

# AUSTRALIAN MUSEUM SCIENTIFIC PUBLICATIONS

Hutchings, P. A., and Christopher J. Glasby, 1988. The Amphitritinae (Polychaeta: Terebellidae) from Australia. *Records of the Australian Museum* 40(1): 1–60. [26 May 1988].

doi:10.3853/j.0067-1975.40.1988.150

ISSN 0067-1975

Published by the Australian Museum, Sydney

nature culture **discover**

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## The Amphitritinae (Polychaeta: Terebellidae) from Australia

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**ABSTRACT.** The amphitritine fauna of Australia comprises 17 genera and 37 species. These are described, and a key to the genera and Australian species is provided. Twenty one new species and one new genus are described: *Amphitrite pachyderma* n. sp., *Amphitritides harpa* n. sp., *A. ithya* n. sp., *Arranooba booromia* n. gen., n. sp., *Baffinia biseriata* n. sp., *Eupolymnia koorangia* n. sp., *Lanassa exelysis* n. sp., *L. ocellata* n. sp., *Lanicides fascia* n. sp., *L. lacuna* n. sp., *L. tribranchiata* n. sp., *Lanice bidewa* n. sp., *Loimia batilla* n. sp., *L. triloba* n. sp., *Neoleprea macrocercus* n. sp., *Phisidia echuca* n. sp., *Pista australis* n. sp., *P. sinusa* n. sp., *P. turawa*, n. sp., *Reteterebella aloba* n. sp. and *Terebella maculata* n. sp., and the following new combination *Longicarpus modestus*.

A full description of all Australian species of this subfamily is given except when a recent description is available.

HUTCHINGS, P.A. and C.J. GLASBY, 1988. The Amphitritinae (Polychaeta: Terebellidae) from Australia. Records of the Australian Museum 40(1): 1-60.

This paper describes the Australian Amphitritinae (F. Terebellidae) and concludes the description of the Australian terebellid fauna (Hutchings & Glasby, 1986a,b, 1987). To date, no species of the subfamily Artacaminae have been found in Australia. We have attempted to examine all the material that is available and have borrowed the complete holdings of terebellids from all museums in Australia. However, material from certain areas of Australia is lacking, especially from shelf or deeper waters, and we anticipate that the terebellid fauna will continue to expand.

In this paper we discuss several genera not previously described from Australia, including several of the abranchiata genera. Hessle (1917) placed these genera in the Amphitritinae rather than in the Polycirrinae because of the arrangement of uncini in double rows on at least some segments. The majority of these genera (*Baffinia*, *Lanassa*, *Laphania*, *Phisidia*, *Proclea*, *Spinospaera* and *Stschapovella*), contain few species and these are often poorly described. Many are deep water species, which have not been recorded since their original description. Considerable problems exist within these genera but a generic revision is beyond the scope of this paper. We have therefore followed

Fauchald's (1977) generic definitions of the abranchiata genera, for the description of several new species from shallow or intertidal areas in southern Australia. However we believe that the current definitions of species in these genera, which are largely based on the structure of the notosetae, pose many problems as most of these setae, when viewed under oil emersion, are denticulate to some degree.

Clarification of the setal structures in the abranchiata genera, using scanning electron microscope techniques, is urgently needed as is the defining of the presence or absence of lateral lobes. In some species examined, described in genera characterised as having lobes, these structures were mere ridges not comparable in structure to those found, for example, in *Pista* or *Loimia*. Any generic revision must consider these points. However, in all genera of terebellids, notosetae must be examined under oil emersion in order to elucidate their fine structure.

Prior to this study, several widely distributed or so called 'cosmopolitan species' had been reported from Australia (Day & Hutchings, 1979). Examination of type material or material from the type locality has

revealed in many cases that the Australian material was not the same and these species have now been described as new. Some of these new species have names derived from aboriginal words which were found by consulting the following sources: a compilation of 'Australian Aboriginal Words and Place Names and Their Meanings' by Endacott (1924) and 'The Aborigine of South Eastern Australia, as They Were' by Massolin (1971).

A discussion of the biogeography of Australian terebellids is given by Hutchings & Glasby (in press) which is largely based on this paper and previous papers on the Polycirrinae and Thelepininae (Hutchings & Glasby, 1986b, 1987).

In this paper, we have examined a considerable amount of material from Western Port, Port Phillip Bay (PPBES, CPBS) and Bass Strait collected by the Museum of Victoria. In the case of type material or individual records we have given latitude and longitude but in many cases we have just quoted station numbers. Full station data including latitude, longitude, depth, sediment, date and method of collecting can be found in the following two technical papers: Poore (1986) for Port Phillip Bay and Western Port) and Wilson & Poore (1987) for Bass Strait.

The following abbreviations have been used.

AHF	Allan Hancock Foundation, Los Angeles
AM	Australian Museum, Sydney
BMNH	British Museum of Natural History, London
CAS	California Academy of Sciences, California
CSIRO	Commonwealth Scientific and Industrial Research Organization, North Beach, Perth
HZM	Zoologisches Institut und Zoologisches Museum der Universität, Hamburg
MCZ	Museum of Comparative Zoology, Harvard
MNHN	Museum D'Histoire Naturelle, Paris

MPW	Muzeum Przyrodnicze, Wroclaw
NMV	Museum of Victoria, Melbourne
NT	Northern Territory Art Gallery and Museum, Darwin
QM	Queensland Museum, Brisbane
QEM	Queensland Electricity Generating Board, Brisbane
SAM	South Australian Museum, Adelaide
SSM	Naturhistoriska Riksmuseet, Stockholm
TASM	Tasmanian Museum, Hobart
USNM	National Museum of Natural History, Smithsonian Institution, Washington, D.C.
UUZM	Uppsala Universitets Zoologiska Museum, Uppsala
WAM	Western Australian Museum, Perth
ZMA	Zoologisch Museum, Amsterdam
ZMB	Zoologisches Museum, Museum für Naturkunde der Humboldt-Universität, Berlin
ZMC	Zoologisk Museum, Copenhagen

### Systematics

#### Amphitritinae

Amphitritae Savigny, 1820: 71.  
Terebellacea Grube, 1850: 325–328.

Prostomium compact. Branchiae present or absent, if present, 1–3 pairs typically branched or tufted. Lateral lobes present or absent on anterior segments. Peristomium may be expanded to form a lobe. Notopodia present for a variable number of segments; notosetae smooth or serrated. Neuropodia present for a large number of segments, uncini avicular, short or long handled, or uncini with teeth arranged in a vertical row. Uncini initially arranged in single rows on thorax but then arranged in double rows posteriorly. Distinct ventral glandular pads present on anterior thoracic segments.

#### Key to the Australian genera of Amphitritinae

(after Fauchald, 1977)\*

1. Branchiae absent ..... 2
- Branchiae present ..... 5
2. Thoracic setigers, 17 or less ..... 3
- Thoracic setigers, more than 20 ..... *Baffinia*
3. Thoracic setigers, 17 pairs, notosetae of setiger 12 enlarged ..... *Arranooba*
- Thoracic setigers, less than 17 pairs, notosetae of setiger 12 not enlarged ..... 4
4. 15 thoracic setigers; notosetae finely denticulated ..... *Lanassa*
- 14 thoracic setigers; some notosetae distinctly pectinated ..... *Phisidia*
5. Notosetae, at least some, with marginally serrated tips ..... 6
- Notosetae all with smooth tips ..... 11

\* This key is artificial and does not imply any phylogenetic relationships.

6. Thoracic uncini all avicular ..... 7  
 —Thoracic uncini, anteriorly long handled with heavily chitinised shafts ..... 10
7. Lateral lobes present ..... *Amphitrite*  
 —Lateral lobes absent ..... 8
8. Notopodia from segment 3, neuropodia from segment 5 ..... *Neoleprea*  
 —Notopodia from segment 4, neuropodia from segment 5 ..... 9
9. 2 pairs of branchiae ..... *Amphitritides*  
 —3 pairs of branchiae ..... *Terebella*
10. 16 pairs of notopodia ..... *Hadrachaeta*  
 —23 pairs of notopodia ..... *Longicarpus*
11. Uncini with teeth in a single row ..... *Loimia*  
 —Uncini with teeth in 2 or more rows consisting of main fang and a crest of smaller teeth ..... 12
12. Anterior uncini short handled ..... 13  
 —Anterior uncini long handled ..... 17
13. Uncini present from segment 5 (setiger 1) ..... *Reteterebella*  
 —Uncini present from segment 4 (setiger 2) ..... 14
14. Lateral lobes absent ..... *Nicolea*  
 —Lateral lobes present ..... 15
15. Lateral lobes present as small lappets on segments 2, 3 and 4 ..... *Eupolymnia*  
 —Lateral lobes absent on segments 2 and 4 ..... 16
16. Peristomial lateral lobes present, lateral lobe also present on segment 3. .... *Lanice*  
 —Peristomial lateral lobes absent, lateral lobes present on segment 3 ..... *Lanicola*
17. Lateral lobes present on segment 3 and sometimes on peristomium ..... *Lanicides*  
 —Lateral lobes present on segments 2 to 4 and sometimes on peristomium ..... *Pista*

***Amphitrite* Müller, sensu lato**

*Amphitrite* Müller, 1771: 8.—Hessle, 1917: 185.—Fauvel, 1927:244–245.

*Amphiro* Montagu, 1808 in McIntosh, 1922: 107.

*Neoamphitrite* Hessle, 1917: 178–179.—Berkeley & Berkeley, 1952: 85.—Kritzler, 1984: 34.

Branchiae 3, rarely 2, pairs from segment 2; dendritically branched or filiform arising from a basal stump or distinct stalk. Lateral lobes present on anterior segments. Notopodia from segment 4, 17–25 pairs; notosetae distally serrated. Neuropodia with uncini from segment 5 (setiger 2) arranged in double rows in posterior thorax, either as an interlocking “zipper” or in 2 distinct rows. Nephridial papillae from segment 3.

**Type species.** *Amphitrite cirrata* Müller, 1771 by monotypy.

**Comments.** We have followed Fauvel’s (1927) definition of *Amphitrite* which synonymises

*Neoamphitrite* Hessle, 1917 with *Amphitrite*. The two genera can be differentiated, according to Hessle, by the form of the nephridia and the form of the branchiae, which in *Neoamphitrite* are richly branched with a distinct stalk and in *Amphitrite*, filiform with a very reduced stalk. We believe that these two types of branchiae are not sufficiently different to constitute a good generic character. For example, the length of the branchial stem is quite variable within and between specimens in our material, with the larger specimens often having a better developed stem. In addition some species such as *Amphitrite robusta* Johnson, 1901 have branchiae which are intermediate between those of *Amphitrite* sensu stricto and those of *Neoamphitrite*. The other distinguishing character used by Hessle is the form of the nephridia which he used as a generic character to separate terebellid genera. The dissection and the segmental affinities of the nephridia are difficult to discern in small specimens or poorly preserved

individuals. The majority of workers since Hesse (1917) have ignored the segmental affinities of the nephridia and most diagnoses of terebellids genera described since 1917 lack details of these structures. When a comprehensive revision of the family is undertaken, the usefulness of this character should be reassessed. It may be that internal morphology is more conservative than external soft structures (i.e. branchiae), and that the arrangement of nephridia will prove to be an important generic character. Another character which should be investigated, is the precise arrangement of uncini in the posterior thorax.

Fauchald (1977) described the genus *Amphitrite* as lacking lateral lobes, however Hesse (1917) clearly stated lateral lobes are present, although the original diagnosis of the genus by Müller (1771) does not mention lateral lobes at all. Hesse's definition is followed here. It is unclear as to the source of Fauchald's (1977) definition of the genus.

The genus *Amphitrite* is represented by two species in Australian waters, *A. pachyderma* n. sp. and *A. oculata*. *Amphitrite pachyderma* n. sp. is well represented on the east coast of Australia, whereas *A. oculata* Hesse, 1917 has been found only from One Tree Island, Great Barrier Reef. *Amphitrite modesta* (Quatrefages, 1865) described from Jervis Bay, New South Wales and also recorded by Whitelegge, 1889 is synonymous with *Longicarpus glandulus* Hutchings & Murray, 1984 and is here redescribed as *Longicarpus modestus*. *Amphitrite rubra* (Risso, 1828), recorded from South Australia to Queensland by various authors (see Day & Hutchings, 1979), has been referred to either *Amphitrite pachyderma* or *Longicarpus modestus*. A type of *A. rubra* has been examined (MNHN UB 392) and the specimen does not belong in the genus *Amphitrite*. A full description of this supposedly widely occurring species is being prepared by Hutchings and Glasby.

#### Key to the Australian species of *Amphitrite*

1. Notopodia, 23 pairs; branchiae, 3 pairs, dendritically branched . . . *A. pachyderma*
- Notopodia, 17 pairs; branchiae, 3 pairs, unbranched . . . . . *A. oculata*

#### *Amphitrite oculata* Hesse

Fig. 1a–d

*Amphitrite oculata* Hesse, 1917: 186.—Fauvel, 1936: 80–81.—Okuda & Yamada, 1954: 193–194, fig. 8.—Imajima & Hartman, 1964: 336.

**Material examined.** Queensland: Great Barrier Reef, One Tree Island, 23°30'S, 152°05'E, 1(AM W200139), 1(AM W200143), 1(AM W200142), 1(AM W200145), 2(AM W200141), 1(AM W200144), 1(AM W200140), 1(AM W200146), specimens range in size from 12.2 mm long, 1.5 mm wide for 57 segments to 16.2 mm long, 2.0 mm wide for 61 segments.

Japan: Misaki, SYNTYPES 1(UUZM 169a), 1(UUZM 169b) coll. S. Bock 23.4.1914, 25.4.1914 respectively.

**Comments.** The syntypes of *Amphitrite oculata* closely resemble the Australian material in all respects except for the distribution of eyespots, which is uniform across the dorsum of the peristomium in the former but concentrated in a distinct patch laterally in the Australian specimens. The setae of the Australian specimens resemble those of the syntypes (Fig. 1a–d). This is the first record of this species in Australian waters, previously known only from Japan.

**Habitat.** Found in shallow waters in Japan; and in coral substrates in the lagoon at One Tree Island.

**Distribution.** Australia (One Tree Island). Japan (Misaki, Fujitas Kolonie, Mori, Seto, Matsushima Bay, Isozaki).

#### *Amphitrite pachyderma* n. sp.

Fig. 1e–h

*Amphitrite rubra*.—Rullier, 1965: 195.—Stephenson et al., 1970: 491; 1974: 113.—Hutchings, 1977: 16 (in part). *Non* Risso, 1826.

**Material examined.** HOLOTYPE: Queensland: Moreton Bay 20°26'S, 147°05'E, Stn III B4, 2.4 kms south of South West Rocks, Peel Island, (AM W5100); complete, 109 segments, 48 mm long, 7.0 mm wide. PARATYPES: Queensland: Moreton Bay 1(AHF Poly 1464), (AM W7091); Gladstone, Auckland Creek 23°51'S, 151°16'E, 1(BMNH ZB 1986.61); Calliope River 1(USNM 99965), 1(AM W198246), 2(AM W198247). Paratypes range in size from about 17.5 mm long, 1.9 mm wide for 80 segments to a posteriorly incomplete specimen 3.6 mm wide.

**Additional material examined.** New South Wales: Georges River, Tom Uglys Bridge 6(AM W7889), 3(AM W7797); Botany Bay, Towra Point 1(AM W7528).

**Description.** Body robust, widest at midthorax, abdomen short gradually tapering. Tentacular lobe short, collar-like. Buccal tentacles largely missing, remaining ones filiform, grooved. Eyespots absent. Peristomium about equal in length to segment 2 dorsally and laterally. Lower lip divided by deep transverse groove to form shelf-like outer region, dome-shaped inner region. Inner lips retracted within oral cavity.

Branchiae paired on segments 2–4, arise from anterior edge of segments, just above line of notopodia, those on segment 3 inserted slightly laterally to those on segments 2 and 4; branchiae dendritically branched with very thick main stem, short, thick secondary branches, mass of short, stumpy terminal branches, with short but distinctive stalks. Branchiae decrease in size posteriorly, those on segment 3, on left side very small, presumably regenerating. Lateral lobes paired on segments 2–4, distinct thickened flaps; each pair equally well developed, arranged in an increasingly dorsal



**Fig.1.** *Amphitrite oculata*. a. short notoseta from setiger 12, scale is 0.1 mm. b. long notoseta from setiger 12, scale is 0.1 mm. c. uncinus from midabdomen, scale is 0.01 mm. d. uncinus from midabdomen, scale is 0.01 mm. *Amphitrite pachyderma* n.sp., holotype. e. ventrolateral view of anterior body, scale is 1 mm. f. long notoseta from setiger 3, scale is 0.1 mm. g. short notoseta from setiger 3, scale is 0.1 mm. h. uncinus from segment 13, scale is 0.01 mm.

position posteriorly. Segments 2 and 3 ventrally thickened, resembling modified ventral pads, segment 4, extremely reduced ventrally (Fig. 1e).

Notopodia from segment 4, present on following 23 segments; podia short, rectangular, retracted in some segments. Notosetae arranged in 2 tiers in each fascicle; long narrow-winged, distally hispid capillaries, shorter capillaries of the same type (Fig. 1f–g). Neuropodia from segment 5 (setiger 2), continue to pygidium; podia elongate, low ridges decreasing in length posteriorly from midthorax; dorsal end of podia marked by small papilla in abdominal segments. Uncini with delicate subrostral guard visible under high power, strong, hooked anterior basal attachment point (Fig. 1h). Dental formula, MF:7–9:7–10:16–22, with most distal row somewhat irregular, perhaps consisting of 2 rows. Uncini arranged in single row to segment 10, then in an alternating row, arranged face to face until segment 44 when uncini are again arranged in single rows to the pygidium.

Midventral glandular pads on segments 5–15, all similar sized; thereafter shallow, segmented glandular groove to pygidium. Nephridial papillae on segments 3–9, first 3 pairs elongate, remainder very flat and small; base of papillae on segments 6–9 swollen, forming glandular discs.

Holotype gravid female.

**Variation.** The material examined shows the following variation: branchiae vary considerably in overall size and in length of terminal filaments, lateral lobes thickened or lamellae like. Notopodia from segment 3, 22–24 pairs. Uncini arranged in an alternate row from segment 11, then in single row from segment 40–44 to the pygidium. Dental formula MF:5–7:6–8:15–25, with most distal row possible consisting of 2 rows of teeth. Midventral glandular pads from segment 5–15 or 16. Nephridial papillae present on segments 3–9 in all paratypes; none with swollen glandular discs at base of papillae.

**Comments.** We have examined a wide range of different sized specimens of *Amphitrite pachyderma* n.sp. The number of pairs of notopodia is commonly 23 pairs with a range of 22 to 24. There appears to be no correlation between the number of pairs of notopodia and the size of the animal. Very few species of *Neoamphitrite/Amphitrite* have this number of notopodia, although ranges of numbers are rarely given in the literature. Only *A. chloraema* (Schmarda, 1861) which has 22 pairs according to Ehlers, 1901, *A. modesta* (Quatrefages, 1865), now *Longicarpus modestus*, which has 21 or 22 pairs and *Neoamphitrite figulus* (Dalyell, 1853) which has 24 pairs according to Hessle, 1917, fall within the range exhibited by the Australian species. Of these, *L. modestus* differs in having anterior uncini with well-chitinised shafts and *A. chloraema* differs from *A. pachyderma* in the shape of the uncini. An uncinus of *A. chloraema* figured by Schmarda lacks a subrostral

ligament as well as a well defined heel like those of the Australian specimens.

A specimen of *N. figulus* (AM W9131) from Maine, identified by Pettibone, was compared to our material. It differs in having uncini arranged in single rows from segment 30 to the pygidium and in having many more pairs of nephridial papillae which are very small and difficult to count but present on at least segments 3 to 15.

*Amphitrite pachyderma* n. sp. differs from the other species of *Amphitrite* occurring in Australia, *A. oculata*, in the number of pairs of notopodia present and in the form of the branchiae, which are unbranched in the latter species.

**Etymology.** Specific name derived from the Greek adjective, *pachys*, thick and *derma*, skin referring to the thickened ventral pads on segments 2 and 3.

**Habitat.** Sheltered bays and estuaries, 2–15 m, sand-muddy sediment, sometimes with shell fragments.

**Distribution.** New South Wales, Queensland.

### *Amphitritides* Augener

*Amphitritides* Augener, 1922: 47.—Fauchald, 1977: 130.

Branchiae 2 pairs, on segments 2 and 3, stalked. Lateral lobes absent. Notopodia from segment 4, continue for variable number of segments; notosetae distally serrated. Neuropodia with uncini from segment 5 (setiger 2), arranged in double rows, face to face on some thoracic and abdominal segments.

**Type species.** *Terebella gracilis* Grube, 1860 by original designation.

**Comments.** The two new species of *Amphitritides* described here, increases the number of species belonging to this genus to four. The type species, *A. gracilis* (Grube, 1860), was described from the Mediterranean Sea and *A. bruneocomata* (Ehlers, 1887) was described from the Caribbean, south of Florida. The two species described in this paper represent the first records of this genus in Australian waters.

### Key to the Australian species of *Amphitritides*

1. Notopodia continue almost to pygidium; nephridial papillae on segments 3 and 6–10. . . . . *A. harpa*  
—Notopodia, 20 pairs, nephridial papillae on segments 3 and 6–13. . . . *A. ithya*

### *Amphitritides harpa* n. sp.

Fig. 2a–f

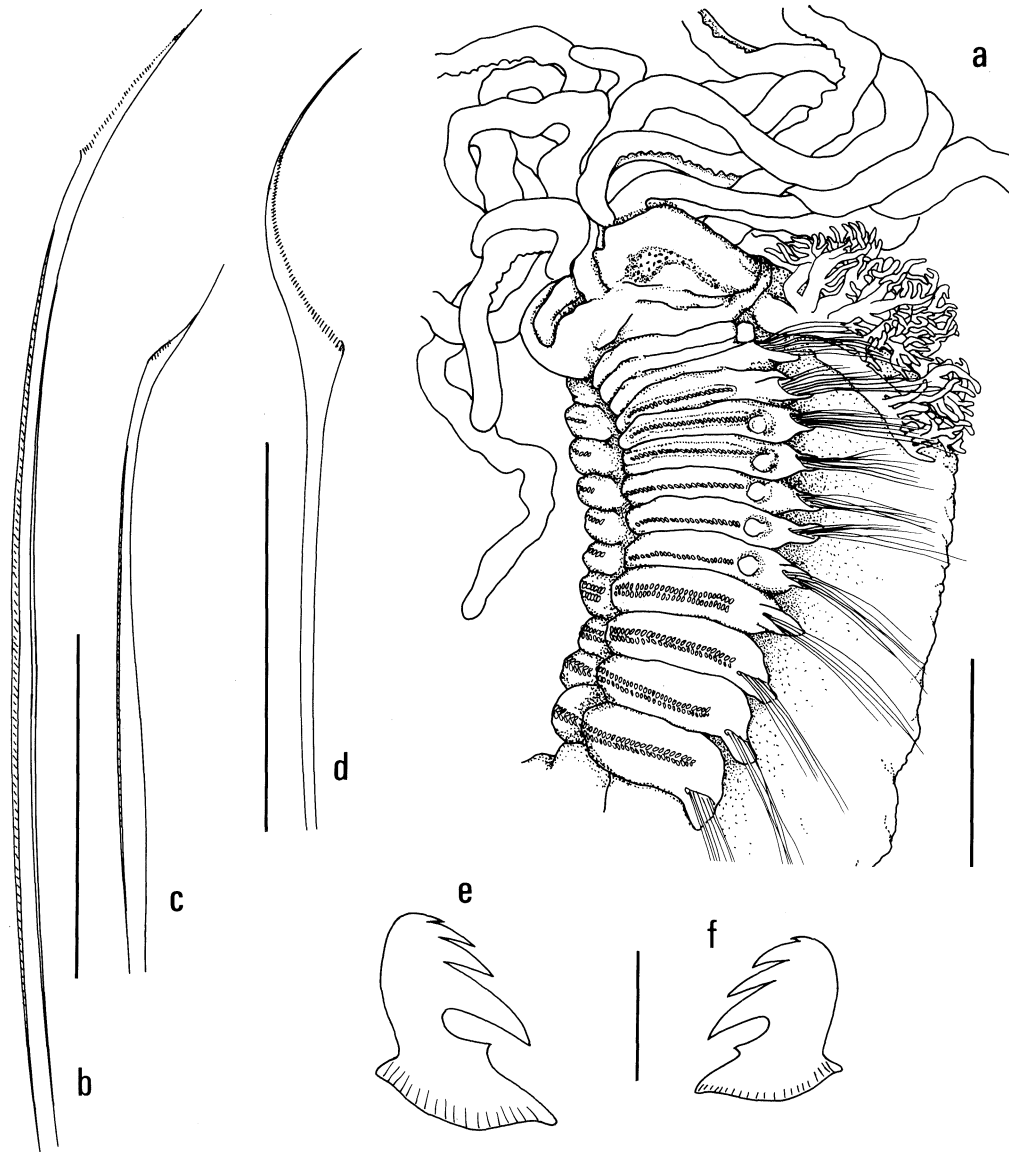
**Material examined.** HOLOTYPE: Queensland: Great Barrier Reef, Stn 9 Eclipse Island, 18°46'S, 146°33'E (AM

W200344) posteriorly incomplete, 81 segments, 1.5 mm wide. PARATYPE: Great Barrier Reef, One Tree Island 23°30'S, 152°05'E (AM W200345); complete, about 100 segments, 19 mm long, 1.0 mm wide.

**Description.** Body widest anteriorly, abdomen very long, gradually tapering, coiled. Tentacular lobe collar like. Buccal tentacles long, filiform, grooved. Eyespots red, arranged in small patch laterally, at the base of posterior tentacular lobe. Peristomium indistinct dorsally, ventrally forming a crescent shaped lower lip, partially covering large, padlike inner lip. Branchiae dendritically branched with

short, thick stalk; 2 pairs on segments 2 and 3, anterior pair arise just above line of notopodia, posterior pair dorsally displaced, arise from posterior edge of segment. Lateral lobes absent (Fig. 2a).

Notopodia from segment 4, continue for at least 78 segments, to near pygidium; podia short, triangular, sub-rounded, reduced posteriorly to small tubercle. Notosetae anteriorly very long, narrow-winged capillaries, slightly hirsute along 1 edge, with very short, faintly hispid tip (Fig. 2b,c), 2 lengths of setae present; posteriorly notosetae sickle-shaped capillaries, wingless, subdistally expanded with



**Fig. 2.** *Amphitritides harpa* n. sp., holotype. **a.** ventrolateral view, anterior body, scale is 1 mm. **b.** long notoseta from notopodia 6, scale is 0.1 mm. **c.** short notoseta from notopodia 6, scale is 0.1 mm. **d.** notoseta from midabdomen, scale is 0.1 mm. **e.** uncinus from midthorax, scale is 0.01 mm. **f.** uncinus from midabdomen, scale is 0.01 mm.



longer hispid region distally, all similar in length (Fig. 2d). Neuropodia from segment 5 (setiger 2), present on all following segments; podia long, low ridges, similar in size throughout first half of body, then podia decreases in length gradually over remaining segments. Uncini with sharply pointed, subrostral ligament and slightly curved base (Fig. 2e,f), dental formula MF:3-4:6-9:9-12; arranged in single rows to segment 10, thereafter uncini arranged in double rows, face to face.

Midventral glandular pads occur on segments 2-12, thereafter reduced to glandular streak, initially deep, becoming shallow, continues to pygidium. Nephridial papillae small, flat, occur on segment 3 just lateral to first pair of branchiae and on segments 6-10 at the dorsal end of the neuropodial tori.

**Variation.** Paratype specimen complete, pygidium with 6 large papillae arranged almost equidistantly around perimeter, ventral pair separated slightly further. Branchiae very small, dendritic, with few branches. Notopodia continue to near pygidium, abdominal ones with reduced complement of notosetae. Midventral glandular pads on segments 2-11. Nephridial papillae arranged as for holotype, although very small, inconspicuous.

**Comments.** *Amphitritides harpa* n. sp. differs from the other species of *Amphitritides* from Australia, *A. ithya* n. sp., in the number of pairs of notopodia present, the form of the notosetae and uncini and the number of pairs and position of the nephridial papillae. For details of these characters see description of *A. ithya* n. sp. It most closely resembles *A. bruneacomata* (Ehlers, 1887) in having a large number of pairs of notopodia, but differs from this species in having peculiar sickle-shaped, subdistally expanded notosetae in posterior segments and the second pair of branchiae dorsally displaced unlike *A. bruneacomata* in which the first pair appears dorsally displaced. The sickle-shaped notosetae resemble those found in the genus *Spinospaera* Hesse. *Amphitritides harpa* differs from *A. gracilis* (Grube, 1860) most noticeably in the number of pairs of notopodia viz. 17 or 18 according to Grube and 17-19 according to Fauvel (1953).

**Etymology.** Specific name from the greek noun, *harpe*, sickle, referring to the sickle-shaped posterior notosetae.

**Habitat.** Found subtidally, in soft sediment, in between reefs.

**Distribution.** Queensland.

### *Amphitritides ithya* n. sp.

Fig. 3a-d

*Terebella pterochaeta*.—Hartmann-Schröder, 1979: 148. Non Schmarida, 1861.

**Material examined.** HOLOTYPE: Queensland: Port Denison 20°03'S, 148°15'E (AM W200338), posteriorly incomplete, 61 segments, 2.3 mm wide. PARATYPE:

Queensland: Gulf of Carpentaria, west of Topsy Creek, 15°28.5'S, 140°53.2'E 1(AM W200339), complete, 77 segments, 13.2 mm long, 1.3 mm wide.

**Additional material examined.** Western Australia: Broome, Mangrove Point 1(NTM W2107), (HZM P16624); Port Hedland (HZM 16625); Cable Beach 2(NTM W22496). Northern Territory: East Point 1(NTM W2825), 1(NTM W2794).

**Description.** Body coiled, widest anteriorly, gradually tapering posteriorly. Tentacular lobe collar like. Buccal tentacles largely missing. Eyespots small, red, arranged in broad band across posterior tentacular lobe, most numerous laterally. Peristomium distinct, slightly longer than succeeding segment dorsally and laterally, ventrally forming pair of thin lower lips; pair of crescent-shaped inner lips protrude from oral cavity. Branchiae richly branched, short stalk, 2 pairs on segments 2 and 3, arise just above line of notopodia. Lateral lobes absent (Fig. 3a).

Notopodia from segment 4, 20 pairs; podia short, rectangular, reducing in size slightly posteriorly. Notosetae of 2 lengths, arranged in 2 tiers, long winged capillaries, distally hispid, short capillaries similarly hispid and winged (Fig. 3b,c). Neuropodia from segment 5 (setiger 2), present on all segments posteriorly; podia low ridges throughout, first 6 pairs of neuropodia positioned laterally, next several pairs longer, extending onto ventrum just short of ventral pads, then neuropodia decreasing in length gradually posteriorly. Uncini with delicate pointed, upright subrostral ligament and convex base (Fig. 3d); dental formula MF:3:4-6:6-9, throughout; uncini arranged in single rows to segment 10, thereafter in double rows, face to face.

Midventral glandular pads on segments 2-13, thereafter glandular streak in shallow groove to pygidium. Nephridial papillae flat, paired, present on segments 3, 6-14; first pair arise just lateral to branchial stalk, remainder arise from anterior base of notopodia.

**Variation.** Paratype with many buccal tentacles, filiform, grooved, longest extending to pygidium. Eyespots fewer, scattered irregularly across dorsum. Notopodia only present to segment 19. Uncini arranged in double rows to near pygidium. Nephridial papillae on segments 3, and 6-13. Structure of pygidium difficult to discern.

**Comments.** *Amphitritides ithya* n. sp. differs from *A. harpa* in having far fewer pairs of notopodia, notosetae of one type (although different lengths), uncini with an upright subrostral ligament rather than one anteriorly directed and nephridial papillae on segments 3 and 6 to 13 or 14. These papillae arise from the anterior base of the notopodia in *A. ithys* unlike *A. harpa* which has nephridial papillae on segments 3 and 6 to 10, and located at the dorsal end of the neuropodial tori.

The material identified by Hartmann-Schröder (1979) as *Terebella pterochaeta* is referred to *A. harpa*.



**Fig.3.** *Amplitritides ithya* n. sp., holotype. **a.** ventrolateral view of anterior body, scale is 1 mm. **b.** long notoseta from notopodia 12, scale is 0.1 mm. **c.** short notoseta from notopodia 12, scale is 0.1 mm. **d.** uncinus from segment 15, scale is 0.01 mm. *Arranooba booromia* n. g., n. sp., holotype. **e.** lateral view of anterior body, scale is 1 mm. **f.** notoseta from setiger 12, scale is 0.01 mm. **g.** notoseta from setiger 12. scale is 0.01 mm. **h.** uncinus from setiger 12, scale is 0.01 mm.

*Terebella pterochaeta* Schmarda, was originally described from southern Africa. Material from southern Africa (HZM PE 1255, PE 1256, PE 1189, V 8770) has been examined and has 29 to 30 pairs of notopodia whereas *A. harpa* has 19 or 20 pairs of notopodia. Type material of *T. pterochaeta* has however, not been located.

**Etymology.** Specific name derived from the Greek adjective *ithys*, straight, upright, referring to the angle of the subrostral ligament of the uncini.

**Habitat.** Paratype collected from about 25 m, details of substrate unknown, no habitat data available for holotype.

Additional material from East Point was collected from rocks embedded in mud and from Cable Beach from the low water mark under stones and encrusting algae.

**Distribution.** Western Australia (Broome), Queensland (Port Denison, Gulf of Carpentaria), Northern Territory (East Point).

#### *Arranooba* n. gen.

Prostomium compact, branchiae absent, lateral lobes present, well developed on peristomium, and segments 2 and 3. Notopodia begin on segment 4 and continue to segment 20 (17 pairs of notopodia). Notosetae of 2 types, narrow-winged capillaries with smooth tips and capillary setae with margins inwardly curved to form a quill-shaped setae. Setae of segment 15 (setiger 12), considerably enlarged and thickened. Neuropodia from segment 5 (setiger 2) and continue to pygidium. Uncini avicular, initially arranged in single rows and then arranged in double rows from uncinigerous segment 7 to the end of the thorax, thereafter in single rows.

**Type species.** *Arranooba booromia* n.sp.

**Comments.** *Arranooba* belongs to the abranchiata group of Amphitritinae, which include *Baffinia* Wesenberg-Lund, *Lanassa* Malmgren, *Laphania* Malmgren, *Leaena* Malmgren, *Phisidia* Saint-Joseph, *Proclea* Saint-Joseph, *Spinospaera* Hessle, and *Stschapovella* Levenstein. These genera are distinguished by such features as the number of pairs of notopodia, type of notosetae, where the neurosetae begin and the presence or absence of lateral lobes. None of the described genera has the combination of features which *Arranooba* possesses. *Laphania* has 17 pairs of notopodia, but lacks lateral lobes and the neurosetae do not begin until segment 8 (setiger 7). *Leaena* appears to be the closest genus to *Arranooba* but only has 16 pairs of notopodia, and lateral lappets are present together with a transverse ridge across the dorsum. Certainly some species of *Leaena* examined have very poorly defined lateral lobes, whereas in *Arranooba* they are very well defined. In no genus of Amphitritinae have any notopodia been recorded in which some setae are considerably enlarged as in *Arranooba*.

As many abranchiata species are small, it is likely that additional species and genera will be found in Australia. Most representatives of these genera occur in the polar regions or in deep water, although this Australian study has recorded several from shallow depths.

The generic name *Arranooba* (gender feminine) is an aboriginal word for a place in Western Australia.

#### *Arranooba booromia* n. sp.

Fig. 3e-h

**Material examined.** HOLOTYPE: Western Australia: Abrolhos Group, Rat Island 16°24'S, 123°07'E, reef crest 1 m in dead coral rubble (AM W200429). Complete specimen, 6 mm in length and 1.5 mm in width.

**Description.** Preserved specimen pale yellow with golden setae, in fine chitinous tube.

Prostomium compact. Single short buccal tentacle remaining. Eye spots absent. Lateral lobes well developed on peristomium, segments 2 and 3, all projecting forwards and encompassing the prostomium. Peristomial lateral lobe rectangular, segment 2 with large rectangular glandular lobe meeting midventrally, largest of the 3 lobes. Segment 3 with small rounded semi-circular lobe overlapping the base of the one occurring on segment 2. All pairs of lateral lobes very tightly overlapping each other. Branchiae absent (Fig. 3e).

Notopodia begin on segment 4, continue for 17 segments, small rounded podia, except for podia of segment 15 (setiger 12), which is considerably enlarged with very well-developed bundle of golden setae. Notosetae of 2 types, very broad-bladed, narrow-winged capillaries with drawn out fine smooth tips, blades with fine surface striations, 2 lengths of this type of seta present; other type of seta with margins enrolled to form a blunt quill type seta. Setae of setiger 12 similar to other setae but much thicker (Fig. 3f,g), more setae present than in typical bundle of setae.

Neuropodia begin on segment 5 (setiger 2), continue to pygidium. Length of uncinal row longer on first 3 uncinigerous segments than subsequent ones. Uncini avicular (Fig. 3h) with the following dental formula MF:4-5:5:6 or MF:6:6:5:α. Uncini initially arranged in single rows, then arranged in double rows from uncinigerous segment 7 to end of thorax, and then uncini again arranged in single rows to the pygidium.

Abdominal uncini arranged on elongate erect rectangular tori with margin slightly expanded giving a globular appearance.

Ventral pads well developed, segmentally demarcated on anterior thorax, from about setiger 12 onwards, width of ventral pad declines and then rapidly tapers into a narrow ventral stripe which then completely disappears. Ventral pads not markedly glandular.

Nephridial papillae absent, and coelom devoid of any gametes.

**Etymology.** The specific name is an aboriginal word for wind. The Abrolhos Islands, the type locality for the species, are known for the strong prevailing winds which blow onto the treeless islands for most of the year.

**Habitat.** Found in coral rubble in depths of 2–3 m.

**Distribution.** Western Australia (Rat Island, Abrolhos group).

*Baffinia* Wesenberg-Lund 1950 emended  
Fournier & Barrie, 1984

*Baffinia* Wesenberg-Lund, 1950: 53–54.—Fournier & Barrie, 1984: 1397–1401.

Abranchiate Amphitritinae, lateral lobes absent, ventral glandular shield well developed on some anterior segments. Notopodia from segment 4, continuing to near posterior end, notosetae of 2 types, limbate with serrated tips in anterior setigers becoming broadly geniculate, flail tipped with strongly serrated blades from about segment 13–15 (setiger 10–12), to end of body. Neuropodia present from segment 5 (setiger 2) to almost the pygidium, uncini uniformly short, avicular with 4–5 rows of small teeth above the main fang, uncini arranged in single rows initially, then in double rows for 20 or more setigers, then arranged in single rows for remaining setigers.

**Type species.** *Baffinia multisetosa* Wesenberg-Lund, 1950, by original designation.

**Comments.** Fournier & Barrie (1984) have recently reviewed this previously monospecific genus and synonymised *Terebella hesslei* Annenkova, 1924 with *B. multisetosa*. We have emended the generic diagnosis to accommodate our new species from Victoria, to allow some variation in the segment on which the notosetae are arranged in double rows and the segment on which the notosetae change from simple to flail tipped setae. Within the Amphitritinae only two genera, *Baffinia* and *Proclea* Saint-Joseph have notosetae changing in structure along the body. *Baffinia* has notopodia from segment 4 and neuropodia from segment 5, whereas *Proclea* has notopodia from segment 4 and neuropodia from segment 6. Thus *Baffinia biseriata* n. sp. clearly belongs to *Baffinia* which is also characterised by uncini arranged in double rows for many segments. In contrast *Proclea* has uncini in double rows only from segments 11–19. We agree with the comments made by Fournier & Barrie (1984) that the genus may need to be reconsidered when generic revisions of some other poorly known terebellid genera are undertaken.

*Baffinia biseriata* n. sp.

Fig. 4a–d

**Material examined.** HOLOTYPE: Victoria: Gabo Island 37° 34' S, 149° 55' E (AM W200437) on vertical rock face in

among dense upper storey of the algae *Phyllospora*, with sparse red algae underneath, 6 m, complete specimen, 69 segments, 15 mm in length and 1.5 mm wide at anterior end tapers towards the pygidium. PARATYPES: Victoria: south south-east side of Gabo Island 23 m, on large boulders in among sponges and ascidians, 1(AM W200438), 1(AHF Poly 1465); Gabo Island, off Monument Bay in 18–20 m, boulder fauna (USNM 99966). New South Wales: Bass Point 34° 36' S, 150° 54' E, 18–20 m (BMNH ZB 1986.62). Paratypes posteriorly incomplete specimens, 10–15 mm in length and 1–1.5 mm in width.

**Additional material examined.** New South Wales: North Head off Sydney, 30 m, 6(AM W200439), 1(AM W200440).

**Description.** Preserved specimen colourless. Prostomium produced anteriorly, short sloping margins thickened from which buccal tentacles arise. Few buccal tentacles remain, thick and grooved. Prostomium ventrally appears as tongue-like projection with thickened margins. Eye spots absent. Branchiae absent. Lateral lobes absent but anterior margins of segments 2–4 are slightly thickened (Fig. 4a).

Distinct segmental ventral glandular pad present initially, continue to setiger 9, but then rapidly taper into narrow glandular streak which continues to pygidium. Anterior dorsum inflated.

Notopodia begin on segment 4, continue to pygidium, podia are small rounded protruberances. First 10 pairs of notopodia with 2 tiers of setae, consisting of 2 types, longest, broad-winged capillaries with long pointed tips, margins of wings minutely hirsute (Fig. 4b), shorter notosetae, wingless, with small flayed tips, prominent V-shaped supporting structure at the base of the flair (Fig. 4c). Subsequent notopodia after segment 13 (setiger 10) with 2 tiers of flail tipped notosetae (Fig. 4c). Basal part of the notosetal blade with well-developed chitinised V-shaped support which almost articulates with the shaft. Blade initially strongly serrated but then rapidly tapers into a long smooth tip.

Neuropodia begin on segment 5 (setiger 2), continue to pygidium. Neuropodia initially with long rows of uncini, surrounded by glandular material. Subsequently the neuropodia become shorter, less glandular, in far posterior have only 5–7 uncini per row. Uncini, arranged in single rows on first 6 neuropodia, subsequently uncini arranged in double rows face to face, this pattern continues until 19 segments from the pygidium, when the uncini are again arranged in single rows. Uncini avicular (Fig 4d) with strongly crested heads, dental formula in 1st neuropodia of MF: 7-8:  $\alpha$ :  $\alpha$ :  $\alpha$ :  $\alpha$ , third neuropodia of MF: 3: 5: 6-8:  $\alpha$ , this formula maintained in posterior thoracic uncini.

Pygidium terminal with an anal rosette with small rounded protruberances around the margin.

**Variation.** Some of the paratypes are gravid, but gonopores are not evident. Paratypes exhibit some variation in the number of buccal tentacles

remaining. Some individuals have small gregarines attached to the surface epithelium. Within the additional material examined from North Head, New South Wales, there is some variation in the segment on which the neuropodial uncini become arranged in double rows; in 2 individuals this does not occur until the segment 12 (8th uncinigerous segment). These individuals are posteriorly incomplete and very small; at this stage we suggest this represents geographical variation in the species.

**Comments.** *Baffinia biseriata* n. sp. is only the second species of *Baffinia* to be described and it differs from *B. multisetosa* Wesenberg-Lund, 1950 in the arrangement of the neuropodial uncini. *Baffinia biseriata* n. sp. has the first 6 neuropodia (setigers 2 to 7) with uncini arranged in single rows, uncini are then arranged in double rows until 19 segments before the pygidium when they are arranged in single rows again. In contrast *B. multisetosa* with 70 segments, has uncini arranged in single rows on the first 8 neuropodia (setigers 2 to 9), then arranged biserially in facing rows on the next 21 neuropodia (setigers 10 to 30), reverting to uniserial arrangement again until almost to the end of the body. The last few segments apparently lack neuropodia (Fournier & Barrie, 1984).

Finally the structure of the notosetae differs in the

two species, with *B. biseriata* n. sp. having a well developed V-shaped supporting structure present at the base of the blade, such a supporting structure appears absent from those figured by Fournier & Barrie (1984).

**Etymology.** The specific name is derived from latin *bi*, double and latin *seriata*, row and refers to the numerous neuropodia with double rows of uncini.

**Habitat.** Found at depths of 6–23 m on boulders in among algae and sponges.

**Distribution.** Victoria (Gabo Island), New South Wales (Bass Point, North Head).

### *Eupolymnia* Verrill

*Eupolymnia* Verrill, 1900: 660.

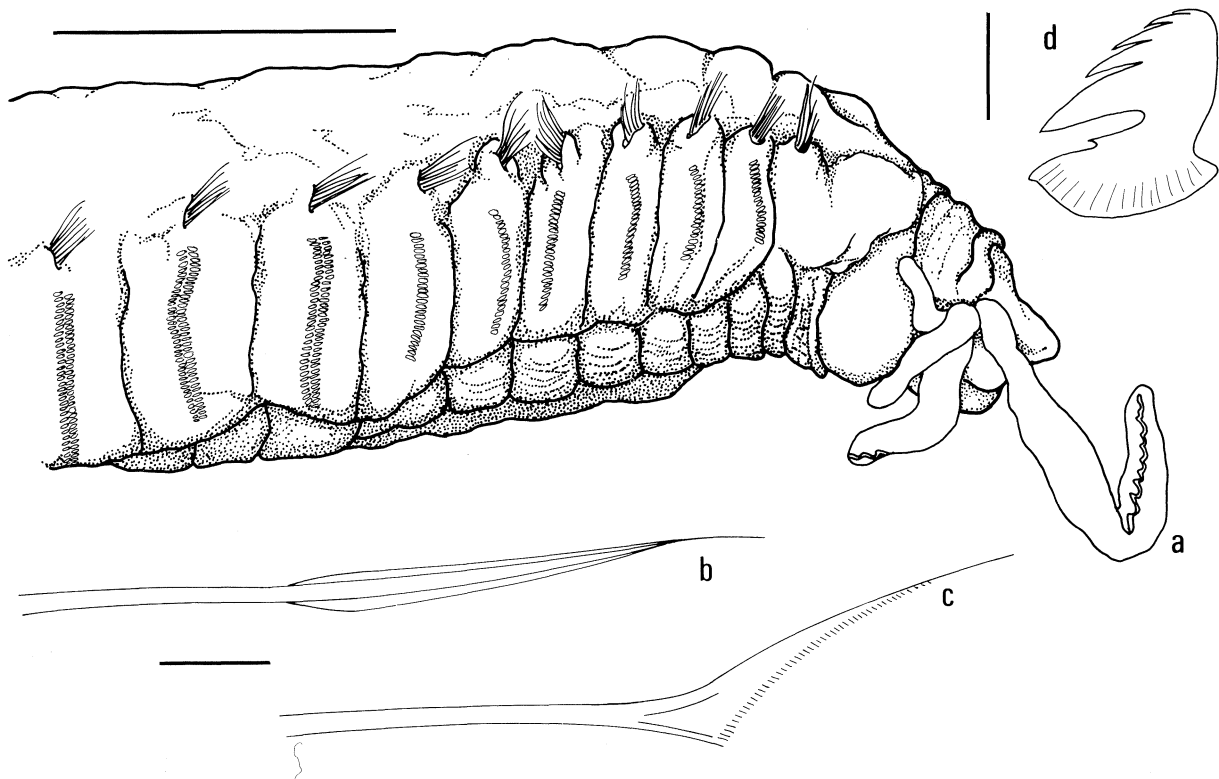
*Amphitritoides* Costa, 1862: 90.

*Pallonia* Costa, 1862: 88–89.

*Polymnia* Malmgren, 1867: 108.

Prostomium compact, branchiae, 3 pairs on segments 2, 3 and 4, branched. Lateral lobes present on segments 2, 3 and 4. Notopodia from segment 4, 17 pairs, with smooth-tipped notosetae. Uncini, avicular present from segment 5.

**Type species.** *Amphitrite nesidensis* delle Chiaje, 1828, designated by Hartman, 1959.



**Fig. 4.** *Baffinia biseriata* n. sp., holotype. **a.** lateroventral view of anterior body, scale is 1 mm. **b.** notoseta from setiger 3, scale is 0.1 mm. **c.** notoseta from setiger 3, scale is 0.1 mm. **d.** uncinus from unciniger 1, scale is 0.01 mm.

**Comments.** We have expanded the generic diagnosis to include the presence of lateral lobes on segment 4, as we do not regard the presence of an additional lobe on segment 4 of *Eupolymnia koorangia* n. sp. sufficient to warrant the erection of a new genus. *Eupolymnia koorangia* resembles *Eupolymnia* in all other respects.

Two species of *Eupolymnia* previously recorded from Australia, *E. nebulosa* (Montagu, 1818) and *E. trigonostoma* (Schmarda, 1861) do not occur in Australia.

***Eupolymnia koorangia* n. sp.**

Fig. 5a–c

*Eupolymnia nebulosa*.—Knox & Cameron, 1971: 38.—Hartmann-Schröder, 1979: 147; 1981: 57–58; 1982: 90; 1984: 44; 1985: 85; 1986: 58.—Hutchings & Murray, 1984: 96. *Non* Montagu, 1818.

*Eupolymnia* sp. Hartmann-Schröder 1987: 57

**Material examined.** HOLOTYPE: South Australia: Kangaroo Island, American River 35°48'S, 137°46'E (AM W14028) complete individual, 2 cm in length and 2.5 mm maximum width. PARATYPES: 1(BMNH ZB 1986.63), 1(USNM 99967), 1(AHF Poly 1466), 2(AM W200726), 2(AM W14027), all from American River inlet, Kangaroo Island.

Waterfall Beach (NMV F52591); Cockburn Sound (WAM 38-84); Rottneest Island, north-west West End (WAM 25-73), Thomson Bay (WAM 52-84); Cervantes (HZM P17166); Rockingham (HZM P17154); Albany (HZM P18104). South Australia: Ceduna (HZM P18105); Denial Bay (HZM P18106); Port Lincoln (HZM P18524); Wallaro, Point Riley (HZM P18664); Port MacDonnell (HZM P18663); Kangaroo Island, Shoal Bay (AM W200715), Emu Bay (AM W200713), Maston Point, American River (AM W200707), Penneshaw Jetty (AM W200712); Torrens Island (TASM K1020); Spencer Gulf (SAM E321); Sir Joseph Banks Group, cove at end of Reevesby Island (SAM E2002). Tasmania: Samphire Island off Flinders (TASM K1019); Eagle Hawk Neck (TASM K1018); Bass Strait: Stn 81, 92, 112, 117, 128, 133, 134, 135, 139, 153, 159, 163, 164, 167, 168, 169, 170, 174, 177, 179, 180, 185, 191, 194, 198, 203, 205, 219 (NMV unreg.). Victoria: Portland Harbour (NMV F52592); Port Phillip Bay, Area 49 Stn 236 (NMV G1705), Area 5, Stn 169 (NMV G1820), PPBES Stn 966 (NMV F52593); Western Port, Flinders Island (NMV F52594); Shoreham Reef (NMV F52595), CPBS Stn 21N (NMV F52613), CPBS Stn 33S (NMV F52596), Stn WBES 1716-3, WBES 1719-2, WBES 1704-2, WBES 1732-3 (NMV unreg); Wilson's Promontory (NMV F52597-F52598); Gabo Island (AM W200814). New South Wales: Jervis Bay (AM W201158), 20°16'S, 169°51'E, 85-100 m (AM W201532); Port Jackson (AM W201533). Queensland: Moreton Bay (AM W201531); Hervey Bay, Port Vernon (AM W201534); One Tree Island Lagoon (AM W201152); Lizard Island (AM W200728); Thursday Island (AM W201530); Escape Reef 15°50'S, 145°50'E 2(AM W201160). Northern Territory: South West of Nassau River, East Gulf of Carpentaria, 22 m, 16°06'S 140°44'E; Darwin, Vostey Beach (NT W144), Lee Point (NT W147); Port Essington, Table Head (NT W142), (NT W1574); Oxley Island (NT W826).

**Description.** Alcohol preserved body pale yellow in colour, except for numerous prostomial eye spots arranged in an extensive ring. Prostomium compact with upper lip extended as rectangular forwardly projecting lip. Peristomium with no expansion. Branchiae, 3 pairs, on segments 2, 3 and 4; each branchia with thick main stalk and few short stumpy dichotomous branches. Lateral lobes on segments 2, 3 and 4. Segment 2 with ventrally displaced lateral lobe, narrow elongate lobe just merges onto the ventral pad laterally. Segment 3 with lateral lobe more laterally displaced, small bluntly digitiform and obliquely positioned towards the notopodia (Fig. 5a,b). Segment 4 with small rounded lobe just above the neuropodial tori on following segment. Margins of all the lobes thin, clear markings, perhaps blood vessels can be seen on the margins of the lobes.

Notopodia begin on segment 4, continue for 17 segments, notosetae arranged in 2 tiers, broad-bladed, very narrow-winged capillaries with tips drawn out into fine smooth points. Notosetal blade highly ornamented but margins of setae smooth. Neuropodia begin on segment 5 (setiger 2), continue almost to the pygidium. Thoracic neuropodia fairly compact, glandular tori. Anterior abdominal neuropodia erect rectangular tori, which become progressively shorter towards pygidium. Uncini avicular, short handled (Fig. 5c) with dental formula MF: 1:2:3. Posterior thoracic neuropodia with uncini arranged in alternate rows from the seventh uncinigerous segment, with dental formula MF:2:3:2.

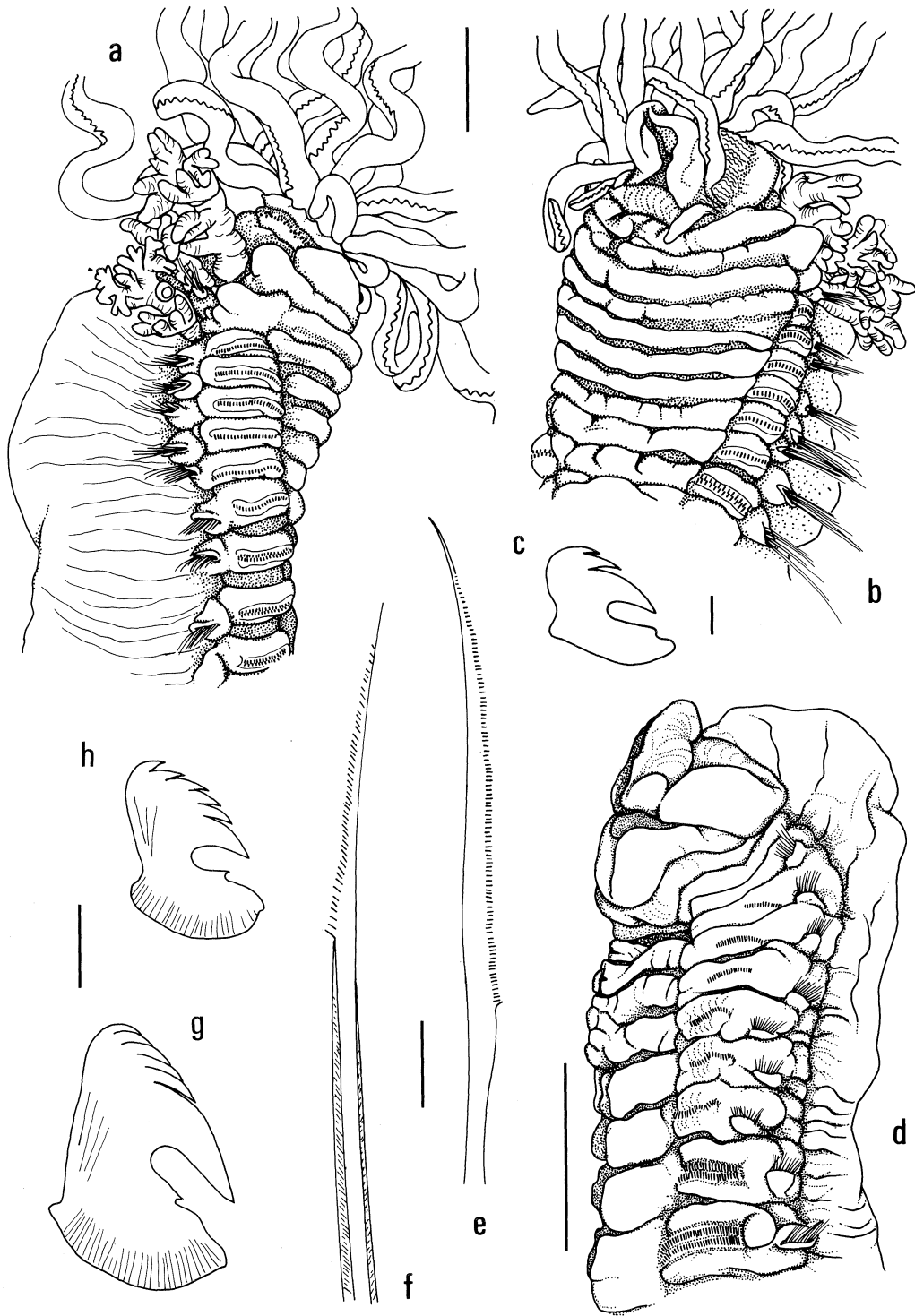
Anterior ventral pads form V-shaped central glandular core, but individual pads still recognisable. Posteriorly, ventral pads form midventral glandular thoracic stripe which continues onto the abdomen. Margins of pygidium convoluted to form an anal rosette.

**Variation.** The paratype material closely resembles the holotype, although some of the branchiae are slightly more branched than those found on the holotype. The markings on the lateral lobes, which may be blood vessels, vary in intensity amongst the type material.

In the non-type material from Shoal Bay, Kangaroo Island, the branchiae and anterior segments are pigmented green. The specimen from Smiths Gulch, Tasmania, lacks eye spots but in all other respects, resembles the type material.

A gravid specimen from Port Lincoln, South Australia (NMV unreg) has a parasitic copepod protruding from the body wall just below the first notopodia. This parasitic copepod closely resembles the one present in *Terebella pappus* (Fig. 22d).

**Comments.** *Eupolymnia koorangia* n. sp. can be easily distinguished from *E. nebulosa* (Montagu, 1818) with which it has been confused in the past, by the development of lateral lobes. Material of *E. nebulosa* from Southern England, the type locality for the species (BMNH ZK 1948.10.20.107; ZK 1950.6.6.21 and AM W200882), has three pairs of



**Fig.5.** *Eupolymnia koorangia* n. sp., holotype. **a.** lateral view of anterior body, scale is 1 mm. **b.** ventral view of anterior body, scale is 1 mm. **c.** uncinus from setiger 2 (unciniger 1), scale is 0.01 mm. *Lanassa exelysis* n.sp., holotype. **d.** lateral view of anterior body, scale is 1 mm. **e.** notoseta from setiger 9, scale is 0.01 mm. **f.** notoseta from setiger 9, scale is 0.01 mm. **g.** uncinus from midbody setiger, scale is 0.01 mm. **h.** uncinus from posterior body setiger, scale is 0.01 mm.

branchiae, each branchiae with few dichotomous branches and virtually no main stalk. Peristomium expanded as a discrete narrow elongated raised ventral collar. Segment 2 with a small spherical lateral lobe attached to ventral pad to form a bilobed structure. Segment 3 with bilobed spherical lateral lobe, dorsolaterally displaced. Segment 4 with small discrete digitiform lobe which is directed dorsally. This arrangement of lateral lobes differs from that described for *E. koorangia*. We have examined material identified by Knox & Cameron (1971) and Hartmann-Schröder (1979, 1981, 1982, 1984, 1985, 1986) as *E. nebulosa* and all the material agrees with *E. koorangia* n. sp. *Eupolymnia trigonostoma* (Schmarda, 1861), described from off the New South Wales coast, has been referred to *E. congruens* (Marenzeller, 1884) by Hessle, 1917. This species also differs from *E. koorangia* in the development and arrangement of lateral lobes. The type material could not be located and no adequate description is available. Several other species of *Eupolymnia* have been described from areas outside Australasia. Most of these species are poorly described, with no detailed descriptions of the shape and orientation of the lateral lobes. We believe that the shape, orientation and development of lateral lobes in *Eupolymnia* are important specific characters. A revision of the genus is needed.

**Etymology.** The specific name refers to an Aboriginal name for kangaroo, the type locality for the species (Kangaroo Island in South Australia).

**Habitat.** Found intertidally to depths of 85–100 m, often associated with seagrass beds in shallower depths.

**Distribution.** Widespread around Australia, locally can be abundant.

### *Hadrachaeta* Hutchings

*Hadrachaeta* Hutchings, 1977: 16.

Prostomium compact with thickened outfolded lips, numerous thick grooved buccal tentacles. Branchiae, 3 pairs on segments 2–4, consisting of simple filaments. Lateral lobes poorly defined. Notopodia from segment 4 (3rd branchiferous) and continue for 16 segments; notosetae finely serrated capillaries. Uncini from segment 5 (setiger 2) and present on all following segments to pygidium. Uncini of first 4 rows heavily chitinised long handled hooks, following ones avicular, and arranged in double rows on posterior thorax.

**Type-species.** *Hadrachaeta aspeta* Hutchings, 1977, by original designation.

### *Hadrachaeta aspeta* Hutchings

*Hadrachaeta aspeta* Hutchings, 1977: 17, fig. 8a–d.— Hutchings & Murray, 1984: 96–97.

**Comments.** Extensive collecting on intertidal mud flats on the seaward side of mangroves along the east and northern coast of Australia has confirmed its limited geographical distribution and restricted habitat, intertidal mudflats in front of *Avicennia* mangroves. This genus is monospecific.

**Distribution.** New South Wales (Hawkesbury River, Broken Bay), Queensland (Moreton Bay).

### *Lanassa* Malmgren

*Lanassa* Malmgren, 1866: 385–386.

*Laphaniella* Malm, 1874: 98.

*Pherea* Saint-Joseph, 1894: 167.

Branchiae absent. Lateral lobes sometimes present; glandular pads well developed. Thoracic notopodia begin on segment 4 and continue for 15 segments. Notosetae serrated capillaries. Neuropodia from segment 5 (setiger 2), with avicular uncini arranged in double rows on some segments.

**Type species.** *L. nordenskioldi* Malmgren, 1866, by original designation.

**Comments.** The genus *Lanassa* has not previously been recorded from Australia. Eight species of the genus have been described worldwide, mainly from cold and deep water. Several of the species have not been reported since they were originally described.

Type material of *Lanassa benthaliana* McIntosh, 1885 (BMNH 1885.12.1.357) has been examined. It is poorly preserved, in two fragments and is probably indeterminate unless additional material can be found. Similarly the type of *L. sarsi* McIntosh, 1885 (BMNH 1885.12.1.356) is in fragments which are not consecutive and again this species is probably indeterminate unless additional material from the type locality can be collected. Currently, neither of these species can be adequately defined because of McIntosh's incomplete descriptions and the poor state of the respective type material. The holotype of *L. capensis* Day, 1955 (BMNH 1961.16.90) appears to have branchial scars which would place it in another genus. Four other species of *Lanassa* and one subspecies have been described according to Hartman (1959, 1965). These are all found in cold waters in the northern hemisphere. The original descriptions of *L. nordenskioldi* Malmgren, 1866, *L. praecox* (Saint-Joseph, 1899), *L. venusta* (Malm, 1874), *L. venusta pacifica* Annenkova, 1938 and *L. gracilis* (Moore, 1923) are inadequate regarding the structure of notosetae in the notopodia along the thorax and the segments on which the uncini are arranged in single and double rows. Thus the genus is in need of revision. A full description of the type species *L. nordenskioldi* Malmgren, 1866, is required before any such revision is attempted.



Key to the Australian species of *Lanassa*

1. Eye spots present; prostomium compact; uncini arranged in double rows for 5 segments beyond last pair of notopodia. . . . . *L. ocellata*  
 — Eye spots absent; prostomium with a tongue-like projection; uncini arranged in double rows for 3 segments beyond last pair of notopodia. . . . . *L. exelysis*

***Lanassa exelysis* n. sp.**

Fig. 5d–h

**Material examined.** HOLOTYPE: Victoria: Swan Bay, Port Phillip Bay, 38°14'S, 144°39'E (AM W200603) subtidal, fine sand silt, complete individual 20 mm in length and 1.5 mm in width with approximately 55 setigers. PARATYPES: All from same locality as holotype, (NMV F52565), (AHF Poly 1467), (USNM 99968), (BMNH ZB 1986.64), (AM W200604) all posteriorly incomplete, ranging in length from 12–20 mm and 1.5 mm in width.

**Additional material examined.** Victoria: Port Phillip Bay Stn 953, 38°09'03'S, 144°27'07'E, sand, 3 m (AM W16122).

**Description.** Preserved animal colourless. Extreme posterior end is regenerating, consists of 10–15 very compact, condensed segments. Prostomium with no buccal tentacles remaining. Prostomium extended forwards ventrally as tongue-like projection, with lateral expansions, anterior margins thickened, glandular. Peristomial collar extends posteriorly in U-shaped backwardly pointing tongue, covers first ventral glandular pad (Fig. 5d). Eye spots absent. Lateral lobes absent.

Distinct ventral glandular pads, initially well developed and segmentally distinct, for first 8 setigers, then pads rapidly taper into narrow ventral stripe which continues to pygidium. Notopodia begin on segment 4, continues for 15 segments. Notopodia well-developed elongate rounded podia with small patch of pigment on either side of emergent setae. Between the notopodia, white elongate segmental lateral glandular patches are present. Neuropodia begin on segment 5 (setiger 2) and continue to within 1 or 2 segments of pygidium. Thoracic neuropodia slightly raised glandular. Abdominal neuropodia more erect than thoracic ones, mounted on glandular tori.

Anterior notosetae, narrow-winged capillaries with long pointed tips, margins of blade faintly hispid; within bundle of setae, 2 groups of setae present one short, other long. In posterior segments in addition to those setae occurring anteriorly, narrow bladed, capillary setae with denticulate margins occur (Fig. 5e,f). Intermediate setae between these 2 types of setae also occur. Difficult to ascertain exactly where denticulate setae first occur, but about segment 12 (setiger 8).

Neuropodia with avicular uncini (Fig. 5g,h) initially arranged in single rows, then in double rows, face to face on setiger 11–21 (setiger 8 to 3 segments beyond the last notosetigerous segment). Subsequently uncini arranged in single rows,

gradually length of neuropodial tori becomes very short, with few uncini present in each torus.

Neurosetae with the following dental formula MF:3-5:6:8-11:a:a. Body cavity with no gametes visible. Nephridial papillae absent.

**Variation.** Some of the paratypes have visible female gametes in the body cavity, i.e. coelomic gametes, but no nephridial papillae present. Buccal tentacles short and grooved.

**Comments.** *Lanassa exelysis* n. sp. differs from the other Australian species of the genus, *L. ocellata* n. sp., in the shape of the prostomium which is more elongate, and has eye spots which are absent in *L. exelysis*. However the major differences are in the type of the posterior notosetae which are broad bladed in *L. ocellata*, and narrow bladed in *L. exelysis*, and the segments on which the uncini are arranged in double rows, 11–21 in *L. exelysis* and 11–23 in *L. ocellata*. These differences are specific differences rather than ones related to size.

For a discussion on other species currently assigned to the genus *Lanassa* see comments given after the generic diagnosis.

**Etymology.** The specific name *exelysis* is greek (f) and refers to the mouth of the estuary, where this species occurs.

**Habitat.** Found subtidally in fine sand and silt in protected marine embayments.

**Distribution.** Victoria (Swan Bay, Port Phillip Bay).

***Lanassa ocellata* n. sp.**

Fig. 6a–d

**Material examined.** HOLOTYPE: New South Wales: Murumbulaga Point, Twofold Bay 37°06'S, 149°56'E, intertidal, rock platform, cryptic fauna (AM W200602), 4 mm long and 1.0 mm wide, posteriorly incomplete.

**Description.** Preserved specimen colourless. Prostomium compact with few thickened buccal tentacles arising from thickened margin which forms small rounded tongue-like extension ventrally. Small discrete group of eye spots present laterally. Branchiae completely absent. Lateral lobes absent. Well developed ventral discrete segmental glandular pads present on segments 4–16 (setigers 1–13), then size of pads decreases, tapers to narrow ventral stripe which continues along rest of body (Fig. 6a).

Notopodia begin on segment 4, continue for 15 segments, well-developed elongate podia. Notosetae anteriorly, of 1 type, narrow-winged capillaries with faintly hispid tips (Fig. 6b); notopodia of midbody

segments, with additional type of notosetae present, these are short, broad-bladed setae with denticulate margin (Fig. 6c). In posterior setigers at least 3–4 of these denticulate setae are present per notopodial fascicle. Denticulate setae are present in at least the last 8 pairs of notopodial fascicles (setigers 8–15); bundles of notosetae from anterior notopodia often include large numbers of damaged setae, so the exact setiger on which the denticulate setae first occur cannot be stated. Neuropodia from segment 5 (setiger 2) occur on all subsequent segments present on the holotype. Thoracic neuropodia well developed, glandular. Abdominal neuropodia glandular, raised, forming 2 discrete ridges along either side of narrow ventral stripe. Uncini avicular (Fig. 6d) with strongly crested head, initially arranged in single rows, from segment 11–23 (setiger 8 to 5 segments beyond the last notosetigerous segment), arranged in double rows face to face; for remaining 3 neuropodial segments uncini arranged again in single rows. Dental formula of uncini as follows MF:5-7:6-8:α.α.

Nephridial papillae absent. Groups of spermatogonia in form of rosettes (coelomic gametes) are present in body cavity.

**Comments.** For comments on the differences between *Lanassa ocellata* n. sp and *L. exelysis* n. sp. see the description of *L. exelysis*.

**Etymology.** The specific name refers to the presence of eye spots.

**Habitat.** Found as crevice fauna living intertidally on rocky shores.

**Distribution.** New South Wales (Twofold Bay).

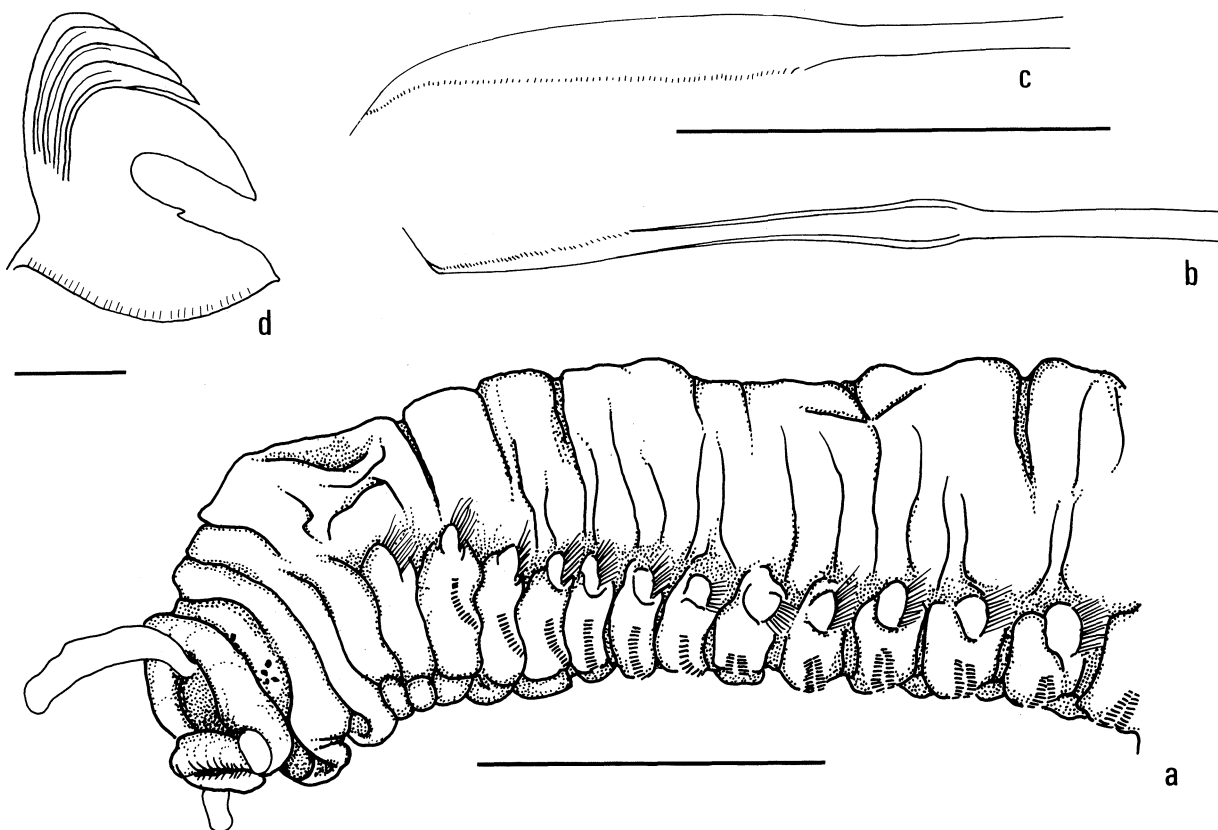
#### *Lanice* Malmgren

*Lanice* Malmgren, 1866: 379.

*Venusia* Johnston, 1865: 241.

*Wartelia* Giard, 1878: 1147.

Prostomium compact. Branchiae, 3 pairs present on segments 2, 3 and 4, branchiae branched. Lateral lobes present on peristomium and segment 3. Notopodia present from segment 4, 17 pairs, notosetae smooth-tipped capillaries. Neuropodia from segment 5 (setiger 2), initially uncini arranged in single rows, subsequently arranged back to back in posterior thorax. Neurosetae avicular uncini. Tube with or without branched fine-meshed fan attached to opening.



**Fig. 6.** *Lanassa ocellata* n. sp., holotype. **a.** lateral view of anterior body, scale is 1 mm. **b.** notoseta from anterior body setiger, scale is 0.1 mm. **c.** notosetae from posterior body setiger, scale is 0.1 mm. **d.** uncinus from midbody setiger, scale is 0.01 mm.

**Type species.** *Nereis conchilega* Pallas, 1766, by monotypy.

**Comments.** We have expanded the definition of the genus to clearly state which segments lateral lobes occur on, and have indicated that the opening of the tube may be smooth or ornamented.

***Lanice bidewa* n. sp.**

Fig. 7a–c

*Lanice conchilega*.—Augener, 1927: 251.—Knox & Cameron, 1971: 38.—Hutchings, 1977: 17–18.—Hartmann-Schröder, 1982: 90. *Non* Pallas, 1766.

**Material examined.** HOLOTYPE: Victoria: Cape Everard, 37° 16' S, 150° 03' E (AM W200764) 10 m in holdfasts of the algae *Phyllospora*, posteriorly incomplete, 2 cm in length and 2 mm maximum width with 12 abdominal segments. PARATYPES: Victoria: Cape Everard, 4 (USNM 99969), 4 (BMNH ZB 1986.65–67). New South Wales: Green Point, Port Jackson 33° 53' S, 151° 13' E (AM W200687), 1 (AHF Poly 1468). All paratype material posteriorly incomplete.

**Additional material examined.** Western Australia: North West Shelf. Stn 01-83-B4G, 19° 05.2' S, 118° 54.1' E (AM W200832), Stn 04-83-B3G, 19° 55.5' S, 117° 56.1' E (AM W200833), Stn 03-83-B8G R9, 19° 29.6' S, 118° 52.2' E (AM W200835); Cable Beach, Broome 1 (NT W2491), 1 (HZM P16618); North West Cape, Neds Beach (WAM 371); Shark Bay, outer bar, north-west of Monkey Rock, (WAM 53-84); Dampier Archipelago, Kendrew Island (WAM 28-84). South Australia: Kangaroo Island, Penneshaw Jetty (AM W200829). Bass Strait: Stn 107, 109, 112, 115, 117, 120, 121, 128, 130, 131, 139, 156, 161, 169, 190, 199, 204 and 205 (NMV unreg). Victoria: Port Phillip Bay (NMV G1731); Western Port, Stn 10 (NMV unreg); Gabo Island (AM W200816), (AM W200818). Queensland: Moreton Bay (AM W5101), (AM W7088); Lizard Island (AM W200871), (AM W200870).

**Description.** Alcohol preserved animal colourless, lives in tube composed of sand and shell fragments, smooth margins to opening of tube. Prostomium compact, with eye spots present. Numerous grooved buccal tentacles present. Prostomium with anteriorly projecting U-shaped lip. Peristomium with large oval-shaped lobes encompassing base of buccal tentacles, lobes connected midventrally by thinner V-shaped connecting strip. Segment 2 lacks lateral lobes. Segment 3 with smaller laterally displaced, rectangular-shaped lateral lobe, not as glandular as peristomial lobes, margins of lobes on segment 3 convoluted. Segment 4 without lateral lobes (Fig. 7a,b).

Branchiae, 3 pairs, on segments 2, 3 and 4, with short main stalk, dichotomous branching, individual branches thick, short. All pairs of branchiae equal in size.

Notopodia from segment 4, continue for 17 segments. Notosetae consist of 2 tiers of broad bladed, narrow-winged capillaries with long, fine, smooth tips. Neuropodia from segment 5 (setiger 2), occur on all following abdominal segments present.

Uncini initially arranged in single rows, but from seventh uncinigerous thoracic segment to last thoracic segment, uncini arranged in double rows back to back. Uncini arranged in single rows on abdominal segments. Uncini short handled, avicular (Fig. 7c) with dental formula ranging from MF:2:1 to MF:3:2. Uncini arranged on long neuropodial tori, in thorax but tori not markedly glandular. Abdominal tori are rectangular, erect, glandular structures.

Ventral pads, first 5 distinct, then followed by very weakly segmented glandular area, forming central solid ventral core, gradually narrows to form narrow midventral glandular groove.

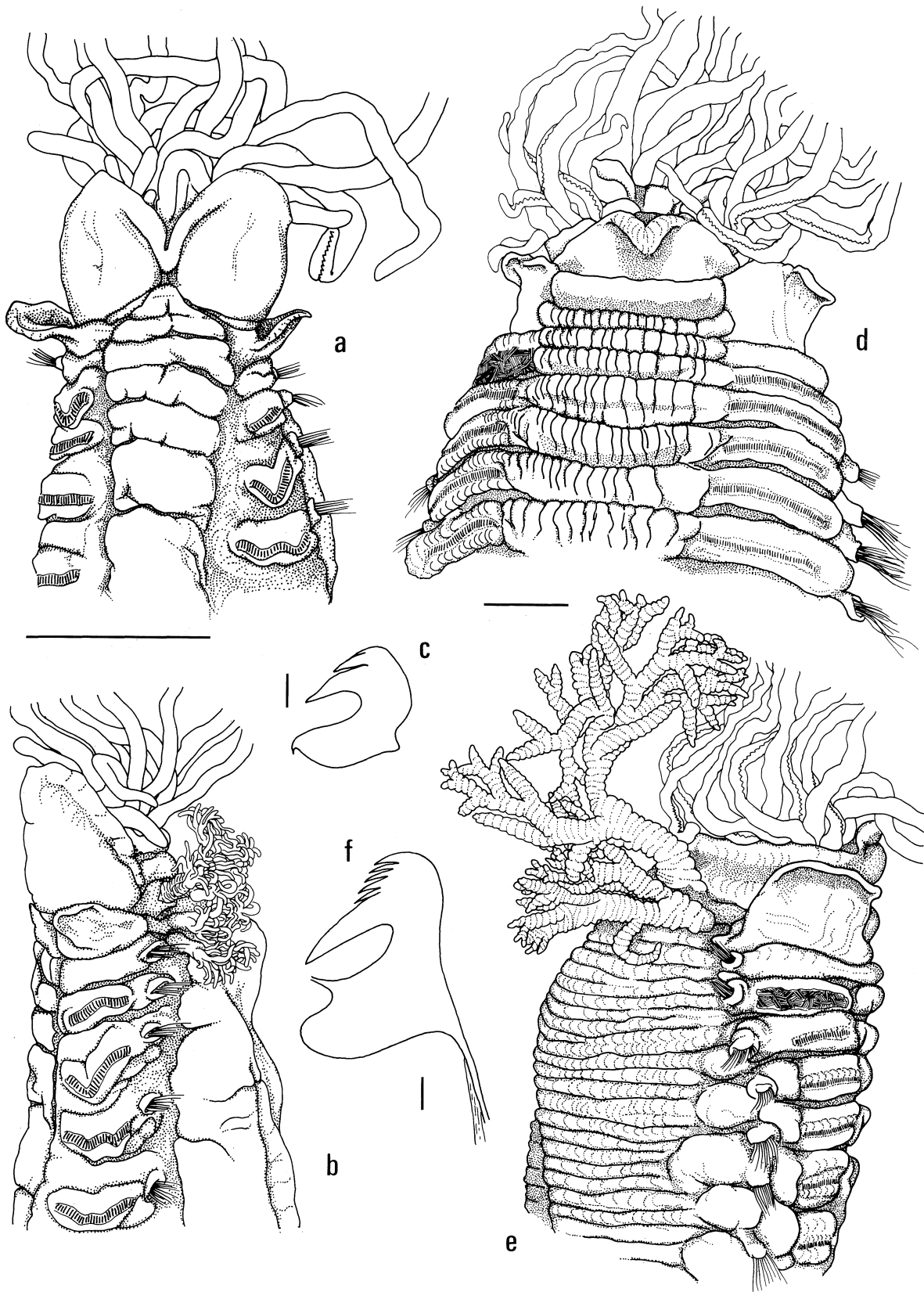
Nephridial papillae present on setigers 3–6, present just posterior to notopodia. Holotype not gravid.

**Variation.** The paratypes exhibited some variation in dentition of the uncini in comparison to the holotype, from MF:2:2 to MF:3:3.

**Comments.** All the material examined (only a portion is listed in the Material examined) is small, although some of it is gravid. The material from North West Shelf is particularly small and not well preserved. All specimens still associated with tubes have tubes with smooth margins. All previously described species of *Lanice* have tubes with frayed margins. Within the Australian Museum collections there are tubes with frayed margins characteristic of *Lanice* but these tubes are all empty. This may mean that another species of *Lanice* is present in Australian waters.

According to Day & Hutchings (1979), only two species of *Lanice* have been recorded from Australia, *L. conchilega* (Pallas, 1766) and *L. flabellum* Baird, 1865. Material labelled as *Terebella flabellum* juvenile? collected by J.B. Jukes in 1846 from 'Australia' and lodged in the British Museum (Natural History), consists of two empty tubes. This may be the material described by Baird. Similarly, New Zealand records appear to consist only of tubes of this species. Material labelled as *Lanice flabellum* (BMNH ZB 1928.2.29.350) collected by the "Terra Nova" expedition in 1910, from off Three Kings Island, New Zealand, consists only of tubes with a fan-shaped structure attached to the opening of the tube. Hartman (1959) suggested that *L. flabellum* was indeterminate as only tubes were present. However some tubes labelled as *L. flabellum* present in the British Museum (Natural History) collections from the Antarctic do contain specimens, and these will be described in a paper on Antarctic terebellids currently being prepared by Hutchings. So at this stage it is unknown if *L. flabellum* occurs in Australian waters. All the Australian records of *L. conchilega* have been examined by us and are referred to *L. bidewa* n. sp.

*Lanice conchilega* has been described from around the world. In most cases the descriptions are inadequate to define the species. Type material of *L. conchilega* has not been located and we suspect it does not exist. Material from the type locality, which is



**Fig. 7.** *Lanice bidewa* n. sp., holotype. **a.** ventral view of anterior body, scale is 1 mm. **b.** lateral view of anterior body, scale is 1 mm. **c.** uncinus from midthoracic setiger, scale is 0.01 mm. *Lanicides fascia* n. sp., holotype. **d.** ventral view of anterior body, scale is 1 mm. **e.** lateral view of anterior body, scale is 1 mm. **f.** uncinus from uncinger 1, scale is 0.01 mm.

given as Holland by Hartman, 1959 has been examined (USNM 44397, washed ashore at Katwyk, Netherlands). This species differs from *L. bidewa* n. sp. in the structure of the branchiae and the lateral lobes. The branchiae in *L. conchilega* consists of many fine branches produced by extensive dichotomous branching. The lateral lobe in *L. conchilega* on segment 3, is a narrow rectangular lobe with a dorsolateral flag-like extension. The peristomium has a well-developed lateral lobe which continues dorsally as a narrow shelf; such a shelf is absent in *L. bidewa*. The prostomium of *L. conchilega* has a U-shaped bifid lateral lip which is corrugated unlike the simple U-shaped lip found in *L. bidewa*. The two species also differ in the arrangement and development of glandular tissue on the ventral pads and around the notopodia. In *L. conchilega* the area around the notopodia is very glandular forming a markedly corrugated glandular lateral stripe along the length of the thorax. In *L. conchilega* the ventral pads of segments 2, 3 and 4 are fused to form a slightly globular ventral pad, whereas in *L. bidewa* the ventral pads of these segments are distinct. Nephridial pores present on segments 4 to 10 on *L. conchilega* and on segments 6 to 9 in *L. bidewa*. Another specimen of *L. conchilega* from the Bay of Naples (USNM 5112) closely resembles USNM 44397. Neither lots of *L. conchilega* include any tubes.

All preserved material of *L. bidewa* is small and colourless whereas *L. conchilega* regularly reaches 25 to 30 cm in length and the body can be rose, yellow or brown, according to Fauvel (1927), although it is unclear if Fauvel is referring to live or preserved material. *Lanice bidewa* is a cryptic species, living in coral substrates, in algal holdfasts or sabellariid reefs, whereas *L. conchilega* occurs in dense colonies on sandy beaches.

The few other species of *Lanice* described are typically deep water species, whereas *L. bidewa* occurs over a wide depth range.

**Etymology.** The specific name *bidewa* refers to the name of the aboriginal tribe living in the region of Cape Everard, the type locality of this species.

**Habitat.** Found in algal holdfasts, sabellariid reefs or living as a cryptic species in coral substrates, intertidally to depths of 120 m.

**Distribution.** Western Australia, South Australia, Victoria, New South Wales, Queensland.

***Lanicides* Hessle, emended.**

*Lanicides* Hessle, 1917: 165.—Fauchald, 1977: 131.

Branchiae, 2 or 3 pairs on segments 2, 3 and 4, branchiae branched. Lateral lobes present on segment 3, sometimes on peristomium. Notopodia from segment 4, notosetae smooth tipped, some setae with serrated margins; long shafted uncini present from segment 5 (setiger 2); subsequently uncini become short handled avicular uncini. Uncini initially arranged in single rows, but on posterior thoracic segments uncini arranged in double rows face to face, abdominal uncini arranged in single rows.

**Type species.** *Terebella (Phyzelia) bilobata* Grube, 1877, designated by Hessle, 1917.

**Comments.** We have emended the generic diagnosis of *Lanicides* as currently defined, to include species with two or three pairs of branchiae and species with lateral lobes developed on the peristomium. Species possessing this arrangement of lateral lobes, cannot be placed in the genus *Pista* as they lack lateral lobes on segments 2 and 4, a generic character of *Pista*. However we suspect that a detailed examination of all species currently assigned to these genera would necessitate considerable reassignment within these genera. Many of the original descriptions do not clearly state the positioning of the lateral lobes or give details on other characters which would clarify their generic status.

We have in this paper described three new species of *Lanicides*, including *L. lacuna*, with 19 to 20 pairs of notopodia. All previously described species of *Lanicides* have 17 pairs of notopodia. Until a revision of the complex of genera containing long handled uncini, with smooth tipped notosetae (*Betapista*, *Eupistella*, *Lanicides*, *Opisthopista*, *Pista*) is carried out, it seems appropriate to retain *L. lacuna* n. sp. in the genus *Lanicides*. The shape of the uncini and arrangement of lateral lobes, places it within the currently accepted generic diagnosis of *Lanicides*. The generic diagnosis has also been emended to include the presence of some finely serrated notosetae (Fig. 9).

The genus *Lanicides* has not previously been described from Australia.

**Key to the Australian species of *Lanicides***

- 1. 3 pairs of branchiae. . . . . *L. tribranchiata*  
 — 2 pairs of branchiae . . . . . 2
- 2. 17 pairs of notopodia; lateral lobe on segment 3 rectangular. . . . . *L. fascia*  
 — 19–20 pairs of notopodia; lateral lobe on segment 3 narrow and elongate. . . . . *L. lacuna*

*Lanicides fascia* n. sp.

Fig. 7d-f

*Nicolea bilobata*.—Augener, 1914: 92. *Non* Grube, 1877.*Nicolea venustula*.—Hartmann-Schröder, 1979: 148 (in part, rest = *Pista violacea*); 1980: 77. *Non* Montagu, 1818.*Lanice conchilega*.—Hartmann-Schröder, 1979: 147. *Non* Pallas, 1766.

**Material examined.** HOLOTYPE: South Australia: West side of Cape Northumberland, Port Macdonnell 38°03'S, 140°42'E (AM W200608), under rocks in sheltered pool, complete individual, 4.5 cm in length, 5 mm maximum width. PARATYPES: South Australia: Speeds Point, Streaky Bay 32°48'S, 134°13'E (BMNH ZB 1986.68) complete, 2 cm in length and 2 mm maximum width; Sellicks Beach 35°20'S, 138°27'E, 1(USNM 99970) posteriorly incomplete, 3 cm in length and 4 mm maximum width; Kangaroo Island, Stokes Bay, 35°37'S, 137°12'E, 1(AHF Poly 1469) complete, 2.5 cm in length and 2 mm maximum width. Victoria: Western Port, 38°14.47'S, 145°21.86'E 3(NMV F52566, F52567, F52568), complete, all about 5 cm in length with maximum width, at midthorax of 4 mm.

**Additional material examined.** Western Australia: Broome (HZM P16619, P16685); Exmouth (HZM P16622); Koombana (HZM V8265); Rottnest Island, North Point (WAM 62-74). South Australia: Kangaroo Island, Stokes Bay (AM W200696), Emu Bay (AM W200697); Cape Robe, Karatta Beach (AM W200695), West side of Cape Northumberland, Point McDonnell (AM W200701). Tasmania: Boat Harbour, Western Bay (TASM K1021). Victoria: Port Phillip Bay, Phillip Island (NMV unreg); Near Eagles Nest (NMV unreg). New South Wales: Twofold Bay (AM W200688); Bass Point (AM W200694); Sydney, North Head (AM W200691). Queensland: Caloundra (AM W200689).

**Description.** Lives in tube made of cemented shell fragments, firmly cemented onto coralline algae.

Preserved animal, pale pink in colour, with numerous buccal tentacles. Prostomium compact. Eye spots absent. Peristomium extended forwards on the ventrum to form slightly tripartite glandular structure.

Branchiae, 2 pairs, on segments 2 and 3, first pair the largest. All branches, main stem of branchia ringed transversely, dichotomous branching but each branchia with relatively few branches. First pair of branchiae dorsally displaced in comparison to second pair of branchiae.

Lateral lobes present on segment 3, rectangular, with margins thinner than base, appearing slightly convoluted; longitudinal markings on surface of lobe. Segment 4 with slightly thickened anterior margin, but not forming lateral lobe (Fig. 7d,e).

Ventral glandular pads initially fairly discrete, well demarcated segmentally, disappear by about setiger 13.

Notopodia begin on segment 4, continue for 17 segments; podia small globular structures with notosetae emerging from sheath in middle of podia. Setae within fascicle tapered, longest setae nearest

dorsum. Notosetae, consist of 2 tiers of broad-bladed, narrow-winged capillaries, with very weakly serrated tips. Neuropodia begin on segment 5 (setiger 2), continue to pygidium. Thoracic neuropodia consist of very long rows of uncini, abdominal tori very glandular, with uncinial rows deeply embedded in the tori. Abdominal uncini arranged in a slightly curved shaped row; abdominal tori rectangular lying flat against the body wall. Uncini avicular (Fig. 7f), with a short shaft present only on first uncinigerous segment, absent on all subsequent uncinigerous segments. Uncinial shaft easily damaged or broken while preparing uncinial mount. Uncini initially arranged in single rows, then from seventh uncinigerous segment to last thoracic segment, uncini arranged in double rows face to face. Abdominal uncini arranged in single rows. Uncini of first thoracic uncinigerous segment with strongly crested head having a dental formula of MF:6:6-8:α.

Nephridial papillae present on segments 3 and 4, situated just posteriorly to second pair of branchiae and first notopodia respectively. Coelomic gametes absent. Anus small muscular sphincter with margins of opening ornamented with numerous very fine papillae.

**Variation.** The paratypes have faint brown pigment along the sides of the grooved buccal tentacles. One of the paratypes exhibits very prominent blood vessels running through the branchiae. None of the type material is gravid.

**Comments.** *Lanicides fascia* can be distinguished from *L. taboguillae* (Chamberlin, 1919) by the arrangement of lobes on segment 3, and the development of the peristomium, and by the limited development of teeth above the main fang of the uncini. *Lanicides vayssierei* (Gravier, 1911) has been synonymised with *L. bilobata* (Grube, 1877) (see Hartman, 1966b for full synonymy) and can be distinguished from *L. fascia* by the presence of two pairs of lateral lobes on segments 2 and 3. Material identified by Augener, 1914 as *Nicolea bilobata* (Grube, 1877), has been examined (HZM V8265), and is referred to *Lanicides fascia*. Hesse (1917) had already transferred Augener's record to the genus *Lanicides* and synonymised it with *L. vayssierei* (Gravier). However Augener's material has lateral lobes only on segment 3 and can thus be distinguished from *L. vayssierei*. *Lanicides vayssierei* was originally described from the Straits of Magellan a very different habitat from Augener's collecting site of Koombana in Western Australia.

Some of the material described by Hartmann-Schröder as *Nicolea venustula* was incorrectly identified and has been referred to *Lanicides fascia*.

**Etymology.** The specific name, *fascia*, is latin for band, stripe or girdle which refers to the banded stalk of the branchiae.

**Habitat.** Found from intertidal to shallow subtidal depths, where firm substrate is available for the tube to be attached to.

**Distribution.** Western Australia (Broome, Exmouth, Koombana, Rottnest Island), South Australia (widespread), Tasmania, Victoria (Port Phillip Bay, Western Port), New South Wales (Twofold Bay, Bass Point, off Sydney), Queensland (Caloundra).

***Lanicides lacuna* n. sp.**

Figs 8a–d; 9a–c

**Material examined.** HOLOTYPE: Queensland: Great Barrier Reef, One Tree Island 23°30'S, 152°05'E (AM W200609), dead, coral substrate in lagoon, 10 m, in 2 fragments, anterior end 2 cm in length, 3 mm maximum width, posterior fragment 3.5 cm in length. PARATYPES: 1(USNM 99971), 1(BMNH ZB 1986.69), 1(AM W200610), 1(AM W200611). All paratypes from same habitat as holotype. PARATYPES: USNM, posteriorly incomplete, 2 cm in length, 2.5 mm maximum width, thorax and 18 abdominal segments; BMNH, complete 4 cm in length, 2.5 mm maximum width; AM, both specimens posteriorly incomplete.

**Additional material examined.** Queensland: One Tree Lagoon, 10 m, 1(AM W200756), 1(AM W200757), 1(AM W200758), 1(AM W200759).

**Description.** Preserved specimen, pale yellow with some dark brown pigment on buccal tentacles. Prostomium compact, eye spots absent. Branchiae, 2 pairs, on segments 2 and 3, first pair largest. Each branchia dichotomously branches almost as soon as main stalk emerges from body wall; several dichotomous branches per branchia.

Peristomium with ventrally arranged glandular, lateral lappets connected mid-dorsally, margins of lappet slightly convoluted (Fig. 8a,b). Segment 2 with no lateral lobes, segment 3 with elongate narrow rectangular lobe. Segment 4, without discrete lateral lobes but entire neuropodia enlarged, glandular. Notopodia from segment 4, continue for 19 segments, notopodia small, globular. Notosetae, narrow-winged, broad-bladed capillaries, surface of blades with faint surface striations, weakly denticulate margins (Fig. 9a–c). Notosetae within fascicle graded in length.

Neuropodia from segment 5 (setiger 2), uncini initially arranged in single rows, from seventh uncinigerous segment to end of thorax, uncini arranged in double rows, face to face, arranged in single rows on abdomen. Uncini avicular with well-developed chitinised shaft, however shaft can easily be broken off during preparation of uncinal mount, in which case point of attachment of shaft to base of uncini is easily recognisable as damaged surface (Fig. 8c). Dental formula of thoracic uncini MF:3:6-7:6:7:α. Uncinal shaft well developed on following 2 uncinigerous segments, however by uncinigerous segment 4, shaft is markedly smaller, reduction continues over next few segments until shaft completely disappears.

Thoracic uncini arranged in very long rows, abdominal uncini arranged on short sessile podia arranged on very glandular area of body wall.

Glandular areas form 2 lateral glandular ridges running along length of abdomen (Fig. 8d). Ventral pads very poorly defined, entire ventrum, lateral areas of thorax, all fairly glandular. Tendency for glandular pads on which neuropodial tori occur to continue across ventrum, thus connecting right and left hand side of body. Glandular area above thoracic tori extending dorsally above notopodium in tongue-like projection, very glandular with speckled brown pigment (Fig. 8a). Pygidium small opening, surrounded by tight sphincter muscle. Nephridial papillae situated very slightly dorsally and posteriorly below point of insertion of notopodia, on segments 4–8 (setigers 1–5). No gametes visible within body cavity.

**Variation.** The paratypes exhibit some variation in the intensity of pigmentation of the glandular area above the notopodia, and the extent to which this pigmented glandular area extends onto the abdomen. The paratype (USNM 99971) has 20 pairs of notopodia.

**Comments.** *Lanicides lacuna* n. sp. can be distinguished from the other previously described species of *Lanicides* by having 19 to 20 pairs of notopodia instead of the typical 17 pairs.

**Etymology.** The specific name *lacuna* refers to the habitat in which this species lives, and is the latin word for a pool or pond.

**Habitat.** Found in dead coral substrate in One Tree Island lagoon, at 10 m.

**Distribution.** Queensland (One Tree Island, Great Barrier Reef).

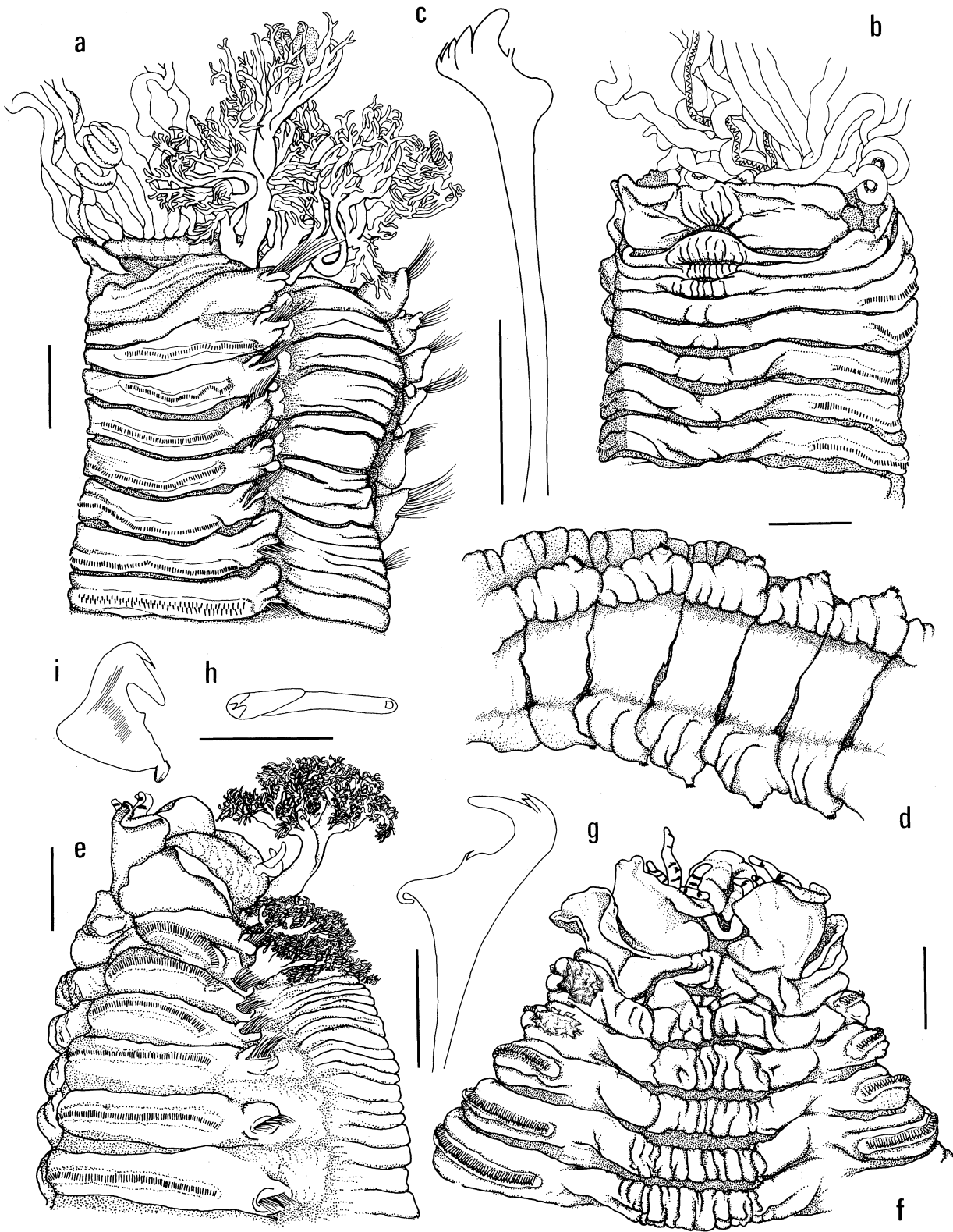
***Lanicides tribranchiata* n. sp.**

Fig. 8e–i; 9d–f

**Material examined.** HOLOTYPE: New South Wales: west side of Solitary Island, 30°12'S, 153°16'E, 12 m (AM W200605), 2.5 cm in length and maximum width 5 mm. PARATYPES: Western Australia, approximately 18 km north of Dongara 29°07'S, 114°50'E, 2(WAM 39-84 series), pipe dredge, MV 'Sprightly' Dredging Cruise 1976; Bass Strait, Stn 212, 38°15'S, 147°22'E, 16 m 3(NMV F52569, F52570, F52571), posteriorly incomplete. Victoria: Cape Wellington, Wilson's Promontory north-east shore 38°56'S, 146°22'E, 1(NMV F52572) posteriorly incomplete. New South Wales: reef off Avalon 33°38'S, 151°20'E, 40 m 1(USNM 99972); Coffs Harbour, 30°18'S, 153°09'E, 1(BMNH ZB 1986.70), 1(AM W200607) on old wharf pilings, tubes cemented between barnacle clumps, 3–6 m; South West Solitary Island, west side 1(AM W200608).

Paratype material posteriorly incomplete, range of maximum anterior width varying from 3–4 mm, (AM W200607-8), complete individuals 3 cm length and maximum thoracic width 4.5 mm.

**Additional material examined.** Western Australia: 18 km north of Dongara. MV. 'Sprightly' dredging cruise 29°07'S, 114°50'E, 18.3 m (WAM 39-84). New South Wales: Port Hacking, Ship Rock, rock face, 20 m 1(AM W200684).



**Fig.8.** *Lanicides lacuna* n. sp., holotype. a. lateral view, anterior body, scale is 1 mm. b. ventral view anterior body, scale is 1 mm. c. uncinus from setiger 2 (first uncinigerous row), scale is 0.1 mm. d. ventral view, posterior body, scale is 1 mm. *Lanicides tribranchiata* n. sp., holotype. e. lateral view, anterior body, scale is 1 mm. f. ventral view, anterior body, scale is 1 mm. g-h. uncinus of setiger 2 lateral and frontal views, scale is 0.1 mm. i. uncinus from posterior thoracic setiger, scale is 0.1 mm.



**Description.** Complete specimen, coiled, body strongly tapered, very thin posterior abdomen. Preserved body, pale yellow, buccal tentacles banded with pale purple. Prostomium compact, with ventral lip extended forwards to form small tongue with thickened glandular margin. Eye spots absent.

Branchiae, 3 pairs on segments 2, 3 and 4, first pair largest; each branchia with thickened main stalk, then with numerous short, equal, dichotomous branches. Lateral lobes present on peristomium. Lobe displaced ventrally, rectangular in shape, with thinner anterior margins which are slightly convoluted, 2 lobes meet midventrally.

Segment 3 has large semi-circular lateral lobe, with thickened base, thinner, less glandular margins which results in convoluted appearance to margins of the lobe. Lobe displaced laterally in comparison to those present on peristomium. Segment 4 has thickened ridge to anterior margin of segment, but no discrete lobe (Fig. 8e,f).

Ventral pads, initially on anterior thorax, well demarcated, individual pads with narrow vertical banding; by about setiger 10, pads decrease in width, by end of thorax, pads no longer present. Midventral groove continues along part of abdomen.

Notopodia begin on segment 4, continue for 17 setigers; podia small squat structures embedded in glandular issue. Notosetae, consist of broad-bladed, narrow-winged capillaries, with smooth tips, blades with vertical striations, setae arranged in 2 tiers, with some variation in length of setae within tier. Some setae with faintly serrated tips (Fig. 9d-f). Neuropodia begin on segment 5 (setiger 2), and continue to pygidium. Thoracic neuropodia very glandular, abdominal uncini arranged on rectangular erect podia, size of tori decreases posteriorly. Uncini are initially arranged in single rows, from seventh uncinigerous segment, uncini arranged in double rows, face to face. Uncini are arranged in single rows again from beginning of abdomen. Uncini avicular, initially with well-developed chitinous shaft (Fig. 8g,h) but by uncinigerous segment 5, shaft no longer present (Fig. 8i). Dental formula MF:2:1:4 (Fig. 8h). Shaft and margins of uncini easily damaged whilst preparing uncinial mount however, when this happens, torn surface is easily visible at base of uncini where shaft has been broken off. Anterior uncini with well-developed tongue on button of uncini which is easily broken off during preparation of uncinial mounts; appears that tendon is attached to tongue. Pygidium narrow smooth ring. No coelomic gametes visible within body cavity. Nephridial papillae not seen.

**Variation.** The paratype material which comes from a variety of locations exhibits the following variation; the presence of banded buccal tentacles in some specimens, whereas in others tentacles appear colourless. It is unclear whether this is a result of the fixation method used or a variable character. Similarly the Western Australian material exhibits

fragments of golden brown pigmentation adjacent to the ventral pads at the margin of the neuropodial tori, such pigmentation is absent in other material. None of the paratype material was gravid i.e. contained coelomic gametes. The additional material examined exhibited some variation in the development of the lateral lobes on segment 3. The material from Western Australia has a larger dorsal extension of the lobe on segment 3 than other material examined. However in all other respects the Western Australian material resembles the type material. The material collected from Ship Rock, Port Hacking has only 16 notopodia on one side, and 17 on the other side. All the other material examined has 17 pairs of notopodia.

**Comments.** *Lanicides tribranchiata* n. sp. appears to have a fairly wide subtidal distribution in Western Australia, Victoria and New South Wales. It has not been collected from South Australia where almost no offshore collecting has been done. *Lanicides tribranchiata* has three pairs of branchiae whereas all other described species have only two pairs of branchiae.

*Lanicides tribranchiata* has very heavily chitinised anterior uncini in contrast to the other two Australian species of *Lanicides* and may belong to a group of species currently within the genus *Pista* (Hutchings, in prep). The structure of the notosetae of *L. tribranchiata* (Fig. 9d,e), is slightly different to *L. lacuna* (Fig. 9a-c) a more typical species of *Lanicides*.

**Etymology.** The specific name *tribranchiata* refers to the three pairs of branchiae present.

**Habitat.** Found subtidally in depths of 3–40 m, with a firm sandy tube attached to solid substrates.

**Distribution.** Western Australia, Bass Strait, Victoria, New South Wales.

#### *Lanicola* Hartmann-Schröder

*Lanicola* Hartmann-Schröder, 1986: 58; 1987: 58.

Eye spots absent. Branchiae, 2 pairs on segments 2 and 3, branched. Thorax with 17 pairs of notopodia from segment 4; notosetae smooth-tipped capillaries. Abdomen long with numerous segments. Neuropodia from segment 5 (setiger 2), uncini arranged in double rows face to face in posterior thorax. Lateral lobe present on segment 3.

**Type species.** *Lanicola lobata* Hartmann-Schröder, 1986, by original designation.

#### *Lanicola lobata* Hartmann-Schröder

*Lanicola lobata* Hartmann-Schröder, 1986: 56; 1987: 58.

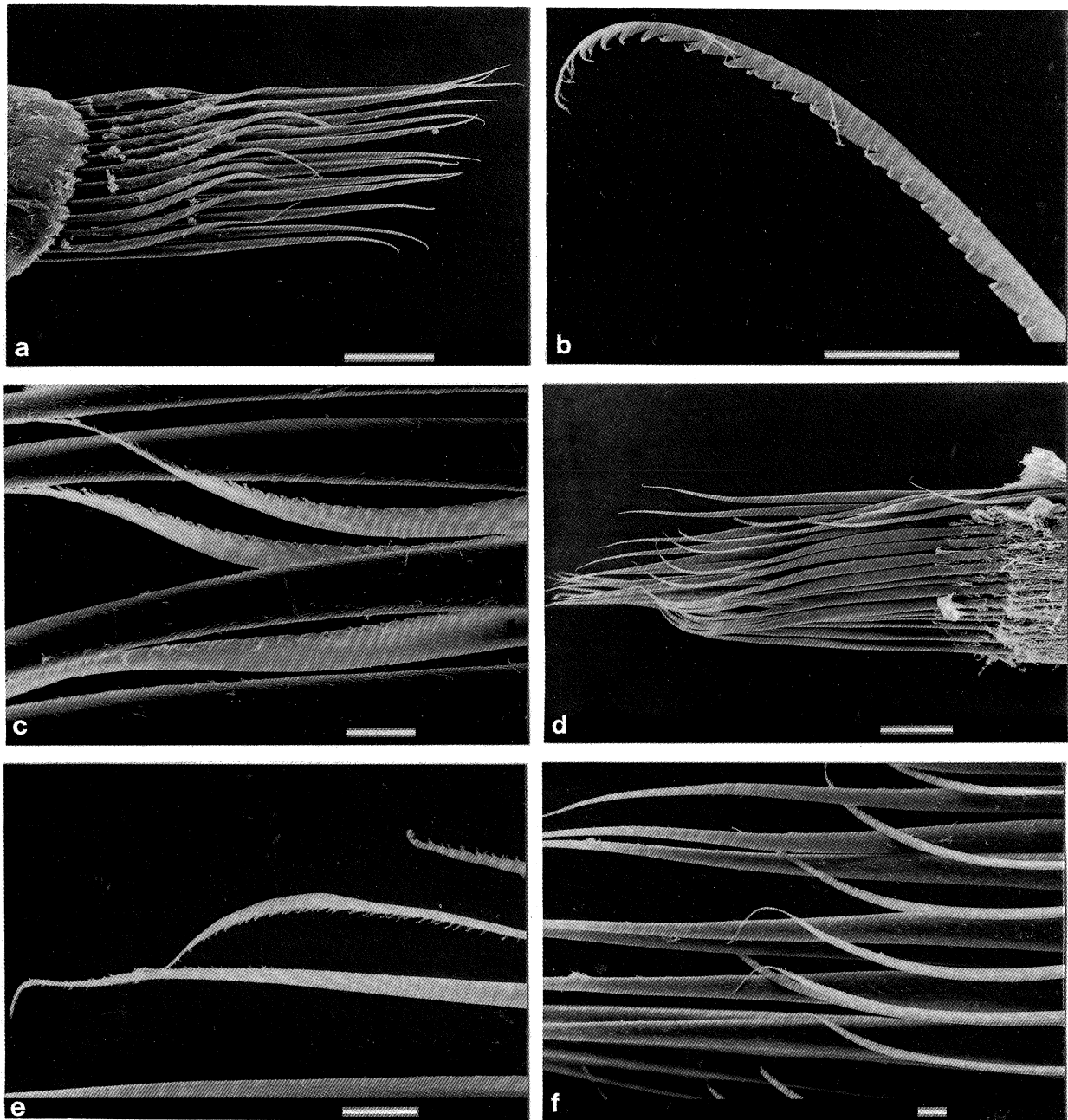
**Material examined.** South Australia, Wallaroo, 3(HZM P18631).

**Description.** Prostomium compact, with eye spots. Branchiae, 2 pairs on segments 2 and 3, each

branchiae with few dichotomous branches. Notopodia from segment 4, 17 pairs, notosetae smooth-tipped capillaries. Neuropodia from segment 5 (setiger 2), uncini initially arranged in single rows, in posterior thorax uncini arranged in double rows, face to face. Uncini avicular with dental formula MF:4-5:7:~10 on first uncinigerous segment to MF:3:6:8:α on middle thoracic segments. Peristomium expanded to form small laterally positioned lobe. Lateral lobe present on segment 3,

lobe elongate rectangular in shape, connected midventrally. Nephridial papillae present on segments 3, 4, 6 and 7.

**Comments.** This species closely resembles *Lanicides fascia*, in the development of a lateral lobe on segment 3 but differs in the development of the uncini of the first uncinigerous segment. At this stage the genus is known only from south-western Australia and Victoria.



**Fig.9.** *Lanicides lacuna* n. sp. **a.** SEM x190 showing 2 kinds of notosetae; scale is 100 μm. **b.** SEM x3000 showing serrations on notoseta, scale is 10 μm. **c.** SEM x1500 showing smooth and serrated notosetae, scale is 10 μm. *Lanicides tribranchiata* n. sp. **d.** SEM x160 showing 2 kinds of notosetae, scale is 100 μm. **e.** SEM x1600 showing 2 kinds of setae, scale is 10 μm. **f.** SEM x650, scale is 10 μm.

**Habitat.** Found among algae on boulders, intertidally.

**Distribution.** South Australia (Wallaroo), Victoria.

*Loimia* Malmgren

*Loimia* Malmgren, 1866: 380.—Hessle, 1917: 170.—Fauchald, 1977: 131.

Branchiae, 3 pairs, dichotomously branched on segments 2, 3 and 4. Lateral lobes present anteriorly from peristomium. Notopodia from segment 4, 17 pairs; notosetae smooth tipped. Neuropodia from segment 5 (setiger 2); uncini with teeth arranged in a vertical series in adults. Uncini arranged in double rows, back to back, on midposterior thorax.

**Type species.** *Terebella medusa* Savigny, 1818, by monotypy.

**Comments.** We have modified the generic description of *Loimia*, stating that uncini with teeth arranged in a vertical series are present only in adults. The thoracic uncini of young animals of some species have more than one row of teeth near the apex (Gravier, 1906; Fauvel, 1907; this paper) while abdominal uncini in young *L. ingens* have a considerable number of teeth arranged in a transverse series (this paper). Wilson (1928) also found that some abdominal uncini of *L. medusa* around 1.0–1.5 cm long have more than one row of teeth near the apex, however thoracic uncini were of the adult type.

In addition to the intraspecific dental variation present in *Loimia*, the form of the upper base of the uncini also varies with age. The uncini of young individuals of both *L. medusa* and *L. ingens* have a prominent, anteriorly directed ligament on the upper base of the uncini which is subsequently lost as the individual ages. In very large specimens of *L. ingens* a similar ligament is also present on the uncini. It would appear therefore that until the ontogeny of *Loimia* species is known, the form of the uncini is of

limited value as a specific character. This factor, together with the rather constant form of the notosetae found in all species of *Loimia* makes the taxonomy of this group difficult.

The genus *Loimia* contains *L. medusa* (Savigny, 1818), which is recorded as a cosmopolitan species, and several species with very restricted distributions. As no adequate description of *L. medusa* exists, a full description of this species based on material from the type locality is being prepared for publication (Hutchings & Glasby, in prep). We suspect that *L. medusa* is not a cosmopolitan species and all records of *L. medusa* from Australia have been referred to *L. batilla* n. sp. Grube (1878) described five species from the Philippines which represents nearly one third of the known species of *Loimia*. Material of four of these species [*L. annulifilis* (MPW – type and non type material ZMB 920); *L. crassifilis* (MPW 309 – type and probably non type material ZMB Q5635); *L. montagui* (MPW 404); *L. variegata* (MPW – type and non type material ZMB Q4968, ZMB 522, ZMB 519)] has been examined and all is in poor condition. The type of *L. variegata* (ZMB 519) has a locality given as the Red Sea in the vial, whereas Grube (1878) gives the type locality as the Philippines. This material is not a species of *Loimia*, however the rest of the material examined of *L. variegata* does belong to the genus. So at this stage most of the species of *Loimia* described from the Philippines pose problems, especially in identifying species of *Loimia* from the Indo-Pacific.

Presently, there are four species of *Loimia* found in Australian waters – *L. batilla* n. sp. and *L. triloba* n. sp. which each have a fairly restricted geographical distribution, and *L. ingens* which is recorded throughout much of Australia. *Loimia ochracea* Grube, 1877 described from north-west Australia has not been recorded since its original description. We have split the *Loimia* species present in Australian waters, primarily on the development and structure of the lateral lobes which we believe are very important characters in the genus *Loimia*.

**Key to the Australian species of *Loimia***

1. A pair of small lateral lobes on segment 4. .... *L. triloba*  
 — Lateral lobes on segment 4 absent. .... 2
2. Lateral lobes, 2 pairs, on segments 2 and 3 ..... *L. ochracea*  
 — Lateral lobes, 1 pair, arise from junction of segments 2 and 3 ..... 3
3. Lateral lobes on segments 2/3 extending ventrally to form an anteriorly projecting scoop. .... *L. batilla*  
 — Lateral lobes on segments 2/3 discrete, not continuous with ventral lobe ..... *L. ingens*

*Loimia batilla* n. sp.

Fig. 10a-f

*Loimia medusa*.—Stephenson et al., 1974: 113.—  
Hutchings, 1977: 19. *Non Savigny*, 1818.

**Material examined.** HOLOTYPE: Queensland: Moreton Bay, south of Peel Island, Stn III B3 20°26'S, 147°05'E (AM W5162), specimen complete consisting of 2 fragments, made up of 68 segments, about 47 mm long, 6.0 mm wide, mature. PARATYPES: Moreton Bay, south of Peel Island 1(AM W5094), 1(AM W5088), 1(AM W7107); Middle Banks off Tangalooma 1(AM W7097), 1(AM W7098), 3(AM W7099), 6(AM W7100), 1(AM W7101), 1(AM W7102), 2(AM W7103), 1(AM W7104), 3(AM W7105), 3(AM W7106), 1(AHF Poly 1470), 1(BMNH ZB 1986.71), 1(USNM 99973). Paratypes mostly incomplete, range in width from 2.1–6.6 mm wide.

**Additional material examined.** Queensland, mouth of Brisbane River 1(QM GH3434).

**Description.** Tentacles with thin black bands, otherwise preserved body unpigmented. Anterior body highly muscular, slightly dorsoventrally compressed, first 11 segments very short with each parapodium in this region touching adjacent ones. Dorsally, pair of white, glandular ridges extends over first 10 segments, just above notopodia. Posterior thoracic segments longer than anterior thoracic segments, body widest over midposterior thorax, tapering gradually over abdominal segments. Last few segments highly tapering in width, presumably representing regenerating posterior end.

Prostomium very short, collar-like, eyespots absent. Peristomium very short dorsally, about half

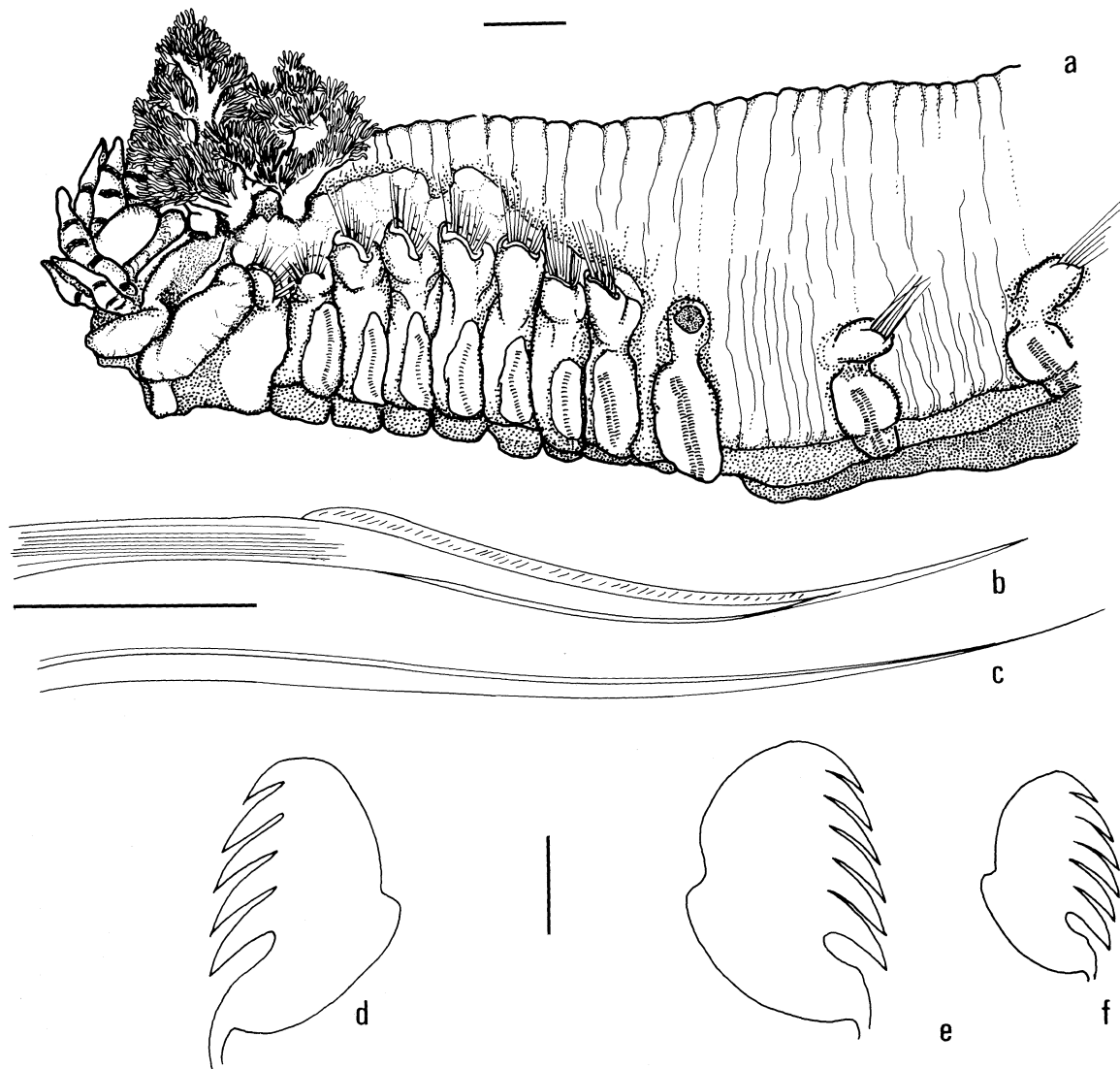


Fig. 10. *Loimia batilla* n.sp., holotype. a. lateral view, anterior body scale is 1 mm. b. notoseta from setiger 5, scale is 0.1 mm. c. notoseta from setiger 5, scale is 0.1 mm. d. thoracic uncinus, scale is 0.01 mm. e. uncinus from anterior abdominal setiger, scale is 0.01 mm. f. uncinus from midabdominal setiger, scale is 0.01 mm.

length of segment 2; laterally expanded as pair of prominent lobes which unite ventrally forming anteriorly directed scoop which partially covers oral cavity. Segments 2 and 3 fused laterally forming pair of lateral lobes which extend ventrally to form glandular scoop. Branchiae 3 pairs on segments 2–4, third pair arise dorsally to notopodia on segment 4. First pair of branchiae about twice size of second and third pair of branchiae; each with thick main stem, branches with spirally whorled filaments distally (Fig. 10a).

Notopodia from segment 4, 17 pairs; first 8 pairs of podia thick, cylindrical, following ones slender, slightly longer than anterior ones. Notosetae consist of 2 types; thick, broad-winged capillaries, slender, narrow-winged capillaries; anterior notosetae shorter, more robust than posterior ones (Fig. 10b,c). Neuropodia from segment 5 (setiger 2), continuing to near pygidium; podia sessile glandular ridges on thorax, abdominal neuropodia elongate pinnules, similar in length to thoracic neuropodia. Thoracic uncini with 5–6 teeth arranged in vertical series, slight protruberance sometimes present on base below teeth (Fig. 10d); abdominal uncini similar in shape, dentition but smaller in size than thoracic ones (Fig. 10e,f). Uncini arranged in single row to segment 10 (6th uncinigerous segment), from segment 11–20, uncini in double rows arranged back to back, thereafter uncini arranged in single row to pygidium.

Ventral glandular pads to segment 12, thereafter shallow glandular streak; pads on segments 2–4 fused, with anterior edge of segment 2 forming anteriorly directed scoop. Nephridial papillae minute conical processes on segment 3, segments 6–8; anterior pair located on posterior edge of segment, lateral to base of branchiae, posterior pairs present at posterodorsal base of notopodia.

Pygidium with 7 large papillae encircling terminal anus.

**Variation.** The paratypes vary from the holotype as follows: – tentacular pigmentation may be absent; anterior segments sometimes not dorsoventrally compressed and without excessively shortened segments, dorsal glandular ridges extend to segments 8 to 10; branchiae with first pair one to two times larger than subsequent pairs; uncini with 5 to 7 teeth in a vertical series, the number appearing to be independent of the size of the animal; nephridial papillae absent in smaller specimens; pygidium with 6 anal papillae in one specimen.

Tube consists of fine, flocculent material covering an inner lining of mucus.

**Comments.** Material identified by Hutchings (1977) as *L. medusa* is synonymous with *L. batilla* n. sp. This species may be distinguished from other species of *Loimia* in having the fused lateral lobes on segments 2 and 3 extending ventrally as a distinct scoop.

**Etymology.** The specific name is derived from the latin *batillum*, a shovel, referring to the scoop-shaped anterior ventrum.

**Habitat.** The species is widespread in Moreton Bay, occurring in fine sand-mud, at depths of 4–12 m.

**Distribution.** Queensland (Moreton Bay). Williams (pers. comm.), who reviewed an early draft of this paper has apparently found this species in Borneo using the above description.

### *Loimia ingens* (Grube)

Fig. 11a–l

*Terebella ingens* Grube, 1878: 228–230, pl. 13, fig. 1.

*Loimia ingens*.—Hessle, 1917: 170.—Hutchings, 1977: 18.

*Loimia* nr. *ingens*.—Hartman, 1966a: 364, pl. 38a,b.

*Loimia medusa*.—Augener, 1922: 46–48; 1927: 253–254.—Hartmann-Schröder, 1979: 147–148. *Non* Savigny, 1818.

*Loimia montagui*.—Monro, 1931: 29. *Non* Grube, 1878.

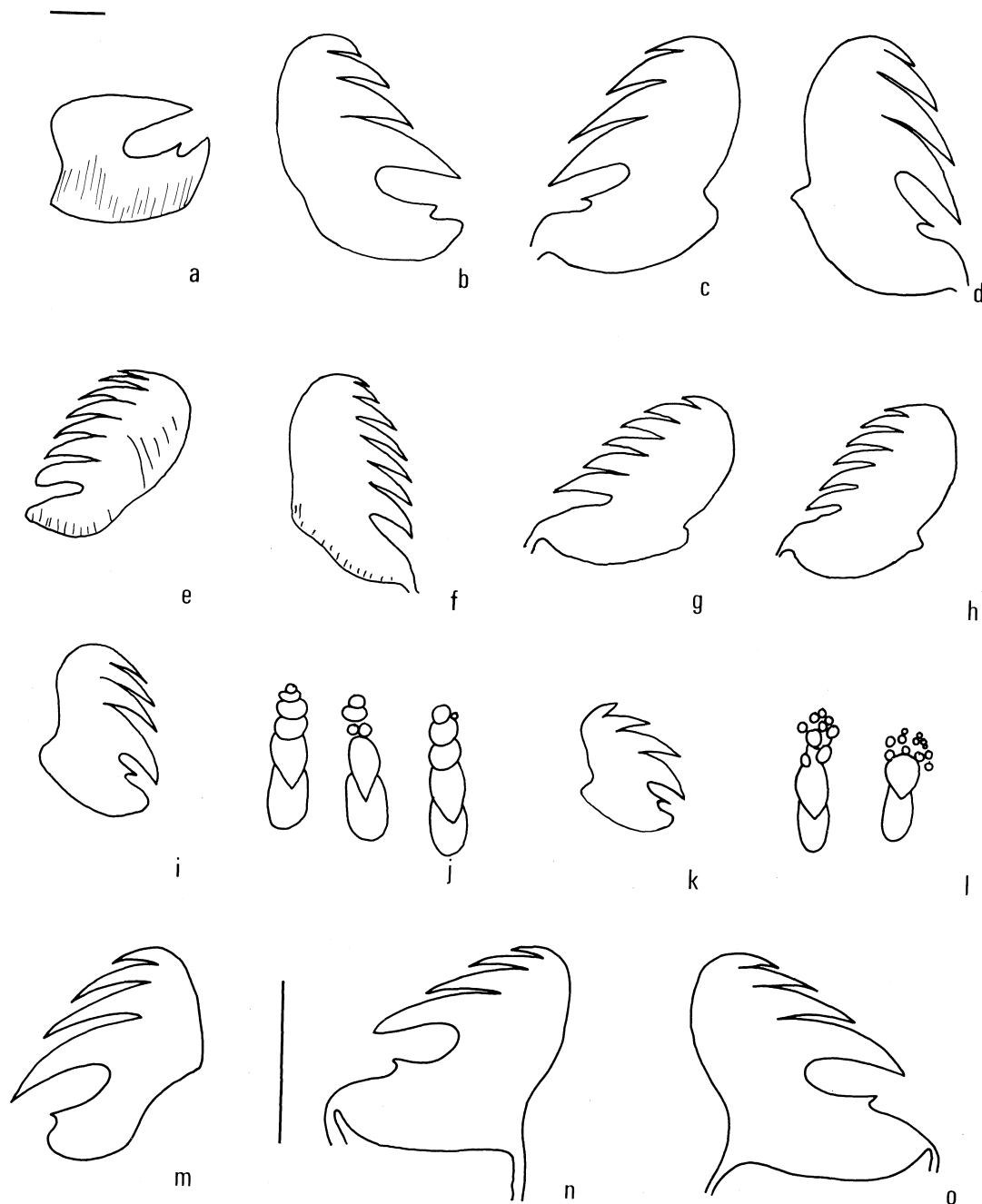
**Material examined.** Western Australia: Admiralty Gulf 1(AM W200467); Rowley Shoals, east side of Clerke Reef 1(WAM 56-84); North West Shelf, off Port Hedland 1(AM W200469), 1(AM W200470); Warroora 2(AM W5446); Rottneest Island 1(WAM 26-73). South Australia: Kangaroo Island, Penneshaw Jetty 1(AM W200466); Upper Spencer Gulf 1(AM W5976). New South Wales: Botany Bay, Quibray Bay 2(AM W196825); Port Jackson (ZMC); Pittwater, Careel Bay 5(AM W194081); Port Stephens 1(AM G11200), 1(AM W5163); South West Solitary Island 1(AM W200554). Queensland: Moreton Bay, south of Peel Island, Stn II B3 1(AM W7990), (AM W5090); Hervey Bay 5(AM W5387); Gladstone, Auckland Creek 1(AM W198248); Great Barrier Reef, North West Pine Island 1(AM W200528), Magnetic Island 3(AM W200545), Great Palm Island 1(AM W200531), Lizard Island 1(AM W200525), 1(AM W200526), 1(AM W200520), 1(AM W200524), 1(AM W200532), Thursday Island 2(AM G11195); Gulf of Carpentaria, West of Burrowes Point 4(AM W200535). Northern Territory: Gove 1(NTM W1323); Port Essington, Table Head 1(NTM W139), Coral Bay 1(NTM W129); Darwin, Fannie Bay 1(AM W200555). A selection of material examined, ranged in width from 0.5–17 mm.

**Comments.** Examination of a large amount of *Loimia* material of different sizes throughout Australian waters revealed considerable variation. Currently we cannot determine if this variation is due to the presence of subspecies or if characters just vary with size. We therefore regard *Loimia ingens* as a species complex. The species complex is characterised by: the absence of prostomial eyespots; two pairs of well-developed lateral lobes on the peristomium, and a pair arising from the junction of segments 2 and 3; three pairs of branchiae in which terminal filaments are arranged spirally; 17 pairs of notopodia and adult uncini with three to seven teeth arranged in a vertical series, and uncini which are arranged in double rows from segments 11 to 20. The

material examined varies in the degree of pigmentation present. This ranges from pigmentation being totally absent or restricted to banded tentacles, to heavy body pigmentation of mottled brown on thorax, dorsum and abdomen and solid brown on ventral pads. The size and shape of lateral lobes also varies, and this appears to be affected by the state of contraction of the head end.

Other characters which vary are the size and degree of branching of the branchiae and the dental formula and shape of the base of the uncini.

The lateral lobes on the peristomium (segment 1) extend ventrally to form one continuous lobe. The degree of development and anterior extension of this lobe varies in the material examined from the lobe completely covering the oral cavity and base of the



**Fig. 11.** *Loimia ingens*. Specimen from Lizard Island, 2.1 mm width (AM W200525). **a-d.** uncini from one row, early precursor, late precursor, first fully formed, and mid row fully formed uncini, respectively, scale is 0.1 mm. Specimen from Moreton Bay (AM W5090), 3.6 mm width. **e-h.** early precursor, late precursor, first fully formed and mid row fully formed uncini. **i-l.** North West Shelf specimen, 0.5 mm (AM W200469), uncini from midabdominal segment, side (k) and frontal (l) views, scale is 0.01 mm. **m-o.** Specimen from Rottneest Island (WAM 26-73), 15 mm width, mid late precursor (m), side view, first fully formed uncini, side view (n), mid row fully formed uncini, side view (o), scale is 0.1 mm.

buccal tentacles to being in a retracted state, recurved backward and exposing the oral cavity. Variation in this latter character appears to be size related. It appears that the lateral lobes of segments 2 and 3 have become fused to form a single lobe, and arise from the junction of segments 2 and 3. This will need to be confirmed by sectioning some material or following the development of lateral lobes from metamorphosis onwards.

The number of teeth in the vertical series of the thoracic uncini is fewest in small specimens of less than 1.0 mm in width (average numbers of teeth per uncini is 4.7) (Fig. 11i-l). The largest number are found in small to medium sized specimens of 2-10 mm in width (av. 5.35) (Fig. 11e-h). The number of teeth is less in specimens of 11 mm in width or larger (av. 4.40) (Fig. 11m-o). In one very small specimen, 2.5 mm long and 0.5 mm in width (AM W200469) (Fig. 11i-l) thoracic uncini have teeth arranged in more or less a vertical series with dental formula of MF:1:1-2:1:1-2:0-1, whereas abdominal uncini have teeth arranged in a transverse series above a MF with dental formula MF:1:2-6:3-7: $\alpha$ . Such a difference in the dental formula and arrangement of teeth within a specimen was not observed in larger animals. In addition to the variation in the dental formula, the smallest and the largest specimens often have a well-developed subrostral ligament below the teeth (Fig. 11i) which is often absent or extremely reduced in the small to medium sized specimens (Fig. 11f). Both these types of uncinial variations were present in the Lizard Island specimens which ranged from 0.8-6.2 mm in width (Fig. 11a-d) and in the North West Shelf specimens which varied from 0.5-2.2 mm in width (Fig. 11i-1).

Earlier authors have remarked on the great variability of the shape and dentition of the uncini of *Loimia medusa* Savigny, both within and between individuals (Gravier, 1906; Fauvel, 1914; Wilson, 1928). Adult and juvenile uncini described by Gravier (p. 224, figs 396-399) are similar in shape and dentition to the thoracic uncini from juvenile and small to medium sized specimens in the material of *L. ingens* examined. Fauvel (1914) suggested that the subrostral ligament in the uncini of juvenile *L. medusa* disappears with wear. In *L. ingens* however we feel that the presence or absence of the subrostral ligament is predetermined in the development of the animal, just as is the number of teeth in the uncini.

To test this hypothesis we examined the shape of the uncini in neuropodia from several different sized animals of Thelepodinae, paying particular attention to the shape of newly formed uncini in the precursor region of each row (Hutchings & Glasby, 1987). We found no evidence of any significant difference in the shape of the basal portion of the uncini. Most uncini are either formed with or without a subrostral ligament, but some uncini are characterised by an intermediate condition which does change noticeably with growth. Hence the importance of

wear in determining the shape of the uncini, and specifically the size of the subrostral ligament, is considered less important than genetic factors.

We examined a specimen identified by Hartman (1966a) as *L. nr. ingens* (AM W3803) and have referred it to *L. ingens*. Similarly we examined material identified by Monro (1931) from the Great Barrier Reef Expedition as *L. montagui* (BMNH 1931.7.1.63) and have also referred this to *L. ingens*.

**Habitat.** Found in marine-sheltered estuarine embayments, from intertidal to 100 m; in mud-sand, associated with *Posidonia* in Botany Bay, Careel Bay and Port Stephens, on rocks embedded in mud and from coral reef flats under dead coral.

**Distribution.** Australia (widespread, north of 36°S lat.)

### *Loimia ochracea* (Grube)

*Terebella (Loimia) ochracea* Grube, 1878a: 547-548.

**Material examined.** Western Australia: Mermaid Cove. HOLOTYPE (ZMB 906); (MPW 583).

Two lots of material labelled as *L. ochracea* by Grube have been found. One vial from the Muzeum Przyrodnicze in Wroclaw consists of odd fragments and could not be positively identified as belonging to a terebellid. The other material also labelled as type in the Zoologisches Museum, Berlin is incomplete posteriorly, but is certainly a species of *Loimia*, and is described below.

**Description.** Type incomplete posteriorly with maximum width of 6.7 mm. Large parts of thoracic epidermis have been removed. No branchiae or buccal tentacles remain. Three pairs of branchial scars on segments 2, 3 and 4, with first pair of scars inserted most dorsally.

Peristomium with no lateral expansion to form lobes. Segment 2 with small rounded ventrolateral lobe connected midventrally by U-shaped connecting ridge. Segment 3 with small semi-spherical lobe directed at angle dorsolaterally.

Notopodia begin on segment 4, as all setae have been shaved off, it is not possible to count total number of pairs of notopodia. Uncini begin on segment 5 (setiger 2), uncini have 5 teeth above main fang in single row. Abdominal neuropodia rectangular erect podia.

Thoracic ventral glandular pads discrete and rectangular. No pigmentation present.

**Comments.** No additional records of this species have been reported and it appears to differ from all of the other described species of *Loimia* from Australia.

**Habitat.** Unknown.

**Distribution.** Western Australia (Mermaid Cove).

### *Loimia triloba* n. sp.

Fig. 12a-d

**Material examined.** HOLOTYPE: Queensland: Great Barrier Reef, Three Isles, 15°07'S, 145°26'E, (BMNH ZB

1986.97), Stn 3.2, coll. no. 268, complete, 158 segments, 107 mm long, 3.8 mm wide. PARATYPES: Great Barrier Reef, Three Isles, Stn 3.1, coll. no. 261, 1(USNM 99974); Low Isles, 16°23'S, 145°34'E, Stn L5, coll. no. 181, 1(AHF Poly 1471), Stn L6, coll. no. 196, 1(AM W200558), Stn L6, coll. no. 199, 3(BMNH ZB 1986.100-102), Stn L3, coll. no. 155, 2(BMNH ZB 1986.98-99), Stn K7, 11°40'S, 144°00'E 5(BMNH ZB 1986.103-107). Paratypes range in width from 0.9–4.0 mm.

**Additional material examined.** Queensland: One Tree Island, lagoon (AM W200555).

**Description.** Body with short, robust thorax, long, wide abdomen, mainly unpigmented except for some bluish pigment on lateral borders of midventral glandular pads. Segments 2–12 glandular where branchiae, and notopodia arise. Prostomium short, compact with inflated upper lip extending anteriorly. Buccal tentacles largely missing. Eyespots dark, arranged in 2 very short rows on either side of posterior prostomium, partially obscured by posterior deflection of collar. Peristomium about half the length of segment 2 dorsally, anterior edge

thickened, elevated slightly; laterally, anterior edge expanded forming pair of well-developed lateral lobes which extend ventrally. Lateral lobes on segment 2 or 3 smaller, angular, not extending ventrally, the exact segmental origin of this lobe cannot be determined, it appears to arise from junction of these 2 segments. Segment 4 with very small, elongate lobe, located just below first pair of notopodia. Branchiae 3 pairs, on segments 2–4, arise dorsally to line of insertion of notopodia, first pair of branchiae about twice as large as subsequent ones; each with thick main stalk, dendritic branching subdistally, distally loosely spiralled filaments (Fig. 12a).

Notopodia from segment 4, 17 pairs; podia short, rectangular, similar-sized throughout. Notosetae consist of winged capillaries of 2 lengths, shorter ones with transparent wing (Fig. 12b,c). Neuropodia from segment 5 (setiger 2), extend to pygidium; podia sessile, glandular ridges on thorax, elevated pinnules on abdomen, similar sized throughout, except on last few segments which are regenerating, podia are

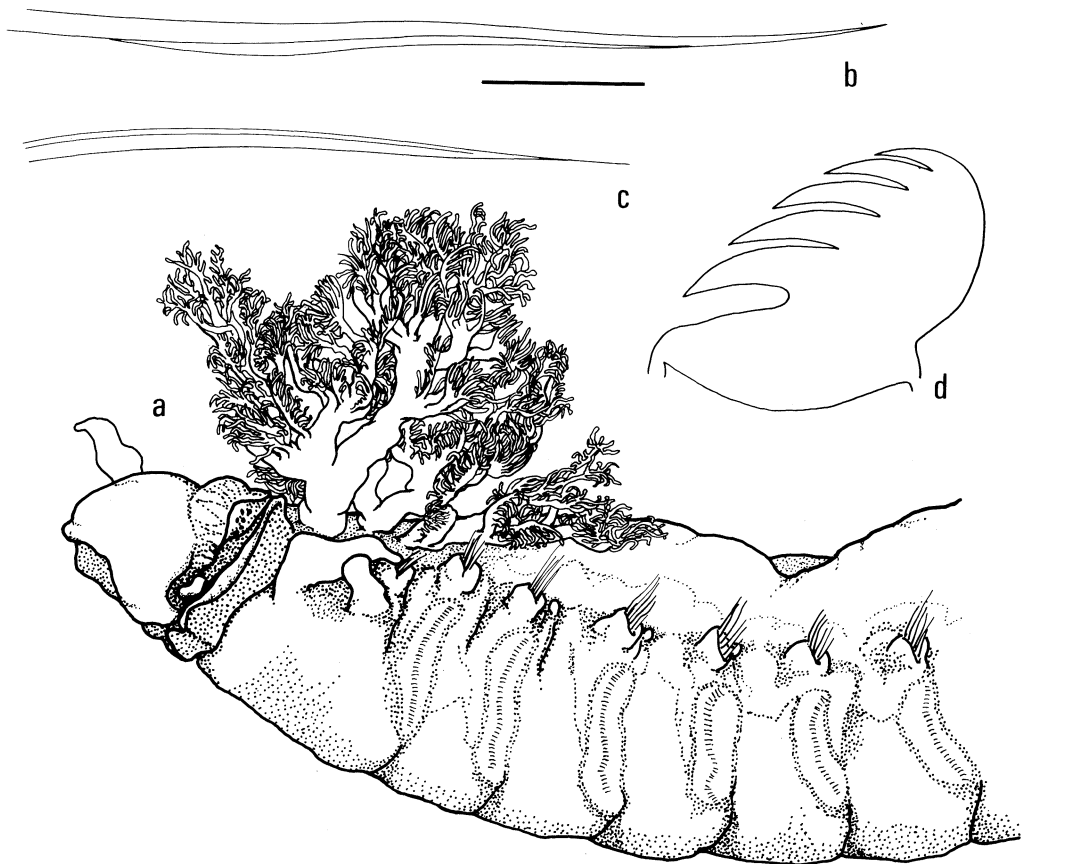


Fig. 12. *Loimia triloba* n. sp., holotype (BMNH ZB 1986.97). a. lateral view, anterior body, scale is 1 mm. b. long notoseta from setiger 5, scale is 0.1 mm. c. short notoseta from setiger 5, scale is 0.1 mm. d. uncinus from midthoracic segment, scale is 0.01 mm.



minute. Uncini with 5 teeth in vertical series, smooth upper base, similar shape throughout (Fig. 12d). Uncini arranged in single rows to segment 10, on segments 11–20 arranged in double rows, back to back, thereafter in single rows to pygidium.

Midventral glandular pads present to segment 14, last few heavily dissected, pads on segments 2–4 fused. Nephridial papillae minute, on segments 3, and 6–8, first pair just ventrolateral to branchiae, remainder posterodorsal to notopodia.

Pygidium with about 15 elongate papillae encircling terminal anus.

**Variation.** Paratypes generally unpigmented, except for 1 complete specimen with a brown pygidium, and some with bluish pigment on the midventral pads to segment 11. Lateral lobes on peristomium well developed ventrally in smaller specimens extending anteriorly to cover base of buccal tentacles, in larger specimens lateral lobe poorly developed ventrally like holotype. Lateral lobes on segment 4 absent in smallest specimens. Branchiae with first pair 1–2 times larger than subsequent ones, smaller specimens with fewer branchial filaments than larger specimens. Uncini with 5 or 6 teeth in a vertical series, smooth slightly humped upper base, without well-developed ligament. Midventral glandular pads to segment 12–15. Nephridial papillae absent in smallest specimens. Pygidium with 3 very long anal cirri in 1 complete specimen.

**Comments.** *Loimia triloba* n. sp. may be distinguished from *L. batilla* n. sp. and *L. ingens* by the presence of eyespots and a pair of small lateral lobes on segment 4. These lobes appear to be present on all but the very smallest specimens (width of body < 1.0 mm), and increasing in size in relation to the other lobes as the worm grows. This situation appears opposite to that recorded by Gravier (1906) for *L. medusa* in which a lobe on the third segment (presumably segment 4 in our scheme) is present in the young but not in the adults.

**Etymology.** The specific name *triloba* refers to the three pairs of lateral lobes on the anterior segments, and is made of *tri* meaning three and *lobus* meaning lobe, which was changed to *loba* as the gender of genus *Loimia* is feminine.

**Habitat.** Found intertidally to depths of 22 m in sediment ranging from muddy sand to medium coarse sand.

**Distribution.** Queensland (Great Barrier Reef).

### *Longicarpus* Hutchings & Murray

*Longicarpus* Hutchings & Murray, 1984: 97.

Branchiae, 3 pairs on segments 2, 3 and 4, dichotomously branched. Lateral lobes poorly developed. Notopodia from segment 4, about 23 pairs; notosetae distally serrated. Neuropodia with uncini from segment 5 (setiger 2), arranged in double

or alternate rows from segment 10 or 11; anterior thoracic uncini with well-chitinised shafts. Nephridial papillae from segment 3.

**Type species.** *Longicarpus glandulus* Hutchings & Murray, 1984 (= *L. modestus*) by original designation.

**Comments.** *Longicarpus* is similar to the genera *Amphitrite* and *Terebella*, in having lateral lobes intermediate between the two. It differs in having long-handled uncini present on anterior segments. It also superficially resembles the genus *Pista* as discussed by Hutchings & Murray (1984). A recent study by Hutchings (in press) of the terebellids of Hong Kong has recorded another species of *Longicarpus* in the harbour of Hong Kong.

### *Longicarpus modestus* (Quatrefages)

*Terebella modesta* Quatrefages, 1865: 365.

*Amphitrite rubra*.—Fauvel, 1917: 265–267, fig. 27a–f.—Knox & Cameron, 1971: 36 (in part). *Non* Risso, 1826.

*Longicarpus glandulus* Hutchings & Murray, 1984: 97, fig. 28.1–5.

**Material examined.** Western Australia: Houtman Abrolhos, Long Island 1(WAM 50-84); Cockburn Sound 1(WAM 32-84), Rottnest Island (AM W201039); Bunbury 1(NTM W2423). South Australia: West Lakes 4(AM W200177); Coffin Bay 1(AM W200174); Upper Spencer Gulf 1(AM W5978); Kangaroo Island, Penneshaw Jetty 2(AM W200172); Sellicks Beach 1(AM W200173). Tasmania: Norfolk Bay, near Eaglehawk 1(AM W200171), Grassy Harbour, King Island 1(NMV unreg), St Helen's, north-east Tasmania (NMV unreg); south-east Tasmania, Midway Point (TASM K1022). Bass Strait: Stn 212 1(NMV unreg), 1(NMV unreg). Victoria: Portland Pier, several(NMV unreg); Mallacoota Inlet 1(AM W200175); Gabo Island 1(AM W200169), 1(AM W200170). New South Wales: Green Cape 1(AM W200164); Jervis Bay, Darling Down 3(AM W200159); Port Hacking, Ship Rock 4(AM W200155); Long Reef 2(AM W200154). Queensland: One Tree Island, lagoon 1(AM W200430). A selection of material examined, size ranged from an incomplete specimen 1.0 mm wide to a complete specimen, 72 mm long, 8.0 mm wide, and about 100 segments.

**Variation.** We have examined a large number of specimens and found additional variations to those described by Hutchings & Murray (1984). This included the colour in alcohol, from pale cream to brown, sometimes with additional rust-red pigment on thorax; 21–24 pairs of notopodia; uncini with a subrostral guard, arranged in a single row from segments 5–10, then in an alternate row to segments 50–58, then in a single row once more to the pygidium; dental formula of uncini MF:3-5:3-9:10-20:α. Nephridial papillae on segments 3–8 at ventral base of notopodia, decrease in size posteriorly, smaller specimens with fewer pairs.

**Comments.** The type specimen of *Terebella modesta* Quatrefages examined by us, was one of a number of specimens described by Quatrefages

(probably syntype 1 [MNHN No. 276a]) from Jervis Bay, albeit in a very incomplete way. The specimen agrees well with the present material. We also examined the holotype of *Longicarpus glandulus* Hutchings & Murray (AM W19532) and found it to be synonymous with Quatrefages' species. Hutchings & Murray (1984) give a detailed description of the species which is characterised by having diffuse glandular areas on anterior segments, rather than discrete lateral lobes and long handled anterior thoracic uncini. We have therefore synonymised *L. glandulus* with *Terebella modesta*.

The previously known distribution of *Longicarpus modestus* has been considerably expanded.

**Habitat.** Occurs from lower intertidal zone to 28 m on exposed rocky coasts under stones, attached to boulders, associated with sponge beds, macroalgae holdfasts and dead coral on reef crests. Also occurs in sheltered bays in sandy sediment, sometimes associated with scallop and mussel clumps, to 30 m. In life, the animal is bright red with orange tentacles and bright red branchiae.

**Distribution.** Western Australia, South Australia (widespread), Tasmania, Victoria, New South Wales (widespread), Queensland.

#### *Neoleprea* Hessle

*Neoleprea* Hessle, 1917: 191–192, fig. 47.

Branchiae, 2 pairs on segments 2 and 3, dichotomously branched. Lateral lobes absent. Notopodia from segment 3, continue for a variable number of segments; notosetae distally serrated. Neuropodia with uncini from segment 5 (setiger 2), arranged in double rows face to face from midthorax. Nephridial papillae numerous, from segment 3 or segment 6.

**Type species.** *Leprea streptochoeta* Ehlers, 1897 designated by Hessle, 1917.

**Comments.** There has been some confusion over the numbering of the branchiferous segments in *Neoleprea* and this has led to confusion as to the segment on which the notopodia first occur. The type species, *Neoleprea streptochoeta* (Ehlers) (Port Stanley, Falkland Islands, SYNTYPES 8(HZM V4931); coll. 17.VII.1893), has 2 pairs of branchiae on segments 2 and 3, notopodia from segment 3 and neuropodia from segment 5. All other existing species of *Neoleprea* (*N. californica* (Moore, 1904) San Diego County, California, HOLOTYPE (CAS 019704), *N. amoyensis* Monro, 1934, Amoy, China, HOLOTYPE (BMNH 1933.3.2.41); coll. T.Y. Chen; *N. clavata* Mohammed, 1973, Mena Abdullah, Kuwait, 29°01'N, 48°10'E, HOLOTYPE (BMNH ZB 1971.57); coll. 10 October, 1969 from intertidal zone under rock), with the exception of *N. japonica* Hessle, 1917, and perhaps *N. spiralis* Johnson, 1901, have the same arrangement of branchiae and podia as the type species and constitute a monophyletic group. The

holotype of *N. spiralis* (HOLOTYPE [MCZ 1874] Puget Sound, Washington, coll. A. Robertson, 1898), is in poor condition and it is not possible to ascertain for certain which segments are branchiferous, however some later descriptions of the species (Berkeley & Berkeley, 1952) give the branchiferous segments as 2 and 3 rather than 3 and 4 as stated by Johnson, 1901. The syntypes of *N. japonica* were re-examined (SYNTYPES 1[SSM unreg] Sagami Yokuskastrasse, [this name not found in Atlas, may refer to Sagami Bay south of Tokyo near Yokusuka] 135 m, 19/6; 1[SSM unreg] Sagami Misaki, 150 m, 11/6; 1[SSM unreg], Sagami Okinose, 500 m, 30/6; coll. S. Bock, 1914), and found to have branchiae on segments 3 and 4, i.e. two pairs of branchiae, notopodia from segment 4 and neuropodia from segment 6. Similarly, specimens of *N. streptochoeta* non Ehlers identified by Hessle (1917) (Falkland Islands SYNTYPES 1(SSM 2169) 51°33'S, 58°10'W, 7 m; 1(SSM 2171), 58°42'S, 57°50'W, 10 m; coll. Svenska Syd-polar Expedition 1901-1903), have the same arrangement. It would appear that these specimens have been wrongly labelled as syntypes of *N. streptochoeta*.

*Neoleprea japonica* and Hessle's material of *N. streptochoeta* cannot be assigned to any described genus of terebellid. We are reluctant, however, to describe this material as a new genus, as it is not in good condition.

#### *Neoleprea macrocercus* n. sp.

Fig. 13a–g

**Material examined.** HOLOTYPE: New South Wales, Diggers Camp, between Minnie Water and Wooli, 153°17'E, 29°19'S, (AM W200340); posteriorly incomplete, 111 segments, 43 mm long, 2.1 mm wide. PARATYPES: 2(AM W200342), 1(AM W200341), 1(AHF Poly 1472), 1(BMNH ZB 1986.72), 1(USNM 99975), collection details as for holotype; range in size from 2.0 mm wide to a complete specimen of 102 segments, 36 mm long, 2.4 mm wide.

**Additional material examined.** Victoria, west of Eagles Nest, 1(NMV unreg). New South Wales: west side of South West Solitary Island 1(AM W200343).

**Description.** Body inflated anteriorly, widest over first few segments tapering gradually to long uniformly wide abdominal region. Tentacular lobe collar like, produced anteriorly as short, smooth, sloping upper lip, deeply cleft medially as result of damage. Buccal tentacles filiform, grooved. Eyespots faint, arranged in 1 irregular row across posterior tentacular lobe. Peristomium about length of segment 2 dorsally, ventrally forming broad lower lip with deep transverse groove separating inner, outer parts. Branchiae, 2 pairs on segments 2 and 3, equal in size, arise laterally just above line of notopodia (Fig. 13a). Branchiae dendritically branched with short stalk, branches decreasing in thickness gradually outward.

Notopodia from segment 3 extend for 28 or 29 segments; podia short, tapered, becoming more pointed posteriorly (Fig. 13b,c). Notosetae arranged in 2 tiers of 2 types of setae, long, narrow-winged, distally hispid capillaries, shorter, hispid, slightly flagged types (Fig. 13d,e). Neuropodia from segment 5 (setiger 3) present on all following segments; podia low, elongate ridges throughout, length of ridges

decreasing posteriorly. Uncini with small, anteriorly projecting subrostral ligament (Fig. 13f), dental formula MF:4-6: 5-7:10-17; arranged in single rows to segment 8, thereafter uncini arranged in double rows to end of body, face to face (Fig. 13g).

Midventral glandular pads on segments 2-15, first few pads yellowish, then becoming white. Midventral glandular groove extends from segment



**Fig. 13.** *Neoleprea macrocercus* n. sp., holotype. **a.** lateral view, anterior body, scale is 1 mm. **b.** notopodia from segment 4 (left side) anterior view, scale is 0.1 mm. **c.** notopodia from segment 24 (left side) anterior view, scale is 0.1 mm. **d.** long notoseta from setiger 4, scale is 0.1 mm. **e.** shorter notoseta from setiger 4, scale is 0.1 mm. **f.** uncinus from segment 11, scale is 0.01 mm. **g.** uncinus from midposterior body segment, scale is 0.01 mm.

16 posteriorly. Nephridial papillae prominent, situated at anteroventral base of notopodia on segments 7–22. Holotype mature female, body wall distended with oocytes in mid and posterior segments; oocytes white, disc shaped, 120–180µm in diameter.

**Variation.** Paratype material widest anteriorly, not inflated, occasionally with midposterior body coiled. Upper lip variably shaped, usually posteriorly deflected. Outer part of lower lip resembling subsequent midventral glandular pads, anterior edge developed as a flange; inner part of lower lip large, longitudinally grooved, inflated somewhat and extruding from mouth cavity. Eyespots faint, arranged in a broad transverse row, may be absent or faded. Branchiae on segments 2 and 3 about equal in size, posterior ones with slightly longer stalk up to a third of the total length of branchia.

Notopodia from segment 3, 28–34 pairs. Neuropodia from segment 5, arranged in double rows from segments 9–11 to pygidium; denticles arranged in 3–4 rows above rostrum as follows:–MF:3-4:4-7:9-15. Midventral pads extend from segment 2 to segments 14–16, first few always a yellowish colour. Nephridial papillae occur from segment 6 or 7 to segments 19–23.

**Comment.** *Neoleprea macrocercus* n. sp may be distinguished from all other species of *Neoleprea* in having 20 to 29 pairs of notopodia and eye spots present on the posterior tentacular lobe. It appears closest to *N. spiralis*, but differs in that the latter species has 38 pairs of notopodia and 20 to 22 midventral pads, whereas *N. macrocercus* has 28 to 34 pairs of notopodia and 13 to 15 pairs of midventral pads.

**Etymology.** Specific name derived from the greek *macro* and *kerkos*, tail referring to the long abdominal region.

**Habitat.** Occurs in reef areas intertidally to 20 m, underneath boulders and in crevices sometimes associated with coral and ascidians or encrusting algal turf.

**Distribution.** Victoria (Eagles Nest), New South Wales (South West Solitary Island, Minnie Water).

#### *Nicolea* Malmgren

*Nicolea* Malmgren, 1866: 380.—Hessle, 1917: 171.—Fauchald, 1977: 132.

*Phyzelia* Schmarda, 1861: 40.

*Heterophyselia* Quatrefages, 1865: 386.

*Thelepepla* Chamberlin, 1919: 422.

Branchiae, 2 pairs, dichotomously branched. Lateral lobes absent. Notopodia from segment 4, 15–40 pairs; notosetae smooth tipped. Neuropodia with uncini from segment 5 (setiger 2), arranged in double rows on posterior thoracic segments.

**Type species.** *Terebella zostericola* Ørsted, 1844, designated by Malmgren, 1866.

**Comments.** The only species of *Nicolea* occurring in Australian waters according to Day & Hutchings (1977) was *N. bilobata* (Grube, 1877) recorded by Augener (1914), however as Day (1975) had earlier correctly pointed out, this species has lateral lobes on anterior segments and was referred to *Lanicides* by Hessle (1917). Other records of *Nicolea* from Australia include *N. venustula* Montagu, 1818 from Cockburn Sound, Western Australia (Day, 1975), *N. amnis* Hutchings & Murray, 1984 from Botany Bay, New South Wales and *N. minima* Hartmann-Schröder, 1984 from Albany, Western Australia. We have examined Day's specimens of *N. venustula*, and the paratype of *N. minima* and consider both to be synonymous with *N. amnis*. The description of *Nicolea amnis* was published in September 1984, and that of *N. minima* was published in November 1984, so that *N. amnis* has priority by two months. The material identified by Hartmann-Schröder (1979, 1980 and 1982) as *Nicolea venustula*, consists of *Pista violacea* Hartmann-Schröder 1984, and a species of *Lanicides*. Thus no records of *N. venustula* from Australia are valid. *Nicolea cetrata* was recorded from Western Port, Victoria, by Augener and omitted from Day & Hutchings (1979). It has been examined (ZMC) and referred to *Pista sinusa*, a new species described in this paper. A short discussion of the genus and its apparently conservative nature is given in Hutchings & Murray (1984).

#### *Nicolea amnis* Hutchings & Murray

*Nicolea amnis* Hutchings & Murray, (Sept.) 1984: 98–100, fig. 29.1–3.

*Nicolea minima* Hartmann-Schröder, (Nov.) 1984: 444–445, fig. 53.

*Nicolea venustula*.—Day, 1975: 201. *Non* Montagu, 1818. *Axionice harrisoni*.—Knox & Cameron, 1971: 38. *Non* Benham, 1916.

**Material examined.** Western Australia: Cockburn Sound, 10(WAM 32-84); Bunbury 1(AM W203); Busselton 2(NTM W2400); Torbay, Port Harding, near Migo Island 5(AM W200361), (AM W200360); 2 km off Cape Peron (AM W201041). South Australia: Great Australian Bight, 32°24'S, 133°30'E 2(AM W13626); Kangaroo Island, Emu Bay 5(AM W200582); Cape Northumberland 1(AM W200371). Tasmania: Tinderbox Bay 1(AM W200596); Maria Island, Darlington 1(AM W199251); Devonport, Horseshoe Reef 4(AM W200599). Bass Strait: Stn 139, 1(NMV F52599), Stn 199 1(NMV F52600). Victoria: Port Phillip Bay, Area 57, Stn 294, 1(NMV G1827), Area 56, Stn 295, 1(NMV G1828), Portland 3(NMV F52601); Gabo Island, south-south-east side 3(AM W200365), off Monumental Bay 2(AM W200368). New South Wales: Twofold Bay, Munganno Point 1(AM W200376), Quarantine Bay 1(AM W200378); Montague Island, 2(AM W200568); Botany Bay, HOLOTYPE (AM W196218), Port Jackson, North Head 3(AM W6397); Long Reef 2(AM W6973); Coffs Harbour 3(AM W200589); Minnie Water 1(AM W194967). Queensland: Caloundra 2(AM W200373); Capricorn Group, One Tree Island 1(AM W200381); Lizard Island,

between Bird and South (AM W200948). Northern Territory: Port Essington, Table Head 3 (NTM W1569); Darwin, East Point 2 (NTM W3046). A selection of material examined.

**Comments.** The material examined here greatly extends the distribution of this species, previously known only from New South Wales estuarine areas. This additional material also expands the variation occurring within the species. The size and degree of branchial branching increases with the size of the animal. Small individuals have two pairs of equal sized branchiae. Larger individuals have the first pair of branchiae considerably longer than the second pair. The number of pairs of notopodia also increases with size, ranging from 14 in small individuals to 17 in the largest specimens examined. The dental formula of the uncini is highly variable, both intraspecifically within a row and interspecifically as follows: MF:2-4:3-10. Nephridial papillae are present on segment 3, at the posterior base of the branchiae and on segments 6 and 7, they are situated at the dorsal base of the notopodia with the posterior two pairs larger, and often elongate.

In addition to the above variation, most of the material examined fell into one of two distinct size groupings, one group ranges from 0.7–1.4 mm in width, and the other from 2.2–7.0 mm in width. Both groups contained a proportion of sexually mature females and, apart from variations attributable to size, there appeared to be no other differences between the two size groups. It would appear, therefore, that *N. amnis* is a polytelic species, capable of reproducing at least twice during its life.

The holotype of *N. amnis* Hutchings & Murray (AM W198419) and the paratypes of *N. minima* Hartmann-Schröder (WAM 74-72), both fall into the small-size group, whereas the specimens identified by Day (1975) as *N. venustula*, (WAM 74-72), fall into the large-size group. These individuals show no additional variations or differences other than those listed here or by Hutchings & Murray (1984), and therefore *N. minima* is synonymised with *N. amnis* and the material identified by Day as *N. venustula* is referred to *N. amnis*.

We have examined material identified as *Axionice harrisoni* by Knox & Cameron (1971) from Port Phillip Bay (NMV G1828, G1827) and referred it to *Nicolea amnis*.

We have also examined the holotype of *Nicolea maxima* Augener, 1923 (HZM V9372) described from the Auckland Islands in the subantarctic. It is a very large species (20 cm in length and with a maximum width of 1 cm) and the arrangement of branchiae and the 20 pairs of notopodia clearly distinguishes it from *N. amnis*.

**Habitat.** Occurs in coastal and estuarine areas, from intertidal to 71 m. The species is associated with kelp holdfasts, clumps of tunicates, ascidians in colder waters, *Posidonia* seagrass beds and the algae *Caulerpa* and in coral substrate at One Tree Island.

**Distribution.** Widespread throughout Australian waters.

### *Phisidia* Saint-Joseph

*Phisidia* Saint-Joseph, 1894: 167.

Branchiae absent; lateral lobes absent. Notopodia 14 pairs, beginning on segment 4. Notosetae distally denticulate; 2 types present, shorter coarser setae with pectinate appearance, longer setae fine and faintly denticulate. Neurosetae beginning on setiger 2, avicular.

**Type species.** *Leaena oculata* Langerhans, 1880 by monotypy.

### *Phisidia echuca* n. sp.

Fig. 14a–d

**Material examined.** HOLOTYPE: South Australia: Kangaroo Island, Victor Harbour, 35°33'S, 138°38'E, just behind bluff, crevice fauna (AM W200472) 15 mm in length and 1.2 mm wide at anterior end. PARATYPES: 1(AHF Poly 1473), 1(USNM 99976), 1(BMNH ZB 1986.73), ranging in length from 12–15 mm in length and in width from 1–1.2; all paratypes gravid and USNM and BMNH material complete. All type material from same locality.

**Additional material examined.** South Australia: Streaky Bay, mud flats with *Posidonia* 1(AM W200474), 1(AM W200480) in amongst mussel clumps, several(AM W200475); Victor Harbour, Kangaroo Island, algal washings 1(AM W200476); Elliston reef, algae from reef flat at low tide 1(AM W200477), algal washings 2(AM W200481); southernmost tip of Murray River heads, underneath boulders covered in oysters and barnacles 1(AM W200478). Victoria: Port Phillip Bay, sand, 3 m 1(AM W16123); Western Port, Beacon Bottom Stn 312, 1(NMV F52602). New South Wales: Jervis Bay, Murrays Beach, *Zostera* seagrass beds 1(AM W194116), 1(AM W194171), 1(AM W194210), Botany Bay 1(AM W195552); Port Stephens, *Posidonia* seagrass beds 1(AM W12573), 1(AM W12459); South West Solitary Island 3(AM W200483).

**Description.** Complete individual with approximately 90 setigers. Preserved individual pale red in colour with patches of pale pigment especially marked on posterior abdomen. Gravid, coelom especially of abdominal segments heavily packed with oocytes.

Prostomium compact, with anteriorly directed ventral lip, with glandular margins. Prostomium dorsally flattened with thickened margins. Several grooved buccal tentacles remaining. Eye spots absent. Branchiae absent. Holotype punctured anteriorly, one nephridium protrudes mid-dorsally, adjacent to third notopodia. Nephridia are clearly visible in this position beneath thin epidermis in paratypes. Notopodia from segment 4, continue for 14 segments. Podia elongate flattened glandular structures (Fig. 14a). Notosetae arranged in 2 tiers, longest tier consisting of broad-bladed, narrow-

winged setae with elongated smooth tips; shorter tier, consisting of 2 types of setae, wingless capillaries with faintly serrated margins, tips of setae drawn out in fine point, broad-bladed, narrow-winged capillaries with smooth tips (Fig. 14b,c). Number of setae with faintly serrated margins increases posteriorly.

Neuropodia begin on segment 5 (setiger 2), continue to pygidium. Neuropodia well developed, especially on thorax where positioned on glandular tori, on abdomen, neuropodial tori erect, glandular. Neuropodial uncini initially arranged in single rows, arranged in double rows face to face on segments 11–20 (7th uncinigerous segment, to 3 segments beyond last pair of notopodia), following neuropodia with uncini arranged in single rows.

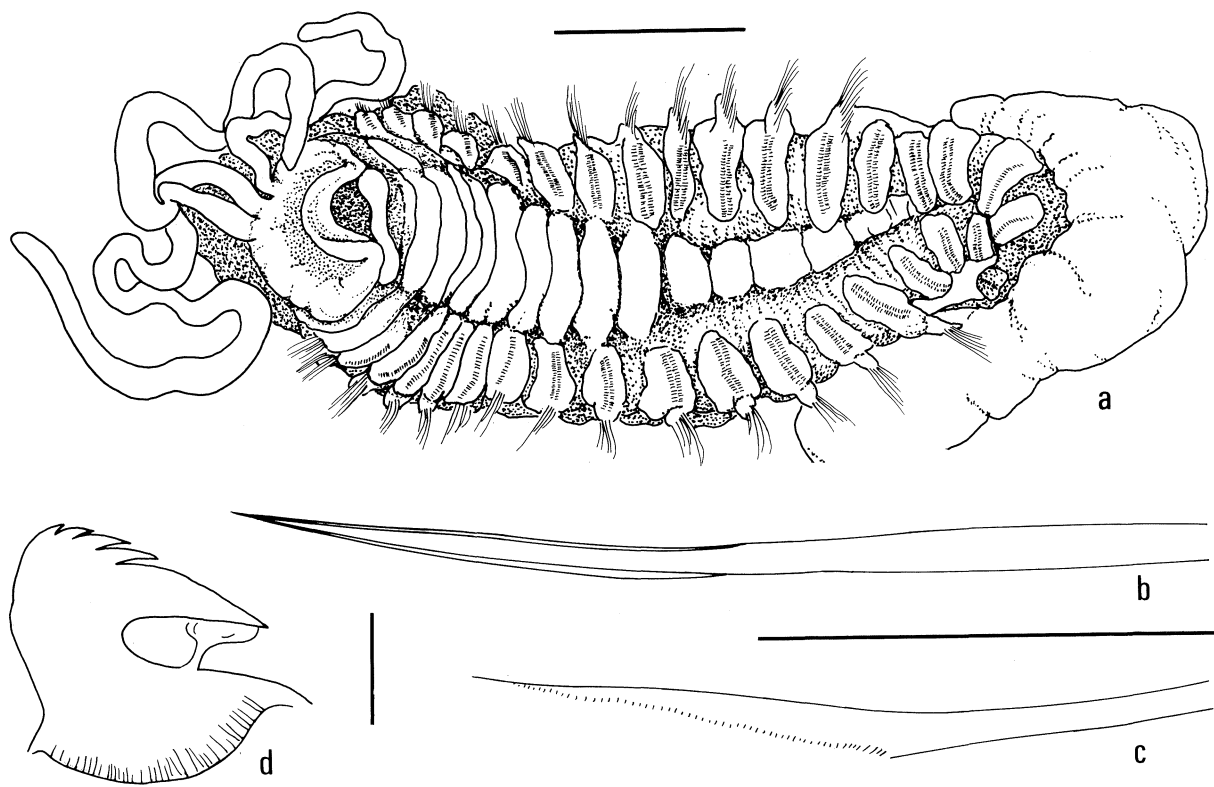
Neuropodial uncini avicular (Fig. 14d), with strongly crested head. Dental formula of uncini varying from MF:6:8: $\alpha$ : $\alpha$ , MF:7:10:12:15+ to MF:7:10: $\alpha$ . Well-developed discrete segmental ventral pads on segments 4–11, on following segments ventral pads rapidly decline in size, discrete midventral glandular stripe continues to pygidium. Pygidium small terminal rosette, with small papillae around margins.

**Variation.** One paratype shows evidence of regenerated posterior segments. The degree and extent of pigmentation of posterior segments varies. The BMNH specimen has U-shaped nephridia clearly visible through the epidermis of the dorsum between segments 6 and 9. The exact details of the nephridia are partially hidden by the numerous oocytes in the coelom in this region. Nephridial papillae are not visible.

The three paratypes exhibit variation in the degree of glandular development on the anterior segments ventrally. In some cases, the anterior ventral pads are raised and slightly paler in colour than the posterior ventral pads.

Additional material from Streaky Bay is considerably larger than the type series and the smooth-tipped setae appear faintly striated suggesting that the degree of serration may increase with size and presumably age. These differences are not considered sufficient to warrant referring the Streaky Bay material to another species. Eye spots are present on some large individuals.

The New South Wales material includes specimens with uncini arranged in double rows on segments 11–21.



**Fig. 14.** *Phisidia echuca* n. sp., holotype. **a.** ventral view of anterior body, scale is 1 mm. **b.** long notoseta from thoracic setiger, scale is 0.1 mm. **c.** shorter notoseta from thoracic setiger, scale is 0.1 mm. **d.** uncinus from anterior thoracic setiger, scale is 0.01 mm.

**Comments.** Three species of *Phisidia* have previously been described: *P. aurea* Southward, 1956, *P. oculata* (Langerhans, 1880) and *P. sagamica* Hesse, 1917, all from the northern hemisphere. *Phisidia echuca* n. sp. can be distinguished from these three species by the segments on which the uncini are arranged in double rows, face to face, and the presence of strongly crested uncini. *Phisidia oculata* has 24 segments with double rows of uncini, *P. sagamica* has three segments with double rows of uncini. *Phisidia aurea* and *P. echuca* both have ten segments with uncini arranged in double rows. However, Southward (1956) indicates that the uncini of *P. aurea* have seven secondary teeth whereas uncini of *P. echuca* have at least four rows of teeth above the main fang with a large number of teeth in each row.

**Etymology.** The specific name *echuca* refers to an aboriginal name meaning a meeting of waters.

**Habitat.** Occurs intertidally and in shallow subtidal areas, often in mud with seagrass beds.

**Distribution.** South Australia, Victoria, New South Wales.

*Pista* Malmgren, emended

*Pista* Malmgren, 1866: 382.—Fauchald, 1977: 132.—Hutchings, 1977: 19.

Tentacular lobe compact, numerous buccal tentacles. Lateral lobes on segments 2–4; and sometimes on the peristomium. Branchiae, 1–3 pairs. Notopodia from segment 4, 17 pairs present; notosetae smooth-tipped, winged capillaries. Neurosetae begin on segment 5 (setiger 2) continue to pygidium. Uncini of anterior thoracic segments with posteriorly elongated bases, following uncini avicular, arranged in double rows on posterior thorax.

**Type species.** *Pista cristata* (O.F. Müller, 1776) by monotypy.

**Comments.** We have expanded the generic diagnosis of *Pista* to include species with well developed lateral lobes on the peristomium, and restricted the diagnosis to species with only 17 pairs of notopodia. Fauchald (1977) suggested that the numbers of notopodia may vary from 15 to 24. However we think that within the currently accepted species of *Pista*, several groups exist which perhaps should be separated into different genera. Species of *Pista* can be differentiated on the basis of the development and shape of the lateral lobes. To facilitate the differentiation of species of *Pista* present in Australia, the key diagnostic features have been tabulated in Table 1.

Table 1. Distinguishing features of Australian species of *Pista*.

Species	Peristomium	Presence and Shape of Lateral Lobes		Seg 4	Nos. of branchiae	Type of branchiae	Thoracic segments with long handled uncini	Distribution
		Seg 2	Seg 3					
<i>P. australis</i>	thickened margins and ventrally forms a glandular V-shaped structure connected midventrally	semi-circular strong midventral connecting collar	semi-circular	small flattened semi-circular	2	plume shaped in spiral	5–11	south east Aust
<i>P. curtiuncata</i>	triangular blunt lobe connected midventrally by small medial lobe	small ventrally displaced semi-circular lobe	triangular-shaped lobe	narrow elongate lobe	2	plume shaped	all thoracic but weakly developed posteriorly	north west WA, NT
<i>P. pectinata</i>	large semi-circular lobe fused midventrally	only present as raised ridge across ventrum	large rectangular lobe	narrow rectangular lobe	3	long main stem with branches coming off along I axis	all thoracic	WA, Vict., NSW, Qld.
<i>P. sinusa</i>	large lateral semi-circular lobe connected midventrally	v. ventrally arranged lobe fused midventrally	bilobed lateral lobe fused to segment 2 forming sinus	narrow elongate lobe	2	short dichotomous branches	all thoracic	NSW, Qld. Vict.

<i>P. trina</i>	absent	ventrolateral lobe connected midventrally	flattened semi-circular lobe	no lobe — segment expanded across ventrum	3	richly dichotomous	5–11	Qld.
<i>P. trunca</i>	large rectangular lobe connected midventrally	small rounded ventrolateral lobe	large semi-circular lobe fused to segment 2 forming sinus	elongate rectangular lobe	2	sparsely dichotomous	all thoracic	Qld.
<i>P. turawa</i>	large lobes fused midventrally	absent	v. large semi-circular lobe expands ventrally to form connecting lobe	v. narrow elongate lobe	2	sparsely dichotomous	all thoracic	Continental slope off Sydney
<i>P. typha</i>	margins expanded forming 2 small lobes connected midventrally	small lobe connected midventrally	large semi-spherical lobe	small semi-spherical lobe	2	plume shaped in tiers	5–11	Qld.
<i>P. violacea</i>	large lateral lobe encompassing tentacles, connected midventrally	lateroventral lobe connected midventrally	large lateral lobe — connected mid-dorsally as a shelf	small rectangular lobe	2	sparsely dichotomous	5–8	all States except Qld.

**Key to the Australian species of *Pista***

1. Branchiae with short branches along 1 side of main stem. . . . . *P. pectinata*  
 —Branchiae plume shaped or with dichotomous branching. . . . . 2
2. Branchiae plume shaped. . . . . 3  
 —Branchiae with dichotomous branching. . . . . 5
3. Margins of peristomium thickened but not forming a lateral lobe. . . . . *P. australis*  
 —Margins of peristomium expanded to form a lateral lobe. . . . . 4
4. Segment 4 with narrow elongate lateral lobe. . . . . *P. curtiuncata*  
 —Segment 4 with small semi-spherical lobe. . . . . *P. typha*
5. Sinus developed inside lateral lobe of segment 3. . . . . 6  
 —Sinus absent inside lateral lobe of segment 3. . . . . 7
6. Segment 4 with lateral lobe which extends across the dorsum as a tripartite shelf. . . . . *P. sinusa*  
 —Segment 4 with lateral lobe which extends across the dorsum as a straight shelf. . . . . *P. trunca*
7. Peristomium expanded to form a glandular lateral lobe. . . . . 8  
 —Peristomium not expanded to form a glandular lateral lobe. . . . . *P. trina*
8. Segment 4 with narrow elongate lateral lobe not extending onto dorsum; body pale yellow in colour; branchiae with few branches. . . . . *P. turawa*  
 —Segment 4 with small rectangular lateral lobe extends across dorsum as a shelf; body typically deep purple in colour; branchiae with numerous branches. . . . . *P. violacea*



*Pista australis* n. sp.

Fig. 15a-f

*Pista typha*.—Knox & Cameron, 1971: 38.—Hutchings, 1977: 22–23 (in part. rest = *P. typha*).—Hutchings & Rainer, 1979: 789–790.—Hutchings & Murray 1984: 100. Non Grube, 1878.

**Material examined.** HOLOTYPE: New South Wales: Merimbula 36° 53'S, 149° 52'E 1 (AM W200877) *Zostera* and *Halophila*, complete 3.2 cm in length and 2.0 mm wide. PARATYPES: New South Wales: Merimbula 10 (AM

W11773), 2 (AM W11382), several (AM W11769), (USNM 99977); many (BMNH ZB 1986.74.91); many (AHF Poly 1474). All paratype material collected from *Posidonia* seagrass beds.

**Additional material examined.** South Australia: Streaky Bay 2 (AM W200449): Upper Gulf, Stn Vincents, *Zostera* beds (AM W5977), (AM W 19380). Bass Strait: Stn 99 40° 05.8'S, 143° 17.5'E, 141 m (NMV F52605). Victoria: Port Phillip Bay, Stn 942 7 m, (NMV unreg), Stn 940 8 m, silty clay (NMV unreg), Western Port, Crib Point (NMV unreg), WP17077-1, (NMV unreg), WP1709-1 (NMV

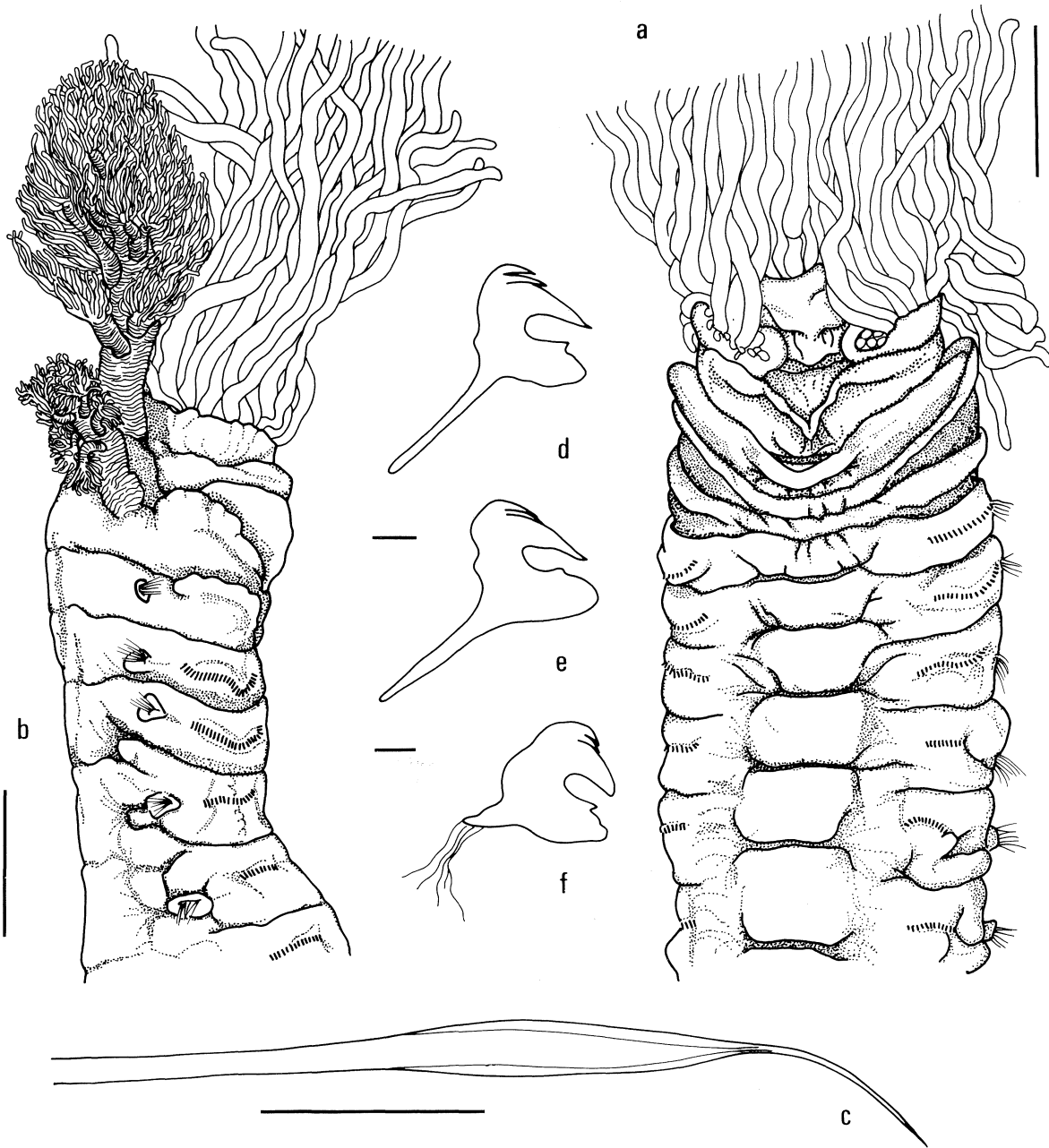


Fig. 15. *Pista australis* n. sp., holotype. a. ventral view of anterior body, scale is 1 mm. b. lateral view of anterior body, scale is 1 mm. c. notoseta from thoracic setiger, scale is 0.1 mm. d. uncinus from 1st thoracic unciniger, scale is 0.01 mm. e. uncinus from 3rd thoracic unciniger, scale is 0.01 mm. f. uncinus from 7th thoracic unciniger, scale is 0.01 mm.

unreg), WP1739-2 (NMV unreg), WP1736-3 (NMV unreg), WBES Stn 1717 (NMV unreg), 1718 (NMV unreg), 1719 (NMV unreg), Gabo Island, 20 m (AM W201173). New South Wales: Merimbula (AM W11772), (AM W11777), (AM W11409), (AM W11765), (AM W11775), (AM W194082), (AM W194150), (AM W195752), (AM W194267), (AM W194429), (AM W194151), (AM W194209); Twofold Bay, Munganno Point 1(AM W200635), 1(AM W200637), Wallis Lake (AM W200347).

**Description.** Preserved body pale pink, complete. Buccal tentacles numerous arising from thickened glandular margin (Fig. 15a). Prostomium compact with anteriorly projecting tongue, glandular with convoluted margin (Fig. 15b). Eye spots absent. Peristomium thickened, on ventrum forms a glandular V-shaped structure connected midventrally.

Branchiae 2 pairs on segments 2 and 3, each pair consists of very unequal sized branchiae, largest on segment 2, followed by slightly smaller one on segment 3, smallest branchia occurs on segment 2. Stalk of branchia stout with marked annulations. Branchiae plume shaped with tufts of branched filaments coming off in spiral fashion around main stalk (Fig. 15a).

Branchiae developed from anterior margin of segments 2 and 3 (Fig. 15a) located considerably dorsal relative to where notopodia arise on segment 4.

Lateral lobes present on segments 2, 3 and 4. Segment 2 with flattened semi-circular lobe, dorsolateral in position with strong midventral connecting collar. Segment 3 with flattened semi-circular lobe more lateral in position than one present on segment 2, lobe connected across ventrum by a narrow ridge. Segment 4 with small flattened semi-circular lobe, more ventrally located than one present on segment 3, connected across ventrum by narrow ridge (Fig. 15b). Ventral glandular pads discrete from segment 5, occur on following 13 segments, then pads rapidly disappear, narrow midventral stripe continues for rest of thorax.

Notopodia from segment 4, continue for 17 segments. Notopodia globular rectangular, setae within bundle graded in length, longest setae occur dorsally. Notosetae arranged in 2 tiers, narrow winged, broad-bladed capillaries with long fine, smooth tips (Fig. 15c). Blades present only for distal quarter of setal length. Neuropodia from segment 5 (setiger 2), continue to pygidium, thoracic neuropodia long on flattened glandular tori, abdominal tori shorter, erect podia, last few abdominal tori extremely short. Uncini initially arranged in single rows, from seventh uncinigerous segment unci arranged in double rows; this arrangement continues for rest of thorax, unci arranged in single rows on abdominal tori. Uncini of first uncinigerous segment avicular with well-developed chitinised shaft (Fig. 15d). Uncinial shaft fragile and often breaks during preparation of slide

mount. If this happens base of uncinus can easily be seen as damaged where shaft was attached. Dental formula of unci of first neuropodia MF:6-7:6:7-8; strongly crested head with teeth of second row well developed. Uncini of third uncinigerous row with shaft, but shaft more delicate than those found on first row of unci (Fig. 15e). Uncini of fifth uncinigerous segment still with shaft, but less chitinised than those found on third uncinigerous segment. Dental formulae of unci from fifth uncinigerous segment MF:6:7-8:6:α, teeth smaller than those found on first uncinigerous segment, number of teeth difficult to count as not arranged in regular rows. By seventh uncinigerous segment, shaft remains only as remnant, degenerating into connecting tendon (Fig. 15f).

Pygidium, terminal with spherical opening with smooth margins. No gametes visible in coelom. Prominent glandular, spherical nephridial papillae present on setigers 3 and 4; inserted intersegmentally dorsally to notopodia.

**Variation.** The paratypes exhibit considerable variation in the amount of brown pigment present on anterior segments. Paratypes range in colour from pale cream to dark brown. Many have lost a branchia and considerable variation exists as to which branchia is the largest. The non type material also exhibits considerable variation in the development of the branchiae. Specimens vary in the development of the glandular area of the peristomium. Similarly the lateral lobe on segment 2 has variable amounts of glandular tissue present. A few specimens exhibit a reduction in size of notopodia posteriorly.

**Comments.** Hutchings (1977) discussed the species of *Pista*, which have two pairs of branchiae, and the ways in which these species could be separated. The only species of this complex occurring in Australia is *Pista typha*. *Pista australis* can be distinguished from *P. typha* by the shape of the peristomial fold (compare Figs. 15a,b; 17f) and by the shape of the unci (see also Table 1).

The two species also appear to have different geographical distributions.

**Etymology.** The specific name *australis* refers to its wide spread distribution in south-eastern Australia.

**Habitat.** Occurs in sheltered estuaries or embayments, in seagrass beds.

**Distribution.** South Australia, Bass Strait, Victoria, New South Wales.

### *Pista curtiuncata* Hartmann-Schröder

Fig. 16a

*Pista curtiuncata* Hartmann-Schröder, 1981: 58, figs. 134-136; 1985:86.

**Material examined.** HOLOTYPE: Western Australia: Cervantes (HZM P16500); Mangrove Bay, North West Cape 1(WAM 13-84), 1(WAM 11-84), 1(WAM 16-84), Mermaid Sound, Dampier Archipelago 1(WAM 23-84),

North West Shelf, Stn 03-83-B2G, 19°56.9'S, 117°52.8'E, several (AM W201202), Stn 05-83-B9G, 19°29.0'S, 118°55.2'E, several (AM W201200), Stn 01-83-B17G, 20°00.3'S, 117°00.4'E, 2 (AM W201191), Stn 04-83-B8G, 19°29.6'S, 118°52.2'E, 2 (AM W201192), Stn 06-82-B9G, 19°27.2'S, 118°58.4'E, 3 (AM W201201). A selection of material examined from North West Shelf, Northern Territory, Arafura Sea (8°09'S 134°50'E) 115 m (AM W200966). Queensland: Pallarenda Beach, North of Townsville (AM W18122); Calliope River 1 (AM W19175), 1 (AM W19176), 1 (AM W19177).

**Comments.** The following are based upon the holotype. The two pairs of branchiae have a strongly ridged thick main stalk, with the main branches coming off the central axis spirally. These main branches are themselves branched.

Peristomium with a triangular blunt lateral lobe, laterally displaced, connected midventrally by small medial lobe. Segment 2 with small ventrally displaced semi-circular lobe connected midventrally by a narrow pleated ridge. Segment 3 with a triangular shaped lateral lobe extending dorsolaterally and connected by a narrow shelf across the ventrum (Fig. 16a). The second pair of branchiae are attached to the anterior margin of segment 3 which is thickened and forms a dorsal ridge. Segment 4 with a small, narrow, elongate lateral lobe which merges with the ventral pads.

The non-type material resembles the holotype, although the material from North West Shelf is extremely small (1–2 mm in length) and much of the material is not in good condition.

**Habitat.** Occurs in intertidal seagrass beds and mud flats in front of mangroves and is also found at 115 m on the North West Shelf.

**Distribution.** Western Australia (North West), Northern Territory (Arafura Sea), Queensland.

### *Pista pectinata* Hutchings

*Pista pectinata* Hutchings, 1977: 19–20, fig. 9a–g.—Hutchings & Murray, 1984: 100.

*Pista* cf. *pectinata*.—Hartmann-Schröder, 1983: 149.

**Material examined.** Western Australia: Dunsborough 1 (HZM P17613), North West Shelf Stn 03-83-B2G, 19°56.9'S, 117°52.8'E (AM W201187). Victoria: Western Port, WBES Stn 1717 (NMV F52604) CPBS Stn 12N, 2 (NMV F52609), CPBS Stn 015, 4 (NMV F52610), CPBS 03S, 1 (NMV F52611) Stn 1738 (NMV unreg). New South Wales: Hawkesbury River 1 (AM W19337). Queensland: Gladstone, Calliope River 1 (AM W10333), Auckland Creek 1 (AM W198256), (AM W198242), 1 (AM W198260), 1 (AM W198255).

**Comments.** This study has extended the range of *P. pectinata* which was previously only known from the east coast of Australia. Material identified by Hartmann-Schröder (1983) as *P. cf. pectinata* from Dunsborough in Western Australia (HZM P17613) has been examined and referred to *P. pectinata*. No other species of *Pista* has been described with this type of branchiae.

Since describing *P. pectinata*, it has become apparent that the arrangement of lateral lobes is one of the most important characters. Therefore, an expanded description of the lateral lobes of *P. pectinata* is given here. Peristomium with large semicircular lobe encompassing base of tentacles, resembling two wings, which are fused midventrally with a distinct notch, central connecting section not as glandular as two lateral wings. Segment 2 with virtually no development of lateral lobes but present as a connecting raised ridge across ventrum; segment 3 with large rectangular lobe connected midventrally by narrow strip; segment 4 with narrow rectangular lobe, lateral in position.

**Habitat.** Occurs in a variety of soft substrates ranging from silty sand to coarse gravel, in depths of 5–50 m.

**Distribution.** Western Australia (Dunsborough), Victoria (Western Port), New South Wales (Hawkesbury River), Queensland (Moreton Bay, Gladstone).

### *Pista sinusa* n. sp.

Fig. 16b–e

*Pista typha*.—Knox & Cameron, 1971: 38. *Non* Grube, 1878.

*Nicolea cetrata*.—Augener, 1927: 249–251. *Non* Ehlers, 1887.

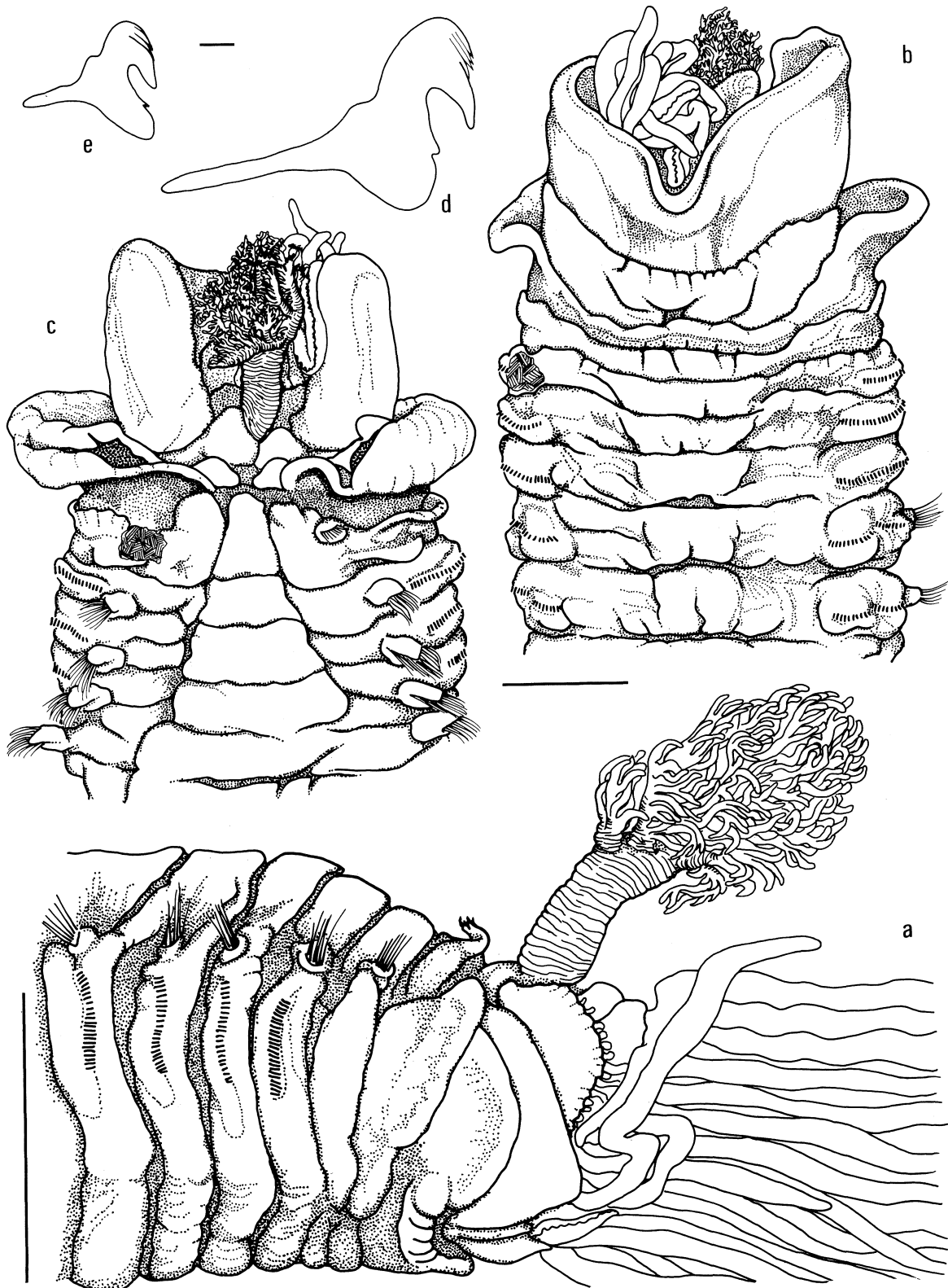
**Material examined.** HOLOTYPE: Victoria: Western Port, Crib Point, Stn 31N 38°20.94'S, 145°13.62'E (NMV F52573) 2.5 cm in length and 2 mm in width anteriorly, but posteriorly incomplete with 32 setigers. PARATYPES: Port Phillip Bay, Stn 907 37°57.7'S, 144°44.7'E 1 (NMV F52579), Western Port, Crib Point, Stn 31N 1 (NMV F52574), Stn 32N 2 (AM W200767), Stn 32S 38°21'60", 145°13.67'E 1 (USNM 99978), 1 (BMNH ZB 1986.92), Stn 32N 1 (NMV F52575), 1 (NMV F52576), 32S 3 (NMV F52577), 3 (NMV F52578), Stn 22N 2 (NMV 52580), Stn 31N 2 (NMV 52581).

**Additional material examined.** Bass Strait, Stn 179 39°03.2'S, 146°39.5'E, 55 m (NMV F52605). Victoria: Port Phillip Bay, Area 28, Stn 286 (NMV G1717); Western Port (ZMC).

**Description.** Prostomium compact with several short grooved buccal tentacles remaining. Peristomium with large lateral semi-circular lobe connected midventrally by a U-shaped thickened ridge. Eye spots absent.

One branchia remaining on segment 2, mid-dorsal in position, branchial scars present on segment 3. Branchia short thick main trunk with several short dichotomous branches arising from the main stem.

Segment 2 with very, ventrally arranged lateral lobe, fused midventrally, dorsal margin of segment thickened and slightly raised from which first pair of branchiae arise. Segment 3 with bilobed lateral lobe fused midventrally as a narrow connecting strip, which forms a connecting ridge across the mid dorsum (Fig. 16b). On the inside of this lateral lobe, a



**Fig.16.** *Pista curtiuncata* holotype. **a.** ventrolateral view, anterior body, scale is 1 mm. *Pista sinusa* n. sp., holotype. **b.** ventral view, anterior body, scale is 1 mm. **c.** dorsal view, anterior body, scale is 1 mm. **d.** uncinus from 1st uncinigerous segment, scale is 0.01 mm. **e.** uncinus from 6th uncinigerous segment, scale is 0.01 mm.

connecting strip which is fused to segment 2 forming a blindly ending pocket or sinus (Fig. 16c). Segment 4 with small narrow elongate lateral lobe which connects onto the ventral pad, and connected across the dorsum by a tripartite shelf. Seventeen pairs of notopodia from segment 4, first pair of notopodia displaced towards mid-dorsal line, subsequent notopodia gradually realigned towards lateral position. Notosetae of 2 lengths, all broad-bladed, narrow-winged, smooth-tipped capillaries. Neuropodia from segment 5 (setiger 2) initially with uncini arranged in single rows, subsequently uncini in double rows from seventh uncinigerous segment to last thoracic segment, uncini arranged in single rows on abdominal tori. Uncini from first uncinigerous segment with well-chitinised long handled shafts and strongly crested heads with a dental formula MF:5-5-7: $\alpha$ : $\alpha$ , the last 2 rows each with numerous small teeth (Fig. 16d) which cannot be counted. Uncinial shaft is maintained on all thoracic uncini (Fig. 16e), the shaft still well developed on last thoracic uncinigerous segment. Abdominal uncini arranged on elongate rectangular tori with a small notopodial cirri; abdominal uncini lacking any shaft, all short-handled avicular uncini.

Ventral glandular pads present until setiger 14, then become less well differentiated and subsequently merge into a narrow midventral groove. Nephridial papillae not seen on holotype.

**Variation.** All the paratype material is incomplete and no specimen has a complete set of branchiae. The dentition of the thoracic uncini varies from MF:6:10: $\alpha$ : $\alpha$  to MF:6:8: $\alpha$ : $\alpha$ , with the teeth of the 1st row above the main fang long and pointed.

**Comments.** *Pista sinusa* most closely resembles *Pista trunca* Hutchings, 1977 in the development of a sinus inside the lateral lobe. This type of structure has not been reported from any other species of *Pista*. However it should be noted that in the original description of *P. trunca* the sinus was not detected.

*Pista sinusa* can be easily distinguished from *P. trunca* by the tripartite dorsal shelf connecting the lateral lobes of segment 4, whereas in *P. trunca* this shelf is not lobed. The dentition of the uncini and the development of the uncinial shaft along the thorax, also differs in the two species. *Pista sinusa* maintains an uncinial shaft to the last thoracic uncinigerous segment whereas in *P. trunca* the shaft has disappeared by the posterior thorax. To distinguish *P. sinusa* from other Australian species of *Pista* see Table 1.

**Etymology.** The specific name *sinusa* refers to the development of a sinus on the inside of the lateral lobe, and is derived from the latin *sinus* meaning pocket or recess.

**Habitat.** Occurs in sheltered protected areas and in deeper oceanic waters of Bass Strait.

**Distribution.** Bass Strait, Victoria (Western Port, Port Phillip Bay).

### *Pista trina* Hutchings

*Pista trina* Hutchings, 1977: 21–22, fig. 11a–e.

**Material examined.** HOLOTYPE: Queensland: Moreton Bay (AM W6798). New South Wales: Merimbula 1(AM W11778), 1(AM W11004).

**Comments.** The following additional comments on the lateral lobes are given. Segment 2 with ventrolaterally situated lobe connected midventrally by a U-shaped glandular strip. Segment 3 with flattened semi-circular lateral lobe extending as a free lobe laterodorsally, base of lobe more glandular than margins, lobes connected midventrally by a triangular glandular area. Segment 4 with no lateral lobe, segment expanded across the ventrum. Peristomium without any lateral extension.

No additional material of this species was found during this study.

**Habitat.** Occurs subtidally in muddy substrates.

**Distribution.** New South Wales (Merimbula), Queensland (Moreton Bay).

### *Pista trunca* Hutchings

Fig. 17a

*Pista trunca* Hutchings, 1977: 20–21, fig. 10a–f.

**Material examined.** HOLOTYPE: Queensland: Moreton Bay (AM W6973); Great Barrier Reef, Stn D16, 14° 32.2'S, 144° 53.4'E, 11 m, 1(BMNH ZB 1986.256), 1(BMNH ZB 1986.258), Stn 26, 16° 14.1'S, 146° 0.8'E, 22 m, 1(BMNH ZB 1986.259-260), Stn D, 14° 25.2'S, 144° 47.9'E, 15 m (BMNH ZB 1986.257).

**Comments.** The additional material collected closely resembles the type material, however more information is given on the positioning of the lateral lobes. Peristomium with large rectangular-shaped lateral lobe connected midventrally by a U-shaped glandular connecting strip with areolated glandular margins. Segment 2 with a small rounded ventrolaterally placed lateral lobe connected across the mid-dorsum. Segment 3 with large semi-circular lateral lobe which continues across the ventrum as a narrow ridge, inside the lobe is a connecting strip to the margin of segment 2 forming a pocket or sinus. Lateral lobe of segment 3 ridged longitudinally and slightly pigmented. Lateral lobe of segment 2 arises ventrolaterally to this sinus. Segment 4 with an elongated rectangular lateral lobe connected to glandular ventral pads, and continues across the dorsum as a straight ridge (Fig. 17a). Two pairs of branchiae arising dorsolaterally from the anterior thickened margins of segments 2 and 3.

The development of the sinus was omitted from the original description but is clearly present on all the material.

**Habitat.** Occurs subtidally in mud and coralline sand.

**Distribution.** Queensland (Great Barrier Reef, Moreton Bay).

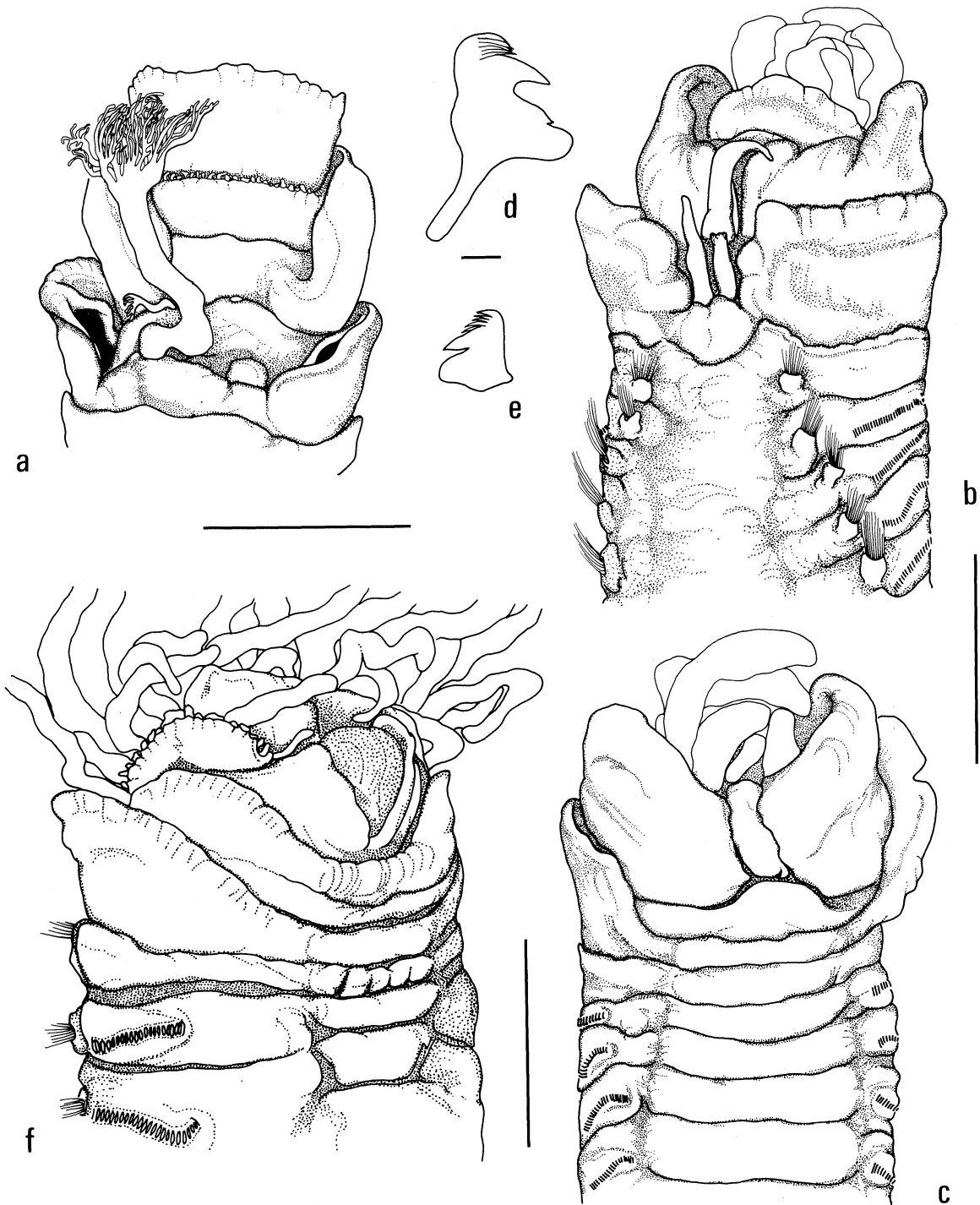


Fig.17. *Pista trunca* holotype. a. dorsal view of anterior end showing sinus development of lateral lobe of segment 3, scale is 1 mm. *Pista turawa* n. sp., holotype. b. laterodorsal view of anterior body, scale is 1 mm. c. ventral view of anterior body, scale is 1 mm. d. uncinus from first thoracic uncinigerous segment, scale is 0.01 mm. e. uncinus from anterior abdominal segment, scale is 0.01 mm. *Pista typha* Royal Soc. Univ. of Qld. GBRE 1973 St. L4 coll. no. 158, 25.viii.73. f. lateroventral view of anterior end, scale is 1 mm.

***Pista turawa* n. sp.**

Fig. 17b–e

**Material examined.** HOLOTYPE: (AM W200682) posteriorly incomplete, 2 cm long and 1.5 mm wide for 22 setigers. PARATYPES: several (AHF Poly 1475), several (BMNH ZB 1986.93-95), several (USNM 99979), many (AM W200683). All paratype material posteriorly incomplete. All material from the continental slope off Sydney, New South Wales, 34°16.1'S, 153°26.7'E, 4860–4866 m, collected by epibenthic sled.

**Description.** Alcohol preserved animal, pale yellow, posterior end not well preserved as found in thick muddy tube with pieces of foraminifera and sponge spicules embedded in walls.

Prostomium compact with numerous grooved buccal tentacles present. Eye spots absent. Branchiae, 2 pairs on segments 2 and 3, each branchiae with thin main stalk and 1 or 2 branches coming off.

Peristomium with very large inverted U-shaped lateral lobes fused midventrally with a wedge of glandular material. Segment 2 very narrow segment with no lateral lobe. Segment 3 with very large semi-circular lobe, very glandular at the base, extends as a lobe onto the laterodorsal margin, also expands ventrally to form a small ventromedial connecting lobe which connects the 2 lateral lobes together. Ventromedial lobe very glandular and thick. Segment 4 with very narrow elongate lateral lobe merges onto ventral glandular pads (Fig. 17b,c).

Seventeen pairs of notopodia beginning on segment 4. Notosetae golden yellow capillaries, all of similar length, broad-bladed, narrow-winged capillaries, drawn out into fine points. Neuropodia begin on segment 5 (setiger 2), thoracic uncini initially arranged in single rows, but arranged in double rows from the seventh uncinigerous thoracic segment, until the end of the thorax; uncini arranged in single rows in abdomen. Abdominal uncini on small rounded neuropodial pinnules projecting laterally towards the dorsum.

Uncini of first uncinigerous row with well developed chitinised shaft and a dental formula ranging from MF:3-6-8-8-10:α to MF:3-4-6-8-8-10:α. Teeth in first row above main fang consist of a large central tooth and 1 smaller tooth on each side (Fig. 17d), or where 4 teeth occur, consist of 1 large tooth and 3 smaller ones. Uncinial shaft, well developed on all thoracic uncini. Dental formula of uncini from last thoracic uncinigerous segment MF:3-4-5-6-8:α, with teeth in 1st row above main fang still unequal in size. Abdominal uncini lacking any shaft and with dental formula of MF:4-5-6-8:α:α (Fig. 17e), abdominal uncini considerably smaller than thoracic ones.

Initially ventral glandular pads rectangular and distinct for 1st, 9 setigers, following ventral pads develop a lateral glandular extension which merges with glandular area of the neuropodia. This arrangement continues for rest of thorax.

Last 2 or 3 thoracic segments bell-shaped with glandular girdles, subsequently the girdles continue

but following segments not elongated. Nephridial papillae not seen.

**Variation.** The paratypes vary considerably in their state of preservation, and they are easily damaged as the tubes are split open. The development of lateral lobes seems consistent, although there is some variation in the development of the branchiae.

**Comments.** *Pista turawa* n. sp. clearly differs from all the other Australian species of *Pista* in the development and arrangement of the lateral lobes, in the lack of a lateral lobe on segment 2 (see Table 1), and in the poorly developed branchiae. *Pista turawa* is unusual in the pronounced chitinised shaft on the uncini which is present throughout the thorax. The majority of *Pista* species have a chitinised shaft developed on only the first few thoracic segments, but in many species descriptions, the posterior thoracic uncini are not described, so perhaps this feature is more widespread than appears.

Several species of *Pista* from deep water have been described, *P. abyssicola* McIntosh, 1885, *P. corrientis* McIntosh, 1885, *P. disjuncta* Moore, 1923, *P. mirabilis* McIntosh, 1885, *P. vinogradovi* Uschakov, 1955 (= *P. pacifica* Uschakov, 1950, name preoccupied), *P. robustiseta* Caullery, 1944, *P. sibogae* Caullery, 1915, *P. somberiana* McIntosh, 1885 and *P. vinogradovi* Uschakov, 1955 (transferred to the genus *Scionella*, see Holthe, 1986). Based on examination of McIntosh types and from the literature for the other species, *P. turawa* clearly differs from all these species in the limited development of the branchiae, the development of the lateral and peristomial lobe and the well-developed chitinised uncinial shaft present on all thoracic uncinigerous segments.

**Etymology.** The specific name *turawa* refers to the name of an Aboriginal tribe living on the coast just south of Sydney, the Turawal tribe.

**Habitat.** Occurs in deep water on the continental slope, living in dense colonies. A few of the tubes opened in the colony contained an ampharetid was present. It is very unusual to find these two families living in such close association.

**Distribution.** New South Wales (continental slope of Sydney).

***Pista typha* Grube**

Fig. 17f

*Terebella (Pista) typha* Grube, 1878a: 232–233, pl. 12, fig. 4.

*Pista typha*.—Hutchings, 1977: 22–23, fig. 12a–b (in part. rest = *P. australis*).—Hutchings & Murray, 1984: 100 (in part. rest = *P. australis*). Non Hutchings & Rainer, 1979.

**Material examined.** HOLOTYPE: (MPW 518) Philippines (Bohol) Semper. Queensland: Great Barrier Reef: Stn D26, 16°41.1'S, 146°08'E, 22 m, (BMNH ZB 1986.124), Stn D16, 14°32.2'S, 144°53.4'E, 11 m, 1 (BMNH ZB 1986.130); Turtle Island, Stn K, 13°28.2'S, 143°42.0'E, 22 m, 5 (BMNH ZB 1986.128); Nymph Island Stn N6,

1(BMNH ZB 1986.158-160), Stn N1, 2(BMNH ZB 1986.126-127); Hope Island Stn EH 2, 3(BMNH ZB 1986.131-133); Low Isles, Stn L4, 16°23.2'S, 145°34.0'E, 4(BMNH ZB 1986.135-139), Stn L7, 1(BMNH ZB 1986.161-163), Stn L6, several(BMNH ZB 1986.154-157), Stn L2, 2(AM W200810), Stn L4, 5(AM W200811); Stn K5, 11°40.4'S, 143°58.3'E, 1(BMNH ZB 1986.128), Stn 2,4, 8(AM W200812), Three Isles Stn 3, 5(BMNH ZB 1986.146-151); Stn D32, 15°44.0'S, 145°27.1'E, 18 m, 1(BMNH ZB 1986.153), Stn D49, 14°42.6'S, 145°10.1'E, 1(BMNH ZB 1986.134) Stn D45, 15°37.3'S, 145°26.5'E, 18 m, 1(BMNH ZB 1986.164), Stn D34, 15°43.8'S, 145°29.2'E, 1(BMNH ZB 1986.125) Stn D5, 1(BMNH ZB 1986.152), Stn D41, 15°37.8'S 145°21.0'E, 1(BMNH ZB 1986.140); One Tree Island, lagoon (AM W201114). Calliope River, Gladstone (AM W198257), (AM W198258); 23°49'S 152°49'E, 348-357 m 1(AM W200964); Moreton Bay (AM W5053).

**Holotype.** The holotype of *P. typha* is a poorly preserved specimen in 2 pieces, total length 3 cm and 1.5 mm in width. The body wall is beginning to breakdown. The branchiae are tufted, plume like, with the branches coming off in a spiral, and each branch itself branched. Interpretation of the lateral lobes is a very tentative but appears that segment 3 has a laterally placed lobe and segment 4 has a small triangular lateral lobe adjacent to the notopodia. The holotype is damaged midventrally so it is not possible to see if the lateral lobes on segments 3 and 4 are connected midventrally. Peristomial folds are absent. The Queensland material agrees with the characters which can be determined on the holotype and an expanded description of *P. typha* based on the Australian material is given below.

**Description.** Two pairs of branchiae, first pair larger than second pair, branchiae of pair not equal in size. Considerable variation occurs as to which branchiae is largest, typically those on segment 2 are the largest, but it can be one of those occurring on segment 3. This suggests that *P. typha* can regenerate its branchiae if they are lost through predation.

Branchiae arise on anteriorly thickened projecting lip of anterior dorsal margin of segments 2 and 3. Branchial filaments come off main axis in tiers, individual filaments branched. Branching more pronounced on larger specimens. Eye spots present or absent.

Lateral lobes on segment 2 situated more laterally than those on segment 3, lobes connected midventrally, by distinct glandular strip. Larger lateral lobes on segment 3 than on segment 2. Lobes semi-spherical, more ventral than lobes on segment 2; base of lobe far more glandular than anterior margin, fuses ventrolaterally with ventral glandular pad. Segment 4 has small semi-spherical lobe, occurring very close to notopodia, continues across ventrum as thickened ridge which joins onto ventral glandular pad. Base of prostomium has thickened margin from which buccal tentacles arise and anteriorly projecting tongue. Margins of peristomium expanded, forming 2 small lobes connected midventrally by ridge (Fig. 17f) which forms an indented thickened ventral glandular strip.

**Comments.** Hutchings (1977) originally reported that *Pista typha* occurred from Moreton Bay in Queensland to Western Port and Port Phillip Bay in Victoria. Examining additional material revealed that two species had been confused as *P. typha*. *Pista typha* occurs in Queensland. South of Moreton Bay, Queensland, *P. australis* n. sp. occurs. The two species have similar branchiae but can be easily separated by the shape of the thoracic uncini and the development of the lateral lobe.

**Habitat.** Occurs from the intertidal to the continental slope (357 m) in muddy coral sand, living in compact tubes made of cemented sand grain.

**Distribution.** Queensland (Great Barrier Reef, Calliope River, Moreton Bay).

### *Pista violacea* Hartmann-Schröder

Fig. 18a-b

*Pista violacea* Hartmann-Schröder, 1984: 45, figs 54-60.  
*Nicolea venustula*.—Hartmann-Schröder, 1979: 148 (in part. rest = *Lanicides fascia*). Non Montagu, 1818.

**Material examined.** HOLOTYPE: Northern Territory: East Arm Boat Ramp, Darwin (NT W1644). Western Australia: Broome 1(HZM P16621), Halls Bank, Fremantle 10 m (AM W5490). PARATYPE: South Australia: Ceduna, Denial Bay 1(AM W198418) 1.2 m, intertidal in amongst algae; Upper Spencer Gulf, Chinaman's Creek 1(AM W5975); Maston, (AM W200899). Tasmania: D'Entre Casteaux Channel 43°2.42'S, 147°20.50E, 14.5-16.5 m, dredged (AM W200905). Bass Strait: Stn 107 (NMV F52606); Stn 117, (NMV F52607), Stn 219 (NMV F52608). New South Wales: Twofold Bay, Quarantine Bay 1(AM W200906), Jervis Bay, Darling Point 20 m 1(AM W200770), Split Solitary Island 1(AM W201318).

**Description.** The following additional information on the paratype and additional material collected is given. Paratype a small posteriorly incomplete specimen, about 1 cm in length, pale purple in colour. Only 1 branchia remains, having relatively long main stalk with few dichotomous branches. Branchiae or branchial scars situated on anterior margins of segments 2 and 3, almost on mid-dorsal line, in vertical arrangement. Prostomium compact. Peristomium with margins expanded to form large laterally encompassing lobes connected midventrally by inverted U-shaped connecting strip. Segment 2 with first pair of branchiae arising from thickened anterior margin which continues laterally as thickened margin, expands into lateroventral lobe, connects midventrally to form distinct collar, midsection pleated. Segment 3 with pair of large lateral lobes and connected across midventrum, bases of lateral lobes continue across mid-dorsum, to form shelf from which second pair of branchiae arise. Segment 4 with small rectangular lobe (Fig. 18a,b) not connected midventrally, forming ridge across dorsum. Arrangement of lateral lobes can be easily made out by tracing lobes from midventrum and gradually following them around to dorsum. First



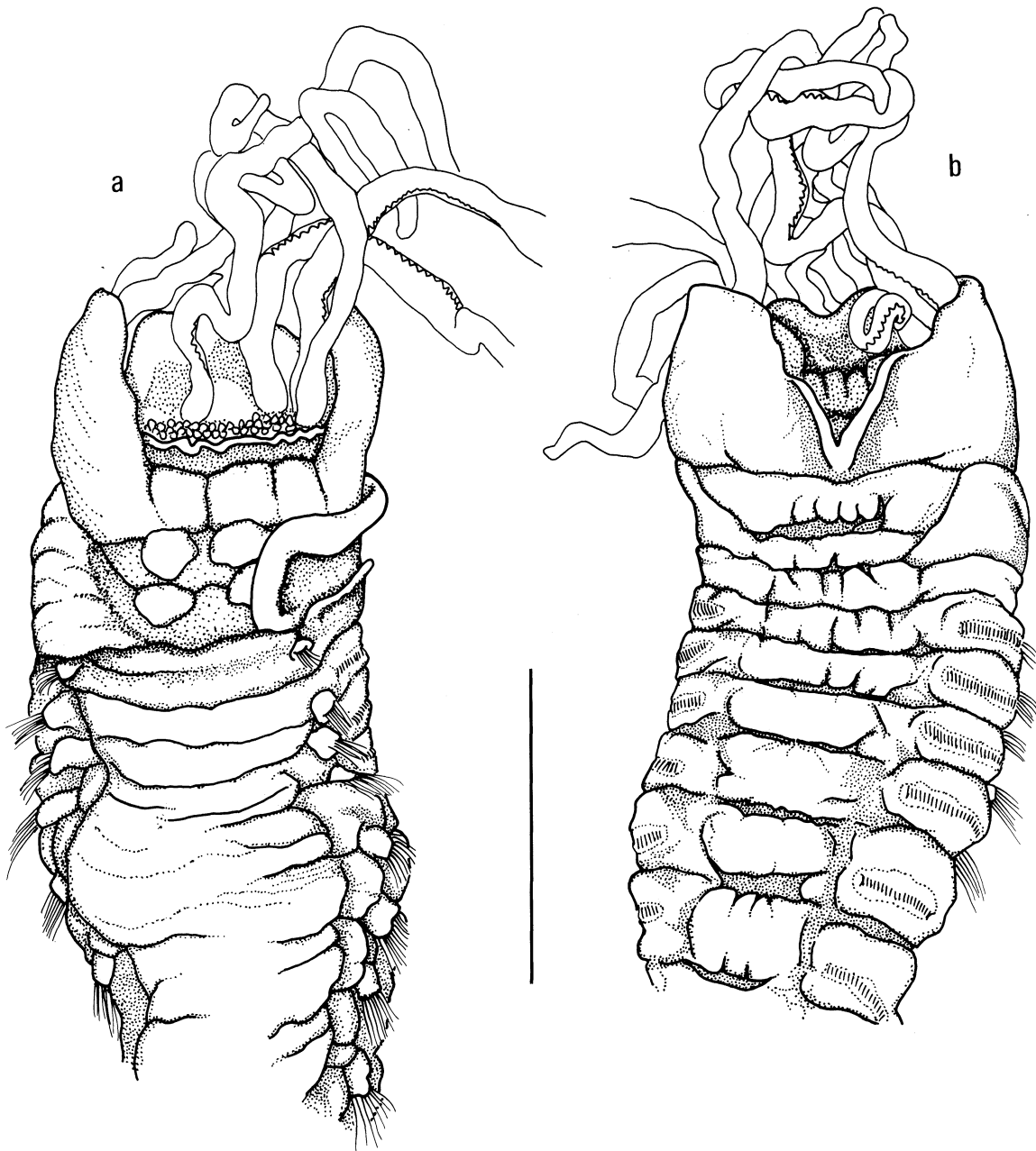
pair of notopodia displaced dorsally in relation to subsequent notopodia. Abdominal neuropodia with small remnant notopodial cirri attached along edge of tori.

The additional material from southern Australia, which is much larger than Hartmann-Schröder's material, contains some material which have nephridial papillae on first and third setigers. The papillae are elongate and arranged intersegmentally

on the posterior margin of setigers 1 and 3. The specimens from the Bass Strait have varying amounts of the purple pigment present. The pigment appears to persist at least for several years in alcohol storage.

**Comments.** The distribution of *P. violacea* has been considerably expanded and Hutchings (in press) has recently found it in Hong Kong.

**Habitat.** Occurs from intertidal to depths of 43 m.



**Fig.18.** *Pista violacea* paratype (AM W198418). **a.** dorsal view of anterior body, scale is 1 mm. **b.** ventral view of anterior body, scale is 1 mm.

**Distribution.** Northern Territory, Western Australia, South Australia, Tasmania, Bass Strait, southern New South Wales.

*Reteterebella* Hartman, emended

*Reteterebella* Hartman, 1963: 355.

Branchiae, 3 pairs, on segments 2–4, stalked, dendritically branched. Lateral lobes inconspicuous or absent. Notopodia from segment 5, 16 pairs; notosetae smooth, narrowly winged capillaries. Neuropodia with uncini from segment 5 (setiger 2), arranged in single rows to segment 9, from segments 10–20 uncini arranged in double rows which alternate, face to face, abdominal uncini arranged in single rows. Abdominal uncini with fine tendons extending from base through each torus, these tendons absent on thoracic uncini. Nephridial papillae, 3 pairs on segments 3–5. Gonopores, 3 pairs on segments 6–8.

**Type species.** *Reteterebella queenslandia* Hartman, 1963, by original designation.

**Comments.** We have expanded the generic description of *Reteterebella* to include the absence of lateral lobes. Also the notopodia and neuropodia begin on the first post branchial segment as indicated by Hartman (1963), but we regard this as the fifth segment, not the fourth as stated by Hartman.

The presence of fine tendons in the abdominal tori resembles those of *Polycirrus* (Hutchings & Glasby, 1986b) and appears to be a relatively rare occurrence in the Amphitritinae. Rather than indicating any phylogenetic affinity with *Polycirrus*, however, we feel that this character is more likely to be an example of convergence as *Polycirrus* differs from *Reteterebella* in several major respects including the absence of branchiae and having uncini arranged in single rows throughout.

The genus was originally described from Australia, although Gibbs (1971) subsequently reported *R. queenslandia* from the Solomon Islands.

**Key to the Australian species of *Reteterebella***

1. Lateral lobes absent; nephridial papilla on segment 5 dorsal to first pair of notopodia. .... *R. aloba*
- Lateral lobes present; nephridial papilla on segment 5 lateral to first pair of notopodia. .... *R. queenslandia*

***Reteterebella aloba* n. sp.**

Fig. 19a–g

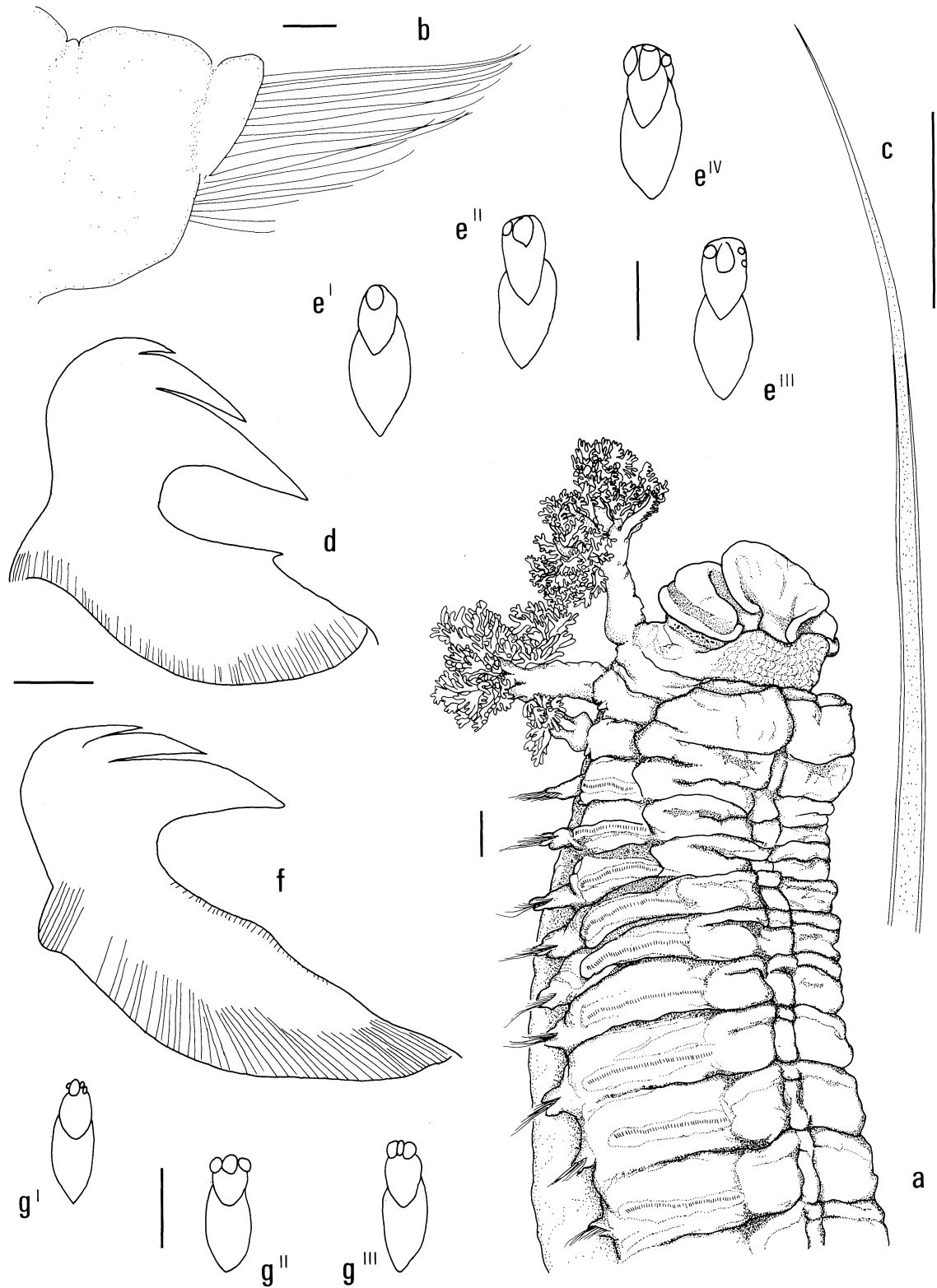
**Material examined.** HOLOTYPE: New South Wales: Port Jackson, Bottle and Glass Rocks 35°53'S, 151°13'E (AM W200135); complete about 120 mm long, 99 segments, 9.0 mm wide. PARATYPES: Port Jackson 1(AM W200134), Bottle and Glass Rocks 33°51'S, 151°16'E 3(AM W102), Camp Cove 33°51'S, 151°17'E 1(USNM 99980); Manly, Fairy Bower 30°53'S, 148°15'E 1(AHF Poly 1476), 1(BMNH ZB 1986.96). Paratypes range in width from 4.5–8.8 mm wide.

**Additional material examined.** South Australia: Kangaroo Island, Penneshaw Jetty 1(AM W200136). New South Wales: Twofold Bay, Quarantine Bay 2(AM W200138), Murrumbulga Point 1(AM W200137).

**Description.** Body long, robust, widest midanteriorly, gradually tapering posteriorly. Tentacular lobe collar-like, prostomium short, smooth. Buccal tentacles absent. Eye spots faint, arranged in faint band across posterior tentacular lobe. Peristomium equal in length to segment 2 dorsally, slightly longer than segment 2 laterally, ventrally distinct, forming thin shelf-like lower lip, partially covering inner lips. Branchiae very prominent, 3 pairs, on segments 2–4, thickly stalked, heavily branched, first pair largest, succeeding pairs progressively smaller; arise just above line of notopodia. Lateral lobes absent (Fig. 19a).

Notopodia from segment 5, 16 pairs; podia rectangular with distal lobe enveloping notosetal bases (Fig. 19b). Notosetae smooth tipped, narrow-winged capillaries of 2 lengths, arranged in 2 tiers; surface of blade appears minutely pitted and granular, wings of setae faintly striated (Fig. 19c). Neurosetae from segment 5 (setiger 1), extending to pygidium; podia long, low ridges on thorax decreasing to about 1/3 length of anterior segments, becoming elevated from body wall on first abdominal segment, then decreasing in length from midabdomen. Thoracic uncini with a delicate sub rostral guard visible under oil immersion and 2 rows of teeth surmounting a main fang, dental formula MF:1:1–4 with medial tooth largest in distal row (Fig. 19d,e); abdominal uncini without subrostral guard, *Polycirrus* like dental formula MF:1:2–4 (Fig. 19f,g). Uncini arranged in single rows to segment 9 and on abdominal segments, from segments 10–20 in double rows which alternate, face to face.

Midventral glandular pads extending to segment 16, thereafter a shallow glandular groove extending to pygidium; anteriorly, pads well developed, incised medially by a somewhat irregular furrow which extends to segment 10 or 11 (Fig. 19a). Three pairs of nephridial papillae on segments 3–5, first 2 pairs at posterolateral base of branchiae, 3rd pair just dorsal to first pair of notopodia, papillae small. Gonopores,



**Fig. 19.** *Reteterebella aloba* n. sp., holotype. (AM W200135). **a.** lateroventral view of anterior body, scale is 1 mm. **b.** 5th notopodium from left side, anterior view, scale is 0.1 mm. **c.** long notoseta from setiger 5, scale is 0.1 mm. **d.** side view of uncinus from segment 10, scale is 0.01 mm. **e-i.** frontal views of uncini from segment 10, scale is 0.01 mm. **f.** side view of uncinus from midabdominal setiger, scale is 0.01 mm. **g-i.** frontal views of uncini from midabdominal setiger, scale is 0.01 mm.

3 pairs on segments 6–8, between noto- and neuropodia, represented by small, rounded swellings.

**Variation.** The paratype material exhibited the following variation: eyespots either faint or else heavily pigmented; lower lip shape variable, may be folded back revealing inner lips; structure of notosetae and uncini consistent with holotype, dental formula of uncini exhibiting slightly more variation than holotype with MF:1:1-8; midventral glandular pads without medial furrow in some specimens, variable; nephridial papillae and gonopores present on all specimens, but sometimes very small.

**Comments.** *Reteterebella aloba* n. sp. may be distinguished from *R. queenslandia* Hartman in lacking lateral lobes, in having the nephridial papillae on segment 5 dorsal to the first pair of notopodia rather than lateral to the first pair (Hartman, 1963, Fig. 1) and in the structure of the setae. Notosetae have a pitted surface in *Reteterebella aloba*, but have a smooth surface in *R. queenslandia*. The uncini change shape along the body in *Reteterebella aloba*, becoming *Polycirrus*-like on the abdomen but remain similar throughout in the Queensland species. In addition the dental formula of the uncini differs between the two species with *Reteterebella aloba* having one tooth in the first row above the main fang and *R. queenslandia* having at least two teeth in this position.

**Etymology.** The specific name *aloba* refers to the absence of lateral lobes, and is derived from the latin *lobus* meaning a rounded projection, like a lateral lobe and used in the negative.

**Habitat.** Occurs in sheltered marine waters 3–10 m, under rocks, or in crevices sometimes associated with sponge and *Posidonia* beds.

**Distribution.** South Australia (Penneshaw Jetty), New South Wales (Sydney region).

***Reteterebella queenslandia* Hartman**

Fig. 20a–d

*Reteterebella queenslandia* Hartman, 1963: 355–357, pl. 1, figs 1–3.—Gibbs, 1971: 198.

**Material examined.** HOLOTYPE: Queensland: Heron Island, reef flat (AM W3755); Marian Reef, Coral Sea (AM W12421); Port Denison 1 (AM W843); Lizard Island, Coconut Beach 2 (AM W200132). Solomon Islands, Maraunibina Island (BMNH 1970.789).

**Comments.** The Lizard Island material examined shows no further variation than indicated by Hartman (1963). The specimen from Port Denison shows a greater range in the dental formula of uncini as follows:–MF:2-6:0-5 (Fig. 20a–c) but teeth in the distal row are minute and in side view the uncinus appears to have only one row surmounting the main fang as in the holotype (Fig. 20d). Material identified by Gibbs (1971) from the Solomon Islands has been re-examined and agrees closely with the type material from Australia.

The species probably occurs in north-west Australia, but no complete animals have been collected.

**Habitat.** Occurs on sandier parts of reef flat, usually under dead coral boulders also from 8 m at Lizard Island on fringing reef, in all cases animal deeply embedded in the reef, living in a soft, flimsy tube made of silt particles. Presence of worm indicated by long white tentacles extended for 1–2 m from animal; tentacles only partially retractile. Species may be locally abundant.

**Distribution.** Queensland.

***Terebella* Linnaeus, emended**

*Terebella* Linnaeus, 1767: 1092.—Hessle, 1917: 187.—

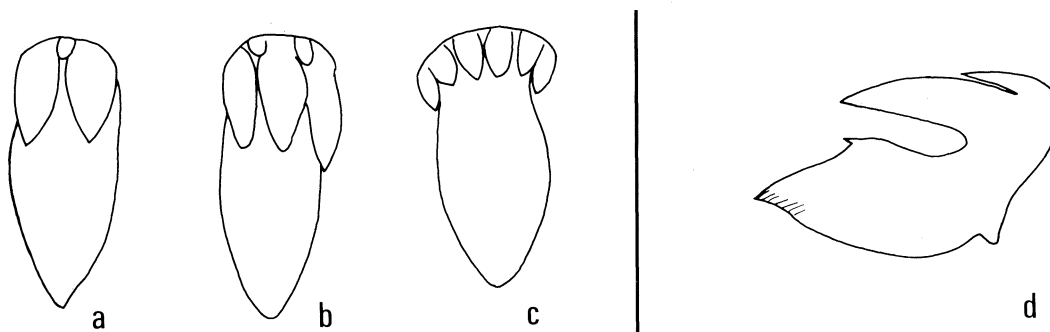
Fauvel, 1927: 254.—Day, 1967: 747.

*Heteroterebella* Quatrefages, 1865: 384.

*Heterophyselia* Quatrefages, 1865: 386.

*Leprea* Malmgren, 1866: 389.

Three pairs of branched branchiae from segment 2. Lateral lobes absent. Notopodia from segment 4, continue for a variable number of segments; notosetae distally serrated. Neuropodia with uncini from segment 5, arranged in double rows, face to face or alternate rows on posterior thorax. Nephridial papillae from segment 3.



**Fig. 20.** *Reteterebella queenslandia* (AM W843). a. uncinus from segment 10, MF:2:1, scale is 0.05 mm. b. uncinus from segment 10, MF:3:2, scale is 0.05 mm. c. uncinus from segment 10, MF:6, scale is 0.05 mm. d. side view of uncinus from segment 10, scale is 0.05 mm.

**Type species.** *Terebella lapidaria* Linnaeus, 1767, by monotypy.

**Comments.** We have restricted the generic diagnosis of *Terebella* slightly to include only those species with three pairs of branched branchiae. Previous generic diagnoses (Fauvel, 1927; Day, 1967) have stated that two or three pairs of branchiae may be present. This, however, created some confusion as *Amphitritides* Augener, 1922 also has two pairs of branchiae and in other respects is indistinguishable from *Terebella*.

A literature review of all *Terebella* species listed by Hartman, 1959 (excluding questionable species) showed that almost all have three pairs of branched branchiae. The exceptions are *T. parvabranchiata* Treadwell, 1906 which apparently has only one pair, however Treadwell mentions that the animal was in poor condition and that other branchiae may have been lost; *T. pterochaeta* Schmarda, 1861, which has three pairs according to Schmarda but only two according to some later reports (McIntosh, 1885; Day, 1967); and *Terebella (Schmardanella) californica* Moore, 1904 which has two pairs of branchiae and has been transferred to *Neoleprea* by Banse, 1980.

Although we recognise the number of pairs of branchiae to be consistent within this genus, we have deliberately not specified the segments on which these occur. Most species of *Terebella* have branchiae on segments 2, 3 and 4, however a few species have the third pair of branchiae differently situated. For example *T. gorgonae* Monro, 1933 (BMNH 1933.7.10.286-290 and BMNH 1933.7.10.291-293) and *T. tantabiddyreekensis*, Hartmann-Schröder, 1980 have the third pair arising from the junction of segments 4 and 5, *T. ehrenbergi yappensis* Okuda, 1937 has the third pair arising from segment 5, *T. maculata* n. sp., this paper, has the third pair arising from segment 6 and *T. inversa* (Willey, 1905) has the third pair from segment 6 or 7. *Terebella haplochaeta* (Ehlers, 1904) has the third pair of branchiae arising from the posterior section of segment 4. The third

pair of branchiae in all these species is dorsally displaced. Other species of *Terebella* having the third pair of branchiae dorsally/posteriorly displaced may be found if type material was to be re-examined.

We have retained these aberrant species in the genus *Terebella* as they resemble other species of *Terebella* in other respects. Four species of *Terebella* are represented in Australian waters. *Terebella stenotaenia* Grube, 1871 was described from Moreton Bay, Queensland, however the description is very brief and the type material could not be located. *Terebella pappus* is common in southern waters, *T. tantabiddyreekensis* Hartmann-Schröder, 1980 is more common in northern waters, and *T. maculata* is known from a single record from the Lacepede Group, Western Australia. *Terebella haplochaeta* (Ehlers, 1904), originally described from New Zealand, has been widely recorded in Australia by Augener (1913, 1914) and Hartmann-Schröder (1980, 1981, 1983, 1984, 1985). Examination of the material described as *T. haplochaeta* from Australia indicated it is *Terebella tantabiddyreekensis* Hartmann-Schröder, 1980. The type (HZM PE 1188) of *Terebella haplochaeta* (Ehlers, 1904) has three pairs of branchiae on segments 2, 3 and 4 of which the second pair is inserted more laterally than those on segments 2 and 4. The first pair of branchiae arise at the junction of segments 2 and 3, second pair at the junction of segments 3 and 4, and the third pair arises in the middle of segment 4. The branchiae have a short thick main stalk with numerous dichotomous branches which come off along the main axis in a slightly spiralled fashion. The notosetae each have a distinct swelling at the base of the serrated blade. *Terebella haplochaeta* does not occur in Australia, and is restricted to subantarctic islands such as Auckland and Campbell Islands and New Zealand (Augener 1923, 1926, 1932; Benham 1927, 1950; Knox & Cameron 1970). Hartmann-Schröder (1979) also recorded *Terebella pterochaeta* Schmarda, 1861 from North West Australia and is synonymised with *Amphitritides ithya*, a new species described in this paper.

#### Key to the Australian species of *Terebella* \*

1. Third pair of branchiae arises on segment 4. . . . . *T. pappus*  
 — Third pair of branchiae arises elsewhere. . . . . 2
2. Third pair of branchiae arises on segment 6. . . . . *T. maculata*  
 — Third pair of branchiae arises on the junction of segments 4 and 5.  
 . . . . . *T. tantabiddyreekensis*

\* *Terebella stenotaenia* Grube is not included in the key as it is incompletely known.

*Terebella maculata* n. sp.

Fig. 21a–h

**Material examined.** HOLOTYPE: Western Australia, Lacepede Group, West Island 16°52'S, 122°08'E (WAM 26-84), complete, about 106 segments, 32 mm long, 2.3 mm wide, female.

**Description.** Body wall of midsection distended with eggs, abdomen gradually tapering, adorned with dark pigment spots on dorsum (Fig. 21a). Tentacular lobe compact. Buccal tentacles filiform, grooved, longest extending about half way back along body. Eyespots present in discontinuous band across posterior tentacular lobe, most numerous laterally, absent medially. Peristomium very short dorsally, equal in length to segment 2 laterally, forming broad, crescent-shaped lower lip ventrally. Branchiae richly branched, thick stalk, 3 pairs on segments 2, 3, 6; first two pairs arise just above line of notopodia, third pair dorsally displaced, slightly larger than first 2 pairs. Lateral lobes absent (Fig. 21b).

Notopodia from segment 4, continuing to near pygidium; podia slender, short initially (Fig. 21c), and reducing in size posteriorly to small tubercle. Notosetae in anterior notopodia of 2 lengths, arranged in 2 tiers, long, slender, narrow-winged capillaries with short, faintly hispid tip, and shorter setae of the same type (Fig. 21d,e); posteriorly notosetae with longer, broader hispid blade and narrow, wingless stem, graded lengths (Fig. 21f,g). Neuropodia from segment 5 (setiger 2), present on all subsequent segments to the pygidium; podia low ridges throughout, longest midanteriorly, decreasing in length gradually posteriorly. Uncini with small, anteriorly pointing, subrostral ligament (Fig. 21h), dental formula MF:3-4:5-8:α, similar throughout; uncini arranged in single rows to segment 10, then in double rows, face to face, last 25 or so segments uncini again arranged in single rows.

Midventral glandular pads on segments 2–13, thereafter a shallow, segmented, glandular groove to pygidium. Nephridial papillae large, 1 pair on segment 3, arising anterior to second pair of branchiae. Pygidium without anal cirri.

**Comments.** *Terebella maculata* n. sp. belongs to the group of *Terebella* which have the third pair of branchiae dorsally displaced and arising from segments 5 to 7. It differs from all of these in having uncini with a subrostral ligament. In addition it differs from the Australian species, *T. tantabiddycreekensis* in the dental formula of the uncini and the segment on which the third pair of branchiae arise.

**Etymology.** Specific name derived from the latin *macula* spot, (f), referring to the dark pigment spots adorning the abdomen.

**Habitat.** Occurs under rocks and in sandy mud intertidally.

**Distributions.** Western Australia (Lacepede Group).

*Terebella pappus* Hutchings & Murray

Fig. 22a–d

*Terebella pappus* Hutchings & Murray, 1984: 100–101, fig. 30.1–2.

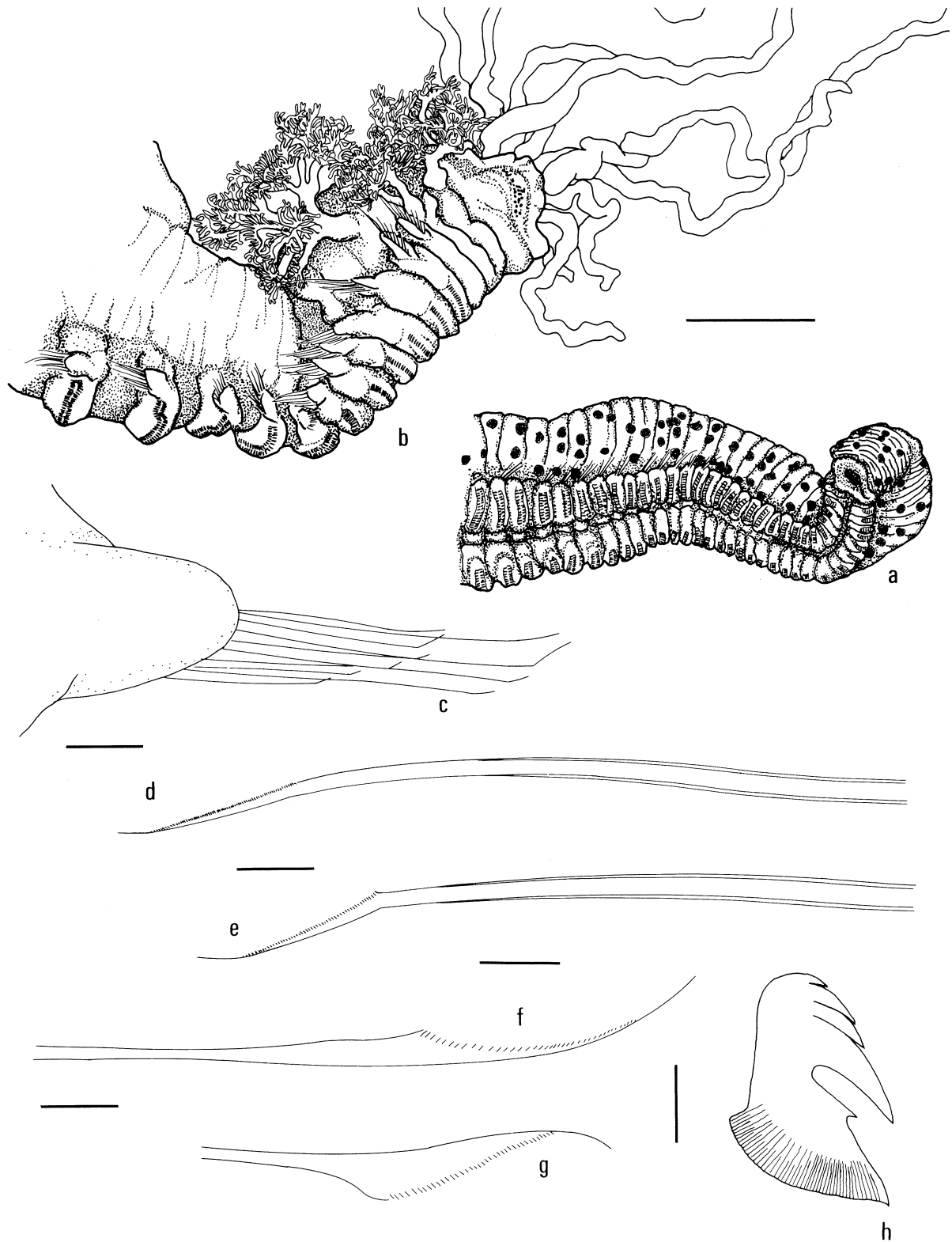
**Material examined.** Western Australia: Nornalup 1(AM W200029). South Australia: Venus Bay 2(AM W200000); Coffin Bay 5(AM W199986); Daly Heads 2(AM W199981); Kangaroo Island, Cape du Couedic 5(AM W199985), American River 10(AM W199979); Coobowie 2(AM W18466); Port Augusta 4(AM W200004); Torrens Island 3(AM W6772); Port Gawler 1(AM W18468); Victor Harbour 3(AM W200006); Cape Dombey 1(AM W200005). Tasmania: Flinders Island, Lady Barron 2(AM W200030). Victoria: Western Port Stn 226, 3(NMV unreg); East of Grey River, Otway's Coast 6(AM W200027); Bastion Point 16(AM W200020); Gabo Island many (AM W200028). New South Wales: Lake Merimbula 1(AM W200037), HOLOTYPE (AM W196195), PARATYPES 17 (AM 196196); Green Cape 1(AM W200035); Twofold Bay, Munganno Point 15(AM W200008); O'Hara Heads, south of Ulladulla 4(AM W200039); Wreck Bay, Cemetery Point 5(AM W200036); Bellambi Beach, north of Wollongong 7(AM W200038); Long Reef 3(AM W200041); Lord Howe Island 2(AM W200042); Coffs Harbour 2(AM W200011); Minnie Water 20 (AM W200015); Ballina 4(AM W200018); Lennox Head 6(AM W200013). Queensland: Hervey Bay, Pialba 9(AM W200019). A selection of material examined, size ranging from individuals with 48 segments, 4.6 mm long, 0.9 mm wide to individuals with 85 segments, 26 mm long, and 2.5 mm wide.

**Comments.** The holotype and paratypes were examined and compared to the present material. In the type material we found notosetae to consist of one type, varying in length viz. very narrow winged capillaries with the distal portion finely serrated (Fig. 20a). The uncini of a paratype specimen were as described by Hutchings & Murray, 1984 (Fig. 20b,c) with a dental formula MF:3-5:6-8.

The present material varies from the type material as follows: – branchiae all uniform in size or decreasing in size posteriorly; uncini with teeth arranged in two or three rows above a main fang as follows:–MF:3-7:6-13, uncini arranged in an alternate row from segment 7, either face to face or back to back, nephridial papillae on segment 2 or anterior edge of segment 3, plus up to four pairs of low nephridial papillae on segments 6 to 9, situated between notopodia and neuropodia although these posterior papillae are often absent.

Some specimens of *Terebella pappus* from Western Port had parasitic copepods attached to them (Fig. 22d). A similar structure was reported by Hutchings & Glasby (1986b) as occurring on the tentacular membrane of the polycirrinid *Amaeana trilobata*, but wrongly interpreted as an egg sac rather than a parasitic copepod.

**Habitat.** Occurs intertidally on rock platforms in crevices, under stones, boulders, in soft sediment in rock pools; associated with *Mytilus edulis*, coralline algae and the serpulid *Galeolaria*. Occasionally the species is found among mangroves.



**Fig.21.** *Terebella maculata* n. sp., holotype. **a.** posterior end of body, ventral view, scale is 1 mm. **b.** anterior end of body, lateral view, scale is 1 mm. **c.** notopodia 4, left side (anterior) view, scale is 0.1 mm. **d.** long notoseta from notopodia 4, scale is 0.01 mm. **e.** shorter notoseta from notopodia 4, scale is 0.01 mm. **f.** long notoseta from midabdominal notopodium, scale is 0.01 mm. **g.** shorter notoseta from midabdominal notopodium, scale is 0.01 mm. **h.** uncinus from midabdominal segment, scale is 0.01 mm.

**Distribution.** Widespread and locally abundant in southern Australian waters.

*Terebella stenotaenia* Grube

*Terebella stenotaenia* Grube, 1871: 49.

**Material examined.** None.

**Description.** Based on the limited description given by Grube. Body with 34 segments. Branchiae, 3 pairs, dendritically branched. Notopodia from segment 4, present on all subsequent segments.

**Comments.** Type material has not been located. At this stage, it is unclear if this species even belongs to the genus *Terebella*.

**Habitat.** Unknown.

**Distribution.** Queensland (Moreton Bay).

*Terebella tantabiddycreekensis* Hartmann-Schröder

*Terebella tantabiddycreekensis* Hartmann-Schröder, 1980: 77–78, figs 122–123.

*Terebella haplochaeta*.—Hartmann-Schröder, 1980: 77 (?in part); ?1981: 58; ?1982: 91; ?1983: 149; 1984 (?in part only = at least 1 specimen of *Terebellas pappus*): 45; ?1985: 86; ?1986: 59.

*Leprea haplochaeta*.—Augener, 1913: 299–300; 1914: 87–89 (in part only, rest = ciratulid, maldanid and *Thelepus plagiostoma*).

**Material examined.** Western Australia: Exmouth (HZM P16623); Broome, Cable Beach 2 (NTM W2147); Abrolhos Group, Rat Island 10 (AM W200064), Shark Bay (HZM V8261); Cockburn Sound, Woodmans Point 2 (WAM 51-87), Princess Royal Harbour (HZM V8262); Rottnest Island (HZM V8260). New South Wales: Jervis Bay, Green Point 3 (AM W200119), off Moona Moona Creek 6 (AM W200126); Bass Point 9 (AM W200118); Clovelly 3 (AM

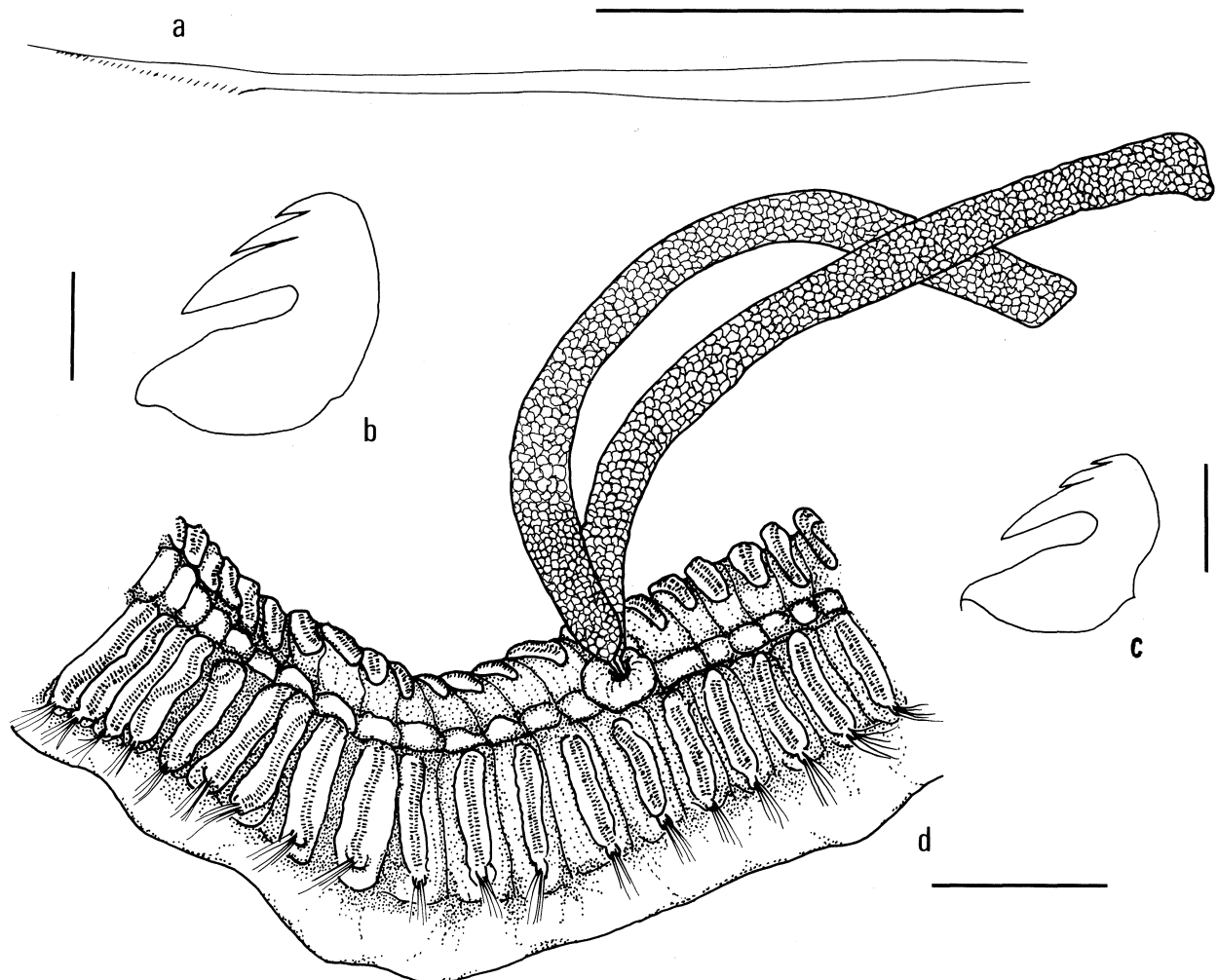


Fig. 22. *Terebella pappus* paratype (AM W196196). a. notoseta from setiger 6, scale is 0.1 mm. b. uncinus from setiger 13, scale is 0.01 mm. c. uncinus from setiger 50, scale is 0.01 mm. *Terebella pappus* NMV Survey 69/01-69/07 226, 5/1/69. d. ventral view, midabdominal setigers, with parasitic copepod, scale is 1 mm.



W200117); Long Reef 1(AM W200121); Terrigal Haven 5(AM W200130); Broughton Island 1(AM W13067); Lord Howe Island 3(AM W200108); South West Solitary Island 1(AM W200127); Minnie Water 1(AM W200112); Angourie Point 6(AM W200109). Queensland: Caloundra 1(AM W200061); Great Barrier Reef, One Tree Island 2(AM W200056), 1(AM W200055), 1(AM W200410), Lizard Island 1(AM W200075), 1(AM W200076), 4(AM W200068). Northern Territory: Fannie Bay 1(AM W200065). A selection of material examined, size range 73 segments, 11.2 mm long, 1.1 mm wide to 123 segments, 58 mm long, 5.2 mm wide.

**Comments.** The present records greatly extend the distribution of this species which was previously only known from Exmouth, Western Australia. The material examined showed the following variations: buccal tentacles with or without eyespots in preserved material; nephridial papillae on segments 3, 5 to 8 or 6 to 8 or 6 to 7, first pair elongate, cylindrical with diameter greatly expanded in one specimen from Bass Point, remaining pairs low, papilliform; notopodia extend for about two thirds to four fifths along body; notosetae of two lengths, shorter type with a subdistal swelling occasionally not as pronounced as illustrated by Hartmann-Schröder, 1980; uncini with dental formula MF:3:4-8, with most distal row containing teeth of variable size, some very small.

*Terebella tantabiddycreekensis* differs from other species of *Terebella* in having three pairs of richly branched gills, with the second pair laterally displaced and the third pair more dorsal, arising from the border of fourth and fifth segments; prominent nephridial papillae on segment 3, located anterodorsal to second pair of branchiae, plus low papillae, typically on segments 5 to 8 located ventral to notopodia; and two types of notosetae with shorter ones flagged, having a rounded, subdistal swelling below a serrated blade.

Material identified by Augener (1913, 1914) from Western Australia is in most cases referred to *T. tantabiddycreekensis* but a sample from Stn 64 on Rottnest Island is a mixture, consisting of a specimen of a cirratulid, a maldanid, *Thelepus plagiotoma* and *T. tantabiddycreekensis*. Hartmann-Schröder (1980, 1981, 1982, 1983, 1984, 1985, 1986) has recorded *T. haplochaeta* from many areas in Western Australia and South Australia. Some of this material has been examined. The material from Exmouth (HZM P16623) is *T. tantabiddycreekensis* but the specimen from Ceduna (HZM P18108) is *Terebella pappus*.

**Habitat.** Occurs intertidally to depths of 20 m often in reef environments, either rock or coral, associated with the kelp *Ecklonia radiata*, coralline algae, seagrass, Vermetidae and algal mats; sometimes associated with *Posidonia* seagrass beds.

**Distribution.** Australia, widespread north of about 32°S on the west coast and about 35°S on the east coast.

**ACKNOWLEDGEMENTS.** We should like to sincerely thank Anna Murray for preparing the plates. This study would not have been possible without the full co-operation of many people who loaned us material and diligently searched their collections for long forgotten types. We therefore thank sincerely: K. Fauchald (USNM), D. George & A. Muir (BMNH), A. Green (TASM) R. Hanley (NTM), G. Hartwich (ZMB), G. Hartmann-Schröder (HZM), S. Van de Spoel (ZMA), G. Morgan (WAM), P. Mather (QM), J. Moverley (QEC), J. Renaud-Mornant (MNHN), S. Parker (SAM), R. Ölerod (SSM), S. Rainer (CSIRO), L. Wallin (UUZM), J. Wiktor (MPW), R. Wilson (NMV). Neil Denning provided us with material of *Lanassa exelysis*. Peter Gibbs kindly allowed us to examine the terebellids collected during The Royal Society Expedition to the Great Barrier Reef in 1973. Finally we should like to thank Sue Doyle for SEM assistance, and Mandy Reid, Steve Perry and Jan Howarth for assistance in the preparation and typing of the manuscript. We should like to thank K. Fauchald, S. Rainer, S. Williams and J. Lowry for providing useful comments on the manuscript. Australian Biological Resources Study Committee provided the salary of one of us (CJG).

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Accepted 26 August 1987



