

## THE SPIONIDAE (POLYCHAETA) FROM SOUTHEASTERN AUSTRALIA AND ADJACENT AREAS WITH A REVISION OF THE GENERA<sup>1</sup>

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### Abstract

The Spionidae of southeastern Australia are described. Intertidal and subtidal collections come mostly from Victoria, New South Wales and southern Queensland. A few records from West Australia, South Australia, Tasmania and the Great Barrier Reef (Queensland) are also included.

A total of 68 species in 19 genera have been identified. These include 4 new genera and 43 new species, with new synonyms and generic emendations also proposed.

The genera with pointed prostomia include *Scolecopsis* (9 species, 8 being new), *Aonides* (1 species) and *Dispio* (1 new species). *Australospio trifida* gen. et. sp. nov. is a unique spionid with both a distally pointed prostomium and lateral prostomial horns. The genera with frontal or lateral prostomial horns include *Malacoceros* (3 species, 2 being new), *Rhynchospio* (2 new species) and *Scolecopides* (1 new species). The definition of *Rhynchospio* is expanded to include those species with branchiae free from dorsal lamellae. *Laonice* includes 3 new species, with 1 being a simultaneous hermaphrodite. *Spiophanes* includes 3 species, *Spio* with 3 species (2 being new) and *Microspio* with 1 new species.

The genera of the *Prionospio*-complex are reviewed and revised to include: *Paraprionospio* (1 species), *Orthoprionospio* gen. nov. (1 new species), *Streblospio* (not represented) and *Prionospio* (9 species, 5 being new).

A generic revision of the *Polydora*-complex is presented with 6 genera recognized: *Boccardia* (3 species), *Carazziella* gen. nov. (4 new species), *Polydora* (15 species, 8 being new), *Boccardiella* gen. nov. (2 species, 1 being new), *Tripolydora* (not represented) and *Pseudopolydora* (5 species, 2 being new). *Polydorella* is synonymized with *Pseudopolydora*.

Approximately  $\frac{2}{3}$  of the species reported herein are endemic to Australia; the remainder are species with more cosmopolitan distributions.

### Introduction

The Spionidae is one of the largest and most common of the polychaete families encountered in intertidal and shallow subtidal habitats throughout the world. Species are typically marine bottom deposit feeders which occur in all types of substrata, from soft muds to hard calcareous structures. Important systematic treatments of the family or of certain genera are by Mesnil (1896), Söderström (1920), Fauvel (1927), Hartman (1941), Pettibone (1962; 1963), Woodwick (1964), Day (1967), Foster (1971), Blake (1971), Blake and Woodwick (1971-72), Rainer (1973), Read (1975) and Light (1977; 1978).

Despite the voluminous global literature on spionids and the large number of species known to occur along some coastlines, there is very little information on Australian spionids. A review of the literature reveals only 4 species which were originally described from Australia. These are *Polydorella prolifera* Augener, 1914 and *Spio mesnili* Augener, 1914 from West Australia, *Polydora polybranchia* Haswell, 1885 (now *Boccardia*) from New South Wales and *Boccardia limnicola* Blake and Woodwick, 1976 from Victoria. In the southeastern region of Australia few species have been identified below the generic level. Haswell (1885) reported *Polydora ciliata* from commercial oysters in New South Wales, Augener (1927) reported *Spiophanes kroeyeri* from Victoria and Monro (1931) reported *Sco-*

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*lelepis* (= *Malacoceros*) *indicus* from Queensland. Several genera have been recorded by Hutchings and Reeher (1974) from New South Wales and by Poore, *et al.* (1975) from Victoria, but species names were generally not assigned. There are no published records at all from Tasmania or South Australia.

The purpose of the present paper is to describe a new and highly endemic spionid fauna from southeastern Australia. As defined herein, southeastern Australia includes southern Queensland from Moreton Bay and Brisbane, all of New South Wales and Victoria, eastern South Australia and Tasmania.

### Materials and Methods

Specimens have been accumulated from several sources. Extensive Victorian material comes from the Port Phillip Bay and Westernport Bay Environmental Surveys (PPBES, WPBES) performed by the Marine Studies Group (MSG) of the Ministry for Conservation. Location of MSG stations plus additional data are given by Poore, *et al.* (1975), Poore and Kudenov (1978 a-b) and Coleman, *et al.* (1978). Additional specimens from the Fisheries and Wildlife Crib Point Benthic Survey (CPBS) in Westernport were also examined. These materials are deposited in the National Museum of Victoria (NMV). Other Victorian materials include NMV collections obtained through Dr Brian Smith, Westernport epifauna collected by Mr Dave Staples and specimens from various localities along the Victorian coast collected by us. Spionidae in the Australian Museum, Sydney (AM) were loaned by Dr P. A. Hutchings. Queensland benthic spionids from Moreton Bay were loaned by Dr W. Stephenson. Some of these specimens are deposited in the Queensland Museum (QM). Spionids from the New South Wales State Fisheries (NSWSF) were provided by Ms M. Skeel from shellfish surveys and through Dr Leon Collett from benthic surveys of Botany Bay. Mr C. Pregoner (University of New South Wales) loaned specimens he had collected from shellfish. Mr R. Buttermore and M. Skeel provided specimens from Tasmania, which are now lodged in the Tasmanian Museum (TM). Mr W. Zeidler, South Australian Museum (SAM), kindly allowed the second

author access to their collections during August 1977. Dr G. Hartmann-Schröder provided Augener type materials from the Zoological Museum of Hamburg (ZMH). Dr Marian H. Pettibone loaned comparative specimens from the collections of the National Museum of Natural History, Washington, D.C. (USNM).

Since the materials examined in the present study were obtained from various sources, there is little uniformity in mode of collection and preservation. Specimens collected by us or in collections of the MSG were fixed in 10% formalin or Bouin's fluid and preserved in 70% ETOH to which glycerine had been added. Type material has been deposited in the NMV, AM and QM.

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### Family Spionidae Grube, 1850

*Diagnosis:* Prostomium variable: anteriorly rounded or incised, anteriorly expanded to acutely pointed, with or without frontal horns. Occipital tentacle sometimes present on prostomial caruncle. A pair of long prehensile peristomial palps arising on either side of caruncle near junction of peristomium and setiger 1. Setiger 1 reduced to well-developed, often fused with peristomium. Parapodia biramous, with parapodial lobes conical, cirriform or foliose; posterior neuropodia often form low



ridges. Setae simple, including capillaries, acicular spines, modified setae (major spines of polydorids) and unidentate to multidentate hooded or non-hooded hooks. Branchiae present or absent over a variable number of segments. Pygidium reduced to well-developed, with or without eirri, or expanded into disc-like structure or forming several lobes.

The following genera and species are covered in this report.

1. *Scolecopsis lamellicincta* sp. nov.
2. *S. carunculata* sp. nov.
3. *S. phyllobranchia* sp. nov.
4. *S. occipitalis* sp. nov.
5. *S. towra* sp. nov.
6. *S. precirriseta* sp. nov.
7. *S.* sp.
8. *S. viridis* sp. nov.
9. *S. victoriensis* sp. nov.
10. *Aonides oxycephala* (Sars, 1862)
11. *Dispio glabrilamellata* sp. nov.
12. *Australospio trifida* gen. et. sp. nov.
13. *Malacoceros indicus* (Fauvel, 1928)
14. *M. tripartitus* sp. nov.
15. *M. reductus* sp. nov.
16. *Rhynchospio glycera* sp. nov.
17. *R. australiana* sp. nov.
18. *Scolecopides aciculatus* sp. nov.
19. *Laonice quadridentata* sp. nov.
20. *L. hermaphroditica* sp. nov.
21. *L. bassensis* sp. nov.
22. *Paraprionospio pinnata* (Ehlers, 1901)
23. *Orthoprionospio cirriformia* gen. et sp. nov.
24. *Prionospio steenstrupi* Malmgren, 1867
25. *P. australiensis* sp. nov.
26. *P. queenslandica* sp. nov.
27. *P. ehlersi* Fauvel, 1928.
28. *P. paucipinnulata* sp. nov.
29. *P. tridentata* sp. nov.
30. *P. multipinnulata* sp. nov.
31. *P. aucklandica* Augener, 1923
32. *P. cirrifera* Wirén, 1883
33. *Spiophanes bombyx* (Claparède, 1870)
34. *S.* cf. *Kroeyeri* Grube, 1860
35. *S. wigleyi* Pettibone, 1962
36. *Spio mesnili* Augener, 1914
37. *S. pacifica* sp. nov.
38. *S. singularis* sp. nov.
39. *Microspio granulata* sp. nov.

40. *Boccardia polybranchia* (Haswell, 1885)
41. *B. proboscidea* Hartman, 1940
42. *B. chilensis* Blake and Woodwick, 1971
43. *Carazziella victoriensis* gen. et. sp. nov.
44. *C. phillipensis* sp. nov.
45. *C. hymenobranchiata* sp. nov.
46. *C. hirsutiseta* sp. nov.
47. *Polydora flava* Claparède, 1870
48. *P. socialis* (Sehmarda, 1861)
49. *P. protuberata* sp. nov.
50. *P. tentaculata* sp. nov.
51. *P. giardi* Mesnil, 1896
52. *P. aciculata* sp. nov.
53. *P. notialis* sp. nov.
54. *P. pilocollaris* sp. nov.
55. *P. armata* Langerhans, 1880
56. *P. ligni* Webster, 1879
57. *P. websteri* Hartman, 1943
58. *P. haswelli* sp. nov.
59. *P. latispinosa* sp. nov.
60. *P. woodwicki* sp. nov.
61. *P. hoplura* Claparède, 1870
62. *Boccardiella bihamata* gen. et. sp. nov.
63. *B. limnicola* (Blake and Woodwick, 1976) comb. nov.
64. *Pseudopolydora paucibranchiata* (Okuda, 1937)
65. *P. kempfi* (Southern, 1921)
66. *P. glandulosa* sp. nov.
67. *P. stolonifera* sp. nov.
68. *P. prolifera* (Augener, 1914) comb. nov.

## KEY TO GENERA OF SPIONIDAE

(\* denotes genera not yet found in Australia)

- 1a. Branchiae absent; setiger 1 with 1-2 large curved neuropodial spines in addition to normal capillaries  
.....*Spiophanes* (p. 224)
- b. Branchiae present; setiger 1 without large neuropodial spines.....2
- 2a. Setiger 5 modified, with specialized setae.....18
- b. Setiger 5 not modified, without specialized setae.....3
- 3a. Prostomium distally pointed (may appear conical with rounded apex in extremely contracted specimens), with or without subdistal lateral horns.....4

- b. Prostomium not distally pointed, with distal lateral or frontal horns, broadly rounded or incised on anterior margin . . . . . 7
- 4a. Branchiae beginning on setiger 1 . . . . . 5
- b. Branchiae beginning on setiger 2 . . . . . 6
- 5a. Prostomium with extra subdistal lateral horns in addition to apical point, appearing 3-parted; setigers 6-9 with dense setal fascicles; notosetae of setiger 1 similar in length to those of succeeding setigers; accessory branchiae absent . . . . . *Australospio* (p. 193)
- b. Prostomium without extra lateral horns; setigers 6-9 without dense setal fascicles; notosetae of setiger 1 long, thin; accessory branchiae present . . . . . *Dispio* (p. 191)
- 6a. Branchiae fused to dorsal lamellae at least basally, continuing to end of body . . . . . *Scolecopsis* (p. 175)
- b. Branchiae completely free from dorsal lamellae, present on variable number of anterior setigers, absent posteriorly . . . . . *Aonides* (p. 189)
- 7a. Prostomium with lateral or frontal horns . . . . . 8
- b. Prostomium without lateral or frontal horns . . . . . 10
- 8a. Branchiae beginning on setiger 1 . . . . . 9
- b. Branchiae beginning on setiger 2 . . . . . *Rhynchospio* (p. 198)
- 9a. Hooded hooks in both noto- and neuropodia of posterior segments . . . . . *Scolecopides* (p. 202)
- b. Hooded hooks only in neuropodia of posterior segments . . . . . *Malacoceros* (p. 195)
- 10a. Branchiae limited to middle and posterior setigers except for a single pair on setiger 2 in males . . . . . *Pygospio*
- b. Branchiae beginning on setiger 1 or 2 and continuing for a variable number of setigers . . . . . 11
- 11a. Branchiae concentrated in 1-22 anterior setigers, absent posteriorly . . . . . 12
- b. Branchiae present over most of body length . . . . . 15
- 12a. Branchiae beginning on setiger 1 . . . . . 13
- b. Branchiae beginning on setiger 2 . . . . . *Prionospio* (p. 211)
- 13a. One pair of cirriform branchiae; with dorsal collar across setiger 2 . . . . . *Streblospio*
- b. Three or more pairs of branchiae; no dorsal collar on setiger 2 . . . . . 14
- 14a. Three pairs of pinnate branchiae; with dorsal ridge across setiger 1 . . . . . *Paraprionospio* (p. 209)
- b. Eighteen to 22 pairs of cirriform branchiae; no dorsal ridge on setiger 1 . . . . . *Orthoprionospio* (p. 210)
- 15a. Branchiae beginning on setiger 1 . . . . . 16
- b. Branchiae beginning on setiger 2 . . . . . 17
- 16a. Hooks in both noto- and neuropodia . . . . . *Marenzelleria*
- b. Hooded hooks only in neuropodia . . . . . *Spio* (p. 226)
- 17a. Prostomium broad, bluntly rounded or squared on anterior margin; branchiae free from dorsal lamellae . . . . . *Laonice* (p. 204)
- b. Prostomium narrow, entire or incised on anterior margin; branchiae fused to dorsal lamellae . . . . . *Microspio* (p. 232)
- 18a. Branchiae beginning on setiger 2 . . . . . 19
- b. Branchiae beginning on setigers 6-12 . . . . . 21
- 19a. Setiger 5 only slightly modified, with prominent parapodia, major spines of 1 type; hooded hooks tridentate, with secondary teeth closely applied to main fang . . . . . *Tripolydora*
- b. Setiger 5 greatly modified, with reduced parapodia and major spines of 2 types or 1 type with companion setae; hooded hooks bidentate with prominent angle between teeth . . . . . 20<sup>1</sup>

<sup>1</sup> *Polydora guillei* Laubier and Ramos, 1974 bears unidentate unhooded neuropodial hooks and does not agree with any known polydorid genus. See Remarks p. 234.

20a. Major spines of setiger 5 of 1 type, these simple, falcate, with smaller companion setae . . . *Boccardiella* (p. 264)

- b. Major spines of setiger 5 of 2 types, first with expanded ends bearing cusps or bristles, second simple, falcate. . . . . *Boccardia* (p. 235)
- 21a. Setiger 5 slightly to moderately modified, usually with prominent parapodia; major spines of 2 types, first simple, acicular or falcate, second pennoned with both types usually arranged in U- or J-shaped row; hooded hooks with secondary tooth closely applied to main fang . . . . . *Pseudopolydora*<sup>2</sup> (p. 267)
- <sup>2</sup> *Pseudopolydora gibbsi* Light, 1974 and *P. stoloni-fera* (this study) deviate somewhat from the generic definition in having more modification to setiger 5 than usually seen in more typical *Pseudopolydora* species. The hooded hooks are typical.
- b. Setiger 5 greatly modified, with reduced parapodia; major spines of 1 or 2 types in curved row, not J- or U-shaped; hooded hooks with prominent angle between teeth. . . . . 22
- 22a. Setiger 5 spines of 1 type, variously shaped, with or without companion setae. . . . . *Polydora* (p. 245)
- b. Setiger 5 spines of 2 types, first type with expanded end, second type falcate, 1 or both types usually with bristles. . . . . *Carazziella* (p. 240)

### Genus *Scolecopsis* Blainville, 1828

*Scolecopsis* Blainville, 1828. *Type-species*: *Lumbricus squamatus* Müller, 1806, by monotypy.

*Aonis* Audouin and Milne-Edwards, 1833. *Type-species*: *Aonis foliosa* Audouin and Milne-Edwards, 1833, by monotypy.

*Nerine* Johnston, 1838. *Type-species*: *N. coniocephala* Johnston, 1838, selected by Quatrefages 1843 (= *Oonis foliosa*).

*Pseudomalacoceros* Czerniavsky, 1881. *Type-species*: *Malacoceros longirostris* Quatrefages, 1843 (= *Lumbricus squamatus*), by monotypy.

*Nerinides* Mesnil, 1896. *Type-species*: *Nerine longirostris* Saint-Joseph, 1894 (= *Nerinides cantabra* Rioja, 1918), by original designation.

*Scolecopsis* Michaelsen, 1897. Erroneous spelling of *Scolecopsis* Blainville, 1828. [Not Malmgren, 1867].

*Pseudonerine* Augener, 1926. *Type-species*: *P. antipoda* Augener, 1926, by monotypy.

[Synonymy *vide* Pettibone, 1963, p. 91].<sup>1</sup>

<sup>1</sup> Fauchald (1977a) has erroneously cited *Nerinides cantabra* Rioja, 1918, as the type-species of *Pseudo-*

*malacoceros* Czerniavsky, 1881, and has replaced *Nerinides* with *Pseudomalacoceros*. Pettibone's synonymy (see above) is the correct one and *Pseudomalacoceros* is a synonym of *Scolecopsis* (*sensu stricto*).

*Diagnosis*: Prostomium pointed on anterior margin, extending posteriorly as narrow caruncle. Occipital tentacle present or absent. Caruncle posteriorly detached or attached to dorsal body wall. Peristomium well-developed, with or without lateral wings. Branchiae beginning on setiger 2, continuing to near posterior end of body; in anterior setigers, branchiae completely fused to dorsal lamellae or with distal portion free. Capillary noto- and neurosetae of anterior setigers usually arranged in 2 tiers; notosetal capillaries of posterior setigers in a single tier. Most capillary setae with prominent sheaths imparting a uni- or bilobate appearance. Neuropodial hooded hooks present. Notopodial hooded hooks present or absent. Hooks uni-, bi-, tri- or multi-dentate. Pygidium with oval disc or multi-lobed appendages.

*Remarks*: *Scolecopsis* as defined above is slightly different from that proposed by Pettibone (1963) in that no provision is made for subgenera. The species are normally grouped into those having a distinct notch in the ventral lamellae (subgenus *Scolecopsis*) and those having entire ventral lamellae (subgenus *Nerinides*). Furthermore, Day (1967) pointed out that *Scolecopsis* normally has both notopodial and neuropodial hooded hooks, whereas *Nerinides* has only neuropodial hooded hooks. One or 2 species alternate in these characteristics, but in general they have held up. Light (1977), however, has determined that *S. squamata* in San Francisco Bay shows a continuous distribution in the presence or absence of the neuropodial cleft. He also notes that some specimens have notopodial hooks, whereas others do not (Light, 1978). Moreover, one of our species, *S. viridis* (see below) has neuropodial hooded hooks and unhooded notopodial acicular spines. It is not clear whether such unhooded spines, which are clearly of a different type than the hooded ones, have the same taxonomic importance as the notopodial hooks of other species.



We consider it to be increasingly difficult to maintain 2 subgeneric or generic (see Fauchald, 1977a) categories based on such tenuous and variable characteristics. Although we regret lumping such a large group of species under one genus, we believe it to be the better course, pending a re-evaluation of the taxonomic characteristics of *Scolelepis*. A similar position was adopted by Light (1977).

The reader is referred to Pettibone (1963) and Foster (1971) for historical and revisionary clarification of the genus *Scolelepis*, and for lists and keys to the species. Eighteen species are listed as valid by Pettibone (1963). Wu and Chen (1964), Hartmann-Schröder (1965), Foster (1971), Bellan and Lagardere (1971), Gibbs (1971); (1972), and Day (1973) have described additional species. In our study, we have identified 9 species belonging to *Scolelepis*, of which 8 are new to science.

#### KEY TO SPECIES OF *SCOLELEPIS* FROM SOUTHEASTERN AUSTRALIA

- 1a. Notosetae present on setiger 1 . . . . . 2
- b. Notosetae absent from setiger 1 . . . . . 5
- 2a. Caruncle posteriorly free from dorsum . . . . . 3
- b. Caruncle attached to dorsum . . . . . 4
- 3a. Setiger 1 with notopodial lamella in presetal position (Fig. 6a-b); hooded hooks multidentate, beginning in neuropodia of setiger 15-20 (Fig. 6 g-f) . . . . . *S. precirriseta*
- b. Setiger 1 with notopodial lamella in postsetal position (Fig. 2a); hooded hooks bi- or tridentate, beginning in neuropodia of setiger 24-25 (Fig. 2 h-k) . . . . . *S. carunculata*
- 4a. Hooded hooks unidentate, aperture of hood smooth (Fig. 1i); occipital tentacle absent, but caruncle posteriorly formed into conical mount (Fig. 1a) . . . . . *S. lamellicincta*
- b. Hooded hooks with 5 apical teeth, aperture of hood serrated (Fig. 6i-j); occipital tentacle present . . . . . *S.* sp.
- 5a. Caruncle posteriorly elevated or free from dorsum . . . . . 6
- b. Caruncle posteriorly low, attached to dorsum . . . . . 8

- 6a. Hooded hooks bidentate (Fig. 3d-e); parapodia and branchiae of middle and posterior setigers vesiculate (Fig. 3c) . . . . . *S. phyllobranchia*
- b. Hooded hooks multidentate (Fig. 4h; 5e); parapodia and branchiae not vesiculate . . . . . 7
- 7a. Caruncle posteriorly elevated into foliose lobe (Fig. 4a-b); superior dorsal capillary setae with smooth shaft and tuberculated sheath (Fig. 4j-l); branchiae free at tips (Fig. 4c-d) . . . . . *S. occipitalis*
- b. Caruncle posteriorly elevated, pointed, not foliose (Fig. 5a-b); superior dorsal capillary setae with striated shaft and minutely spinous sheath (Fig. 5a-b); branchiae completely fused to dorsal lamellae . . . . . *S. towra*
- 8a. Posterior notopodia with acicular spines (Fig. 8g) in addition to capillary setae; area posterior to caruncle with nuchal papilla and raised rectangular patch (Fig. 7 a-b) . . . . . *S. viridis*
- 8b. Posterior notopodia without acicular spines, with capillary setae only; caruncle with rounded lobe; nuchal papilla located posterior to caruncle (Fig. 9 a-b) . . . . . *S. victoriensis*

#### *Scolelepis lamellicincta* sp. nov. (Figure 1)

*Material examined:* QUEENSLAND. Heron Island, sandy shore, NE of island, mid-low tide levels (1 specimen, AM W13000). VICTORIA. Westernport, Point Leo, coll. Mar. Studies Grp., 18 Jan. 1969, Sta. 57/01, 69/05 (HOLOTYPE, NMV G102; PARATYPE, NMV G2987); Shorham, coll. R. Jenz, Sta V40, 3 Dec. 1965 (PARATYPE, NMV G2988); Somers, coll. R. Jenz, Sta. V77, Jan. 1966 (PARATYPE, NMV G2989); Walkerville, coll. R. Jenz, Sta. V170, Jan. 1966 (PARATYPE, NMV G2990). TASMANIA. Macquarie Island, Buckles Bay, dredged, Dec. 1960 (PARATYPE, NMV G2986). SOUTH AUSTRALIA. Elliston, in sand at base of jetty, coll. I. M. Thomas, 18 Feb. 1975 (14, SAM E1577).

*Description:* Holotype 32 mm long and 2.2 mm wide across parapodia for 100 setigers; paratypes up to 100 mm long and 8 mm wide for 140 setigers. Body widest anteriorly, rectangular in cross section. Salmon coloured in alcohol.

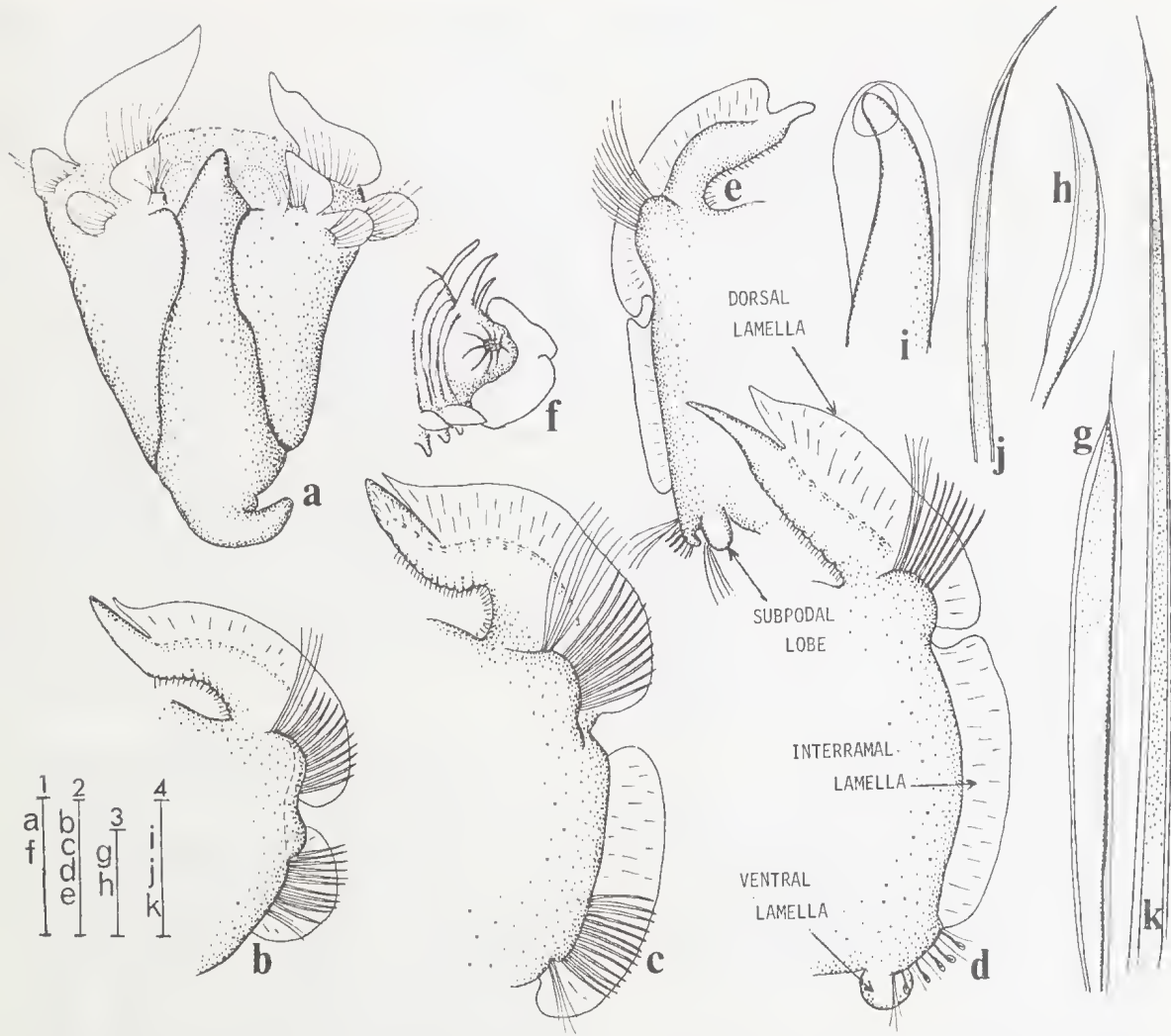


Figure 1—*Scoelepis lamellicincta* sp. nov.—a, anterior end, dorsal view; b, left setiger 11, anterior view; c, left setiger 33, anterior view; d, left setiger 51, anterior view; e, right setiger 120, anterior view; f, pygidium, dorsolateral view; g, capillary seta from posterior tier, setiger 10; h, capillary seta from anterior tier, setiger 10; i, unidentate hooded hook; j, sabre seta; k, superior capillary notoseta. [Scale 1 = 100  $\mu\text{m}$ ; 2 = 200  $\mu\text{m}$ ; 3 = 50  $\mu\text{m}$ ; 4 = 20  $\mu\text{m}$ ]

Prostomium anteriorly projecting, elongate, distally pointed, tapering posteriorly to a blunt and attached, but elevated lobe (Fig. 1a). Two pairs of eyes, arranged trapezoidally, an-

terior pair the larger. Palps extending posteriorly to setiger 10, with basal membrane. Peristomium well-developed, forming lateral wings partially overlapping prostomium.

Setiger 1 reduced, with leaf-like dorsal lamellae and rounded ventral lamellae (Fig. 1a). Dorsal lamellae from setiger 2 distally free from branchiae, flattened, narrow and distally pointed (Fig. 1b-e). Postsetal neuropodial lamellae small and rounded at first, increasing in size and becoming broadly rounded in subsequent anterior segments (Fig. 1b-c); at setigers 19-35, dividing into a long interrampal lamella and a small, rounded ventral lamella (Fig. 1d-e). With slight interrampal presetal

swelling in setigers 2-15 (Fig. 1b); curved subpodal lobe present in far posterior neuropodia (Fig. 1e).

Notosetae arranged in superior and inferior fascicles in anterior setigers and in single fascicles in posterior setigers. All inferior anterior capillary notosetae and neurosetae with granulations (Fig. 1g-h); granulations becoming obscured in posterior notopodial capillaries. Superior fascicle including capillaries with granulated shaft and clear, transparent sheath (Fig. 1k). Anterior capillary neurosetae similar to notosetae. Inferior neuropodial sabre setae from setiger 2-13, numbering 3-6 per fascicle; these distally pointed with finely granulated shaft and prolonged sheaths (Fig. 1j). Unidentate hooded hooks in neuropodia from setiger 25-38, and in notopodia from setiger 75-80, numbering 5-6 per ramus. Hooks distally falcate, blunt, aperture of hood forming smooth circle (Fig. 1i).

Branchiae fused to notopodial lamellae, but distally free (Fig. 1b-e). Pygidium with incised ventral cushion (Fig. 1f). Anus dorsal, surrounded by crenulate margin.

*Remarks:* *Scolecipis lamellicincta* is most closely related to *S. bonneri* (Mesnil) from France and to *S. foliosa* (Audouin Milne-Edwards) of cosmopolitan distribution; it differs from those species and all others by the structure of the parapodia, especially by the long interramal lamella of the middle and posterior segments. The conical caruncle is also unique.

*Distribution:* Queensland; Victoria; Tasmania, Macquarie Island; South Australia.

### *Scolecipis carunculata* sp. nov.

(Figure 2)

*Material examined:* QUEENSLAND. Moreton Bay, Jackson Creek, mangroves and sand flats, coll. P. Hutchings and C. Wallace, 12 July 1973 (1, AM W6057). NEW SOUTH WALES. Belmont Beach, HDWBS sample, Jan. 1976 (1, AM W8926). VICTORIA. Port Phillip Bay, Werribee MSG Sta. 1871, coll. G. Poore and J. D. Kudenov, Nov. 1975 (1, NMV G2991); Westernport, Shorham, Sta. V47, coll. R. Jenz, 20 Dec. 1965 (HOLOTYPE, NMV G2992; 5 PARATYPES NMV G2993); Port Fairy, Sta. V51, coll. R. Jenz, 10 Jan. 1966 (1, NMV G2994). Portland, Sta. V62, coll. R. Jenz, 8 Jan. 1966 (1, NMV G2995); Somers, Sta. V77, coll. R. Jenz, Jan. 1966

(2, NMV G2996). WEST AUSTRALIA. Safety Bay, south of Perth, coll. 15 Sept. 1968 (2, NMV G2997). *Description:* A large species, measuring up to 48 mm long and 3 mm wide for 110 setigers. Body widest anteriorly, tapering gradually posteriorly; elliptical in cross section. Colour in alcohol: opaque white to dusky brown.

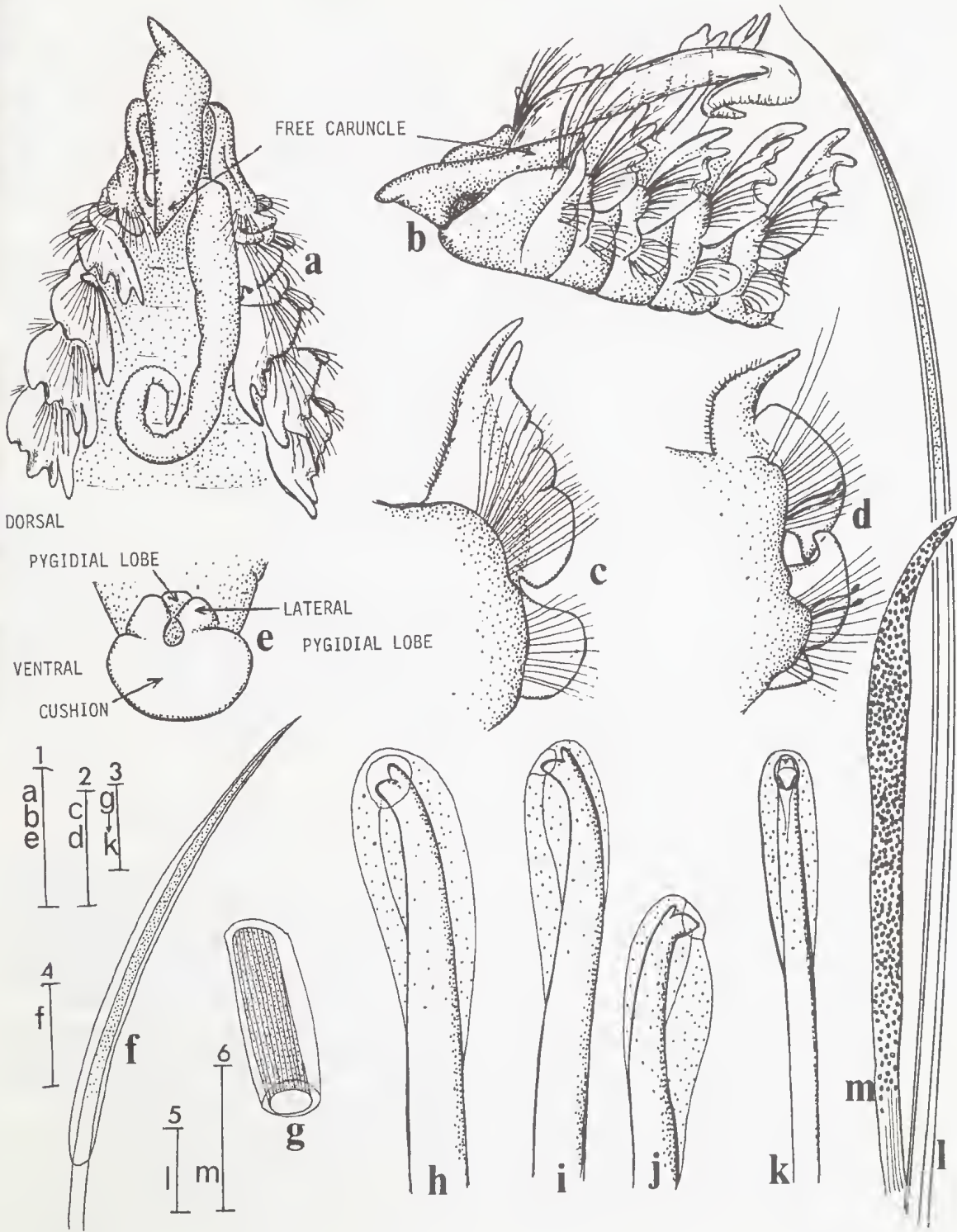
Prostomium slightly fusiform, pointed anteriorly and posteriorly, posterior lobe free unattached, extending to anterior margin of setiger 2 (Fig. 2a-b). Two pairs of eyes, arranged trapezoidally, the anterior pair slightly larger. Palps extending posteriorly to setiger 8-9. Peristomium well-developed, forming lateral wings, but not overlapping prostomium.

Setiger 1 reduced (Fig. 2a), with elliptical postsetal lamellae, dorsal lobes larger than ventral ones. Notopodial lamellae distally free from branchiae, entire, but greatly folded (Fig. 2c). Neuropodial lamellae in anterior setigers elliptical (Fig. 2c), becoming bilobed by setiger 30-35 (Fig. 2d). Parapodial lamellae of posterior setigers overlapping interramally (Fig. 2d).

Anterior setal tiers bear granulated capillaries with transparent sheaths (Fig. 2f-g); superior capillaries of posterior notopodial tiers and inferior capillaries of posterior neuropodial tiers with smooth shafts and sheaths bearing large vesicles, appearing golden in reflected light (Fig. 2m); remaining capillaries of posterior tiers non-granulated; superior dorsal capillaries distally granulated, with thin, prolonged distal process (Fig. 2l). Two to 3 inferior sabre setae in neuropodia from setiger 3. Hooded hooks beginning in setiger 24-45 in neuropodia and in setiger 70-80 in notopodia.

Figure 2—*Scolecipis carunculata* sp. nov.—a, anterior end, dorsal view; b, anterior end, lateral view; c, right setiger 10, anterior view; d, right setiger 30, anterior view; e, pygidium; f, anterior capillary seta; g, detail of shaft of f; h, neuropodial bidentate hooded hook, frontal view; i, same, lateral view; j, notopodial tridentate hooded hook, lateral view; k, notopodial tridentate hooded hook, frontal view; l, inferior capillary neuroseta; m, superior capillary notoseta. [Scale 1 = 500  $\mu$ m; 2 = 500  $\mu$ m; 3 = 20  $\mu$ m; 4 = 50  $\mu$ m; 5 = 20  $\mu$ m; 6 = 20  $\mu$ m]





Hooks bidentate in neuropodia (Fig. 2h-i) and bi- and tridentate in notopodia (Fig. 2j-k); hooks with primary and secondary hoods, primary hood bearing minute granules and secondary hood clear.

Branchiae stout, triangular, partially fused to dorsal lamellae. Pygidium with large ventral, entire cushion; anus surrounded by paired lateral and single dorsal lobes (Fig. 2e).

*Remarks:* *Scolelepis carunculata* is most closely related to *S. squamata* (Müller) in having notosetac on setiger 1 and in exhibiting bidentate hooded hooks. *S. carunculata* differs in the gills being fused to the dorsal lamellae for most of their length, the posterior notopodia are not incised, the dorsal and ventral lamellae of posterior setigers overlapping interramally and in the pygidium having dorsal and lateral lobes in addition to the ventral cushion. *S. carunculata* further differs from all previously described species of the genus in having hooded hooks with a secondary hood.

*Distribution:* Queensland; New South Wales; Victoria; West Australia.

#### *Scolelepis phyllobranchia* sp. nov.

(Figure 3)

*Material examined:* QUEENSLAND. Moreton Bay, Middle Banks, Sta. 4B coll. W. Stephenson, Jan. 1976 (HOLOTYPE, NMV G2983; PARATYPE, NMV G2984); Sta. 48, Dec. 1972 (PARATYPE, NMV G2985); Sta. 4C, March 1976 (PARATYPE, QM G11586); Sta. 53, Sept. 1973 (PARATYPE, QM G11587).

*Description:* All specimens are incomplete. Holotype the largest specimen, measuring 15 mm long and 5 mm wide for 27 setigers. Anterior end dorsoventrally flattened, wide, rectangular in cross section. Colour in alcohol: opaque white.

Prostomium anteriorly elongate, distally pointed, continuing posteriorly as elevated mound with small apical nuchal papilla (Fig. 3a). Two pairs of subequal eyes, arranged rectangularly. Palps missing. Peristomium moderately developed, forming low lateral wings, partially encompassing prostomium.

Setiger 1 reduced, bearing small rounded notopodial lamellae, lacking notosetae; subquadrate neuropodial lamellae (Fig. 3a). Noto-

podial lamellae totally fused to branchiae from setiger 2 to about 18, thereafter notopodial lamellae from about setiger 20-25 displaced distally on elongated stalk (Fig. 3c), diverging to form 2 leaf-shaped, vesiculate processes: a dorsal lamella and separate branchia. Anterior neuropodial lamellae rounded (Fig. 3b), becoming bilobed from about setiger 25, with vesiculate petaloid interramal lamella (Fig. 3c).

Capillaries of anterior setal tiers mostly granulated, those of posterior row, and anterior superior fascicle of 4-5 capillaries, non-granulated, sheathed, with sheath being distally prolonged in superior capillaries (Fig. 3 f-g). Inferior sabre setae absent. Bidentate hooded hooks in neuropodia from setiger 23 (Fig. 3d-e); notopodial hooks lacking in fragmentary material.

Nature of pygidium unknown.

*Remarks:* *Scolelepis phyllobranchia* is unique among spionids in having a stalk or trunk on posterior segments from which branch separate notopodial lamellae and gill processes. These parts as well as the neuropodial interramal lamellae are vesiculated and resemble the dorsal cirri of phyllodocids. The fragmentary nature of the types precludes an assessment of the presence of notopodial hooks.

*Distribution:* Queensland, Moreton Bay.

#### *Scolelepis occipitalis* sp. nov.

(Figure 4)

*Material examined:* NEW SOUTH WALES. Burwood Beach, HDWBS samples, June 1975 (HOLOTYPE, AM W8910 plus 8 PARATYPES from 8 stations, April, May, July, Sept. 1975, AM W8909, 8911-8917); Belmont Beach, HDWBS samples, 9 stations, June, July, Sept., Nov., Dec. 1975 and Feb. 1976 (9 PARATYPES, AM W8918-8925, 8928).

*Description:* A moderate-sized species, up to 16 mm long and 3.0 mm wide for 68 setigers. Body widest anteriorly, rectangular in cross section. Colour in alcohol: opaque white.

Prostomium anteriorly inflated with a distal conical protuberance (Fig. 4a); posteriorly produced into a flattened, irregularly-shaped, partly branched occipital process (Fig. 4a-b). Eyes absent. Palps missing. Peristomium mod-

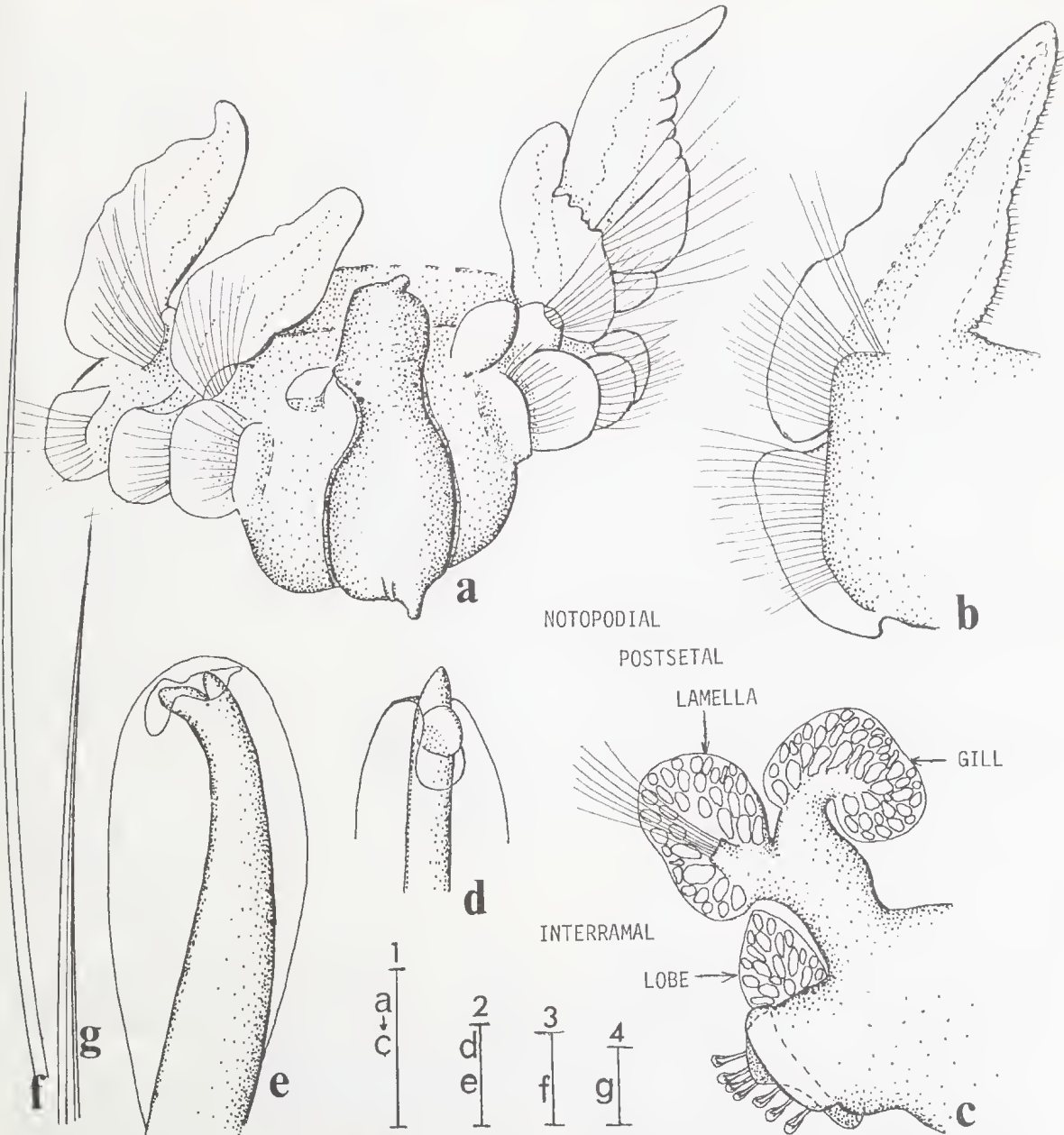


Figure 3—*Scolelepis phyllobranchia* sp. nov.—a, anterior end, anterodorsal view; b, right setiger 10, anterior view; c, right setiger 25, anterior view; d, bidentate hooded hook, frontal view; e, bidentate hooded hook, lateral view; f, superior capillary notoseta; g, detail of same. [Scale 1 = 100 μm; 2 = 20 μm; 3 = 100 μm; 4 = 10 μm]

Setiger 1 reduced, with small digitiform aseptigerous notopodial lobes; neuropodial lamellae rounded, bearing capillary setae (Fig. 4 a-b). Anterior notopodial lamellae partly fused with branchiae from setiger 2, but distally free; lamellae elongate with rounded tips in anterior segments (Fig. 4c), becoming wing-shaped and distally pointed in posterior segments (Fig. 4d-e). Branchiae robust, wide and short at first,

erately developed, with small lateral wings (Fig. 4a).



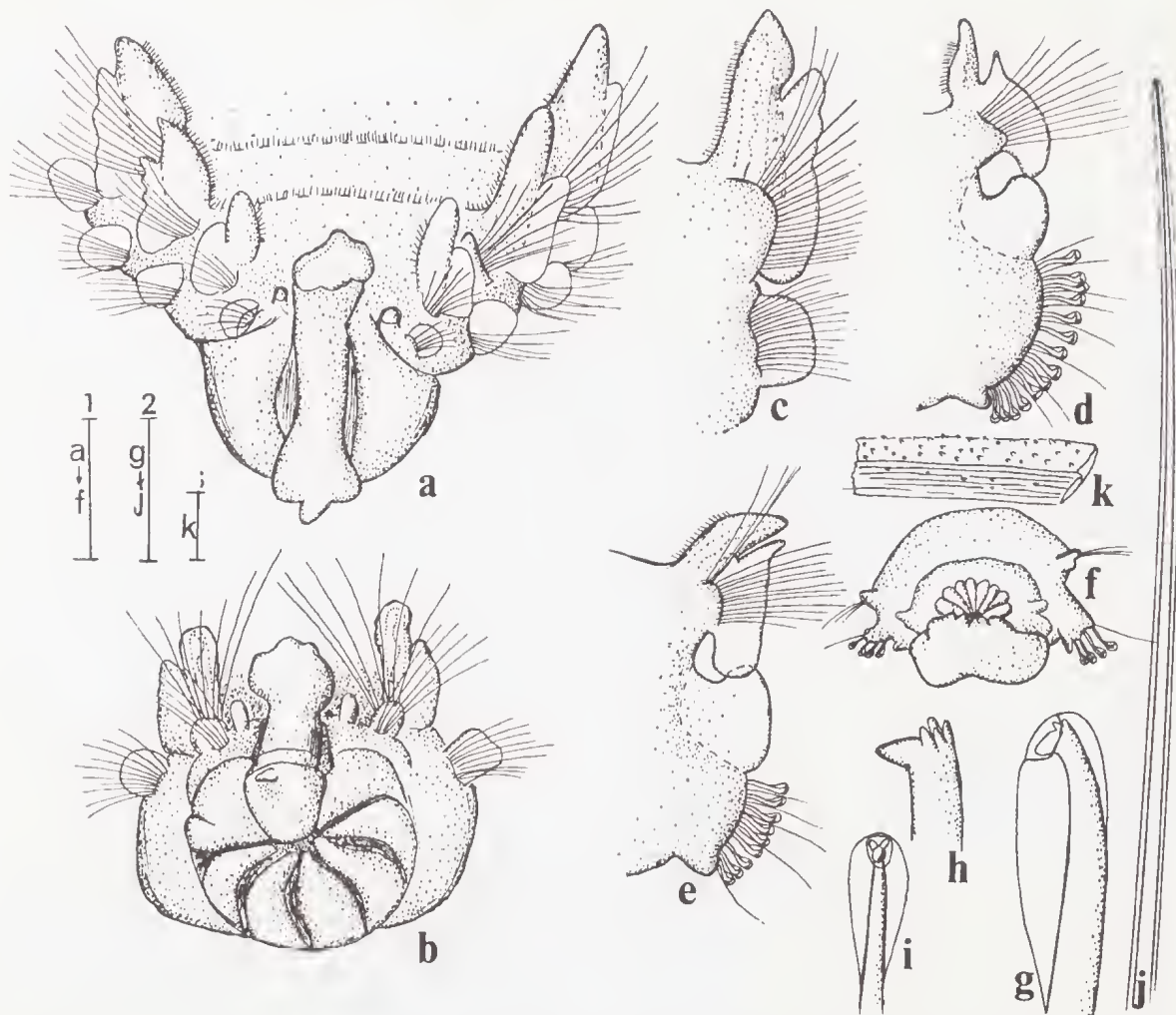


Figure 4—*Scolelepis occipitalis* sp. nov.—a, anterior end, frontal view; b, anterior end, dorsal view; c, right setiger 11, anterior view; d, right setiger 58, anterior view; e, right setiger 58, anterior view; f, pygidium, terminal view; g, quinquedentate hooded hook, lateral view; h, detail of quinquedentate hooded hook, hood omitted [not to scale]; i, quinquedentate hooded hook, frontal view; j, superior capillary notoseta; k, detail of shaft of same. [Scale 1 = 100  $\mu$ m; 2 = 20  $\mu$ m; 3 = 10  $\mu$ m]

increasing in size over anterior region, decreasing in length posteriorly. Anterior neuropodial lamellae entire and rounded; lamellae divided in middle and posterior segments, forming a small ventral lobe and large interrampal lamella

(Fig. 4c-e). Dorsal and interrampal lamellae of middle and posterior segments overlapping (Fig. 4d-e). Inferior presetal neuropodial lobe from setiger 19-20 (Fig. 4d-e).

Capillary setae granulated in anterior tier, smooth in posterior tier; superior group of 2-5 capillaries with smooth shaft and tuberculated sheath (Fig. 4j-k). Neuropodial quinquedentate hooded hooks from setiger 24-25 (Fig. 4g-i), notopodial hooks beginning about setiger 52. Hooks bearing 4 small apical teeth in 2 rows with a V-shaped medial gap surmounting large main fang (Fig. 4h-i); quinquedentate hooks appearing tridentate in certain views (Fig. 4g-i); inferior sabre setae absent.

Pygidium with ventral cushion, with 1 achae-

tous preanal segment. Anus with deeply scalloped margin (Fig. 4f).

*Remarks:* *Scolelepis occipitalis* is readily recognized by the flattened, partly branched occipital lobe and the configuration of the hooded hooks, which more closely resemble those seen in the genus *Prionospio* than in other species of *Scolelepis*.

*Distribution:* New South Wales.

### *Scolelepis towra* sp. nov.

(Figure 5)

*Material examined:* NEW SOUTH WALES. Botany Bay, Towra Beach, NSWFS Sta. 226, associated with *Posidonia* (HOLOTYPE, NMV G2982).

*Description:* Holotype an incomplete anterior fragment, measuring 7 mm long and 0.8 mm wide for 28 setigers. Specimen a gravid female with hard membraned primary oocytes.

Prostomium distally pointed, widest subterminally, with caruncle tapering posteriorly to form erect conical lobe extending to anterior margin of setiger 3, with slight constriction at level of eyes. Two pairs of eyes arranged trapezoidally, anterior pair the larger (Fig. 5a-b). Palps missing. Peristomium moderately enlarged, without lateral wings.

Notopodial lobe of setiger 1 reduced, lacking notosetae; neuropodium rounded, with capillary setae. Notopodial lamellae completely fused with branchiae from setiger 2, rounded at first (Fig. 5c) then becoming triangular (Fig. 5d) in subsequent segments. Neuropodial lamellae auricular and continuous with notopodial lamellae in anterior setigers (Fig. 5c), decreasing in size posteriorly and shifting dorsally to interramal position, becoming asymmetrical and overlapping notopodial lamellae (Fig. 5d). Low rounded presetal neuropodial lobe from setiger 15-18 (Fig. 5d).

Anterior capillary notosetae and superior group of 3-5 longer capillaries with striated shaft and minutely spinous sheath (Fig. 5g-h), distally prolonged as fine tip. Smooth sabre setae in neuropodia only in setigers 10-14. Multidentate hooded hooks begin setiger 14-15, secondary teeth arranged in 2 pairs, closely applied to elongated main fang (Fig. 5e-f). Notopodial hooks unknown. Nature of pygidium unknown.

*Remarks:* *Scolelepis towra* is closely related to *S. texana* Foster, 1971, from the Gulf of Mexico and *S. occipitalis* (this study), all of which have multidentate hooded hooks. The hooks of *S. occipitalis* differ from those of *S. towra* in exhibiting a large, medial, V-shaped gap between the pairs of apical teeth; no such gap occurs in the hooks of *S. towra*. *S. towra* and *S. texana* have quite similar hooks, but the 2 species can be separated as follows: in *S. towra*, the branchiae are totally fused to the dorsal lamellae and there is no occipital cirrus (although the posterior edge of the caruncle forms an erect lobe); in *S. texana* branchiae are only fused basally, and an erect occipital antenna is present. In addition, the anterior dorsal capillaries of *S. towra* bear striated shafts with finely spinous sheaths; those of *S. texana* exhibit punctate shafts with clear, entire, hyaline sheaths, similar to those seen in *S. squamata* (W. J. Light, personal communication).

*Distribution:* New South Wales, Botany Bay, Towra Beach.

### *Scolelepis precirriseta* sp. nov.

(Figure 6a-h)

*Material examined:* QUEENSLAND. Deception Bay, Burpengary Creek (1, AM W7129); Brisbane, Fine Station, Feb. 1972 (9, AM W7483); 14-25 m, May 1974 (HOLOTYPE, AM W13052; 2 PARATYPES, AM W13047). NEW SOUTH WALES. Wallis Lake, *Zostera* beds, coll. Dixon and O'Gower, Dec. 1970 (2, AM W5007).

*Description:* A moderate-sized species, up to 17 mm long and 1.5 mm wide for 39 setigers. Body dorsoventrally flattened anteriorly, setigers 1-18 elliptical in cross section, subquadrate posteriorly. Collection includes males with sperm and females with hard membraned oocytes. Colour in alcohol: opaque white.

Prostomium anteriorly pointed or blunt, depending on amount of contraction during preservation. Posterior aspect of prostomium produced into elevated free lobe extending posteriorly to setiger 2 (Fig. 6a). Constriction present at level of eyes. Two pairs of eyes, trapezoidally arranged, anterior pair the larger. Peristomium moderately developed, but without lateral wings. Regenerating palps inserted posterolaterally to prostomium in holotype

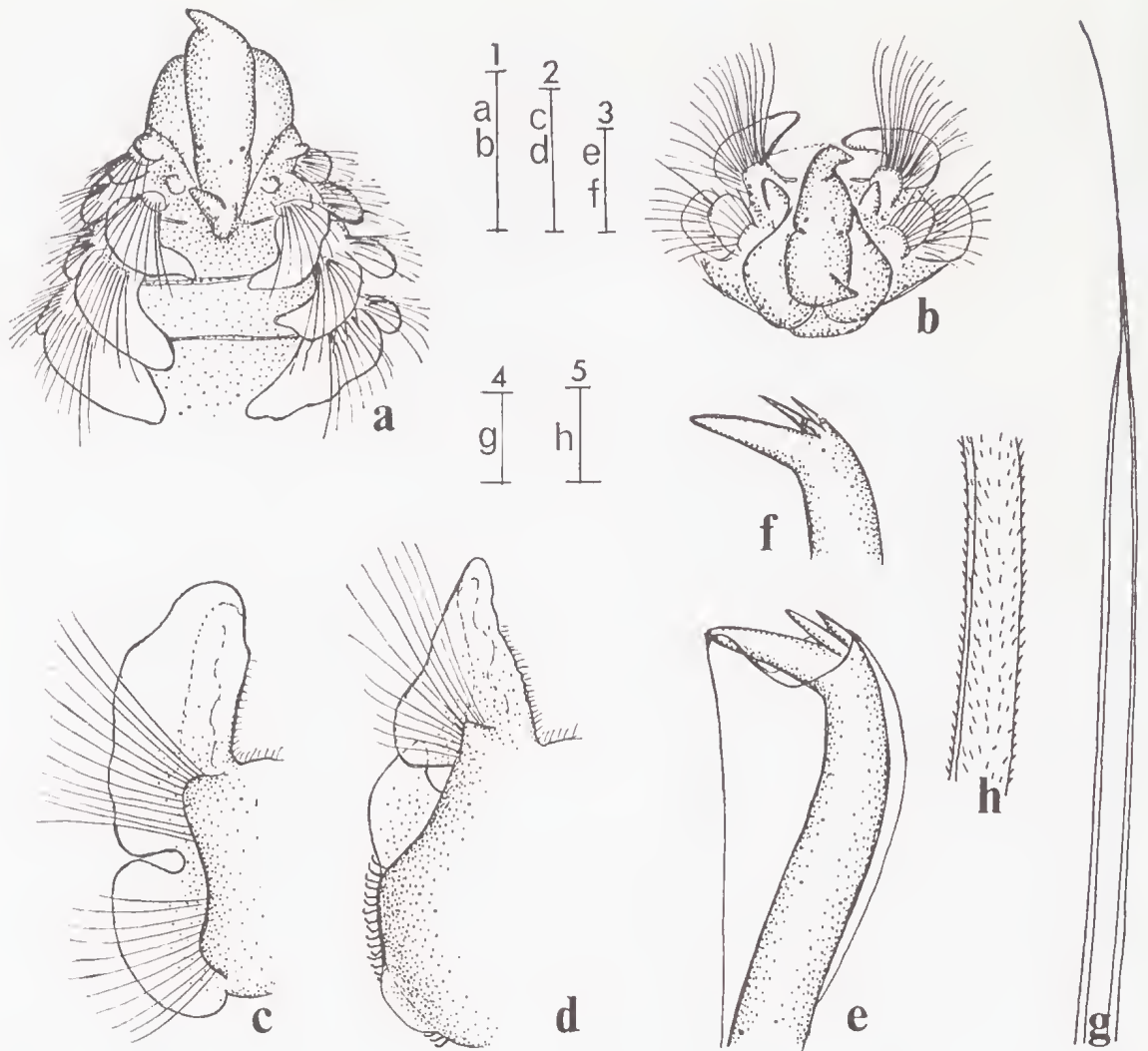


Figure 5—*Scolelepis towra* sp. nov.—a, anterior end, dorsal view; b, anterior end, frontal view; c, right setiger 10, anterior view; d, right setiger 20, anterior view; e, quinque-dentate hooded hook, lateral view; f, quinque-dentate hooded hook, without hood showing 2 broken teeth and 2 entire teeth behind, lateral view; g, superior capillary notoseta; h, detail of sheath of same. [Scale 1 = 100  $\mu$ m; 2 = 500  $\mu$ m; 3 = 10  $\mu$ m; 4 = 20  $\mu$ m; 5 = 10  $\mu$ m]

(Fig. 6a). Setiger 1 reduced, but with notosetae; notopodial lamellae fingerlike and presetal instead of postsetal in location; neuropodial lamellae rounded and postsetal (Fig. 6a-b).

Dorsal lamellae basally fused with branchiae in anterior setigers, becoming free posteriorly. Lamellae of anterior setigers distally pointed (Fig. 6c), becoming hatchet-shaped in posterior setigers (Fig. 6d-e). Neuropodial lamellae continuous with notopodial lamellae in anterior setigers, the 2 being separated by a shallow notch (Fig. 6c); neuropodia becoming broadly rounded at about setiger 29, then moving to interramal position (Fig. 6d-e).

Anterior dorsal capillaries non-granulated or granulated; 4-5 superior dorsal capillaries with non-granulated shaft and tubercles on sheath (Fig. 6h). Hooded hooks first present



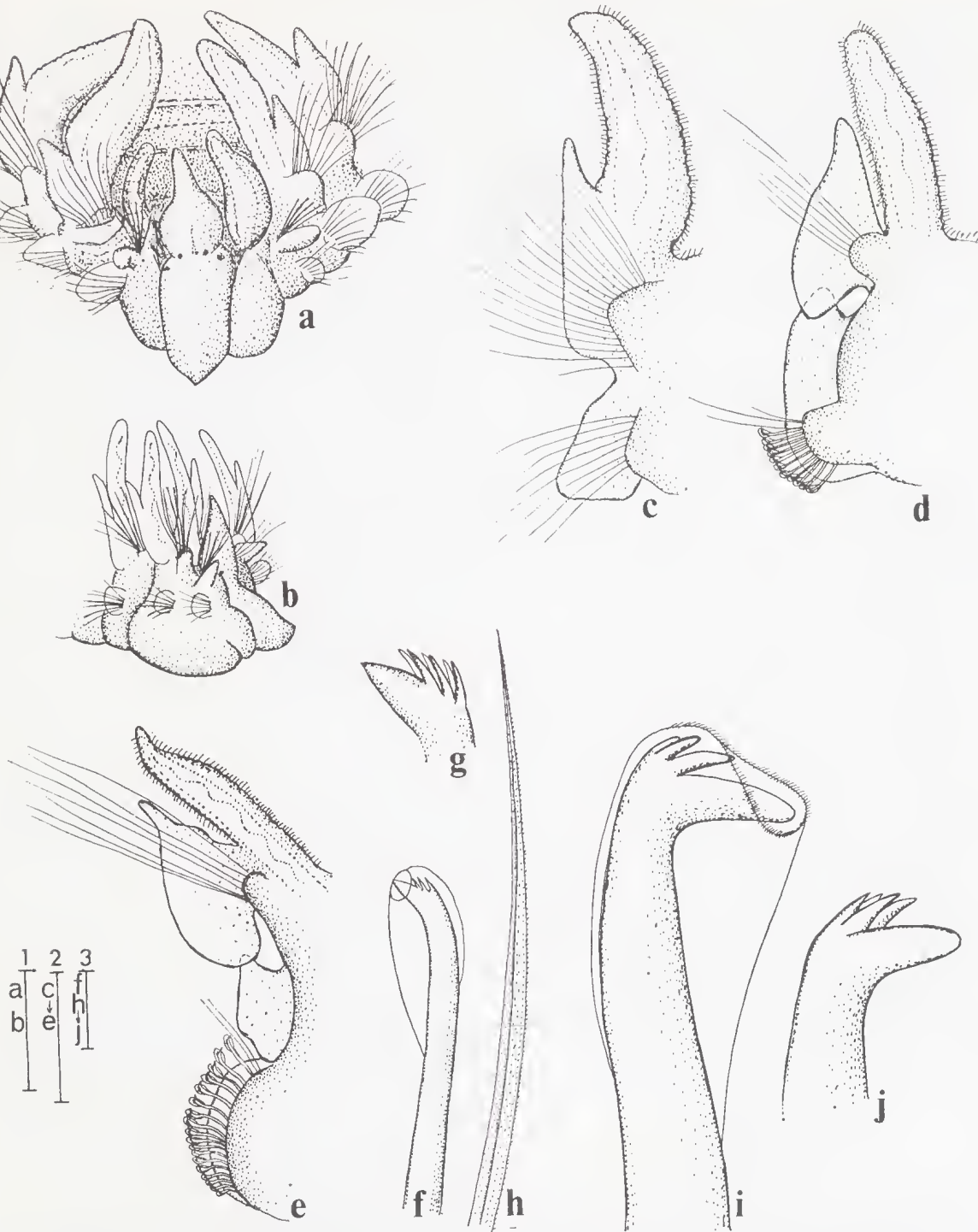


Figure 6—*Scolelepis precirriseta* sp. nov.—a, anterior end, dorsal view; b, anterior end, lateral view; c, right setiger 10, anterior view; d, right setiger 39, anterior view; e, right setiger 39, anterior view; f, multidentate hooded hook, lateral view; g, same, enlarged, hood omitted [not to scale]; h, superior capillary notoseta—*Scolelepis* sp.—i, hexadentate hooded hook, lateral view; j, hexadentate hooded hook, without hood showing arrangement of teeth, frontolateral view. [Scale 1 = 100  $\mu\text{m}$ ; 2 = 300  $\mu\text{m}$ ; 3 = 20  $\mu\text{m}$ ]

in neuropodia from setiger 15-20, mostly replacing capillaries. Hooks with relatively small primary fang and 3 pairs of small apical teeth (Fig. 6f-g), suggestive of a *Prionospio* setal type, appearing quadridentate in lateral view. Notopodial hooks unknown. Sabre setae unknown. Nature of pygidium unknown.

*Remarks:* *Scolecopsis precirriseta* differs from all known species of the genus in having the dorsal lamella of setiger 1 in the presetal instead of postsetal position. The outer superior dorsal capillaries have minute tubercles on the sheath.

*Distribution:* Queensland; New South Wales.

### *Scolecopsis* sp.

(Figure 6i-j)

*Material examined:* VICTORIA. Westernport, Crib Point, CPBS Sta. 32N (1, NMV G2894; 1, NMV G2895).

*Remarks:* The specimens are incomplete and measure up to 25 mm long and 2.5 mm wide for 44 setigers. They are poorly preserved. An occipital tentacle is present. There are no eyes. Setiger 1 bears notosetae. The branchiae are completely fused to the dorsal lamellae in at least in anterior segments. The dorsal lamellae appear highly glandular in anterior segments and are reddish in colour. Anterior fascicles have non-granulated capillary setae with sheaths. Multidentate hooded hooks begin on setiger 11. The margin of the hood aperture is serrated (Fig. 6i). Apical teeth are arranged in 2 pairs above the main fang, and underlie a small unpaired tooth (Fig. 6i-j). Sperm were observed in one specimen (NMV G-2894) and proved to be of the primitive type (Franzén, 1956). Specific identification cannot be made from the present, badly preserved specimens.

*Distribution:* Victoria, Westernport Bay, in muddy sand.

### *Scolecopsis viridis* sp. nov.

(Figures 7-8)

*Material examined:* QUEENSLAND. Great Barrier Reef, Opal Reef, coll. 9 Nov. 1976, subtidal, 2 m in coral sand under boulder on reef flats, coll. J. H. Dorsey (HOLOTYPE, NMV G2914).

*Description:* Holotype complete, measuring 200 mm long and 9 mm wide for about 200

setigers. Body widest anteriorly, gradually tapering posteriorly, generally rectangular in cross section. Posterior segments each with raised glandular ridges surrounding body. Specimen a gravid female with flattened, hard membraned oocytes. Colour in life: bright green; in alcohol: dark grey.

Prostomium distally pointed, widest subterminally, gradually tapering posteriorly (Fig. 7a-b). Flattened nuchal papilla present posterior to and separated from caruncle. A raised rectangular area occurring just posterior to papilla, on setiger 3 (Fig. 7a-b). Palps missing. Two pairs of eyes in trapezoidal arrangement. Peristomium well-developed, forming lateral thickening about prostomium.

Setiger 1 reduced, but with small rounded notopodial lamellae, lacking notosetae; neuropodial lamella auricular, much larger than notopodial lamella (Fig. 7a). From setiger 2 notopodial lamellae marginally rounded, completely fused with branchiae, both elements forming strap-like structure (Fig. 8a-b); lamellae highly reduced in middle and posterior body region, where branchiae become separated and smaller (Fig. 8c-d), with notopodia elongating into cirriform lobes, barely fused basally to branchiae. Branchiae reduced to ciliated mounds in far posterior setigers (Fig. 8e). Anterior neuropodial lamellae entire (Fig. 8a); with inferior notch in middle setigers (Fig. 8b), becoming narrowly rounded (Fig. 8c-e) in posterior setigers, with small presetal lobe (Fig. 8d-e).

Setal fascicles arranged as 5 tiers of capillary setae per ramus in anterior setigers, decreasing to 2 tiers by setiger 40. From about setiger 50, notopodia each with superior and inferior tuft of capillaries (Fig. 8c). Anterior capillary notosetae of 2 types: (1) those of tiers 1-2 with granulated shaft and clear sheath (Fig. 7c-d); (2) those of tiers 3-5 and superior fascicles with non-granulated shaft and prominently bristled sheath (Fig. 7e-f). With simple, heavy acicular spines in notopodia of middle and posterior setigers (Fig. 8g) from setiger 50. Neurosetae including sheathed granulated and non-granulated capillaries in addition to bidentate hooded hooks. Two inferior sabre setae from setiger 2, number of sabre setae increasing to 20 per fascicle in middle segments;

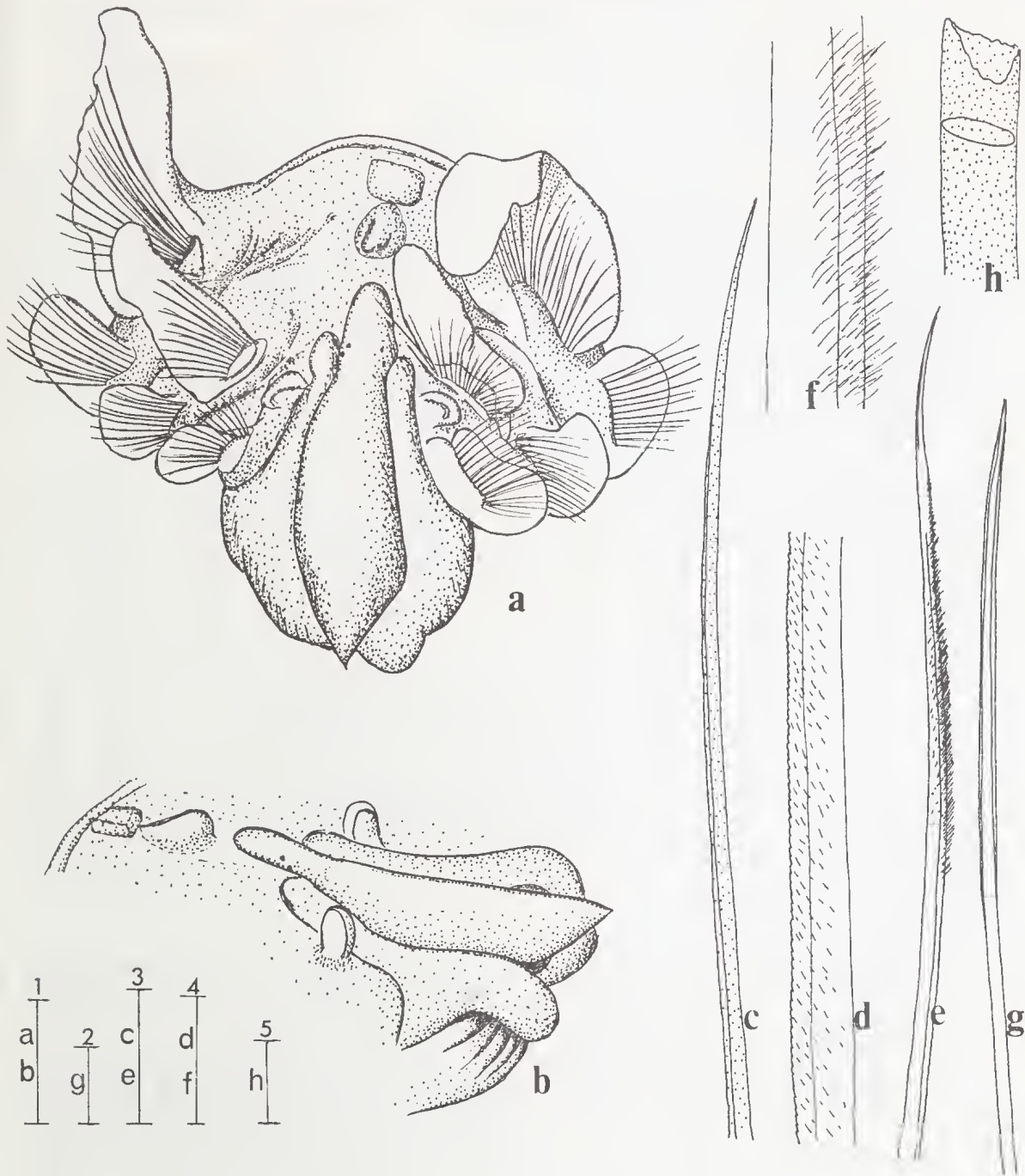


Figure 7—*Scolelepis viridis* sp. nov.—a, anterior end, dorsal view; b, prostomium and peristomium, lateral view; c, superior capillary notoseta; d, detail of same; e, capillary notoseta from tier 3; f, detail of same; g, inferior neuropodial sabre seta; h, detail of same. [Scale 1 = 200  $\mu\text{m}$ ; 2 = 100  $\mu\text{m}$ ; 3 = 100  $\mu\text{m}$ ; 4 = 20  $\mu\text{m}$ ; 5 = 20  $\mu\text{m}$ ]





Figure 8—*Scolelepis viridis* sp. nov.—a, right setiger 10, anterior view; b, right setiger 38, anterior view; c, right setiger 100, anterior view; d, right setiger 150, anterior view; e, right setiger 190, anterior view; f, pygidium, terminal view; g, notosetal spine; h, bidentate hooded hook, lateral view; i, same, frontal view. [Scale 1 = 200  $\mu$ m; 2 = 50  $\mu$ m]

these with non-granulated shafts and minute bristles on sheath (Fig. 7g-h). Bidentate hooded hooks from setiger 28-29 in neuropodia, secondary tooth forming angle of about 60° with main fang (Fig. 8h-i).

Pygidium with 2 papillae: the first small,

dorsomedial, the second ventromedial, conical and larger. Pygidium surrounded by thick glandular rings (Fig. 8f).

*Remarks:* *Scolelepis viridis* is a unique species, characterized by having a nuchal papilla and peculiar raised nuchal area posterior to the caruncle; glandular ridges on posterior body segments; reduction of dorsal lamellae and corresponding elongation of the notopodia in middle and posterior segments; the presence of unhooded acicular spines in notopodia; bidentate neuropodial hooded hooks; 5 tiers of anterior capillary setae; and a peculiar pygidial structure with dorsal and ventral papillae.

*Distribution:* Queensland, Great Barrier Reef, with coral.

***Scolelepis victoriensis* sp. nov.**

(Figure 9)

*Material examined:* VICTORIA. Westernport, WPBES Stations 1718-1 (PARATYPE, NMV G2906); 1723-2 (PARATYPE, NMV G2907); 1734-2 (PARATYPE, NMV G2908); 1736-1 (PARATYPE, NMV G2909); 1737-1 (PARATYPE, NMV G2910); 1738-3 (PARATYPE, NMV G2911); 1740-1 (HOLOTYPE, NMV G2912); Crib Point, CPBS Station 300, Dec. 1970 (PARATYPE, NMV G2913).

*Description:* All specimens incomplete anterior fragments measuring up to 15 mm long and 4 mm wide for 31 setigers. Body widest anteriorly, elliptical in cross section. Colour in alcohol; opaque white.

Prostomium distally pointed; posteriorly with rounded lobe just behind and above the 2 pairs of eyes. Anterior pair of eyes the larger. With nuchal papilla posterior to caruncle on setiger 2 (Fig. 9a). Palps missing. Peristomium well-developed, with lateral wings. Proboscis an eversible sac.

Setiger 1 reduced with small, petaloid notopodial lamellae, lacking notosetae; neuropodial about as long as notopodial lamellae (Fig. 9 a-b). Notopodial lamellae marginally rounded and straplike on all anterior setigers, entirely fused to branchiae. Neuropodial lamellae subquadrate in anterior setigers (Fig. 9c), low and broadly rounded in middle body segments (Fig. 9d). Anterior notopodia with well-developed presetal lobes (Fig. 9c-d).

All notopodia bearing capillaries with granulations on shaft and broadly sheathed with minute hair-like fimbriations (Fig. 9e); sheath more closely applied in superiormost capillaries, with fine bristles only apparent under oil immersion (Fig. 9g-h). Neuropodial capillaries similar to those of notopodia. Inferior sabre setae beginning on setiger 2-3 with 2-3 per tuft at first, subsequently increasing to 4-5. Bidentate neuropodial hooded hooks from setiger 25, these hooks bearing a single distally pointed, rather long apical tooth closely applied to main fang (Fig. 9f). Margin of hood aperture not serrated. Dorsal hooks lacking.

*Remarks:* *Scolelepis victoriensis* is a unique species in the nature of the overlapping apical

tooth of the hooded hooks. The presence of a prostomial swelling and separate nuchal papilla are also unusual.

*Distribution:* Victoria, Westernport.

**Genus *Aonides* Claparède, 1864**

*Aonides* Claparède, 1864. *Type-species:* *A. auricularis* Claparède, 1864 [= *A. oxycephala* (Sars, 1862)], by monotypy.

*Paranerine* Czerniavsky, 1881. *Type-species:* *Nerine oxycephala* Sars, 1862, by monotypy.

*Diagnosis:* Prostomium conical, tapered both anteriorly and posteriorly. Peristomium poorly developed. Branchiae cirriform, separated from dorsal lamellae, beginning on setiger 2 and present on a variable number of anterior setigers; absent posteriorly. Bi- or tridentate hooded hooks present in both notopodia and neuropodia. Pygidium with anal cirri.

*Remarks:* A small genus, represented in our collections by only 1 species, *A. oxycephala*, an apparently cosmopolitan species (see Ramos, 1976).

***Aonides oxycephala* (Sars, 1962)**

*Nerine oxycephala* Sars, 1862, p. 64.

*Aonides oxycephala:* Ramos, 1976, p. 11 (Synonymy).

*Aonides californiensis* Rioja, 1947, p. 205. *Fide* Ramos, 1976.

*Aonides mayaguezensis* Foster, 1969, p. 393; 1971, p. 66. *Fide* Ramos, 1976.

*Material examined:* NEW SOUTH WALES. Merimbula, Sta. MER 287N, Spencer Park Transect, sand, 5 Oct. 1975, coll. J. H. Day, *et al.* (1, AM W11735); Sta. MER 289V, channel core N, side central sand bank, *Halophila*, 4 Dec. 1975 (1, AM W11746); Sta. MER 297W, channel core opposite Spencer Park (1, AM W11747). VICTORIA. Port Phillip Bay, PPBES Station 985/2 (1, NMV G2915).

*Remarks:* These specimens agree well with the description by Ramos (1976). There are at least 20 pairs of branchiae, and bidentate hooded hooks begin in the notopodia from about setiger 29 and in the neuropodia from about setiger 40. The usefulness of branchial distributions in the delineation of *Aonides* species needs careful consideration, particularly when dealing with what may be a widespread species. Similarly, the first occurrence of noto- and neuropodial hooks may not be taxonomically important in this genus. An evaluation of this feature requires a more thorough understanding of the larval development (see Hannerz, 1956, pp. 26-32).

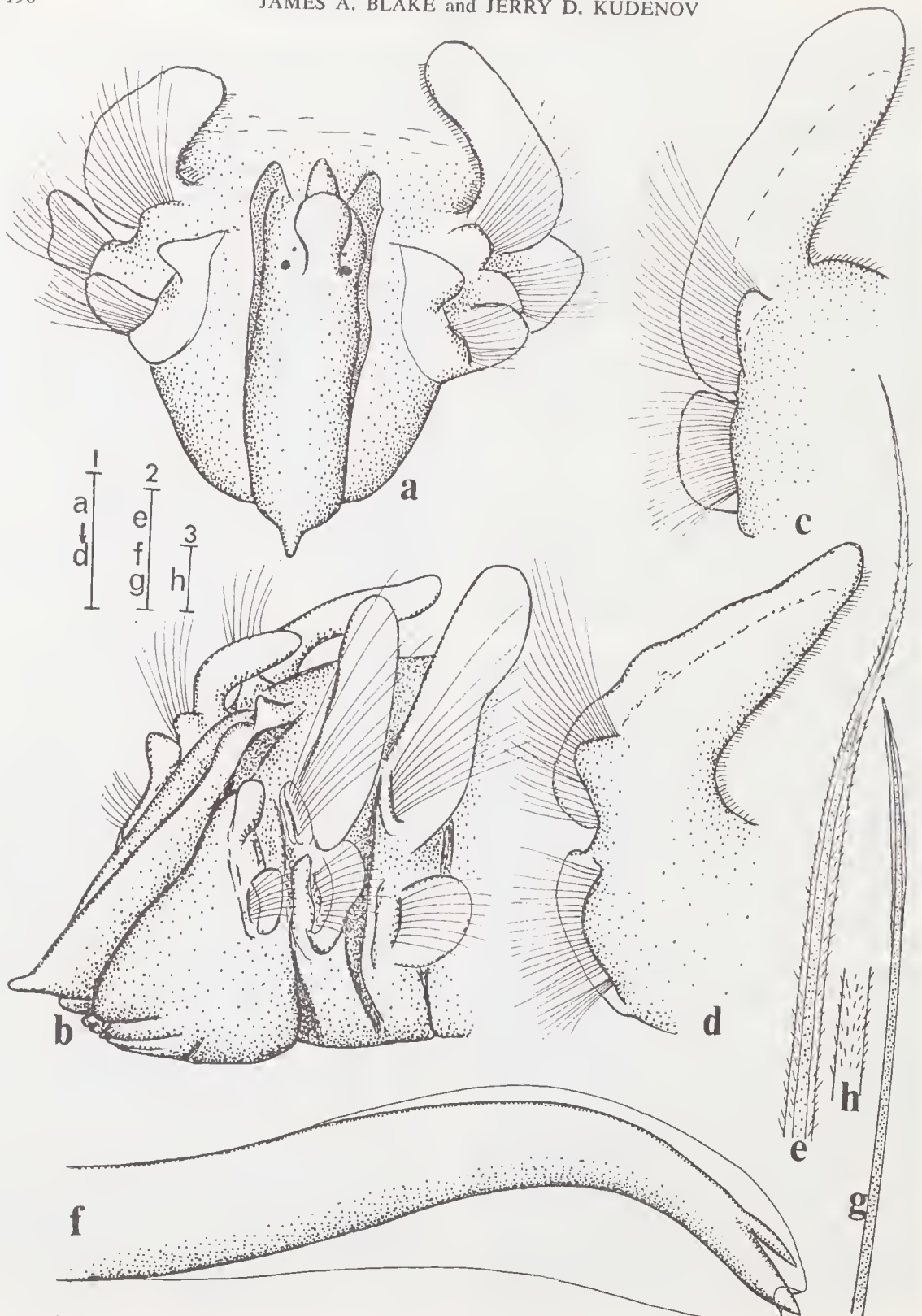


Figure 9—*Scolelepis victoriensis* sp. nov.—a, anterior end, lateral view; b, anterior end, dorsal view; c, right setiger 8, anterior view; d, right setiger 21, anterior view; e, normal capillary notoseta, distal process; f, bidentate hooded hook, lateral view; g, superior capillary notoseta; h, shaft, detail of same. [Scale 1 = 100  $\mu$ m; 2 = 30  $\mu$ m; 3 = 10  $\mu$ m]



*Distribution:* New South Wales, Merimbula, associated with sandy channel sediments and *Posidonia*; Victoria, Port Phillip Bay, 9 m in sandy sediments.

### Genus *Dispio* Hartman, 1951

*Type-species:* *D. uncinata* Hartman, 1951, by monotypy.

*Diagnosis:* Prostomium fusiform, anteriorly pointed, with narrow caruncle extending posteriorly. Eyes present or absent. Peristomium moderately developed, forming low lateral wings. Anterior parapodial lamellae lobed or entire. Presetal notopodial and neuropodial lobes present or absent. Branchiae present from setiger 1, fused to notopodial lamellae for half or more of their length. With accessory branchiae on posterior face of notopodia in middle and posterior segments. With capillary notosetae only. Neurosetae include capillaries, hooded hooks and sabre setae. Pygidium with midventral flap and prominent anal cirri.

### *Dispio glabrilamellata* sp. nov.

(Figure 10)

*Material examined:* QUEENSLAND. Moreton Bay, Middle Banks, Sta. 3, Dec. 1973 (1, QM G11588); 6D, March 1976 (QM G11589), coll. W. Stephenson. NEW SOUTH WALES. Sydney, S. end Manly Beach, 7.2-8.7 m, coll. 30 June 1971 coll. P. A. Hutchings (1, AM W13001); Burwood Beach, HDWBS Stations, March, May, July, Nov. 1975 (4 PARATYPES, AM W8890-8893); McMasters Beach, HDWBS Stations, July, Nov. 1975 (8 PARATYPES, AM W8894-8896, 8946; HOLOTYPE AM W13048); Belmont Beach, HDWBS Station, Jan. 1976 (2 PARATYPES, AM W8897, 8833); Dudley Beach, HDWBS Station, July 1975 (PARATYPE, AM W8898). VICTORIA. West-ernport, West Head, Flinders Rock Platform, coll. R. Jenz, 16 Jan. 1968 (2 PARATYPES, NMV G2952).

*Description:* All specimens incomplete. Largest fragments up to 20 mm long and 3 mm wide for 110 setigers. Body widest anteriorly, tapering gradually posteriorly; trapezoidal to rectangular in cross section. Colour in alcohol: opaque white.

Prostomium elongate, sharply pointed anteriorly (Fig. 10a). Caruncle short, narrow, reaching only to posterior margin of setiger 1. Occipital tentacle absent, but prominent boss present behind eyes (Fig. 10b). Two pairs of subdermal eyes, often obscured, arranged tra-

pezoidally. Palps missing. Peristomium well-developed, forming distinct lateral wings partially encompassing prostomium (Fig. 10a-b).

Setiger 1 slightly reduced with notopodium shifted dorsally and bearing 4-5 long notosetae; neurosetae much shorter than notosetae. Notopodial lamellae of setiger 2 and succeeding setigers entire, long and narrow, fused with branchiae; lamellae distally free with pointed tips and entire margins (Fig. 10c-c). Neuropodial lamellae rounded to subrectangular in anterior setigers (Fig. 10c), with pointed superior and inferior processes in posterior setigers (Fig. 10d-e). Presetal notopodial lobes from about setiger 30 as thickened margins (Fig. 10d), becoming quite elongate, subulate and maximally developed from around setiger 80 (Fig. 10e), decreasing in size thereafter. Presetal neuropodial lobes from about setiger 60, becoming broadly triangular from around setiger 80 (Fig. 10e).

Setal fascicles arranged in 2 tiers in each ramus. Notosetae sheathed and with or without transverse partitions in the shaft (Fig. 10f). Anterior setigers with 30-35 capillaries and 3-4 longer superior setae in each notopodium, these gradually reduced to about 10 normal and 3 longer superior setae in posterior setigers. Capillaries of setiger 1, superior notosetae and those in posterior tiers of both rami without transverse partitions; anterior tiers in each notopodium with transversely barred capillaries, these partitions tending to disappear in posterior setigers. Neurosetal capillaries similar to notosetal. Neuropodial sabre setae present from setiger 9-11, these lacking partitions initially, but becoming thicker and transversely barred from around setiger 25. Sabre setae numbering 2-5 per fascicle. With unidentate hooded hooks in neuropodia from setiger 22-26 (Fig. 10g); 1 juvenile specimen (AM W8891) with bidentate and unidentate hooded hooks intergrading in the same fascicle (Fig. 10h).

Branchiae from setiger 1, smooth, not serrated, fused with dorsal lamellae. Accessory branchiae on posterior face of notopodia from about setiger 23, continuing to end of body; each with up to 4-6 digitate processes (Fig. 10 d-e). Nature of pygidium unknown.

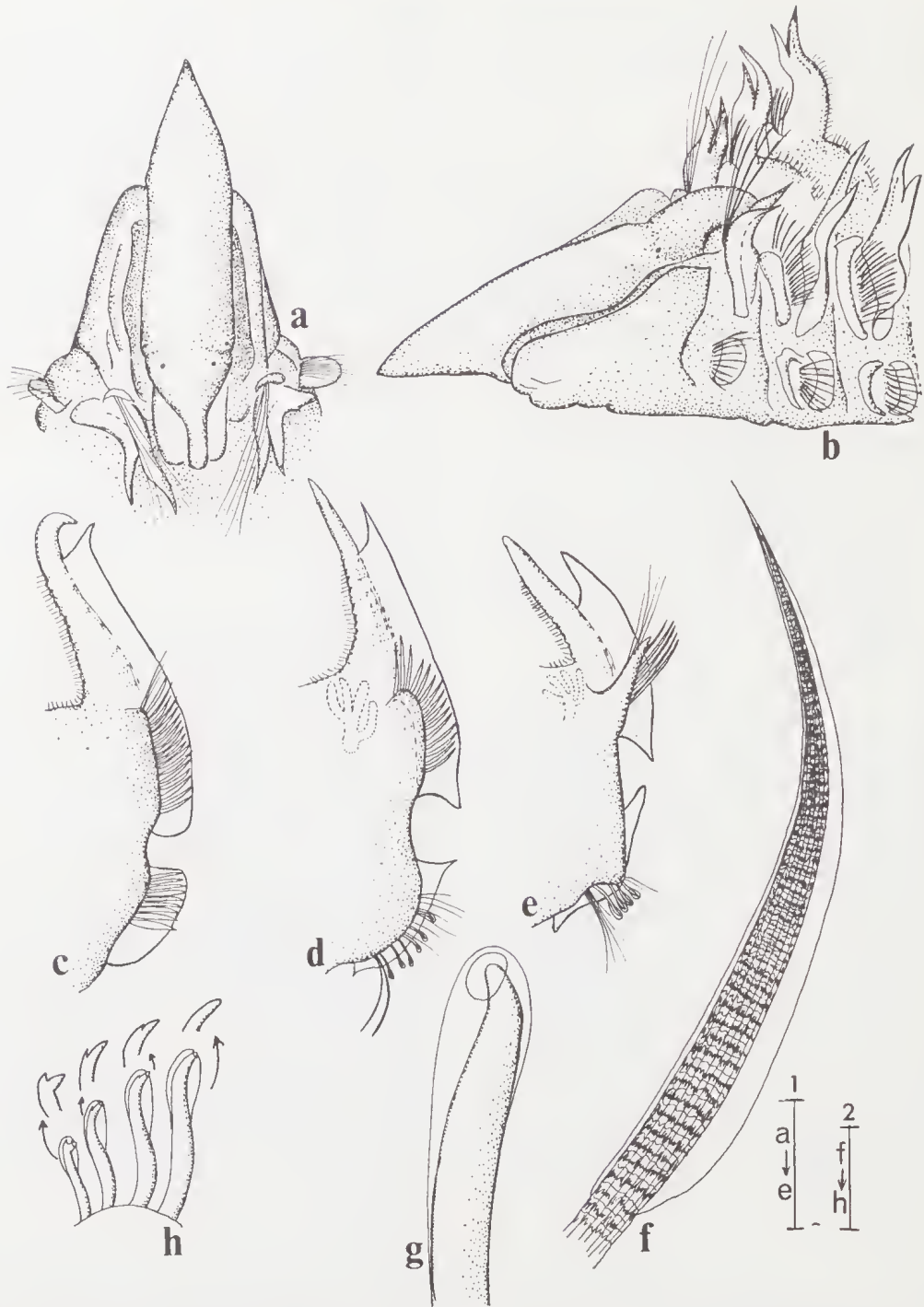


Figure 10—*Dispio glabrilamellata* sp. nov.—a, anterior end, dorsal view; b, anterior end, lateral view; c, left setiger 9, anterior view; d, left setiger 35, anterior view [broken lines indicate location of accessory branchiae on posterior side]; e, left setiger 80, anterior view [same with accessory branchiae]; f, anterior capillary notoseta; g, unidentate hooded hook; h, neuropodial fascicle of hooded hooks from juvenile showing bidentate (unworn) grading into unidentate (worn) hooded hooks [insets amplify details, not to scale]. [Scale 1 = 100  $\mu$ m; 2 = 50  $\mu$ m]

*Remarks:* *Dispio* was reviewed by Pettibone (1963) and Foster (1971). Four species were known at that time: *D. uncinata* Hartman, 1951 from the Gulf of Mexico; *D. magna* (Day, 1955) from South Africa; *D. schusteriae* Friedrich, 1956 from Central America; and *D. remanei* Friedrich, 1956 from Central America. The two latter species were noted by Foster (1971) to be incompletely described. She noted a wide range of variability in the number and distribution of serrations of the parapodial lamellae in specimens of *D. uncinata* from North America, the Caribbean Sea and Chile. Since these characters were ones which Friedrich (1956) had used to justify his 2 species, Foster strongly suggested that they were probably conspecific with *D. uncinata*, but did not formally place them into synonymy. We concur with Foster's implied synonymy of Friedrich's 2 species with *D. uncinata*, but prefer to delay a formal referral until the type material can be located and examined. Foster considered *D. magna* to be a distinct species because it completely lacks parapodial serrations and its accessory branchiae are reduced to short nodules. *Dispio maroroi* Gibbs, 1971 from the Solomon Islands also falls within the limits of variability for *D. uncinata* (see Light, 1977; 1978) and should probably be referred to synonymy. Like *D. magna*, *D. glabrilamellata* lacks parapodial serrations, but like *D. uncinata* has digitiform accessory branchiae.

The transversely barred capillary setae of *D. glabrilamellata* would at first glance appear Light (1978), however, has found similar setae in *D. uncinata* from California.

The occurrence of bidentate hooded hooks in juveniles of *D. uncinata* was reported by Foster (1971) and have been observed in larval stages of the same species (Blake, unpublished data). We have also found such hooks in juvenile *D. glabrilamellata*; in a single fascicle there is a gradation of wear from the bidentate to unidentate condition, suggesting that unidentate hooks can result from worn bidentate hooks (however, see Foster, 1971, p. 78).

*Distribution:* Queensland; New South Wales; Victoria.

### Genus *Australospio* gen. nov.

*Type-species:* *Australospio trifida* sp. nov. Gender, feminine.

*Diagnosis:* Prostomium with both anterior pointed projection and sub-distal lateral horns. No occipital cirrus. Peristomium reduced, with poorly-developed lateral wings. Proboscis eversible, sac-like. Branchiae from setiger 1, continuing almost to posterior end, basally fused with notopodial lamellae in anterior setigers, becoming nearly free posteriorly. Notopodial lamellae well-developed, entire; neuropodial lamellae well-developed, tending towards bilobate condition in middle setigers. Notosetae all capillaries. Neuropodial setae including capillaries, hooded hooks and inferior sabre-like setae. Nature of pygidium unknown.

*Remarks:* *Australospio* is closely allied to *Scolecopsis* Blainville, *Aonides* Claparède and *Dispio* Hartman in having gills and a pointed prostomium. *Australospio* differs in also bearing lateral horns on the prostomium, a characteristic typical of *Malacoceros* Quatrefages, *Rhynchospio* Hartman and *Scolecopedes* Ehlers; however, in the last 3 genera, the prostomium is not anteriorly pointed. The branchiae begin on setiger 1 in both *Australospio* and *Dispio* and on setiger 2 in *Aonides* and *Scolecopsis*. The notopodial lamellae are at least basally fused to the branchiae in *Dispio*, *Australospio* and *Scolecopsis*, whereas they are completely free in *Aonides*. The hooded hooks are bidentate in *Australospio*, bidentate to tridentate in *Aonides*, unidentate in adult *Dispio* species and range from unidentate to multidentate in species of *Scolecopsis*. Only a single species, *Australospio trifida* sp. nov. is known.

### *Australospio trifida* sp. nov.

(Figure 11)

*Scolecopsis* sp. Hutchings, 1974, p. 182.

*Material examined:* NEW SOUTH WALES. Botany Bay, Towra Beach, NSWFS Stations 286 (3 PARATYPES, NMV G2902); 298 (6 PARATYPES, AM W13002); 300 (1, AM W13003); 303 (2, AM W13004); 307 (3, AM W13005); 310 (HOLOTYPE, NMV G2901; 5 PARATYPES, NMV G2903); Towra Point, NSWFS Stations 287 (6, AM W13006); 292 (3, AM W13007); 297 (2, AM W13008); Wallis Lake, *Zostera* bed, Dec. 1970, coll. Dixon and O'Gower (PARATYPE, AM W5006). VICTORIA. Western-



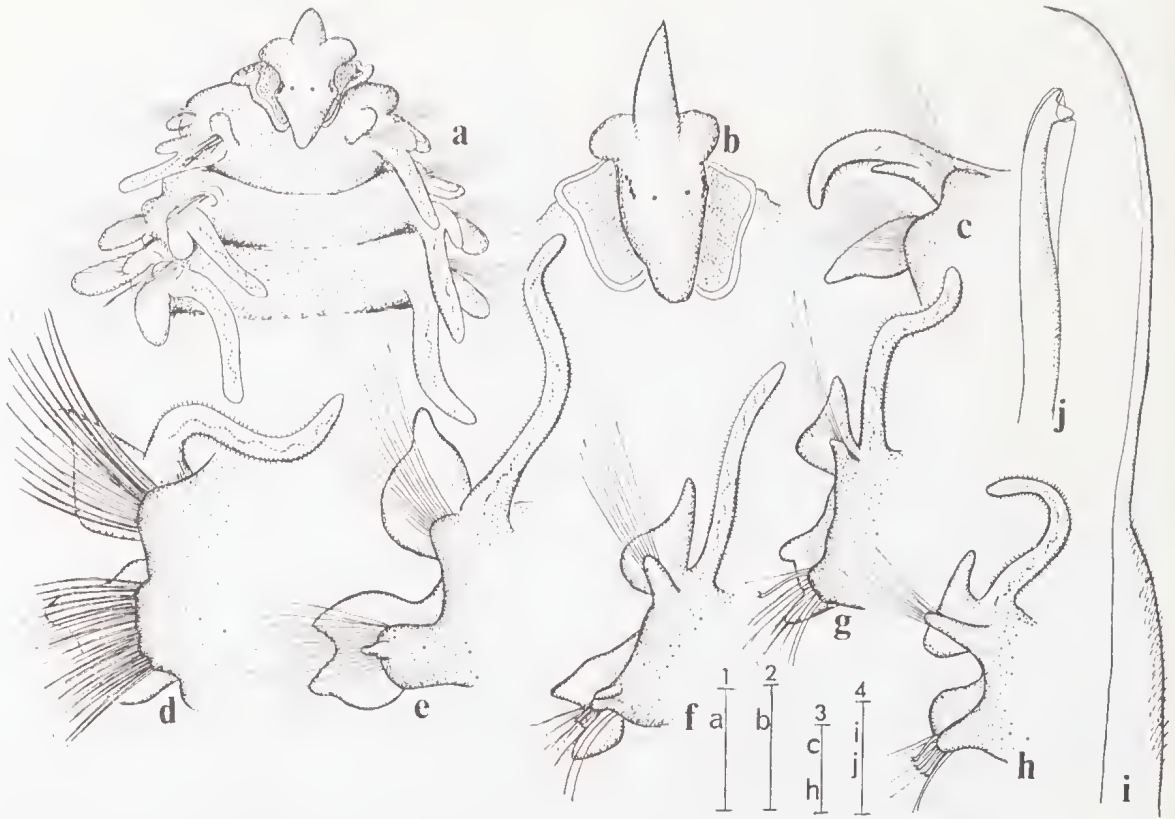


Figure 11—*Australospio trifida* gen et sp. nov.—a, anterior end, dorsal view; b, prostomium, dorsal view; c, right setiger 1, anterior view; d, right setiger 7, anterior view; e, right setiger 15, anterior view; f, right setiger 22, anterior view; g, right setiger 40, anterior view; h, right setiger 50, anterior view; i, neuroseta from setiger 7; j, bidentate hooded hook. [Scale 1 = 100  $\mu$ m; 2 = 50  $\mu$ m; 3 = 200  $\mu$ m; 4 = 30  $\mu$ m]

port, WPBES Stations 1713-2 (PARATYPE, NMV G2904); 1716-3 (PARATYPE, NMV G2905); Port Phillip Bay, Hobsons Bay, 14 April 1977, coll. J. E. Watson (3, NMV G2998).

**Description:** Only incomplete specimens available. A moderate-sized species, up to 12 mm long and 3 mm wide for 55 setigers. Holotype a 50 setiger fragment, 12 mm long and 1.8 mm wide. Body widest anteriorly and dorsoventrally flattened, tapering posteriorly, becoming oval in cross section. Body opaque white in alcohol, but with paired mid-ventral black pigment spots on setigers 2-10.

Prostomium anteriorly pointed, with 2 la-

terally projecting horns (Fig. 11a-b); caruncle reduced, extending posteriorly just into setiger 1. Three to 5 pairs of red, circular eyes. Peristomium reduced ventrally, enveloping prostomium laterally as indistinct wings, palps basally thickened, extending posteriorly for 11-12 segments.

Branchiae from setiger 1, basally fused to dorsal lamellae in anterior and middle setigers, free in posterior setigers; branchiae long and thin throughout with cilia on both inner and outer margins.

Dorsal lamellae short and cirriform on setigers 1-3 (Fig. 11c), becoming broad and leaf-like through setiger 7 (Fig. 11d-e), smaller in middle and posterior setigers (Fig. 11f-h); posterior setigers with prolonged finger-like notopodial lobe (Fig. 11f-h); ventral lamellae leaf-like, entire in anterior setigers, narrow at first (Fig. 11c), becoming broader (Fig. 11d) by setiger 7; lamellae bilobed in middle and posterior setigers (Fig. 11e-g), again becoming entire in far posterior setigers (Fig. 11h).

Setal fascicles arranged in 2 dorsoventral tiers on setigers 1-3, increasing to 4 tiers over setigers 4-11, subsequently diminishing to 2 tiers by setiger 14, with a single tier by setiger 15. Setigers 6-9 conspicuous, appearing modified with heavy thickened capillaries (Fig. 11d) numbering up to 140 in both noto- and neuropodia. Notozetae all capillaries throughout; heavy notosetal capillaries of setigers 6-9 including both granulated and non-granulated types with sheaths only in the latter. Neuropodial capillaries of setigers 6-9 including granulated and unusual geniculate setae bearing fine bristles (Fig. 11i). Bidentate neuropodial hooded hooks (Fig. 11j) from setiger 15-22, numbering 2-3 per neuropodium and accompanied by capillaries and 3-4 granulated inferior sabre setae.

Nature of pygidium unknown.

*Remarks:* *Australospio trifida* is a unique spionid in having both a distally pointed prostomium and subdistal lateral prostomial horns. The species is also unusual in having an anterior modified region with thickened capillaries. Some of those capillaries are of a peculiar hirsuted geniculate type, heretofore unknown in the Spionidae and reminiscent of similar setae reported from species of the family Heterospionidae.

*Distribution:* New South Wales; Victoria. In mud, *Zostera* and *Posidonia* beds.

#### Genus *Malacoceros* Quatrefages, 1843

*Malacoceros* Quatrefages, 1843. *Type-species:* *Spio vulgaris* Johnston, 1827, designated by Pettibone, 1963.

*Colobranchus* Schmarda, 1861. *Type-species:* *C. tetracerus* Schmarda, 1861, by monotypy.

*Uncinia* Quatrefages, 1865. *Type-species:* *Colobranchus ciliatus* Keferstein, 1862 (= *C. tetracerus* Schmarda, 1861), by monotypy.

*Scolecopsis* Malmgren, 1867. *Type-species:* *Spio vulgaris* Johnston, 1827, by original designation.

*Diagnosis:* Prostomium with frontal horns; eyes present or absent; branchiae from setiger 1, partly fused with notopodial lamellae, extending for most of body length. With only capillary notosetae. Neurosetae include capillaries, hooded hooks and sabre setae. Pygidium with anal cirri.

*Remarks:* The present definition of *Malacoceros* conforms closely to that of Pettibone (1963) except that we prefer to elevate *Rhynchospio* to a full genus, thus separating out those species with branchiae from setiger 2.

Three species of *Malacoceros* have been identified in our collections, of which 2 are newly described.

#### KEY TO SPECIES OF *MALACOCEROS* FROM AUSTRALIA

- 1a. Neuropodial lamellae of middle and posterior segments with nipple-like projections . . . . . *M. indicus*
- b. Neuropodial lamellae of middle and posterior segments rounded, without projections (Fig. 12c) . . . . . 2
- 2a. Setiger 1 markedly reduced, with short branchiae (Fig. 13a); body without pigment . . . . . *M. reductus*
- b. Setiger 1 well-developed, with long branchiae (Fig. 12a); body with dark brown pigment . . . . . *M. tripartitus*

#### *Malacoceros indicus* (Fauvel, 1928)

*Scolecopsis indica* Fauvel, 1928a, p. 93; 1930, p. 35; 1953, p. 313; Monro, 1931, p. 25.

*Malacoceros indicus:* Pettibone, 1963, p. 99; Day, 1967, p. 477; Foster, 1971, p. 50.

*Material examined:* QUEENSLAND. Great Barrier Reef Expedition, 1929 (1, AM W2953).

*Remarks:* The single specimen agrees well with the description given by Foster (1971); it is probably one of the specimens studied by Monro (1931). The prostomium is T-shaped, and the caruncle extends posteriorly to setiger 2. There are no eyes. The branchiac are basally fused to the notopodial lamellae and begin on setiger 1. Notozetac are found on setiger 1 and tri- and quadridentate neuropodial hooded hooks are present from setiger 50. The middle and posterior neuropodial lamellae have nipple-like projections. Inferior tufts of neurosetal capillaries are present, each with about 20 setae per bundle. The pygidium was missing.

*Distribution:* Queensland, Great Barrier Reef; circumtropical.

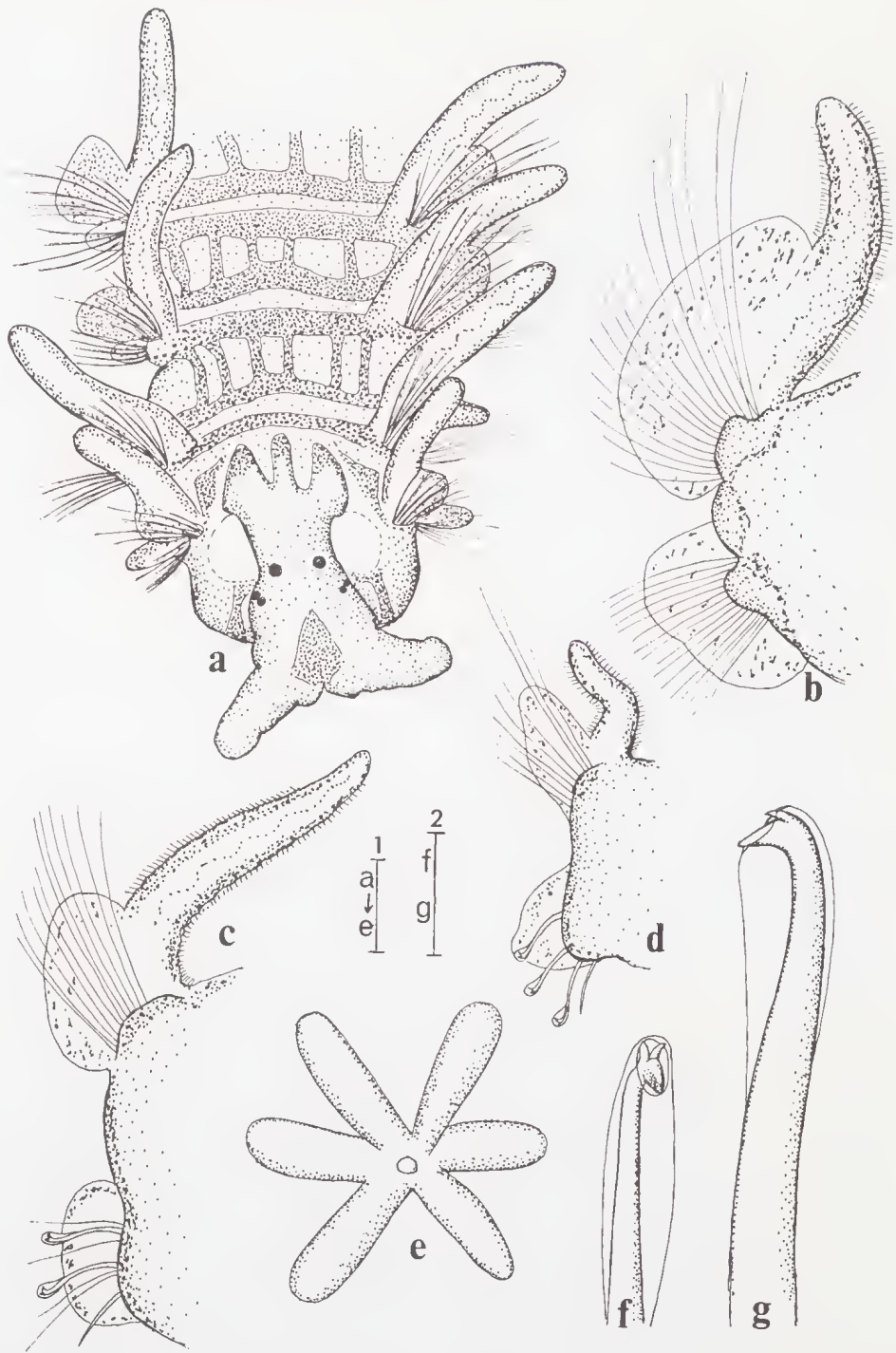


Figure 12—*Malacoceros tripartitus* sp. nov.—a, anterior end, dorsal view; b, right setiger 8, anterior view; c, right setiger 40, anterior view; d, right setiger 65, anterior view; e, pygidium, terminal view; f, tridentate hooded hook, frontal view; g, tridentate hooded hook, lateral view [Scale 1 = 200  $\mu$ m; 2 = 30  $\mu$ m]



**Malacoceros tripartitus** sp. nov.

(Figure 12)

*Material examined:* VICTORIA. Port Phillip Bay, Werribee, Little River, Station 6, MSG Monitoring Program (P609), coll. J. D. Kudenov, 11 Jan. 1977 (HOLOTYPE, NMV G2916; 9 PARATYPES, NMV G2917, 2919-2923); 14 April 1977 (2 PARATYPES, NMV G2918); Yarra River, MSG Benthic Survey, 10 Oct. 1975, coll. G. Poore and J. D. Kudenov, black mud, 7 m, Sta. 128/1 (42, NMV G2924); 128/4 (76, NMV G2925); 128/5 (341, NMV G2926).

*Description:* A moderately-sized species, up to 17 mm long and 1.1 mm wide for 85 setigers. Body widest anteriorly, gradually tapering posteriorly. Colour in alcohol dark brown, with dusky brown pigment granules distributed throughout epidermis in distinct banding patterns over dorsum, ventrum and all along body (Fig. 12a).

Prostomium T-shaped, with distinct lateral horns, continuing posteriorly as a peculiar trilobed caruncle to anterior margin setiger 2 (Fig. 12a). Three pairs of round eyes, trapezoidally arranged, posterior pair the larger; anterior pair formed of 2 partially fused spots (Fig. 12a). Palps inserted posterior to level of eyes, extending posteriorly to setigers 9-10. Peristomium reduced, lacking lateral wings.

Setiger 1 well-developed, with notosetae. Dorsal lamellae elliptical in anterior and middle body setigers (Fig. 12b-c), becoming elongate, and narrow in posterior setigers (Fig. 12d). Anterior neuropodial lamellae subquadrate (Fig. 12b), becoming elliptical in middle setigers (Fig. 12c), and subtriangular in posterior setigers (Fig. 12d). Anteriormost segments with thickened presetal noto- and neuropodial lobes (Fig. 12b).

Notosetae forming spreading fascicles of sheathed, non-granulated capillaries. Neurosetae including non-granulated capillaries, tridentate hooded hooks from setiger 31 and inferior sabre setae from setiger 25 (Fig. 12c-d); hooded hooks distinctly tridentate in frontal view (Fig. 12f), but appearing bidentate in lateral aspect (Fig. 12g).

Branchiae elongate, strap-like, fused to notopodial lamellae. Those on setiger 1 not as well-developed as on succeeding segments. All

branchiae marginally pigmented with brown granules.

Pygidium terminal with 6 anal cirri (Fig. 12e).

*Remarks:* *Malacoceros tripartitus* most closely resembles *M. tetracerus* (Schmarda) from Europe in having a similarly shaped prostomium. *M. tripartitus* has tridentate hooded hooks, a trilobed caruncle and a heavily pigmented body. *M. tetracerus* has bidentate hooded hooks, an entire caruncle and lacks body pigmentation. Foster (1971) pointed out that the hooded hooks of *Malacoceros* need to be examined under oil immersion in order to elucidate their structure; a re-examination of species such as *M. tetracerus* is necessary in order to improve our understanding of the systematics of the genus.

*Distribution:* Victoria, Port Phillip Bay, in mud.

**Malacoceros reductus** sp. nov.

(Figure 13)

*Material examined:* NEW SOUTH WALES. Burwood Beach, HDWBS Stations, Sept., Oct., Nov. 1975 (HOLOTYPE, AM W8906; 13 PARATYPES, AM W8882, 8904, 8905, 8907, 8908).

*Description:* A moderately-sized species, up to 16 mm long and 0.8 mm wide for 75 setigers. Body widest anteriorly, evenly tapering posteriorly; subrectangular in cross section. Colour in alcohol: whitish-brown.

Prostomium with anterior medial incision and very pronounced lateral horns; posteriorly a faint medial protuberance present between lateral nuchal processes that encompass palps (Fig. 13a). Two pairs of eyes, anterior pair the larger, each consisting of 2 fused ocelli; posterior pair round and small. Peristomium moderately developed, forming lateral wings. Palps extending posteriorly to setiger 6-7.

Setiger 1 reduced, but with notosetae. Anterior notopodia fused with branchiae (Fig. 13b-c); both rami of posterior parapodia emerging from raised basal mounds (Fig. 13d).

Notosetae with superior group of capillaries overlying main fascicle, the latter arranged in 2 tiers bearing sheathed, granulated capillaries (Fig. 13f), as well as non-granulated ones. Anterior setigers with about 20 setae per fascicle,

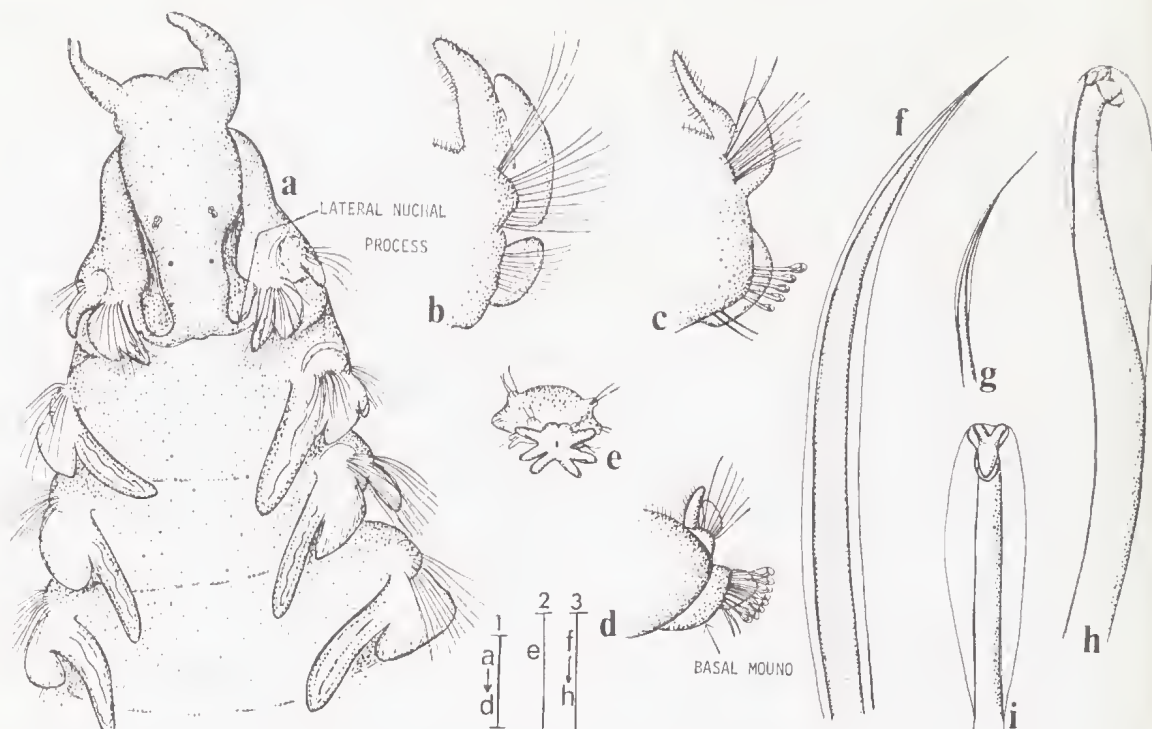


Figure 13—*Malacoceros reductus* sp. nov.—a, anterior end, dorsal view; b, left setiger 11, anterior view; c, left setiger 38, anterior view; d, left setiger 65, anterior view; e, pygidium; f, capillary notoseta; g, sabre seta; h, tridentate hooded hook, lateral view; i, tridentate hooded hook, frontal view. [Scale 1 = 200  $\mu$ m; 2 = 100  $\mu$ m; 3 = 20  $\mu$ m]

and about 5 in superior tuft; fewer setae per fascicle in middle and posterior setigers. Neurosetae include both granulated and non-granulated capillaries of which some are faintly spinous; with tridentate hooded hooks from setiger 20, replacing capillaries, and a single inferior sabre seta from setiger 20. Sabre setae with sheaths forming long distal processes (Fig. 13g). Hooded hooks with distinct, readily visible apical teeth (Fig. 13h-i).

Branchiae of setiger 1 very short, inconspicuous (Fig. 13a), those of setiger 2 more elongate, strap-like and fused to dorsal lamellae; branchiae becoming reduced in length by setiger 35; absent from last 10-12 setigers.

Pygidium terminal, small, with 3 pairs of

short, digitiform anal cirri and a pair of dorsal swellings (Fig. 13e).

**Remarks:** *Malacoceros reductus* most closely resembles *M. fuliginosa* (Claparède) in having a similarly shaped prostomium. In *M. reductus*, setiger 1 is distinctly reduced, tridentate hooded hooks are present from setiger 20-21 and pigmentation is lacking. In *M. fuliginosa*, the parapodia of setiger 1 are only slightly reduced, bidentate hooded hooks occur from setiger 30-40 and the body is heavily pigmented.

**Distribution:** New South Wales in beaches.

**Genus *Rhynchospio* Hartman, 1936 emended**

**Type-species:** *R. arenicola* Hartman, 1936, by monotypy.

**Diagnosis:** Prostomium with frontal horns, caruncle variously developed. Occipital tentacle absent. Eyes present. Branchiae from setiger 2, free from dorsal lamellae or only fused basally. With only capillary notosetae. Neurosetae including capillaries, hooded hooks and sabre setae. Pygidium with cirri or lobes.

**Remarks:** *Rhynchospio* Hartman has been considered both as a full genus (Hartman, 1959;

Day, 1967; Fauchald, 1977a) and as a subgenus of *Malacoceros* (Pettibone, 1963; Foster, 1971). However, we consider the first appearance of the branchiae to be an important taxonomic characteristic for the family Spionidae. We therefore prefer to treat *Malacoceros* and *Rhynchospio* as full genera.

Foster (1971) and others have included the fusion of branchiae and lamellae in their definition of *Rhynchospio*. However, a basal fusion of these 2 elements is barely evident in the 2 valid species discussed by Foster (1971). In this study, we have found 2 previously undescribed species in which the branchiae and lamellae are entirely free from one another. The definition of *Rhynchospio* is accordingly amended herein. According to Hartman (1966) and Fauchald (1977a), spionids having branchiae and lamellae free from each other should be referred to the genus *Mesospio* Gravier, 1911. Such a conclusion is unacceptable, however, since Gravier (1911) clearly states in his discussion that *M. moorei* Gravier, 1911, the type-species, lacks frontal horns. His figures depict a spionid with an incised prostomium. *Mesospio* was referred to the genus *Microspio* Mesnil, 1896 by Foster (1971). We agree with that synonymy since Gravier's species, *Mesospio moorei*, agrees well with the generic definition of *Microspio*.

Foster (1971) reduced the number of valid species of *Rhynchospio* to 2. We are presently re-examining some of her proposed synonyms as part of another study, but for the time being are following her revision.

The following species are assigned to *Rhynchospio*<sup>1</sup>:

<sup>1</sup> *Rhynchospio microcera* Dorsey, 1977 is herein referred to the genus *Microspio*.

1. *R. glutaea*, Ehlers, 1897), p. 83. Straits of Magellan.  
*Scolecopsis cornifera* Ehlers, 1913, p. 509. *Fide* Pettibone, 1963.  
*Rhynchospio arenicola* Hartman, 1936, p. 51. *Fide* Foster, 1971.  
*Rhynchospio arenicola asiaticus* Khlebavitsch, 1959. *Fide* Foster, 1971.
2. *R. inflatus* Foster, 1971, p. 57. Bahamas.

3. *R. glycera* sp. nov. (see below). New South Wales.
4. *R. australiana* sp. nov. (see below). West Australia.

### *Rhynchospio glycera* sp. nov.

(Figure 14)

*Material examined*: NEW SOUTH WALES. Burwood Beach, HDWBS Station, Dec. 1975 (HOLOTYPE, AM W8903).

*Description*: Holotype incomplete, coiled, measuring approximately 8 mm long and 0.5 mm wide for 47 setigers. Body widest anteriorly, elliptical in cross section. Colour in alcohol: opaque white.

Prostomium well-developed, forming large, conical anterior projection bearing a pair of apical horns (Fig. 14a); with raised medially-incised ridge about half-way between anterior and posterior ends, bearing 2 pairs of trapezoidally arranged eyes. Caruncle posteriorly merging with a prominent occipital lobe bearing 2 pairs of digitiform nuchal organs arising from a common base (Fig. 14a). Palps missing. Peristomium greatly reduced, not visible in dorsal view. Muscular pharynx visible through body wall.

Setiger 1 reduced, with bluntly conical notopodial and quadrate neuropodial lamellae; both notosetae and neurosetae present (Fig. 14a). Notopodial lamellae free from branchiae, anterior ones quadrate, those of posterior region subclavate (Fig. 14b-c). Anterior neuropodial lamellae quadrate, posterior ones triangular (Fig. 14b-c).

Setal fascicles arranged in 2 parallel tiers. Notosetae all sheathed, non-granulated capillaries, with somewhat opaque, lightly bristled sheaths (Fig. 14d-e). Anterior notopodia with about 20 short and stout and 3 longer superior capillaries per fascicle (Fig. 14b); posterior notopodia with about 15 narrow capillaries and no superior ones (Fig. 14c). Capillaries of anterior setigers increase in length ventrally. Neurosetae sheathed, non-granulated, opaque, lightly bristled capillaries. No evidence of sabre setae. Anterior neuropodia with about 15 short and stout and 3 longer inferior capillaries (Fig. 14b). Posterior neuropodia with narrow capillaries and hooded hooks (Fig.



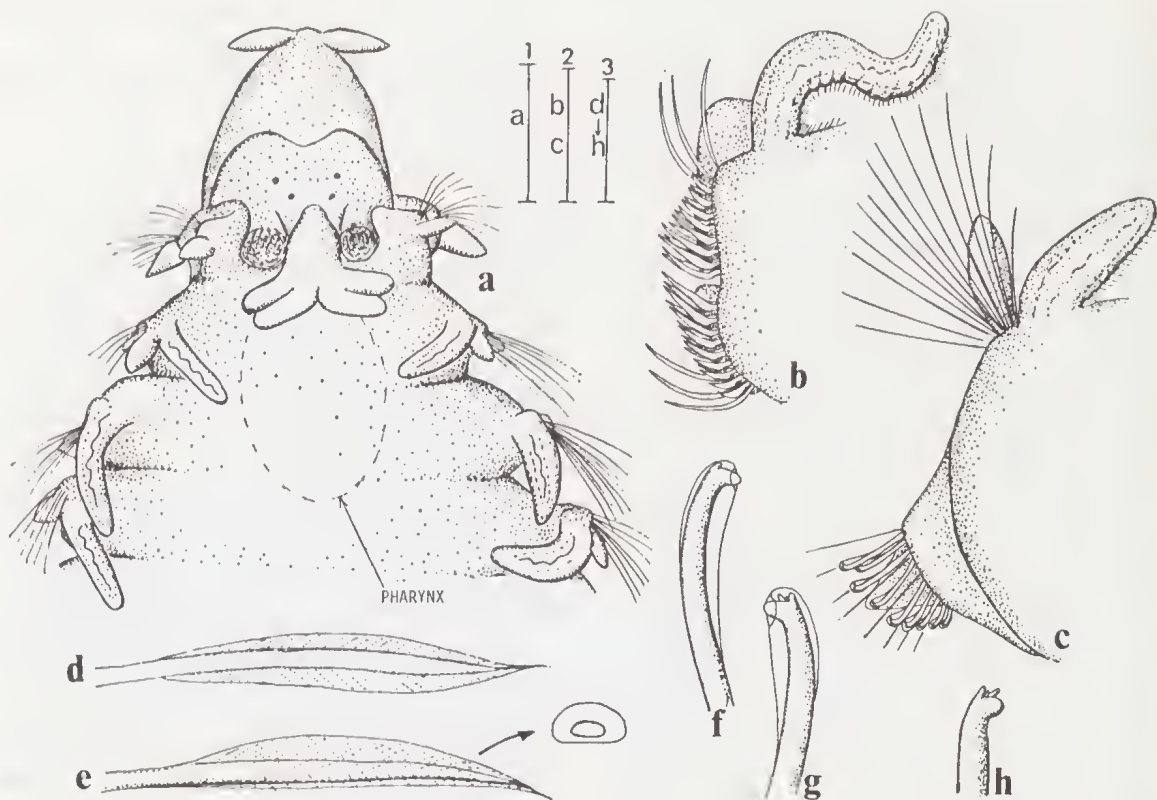


Figure 14—*Rhynchospio glycera* sp. nov.—a, anterior end, dorsal view; b, right setiger 8, anterior view; c, right setiger 45, anterior view; d-e, anterior capillary setae [inset, cross section of same]; f, quadridentate hooded hook, lateral view; g, same, anterolateral view; h, same without hood. [Scale 1 = 200  $\mu$ m; 2 = 200  $\mu$ m; 3 = 20  $\mu$ m]

14c); quadridentate hooded hooks from setiger 27, these appearing bidentate in lateral view, with inconspicuous, medial quaternary tooth inserted between 2 longer intermediate-length apical teeth (Fig. 14f-h), all 3 in 1 plane overlying enlarged main fang.

Branchiae on setiger 2, slightly shorter than subsequent ones, not fused to dorsal lamellae, and continuing to end of specimen. Inner margins ciliated; no evidence of transverse ciliated dorsal ridges. Nature of pygidium not known. *Remarks:* *Rhynchospio glycera* differs from other species of the genus in having a conical prostomium with apically-mounted frontal horns resembling the prostomial antennae seen

in the errant family Glyceridae, in having 4 nuehal organs arising from the earuncle and in the highly unusual arrangement of anterior notopodial capillaries, where they increase in length from the superior to inferior the position.

*Distribution:* New South Wales.

#### *Rhynchospio australiana* sp. nov.

(Figure 15)

*Material examined:* WEST AUSTRALIA. Perth, Cottesloe Beach, in calcareous algae and *Idanthrysus* tubes -3-66 m, coll. H. Paxton, 14 Feb. 1970 (HOLOTYPE, AM W4362).

*Description:* Holotype complete, measuring 5 mm long and 0.3 mm wide for 31 setigers. Body widest anteriorly, tapering gradually posteriorly, trapezoidal in cross section. Pigmentation in patterns of single red chromatophores dorsomedially on setigers 6-13; colour in alcohol: light brown.

Prostomium anteriorly prolonged, blunt bearing 2 broad lateral horns (right one miss-

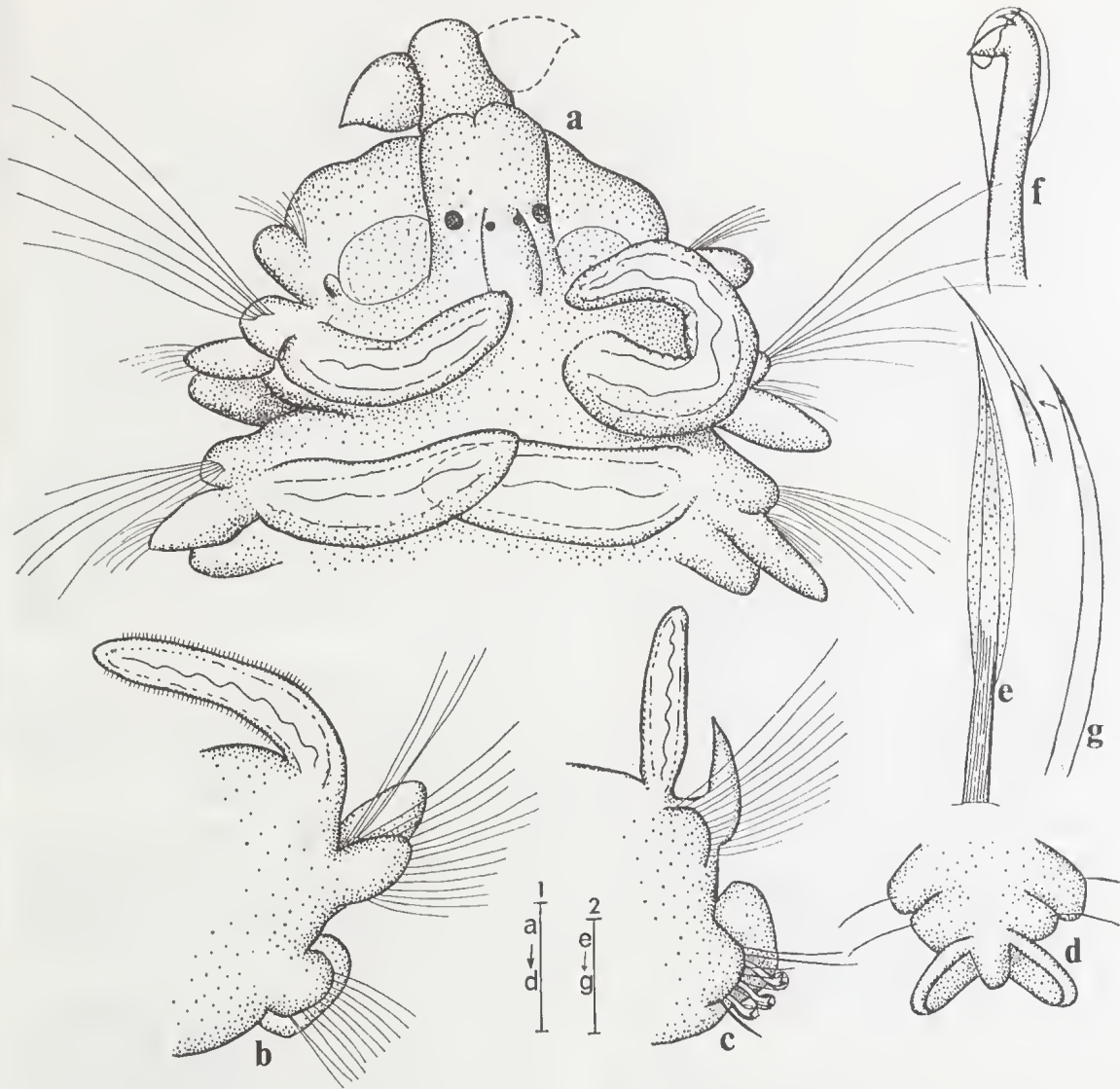


Figure 15—*Rhynchospio australiana* sp. nov.—a, anterior end, dorsal view; b, left setiger 5, anterior view; c, left setiger 23, anterior view; d, pygidium, dorsal view; e, superior capillary notoseta, setiger 5; f, tridentate hooded hook, lateral view; g, inferior sabre seta [inset, detail of same, not to scale]. [Scale 1 = 200  $\mu$ m; 2 = 20  $\mu$ m]

ing from the type), inflated, slightly incised where it overlies anterior margin of peristomium; with raised boss posteriorly (Fig. 15a). Two pairs of eyes, arranged in shallow cres-

cent, distal pair the larger. No occipital cirrus; palp scars on either side of prostomium behind eyes. Peristomium greatly reduced; lateral wings absent.

Setiger 1 with short notopodial lobes, lacking notosetae (Fig. 15a). Neuropodia laterally reduced, with inflated lamellae and capillary neurosetae. Both pre- and postsetal lobes of both rami inflated (Fig. 15b) in anterior setigers; the presetal lobes becoming reduced in posterior setigers (Fig. 15c); notopodial lamellae cylindrical, distally blunt, conical in setigers 2-13; thereafter digitate. Neuropodial

lamellae inflated, elliptical to irregularly rounded.

Notosetal capillaries distally sheathed, sub-lanceolate, granulated, arranged in 2 tiers per fascicle. Anterior tiers with 15-16 capillaries and 4-5 slightly isolated superior ones; middle setigers with 10 such capillaries, no superior tufts. Superior notopodial capillaries of setigers 2-6 with sheaths bearing large vesicles (Fig. 15e), inferior capillaries lacking such vesicles in sheaths; capillaries from posterior tiers with lightly bristled sheaths. Neurosetae arranged in 2 tiers; anterior tiers bearing 6-7 sheathed granulated capillaries per tier; posterior setigers with 2 superior capillaries, 3 hooded tridentate hooks and inferior sabre seta. Anterior capillaries similar to those of notopodia. Hooded hooks and sabre setae from setiger 8; the hooks with an inconspicuous tooth inserted above the more prominent apical tooth; margin of hood uneven, not serrated (Fig. 15f); sabre setae granulated, distally tapering with prolonged sheath (Fig. 15g).

Branchiae of setiger 2 slightly smaller than those of succeeding setigers; not fused to dorsal lamellae. Branchiae overlapping middorsally, continuing to within last 10 body segments; inner and outer margins ciliated, no transverse ciliary ridges.

Pygidium terminal, trilobate (Fig. 15d). Lateral lobes flattened, plate-like, subequal, the single middorsal lobe a small knob.

*Remarks:* *Rhynchospio australiana* differs from other species of the genus by the shape of the prostomium, which has a subterminal inflated, incised area and 2 broad lateral horns on the terminal portion, by lacking notosetae on setiger 1, the form of the vesiculated sheaths of the anterior capillary setae and the unique structure of the pygidium.

*Distribution:* West Australia.

#### Genus *Scolecopides* Ehlers, 1907

*Type-species:* *Scolecopides benhami* Ehlers, 1907, by monotypy.

*Diagnosis:* Prostomium with frontal or lateral horns. Branchiae present from setiger 1, limited to anterior setigers or continuing throughout body. Anterior setae mostly capillary, with ventral acicular spines present. Bidentate

hooded hooks present in both neuropodia and notopodia. Pygidium with cirri surrounding anus.

*Remarks:* The following species of *Scolecopides* are herein recognized:

1. *S. benhami* Ehlers, 1907, p. 14. New Zealand.
2. *S. viridis* (Verrill, 1873), p. 600 [as *Scolecopis*]. New Jersey.  
*S. arctius* Chamberlin, 1920, p. 17. *Fide* Foster, 1971.
3. *S. aciculatus* sp. nov. (see below). Victoria.

#### *Scolecopides aciculatus* sp. nov.

(Figure 16)

*Material examined:* VICTORIA. Westernport, Flinders, in sand on rock platform, 15 Dec. 1974, coll. J. D. Kudenov (HOLOTYPE, NMV G2891; 100+ PARATYPES, NMV G2892); Port Phillip Bay, Werribee, MSG Monitoring Programme (P609), coll. J. D. Kudenov, 11 Jan. 1977, Stations 16 (24, NMV G2999); 18 (81, NMV G3000-3001); 20 (39, NMV G3002-3003).

*Description:* A large species, measuring up to 37 mm long and 1.5 mm wide for 140 setigers. Body dorsoventrally flattened anteriorly, becoming cylindrical and narrower posteriorly. Colour in alcohol: tan to brown.

Prostomium broadly rounded on anterior margin, bearing 2 lateral horns (Fig. 16a). Posteriorly, prostomium tapering as blunt caruncle terminating at posterior margin of setiger 1; eyes absent; palps short, thick, extending posteriorly to setiger 8.

Setigers 1 and 2 well-developed, but notopodial lamellae and branchiae shorter than on succeeding setigers. Anterior notopodial lamellae elongate, foliaceous, fused basally with branchiae (Fig. 16c); posterior notopodial lamellae shorter, similarly fused to branchiae (Fig. 16d). Neuropodial lamellae much smaller, less foliaceous than those of notopodia.

Capillary notosetae lacking granulations or sheaths. Capillary neurosetae with minute granulations near tips in setigers 1-6, mostly replaced in setigers 6-8 with 2 dorsoventral tiers of acicula, but with a few inferior capillaries remaining (Fig. 16c); acicula sharply pointed or distally blunt (Fig. 16e), blunted acicula thicker and darker than pointed ones; acicula becoming partially replaced by capillary setae



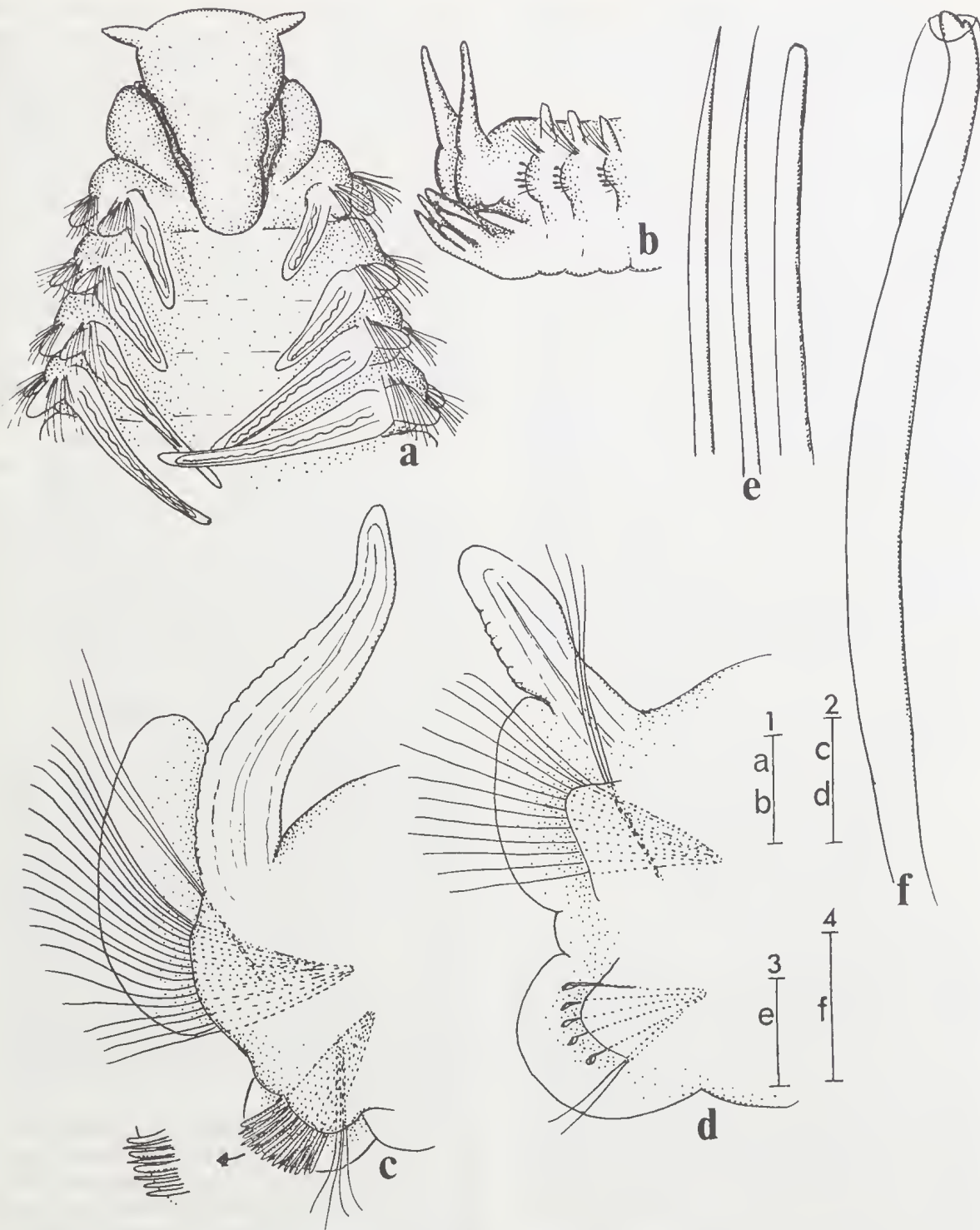


Figure 16—*Scolecolepides aciculatus* sp. nov.—a, anterior end, dorsal view; b, posterior end, lateral view; c, right setiger 13, anterior view; d, right setiger 60, anterior view; e, acicular neurosetae from anterior setigers showing different forms; f, hooded hook. [Scale 1 = 200  $\mu$ m; 2 = 200  $\mu$ m; 3 = 20  $\mu$ m; 4 = 20  $\mu$ m]

before first bidentate hooded hooks on setiger 39-55; hooded hooks with a greatly reduced inconspicuous secondary tooth (Fig. 16f). Notopodial hooded hooks beginning on setigers 80-85.

Branchiae begin setiger 1, long, basally fused to postsetal lobes, continuing to near posterior of body. Pygidium with 2 long superior cirri and up to 6 smaller ones surrounding terminal anus (Fig. 16b).

*Remarks:* *Scolecopides aciculatus* and *S. benhami* closely resemble each other in bearing lateral horns on the prostomium; they differ in this respect from *S. viridis*, which has short frontal horns. *S. aciculatus* has 20 or more neuroacicula of 2 types (pointed and blunt) from setiger 6-8, whereas *S. benhami* has only 4-5 pointed acicula beginning on setiger 9. The pygidium of *S. aciculatus* has 2 long superior cirri and 6 smaller ventral cirri, while *S. benhami* has numerous short cirri. Species of *Scolecopides* appear to be limited to waters of reduced salinity (George, 1966; Estcourt, 1967). *S. aciculatus* has been taken near sewage outfalls and may also tolerate low salinities.

*Distribution:* Victoria, Westernport Bay, Port Phillip Bay.

#### Genus *Laonice* Malmgren, 1867

*Laonice* Malmgren, 1867. *Type-species:* *Nerine cirrata* M. Sars, 1851, designated by Malmgren, 1867. *Sponides* Webster and Benedict, 1887. *Type-species:* *S. cirrata* Webster and Benedict, 1887 [Homonym, = *L. cirrata* (Sars)], by monotypy.

*Aricideopsis* Johnson, 1901. *Type-species:* *A. megalops* Johnson, 1901, monotypy.

*Diagnosis:* Prostomium anteriorly rounded to slightly incised, lacking frontal horns; caruncle extending posteriorly for variable number of setigers; occipital tentacle present. Peristomium reduced, generally without lateral wings. Branchiae from setiger 2, separated from dorsal lamellae, continuing for at least  $\frac{1}{2}$  of body. Notopodia with capillaries only; neurosetae including capillaries, hooded hooks and sabre setae. Interparapodial genital pouches present. Pygidium with anal cirri.

*Remarks:* A considerable degree of confusion persists regarding this genus because of 2 different approaches to species identification: Sö-

derström (1920) emphasized the distribution of genital pouches and recognized that a close relationship exists between their first appearance and the end of the atokous region. This approach was followed by Banse and Hobson (1968) who indicate that although the brood pouches of their newly described species, *L. pugettensis*, first appear from setiger 2-7, oocytes could be seen through the body wall at or just behind setiger 25 (Banse and Hobson, 1968, pp. 26-27); they recognized 5 species of *Laonice* in their paper. A second approach (Fauvel, 1927; Foster, 1971) questions the reliability of this relationship and points out that the distribution of genital pouches is highly variable. Foster (1971) considers *Laonice cirrata* (Sars, 1851) as the only valid species.

It is essential, however, to determine the role of genital pouches in reproduction in order to understand the taxonomic significance of their distribution on the body. At present there is little information available on reproduction in *Laonice*. Morphology of the genital pouches before and after spawning has been described by Söderström (1920) and Orrhage (1964). Hannerz (1956) cultured and described larvae isolated from plankton and determined that the eggs and sperm were spawned into sea water with development being entirely planktonic. No mention was made of the role genital pouches might play in reproduction. We are herein describing a species with an anterior region bearing eggs and genital pouches and a posterior region bearing sperm. The occurrence of anterior brood pouches may reflect the type of reproduction. In our simultaneous hermaphrodite, the genital pouches are more anteriorly located than in most forms. Forms with brood pouches beginning more posteriorly may have separate sexes or possibly represent stages in sequential hermaphroditism.

We prefer to re-examine the *Laonice*-complex utilizing the distribution of genital pouches, together with the configuration of the caruncle, capillary setae, hooded hooks and parapodia. In the present survey we have found 3 distinct forms of *Laonice*, all of which differ from the description of *L. cirrata* as given by Foster (1971). Although a thorough

study of *Laonice* from worldwide areas is needed, we feel justified in describing each form as a distinct species. Each is compared to *L. cirrata* as defined by Foster (1971); other known species of *Laonice* are insufficiently described.

KEY TO SPECIES OF *LAONICE* FROM  
SOUTHEASTERN AUSTRALIA

- 1a. Genital pouches from between setigers 1-2 or 2-3; hooded hooks bi- or quadridentate ..... 2  
 b. Genital pouches from between setigers 6-7; hooded hooks quadridentate (Fig. 17f)..... *L. quadridentata*  
 2a. Hooded hooks bidentate, hood margins smooth (Fig. 18g); nuchal organs paired, extending to setiger 7; genital pouches beginning between setigers 2-3..... *L. bassensis*  
 b. Hooded hooks quadridentate (Fig. 17i), hood margin serrated (Fig. 17j); nuchal organ single, extending to setigers 50-55; genital pouches beginning between setiger 1-2  
 ..... *L. hermaphroditica*

***Laonice quadridentata* sp. nov.**

(Figure 17a-g)

*Material examined:* VICTORIA. Port Phillip Bay, PPBES Stations 930/1 (HOLOTYPE, NMV G2954) and 37 PARATYPES as follows: 908/5 (1, NMV G2960); 909/2 (1, NMV G2976); 910/5 (1, NMV G2966); 925/5 (1, NMV G2961); 926/1 (2, NMV G2971); 926/2 (1, NMV G2957); 930/4 (1, NMV G2977); 931/3 (1, NMV G2964); 931/4 (1, NMV G2981); 932/2 (2, NMV G2973); 932/3 (1, NMV G2963); 932/4 (1, NMV G2967); 932/5 (3, NMV G2970); 933/4 (2, NMV G2959); 933/5 (1, NMV G2980); 936/1 (5, NMV G2958); 944/4 (1, NMV G2974); 946/1 (1, NMV G2962); 954/3 (1, NMV G2969); 957/2 (1, NMV G2972); 957/5 (1, NMV G2953); 965/4 (1, NMV G2979); 972/4 (1, NMV G2978); 982/4 (1, NMV G2955); 983/1 (1, NMV G2975); 983/2 (1, NMV G2956); 983/5 (1, NMV G2968); 985/5 (1, NMV G2965).

*Description:* A large species, up to 50 mm long and 3 mm wide for 136 setigers. Colour in alcohol: pink with faint grey pigment on lamellae.

Prostomium bluntly rounded, 2 pairs of eyes, all fused together into transverse patch; caruncle extending to setiger 18 (Fig. 17a);

with long cirriform occipital tentacle; peristomium forming slight lateral wings emphasizing grooves next to prostomium, with thick palps extending posteriorly for 6 setigers. Setiger 1 about  $\frac{1}{2}$  as large as setiger 2, with subrectangular to rounded parapodial lamellae, containing prominent setal fascicles. Notopodial lamellae from setiger 2 distally pointed, becoming elliptical (Fig. 17b); anterior neuropodial lamellae elliptical, distally blunt, subsequently becoming subtriangular and distally pointed (Fig. 17b).

Notosetae and neurosetae including sheathed, granulated capillaries. Quadridentate hooded hooks bearing 3 small, obscure apical teeth surmounting larger main fang (Fig. 17c-d) from neuropodium of about setiger 40, best seen in lateral view; inferior sabre setae from setiger 16, these heavily granulated, sheathed, distally prolonged (Fig. 17e).

Branchiae reduced at first, smaller than and free from notopodial lamellae, these gradually increasing in length in succeeding setigers, becoming longer than dorsal lamellae. Genital pouches first present between setigers 6-7 (Fig. 17f). Pygidium with 11-12 anal cirri (Fig. 17g). *Remarks:* *Laonice quadridentata* differs from *L. cirrata* in having quadridentate, rather than bidentate, hooded hooks and heavily granulated inferior sabre setae.

*Distribution:* Victoria, Port Phillip Bay.

***Laonice hermaphroditica* sp. nov.**

(Figure 17h-k)

*Material examined:* QUEENSLAND. Moreton Bay, Middle Banks, Sta. 29, Sept. 1972 (HOLOTYPE, NMV G2893); Sta. 35, Sept. 1972 (PARATYPE, QM G11591), Dec. 1972 (2 PARATYPES, QM G11592); Sta. 57, Dec. 1973 (PARATYPE, QM G11593), coll. W. Stephenson.

*Description:* A moderate-sized species, up to 24 mm long and 0.8 mm wide for 80 setigers. Body widest anteriorly, somewhat flattened, elliptical in cross section, becoming cylindrical posteriorly. Colour in alcohol: opaque white with diffuse grey on dorsal lamellae.

Prostomium bluntly rounded on anterior margin (Fig. 17h); caruncle extending posteriorly to setiger 50, present between dorsal transverse segmental lamellae; occipital ten-



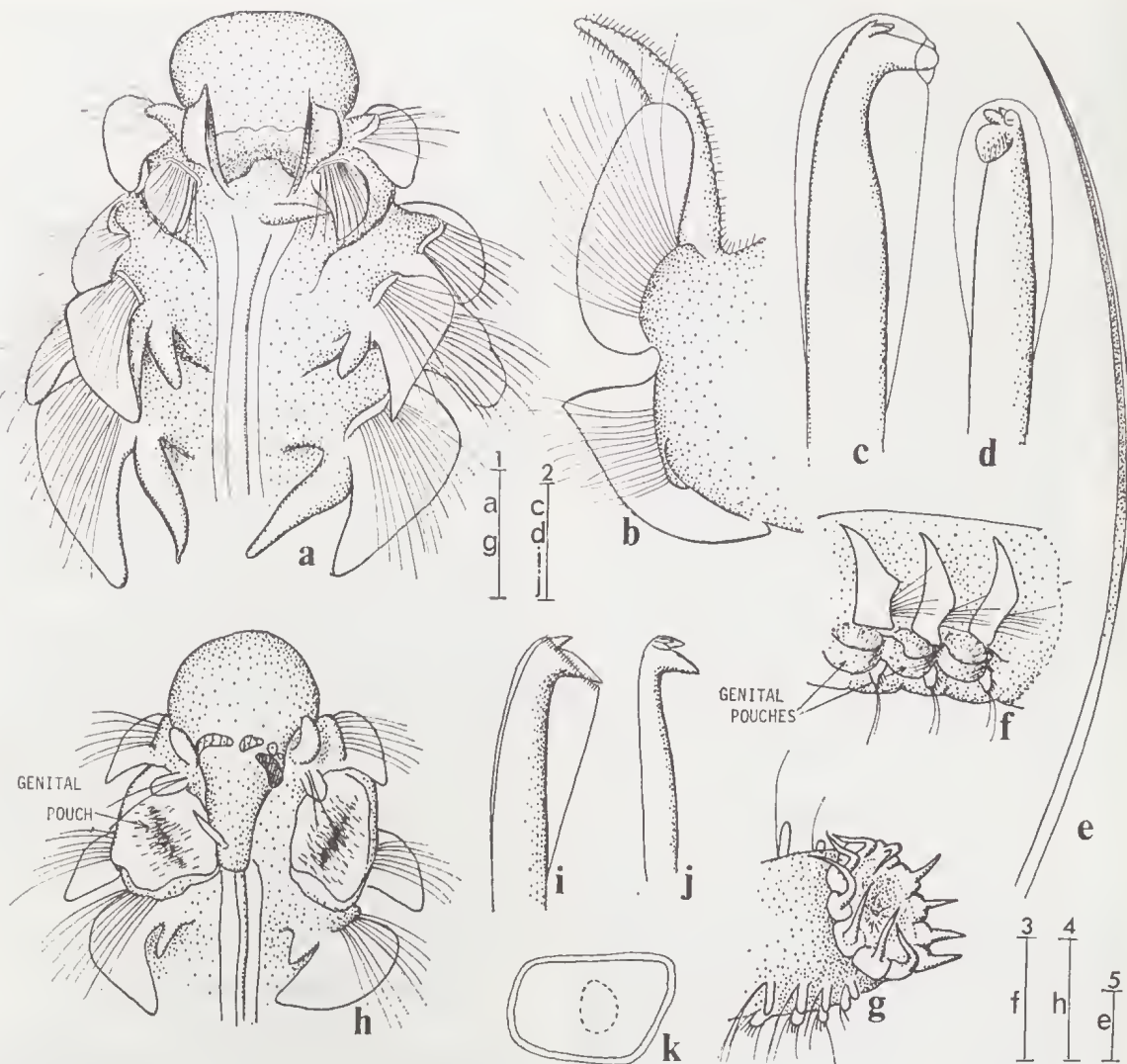


Figure 17—*Laonice quadridentata* sp. nov.—a, anterior end, dorsal view; b, right setiger 10, anterior view; c, quadridentate hooded hook, lateral view; d, quadridentate hooded hook, frontal view; e, sabre seta; f, lateral view showing brood pouches and dorsal lamellae; g, pygidium, dorsolateral view—*Laonice hermaphroditica* sp. nov.—h, anterior end, dorsal view; i, quadridentate hooded hook, lateral view; j, same, without hood, anterolateral view; k, oocyte [250  $\mu$ m]. [Scale 1 = 100  $\mu$ m; 2 = 20  $\mu$ m; 3 = 200  $\mu$ m; 4 = 50  $\mu$ m; 5 = 100  $\mu$ m].

tacle short, thin; 2 pairs of eyes, posterior pair with 1 member often missing, darker in colour, irregularly shaped and placed; anterior pair lighter in colour. Peristomium poorly-developed; palps missing.

Setiger 1 reduced with short, narrow notopodial lamellae bearing only 2-3 capillary setae (Fig. 17h); subsequent notopodial lamellae broad, bluntly rounded. Anterior neuropodial lamellae foliaceous, distally pointed, subsequently becoming reduced and rudimentary.

Notopodia with sheathed capillaries; quadridentate hooded hooks in neuropodia from setigers 24-25, often appearing bidentate in lateral view (Fig. 17i-j); aperture of hood distinctly serrated (Fig. 17i).

Nature of pygidium unknown. Genital pouches first present between setigers 1-2, these large, delicate and easily detached. Large primary oocytes, up to 300  $\mu\text{m}$  in diameter present in anterior 54-55 setigers (Fig. 17k). Short headed sperm present in coelomic cavity from about setiger 56.

*Remarks:* *Laonice hermaphroditica* differs from *L. cirrata* in having quadridentate, rather than bidentate hooded hooks, the caruncle is prolonged over 50 setigers instead of 12-30 and genital pouches first occur from setiger 1 rather than from setiger 4 or thereafter. *L. hermaphroditica* differs from *L. cirrata* and *L. quadridentata* in its apparent simultaneous hermaphroditism and in having hooded hooks with serrated apertures.

*Distribution:* Queensland, Moreton Bay.

#### *Laonice bassensis* sp. nov.

(Figure 18)

*Material examined:* VICTORIA. Bass Strait, ESSO-GIPPS Sta. 8, 106 m, dredged sandy clay bottom, 148° 43' 50"E. 38° 50' 8"S, May 1969 (HOLOTYPE, AM W13009); Sta. 9, 144 m, May 1969 (PARATYPE, AM W13010).

*Description:* Largest specimen, the holotype, measuring 13 mm long and 1.2 mm wide for 42 setigers. Body widest anteriorly, elliptical in cross section, becoming cylindrical posteriorly. Colour in alcohol: opaque white.

Prostomium medially incised on anterior margin (Fig. 18a-b); caruncle continuing to setiger 2, surrounded laterally by 2 nuchal organs extending posteriorly to setiger 7; with small digitiform occipital tentacle; no eyes. Peristomium reduced, with grooves separating prostomium from peristomium; palps missing.

Setiger 1 reduced, dorsally displaced, abutting against prostomium (Fig. 18a-b); anterior notopodial and neuropodial lamellae foliose (Fig. 18c), with rounded apices; posterior dorsal lamellae triangular, elliptical, with pointed inferior processes (Fig. 18d).

All setae arranged in 2 tiers. Capillaries sheathed, shafts with or without granulations distributed along striae (Fig. 18f); anterior notopodia with about 50 capillaries; posterior setigers with about 35 per ramus; neuropodial capillaries similar to those of notopodia, but fewer in numbers. Bidentate hooded hooks from setigers 22-23 (Fig. 18g). Inferior sabre setae from setigers 9-10.

Branchiae shorter than dorsal lamellae for first 4-5 segments, thereafter larger, not fused with lamellae. Genital pouches commencing between setigers 2-3 (Fig. 18e). Nature of pygidium unknown.

*Remarks:* *Laonice bassensis* differs from *L. cirrata* in having an incised, rather than an entire prostomium, paired rather than single nuchal organs, ventrally directed rather than triangular dorsal lamellae in posterior setigers and genital pouches beginning from setiger 2 rather than from setiger 4-50. *L. bassensis* differs from *L. hermaphroditica* and *L. quadridentata* in having bidentate rather than quadridentate hooded hooks.

*Distribution:* Victoria, Bass Strait.

#### General Remarks on the *Prionospio*-complex

Foster (1969; 1971) reorganized *Prionospio* Malmgren into 5 genera: *Prionospio*, *Paraprionospio* Caullery, *Apoprionospio* Foster, *Aquilaspio* Foster and *Minuspio* Foster. With exception of *Paraprionospio*, which has pinnate branchiae beginning on setiger 1, the other 4 genera have branchiae from setiger 2 and are separated on the basis of branchial form. Thus, variation in a single characteristic has been used to set aside 4 genera. Perhaps anticipating objections to the scheme, Foster (1971, p. 80) suggested that 5 subgenera of *Prionospio* might be more acceptable. Day (1973), however, disagreed with the need for *Apoprionospio* and Light (1977) preferred to use subgenera, but synonymized *Aquilaspio* with *Paraprionospio*. Other authors have used all 5 as full genera or as subgenera.

In the present study, we have found 2 heretofore undescribed Australian species which cause considerable confusion to Foster's arrangement. One represents a new genus: it has a well-developed peristomium, setiger 1 is

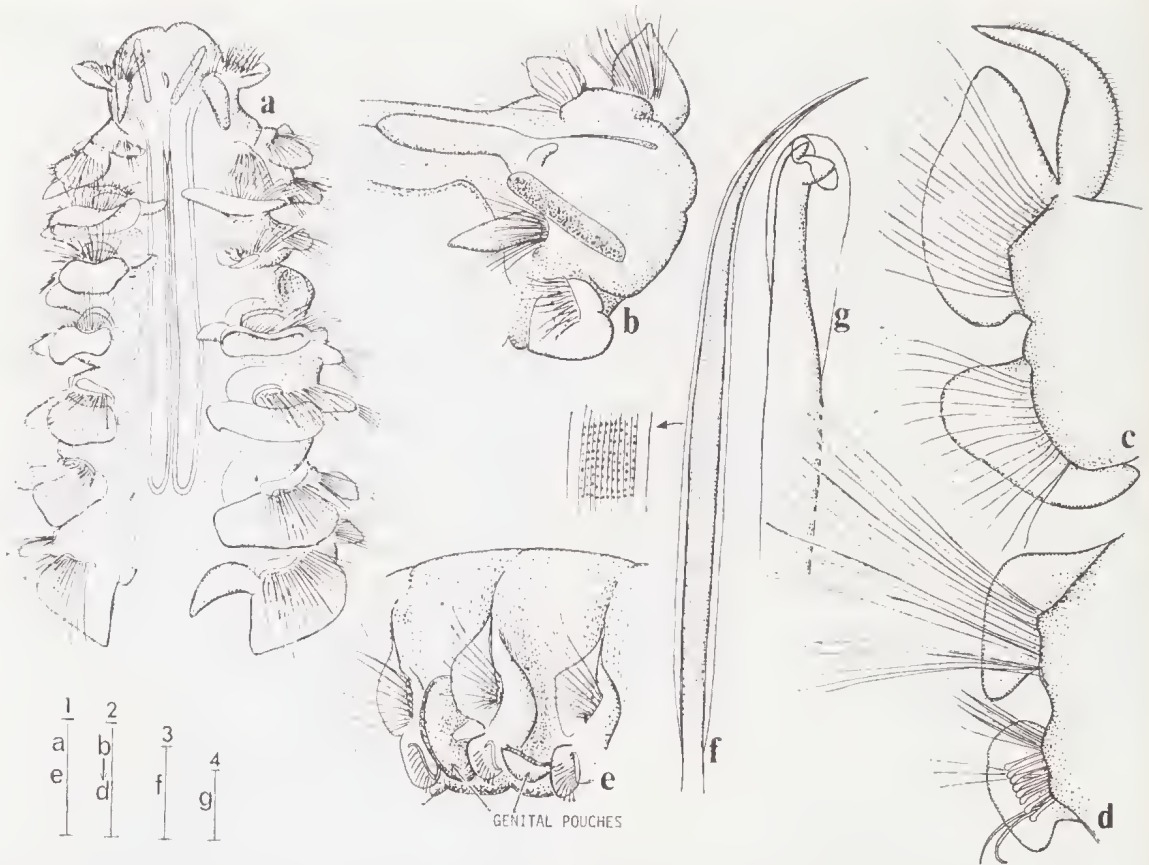


Figure 18—*Laonice bassensis* sp. nov.—a, anterior end, dorsal view; b, prostomium, anterolateral view; c, right setiger 8, anterior view; d, right setiger 41, anterior view; e, genital pouches from about setiger 50, lateral view; f, anterior capillary seta [inset, detail of shaft, not to scale]; g, bidentate hooded hook. [Scale 1 = 200  $\mu\text{m}$ ; 2 = 50  $\mu\text{m}$ ; 3 = 50  $\mu\text{m}$ ; 4 = 20  $\mu\text{m}$ ]

distinct and lacks a dorsal ridge between the parapodial bases, bears 18-22 pairs of branchiae from setiger 1 and has an unusual pygidium and lacks anal cirri. The second species belongs to the genus *Prionospio*, the first and third pairs of branchiae are pinnate and the second and fourth pairs cirriform. The pinnate branchiae have very few pinnules, however so few, in fact that some specimens are missing pinnules on one or both members of a gill-pair. Individual specimens might be thus classified with either *Prionospio* (*sensu*

*stricto*) or a modified version of *Apoprionospio*, based upon Foster's generic definitions.

We consider that the form of branchiae is not an adequate justification for separating genera when used as the sole criterion. We include a suite of what appear to be more conservative characteristics in arranging the *Prionospio*-complex. The position of the branchiae, degree of development of the peristomium, the distinctness and degree of development of setiger 1, structure of the hooded hooks and the form of the pygidium are considered the major generically important characteristics. Branchial form is considered to be of secondary importance. Any discussion of this complex must include the genus *Streblospio* Webster (see also Foster, 1971; Light, 1977). The following genera and subgenera are recognized in the *Prionospio*-complex:

1. *Paraprionospio* Caullery, 1914



2. *Orthoprionospio* gen. nov.
3. *Streblospio* Webster, 1879a
4. *Prionospio* Malmgren, 1867 (*sensu lato*)
  - a. Subgenus *Aquilaspio* Foster, 1971
  - b. Subgenus *Minuspio* Foster, 1971
  - c. Subgenus *Prionospio* (*sensu stricto*) [includes *Apoprionospio* Foster, 1971]

Characteristics separating these genera may be seen in Table 1.

The first 3 genera have branchiae beginning on setiger 1 and well-developed peristomia with lateral wings developed to various degrees (see Table 1). In *Paraprionospio* and *Orthoprionospio* setiger 1 is well-developed and distinct from the peristomium, while in *Streblospio* setiger 1 is reduced and fused with the peristomium. *Streblospio* and *Paraprionospio* share peculiarities of hooded hook structure and development of anterior ridges and collars, while *Orthoprionospio* has hooded hooks approaching the condition seen in *Prionospio* and lacks anterior dorsal ridges. *Paraprionospio*, *Orthoprionospio* and *Streblospio* all have different pygidial structures. In *Prionospio*, the branchiae begin on setiger 2, with the peristomium and setiger 1 both reduced and fused. The hooded hooks have inconspicuous secondary hoods. Various kinds of dorsal ridges or crests may be present or absent, but normally only on the postbranchial setigers. The pygidium in *Prionospio* is similar to that of *Paraprionospio*; it includes a medial and 2 ventrolateral cirri. About 30 species of *Prionospio* are currently recognized (Foster, 1971; Fauchald, 1972; this study). We follow Foster (1971) in recognizing groups of species according to whether the branchiae are all pinnate (subgenus *Aquilaspio*), all cirriform (subgenus *Minuspio*) or a combination of cirriform and pinnate (subgenus *Prionospio*). We do not consider these taxa as full genera since their separation is presently based on only a single character. However, we do consider that they are useful categories to separate species groups. *Apoprionospio* cannot be justified as even a subgenus because it is based on a particular ordered arrangement of pinnate and cirriform branchiae. We consider such a character to be important only at the species

level. In this regard we agree with Day (1973). We cannot agree with Light (1977) that *Aquilaspio* is a synonym of *Paraprionospio* because all of the major generic characters of *Prionospio* (Table 1) apply equally to species assigned to *Aquilaspio* and are very different from the generic characters of *Paraprionospio*.

*Streblospio* has not been encountered in our studies. *Paraprionospio pinnata*, *Orthoprionospio cirriformia* gen. et. sp. nov. and 9 species of *Prionospio*, including 5 new species, are described below.

#### Genus *Paraprionospio* Caullery, 1914

*Type-species*: *P. pinnata* (Ehlers, 1901), designated by Caullery (1914).

*Diagnosis*: Prostomium wedge-shaped, slightly curved on anterior margin, without posterior caruncle; peristomium well-developed forming erect lateral wings often completely overlapping prostomium. Setiger 1 well-developed, distinct from peristomium. Notopodial lamellae of setigers 1-5 enlarged, thereafter becoming smaller, rounded. Distinct transverse dorsal ridge present between branchial bases of setiger 1; 3 pairs of branchiae from setiger 1, all pinnate. Anterior setae all capillaries in both rami; posterior noto- and neuropodia with multidentate hooded hooks; hooded hooks with secondary teeth closely applied to main fang; with prominent secondary hood. Ventral sabre setae present. Pygidium with 1 long medial cirrus and 2 shorter ventrolateral cirri.

#### *Paraprionospio pinnata* (Ehlers, 1901)

*Prionospio pinnata* Ehlers, 1901, p. 163; 1908, p. 110; Augener, 1927, p. 351; Okuda, 1937, p. 247; Fauvel, 1953, p. 323; Hartman, 1960, p. 114; Imajima and Hartman, 1964, p. 286; Hartmann-Schröder, 1965, p. 211; Day, 1967, p. 488.  
*Paraprionospio pinnata*: Foster, 1971, p. 102 (Synonymy).

*Material examined*: NEW SOUTH WALES. Stockton Bight, dredge, 5.9-9 m, coll. N. Ruello, July 1970 (2, AM W4410); Sydney, Malabar, 28 m, AMSBS Station CA+5 March 1974 (4, AM W6501); B3 S1 (1, AM W6502).

*Description*: Prostomium curved on anterior margin; spindle-shaped, no caruncle; 0-4 eyes. Segment 1 achaetous, together with peristomium forming lateral wings overlapping pro-

TABLE 1  
Taxonomic Criteria Separating Genera of the *Prionospio*-complex

Genus	Peristomium	Setiger 1	Branchiae a. Begin b. Structure	Dorsal ridges or collars	Hooded hooks	Pygidium
<i>Paraprionospio</i>	Enlarged with prominent wings	Well-devel., free from peristomium	a. Setiger 1 b. 3 pairs, all pinnate	Prominent ridge across setiger 1	Large apical teeth, closely applied to main fang; secondary hood prominent	With 1 long dorsomedial cirrus and 2 short ventromedial cirri
<i>Orthoprionospio</i>	Enlarged with moderate wings	Well-devel., free from peristomium	a. Setiger 1 b. 18-22 pairs all cirriform	Absent	Small apical teeth not closely applied to main fang; secondary hood not apparent	With 1 ventral lobe and 4 small lateral papillae
<i>Streblospio</i>	Enlarged with low wings	Reduced, fused to peristomium	a. Setiger 1 b. 1 pair, cirriform	Inconspicuous ridge across setiger 1; prominent hood or collar across dorsum of setiger 2	Large apical teeth not closely applied to main fang; secondary hood prominent	Simple, with 2 rounded lobes; appendages absent
<i>Prionospio</i>	Reduced, with or without lateral wings	Reduced, fused to peristomium	a. Setiger 2 b. 3-40 pairs, all pinnate, cirriform, or combination of both types	Absent. Some species with membranous crests across dorsum on post-branchial segments	Small secondary teeth not closely applied to main fang; secondary hood inconspicuous	With 1 long dorsomedial and 2 short ventrolateral cirri

stomium; palps long with conspicuous membranous basal sheath. Setiger 1 well-developed with prominent parapodial lobes and a conspicuous transverse dorsal ridge connecting bases of first pairs of branchiae. Anterior parapodial lamellae of setigers 1-5 foliose, those of neuropodia less foliaceous and smaller than in preceding segments; notopodia becoming progressively longer and thinner in posterior segments.

Anterior setae in both rami all capillaries. Notosetae anteriorly arranged in 3 tiers; capillaries appearing bilimbate, with prominent sheaths bearing granulations. Multidentate hooded hooks and sabre setae in neuropodia from setiger 9, accompanied by several capillaries; notopodial hooded hooks commencing

posterior to setiger 20, these hooks with 8 secondary teeth in 2 rows above main fang, with a clear primary hood and striated internal secondary hood, the latter tightly applied to shaft.

Pinnules of branchiae numerous, subject to various configurations depending upon stage of growth and or regeneration (*vide* Foster, 1971).

Pygidium bearing 1 long medial cirrus and 2 short lateral cirri, similar to those seen in the genus *Prionospio*.

*Distribution*: New South Wales; cosmopolitan.

Genus *Orthoprionospio* gen. nov.

*Type-species*: *Orthoprionospio cirriformia* sp. nov.

Gender, feminine.

*Diagnosis*: Prostomium rounded on anterior



margin; caruncle absent. Peristomium well-developed, forming prominent lateral wings alongside prostomium. Setiger 1 well-developed, distinctly separate from peristomium, parapodia indistinguishable from those of succeeding setigers; notopodial lamellae of all anterior setigers foliose, becoming reduced in posterior segments; dorsal ridges lacking. Branchiae beginning on setiger 1, 18-22 pairs, all cirriform. Anterior setae all capillary; multidentate hooded hooks in both neuropodia and notopodia of posterior segments; hooks with apical teeth not closely overlapping main fang; without secondary hood; inferior sabre setae present in middle and posterior segments. Pygidium with 1 reduced, conical ventral lobe and 4 very small lateral papillae.

*Remarks:* See Table 1 and foregoing discussion. A single species, *O. cirriformia* is known.

#### **Orthoprionospio cirriformia** sp. nov.

(Figure 19)

*Material examined:* NEW SOUTH WALES. Botany Bay, Georges River, Picnic Point, coll. NSWSP, 5 July 1972 (7, AM W13011). VICTORIA. Yarra River, MSG Benthic Survey, 10 Oct. 1975, coll. G. Poore and J. D. Kudenov, black mud, 7 m, Stations 128/1 (HOLOTYPE, NMV G2846; 12 PARATYPES, NMV G2847); 128/2 (3, NMV G3004); 128/4 (7, NMV G3005); 128/5 (7 PARATYPES, NMV G2848). TASMANIA, Derwent Estuary, 5 Jan. 1977, coll. R. Buttermore (TM K842).

*Description:* A moderate-sized species, up to 22 mm long for 100 segments. Body light tan to brown in alcohol with black pigment present on palps and between some anterior parapodia.

Prostomium broadly rounded on anterior margin, bell-shaped (Fig. 19b), without caruncle. Three pairs of eyes, anteriormost pair cup-shaped followed by more rounded pairs, all arranged in straight rows. Peristomium with raised lateral peristomial wings (Fig. 19a-b).

Setiger 1 well-developed with enlarged dorsal lamellae; those of all anterior setigers enlarged, subtriangular in shape (Fig. 19f); posterior notopodial lamellae reduced to short lobes; neuropodial lamellae smaller, more rounded. Notosetae including fascicles of delicate capillaries lacking granulations; neuro-

setae similar to notosetae but fewer in number; 2-3 granulated inferior sabre setae per neuropodium, and beginning setiger 18-22 (Fig. 19e); multidentate hooded hooks in neuropodia from setiger 29-34, and in notopodia from setiger 62-68; neuropodial hooks numbering 4-6 per fascicle accompanied by capillaries; hooks bearing 8 apical teeth in 2 rows above main fang (Fig. 19c-d); notopodial hooks in far posterior setigers long, projecting prominently from body and accompanied by long capillaries (Fig. 19g).

Branchiae long, cirriform, beginning setiger 1, continuing for 18-22 segments (Fig. 19a, f). Pygidium as described for genus (Fig. 19g-h).

*Ecology:* The species is common in areas of reduced salinity and according to R. Buttermore is '... the most numerous species in the Derwent Estuary [Tasmania]' (personal communication). The species is also common in the Yarra River (Poore and Kudenov, 1978 b).

*Distribution:* New South Wales; Victoria; Tasmania.

#### **Genus Prionospio** Malmgren, 1867

*Prionospio* Malmgren, 1867. *Type-species:* *P. steenstrupi* Malmgren, 1867, by monotypy.

*Ctenospio* M. Sars, 1867. *Type-species:* *C. plumosus* M. Sars, 1867, by monotypy.

*Apoprionospio* Foster, 1969. *Type-species:* *A. dayi* Foster, 1969, by monotypy.

*Diagnosis:* Prostomium more or less straight, medially incised or rounded on anterior margin, without frontal horns; caruncle variously elongated. Peristomium fused in varying degrees with setiger 1, often forming low lateral wings. Parapodia of setiger 1 reduced, notopodia on branchial bearing segments enlarged; postbranchial notopodia becoming smaller, inconspicuous; dorsal folds or crests present or absent on postbranchial segments, rarely on branchial segments. Branchiae all pinnate (subgenus *Aquilaspio* Foster, 1971), all cirriform (subgenus *Minuspio* Foster, 1971) or both pinnate and cirriform (subgenus *Prionospio* [*sensu stricto*]), branchiae always limited to anterior setigers. Anterior setae all capillaries; hooded hooks in posterior noto- and neuropodia; hooks bi-, tri- or multidentate; inferior sabre setae present. Pygidium with 1 long medial



- 3a. Three pairs of pinnate branchiae; low dorsal crest on setiger 7  
 ..... *P. aucklandica*
- b. Four pairs of pinnate branchiae; dorsal crests absent ..... *P. multipinnulata*
- 4a. First pair of branchiae long, pinnate, second and third pairs shorter, cirriform, fourth pair long, thin, cirriform (Fig. 20m); with genital pouches on anterior setigers ..... *P. ehlersi*
- b. Branchiae otherwise; genital pouches absent ..... 5
- 5a. First and third pairs of branchiae pinnate (pinnules sparse), second and fourth pairs cirriform (Fig. 22a); caruncle long, reaching to setiger 5  
 ..... *P. paucipinnulata*
- b. Branchiae otherwise; caruncle reaching to setiger 2 ..... 6
- 6a. First and fourth pairs branchiae pinnate, second and third pairs cirriform (Fig. 20a-b); hooded hooks multidentate (Fig. 21h) ..... 7
- b. First 3 pairs of branchiae cirriform, fourth pair pinnate (Fig. 23a); hooded hooks tridentate (Fig. 23d)  
 ..... *P. tridentata*
- 7a. Peristomium forming lateral peristomial wings (Fig. 20a) ..... *P. steenstrupi*
- b. Peristomium not forming lateral wings ..... 8
- 8a. Prostomium smoothly rounded on anterior margin (Fig. 20b); prominent dorsal crests on setigers 11-18 (Fig. 20d); first 3 pairs of branchiae short, fourth pair long (Fig. 20b)  
 ..... *P. australiensis*
- b. Prostomium broad or slightly incised on anterior margin (Fig. 21a); dorsal fold on setiger 5 and low dorsal crests on variable number of setigers from setiger 9 (Fig. 21c); first and fourth pairs of branchiae longest, second and third pairs short (Fig. 21a)  
 ..... *P. queenslandica*

**Prionospio (Prionospio) steenstrupi**

Malmgren, 1867

(Figure 20a)

*Prionospio steenstrupi* Malmgren, 1867, p. 202; Mes-

nil, 1897, p. 90; Söderström, 1920, p. 232; Fauvel, 1927, p. 60; Day, 1963, p. 418; 1967, p. 489; Hartman, 1965b, p. 152; Hartmann-Schröder, 1971, p. 325; Foster, 1971, p. 84 (Synonymy); Light, 1977, p. 80.

*Spiophanes tenuis* Verrill, 1879, p. 176; 1881, p. 320. *Fide* Pettibone, 1954, p. 282.

*Prionospio tenuis* Verrill, 1881, p. 370. *Fide* Foster, 1971, p. 84.

*Prionospio steenstrupi malayensis* Caullery, 1914, p. 355. *Fide* Foster, 1971, p. 84. [But see Fauchald, 1972, p. 196].

*Prionospio bocki* Söderström, 1920, p. 234. *Fide* Foster, 1971, p. 84 (Synonymy). [But see Fauchald, 1972, p. 197].

*Prionospio malmgreni* var. *dubia* Day, 1961, p. 489. *Fide* Foster, 1971, p. 84.

*Prionospio malmgreni*: of authors [*partim*]. [Not Claparède, 1870]. *Fide* Fauchald, 1972, p. 197; Light, 1977, p. 80.

*Material examined*: NEW SOUTH WALES—Wallis Lake, Forster, boatsheds, 0.3 m, *Zostera* beds, 24 May 1968, coll. H. Paxton (1, AM W4242; 2, AM W4254); Wallis Lake, weed bed mixed, Dec. 1970, coll. Dixon and O'Gower (1, AM W5018; 2, AM W5020); Charlotte Bay, thick weed, mud-clay, coll. Dixon and O'Gower, Dec. 1970 (1, AM W5021); Sydney, North Head, AMSBS Station, 32 m, May 1972 (AM W6505). VICTORIA. 113 km south Lakes Entrance, 93.6 m, 148° 24' 50"E-39° 00' 00"S, sand, coll. C. Phipps (1, AM W13012).

*Description*: A small species, up to 15 mm long for 170 setigers. Prostomium wedge-shaped, broadly rounded anteriorly, caruncle to posterior margin of setiger 1 (Fig. 20a); 2-3 pairs of eyes. Peristomium reduced, fused dorsally to setiger 1. Parapodia of setiger 1 well-developed with notopodial lamellae forming erect peristomial wings; notopodial lamellae thereafter more rounded, forming low transverse dorsal crests on some specimens. Anterior setae all capillaries; neuropodial sabre setae beginning on setiger 12; multidentate hooded hooks from setiger 15-18 ventrally and from setiger 30-40 dorsally; these hooks multidentate with 10-12 apical teeth arranged in 2 vertical rows above main fang. Four pairs of branchiae with first and fourth pinnate, second and third cirriform. Pygidium with 1 long and 2 short cirri.

*Remarks*: See comments below for *P. queenslandica*.

*Distribution*: New South Wales; Victoria; cosmopolitan.

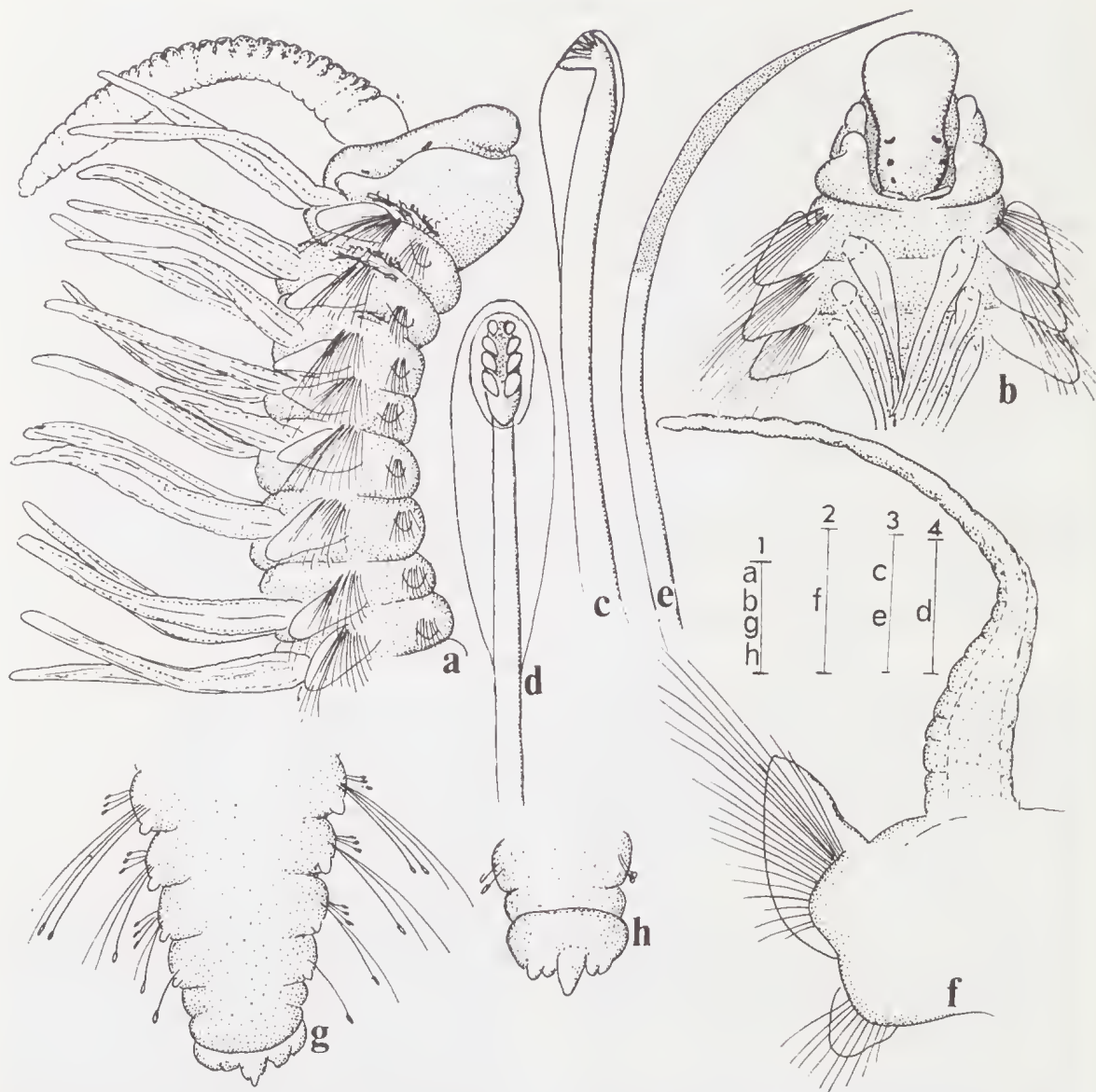


Figure 19—*Orthoprionospio cirriformia* gen. et sp. nov.  
 —a, anterior end, lateral view; b, anterior end, dorsal view; c, hooded hook, lateral view; d, hooded hook, frontodorsal view; e, sabre seta; f, right setiger 8 in anterior view; g, posterior end, dorsal view; h, posterior end, ventral view. [Scale 1 = 200  $\mu$ m; 2 = 200  $\mu$ m; 3 = 20  $\mu$ m; 4 = 10  $\mu$ m]

cirrus and 2 short ventrolateral cirri or thickened lobes.

KEY TO SPECIES OF *PRIONOSPIO* FROM  
 SOUTHEASTERN AUSTRALIA

- 1a. Branchiae all cirriform (Fig. 25a) ..... *P. cirrifera*  
 b. Branchiae all pinnate or pinnate and cirriform ..... 2  
 2a. Branchiae all pinnate (Fig. 24a; 25b) ..... 3  
 b. Branchiae both pinnate and cirriform (Fig. 20a-b) ..... 4

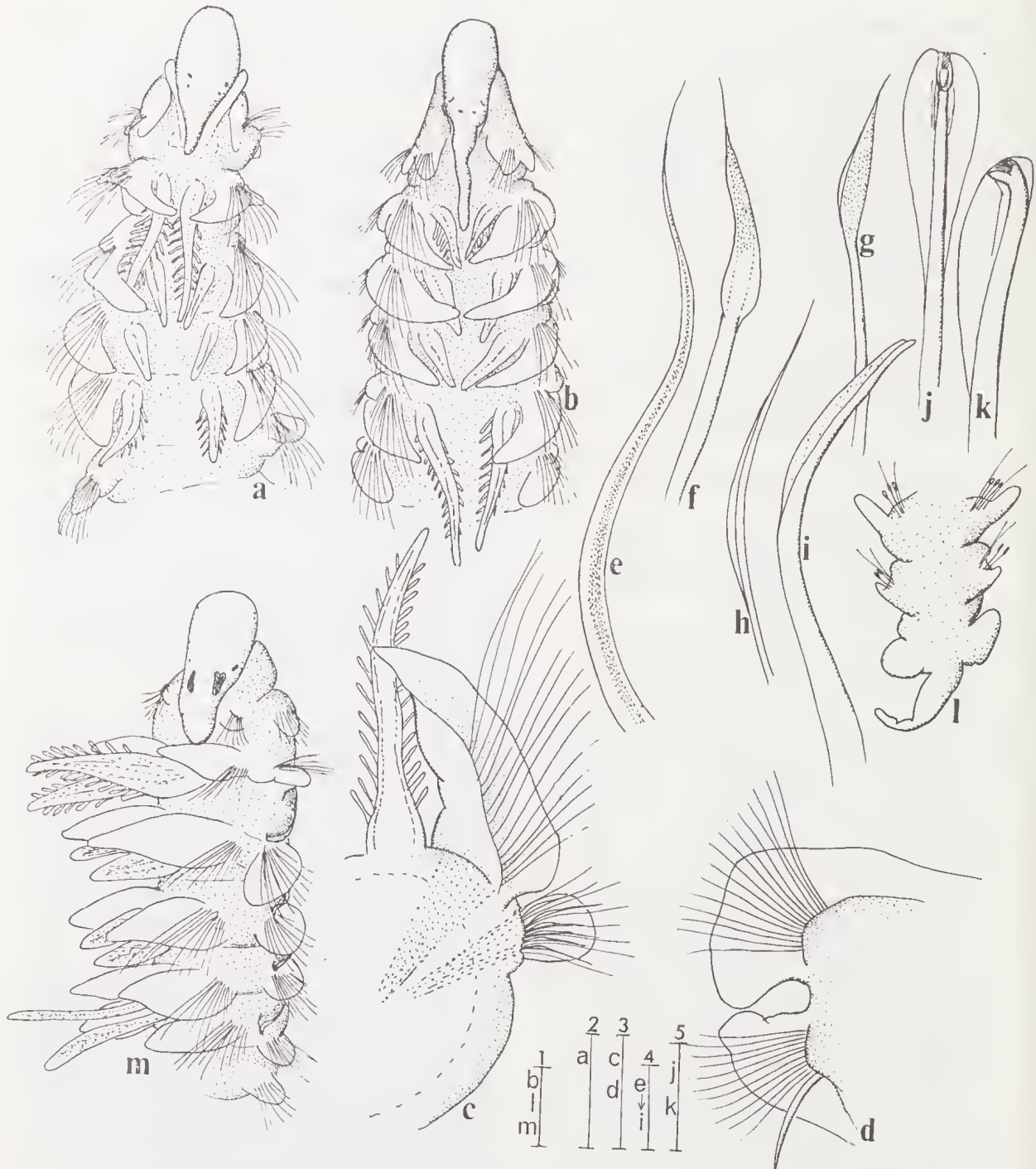


Figure 20—*Prionospio steenstrupi* Malmgren—*a*, anterior end, dorsal view—*Prionospio australiensis* nov. sp.—*b*, anterior end, dorsal view; *c*, left setiger 4, anterior view; *d*, right setiger 4, anterior view; *e*, capillary notoseta, setiger 4 from anterior tier; *f*, capillary notoseta, setiger 4 from posterior tier; *g*, sheathed neuroseta, setiger 4; *h*, capillary neuroseta, setiger 13; *i*, sabre seta; *j-k*, multidentate hooded hooks; *l*, posterior end, dorsal view—*Prionospio ehlersi* Fauvel—*m*, anterior end, dorsolateral view. [Scale 1 = 200  $\mu$ m; 2 = 200  $\mu$ m; 3 = 50  $\mu$ m; 4 = 20  $\mu$ m]



**Prionospio (Prionospio) australiensis** sp. nov.

(Figure 20b-1)

*Material examined:* QUEENSLAND. Moreton Bay, Middle Banks, Sta. 8, Sept. 1976 (HOLOTYPE, NMV G2842; 14 PARATYPES, NMV G2843), coll. W. Stephenson.

*Description:* A moderately-sized species, up to 34 mm long and 0.75 mm wide for 50 segments. Colour in alcohol: opaque white.

Prostomium bluntly rounded on anterior margin, continuing posteriorly as narrow caruncle to middle setiger 2 (Fig. 20b). Two pairs of eyes, anterior pair cup-shaped, posterior pair irregularly shaped, both pairs about equal in size. Peristomium fused with setiger 1, not forming peristomial wings.

Setiger 1 well-developed with enlarged notopodia and notosetae, but smaller than succeeding setigers; setigers 2-5 with enlarged notopodial lamellae (Fig. 20c), thereafter lamellae rounded, extending across dorsum as prominent dorsal crests on setigers 11-18 (Fig. 20d); dorsal lamellae pronounced on remaining segments; neuropodia of anterior setigers small, rounded at first (Fig. 20c), gradually becoming wider. Capillary notosetae of setigers 1-11 arranged in 3 tiers, with first tier containing shorter lanceolate setae with prominent distal granulations and sheaths (Fig. 20f) and second and third tier containing longer setae with granulations throughout length of shafts and indistinct sheaths (Fig. 20e); thereafter dorsal capillaries delicate, arranged in 2 poorly differentiated tiers. Capillary neurosetae small, unilimbate (Fig. 20g-h). Inferior neuropodial sabre seta from setiger 11 (Fig. 20i); multidentate hooded hooks from neuropodia setiger 17 and from notopodia from about setiger 45; neuropodia with about 8 hooks accompanied by capillaries; these hooks with 8-12 apical teeth arranged in 2 rows above main fang (Fig. 20j-k).

Four pairs of branchiae with the first and fourth pairs pinnate, the second and third pairs cirriform (Fig. 20b). First 3 pairs short, the fourth long; pinnules numerous on posterior face of pinnate branchiae.

Pygidium with 1 long medial cirrus and 2 rounded lateral lobes (Fig. 20l).

*Remarks:* See comments below following *P. queenslandica*.

*Distribution:* Queensland, Moreton Bay.

**Prionospio (Prionospio) queenslandica** sp. nov.

(Figure 21)

*Material examined:* QUEENSLAND. Moreton Bay, Middle Banks, Sta. 4, Sept. 1976 (HOLOTYPE, NMV G2839; 27 PARATYPES, NMV G2840), coll. W. Stephenson.

*Description:* A moderately-sized species, up to 23 mm long for 65 setigers. Body generally opaque white in alcohol.

Prostomium broad, with 4 small peaks on anterior margin, appearing slightly incised in some specimens (Fig. 21a); caruncle continuing posteriorly to posterior border of setiger 2; 2 pairs of eyes, anterior pair cup-shaped, posterior pair irregular, consisting of several individual ocelli fused together. Peristomium fused with setiger 1, lacking peristomial wings.

Setiger 1 well-developed, with notosetae but with smaller parapodial lobes than succeeding setigers. Setigers 2-5 with enlarged foliose notopodial lamellae (Fig. 21b), with well-developed transverse dorsal fold on setiger 5; subsequent dorsal lamellae low, merging with dorsum in setigers 6-8, but extending across dorsum on setigers 9-13 forming low dorsal crests (Fig. 21c), these low crests indistinct, but continuing on setigers posterior to 14 (Fig. 21d); neuropodia smaller, rounded in anterior setigers, becoming more elongated from about setiger 10. Notosetae and neurosetae of anterior setigers include spreading fascicles of stout, lanceolate granulated capillary setae (Fig. 21g) and delicate smooth capillary setae (Fig. 21f). One inferior neuropodial sabre seta per fascicle from setiger 10 (Fig. 21e), sabre setae bearing a prominent granular sheath; multidentate hooded hooks in neuropodia from setiger 14 and in notopodia from setiger 35-40, hooks numbering 7-8 in neuropodia, accompanied by capillaries; these hooks with 10-12 apical teeth arranged in 2 rows above main fang (Fig. 21h-i).

Four pairs of branchiae, first and fourth pairs long and pinnate, second and third pairs short, cirriform (Fig. 21a); with pinnules paired along axis of branchia, but absent from tip.

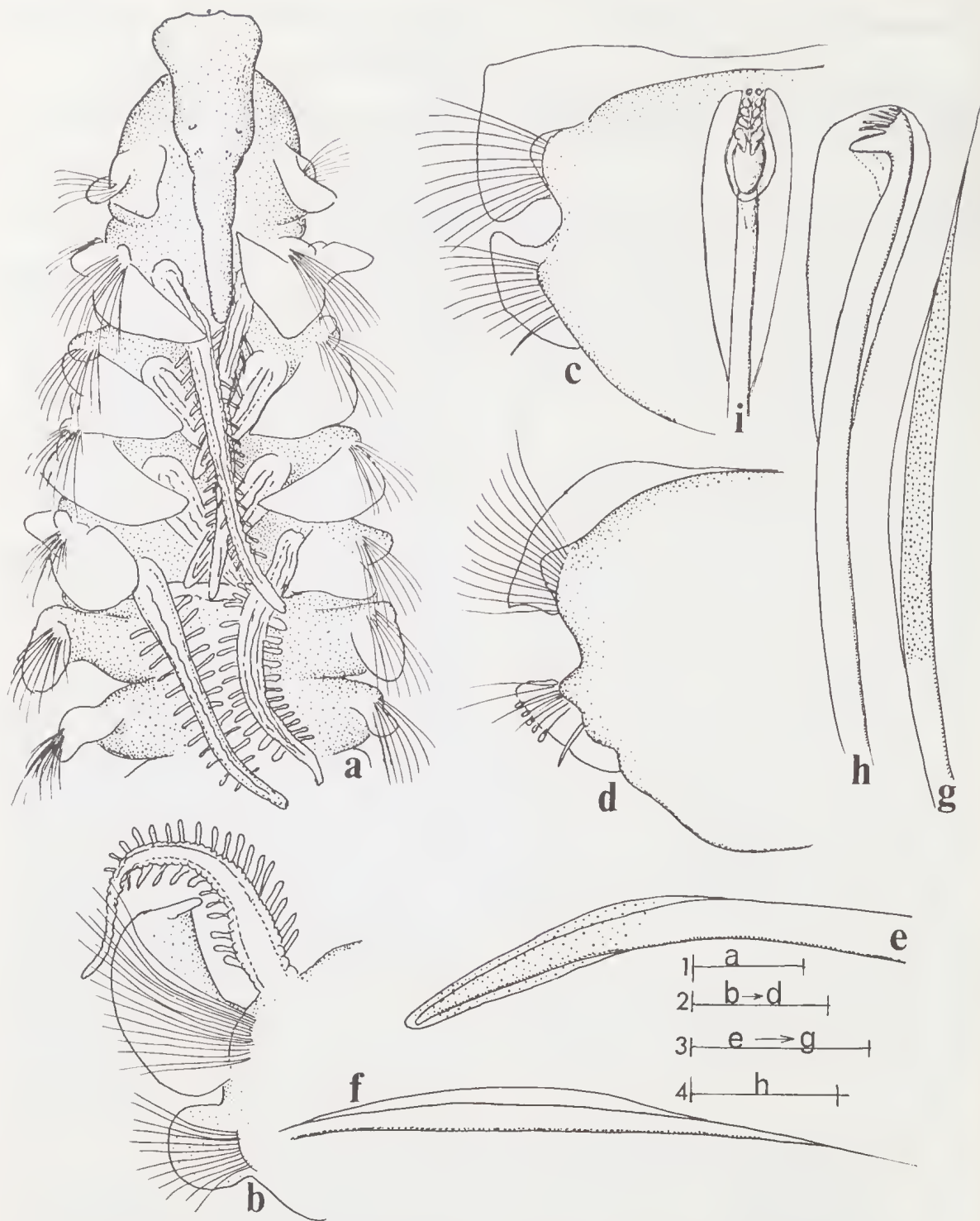


Figure 21—*Prionospio queenslandica* sp. nov.—a, anterior end, dorsal view; b, right setiger 5, anterior view; c, right setiger 12, anterior view; d, right setiger 20, anterior view; e, sabre seta; f, smooth capillary notoseta from setiger 5; g, granulated capillary notoseta from setiger 5; h, hooded hook, lateral view; i, same, frontal view. [Scale 1 = 200  $\mu$ m; 2 = 300  $\mu$ m; 3 = 50  $\mu$ m; 4 = 20  $\mu$ m; 5 = 10  $\mu$ m]

Pygidium with a single long medial cirrus and 2 lateral bulges.

*Remarks:* Foster (1971) redescribed *P. steenstrupi* and compared it with *P. fallax* Söderström, 1920. She noted that *P. fallax* possesses a high dorsal crest on setiger 7, which *P. steenstrupi* presumably lacks. *P. steenstrupi*, however, may possess or lack low or high dorsal crests on some postbranchial setigers (Foster, 1971; Light, 1977). Light (1977) found that specimens which he referred to *P. steenstrupi* from Canada, San Francisco Bay and southern California possess moderate to well-developed dorsal folds on a variable number of segments from setiger 7. He also suggested that *P. cristata* Foster, 1971 might be a juvenile of *P. steenstrupi*, since it has dorsal crests on setigers 7 and 9 and overlaps characteristics on *P. steenstrupi* from the northeastern Pacific.

None the less, after a study of Australian materials it is apparent to us that several closely related species forming a suite of siblings may eventually need to be sorted from populations currently lumped by Foster (1971) and others under the name *P. steenstrupi*.

There is no question that at least 3 species in the *steenstrupi* group occur in Australia. What we call *P. steenstrupi* has a reduced peristomium, which forms peristomial wings in conjunction with notopodia of setiger 1. *P. australiensis* and *P. queenslandica* on the other hand, have well-developed peristomia, but lack any development of lateral peristomial wings. *P. australiensis* is distinguished from *P. queenslandica* in having the prostomium smoothly rounded on the anterior margin instead of broad or slightly incised, by having prominent dorsal crests on setigers 11-18 instead of low crests from setiger 9, in lacking instead of having a dorsal fold on setiger 5 and in having a short pinnate gill on setiger 2, instead of a long one.

*Distribution:* Queensland, Moreton Bay.

**Prionospio (Prionospio) ehlersi** Fauvel, 1928  
(Figure 20m)

*Prionospio ehlersi* Fauvel, 1928b, p. 10; 1936, p. 61; Day, 1967, p. 490; Hartman, 1965a, p. 151; Hartman and Fauchald, 1971, p. 105; Gibbs, 1971, p. 170.

*Prionospio krusadensis:* Lee, 1976, p. 65. [Not Fauvel, 1929 = *P. aucklandica* Augener].

*Material examined:* QUEENSLAND. Moreton Bay, Middle Banks, Sta. 9, Sept. 1976 (2, NMV G2841), coll. W. Stephenson.

*Description:* A small species, up to 8 mm long and 0.8 mm wide for about 35 setigers. Colour in alcohol: opaque white.

Prostomium broadly rounded on anterior margin, caruncle short, terminating at posterior margin of setiger 1 (Fig. 20m). Two pairs of eyes, anterior pair small, inconspicuous, consisting of several small individual spots, posterior pair enlarged, irregularly shaped. Peristomium reduced, fused with setiger 1, without lateral wings.

Setiger 1 reduced, notosetae present with small noto- and neuropodia. Setigers 2-6 with enlarged subtriangular notopodial lamellae, these largest on setigers 2-4; following notopodia low, occasionally forming low ridges across dorsum, but prominent dorsal crests lacking; neuropodia small rounded throughout. With genital pouches between successive neuropodia of anterior segments beginning between setigers 2-3.

Anterior segments with dense fascicles of granular unilimbated capillary notosetae arranged in 3 tiers; neurosetae fewer, less dense; neuropodia with a stout inferior sabre seta and multidentate hooded hooks from setiger 20; 5-6 neuropodial hooks accompanied by capillaries; hooks with 6-8 apical teeth in 2 rows above main fang and a conspicuous secondary hood.

Four pairs of branchiae on setigers 2-5. First pair long, pinnate, second and third pairs short, cirriform with fourth pair long, thin, cirriform. Pygidium typical for genus.

*Remarks:* Specimens from Queensland agree well with descriptions from other areas. *P. ehlersi* is the only *Prionospio* observed in Australia to date with genital pouches. The branchial arrangement is unique.

*Distribution:* Queensland; Morocco; South Africa; eastern North America; South America; Solomon Islands; Korea.

**Prionospio (Prionospio) paucipinnulata** sp. nov.  
(Figure 22)

*Material examined:* VICTORIA. Port Phillip Bay,



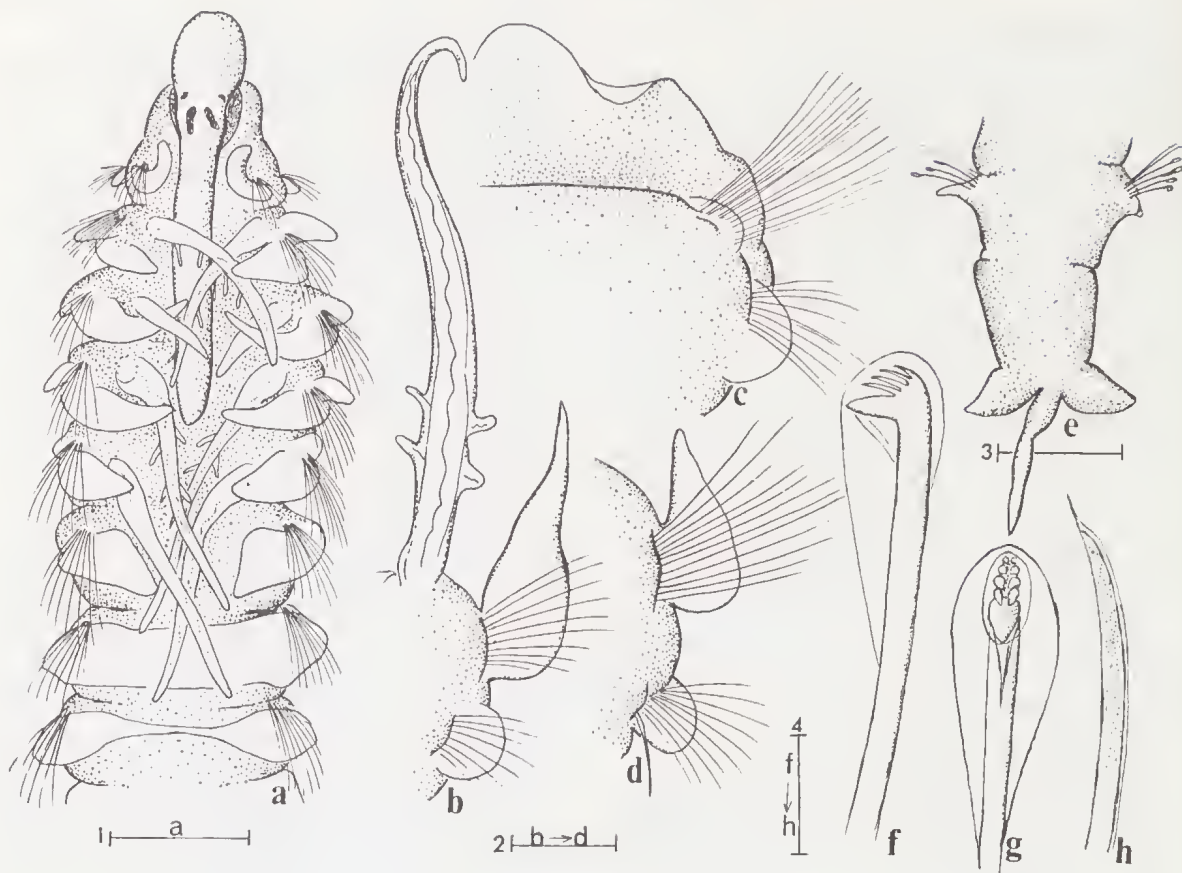


Figure 22—*Prionospio pausipinnulata* sp. nov.—a, anterior end, dorsal view; b, left setiger 4, anterior view; c, left setiger 20, anterior view; d, left setiger 10, anterior view; e, posterior end, dorsal view; f, hooded hook, lateral view; g, same, frontal view; h, sabre seta. [Scale 1 = 200  $\mu$ m; 2 = 200  $\mu$ m; 3 = 300  $\mu$ m; 4 = 20  $\mu$ m]

PPBES Stations 985 (HOLOTYPE, NMV G2837; 21 PARATYPES, NMV G2838; 80, NMV G3006); 907 (2, NMV G3007); 918 (1, NMV G3008); 944 (4, NMV G3009); 945 (6, NMV G3010).

**Description:** A small species, up to 7 mm long and 0.4 mm wide for 53 setigers. Colour in alcohol: opaque white.

Prostomium rounded on anterior margin, continuing posteriorly as long caruncle to posterior setiger 4 (Fig. 22a); 2 pairs of eyes; anterior pair smaller, cup-shaped; and a larger, irregularly shaped posterior pair. Peristomium broad with short lateral wings.

Setiger 1 well-developed, smaller than setiger 2; setigers 2-5 with well-developed subtriangular notopodial lamellae (Fig. 22b); notopodia of setiger 7 fused, forming large dorsal crest (Fig. 22c); similar crest also present on setiger 8 but less-developed; notopodia thereafter smaller, appearing subtriangular (Fig. 22d); neuropodia small, rounded throughout. Notosetae of first and subsequent setigers including fascicles of granulated capillaries, those on setiger 1 being thinner; neurosetae of setigers 1-9 in fascicles of granular capillaries; a single inferior sabre seta in each neuropodium from setiger 10 (Fig. 22h). Multidentate hooded hooks from neuropodia of setiger 13 with 1-3 hooks at first, thereafter increasing to 6-7 in middle body segments, those hooks with 6-8 apical teeth arranged in 2 rows above main fang (Fig. 22f-g); similar hooks in notopodia from setiger 34-35.

Four pairs of branchiae in setigers 2-5; first and third pairs pinnate, second and fourth pairs cirriform; short second pair (Fig. 22a); branchial pinnules sparse, usually no more than 4-7 on a single branchia; in some cases, pinnules reduced to 1-3 per gill or may even be lacking from 1 or both members of a branchial pair.

Pygidium with 1 long medial cirrus and 2 lateral lappets (Fig. 22e).

*Remarks:* *Prionospio paucipinnulata* is unique in the arrangement of pinnate (first and third) and cirriform (second and fourth) branchiae and the reduced number of pinnules on the pinnate branchiae. The long caruncle is also unusual among species of *Prionospio*.

*Distribution:* Victoria.

#### ***Prionospio (Prionospio) tridentata* sp. nov.**

(Figure 23)

*Material examined:* NEW SOUTH WALES. Botany Bay, Towra Point, coll. NSWSEF, April 1973 (2, NMV G2844; 1, NMV G2845); Newcastle, Burwood Beach, HDWBS Station, March 1975 (HOLOTYPE, AM W8829), April, 1975 (PARATYPE, AM W8900).

*Description:* A small species, up to 10 mm long and 0.5 mm wide for 60 segments. Colour in alcohol: light tan.

Prostomium trapezoidal, anteriorly broad to narrow with medial incision, tapering posteriorly to narrow caruncle terminating midway onto setiger 2 (Fig. 23a); 2 pairs of eyes, anterior pair widely spaced, cup-shaped, posterior pair rounded, close together. Peristomium reduced, without lateral wings.

Setiger 1 well-developed, with notosetae, parapodial lamellae smaller than those of following setigers; notopodia of setigers 2-6 with enlarged triangular lamellae, those of setiger 7 merging across dorsum as a dorsal crest; dorsal lamellae of succeeding setigers low, merging with dorsum, not forming crests; neuropodial lamellae rounded throughout. Setigers 2-5 with dense fascicles of bilimbate granulated capillaries (Fig. 23b). Neuropodia bearing an inferior sabre seta with partial distal sheath from setiger 11 (Fig. 23c); tridentate hooded hooks having 2 secondary teeth in line above main fang (Fig. 23d), in neuropodia from seti-

ger 19 and in notopodia from setiger 28; neuropodial hooks number 4-5 with capillaries.

Four pairs of branchiae on setigers 2-5, first pair narrow, thin, cirriform, second and third pairs thick, cirriform, fourth pair thick, long, pinnate (Fig. 23a) with numerous pinnules on posterior face.

Pygidium with short medial cirrus and 2 lateral bulges.

*Remarks:* Six species of *Prionospio* have been previously described as having the first 3 pair of branchiae cirriform and the fourth pinnate (Fauchald, 1972). Five of those species and *P. tridentata* are compared in Table 2. *P. nova* Annenkova, 1938 is poorly known and based upon incomplete specimens. Since there is no type material, or any specimens, for that matter, of *P. nova* available (Light, personal communication), the species is here considered a *nomen dubium*. *P. tridentata* is most closely related to *P. caspersi* (Table 2). *P. tridentata* differs by having tridentate, instead of bidentate, hooded hooks, and the prostomium is distinctly bilobed to incised instead of entire.

Foster (1969) removed this entire species group from *Prionospio* to her newly erected genus *Apoprionospio*. We do not consider that the ordered arrangement of cirriform and pinnate branchiae is a character of sufficient weight to warrant generic or subgeneric rank and have included *Apoprionospio* in the synonymy of *Prionospio* (see foregoing discussion above, p. 209).

*Distribution:* New South Wales.

#### ***Prionospio (Aquilaspio) multipinnulata* sp. nov.**

(Figure 24)

*Material examined:* NEW SOUTH WALES. Merimbula, Sta. MER 404L-S, core sample, *Posidonia*, opposite Spencer Park, 18 March 1976, coll. J. H. Day, *et al.* (1, AM W11736); MER 278M, netting over weed beds, 3 Dec. 1975 (1, AM W11737). VICTORIA. Port Phillip Bay, PPBES Station 953 (HOLOTYPE, NMV G2836; 5 PARATYPES, NMV G2833-2835).

*Description:* Only incomplete specimens available. A moderately-sized species, up to 36 mm long for 85 setigers. Colour in alcohol: opaque white.

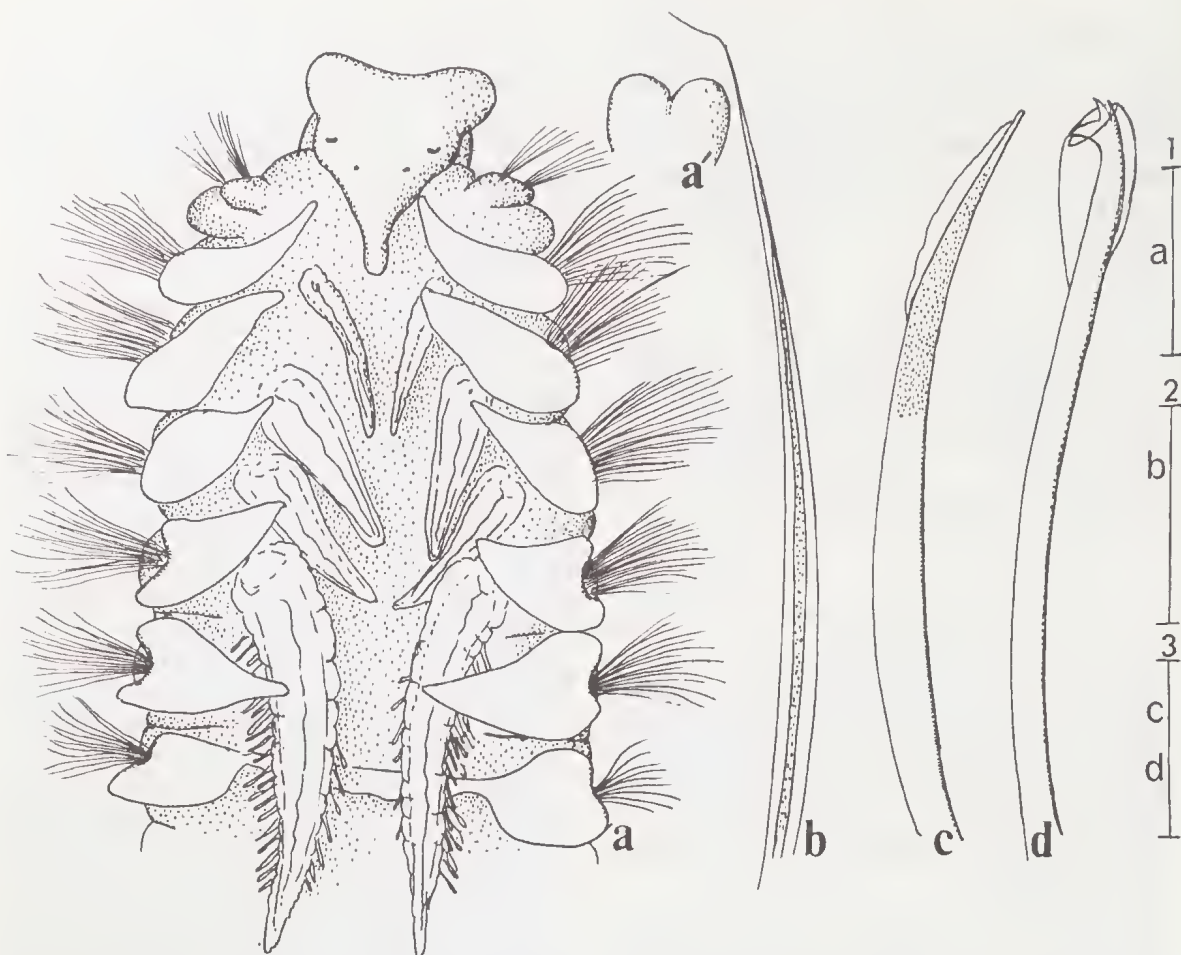


Figure 23—*Prionospio tridentata* sp. nov.—a, anterior end, dorsal view; a', prostomium from holotype; b, anterior capillary noto-seta; c, sabre seta; d, hooded hook. [Scale 1 = 200  $\mu$ m; 2 = 200  $\mu$ m; 3 = 20  $\mu$ m]

Prostomium broadly rounded on anterior margin, tapering posteriorly as short caruncle to anterior margin of setiger 2 (Fig. 24a); 4-6 pairs of eyes, anterior pair largest, posterior pair often divided. Peristomium with short lateral wings.

Setiger 1 well-developed, notosetae present, notopodial lobe enlarged, neuropodium small, rounded; setigers 2-5 with enlarged notopodia (Fig. 24d), thereafter notopodia smaller, of low profile, merging with dorsum but not forming dorsal crests (Fig. 24e-f); neuropodia smaller, rounded throughout body. Anterior capillary

notosetae and neurosetae granulated; neuropodia with an inferior sabre seta lacking a sheath from setiger 10; multidentate hooded hooks accompanied by capillaries in neuropodia from setiger 18; 5-6 such hooks and capillaries in notopodia from setiger 30; hooded hooks with 6-8 apical teeth arranged in 2 rows above main fang (Fig. 24b-c), surmounted by a single apical tooth (Fig. 24c).

Four pairs of pinnate branchiae on setigers 2-5, first pair the largest (Fig. 24a). Numerous pinnules irregularly arranged on posterior side. Nature of pygidium unknown.

*Remarks:* *Prionospio multipinnulata* is closely related to *P. peruana* Hartmann-Schröder, 1962 from Peru and to *P. tetelensis* Gibbs, 1971 from the Solomon Islands in having 4 pairs of pinnate branchiae. *P. multipinnulata*



TABLE 2

Some Taxonomic Characteristics of Species of the *Prionospio pygmaea* Group

Species	Anterior margin of prostomium	Peristomium	Sabre setae begin	Hooded hooks: number of apical teeth	Distribution of branchial pinnules	Occurrence of dorsal crests	References
<i>dayi</i> Foster	Broad with small distal peak	With low lateral wings	Setiger 11	2-3	2 rows	Setiger 7 only	Foster, 1969; 1971
<i>caspersi</i> Laubier	Broad to weakly concave	Reduced; no lateral wings	Setiger 11	1	Irregular	Setiger 7 only	Laubier, 1962
<i>pygmaea</i> Hartman	Broad with small distal peak	With low lateral wings	Setiger 11	6-8	2 rows	Setiger 7 & subsequent segments*	Hartman, 1961; Foster, 1971; Light, 1978
<i>saldanha</i> Day	Rounded	Well-developed; with low lateral wings	Setiger 12	1	Irregular	Setiger 19 to end of body	Day, 1961; 1967
<i>vermilliensis</i> Fauchald	Broad	Well-developed with low lateral wings	?	?	2 rows	?	Fauchald, 1972
<i>tridentata</i> n. sp.	Concave to deeply incised	Reduced; no lateral wings	Setiger 11	2	Irregular	Setiger 7	This study

\* The presence of very thin dorsal membranous crests have only recently been discovered in *P. pygmaea* (see Light, 1978).

differs from both species in lacking dorsal crests on postbranchial setigers; from *P. tetelensis* in having a shorter caruncle and lacking notosetae on setiger 1; and from *P. peruana* in having the prostomium broadly rounded on the anterior margin, rather than straight across with an apical peak, and further differs in having instead of lacking short peristomial wings.  
*Distribution:* New South Wales; Victoria.

***Prionospio (Aquilaspio) aucklandica***  
Augener, 1923  
(Figure 25b-g)

*Prionospio aucklandica* Augener, 1923, p. 69.  
*Prionospio krusadensis* Fauvel, 1929, p. 182; 1930, p. 38; 1953, p. 236. *Fide* Foster, 1971.

*Material examined:* NEW SOUTH WALES. Wallis Lake, sandy mud, Dec. 1970, coll. Dixon and O'Gower (1, AM W5017); Merimbula, Sta. MER

197A, transect on S. bank of estuary 200 m seaward of bridge, coll. J. H. Day *et al.* 6 Oct. 1975 (1, AM W11739; 2, AM W11740); Botany Bay, Towra Point, Towra Beach, NSWFS Stations 317 (4); 207 (2); 321 (6); 325 (5); 329 (1); 331 (6); 332 (6); 333 (1); 335 (7); 344 (2) (NMV G3135-3144). VICTORIA. Port Phillip Bay, PPBES Stations 919 (3); 929 (7); 932 (1); 940 (1); 941 (1); 944 (87); 953 (41); 971 (1) (NMV G3092-3099); Werribee; MPSG Sta. 1833, coll. G. Poore and J. D. Kudenov, Nov. 1975 (1, NMV G3091); Westernport, WPBES Stations 1701 (2); 1703 (5); 1705 (13); 1706 (6); 1708 (3); 1709 (1); 1710 (4); 1715 (1); 1716 (9); 1718 (4); 1720 (1); 1721 (12); 1724 (1); 1735 (2); 1736 (6); 1737 (16); 1738 (16); 1740 (22); 1741 (15) (NMV G3072-3090).

*Description:* A moderately-sized species, up to 23 mm for 110 segments. Colour in alcohol: opaque white.

Prostomium rounded on anterior margin with 3 small prominences, these obscured if

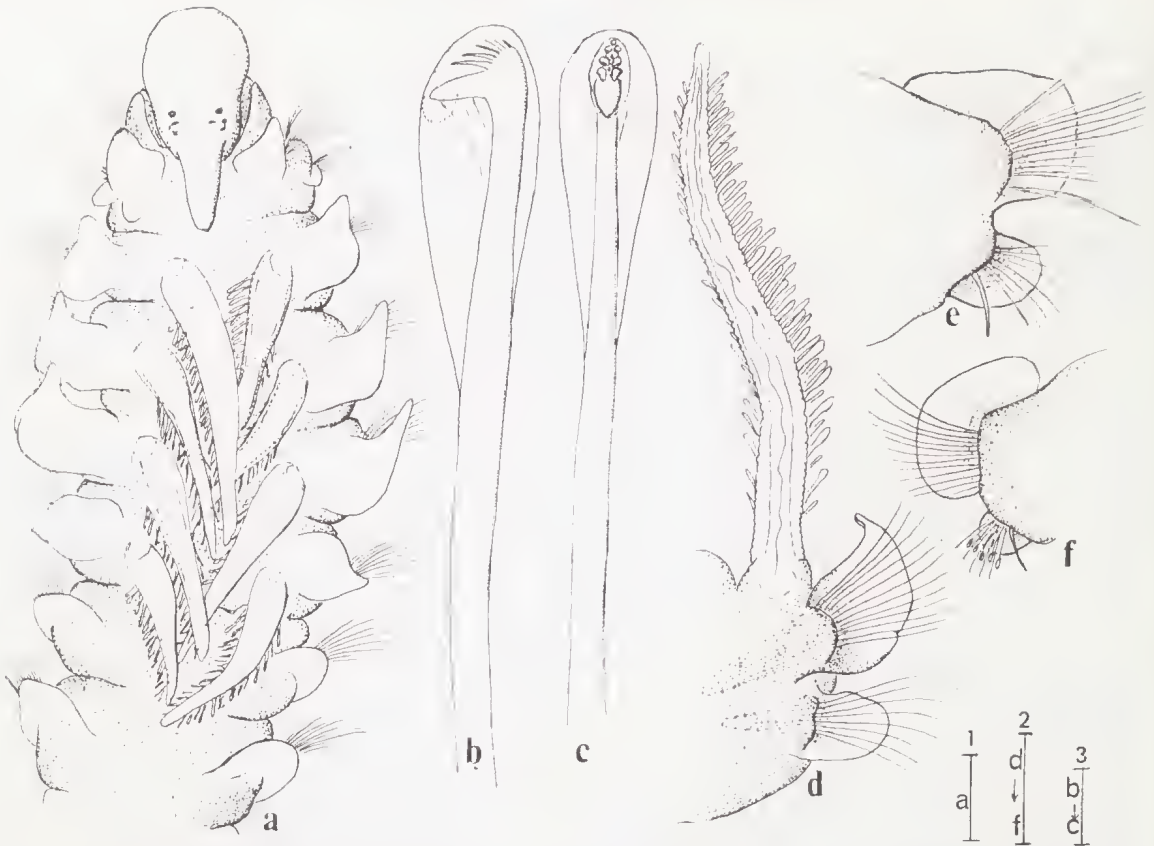


Figure 24—*Prionospio multipinnulata* sp. nov.—a, anterior end, dorsal view; b-c, hooded hooks; d, left setiger 4, anterior view; e, left setiger 10, anterior view; f, right setiger 20, anterior view. [Scale 1 = 200  $\mu$ m; 2 = 200  $\mu$ m; 3 = 20  $\mu$ m]

poorly preserved (Fig. 25b); caruncle thick, continuing to posterior end of setiger 1; 2 pairs of eyes, the anterior pair somewhat further apart, oval, posterior pair more closely spaced, cup-shaped. Peristomium narrow, without lateral hood; palps thick, extending posteriorly for 6-7 segments.

Setiger 1 well-developed, notosetae present; dorsal lamellae of setigers 2-5 enlarged, membranous, thereafter notopodia reduced; setiger 7 with low dorsal crest; neuropodia smaller, more rounded throughout body. Noto- and neuropodia of setigers 1-9 with heavy bilimbate capillaries exhibiting prominent granulations (Fig. 25g). Capillaries thereafter smaller; inferior sabre setae in setiger 10 (Fig. 25f); multidentate hooded hooks appearing in neuro-

podia from setiger 17-18 and in notopodia from setiger 27-30; hooks bearing 5 tiers of apical teeth arranged in multiple rows above main fang; lower tier with 3-4 teeth, second and third tiers with 2-4 teeth each, fourth tier with 2 teeth and fifth with a single apical tooth (Fig. 25c-e); primary hood long and inflated; secondary hood present, but inconspicuous.

Three pairs of branchiae on setigers 2-4, all pinnate, first pair the largest (Fig. 25b). Pygidium with 1 long cirrus and 2 short lobes.

*Remarks:* The large number of teeth on the hooded hooks reported for this species appears to be unique for the genus *Prionospio*. It is the only member of the genus known to bear 3 pairs of pinnate gills.

*Distribution:* New South Wales; Victoria; India; Auckland Islands.

***Prionospio (Minuspio) cirrifera* Wirén, 1883**

(Figure 25a)

*Prionospio cirrifera* Wirén, 1883, p. 409; Fauvel,

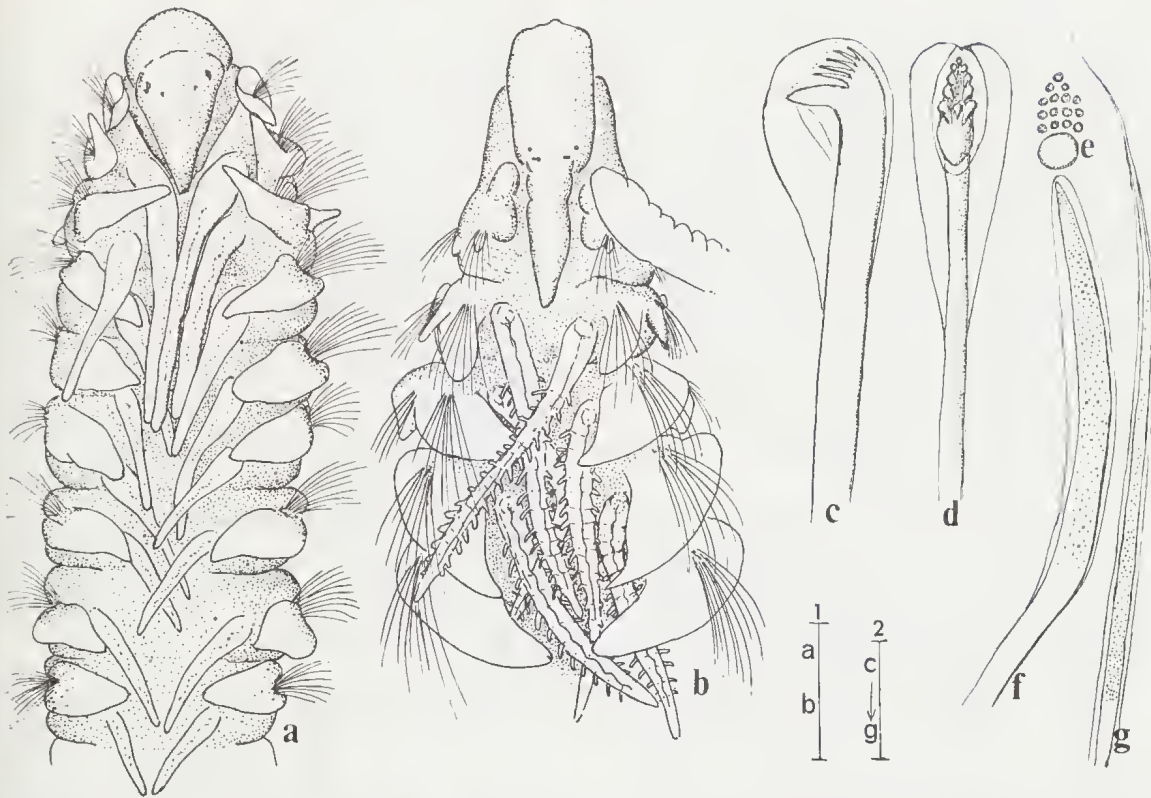


Figure 25—*Prionospio cirrifera* Wirén—a, anterior end, dorsal view—*Prionospio aucklandica* Augener—b, anterior end, dorsal view; c, hooded hook, lateral view; d, same frontal view; e, diagram of hooded hook tooth pattern at maximal development of secondary teeth; f, sabre seta; g, anterior capillary notoseta. [Scale 1 = 200  $\mu$ m; 2 = 20  $\mu$ m]

1927, p. 62; 1953, p. 324; Söderström, 1920, p. 237; Day, 1967, p. 486; Hartmann-Schröder, 1971, p. 324.

*Prionospio multibranchiata* Berkeley, 1927, p. 414; Pettibone, 1967, p. 12. HOMONYM [not Fauvel, 1928a].

*Prionospio delta* Hartman, 1965a, p. 11, 46, 147. *Fide* Foster, 1971, p. 108.

*Minuspio cirrifera*: Foster, 1971, p. 108 (Synonymy).

*Prionospio (minuspio) cirrifera*: Light, 1977, p. 82.

**Material Examined:** QUEENSLAND. Deception Bay, Burpengary Creek, Jan. 1975 (50+, AM W7127-7128, 7130-7131). NEW SOUTH WALES. Newcastle, Hunter River region, April, June 1971, coll. P. A. Hutchings and N. Ruello (20+, AM W13013-13015); Tuncurry Creek, Site 25-3, Aust. Littoral Soc., Jan. 1973 (1, AM W5673); Merimbula, Sta. MER 120G, Oyster lease transect, Oct. 1975, coll. J. H.

Day *et al.* (3, AM W11723); MER 117F Oct. 1975 (3, AM W11724); MER 148W, Spencer Park transect, *Zostera*, muddy sand, Oct. 1975 (1, AM W11728); MER 278M, netting over weed beds, Dec. 1975 (1 AM W11727); MER 366N-Z, grab sample from channel, March 1976 (1, AM W11726). VICTORIA. Port Phillip Bay, PPBES Stations 901 (93); 913 (2); 921 (11); 932 (2); 945 (54); 952 (215); 962 (1); 978 (2); 983 (5) (NMV G3146-3154); Hobsons Bay-Yarra River, MSG Stations, Feb.-Nov. 1975, coll. G. Poore and J. D. Kudenov, 128 (1554, NMV G3155); 131 (165, NMV G3156); 134 (109, NMV G3157); Paynesville, Gippsland Lakes, from jetty, 2 m, sand, coll. J. D. Kudenov (20, NMV G3145).

**Description:** Prostomium anteriorly rounded, with caruncle extending to posterior end of setiger 2 (Fig. 25a). Peristomium with low lateral wings partially enclosing prostomium. Six to 12 pairs of cirriform branchiae from setiger 2; these varying in length. Low dorsal crests present on a variable number of post-branchial setigers. Anterior setae all capillaries; multidentate hooded hooks in neuropodia from setiger 12-19 and in notopodia from setiger 15-40; these hooks with 8-10 apical teeth ar-



ranged in 2 rows over main fang. Pygidium with long medial cirrus and 2 lateral cirri.

*Remarks:* The variability seen in different populations of *P. cirrifera* suggest that a detailed global analysis of the morphology of this species is needed. We have not observed genital pouches on any of our specimens, nor did Light (1977) in his San Francisco Bay study. Foster (1971), however, indicated that they did occur in some of her material.

*Distribution:* Queensland; New South Wales; Victoria; cosmopolitan.

#### Genus *Spiophanes* Grube, 1860

*Type-species:* *Spiophanes kroeyeri* Grube, 1860, by monotypy.

*Diagnosis:* Prostomium anteriorly broad, rounded or bell-shaped with frontal horns developed to varying degrees; eyes present or absent; with or without occipital tentacle. Branchiae entirely lacking. Setigers 1-4 shifted dorsally with well-developed dorsal and ventral lamellae; setigers 5-14 generally with interramal thread glands forming supernumerary bacillary setae. Neuropodia of setiger 5 and subsequent segments poorly-developed, with reduced neuropodia; notopodia also reduced, more laterally placed. Anterior notosetae all capillaries, hooks or crochets only in neuropodia, generally from about setiger 15, these hooks bi-, tri-, or quadridentate, with or without hood; 1-2 large curved spines in neuropodia of setiger 1, inferior sabre setae generally occurring in middle and posterior neuropodia. Pygidium with 2 or more anal cirri, with or without other processes or papillae.

#### KEY TO SPECIES OF *SPIOPHANES* FROM SOUTHEASTERN AUSTRALIA

- 1a. Occipital tentacle present; prostomium bell-shaped, broad anteriorly, without frontal horns; nuchal organs single (Fig. 27a) . . . . . *S. kroeyeri*
- b. Occipital tentacle absent; prostomium rounded anteriorly or with distinct frontal horns; nuchal organs paired . . . . . 2
- 2a. Prostomium rounded anteriorly; nuchal organs extend posteriorly to setiger 4 then curve back anteriorly toward prostomium (Fig. 26a) . . . *S. wigleyi*

- b. Prostomium straight across anteriorly, with prominent frontal horns; nuchal organs extend posteriorly and terminate about setiger 4 . . . . . *S. bombyx*

#### *Spiophanes bombyx* (Claparède, 1870)

*Spio bombyx* Claparède, 1870, p. 485.

*Spio crenaticornis:* Giard, 1881, p. 600. *Not* Montagu, 1813. *Fide* Mesnil, 1896, p. 249; Foster, 1971, p. 41.

*Spiophanes verrilli* Webster and Benediet, 1884, p. 728. *Fide* Pettibone, 1962, p. 85; Foster, 1971, p. 41.

*Spiophanes bombyx:* Mesnil, 1896, p. 249; Fauvel, 1927, p. 41; Söderström, 1920, p. 243; Okuda, 1937, p. 222; Day, 1967, p. 474; Foster, 1971, p. 41 (Synonymy); Light, 1977, p. 80.

*Material examined:* QUEENSLAND. Moreton Bay, Middle Banks, Sta. 5A, Jan. 1976, coll. W. Stephenson (2, QM G11594). VICTORIA. Gippsland, McGaurans Beach, 9-18 m, sandy with shell fragments and silt, June, Aug. 1977, coll. J. E. Watson (2, NMV G3050).

*Description:* Prostomium with 2 prominent frontal horns, lacking occipital cirrus. Neuropodia of setiger 1 with 1-2 large curved spines. Hooded hooks tridentate, beginning on setiger 15-16. Setiger 5-15 with parapodial thread glands, from which supernumerary setae extend through an interramal opening. Pygidium with 2 anal cirri.

*Remarks:* *Spiophanes bombyx* is the best known species of the genus, occurring throughout the world in sand substrata. Our specimens agree well with the recent description by Foster (1971). Day (1967) described *S. bombyx* from South Africa as having an occipital tentacle, but subsequently reported this to be in error (Day, 1973).

*Distribution:* Queensland; Victoria; cosmopolitan.

#### *Spiophanes wigleyi* Pettibone, 1962

(Figure 26)

*Spiophanes wigleyi* Pettibone, 1962, p. 83; Hartman, 1965a, p. 147; Foster, 1971, p. 43.

*Material examined:* VICTORIA. Bass Strait, ESSO-GIPPS Sta. 9, sand, 148° 35'S-38° 8'E. (1, AM W13016); Sta. 17, 419 m, sand, 148° 34'S-38° 59'E (3, AM W13017); Sta. 20, 93.6 m, sand, 148° 24' 50"S-39° 00' 02"E (1, AM W13018).

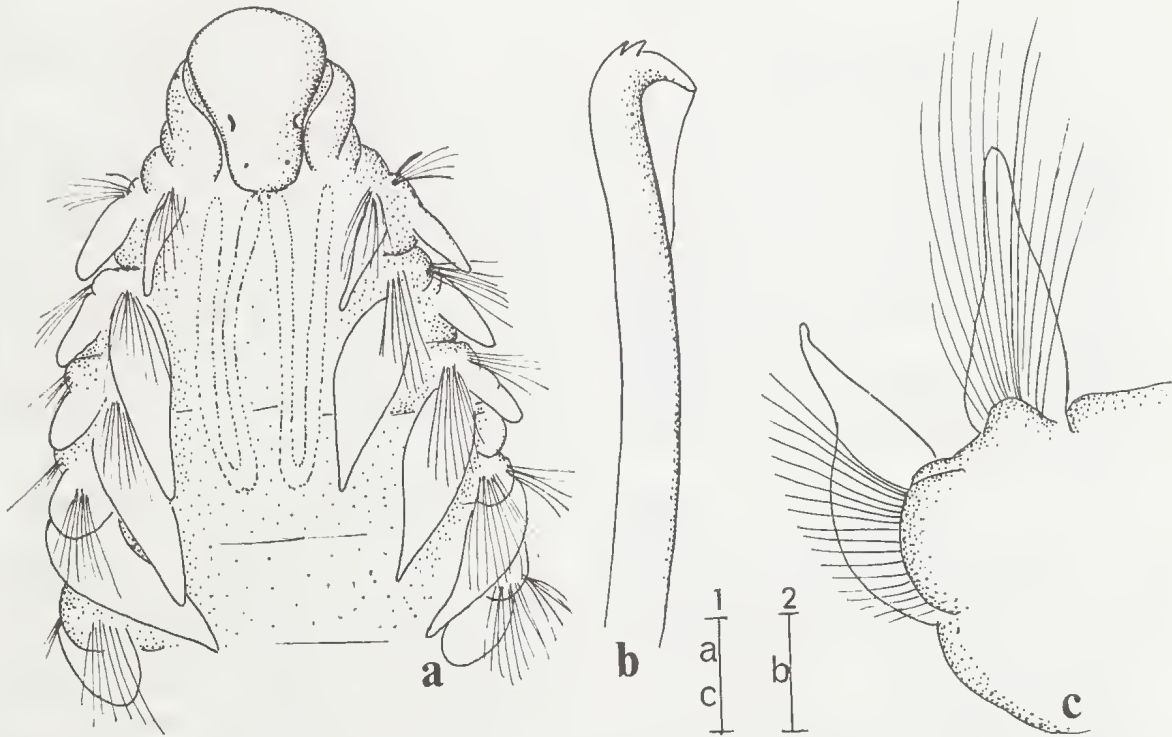


Figure 26—*Spiophanes wigleyi* Pettibone—a, anterior end, dorsal view; b, hooded hook; c, right setiger 3, anterior view. [Scale 1 = 200  $\mu$ m; 2 = 20  $\mu$ m]

**Description:** A small species up to 10 mm long for about 40 segments. Prostomium rounded anteriorly, lacking frontal horns and occipital tentacle (Fig. 26a). Caruncle absent; usually 2 pairs of eyes, the anterior pair cup-shaped, posterior pair oval; a pair of recurved dorsal sense organs extending to setiger 4, then turning forward and returning to setiger 1 forming W-shaped pattern (Fig. 26a). Setiger 1 well-developed but with shorter dorsal cirri than 2-4; notopodia of setigers 1-4 basally broad, tapering distally (Fig. 26c), neuropodia broadly triangular, longest on setigers 2-3; parapodia reduced from setiger 5, neuropodia pad-like; notopodia shorter.

Anterior noto- and neurosetae capillaries with granulations arranged in 2 tiers, neurosetae reduced to 1 tier by setiger 9; tridentate neuropodial hooks with reduced hood (Fig. 26b) from setiger 15-16.

Dorsal segmental ridges or crests present

from setiger 15, these prominent on setigers 18-30 thereafter inconspicuous. Setiger 5-14 with parapodial thread glands bearing bacillary setae. Genital pouches absent.

Pygidium with 4-6 anal cirri.

**Remarks:** Specimens agree well with the original description of *S. wigleyi*. The apparent disjunct range of this species is probably a reflection of the lack of samples along continental shelf margins.

**Distribution:** Victoria; North America, New England [Type locality] to Gulf of Mexico.

#### *Spiophanes* cf. *kroeyeri* Grube, 1860

(Figure 27)

*Spiophanes kroeyeri* Grube, 1860, p. 88; Pettibone, 1962, p. 85 (Synonymy).

*Spiophanes kroeyeri*: Fauchald, 1972, p. 29; Light, 1977, p. 79 (Synonymy).

**Material examined:** QUEENSLAND. Moreton Bay, Middle Banks, Sta. 4, Sept. 1976, coll. W. Stephenson (11, NMV G2849-2850). NEW SOUTH WALES. Sydney, Malabar, AMSBS Sta. B3 S1 (12, AM W6499); Same, Sta. CA + 5 (AM W6500); Newcastle, Burwood Beach, HDWBS Station, April 1975 (1, AM W8947). VICTORIA. Bass Strait, ESSO-GIPPS Stations 11, 738 m, 148° 39'S-38° 18' 20'E (1, AM

W13019); Sta. 13, 1440 m, ooze, 148° 40' 10"S-38° 26' 26"E (1, AM W13020); Sta. 20, 93.6 m, sand, 148° 24' 50"S-39° 00' 02"E (AM W13021).

*Description:* A moderate-sized species up to 22 mm long and 2 mm wide for 47 segments. Body generally opaque white in alcohol with dark brown parapodial glands on setigers 6-12. Body flattened, thereafter narrower, cylindrical.

Prostomium bell-shaped, with occipital tentacle, caruncle extending to setiger 1-2. Eyes variable, usually 2 pairs, anterior pair rounded, posterior pair with several distinct ocelli (Fig. 27a). Peristomium well-developed, but not enclosing prostomium. Narrow nuchal ciliary tracts extending posteriorly along dorsum behind caruncle.

Setiger 1 with finger-like, pointed neuropodial lamella (Fig. 27b); ventral lamellae of setigers 2-4 rounded, elongate; neuropodia thereafter reduced to low ridge (Fig. 27e); notopodia of setigers 1-4 cirriform, thereafter reduced, with broad base and narrow finely tapered cirrus (Fig. 27c-e).

Setiger 1 with large, curved non-granulated spine (Fig. 27b). Granulated inferior sabre seta appearing on setiger 4, 1 per fascicle, continuing throughout body (Fig. 27g); notosetae of setigers 1-4 in 3 tiers, setae of first tier with granulations, rest non-granulated, all unilimbate; notosetae of setiger 5 and subsequent setigers fewer, shorter; capillary neurosetae of setigers 1-4 smooth, these replaced over following setigers by broadly sheathed pointed setae with granulated shafts (Fig. 27f), numbering up to 12-15 per fascicle by setiger 9 (Fig. 27c); all capillaries replaced by setiger 15 with 6-7 quadridentate hooks (Fig. 27d) without hoods (Fig. 27h); hooks increasing to 11-12 per ramus in posterior neuropodia.

Dark glands present between noto- and neuropodia on setigers 6-12, each gland with a cleft (Fig. 27c); no bacillary setae (see *Remarks*). Genital pouches from setiger 15 occurring between successive parapodia for variable number of segments; dorsal crests with cilia from setiger 18 (Fig. 27e).

Pygidium cylindrical, surrounded by 8 thin cirri.

*Remarks:* The present specimens are closely related to *S. kroeyeri* Grube, 1860 known from

cosmopolitan cold water areas (Light, 1977). They differ somewhat in having a bell-shaped instead of subtriangular prostomium, and by lacking, instead of having, bacillary setae emerging from parapodial thread glands. Although bacillary setae are often difficult to observe, we did examine each specimen carefully, and in no case were the supernumerary setae detected. Several segments were removed and squashed under coverslips, but in no case were threads or bacillary setae observed. The glandular material appeared as clumps of globular cells suggestive of mucous glands rather than thread glands. We tentatively refer our material to *S. kroeyeri*.

#### General Remarks on the Genera *Spio* and *Microspio*

The separation of the genera *Spio* and *Microspio* has been vague in the previous literature. *Microspio* is currently considered a subgenus of *Spio* (see Foster, 1971). The branchiae begin on setiger 1 in *Spio* and on setiger 2 in *Microspio*. However, some species of *Spio*, have very reduced branchiae on setiger 1 and have been considered by some authors as species of *Microspio* (see Foster, 1971 for review). We consider that the first occurrence of the branchiae is absolute, regardless of size, and concur with Foster (1971), but prefer to raise both taxa to full generic rank.

Species of both *Spio* and *Microspio* are numerous and in need of review (Holmquist, 1967; Foster, 1971). Our studies have confirmed that the dorsal sense organs of the Australian species are important to species concepts, provided that specimens are well-preserved. Such an approach was previously utilized by Söderström (1920). Any revision of *Spio* and *Microspio* should thus consider dorsal sense organs at the species level.

#### Genus *Spio* Fabricius, 1785

*Spio* Fabricius, 1785. *Type-species: Nereis filicornis* Müller, 1776, designated by Söderström, 1920.  
*Paraspio* Czerniavsky, 1881. *Type-species: Spio decoratus* Bobretzky, 1870, by monotypy.

*Diagnosis:* Prostomium anteriorly rounded or incised, without frontal horns (although may be anteriorly inflated); eyes present or absent.



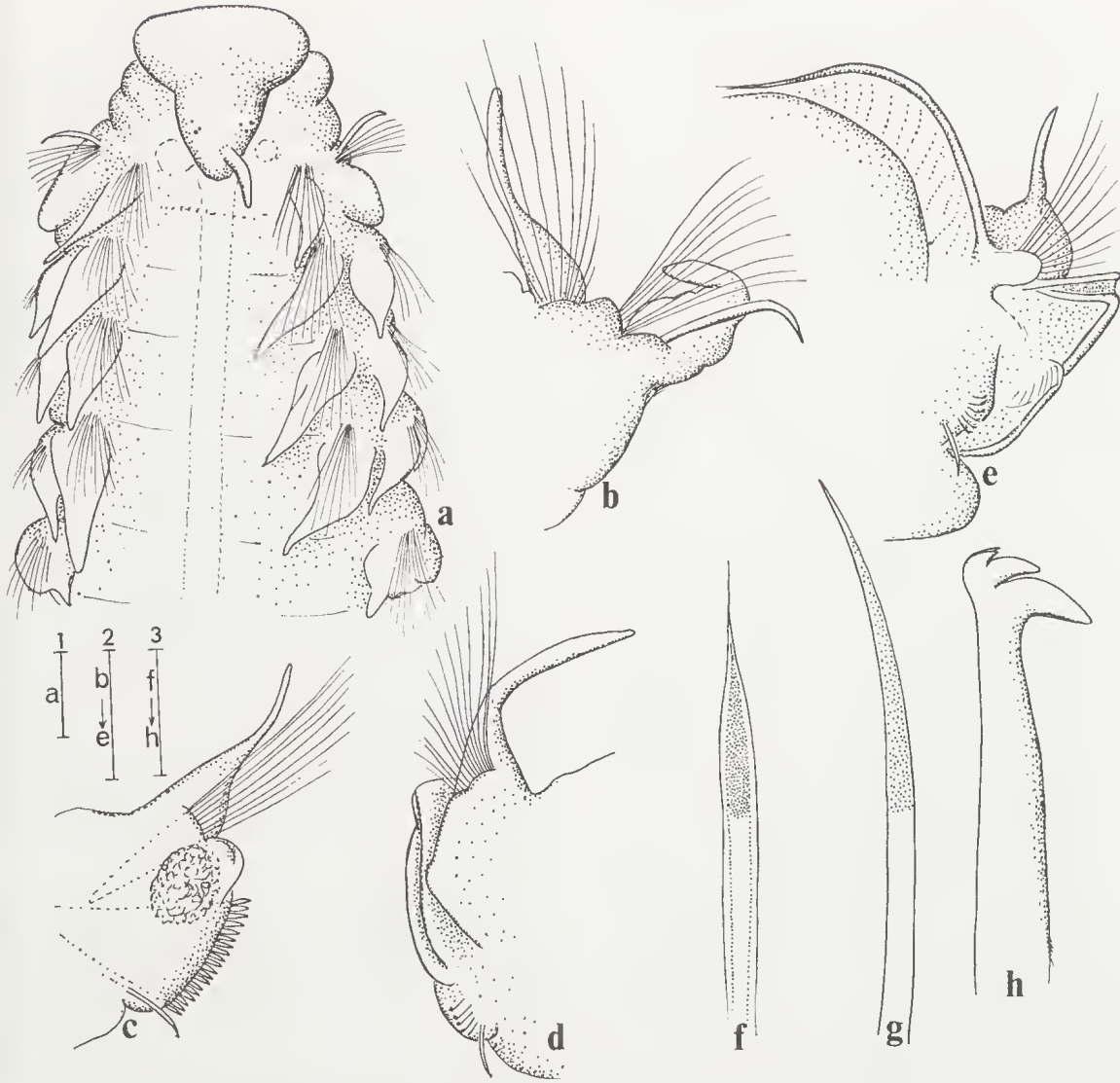


Figure 27—*Spiophanes* cf. *kroeyeri* Grube—a, anterior end, dorsal view; b, left setiger 1, anterior view; c, left setiger 9, anterior view; d, right setiger 15, anterior view; e, left setiger 21, anterior view; f, broad sheathed neuroseta from setiger 9; g, sabre seta, setiger 15; h, quadridentate hook. [Scale 1 = 200  $\mu$ m; 2 = 200  $\mu$ m; 3 = 20  $\mu$ m]

Branchiae from setiger 1, continuing throughout body, fully developed or greatly reduced at first, increasing in length thereafter, often partially fused to dorsal lamellae in anterior, and free in posterior setigers. Notosetae capil-

laries only; neurosetae including capillaries, hooded hooks and sabre setae. Pygidium with anal cirri.

#### KEY TO SPECIES OF *SPIO* FROM AUSTRALIA

- 1a. Prostomium incised on anterior margin . . . . . *S. mesnili*
- b. Prostomium entire on anterior margin . . . . . 2
- 2a. Branchiae reduced on setiger 1, fully developed by setiger 2 (Fig. 29a); hooded hooks multidentate (Fig. 29g) from setiger 15-20 . . . . . *S. singularis*

- b. Branchiae fully developed on setiger 1 (Fig. 28a); hooded hooks tridentate (Fig. 28i) from setiger 9-11  
 .....*S. pacifica*

***Spio mesnili* Augener, 1914**

(Figure 28l)

*Spio mesnili* Augener, 1914, p. 10.

*Material examined:* WEST AUSTRALIA. Sharks Bay, Surf Point, outer bar, 16 June 1905, S.W. Australia Exped. 1905, Sta. 25 (1, TYPE, ZMH V-8222).

*Description of Holotype:* The type specimen is a poorly preserved anterior fragment approximately 4 mm long and 1.1 mm wide for 17 setigers. Body elliptical in cross section. Colour in alcohol: opaque white.

Prostomium anteriorly incised; no eyes; occipital tentacle lacking; nuchal organs obscured by poor preservation; peristomium poorly-developed; proboscis a flattened funnel.

Setiger 1 reduced dorsally, with notosetae; notopodial lamellae fused with branchiae; neuropodial lamellae small, elliptical; parapodia of setiger 2 slightly displaced dorsally, intermediately between those of setigers 1 and 3, subsequent segments similar to setiger 3.

Anterior setae sheathed capillaries, arranged in 2 tiers in both rami, first tier with short, granulated capillaries in all parapodia, second tier with non-granulated capillaries in all notopodia and in neuropodia of setigers 1-10; tridentate hooded hooks with secondary hoods first appearing in neuropodia of setiger 11, these hooks bearing main fang overlain by elongate secondary tooth and a third small apical tooth, poorly-defined (Fig. 28l). Setal distribution as follows: notopodia of setigers 4-14 with 9-10 capillaries in first tier and 10-12 in second tier; neurosetae of setiger 4 as in notopodia; neurosetae from setiger 14 with 7-8 granulated capillaries in first tier and 6 hooded hooks in second tier, plus 3 inferiorly located granulated capillaries. Branchiae from setiger 1 reduced,  $\frac{1}{2}$  as long as on setiger 2, branchiae arching dorsally, reaching midline at about setiger 10-15, bases connected by transverse dorsal ciliated ridge continuous with ciliated inner gill margin.

Pygidium absent on type, but according to

Augener (1914) it consists of 2-4 anal cirri.

*Remarks:* The new description of the type as presented above, generally agrees with the original description by Augener (1914, pp. 10-12). He notes, however, that 2 pairs of eyes were present and arranged in a square. The absence of those eyes on the type today, probably represents fading after 60 years in alcohol.

The type specimen of *S. mesnili* is from station 25 (S.W. Australian Expedition of 1905) and was noted by Augener (1914) to differ from other specimens from stations 1 and 3. The latter specimens were said to bear branchiae on setiger 1 which were as long as those on setiger 2, they apparently lacked granulated notosetae, and the tridentate hooded hooks began on setiger 14 and numbered only 3-4 per fascicle. In contrast, the type specimen has branchiae on setiger 1 which are only  $\frac{1}{2}$  as long as on setiger 2, the anterior notosetae are granulated and hooded hooks begin on setiger 11 and number up to 7-8 per fascicle. The specimens from stations 1 and 3 possibly represent a separate species, but final confirmation and possible identification must await either the location of those specimens or the collection of new materials from Sharks Bay.

*Spio mesnili* bears some similarity to *S. pacifica* (see below), but differs in having an incised prostomium and hooded hooks with secondary hoods and in lacking granulated sheaths in anterior capillaries. The presence or absence of inferior sabre setae in *S. mesnili* is not known.

*Distribution:* West Australia, Sharks Bay.

***Spio pacifica* sp. nov.**

(Figure 28a-k)

*Material examined:* QUEENSLAND. Moreton Bay, Middle Banks, Sta. 6E, May 1976, coll. W. Stephenson (1, QM G11590). NEW SOUTH WALES. Botany Bay, Towra Point, coll. NSWFS, April 1973, Sta. 211 (HOLOTYPE, NMV G2939 and 27 PARATYPES, NMV G2940); 107 PARATYPES from Botany Bay as follows: Sta. 213 (3); 332 (11); 337 (16); 340 (11) (NMV G2941-2944); 203 (3); 207 (2); 215 (4); 218 (6); 320 (5); 324 (4); 325 (10); 329 (13); 331 (11); 344 (8) (AM W13022-13031); Stockton Beach, HDWBS Station, Nov. 1975, (1, AM W8899). VIC-

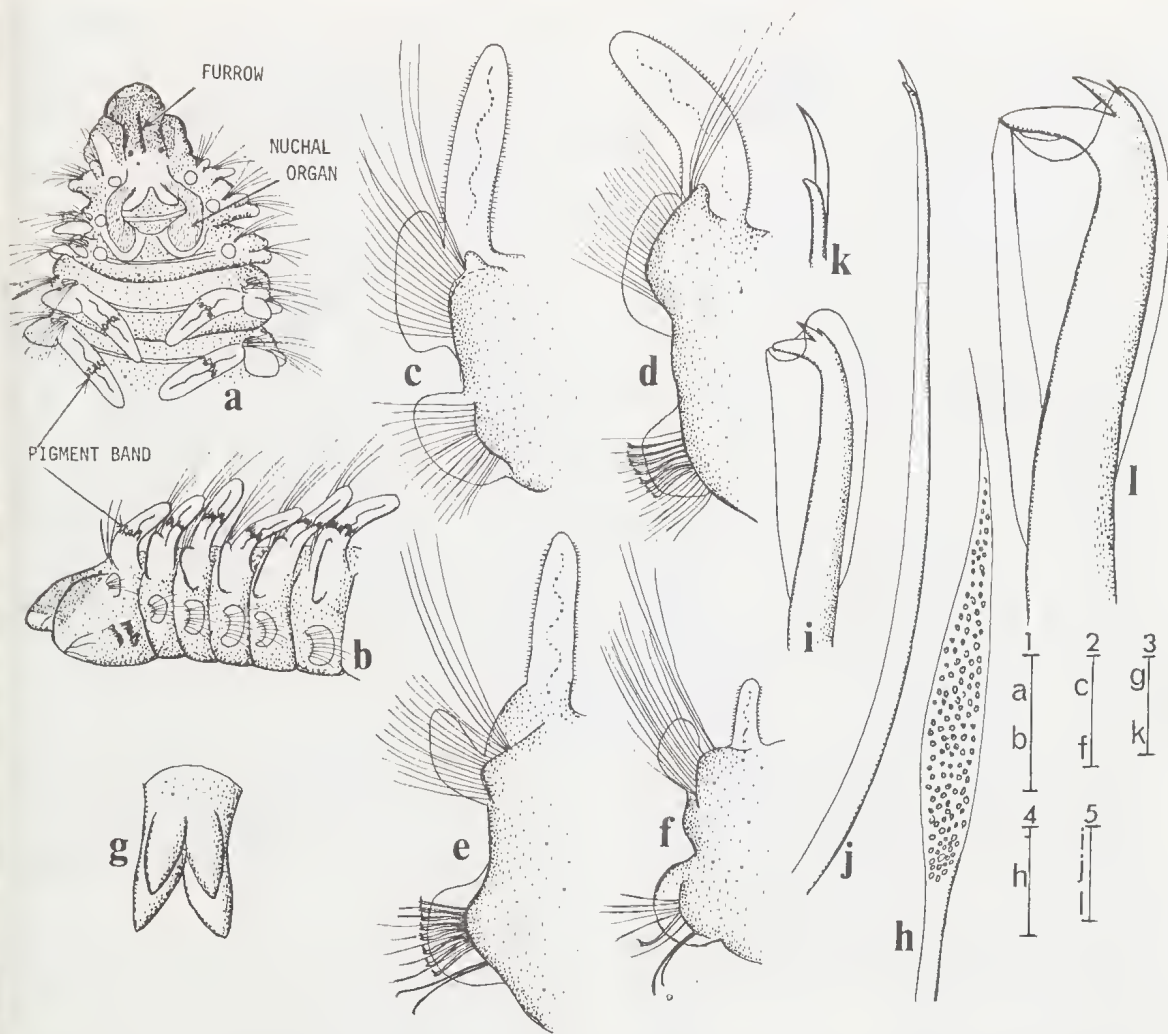


Figure 28—*Spio pacifica* sp. nov.—a, anterior end, dorsal view; b, anterior end, lateral view; c, right setiger 4, anterior view; d, right setiger 11, anterior view; e, right setiger 22, anterior view; f, right setiger 36, anterior view; g, pygidium, dorsal view; h, anterior capillary seta; i, tridentate hooded hook; j, inferior sabre seta; k, detail of j [not to scale]—*Spio mesnili* Augener—1, hooded hook. [Scale 1 = 100  $\mu$ m; 2 = 200  $\mu$ m; 3 = 20  $\mu$ m; 4 = 50  $\mu$ m; 5 = 20  $\mu$ m]

TORIA, Westernport, Crib Point, CPBS Station 32S Dec. 1969 (1, NMV G2896); Westernport, WPBES Stations 1722 (2, NMV G2929-2930); 1724 (4, NMV G2927-2928); 1732 (1, NMV G2931). Port Phillip Bay, PPBES Stations 123/3 (1, NMV G2938);

920/5 (1, NMV G2934); 945 (2, NMV G2932-2933); 967 (5, NMV G2935-2937).

**Description:** A small species, up to 10 mm long and 1 mm wide for 50 setigers. Body widest anteriorly, tapering gradually posteriorly. Specimens heavily pigmented anteriorly with brown pigment on prostomium, peristomium, dorsum, ventrum and intersegmental regions (Fig. 28 a-b); brown transverse band mid-way along gill filaments (Fig. 28b) and paired mid-ventral spots on setigers 2-10; no pigment in middle and posterior setigers.

Prostomium rounded on anterior margin, with a median furrow (Fig. 28a). Caruncle divides into 2 lobes surrounded laterally by



paired, curved ciliated nuchal organs extending to middle of setiger 3. Eyes 2 pair; anterior pair largest. Palps extend posteriorly to setiger 8-10. Peristomium moderately developed to form lateral wings.

Setiger 1 reduced, notopodial lamellae small, elliptical, dorsolaterally positioned; neuropodial lamellae 2-3 times larger, subquadrate (Fig. 28a-b); notopodial lamellae of anterior setigers elliptical to subquadrate (Fig. 28c-d); those of middle and posterior setigers elongate, rounded (Fig. 28e-f); neuropodial lamellae rounded (Fig. 28c-f), with presetal notopodial lobes in setigers 1-17 (Fig. 28c-d).

Anterior notosetae and neurosetae sheathed capillaries, granulated and non-granulated, arranged in 2 tiers, notopodia with additional 3 long smooth superior capillaries; capillaries of anterior tier golden with large granules in setigers 1-6 (Fig. 28h); granulations becoming small, and setae appearing light brown by setiger 11; granulations only distal from about setiger 22 and completely gone by setiger 36; anterior neurosetae include sheathed granulated and non-granulated capillaries arranged in 2 tiers; inferior sabre setae from setigers 11-33, these sabre setae unique, granulated, distally falcate with partial hood formed by extension of sheath (Fig. 28j-k); neuropodial tridentate hooded hooks first present from setiger 9-11, with third tooth inconspicuous, then becoming more pronounced in posterior setigers (Fig. 28i). Margin of hood aperture smooth.

Branchiae beginning setiger 1, continuing to end of body; well-developed, fused with dorsal lamellae in anterior segments, free in middle and posterior segments, ciliated on both inner and outer margins, connected by transverse ciliated bands across dorsum; ciliated band of setiger 2 interrupted by paired nuchal organs (Fig. 28a).

Pygidium terminal, with 2 pairs of thick anal cirri (Fig. 28g), ventral pair  $1\frac{1}{2}$  times longer and wider than dorsal pair; pygidium equal in length to last 5-6 setigers.

*Remarks:* *Spio pacifica* and *Spio pettiboneae* Foster, 1971 have rounded prostomia, large branchiae on setiger 1 and tridentate hooded hooks. *S. pacifica* differs in having presetal

notopodial lobes in the anterior segments, an inconspicuous third tooth on the hooded hooks instead of a prominent one, acicular and falcate sabre setae with distal partial hoods and a different pygidial structure.

*Distribution:* Queensland; New South Wales; Victoria.

### *Spio singularis* sp. nov.

(Figure 29)

*Material examined:* QUEENSLAND. Moreton Bay, Middle Banks, Sta. 57, Dec. 1972, coll. W. Stephenson (HOLOTYPE, NMV G2884); Sta. 51, Dec. 1973 (PARATYPE, NMV G2945); Sta. 48, Dec. 1972 (PARATYPE, NMV G2946); Sta. 29, Sept. 1972 (3 PARATYPES, QM G11595); Sta. 28, Dec. 1973 (PARATYPE, QM G11596).

*Description:* Only incomplete specimens available. A small species, up to 10 mm long and 2 mm wide for 30 setigers. Anterior body very wide, subrectangular in cross section. Body brownish red with brown pigment patches on prostomium, and brown interramal spots (Fig. 29 a-b).

Prostomium bluntly rounded, with raised inflated boss at level of setiger 1 (Fig. 29a); caruncle extending posteriorly in 1 or 2 descending steps to middle of setiger 2; no eyes; peristomium reduced, forming slight lateral wings; nuchal organs paired, extending to anterior margin setiger 3.

Setiger 1 reduced, with notosetae, notopodia shifted dorsally, notopodial lamellae elliptical, becoming subtriangular in middle segments (Fig. 29c-e); neuropodial lamellae elliptical to broadly rounded (Fig. 29c-e). Notosetae sheathed capillaries, arranged in 2 tiers, those of anterior setigers granulated, becoming non-granulated posteriorly; neurosetae similarly arranged in 2 tiers; sabre setae first present from about setiger 13; hooded hooks from setiger 15, numbering up to 6 per neuropodium, appearing tridentate in lateral view (Fig. 29f); but with 4-5 secondary teeth when seen in frontal view (Fig. 29g).

Branchiae short on setiger 1, reaching full-size by setiger 2, but gills narrower than those of setiger 3, branchial ciliation present on inner gill margin, continuous with dorsal transverse ciliary bands on body wall (Fig. 29a). Pygidium unknown.

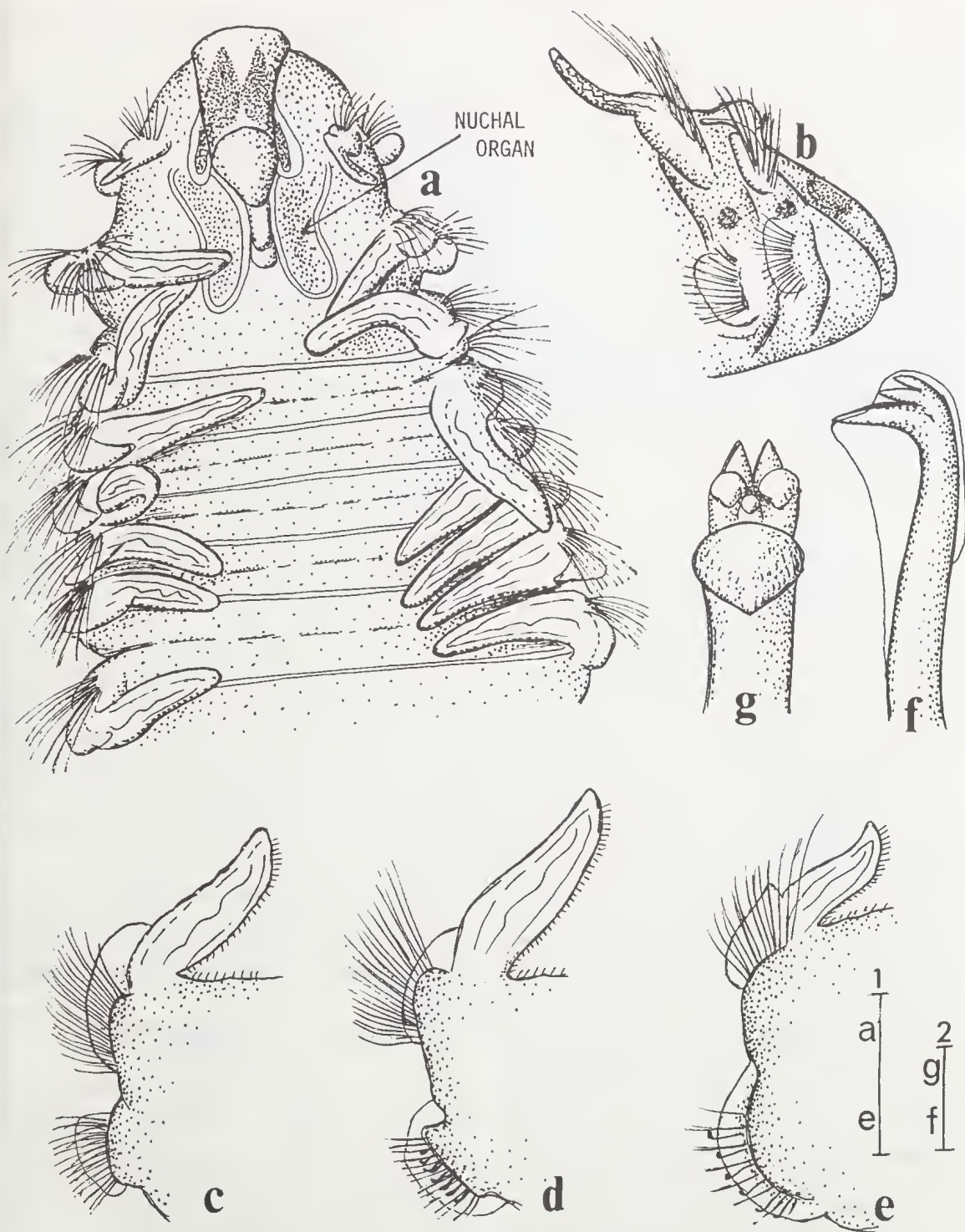


Figure 29—*Spio singularis* sp. nov.—a, anterior end, dorsal view; b, anterior end, lateral view; c, right setiger 6, anterior view; d, right setiger 13, anterior view; e, right setiger 27, anterior view; f, quinquedental hooded hook, lateral view; g, hexadentate hooded hook, hood omitted [not to scale]. [Scale 1 = 100  $\mu$ m; 2 = 20  $\mu$ m]



*Remarks:* The presence of hooded hooks bearing 4 and 5 apical teeth is unique for the genus *Spio*.

*Distribution:* Queensland, Moreton Bay.

### Genus *Microspio* Mesnil, 1896

*Microspio* Mesnil, 1896. *Type-species:* *Spio mecznikowianus* Claparède, 1869, designated by Söderström, 1920.

*Mesospio* Gravier, 1911. *Type-species:* *Mesospio moorei* Gravier, 1911, by monotypy. *Fide* Foster, 1971.

*Diagnosis:* Prostomium rounded to bilobed on anterior margin, without frontal horns; eyes present or absent. Occipital cirrus present or absent. Branchiae beginning on setiger 2. Capillary notosetae only; neurosetae including capillaries, hooded hooks and sabre setae. Pygidium with anal cirri.

### *Microspio granulata* sp. nov.

(Figures 30-31)

*Material examined:* NEW SOUTH WALES. Botany Bay, Towra Point, NSWFS Stations 329, April 1973 (HOLOTYPE, NMV G2947), 6 PARATYPES as follows: Sta. 211 (1, NMV G2950); Sta. 311 (1, NMV G2951); Sta. 325 (1, NMV G2948); Sta. 338 (1, AM W13049); Sta. 342 (1, AM W13050); Sta. 335 (1, AM W13032).

*Description:* Holotype and paratypes incomplete, up to 10 mm long and 1.5 mm wide for 31 setigers. Body very wide anteriorly, elliptical in cross section; intensely pigmented with brown patches on prostomium, peristomium and branchiae, brown paired rectangular patches on dorsum continuous laterally and ventrally (Fig. 30a-b); a dorsomedial strip lacking pigment in anterior 6-7 segments (Fig. 30a); from setiger 8, segmentally paired medial pigment areas, occurring on each side of transverse ciliary band.

Prostomium bilobed, deeply incised on anterior margin with medial furrow continuing on frontal lobe, caruncle bluntly terminating at middle of setiger 2, posteriorly rounded, with prominent occipital papilla (Fig. 30a-b); 2 pairs of eyes, arranged trapezoidally, anterior pair the larger. With transverse hood reminiscent of dorsal collar seen in genus *Streblospio* present posterior to prostomium, surrounded laterally and posteriorly by curved nuchal

grooves. Peristomium weakly developed. Palps extend posteriorly 6-7 setigers. Proboscis an eversible sac.

Setiger 1 reduced, with small digitiform notopodial lamellae shifted dorsally, lacking notosetae; postsetal neuropodial lamellae reduced, inserted ventrolaterally (Fig. 30a-b); anterior notopodial lamellae broadly to narrowly rounded, partially fused to branchiae (Fig. 30c-c); anterior neuropodial lamellae broadly rounded, reaching maximum size at about setiger 20.

Notosetae include sheathed capillaries arranged in 2 tiers; notopodia with 20-30 capillaries in main fascicles plus 2-3 long superior capillaries; anterior tiers of setigers 2-5 with granulated capillaries, these granulations lost in subsequent setigers, only non-granulated capillaries remaining in posterior setigers; posterior tiers with distally granulated capillaries throughout body; sheaths of setae on setigers 2-6 strongly granulated (Fig. 31a). Neurosetae of anterior setigers with about 10-11 capillaries in each of 2 tiers, plus 2 long, tapered, inferior capillaries; capillaries of anterior tiers of setigers 1-4 granulated throughout their lengths, remaining setae of both neurosetal tiers granulated only on distal half. Capillary sheaths of posterior tiers distally bristled (Fig. 31b); tridentate hooded hooks beginning from setiger 9, 8-9 hooks per fascicle (Fig. 31c-d); sabre setae first appearing in setigers 15-17, these distally mucronate, heavy and spinous (Fig. 31e).

Branchiae fully developed from setiger 2, continuing to end of body; with inner ciliated gill margins connected by transverse ciliated ridges on dorsum from setiger 3. Pygidium unknown.

Genital pouches present from setiger 12, decreasing in size to setiger 29 (Fig. 30d-e).

*Remarks:* *Microspio granulata* is similar to *M. mecznikowianus* (Claparède) in lacking notosetae on setiger 1 and in bearing tridentate hooded hooks. *M. granulata* differs in having an occipital cirrus and a transverse hood across setiger 2; such a hood is otherwise known only in the genus *Streblospio*.

*Distribution:* New South Wales, Botany Bay.



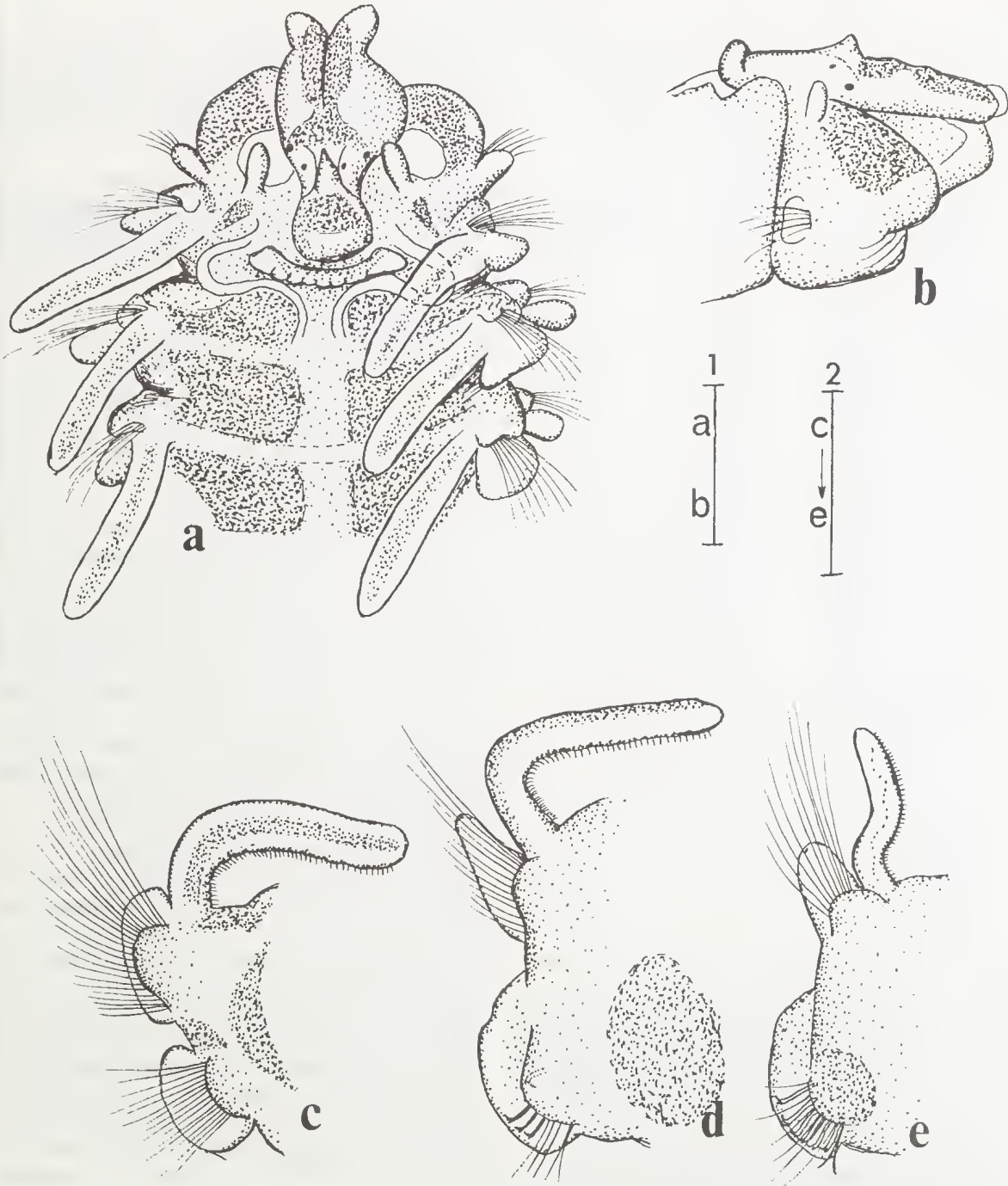


Figure 30—*Microspio granulata* sp. nov.—a, anterior end, dorsal view; b, anterior end, lateral view; c, right setiger 4, lateral view; d, right setiger 12, anterior view; e, right setiger 29, anterior view. [Scale 1 = 100  $\mu\text{m}$ ; 2 = 200  $\mu\text{m}$ ]

#### General Remarks on the *Polydora*-complex

The generic arrangement of the numerous species of the *Polydora*-complex has usually been based upon the first appearance of hooded hooks and the presence of branchiae

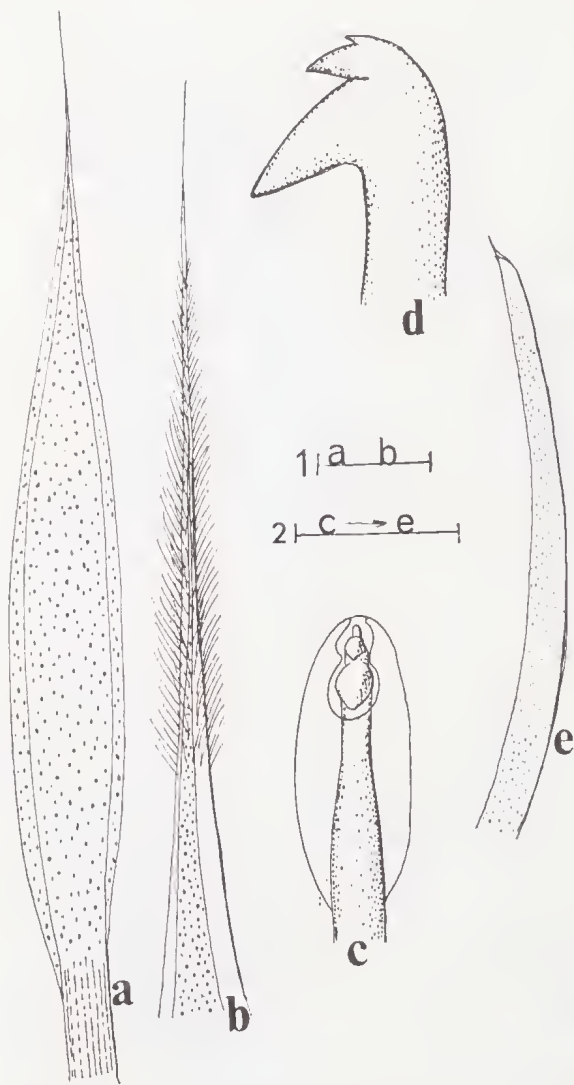


Figure 31—*Microspio granulata* sp. nov.—a, superior capillary notoseta; b, anterior capillary neuroseta, distal tip; c, tridentate hooded hook, frontal view; d, tridentate hooded hook, lacking hood, lateral view; e, inferior sabre seta. [Scale 1 = 20  $\mu$ m; 2 = 20  $\mu$ m]

anterior or posterior to setiger 5. Five genera are normally recognized: *Polydora* Bosc, *Boccardia* Carazzi, *Pseudopolydora* Czerniavsky, *Tripolydora* Woodwick and *Polydorella* Augener. A sixth genus, *Paraboccardia* Rainer has lately been regarded as a subgenus of *Boccardia* (Read, 1975). Many species, how-

ever, demonstrate characteristics of one or more of these genera and the system has remained unstable (Woodwick, 1964; Foster, 1971; Read, 1975) with little agreement between workers on which genera (or subgenera) are valid.

In the present study we introduce a new generic format based on the degree of modification of setiger 5, structure of modified spines in setiger 5, first appearance of branchiae and to a lesser degree, structure and first appearance of hooded hooks.

The polydorids are herein arranged into 6 full genera: *Pseudopolydora*, *Polydora*, *Carazziella* nov. gen., *Tripolydora*, *Boccardiella* nov. gen. and *Boccardia*. *Paraboccardia* is a new synonym of *Boccardia* and *Polydorella* is a new synonym of *Pseudopolydora*. Details for each of these genera and reasons for the synonymies are discussed under each genus in the text. Table 3 is a summary of characteristics of each of the 6 genera. As seen in this arrangement, 3 genera have branchiae beginning on setiger 2 and 3 have branchiae beginning posterior to setiger 5. In each of these groups there is a genus bearing a close relationship to one in the other group. For example, *Pseudopolydora* and *Tripolydora* are similar, but the first has branchiae posterior to setiger 5 while the second has branchiae from setiger 2. Both have relatively undeveloped fifth setigers and similar hooded hook structures, but a different arrangement and structure of major spines of setiger 5. In a similar manner, *Polydora* and *Boccardiella* show close relationships as do *Carazziella* and *Boccardia*. *Polydora* remains the most heterogeneous of the genera and it contains the greatest number of species. *Polydora guillei* Laubier and Ramos, 1974 from the Mediterranean, described from fragmentary specimens, differs from all 6 polydorid genera and all known spionids in having unhooded unidentate neuropodial hooks from setiger 15. The species probably represents a separate genus.

In the present study only the genus *Tripolydora* was not encountered. Species making up the newly proposed genera *Carazziella* and *Boccardiella* are, in part, removed from other pre-existing genera, but, several new

TABLE 3  
Some Taxonomic Characteristics of the Genera of the *Polydora*-complex

<i>Genus</i>	<i>Setiger 1</i>	<i>Setiger 5</i> <i>modification</i>	<i>Setiger 5</i> <i>major spines</i>	<i>Branchiae</i> <i>begin</i>	<i>Hooded</i> <i>hooks</i> <i>beginning;</i> <i>no. teeth</i>	<i>Hooded hooks</i> <i>Structure</i>
<i>Pseudopolydora</i>	Normal to achaetous	Slight to moderate	2 types, usually in J- or U-shaped double rows	Posterior to setiger 5	Setiger 8; bidentate	Secondary tooth closely applied main fang; with constriction on shaft
<i>Polydora</i>	With or without notosetae	Great	1 type, with or without companion setae	Posterior to setiger 5	Setigers 7-17; bidentate	With prominent angle between teeth; with or without constric- tion on shaft
<i>Carazziella</i>	With or without notosetae	Great	2 types in 2 rows, 1 or both may bear bristles	Posterior to setiger 5	Setigers 7-14; bidentate	With prominent angle between teeth; without constriction on shaft
<i>Tripolydora</i> *	Without notopodia and notosetae	Slight	1 type, with companion setae	Setiger 2, present on setiger 5	Setiger 9; tridentate	Secondary teeth closely applied to main fang; no constriction on shaft
<i>Boccardiella</i>	With or without notosetae	Great	1 type, with companion setae	Setiger 2, present or absent on setiger 5	Setiger 7; bidentate	With prominent angle between teeth; without constriction on shaft
<i>Boccardia</i>	With or without notopodia and <sup>†</sup> notosetae	Great	2 types in 2 rows, 1 may be bristle- topped	Setiger 2, absent on setiger 5	Setigers 7-8; bidentate	With prominent angle between teeth; without constriction on shaft

\* Holotype of *Tripolydora spinosa* Woodwick, 1964 [Type-species] from Eniwetok was examined (USNM 254881).

species are also described. Fifteen new polydorid species are described below from southeastern Australia. Further reviews and descriptions of additional new species from world-wide areas will be published in a subsequent paper (Blake, in preparation).

#### Genus *Boccardia* Carazzi, 1893 emended

*Boccardia* Carazzi, 1893. *Type-species: Polydora (Leucodore) polybranchia* Haswell, 1885, by monotypy.

*Paraboccardia* Rainer, 1973. *Type-species: Paraboccardia syrtis* Rainer, 1973, by original designation.

**Diagnosis:** Prostomium rounded or incised, extending posteriorly as caruncle. Setiger 1 with

or without notosetae. Setiger 5 modified with 2 types of major spines, few capillary notosetae, or these absent. Bidentate hooded hooks with conspicuous angle between teeth, without constriction or manubrium on shaft; first appearing on setiger 7-8. Posterior notopodial spines present or absent. Branchiae beginning on setiger 2, absent from setiger 5, present thereafter and continuing for variable number of segments. Pygidium disc-like with or without separate lobes or reduced to small lobes or cuffs.

**Remarks:** The genus *Boccardia* is herein restricted to those species having 2 types of ma-



major spines on setiger 5. Species formerly assigned to *Boccardia* on the basis of gills being present anterior to setiger 5, but having a single type of major spine on setiger 5 are here transferred to *Boccardiella* (see below).

*Paraboccardia* was erected by Rainer (1973) for a group of New Zealand species, in which the hooded hooks were first present on setiger 8 instead of 7; Read (1975) treated *Paraboccardia* as a subgenus of *Boccardia*. The distribution of hooded hooks has been found to be of marginal importance in defining spionid genera, and for that reason *Paraboccardia* is here considered a synonym of *Boccardia*.

*Boccardia* is left with 16 species, 3 of which occur in Australia.

KEY TO SPECIES OF *BOCCARDIA* FROM  
SOUTHEASTERN AUSTRALIA

- 1a. One of the 2 types of major spines on setiger 5 densely bristle-topped without distal cavity (Fig. 32d); occipital tentacle absent.....2  
 b. One of the 2 types of major spines on setiger 5 with distal concavity and central cone, bristles few, only around rim (Fig. 33d); occipital tentacle present.....*B. chilensis*  
 2a. Prostomium deeply incised (Fig. 33a); notosetae absent from setiger 1.....*B. polybranchia*  
 b. Prostomium rounded or weakly incised; short notosetae on setiger 1.....*B. proboscidea*

***Boccardia polybranchia* (Haswell, 1885)  
 emended  
 (Figure 32)**

*Polydora polybranchia* Haswell, 1885, p. 275; Söderström, 1920, p. 256.

*Boccardia polybranchia*: Carazzi, 1893, p. 16; Mesnil, 1896, p. 221; Fauvel, 1927, p. 58; Hartman, 1948, p. 63; Berkeley and Berkeley, 1952, p. 16; Imajima and Hartman, 1964, p. 279; Hartman, 1966, p. 15; Day, 1967, p. 463. [Major references only].

*Polydora euryhalina* Hartmann-Schröder, 1960, p. 33. Fide Hartman, 1965b.

**Material examined:** NEW SOUTH WALES. Coffs Harbour, amongst *Galeolaria* tubes and coralline algae, on rocks, in pools, 28 Feb. 1971, coll. P. Hutchings (2, AM W13033). VICTORIA. Kilcunda, amongst algae in tide pools, 13 Feb. 1977, coll. J. A.

Blake and J. D. Kudenov (1, NMV G3011). Tasmania, Macquarie Island (5, AM W4742-4743).

**Description:** A moderate-sized species up to 15 mm long for 80 segments. Specimens light tan in alcohol, with dark pigment along sides of prostomium and on palps.

Prostomium anteriorly bifid, continuing posteriorly as caruncle to posterior margin of setiger 3 (Fig. 32a); no occipital tentacle; 2 pairs of eyes, anterior pair more widely separated than posterior pair. Palps thick extending posteriorly for 9-10 setigers.

Setiger 1 reduced, with small notopodial lobe, without notosetae. Capillary neurosetae short; setigers 2, 3, 4, -, 6 and succeeding segments with prominent fascicles of sheathed, unilimbate capillary notosetae arranged in 3 tiers: first tier with short, thick setae, the second gradually elongating, setae of third tier longest and thinnest. Number of capillary setae gradually reduced along body, with only a few long pointed setae remaining, in posterior segments; without posterior notopodial spines. Neuropodia of setigers 2, 3, 4, - and 6 bearing fascicles of unilimbate capillary setae. Bidentate hooded hooks beginning setiger 7; hooks numbering 7-8 at first with 3-4 capillaries, increasing to 12-13 in middle body segments, the capillaries dropping out; hooks exhibiting wide angle between teeth; hood bearing striae and serrations at hood opening (Fig. 32b).

Setiger 5 with ventral fascicle of unilimbate capillary setae; major spines of 2 types: (1) simple falcate with weak subdistal concavity along one edge (Fig. 32c); (2) bristle-topped, with tip laterally produced into smooth boss (Fig. 32d-e).

Branchiae on setigers 2, 3, 4, -, 6 and succeeding segments, but absent from posterior ¼ of body; branchiae longest from setigers 8-9, rarely overlapping at midline.

Pygidium with 4 equal lobes (Fig. 32f). **Remarks:** The original description of *B. polybranchia* by Haswell (1885) (as *Polydora*) was brief and lacked figures. There have been no reports of the species from Australia since the original description. The type locality has changed drastically since 1885 and oyster growing centres, once so numerous along the Hunter River are essentially gone due to industrial

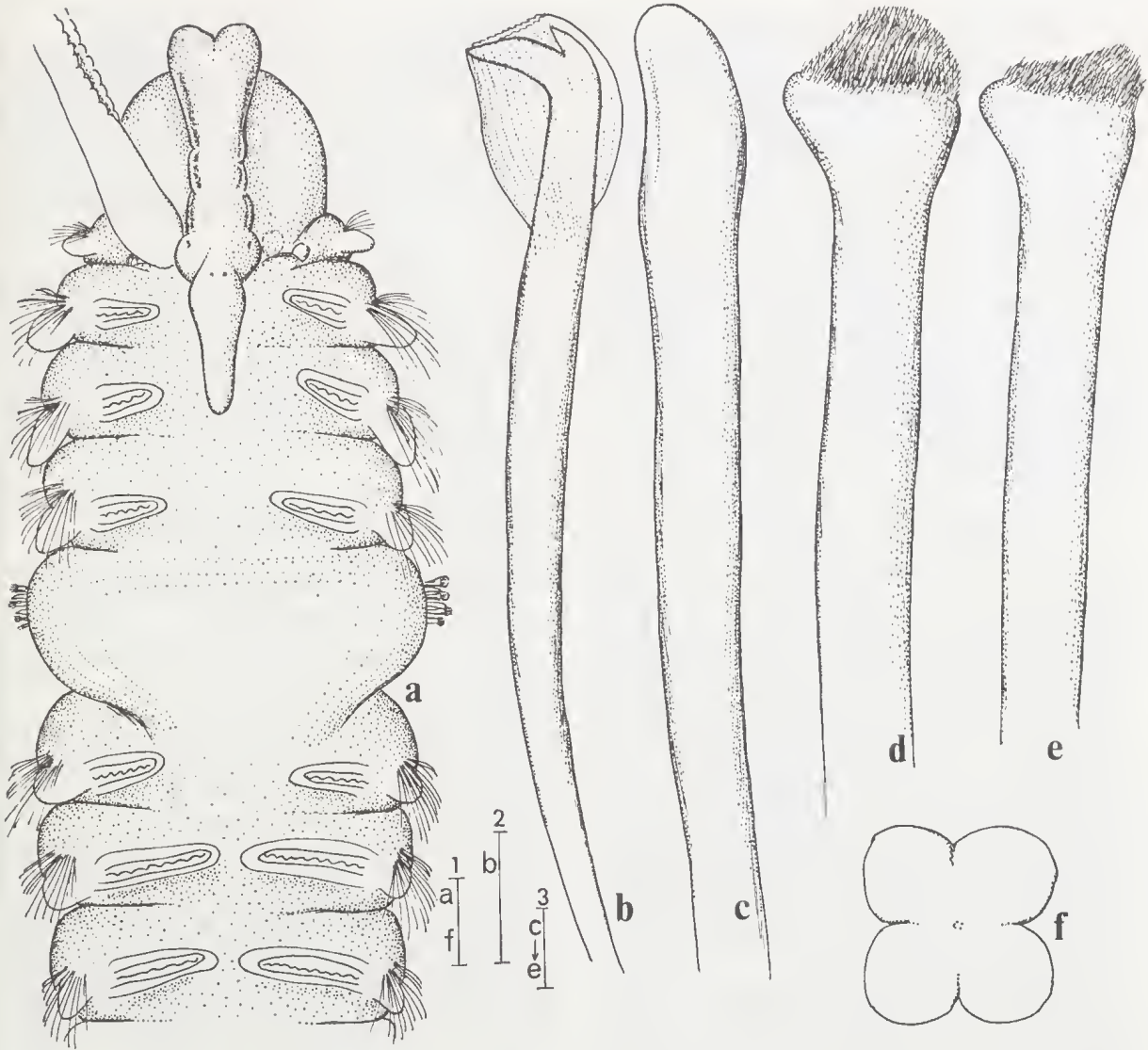


Figure 32—*Boccardia polybranchia* (Haswell)—a, anterior end, dorsal view; b, hooded hook; c, simple spine from setiger 5; d-e, bristle-topped spines from setiger 5; f, pygidium. [Scale 1 = 200  $\mu\text{m}$ ; 2 = 20  $\mu\text{m}$ ; 3 = 20  $\mu\text{m}$ ]

development and pollution. Carazzi (1893) re-described the species based on materials from Naples. Subsequent authors have adapted Carazzi's definition of *B. polybranchia* and the species as such has been reported from many regions of the world.

New collections have been acquired in the benthos in the Hunter River area from the one

remaining oyster farm, as well as from adjacent areas. In no case was a specimen taken which agreed with the current definition of *B. polybranchia*. *Boccardia chilensis* (see below), however, was abundant and proved to be the only species of *Boccardia*. Collections from Coff's Harbour, 325 km north of the Hunter River entrance, contained 2 specimens which fit *B. polybranchia*. Another specimen from Kilcunda, Victoria also proved to be *B. polybranchia*. Because these specimens agree so well with the more cosmopolitan concept of *B. polybranchia*, they are here accepted as



representing that species, even though not found at the type locality. It is possible that *B. chilensis* may actually be what Haswell originally described, but because of inadequate descriptions, the lack of type material and alteration of the type locality, that can probably never be definitely ascertained.

The synonyms listed above represent a few of the many citations of *B. polybranchia* in the literature. A more complete review of this literature and a comparison of the Coff's Harbour material with *B. polybranchia* from South America and elsewhere is the subject of another paper (Blake, in preparation).

*Distribution:* New South Wales; Victoria; Tasmania, Macquarie Island; cosmopolitan.

#### ***Boccardia proboscidea* Hartman, 1940**

(Figure 33a-c)

*Polydora californica* Treadwell, 1914, p. 203. HOMO-NYM.

*Boccardia proboscidea* Hartman, 1940, p. 382; 1941, p. 299; 1944, p. 259; 1961, p. 28; 1969, p. 95; Hartman and Reish, 1950, p. 27; Berkeley and Berkeley, 1950, p. 51; 1952, p. 17; Woodwick, 1963, p. 132; 1977, p. 347; Imajima and Hartman, 1964, p. 279; Fauchald, 1977b, p. 47; [Not Carrasco, 1974, p. 186; 1976, p. 8 = *B. tricuspa* (Hartman)].

*Material examined:* VICTORIA. Port Phillip Bay, Werribee, MSG Monitoring Program (P609), coll. J. D. Kudenov, 11 Jan. 1977, Station 9 (919, NMV G3012-3016), numerous additional specimens with egg capsules, used for live study, many not preserved, coll. J. A. Blake and J. D. Kudenov, 17 Feb., 3 Mar. 1977 (NMV G2851, 2854).

*Description:* Prostomium rounded to weakly incised on anterior margin; caruncle to end of setiger 3; 4 eyes. Notosetae present on setiger 1. Spines of setiger 5 of 2 types: (1) falcate, simple (Fig. 33b); (2) bristle-topped (Fig. 33a). Bidentate hooded hooks beginning setiger 7 (Fig. 33c). Branchiae occurring on setigers 2, 3, 4, -, 6 and succeeding segments, absent from posterior  $\frac{1}{3}$  of body. Pygidium with 4 lobes, dorsal pair smaller than ventral.

*Remarks:* Some specimens tend to show a faint incision on the prostomium, but the species agrees in all other respects with *B. proboscidea* from California. The colouration in life is a pale green on the body with 2 long black lines along the sides of the prostomium,

exactly the same as those we have observed on live specimens from California.

The presence of *B. proboscidea* in Port Phillip Bay is the first record from the southern hemisphere. Carrasco (1974; 1976) reported it from Chile, but his descriptions match those of *B. tricuspa* (Hartman), and his specimens should probably be referred to the latter species.

*Ecology:* At the sewage outfall drains at Werribee, *B. proboscidea* is the numerically dominant polychaete at some stations (Kudenov, unpublished). Johnson (1970) determined that *B. proboscidea* was opportunistic on sand flats in Tomales Bay, California, where it often dominates.

*Distribution:* Victoria, North America, California, Oregon; Panama; Japan.

#### ***Boccardia chilensis* Blake and Woodwick, 1971**

(Figure 33d-e)

*Polydora polybranchia:* Fauvel, 1916, p. 441. [Not Haswell, 1885].

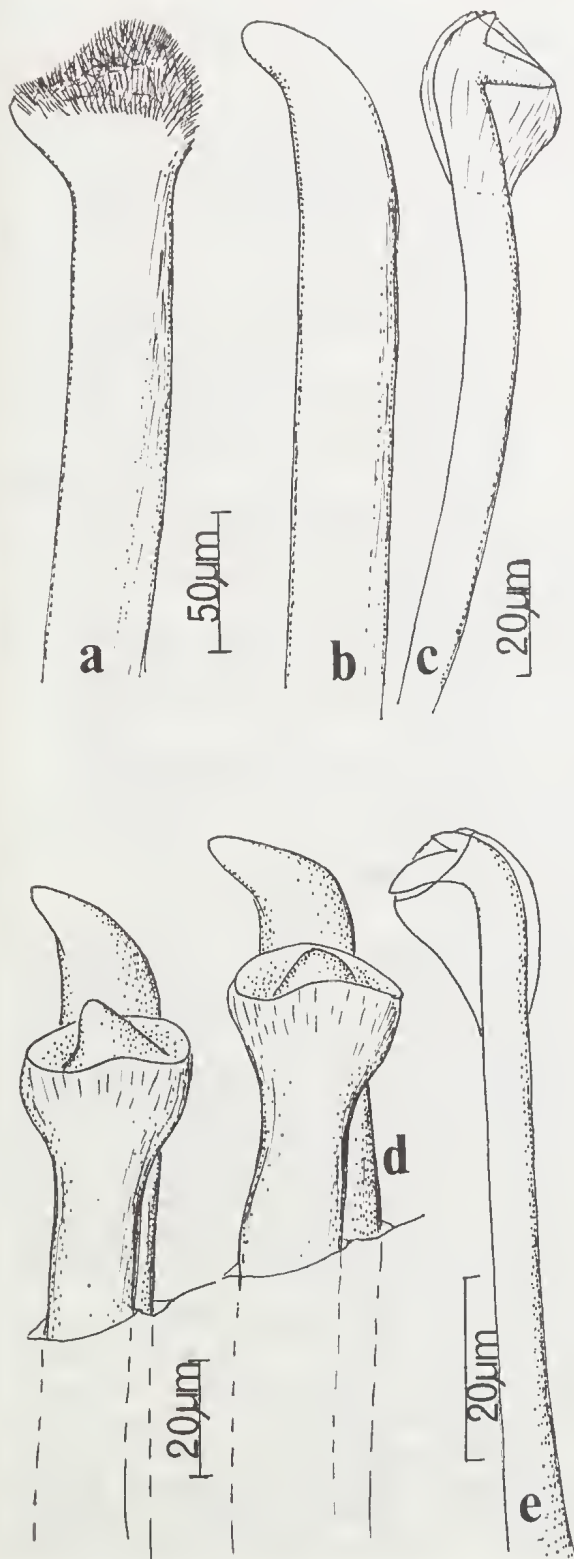
*Boccardia* sp. Hartman, 1948, p. 109.

*Boccardia chilensis.* Blake and Woodwick, 1971, p. 36; Read, 1975, p. 398; Carrasco, 1976, p. 11.

*Boccardia jubata* Rainer, 1973, p. 547. *Fide* Read, 1975.

*Material examined:* NEW SOUTH WALES. Hunter River, Fullerton Creek, dredged, shell bottom, 16 Feb. 1977, coll. M. Skeel (65+, NMV G3017); Camden Haven, Evans Oyster lease, bottom sample, 20 April 1977, coll. M. Skeel (1, NMV G3018); Same, Kennedy-Googley's lease, on oysters, 20 April 1977, coll. M. Skeel (6, NMV G3019); Nambucca, Diemars Lease, in, on oysters, 26 April 1977, coll. M. Skeel (3, NMV G3020); MacLeary River, Stewarts Point, Sheppards Lease, from oysters, 5 May 1977, coll. M. Skeel (10, NMV G3021); Port Stephens, North Bay arm, Phillips Lease, mud, 5 May 1977, coll. M. Skeel (4, NMV G3022); Port Phillips, Swan Bay, oysters, 28 April 1977, coll. M. Skeel (4, NMV G3023); Port Stephens, Tilligery Creek, 28 April 1977, coll. M. Skeel (10, NMV G3024); Sydney, Vault Point, Drumoyne, inside terminal spire whorls of *Velacumantes australis*, 7 May 1975, coll. J. Walker (1, AM W7133); Paramatta River, Road Point, rock pool covered with *Ulva*, 27 Jan. 1971, coll. R. McCloskie (3, AM W4523); Minnie Waters, offshore reef, under boulders in gravel, crevices, sandy-silt, 25 Feb. 1971, J. Holloway and P. Hutchings (2, AM W13034). VICTORIA. Port Phillip Bay, St. Kilda Marina, amongst *Galcolaria* tubes, 6 April 1977, coll. J. A. Blake and J. D. Kudenov (18, NMV G2853); Werribee, Station 14, MPSP Monitoring





Program (P609), coll. J. D. Kudenov, 14 Feb. 1977 (38, NMV G3025-3027), numerous additional specimens with egg capsules, used for live study, not preserved, coll. J. A. Blake and J. D. Kudenov, 17 Feb., 3 Mar. 1977. TASMANIA. Macquarie Island, among coralline algae, Green Gorge, in rock pool, Jan. 1964 (7, NMV G2851; several in coralline algae, NMV G3028).

*Description:* Prostomium deeply incised on anterior margin; occipital tentacle present; caruncle to posterior end of setiger 2 with additional mid-dorsal swelling on setigers 5-8. Setiger 1 with long notosetae. Setiger 5 with about 4 simple falcate spines and 4 spines with distal concavity and central cone (Fig. 33d); bidentate hooded hooks beginning on setiger 7 (Fig. 33e). Branchiae occurring on setigers 2, 3, 4, -, 6 and succeeding setigers. Pygidium a fleshy pad, weakly divided.

*Remarks:* Australian specimens agree well with descriptions from Chile (Blake and Woodwick, (1971) and New Zealand (Rainer, 1973 as *B. jubata*; Read, 1975). Minor differences between Chilean specimens and those from New Zealand were pointed out by Read (1975), but are taxonomically insignificant. We note, however, that both New Zealand and Australian specimens have long capillary notosetae in setiger 1 whereas the Chilean specimens were not observed to have such long setae. Length of the notosetae on some specimens is reminiscent of *B. columbiana* from the Pacific coast of North America. The lack of such setae in the Chilean material may be actual or merely reflect the treatment and age of material examined by Blake and Woodwick (1971) which was part of the Lund University Chile Expedition of 1948. Larvae of *B. chilensis* recently described by Carrasco (1976) from Chile are nearly identical to larvae we have cultured from Port Phillip Bay (Blake and Kudenov, unpublished).

In Australia, *B. chilensis* is readily differentiated from related species by the form of the bristle-topped spines of setiger 5 (see key).

Figure 33—*Boccardia proboscidea* Hartman—a, bristle-topped spine from setiger 5; b, simple spine from setiger 5; c, hooded hook—*Boccardia chilensis* Blake and Woodwick—d, group of simple and cusp-topped spines from setiger 5; e, hooded hook.

*Distribution:* New South Wales; Victoria; Chile; New Zealand; Falkland Islands; Macquarie Island.

Genus *Carazziella* gen. nov.

*Type-species:* *Polydora citrona* Hartman, 1941. Gender, feminine.

*Diagnosis:* Prostomium rounded or incised, extending posteriorly as a caruncle; eyes present. Setiger 1 with or without notosetae. Setiger 5 modified with 2 types of heavy spines arranged in a double curved row: (1) first type with an expanded tip bearing cusps or bristles; (2) second type simple, falcate; both types usually bristle-topped; superior dorsal notosetae present or absent; neurosetae of setiger 5 forming a well-developed fascicle of capillaries. Bidentate neuropodial hooded hooks beginning on setiger 7-14, with conspicuous angle between teeth, without constriction on shaft. Branchiae beginning posterior to setiger 5. Pygidium with 2-4 lobes or 4 finger-like cirri.

*Remarks:* Species having 2 types of major spines in 2 rows in setiger 5 as adults and previously referred to the genus *Polydora* are herein assigned to *Carazziella*. The species of *Carazziella* form a link between the genera *Boccardia* and *Pseudopolydora*. Since both types of major spines in most species of *Carazziella* bear bristled tips, they are among the most modified in the entire *Polydora*-complex. They are most closely related to *Boccardia* species in setal morphology, but unlike the latter genus, all lack branchiae anterior to setiger 5.

Seven species are herein assigned to *Carazziella*. These are *Polydora citrona* Hartman, 1941 from California designated the type-species, *Pseudopolydora reishi* Woodwick, 1964 from Eniwetok, *Polydora quadricirrata* Rainer, 1973 from New Zealand and 4 newly described species below. Five additional new species, three from North America and two from South America, will be described in a subsequent paper (Blake, in preparation).

Some juvenile and post-larval *Polydora* are known to have 2 types of spines in setiger 5. This is considered a larval and not an adult characteristic (see *Remarks* under *Polydora*).

The genus *Carazziella* is named in honour of Carazzi, an early Italian student of the family Spionidae.

KEY TO SPECIES OF *CARAZZIELLA* FROM SOUTHEASTERN AUSTRALIA

- 1a. Hooded hooks beginning on setigers 7-8; branchiae and notopodia separate . . . . . 2
- b. Hooded hooks beginning on setigers 11-14; branchiae and notopodia fused . . . . . *C. hymenobranchiata*
- 2a. Hooded hooks beginning on setiger 7; superior dorsal fascicle with distinctive fimbriated setae (Fig. 37c) . . . . . *C. hirsutisetata*
- b. Hooded hooks beginning on setiger 8; superior dorsal fascicle with simple, unilimbate setae (Fig. 34d) or such setae absent . . . . . 3
- 3a. Setiger 1 without notosetae, notopodium short, same length as neuropodium; prostomium rounded (Fig. 34a-b) . . . . . *C. victoriensis*
- b. Setiger 1 with notosetae, notopodium longer than neuropodium; prostomium bifid (Fig. 35a) . . . . . *C. phillipensis*

*Carazziella victoriensis* sp. nov.

(Figure 34)

*Material examined:* VICTORIA. Port Phillip Bay, PPBES Stations 901/1 (3, NMV G3103); 901/3 (4, NMV G3104); 901/4 (25, NMV G3105); 904/1 (1, NMV G3106); 914/4 (3, NMV G3107); 924/3 (1, NMV G3108); 930/2 (8, NMV G3109); 930/3 (HOLOTYPE, NMV G2855; 2 PARATYPES, NMV G2857); 940/2 (8, NMV G3110); 940/3 (14, NMV G3111); 941/1 (9, NMV G3112); 941/3 (2, NMV G3113); 943/3 (10 PARATYPES, NMV G2856); 943/5 (7, NMV G3114); Westernport, WPBES Stations 1701 (8); 1703 (1); 1711 (4); 1712 (5); 1713 (7) (NMV G3115-3119); Paynesville, Gippsland Lakes, jetty, sand, 2 m, 7 August 1975, coll. J. D. Kudenov (350+, NMV G3120).

*Description:* A small species, up to 5 mm long and 0.5 mm wide for 38 setigerous segments. Body generally opaque white, except for brown flecks around eyes.

Prostomium flattened or rounded on anterior margin (Fig. 34a-b); caruncle unique, extending to posterior margin of setiger 1 where it terminates, followed by a second ridge

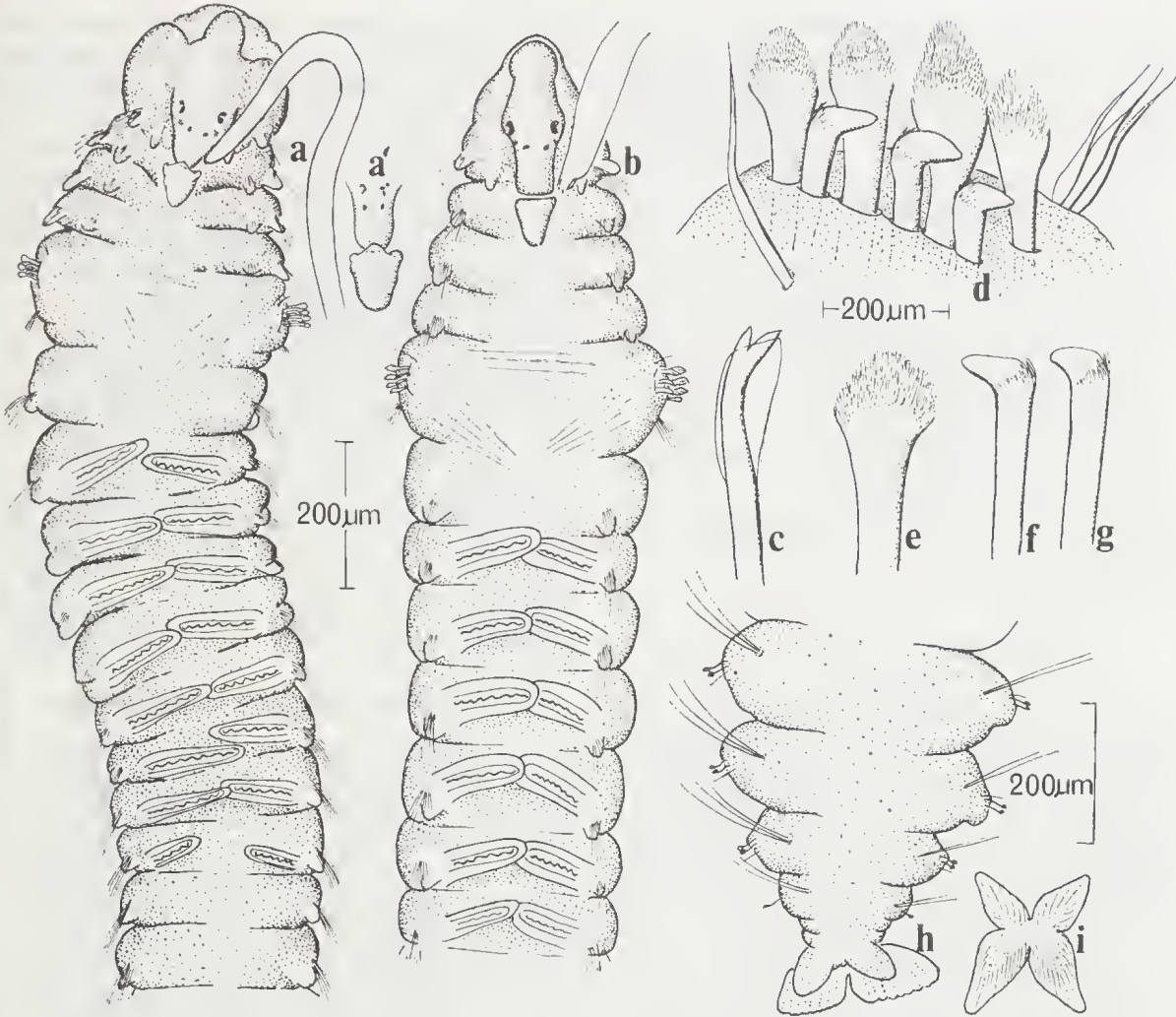


Figure 34—*Carazziella victoriensis* gen. et sp. nov.—  
 a, anterior end, dorsal view in contracted state; a', detail of caruncle [not to scale];  
 b, anterior end, dorsal view in relaxed state; c, hooded hook; d, setae of setiger 5,  
 single superior dorsal seta on left, bristle-topped spines in centre, ventral fascicle  
 to right; e, bristle-topped spine from setiger 5; f-g, falcate spines from setiger 5;  
 h, posterior end in dorsal view; i, pygidium.

on setiger 2 (Fig. 34a-b); anterior margin of ridge elevated, sometimes overlapping terminal end of caruncle (Fig. 34a'); no occipital tentacle, although anterior edge of ridge may approximate tentacle; 2 pairs of eyes: anterior pair cup-shaped; posterior pair oval. Peristo-

mium inflated extending anteriorly beyond prostomium; palps long, extending posteriorly 12-15 setigers.

Setiger 1 with well-developed noto- and neuropodial lobes, but lacking notosetae; neurosetae including simple fascicle of capillary setae. Setigers 2-4 with fascicles of capillary noto- and neurosetae. Parapodial lobes short, conical. Setiger 6 and succeeding segments with fascicles of long capillary notosetae. Neuro-podia of setigers 6-7 with capillary setae; bidentate hooded hooks from setiger 8 (Fig. 34c), these number 2-6 per fascicle and accompanied by 2-3 inferior capillary setae for most of body length.

Setiger 5 distinctly modified, with heavy dor-



sal musculature and prominent heavy modified spines, these spines of 2 types, both with bristle-tops and arranged in a double curved row: (1) ventral row of spines large, distally expanded and bristle-topped (Fig. 34d-e); (2) dorsal row smaller, falcate, with short bristles enveloping fang distally (Fig. 34d, f-g); 1 or 2 small, unilimbate superior dorsal capillaries present above anteriormost spine (Fig. 34d), occasionally absent; with prominent fascicle of sheathed, bilimbate capillaries ventral to major spine series (Fig. 34d).

Branchiae from setiger 7, continuing for only 7-10 setigers.

Pygidium with 4 lobes, ventral pair larger than dorsal pair (Fig. 35h-i).

*Remarks:* See comments for *C. phillipensis*.

*Distribution:* Victoria.

### ***Carazziella phillipensis* sp. nov.**

(Figure 35)

*Material examined:* VICTORIA. Port Phillip Bay, PPBES Stations 901/1 (2 PARATYPES, NMV G2861); 901/3 (14, NMV G3122); 901/4 (5, NMV G3123); 901/5 (PARATYPE, NMV G2859); 901/5 (2, NMV G3124); 904/2 (1, NMV G3125); 915/3 (1, NMV G3126); 926/2 (1, NMV G3127); 933/3 (2, NMV G3129); 936/5 (1, NMV G3130); 943/3 (1, NMV G3131); 972/1 (HOLOTYPE, NMV G2858); Hobsons Bay-Yarra River, MSG Station 134/4, 10 Feb. 1975, coll. G. Poore and J. D. Kudenov (3 PARATYPES, NMV G2860).

*Description:* Similar to *C. victoriensis*. Body small, up to 5 mm long and 0.5 mm wide for 36 setigerous segments. Generally opaque white in alcohol with dusky brown on prostomium and near eyes.

Prostomium anteriorly weakly incised, appearing nearly round on contracted specimens (Fig. 35a); earuncle generally as in *C. victoriensis*, without occipital tentacle; 4 pairs of eyes: anterior pair distinctly cup-shaped; posterior pair oval to irregular in shape. Peristomium inflated as in *C. victoriensis*; palps extending posteriorly for 8-9 setigers.

Setiger 1 with well-developed fascicles of capillary noto- and neurosetae (Fig. 35a); notopodial lobe unusually long, much longer than neuropodial lobe. Setigers 2-4 with fascicles of capillary notosetae and neurosetae; notopodial

lobes broad and short, neuropodial lobes short and finger-like. Setiger 6 and succeeding segments with spreading fascicles of capillary notosetae; neuropodia of setigers 6-7 with capillary setae. Bidentate hooded hooks from setiger 8 (Fig. 35b); these hooks numbering 5-7 per neuropodium throughout, accompanied by several capillary setae at each end of row of hooded hooks, although in some cases only inferior group of capillaries present.

Setiger 5 large (Fig. 35c), with 2-3 superior dorsal capillaries anterior and dorsal to major spines; spines of 2 types: (1) ventral row of large, bristle-topped spines with distal cavity (Fig. 35c); (2) dorsal spines smaller, falcate, with bristles forming prominent tuft on convex surface (ventral) of spine (Fig. 35c); setiger 5 with well-developed ventral fascicle of capillary setae.

Branchiae from setiger 7, occurring for only 5-6 setigers; branchiae broad, meeting at midline.

Pygidium with 4 subequal lobes (Fig. 35d).

*Remarks:* *Carazziella victoriensis* and *C. phillipensis* are closely related. *C. phillipensis* bears notosetae on setiger 1, the prostomium is anteriorly incised and the ventral row of major spines on setiger 5 exhibits a prominent distal concavity. In contrast, *C. victoriensis* lacks notosetae on setiger 1, the prostomium is anteriorly entire and the ventral row of major spines on setiger 1 are distally conical and domed, showing only a faint notch or none at all.

*Distribution:* Victoria, Port Phillip Bay.

### ***Carazziella hymenobranchiata* sp. nov.**

(Figure 36)

*Material examined:* VICTORIA. Port Phillip Bay, PPBES Stations 904 (1, NMV G3049); 906/1 (PARATYPE, NMV G2862); 921/3 (5 PARATYPES, NMV G2863); 944/4 (4 PARATYPES, NMV G2864); 126/6 (HOLOTYPE, NMV G2865).

*Description:* Most specimens incomplete anterior fragments; holotype measuring 5 mm long for 20 setigers. A paratype measures 10 mm long and 1.0 mm wide for approximately 48 segments. Body light tan, no other body pigment.

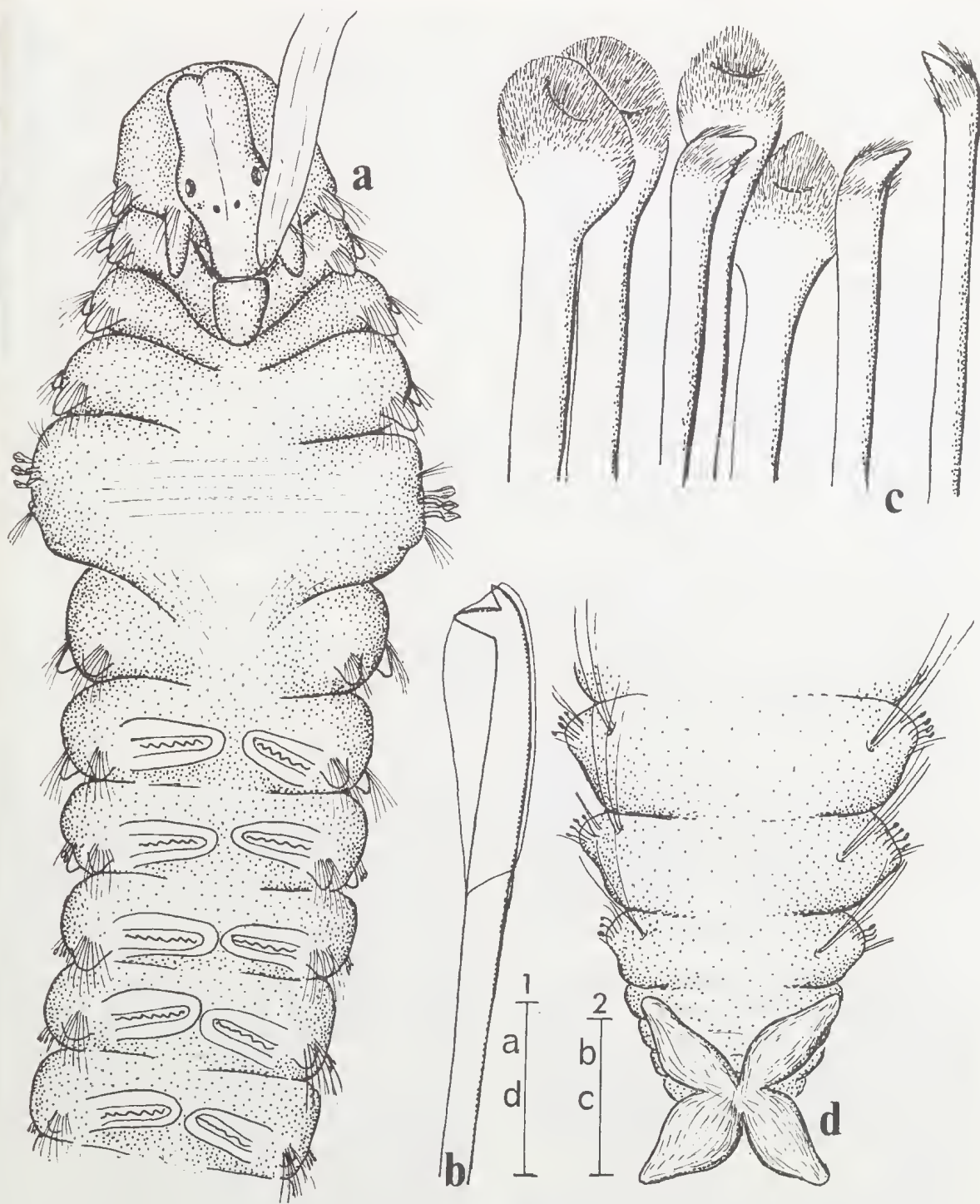


Figure 35—*Carazziella phillipensis* sp. nov.—a, anterior end in dorsal view; b, hooded hook; c, group of spines from setiger 5; d, posterior end in dorsal view. [Scale 1 = 200  $\mu\text{m}$ ; 2 = 20  $\mu\text{m}$ ]

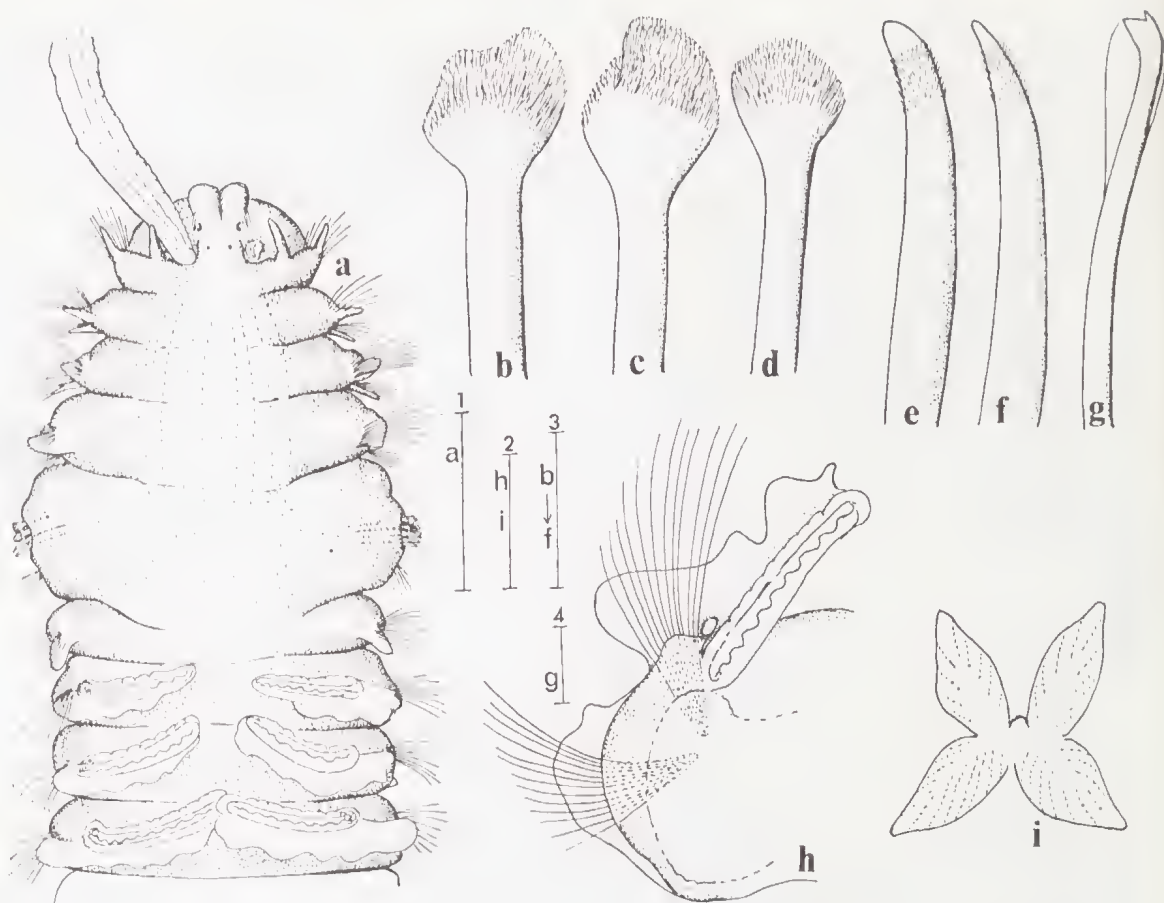


Figure 36—*Carazziella hymenobranchiata* sp. nov.—a, anterior end, dorsal view; b-d, large bristle-topped spines from setiger 5; e-f, curved spines from setiger 5; g, hooded hook; h, right parapodium, setiger 10, anterior view; i, pygidium. [Scale 1 = 500  $\mu$ m; 2 = 200  $\mu$ m; 3 = 50  $\mu$ m; 4 = 20  $\mu$ m]

Prostomium distinctly bifid on anterior margin; caruncle not apparent, nuchal ridge merging with setiger 1 immediately posterior to eyes (Fig. 36a); 2 pairs of eyes: first pair cup-shaped and widely spaced; posterior pair rounded and closely spaced. Peristomium slightly enlarged, but not inflated; palps reaching posteriorly 8-9 segments.

Setiger 1 with long noto- and neuropodial lobes, but lacking notosetae (Fig. 36a); neurosetae including spreading fascicles of capillary setae. Setigers 2-4 with spreading fascicles of unilimbate capillary noto- and neurosetae; digi-

tiform notopodial lobes of setigers 2, 3, 4, - and 6 become expanded leaf-like lamellae on setiger 7; these extending ventrally down the segment and fusing dorsally with branchiae, forming membranous wings (Fig. 36a, h); condition persisting through gill bearing middle body region, thereafter notopodial lobes reduced to simple protuberances. Notosetae unilimbate capillaries from setiger 6, posterior capillaries lacking sheaths. Neuropodia of setigers 2, 3, 4, - and 6 at first digitiform, becoming progressively flattened blade-like lobes; neuropodial lobe a thin lamella throughout branchial region. Neurosetae in setigers 6-10 unilimbate capillaries. First appearance of hooded hooks variable from setiger 11-14; hooks with reduced secondary tooth (Fig. 36g), numbering 5-6 initially, increasing to 7-8 per neuropodium in mid-body region, reduced to 5-6 in posterior region; hooks accompanied by



equal number of interspersed slender capillary setae.

Modified spines of setiger 5 arranged in semi-circle, with 7-8 large brush-like spines enclosing 3-4 falcate spines; bristle-topped spines with tall peak, seen in certain angles (Fig. 36b-d); falcate spines with fine bristles on sub-distal curved portion of shaft (Fig. 36e-f); without superior dorsal setae, but with spreading fascicles of ventral unilimbate capillaries.

Branchiae from setiger 7, continuing through middle body segments, these fused with flattened notopodial lobes, as noted above (Fig. 36h).

Pygidium with 4 subequal lobes (Fig. 36i).

*Remarks:* The fusion of branchiae and notopodial lobes in *C. hymenobranchiata* are unique for this genus, as is the lack of a posteriorly prolonged caruncle, and the relative lack of peristomial inflation.

*Distribution:* Victoria, Port Phillip Bay.

#### *Carazziella hirsutisetata* sp. nov.

(Figure 37)

*Material examined:* NEW SOUTH WALES. Botany Bay, Towra Point, NSWFS Stations, 17 April 1973 (HOLOTYPE, NMV G2866; 6 PARATYPES, NMV G2867-2969).

*Description:* A small species measuring 3.2 mm long and 0.5 mm wide for 34 setigerous segments. Body widest at setiger 5, tapering abruptly anteriorly and in posterior segments. Generally opaque white in alcohol with some brown pigment near eyes.

Prostomium rounded on anterior margin, appearing bulbous, continuing posteriorly as caruncle to posterior border of setiger 2 (Fig. 37a); 2-3 pairs of eyes: anterior pair cup-shaped, further apart and occasionally divided into 2 pairs; posterior pair oval, closer together; no occipital tentacle.

Setiger 1 with long notopodial and neuro-podial lobes, but lacking notosetae (Fig. 37a); neurosetae slender, unilimbate capillaries. Setigers 2, 3, 4, -, 6 and succeeding segments with thickened notopodia and fascicles of unilimbate capillaries arranged in 2 tiers: first tier with shorter, thicker setae, those of second tier being longer; notosetae of posterior segments reduced to a few long slender capillaries.

Neurosetae of setigers 2, 3, 4, - and 6 similar to notosetae, arranged in spreading 2-tiered fascicle. Bidentate hooded hooks with reduced angle between teeth (Fig. 37b) from setiger 7, with 3 hooks and 5 capillaries at first, thereafter 7-9 hooks and 3-4 capillaries in middle segments, with 3 hooks and no capillaries in posterior segments.

Setiger 5 setae include a dorsal group of 3-4 peculiar truncated, distally fimbriated setae (Fig. 37c), 2 types of bristle-topped spines and a ventral inferior fascicle of unilimbate capillary neurosetae. Bristle-topped spines of 2 types: (1) a ventral row of spines distally expanded into 3 very pronounced bluntly rounded knobs enclosing a deep central concavity (Fig. 37f-g), 1 of these knobs greatly exceeding the other 2 in length; (2) 4-5 falcate spines in a dorsal row (Fig. 37d-e) bearing bristled tips (Fig. 37d-e).

Branchiae from setiger 7, occurring only over 5-6 segments or setigers 12-13. Branchiae short, thickened, barely reaching to mid-line.

Pygidium with 4 thin subequal lobes or cirri (Fig. 37h).

*Remarks:* *Carazziella hirsutisetata* is the only species of the genus with hooded hooks beginning on setiger 7. The large tricuspid bristle-topped spines of setiger 5 are unusually pronounced at their apex and bear a large terminal notch or cavity. The dorsal superior fascicle also bears highly distinctive fimbriated setae which appear to be transitional between normal capillaries and bristle-topped major spines.

*Distribution:* New South Wales, Botany Bay.

#### Genus *Polydora* Bosc, 1802 emended

*Polydora* Bosc, 1802. *Type-species:* *Polydora cornuta* Bosc, 1802.

*Diplotis* Montagu, 1813. *Type-species:* *Diplotis hyalina* Montagu, 1813.

*Leucodore* Johnston, 1838. *Type-species:* *Leucodore ciliatus* Johnston, 1838.

*Leipoceras* Mobius, 1874. *Type-species:* *Leipoceras uviferum* Mobius, 1874.

*Dipolydora* Verrill, 1881. *Type-species:* *Polydora concharum* Verrill, 1881.

*Protopolydora* Czerniavsky, 1881. *Type-species:* *Polydora hamata* Langerhans, 1880. (HOMONYM of *Polydora hamata* Webster, 1879b) = [*Polydora posthamata* Jones, 1962].

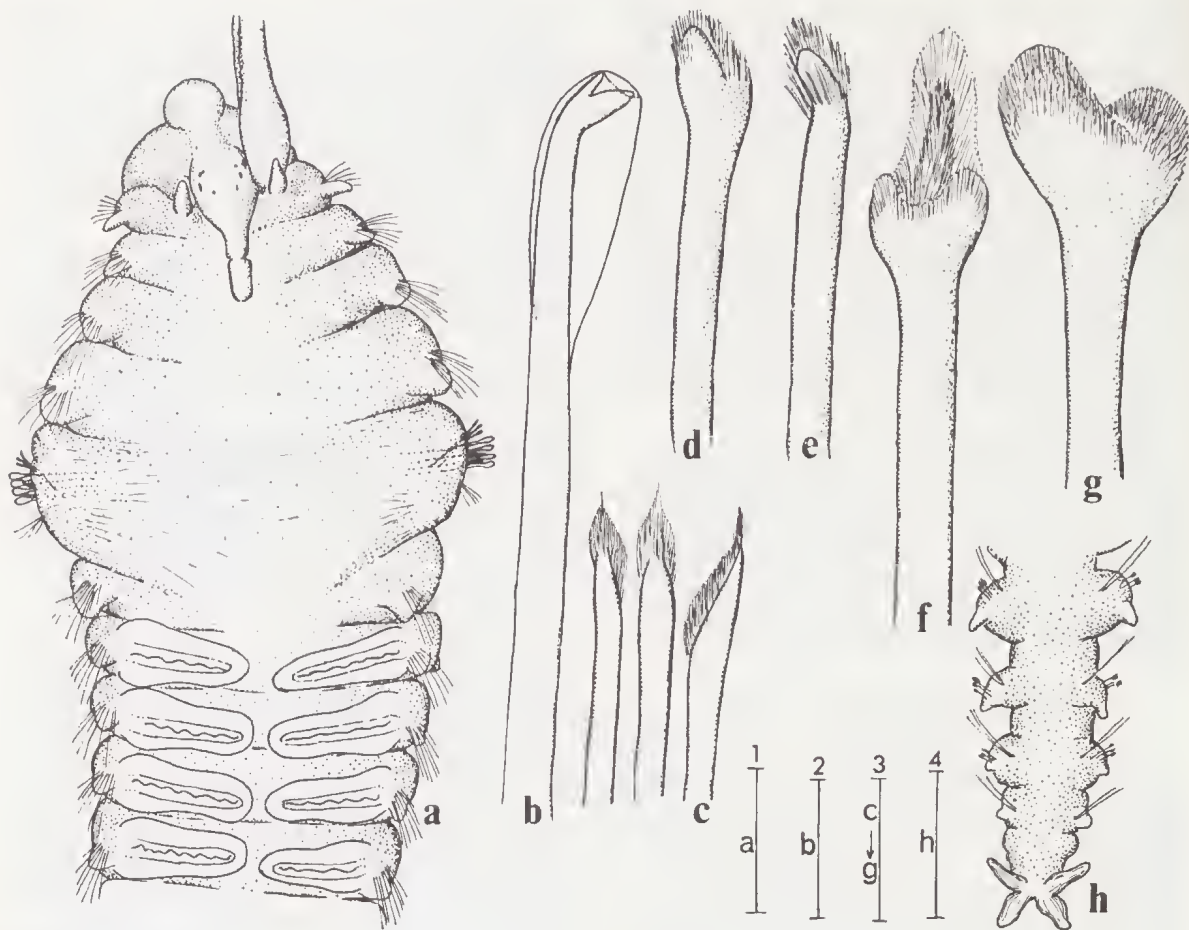


Figure 37—*Carazziella hirsutiseta* sp. nov.—a, anterior end, dorsal view; b, hooded hook; c, superior dorsal setae, setiger 5; d-e, falcate bristle-topped spines, setiger 5; f-g, large bristle-topped spines, setiger 5; h, posterior end, dorsal view. [Scale 1 = 200  $\mu\text{m}$ ; 2 = 100  $\mu\text{m}$ ; 3 = 20  $\mu\text{m}$ ; 4 = 100  $\mu\text{m}$ ]

*Pseudoleucodore* Czerniavsky, 1881. *Type-species:*  
*Leucodorum caecum* Oersted, 1843.

**Diagnosis:** Prostomium anteriorly entire or incised, extending posteriorly as caruncle; eyes present or absent. Setiger 1 with or without notosetae. Setiger 5 greatly modified, with major spines of one type, usually accompanied by slender companion setae; spines arranged in single curved row. Posterior notopodial spines present or absent. Neuropodial hooded hooks bidentate with conspicuous angle be-

tween teeth, with or without constriction on shaft and beginning on setigers 7-17. Branchiae beginning posterior to setiger 5. Pygidium reduced or enlarged, cuff-like, saucer-like or divided into lobes.

**Remarks:** With the erection of the genus *Carazziella*, species with 2 types of major spines in setiger 5 as adults are removed from *Polydora*. This includes *P. citrona* Hartman, which was noted by Woodwick (1964) as one of the species not exactly conforming to the definition of *Polydora*. Restricting the genus *Polydora* to include only those species with 1 type of major spine on setiger 5 stabilizes the genus, although there remain a few problems with species described as juveniles. Blake (1969) pointed out that some species of larval or post-larval *Polydora* have an initial simple falcate

spine among the main series of spines which develop on setiger 5. This spine eventually drops out and is replaced by the setae typical for that particular species. At least 3 species have been described from juveniles having such a setal configuration: *P. heterochaeta* Rioja, 1939; *P. laticephala* Hartmann-Schröder, 1959 and *P. punctata* Hartmann-Schröder, 1959. This type of setal arrangement is considered to be a larval and not an adult characteristic (Blake, 1969); the validity of any species described from larval or post-larval forms should be seriously questioned.

*Polydora cornuta* Bosc, 1802 is the indeterminate type-species of the genus (Blake, 1971; Foster, 1971). Comments concerning the identification of *P. cornuta* will be included in a forthcoming paper (Blake, in preparation).

#### KEY TO SPECIES OF *POLYDORA* FROM SOUTHEASTERN AUSTRALIA

- 1a. Hooded hooks with constriction on shaft (Fig. 43j) . . . . . 10
- b. Hooded hooks without constriction on shaft (Fig. 38b) . . . . . 2
- 2a. Major spines of setiger 5 bearing accessory structures as teeth, flanges, or bristles, or with distal cavity . . . . . 6
- b. Major spines of setiger 5 simple, falcate, without accessory structures, but may have subterminal enlargement (Fig. 38a, d, e) . . . . . 3
- 3a. Occipital tentacle present (Fig. 39a) . . . . . *P. tentaculata*
- b. Occipital tentacle absent . . . . . 4
- 4a. Posterior notopodial spines or needles present; gizzard absent, or if present, seen only upon dissection . . . . . 5
- b. Posterior notopodial spines absent; gizzard present internally in setigers 18-19, prominently seen externally as swelling . . . . . *P. socialis*
- 5a. Posterior notopodial spines present as individual acicula among capillaries (Fig. 38h); major spines of setiger 5 with large subterminal protuberance (Fig. 38f) . . . . . *P. protuberata*
- b. Posterior notopodial spines present as dense expanded packets of needles (Fig. 38c); major spines of setiger 5 with weak subterminal swelling (Fig. 38a) . . . . . *P. flava*
- 6a. Major spines of setiger 5 with crest of bristles on convex side and with accessory flange, collar or cavity . . . . . 8
- b. Major spines of setiger 5 without crest of bristles, with 1 or 2 accessory teeth, with or without cawling or hood connecting teeth . . . . . 7
- 7a. Major spines of setiger 5 with large accessory tooth (Fig. 38i); posterior notopodial spines absent; branchiae from setiger 9 . . . . . *P. giardi*
- b. Major spines of setiger 5 bifid with hood or cawling connecting 2 teeth (Fig. 43a-c); posterior notopodial acicular spines present (Fig. 43g); branchiae from setiger 7 . . . . . *P. armata*
- 8a. Branchiae from setiger 9; major spines of setiger 5 with lateral accessory flange (Fig. 40g-h); posterior notopodial spines present . . . . . *P. aciculata*
- b. Branchiae from setiger 7; major spines setiger 5 with subterminal concavity or collar; posterior notopodial spines absent . . . . . 9
- 9a. Prostomium entire, major spines of setiger 5 with subterminal concavity and crest of bristles on convex side (Fig. 41b) . . . . . *P. notialis*
- b. Prostomium incised; major spines of setiger 5 with collar on convex side from which bristles emerge (Fig. 42b-c) . . . . . *P. pilocollaris*
- 10a. Posterior notopodia with needle packets or large spines . . . . . 11
- b. Without posterior notopodial spines . . . . . 12
- 11a. Packets of posterior notopodial needles (Fig. 45j-k); major spines of setiger 5 with small lateral flange (Fig. 45c-f) . . . . . *P. latispinosa*
- b. Posterior notopodial spines individual, large, not needle-like, curved in towards mid-line (Fig. 47e); major spines of setiger 5 with large flange (Fig. 47b-c) . . . . . *P. hoplura*



- 12a. Occipital tentacle present; companion setae of setiger 5, delicate, feathery in appearance (Fig. 43h) ..... *P. ligni*
- b. Occipital tentacle absent; companion setae of setiger 5, bilimbate, not feathery (Fig. 46g) ..... 13
- 13a. Prostomium entire; caruncle short, globular (Fig. 46g); pygidium smaller than posterior segments, cuff-shaped (Fig. 46k) ..... *P. woodwicki*
- b. Prostomium incised; caruncle long, narrow (Fig. 44a); pygidium, larger than posterior segments, saucer-like (Fig. 44g) ..... 14
- 14a. Major spines of setiger 5 with 1 accessory flange (Fig. 43k, m) ..... *P. websteri*
- b. Major spines of setiger 5 with 1 accessory flange located just ahead of an accessory tooth (Fig. 44c-e) ..... *P. haswelli*

***Polydora flava* Claparède, 1870**

(Figure 38a-c)

*Polydora flava* Claparède, 1870, p. 487; Fauvel, 1927, p. 52; Day, 1967, p. 468; Hartmann-Schröder, 1971, p. 305. [major references only]

*Polydora pusilla* Saint-Joseph, 1894, p. 65.

*Polydora dorsomaculata* Rainer, 1973, p. 558. *New synonymy.*

*Material examined:* NEW SOUTH WALES. North Heads, Sydney, AMSBS, May 1972 (1, AM W6941); Botany Bay, Towra Beach, NSWFS Station, April 1973 (1, AM W13035). VICTORIA. Port Phillip Bay, PPBES Stations 907 (55), 913 (1), 915 (1), 919 (56), 929 (318), 930 (4), 932 (4), 944 (2), 985 (1) (NMV G3029-3037); Westernport, Crib Point, CPBS Station 32A, April 1970 (5, NMV G3048).

*Description:* A moderate-sized species averaging about 8 mm long and 0.5 mm wide for 80 setigerous segments.

Prostomium strongly bifid on anterior margin, caruncle extending to setiger 3; no occipital tentacle; no eyes. Setiger 1 with both noto- and neuropodial setal fascicles; notopodial lobes of setiger 1 long. Setigers 2, 3, 4, - and 6 with well-developed fascicles of sheathed, unilimbated capillaries in both rami. Bidentate neuropodial hooded hooks completely replacing capillaries from setiger 7,

hooks numbering 3-4 per ramus, and normally with wide angle between teeth (Fig. 38b); one specimen from Towra Beach, N.S.W. bearing a reduced secondary tooth in posterior setigers. With capillary notosetae in posterior setigers accompanied by packets of fine needles (Fig. 38c).

Setiger 5 modified, bearing curved row of simple falcate spines, each with subterminal swelling (Fig. 38a); with bilimbate companion setae and 5-6 superior dorsal pointed setae; ventral fascicle of sheathed unilimbated capillaries present.

Branchiae from setiger 8. Pygidium a 3-lobed disc, with 2 small dorsal lobes and a larger ventral lobe.

*Remarks:* This species agrees well with descriptions from other seas. The posterior needles are arranged in a tight, flattened group as in *P. convexa* Blake and Woodwick (1972) and *P. latispinosa* (see below).

*Distribution:* New South Wales; Victoria; Europe; Ceylon; Sumatra; Japan.

***Polydora socialis* (Schmarda, 1861)**

(Figure 38d-e)

*Polydora socialis:* Blake, 1971, p. 20 (Synonymy); Light, 1977, p. 71.

*Polydora plena:* Foster, 1971, p. 24. *Fide* Light, 1977, p. 71.

*Material examined:* NEW SOUTH WALES. Sydney, Wy-ar-gine Point, Middle Harbour, in *Galeolaria* associations, 14 Dec. 1968 (1, AM W13036); Malabar, Sydney, AMSBS Stations (1, AM W6496; 5, AM W6497); Sydney Harbour, S.E. Chinamens Beach, Malacological club survey, 8 May 1971 (1, AM W13037); Botany Bay, Towra Beach, NSWFS Station, 12 April 1973 (1, AM W13038). VICTORIA. Port Phillip Bay, PPBES Stations 907 (56); 919 (144); 929 (318); 932 (4); 944 (2); 953 (7); 965 (4); 978 (9); 982 (3) (widespread in PPB) (NMV G3158-3166).

*Description:* A moderate-sized species, up to 9 mm long and 0.75 mm wide for 66 setigers. Prostomium strongly incised on anterior margin, caruncle extending to setiger 4-5; no occipital tentacle; 2 pairs of eyes. Setiger 1 with notosetae. Major spines of setiger 5 with subterminal boss (Fig. 38d). Companion setae bilimbate (Fig. 38d). No posterior notopodial spines. Bidentate hooded hooks from setiger 7 (Fig. 38e) accompanied by capillary setae. Branchiae from setiger 8. Pygidium disc-like.

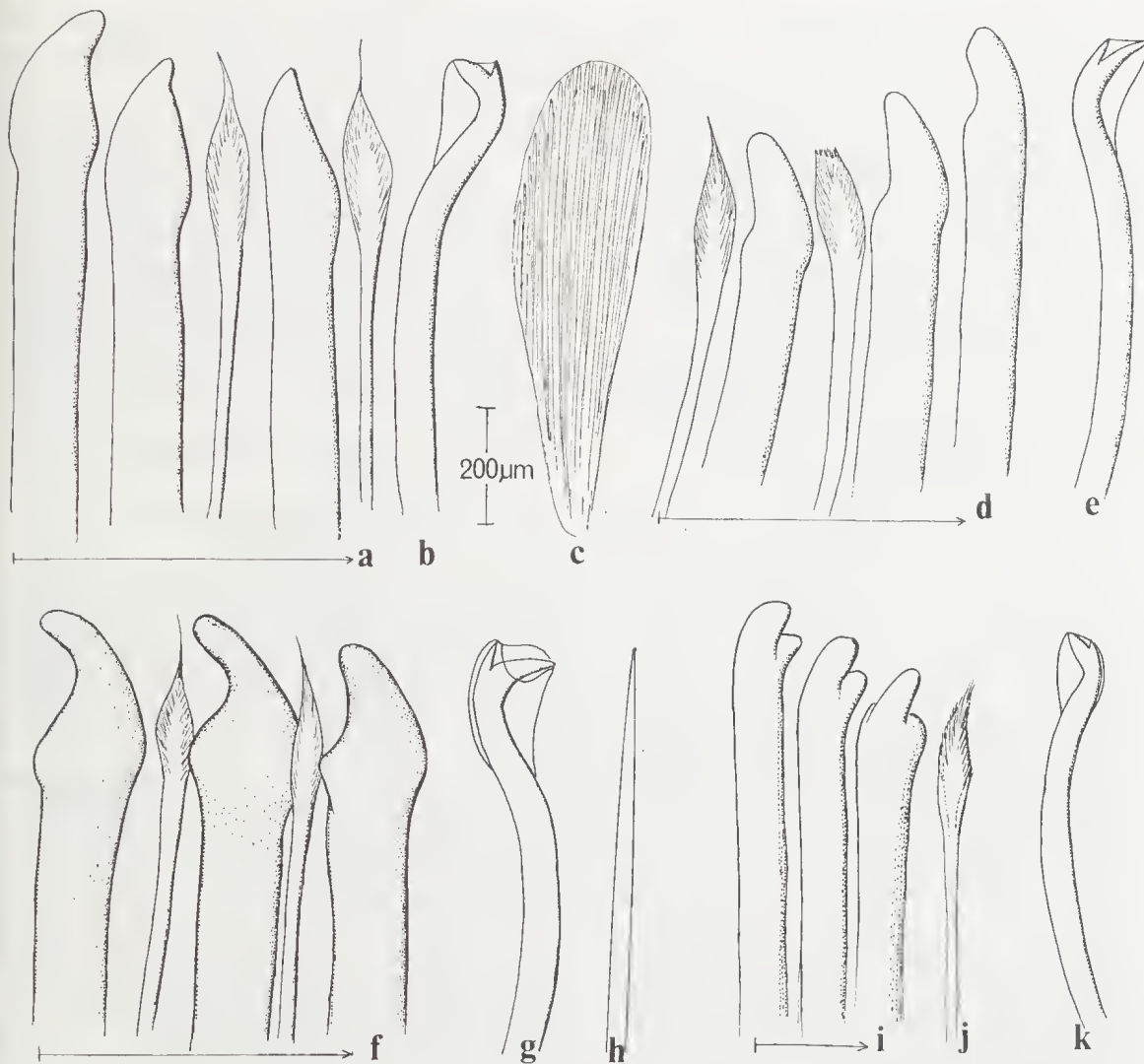


Figure 38—*Polydora flava* Claparède—a, 3 major spines and 2 companion setae, setiger 5; b, hooded hook; c, posterior notopodial needles—*Polydora socialis* (Schmarda)—d, 4 major spines and 2 companion setae, setiger 5; e, hooded hook—*Polydora protuberata* nov. sp.—f, 3 major spines and 2 companion setae, setiger 5; g, hooded hook; h, posterior notopodial spine—*Polydora giardi* Mesnil—i, 3 major spines, setiger 5; j, companion seta, setiger 5; k, hooded hook.

seem generally smaller. Reduction of the secondary tooth in posterior hooded hooks was observed by Blake (1971), for specimens from New England; this feature was not found in the present collections. Variation in that character has been observed in other populations from North America and will be discussed in a subsequent paper (Blake, in preparation). Some specimens exhibit dorsal pigment flecks, which are believed to be remnants of larval pigment (Blake, 1971). The gizzard is a highly diagnostic feature of *P. socialis*. Located internally at about setigers 18-19, it appears as a conspicuous external bulge. A simi-

Gizzard present internally in setigers 18-19.

*Remarks:* Specimens agree well with collections from other geographic areas, although they

lar structure is also present in *P. protuberata* and *P. tentaculata* (see below), but is not as conspicuous as in *P. socialis* and best seen upon dissection. As shown by Blake (1971), *P. socialis plena* Berkeley and Berkeley, 1936 is an invalid subspecies because the character on which it is based, namely the presence of notosetae on setiger 1, occurs on all specimens of *P. socialis (sensu lato)*. Hence, elevation of *P. plena* to full species rank by Foster (1971) is not supported (see also Light, 1977).

*Distribution:* New South Wales; Victoria; New Zealand; North America; South America.

### *Polydora protuberata* sp. nov.

(Figure 38f-h)

*Material examined:* VICTORIA. Port Phillip Bay, PPBES Stations 904 (1, NMV G3049) 907 (20 PARATYPES, NMV G2871); 908 (2, NMV G3050); 913 (1, NMV G3051); 922 (2, NMV G3052); 928 (3, NMV G3053); 930 (1, NMV G3054); 946 (HOLOTYPE, NMV G2870).

*Description:* Holotype the largest specimen, broken in 2 parts, measuring 16 mm long and 1 mm wide for 115 segments. Body colourless.

Prostomium distinctly incised on anterior margin, caruncle extending to setigers 3-5, no occipital tentacle or eyes.

Setiger 1 with capillary notosetae. Setigers 2, 3, 4, -, 6 and succeeding segments with unilimbate capillary notosetae in 3 tiers; posterior notopodia with several short acicular spines in addition to long capillaries (Fig. 38h). Neurosetae of setigers 2, 3, 4, - and 6 with unilimbate capillaries in 2 tiers. Four to 5 bidentate neuropodial hooded hooks from setiger 7, accompanied by capillary setae for only a few segments; hooks with wide angle between teeth; main fang forming oblique angle with shaft; constriction lacking on shaft (Fig. 38g).

Setiger 5 modified, with superior dorsal fascicle of geniculate setae lacking sheaths, a curved row of major spines and sheathed bilimbate companion setae and a ventral fascicle of unilimbate capillaries; major spines simple, falcate, with a large subterminal protuberance (Fig. 38f), this much more pronounced than in *P. socialis* (Fig. 38d).

Branchiae from setiger 8, continuing to near posterior end. Pygidium disc-like, with dorsal

notch. Weakly-developed gizzard, best seen in dissection, observed on some specimens at about setigers 17-18.

*Remarks:* *Polydora protuberata* is very similar to *P. caeca* (Oersted, 1843) from Europe (Fauvel, 1927; Hartmann-Schröder, 1971) and South Africa (Day, 1967). The 2 species differ in the structure of the major spines of setiger 5. In *P. caeca*, the spines have a slight swelling whereas *P. protuberata* has a large expanded protuberance. The 2 species also differ in habitat. *P. caeca* is a borer in calcareous habitats (Fauvel, 1927) while *P. protuberata* lives in sediment.

*Distribution:* Victoria, Port Phillip Bay.

### *Polydora tentaculata* sp. nov.

(Figure 39)

*Material examined:* QUEENSLAND. Moreton Bay, Middle Banks, Sta. 34, March 1974, coll. W. Stephenson (2 PARATYPES, QM G11597); Sta. 56, June 1974 (PARATYPE, QM G11600). NEW SOUTH WALES. Botany Bay, Towra Beach, NSWFS Station, April 1973 (HOLOTYPE, NMV G2885; 1 PARATYPE, NMV G2886).

*Description:* A moderate-sized species up to 15 mm long and 1.0 mm wide for 88 setigerous segments. Body generally opaque white with some anterior brown pigment bars located dorsally on anterior setigers.

Prostomium deeply bifurcate on anterior margin, forming 2 divergent lobes (Fig. 39a). Caruncle extending to middle of setiger 5; with triangular shaped occipital tentacle present at level of setiger 1; eyes 0-2.

Setiger 1 with notosetae and long notopodial lobes (Fig. 39a). Setigers 2, 3, 4, -, 6 and succeeding setigers with fascicles of notosetae arranged in 2 tiers; posterior notosetae including long slender capillaries (Fig. 39b) and a stouter spine (Fig. 39c). Neurosetae of setigers 2, 3, 4, - and 6 with capillaries. Bidentate hooded hooks from setiger 7, hooks numbering 5-8 throughout; without constriction on shaft; angle between teeth variable within a single fascicle, being widest in superiormost position (Fig. 39d) and less in more inferior position (Fig. 39e); hooks accompanied by inferior capillaries in first few segments.

Setiger 5 modified, larger than setigers 4 or



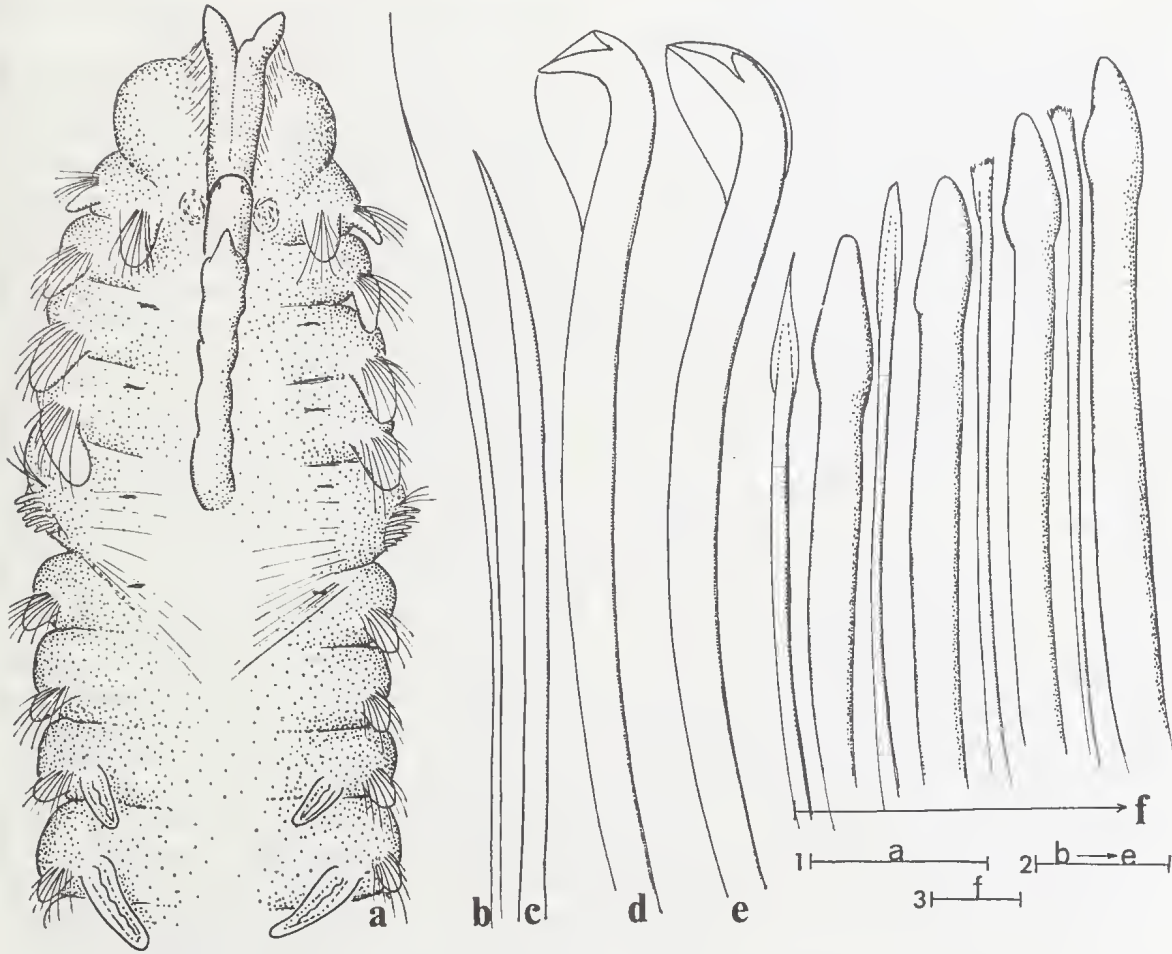


Figure 39—*Polydora tentaculata* sp. nov.—a, anterior end, dorsal view; b, long posterior capillary notoseta; c, short acicular-like posterior notoseta; d, hooded hook from superior neuropodial position; e, hooded hook from inferior neuropodial position; f, group of 4 major spines and 4 companion setae, setiger 5. [Scale 1 = 500  $\mu$ m; 2 = 200  $\mu$ m; 3 = 20  $\mu$ m]

6; setae including a superior dorsal fascicle of geniculate setae lacking sheaths, a curved row of major spines accompanied by simple bilimbate companion setae (Fig. 39f) and a ventral fascicle of unilimbate capillaries. Major spines simple, falcate, lacking accessory structures (Fig. 39f).

Branchiae from setiger 8, small at first, reaching full-size by setiger 10, present over most of body.

Pygidium unknown.

Gizzard observed at level of setigers 19-20 as bulge in dorsum; appears as muscular enlargement of intestine upon dissection; not as well-developed as in *P. socialis*.

*Remarks:* *Polydora tentaculata* is most closely related to *P. socialis*, *P. flava*, *P. protuberata* and *P. caeca*. It differs from all of these in possessing an occipital tentacle and in bearing hooded hooks in which the angle changes within individual fascicles from the superior to inferior position. In the combined feature of bearing an occipital tentacle and simple major spines on setiger 5, *P. tentaculata* also resembles *P. nuchalis* Woodwick (1953) from California. The latter species, however, exhibits a constriction on the shafts of the hooded hooks, and belongs to a group of spe-

cies related to *P. ligni* Webster (see below).

*Distribution:* Queensland; New South Wales.

***Polydora giardi* Mesnil, 1896**

(Figure 38i-k)

*Polydora giardi* Mesnil, 1896, p. 195; Fauvel, 1927, p. 50; Hartman, 1941, p. 309; 1969, p. 135; Rainer, 1973, p. 560; Read, 1975, p. 413.

*Material examined:* NEW SOUTH WALES. Sydney, Wy-arr-gine Point, Middle Harbour, from *Galeolaria* association, 19 Dec. 1968 (10+, AM W13039). VICTORIA. Kilcunda, Bourne Creek, in shell (*Haliotus ruber*, 11 April 1977, coll. J. A. Blake and J. D. Kudenov (6, NMV G2949); Bass Strait, 20 m, 38° 28'S-144° 48'E, dredged, from bryozoans, coralline algae on sandstone reef, coll. J. A. Blake and J. D. Kudenov, May 1977 (2, NMV G3055).

*Description:* A small species measuring up to 7 mm long and 0.3 mm wide for 75 setigerous segments, but reported larger in other areas (Rainer, 1973). Prostomium incised, caruncle extending to anterior margin of setiger 3; no occipital tentacle or eyes. Setiger 1 with both noto- and neurosetae, and well-developed parapodial lobes. Notopodia of setigers 2, 3, 4, -, 6 and succeeding segments with fascicles of unilimbate capillaries; with long capillaries in posterior setigers, but spines lacking. Neurosetae of setigers 2, 3, 4, - and 6 with unilimbate capillaries. Bidentate hooded hooks from setiger 7, 3-4 hooks at first accompanied by 1-2 capillaries; hooks with acute angle between secondary tooth and main fang and wide angle between main fang and shaft (Fig. 38k), no constriction on shaft.

Setiger 5 modified with dorsal fascicle of prominent geniculate setae, lacking sheaths, a curved row of heavy spines and bilimbate companion setae (Fig. 38j) and a ventral fascicle of winged capillary neurosetae; major spines falcate with large accessory tooth (Fig. 38i), some specimens appearing to have an additional small spur on convex side of shaft.

Branchiae from setiger 9, absent from posterior  $\frac{1}{3}$  of body. Pygidium a small disc.

*Distribution:* New South Wales; Victoria; Europe; California; New Zealand.

***Polydora aciculata* sp. nov.**

(Figure 40)

*Material examined:* VICTORIA. Kilcunda, Bourne Creek, in shell *Haliotus ruber*, 11 April 1977, coll.

J. A. Blake and J. D. Kudenov (HOLOTYPE, NMV G2872, 8 PARATYPES, NMV G2873).

*Description:* A moderate-sized species up to 10 mm long and 0.3 mm wide for 85 setigers. Body generally opaque white in alcohol, with faint brown lines along margin of caruncle.

Prostomium entire and narrow on anterior margin (Fig. 40a), caruncle continuing as low ridge to posterior margin of setiger 3; no occipital tentacle or eyes. Peristomium and prostomium depressed and lower in lateral view than first setiger and succeeding segments.

Setiger 1 with capillary setae in both rami (Fig. 40a). Setigers 2, 3, 4, -, 6 and succeeding setigers containing spreading fascicles of unilimbate capillary notosetae arranged in 2 tiers, first tier with shorter setae and longer setae in second; in mid-body region, shorter capillary setae replaced by 2-3 stout acicular spines (Fig. 40b-c) accompanied by 3-4 long, thin capillary setae. Notosetae maintaining this arrangement to end of body (Fig. 40k-l). Three to 4 bidentate hooded hooks per neuropodium from setiger 7 accompanied by a single capillary for a few segments; without constriction on shaft (Fig. 40d); hooks with wide angle between secondary tooth and main fang; this angle gradually diminishing along body, secondary tooth and hood gradually becoming smaller and more closely pressed to main fang (Fig. 40e), both eventually disappearing in far posterior segments (Fig. 40f), leaving neuropodia with acicular spines.

Setiger 5 modified, overlapping setiger 6 (Fig. 40a); setae including 5-6 superior dorsal geniculate setae (Fig. 40j) lying anterior to a semi-circular row of heavy spines alternating with smaller hastate companion setae (Fig. 40i) and small fascicle of unilimbate capillary neurosetae located ventral to major spines; major spines falcate, with distinct lateral flange and crest of fine bristles on convex side of curved end (Fig. 40g-h).

Branchiae from setiger 9, at first short reaching full-size on setigers 11-12, present only over first  $\frac{1}{3}$  of body, absent thereafter.

Pygidium with 4 lobes, the dorsal pair smaller than ventral pair (Fig. 40k).

*Remarks:* *Polydora aciculata* has several unique characteristics: the modified spines of

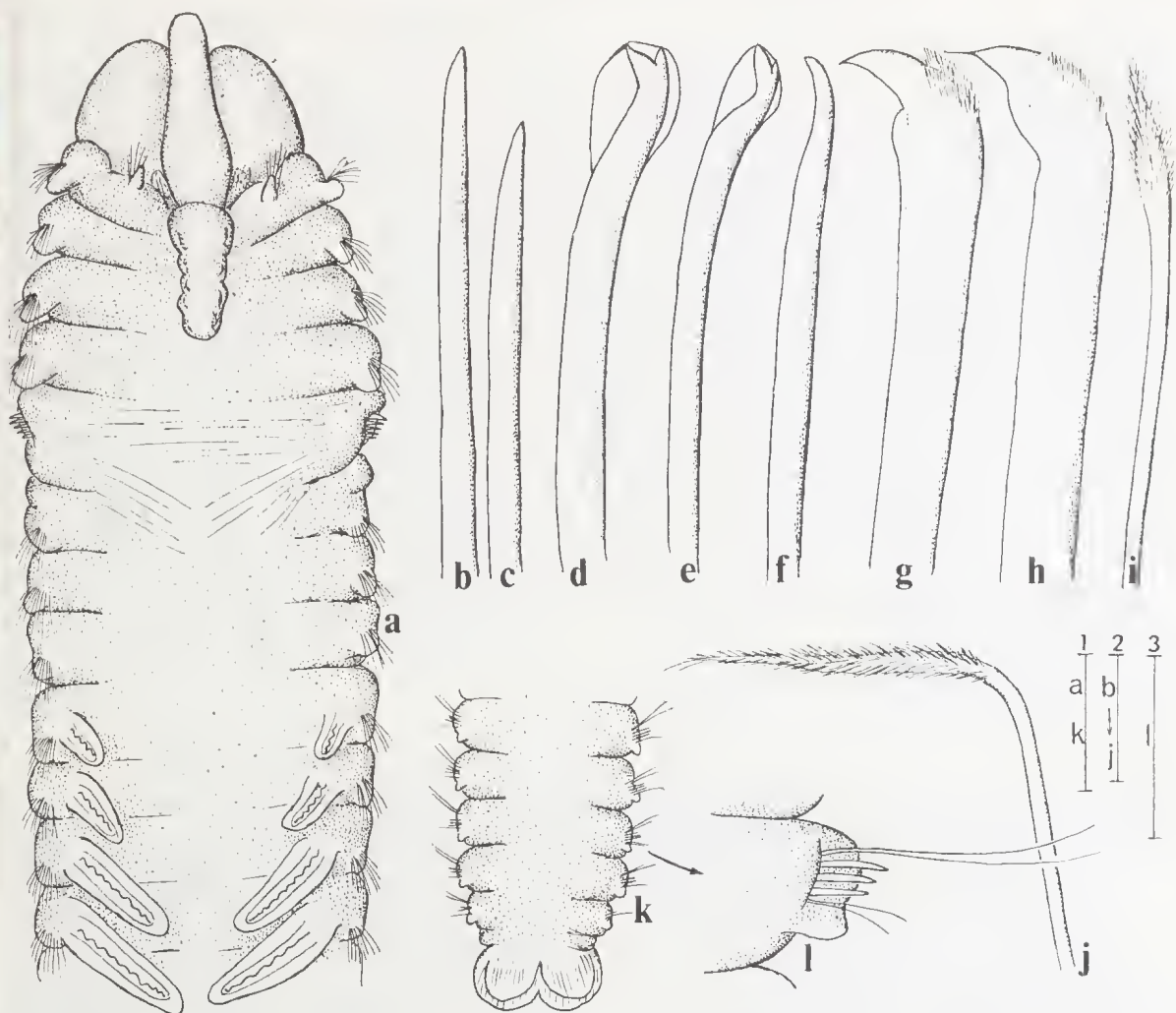


Figure 40—*Polydora aciculata* sp. nov.—a, anterior end, dorsal view; b-c, posterior notopodial spines; d, hooded hook from anterior setiger; e, hooded hook from medial body setiger; f, posterior neuropodial spine; g-h, major spines from setiger 5; i, hastate companion seta, setiger 5; j, superior dorsal seta from setiger 5; k, posterior end, dorsal view; l, posterior segment, dorsal view. [Scale 1 = 200  $\mu$ m; 2 = 20  $\mu$ m; 3 = 20  $\mu$ m]

setiger 5 are similar to those of *P. caulleryi* Mesnil and *P. notialis* sp. nov. (see below). Those of *P. caulleryi* are sharply falcate, with a crest of bristles, but no accessory structures, those of *P. notialis* bear a crest of bristles and a

subterminal concavity. *P. aciculata* has a crest and a pronounced lateral flange.

The presence of posterior acicular spines in both notopodia and neuropodia is rare in polydorids. *P. convexa* Blake and Woodwick (1972) has a similar arrangement with unidentate hooded hooks and specialized posterior notosetae. The notosetae, however, are not acicula, but packets of fine needles. *Boccardia basilaria* Hartman (1961) has posterior noto- and neuropodial acicular spines. This situation was not noted by Hartman (1961) and was only determined during a recent examination of the types (Blake, unpublished).

*Ecology*: Occupies twisting galleries in shells



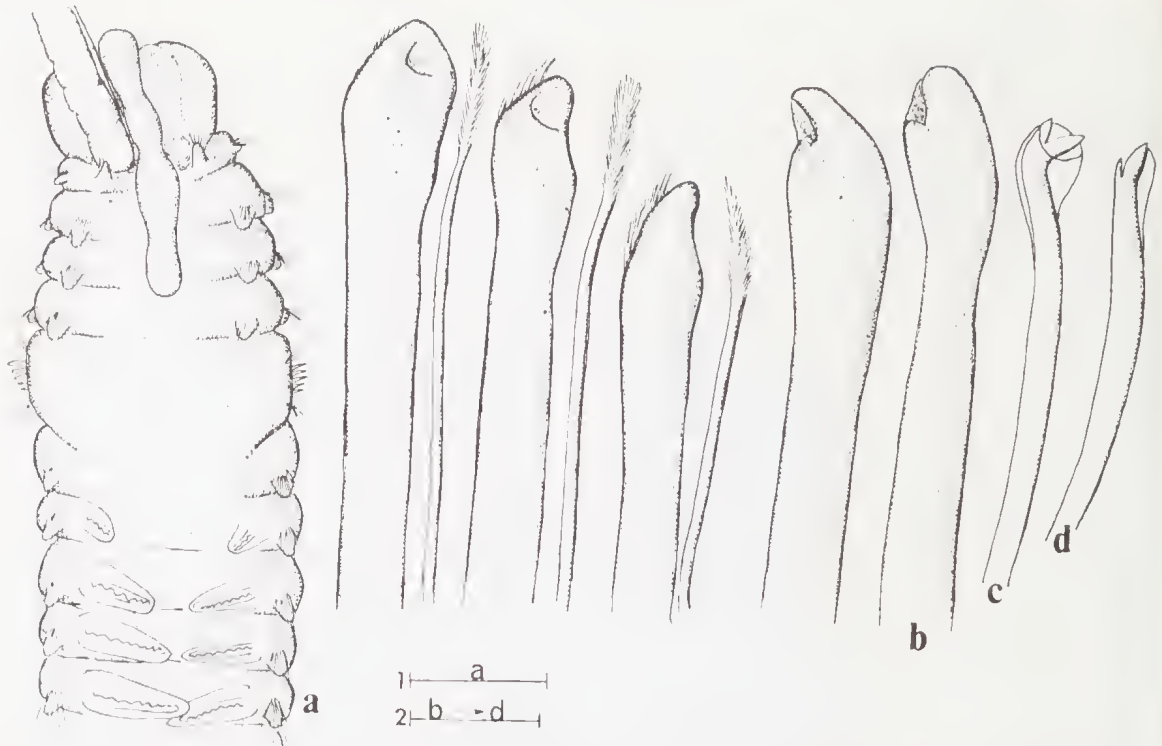


Figure 41—*Polydora notialis* sp. nov.—a, anterior end, dorsal view; b, major spines and companion setae, setiger 5 showing different angles and degrees of wear; c, hooded hook, setiger 8; d, hooded hook, setiger 35. [Scale 1 = 200 μm; 2 = 20 μm]

of *Haliotis ruber* Leach, 1814. Associated with *Polydora giardi* Mesnil in the shells.

*Distribution:* Victoria.

***Polydora notialis* sp. nov.**

(Figure 41)

*Material examined:* SOUTH AUSTRALIA. Tipara, from shell of *Haliotis roei*, 7 April 1971, coll. S. Shepherd (HOLOTYPE, NMV G2877).

*Description:* A single, posteriorly incomplete specimen measures 3.5 mm long and 0.4 mm wide for 38 setigerous segments. Body generally opaque white in alcohol, with lateral intersegmental brown pigment on setigers 1-3 and along margins of prostomium.

Prostomium rounded on anterior margin, caruncle extending to posterior margin of setiger 3 (Fig. 41a); no occipital tentacle. Two

pairs of subcutaneous eyes. Palps short, extending posteriorly for 6 setigers.

Setiger 1 with capillary notosetae in both noto- and neuropodia (Fig. 41a). Setigers 2, 3, 4, -, 6 and succeeding segments with 2 tiers of unilimbate capillary notosetae; first tier with shorter setae; number of capillary notosetae gradually diminishing in posterior segments; nature of posterior end unknown. Neurosetae of setigers 2, 3, 4, - and 6 as spreading fascicles of winged capillaries. Bidentate hooded hooks beginning on setiger 7, with 3 hooks in anterior setigers, accompanied by capillary setae for a few segments, number of hooks reduced to 2 per neuropodium posteriorly; angle between main fang and secondary tooth acute, wider in anterior and becoming much reduced in posterior setigers (Fig. 41c-d); without constriction on shaft.

Setiger 5 modified, with heavy dorsal musculature, overlapping setiger 6; setae include dorsal fascicle of geniculate setae, curved row of 4-5 heavy spines, thin hastate companion setae (Fig. 41b) and ventral fascicle of unilimbate capillary neurosetae; 4-5 major spines

with expanded, slightly curved end, with subterminal cavity (Fig. 41b), convex side of inflated end bearing bristled crest.

Branchiae from setiger 7, reaching full-size by setiger 10, continuing for  $\frac{1}{2}$  body length. Pygidium unknown.

**Remarks:** *Polydora notialis* bears similarities to 2 groups of species. With a subdistal concavity on the major spines of setiger 5, *P. notialis* is similar to *P. hornelli* Willey (1905) from India, *P. cavitensis* Pillai (1965) from the Philippines, *P. allopors* Light (1970a) from California and *P. wobberi* Light (1970b) from the Gulf of California. *P. notialis* differs from each of the foregoing species in possessing a crest of fine bristles on the convex surface of those same spines and in the lack of a constriction on the shaft of the hooded hooks. *P. notialis* also resembles those species having a crest on the major spines: *P. caulleryi* Mesnil and *P. aciculata* (see remarks for preceding species).

**Distribution:** South Australia.

### *Polydora pilocollaris* sp. nov.

(Figure 42)

**Material examined:** VICTORIA. Port Phillip Bay, PPBES Station 907 (HOLOTYPE, NMV G2878; 6 PARATYPES, NMV G2879-2880).

**Description:** A small species, measuring up to 6.5 mm long and 0.5 mm wide for 70 setigerous segments. Holotype 3.5 mm long and 0.3 mm wide for 55 setigers. Opaque white in alcohol.

Prostomium distinctly incised anteriorly with 2 rounded lobes; caruncle thickened, extending to posterior margin of setiger 2-3 (Fig. 42a); no occipital tentacle; eyes present as only 1 subcuticular pair, or absent.

Setiger 1 with long finger-like notopodial lobe, notosetae lacking, with capillary neurosetae. Setigers 2, 3, 4, -, 6 and succeeding setigers with fascicles of unilimbate capillary notosetae arranged in 2 tiers, setae of first tier the shorter and thicker; shorter setae gradually lost in posterior setigers. No specialized posterior notosetae, but with short pointed capillaries accompanying longer ones.

Neuropodia of setigers 2, 3, 4, - and 6 with spreading fascicles of unilimbate capillaries.

Three to 5 bidentate hooded hooks from setiger 7, accompanied by a single capillary for first few setigers; hooks with relatively narrow angle between secondary tooth and main fang (Fig. 42d); no constriction on shaft.

Setiger 5 modified, overlapping setiger 6; with dorsal fascicle of heavy geniculate setae, curved row of major spines, hastate companion setae (Fig. 42b) and a ventral fascicle of unilimbate capillaries; major spines falcate, with collar on convex side bearing prominent tuft of bristles (Fig. 42c); unworn spines sometimes with a thin distal mucron.

Branchiae from setiger 7, at first small, reaching full-size on setiger 10-11; absent from posterior  $\frac{1}{2}$  of body.

Pygidium with 4 lobes, dorsal pair slightly smaller than ventral pair (Fig. 42e).

**Remarks:** *Polydora pilocollaris* resembles *P. convexa* Blake and Woodwick (1972) from California in having a collar on the convex side of the major spines of setiger 5. *P. convexa*, however, lacks the tuft of bristles associated with the collar, has a posterior armature which *P. pilocollaris* lacks and has unidentate hooded hooks in posterior segments, rather than bidentate ones, as in *P. pilocollaris*.

**Distribution:** Victoria, Port Phillip Bay.

### *Polydora armata* Langerhans, 1880

(Figure 43a-g)

*Polydora armata* Langerhans, 1880, p. 93; Fauvel, 1927, p. 55; Hartman, 1941, p. 306; 1969, p. 127; Woodwick, 1964, p. 14; Day, 1967, p. 466; Rainer, 1973, p. 58; Read, 1975, p. 412.

*Polydora monilaris* Ehlers, 1905, p. 43. *Fide* Day, 1954.

**Material examined:** VICTORIA. Port Phillip Bay, Point Gellibrand, Williamstown, in shell of *Haliotis ruber*, 5 April 1977, coll. J. A. Blake and J. D. Kudenov (70+, NMV G2881). SOUTH AUSTRALIA. Tipara, shell of *Haliotis roei*, 19 May 1971, coll. S. Shepherd (4, NMV G3056).

**Description:** A small species, up to 3-4 mm long and 0.5 mm wide for 30 segments. Prostomium bilobed anteriorly; caruncle extending to posterior margin of setiger 2; no occipital tentacle or eyes. Setiger 1 with 2-3 capillary notosetae; neurosetae more numerous. Setigers 2, 3, 4, -, 6 and succeeding setigers with unilimbate capillary notosetae; posterior setigers with

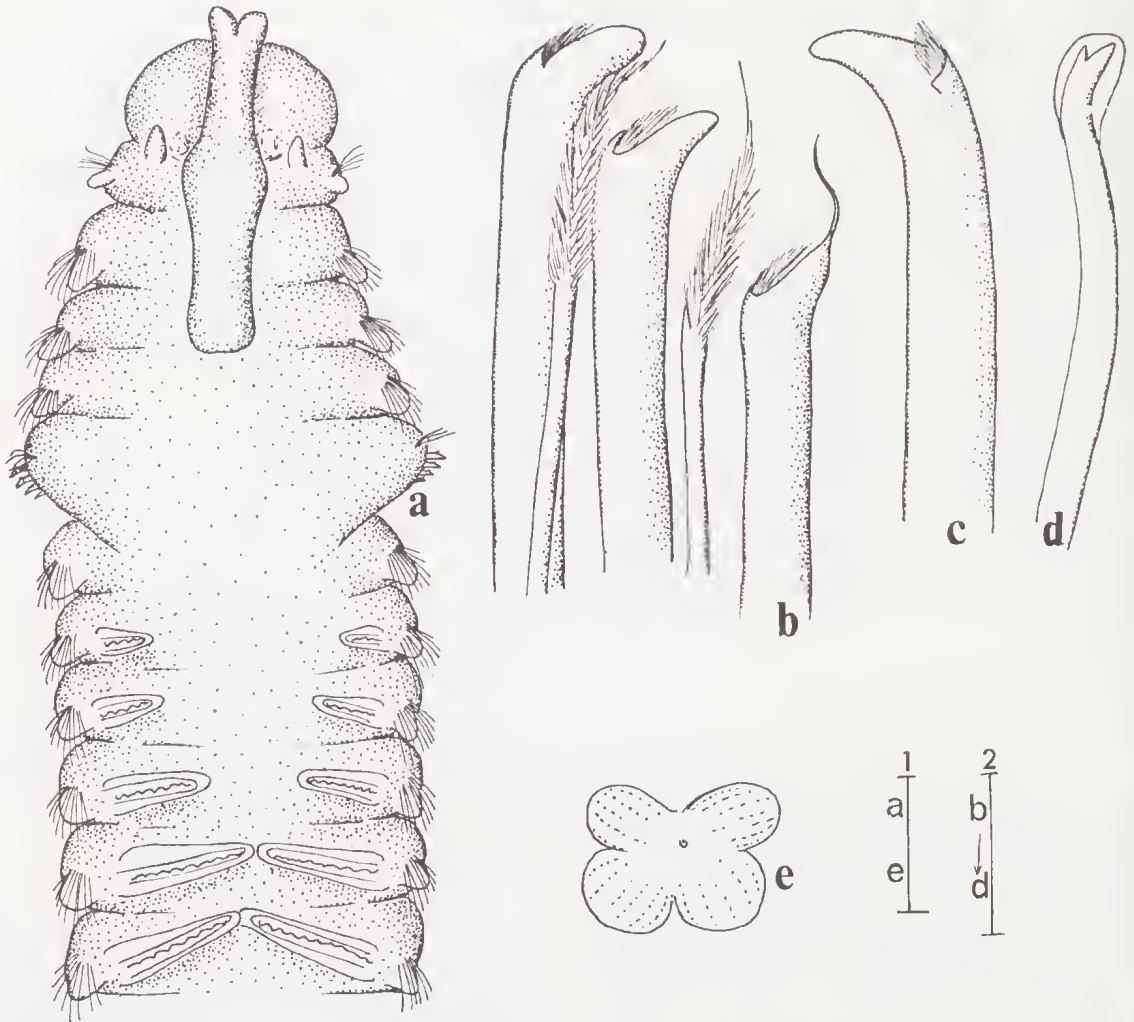


Figure 42—*Polydora pilocollaris* sp. nov.—a, anterior end, dorsal view; b, fascicle of 3 major spines and 2 companion setae, setiger 5; c, individual major spine, setiger 5; d, hooded hook; e, pygidium. [Scale 1 = 300  $\mu\text{m}$ ; 2 = 20  $\mu\text{m}$ ]

cone-shaped bundles of acicular spines (Fig. 43g), these usually not emergent in small specimens. Neurosetae of setigers 2, 3, 4, - and 6 unilimbate capillaries. Bidentate hooded hooks beginning on setiger 7 (Fig. 43f), without constriction on shaft, with acute, but fairly wide angle (about  $50^\circ$ ) between main fang and secondary tooth.

Setiger 5 highly modified, with dorsal fas-

cicle of 2-3 geniculate setae, a row of heavy spines and ventral fascicle of unilimbate capillary neurosetae; major spines bidentate, teeth connected by lateral hood or cowling on one side (Fig. 43a-c) and thin shelf on opposite side (Fig. 43d-e). Cowling bears fine bristles seen only under oil immersion on new or unworn spines. No companion setae of any sort.

Branchiae from setiger 7, reaching full-size by setiger 8, continuing to setigers 11-12. Pygidium small, cuff-shaped, with dorsal and ventral gaps.

*Remarks:* We have found *P. armata* to have bidentate spines on setiger 5 as Langerhans (1880) originally reported. The pres-



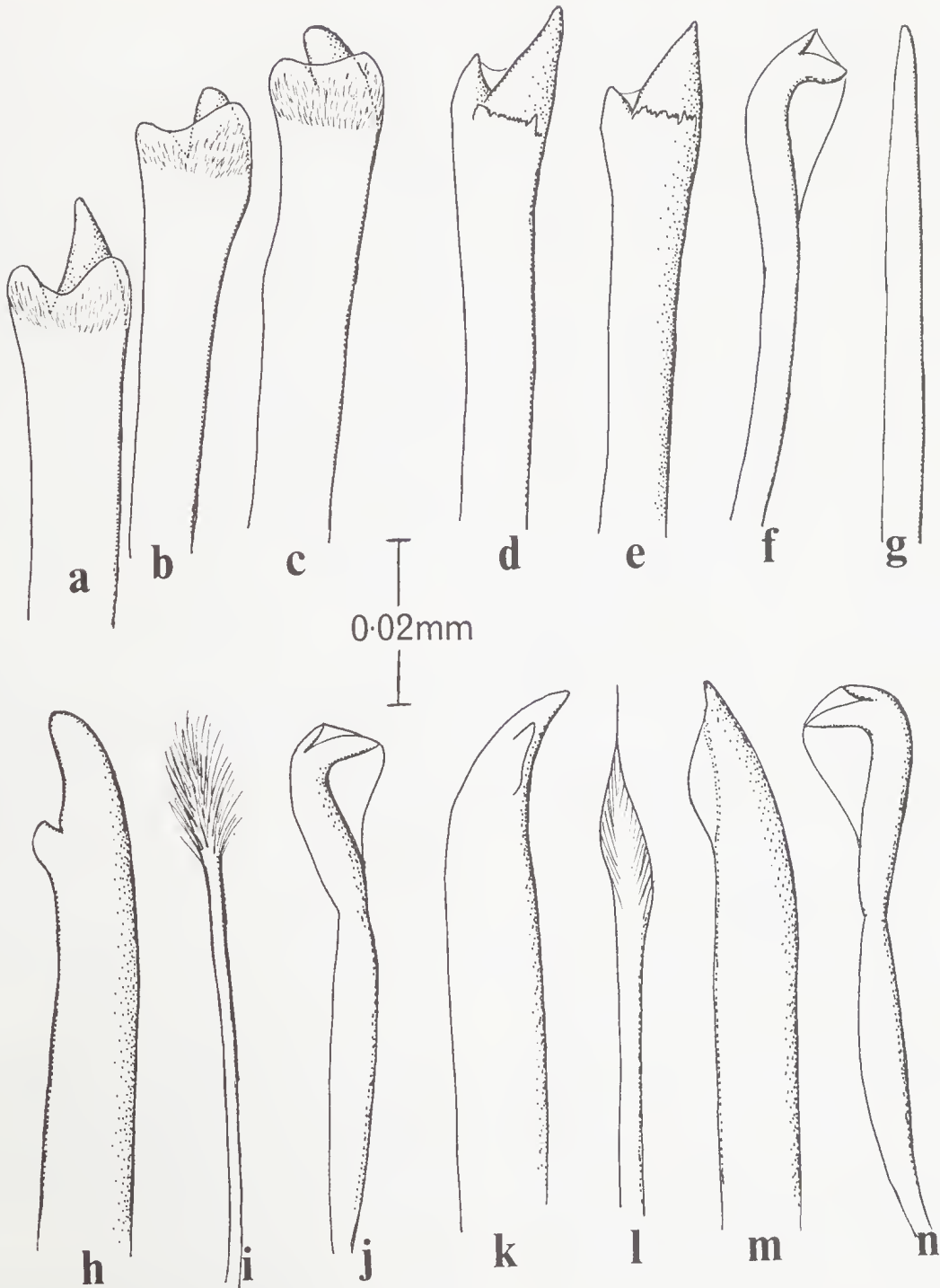


Figure 43—*Polydora armata* Langerhans—a-e, spines, setiger 5; f, hooded hook; g, posterior notopodial spine—*Polydora ligni* Webster—h, major spine, setiger 5; i, companion seta, setiger 5; j, hooded hook—*Polydora websteri* Hartman—k, major spine, setiger 5; l, companion seta, setiger 5; m, major spine, setiger 5; n, hooded hook.

ence of minute bristles on the hood or cowl-ing is a new finding, although Figure 2(2) of Woodwick (1964) suggests that similar bristles are present in his Eniwetok specimens.

*P. armata*, *P. caulleryi* Mesnil, *P. quadrilobata* Jacobi, 1883 and *P. aciculata* belong to a group of species having acicular spines in the posterior notopodia, hooded hooks lacking a constriction on the shaft and some similarity in design of the major spines of setiger 5. The major spines in *P. armata* are unique, but have been interpreted in various ways by different authors, apparently because the spines look different in different views. Woodwick (1964) reviewed the literature on *P. armata* spines and presented illustrations based on Eniwetok specimens which compared favourably with the various past interpretations of other authors. In this manner he was able to support the synonymy of *P. monilaris* Ehlers, 1905 with *P. armata*, first proposed by Day (1954). Rainer (1973) did not disagree with this synonymy, but suggested that the types of *P. monilaris* should be examined. We support the synonymy of *P. monilaris* and *P. armata*, but also feel that type material should be located and examined.

*Distribution:* Victoria; South Australia; Japan; South Africa; Europe; New Zealand; North Eastern Pacific.

#### ***Polydora ligni* Webster, 1879**

(Figure 43h-j)

*Polydora ligni* Webster, 1879b, p. 119; Blake, 1971, p. 5 (Synonymy); Foster, 1971, p. 22 (Synonymy); Light, 1977, p. 70.

*Material examined:* VICTORIA. Port Phillip Bay, Hobsons Bay-Yarra River, MSG Stations, Feb.-Aug. 1975, coll. G. Poore and J. D. Kudenov, Sta. 128 (1144); 130 (58); 133 (7); 136 (28); 138 (1) (NMV G2882, 3167-3171); Werribee, MSG Monitoring Programme (P609), coll. J. D. Kudenov, Stations 10-11, 11 Jan. 1977 (3, NMV G3172-3174).

*Description:* A medium to large species, often measuring up to 32 mm long for 80 setigerous segments (Blake, 1971), Australian specimens generally smaller. Colour in alcohol: opaque white.

Prostomium incised with 2 widely separated lobes; caruncle to setiger 2-3. Two pairs of

eyes, widely spaced, forming a square; occipital tentacle on caruncle behind eyes.

No notosetae on setiger 1, but with well-developed finger-like notopodial lobe; neurosetae with fascicle of delicate capillaries. Setigers 2, 3, 4, - and 6 with typical fascicles of unilimbate capillary noto- and neurosetae. No posterior spines. Bidentate neuropodial hooded hooks from setiger 7 (Fig. 43j), main fang forming approximately right angles with shaft; shaft with constriction.

Setiger 5 with curved row of modified spines and closely adhering feather-like companion setae (Fig. 43i), spines weakly falcate with small secondary tooth (Fig. 43h); with ventral fascicle of unilimbate capillaries.

Branchiae from setiger 7, continuing to posterior end. Pygidium a large flaring disc.

*Distribution:* Victoria; North America; northern Europe.

#### ***Polydora websteri* Hartman, 1943**

(Figure 43k-n)

*Polydora ciliata:* Haswell, 1885, p. 272 [Not Johnston, 1838].

*Polydora websteri* Hartman, 1943, p. 70; Blake, 1971, p. 6 (Synonymy); Foster, 1971, p. 26 (Synonymy).

*Material examined:* NEW SOUTH WALES. Newcastle, ca. 1885 (3, AM G11390); Tuross Lake, from *Crassostrea commercialis*, April 1977, coll. M. Skeel (4, NMV G3057).

*Description:* A moderately-sized species measuring up to 10 mm long and 0.5 mm wide for 100 setigerous segments.

Prostomium weakly bifid on anterior margin, caruncle extending to middle setiger 3; 4 eyes; no occipital tentacle.

Setiger 1 lacking notosetae. Setigers 2, 3, 4, -, 6 and succeeding setigers with unilimbate capillary notosetae; posterior notopodial spines absent. Setigers 2, 3, 4, - and 6 with unilimbate capillary neurosetae. Six to 7 bidentate hooded hooks per neuropodium from setiger 7 having a wide angle between teeth (Fig. 43n); main fang forming right angle with shaft; with constriction.

Setiger 5 with dorsal and ventral fascicles of unilimbate capillaries and a row of major spines and bilimbate companion setae (Fig. 43l), major spines falcate with lateral flange (Fig. 43k, m).

Branchiae from setiger 7, absent from posterior  $\frac{1}{3}$  of body. Pygidium disc-like with dorsal notch.

*Remarks:* Specimens agree well with *P. websteri* from North American waters. The species may be widespread in oyster growing centres where it forms mud-blisters in shells. Specimens of *P. ciliata* reported by Haswell (1885) most certainly should be referred to *P. websteri*, since specimens in the Australian Museum appear to be from Haswell's collection (E. Pope, communication to K. H. Woodwick, 1964). *P. websteri* is related to *P. ciliata* (Johnston, 1838) and has probably been mistaken for it on numerous occasions (see Hartman, 1943; Blake, 1971). Such references can only be verified by direct examination of the specimens in question. This uncertainty applies to the reports of *P. ciliata* in oysters from New South Wales by Whitelegge (1890) and Roughley (1922). Their specimens were possibly *P. websteri*, but in the absence of specimens, such suspicions cannot be verified.

The presence in Australia of another closely related and newly described species, *P. haswelli* (see below), adds to the confusion. *P. websteri* and *P. haswelli* are separated with difficulty (see key) and since both occur with oysters, careful attention to detail is required to separate reliably.

*Ecology:* Drills into oyster shells, forming mud-blisters (for review, see Blake and Evans, 1973).

*Distribution:* New South Wales; North America.

### *Polydora haswelli* sp. nov.

(Figure 44)

*Material examined:* NEW SOUTH WALES. Sydney, Wy-ar-gine Point, Middle Harbour, *Galeolaria* association, 19 Dec. 1968 (5, AM W13040); Scraping from hull of BEN SHORTRIDGE, tug from Newcastle, coll. Sydney Harbour, 29 Feb. 1972 where tug was cleaned, *P. Hutchings* (1, AM W13041); Sydney Harbour, 8-10 m, near N. Chinamens Beach, sand, 8 May 1971, coll. *P. Hutchings* (HOLOTYPE, AM W 7283; 12 PARATYPES, AM W13042; 5 PARATYPES, NMV G2883); Botany Bay, Towra Beach, NSWFS Station, April 1973 (1, AM W13043); Camden Haven, Kennedy oyster lease, in mud blisters, 20 April 1977, coll. M. Skeel (3, NMV G3058).

*Description:* A moderate-sized species, up to

13 mm long and 0.75 mm wide for 72 segments. Body light tan with considerable black pigment, including a line along each side of prostomium, an area on peristomium anterior to palps and paired dorsolateral spots located on setigers 1-3; additional pigment on palps.

Prostomium distinctly incised on anterior margin, caruncle extending posteriorly to middle of setiger 3 (Fig. 44a); occipital tentacle; 4 small, oval-shaped, subcuticular eyes, or eyes absent.

Setiger 1 with short conical notopodial lobes lacking notosetae; neuropodial lobes finger-like, with fascicle of thin capillaries. Setigers 2, 3, 4, -, 6 and succeeding segments with spreading fascicles of unilimbate capillary notosetae; posterior notosetae gradually reduced to few long slender erect capillaries; no posterior spines. Neurosetae of setigers 2, 3, 4, - and 6 unilimbate capillaries. Six to 8 bidentate hooded hooks in neuropodia from setiger 7; these with strong angle between secondary tooth and main fang, main fang forming right angle with shaft; with prominent constriction on shaft (Fig. 44f); not accompanied by capillaries.

Setiger 5 strongly modified, musculature overlapping setiger 6; setae including dorsal fascicle of bilimbate setae, curved row of heavy spines (Fig. 44c-e) alternating with bilimbate companion setae (Fig. 44b) and a ventral inferior fascicle of capillaries; heavy spines slightly falcate with 2 accessory structures (Fig. 44c-e); one a prominent accessory tooth; the second a low flange located just distal to tooth.

Branchiae from setiger 7, small at first, reaching full-size by setiger 9 and overlapping at mid-line; branchiae absent from posterior  $\frac{1}{4}$  of body. Pygidium a flaring disc with narrow dorsal notch (Fig. 44g).

*Remarks:* *Polydora haswelli* resembles *P. websteri* in having a flange on the major spines of setiger 5; it also resembles *P. ciliata* in having a sharp accessory tooth on those same spines. It differs from both species in bearing both a flange and an accessory tooth. The species is named for Professor W. F. Haswell, a pioneering Australian polychaete taxonomist who



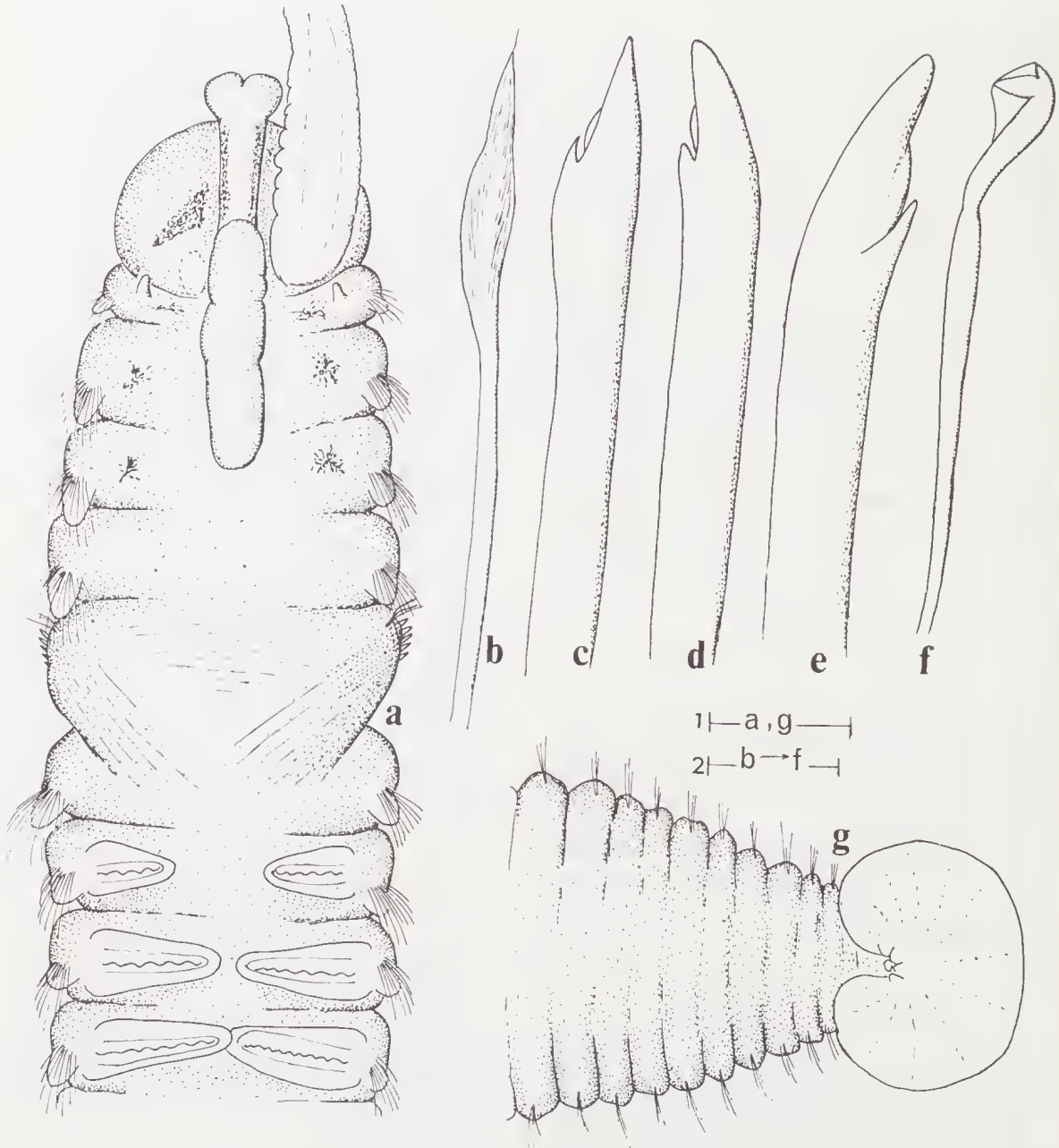


Figure 44—*Polydora haswelli* sp. nov.—a, anterior end, dorsal view; b, companion seta, setiger 5; c-e, major spines, setiger 5; f, hooded hook; g, posterior end, dorsal view. [Scale 1 = 200  $\mu$ m; 2 = 20  $\mu$ m]

*Distribution:* New South Wales.

***Polydora latispinosa* sp. nov.**

(Figure 45)

*Material examined:* VICTORIA. Port Phillip Bay, Point Cook, dredged, oysters and scallops (*Pecten alba*) shells, 14 April 1977, coll. J. A. Blake and J. D.

published an early paper on *Polydora* in Australia (Haswell, 1885).

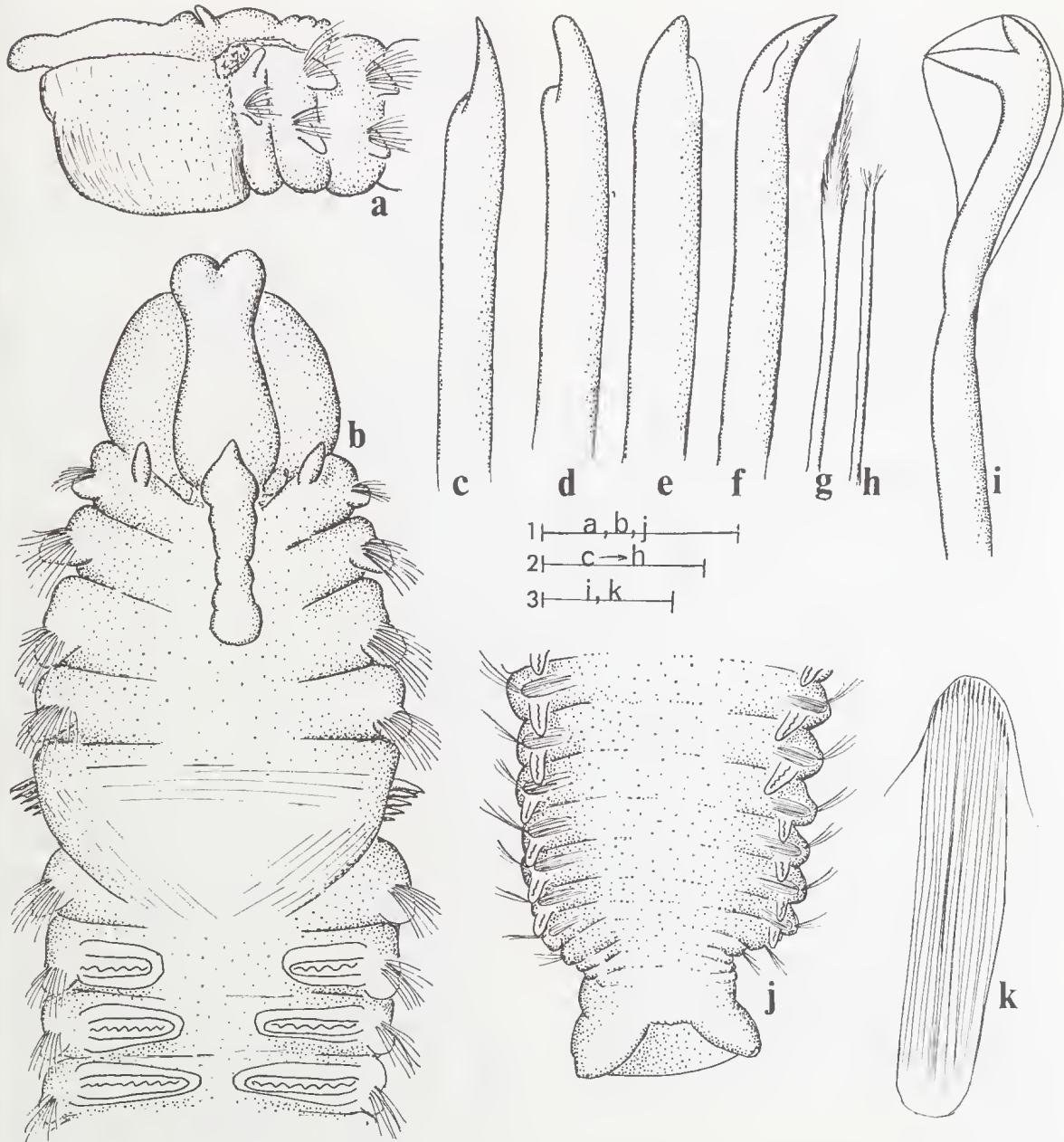


Figure 45—*Polydora latispinosa* sp. nov.—a, anterior end, lateral view; b, anterior end, dorsal view; c-f, major spines, setiger 5, various views; g-h, companion setae, setiger 5 (worn and unworn); i, hooded hook; j, posterior end, dorsal view; k, posterior bundle of needles. [Scale 1 = 500  $\mu$ m; 2 = 50  $\mu$ m; 3 = 20  $\mu$ m]

Kudenov (HOLOTYPE, NMV G2874; 50+ PARATYPES, NMV G2875-2876).

*Description*: A large species, measuring up to 33 mm long and 1.2 mm wide for 210 setigerous segments. Body light tan in life with bright red blood vessels and branchiae; some dark ventral patterns caused by capillary blood

vessels; brown pigment along edges of caruncle.

Prostomium distinctly bilobed anteriorly (Fig. 45a); caruncle extending posteriorly to end of setiger 2; with short triangular occipital tentacle formed by fold in caruncle at anterior margin of setiger 1 (Fig. 45b); 1-2 pairs of obscure, subcutaneous eyes present or eyes absent. Palps short, thick, extending posteriorly only 5-6 setigers.

Setiger 1 with well-developed finger-like notopodia, lacking notosetae; with fascicle of delicate capillary neurosetae. Setigers 2, 3, 4, -, 6 and succeeding segments with capillary notosetae arranged in 2 tiers, first tier with shorter thicker setae; posterior notopodia with fewer, pointed thinner capillaries and flattened packets of fine needles, these sometimes projecting through cuticle (Fig. 45j-k). Neurosetae of setigers 2, 3, 4, - and 6 unilimbate capillaries, not as prominent as notosetae. Bidentate hooded hooks from setiger 7, about 6 hooks per neuropodium at first, completely replacing capillary setae, increasing to 11-12 per neuropodium in middle body segments and diminishing, to 5-6 per ramus, posteriorly; hooks with strong angle between teeth throughout, main fang forming right angle with shaft; with distinct constriction on shaft (Fig. 45i).

Setiger 5 large, overlapping 6 with heavy dorsal musculature; no dorsal fascicle; with a row of major spines alternating with narrow hastate setae (Fig. 45g-h), and ventral fascicle of unilimbate capillary setae; major spines falcate with lateral sheath or flange (Fig. 45c-f).

Branchiae from setiger 7, at first small, reaching full-size on setigers 9-10, continuing to posterior end of body.

Pygidium a large flaring disc, with wide dorsal gap (Fig. 45j).

*Remarks:* *Polydora latispinosa* belongs to the *P. ciliata-websteri* group; it is most closely related to *P. vulgaris* Mohammad (1972) in having an occipital tentacle and posterior notopodial spines and in lacking superior notosetae on setiger 5. However, in *P. latispinosa* the posterior spines are packets of fine needles, while *P. vulgaris* bears individual notopodial spines.

*Ecology:* *Polydora latispinosa* forms complex burrows and mud-blisters in shells of scallops and oysters in Port Phillip Bay.

*Distribution:* Victoria, Port Phillip Bay.

### *Polydora woodwicki* sp. nov.

(Figure 46)

*Material examined:* VICTORIA. Port Phillip Bay, Point Gellibrand, Williamstown, shell of *Haliotis ruber*, 5 April 1977, coll. J. A. Blake and J. D. Kudenov (HOLOTYPE, NMV G2873).

*Description:* A moderate-sized species. The holotype is in 3 parts, measuring in total 15 mm long and 0.75 mm wide for 105 segments. Colour light tan with red-brown intersegmental pigment in posterior segments.

Prostomium anteriorly entire; caruncle short, thick and bulbous, extending posteriorly to end of setiger 2 (Fig. 46a); no occipital tentacle; 2 pairs of oval eyes; palps regenerating on holotype (Fig. 46a) and normal length or form unknown.

Setiger 1 with rounded notopodial lobes, lacking notosetae; neuropodial lobe ill-defined, but with spreading fascicle of delicate capillaries. Setigers 2, 3, 4, -, 6 and succeeding setigers with short, thick notopodial lobes bearing unilimbate capillary notosetae arranged in 2 tiers: first tier with short setae, long, thin setae in second tier. In posterior setigers notopodia reduced, setae fewer, more delicate. Posterior notosetae including both long and short stiff, erect capillary setae, imparting spinous appearance to posterior end (Fig. 46k). Neurosetae of setigers 2, 3, 4, - and 6 in spreading fascicles of unilimbate capillaries. Five to 6 bidentate hooded hooks in anterior segments from setiger 7, completely replacing capillary setae, with hooks increasing to 8 per ramus in middle segments; hooks with wide angle between teeth, main fang forming right angles or less with shaft; with prominent constriction on shaft (Fig. 46b).

Setiger 5 modified, somewhat contracted and larger than setigers 4 and 6; with superior dorsal fascicle of geniculate setae (Fig. 46j), a group of major spines alternating with bilimbate companion setae (Fig. 46e, g) and a ventral inferior fascicle of unilimbated setae (Fig. 46i). Major spines slightly falcate with prom-



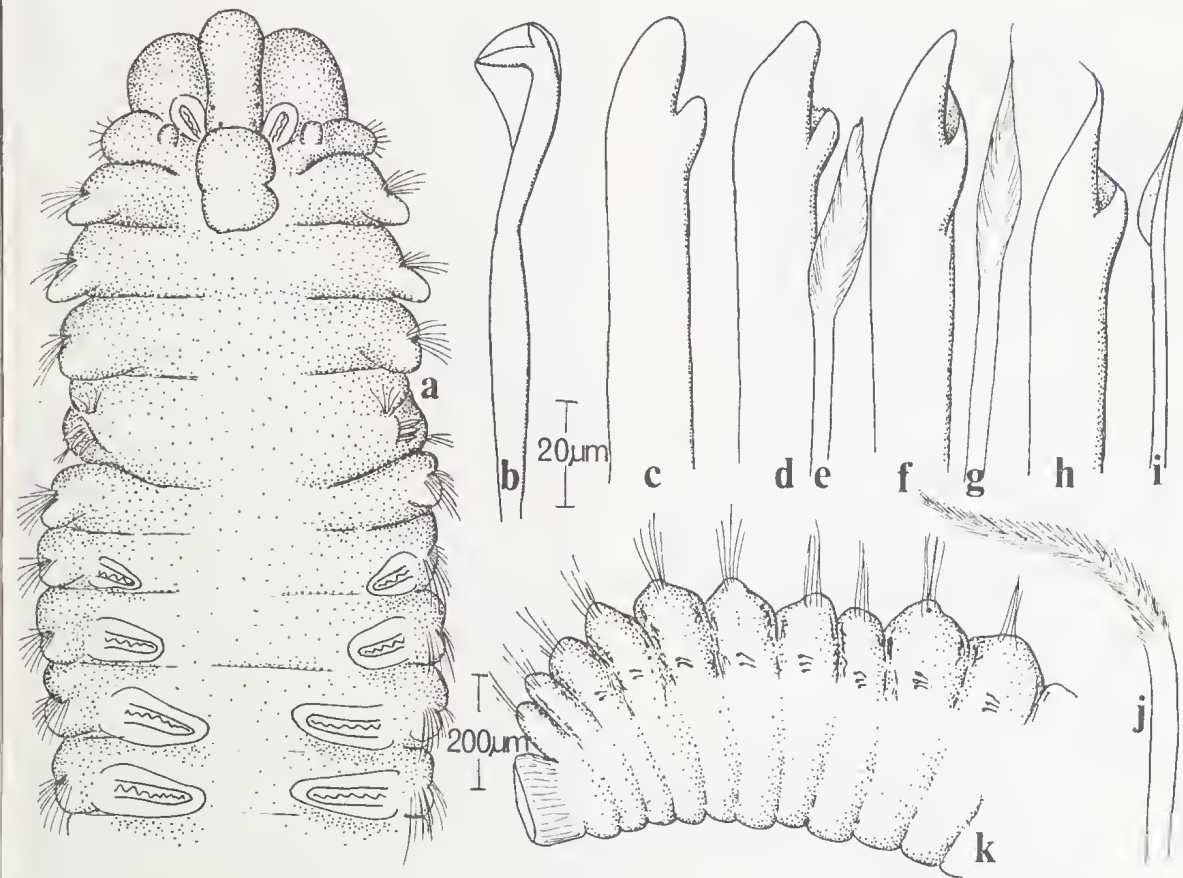


Figure 46—*Polydora woodwicki* sp. nov.—a, anterior end of holotype in dorsal view; b, hooded hook; c-h, 4 major spines and 2 companion setae, setiger 5; i, neuroseta, setiger 5; j, superior dorsal notoseta, setiger 5; k, posterior end, lateral view.

inent accessory flange (Fig. 46c-d, f, h); unworn spines with terminal mucron (Fig. 46h).

Short branchiae from setiger 7, never extending more than  $\frac{1}{3}$  of distance across dorsum (Fig. 46a), continuing for only 21-23 segments, absent from posterior  $\frac{2}{3}$  of body.

Pygidium a small cuff-shaped disc, with mid-dorsal gap, somewhat telescoped into terminal segments (Fig. 46k).

**Remarks:** *Polydora woodwicki* belongs to the *P. websteri-ciliata* group in having an accessory flange on the major spines of setiger 5. The species is most closely related to *P. spondylana* Mohammad (1973) in having a rounded pro-

stomium. *P. spondylana* differs in having an enlarged, oval prostomium, a long narrow caruncle reaching to setiger 5, no eyes and a large disc-like pygidium, while *P. woodwicki* has a typical narrow Prostomium, short bulbous caruncle reaching only to setiger 3, 4 eyes and a smaller cuff-shaped pygidium. *P. woodwicki* also resembles *P. rickettsi* Woodwick (1961) from Mexico in having a rounded prostomium. *P. rickettsi*, however, has a long caruncle reaching to setiger 5, the major spines of setiger 5 bear a distinct accessory tooth rather than a flange and the pygidium is large and disc-like, being larger than prepygidial segments. This species is named in honour of Dr. Keith H. Woodwick, in recognition of his many studies on spionid polychaetes.

**Ecology:** Bores into abalone shells. At Point Gellibrand it was associated with *P. armata*.

**Distribution:** Victoria, Port Phillip Bay.

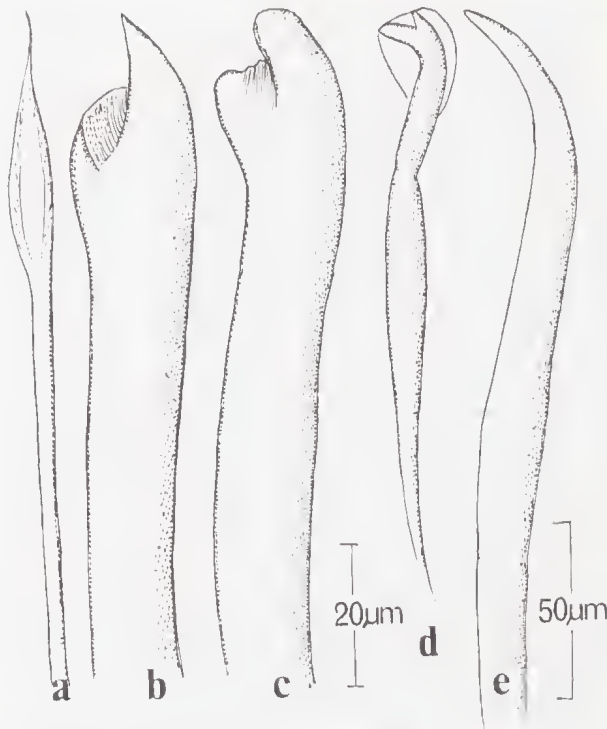


Figure 47—*Polydora hoplura* Claparède—a, companion seta, setiger 5; b-c, major spines, setiger 5; d, hooded hook; e, posterior notopodial spine.

***Polydora hoplura* Claparède, 1870**  
(Figure 47)

*Polydora hoplura* Claparède, 1870, p. 58; Carazzi, 1893, p. 20; Fauvel, 1927, p. 50; Day, 1967, p. 468; Read, 1975, p. 411.

**Material examined:** NEW SOUTH WALES. Point Henry Pier, in oysters, 22 March 1975, coll. C. Prengzer (1, NMV G3059). TASMANIA. Simmons Beach, shells *Crassostrea gigas*, 17 June 1977, shipment specimens arranged M. Skeel (10+, NMV G3060).

**Description:** A large species measuring up to 40 mm long and 2 mm wide for over 160 segments. Body colourless.

Prostomium weakly incised, caruncle extending to end of setiger 3; with low occipital tentacle. Notosetae lacking on setiger 1, neurosetal capillaries present. Setigers 2, 3, 4, -, 6 and succeeding segments with fascicles of unilimbate capillary notosetae; posterior segments with 1-2 large, medially directed falcate spines in each fascicle (Fig. 47e). Neurosetae of setigers 2, 3, 4, - and 6, short, unilimbate capil-

laries; 8-10 bidentate hooded hooks from setiger 7, exhibiting wide angle between teeth; main fang and shaft forming oblique angle; with constriction on shaft (Fig. 47d).

Major spines of setiger 5 falcate, with large subterminal flange, appearing tooth-like in certain views and depending upon wear (Fig. 47b-e); companion setae bilimbate (Fig. 47a); with dorsal and ventral fascicles of unilimbate capillary setae.

Branchiae from setiger 7 along most of body, terminating just anterior to appearance of posterior spines.

Pygidium a large disc with wide dorsal notch. **Remarks:** Australian specimens agree with descriptions of specimens from New Zealand by Read (1975); the occipital tentacle and long caruncle, seen in these examples has not been reported in earlier accounts from Europe.

**Ecology:** Forms mud-blisters in oysters.

**Distribution:** New South Wales; Tasmania; Europe; South Africa; New Zealand.

**Genus *Boccardiella* gen. nov.**

**Type-species:** *Polydora hamata* Webster, 1879a. Gender feminine.

**Diagnosis:** Prostomium anteriorly entire or incised, extending posteriorly as caruncle. Setiger 1 with or without notosetae. Setiger 5 strongly modified with only 1 type of major spine in a single row, with smaller companion setae; capillary notosetae present. Bidentate hooded hooks from setiger 7, main fang and shaft forming oblique angle with reduced (acute) angle between main fang and secondary tooth; main fang and secondary tooth more or less subequal without constriction on shaft; posterior notopodial spines or 'boat hooks' present or absent. Branchiae from setiger 2, present or absent on setiger 5, continuing for variable number of segments. Pygidium disc-like or reduced to small lobes or lappets, with or without small cirri or papillae.

**Remarks:** Species with branchiae anterior to setiger 5 and with only 1 type of major spine on setiger 5 are herein removed from *Boccardia* to *Boccardiella*, which contains the following species:

1. *B. bihamata* sp. nov. (see below)

2. *B. hamata* (Webster, 1879a) n. comb.  
*Boccardia uncata* Berkeley, 1927. *Fide* Blake (1966).
3. *B. ligerica* (Ferronière, 1898) comb. nov.  
*Polydora redeki* Horst, 1920. *Fide* Blake and Woodwick (1971).  
*Polydora uncatiformis* Monro, 1938.  
New synonymy.
4. *B. limnicola* (Blake and Woodwick, 1976) comb. nov.
5. *B. magniovata* (Read, 1975) comb. nov.
6. *B. truncata* (Hartman, 1936) comb. nov.

*Boccardiella* species are a distinct group of polydorids, sharing setal characteristics of setiger 5 with *Polydora* on the one hand, and branchial characteristics with *Boccardia* on the other. Distinctions between this species group and other *Boccardia* species were observed by Blake and Woodwick (1971). The synonymy of *Polydora uncatiformis* Monro, 1938 with *Boccardia hamata* (now *Boccardiella*) proposed by Blake (1966) was in error. Monro's species should instead be referred to synonymy with *Boccardiella ligerica*. Further comments on that situation will be published elsewhere (Blake, in preparation). For further information on the *Boccardiella* species see Blake and Woodwick (1971; 1976) and Read (1975). See Table 3 for generic relationships of *Boccardiella* to the other polydorid genera and remarks elsewhere.

#### *Boccardiella bihamata* sp. nov.

(Figure 48)

*Material examined:* NEW SOUTH WALES. Botany Bay, Towra Beach, NSWFS Stations, 12-17 April 1973 (HOLOTYPE, NMV G2887; 4 PARATYPES NMV G2888-2889; 5 PARATYPES, AM W13044).

*Description:* A moderate-sized species measuring up to 12 mm long and 0.75 mm wide for 75 setigers. Specimens mostly opaque white in alcohol; colour on some specimens indeterminate due to staining by Rose Bengal.

Prostomium distinctly bifid on anterior margin, forming 2 rounded lobes (Fig. 48a), caruncle extending posteriorly to near posterior border setiger 3; without occipital tentacle; 2 pairs of eyes, or eyes absent; when present anterior pair widely spaced and oval, posterior

pair widely spaced and cup-shaped. Palps long, extending posteriorly for 20-22 setigers.

Setiger 1 with well-developed noto- and neuropodia, but lacking notosetae (Fig. 48a); neurosetae including a small fascicle of capillaries. Setigers 2, 3, 4, -, 6 and succeeding segments with spreading fascicles of unilimbate capillary notosetae arranged in 2 tiers, the more anterior setae shortest and thickest; number of capillary setae gradually reduced through middle body segments. Posterior end highly modified, with 2 types of acicular notopodial spines; each notopodium with (1) a large, stout recurved hook (Fig. 48k), (2) accompanied by 3-4 smaller straight acicular spines (Fig. 48l-n), and 2-3 long capillary setae (Fig. 48n); parapodia elevated on each side, forming middorsal channel into which acicular spines project (Fig. 48m-n). Neuropodia of setigers 2, 3, 4, - and 6 with fascicles of unilimbate capillaries. Bidentate hooded hooks from setiger 7, numbering 6-8 through middle segments accompanied by 2-3 inferior capillary setae, reduced to 3-4 in posterior segments, with capillaries becoming lost; structure of hooks changing from anterior to posterior setigers: hooks initially bidentate with an obtuse angle between nearly subequal teeth (Fig. 48g-h), secondary tooth becoming lost in posterior setigers, resulting in unidentate hooded hooks (Fig. 48i), with superior hooks usually losing hood (Fig. 48j), with broken hood occasionally seen hanging from shaft.

Setiger 5 with dorsal superior fascicle of 5-6 stout geniculate unilimbate setae (Fig. 48f), row of major spines (Fig. 48c-d) alternating with bilimbate companion setae (Fig. 48b) and a ventral inferior fascicle of 10-12 unilimbate capillaries (Fig. 48e); major spines simple, weakly falcate, without accessory structures (Fig. 48c-d).

Branchiae occurring setigers 2, 3, -, -, 6 and subsequent segments for about  $\frac{2}{3}$  of body length.

Pygidium a flattened plate from which 2 short lateral cirri arise (Fig. 48m), closely resembling that of *B. hamata*. The anus opens dorsally.

*Remarks:* *Boccardiella bihamata* is closely related to *B. hamata* and *B. ligerica* in the struc-



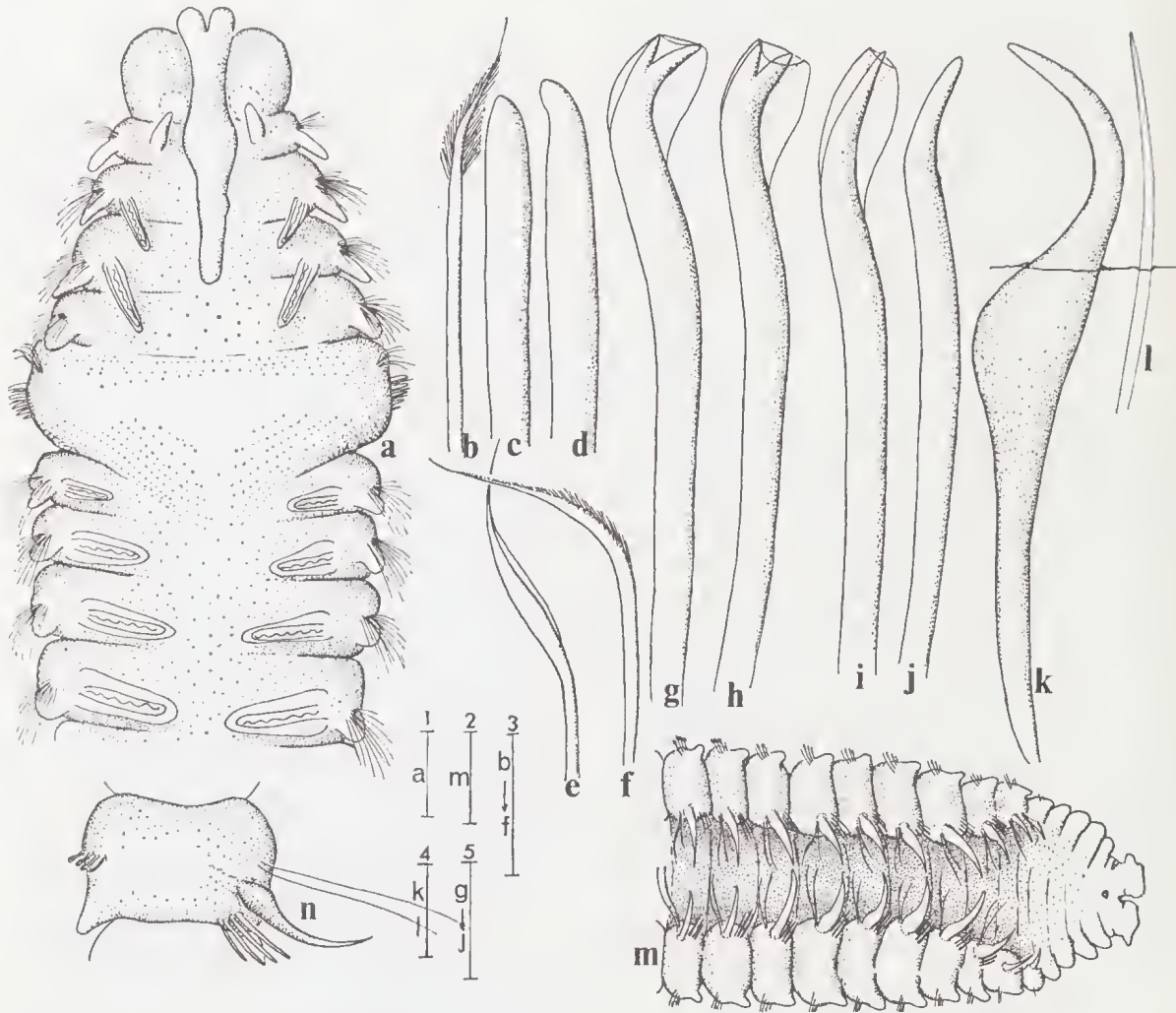


Figure 48—*Boccardiella bihamata* gen. et sp. nov.—a, anterior end, dorsal view; b, companion seta, setiger 5; c-d, major spines, setiger 5; e, neuroseta, setiger 5; f, superior dorsal seta, setiger 5; g-j, progression of hooded hook structure from anterior (g), medial (h) and posterior (i, j) setigers; k-l, large hook and small spine from posterior notopodium; m, posterior end, dorsal view; n, posterior segment, dorsal view. [Scale 1 = 200  $\mu$ m; 2 = 200  $\mu$ m; 3 = 50  $\mu$ m; 4 = 50  $\mu$ m; 5 = 20  $\mu$ m]

ture of the posterior end and in bearing large recurved posterior notopodial hooks. It differs significantly from both in the possession of an additional type of acicular notopodial spine in posterior segments and in the presence of unidentate neuropodial hooks in the same region.

See Blake and Woodwick (1971; 1976) for further information on related species.

*Distribution:* New South Wales, Botany Bay.

***Boccardiella limnicola* (Blake and Woodwick, 1976) comb. nov.**

*Boccardia limnicola* Blake and Woodwick, 1976, p. 123.

*Material examined:* QUEENSLAND. Brisbane, Centenary Bridge, Feb. 1972 (10+, AM W7491); Deception Bay, Burpengary Creek, Jan. 1975, coll. J. Davie (70+, AM W7126). VICTORIA. Port Phillip Bay, Werribee, MSG Monitoring Programme (P609), coll. J. D. Kudenov, Station 10, 11 Jan. 1977 (16, NMV G3061-3063); Lake Bong Bong, 17 Nov. 1970, coll. B. V. Timms (HOLOTYPE AM W7033; 19 PARATYPES AM W7034); Glenelg River, July 1975, coll. J. D. Kudenov and P. A. Hutchings (48,

NMV G3064-3065); Fitzroy River, July 1975, coll. J. D. Kudenov and P. Hutchings (20, NMV G3066); Port Fairy, July 1975, coll. J. D. Kudenov and P. Hutchings (50+, NMV G3068); Warrnambool, Merri River, July 1975, coll. J. D. Kudenov and P. Hutchings (21, NMV G3067); Paynesville, Gippsland Lakes, jetty, 2 m, sand, Aug. 1975, coll. J. D. Kudenov (9, NMV G3069-3070).

**Remarks:** The reader is referred to Blake and Woodwick (1976) for a description of the species. We note in the new material, that the length of the branchiae on setiger 5 is highly variable, being rudimentary on some specimens to as long as those on setigers 4 and 6 in others.

*Boccardiella limnicola* is similar to *B. magniovata* (Read, 1975) from New Zealand. The latter species differs significantly, however, in lacking branchiae on setiger 5 and form of the pygidium. The two species are very closely related, however, and share a common ancestry.

**Ecology:** *B. limnicola* was described from freshwater Victorian lakes. Although favouring areas of reduced salinities, we have now found the species to occur in more saline environments such as tidal rivers and near sewage outfalls. One record of a freshwater spionid overlooked by Blake and Woodwick (1976) was that of *Marenzellaria wireni* reported by Holmquist (1967) from Alaska.

**Distribution:** Queensland; Victoria.

#### Genus *Pseudopolydora* Czerniavsky, 1881 emended

*Pseudopolydora* Czerniavsky, 1881. *Type-species:* *P. antennata* (Claparède, 1870), by monotypy.

*Carazzia* Mesnil, 1896. *Type-species:* *C. antennata* (Claparède, 1870), by monotypy.

*Polydorella* Augener, 1914. *Type-species:* *P. prolifera* Augener, 1914, by monotypy. *New synonymy.*

**Diagnosis:** Prostomium entire or incised, extending posteriorly as a caruncle; occipital tentacle present or absent; eyes present or absent. Setiger 1 generally reduced, with or without notosetae (and in some species without neurosetae if animals are reproducing asexually and regenerating). Setiger 5 generally not distinctly enlarged, with noto- and neuropodia often well-developed with postsetal lobes and bearing spreading fascicles of capillaries; with curved row of heavy spines of 2 types, or single type with companion setae; modified

setae often forming J- or U-shaped setal group. Posterior notopodial spines or 'boat hooks' present or absent. Neuropodial hooded hooks from setiger 8, these hooks bidentate, with secondary tooth closely applied to main fang, with constriction on shaft; accompanying capillaries present or absent. Branchiae first appearing posterior to setiger 5. Pygidium enlarged or reduced, collar-like or divided into lobes or small lappets.

**Remarks:** Species of the genus *Pseudopolydora* are among the least modified of the *Polydora*-complex. Read (1975) pointed out that the low degree of modification to setiger 5 and the structure of the hooded hooks are more characteristic of *Pseudopolydora* than the first appearance of hooded hooks on setiger 8. One species, *P. reishi* Woodwick (1964) was noted by Read (1975) to be doubtfully placed in *Pseudopolydora*. We agree, and herein transfer it to *Carazziella*.

*Polydorella*, with modified spines on setiger 4, rather than 5, was noted by Read (1975) to be closely related to *Pseudopolydora*. In this study, we have been able to examine the type series of *Polydorella prolifera*, the type-species of the genus, and to demonstrate that setae may be present on the generally achaetous segment 1 on some specimens. This is a function of the state of regeneration, since the species is capable of asexual reproduction by paratomy. The discovery of a closely related and previously undescribed species, has confirmed this point of view. We therefore place *Polydorella* into synonymy with *Pseudopolydora*. The status of *Polydorella novaegeorgiae* Gibbs, 1971 remains uncertain, until type material is examined. Its overall morphology is, however, very similar to species of *Pseudopolydora*.

*Pseudopolydora* is herein defined to include species in which setiger 1 is completely reduced to an achaetous condition.

#### KEY TO SPECIES OF *PSEUDOPOLYDORA* FROM AUSTRALIA

- 1a. Maximal number of segments 15-16; small, up to 3 mm long . . . . . 2
- b. More than 20 segments; large, over 6 mm long . . . . . 3
- 2a. Pennoned spines of setiger 5 with fe-



- nestrated edge surrounding cavity, and long bristled apex (Fig. 50n); prostomium entire. . . . . *P. prolifera*
- b. Pennoned spines of setiger 5 with expanded bristle-topped ends (Fig. 50 f-h); prostomium incised. . . . . *P. stolonifera*
- 3a. Prostomium entire. . . . . *P. paucibranchiata*
- b. Prostomium incised. . . . . 4
- 4a. Prostomium with 2 widely flaring anterior lobes; occipital tentacle just behind eyes; caruncle continuing posteriorly to setigers 3-4; branchiae without glands. . . . . *P. kempi*
- b. Prostomium with 2 rounded anterior lobes (Fig. 49a); nuchal tentacle at posterior end of caruncle on setiger 2; branchiae with glands (Fig. 49a) . . . . . *P. glandulosa*

***Pseudopolydora paucibranchiata* (Okuda, 1937)**

*Polydora* (Carazzia) *paucibranchiata* Okuda, 1937, p. 231.

*Pseudopolydora paucibranchiata*: Imajima and Hartman, 1964, p. 288; Blake, 1975, p. 215; Blake and Woodwick, 1975, p. 110; Read, 1975, p. 414; Light, 1977, p. 71 (Synonymy).

*Material examined*: NEW SOUTH WALES. Botany Bay, Towra Beach, NSWFS Stations, 12 April 1973 (1, AM W13045); Jervis Bay, Currubene Creek, 23 Jan. 1977 (1, AM W5223). VICTORIA. Port Phillip Bay, PPBES Stations 904 (2); 919 (15); 924 (2); 926 (10); 939 (4); 942 (47); 953 (36); 984 (2) (NMV G3175-3182); Hobsons Bay-Yarra River, MSG Stations, Feb., May 1975, coll. G. Poore and J. D. Kudenov, 128 (637); 130 (3); 131 (4); 132 (15); 138 (21) (NMV G2890, 3183-3187); Westernport, WPBES Stations 1702 (27, NMV G3133); 1716 (64, NMV G3134).

*Description*: Prostomium entire on anterior margin, caruncle extending to posterior margin of setiger 3; occipital tentacle present. Palps long, extending  $\frac{1}{2}$  length of worm. Setiger 1 without notosetae. Major spines of setiger 5 arranged in a U-shaped line, consisting of 12-14 pennoned, curved spines and an equal number of simple falcate spines; setiger 5 relatively unmodified, same size as setigers 4 and 6. Hooded hooks from setiger 8, completely replacing neuropodial capillaries. Branchiae from setiger 7, continuing to about setiger 35. Pygidium with small, ventral, collar-like disc with large dorsal gap.

*Remarks*: Specimens agree well with others observed by us in California. *P. paucibranchiata* is widely distributed in bays throughout the Pacific and is possibly introduced into Australia. It is similar in some respects to *P. kempi*, but differs in having an entire, rounded, rather than incised prostomium, and a ventral collar-like rather than a dorsally flaring pygidium. *Distribution*: New South Wales; Victoria; Japan; California; New Zealand.

***Pseudopolydora kempi* (Southern, 1921)**

*Polydora* (Carazzia) *kempi* Southern, 1921, p. 636; Okuda, 1937, p. 233.

*Neopygospio laminiifera* Berkeley and Berkeley, 1954, p. 462. *Fide* Banse 1972, p. 219.

*Pseudopolydora kempi japonica* Imajima and Hartman, 1964, p. 287.

*Pseudopolydora kempi californica* Light, 1969, p. 542.

*Pseudopolydora kempi*: Hartman, 1969, p. 167; Blake, 1975, p. 215; Blake and Woodwick, 1975, p. 126; Light, 1977, p. 71.

*Polydora* (*Pseudopolydora*) *kempi japonica*: Banse, 1972, p. 219.

*Material examined*: QUEENSLAND. Moreton Bay, Jackson Creek, 12 July 1973, coll. C. Wallace and P. Hutchings (1, AM W6042); Same, Serpentine Creek, sand bank, coll. C. Wallace (1, AM W6043); Brisbane River, Quarantine Station May 1972 (6, AM W7474). NEW SOUTH WALES. Merimbula, Sta. 197H, 200J, 6 Oct. 1975, sand, coll. by J. H. Day, *et al.* (1, AM W11703, 1, AM W11704).

*Description*: A moderately large species, up to 25 mm long for 45 setigers in some areas, generally smaller in Australia. Body opaque white, otherwise colourless, but with black anterior intersegmental pigment in other localities (Light, 1969).

Anterior end expanded. Prostomium with 2 widely flared lobes, continuing posteriorly as a caruncle to setiger 3-4. Occipital tentacle present, just posterior to eyes; 2 pairs of eyes.

Setiger 1 without notosetae, postsetal lobes erect, short. Setigers 2 and succeeding with well-developed notopodial fascicles of unilimbate setae arranged in 3 tiers: shortest thickest setae in first tier; becoming progressively longer and thinner in tiers 2 and 3; setigers 4 and 6 with anterior tier developed ventrally, curving posteriorly and approaching the condition found in modified setae of setiger 5 (see Southern, 1921, p. 636, pl. 28, fig. 30; Okuda,



1937, p. 235, fig. 13b). Neurosetae setigers 2-7 with well-developed fascicles of unilimbate capillary setae; 25-30 bidentate hooded hooks from setiger 8.

Setiger 5 with about 23-25 pairs of each of 2 types of specialized spines arranged in a J-shaped row: outer row consisting of short pennoned setae, inner row consisting of simple spines, slightly curved apically.

Branchiae from setiger 7, continuing posteriorly for about  $\frac{1}{2}$  body length. Pygidium missing in Australian specimens, but elsewhere reported disc-like, dorsally notched and bearing 2 erect processes on each dorsolateral side (Okuda, 1937; Blake, 1975; Blake and Woodwick, 1975).

*Remarks:* *Pseudopolydora kemp* is one of the least modified members of the genus or the *Polydora*-complex for that matter. In overall view, it is difficult to see the modification of setiger 5. Specimens reported here agree well with descriptions from other areas. Lack of pigmentation may be actual or be an artifact of preservation.

*Distribution:* Queensland; New South Wales; Japan; India; British Columbia, California.

#### *Pseudopolydora glandulosa* sp. nov.

(Figure 49)

*Material examined:* QUEENSLAND. Moreton Bay, Middle Banks, Stas. 43, 54, Sept. 1972, coll. W. Stephenson (2, QM G11598-11599). NEW SOUTH WALES. Botany Bay, Towra Beach, NSWFS Stations, April 1973, (2, AM W13046). VICTORIA. Westernport, Crib Point, CPBS Station 300 (HOLOTYPE, NMV G2899; 5 PARATYPES, NMV G2900).

*Description:* A small species, measuring up to 11 mm long and 1.1 mm wide for 37 setigerous segments on an incomplete specimen. Animals heavily pigmented, with brown pigment on prostomium, peristomium and anterior margins of setigers 1-6; brown pigment on posterior margins of most segments ventrally.

Anterior end broad, head and first 2 setigers small and contracted relative to setiger 3 and following segments. Prostomium distinctly incised on anterior margin (Fig. 49a), but not formed into flaring lobes; caruncle terminating at middle to end of setiger 2; occipital tentacle inserted at posterior end of caruncle (Fig. 49a).

Peristomium well-developed, folded into 2 lobes; palps missing.

Setiger 1 with short notopodial lobes, lacking notosetae; neuropodia well-developed with delicate capillary setae (Fig. 49a). Setiger 2 and succeeding setigers with rounded notopodial lobes and long, thin capillary notosetae, arranged in 2 tiers, with shorter, thicker setae in first tier and longer, thinner setae in second; posterior spines absent; neurosetae of setigers 2-7 with dense fascicles of broad bilimbate capillary setae having fine granulations on the shaft (Fig. 49d). Bidentate hooded hooks numbering 18-21 per fascicle without accompanying capillary setae beginning in setiger 8; hooks with reduced angle between teeth, a striated hood with serrated hood opening and distinct constriction on shaft (Fig. 49e).

Setiger 5 only slightly modified, not much different from 4 and 6, with J-shaped row of modified spines located between the noto- and neuropodial fascicles. Outer setae pennoned (Fig. 49c), inner setae as simple spines with inflated slightly curved apex (Fig. 49b).

Branchiae from setiger 7, continuing for only about 11 setigers. Branchiae granular, with additional line of glands extending across dorsum between each gill. Pygidium unknown.

*Remarks:* *Pseudopolydora glandulosa* has a relatively unmodified fifth setiger and approaches *P. kemp* (Southern) in certain respects. The 2 species differ strikingly in overall appearance, especially the larger more erect notopodial lobes and wider flaring prostomium of *P. kemp*. The pigmentation of *P. glandulosa* contrasts with that of *P. kemp* in Australia, where it is generally lacking. In California, however, *P. kemp* is heavily pigmented in the intersegmental regions of the anterior setigers (Light, 1969, fig. 9), *P. glandulosa* on the other hand, has prominent dorsal and ventral pigmentation. The striated hood of the hooded hooks of *P. glandulosa* is unique for the genus. *Distribution:* Queensland; New South Wales; Victoria.

#### *Pseudopolydora stolonifera* sp. nov.

(Figure 50a-j)

*Material examined:* VICTORIA. Westernport, Crawfish Rock, 5 m, associated with various sponge

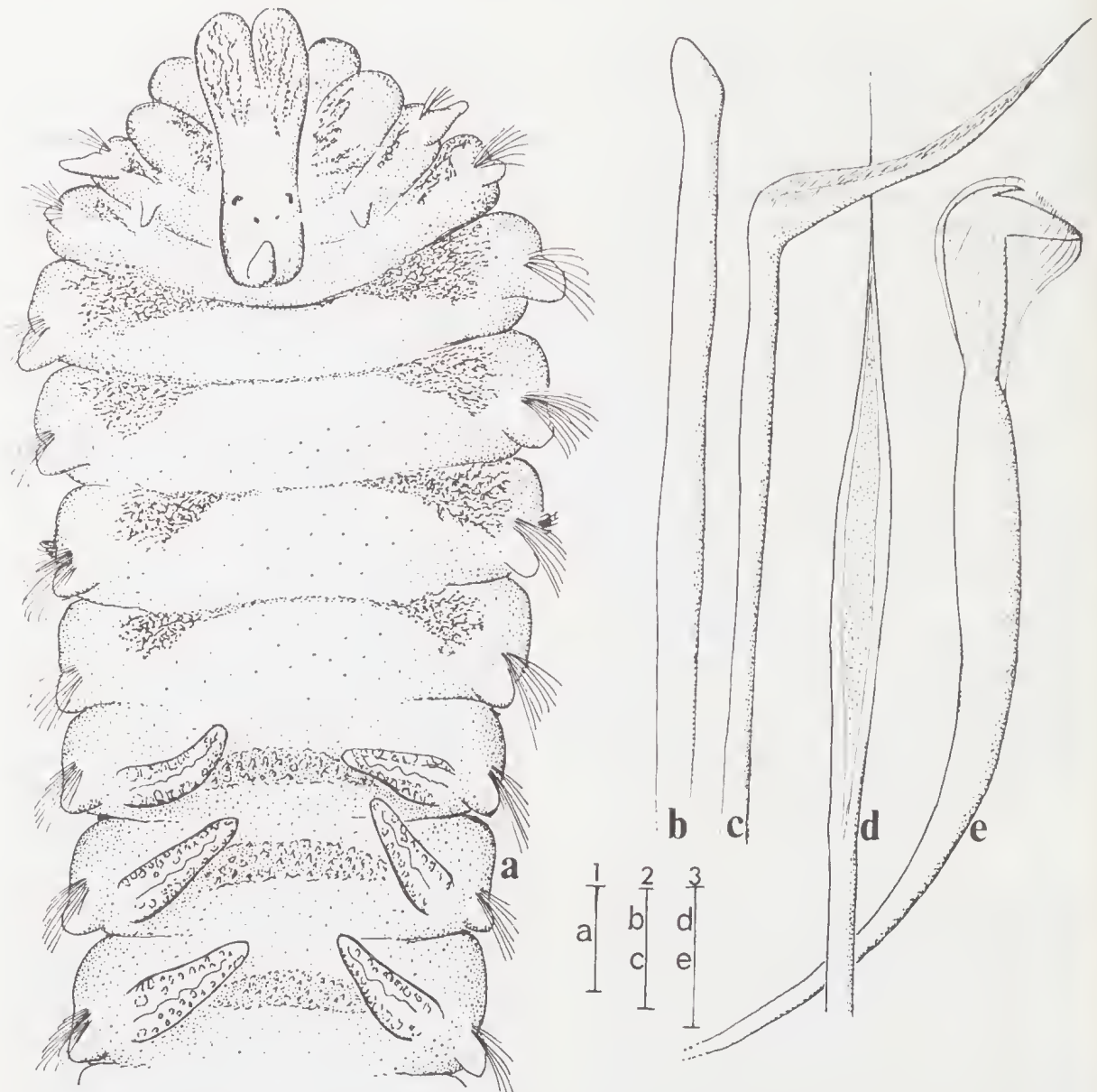


Figure 49—*Pseudopolydora glandulosa* sp. nov.—a, anterior end, dorsal view; b, simple spine, setiger 5; c, pennoned spine, setiger 5; d, neuroseta, setiger 5; e, hooded hook. [Scale 1 = 200  $\mu$ m; 2 = 30  $\mu$ m; 3 = 20  $\mu$ m]

species, and pycnogonid *Nymphon mulleri*, 3 Jan. and 13 May 1977, coll. D. Staples (HOLOTYPE, NMV G2897; 60+ PARATYPES, NMV G2898; 50+, NMV, G3071).

**Description:** A small species measuring 2.8 mm long and 0.4 mm wide for a maximum of

16 setigerous segments. First 8 setigers narrow, last 8 greatly enlarged. Body with reticulated brown pigment on gills, peristomium and laterally on anterior body segments; reflective white pigment on prostomium observed in living animals. Some specimens undergoing active asexual reproduction with regeneration of a new head beginning between setigers 10-11. Following description refers to entire animals only, not regenerating ones.

Prostomium incised on anterior margin (Fig.

50a-b), caruncle terminating at posterior edge of setiger 2, occipital tentacle and eyes absent.

Setiger 1 reduced, without notopodium or notosetae; neuropodium ventrally displaced, with fascicles of winged capillaries (Fig. 50b-c). Setigers 2, 3, 4, -, 6 and succeeding setigers with fascicles of unilimbate capillary notosetae, these becoming longer and fewer in posterior setigers. Neurosetae of setigers 2, 3, 4, -, 6 and 7 with unilimbate capillaries. Bidentate hooded hooks beginning on setiger 8, numbering 6-8 throughout, lacking accompanying capillaries; hood with serrated opening (Fig. 50d).

Setiger 5 modified, with both types of major spines arranged in a slightly curved line (Fig. 50b, e); major spines numbering 3-5 of each type, including: (1) pennoned, densely bristled spines with expanded ends (Fig. 50f-h) in ventral row, and (2) simple acicular spines (Fig. 50e, i) in dorsal row; no superior dorsal fascicle; with inferior ventral fascicle of 3-5 bilimbate setae (Fig. 50j).

Two pairs of branchiae on setigers 7-8. Pygidium with 3 small cirri developed above smooth terminal ending (Fig. 50b).

**Asexual Reproduction:** The collection includes animals in various stages of regeneration and budding. A new anterior end develops in a growth zone between setigers 10-11. Small palp buds appear with morphology of the head developing prior to budding. This type of asexual reproduction where development precedes budding is called *paratomy* (Schroeder and Hermans, 1975). Different stages of regeneration are seen in the collections. Some late stages of regeneration appear complete, but setiger 1 lacks notosetae, a situation similar to that seen in *P. prolifera* (see below).

**Remarks:** *Pseudopolydora stolonifera* shows more modification to setiger 5 than most species of the genus, in having poorly developed parapodia and in lacking notosetae. The structure of the spines on setiger 5 and hooded hooks, however, clearly ally this species to *Pseudopolydora* and not *Carazziella*. The species is most closely related to *P. prolifera*, but differs in having a bilobed instead of an entire prostomium, having serrated openings on the hooded hooks, lacking superior dorsal notosetae on setiger 5 and by having the pennoned

major spines of setiger 5 with expanded densely bristled tips instead of a fenestrated spine with apical cavity.

**Distribution:** Victoria, Westernport Bay, on sponges.

***Pseudopolydora prolifera* (Augener, 1914)**  
comb. nov.

(Figure 50k-n)

*Polydorella prolifera* Augener, 1914, p. 16. [Not Fauvel, 1930, p. 36; 1953, p. 322].

**Material examined:** WEST AUSTRALIA. Sharks Bay, South Passage, 9 m, 16 April 1905, S.W. Australia Exped. 1905 (2 SYNTYPES, ZMH V10106).

**Description:** A small species, capable of asexual reproduction by paratomy. Both syntypes with 16 setigers measuring up to 2.8 mm long and 0.6 mm wide. Both specimens slightly damaged, showing evidence of deterioration.

Prostomium entire on anterior margin, no apparent caruncle or occipital tentacle; eyes absent. Setiger 1 reduced, without notopodium or notosetae; neuropodial lobe small, dorsally elevated with 3-4 very fine capillaries on one specimen and absent on second leaving an entirely achaetous segment. Setigers 2, 3, 4, -, 6 and succeeding setigers with fascicles of unilimbate capillary notosetae; neurosetae fewer in number. Neuropodial hooded hooks from setiger 8 (Fig. 50k), 4-5 hooks at first increasing to 6 in middle body segments, reduced to 2-3 in posterior segments, without accompanying capillaries.

Setiger 5 only slightly modified, with well-developed dorsal and ventral fascicles of unilimbate capillary setae (Fig. 50l) and 2 types of major spines: (1) 1 type distally enlarged, with one edge fenestrated and surrounding cavity and other bearing elongated bristle-topped projection (Fig. 50n); (2) second type a simple acicular spine (Fig. 50m).

Branchiae missing on types, but according to Augener (1914), a single pair occur on what would be setiger 7. With a dark-brown achaetous segment bearing 2 palp buds lying between setigers 10 and 11, denoting area where a new anterior end is regenerating. Pygidium consisting of 2 thickened lateral lobes, with wide medial gap (Augener, 1914).

**Remarks:** *Polydorella* was described as having



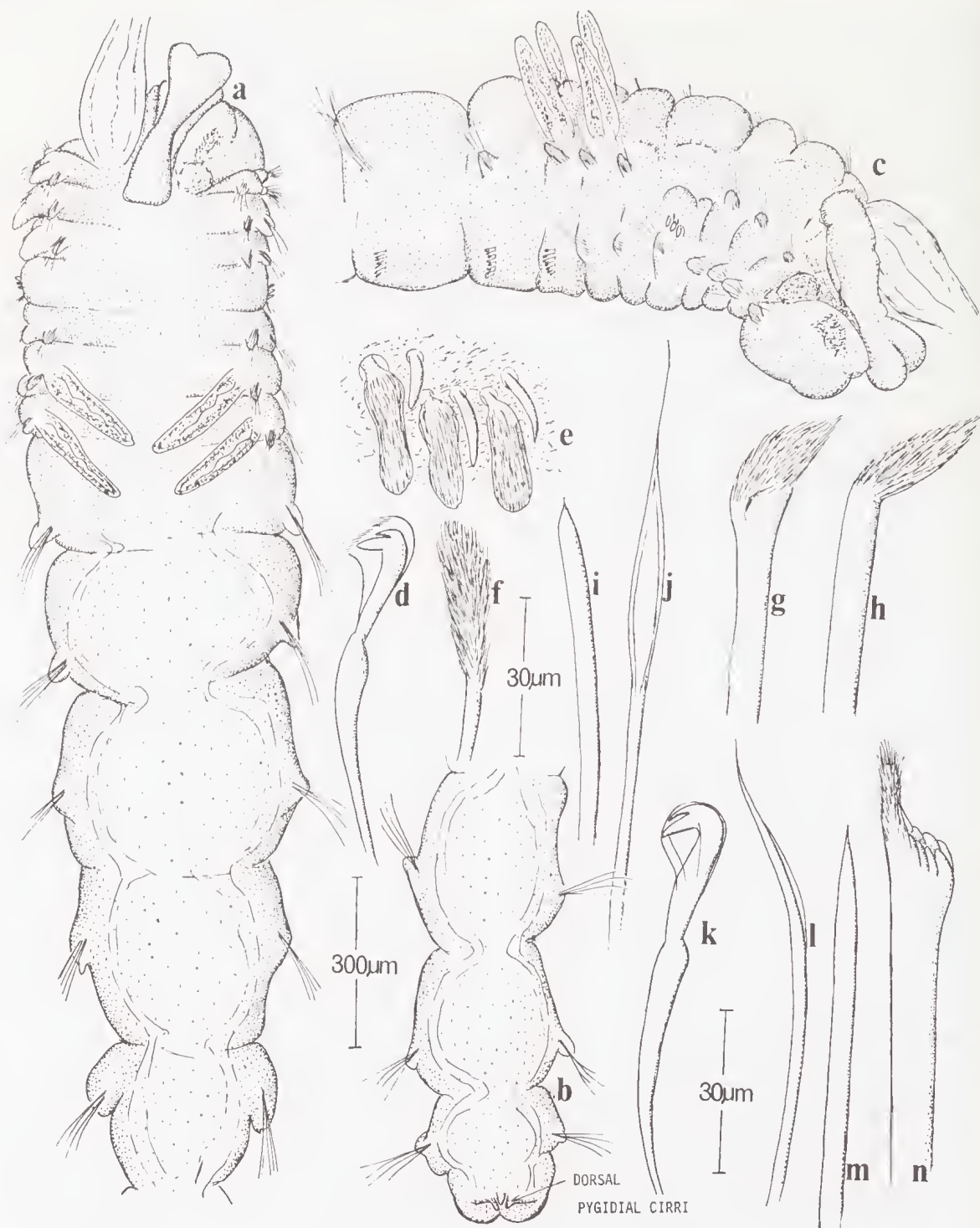


Figure 50—*Pseudopolydora stolonifera* sp. nov.—a-b, entire animal in dorsal view, drawn in 2 parts (a, is the first 13 setigers; b, the last 3 setigers); c, anterior end, lateral view; d, hooded hook; e, group of spines, setiger 5, lateral view; f-h, pennoned spines, setiger 5; i, simple spine, setiger 5; j, neuroseta, setiger 5—*Pseudopolydora prolifera* (Augener)—k, hooded hook; l, superior notoseta, setiger 5; m, simple spine, setiger 5; n, pennoned-type spine, setiger 5.

the fourth setigerous segment modified instead of the fifth. An examination of the 2 syntypes has shown that one bears an achaetous first segment with a conspicuous neuropodial lobe, 3 normal setigers and then the modified segment. The second specimen has 3-4 very fine capillary setae associated with the neuropodial lobe on the first segment. Thus Augener's species should be referred to *Pseudopolydora* since 4 setigers precede the modified one, instead of 3. Since 1 of the 2 specimens did actually lack setae on the first segment, the presence and absence of setae in setiger 1 in different specimens of the species emphasize the tendency for reduction in setiger 1 among species of *Pseudopolydora*. In *P. prolifera*, however, the reduction of setiger 1 is in part explained by its mode of asexual reproduction. Specimens undergoing anterior regeneration would probably demonstrate various stages of setal development. If the regenerating region involves a specific characteristic such as an already reduced first setiger, then the total absence of setae on setiger 1 would not be unexpected. We have this very situation in another, closely related species, *P. stolonifera* (see above).

Since the type-species of the genus *Polydorella* is now known to lie well within the definition of the genus *Pseudopolydora*, the former genus must be sunk into synonymy in its entirety.

Still another species may exist with a reduced first setiger and asexual reproduction. Fauvel (1930; 1953) and Gravely (1927) reported a species from India which Fauvel called *Polydorella prolifera* and Gravely referred to as 'post-larval chaetopterid'. This species, however, clearly has a different type of acicular spine on the modified segment. Gravely (1927) indicated it lived on the surface of sponges, as does *Pseudopolydora stolonifera* (see above).

*Distribution:* West Australia, Sharks Bay.

### Discussion

*Genera of the Spionidae:* Apart from disagreements relating to the status of particular taxa at subgeneric or generic levels, the spionid genera have been relatively well understood

due to recent efforts by Hartmann (1941; 1959), Pettibone (1963), Day (1967) and Foster (1971).

Australian spionids, however, have presented so many new taxa that a re-examination of the status of certain genera and generic groups must be undertaken. Throughout this paper we have reviewed certain genera or generic complexes where appropriate, and either expanded their definitions to accommodate new species or have named new genera to accommodate taxa otherwise too far removed from existing taxa. We have also taken the opportunity to partly alter the generic arrangement of the *Polydora*-complex because of the new species groups in our collections.

At least 3 genera: *Polybranchia* Potts, 1928; *Anaspio* Chamberlin, 1920; and *Morants* Chamberlin, 1919 are not included, although Fauchald (1977a) diagnosed all 3 in his book on polychaete families and genera. We consider that the former may be validly placed among genera with frontal horns, but prefer to wait, pending a re-examination of the type-species. The 2 latter genera are highly doubtful. Both were possibly described from damaged material and neither has been reported since the original description. Type material is apparently lost. Both *Anaspio* and *Morants* are best considered *nomina dubia*.

*Generic Characteristics:* Different taxonomic characters are important at the generic level in different generic groups. This is expected since different groups of species have specialized along their own lines following an early dichotomy from ancestral spionids. Spionids possibly date from Devonian time (Cameron, 1967; 1969), and one should not expect to use the same characteristics with equal weight in genera such as *Scoelepis*, *Prionospio* and *Polydora*. Species of these genera and others have different ecological requirements and modes of life. Structures important in the adaptive radiation of polydorids are certainly not the same as those in genera such as *Scoelepis* or *Prionospio*. Each genus has evolved independently and its species may not necessarily utilize the same structures as species belonging to other genera. With spionids, then, we cannot organize a simple system of uniform

characters to diagnose genera as is possible for certain other families (Kudenov and Blake, 1978). Instead, we must consider a wide range of features inherent in a given generic group; it is to be expected that the reasons for separating genera with frontal horns are not necessarily the same as those distinguishing groups with pointed prostomia.

Some characteristics do remain conservative throughout the family: these include the shape of the prostomium and first appearance of branchiae. These characters have been and are still important in establishing the current generic system for spionids. For example, *Scolecilepis-Dispio*; *Malacoceros-Rhynchospio*; *Polydora-Boccardia*; *Spio-Microspio*; *Paraprionospio-Prionospio* are some examples of generic groups where the first appearance of branchiae are important. Other characters important to some genera are the degree of fusion of branchiae and dorsal lamellae, the presence or absence of notopodial hooded hooks, the structure of the hooded hooks and their initial occurrence in some genera (in other genera, the occurrence of hooded hooks is age dependent [Hannerz, 1956] and is not always reliable).

Some genera have their own peculiar morphology: *Dispio* has accessory branchiae on the postsetal notopodial lobes, the polydorids have various degrees of modifications to setiger 5, and species of the *Prionospio*-complex have various peristomial and branchial modifications not found in other groups.

*Zoogeographic Considerations:* Three species included in this report are only known from West Australia. Of the 63 species reported herein for the Southeast and 2 from the Great Barrier Reef (Queensland), 44 are endemic to Australia. The other species generally have more cosmopolitan distributions. Such species include: *Aonides oxycephala*, *Malacoceros indicus*, *Paraprionospio pinnata*, *Prionospio steenstrupi*, *P. ehlersi*, *P. cirrifera*, *Spiophanes bombyx*, *S. kroeyeri*, *Polydora flava*, *P. socialis*, *P. giardi*, *P. armata*, *P. ligni*, *P. websteri*, *P. hoplura* and *Boccardia polybranchia*. Two species, *Pseudopolydora kempfi* and *P. paucibranchiata* have wide distributions in the Pacific basin, while *Boccardia chilensis*, and *Priono-*

*spio aucklandica* are limited to the Southern Hemisphere. *Boccardia proboscidea* is known from Western North America and Japan and has apparently been introduced to Port Phillip Bay. *Spiophanes wigleyi* is known from continental shelf margins of eastern North America and the Gulf of Mexico. However, this apparent disjunct range may represent inadequate sampling on continental shelf margins.

Several bays have been found to harbour large numbers of endemic species. For example, Port Phillip Bay is the only known locality for 10 species. Westernport Bay has 2 endemic species and 1 species occurs in both bays. It is likely that several of these species will be found to be more widely distributed in Victoria once careful investigation of the Gippsland Lakes is completed.

Two other areas containing large numbers of endemic forms are Botany Bay in New South Wales and Moreton Bay in Queensland; four new taxa come from the former and 5 from the latter location. Other areas in New South Wales and Queensland contain still other endemic species. While many endemic species occur in several localities, the high percentage of species known from just a single locality is surprising. We suspect that some of these isolated records may reflect lack of adequate collecting, but it does appear that certain bodies of water, such as Port Phillip Bay, Victoria are important areas for adaptive radiation.

We anticipate the discovery of still more species of Spionidae from this region. Our lack of material from South Australia and Tasmania is painfully apparent. Moreover, the shell boring habitat has scarcely been explored for the polydorids. Microhabitats, such as sponges and corals, have not been investigated.

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