µm in diameter.

In recent benthic surveys, specimens having all capillaries and believed to be this species have been identified in the genus *Aphelochaeta*. Because this species has been found to have acicular spines in posterior setigers and a different morphology to the peristomial region, the concept of the species is changed from what was originally described by Monro (1930) and as restated by Hartman (1966). Because of this, recent identifications of *Aphelochaeta epitoca* (or as *Tharyx*) most certainly refer to other species.

By having the spines limited to posterior setigers, *Chaetocirratulus epitocus* is similar to *C. andersenensis*. However, the two species differ in the nature of the pre-setigerous region. In *C. epitocus*, the pre-setigerous region

is long and narrow and consists of a smooth anterior section and a narrow lobate posterior section that may be a distinct achaetous segment, and which bears both the dorsal tentacles and first pair of branchiae. In *C. andersenensis*, the pre-setigerous region is short, about as wide as long, and has three distinct annular peristomial rings. The dorsal tentacles and first pair of branchiae are located at the posterior margin of the last peristomial ring. In addition, most specimens of *C. andersenensis* have distinctly fusiform bodies with obvious segmental grooves. In contrast, *C. epitocus*, while somewhat expanded in the middle segments, has a thick elongate body where the segmental grooves are either lacking or obscure. Further, *C. andersenensis* has a distinct MG staining pattern in the pre-setigerous region that is entirely absent in *C. epitocus*.

Distribution. Antarctic Peninsula, 93–335 m.

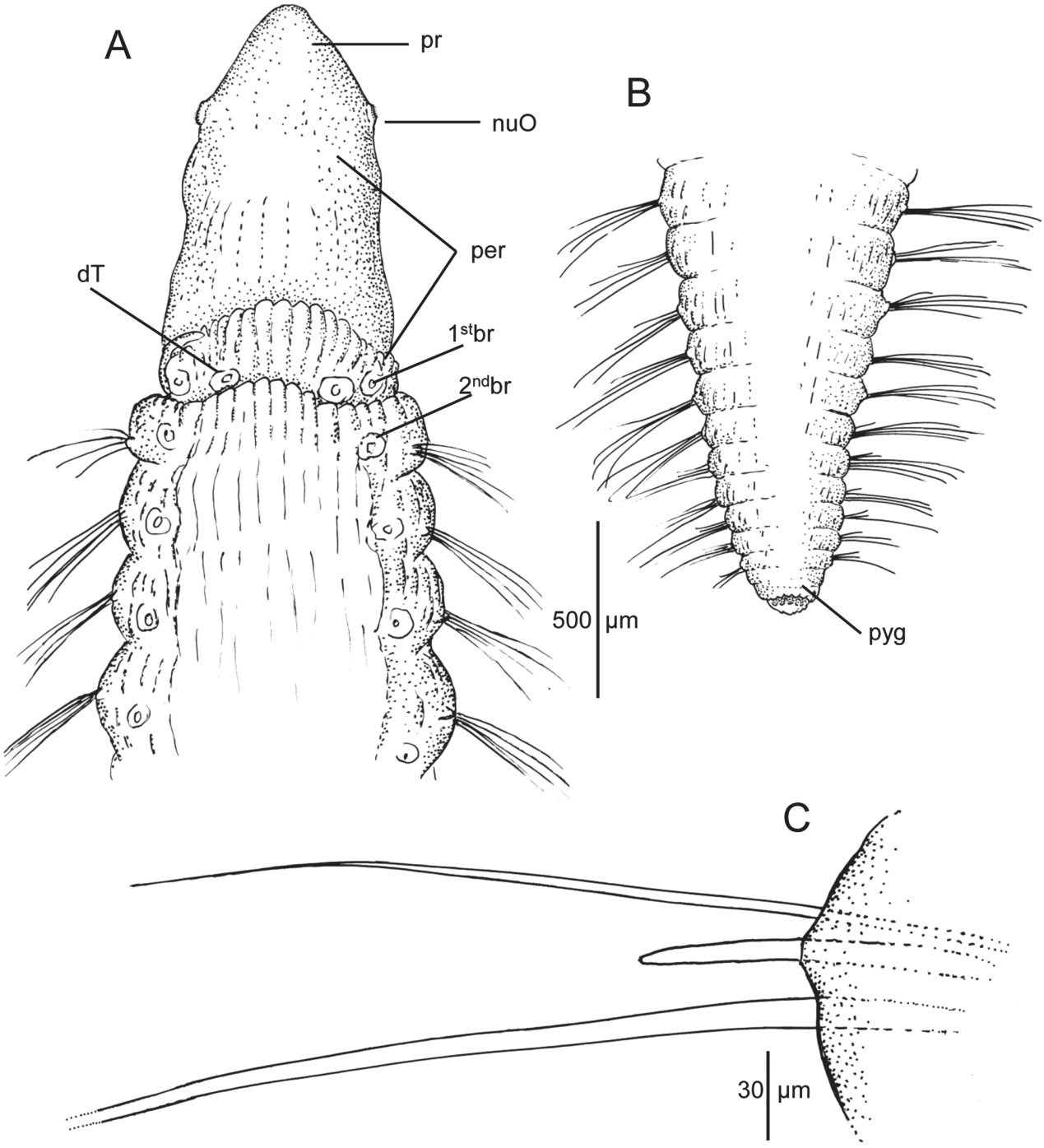

FIGURE 31. *Chaetocirratulus epitocus* (Monro, 1930). Lectotype (BMNH 1930.10.8.2116): A, anterior end, dorsal view; B, posterior end, dorsal view; C, neuropodial capillaries and acicular spine from far posterior setiger.

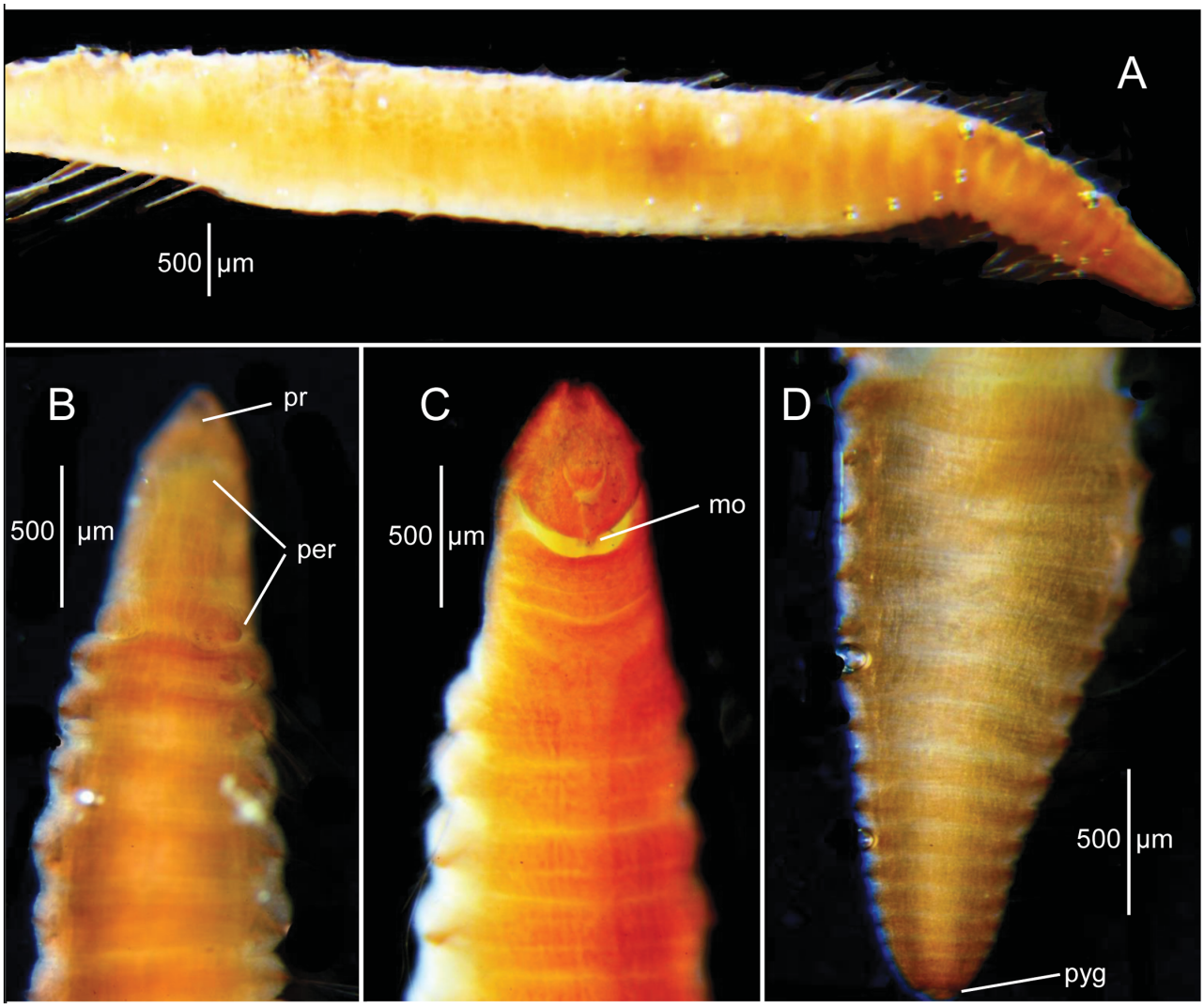

FIGURE 32. *Chaetocirratulus epitocus* (Monro, 1930). Photomicrographs of lectotype (BMNH 1930.10.8.2116): A, dorsal view of nearly entire worm, far posterior segments not included; B, anterior end, dorsal view; C, anterior end, ventral view; D, posterior end, dorsal view. A–D, stained with Shirlastain A.

Chaetocirratulus furvus new species

Figures 33–34

Material examined. **Off Peru, South of Callao**, SEPBOP, R/V *Anton Bruun* Cr. 17, Sta. 660-G, coll. 22 Jun 1966, 12°58′S, 77°16′W, dredged, 1000 m, **holotype** (USNM 1490735) and 1 **paratype** (USNM 1490736).

Description. Collection includes holotype, one paratype, and several mid-body fragments. Holotype a large male with sperm platelets, complete but in three pieces, 60 mm long, 2.0–2.2 mm wide, with 106 setigerous segments; paratype an anterior fragment with 32 setigers. Body generally cylindrical in cross section with venter weakly flattened; dorsal groove absent, weakly developed mid-ventral groove present in middle body segments. Posteriormost 15 segments expanded laterally, rounded dorsally, and flattened ventrally (Figs. 33B, 34C). Individual segments well defined with distinct segmental grooves. Color in alcohol tan, with prominent black pigment on parapodia, scattered on dorsum of anterior-most segments (Fig. 34A) and across venter of anterior setigers. Pigment strongest on venter of holotype posterior to mouth (Fig. 34B), then continuing over next 18 setigers as bands on posterior margin of individual segments; similar pigment continuing as black spots posterior to notosetae for about 20 segments; far posterior segments not pigmented (Fig. 34C); similar pigment on paratype except not as dark.

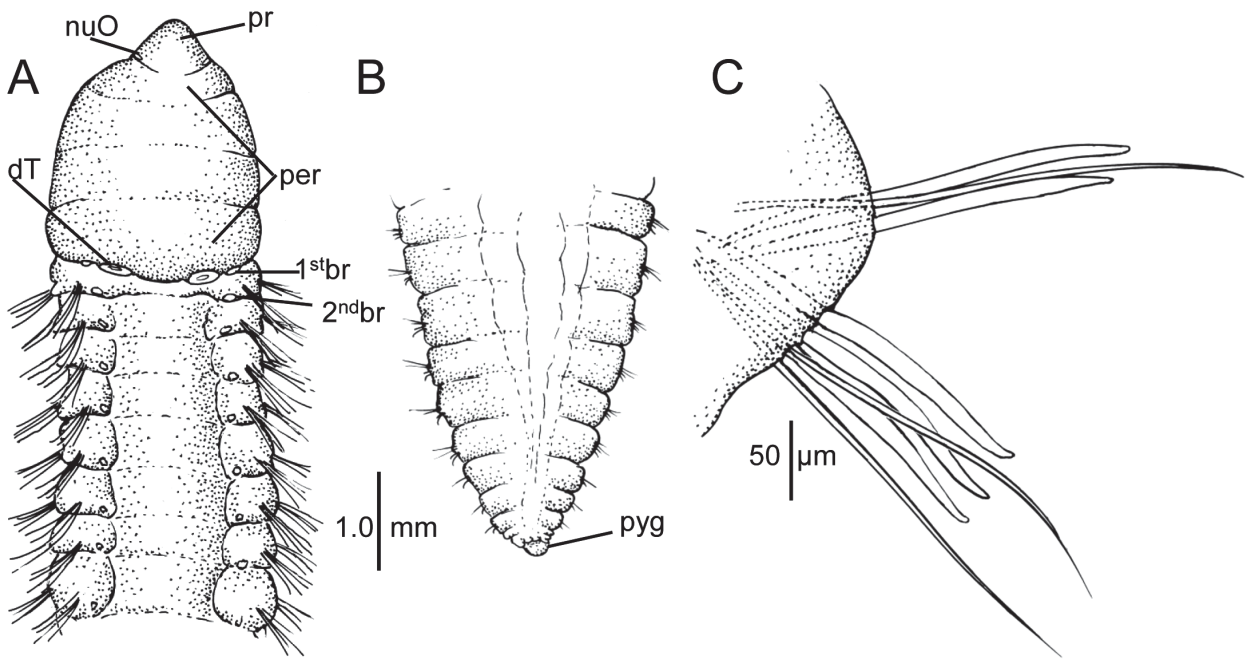

FIGURE 33. *Chaetocirratulus furvus* **n. sp.** Holotype (USNM 1490735): A, anterior end, dorsal view; B, posterior end, dorsal view; C, parapodia from posterior body segment, anterior view.

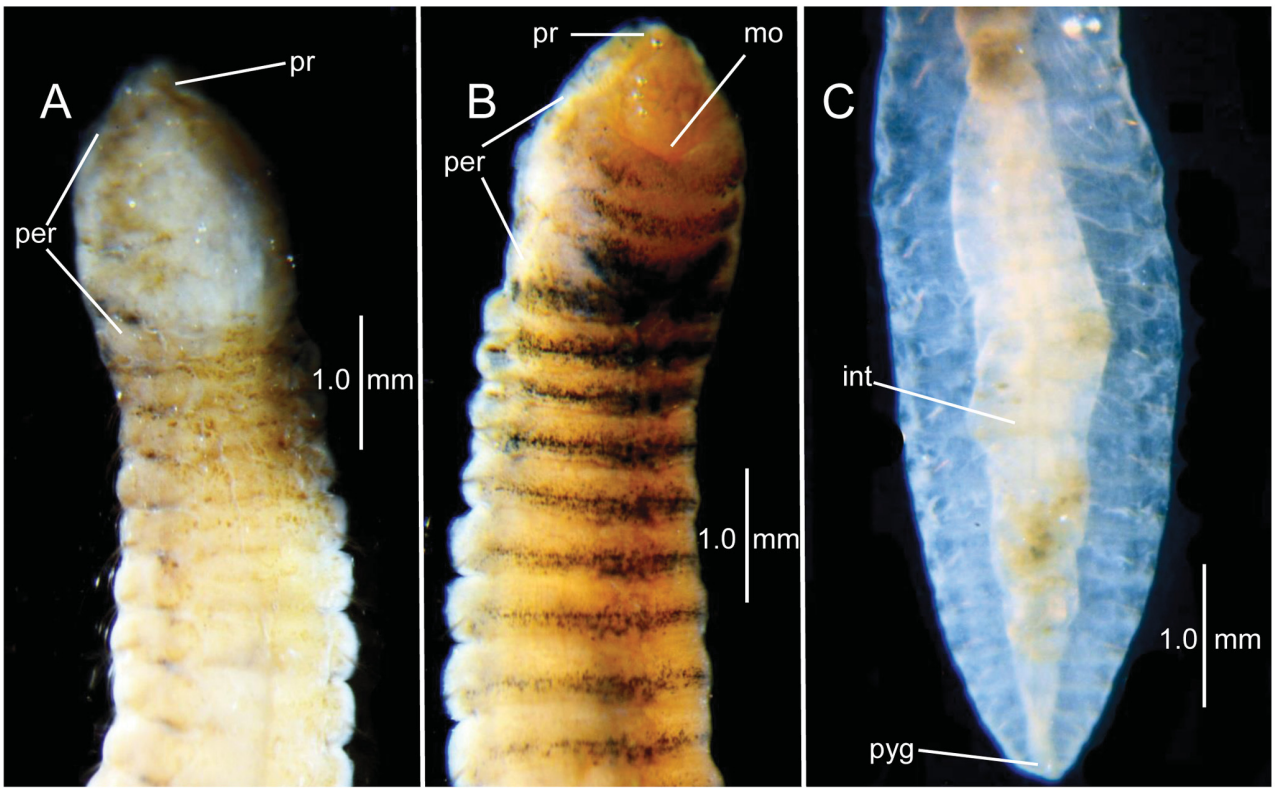

FIGURE 34. *Chaetocirratulus furvus* **n. sp.** Photomicrographs of holotype (USNM 1490735): A, anterior end, dorsal view; B, anterior end, ventral view; C, posterior end, dorsal view.

Pre-setigerous region relatively short, bulky, slightly longer than wide, broadly rounded anteriorly, bearing short, triangular prostomium narrowing to rounded tip (Figs. 33A, 34A–B); eyespots absent; nuchal organs narrow

grooves at posterior lateral margins. Peristomium dorsally elevated but not as a separate crest, with four weakly developed annular rings, denoted by three thin grooves as lines across dorsum (Fig. 33A); ventrally, first two peristomial rings forming lower lip of mouth (Fig. 34B). Dorsal tentacles arising from posterior margin of peristomium (Fig. 33A); first pair of branchiae arising lateral to dorsal tentacles also on posterior margin of peristomium (Fig. 33A). Second pair of branchiae on setiger 1 dorsal to notosetae (Fig. 33A).

Parapodia of anterior setigers well developed, forming rounded shoulders along lateral margins (Fig. 33A). Noto- and neuropodia of first 15–20 segments with 12–16 capillaries arranged in two rows with those of second row thicker than those of first. Setae reduced to three thick and three thin capillary setae by setiger 30; thick capillaries of neuropodia transitioning to three blunt tipped spines accompanied by 1–2 thin capillaries by setigers 30–37; two spines first present in notopodia from setigers 35–37. Spines and capillaries continuing along body to posterior end, typically with two spines and 1–2 capillaries in notopodia and 2–3 spines and 1–2 capillaries in neuropodia; parapodia not elevated, setae not forming cinctures. Spines relatively inconspicuous along body, golden in color, straight to weakly sigmoid, tapering to narrow blunted tip (Fig. 33C).

Expanded posterior end terminating in pygidium with a few papillae dorsal to anal opening and rounded ventral lobe below anal opening (Figs. 33B, 34C).

Methyl Green stain. Entire pre-setigerous region retaining stain both dorsally and ventrally; parapodial shoulders of anterior setigers retaining stain on anterior border; stain retained between noto- and neurosetae of anterior and middle segments; dorsal surface not staining, but prominent transverse bands extending across venter of anterior segments with intersegmental areas clear. Segmental staining area encompasses and extends beyond transverse band of black pigment speckles.

Etymology. The epithet is from *furvus*, Latin for dusky or black, referring to the black bands of pigment on the anterior segments of this species.

Remarks. *Chaetocirratulus furvus* **n. sp.** differs from other species of the genus, but is somewhat similar to *C. neogracilis* **n. sp.**, which also occurs in deep water off Peru, in having golden spines along the posterior half of the body. However, the spines of *C. furvus* **n. sp**. are smaller and less conspicuous and the pre-setigerous region and pygidial morphology are entirely different; in addition, *C. neogracilis* **n. sp.** does not have any pigment on the body as in *C. furvus* **n. sp.**

Distribution. Known only from deep water off Peru, 1000 m.

Chaetocirratulus neogracilis new species

Figure 35

Material examined. Off Peru, Peru-Chile Trench, SEPBOP, R/V *Anton Bruun*, Cr.17, Sta. 663-C, 13°44′S, 77°33′W, Menzies trawl, 4100 m, **holotype** (USNM 1490737) and 6 **paratypes** (USNM 1490738).

Description. All specimens incomplete, seven anterior ends and one posterior end. Three longest anterior fragments with 24, 26, and 31 setigers (holotype); these 6, 5.5, and 8 mm long, respectively, and 0.6–0.8 mm wide. Posterior fragment with 13 setigers, 3 mm long and 0.5 mm wide. All fragments elongate, narrow, and cylindrical in cross-section; ventral groove absent. One specimen with weak mid-ventral ridge. Color in alcohol: flesh colored with no pigment. Two anterior fragments and posterior fragment gravid with large yolky eggs 140–150 µm in diameter with large germinal vesicle.

Prostomium broadly triangular, wedge-shaped, tapering to narrow anterior end (Fig. 35A); eyespots absent; nuchal organs forming prominent lobes on posterior lateral border (Fig. 35A). Peristomium divided into a broad, smooth anterior section that merges with a wider and shorter posterior section, likely in part an achaetous segment that bears a pair of dorsal tentacles anteriorly and first pair of branchiae on posterior border (Fig. 35A); second pair of branchiae on setiger 1 dorsal to notosetae (Fig. 35A). All dorsal tentacles and branchiae missing or limited to stumps or scars.

Parapodia reduced to low lobes from which setae emerge. Noto- and neuropodial setal fascicles close together. Some posterior parapodia with small papilla between noto- and neurosetae, likely a sense organ (Fig. 35C); present on posterior segments of anterior fragments and most segments of posterior fragment. Anterior setae all capillaries, 3–4 broad and brass-colored, a few others thin, more elongate, possibly natatory. Neuropodial acicular spines first present from setigers 11–14; one spine per neuropodium at first, then increasing to 3–4 spines over following 5–6

segments. Notopodial spines not present in available anterior ends, but both noto- and neuropodial acicular spines present on 13-segment posterior fragment. Form and arrangement of neuropodial spines identical in anterior fragments and single posterior fragment. Notopodial spines usually a single large spine with 1–2 capillaries; neuroacicular spines 2–3 with two capillaries (Fig. 35C, G). Individual spines golden in color, gently curved, tapering to pointed tip (Fig. 35D–F). Pygidium with a rounded lobe ventral to anal opening (Fig. 35B).

Methyl Green stain. Specimens staining uniformly with no pattern, destaining rapidly.

Etymology. The species name *neogracilis* is derived from the Latin, *neo* for new and *gracile* for slender or thin and indicating the close similarity with *Chaetozone gracilis* of Moore (1923).

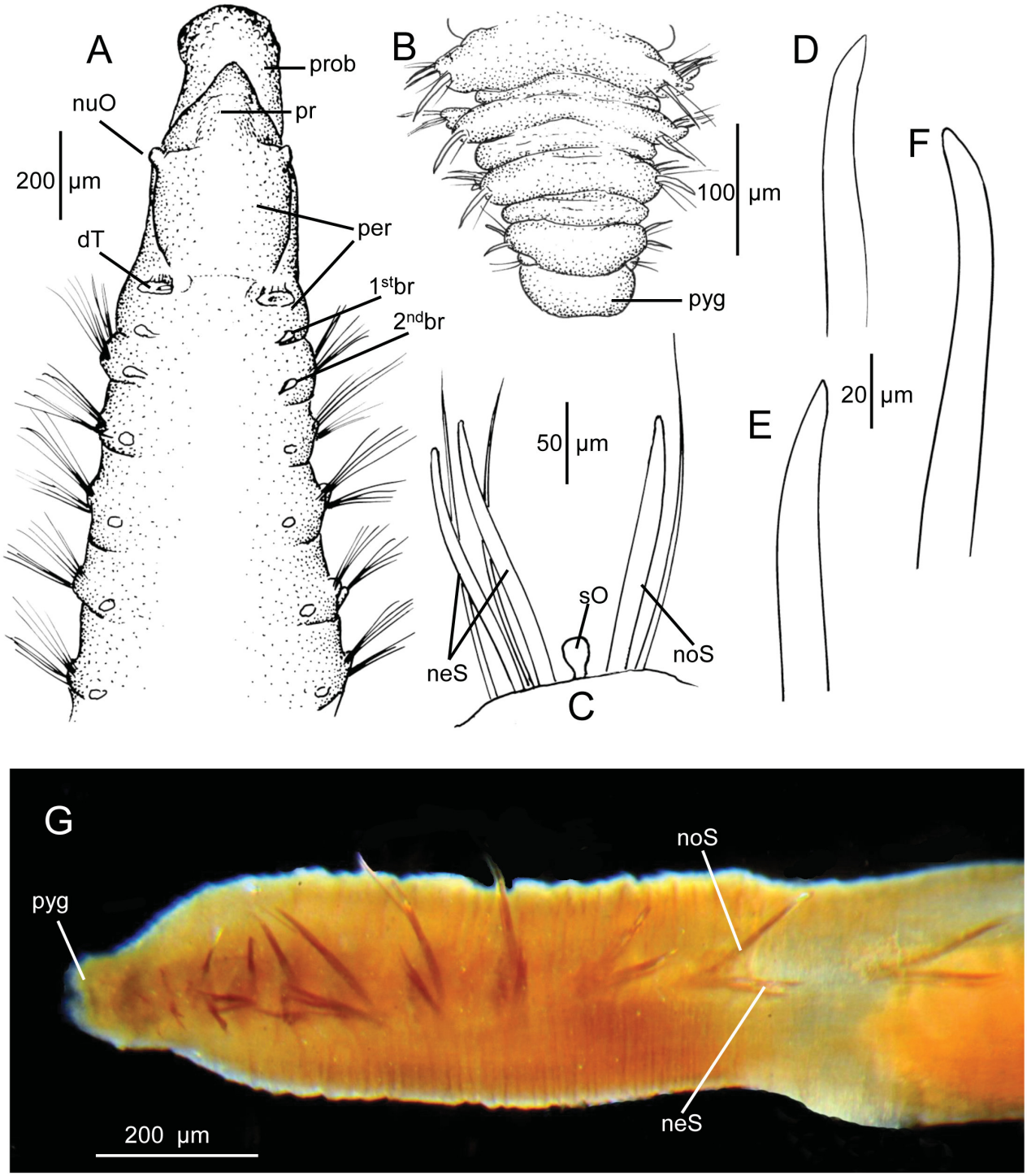

FIGURE 35. *Chaetocirratulus neogracilis* **n. sp.** A, anterior end, dorsal view; B, posterior end, dorsal view; C, parapodium from posterior segment; D–F, neuropodial acicular spines; G, posterior end, lateral view. A, holotype (USNM 1490737); B–G, paratypes (USNM 1490738).

Remarks. *Chaetocirratulus neogracilis* **n. sp.** from 4100 m off Peru is similar to *Chaetozone gracilis* from 4016 m off southern California (Moore, 1923), which is known only from the holotype, redescribed by Blake (1996). Initially, these new specimens were thought to be *C. gracilis* because they come from similar abyssal depths, both have a broad conical prostomium, and a peristomium divided into a smooth anterior section and posterior section that bears both the dorsal tentacles and first pair of branchiae.

Chaetozone gracilis, however, is a much larger species, the holotype being 29 mm long with 110 setigers. In contrast, the largest anterior fragment of *C. neogracilis* **n. sp.** is only 8 mm long and has 31 setigers. A posterior fragment in the same collection has only 13 setigers and only adds 3 mm to the length. However, the size differential would not account for observed differences in the number and distribution of acicular spines along the body.

In *Chaetozone gracilis*, the notosetae are all capillaries except for the last, pre-pygidial segments (ca. setiger 108–110), where two spines accompany two capillaries; in *C. neogracilis* **n. sp.**, the last 13 setigers of the one posterior fragment each have one large conspicuous notoacicular spine and two capillaries. The posterior neurosetae of *C. gracilis* include 4–6 acicular spines and an equal number of alternating capillaries. In contrast, the posterior neuroacicular spines of *C. neogracilis* **n. sp.** include 2–3 heavy spines and two capillaries. Both the noto- and neuroacicular spines of posterior segments in *C. neogracilis* **n. sp.** are large and provide the species with a conspicuous posterior armature. In *C. gracilis*, the posterior spines are not overly large or conspicuous. *Chaetozone gracilis*, however, should also be referred to *Chaetocirratulus* **n. gen**. and will be dealt with in a subsequent paper (Blake unpublished).

Distribution. Off Peru in abyssal depths, 4100 m.

Chaetocirratulus pinguis Hartman, 1978, new combination

Figure 36

Chaetozone pinguis Hartman, 1978:166, fig. 18a–c; Usha *et al*. 2014: 917.
Cirratulus patagonicus: Hartman 1978: 166. **Not** Kinberg 1866.

Material examined. Weddell Sea, USCG *Glacier* Sta. 69-1, 24 Feb. 1969, 74°28.1′S, 30°31.7′W, 513 m, **holotype** (USNM 46782) and 13 **paratypes** (USNM 46783); Sta. 68-5, 9 Feb 1968, 76°00′S, 55°00′W, 400 (1, USNM 46800); Sta. 69-7, coll. 01 March 1969, 77°16′S, 42°38′W, 512 m, (1, USNM 490733); **Weddell Sea, east of former Larsen Ice Shelf A Area**, RVIB *Nathaniel B. Palmer* Cr. 2000-03, coll. J.A. Blake, Sta. 26, 23 May 2000. 64°39.564′S, 059°13.226′W, SM grab, 564 m (1, MCZ 149836).—**East Antarctic Peninsula, Prince Gustav Channel**, RVIB *Nathaniel B. Palmer* Cr. 2000-03, coll. J.A. Blake, SM grab, Sta. 01, 14 May 2000, 64°17.625´S, 058°34.678´W. 768 m (1, JAB); Sta. 34, 24 May 2000, 64°10.995′S, 058°34.140′W, 865 m (5, MCZ 149837; 1 SEM stub, JAB); **N of Larsen Ice Shelf Area A, off Lindenberg Island,** RVIB *Nathaniel B. Palmer* Cr. 2000-03, coll. J.A. Blake, SM grab, Sta. 03, 15 May 2000, 64°53.533′S, 059°30.694′W, 385m (1, MCZ 149838); **former Ice Shelf A Area, Greenpeace Trough**, RVIB *Nathaniel B. Palmer* Cr. 2000-03, coll. J.A. Blake, SM grab, Sta. 22, 20 May 2000, 64°46.632′S, 060°21.557′W, 868 m (1, LACM-AHF Poly 10214); Sta. 12, 19 May 2000, 64°55.101′S, 060°24.459′W, 317 m (1, LACM-AHF Poly 10215); **former Ice Shelf A Area, border with Larsen B,** RVIB *Nathaniel B. Palmer* Cr. 2000-03, coll. J.A. Blake, SM grab, Sta. 13, 19 May 2000, 64°53.517′S, 060°28.836′W, 323 m (1, LACM-AHF Poly 10216); Sta. 14, 19 May 2000, 64°51.818′S, 060°33.438′W, 419 m (4, LACM-AHF Poly 10217).—**South Shetland Islands, Clarence Island,** USNS *Eltanin*, Cr. 12, Sta. 1089, 17 Apr 64, 60.78°S, 53.507°W, Blake trawl, 641 m (1, USNM 1013943).—**Ross Sea, Pennell Bank, off Ross Ice shelf**, ca. 385 km W of McMurdo Station, USNS *Eltanin* Cr. 32, Sta. 2060, 25 Jan 1968, 77.98°S, 178.18°E, Camera grab, 647 m (1, USNM 1490734).

Description. A small species, specimen from USNS *Eltanin* Sta. 1089 (USNM 1013943) 6 mm long and 5.2 mm wide for 48 setigerous segments; types smaller, up to 4.2 mm long for 30 segments. Body distinctly fusiform in shape in types (Fig 36A) and some non-types; juveniles more elongate, thick, tapering posteriorly, thickened in middle, but not distinctly fusiform. Individual segments biannulate (Fig. 36B). Shallow mid-dorsal groove apparent in some specimens (Fig. 36A). Color tan, with no additional pigmentation.

Prostomium broadly rounded on anterior margin, subtriangular in shape, wider than long (Fig. 36A–B). Peristomium well developed, dorsally overlapping first segment somewhat, with deep lateral grooves forming

three weakly developed annular rings, well developed laterally (Fig. 36B); dorsum of peristomium relatively smooth, without dorsal crest (Fig. 36A). Dorsal tentacles medial in location, arising from groove between peristomium and setiger 1 (Fig. 36A–B) or anterior margin of first setiger; tentacles thick, short in preservation. First pair of branchiae arising lateral to dorsal tentacles in same groove between peristomium and setiger 1 (Fig. 36A–B); subsequent branchiae arising dorsal to setal fascicles (Fig. 36B), continuing through first half of body.

Capillary setae in noto- and neuropodia throughout; acicular spines in notopodia from middle and posterior setigers and in neuropodia from setiger 1–5. Acicular spines short, straight (Fig. 36D–E); capillaries sometimes with finely serrated or fringed border (Fig. 36E, inset).

Pygidium terminating a conical lobe ventral to anal opening (Fig. 36A).

Methyl Green stain. The prostomium stains lightly; the peristomium stains heavily, especially on the sides; the body segments are generally unstained.

Remarks. *Chaetocirratulus pinguis* is similar to *C. andersenensis* in that most specimens have a robust, fusiform body. The two species differ in that the first has acicular spines present in the neuropodia from anterior setigers 1–5 instead of a far posterior setiger. *Chaetocirratulus andersenensis* has acicular spines limited to a few posterior neuropodia, rarely in notopodia; whereas in *A. pinguis*, acicular spines are present in both noto- and neuropodia throughout. In addition, the three peristomial rings are typically prominent and well-defined in *C. andersenensis*, but only weakly developed in *C. pinguis*, giving the pre-setigerous region a smooth appearance.

Habitat. *Chaetocirratulus pinguis* was noticeably abundant in the vicinity of the former Larsen Ice Shelf A where the surficial sediments (0–5 cm) consist of 0–40% sand likely derived from the formerly overlying ice cover (Gilbert & Domack 2003).

Distribution. Weddell Sea and Antarctic Peninsula in shelf and upper slope depths, 317–865 m; East Antarctica, 203 m.

Genus *Chaetozone* Malmgren, 1867

Type species: *Chaetozone setosa* Malmgren, 1867, by monotypy.

Diagnosis. (Emended, after Blake 2015). Prostomium blunt to conical, peristomium elongate to short, usually lacking eyespots, with a pair of small nuchal slits or depressions at posterior edge; with a single pair of grooved dorsal tentacles arising from posterior edge of peristomium, or sometimes more posterior on an asetigerous anterior segment, or rarely on an anterior setiger. First pair of branchiae arising from an achaetous segment or first setiger; sometimes with first two pairs of branchiae on a single anterior segment. Body usually expanded anteriorly and narrowed posteriorly, rarely with middle or posterior body segments beaded or moniliform; posterior end often expanded. Setae include capillaries on most setigers and sigmoid acicular spines in neuropodia and notopodia, with spines typically concentrated in posterior segments forming distinct cinctures with spines carried on elevated membranes; cinctures with few to many spines sometimes encircling entire posterior end, accompanied with none to many alternating capillaries; bidentate spines sometimes present in juveniles or occasionally in ventral-most position of far posterior setigers of adults, accompanying unidentate spines in cinctures; some species with long, natatory-like capillary notosetae, sometimes limited to gravid individuals. Pygidium a simple lobe, disk-like, or with long, terminal cirrus.

Remarks. Blake (2015) emended the genus *Chaetozone*, described the lectotype of *C. setosa*, added eight new species, and reviewed more than 20 species from North America. He effectively limited the genus to species having numerous elongate acicular spines in both noto- and neuropodia that form a prominent and conspicuous armature in modified parapodia of posterior segments. A few other species having few or inconspicuous spines, or spines limited to the neuropodia, are here referred to the genus *Chaetocirratulus* **n. gen.** (see above).

Species of *Chaetozone* from Antarctica that agree with the definition presented here have historically been referred to the type-species, *C. setosa* by Hartman (1967, 1978) and Hartmann-Schröder & Rosenfeldt (1989, 1990). With the recent redescription and restriction of the range of *C. setosa* to the Arctic (Chambers 2000; Blake 2015) and description of numerous new species from worldwide locations, many of which were formerly referred to *C. setosa* (Blake 1996, 2006, 2015; Doner & Blake 2006; Dean & Blake 2007; Magalhães & Bailey Brock 2013; Elías *et al*. 2017, and others) it is apparent that the Antarctic species of *Chaetozone* remain poorly known.

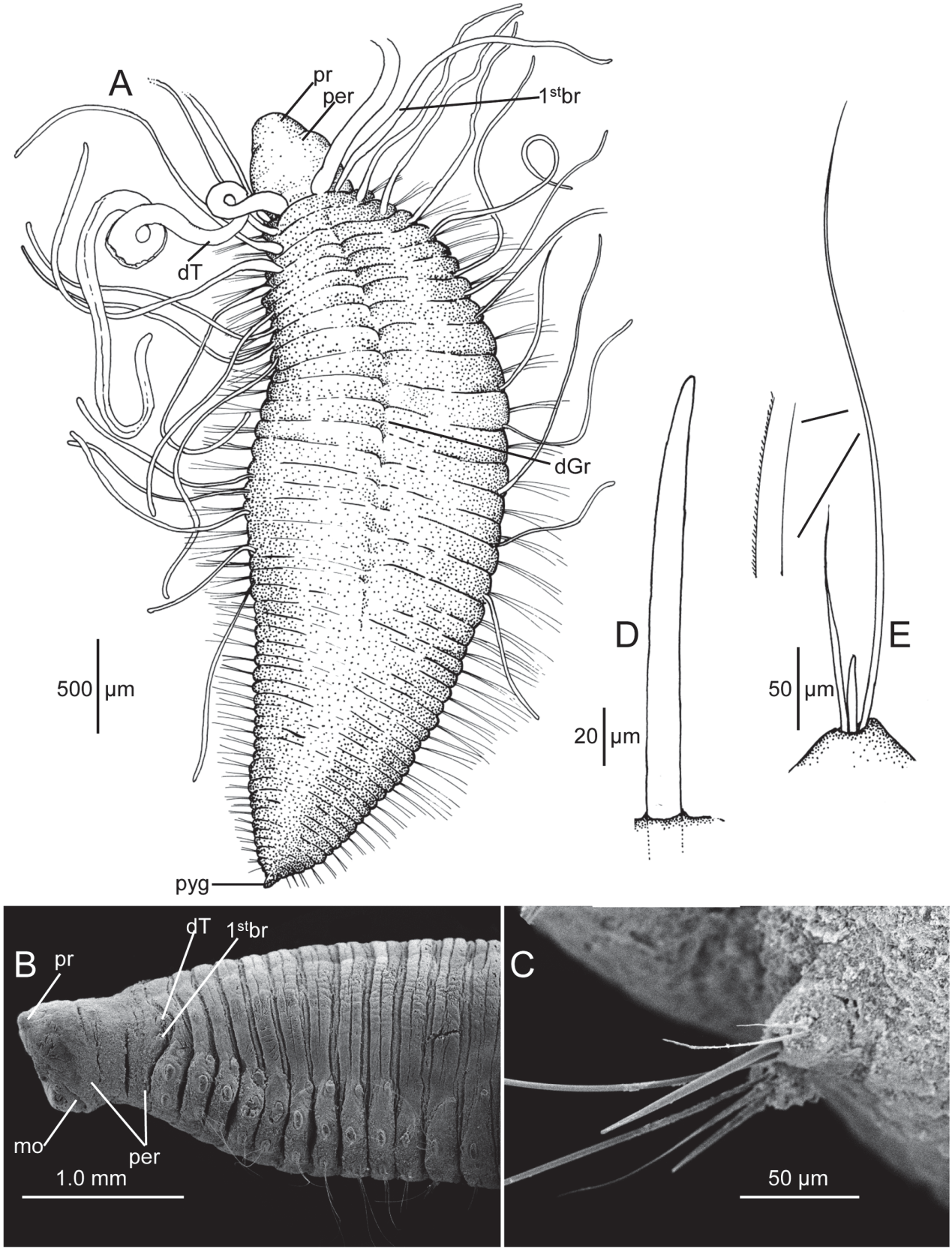

FIGURE 36. *Chaetocirratulus pinguis* (Hartman, 1978). A, entire worm, dorsal view; B, SEM of anterior end, dorsolateral view; C, SEM of anterior neurosetae; D, neuropodial acicular spine; E, neuropodial capillaries and spine (inset not to scale). A, D–E, paratype (USNM 46783); B–C, NBP Sta. 34, SEMs.

In the present study, five species of *Chaetozone* are reported from western South America, two new and seven species are reported from Antarctica, five new. Two species of *Caulleriella, C. bransfieldensis*, and *C. homosetosus* described by Hartmann-Schröder & Rosenfeldt (1989) from the Antarctic Peninsula are here referred to *Chaetozone*.

Chaetozone australosetosa new species

Figures 37–39

Chaetozone setosa: Hartman 1978: 166. **Not** Malmgren, 1867.
Chaetozone sp.: Hartman 1978: 166.
Tharyx spp. Hartman 1967: 118 (in part).

Material examined. **East Antarctic Peninsula, Prince Gustav Channel**, RVIB Nathaniel *B. Palmer*, coll. J.A. Blake, SM grab, Sta. 33, 24 May 2000, 64°11.959′S, 058°41.857′W, 587 m, RVIB Nathaniel *B. Palmer*, coll. J.A. Blake, **holotype** (LACM-AHF Poly 10219) and 72 **paratypes** (LACM-AHF Poly 10220); Sta. 01, 14 May 2000, 64°17.625′S, 058°34.678′W. 768 m, 151 **paratypes** (MCZ 149839); Sta. 27, 23 May 2000, 64°22.934′S, 058°36.976′W. 684 m, 34 **paratypes**, (MCZ 149840); Sta. 28, 23 May 2000, 64°22.018′S. 058°30.942′W. 794 m, 42 **paratypes** (MCZ 149841); Sta. 29, 24 May 2000, 64°21.361′S, 058°26.637′W, 690 m, 20 **paratypes** (LACM-AHF 10218); Sta. 30, 24 May 2000, 64°16.875′S, 058°26.985′W. 843 m, 9 **paratypes** (MCZ 149842); Sta. 34, 24 May 2000, 64°10.995′S, 058°34.140′W, 865m, 47 **paratypes** (LACM-AHF 10221); Sta. 35, 25 May 2000, 64°10.471′S, 058°28.505′W, 651 m, 27 **paratypes** (MCZ 149843); **near Cape Longing**, Sta. 02, 15 May 2000, 64°18.387′S, 058°37.911′W, 504 m, (31, MCZ 149844).—**East Antarctic Peninsula, former Larsen Ice Shelf A area, Greenpeace Trough,** RVIB Nathaniel *B. Palmer*, coll. J.A. Blake, SM grab, Sta. 05, 17 May 2000, 64°46.520′S, 060°10.720′W, 978 m (1, MCZ 149846); Sta. 16, 19 May 2000, 64°43.897′S, 059°55.745′W, 713 m, (8, LACM-AHF 10224); Sta. 17, 19 May 2000, 64°39.793′S, 060°07.662′W, 719 m, (1, JAB); Sta. 19, 20 May 2000, 64°42.778′S, 060°20.846′W, 879 m (5, JAB); Sta. 22, 20 May 2000, 64°46.632′S, 060°21.557′W, 868 m, (4, JAB); Sta. 23, 21 May 2000, 64°47.144′S, 060°21.566′W, 901 m, (10, JAB).—**East Antarctic Peninsula, Larsen Ice Shelf area**, **border with Larsen B**, RVIB *Nathaniel B. Palmer*, coll. J.A. Blake, SM grab, Sta. 10, 18 May 2000, 64°57.368′S, 060°13.392′W, 332 m, (2, MCZ 149847); Sta. 11, 18 May 2000, 64°56.669′S, 060°19.281′W, 350 m (33, MCZ 149848); Sta. 12, 19 May 2000, 64°55.101′S, 060°24.459′W, 317 m (74, MCZ 149848); Sta. 13, 19 May 2000, 64°53.517′S, 060°28.836′W, 323 m, (79, LACM-AHF 10222); Sta. 14, 19 May 2000, 64°51.818′S, 060°33.438′W, 419 m, (26, LACM-AHF 10223).—**Weddell Sea, east of Larsen A area,** RVIB Nathaniel *B. Palmer*, coll. J.A. Blake, SM grab, Sta. 25, 22 May 2000, 64°43.314′S, 059°38.459′W, 628 m, (15, USNM 1490762); Sta. 26, 23 May 2000, 64°39.564′S, 059°13.226′W, 564 m, (58, USNM 1490763); **off Lindenberg Island**, Sta. 03, 15 May 2000, 64°53.533′S, 059°30.694′W, 385 m, (39, MCZ 149845).—**Weddell Sea, Coats Land,** Halley Bay, NW of bay, USCG *Glacier* Sta. 7, 01 Mar 1969, 77°16′ S, 42°38′ W, 512 m (1, USNM 46814).—**West Antarctic Peninsula,** Marguerite Bay, USCG *Eastwind*, coll. D. Pawson & Squires, Sta. 4A, 24 Jan 1966, 67°53′S, 69°10.5′W, 300 m (6, USNM 1490761); **Janus Island,** outside of Arthur Harbor, R/V *Hero* Sta. 721-843, 26 Jan 1972, 64.792° S, 64.125°W, Blake Trawl, 107 m (1, USNM 1490759).—**South Shetland Islands,** Bransfield Strait, north of d'Urville Island, USNM *Eltanin* Cruise, 6, Sta. 418, 2 Jan 1963, 62.648°S, 56.170°W, Blake trawl, 311–426 m (1, USNM 56000).—**West Antarctic Peninsula**, **Ross Sea, off Marie Byrd Land**, west of Cape Colbeck, USNS *Eltanin* Cr. 51, Sta. 5769, 15 Feb 1972, 77.152°S, 158.993°W, Menzies trawl, 344–357 m (1 USNM 1490760).

Description. A moderate-sized species with elongate body, narrow anteriorly, gradually becoming thicker through anterior one-third (Figs. 37A, 38A, 39A–B), then narrowing through posterior two-thirds (Fig. 39A, C). Holotype from Station 33 (LACM-AHF Poly 10219) complete with 55 setigers, 10.3 mm long, 0.3 mm wide across pre-setigerous region, 1.0 mm wide at setiger 22, 0.6 mm wide across posterior cinctured segments. Large paratypes similar to holotype in size and shape: paratype from Station 27 (MCZ 149840) with 59 setigers, 10.2 mm long and 1.0 mm wide across widest segments of anterior one-third. Other large complete paratypes with 55–63 setigerous segments and ranging from 10 to 10.3 mm long. A narrow mid-dorsal groove extends posteriorly as a line along body from about setiger 20; a mid-ventral groove extends from peristomium along entire body, not apparent in smaller specimens. Body weakly fusiform in shape due to some specimens having an enlarged stomach

prior to narrowing of body; stomach area usually swollen when filled with fine sediment (Fig. 39A–C). Anterior segments crowded, about ten times as wide as long (Fig. 37A), in large specimens segments becoming longer, but still about three times as wide as long in posterior segments. Posterior segments with deep grooves between individual segments (Figs. 37C) and with parapodia modified, elevated, with thin membranes bearing spreading fascicles of spines and alternating capillaries producing a prominent cinctured armature (Fig. 38B–C). Color in alcohol light tan; holotype and a few paratypes with patches of medial brown pigment on venter of a few segments from about setigers 18–22.

Pre-setiger region divided into prostomium, peristomium, and an achaetous segment fused with setiger 1. Prostomium small, triangular, narrowing to rounded tip (Fig. 37A–B); nuchal organs reduced to thin slits at posterior margin of prostomium, difficult to observe with light microscope; eyespots absent. Peristomium distinctly separated from posterior asetigerous as a smooth triangular section with no annular rings, weakly separated from prostomium anteriorly and surrounding mouth ventrally. Achaetous segment dorsally bears a pair of dorsal tentacles followed by first pair of branchiae (Figs. 37A, 38A); this achaetous segment seamlessly merged both dorsally and ventrally with setiger 1, which bears second pair of branchiae; achaetous segment with a distinct dorsal groove separating it from anterior peristomial region, but no groove present ventrally (Fig. 37B). Branchiae continuing on subsequent segments for at least two-thirds of body. Branchiae, on setigerous segments, arising dorsal to notosetae (Figs. 37A, 38A).

Parapodia of anterior and middle segments reduced to low ridges or mounds from which setae arise; posterior setigers with swollen podia bearing raised membrane from which acicular spines arise forming prominent cinctures (Figs. 37C, 38B). Setae of anterior segments all capillaries numbering 8–10 per fascicle in noto- and neuropodia, with notosetae longer than neurosetae. Long, thin, natatory-like capillaries present in notopodia of largest sexually mature specimens, entirely absent in smaller immature specimens. Neuropodial blunt-tipped acicular spines first appear in posterior body segments from setigers 31–38 (37 in holotype); notopodial spines from setigers 34–44 (43 in holotype). Noto- and neuropodial spines initially numbering 1–3 in a fascicle with 5–6 capillaries, then increasing to 3–4 spines; posterior cinctures on last 6–8 setigers with up to 9–11 spines each in noto- and neuropodia, or 18–22 spines on a side (Fig. 38B), presence of alternating capillaries variable, with some cinctures having only 1–3 capillaries among spines; when present, capillaries thin and elongated. High membranes of left and right notopodia extending over dorsal midline forming shallow channel (Fig. 37C); ventral surface flattened. Individual spines weakly curved, with narrow blunted tip (Fig. 39E); each with internal core clearly visible in light microscopy (Figs. 38C–D).

Body terminating in simple pygidium bearing 3–4 short papillae dorsal to anal opening and with broad cup-like structure ventral to anal opening (Figs. 37C–D).

Variability. Due to the large number of specimens available for study, a full range of sizes is available from post-larvae with 16 setigers up to the adults as described. A 34-setiger juvenile is shown in Fig. 39A–C. This specimen is 2.9 mm long and 0.22 mm wide and has most of the features of the large adults except that there is no dorsal groove separating the anterior peristomium from the achaetous segment that bears the dorsal tentacles and first pair of branchiae. These specimens also lack any of the long, natatory setae present in the adults that are apparently associated with sexual maturity in this species. The neuropodial acicular spines begin on setiger 12–13 and the notoacicular spines begin on setiger 15. The pygidium at this stage is only a simple rounded lobe rather than the cup-like structure of adults.

These specimens when stained with Shirlastain A and mounted in glycerin are more transparent than the larger adults and as such some internal anatomy is evident, including the brain or supraesophageal ganglion and the digestive track including the pharynx, esophagus, enlarged stomach filled with silt, and intestine (Fig. 39A–C).

A 16-setiger post larva is shown in Fig. 39D–F. At this early stage the prostomium and peristomium together are a smooth uninterrupted section continuing to setiger 1. The posterior setigers are moniliform prior to transitioning to the more typical cinctured segments of the adults; a few acicular spines are present in the last three setigers.

Methyl Green stain. The pre-setigerous region does not stain at all; the rest of the body stains uniformly green with no separate pattern; there are thin mid-dorsal and mid-ventral lines that stain darker and extend along most of the body.

Etymology. The epithet *australosetosa* is derived from the Latin *austral* for southern, and *seta* for bristle; in combination the name represents the "southern setosa" to contrast with *Chaetozone setosa* Malmgren, the type-species from the Arctic.

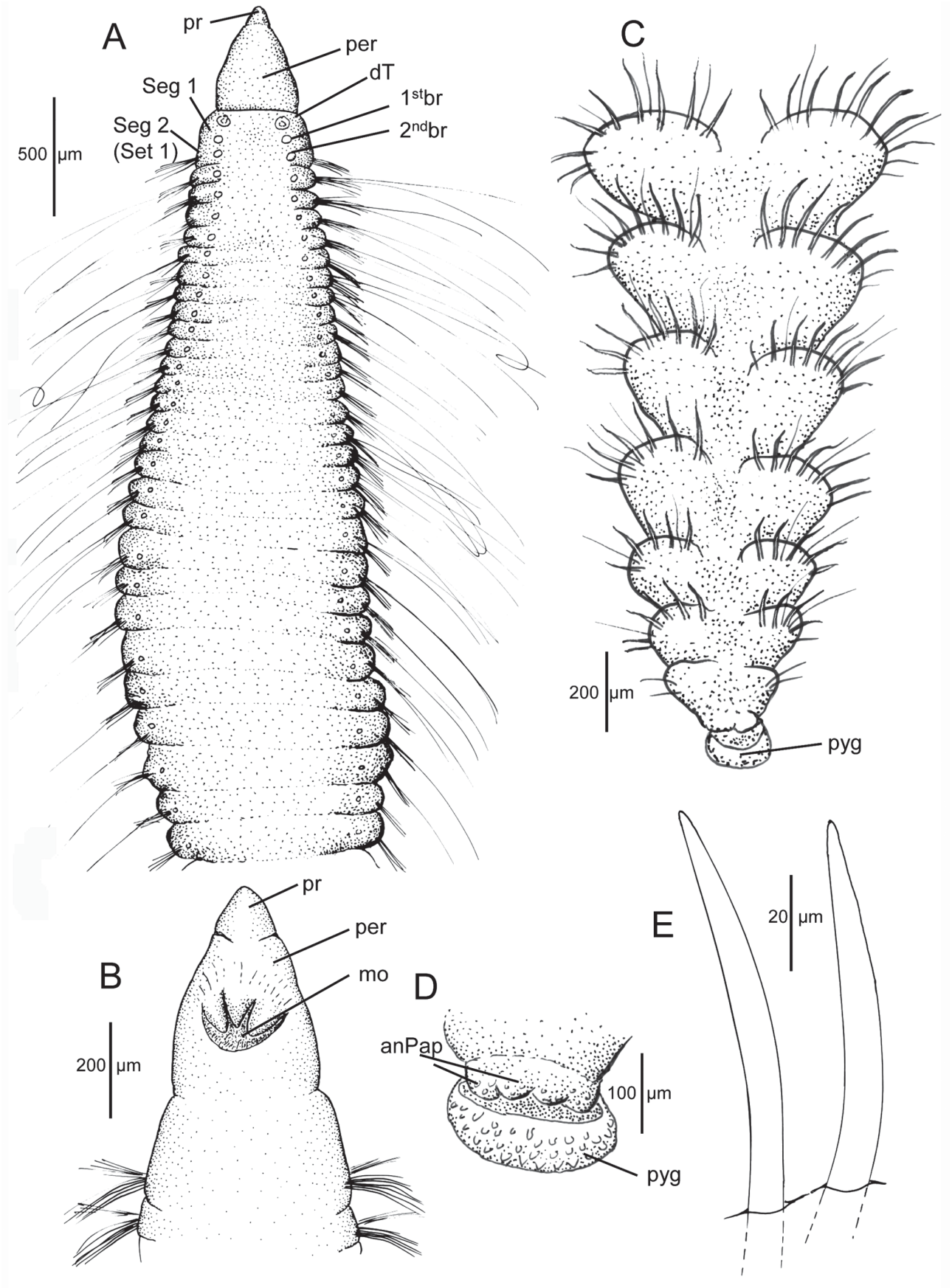

FIGURE 37. *Chaetozone australosetosa* **n. sp.** Holotype (LACM-AHF Poly 10219): A, Anterior half of holotype, dorsal view; B, anterior end, ventral view; C, posterior end, dorsal view; D, detail of pygidium, dorsal view; E, posterior neuropodial spines.

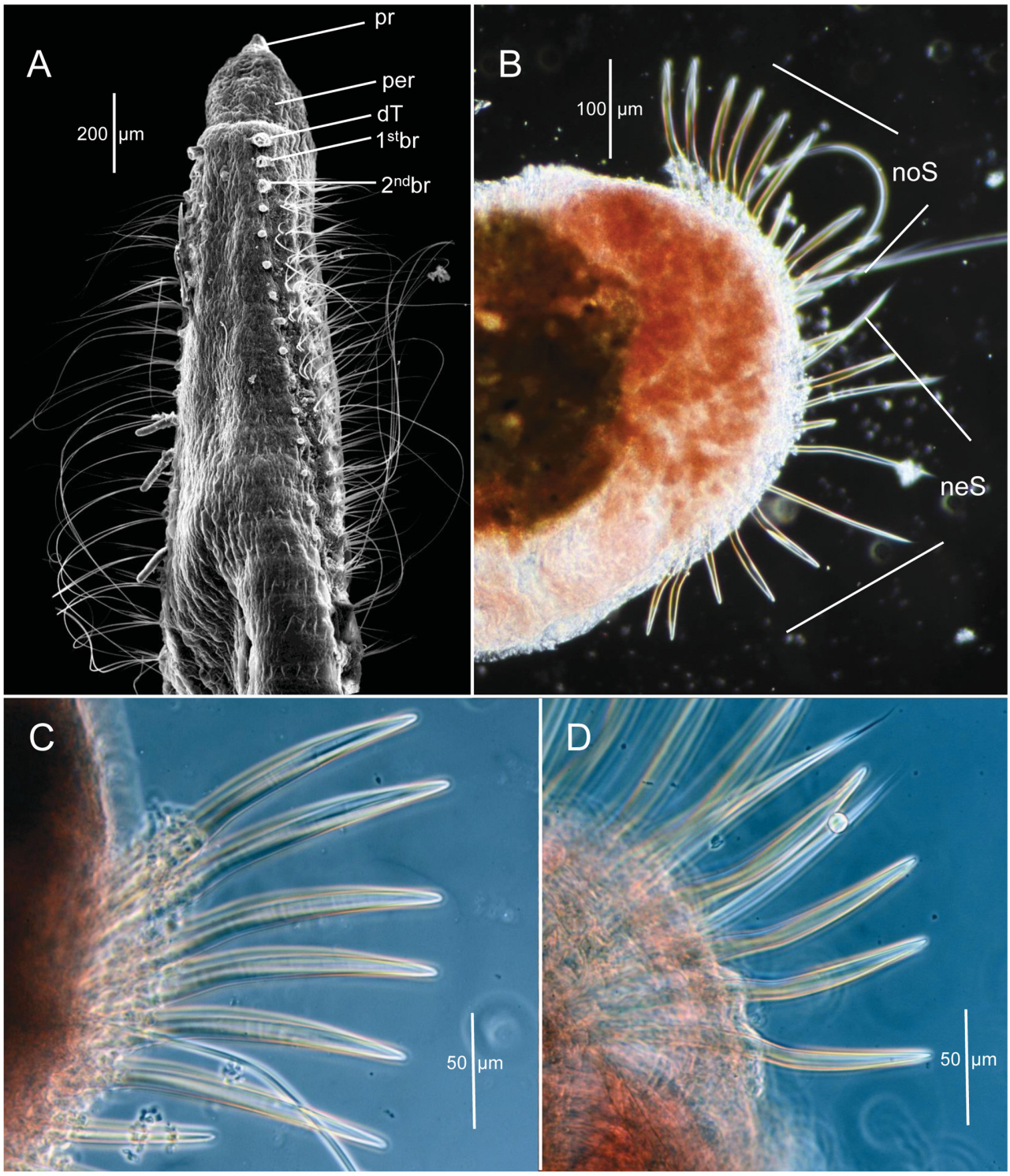

FIGURE 38. *Chaetozone australosetosa* **n. sp.** Paratypes (MCZ 149839), SEM and photomicrographs: A, anterior end, dorsal view; B, posterior parapodium, anterior view; C, notoacicular spines from posterior setiger; D, neuroacicular spines from posterior setiger.

Remarks. *Chaetozone australosetosa* **n. sp.** and a companion species, *C. biannulata* **n. sp.** (see below), are unique among species of *Chaetozone* in the manner in which the pre-setiger region posterior to the prostomium is divided into two parts, the second of which is interpreted as an achaetous segment that merges seamlessly with the anterior border of setiger 1. No separate segmental groove separates the achaetous segment from setiger 1. Both the dorsal tentacles and first pair of branchiae are located on the achaetous section anterior to setiger 1; the latter

carries the second pair of branchiae. The first and second pair of branchiae are arranged in a line directly posterior to the dorsal tentacles. *Chaetozone australosetosa* **n. sp.** differs from *C. biannulata* **n. sp.** in having a short, more bulbous pre-setigerous area instead of an elongate, narrow, triangular-shaped form. Both species are easily distinguished from other *Chaetozone* species by the obvious separation of the peristomium from the achaetous segment and in turn, the merger of the achaetous segment with setiger 1.

Two other species with a similar peristomium and achaetous segment arrangement are *C. reticulata* **n. sp.** from deep-water in the Weddell Sea (see below) and *C. hystricosa* Doner & Blake, 2006 from off New England in 70–100 m. However, in both of these species there is no dorsal groove separating the peristomium into two annular rings. The entire pre-setigerous region and setiger 1 combined is a single, elongate triangular-shaped area that is not interrupted by grooves. In addition, these two species have fewer spines in the posterior cinctures, i.e., about 11–13 spines on a side instead of the more than 20 in *C. australosetosa* **n. sp.** All three of the Antarctic species have a reduced number and irregular arrangement of capillaries accompanying the posterior acicular spines; *C. hystricosa* on the other hand, has a more typical pattern where an equal number of capillaries alternate with the spines. *Chaetozone reticulata* **n. sp.** has a distinctive reticulated pigment pattern over the dorsal surface; *C. australosetosa* **n. sp**., *C. biannulata* **n. sp**. and *C. hystricosa* have no consistent or distinctive pigment markings.

Distension of body segments with an enlarged "stomach" in some specimens of both *C. australosetosa* **n. sp.** and *C. biannulata* **n. sp.** is similar in some respects to another Antarctic species, *C. shackletoni* **n. sp.**, and to *C. brunnea* Blake, 2006 from deep-water offshore California. In both of these latter species, the "stomach" is a permanent feature. In *C. brunnea*, the enlarged area consistently provides a distinct twist to the body; whereas, the enlarged stomach when present in *C. australosetosa* **n. sp.** and *C. biannulata* **n. sp.** causes a dorsal hump on the body and not a twist. In most specimens of *C. australosetosa* **n. sp.** examined, the stomach was not distended.

Habitat & biology. Among the nearly 300 species of benthic invertebrates identified from samples taken from the vicinity of the Larsen Ice Shelf A and Prince Gustav Channel in May 2000, *Chaetozone australosetosa* **n. sp.**, with approximately 800 specimens in 33 samples, was the single most abundant species encountered. The surficial sediments at these locations consisted of 20–40% sand in the upper 0–5 cm (Gilbert & Domack 2003). The dominance of *C. australosetosa* **n. sp.** and other cirratulids in the benthic communities along the eastern side of the Antarctic Peninsula is striking and more typical of shallow-water assemblages we have sampled in North America. The benthic community ecology will be reported in another paper (Blake & Maciolek, in preparation). In addition, *C. australosetosa* is the most common and widespread species of *Chaetozone* encountered in shelf depths elsewhere in Antarctica.

Reproductive morphology included natatory setae in the largest specimens; eggs with diameters up to 165 µm were observed in specimens from the Larsen Ice shelf area collected in May 2000.

Distribution. Widespread in Antarctica; a dominant benthic species in shelf sediments of the East Antarctic Peninsula and the Weddell Sea, 317–978 m; West Antarctic Peninsula, Bransfield Straits, South Shetland Islands, McMurdo Sound.

Chaetozone biannulata new species

Figures 40–41

Tharyx marioni: Hartman, 1967: 118 (in part).
Chaetozone setosa: Hartman, 1978: 166. **Not** Malmgren, 1867.
Chaetozone sp.: Hartman, 1978: 166 (in part).
Chaetozone sp. 1: Blake & Narayanaswamy 2004: 1806, 1813.
Chaetozone sp. 2: Blake & Narayanaswamy 2004: 1813.
Chaetozone sp. 3: Hilbig 2001: 540 (in part); Hilbig *et al*. 2006: 715, 717, 719, 724 (in part); Montiel *et al.* 2005: 197, 2016: Appendix 2 (in part).

Material Examined. Drake Passage, North of South Shetland Islands, R/V *Polarstern*, ANDEEP I (ANT-XIX/3), Sta. PS61/114-6, 18 Feb 2002, 61°43.55′S, 60°43.87′W, box corer, 2905 m, **holotype** (SMF 24915) and 14 **paratypes** (SMF 24916); Sta. PS61/114-5, 18 Feb 2002, 61°43.55′S, 60°43.87′W, MUC, 2917 m, 5 **paratypes** (SMF 24917); Sta. PS61/114-8, 18 Feb 2002, 61°43.46′S, 60°43.29′W, box corer, 2881 m, 3 **paratypes** (SMF 24918); Sta. PS61/40-4, 26 Jan 2002, 58°55.27′S, 61°0.02′W, box corer, 1838 m, 1 **paratype** (SMF 24919); Sta.

PS61/43-2, 29 Jan 2002, 60°26.95′S, 56°4.96′W, box corer, 3957 m, (16, SMF 24920); **Drake Passage,** USNS *Eltanin*, Cr. 4, Sta. 126, 29 Jul 1962, 57°12′S, 62°48′W, 3733–3806 m (5, USNM 56004); **off King George Island**, R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-334, 19 Mar 1998, 61°26.7′S, 58° 06.6′W, MG, 1028 m (1, MCZ 149850); Sta. 48-341, 19 Mar 1998, 61°34.5′S, 58°07.0′W, MG, 429 m (8, MCZ 149851).—**Scotia Sea,** R/V *Polarstern*, ANDEEP I (ANT-XIX/3), Sta. PS61/46-3, 01 Jan 2002, 60°37.92′S, 53°57.17′W, box corer, 2888 m, 6 **paratypes** (MCZ 24921); Sta. PS61/46-5, 01 Jan 2002, 60°38.13′S, 53°57.68′W, box corer, 2894 m (1 juvenile, SMF 24922).—**Scotia Sea, Powell Basin**, R/V *Polarstern*, ANDEEP III (ANT-XXII/3), Sta. PS67/121-12, 15 Mar 2005, 63°36.19′S, 50°37.15′W, box corer, 2657 m, (1, SMF 24923); Sta. PS67/142-7, 18 Mar 2005, 62°11.61′S, 49°29.45′W, box corer, 3406 m (3, SMF 24924); Sta. PS67/151-6, 21 Mar 2005, 61°45.55′S, 47°7.56′W, box corer, 1180 m, 1 **paratype** (SMF 24925); 1 paratype on SEM Stub (MCZ 149852); Sta. PS67/153-5, 29 May 2005, 63°19.41′S, 64°36.82′W, MUC, 2079 m (1, SMF 24926).—**Weddell Sea, off East Antarctic Peninsula,** R/V *Polarstern*, ANDEEP II (ANT-XIX/4), Sta. PS61/131-8, 06 Mar 2002, 65°18.65′S, 51°30.91′W, box corer, 3068 m (1, SMF 24927); Sta. PS61/131-9, 06 Mar 2002, 65°18.55′S, 51°31.95′W, MUC, 3064 m, (1, SMF 24928); USCG *Glacier* Sta. 68-5, 09 Feb 1968, 76°00′S, 55°00′W, VV grab, 400 m, (2 complete, USNM 46784); Sta. 68-40, 03 Mar 1968, 71°47.6′S, 40°41.3′W, 2949m (1, USNM 46785); Sta. 69-21, 13 Mar 1969, 73°52′S, 31°, 18′W, 2288 m, (2, USNM 46798); Sta. 69-4, 26 Feb 1969, 77°05.5′S, 35°04′W, 743 m (1, USNM 46790).—**Central Weddell Sea**, R/V *Polarstern*, ANDEEP II (ANT-XIX/4), Sta. PS61/138-7 17 Mar 2002, 62°58.01′S, 27°53.87′W, MUC, 4541 m (1, SMF 24931).—**Weddell Sea, off South Sandwich Islands**, R/V *Polarstern*, ANDEEP II (ANT-XIX/4), Sta. PS61/141-7, 22 Mar 2002, 58°24.91′S, 25°1.24′W, box corer, 2217 m (2, SMF 24929).—**South Sandwich Trench**, R/V *Polarstern*, ANDEEP II (ANT-XIX/4), PS61/142-5, 24 Mar 2002, 58°50.83′S, 23°58.61′W, MUC, 6337 m (2, SMF 24930).—**Weddell Sea, off Coats Land**, USCG *Glacier*, Sta. 69-8, 2 Mar 1969, 77.603°S, 42.500°W, 585 m, (6 USNM 46793); Sta. 69-19, 11 Mar 1969, 74.105°S, 32.605°W, 1622 m (1); Sta. 69-20, 12 Mar 1969, 73.823°S, 31.682°W, 2288 m (1, USNM 46797).—**South Shetland Islands, off King George Island**, R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-326, 17 Mar 1998, 62°20.1′S, 58°38.8′W, MG, 606 m (10, SMF 24932).—**West Antarctic Peninsula, Bransfield Strait**, USNS *Eltanin* Cr. 6, Sta. 416, 02 Jan 1963, 63.67°S, 56.22°W, trawl, 494–507 m (1, USNM 1490765).—**Ross Sea, E. McMurdo Sound**, SW of Tent Island, Deep-Freeze II, USCG *Glacier*, 77°43.1′S, 166°21.5′E, OPG Grab, 421 m, coll. W.L. Tressler (1, USNM 1490766).—**South Pacific Ocean, East of New Zealand,** 180 km east of Antipodes Islands, USNS *Eltanin* Cr. 32, Sta. 2143, 26 Feb. 1968, 49.85°S, 178.583°E, Blake trawl, 2100 m (3, USNM 1490767).

Description. A moderate-sized species, holotype complete, 9.3 mm long, 0.65 mm wide across mid-body, 55 setigerous segments. Complete paratypes 9.3 to 11.8 mm long for 58–60 setigerous segments. Body with anterior segments short, about four times wider than long (Fig. 40A), becoming widest in middle body at five times wider than long, then narrowing posteriorly to moniliform segments about 1.5 times as wide as long. Wide mid-body with enlarged stomach area apparent through body wall, sometimes enlarged and apparent externally, but not distending body to any extent. Dorsal grooves and ridges absent; venter with low mid-ventral ridge present from anterior to posterior segments. Posterior segments tapered over last 15 segments, with weak groove between elevated parapodia of cinctured segments bearing spines producing prominent armature. Color in alcohol light tan, with brown pigmentation dorsolateral in segmental grooves of some specimens.

Entire pre-setiger region elongate, triangular with three parts: prostomium, peristomium, and achaetous segment merging seamlessly with setiger 1. Prostomium elongate, triangular in dorsal view, 1.5x longer than wide, tapering to narrow tip (Figs. 40A, 41A–C); eyespots absent; nuchal organs prominent elevated lobes at posterior border with peristomium (Figs. 40A, 41A–C), each with circular opening bearing cilia (Fig. 41A inset), not pigmented. Peristomium indistinctly separated from prostomium and separately from achaetous segment by prominent transverse groove (Figs. 40A, 41A–C); peristomium with low dorsal crest and ventrally surrounding mouth; achaetous segment separated from peristomium by distinct dorsal groove, not continuing ventrally (Figs. 40A, 41A–C); achaetous segment extending posteriorly, merging with setiger 1 with only evidence of separation a weak lateral groove seen in SEM (Fig. 41A); achaetous segment bearing dorsal tentacles followed by first pair of branchiae (Figs. 40A, 41A–C). Second pair of branchiae dorsal to notosetae on setiger 1; branchiae continuing on subsequent setigers throughout body.

Anterior parapodia reduced to low elevations from which setae emerge; individual segments denoted dorsally by transverse grooves (Figs. 40A, 41C). Middle parapodia reduced to individual setal tori. Posterior setigers

becoming moniliform, then transitioning to cinctured segments with elevated membranes from which spines and capillaries emerge (Figs. 40B, 41E). Anterior setae all simple capillaries; sexually mature specimens with long natatory notosetae; 10–12 notosetae and 8–10 neurosetae in thoracic setigers; reduced to 6–8 noto- and neurosetae per fascicle in far abdominal segments; notosetae longer than neurosetae; fascicles of noto- and neurosetae arising close to one another. Notoacicular spines from setigers 34–35; neuroacicular spines from setigers 37–38. In cinctured segments, up to 10–11 spines in notopodia and 10–13 spines in neuropodia, or full cinctures with 20–24 spines on a side. In cinctures, thin capillaries typically alternating with notoacicular spines in lower part of fascicle and with neuroacicular spines in upper part of fascicle (Fig. 41E). Spines curved, tapering to pointed tip (Figs. 40C, 41D–E).

Last few cinctured segments narrowing to pygidium bearing ventral, disc-like lobe (Fig. 40B).

Methyl Green stain. Body stains more or less uniformly throughout; with a band of stain around the subapical part of the prostomium, tip of prostomium not staining at all; some stain concentrated in intersegmental grooves of mid-body segments.

Etymology: The species name *biannulata* is from the Latin*, bis* for two and *annulatus* for ringed, in reference to the two distinctly separate pre-setal rings consisting of the peristomium and an achaetous segment.

Remarks. *Chaetozone biannulata* **n. sp.** and *C. australosetosa* **n. sp.** form a species pair, with the first more common in deep-water slope depths and the second more common in shelf depths. Both species are unique among in the manner in which the peristomium is divided into two parts, the second of which is interpreted as an achaetous segment that merges seamlessly with the anterior border of setiger 1. The main differences between the two species are that *C. biannulata* **n. sp.** has a long, narrow triangular-shaped prostomium/peristomium whereas in *C. australosetosa* **n. sp.** this is short and conical. These differences result in the pre-setigerous region of *C. australosetosa* **n. sp.** being shorter and somewhat bulbous compared to the elongate triangular shape of *C. biannulata* **n. sp.**

Similarities and differences between *C. australosetosa* **n. sp.** and *C. biannulata* **n. sp.** with *C. reticulata* **n. sp.**, another Antarctic species, and *C. hystricosa* from North America are discussed with *C. australosetosa* **n. sp.** (see above).

Habitat & biology. The majority of samples for which surficial sediment data was developed during ANDEEP I and II was predominately silt-clay with lesser amounts of sand or pebbles. The color of the mud was generally dark greenish-grey or brown (Howe *et al*. 2004, 2007). There was considerable evidence of bioturbation in the sediment profile images (Diaz 2004). The Powell Basin station sampled during ANDEEP III had surficial sediment that was fine-to-medium silt, poorly sorted with sand (3%), silt (66%), and clay (31%) (Howe *et al*. 2007).

Eggs measuring 60–100 µm observed in several ovigerous females from the Weddell Sea.

Distribution: Drake Passage and Scotia Sea, 421–3957 m; Weddell Sea to South Sandwich Trench, 743–6337 m; off South Shetland Islands, 400–606 m; South Pacific Ocean, E of New Zealand, 2100 m.

Chaetozone bransfieldensis (Hartmann-Schröder & Rosenfeldt, 1989) new combination

Figure 42

Tharyx spp. Hartman 1967: 118 (in part).
Chaetozone setosa: Hartman 1978:166 (in part). **Not** Malmgren, 1866.
Caulleriella bransfieldensis Hartmann-Schröder & Rosenfeldt, 1989: 67, figs. 3–5.

Material Examined. Antarctic Peninsula, Bransfield Strait, R/V *Polarstern*, Cr. ANT-III/2, Sta. 207, coll. 3 Dec. 1984, 62°59′S, 57°05′W, 68 m, **holotype** (ZMH P-19615); USNS *Eltanin* Cr. 6, Sta. 436, 8 Jan 1963, 63.23°S, 58° W, Otter trawl, 73 m (1, USNM 1129132).—**South Shetland Islands**, south of Low Island, R/V *Hero* Sta. 691-26, 10 Feb 1969, 63.425°S, 62.250°W, 119–124 m, (1, USNM 187652); NE of Clarence Island, USNS *Eltanin* Cr. 12, Sta. 1089, 17 Apr 1964, 60.78°S, 53.507°W, 641 m (1, USNM 56078); Deception Island, R/V *Hero*, Sta. 721-797, 12 Jan 1972, 62.972°S, 60.83°W, Petersen grab, 81 m (1, USNM 1490769).—**Ross Sea,** off Cape Adare, USNS *Eltanin* Cr. 27, Sta. 1869, 13 Jan 1967, 71.267°S, 171.667°E, trawl, 1565–1674 m, (1, USNM 1490768).—**Weddell Sea**, Coats Land, off Halley Bay, USCG *Glacier*, Sta. 69-1, 24 Feb 1969, 74.468°S, 30.528°W, Anchor dredge, 513 m (3, USNM 46788).

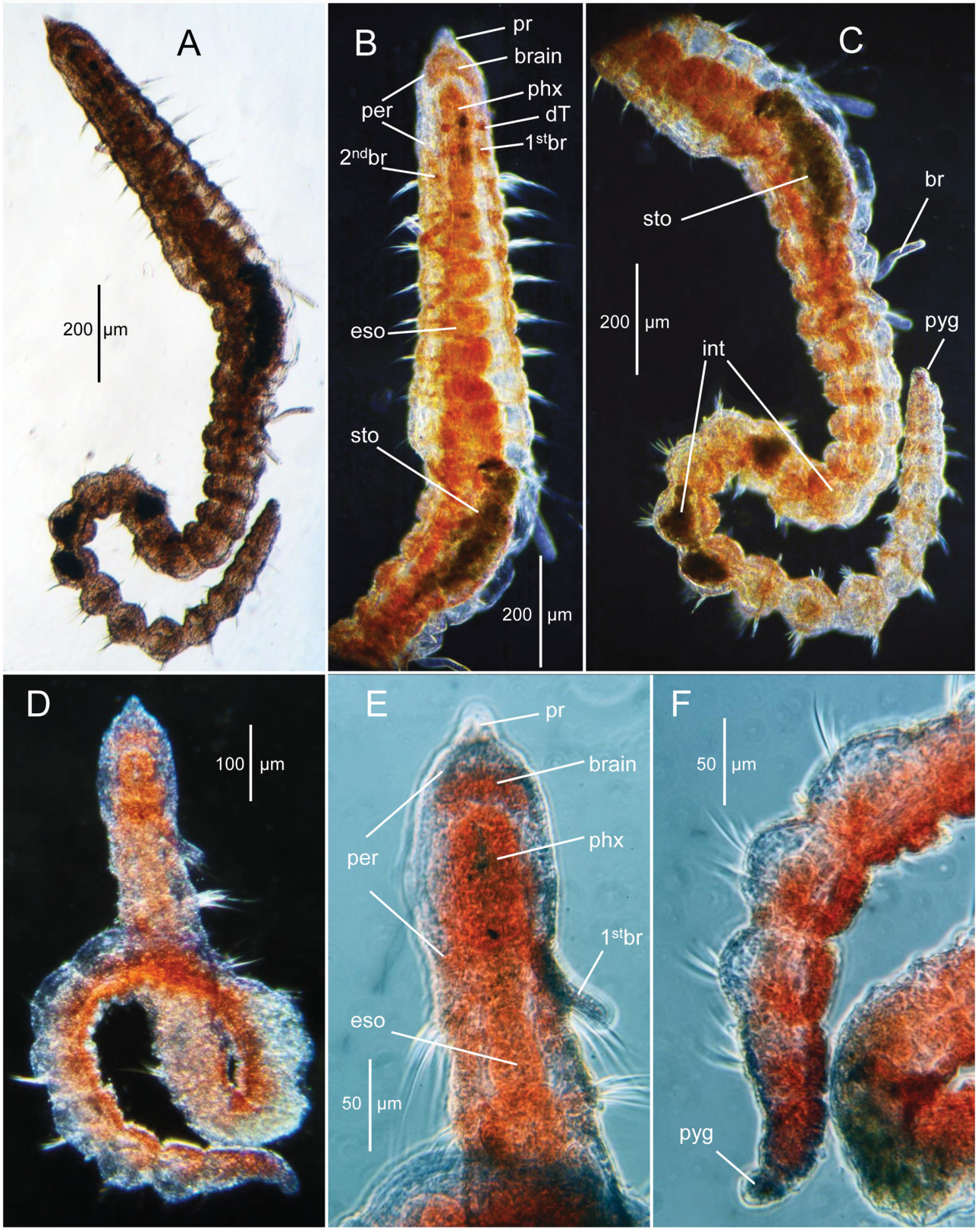

FIGURE 39. *Chaetozone australosetosa* **n. sp.** Paratypes (MCZ 149839), photomicrographs of juveniles: A–C, 34-setiger juvenile: A, entire worm, dorsal view; B, same, anterior half, dorsal view twisting to lateral view; C, same, posterior half, dorsal view twisting to lateral view. D–F, 16 setiger juvenile: D, entire worm, twisted from dorsal to lateral; E, anterior end, dorsal view; F, posterior end, right lateral view. All stained with Shirlastain A.

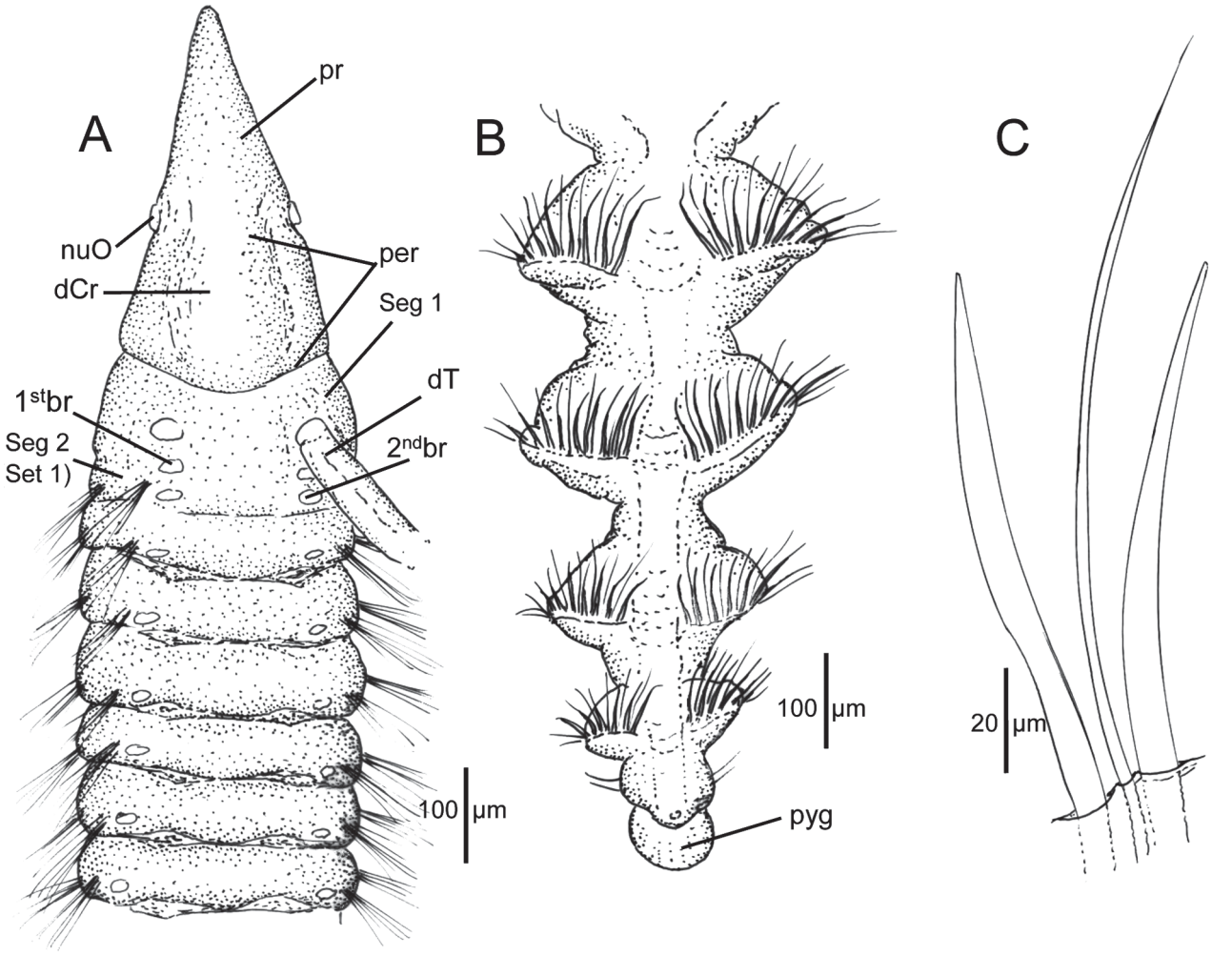

FIGURE 40. *Chaetozone biannulata* **n. sp.** Paratype (Sta. 151-6, SMF 24925): A, anterior end, dorsal view; B, posterior end, dorsal view; C, neurosetae from posterior setiger.

Description. A small to moderate-sized species, holotype approximately 10 mm long, 1.0 mm wide for 82 setigers; paratypes reported larger, 22 mm long, 1 mm wide with up to 122 setigers (Hartmann-Schröder & Rosenfeldt 1989). Body enlarged, somewhat fusiform anteriorly, then narrowing posteriorly. Color in alcohol: light tan, with some faint dusky pigment on anterior end especially in grooves of peristomial annuli.

Prostomium triangular, narrowing to rounded tip (Fig. 42A); a single pair of reddish eyespots present (Fig. 42A inset), or absent; each eyespot when present round with distinct lens surrounded by red pigment cup; nuchal organs not observed. Peristomium wide, with two annuli, second trapezoidal in shape, narrowing posteriorly and terminating in middle of setiger 1. Dorsal tentacles arising from setiger 1, lateral to end of peristomium (Fig. 42A); first pair of branchiae lateral and posterior to dorsal tentacles on setiger 1; second pair of branchiae on setiger 2; subsequent branchiae dorsal to notosetae on each segment; most branchiae short or limited to stubs (Fig. 42C).

Parapodia reduced to simple setal tori; postsetal lamellae absent. Setal fascicles of noto- and neuropodia close to one another throughout body. Notosetae long capillaries anteriorly, partially replaced by a pair of heavy curved spines from about setiger 22–24; capillary neurosetae mostly replaced by 1–2 heavy spines from setiger 9–12, spines increasing to 4–5 in far posterior setigers; noto- and neuroacicular spines in pairs throughout middle setigers (Fig. 42B); posterior spines forming partial cinctures with 4–5 opposing spines arising from thin membranous elevated podial lobes (Fig. 42C); 8–10 spines on a side. Spines heavy, with those most medial and newest thicker and more curved (Fig. 42D). Some specimens epitokous with long, natatory setae. Pygidium a rounded disk ventral to anal opening.

Methyl Green stain. Body staining uniformly; no distinct pattern or speckling apparent.

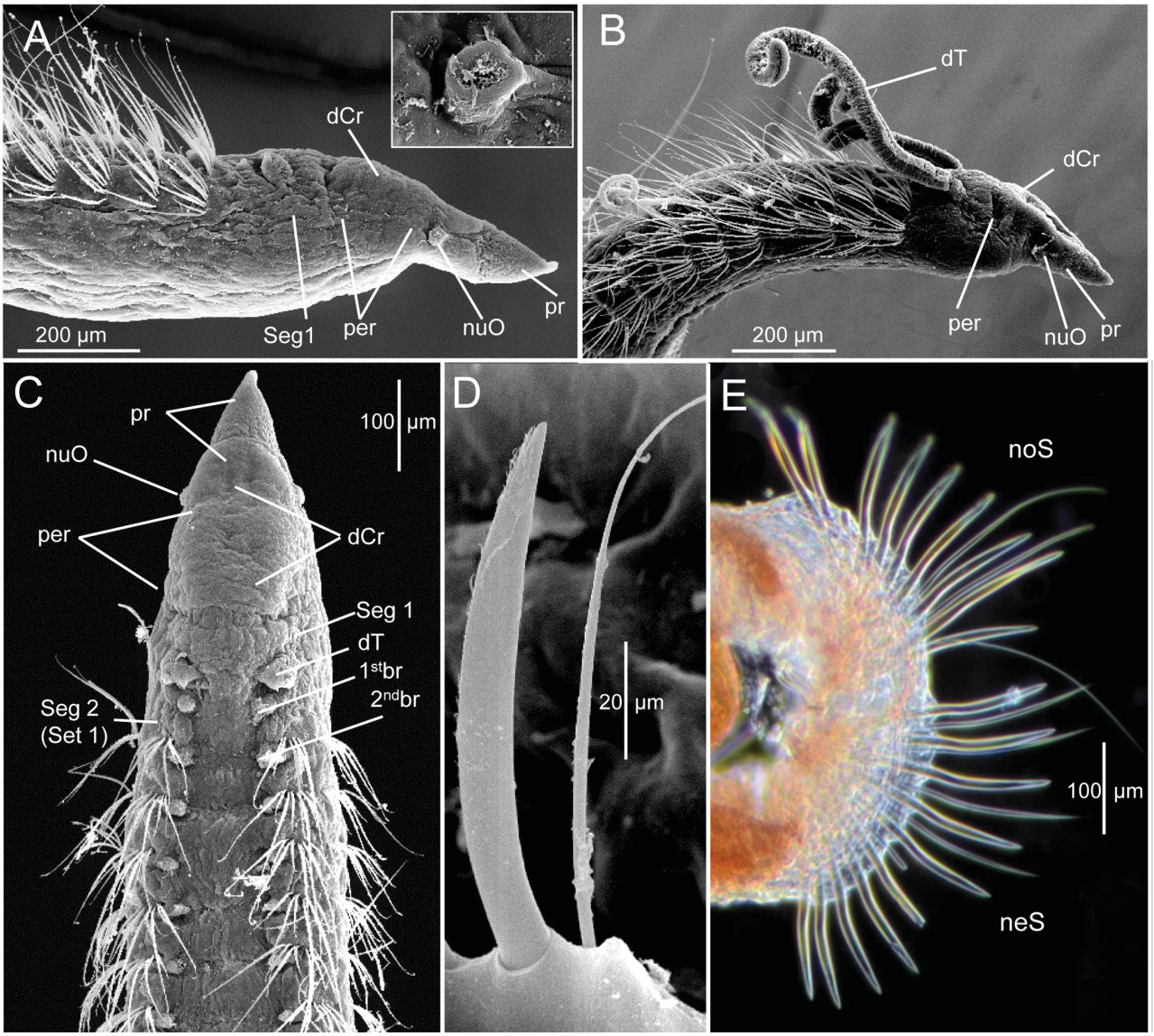

FIGURE 41. *Chaetozone biannulata* **n. sp.** A–D, SEMs: A, anterior end, right lateral view (inset of nuchal organ); B, anterior end, right lateral view; C, anterior end, dorsal view; D, notoacicular spine and capillary. E, photomicrograph of posterior parapodium, anterior view. A–D, paratypes (SEM stubs, Sta. 151-6, MCZ 149852); E, paratype (Sta. 151-6, SMF 24925).

Remarks. *Caulleriella bransfieldensis* is here transferred to *Chaetozone* because it has simple blunt-tipped spines in the noto- and neuropodia instead of bidentate hooks. The spines form partial cinctures in posterior segments as in several related species (Blake 1996, 2015). Furthermore, the setal fascicles of noto- and neuropodia are set close together instead of widely separated as in species of *Caulleriella* (see Blake 1996; this study). The species is readily distinguished from Antarctic congeners by the presence of a single pair of eyespots (when present) and the heavy noto- and neuropodial spines that form partial cinctures in posterior segments.

On a global basis *C. bransfieldensis* is similar to *C. acuta* Banse & Hobson, 1968 from the Puget Sound, Washington (see Blake 1996). Both species have a pair of eyespots and acicular spines first present from anterior setigers; posterior spines are developed into partial cinctures. In *C. acuta*, some anterior notopodial spines are of an unusual oblique shape with fibrils present along one edge; such setae are absent in *C. bransfieldensis*. In *C. acuta* the dorsal tentacles and first pair of branchiae arise from the posterior part of the peristomium; in *C. bransfieldensis*, they first appear on setiger 1.

Distribution. Antarctic Peninsula, Ross Sea, Weddell Sea, shelf and slope depths, 73–1674 m.

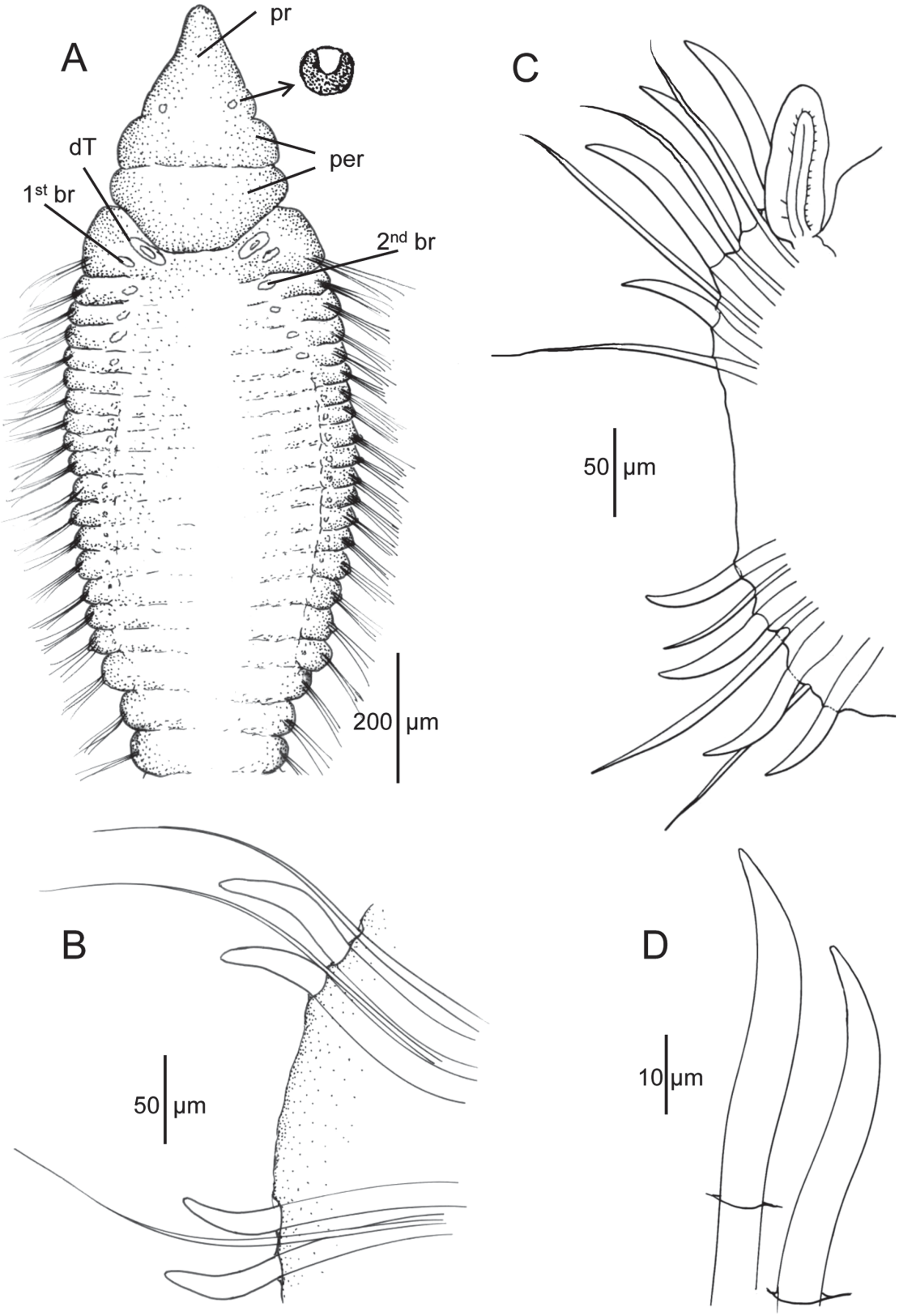

FIGURE 42. *Chaetozone bransfieldensis* (Hartmann-Schröder & Rosenfeldt, 1989). A, anterior end, dorsal view, arrow indicates detail of eyespot, not to scale; B, mid-body segment, setiger 40, with paired noto- and neuroacicular spines and companion capillaries; C, far posterior segment, with partial cinctures of noto- and neuroacicular spines; D, neuroacicular spines. A, C, holotype (ZMH P-19615); B, D, specimen from *Hero*, Sta. 721-797 (USNM 1490769). C, modified from Hartmann-Schröder & Rosenfeldt 1989.

***Chaetozone castanea* new species**
Figures 43–44

Material examined. **Peru: Off Lima**, SEPBOP, R/V *Anton Bruun* Cr. 17, Sta. 657-K, 24 Jun 1966, 12°10′S, 77°27′W, rock dredge, 150 m, **holotype** (USNM 1490739) and 90 **paratypes** (USNM 1490740); Sta. 657-F, 24 Jun 1966, 12°03S, 77°18′W, rock dredge, 105 m (1, USNM 1490741); **North of Lima**, SEPBOP, R/V *Anton Bruun* Cr. 16, Sta. 654-A, 10 Jun 1966, 09°29′S, 78°54′W to 09°32′S, 78°47′W, trawl, 140 m, (2, USNM 1490742); Cr. 18B, Sta. 751, 04 Sep 1966, 10°02′S, 78°38′W, 160 m (5, USNM 1490743); **South of Lima**, SEPBOP, R/V *Anton Bruun* Cr. 18A, Sta. 735, 24 Aug 1966, 16°20′S, 73°27′W, trawl, 110 m (80, USNM 1490744).—**Chile: Bahia Mejillones**, SEPBOP, R/V *Anton Bruun* Cr. 18A, Sta. 721, 19 Aug 1966, 23°02′S, 70°27′W, trawl, 65–98 m (135, USNM 1490745).

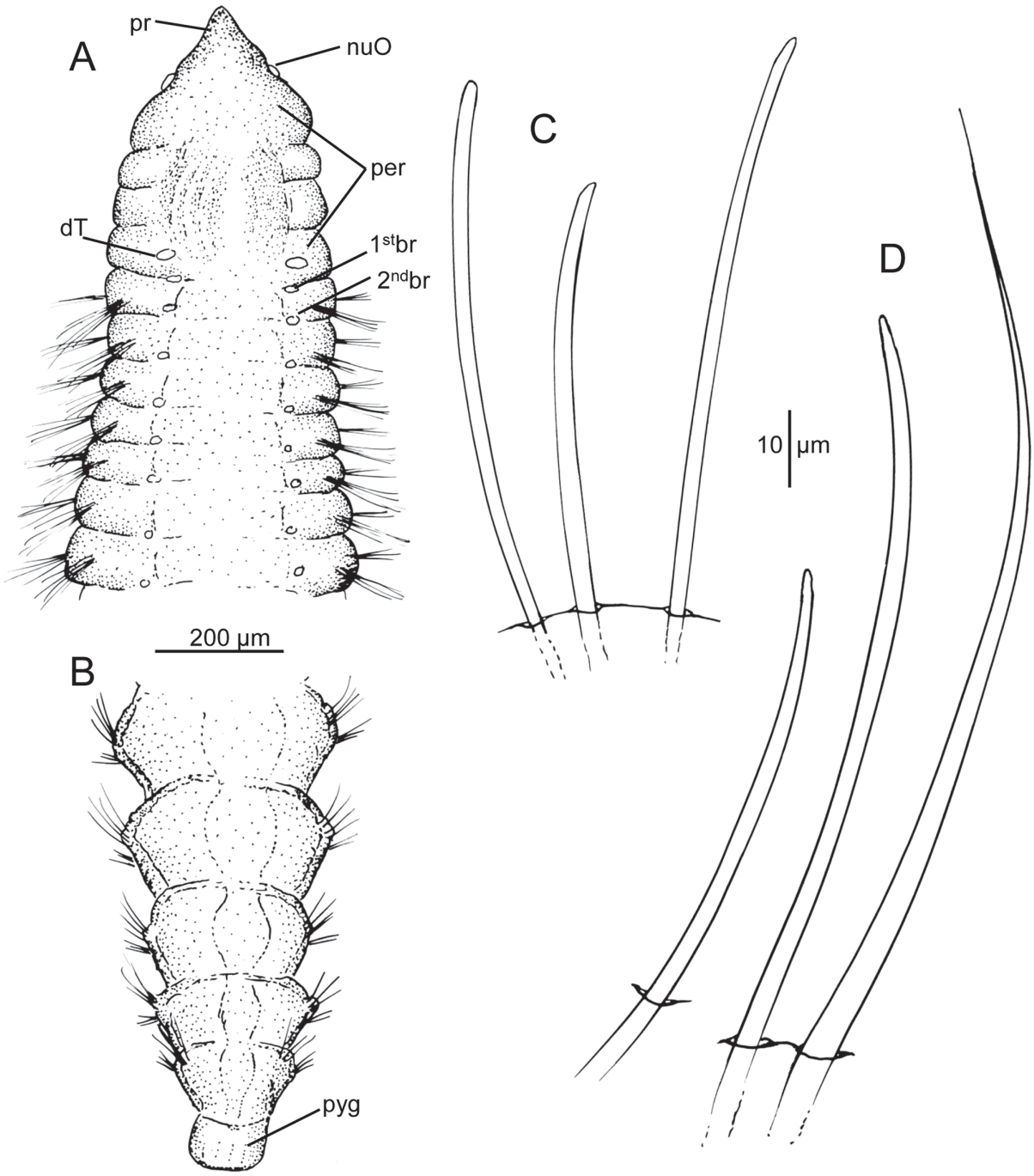

FIGURE 43. *Chaetozone castanea* **n. sp.** Paratype (USNM 1490740): A, anterior end, dorsal view; B, posterior end, dorsal view; C, posterior notoacicular spines; D, posterior neuroacicular spines.

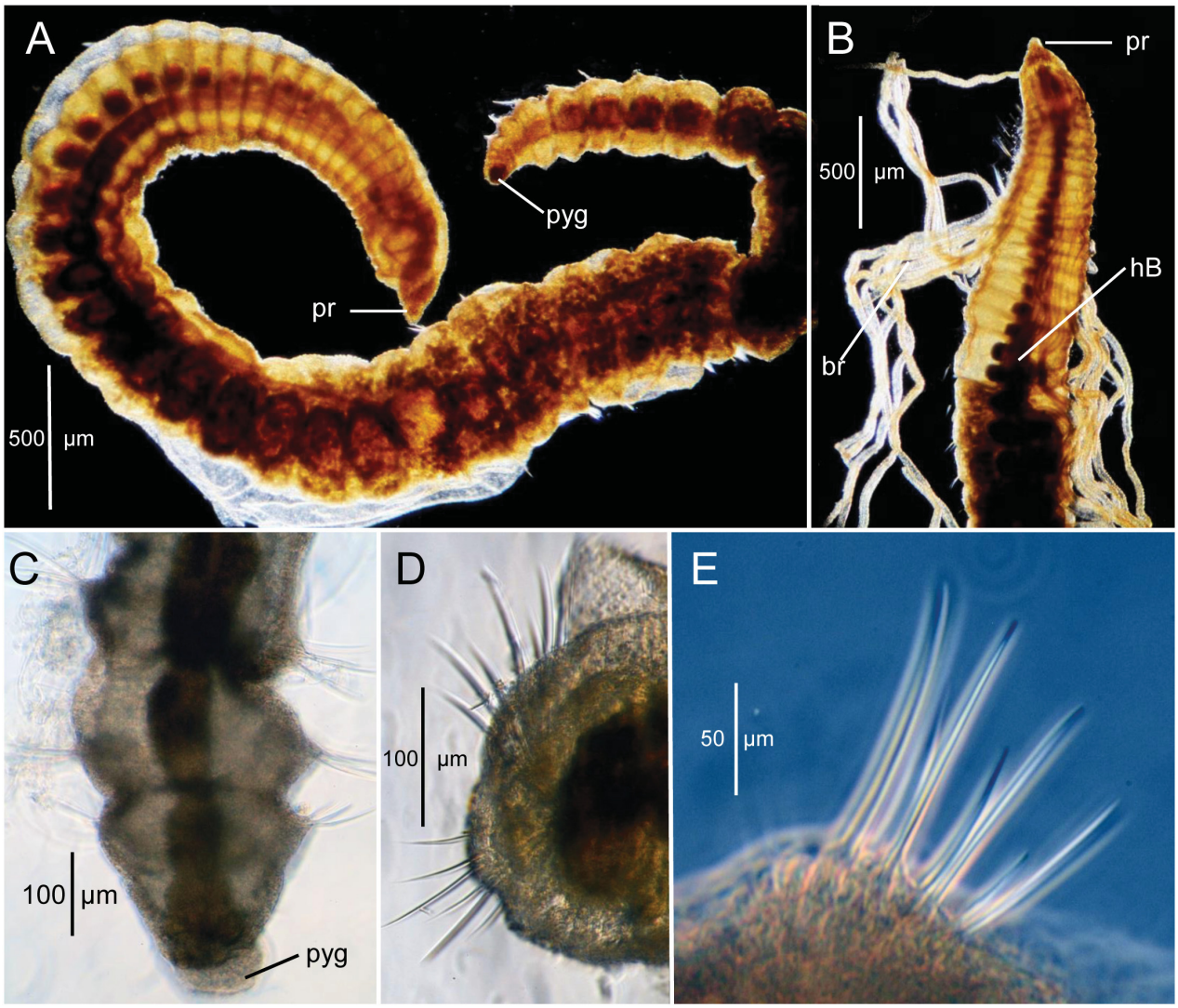

FIGURE 44. *Chaetozone castanea* **n. sp.** Paratypes (USNM 1490740): A, entire worm, ventrolateral view; B, anterior end, dorsal view; C, posterior end, dorsal view; D, posterior parapodium, posterior view; E, neuroacicular spines

Description. A small species, holotype complete, 7.0 mm long, 0.5 mm wide for 50 setigerous segments; largest paratypes 7.6–7.8 mm long, 0.5 mm wide with 45–50 setigers. Body elongate, widest in middle segments, narrowing posteriorly; anterior segments about five times as wide as long; middle body segments about twice as wide as long (Fig. 44A). Dorsum rounded, without groove or ridge; venter somewhat flattened, without groove or ridge. Far posterior setigers narrowing, somewhat moniliform (Figs. 43B, 44A, C). Dorsal blood vessel and heart body prominent in larger specimens (Fig. 44B). Color in alcohol distinctly light to dark brown from numerous subdermal pigmented cells throughout body.

Prostomium triangular, narrowing to a rounded anterior margin (Figs. 43A, 44A–B); eyes absent; nuchal organs elevated lobes, lateral on posterior margin of prostomium. Peristomium with anterior section merged with prostomium, followed by three nearly equal annular rings (Fig. 43A), peristomial grooves best developed laterally; dorsum relatively smooth, with a low raised mound forming weak dorsal ridge. Dorsal tentacles arising from middle of last peristomial ring (Fig. 43A); first pair of branchiae lateral and slightly posterior to tentacles on anterior margin of setiger 1 (Fig. 43A); second pair of branchiae on posterior edge of setiger 1, dorsal to notosetae; subsequent setigers with branchiae in similar location (Fig. 43A); branchiae continuing into middle body segments, absent in posterior half of body.

Setiger 1 of approximately same size as following segments (Fig. 43A); podial lobes reduced to low mounds throughout, best developed in far posterior setigers (Figs. 43B, 44C). Noto- and neurosetae from setiger 1 all

capillaries; notosetae 4–5 per fascicle, neurosetae 5–6 per fascicle; each capillary long, thin, with no fibrils apparent along edge of shaft; long natatory-like notosetae absent. Capillaries in both noto- and neuropodia transitioning to acicular spines from about setiger 39–45, earlier in shorter specimens; notoacicular spines longer than neuroaciculars, numbering 2–3 per fascicle and accompanied by an equal number of capillaries; neuroacicular spines shorter, 5–6 per fascicle (Fig. 44E), companion capillaries rare. Individual spines with narrow shaft, tapering to blunted tip (Fig. 43C–D). Posterior spines organized into partial cinctures; with only 7–9 thin, narrow spines on a side (Fig. 44D); accompanying capillaries long, irregularly spaced, not noticeably alternating with spines.

Pygidium a simple achaetous segment with terminal anus and ventral disk-like lobe (Figs. 43B, 44C).

Methyl Green stain. Pre-setigerous region and far posterior segments not retaining stain; rest of body staining uniformly with no pattern.

Etymology. The epithet is from the Latin, *castaneus* for brown or the color of chestnuts in reference to the overall brown pigment on this species.

Remarks. *Chaetozone castanea* **n. sp.** is readily identified by its overall brown color due to numerous subdermal pigmented glands. The last peristomial ring before setiger 1 may be an achaetous segment because it bears the dorsal tentacles; the first pair of branchiae occurs at its junction with setiger 1 suggesting that a setiger has been lost. Here the first pair of branchiae is interpreted as being on the anterior border of setiger 1, which means that two branchiae occur on that segment. Given the reduced number of posterior spines and its distinct brown-pigmented body, *C. castanea* **n. sp.** differs from all other described species of *Chaetozone*. *Chaetozone castanea* **n. sp.** has acicular spines that are elongate, thin, and taper to a narrow, blunted tip instead of being short, sigmoid, thick, and taper to a curved, blunted tip. In this respect, *T. castaneus* **n. sp.** is most similar to the Antarctic species, *C. homosetosa* (see below). *Chaetozone homosetosa*, however, is a much larger species, up to 24 mm long vs. 7 mm for *T. castaneus* **n. sp**. and lacks pigment on the body.

Biology. Both males with sperm packets and females with large yolky eggs measuring up to 230 µm in diameter are present in the type collection. Eggs this large suggest either a lecithotrophic or direct development.

Distribution. Offshore Peru, 105–160 m; Chile, 65–98 m.

Chaetozone corona Berkeley & Berkeley, 1941

Chaetozone spinosa corona Berkeley & Berkeley, 1941: 45–46.

Chaetozone corona: Hartman 1960: 125; 1961: 109–110; 1969: 235, figs. 1–3; Blake 1996: 285–287, figs. 8.6; Çinar & Ergen 2007: 341–345, figs. 2–4; Dean & Blake 2007: 46–47, fig. 3; Çinar 2009: 2304–2305; Çinar *et al*. 2011: 2115; Çinar *et al*. 2012a: 1462; Çinar *et al*. 2012b: 960; Çinar & Dagli 2013: 925; Blake 2015: Table 2; Le Garrec *et al*. 2017: 433–445, fig. 3.

Material examined. **Off Ecuador**, SEPBOP, R/V *Anton Bruun* Cr. 18B, Sta. 768-D, 10 Sep 1966, 03°36′S, 80°38′W, ca. 50 m (1, USNM 1490770).

Descriptive remarks. The single specimen is complete, 16 mm long, 1 mm wide, and with about 60 setigerous segments. The pre-setigerous region is short and thick with a triangular-shaped prostomium and thick peristomium with a rounded dorsal crest. The characteristic eyespots are not visible, possibly having faded after 50 years in preservative. Three neuropodial spines are present from setiger 1; a single notopodial spine is present from setiger 4. Posterior segments contain partial cinctures with three notopodial acicular spines and five neuropodial spines. The spines alternate with capillaries. Long natatory-like capillary setae arise from anterior and middle-body notopodia. Small oocytes are present in the coelom.

General remarks. This single specimen is the first record of *Chaetozone corona* from the SE Pacific off South America. Previous Pacific records are from California to Costa Rica (Blake 1996; Dean & Blake 2007). Other records of the species are from Brazil, the Mediterranean Sea, and the Bay of Biscay; these records are summarized by La Garrec *et al.* (2017). The widespread occurrence of *C. corona* outside the Pacific Ocean suggests it may be an introduced species in those sites (Le Garrec *et al*. 2017).

Distribution. Eastern Pacific, California to Ecuador, 24–120 m; Brazil, shallow water; Bay of Biscay, 12–33 m; Mediterrean Sea, 2.5–90 m.

***Chaetozone cristata* new species**
Figures 45–46

Chaetozone sp. 3: Hilbig 2001: 540 (in part); Hilbig *et al*. 2006: 715, 717, 719, 724 (in part).

Material examined. **West Antarctic Peninsula, Palmer Archipelago**, Gerlache Strait, R/V *Hero* Sta. 824-25-1, 23 Mar 1982, 64.253°S, 61.458°W, trawl, 540–605 m, 1 **paratype** (USNM 1490773); Sta. 824-25-2, 24 Mar 1982, 64.348°S, 61.592°W, VV grab, 92 m, **holotype** (USNM 1490771) and 7 **paratypes** (USNM 1490772); Anvers Island, Ryswyck Point, R/V *Hero*, Sta. 824-32-1, 25 Mar 1982, 64.625°S, 62.853°W, Blake trawl, 640-670 m, 2 **paratypes** (USNM 1490774).—**South Shetland Islands, off King George Island**, R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-299, 14 Mar 1998, 62°15.8′S, 58°42.7′W, MG, 207 m, 11 specimens (SMF 24933).

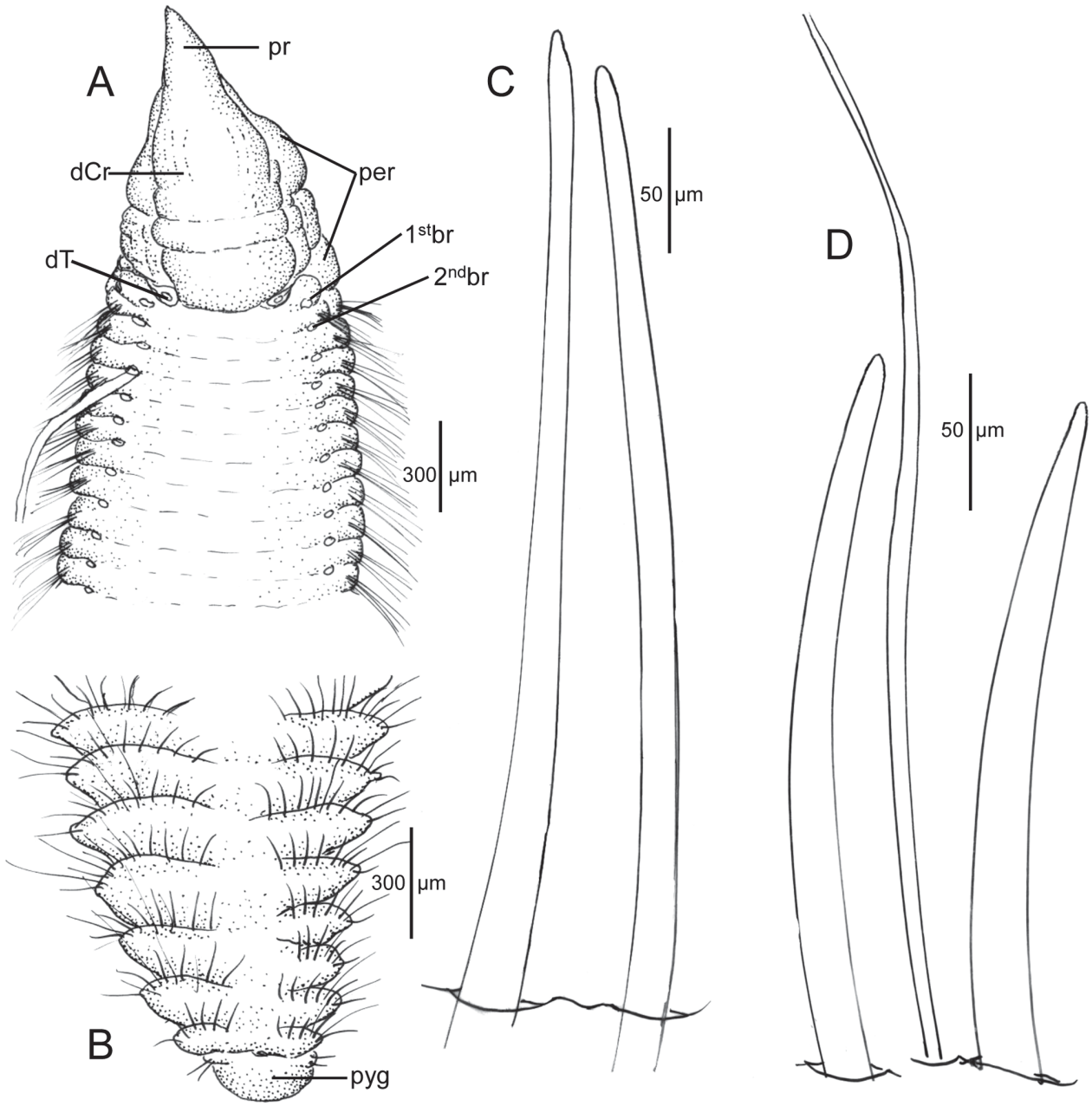

FIGURE 45. *Chaetozone cristata* **n. sp.** A, Anterior end, dorsal view; B, posterior end, dorsal view; C, notopodial spines from far posterior setiger; D, neuropodial spines from far posterior setiger. A, C–D, paratype *Hero* Sta. 824-25-2 (USNM 1490772); B, holotype *Hero* Sta. 824-25-2 (USNM 1490771).

Description. A moderate-sized species, holotype complete, 14 mm long, 0.8 mm wide with approximately 100 setigerous segments; paratypes 12–18 mm long, 0.7–0.8 mm wide, with 90–107 setigerous segments. Body elongate, widest in anterior segments, gradually narrowing posteriorly; anterior segments about ten times as wide as long; middle body segments about twice as wide as long; posterior setigers narrowing, about three times as wide as long near posterior end, not moniliform. Dorsum rounded, without groove or ridge; venter somewhat flattened, with prominent mid-ventral groove from anterior through posterior segments (Fig. 46C–D). Color in alcohol distinctly light tan, no additional pigment apparent anywhere on body.

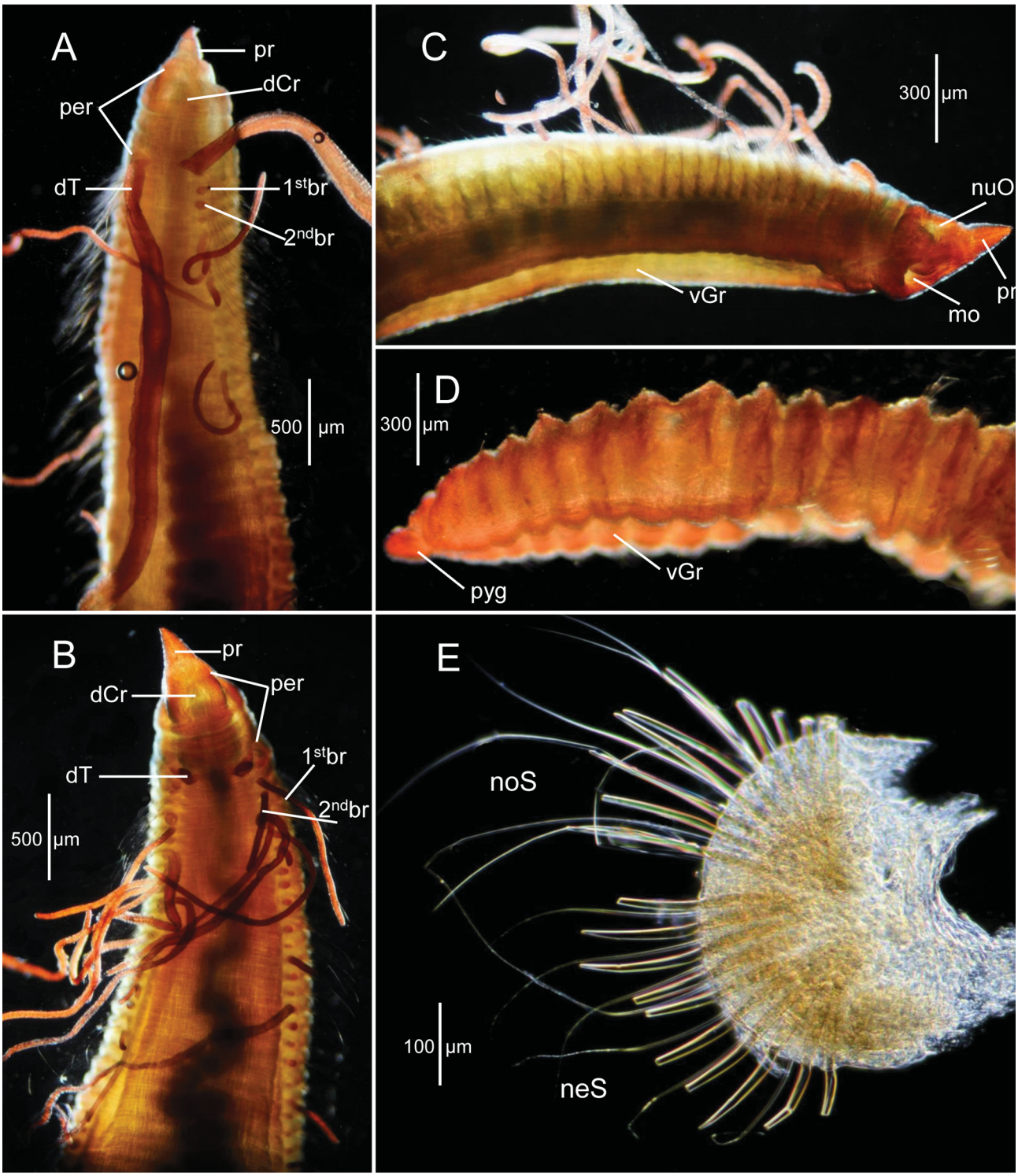

FIGURE 46. *Chaetozone cristata* **n. sp.** Photomicrographs: A–B, anterior ends, dorsal view; C, anterior end, right lateral view; D, posterior end, right lateral view; E, posterior parapodium, left, anterior view. A, C, E, paratype Sta. 32-25-2 (USNM 1490772); B, D, holotype (USNM 1490771). A–D, stained with Shirlastain A.

Prostomium triangular, narrowing apically to pointed tip (Figs. 45A, 46A–C); eyespots absent; nuchal organs deep notches on posterior lateral margin (Fig. 46C). Peristomium with three more-or-less distinct annular rings surmounted by rounded, grooved dorsal crest (Figs. 45A, 46A–B); grooves best seen dorsally; peristomium followed by an achaetous segment (Fig. 45A). Dorsal tentacles arising from groove between last peristomial ring and achaetous segment (Fig 45A). First pair of branchiae lateral and slightly posterior to tentacles on posterior margin of achaetous segment (Fig. 45A); second pair of branchiae on posterior edge of setiger 1, dorsal to notosetae (Figs. 45A, 46A–B); subsequent setigers with branchiae in similar location.

Parapodia of anterior and middle segments reduced to low ridges or mounds from which setae arise; posterior setigers modified with swollen podia, cinctures reduced, lacking high-elevated membranes present in related species; acicular spines in these podia forming prominent armature (Figs. 45B, 46E). Anterior setae all capillaries numbering 8–10 in noto- and neuropodia with notosetae longer than neurosetae; capillaries of middle segments similar in number. Long, thin, natatory-like capillaries present in middle and posterior segments of gravid specimens. First appearance of acicular spines along body variable, somewhat size dependent. Neuropodial acicular spines first appear in posterior body segments from setigers 57–70 (57 in holotype); notopodial spines from setigers 70–96 (70 in holotype). Noto- and neuropodial spines initially numbering 1–3 per fascicle with 5–6 capillaries; posterior full cinctures from last 6–10 setigers with up to 9–10 spines in noto- and neuropodia, up to 19–20 spines on a side (Fig. 46E); spines alternating with long, thin capillaries. Individual neuroacicular spines curved, with narrow blunted tip (Fig. 45D); each with internal core clearly visible in transmitted light (Fig. 46E); notoacicular spines longer, narrower than neuroacicular spines, with weakly curved to straight shaft (Fig. 45C).

Body terminating in simple pygidium with broad, rounded lobe ventral to anus (Figs. 45B, 46D).

Variability. Some specimens with peristomial annulations less distinct resulting in peristomium and dorsal crest appearing smooth; annular grooves and location of dorsal tentacles and branchiae revealed, however, after staining with Shirlastain A or Methyl Green.

Methyl Green stain. Posterior half of peristomium retains stain; rest of body stains uniformly; some specimens with weak ventral bands on some anterior parapodia; other specimens not staining at all.

Etymology. The species name *cristata* is from the Latin *cristatus* for crested, referring to the prominent dorsal crest on the peristomium of this species.

Remarks. Among Antarctic species of *Chaetozone*, *C. cristata* **n. sp.** occurs in relatively shallow waters and is readily identified by the three peristomial rings and prominent peristomial crest. In addition, the full posterior cinctures contain shorter curved spines in the neuropodia and longer, thinner notopodial spines that are nearly straight. Furthermore, *C. cristata* **n. sp.** has a Methyl Green staining pattern on the peristomium of most specimens; related Antarctic species with full cinctures lack a prominent Methyl Green pattern.

Habitat & biology. R/V *Hero* samples from the West Antarctic Peninsula suggest that *Chaetozone cristata* **n. sp.** is associated with a mixed sediment: Sta. 824-25-2 (gravel, mud, and rocks); Sta. 824-32-1 (foliaceous bryozoa with mud and pebbles). One paratype from *Hero* Sta. 824-25-2 (USNM 1490772) has large eggs, up to 152 µm in diameter.

Distribution. West Antarctic Peninsula, 92–670 m.

Chaetozone curvata Hartmann-Schröder, 1965

Chaetozone curvata Hartmann-Schröder, 1965: 219–221, figs. 213–215; Rozbaczylo 1985: 151; Blake 1996: 289; Montiel 2005: 88, 94.

Material examined. Chile, offshore Valdivia, **holotype**, Sta. 96, coll. 15 Mar 1960, 39°59.9′S, 74°0.15′W, silt with fine sand, stones, and little detritus, 260 m (ZMH P-15050).

Description. Holotype complete, 11 mm long, 0.5 mm wide, with 85 setigers. Specimen in poor condition, darkly colored, almost black, likely due to having died prior to preservation. Some evidence of pigment granules on anterior segments, these obscured by dark color. Anterior segments narrow, about eight times wider than long; middle segments becoming longer and more rounded, posterior segments cinctured.

Prostomium slender, conical, slightly longer than wide; eyespots absent; nuchal organs not observed. Peristomium with three rings, first narrow, merged with prostomium; second and third rings larger, about equal in size, each about twice as large as following setigerous segments; no dorsal crest, grooves cutting each ring

continuing dorsally. Dorsal tentacles arise from posterior margin of peristomium. First branchiae on setiger 1 dorsal to notosetae; subsequent branchiae on following segments in same position; branchiae present along three-quarters of body, absent from last 20–25 segments.

Parapodia reduced, anterior parapodial shoulders not evident. Setae all capillaries for about first 60 setigers, with notosetae longer than neurosetae; long natatory-like setae not present. Transition to acicular spines occurs at about setiger 60 or in posterior one-third of body. With appearance of spines, parapodia becoming higher, forming elevated membranes in last ten segments with a dorsal gap between notopodia. These membranes bear complete cinctures of spines, with up to 12 in notopodia and 10 in neuropodia or up to 22 spines on a side. Spines accompanied by thin alternating capillaries. Individual notoacicular spines narrow, long, slightly curved along shaft and sharply curved apically to narrow, pointed tip that curves back and adheres to shaft. Neuroacicular spines similar, but shorter, thicker at base and with a similar sharply bent tip that curves over toward shaft.

Pygidium with a short, triangular lobe ventral to anus.

Remarks. *Chaetozone curvata* was the first species in the genus to be described having acicular spines with a sharp tip that curves over and adheres to the shaft. With the description of *C. gesae* **n. sp.**, there are now seven such species known (see Remarks for *C. gesae* **n. sp.**, below).

Distribution. Central and southern Chile, 82–260 m.

***Chaetozone gesae* new species**
Figure 47

Material examined. Off Western South America, central Chile, USNS *Eltanin* Cr. 4, Sta. 203, 31 Aug 1962, 35.65°S, 73.13°W, Petersen grab, 436 m, **holotype** (USNM 56074).

Description. A small species, holotype complete, 5.4 mm long, 0.4 mm wide for 72 setigerous segments. Color in alcohol light tan to brown, lacking any distinctive body pigment. Body elongate, narrow, widest in middle segments, narrowing posteriorly; 12–15 posterior setigers formed into distinct cinctures with high membranes bearing spines (Fig. 47B). Dorsum rounded, without dorsal groove; venter somewhat flattened, with shallow ventral groove present from about setiger 15, deepening in middle body segments, not apparent posteriorly.

Prostomium triangular, narrowing to a blunted anterior margin (Fig. 47A); eyespots absent; small slit-like nuchal organ present laterally on posterior margin, not pigmented; peristomium with three nearly equal annular rings, surmounted dorsally by a raised ridge without annular grooves, extending to anterior margin of setiger 1 (Fig 47A). Dorsal tentacles arising from posterior margin of raised peristomial ridge (Fig. 47A); first pair of branchiae lateral and slightly posterior to tentacles, on anterior margin of setiger 1; second pair of branchiae on posterior edge of setiger 1, dorsal to notosetae (Fig. 47A); subsequent setigers with branchiae in similar location.

Setiger 1 of approximately same size as following segments; podial lobes reduced to inconspicuous ridges in anterior setigers; inflated and conspicuous in middle setigers, greatly enlarged with elevated ridges and conspicuous armature in posterior setigers (Fig. 47B); posterior segments separated by deeply cut intersegmental furrows. Noto- and neurosetae from setiger 1 all capillaries; notosetae 8–10 per fascicle, neurosetae 7–9 per fascicle; each capillary thickened, but with no distinct fibrils apparent along edge; setigers 25–50 with long, natatory-like notosetae. Acicular spines first present from about setiger 50 in both noto- and neuropodia; spines numbering 1–3 at first, accompanied by an equal number of thin capillaries; in far posterior setigers notopodial spines numbering 7–8 and neuropodial spines numbering 6–7, forming nearly complete cinctures with spines numbering 13–15 on a side and accompanied by alternating thin capillaries (Fig. 47B); spines with relatively straight shaft, weakly curved apically, with sharply pointed tip that curves back and adheres to shaft, thus superficially resembling blunted tip (Fig. 47C–G); one spine observed with double tip, with one tip projecting forward and the other curved back and fused the shaft (Fig. 47F); shaft with weak node or notch at point of emergence from podial lobe.

Last few cinctured setigers narrowing to posterior end; pygidium a simple achaetous segment with terminal anus and ventral bi-lobed disk (Fig. 47B).

Methyl Green stain. No pattern.

Etymology. This species is named for Dr. Gesa Hartmann-Schröder, retired annelid curator of the Zoological Museum of Hamburg, in recognition of her major works on polychaetes of Western South America and Antarctica.

Her species, *Chaetozone curvata*, was the first *Chaetozone* discovered with the distinctive spines having a sharply pointed tip that curves back and adheres to the shaft (Hartmann-Schröder 1965).

Remarks. *Chaetozone gesae* **n. sp.** is the seventh species to be described having spines with the unusual sharply pointed tip that curves back and adheres to the shaft. The following species are previously known: *C. curvata*, from coastal waters of Chile; *C. commonalis* Blake, 1996 from California shelf depths; *C. allanotai* Blake, 2006, from California deep-water slope depths; *C. anasima* Doner & Blake, 2006 from offshore New England; *C. camasetosa* Blake, 2015 from the Puget Sound; and *C. nicoyana* Dean & Blake, 2007 from the Pacific coast of Costa Rica. *Chaetozone curvata* and *C. commonalis* have the first pair of branchiae on setiger 1, whereas *C. allanotai*, *C. anasima*, *C. camasetosa*, *C. gesae* **n. sp.**, and *C. nicoyana* have an extra pair of branchiae just lateral and posterior to the dorsal tentacles on the anterior margin of setiger 1, as well as a pair on the posterior margin of the same setiger, effectively having two branchiae on setiger 1, suggesting that a segment has been lost or two segments have been fused. *Chaetozone anasima* lacks distinct peristomial rings, including any demarcation or annulation between the peristomium and setiger 1; whereas, *C. allanotai, C. camasetosa,* C. *gesae* **n. sp.**, and *C. nicoyana* have two or three distinct peristomial rings. Of these, *C. nicoyana* is unusual in having both long and short spines in posterior cinctures that number up to 19–20 spines on a side. *Chaetozone gesae* **n. sp.** is the only species to have a raised peristomial ridge that merges with setiger 1. Further, *C. gesae* **n. sp.** has fewer spines in the posterior cinctures and does not exhibit any Methyl Green staining reaction, unlike that described for *C. allanotai* and *C. camasetosa* (Blake 1996, 2015).

Distribution. Offshore Chile, 436 m.

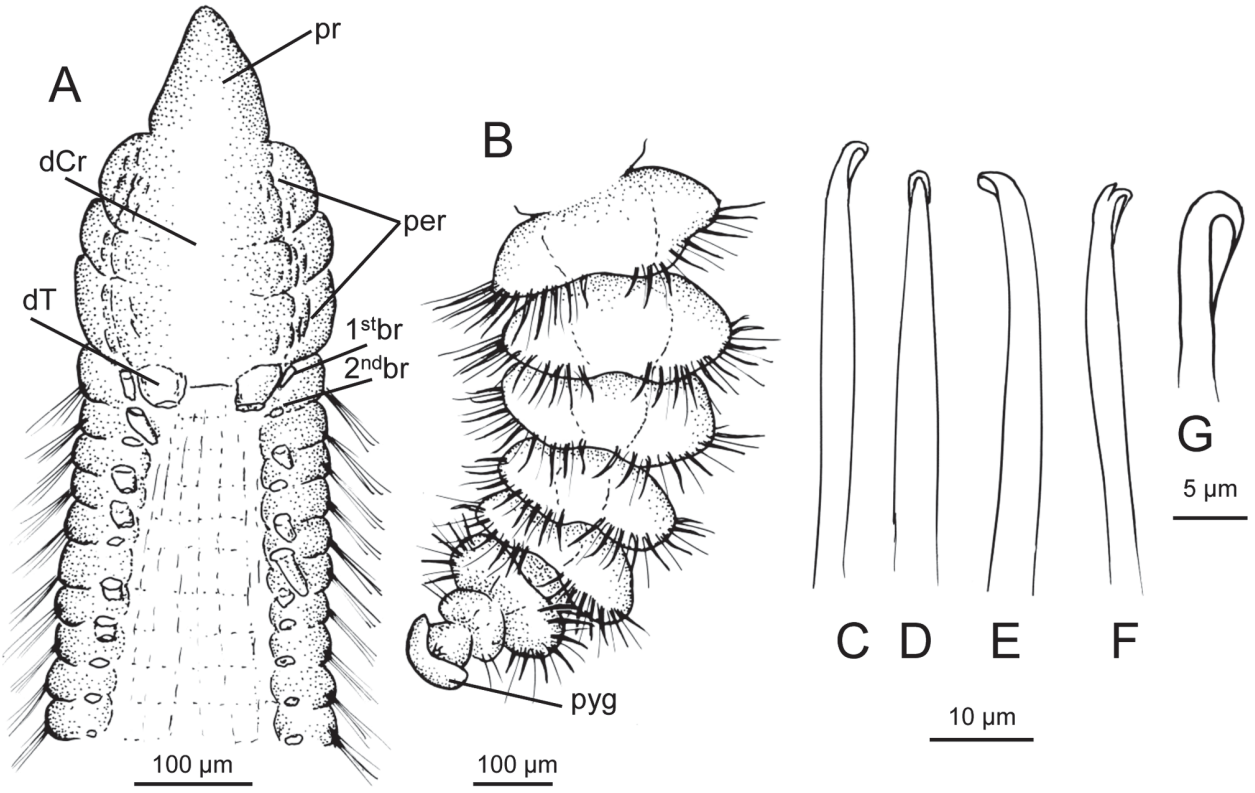

FIGURE 47. A–G. *Chaetozone gesae* **n. sp.** Holotype (USNM 56074): A. anterior end, dorsal view; B, posterior end, dorsal view; C–F, neuropodial spines from far posterior setiger; G, detail of curved tip of posterior spine.

Chaetozone homosetosa (Hartmann-Schröder & Rosenfeldt, 1989) new combination

Figures 48–49

Tharyx spp. Hartman 1967: 118 (in part).

Caulleriella homosetosa Hartmann-Schröder & Rosenfeldt, 1989: 67–68, figs. 6–8; 1990: 11.

Chaetozone sp. 1: Hilbig 2001: 540; Hilbig *et al.* 2006: 715, 717–719, 724 (in part); Ellingsen *et al*. 2007: 1269; Montiel *et al.* 2016: Appendix 2.

Chaetozone sp. 3: Hilbig 2001: 540; Hilbig *et al.* 2006: 715, 717, 719, 724 (in part); Montiel *et al.* 2005: 197; 2016: Appendix 2.

Material Examined. South Shetland Islands, King George Island, Admiralty Bay, R/V *Polarstern* Cr. ANT-III/2, 03 Dec 1984, Sta. 203, 62°05.30′S, 57°39′W, 265 m, **holotype** (ZMH 196329) and 24 **paratypes** (ZMH 196330); **Collins Harbor**, USCG *Staten Island*, coll. W.L. Schmidt, 28 Feb 1963, Sta. 64-63, 62.2°S, 58.93°W, 86 m (1, USNM 187606); **Martel Inlet,** R/V *Hero*, Sta. 721-809, 15 Jan 1972, 62.0933°S, 58.3683°N, Petersen grab, 142 m 1 (USNM 187627); **Deception Island**, R/V *Hero* Sta. 824 44-1, 03 April 1982, 62.9867°S, 60.5775°W, VV grab, 60 m (3, USNM 187647).—**Off King George Island,** R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 299, 14 Mar 1998, 62°15.8′S, 58°42.7′W, MG, 207 m (7, SMF 24938); Sta. 300, 14 Mar 1998, 62°16.8′S, 58°42.1′W, MG, 423 m (26, SMF 24939); Sta. 330, 18 Mar 1998, 61°20.6′S, 58°15.1′W, MG, 2009 m (2, SMF 24940).—**Drake Passage**, R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-341, 19 Mar 1998, 61°34.5′S, 58°07.0′W, MG, 429 m (4, SMF 24941); **Drake Passage**, R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-345, 20 Mar 1998, 61°53.3′S, 59°06.9′w, MG, 218 m (9, SMF 24942); Sta. 48-356, 20 Mar 1998, 62°00.3′S, 59°14.9′W, MG, 103 m (2 SMF 24943).—**West Antarctic Peninsula, Palmer Archipelago, Anvers Island,** Arthur Harbor: R/V *Hero* Sta. 721-758, 2 Jan 1972, 64.7658°S, 64.1106°W, Petersen grab, 73 m (1, USNM 187630); Sta. 721-759, 2 Jan 1972, 64.765°S, 64.1142°W, Petersen grab, 84 m (1, USNM 1129131); Sta. 721-771, 2 Jan 1972, 64.76°S, 64.12331°W, Petersen grab, 82 m (1, USNM 1129135); Sta. 824-38-1, 29 Mar 1982, 64.7567°S, 64.1439°N, VV grab, 193 m (400+ USNM 1129127); **Janus Island**, R/V *Hero*, Sta. 731-1798, 18 Feb 1973, 64.7889°S, 64.1172°W, OP grab, 105 m (1, USNM 1129133); **Wilhelm Archipelago, Petermann Island**, R/V *Hero* Sta. 721-990, 10 Dec. 1971, 65.170°S, 64.125°N, Petersen grab, 64 m (1, USNM 1129134); **Argentine Islands, Meek Channel,** R/V *Hero,* Sta. 824-3-3, 15 Mar 1982, 65.2333°S, 64.2583°W, VV grab, 59 m (210, USNM 187978); Sta. 824-3-4, 15 Mar 1982, 65.2333°S, 64.2583°W, VV grab, 60 m (215, USNM 187986); Sta. 824-3-5, 15 Mar 1982, 65.233°S, 64.258°W, VV grab, 60 m (40+ USNM 1490750); **Melchior Island**, R/V *Hero,* Sta. 824-16-2, 22 Mar 1982, 64°19.50′S, 62°59.58′W, VV grab, 85 m (23, USNM 1490751); Sta. 824-16-3, 22 Mar 1982, 64°19.50′S, 62°59.58′W, VV grab, 85 m (20, USNM 1490752); Sta. 824-16-4, 22 Mar 1982, 64°19.50′S, 62°59.58′W, VV grab, 87 m (10, USNM 1490753).—**East Antarctic Peninsula, Prince Gustav Channel,** RVIB *Nathaniel B. Palmer*, Cr. 2000-3, coll. J.A. Blake, SM grab, Sta. 01, 14 May 2000, 64°17.625′S, 058°34.678′W, SM grab, 768 m (4 + 50 juvs,, LACM-AHF Poly 10232); Sta. 33, 24 May 2000, 64°11.959′S, 058°41.857′W, 587 m (3, MCZ 149859); Sta. 34, 24 May 2000, 64°10.995′S, 058°34.140′W, 865 m (5, MCZ 149860); Sta. 35, 24 May 2000, 64°10.471′S, 058°28.505′W, 651m (4, JAB).—**East Antarctic Peninsula, former Larsen Ice Shelf A area,** border with Larsen B, RVIB *Nathaniel B. Palmer*, Cr. 2000-3, coll. J.A. Blake, SM grab, Sta. 11, 18 May 2000, 64°56.669′S, 060°19.281′W, 350 m (2, MCZ 149861); Sta. 22, 20 May 2000, 64°46.632′S, 060°21.557′W, 868 m (5, MCZ 149866).—**Weddell Sea**, USCG *Glacier*, Sta. 69-2, 25 Feb 1969, 75.517°S, 30.133°W, 412 m (1, USNM 1490778); **Weddell Sea, SW of Vestkapp,** R/V *Polarstern*, EASIZ II (ANT-XV/3), coll. B. Hilbig, Sta. 48-092, 04 Feb 1998, 73°34.2′S, 22°38.0′W, MG, 994 m (9, SMF 24944); Sta. 48-131, 08 Feb 1998, 73°23.7′S, 22°09.1′W, MG, 1985 m (1, SMF 24945); **off Halley Bay,** Sta. 48-136, 09 Feb 1998, 74°33.0′S, 27°13.1′W, MG, 2012 m (10, SMF 24946).—**Ross Sea, Victoria Land, off Ross Island,** USNS *Eltanin* Cr. 27, Sta. 1907, 22 Jan 1967, 77.058°S, 166.233°E, Blake trawl, 891 m (3, USNM 1129136).—**East Antarctica, Wilkes Land, Budd Coast**, Wilkes Sta. 24, 24 Dec 1961, 66.26569°S, 110.56833°E, trawl, 73 m (2, USNM 187603).

Description. A large species, holotype 23 mm long, 6 mm wide, for about 128 setigerous segments; R/V *Hero* specimens similar, up to 24 mm long with about 110–130 setigerous segments. Body narrow, thin throughout (Fig. 48A) slightly enlarged from about setiger 15, narrowing in posterior segments (Figs. 48B, 49C). Anterior region rounded dorsally in cross section, flattened ventrally, with no distinct ventral groove or ridge; middle and posterior segments cylindrical in cross section, but not moniliform. Color in alcohol: light tan, most specimens with inconspicuous black pigment speckles on posterior lateral margins of peristomium (Fig. 49A, D–E), often absent.

Prostomium small, triangular, narrowing to rounded tip (Figs. 48A, 49A); eyespots absent; nuchal organs shallow grooves on posterior lateral margin of prostomium, sometimes everted. Peristomium narrow, elongate, about 2/5 longer than wide with three annular rings apparent, best observed laterally, but extending on to but not across dorsum on some specimens (Fig. 49A); dorsum elevated as a relatively smooth dorsal crest (Figs. 48A, 49A); in some specimens, annular rings only vaguely obvious laterally with grooves visible after staining (Fig. 49A–B, D). Dorsal tentacles missing on most specimens, but these narrow, not unusually long when present, arising from posterior border of peristomium (Figs. 48A, 49A). First pair of branchiae arising posterior to and

lateral to dorsal tentacles (Fig. 48A); subsequent branchiae on posterior border of each setiger, just dorsal to notosetae (Fig. 48A); most branchiae short.

Parapodia reduced to simple setal tori; postsetal lamellae absent. Setal fascicles of noto- and neuropodia close together throughout body. Notosetae long capillaries, about ten per fascicle in anterior setigers, decreasing to 7–8 posteriorly; long natatory-like setae throughout body in most specimens, absent in smaller specimens; in posterior segments 3–4 sharply curved narrow notoacicular spines present in last few pre-pygidial segments; neurosetae all capillaries for first 30–60 setigers, 8–10 per fascicle, then transitioning to mixture of short weakly curved spines and capillaries, followed by all spines in last 20 or so setigers, these numbering 5–6 per fascicle (Fig. 48C). Neuroaciculars relatively simple, shorter than notoaciculars, most blunt-tipped (Fig. 48D), curved toward notopodia; notoaciculars longer, also curved, most sharply pointed, a few blunt-tipped; spines not alternating with capillaries but some notoaciculars accompanied with capillaries. Noto- and neuroacicular spines together in posterior setigers forming partial cinctures numbering about 8–9 spines on a side (Fig. 48C).

Pygidium tapering, conical with dorsal anus and ventral lobe; opening of anus bordered dorsally by 6–8 small papillae (Figs. 48B, 49C).

Methyl Green stain. Methyl Green imparts a pattern to the peristomium with the annular rings and dorsal crest staining (Fig. 49E–F); individual segments with stain concentrating as bands on the venter of some anterior setigers; many specimens not staining or only weakly, probably due to the more than 40–50 years storage in alcohol.

Remarks. *Caulleriella homosetosa* is transferred to *Chaetozone* because it has short, curved, sigmoid acicular spines in the neuro- and notopodia instead of bidentate hooks. Furthermore, the setal fascicles of noto- and neuropodia are set close together instead of widely separated as in species of *Caulleriella* (see Blake 1996). In the original description, Hartmann-Schröder & Rosenfeldt (1989) indicated that the dorsal tentacles and first branchiae originated on setiger 1. However, examination of the holotype indicates this to be in error and they are confirmed as originating on the achaetous posterior part of the peristomium.

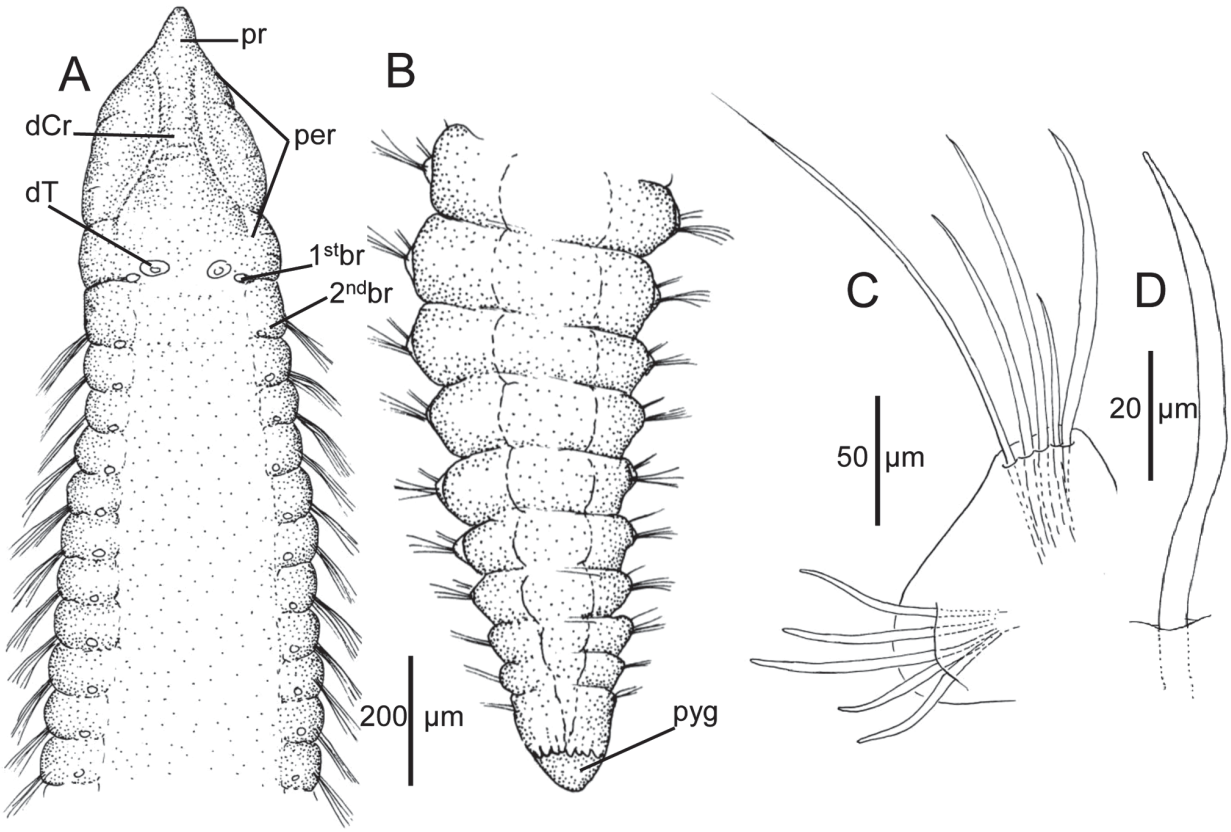

FIGURE 48. *Chaetozone homosetosa* (Hartmann-Schröder & Rosenfeldt, 1989). R/V *Hero* Sta. 8-24, 38-1 (USNM 1129127): A, anterior end, dorsal view; B, posterior end, dorsal view; C, noto- and neurosetae of posterior setiger; D, posterior neuroacicular spine.

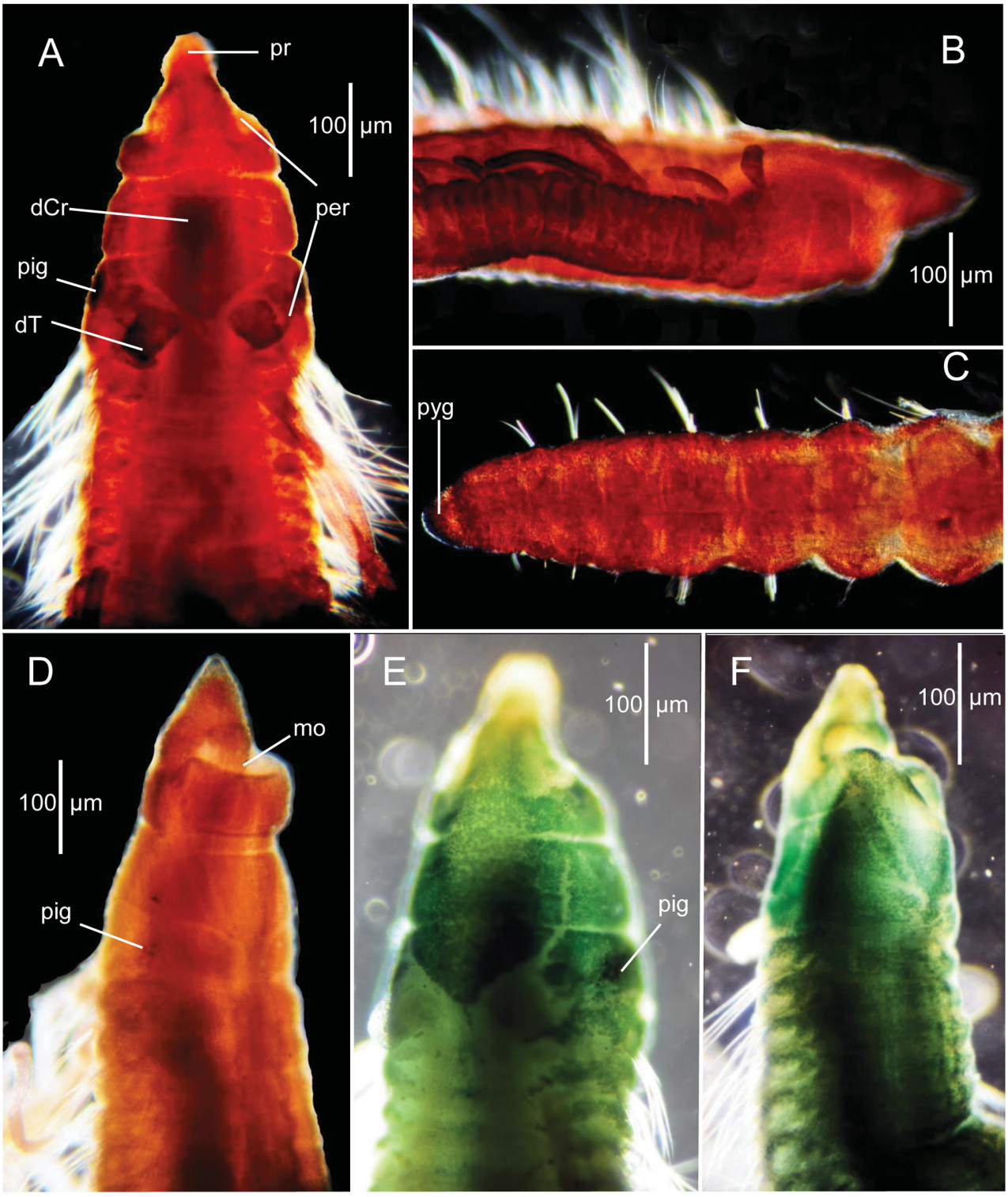

FIGURE 49. *Chaetozone homosetosa* (Hartmann-Schröder & Rosenfeldt, 1989). Photomicrographs: A, anterior end, dorsal view; B, anterior end, right lateral view; C, posterior end, dorsal view; D, anterior end, ventrolateral view; E, anterior end, dorsal view; F, anterior end, ventrolateral view. A–D, R/V *Hero* Sta. 824 16-2 (USNM 1490751), stained with Shirlastain A; E–F, R/V *Hero* Sta. 824 3-5 (USNM 1490750), stained with Methyl Green.

Chaetozone homosetosa is similar in overall appearance to *Tharyx obtusus*, also redescribed in this study (see below). The two species are difficult to separate superficially and sometimes occur in the same samples. Both have a similar morphology to the pre-setiger region with a peristomium having three annular rings and the dorsal tentacles and first pair of branchiae occurring on the posterior ring just anterior to setiger 1. The two species differ,

however, in the nature of the posterior noto- and neurosetae. In *C. homosetosa*, the posterior neurosetae are short, curved, blunt-tipped and arranged into partial cinctures; in *T. obtusus*, the short spines have classic *Tharyx*-like knobbed or sub-bidentate tips together with short barbs along the shaft that create a weakly serrated edge on the concave side below the main fang; in *C. homosetosa* the posterior notosetae include capillaries and thicker spines with blunted tips thus agreeing with the definition of *Chaetozone* instead of *Tharyx*.

The overall appearance of the body and relatively few posterior acicular spines of C. *homosetosa* were initially thought to represent a kind of *Tharyx* with simple spines instead of with knob-tipped spines typical of most *Tharyx* species. *Chaetozone homosetosa* is similar in this respect to *C. castanea* **n. sp**. By having reduced cinctures with thin blunt-tipped spines. Both *C. homosetosa* and *C. castanea* **n. sp.** depart in this respect, from most species of *Chaetozone* that have heavier golden-colored sigmoid posterior spines.

Chaetozone homosetosa has long, natatory-like notosetae present from anterior setigers in most specimens; Hartmann-Schroder & Rosenfeldt (1989) observed these from about setiger 15. These setae appear to be associated with sexual maturity; they are absent in small specimens.

Habitat. *Tharyx homosetosus* is one of several bitentaculate cirratulids that occur in the vicinity of the Prince Gustav Channel and former Larsen Ice Shelf A. The surficial sediments at these locations collected in May 2000 consisted of 20–40% sand in the upper 0–5 cm (Gilbert & Domack 2003).

Distribution. East Antarctica, 73 m; West Antarctic Peninsula, 59–429 m; East Antarctic Peninsula, 350–868 m; Weddell Sea, 994–1988 m.

Chaetozone reticulata new species

Figures 50, 51A

Tharyx sp. Hartman 1978: 167 (in part).

Material examined. **Antarctica, Weddell Sea,** USCG *Glacier*, Sta. 69-22, 13 Mar 1969, 73°28.4′S, 30°26.9′W, 3111 m, **holotype** (USNM 46817).

Description. A moderate-sized species, with body elongate, narrow in anterior segments (Fig. 50A), then widened in middle segments, narrowing posteriorly (Fig. 50E). Holotype a mature male with numerous sperm packets in coelom; complete but twisted with some damage, 8.7 mm long, 0.45 mm wide across anteriormost setigers, 0.65 mm wide across mid-body setigers, 0.22 mm wide across far posterior setigers, with 43 setigerous segments. Dorsal and ventral grooves and ridges absent, but with narrow mid-ventral white line apparent upon staining with MG extending posteriorly from mouth along most of body. Anterior segments narrow, about 5–6 times wider than long; posterior segments longer, about 1.5 times as wide as long, but never with oval or moniliform shape (Fig. 50E). Color in alcohol, tan, with prominent dark brown to black pigment along body; mid-body segments with pigment arranged in distinct reticulated pattern (Fig. 50A, D).

Pre-setiger region elongate, about as long as first five setigerous segments (Figs. 50A–C, 51A). Prostomium short, triangular in shape, narrowing to rounded tip (Fig. 51A); eyespots absent; nuchal organs low mounds on posterior lateral margins (Fig. 51A). Peristomium elongate, with smooth surface, longer than wide with no obvious grooves or annular rings, merging seamlessly with setiger 1 (Fig. 51A); dorsal crest absent; ventrally forming upper and lower lips of mouth (Fig. 50C). Dorsal tentacles arising mid-dorsally about two-thirds along peristomium (Figs. 50B, 51A). First pair of branchiae arising immediately posterior to dorsal tentacles; second pair of branchiae arising on setiger 1, dorsal and posterior to origin of notosetae (Figs. 50B, 51A); subsequent branchiae in similar location on following segments. Branchiae or scars observed on most segments through middle body.

Parapodia of anterior and middle segments reduced to low mounds and ridges from which setae arise; posterior segments with more prominent ridges from which acicular spines arise, but not elevated into raised membranes. Setae of anterior three-fourths of body all capillaries with 4–5 setae per noto-and neuropodia; notopodia with 1–3 extra-long, natatory-like setae variable in number but present along entire body (Figs. 50B, D–E, 51A). Acicular spines first present in neuropodia from setiger 31 and notopodia from setiger 37. Neuropodial spines numbering 1–3 until last few setigers, then increasing to 5–6 in posteriormost setigers; notopodial spines numbering in 1–2 until last few setigers, then increasing to 4–5 in posteriormost setigers. Last 2–3 segments with acicular spines forming partial cinctures with up to 11 spines on a side. Capillaries irregularly distributed with spines, not

alternating. Individual acicular spines initially short, sigmoid in shape, narrowing to rounded tip; last few setigers with spines longer, less curved (Fig. 50G); internal core of individual spines relatively clear.

Body terminating in simple pygidium with rounded ventral lobe (Fig. 50F).

Methyl Green stain. Body staining uniformly with no pattern, destaining entirely. As noted above mid-ventral unstained line extends from posterior border of mouth to near posterior end.

Etymology. The epithet is from the Latin, *reticulatus* for netlike and refers to the reticulated pigment pattern that characterizes this species.

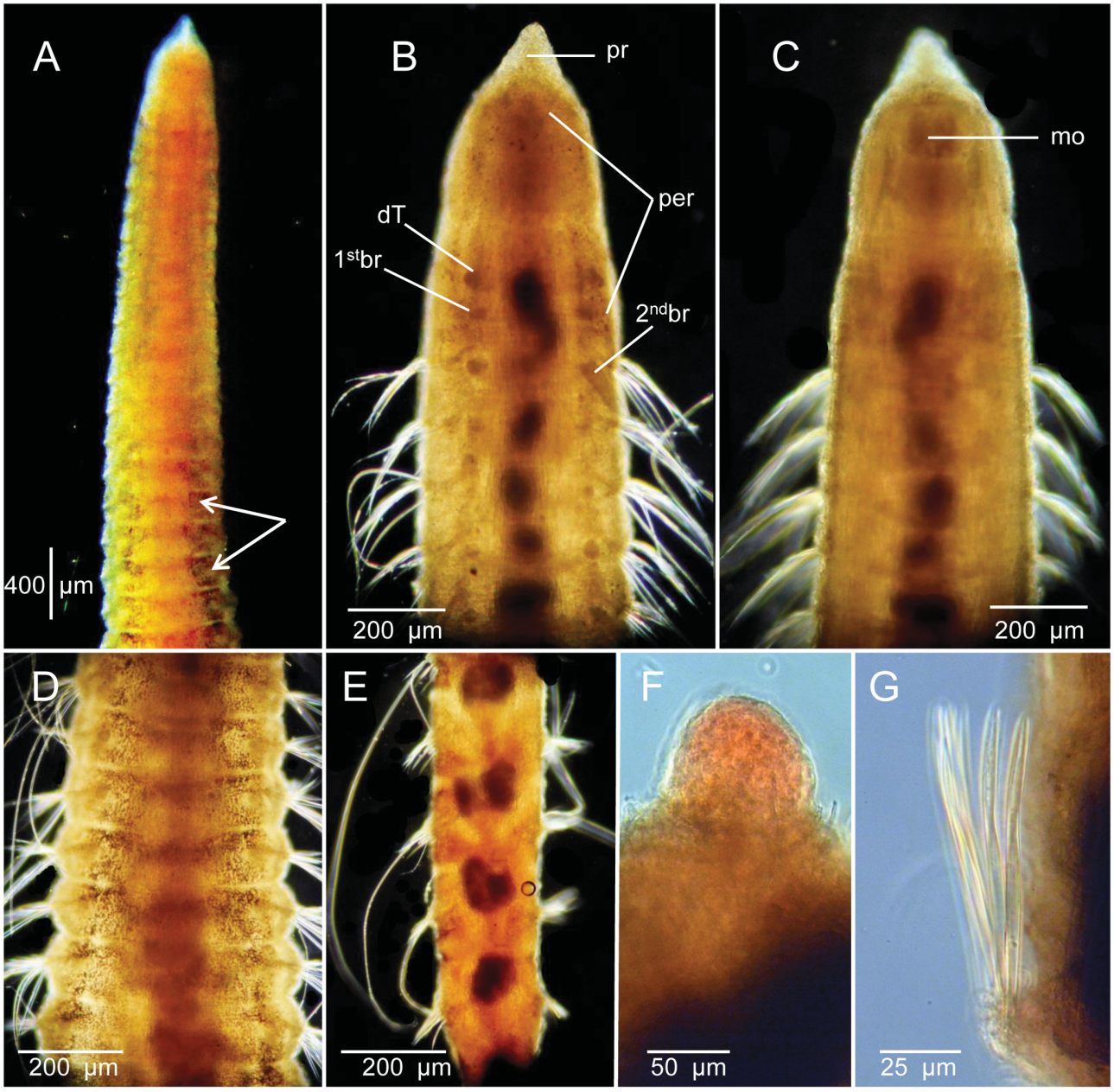

FIGURE 50. *Chaetozone reticulata* **n. sp.** Photomicrographs of holotype (USNM 46817): A, anterior end, dorsal view; B, anterior end, detail, dorsal view; C, anterior end, ventral view; D, middle body segments, dorsal view with reticulated pigment; E, posterior segments, dorsal view; F, Ventral pygidial lobe; G, fascicle of posterior acicular spines.

Remarks. The general shape of the pre-setiger region, seamless merger with setiger 1, and arrangement of the dorsal tentacles and first two pair of branchiae of *Chaetozone reticulata* **n. sp.** is similar to that of *C. australosetosa* **n. sp.** and *C. biannulata* **n. sp.** also reported in this study (see above). However, the two latter species have a prominent annular groove that divides the peristomium into two parts; in *C. reticulata* **n. sp.** there is no such groove and the entire peristomium is a single smooth unit. Globally, the shallow-water North American species, *C.*

hystricosa from off New England has a similar peristomial structure but differs morphologically from *C. reticulata* **n. sp**., an abyssal species, in having an elongate prostomium instead of a short one, more spines in the posterior cinctures, and is not pigmented. Additional comments on these species are in the Remarks for *C. australosetosa* **n. sp**. above.

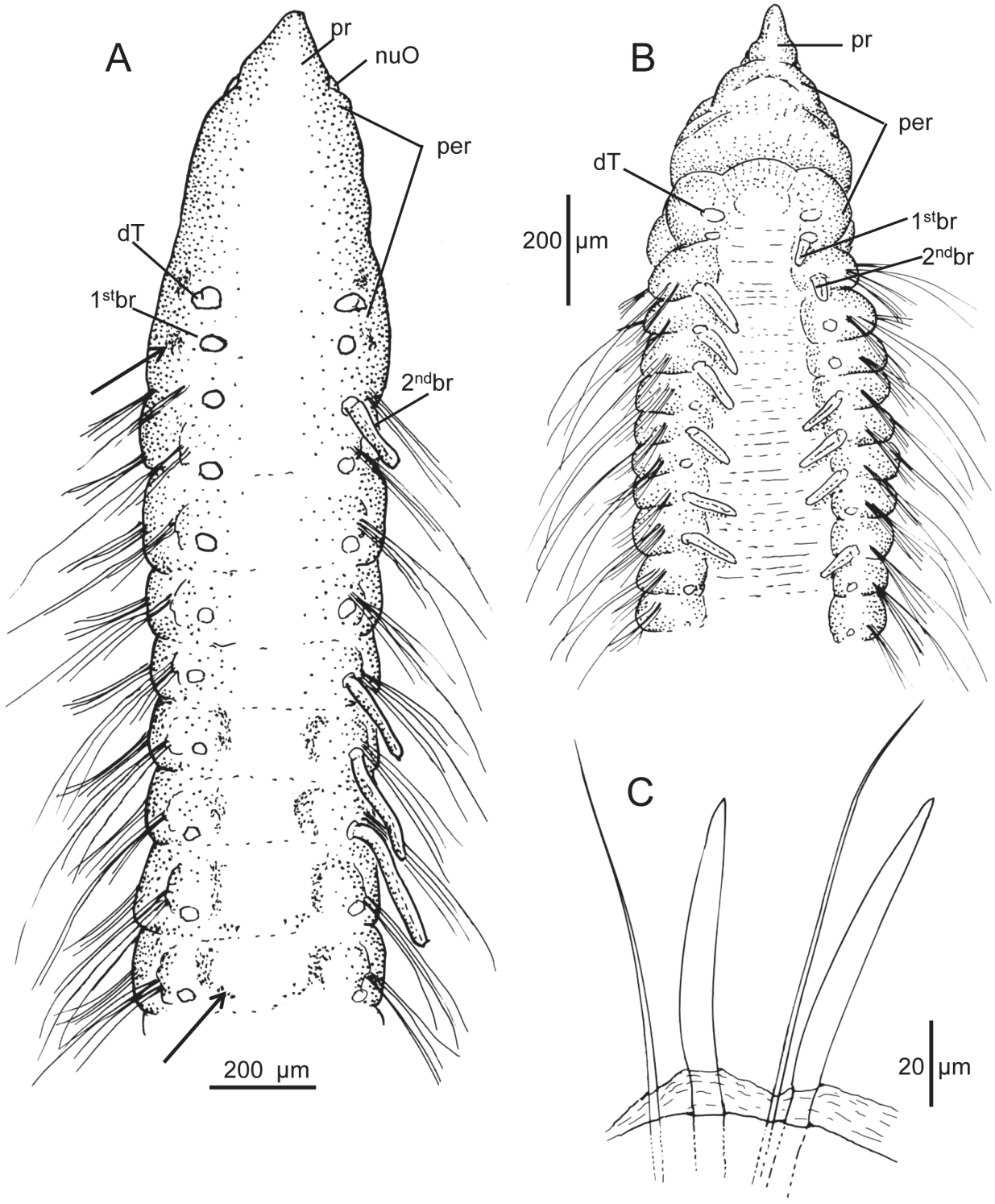

FIGURE 51. A, *Chaetozone reticulata* **n. sp**. Holotype (USNM 46817), anterior end dorsal view. Arrows denote pigment. B–C, *Chaetozone shackletoni* **n. sp.** USCG *Glacier* Sta. 69-20 (USNM 1490776): B, anterior end, dorsal view; C, posterior neurosetae.

Globally, there are few species of *Chaetozone* with a similar distribution of body pigment as found in *C. reticulata* **n. sp.** *Chaetozone pigmentata* Blake, 1915 from the North American Arctic shelf depths does have similar pigment but an entirely different pre-setiger region and arrangement of the peristomium, achaetous segment, and distribution of the dorsal tentacles and anterior branchiae (Blake 2015).

Distribution. Weddell Sea, Antarctica, 3111 m.

***Chaetozone shackletoni* new species**
Figures 51B–C, 52, 53

Material Examined. Scotia Sea, Powell Basin, R/V *Polarstern*, ANDEEP III (ANT-XXII/3), Sta. PS67/121-10, 14 Mar 2002, 63°41.74′S, 50°42.99′W, box corer, 2621 m, **holotype** (SMF 24934) and 2 **paratypes** with fragments (SMF 24935).—**Drake Passage, off South Shetland Islands**, R/V *Polarstern*, ANDEEP I (ANT-XIX/3), Sta. PS61/105-5, 14 Feb 2002, 61°23.72′S, 58°50.04′W, box corer, 2266 m, 5 **paratypes**, (SMF 24936).—**Weddell Sea off Cape Norvegia**, R/V *Polarstern*, ANDEEP III (ANT-XXI/3), Sta. PS67/78-6, 21 Feb 2005, 71°09.45′S, 14°0.32′W, box corer, 2168 m,1 **paratype** on SEM stub (MCZ149853); **off Coats Land**, USCG *Glacier*, *S*ta. 69-19, 11 Mar 1969, 74.105°S, 32.605°W, 1622 m, 1 **paratype** (USNM 1490775); Sta. 69-20, 12 Mar 1969, 73.823°S, 31.682°W, 2288 m, 2 **paratypes** (USNM 1490776). Detached posterior ends present. Some specimens photographed alive during ANDEEP I cruise complete (Sta. PS67/121-10) but fragmented during preservation.

Description. A small to moderately-sized species; holotype mostly complete, 10.9 mm long, 0.35 mm wide across anterior setigers, 0.8 mm wide across expanded middle segments, with about 50 setigerous segments; incomplete paratype from *Glacier* Sta. 69-19, 9.5 mm long, 0.4 mm wide across anterior setigers, 1 mm wide across expanded middle segments, with 43 segments. Body with distinctive shape, including narrow anterior thoracic region of about 15–20 setigers, enlarged middle body "stomach" area, and narrow posterior setigers (Fig. 52A, C). Anterior and middle segments generally cylindrical in cross section, with narrow, shallow mid-dorsal groove present (Fig. 53A) or absent in anterior thoracic segments; venter of thoracic segments weakly flattened, or with shallow groove present or absent; posterior segments somewhat dorsoventrally flattened; weakly developed. Expanded middle segments prominent, with enlarged stomach area filled with fine sediment (Fig. 52A, C), also swollen with eggs in mature specimens. Color in life: deep green, darkest in posterior setigers; color in alcohol light tan, with distinctive brown to reddish pigmentation throughout body.

Prostomium short, conical, tapering to narrow rounded tip (Figs. 51B, 52A, C–D, 53A–C); eyespots absent; circular ciliated nuchal organ present dorsolateral to oral opening (Fig. 51C inset); peristomium with three annular rings, first two rings merged dorsally, divided laterally, third ring largest, with pair of dorsal tentacles arising from near posterior margin (Figs. 51B, 53A–B); first pair of branchiae located posterior to tentacles, but anterior to setiger 1 (Figs. 51B, 53A–B). Second pair of branchiae on setiger 1, dorsal to notosetae on posterior margin, subsequent branchiae in similar location (Figs. 51B, 53A). In most specimens, dorsal tentacles and branchiae relatively short throughout body (Figs. 51B, 52A).

Parapodia reduced with setae emerging directly from body wall; in far posterior setigers parapodia formed into low membranes bearing partial cinctures of spines and capillaries (Fig. 53D). Noto- and neurosetae from setiger 1 all capillaries (Fig. 53B, E–F), numbering 6–10 per fascicle; individual capillaries with numerous fibrils arising from shaft, best seen with SEM (Fig. 53G). Some specimens with long, natatory-like capillaries along most of the body. Acicular spines first occur from setigers 20–25 in neuropodia and setigers 25–30 in notopodia; in smaller specimens, these spines occur more anteriorly, but usually associated with enlarged mid-body segments. In most posterior setigers noto- and neuroacicular spines formed into partial cinctures with spines emerging from low elevated membranes (Figs. 52B, 53D); notopodial spines numbering 6–7 and neuropodial spines 5–6, or with 11–13 spines on a side; spines accompanied by closely situated, thin, smooth capillaries; spines broad, tapering to a pointed tip (Figs. 51C, 52B, 53H).

Pygidium simple rounded lobe ventral to anal opening (Fig. 53D).

Variability. Most of the variability observed in *C. shackletoni* **n. sp.** is likely due to contraction during preservation. The peristomial rings are more obvious in specimens where the pre-setiger region appears shortened, likely due to contraction. The presence of a mid-dorsal groove on the anterior thoracic segments is difficult to observe and may be an artifact of preservation. The pigmentation present along most of the body in preservative is

either reddish or brown; this pigment is faded in some specimens or entirely absent. In most specimens, the dorsal tentacles and branchiae are missing, but when present, they are often short, not elongate. In the largest specimens, the swollen middle section is also longer and encompasses more segments. In general, the prostomium is short, not elongate as in *C. biannulata* **n. sp.**

Methyl Green stain. Body stains uniformly throughout, with no distinct pattern.

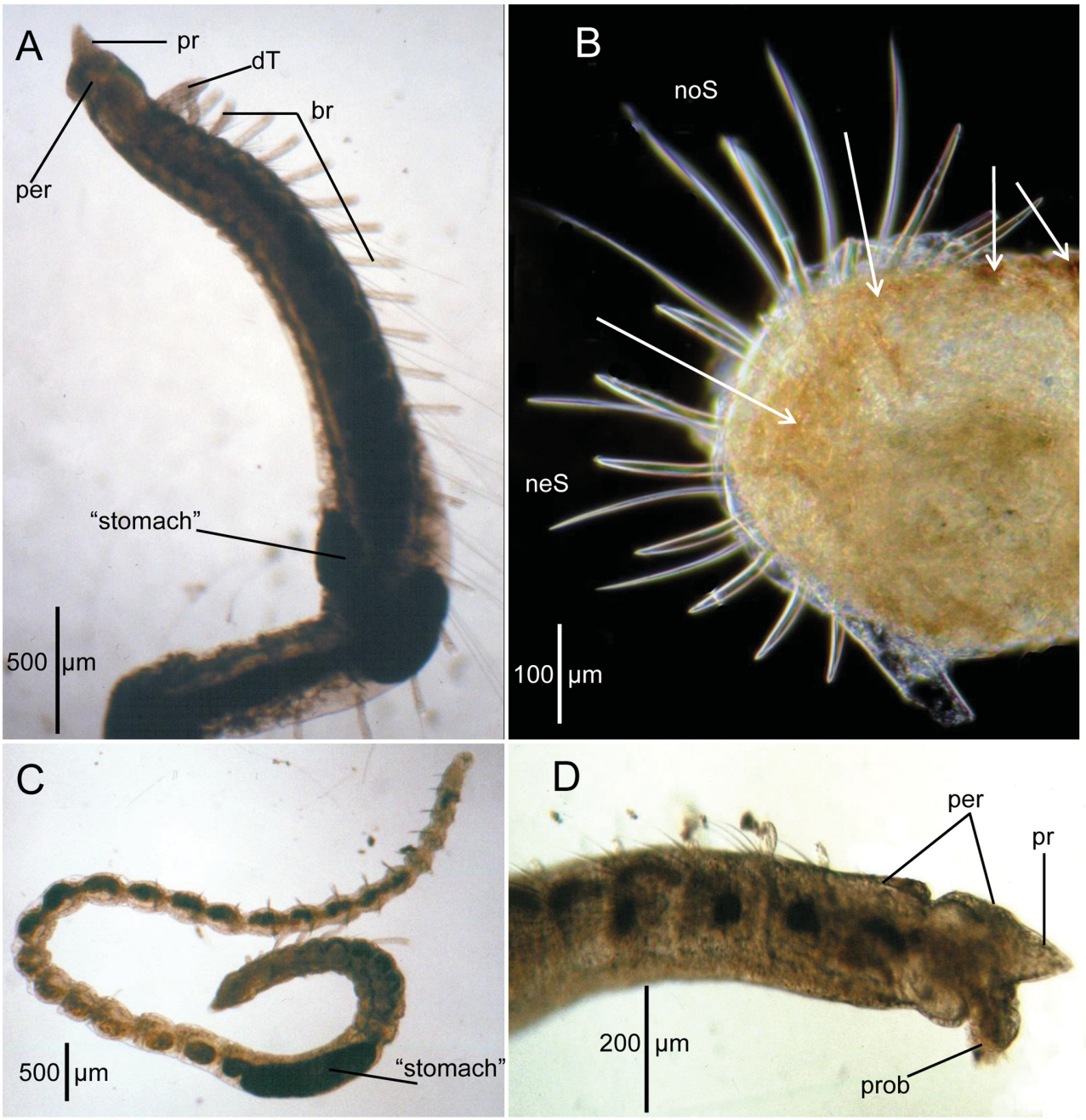

FIGURE 52. *Chaetozone shackletoni* **n. sp.** A, anterior two-thirds of worm photographed in life, left lateral view; B, posterior parapodium, left anterior view; C, entire worm photographed in life; D, anterior end, right lateral view. A, C–D, ANDEEP I, Sta. 105-5, paratypes (SMF 24936); B, USCG *Glacier* Sta. 69-20, paratype (USNM 1490776).

Etymology. This species in named in honor of Sir Ernst Shackleton (1874–1922), Antarctic explorer of the Heroic Age, whose Imperial Trans Antarctic Expedition (1914–1917) was curtailed by ice in the Weddell Sea, resulting in his ship the HMS *Endurance* being trapped, eventually crushed, and sunk, leaving all hands with few options for survival. Shackleton, however, organized the crew and after hauling their life boats across the ice to open water, they eventually landed on Elephant Island. There being no hope for rescue, Shackleton led a small

crew on his now-famous boat journey to South Georgia where eventually, after a trek over the mountains from the southern to northern side of the island to the whaling station at Grytviken, he was able to find a vessel, return, and rescue his crew with no loss of life. Years later, while on another expedition, he died on 5 Jan 1922 on South Georgia where he was buried.

Remarks. *Chaetozone shackletoni* **n. sp.** is a deep-water species that closely resembles *C. biannulata* **n. sp.** with which it may co-occur. *Chaetozone shackletoni* **n. sp.** differs in having a shorter prostomium, a distinctly enlarged middle section along the body, brown to red pigmented areas along the body, and partial posterior cinctures of acicular spines with up to 13 spines on a side instead of up to 24 in *C. biannulata* **n. sp.** In life, the body of *C. shackletoni* **n. sp.** is pigmented green; in preservative, it is brown to red, but fades considerably after long periods of preservation.

The enlarged middle body segments and pigmentation of *C. shackletoni* **n. sp.** is reminiscent of another deep-water species, *C. brunnea*, from the eastern North Pacific (Blake 2006). In *C. brunnea*, however, the enlarged area is limited to only a few segments, which actually produce a twist on the body resulting in the posterior segments often being offset from the anterior segments. In *C. brunnea*, the enlarged segments function as a stomach that is filled with sediment. In *C. shackletoni* **n. sp.**, the enlarged segments are more posterior on the body, occupy up to 10 segments, and, based on observations, may simply be a site where eggs are stored and mature. An enlarged stomach also occurs in *C. australosetosa* **n. sp.** and *C. biannulata* **n. sp.** but is rarely conspicuous.

Habitat. Sediments in areas where *Chaetozone shackletoni* **n. sp.** were collected were generally olive-grey sandy muds, with silt content being the highest fraction. At the Weddell Sea station the sediment was moderately to poorly sorted: sand (9%), silt (72%), and clay (19%) (Howe *et al.* 2007).

Distribution. Antarctic Seas: Drake Passage, Scotia Sea, and Weddell Sea in slope depths, 1622–2288 m.

Chaetozone spinosa Moore, 1903

Chaetozone spinosa Moore, 1903: 468–470, pl. 26, figs. 73–74; Imajima & Hartman 1964: 297–298; Blake 1996: 300–303, figs. 8.13–8.14; Blake 2006: 54, fig. 6E–I.

Material examined. Off Peru, Peru-Chile Trench, SEPBOP, R/V *Anton Bruun* Cr.17, Sta. 663-C, 13°44′S, 77°33′W, Menzies trawl, 4100 m, 2 specimens (USNM 1490777).

Descriptive remarks. *Chaetozone spinosa* is a deep-sea species previously known from off Japan and northern California (Blake 1996, 2006). The two incomplete specimens from the Peru-Chile Trench are smaller than those from off California but agree well with the descriptions presented in those two papers. A brief description follows.

In this species, the body is thickest anteriorly and broadly flattened dorsally (Blake 2006: Fig. 6E). The prostomium is short, triangular, and fused with and mostly indistinguishable from the peristomium. The prostomium and peristomium together form a large, heart-shaped head that is distinctly set off from a reduced segment 1 (Blake 2006: Fig. 6E–F). Segment 1 lies between the peristomium and setiger 1 and is visible both dorsally and laterally (Blake 2006: Fig. 6F); the first pair of branchiae arise on this reduced segment as apparently do the tentacles.

Setiger 1 is larger than following ones, bearing a pair of branchiae located dorsal to notochaetae. Setae of anterior segments include capillaries; long natatory capillaries are present on the two specimens here. The noto- and neurosetal fascicles of capillaries nearly merge laterally, with little space between them. Neuropodial acicular spines are present from setigers 21–25 (per Blake 2006), but in the present smaller specimens they occur from setiger 12–13; notopodial acicular spines occur from setiger 29 in the larger specimen.

General remarks. The two specimens, while incomplete, are well preserved and retain the form of the unusual pre-setal "head" that dominates the anterior end and provides ready recognition for this species. The narrow achaetous segments between the "head" and setigerous segments are as previously described.

Chaetozone spinosa is a deep-sea species; the present specimens from the Peru-Chile Trench represent its deepest record and most southern location.

Distribution. Off Japan, 280 m; off California, ca. 2000–3100 m; Peru-Chile Trench, 4100 m.

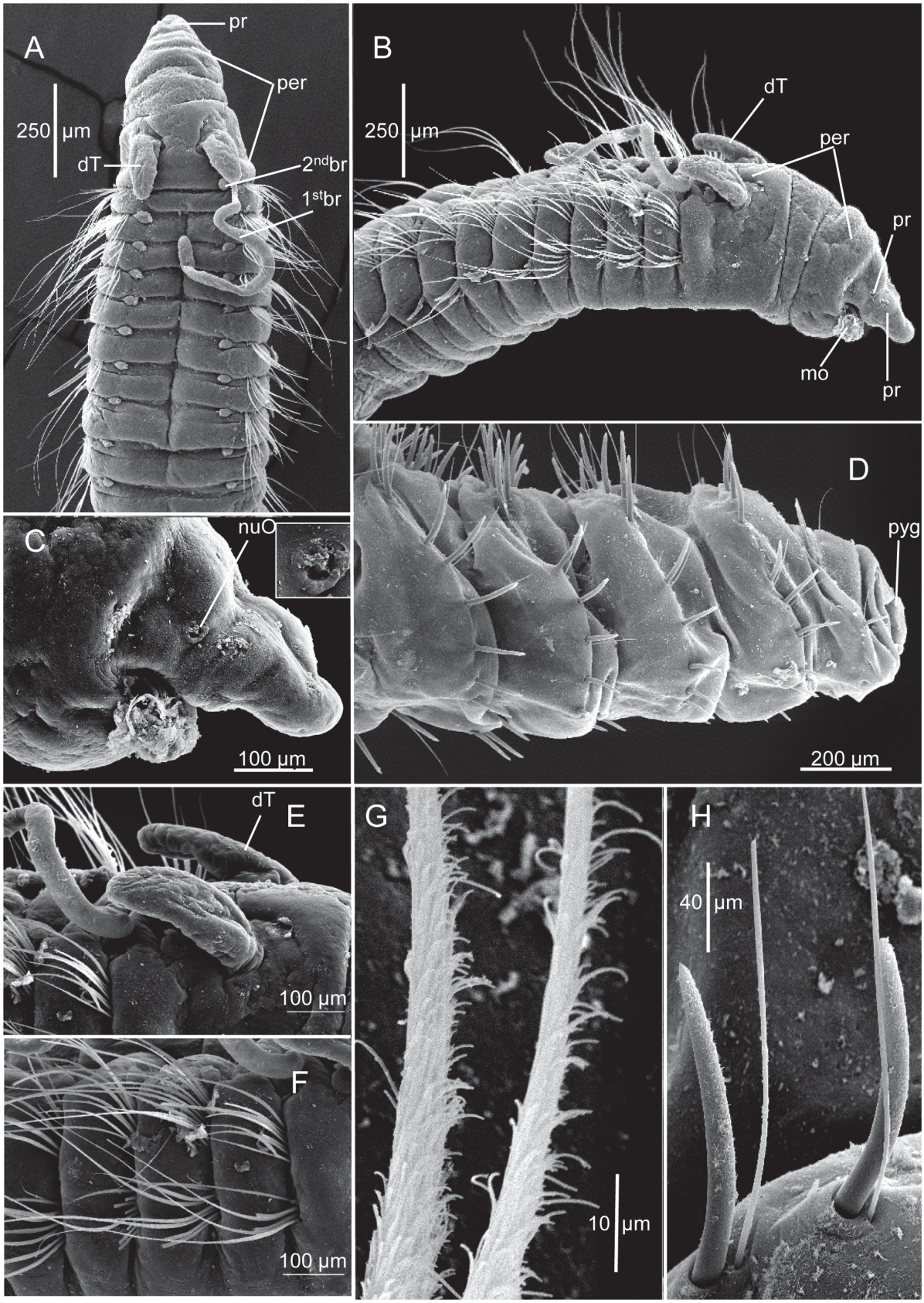

FIGURE 53. *Chaetozone shackletoni* **n. sp.** SEMs of paratype, ANDEEP III Sta. 78-6 (MCZ 149853): A, anterior dorsal view; B, anterior end, right lateral view; C, pre-setigerous region, right lateral view (inset of nuchal organ, not to scale); D, posterior end, left lateral view; E, peristomium and setiger 1, right lateral view; F, setigers 1–4, right lateral view; G, detail of capillary notosetae; H, posterior neuroacicular spines and capillaries.

Genus *Tharyx* Webster & Benedict, 1887. Emended, Blake, 1991

Type species: *Tharyx acutus* Webster & Benedict, 1887, by monotypy.

Diagnosis. (Emended). Prostomium conical; peristomium elongate, with pair of grooved dorsal tentacles arising on posterior margin anterior to setiger 1; abdominal segments sometimes beadlike. Noto- and neurosetae arising close to one another, not widely separated. Setae include simple capillaries in anterior and middle setigers, acicular spines present in posterior setigers either in both posterior noto- and neuropodia or only in neuropodia. Long, natatory-like setae present or absent. Acicular spines typically short, curved, sometimes geniculate or sickle-shaped, narrowing to expanded tip, typically irregularly notched, or sub-bidentate; tips with pair of stunted or rounded knobs but not with two distinct teeth; spines rarely with oval tips. Capillaries may accompany posterior spines or are absent, when present not alternating with spines. Pygidium with terminal anus and small ventral lobe or disk. Several species with black pigment markings on posterior lateral margin of peristomium.

Remarks. Blake (1991) established that the type species of the genus *Tharyx*, *T. acutus*, had knob-tipped hooks or spines in addition to capillaries. This discovery upset the traditional concept of *Tharyx*, which was based upon specimens having all capillaries (see Hartman 1961). Blake (1991) therefore restricted species of *Tharyx* to those having knob-tipped acicular spines and moved species having simple and serrated capillaries to the genera *Aphelochaeta* and *Monticellina* (now *Kirkegaardia*), respectively.

Because they have short knobs or lobes on the acicular spines that may appear to be teeth in some views, species of *Tharyx* have been compared with species of *Caulleriella;* the two genera are, however, easily distinguished from one another by the position of the noto- and neuropodia. In *Caulleriella*, the setal fascicles are widely separated from one another, so much so that in cross-section some species appear to have the fascicles at the four corners of body. In *Tharyx*, on the other hand, the setal fascicles are more laterally placed on the body wall and closer together. Further, the acicular spines of *Caulleriella* are distinctly bidentate instead of sub-bidentate or with knob-shaped tips.

Although species of *Tharyx* and *Chaetozone* both have acicular spines in posterior segments, those of *Tharyx* are usually smaller, inconspicuous and never form the elaborate cinctured armature so characteristic of *Chaetozone* (Blake 1996, 2006, 2015). Blake & Göransson (2015) listed 11 species in the genus *Tharyx*, none of which was from Antarctica. After examination of the holotype and paratypes of *Caulleriella obtusa* described by Hartmann-Schröder & Rosenfeldt (1990), that species is here referred to *Tharyx* and is redescribed. In addition, three species, *T. coloris* **n. sp.** from the East Antarctic Peninsula, *T. moniliformis* **n. sp.** from the deep Weddell Sea, and *T. tierralobos* **n. sp.** from off Peru, are new to science bringing the total number of described species of *Tharyx* to 15.

***Tharyx coloris* new species**
Figures 54–55

Chaetozone sp. 1: Hilbig 2001: 540 (in part); Hilbig *et al.* 2006: 715, 717–719, 724 (in part).

Material examined. **East Antarctic Peninsula, Prince Gustav Channel,** RVIB *Nathaniel B. Palmer* Cr. 2000-3, coll. J.A. Blake, SM Grab, Sta. 01, 14 May 2000, 64°17.625′S, 058°34.678′W, 768 m, **holotype** (LACM-AHF Poly 10225) and 50 **paratypes** (LACM-AHF Poly 10226); Sta. 27, 23 May 2000, 64°22.934′S, 58°36.976′W, 684 m, 11 **paratypes** (LACM-AHF Poly 10227); Sta. 28, 23 May 2000, 64°22.018′S, 058°30.942′W, 794 m, 37 **paratypes** (LACM-AHF Poly 10228); Sta. 29, 24 May 2000, 64°21.361′S, 058°26.637′W, 690 m, 29 **paratypes** (USNM 1490746); Sta. 30, 24 May 2000, 64°16.875′S, 058°26.985′W, 843 m, 8 **paratypes** (USNM 1490747); Sta. 33, 24 May 2000, 64°11.959′S, 058°41.857′W, 587 m, 11 **paratypes** (USNM 1490748); Sta. 34, 24 May 2000, 64°10.995′S, 058°34.140′W, 865 m, 15 **paratypes** (MCZ 149854); Sta. 35, 25 May 2000, 64°10.471′S, 058°28.505′W, 651 m, 14 **paratypes** (MCZ 149855.—**East Antarctic Peninsula, Former Larsen Ice Shelf A area**, **Greenpeace Trough**, RVIB *Nathaniel B. Palmer* Cr. 2000-3, coll. J.A. Blake, SM grab, Sta. 7B, 18 May 2000, 64°43.523′S, 060°04.771′W, 839 m (1, JAB); **border with Larsen B,** RVIB *Nathaniel B. Palmer* Cr. 2000-3, coll. J.A. Blake, SM grab, Sta. 12, 19 May 2000, 64°55.101′S, 060°24.459′W, 317 m (2, JAB); Sta. 13, 19 May 2000, 64°53.517′S, 060°28.836′W, 323 m (3, JAB); Sta. 14, 19 May 2000, 64°51.818′S, 060°33.438′W, 419 m (3, JAB); **Greenpeace Trough**, Sta. 18, 20 May 2000, 64°39.381′S, 059°59.498′W, 665 m (1, JAB).—**Weddell Sea, east of former Larsen Ice Shelf A area**, RVIB *Nathaniel B. Palmer* Cr. 2000-3, coll. J.A. Blake, SM grab, Sta. 26, 23 May 2000, 64°39.564′S, 059°13.226′W, 564 m (26, MCZ 149856); **Weddell Sea**, **SW of Vestkapp**, EASIZ II, R/V *Polarstern*, ANT-XV/3, coll. B. Hilbig, Sta. MG 48-093, 4 Feb 1998, 73°28.3′S, 22°54.5′W, 1988 m, 994 m, (4, SMF 24937); **Weddell Sea, off Coats Land**, USCG *Glacier*, Sta. 69-8, 02 Mar 1969, 77°36.2′S, 42°30′W, 585 m (1, USNM 1490749).

Description. A moderately sized species, holotype complete, 9.3 mm long, 0.65 mm wide across gravid middle body segments, with 85 setigerous segments. Largest paratypes similar, 9–9.5 mm long with 75–90 segments. Body elongate, generally widest in gravid middle body segments, narrowing in far posterior segments. Anterior segments narrow, about ten times wider than long (Fig. 54A); posterior segments narrower, about three times wider than long (Fig. 54C); moniliform or oblong segments absent. Dorsal groove or ridge absent, dorsum broad, relatively smooth anteriorly; with shallow ventral groove present from anterior segments to near posterior end (Fig. 55C); this groove typically with a mid-ventral bulge in each segment where two sides join resulting in low ridge. Color in alcohol overall light tan, but with distinctive brownish-red pigment scattered over peristomium, anterior parapodia, and branchial stubs (Fig. 55B); ventrally pigment on each segment follows contours across mid-ventral groove and central ridge (Fig. 55C). This pigment very dark and intense on some specimens, faded in others; highly diagnostic for this species.

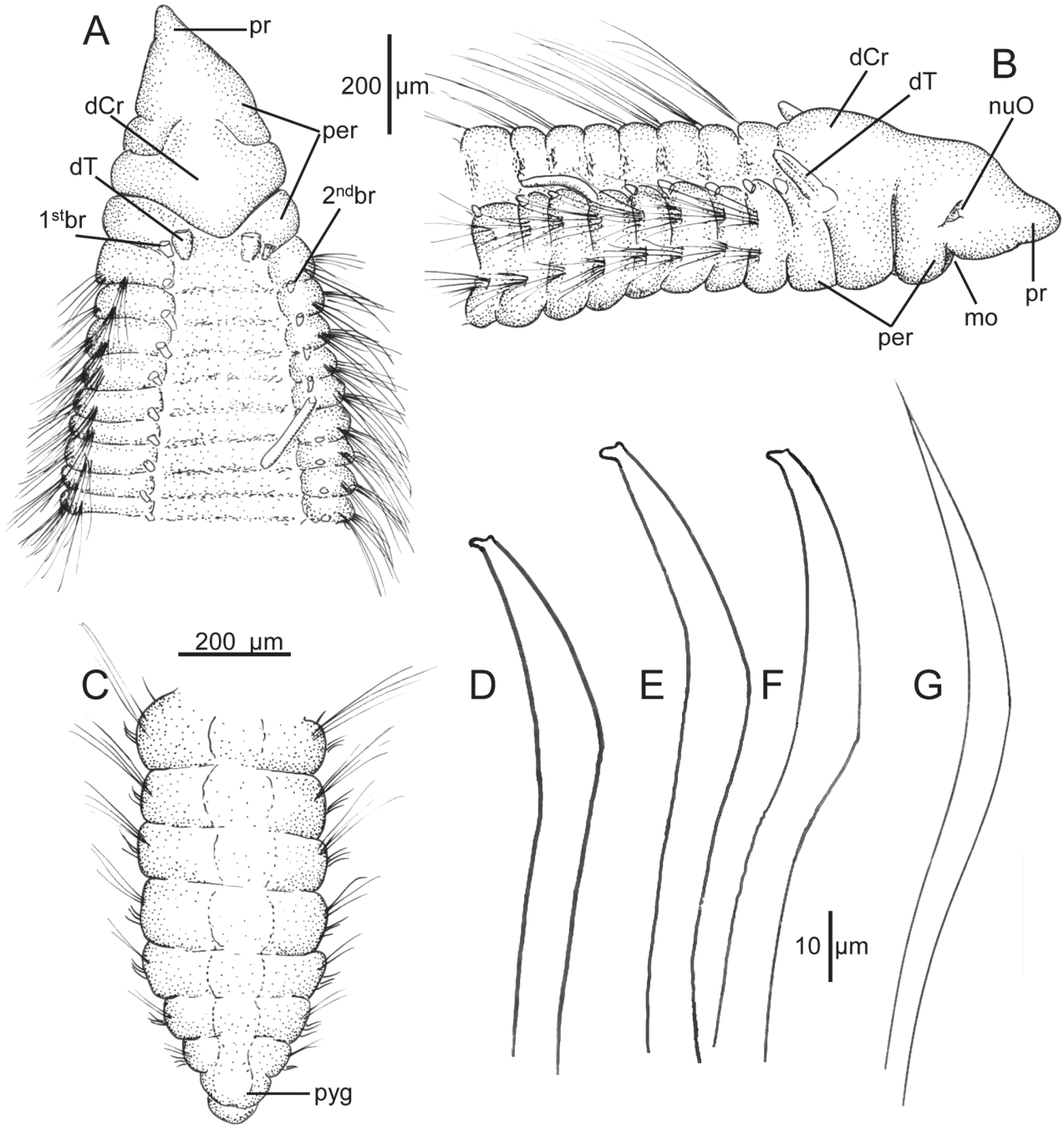

FIGURE 54. *Tharyx coloris* **n. sp.** Paratype (MCZ 149854): A, anterior end, dorsal view; B, anterior end, right lateral view; C, posterior end, dorsal view; D–E, posterior neuropodial geniculate spines; F, transitional neuropodial spine; G, capillary neuroseta.

Prostomium broad, triangular, narrowing to rounded tip (Figs. 54A–B, 55B–D); eyespots absent; nuchal organs shallow grooves on posterior lateral margin of prostomium (Figs. 54B, 55D). Peristomium broad, wider than long, with three annular rings, best seen dorsally (Fig. 54A–B); middle ring largest, dorsally expanded, extending anteriorly over first ring and posteriorly over third ring, forming rounded dorsal crest (Fig. 54A–B). Third ring narrow, similar in shape to setiger 1 and may be an achaetous segment; dorsal tentacles and first pair of branchiae arising on third ring with branchiae located lateral and slightly posterior to tentacles (Fig. 54A–B). Second pair of branchiae on setiger 1 dorsal to notosetae (Fig. 54A–B); branchiae of following segments in similar location; branchiae observed on segments in middle body segments but not in posterior segments.

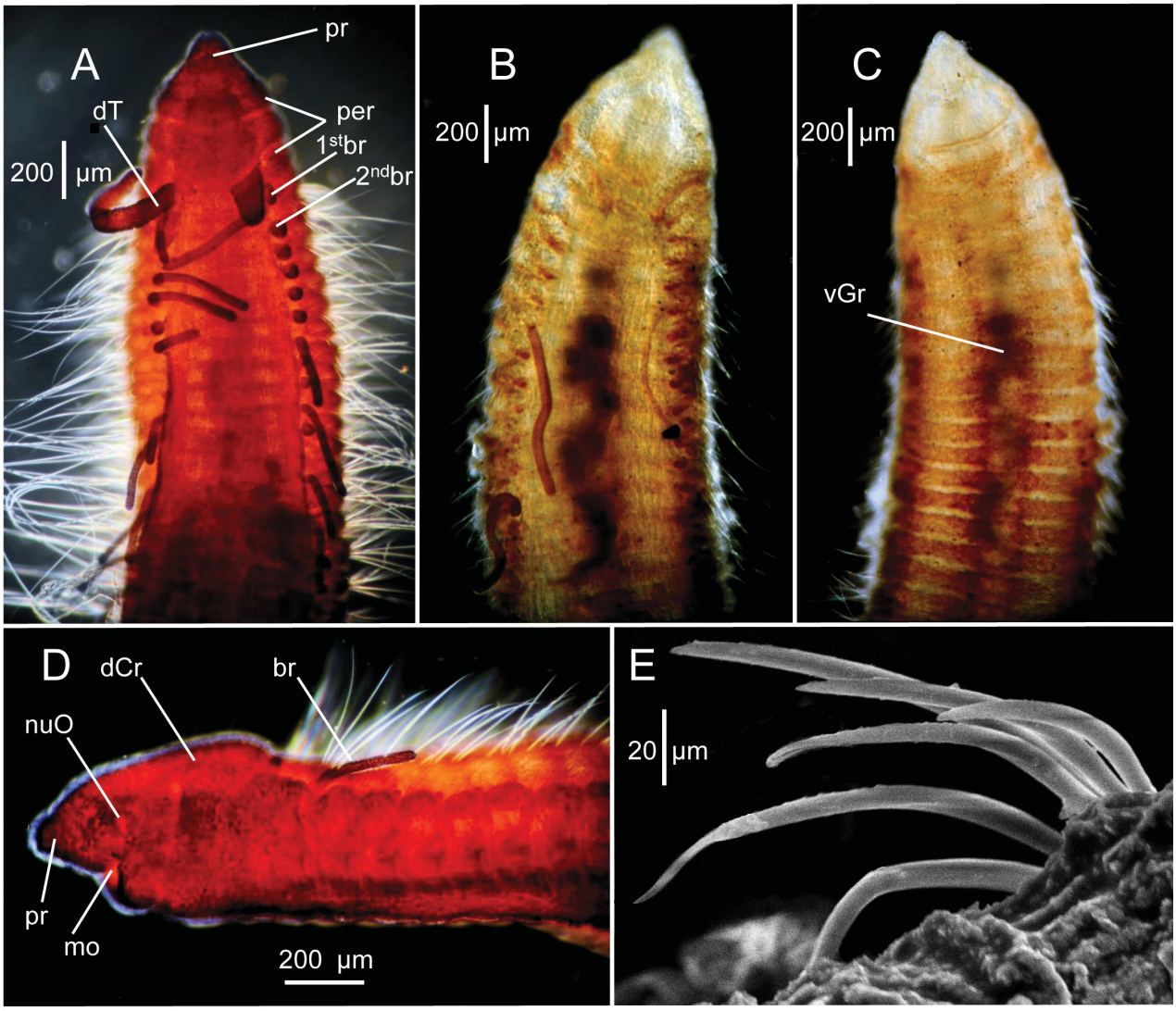

FIGURE 55. *Tharyx coloris* **n. sp.** Paratypes (MCZ 149854): A–B, anterior ends, dorsal view; C, anterior end, ventral view; D, anterior end, left lateral view; E, SEM of posterior neuropodial acicular spines. A, D, stained with Shirlastain A; B–C, unstained.

Parapodia reduced to simple setal tori; postsetal lamellae absent. Setal fascicles of noto- and neuropodia close together throughout body. Notosetae long capillaries including long natatory-like setae throughout most of body, absent in smaller specimens; notosetae of anterior segments 6–10 per fascicle, reduced to 3–5 posteriorly; notoacicular spines entirely absent. Neuroacicular spines relatively simple, first present from about setiger 60 or later; individual spines geniculate to sickle-shaped, tapering to narrow sub-bidentate or knobbed tip (Fig. 54D–F), detail of tips difficult to observe in some views, with some appearing to have angled tips (Fig. 55E); some posterior fascicles with up to 5–6 spines per neuropodium with some having geniculate shaft with capillary tips (Fig. 54G) and transitioning to blunt-tipped spines (Fig. 54D–F); spines curved toward notopodia.

Last few segments narrowing to short pygidium bearing single rounded lobe ventral to anal opening (Fig. 54C).

Methyl Green stain. No distinct staining pattern anywhere along body; stain retained only in intersegmental furrows.

Etymology. *Coloris* is Latin for hue or tint, referring to the reddish colored pigment prominent on the anterior body segments of this species.

Remarks. *Tharyx coloris* **n. sp.** is superficially similar to *Chaetozone homosetosa* with which it may co-occur. A careful comparison of pigment, Methyl Green staining reactions, and the morphology of both soft and hard body

parts confirmed that two different species were present. *Tharyx coloris* **n. sp.** differs from other species of *Tharyx* globally by having distinctive reddish-brown pigment over much of the body and from Antarctic species by the entire absence of notoacicular spines.

Habitat & biology. Specimens from the East Antarctic Peninsula were collected in May 2000. Mature females were present with numerous eggs in individual parapodia from about setiger 15 and continuing to about 20 setigers from the pygidium. The largest eggs ranged from 170–180 μm in the longest dimension.

Tharyx coloris **n. sp.** is one of several bitentaculate cirratulids common in the vicinity of the Prince Gustav Channel and the former Larsen Ice Shelf A collected in May 2000. The surficial sediments at these locations consisted of 20–40% sand in the upper 0–5 cm (Gilbert & Domack 2003).

Distribution. East Antarctic Peninsula, 317–794 m; Weddell Sea, 564–1988 m.

Tharyx moniliformis **new species**

Figures 56–57

Tharyx antarcticus: Blake & Narayanswamy 2004: 1806, 1813 (in part). Not Hartman 1978.

Material examined. **East Antarctic Peninsula former Larsen Ice Shelf A area**, RVIB *Nathaniel B. Palmer*, Cr. 2000-3, coll. J.A. Blake, SM grab, Sta. 05, 17 May 2000, 64°46.520′S, 060°10.720′W, 978 m, **holotype** (LACM-AHF Poly 10229) and 2 **paratypes** (LACM-AHF Poly 10230); Sta. 06, 17 May 2000, 64°45.518′S, 060°10.720′W, 733 m (2, MCZ 149862); Sta. 7, 18 May 2000, 64°43.523′S, 060°04.771′W, 839 m, 11 **paratypes** (MCZ 149863); Sta. NBP 14, 19 May 2000, 64°51.818′S, 060°33.438′W, 419 m (1, MCZ 149864); Sta. 21, 20 May 2000, 64°45.827′S, 060°19.450′W, 912 m, 3 **paratypes** (MCZ 149865); Sta. 23, 21 May 2000, 64°47.144′S, 060°21.566′W, 901 m, 3 **paratypes** (MCZ 149867)**.—Weddell Sea, East of Larsen Ice Shelf A area,** RVIB *Nathaniel B. Palmer*, Cr. 2000-3, coll. J.A. Blake, SM grab, Sta. 25, 22 May 2000, 64°43.314′S, 059°38.459′W, 628 m (6, MCZ 149868); Sta. 26, 23 May 2000, 64°39.564′S, 059°13.226′W, 564 m (8, MCZ 149869).—**Weddell Sea, E of Antarctic Peninsula**, R/V *Polarstern*, ANDEEP II (ANT-XIX/4), Sta. PS61/131-7, 06 Mar 2002, 65°19.45′S, 51°30.97′W, MUC, 3057 m (1, MCZ 149870); Sta. PS61/132-4, 06 Mar 2003, 65°17.75′S, 53°22.92′W, box corer, 2085 m, 2 **paratypes** (SMF 24947); Sta. PS61/132-5, 07 Mar 2002, 65°17.68′S, 53°23.00′W, MUC, 2084 m (1, SMF 24948); Sta. PS61/132-6, 07 Mar 2002, 65°17.77′S, 54°0.00′E, box corer, 2086 m (2, SMF 24949); Sta. PS61/133-6, 07 Mar 2002, 65°20.18′S, 54°143.6′W, MUC, 1120 m, 1 **paratype** (SMF 24950); 2, photographed alive (JAB); Sta. PS61/133-7, 07 Mar 2002, 65°20.10′S 54°14.87′W, box corer, 1110 m (1, SMF 24952); Sta. PS/139-10, 20 Mar 2002, 58°14.18′S, 24°20.47′W, box corer, 3935 m (2, SMF 24951).—**Scotia Sea, Powell Basin**, R/V *Polarstern*, ANDEEP III (ANT-XXII/3), Sta. PS67/121-10, 14 Mar 2002, 63°41.74′S, 50°42.99′W, box corer, 2621 m (2, SEM stubs JAB).

Description. A small, fragile, threadlike species; holotype complete, 7.12 mm long, 0.25 mm wide across middle segments, with 52 setigers; complete paratype from ANDEEP II Sta. 133-6 (SMF 24950), 8.5 mm long, 0.2 mm wide across anterior segments, with 68 setigerous segments. Body more or less cylindrical throughout with no obvious dorsal or ventral ridges or grooves. Anterior segments narrow, but no more than three times as wide as long (Figs. 56B, 57E); middle and posterior segments rounded, moniliform (Figs. 56C, 57C). Most specimens with some middle and posterior segments distended with eggs and/or developing embryos (Fig. 57C–D, F–H). Far posterior segments tapering to simple rounded pygidium (Fig. 56C). Color in alcohol opaque white, no body pigments except 1–2 black spots laterally in middle of peristomium on some specimens (Fig. 56A).

Pre-setal region long, narrow, smooth, lacking any obvious annuli (Figs. 56A–B, 57C–E). Prostomium triangular, tapering to narrow rounded apex (Figs. 56A–B, 57C–E); eyespots absent; nuchal organs not observed. Peristomium narrow, elongate, about twice as long as wide (Fig. 56A–B); dorsal tentacles arising from near posterior margin, with first pair of branchiae located directly posterior to tentacles (Fig. 56A–B). Second pair of branchiae arising from posterior margin of setiger 1, dorsal to notosetae (Fig. 56A–B); subsequent branchiae from a similar location in subsequent segments. Branchiae not observed after about 20 segments.

Anterior setae all capillaries, with 4–6 in notopodia and 4–5 in neuropodia. Some capillaries of middle noto- and neuropodia becoming shorter, thicker, transitioning to curved acicular spines in posterior segments from about setiger 40. Notoacicular spines numbering 1–2 per notopodium, accompanied by 1–2 capillaries; neuroacicular

spines numbering 3–4 per neuropodium, with 1–2 capillaries. Noto-acicular spines short, weakly geniculate, with a swollen tip usually having a clear center (Fig. 56D). Neuroacicular spines with sub-bidentate apical knob on concave side longer than on convex side, these spines also with short barbs or serrations along concave side of shaft (Figs. 56E, 57A–B).

Methyl Green stain. No pattern, body not retaining stain.

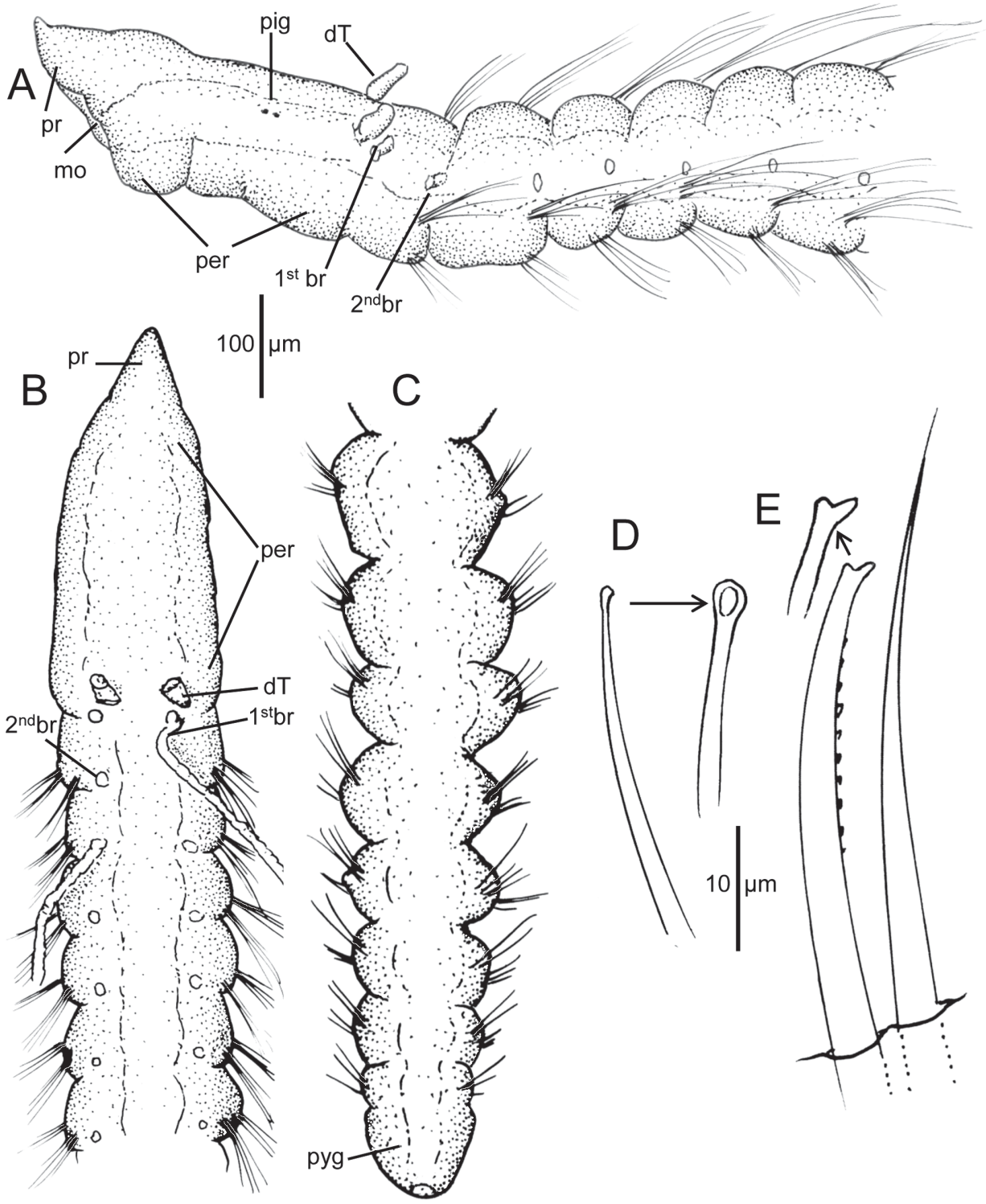

FIGURE 56. *Tharyx moniliformis* **n. sp.** A, anterior end, left lateral view; B, anterior end, dorsal view; C, posterior end, dorsal view; D, posterior notosetae; E, posterior neurosetae (inset not to scale). A, holotype (LACM-AHF Poly 10229), B–E, paratype (LACM-AHF Poly 10230).

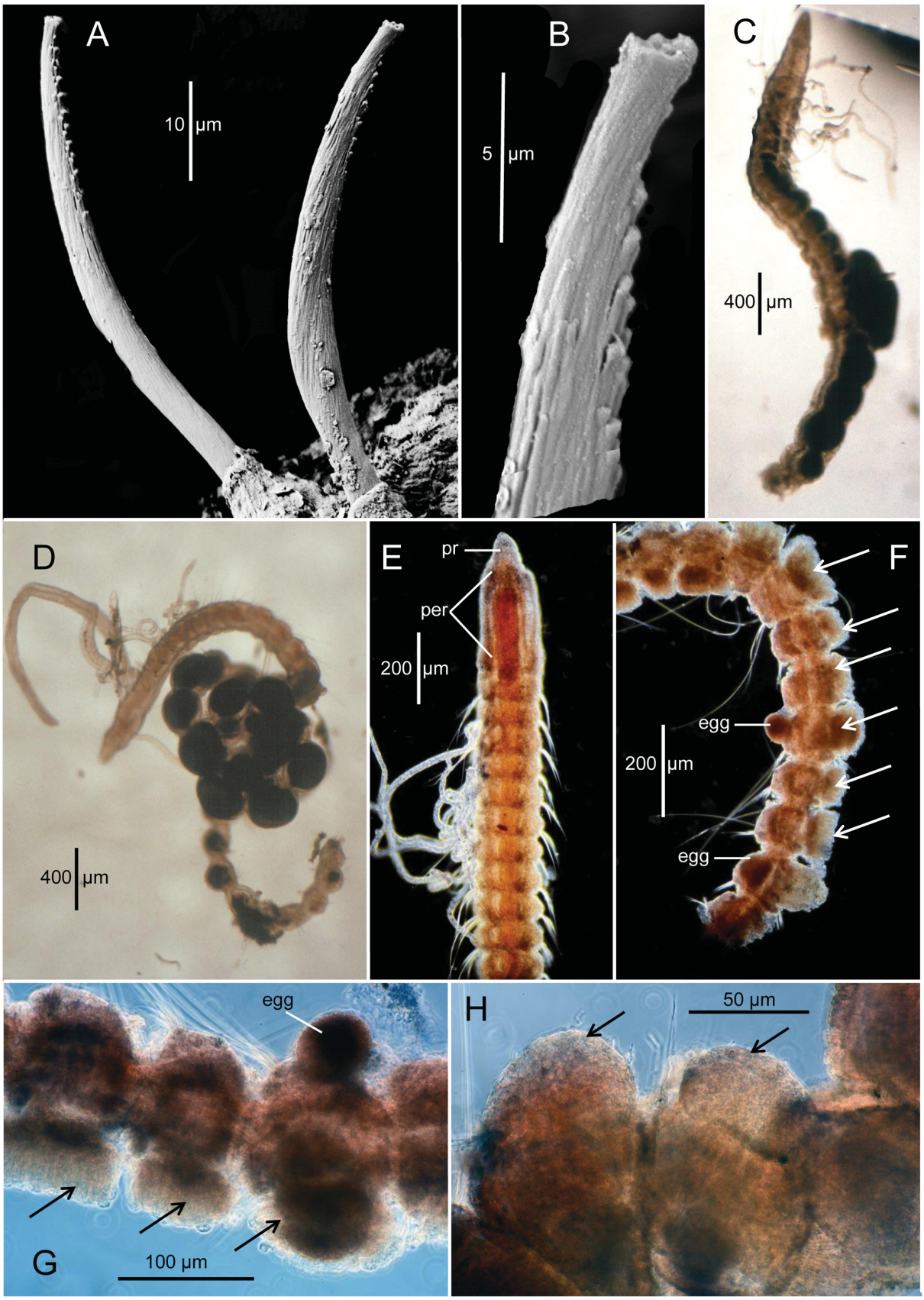

FIGURE 57. *Tharyx moniliformis* **n. sp.** A–B, SEM of posterior neuropodial acicular hooks; C–D, two sexually mature adults, photographed alive; E, anterior end, dorsal view; F, posterior brooding segments, lateral view; G–H, detail of brooding segments with eggs and embryos. Arrows point eggs, embryos, or brooding segments. A–B, ANDEEP Sta. PS/61, 139-10 (SMF 24951); C–D Sta. PS/61 133-6 (SMF 24950); E–H, holotype (LACM-AHF Poly 10229).

Etymology. The species name is derived from *monile*, Latin for a "string of beads" and *forma*, Latin for "shape", referring to the bead-like segments that occur on this small species.

Remarks. *Tharyx moniliformis* **n. sp.** is a small threadlike species that can be distinguished from other species in Antarctica by the presence of moniliform middle and posterior segments that, when mature, bear dorsal eggs or brood chambers. In addition, the morphology of the two types of posterior acicular spines and the presence of a row of serrations along the concave side of the shaft of the sub-bidentate acicular spines are diagnostic. The sub-bidentate acicular spines are typical for other species, but to date, only *T. kirkegaardi* Blake, 1991 from deep-water off North America and *T. obtusus* from shallow depths off the Antarctic Peninsula have been recorded with subapical serrations along the shaft (Blake 1991; 1996; this study).

Habitat & biology. The specimens reported here were collected as part of the Larsen Ice shelf A cruise along the eastern Antarctic Peninsula in May 2000 and the ANDEEP II cruise off the Peninsula in the Weddell Sea in January and February 2002. The surficial sediments in the vicinity of the Larsen Ice Shelf area consisted of 20–40% sand in the upper 0–5 cm (Gilbert & Domack 2003). The surficial sediments along the Weddell Sea transect consisted of dark greenish-grey silt or clay with numerous pebble-sized drop stones observed on the surface. The fine sediments below the surface were observed in sediment profile images to have considerable bioturbation with feeding voids visible to a depth of 11.8 cm (Diaz 2004).

Most specimens are gravid females with long natatory notosetae and swollen segments bearing large rounded eggs and/or developing embryos (Fig. 57C–D, F–E). The swollen upper half of these segments appear to be brood chambers. Eggs measured from 85–135 µm in diameter and there are no more than 1–2 per segment where they occur. There appears to be only one embryo developing per segment. At the stages observed, each embryo consists of numerous cells that form an elongate mass, some of which are curved into what might be anterior and posterior ends. Some of these were damaged by handling and preservation, but study of living specimens and thin sections of the gravid segments would help understand how these embryos are developing.

Distribution. Off the East Antarctic Peninsula and central Weddell Sea, 564–3935 m.

Tharyx obtusus (Hartmann-Schröder & Rosenfeldt, 1990) new combination

Figures 58–59

Caulleriella obtusa Hartmann-Schröder & Rosenfeldt, 1990: 114, figs. 31–34.
Tharyx sp. 1: Hilbig *et al.* 2006: 724.

Material Examined. Antarctica, off Elephant Island, R/V *Walther Herwig*, Cr. 68/1, Sta. 148, 23 Feb 1985, 61°12,7′S, 55°56.4′W, grab, 134 m, **holotype** (ZMH P-19952).—**West Antarctic Peninsula, Bransfield Strait**, off Low Island, R/V *Hero* Sta. 691-26, 119–124 m (1, USNM 187622).—**South Shetland Islands, off King George Island**, R/V *Polarstern*, EASIZ II (ANT-XV/3), Sta. 325, 17 Mar 1998, 62°21.9′S, 58°42.6′W, SM, 805 m (1, SMF 24953).—**East Antarctic Peninsula, Prince Gustav Channel,** RVIB *Nathaniel B. Palmer* Cr. 2000-3, coll. J.A. Blake, SM grab, Sta. 01, 14 May 2000, 64°17.625′S, 058°34.678′W, 768 m (35, LACM AHF-Poly 10231); Sta. 34, 24 May 2000, 64°10.995′S, 058°34.140′W, 865 m (1, JAB); **near Cape Longing**, Sta. 02, 15 May 2000, 64°18.387′S, 058°37.911′W, 504 m, (12, MCZ 149873); Sta. 02A, 15 May 2000, 64°18.387′S, 058°37.911′W megacore, 504 m (1, JAB); **East Antarctic Peninsula, former Larsen Ice Shelf A area, border with Larsen B,** RVIB *Nathaniel B. Palmer*, Cr. 2000-3, coll. J.A. Blake, SM grab, Sta. 11, 18 May 2000, 64°56.669′S, 060°19.281′W, 350 m (20, USNM 1490754); Sta. 12, 19 May 2000, 64°55.101′S, 060°24.459′W (30, USNM 1490755); Sta. 13, 19 May 2000, 64°53.517′S, 060°28.836′W, 323 m (20, MCZ 149871); Sta. 14, 19 May 2000, 64°51.818′S, 060°33.438′W, 419 m (2, JAB).—**East Antarctic Peninsula**, **Former Larsen Ice shelf A area, Greenpeace Trough,** RVIB *Nathaniel B. Palmer*, Cr. 2000-3, coll. J.A. Blake, SM grab, Sta. 19, 20 May 2000, 64°42.778′S, 060°20.846′W, 879 m (3, JAB); Sta. 23, 21 May 2000, 64°47.144′S, 060°21.566′W, 901 m (4, MCZ 149875).—**Weddell Sea, East of Larsen Ice Shelf A**, RVIB *Nathaniel B. Palmer*, Cr. 2000-3, coll. J.A. Blake, SM grab, Sta. 25, 22 May 2000, 64°43.314′S, 059°38.459′W, 628 m (5, JAB); Sta. 26, 23 May 2000, 64°39.564′S, 059°13.226′W, 564 m (34, MCZ 149872); **off Lindenberg Island,** Sta. 03, 15 May 2000, 64°53.533′S, 059°30.694′W, 385 m (3, MCZ 149874).—**Weddell Sea**, **East of Antarctic Peninsula**, USCG *Glacier*, Sta. 68-5, 09 Feb 1968, 76°00′S, 55°00′W, 400 m (1, USNM 1490756)

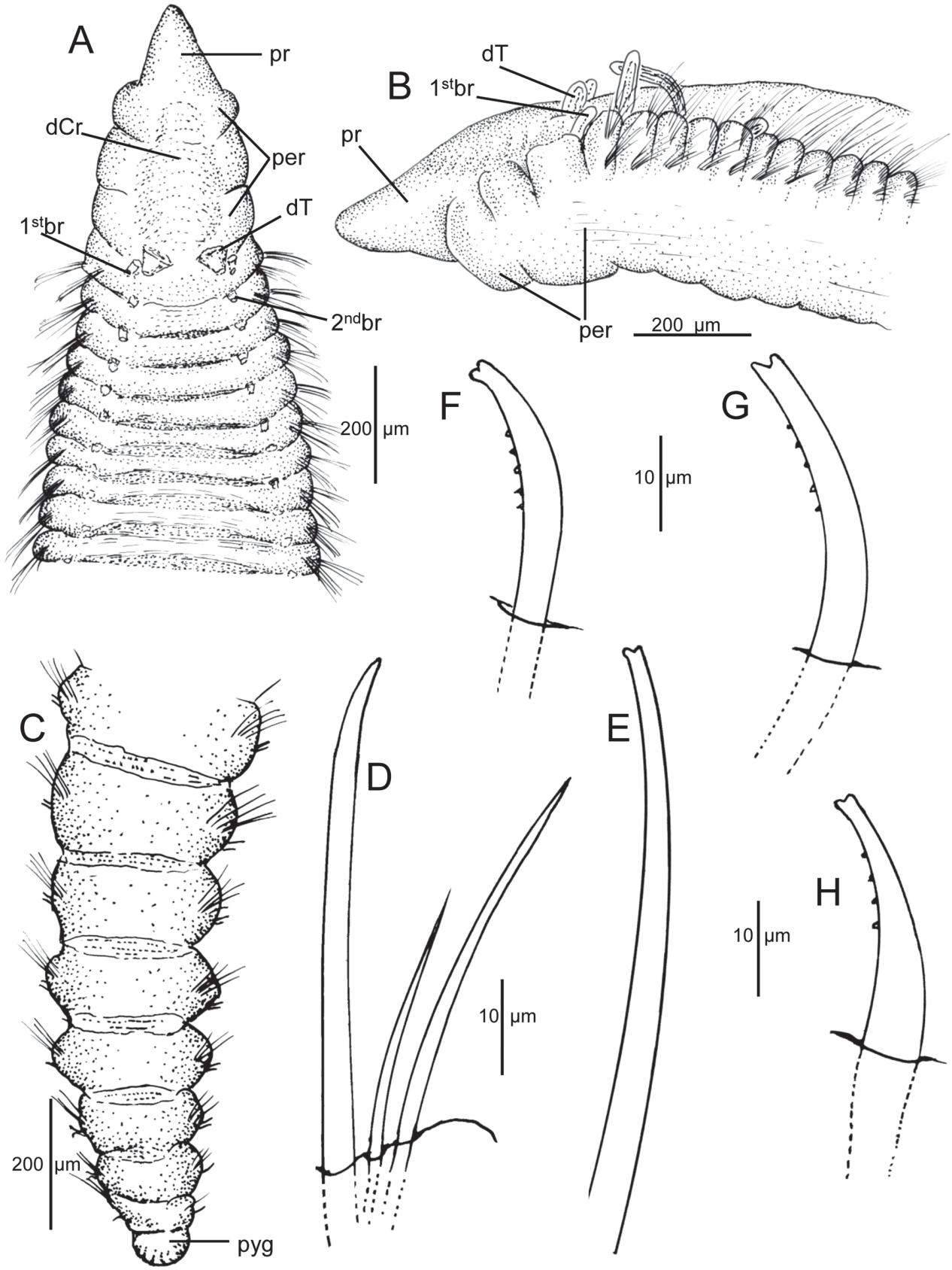

FIGURE 58. *Tharyx obtusus* (Hartmann-Schröder & Rosenfeldt, 1990). A, anterior end, dorsal view; B, anterior end, left lateral view; C, posterior end, dorsal view; D, notosetae from posterior setiger; E, posterior notopodial spinous seta; F–H, short, curved hooked neurosetae from far posterior setiger. A, C–H, specimens from Sta. NBP-01 (LACM-AHF Poly 10231); B, holotype (ZMH P-19953).

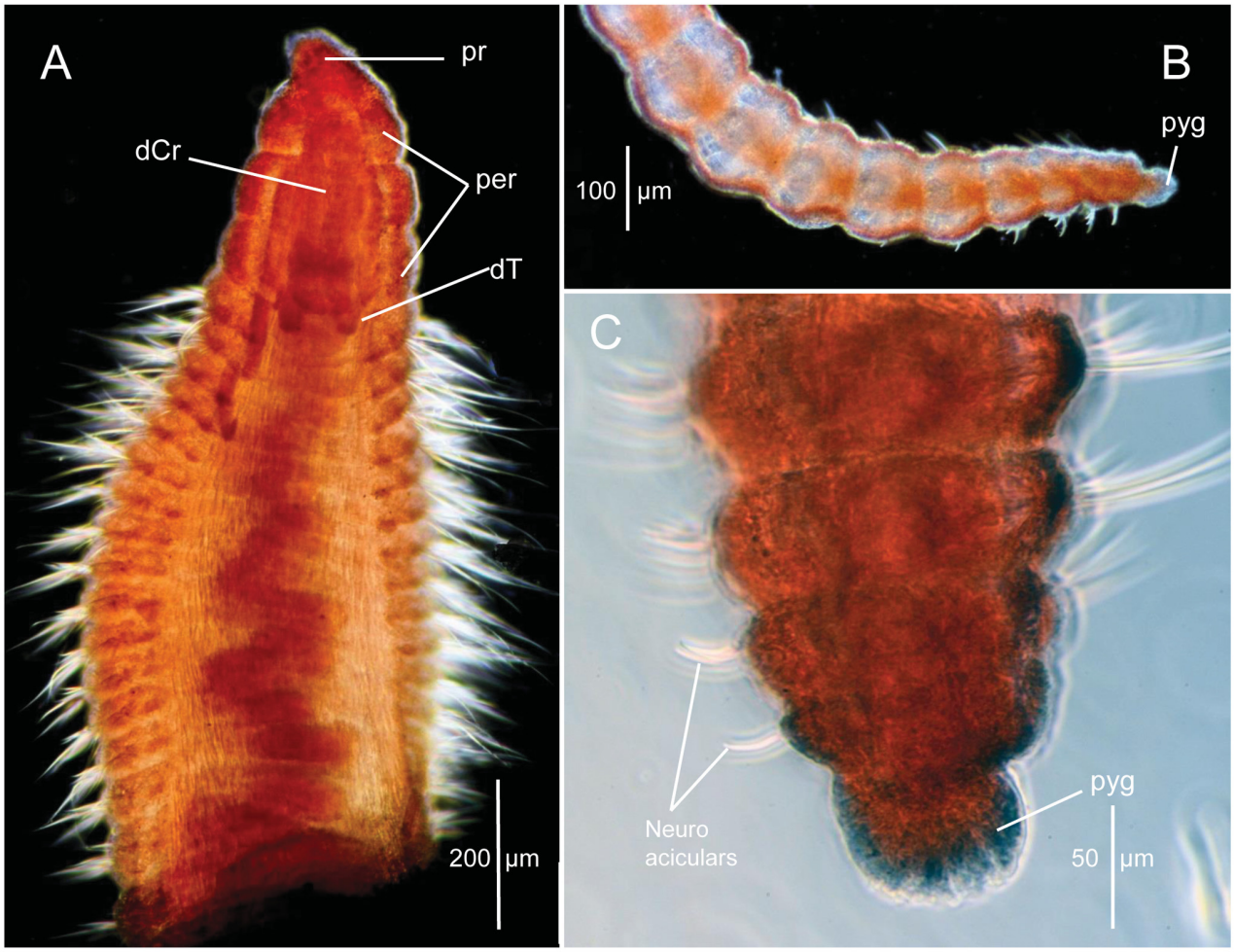

FIGURE 59. *Tharyx obtusus* (Hartmann-Schröder & Rosenfeldt, 1990). Photomicrographs: A, anterior end, dorsal view; B, posterior end, left lateral view; C, posterior end, dorsal view. All from Sta. NBP-01 (LACM-AHF Poly 10231). All stained with Shirlastain A.

Description. A moderately sized species, holotype 11 mm long, 0.5 mm wide across thoracic segments for about 85 setigers. Two specimens from NBP Sta. 01 (LACM AHF-Poly 10231), 9.0–9.45 mm long and 365–435 µm wide for 76–85 setigers. Anterior end through first 15–20 segments dorsally flattened, expanded laterally, each segment relatively short, 9.5 times wider than long (Figs. 58A, 59A); following segments longer, about 2.5 times as wide as long, rounded in cross section, but not moniliform; posteriormost segments narrowest, somewhat flattened ventrally. Weak ventral groove present or absent. Color in alcohol light tan; a few specimens with black pigment spots on posterior lateral margin of peristomium.

Prostomium triangular, as long as wide; bluntly pointed on anterior margin (Figs. 58A–B, 59A); a few specimens with prostomium shorter, more rounded anteriorly; eyespots absent; nuchal organs barely visible as notch at posterior margin. Peristomium elongate, slightly longer than wide, with three annular rings of similar length (Figs. 58A–B, 59A), best seen laterally and when stained with Shirlastain A; with low dorsal crest. Paired dorsal tentacles arising from medial position at posterior margin of peristomium (Figs. 58A–B, 59A); first pair of branchiae arising lateral and posterior to tentacles at border of peristomium and setiger 1 (Fig. 58A–B).

Notosetae of first 60–65 setigers all capillaries, with those of first few setigers numbering 6–8 per fascicle and vaguely arranged in two rows with those of posterior row longer than those of first row; subsequent setae over most of body occurring in a single row, numbering 4–5 in a fascicle. Notosetae relatively long throughout body with those of posterior segments becoming curved and thicker, with some in far posterior segments becoming spinous rather than finely tipped (Fig. 58D); a few developing a flattened, knobby tip (Fig. 58E). Neurosetae of middle segments becoming curved, geniculate and shorter but with capillary tips; in far posterior segments 1–4 ventral

most setae becoming hooked, with tips bearing two sub-bidentate knobs and with short barbs along concave margin producing a weakly serrated edge (Fig. 58F–H); serrations not visible in all angles and otherwise difficult to detect on some specimens.

Pygidium with large ventral lobe, anal cirri absent (Figs. 58C, 59B–C).

Variability. The greatest variability is in the nature of the posterior noto- and neuropodial spines on small specimens or juveniles with fewer than 25–30 setigers. In many cases, the spines are not curved or geniculate but appear straight and pointed except for those in the last 2–3 segments. While this likely means that with growth, the larger specimens will have more posterior segments with curved neuroacicular spines, it does mean that smaller specimens cannot always be reliably identified as a species of *Tharyx*.

Another point of variation is that the peristomial annulations are not apparent in juveniles, making the pre-setigerous region appear long, narrow, and smooth.

Methyl Green stain. No staining pattern apparent on either the type specimens or the new materials.

Remarks. *Caulleriella obtusus* agrees well with the definition of *Tharyx* as originally established by Blake (1991) and is here transferred to that genus. *Tharyx obtusus* has noto- and neuropodia set close to one another and has the classic knob or sub-bidentate tipped acicular spines first described by Blake (1991) for the type species, *T. acutus*. In addition, the presence of serrations along the concave margin of these same spines is similar to those of *T. kirkegaardi* from deep-water off North America (Blake 1991, 1996) and *T. moniliformis* **n. sp.** (see above). *Tharyx obtusus* is superficially similar to *Chaetozone homosetosa* in the same samples. However, that species has posterior acicular spines that are short, curved, and blunt-tipped instead of curved with knobby tips and a serrated edge along the shaft. In addition, *T. homosetosa* has a prominent MG staining pattern that is absent in *T. obtusus*.

Habitat. *Tharyx obtusus* was one of several bitentaculate cirratulids that were common and often abundant along the East Antarctic Peninsula in the Prince Gustav Channel and vicinity of the Larsen Ice Shelf A collected in May 2000. The surficial sediments in these locations consisted of 20–40% sand in the upper 0–5 cm (Gilbert & Domack 2003).

Distribution. Known only from off Elephant Island, Bransfield Straits, and off the East Antarctic Peninsula in depths of 119–768 m.

Tharyx tierralobos new species

Figures 60–61

Material examined. Off northern Peru, Isla Lobos de Tierra, SEPBOP, R/V *Anton Bruun*, Cr. 16, Sta. 635-A, coll. 05 Jun 1966, 06°27′S, 80°56′W, trawl, 160 m, **holotype** (USNM 1490757) and 3 **paratypes** (USNM 1490758).

Description. A small species, holotype complete, 7.1 mm long, 0.5 mm wide across anterior segments, with approximately 115 setigerous segments; one complete paratype smaller, 3.4 mm long, 0.3 mm wide across anterior segments, with 110 setigerous segments. All segments short, crowded throughout, not becoming longer in middle body (Figs. 60A, 61A–B). Body generally dorsoventrally flattened, especially in posterior half; anterior segments with dorsum weakly elevated and rounded over lateral parapodial shoulders (Fig. 60A); venter flattened with mid-ventral groove extending along entire body (Fig. 61B); venter of far posterior segments with broad shallow groove into which neurosetae project (Fig. 61C). Color in alcohol: light tan, no body pigment present on holotype; one paratype with dusky pigment on peristomium and at interface with setiger 1.

Prostomium triangular, tapering to narrow tip (Figs. 60A, 61A); eyespots absent; nuchal organs narrow slits on posterior lateral margins. Peristomium with three weakly developed rings with grooves not crossing dorsum (Fig. 60A); with prominent dorsal crest extending onto setiger 1 (Fig. 60A). Dorsal tentacles on posterior margin of peristomium, lateral to posterior extension of dorsal crest (Fig. 60A). First pair of branchiae on setiger 1, dorsal to notosetae (Fig. 60A); subsequent branchiae in similar position; branchiae present on all segments of first one-third of body, irregularly present on middle and posterior segments.

Noto- and neuropodia moderately separated from one another, most noticeably in middle and posterior segments; anterior notopodia forming distinct dorsal shoulders in anterior segments (Fig. 60A), less distinct shoulders posteriorly; neuropodia less well developed. In middle and posterior segments, setae arising from low ridge. Anterior setae all capillaries, numbering about 5–6 per fascicle. Neuropodial hooks first present from setiger

28, numbering 1–2 at first with 2–3 thin capillaries, increasing to 3–4 hooks in middle and posterior segments with 2–3 thin capillaries; neuropodial hooks short, geniculate, tapering to rounded weakly expanded tip, appearing hollow internally (Fig. 60B–C, inset). Notosetae all capillaries through middle segments replaced in posterior segments by 3–4 long geniculate setae that taper to narrow pointed tip (Fig. 60D); these accompanied by 3–4 long, thin capillaries.

Pygidium with about 6–8 glandular papillae surrounding anal opening.

Methyl Green stain. Stain retained on dorsum and venter of prostomium and peristomium producing distinct pattern, best seen on holotype (Fig. 61A). No stain retained on individual segments.

Etymology. The name *tierralobos* is derived from the name of the island "Lobos de Tierra" near the collecting site off northern Peru.

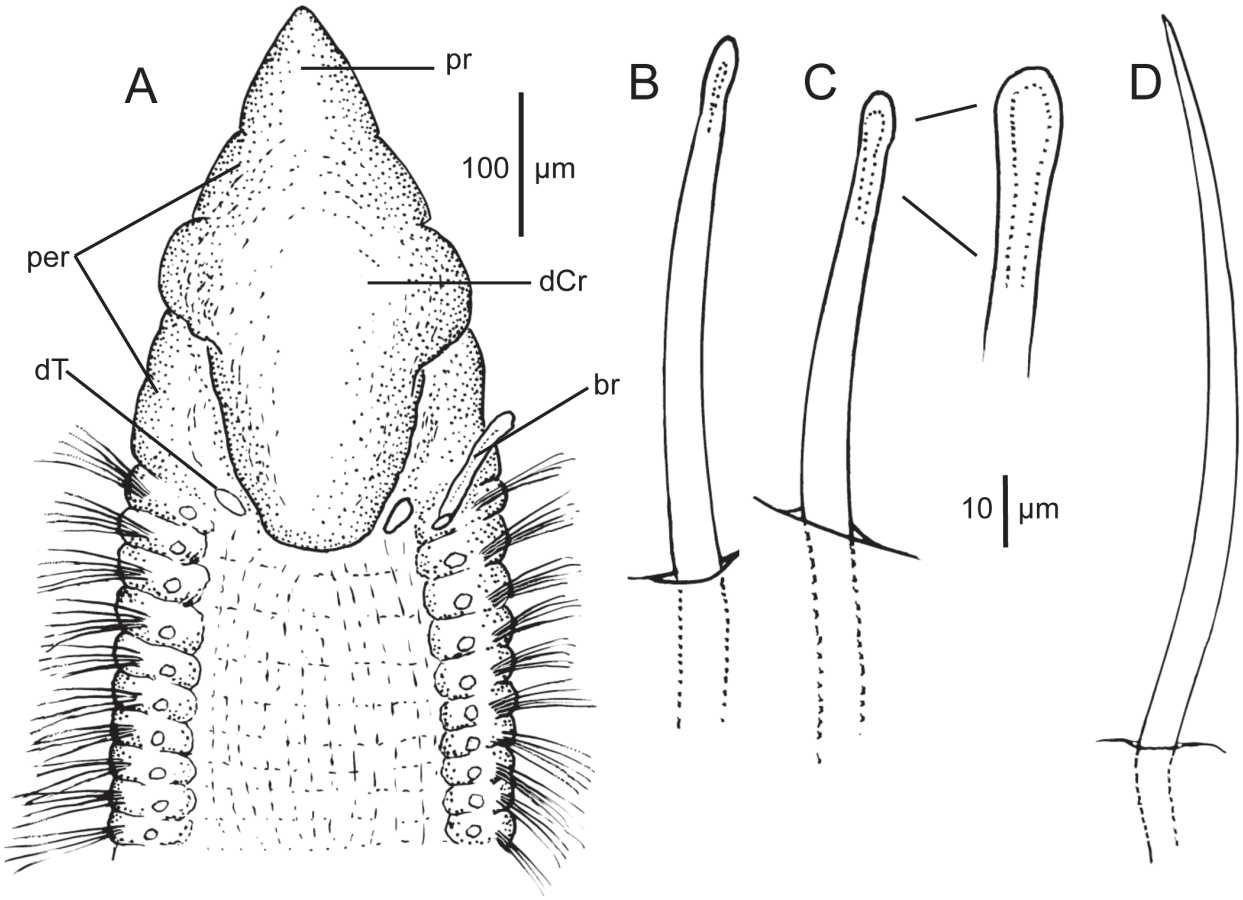

FIGURE 60. *Tharyx tierralobos* **n. sp.** Holotype (USNM 1490757): A, anterior end, dorsal view; B–C, posterior neuropodial acicular spines (inset not scale); D, posterior notopodial spinous seta.

Remarks. *Tharyx tierralobos* **n. sp.** differs from most of its congeners by having a relatively thick body with numerous short segments throughout and with the tips of the neuropodial geniculate hooks expanded, but with a rounded tip instead of the sub-bidentate or irregular knobby tip characteristic of most *Tharyx* species. Based on the body shape and details of the noto- and neuropodial hooks, *T. tierralobos* **n. sp.** is most similar to *T. robustus* Blake & Göransson, 2015, from northern Europe. The two species differ in that *T. robustus* has the first pair of branchiae on the peristomium posterior to the base of the dorsal tentacles whereas *T. tierralobos* **n. sp.** has the first branchiae arising directly on setiger 1. Additional differences are that (1) *T. robustus* has characteristic pigment spots on the posterior lateral margins of the prostomium that are absent in *T. tierralobos* **n. sp.**; (2) both species have relatively flattened bodies, but *T. tierralobos* **n. sp.** has a prominent ventral groove along most of the body that is not well-developed in *T. robustus,* which instead has a distinct mid-ventral ridge; and (3) the notopodial acicular hooks of *T. robustus* consist of both short and long curved setae, whereas the notopodial hooks of *T. tierralobos* **n. sp.** are limited to long, geniculate hooks that taper to a point.

It is noted that the noto- and neuropodia of *T. tierralobos* are moderately separated from one another, especially in middle and posterior segments, a characteristic of species of *Caulleriella*. However, by lacking any evidence of bidentate hooks, this species has been assigned to *Tharyx*, but is clearly an outlier and deserves further study.

Distribution. Known only from off Peru, near Isla Lobos de Tierra, 160 m.

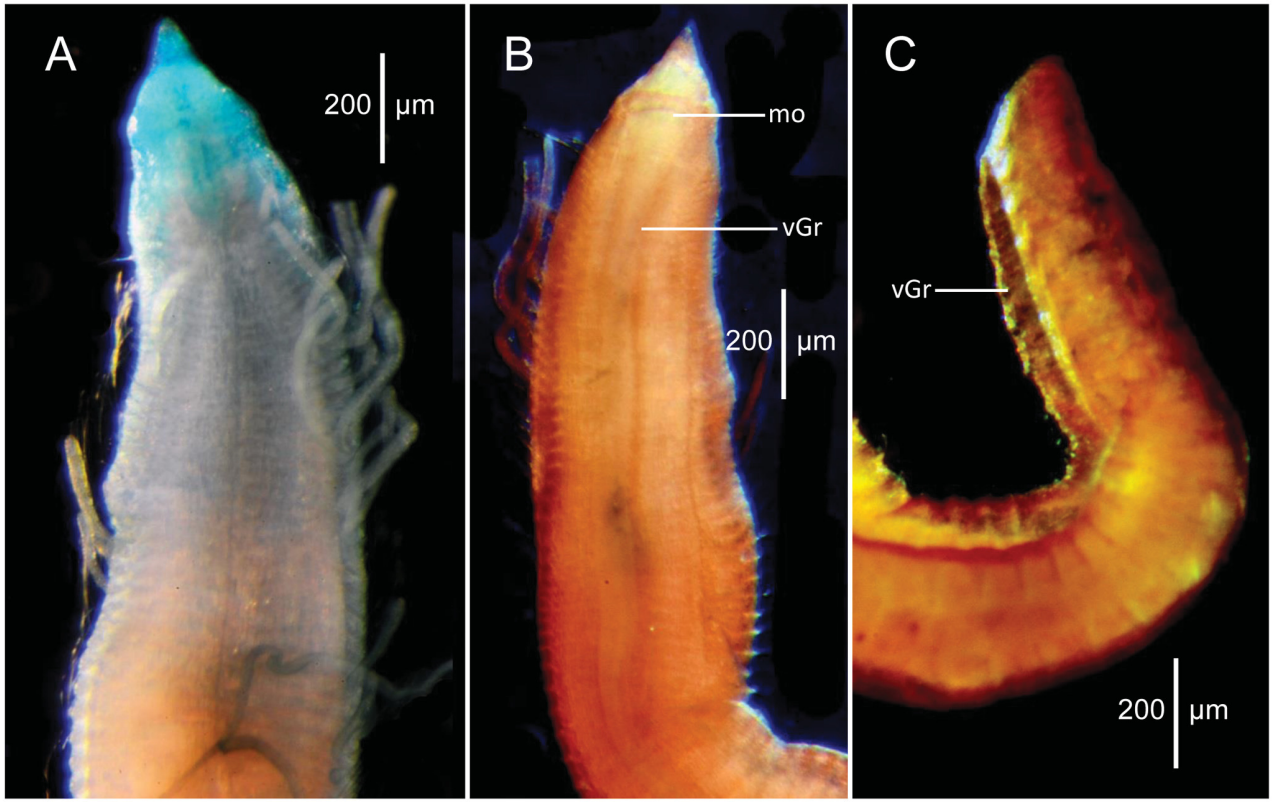

FIGURE 61. *Tharyx tierralobos* **n. sp.** Paratype (USNM 1490758): A, anterior end, dorsal view; B, anterior end, ventral view; C, posterior end, ventrolateral view. A, stained with Methyl Green; C–D, stained with Shirlastain A.

Discussion

General comments on biogeography. Among the 41 species of bitentaculate Cirratulidae reported in this study, 16 occur along the western coast of South America from Ecuador to Patagonia from low water to abyssal depths. One species, *Aphelochaeta cincinnata*, appears to be limited to shelf depths off subantarctic islands, while another 24 species occur in the seas around Antarctica ranging from shallow water to abyssal depths.

At the time of Blake's (1991) paper revising the genus *Tharyx*, there were about 70 known species of bitentaculate cirratulids, some of which were reported widely. In the ensuing 27 years, another 125 species have been described, including those in this study. Much of this effort has come about from collections of offshore species, where the bitentaculates are dominant. In addition, with the availability of numerous new collections and newly recognized morphological characters, so-called cosmopolitan species such as *Chaetozone setosa* have been shown to have a restricted range with the global records gradually being referred to new species. Endemism appears to be the rule among bitentaculate cirratulids with wide-ranging global species being rare. One exception is *Chaetozone corona*, originally described from southern California, which ranges south to Ecuador (this study) but the species has apparently been introduced to widely separated locations such as Brazil, Florida, the Mediterranean Sea, and the Brittany coast of France (see Le Garrec *et al.* 2017).

The present study together with Blake (2016) records 22 species of bitentaculate cirratulids from western South America from Ecuador to the Magellan region of Chile. Apart from *Aphelochaeta antelonga*, which also occurs off Costa Rica, and *Chaetozone spinosa*, a Pacific deep-sea species, 20 are currently limited to western South America. At the same time, 28 species are recorded from the Southern Ocean and Antarctica, all of which are believed to be endemic.

General Comments on the bitentaculate genera. In a study such as this where numerous species in poorly studied habitats are collected, it is inevitable that specimens will be encountered that depart from or challenge the currently accepted definitions of the genera. This has certainly been the case in the present study. In the species descriptions presented above and the discussions that follow below some of these problems are addressed and at least some effort has been taken to deal with outlier taxa.

Chaetocirratulus **n. gen**. is established to deal with specimens that have historically been referred to *Chaetozone*, but that lack the distinctive posterior armature where large sigmoid spines form cinctures. Efforts are made to address similarities and differences among taxa referred to the genera *Caulleriella*, *Chaetozone*, *Chaetocirratulus* **n. gen**., and *Tharyx*, but outliers are still present and are identified as such. A similar situation was previously identified for the genus *Kirkegaardia* by Blake (2016) where several species did not fully agree with or were outside the generic diagnosis. With the greatly expanded surveys of offshore habitats in recent decades, especially in the deep sea, it is to be expected that more taxa will be encountered that depart from conventional definitions of the genera and different approaches to classifying bitentaculate cirratulids may be required.

Bitentaculate Cirratulidae from off western South America and the Magellan region. Prior to the paper by Blake (2016) and the present study, only five named and described species of bitentaculate Cirratulidae were known from western South America: *Aphelochaeta aquiseta* Hartmann-Schröder, 1962 from Peru, *A. longisetosa* from Chile, *Caulleriella chilensis* from Chile, *C. magnaoculata* from Peru, and *Chaetozone curvata* from Chile. With the addition of 17 species (Blake 2016, present study), there are now 22 species known from along the long continental margin extending from Ecuador to Tierra del Fuego. Eight new species are described in the present paper.

Provisional categories of species of *Aphelochaeta, Caulleriella*, *Chaetozone, Kirkegaardia* (as *Monticellina*), and *Tharyx* by Montiel (2005), Montiel *et al*. (2005), Palma *et al*. (2005), and Soto *et al*. (2016) suggest that many additional species await description. In addition, records of *Aphelochaeta cincinnata* and *Chaetozone setosa* by these authors and others may refer to multiple species, given the current reassignment of Antarctic material previously referred to those species.

The following species are currently reported and verified as occurring from the long coastline of western South America to the Straits of Magellan and Tierra del Fuego:

1 *Aphelochaeta antelonga* Dean & Blake, 2016. Costa Rica, 11–18 m; Chile, off Valparaiso, 20–119 m
2 *Aphelochaeta aquiseta* Hartmann-Schröder, 1962. Peru, Isla Santa, Bahia Coisco, 9 m
3 *Aphelochaeta longisetosa* (Hartmann-Schröder, 1965). Chile, intertidal to 209 m
4 *Aphelochaeta magellanica* **n. sp.** Chile, Straits of Magellan, 200–300 m
5 *Caulleriella chilensis* Carrasco, 1977 **n. status**. Chile, Bahia de Concepción, 2–25 m
6 *Caulleriella ecuadoriana* **n. sp.** off Ecuador, 8–20 m
7 *Caulleriella magnaoculata* Hartmann-Schröder, 1962. Peru, Isla Santa, Bahia Coisco, 9 m
8 *Caulleriella suroestense* **n. sp.** Off Chile, Juan Fernandez Islands, shallow subtidal
9 *Chaetocirratulus furvus* **n. sp.** Off Peru, South of Callao, 1000 m
10 *Chaetocirratulus neogracilis* **n. sp.** Off Peru, Peru-Chile trench,4100 m
11 *Chaetozone castanea* **n. sp.** Off Peru, 105–160 m; Chile, 65–98 m
12 *Chaetozone curvata* Hartmann-Schröder, 1965. Central and southern Chile, 82–260 m
13 *Chaetozone corona* Berkeley & Berkeley, 1941. Off Ecuador, ca. 50 m
14 *Chaetozone gesae* **n. sp.** Off northern Chile, 460 m
15 *Chaetozone spinosa* Moore, 1903. Peru-Chile Trench, 4100 m
16 *Kirkegaardia antonbruunae* Blake, 2016. Off Peru, 1000 m; off Chile, SW of Valparaiso, 737–750 m
17 *Kirkegaardia araiotrachela* Blake, 2016. Off Peru, 520–805 m
18 *Kirkegaardia chilensis* Blake, 2016. Off Chile, 624–957 m
19 *Kirkegaardia giribeti* (Dean & Blake, 2009). Costa Rica, intertidal; off Ecuador shallow subtidal
20 *Kirkegaardia heroae* Blake, 2016. Off Tierra del Fuego, 33–44 m
21 *Kirkegaardia jumarsi* Blake, 2016. Off Peru, Peru-Chile Trench, 5430 m
22 *Tharyx tierralobos* **n. sp.** Off Peru, 160 m

Bitentaculate Cirratulidae from the Southern Ocean and Antarctica. The earliest attempt to summarize and list bitentaculate Cirratulidae from Antarctic seas was by Hartman (1966), who used available literature from Ehlers (1908), Monro (1930, 1939), and Augener (1932) and their published illustrations to characterize the fauna. This was followed by two subsequent works by Hartman (1967, 1978) that were based on new materials collected by American surveys on the USNS *Eltanin* and USCG *Glacier* in widespread locations around Antarctica. Unfortunately, many of the specimens were given names of species from other oceans such as *Chaetozone setosa*, *Tharyx annulosus*, and *T. marioni* with little or no descriptive information. The papers by Hartmann-Schröder & Rosenfeldt (1989, 1990) introduced several well-described new species from the Antarctic Peninsula with good illustrations. Apart from Blake (2016), no subsequent papers have provided any taxonomic descriptions of Antarctic bitentaculate cirratulids.

Upon initiation of this study with the USARP collections, it became apparent that there were many more species of bitentaculate cirratulids in Antarctica than were being recognized. After my own field work at McMurdo Station, a cruise to the vicinity of the Larsen Ice Shelf A, deep-sea surveys in the Weddell Sea as part of the ANDEEP program, and access to an important continental shelf and slope collection from the EASIZ II project provided by Dr. Brigitte (Hilbig) Ebbe, a species-rich set of samples was available to supplement the original USARP collections and became the basis of this study. In addition to the new materials, it was critical to reexamine type materials of previously described species in order to verify or update their descriptions and compare with the new collections. After examining more than 4000 specimens, the 28 species of bitentaculate cirratulids listed below can be confirmed as occurring in the Southern Ocean and other seas around Antarctica. Twenty-one species new to science were discovered, including 19 described in the present study and two species of *Kirkegaardia* previously described (Blake 2016).

The seven species of *Aphelochaeta* are all new to science; many of these have most certainly been identified as *A. cincinnata* or perhaps *A. epitoca* in prior surveys. *Aphelochaeta palmeri* **n. sp.** appears to be the most common species of the genus in Antarctica, but other species do co-occur with it. Additional species may be present in the deep-sea collections but are not described due to fragmentation or poor condition of the specimens. Five species of *Caulleriella*, four new to science, occur mostly in deep water. Four species, one new, are referred to a new genus, *Chaetocirratulus* **n. gen.**, that was established for species formerly referred to *Chaetozone* that lacked the distinctive posterior cinctured armature; instead their spines are generally small and inconspicuous. These cirratulids have a broad, rounded or wedge-shaped prostomium similar to multitentaculate cirratulids of the genus *Cirratulus*. Seven species of *Chaetozone*, five new, are described. *Chaetozone australosetosa* **n. sp.** is widespread in shelf depths, whereas *C. biannulata* **n. sp.** and *C. shackletoni* **n. sp.** are more common in deep-sea sediments. *Chaetozone bransfieldiana* and *C. homosetosa*, originally described as *Caulleriella* (Hartmann-Schröder & Rosenfeldt 1989) are here referred to *Chaetozone*. Three species of *Tharyx* have been identified, two new to science; *T. obtusus*, originally described as *Caulleriella* by Hartmann-Schröder & Rosenfeldt, 1990) is here referred to *Tharyx*.

There is no overlap of bitentaculate cirratulids from the Southern Ocean and Antarctica with species from South America. The following 28 species of bitentaculate Cirratulidae are here recognized from Antarctic seas:

1 *Aphelochaeta aubreyi* **n. sp.** Antarctic Peninsula, Weddell Sea, 25–2000 m
2 *Aphelochaeta bimaculata* **n. sp.** Weddell Sea, east of the Antarctic Peninsula, 851 m
3 *Aphelochaeta brandtae* **n. sp.** Antarctica: Drake Passage, Scotia Sea, Weddell Sea; slope and abyssal depths, 1166–3957 m
4 *Aphelochaeta dearborni* **n. sp.** Antarctica, 24–1510 m
5 *Aphelochaeta hormosa* **n. sp.** East Antarctica, 238 m
6 *Aphelochaeta palmeri* **n. sp.** Widespread in Antarctica, 20–1100 m
7 *Aphelochaeta spectabilis* **n. sp.** Antarctic Peninsula and Weddell Sea, 85–2000 m
8 *Caulleriella antarctica* Hartman, 1978. Weddell Sea, 400–1120 m; McMurdo Sound, 6 m
9 *Caulleriella eltaninae* **n. sp.** Antarctic Peninsula, Ross Sea, 210–870 m
10 *Caulleriella fimbriata* **n. sp.** Southern Ocean, 1884 m
11 *Caulleriella fucata* **n. sp.** Antarctic Peninsula, 11–12 m
12 *Caulleriella kacyae* **n. sp.** Weddell Sea, 1035 m
13 *Chaetocirratulus abyssalis* **n. sp.** Ross Sea, 1600 m

14 *Chaetocirratulus andersenensis* (Augener, 1932) **n. comb.** Widespread in Antarctica, 120–2900 m
[*Tharyx fusiformis* Monro, 1939] **n. syn.**
15 *Chaetocirratulus epitocus* (Monro, 1930) **n. comb.** Antarctic Peninsula, 93–335 m
16 *Chaetocirratulus pinguis* (Hartman, 1978) **n. comb.** Antarctic Peninsula, Weddell Sea, East Antarctica, 203–865 m
17 *Chaetozone australosetosa* **n. sp.** Widespread in Antarctica, 107–978 m
18 *Chaetozone biannulata* **n. sp.** Widespread in Antarctica, 400–6337 m
19 *Chaetozone bransfieldensis* (Hartmann-Schröder & Rosenfeldt, 1989) **n. comb.** Antarctic Peninsula, Weddell Sea, Ross Sea, 73–1600 m
20 *Chaetozone cristata* **n. sp.** Antarctic Peninsula, 92–670 m
21 *Chaetozone homosetosa* (Hartmann-Schröder & Rosenfeldt, 1989) **n. comb.** Antarctic Peninsula, Weddell Sea, East Antarctica, 75–1988 m
22 *Chaetozone reticulata* **n. sp.** Weddell Sea, 3111 m.
23 *Chaetozone shackletoni* **n. sp.** Southern Ocean, Weddell Sea, 1600–2300 m
24 *Kirkegaardia brigitteae* Blake, 2016. Southern Ocean, Weddell Sea, Bellingshausen sea, 1510–3801 m
25 *Kirkegaardia olgahartmanae* Blake, 2016. Antarctic Peninsula, 600–2000 m
26 *Tharyx coloris* **n. sp.** Antarctic Peninsula, Weddell Sea, 564–1988 m
27 *Tharyx moniliformis* **n. sp.** Antarctic Peninsula, Weddell Sea, 565–2086 m
28 *Tharyx obtusus* (Hartmann-Schröder & Rosenfeldt, 1990) **n. comb.** Antarctic Peninsula, 120–768 m

Species of *Aphelochaeta* (Table 1). Species of *Aphelochaeta* have proven to be the most difficult to work with among all Cirratulidae largely due to their lack of distinctive setal morphology and tendency to fragment if handled improperly upon collection and preservation. In lieu of setal morphology, species of *Aphelochaeta* can be characterized by the nature of the pre-setigerous region, including prostomial shape; number and extent of peristomial rings; presence or absence of a dorsal crest; location of the dorsal tentacles and first pair of branchiae; presence or absence of dorsal and/or ventral grooves or ridges along the body; nature of anterior, middle, and posterior segments including their size and shape, whether moniliform or not; shape of the posterior end, whether narrow or expanded; presence of body pigment; and Methyl Green staining patterns.

The 17 species tabulated in Table 1 represent those known to occur along the Pacific coast of Central and South America, in Patagonia, and Antarctic Seas. Eleven sets of characters are listed and with the descriptions and illustrations presented here and in cited papers, should be sufficient to identify them. However, additional species are known from the deep-water Antarctic collections based on fragmented specimens and other species are likely in South America based on provisional categories present in some benthic papers.

Species of *Caulleriella* (Table 2). Among the bitentaculate cirratulids, species of *Caulleriella* are easy to recognize because the noto- and neuropodia of middle and posterior segments are widely separated from one another. In extreme examples, the four chaetae-bearing podial lobes of a single segment, when viewed in cross-section, have the chaetae arising at four corners of the body. All species of *Caulleriella* have bidentate hooks. However, *C. trispina* Elias & Rivero, 2011 has unidentate hooks in middle body segments; these setae transition to bidentate hooks posteriorly. *Chaetozone armata* Hartman, 1963 from off California has widely separated podia yet there are only single spines in middle and posterior segments and they superficially are unidentate, not bidentate. A careful examination of these spines on the holotype (LACM-AHF Poly 0566) revealed that a short, worn accessory tooth or sheath is present on the convex side; juveniles of this species were found with bidentate hooks. Therefore, *Chaetozone armata* was transferred to *Caulleriella* by Blake & Magalhães (2017). Two other species of *Caulleriella* have spines with reduced teeth suggesting wear: *C. cucula* Dean & Blake 2007 and *C. murilloi* Dean & Blake 2007, both from Costa Rica. There are currently 37 species of *Caulleriella* considered valid in WoRMS (Read & Fauchald 2018b). However, several species from that list were referred to other genera by Blake (1991, 1996) and others are referred elsewhere (see below). In the present study, six new species are described and with removal of several species, the overall number of *Caulleriella* species is increased to 38. Taxonomic characteristics of species of *Caulleriella* known from the study area encompassed in the present paper are presented in Table 2.

In the present study, three species, two new, are recorded from western South America; five species, four new, are from Antarctic seas. All of these species are unique and differ from the five species described as new from off Costa Rica by Dean & Blake (2009) and the three species described as new by Elias & Rivero (2008, 2011) from off Mar del Plata, Argentina. There is thus a high degree of endemism among species of *Caulleriella* from the

Pacific and Atlantic coasts of South America and Antarctic seas. Globally however, several of the older named species such *Caulleriella alata* Day, 1961, and *C. bioculata* (Keferstein, 1862) are reported widely, and specimens from those localities need to be examined using the characteristics more recently applied to *Caulleriella* species descriptions.

The following species listed in Read & Fauchald (2018b) are removed from *Caulleriella* and referred elsewhere:

1 *Caulleriella bransfieldensis* Hartmann-Schröder & Rosenfeldt, 1989. Referred to *Chaetozone*, this study
2 *Caulleriella dimorphosetosa* Hutchings & Murray, 1984. Referred to *Chaetozone*, *fide* Blake 1996
3 *Caulleriella gracilis* Hartman, 1969. Rescribed as *Chaetozone hartmanae* Blake, 1996. *Fide* Blake 1996.
4 *Caulleriella homosetosa* Hartmann-Schröder & Rosenfeldt, 1989. Referred to *Chaetozone,* this study
5 *Caulleriella longisetosa* Hutchings & Murray, 1984. Referred to *Tharyx*, *fide* Blake, 1991
6 *Caulleriella obtusa* Hartmann-Schröder & Rosenfeldt, 1990. Referred to *Tharyx,* this study
7 *Caulleriella retusiseta* Hutchings & Murray, 1984. Referred to *Tharyx*, *fide* Blake (1991)
8 *Caulleriella serrata* Eliason, 1962. Referred to *Kirkegaardia* here based on the serrated nature of the acicular spines.

The following 38 species of *Caulleriella* are here considered valid:

1 *Caulleriella acicula* Day, 1961. South Africa, subtidal
2 *Caulleriella alata* (Southern, 1914). Ireland (type-locality), intertidal
3 *Caulleriella antarctica* Hartman, 1978. Antarctica, shelf and slope depths to 1120 m
4 *Caulleriella armata* (Hartman, 1963). Southern California, shelf depths. Transferred from *Chaetozone* by Blake & Magalhães (2017)
5 *Caulleriella apicula* Blake, 1996. Southern California, 24 m
6 *Caulleriella bioculata* (Keferstein, 1862). France (type-locality)
7 *Caulleriella bremecae* Elias & Rivero, 2008. Argentina, intertidal
8 *Caulleriella cabbsi* Pocklington & Coates, 2010. Bermuda, 8–10 m in seagrass beds
9 *Caulleriella capensis* (Monro, 1930). South Africa
10 *Caulleriella chilensis* Carrasco, 1977. Off Chile, 2–45 m; **new status**
11 *Caulleriella cordiformia* Magalhães & Bailey-Brock, 2013. Hawaii, Oahu, Mamala Bay, 100 m
12 *Caulleriella cristata* Blake, 1996. Central California, intertidal in rocks
13 *Caulleriella cucula* Dean & Blake, 2007. Costa Rica, subtidal, 9–46 m
14 *Caulleriella dulcensis* Dean & Blake, 2007. Costa Rica, intertidal
15 *Caulleriella ecuadoriana* **n. sp.** Off Ecuador, 8–20 m
16 *Caulleriella eltaninae* **n. sp.** Antarctica, 210–870 m
17 *Caulleriella fimbriata* **n. sp.** Southern Ocean, 1884 m
18 *Caulleriella fragilis* (Leidy, 1855). Eastern North America, Rhode Island, intertidal
19 *Caulleriella fucata* **n. sp.** Antarctic Peninsula, 11–12 m
20 *Caulleriella galeanoi* Elias & Rivero, 2008. Argentina, intertidal
21 *Caulleriella glabra* Gallardo, 1968. Viet Nam, Bay of Nha Trang, 8–17 m
22 *Caulleriella hamata* (Hartman, 1948). NE Pacific, Alaska to California, intertidal to low water
23 *Caulleriella kacyae* **n. sp.** Antarctica, Weddell Sea, 1035 m
24 *Caulleriella lajolla* Blake, 1996. Southern California, intertidal
25 *Caulleriella magnaoculata* Hartmann-Schröder, 1962. Peru, 9 m
26 *Caulleriella mediterranea* Lezzi, 2017. Mediterranean Sea, off Italy, 8 m
27 *Caulleriella minuta* Dean & Blake, 2007. Costa Rica, intertidal
28 *Caulleriella moralesensis* Dean & Blake, 2007. Costa Rica, intertidal
29 *Caulleriella murilloi* Dean & Blake, 2007. Costa Rica, roots of mangroves
30 *Caulleriella pacifica* E. Berkeley, 1929. N.E. Pacific, Washington to California, shallow subtidal
31 *Caulleriella parva* Gillandt, 1979. Northern Germany, subtidal
32 *Caulleriella petersenae* Díaz-Díaz, Cárdenas-Oliva & Liñero-Arana, 2014. Caribbean Sea, NE Venezuela, shallow subtidal

33 *Caulleriella suroestense* **n. sp.** Off Chile, Juan Fernandez Islands, shallow subtidal
34 *Caulleriella tricapillata* Hutchings & Rainer, 1979. Australia, New South Wales, Careel Bay, subtidal
35 *Caulleriella trispina* Elías & Rivero, 2011. Argentina, 12–89 m
36 *Caulleriella typhlops* (Willey, 1905). Sri Lanka, Gulf of Mannar
37 *Caulleriella venefica* Doner & Blake, 2006. Eastern North America, Massachusetts to middle Atlantic, 30–85 m
38 *Caulleriella viridis* (Langerhans, 1881). Type-species. Canary Islands, Madeira, intertidal

Comments on bitentaculate Cirratulidae with acicular spines. Species of *Chaetozone* are readily recognized by their unique posterior armature with rows of large, conspicuous, brass-colored noto- and neuroacicular spines, usually with alternating capillaries, arranged into spreading fascicles of few to many spines; in some species these rows of spines nearly encircle the posterior-most segments. The parapodia carrying these spines are typically elevated, sometimes with thin membranes from which the spines and capillaries project. The role of this unusual posterior armature is not known but may serve as an anchor to support these worms during their burrowing and feeding activities. Jumars *et al.* (2015), however, noted that the manners in which these cinctured spines deploy in burrowing activities are unknown. In addition to the posterior armature, species of *Chaetozone* typically have relatively robust bodies that are widest anteriorly and taper through middle segments to the narrow cinctured posterior end. A few species have expanded segments in the mid-body, due to an enlarged stomach or with a swelling caused by gametes (Blake 2006, 2015, this study).

In addition to the species of *Chaetozone* with conspicuous cinctured posterior spines are other species that have only a few spines, usually inconspicuous, and not arranged into cinctures. One group is represented by species now referred to the genus *Tharyx*, which typically have narrow, curved, geniculate noto- and neuropodial spines that terminate in an expanded tip that may be rounded, sub-bidentate, or knobby. In a recent review of *Tharyx*, Blake & Göransson (2016) acknowledged that some species shared some non-setal characters with *Aphelochaeta* species. They therefore updated the concept of the genus to include species with a long narrow body shape, dorsal tentacles arising from the posterior margin of the peristomium, lateral peristomial pigment spots present or absent, and the nature of the posterior acicular spines. With regard to the acicular spines, they noted that the notopodial spines are present or absent; when present, they are usually longer, less curved, and somewhat variable in the structure of the tip of the shaft. The neuropodial spines, however, are invariably short, curved, or geniculate, and have tips that are blunt, flattened, or with an irregular shape that is knobby or sub-bidentate, but not bidentate as in species of *Caulleriella*. A few species were noted to have serrations along the shaft below the expanded tip. Blake & Göransson (2016) also noted that the capillaries accompanying the acicular spines in *Tharyx* species do not alternate with them as in many species of *Chaetozone*.

Another group of non-*Chaetozone* bitentaculate Cirratulidae with a reduced number of acicular spines not arranged into posterior cinctures is also known. These species, mostly from deep water and rarely reported in the literature, are poorly characterized and in some cases were not even described or recognized as having posterior spines. An unusually large number of these species have been encountered in the present study and in order to characterize them as a group and distinguish them from other bitentaculate Cirratulidae, they are referred to a new genus, *Chaetocirratulus* **n. gen.** This genus is not based on a phylogenetic hypothesis but is instead based on consistent morphological differences among species of *Chaetozone*, *Tharyx*, and the new genus. In several respects, species of *Chaetocirratulus* **n. gen.** are more closely related to *Cirratulus*, a multitentaculate genus, as proposed by Petersen (1991) following her examination of types of *Chaetozone gayheadia*.

Species referred to *Chaetocirratulus* **n. gen.** typically have large robust bodies with a fusiform shape, short segments, and poorly developed parapodia. Distinct regions of the body are not readily apparent. The prostomium is broadly rounded or wedge-shaped and the peristomium is either smooth or with up to three rings; no dorsal crest has been observed in any species to date. The dorsal tentacles arise on the posterior margin of the peristomium. A weak dorsal groove has been observed in *C. pinguis*, but ventral grooves are absent, with the body being generally round in cross section. Apart from *C. pinguis*, in which acicular spines begin on setigers 1–5, spines are limited to far posterior setigers in other species from the study area. The acicular spines of *Chaetocirratulus* **n. gen.** species are either straight (awl-shaped), or weakly curved apically, but not sigmoid or geniculate; they have no accessory structures and terminate in a narrow rounded tip. In addition to the six species from South America and Antarctica described in this study, three species from off North America also agree with the definition of *Chaetocirratulus* **n. gen.** The three North American species will be discussed in detail in a forthcoming paper (Blake unpublished).

TABLE 1. Morphological characters of 17 species of *Aphelochaeta* from the Pacific coast of Central and South America, Patagonia, and Antarctica[1].

Species/Character	Prostomial shape	Pre-setiger L vs W ratio[2]	Number peristomial rings	Location dorsal tentacles	Location first branchiae	Thorax	Mid-body segments
A. antelonga Dean & Blake, 2016.	Short, triangular, rounded apex	2.5:1	2 weakly developed rings	Per	Per	Expanded; segments crowded	As long as wide
A. aequiseta Hartmann-Schröder, 1962	Triangular, rounded apex	1.5:1	3	Per	Set 1	Weakly expanded	Unknown
A. aubreyi **n. sp.**	Triangular, rounded apex	1.5–2:1	2 with extra thin grooves +/-; dCr present	Per	Per	Expanded laterally & ventrally	Weakly to strongly moniliform
A. bimaculata **n. sp.**	Triangular, with narrow, rounded apex	2.2:1	3 weakly developed laterally	Per	Per	Weakly expanded	Wider than long, not rounded
A. brandtae **n. sp.**	Triangular, bluntly rounded anterior margin	1.5:1	2, weakly defined	Per	Per	Expanded laterally, with few segments and prominent parapodial shoulders	Rounded or oval, not moniliform
A. cincinnata Ehlers, 1908	Triangular, merged with per, rounded apex	2:1	No rings	Per, at level of set 1	Per, anterior lateral to dT	Narrow, not expanded; low parapodial shoulders present	About as wide as long
A. dearborni **n. sp.**	Triangular, rounded apex	1.5:1	3 with dCr	Per, at anterior margin of set 1	Per or ant margin set 1, lateral to dT	Expanded laterally and ventrally	Wider than long
A. guimondi Dean & Blake, 2016	Narrow, long, pointed	1.7:1	3 with dCr	Per	Set 1	Narrow to weakly expanded with mid-dorsal channel	About 2x as wide as long
A. hormosa **n. sp.**	Short, conical, tapering to rounded apex	~1:1	3	Per	Per lateral to dT	Expanded dorsally and ventrally	Moniliform
A. longisetosa (Hartmann-Schröder, 1965)	Short, triangular, narrow tip	1:1	3, weak dCr	Per	Set 1	Expanded, but continuing posteriorly; segments numerous, narrow	Crowded, narrow
A. magellanica **n. sp.**	Short, triangular, tapering to blunt apex	1.2:1	3, with dCr	Per, carried to level of set 1	Ant margin of set 1; thus 2 br on set 1	Weakly expanded, ventrally flattened	Crowded, narrow throughout
A. malefica Elias & Rivero, 2009	Triangular, tapering to narrow apex	2:1	3, dCr extending over set 1	Per, carried to level of set 1	Set 1	Narrow, not expanded, segments narrow; dorsum elevated	moniliform
A. palmeri **n. sp.**	Broadly triangular, rounded apex	1.5:1	3, well developed; with dCr	Per	Per	Expanded, dorsum broadly rounded	As long as wide, not moniliform
A. praeacuta Dean & Blake, 2016	Triangular, narrowing to pointed tip; turned upward	1.2:1	2, 1st large overlapping narrow 2nd ring	Per on 2nd annular ring	Ant margin of set 1, thus 2 br on set 1	Narrow, dorso- ventrally flattened	Narrow, 6 times wider than long
A. spectabilis **n. sp**.	Widely triangular, rounded apex	1.5:1 to 1 1	3, weakly developed; with dCr	Per	Ant margin of set 1; thus 2 br on set 1	Widely expanded, swollen segments crowded	As wide as long, not moniliform
A. striata Dean & Blake, 2016	Pointed	2.2:1	2, 1st narrow, 2nd long, smooth	Per	Ant margin of set 1; thus 2 br on set 1	Narrow, segments not crowded, 2x as wide as long	As wide as long, not moniliform
A. zebra Dean & Blake, 2016	Short, rounded	1:1	3	Per	Ant margin of set 1	Expanded dorsally; flattened ventrally, segments crowded	2x wide as long, not moniliform

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TABLE 1. (Continued)

Species/Character	Ventral body groove	Posterior segments	Unique characters	Methyl Green stain	Distribution & depth/other references
A. antelonga Dean & Blake, 2016.	+/- mid-body	Weakly expanded	Elongate, narrow pre-setiger region	Ant thoracic venter only	Costa Rica, Chile, subtidal; this study
A. aequiseta Hartmann-Schröder, 1962	Unknown	Unknown	3 well-developed per rings; triangular prostomium, rounded	Not tested.	Peru, 9 m
A. aubreyi **n. sp.**	Weak or absent in posterior segments	Weakly inflated dorsally	Black pigment, posterior lateral on per	Weak, intersegmental grooves, mainly on venter	Antarctica, low water to 1500 m
A. bimaculata **n. sp.**	Narrow, shallow, along entire body	Narrow	Long narrow pre-setiger region; black pigment on per, parapodia, and along mid-ventral groove	Pre-set region with pro and per staining heavily; bands across anterior venter and weaker on dorsum	Antarctica, Weddell Sea, 851 m
A. brandtae **n. sp.**	Absent	Narrow	Smooth peristomium; MG with broad darkly stained stipes on venter	Pro and per with strong staining pattern with clear ocular are; broad darkly stained stipes on venter	Antarctica, deep-sea, 1166–3957 m
A. cincinnata Ehlers, 1908	Absent	Not observed	Elongate, narrow, smooth pre-set region; branchiae anterior to dT	No pattern	SubAntarctic Islands; shallow subtidal; this study.
A. dearborni **n. sp.**	Absent	Narrow, not expanded	Transverse glands on venter of thorax; narrow posterior end; black pigment on lower lip of mouth	Pre-set region with speckled pattern; anterior segments with intersegmental stain; transverse stripes may occur on venter	Antarctica, widespread, 24–1510 m
A. guimondi Dean & Blake, 2016	Present	Expanded	Wide mid-dorsal channel of thorax with crest continuing from per; long narrow prostomium	Venter of thorax staining dark blue, but not as bands; rest of body unstained	Costa Rica, 11–26 m in mixed sediments
A. hormosa **n. sp.**	Absent	Weakly expanded, rounded dorsally, flattened ventrally	MG Staining pattern; moniliform abdominal segments	Distinctive and intense MG staining pattern on pre-set region; prostomium stains intensely; transverse bands on thoracic segments	East Antarctica, 238 m
A. longisetosa (Hartmann-Schröder, 1965)	Mid-body to posterior end	Inflated	Numerous long, silky capillaries	No pattern	Central and southern Chile, shallow subtidal; Carrasco 1977; This study
A. magellanica **n. sp.**	Mid-body to posterior end	Narrow, flattened ventrally; grooved dorsally	2 br on set 1; MG on head; narrow posterior end	Pre-set region dark green with clear gap between pro and per; anterior segments stain ventrally	Magellan region of South America, 200–300 m
A. malefica Elias & Rivero, 2009	Absent	Expanded dorsally	Elongate pre-set area with 3 rings; prominent anterior parapodial shoulders	No pattern, pre-set area pale green	Argentina, off Mar del Plata 12–15 m
A. palmeri **n. sp.**	Shallow, along entire body	Expanded, fusiform dorsally, flattened or grooved ventrally	3 prominent per rings surmounted by dCr; yellow to golden transverse glands on anterior segments; fusiform posterior end.	Pre-set region with weak speckles or not apparent; anterior borders of parapodia; transverse posterior borders of thoracic segments with bands across venter	Antarctica, widely distributed, 20–1100 m
A. praeacuta Dean & Blake, 2016	Present along entire body	Widened, dorso-ventrally flattened	Upturned prostomium; narrow second per ring; enlarged set 1 with 2 branchiae	No pattern, dorsum of thorax dark blue	Costa Rica, 13–28 m in sandy sediments
A. spectabilis **n. sp**.	Absent	Expanded dorsally and ventrally	Swollen anterior segments; weak per rings; 2 br on set 1; distinctive MG pattern	Pre-set region with prominent, distinctive pattern; parapodia and transverse bands across dorsum and venter prominent	Antarctic Peninsula; Weddell Sea, 85–2012 m
A. striata Dean & Blake, 2016	Present, narrow	Weakly expanded last few segments	Narrow body; segments not crowded, 2 br on set 1	Transverse mid-ventral thoracic stripes	Costa Rica, 11–28 m
A. zebra Dean & Blake, 201	Present, abdominal segments	Inflated dorso-ventrally	Broadly rounded prostomium; short pre-set area; MG stripes posterior segments	Posterior segments with intersegmental stripes	Costa Rica, coral reefs

[1]Abbreviations: br, branchiae; dCr, dorsal crest; dT, dorsal tentacle; MG, methyl green; Pro, prostomium; Per, peristomial or peristomium; Pre-set, pre-setigerous region; set, setiger.
[2]Pre-setiger = prostomium + peristomium.

TABLE 2. Taxonomic Characters of Nine Species of *Caulleriella* from the Pacific coast of South America and the Southern Ocean (Antarctica)

Species	Prostomium	No. peristomial rings	Nature of segment 1	Position of first pair of branchiae	Position of dorsal tentacles	Capillaries in posterior notopodia	Capillaries in posterior neuropodia
C. antarctica Hartman, 1978	Short, triangular	2	Setigerous complete	Lateral to dT on per	Posterior end of per	Present	Present or absent
C. chilensis Carrasco, 1977[1] **New status**	Narrow, triangular, rounded apex; pair of eyespots	3	Setigerous, complete	Set 1	Posterior end of per at level of set 1	Present	Absent
C. ecuadoriana **n. sp.**	Short, triangular	3	Setigerous, complete	Lateral to dT on per	Posterior end of per	Present	Present
C. eltaninae **n. sp.**	Short, triangular, possible eyespots	3	Achaetous	Dorsal to notosetae, set 1	On achaetous segment	Present	Present
C. fimbriata **n. sp.**	Short, triangular	1	Setigerous, complete	Dorsal to notosetae, set 1	Near posterior end of per	Present	Present
C. fucata **n. sp**.	Short, triangular	2	Achaetous, complete	On achaetous segment	In groove between per & achaetous segment	Present	Absent
C. kacyae **n. sp.**	Elongate, narrow	3	Setigerous, complete	Dorsal to notosetae, set 1	Posterior margin of per	Present	Absent
C. magnaoculata Hartmann-Schröder, 1962	Conical, rounded apex; with large pigmented nuchal organs	3	Setigerous complete	Dorsal to notosetae on set 1	Between parapodia of set 1	Present	Present
C. suroestense **n. sp.**	Triangular with narrow tip	2	Setigerous complete	Dorsal to notosetae on set 1	Posterior margin of per	Present	Absent

Continued.

Species	Hooks start set & maximum number	Nature of posterior hooks	Pygidium	Distribution & depth
C. antarctica Hartman, 1978	No: 8–9 (2) Ne: 6 (2–5)	Geniculate; noto hooks long, thin with short knobs; neuro hooks shorter, thicker with main tooth & second formed by sheath	With two anal cirri	Antarctica, shelf and slope depths to 1120 m. This study
C. chilensis Carrasco, 1977[1] **New status**	No: 32–40 Ne: 7–13	Curved, with sheath on convex side extending as apical tooth	Reduced lobe ventral to anus	Chile, Concepción Bay, 6–27 m.
C. ecuadoriana **n. sp.**	No: 20 (3–4) Ne: 1 (6)	Geniculate with Large main fang, short pointed apical tooth	Rounded lobe ventral to anal opening	Off Ecuador, 8–20 m
C. eltaninae **n. sp.**	No: absent Ne: 19–21 (6–7)	Geniculate with Teeth short, blunt tipped	Short papillae around anus; one ventral cirrus	Antarctic Peninsula, Ross Sea, 201–870 m
C. fimbriata **n. sp.**	No: 23 (3–4) Ne: 6 (2–3)	Elongate, curved, noto-hooks without apical tooth; Neuro-hooks with both teeth, short, pointed	Single anal cirrus	Southern Ocean, 1884 m
C. fucata **n. sp**.	No: absent Ne: 5-7 (8–10)	Short, thick, curved, with both teeth long, pointed	2–3 papillae dorsal to anus, flattened lobe ventrally	Antarctic Peninsula, 11–12 m
C. kacyae **n. sp.**	No: 105 (1–2) Ne: 18 (6)	Noto hooks long, thin blunt tipped; neuro hooks short, curved with large main fang and 2 apical teeth formed by sheath	5 papillae dorsal to anus & two lateral cirri	Antarctica, Weddell Sea, 1035 m
C. magnaoculata Hartmann-Schröder, 1962	No: 36–37 (5) Ne: 10 (9)	Short, geniculate, with main fang thick, apical tooth thin, sharp	Short, rounded	Off Peru, 9 m. This study
C. suroestense **n. sp.**	No: 27–28 (4–5) Ne: 1 (5)	Short, geniculate, with main fang thick, apical tooth sharply pointed, closely adhering	8 papillae dorsal to anus and single ventral lobe	Off Chile, Juan Fernandez Islands, shallow subtidal

[1]*Caulleriella alata chilensis* Carrasco, 1977 here raised to full species status.
Abbreviations: dT, dorsal tentacle; per, peristomium; set, setiger.

All nine species are listed below:

1 *Chaetocirratulus abyssalis* **n. sp.** Ross Sea Antarctica, slope depths, 1562–1674 m
2 *Chaetocirratulus andersenensis* (Augener, 1932) **n. comb.** Antarctica, shelf depths, 120–840 m
[*Tharyx fusiformis* Monro, 1939 **new syn.** Antarctica.]
3 *Chaetocirratulus benthalianus* McIntosh, 1885 **n. comb.** Off Nova Scotia, abyssal, 2286 m
4 *Chaetocirratulus epitocus* (Monro, 1930) **n. comb.** Antarctica, shelf depths, 93–335 m
5 *Chaetocirratulus furvus* **n. sp.** Off Peru, slope depths, 1000 m
6 *Chaetocirratulus gracilis* (Moore, 1923) **n. comb.** Southern California, abyssal, 4006 m
7 *Chaetocirratulus gayheadius* (Hartman, 1965) **n. comb.** Off New England, shelf and slope depths.
8 *Chaetocirratulus neogracilis* **n. sp.** Peru-Chile Trench, 4100 m
9 *Chaetocirratulus pinguis* (Hartman, 1978) **n. comb.** Antarctica, shelf and upper slope depths, 317–865 m

Species of *Chaetozone* (Table 3). Twelve species of *Chaetozone*, seven new, have been encountered in the study area: five from western South America and seven from Antarctica. Blake & Magalhães (2017) recognized 53 species of *Chaetozone*. However, with the removal of *C. andersenensis*, *C. benthaliana*, *C. gayheadia*, and *C. gracilis* to *Chaetocirratulus* **n. gen**. and the addition of five new species, the new total is 54, the largest genus of Cirratulidae. Characters important to the recognition of species reported in the present study are in Table 3.

Blake (2015) redescribed the type-species, *Chaetozone setosa*, described eight new species and established a suite of characters and criteria that were important to recognize distinct groups of species within this large genus. With the removal of several outlier species to *Chaetocirratulus* **n. gen**., the definition and concept of *Chaetozone* is now narrower.

Among the new species described in this study, *Chaetozone australosetosa* **n. sp.** and *C. biannulata* **n. sp.** are unusual in having the peristomium divided into two parts by a prominent transverse dorsal groove. The second part of the peristomium, appears to be an achaetous segment that bears both the dorsal tentacles and first branchiae and merges seamlessly with setiger 1, which bears the second pair of branchiae dorsal to the notosetae. The lack of a groove separating setiger 1 from the achaetous segment presents an unusual appearance of the pre-setigerous region. The two species represent a depth-related pair of closely related taxa where *C. australosetosa* **n. sp.** is common in shelf depths (107–978 m) and *C. biannulata* **n. sp.** is common in deeper waters including the South Sandwich Trench (6337 m). Another species, *C. reticulata* **n. sp**. from abyssal depths in the Weddell Sea is similar to both *C. australosetosa* **n. sp.** and *C. biannulata* **n. sp.** but lacks the distinct groove separating the two parts of the peristomium.

Chaetozone gesae **n. sp.** from outer shelf depths off Chile is the seventh species discovered with acicular spines that narrow to a fine tip that curves back and adheres to the shaft. The first of these species to be discovered, *C. curvata*, is known from Chilean nearshore waters (Hartmann-Schröder 1962; Blake 1996, this study). Other species are known from Central and North America (Blake 1996, 2006, 2015; Doner & Blake 2006; Dean & Blake 2007).

Chaetozone shackletoni **n. sp.** has an enlarged "stomach" area in the mid-body segments and an overall brown to reddish pigment in alcohol that in life is green. This combination of characters is similar to that of *C brunnea* Blake, 2006, described from deep water off California and suggests another species group within the genus *Chaetozone*.

Chaetozone bransfieldensis is transferred from *Caulleriella* to *Chaetozone*; it is unusual in having a pair of eyespots and reduced posterior cinctures with only 8–10 large spines on a side. Eyespots are rare in species of *Chaetozone*. Other species of *Chaetozone* reported with eyespots are: *C. acuta* Banse & Hobson from the Puget Sound (Blake 1996), *C. corona* (see Le Garrec *et al*. 2017); *C. gibber* Woodham & Chambers, 1994 from off SE England, and *C. carpenteri* (McIntosh, 1911) from the Mediterranean Sea (Chambers *et al*. 2011).

Chaetozone castanea **n. sp.** and *C. homosetosa* are species with a reduced number of narrow blunt-tipped spines forming partial cinctures; the latter, was originally described in the genus *Caulleriella* (Hartmann-Schröder & Rosenfeldt 1989). Both species are clearly outliers in that the more typical large, sigmoid spines of *Chaetozone* are replaced by elongate, thin spines that are only weakly curved. Both were at one time considered as possible species of *Tharyx*, but since neither exhibited any evidence of acicular spines with expanded or modified tips they were referred to *Chaetozone*.

TABLE 3. Taxonomic Characteristics of Twelve Species of *Chaetozone* from Western South America and Antarctica.

Species/Character	Nature of Segment 1	Position of first pair of branchiae	Position of paired tentacles	Nature of posterior cinctures	Nature of posterior spines	Companion setae with spines	Posterior podial lobes or membranes
C. australosetosa **n. sp.**	Entirely fused with set 1	Posterior to dT on achaetous segment anterior to set 1	On achaetous segment	Complete, with 9–11 spines in noto- and neuropodia; 19–22 spines on a side	Weakly curved with narrow, blunted tip	Variable, reduced to only 1–3 capillaries among spines	High, thin membranes in notopodia; lower in neuropodia
C. biannulata **n. sp**.	Entirely fused with set 1	Posterior to dT on achaetous segment anterior to set 1	On achaetous segment	Complete, with 10–13 spines in notopodia and neuropodia; 20–24 spines on a side	Curved, tapering to pointed tip	Long, thin capillaries; alternating with spines in lower noto- and upper neuropodia	Elevated membranes in both noto- and neuropodia
C. bransfieldiensis (Hartmann-Schröder & Rosenfeldt, 1989) **n. comb.**	Same as set 1	Set 1	Anterior edge of set 1 with post extension of per	Reduced, 4 spines in noto- and neuropodia	Heavy, sigmoid shape, curving to narrow tip	Short, thick capillaries, alternating with spines	Low thin membranes in both noto- and neuropodia
C. castanea **n. sp.**	Set 1	Anterior margin set 1 + second br also on set 1	Middle of last per ring	Partial, with 7–9 narrow spines on a side	Long, narrow, curved with blunt tip	Few, long, not alternating with spines	Low, weakly developed
C. corona Berkeley & Berkeley, 1941	Same as set 1	On last peristomial ring, lateral to dT	Posterior margin of per	Partial, with 5–6 spines in noto- and neuropodia; 10–12 spines on a side	Weakly curved, tapering to narrow tip, notoaciculars longer, thinner than neuroaciculars	Long, thin capillaries	Moderately developed
C. cristata **n. sp.**	Last per ring	Lateral to DT on achaetous segment	Groove between last per ring and achaetous segment	Complete, with 9–10 spines in noto- and neuropodia; 19–20 on a side	Noto aciculars long, narrow, blunt-tipped; neuro-aciculars shorter, curved, with narrow tip	With long, thin alternating capillaries	Reduced, without elevated membranes
C. curvata Hartmann-Schröder, 1965	Set 1	Set 1	Posterior margin per	Complete, with 12 spines in noto- and 10 in neuropodia; 22 on a side	Shaft straight, curved apically with tip sharply curved toward shaft	Alternating thin capillaries	High, elevated membranes
C. gesae **n. sp.**	Set 1	Anterior margin set 1 + second br also on set 1	Posterior margin per	Partial, with 7–8 spines in noto- and 6–7 neuropodia; 13–15 on a side	Shaft straight, curved apically with tip curved and adhering to shaft	Alternating thin capillaries	Low, elevated membranes
C. homosetosa Hartmann-Schröder & Rosenfeldt, 1989	Set 1	Lateral to dT on posterior margin of per	Posterior margin of per	Partial, 8–9 spines on a side	Sigmoid, narrow, narrowing to pointed or blunt tips	Few, not alternating	Low, weakly developed
C. reticulata **n. sp.**	Set 1	Posterior to dT on per	About 2/3 distance along per	Partial, with up to 11 spines on a side	Sigmoid, with rounded tip	Not alternating, irregular in fascicles	Prominent lobes, but no raised membranes
C. shackletoni **n. sp.**	Set 1	Posterior to dT on per	Middle of 3rd per ring	Partial, with 6–7 spines in noto- and 5–6 in neuropodia; 11–13 spines on a side	Shaft large, gently curving to pointed tip	A single thin capillary adjacent to each spine	Low elevated membranes
C. spinosa Moore, 1903	Fused with set 1	Lateral to dorsal tentacles on fused segments 1–2 followed by second pair br	In groove at posterior margin of per	Partial, with 8–9 spines in noto- and neuropodia; 16–18 spines on a side	Short, curved, blunt tipped	Long thin capillaries	Low, inconspicuous

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TABLE 3. (Continued)

Species/Character	Long, natatory-like notosetae	Approximate segmental origin of spines	Dorsal longitudinal groove or ridge	Ventral longitudinal groove or ridge	Pygidium	Unique characters	Distribution/depth
C. australosetosa **n. sp.**	Present, larger sexually mature specimens; absent in smaller	Posterior one-third; 31–38 neuropodia; 34–44 notopodia	Narrow, shallow channel from ca. set 20 or absent	Mid-ventral groove from per posteriorly	3–4 short papillae dorsal to anus; broad ventral cup	Two per rings; second merging with set 1; prostomium short, conical.	Antarctica, widespread in shelf depths; 107–978 m
C. biannulata **n. sp**.	Present in sexually mature specimens	Posterior one-third; 34–35 neuropodia; 37–38 notopodia	Absent	Low ridge present; some specimens with ventral groove	With ventral disk-like lobe	Two per rings; second merging with set 1; prostomium long, triangular pointed	Antarctica, widespread in deeper sediments; 421–6337 m
C. bransfieldiensis (Hartmann-Schröder & Rosenfeldt, 1989) **n. comb.**	Present in sexually mature specimens	Anterior one fourth; 9–12 in neuropodia; 22–24 in notopodia	Absent	Absent	With ventral rounded disk	Two per rings; second wedge-shaped, extending on to set 1; reduced posterior cinctures; pair of reddish eyespots present or absent	Antarctic Peninsula and Weddell Sea, 68–541 m; Ross Sea, 1565–1674 m
C. castanea **n. sp.**	Absent	Posterior one-fourth, set 39–45	Absent	Absent	With ventral disk-like lobe	Numerous darkly pigmented cells on body;. 2 branchiae on set 1	Offshore Peru and Chile, 65–160 m
C. corona Berkeley & Berkeley, 1941	Not observed	Setiger 1 in neuropodia; 8–9 in notopodia; on specimens with 60 set	Absent	Shallow channel ventrally	Terminal anus with blunt, ventrally directed lobe	Prominent eyespots; neuro-aciculars from set 1; rounded dorsal crest; MG pattern	Western Mexico to Central California; Brazil, Chile, Britany coast of France
C. cristata **n. sp.**	Present, middle segments of mature specimens	Posterior one-third, 57–70 in neuropodia; 70–96 in notopodia	Absent	Present, well-developed along entire body	Broad ventral lobe below anus	Prominent dorsal per crest; Ventral groove along body; noto-aciculars longer, thinner than neuro-aciculars	West Antarctic Peninsula, 92–670 m
C. curvata Hartmann-Schröder, 1965	Not observed	Posterior one-third, 60 in noto- and neuropodia	Absent	Absent	With ventral rounded lobe	Two branchiae on set 1; peristomial dCr absent; posterior spines with tip sharply curved.	Central and southern Chile, 82–260 m. (Blake 1996; Montiel 2005)
C. gesae **n. sp.**	Absent	Posterior one-third, 50 in noto- and neuropodia	Absent	Present in middle body segments	With ventral bi-lobed disk	Peristomial with prominent dCr; posterior spines with tip curved over and attached to shaft	Off northern Chile, 436 m
C. homosetosa Hartmann-Schröder & Rosenfeldt, 1989	Present, most specimens	Mid-body in neuropodia; last few in notopodia	Absent	Absent	Small papillae bordering anus; with conical ventral lobe	MG staining pattern; long natatory setae; few posterior spines	Antarctic Peninsula, 59-868 m; Weddell Sea, 994-1988 m
C. reticulata **n. sp.**	Present along entire body	Posterior one-fourth; 31 in neuropodia; 37 in notopodia	Absent	Absent	With rounded ventral lobe	Peristomium smooth, merging seamlessly with set 1; body with reticulated pigment pattern	Antarctica, Weddell Sea, Antarctica, 3111 m
C. shackletoni **n. sp.**	Present on most specimens	Middle, setigers 20–25 in neuropodia; 25–30 in notopodia	Narrow, anterior thoracic segments, present or absent	Shallow groove in middle segments or absent	Rounded lobe ventral to anus	Enlarged middle "stomach" area; 3 per rings, no dorsal crest;	Antarctica: Drake Passage, Scotia Sea; Weddell Sea; 1622–2288 m
C. spinosa Moore, 1903	Present or absent	Anterior third; 21–33 in neuropodia; ~45 notopodia; on specimens with ~85 set	Shallow dorsal groove along most of body	With segmental ridges along midline	Cupped ventral lobe	Pre-setiger region with prostomium and per a single "head" set off from first segment; dT, & first two br on fused segments 1–2 (set 1)	California; continental slope; shelf off Japan; off Chile. (Blake 1996; 2006; this study)

Abbreviations: br, branchiae; dCr, dorsal crest; dT, dorsal tentacle; MG, methyl green; per, peristomium; set, setiger.

TABLE 4. Some taxonomic characters of four species of *Tharyx* from Western South America and Antarctica.

Species/ Character	Body shape	Prostomium	Nuchal organs	Number of peristomial rings	Dorsal tentacles	1st branchiae	Pigment
T. coloris **n. sp.**	Elongate, widest in middle, narrowing posteriorly	Broad, triangular, narrowing to rounded tip	Shallow grooves	3; middle ring large extending dorsally over 1st to 3rd rings; 3rd ring an achaetous segment	Middle of 3rd per ring (achaetous segment)	Posterior margin of 3rd per ring	Reddish-brown pigment scattered on body; esp. in mid-ventral groove
T. moniliformis **n. sp.**	Fragile, threadlike; middle segments moniliform	Short, triangular, rounded on tip	Not observed	Narrow, elongate, not separated into separate rings	Arise from near posterior border of per	Posterior to dT on per	Black pigment spots in middle of per or absent
T. obtusus (Hartmann-Schröder & Rosenfeldt, 1990) **n. comb.**	Elongate, widest anteriorly, narrowing posteriorly; posterior end flattened	Triangular, as long as wide, tapering to rounded tip	Shallow notches	3 rings visible, laterally, with low dCr	Posterior margin of per	Lateral and posterior to tentacles on per	Few pigment spots, posterior lateral margins of per, or absent
T. tierralobos **n. sp.**	Elongate relatively thick, with numerous crowded segments; with groove along venter	Triangular as long as wide, tapering to rounded tip	Narrow slits	4 weakly developed laterally, with prominent dCr extending on to setiger 1	Posterior margin of per lateral to dCr	Set 1, dorsal to notosetae	Dusky pigment on per and set 1, or absent

Continued.

Species/ Character	Methyl Green stain	Posterior notopodial spines	Posterior neuropodial spines	Unique characters	Distribution/ depth
T. coloris **n. sp.**	No pattern, stain retained only in segmental furrows	Absent	Sickle-shaped curved, tapering to blunt or angled tip; few capillaries present	Distinctive reddish-brown pigment; Ventral groove with mid-ventral ridge along body; no notopodial spines	East Antarctic Peninsula, 317–794 m; Weddell Sea, 564–1988 m
T. moniliformis **n. sp.**	No pattern	1–2 spines and 1–2 capillaries; one type of spines with expanded tip; 2nd type with knob-like tip and serrations along shaft	3–4 spines and 1–2 capillaries; one type of spines with expanded tip; 2nd type with knob-like tip and serrations along shaft	Moniliform middle segments; these with egg or brood chambers when mature; 2 types of noto- and neuroaciculars	East Antarctic Peninsula & Weddell Sea, 564–2086 m
T. obtusus (Hartmann-Schröder & Rosenfeldt, 1990) **n. comb.**	No pattern	1–2 long, curved spines with knobby tips, with a few long capillaries	1–4 Short, curved, geniculate spines with sub-bidentate tips and serrations on shaft, with a few capillaries	Neuroaciculars with knobbed tips and serrated shafts; long natatory notosetae in most specimens	East & West Antarctic Peninsula, Elephant Island, 119–768 m. This study
T. tierralobos **n. sp.**	Distinct pattern on dorsum and venter of prostomium and per; no stain on rest of body	3–4 long geniculate spines with pointed tips & 3–4 capillaries	3–4 short, curved geniculate spines with expanded tips & 2–3 thin capillaries	Per with prominent dCr and MG pattern; Ventral groove along entire body; neuropodial spine with expanded rounded tip	Off Peru, 160 m

Abbreviations: br, branchiae; dCr, dorsal crest; dT, dorsal tentacle; MG, methyl green stain; per, peristomium or peristomial; set, setiger.

Species of *Tharyx* (Table 4). Blake & Göransson (2015) as part of their description of three species from northern European waters (two new) prepared a tabular summary of the then-known 11 species of *Tharyx*. The four species treated in the present study include one transferred from *Caulleriella* and three species new to science; three species occur in Antarctic waters; one occurs along the Peruvian and Chilean coasts. The morphology of these four additional species is included in Table 4 and effectively updates the data published by Blake & Göransson (2015). The total number of known *Tharyx* species is thus increased from 11 to 15. Additional species, mostly from off North America, are known and will be treated in subsequent papers (Blake unpublished).

The results of the present study suggest considerable diversity among species of *Tharyx* in Antarctic waters, with three species occurring along the East Antarctic Peninsula in the Prince Gustav Channel and in and around the site of the former Larsen Ice Shelf A and the adjacent Weddell Sea. The species can be easily separated by the characters provided in Table 4. *Tharyx tierralobos* **n. sp.** from off Peru is an outlier in that the posterior acicular spines, while having an expanded tip, are not apically modified with knobs. Further, the parapodia are moderately separated, especially in posterior segments and thus approach the genus *Caulleriella*, but without bidentate hooks.

Acknowledgements

This study was initiated by the Smithsonian Oceanographic Sorting Center (SOSC) in 1980 to identify polychaetes of several families collected by surveys conducted by the United States Antarctic Research Program (USARP) in Antarctic Seas and the Southeastern Pacific Oceanographic and Biological Program (SEPBOP) off western South America. Ms. Betty Landrum and Dr. Gordon Hendler, then managers of the SOSC, provided the USARP and SEPBOP collections and contractual support. The late Dr. Meredith Jones arranged for the loan of Antarctic cirratulids from the general collections of the National Museum of Natural History. As parts of this study were completed, Ms. Cheryl Bright, Ms. Linda Ward, Mr. Bill Moser, and most recently Ms. Katie Ahlfield, all of the National Museum of Natural History, curated and catalogued the various collections as they were submitted.

Other collections or type specimens were loaned by Dr. Roy Oleröd, Naturhistoriska Riksmuseet, Stockholm, who arranged for the loan of cirratulids from the Lund University Chile Expedition (1948–1949); Dr. Gesa Hartmann-Schröder, Zoological Museum of Hamburg; Dr. David George and Ms. Emma Sherlock, British Museum of Natural History; and Dr. G. Hartwich, Zoological Museum of Berlin. Dr. Eulogio Soto provided some specimens of *Aphelochaeta* from Valparaiso Bay, Chile.

Dr. Stacy Kim, Moss Landing Marine Laboratories, collected sediment cores containing cirratulids and other invertebrates by scuba diving during my stay at McMurdo Station in January 2000. Ms. Felicity McEnnulty, Biodiversity Curator of the Australian Antarctic Division, arranged for me to examine some polychaetes from Casey Station on Vincennes Bay and Davis Station on the Leopold and Astrid coasts. Antarctic specimens from the EASIZ II cruise on the R/V *Polarstern* in 1998 were provided by Dr. Brigitte (Hilbig) Ebbe.

A major source of new material was collected by me on the Larsen Ice Shelf A cruise April–May 2000. Additional deep-water specimens were collected as part of the ANDEEP I–III cruises, for which Prof. Dr. Angelika Brandt and Dr. Brigitte (Hilbig) Ebbe are thanked for supporting my participation. Ms. Marie Evans assisted me on ANDEEP I–II; Dr. Bhavani Narayanaswamy and Ms. Stacy Doner Tewari expertly processed and sorted the samples collected as part of ANDEEP III. Dr. Jason Williams of Hofstra University prepared several of the SEMs used in this study. Others were prepared by Ms. Stacy Doner Tewari, Dr. Harlan K. Dean, and Dr. Eulogio Soto.

Initial support for this study was arranged by Ms. Betty Landrum through a contract with the SOSC. In 1998, the late Dr. Kristian Fauchald, then Chairman of the Department of Invertebrate Zoology, National Museum of Natural History, arranged for an additional contract to help move this study and others along. My participation on the Larsen Ice Shelf survey was arranged by Dr. Pat Reynolds and Dr. Eugene Domack under National Science Foundation (NSF) grant No. OPP-98114383. Field logistics and laboratory support for the ANDEEP cruises was provided by NSF Grant No. OPP-0086665 through the University of Massachusetts, Boston. More recently, support for the completion of this manuscript and SEMs was provided by the NSF Grant No. DEB-0118693 (PEET) also through the University of Massachusetts, Boston.

The author thanks Dr. Nancy Maciolek for a comprehensive technical and editorial review of a late draft of the manuscript. Drs. Wagner Magalhães and Harlan K. Dean provided comments on the manuscript and verbal discussions that greatly improved the final presentation.

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