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## The Polycirrinae (Polychaeta: Terebellidae) from Australia

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**ABSTRACT.** The polycirrine fauna of Australia comprises four genera and 22 species. These are described, and a key to the genera and Australian species are provided. Eleven new species are described: *Hauchiella renilla* n. sp., *Lysilla laciniata* n. sp., *L. bilobata* n. sp., *L. jennacubinae* n. sp., *Polycirrus bicrinalis* n. sp., *P. disjunctus* n. sp., *P. nephrosus* n. sp., *P. parvus* n. sp., *P. paucidens* n. sp., *P. tessellatus* n. sp. and *P. variabilis* n. sp., and the following new combinations, *Amaeana apheles* (Hutchings) and *Polycirrus octoseta* (Hutchings). A full description of all Australian species of this subfamily is given except when a recent full description is available. Comments are made on the variety of characters which have been used to describe species of *Polycirrus* and the value of these characters.

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The Polycirrinae recorded from Australia prior to 1979 are listed by Day & Hutchings (1979) and include six species belonging to four genera. In 1984 we began a revision of the family Terebellidae (Hutchings & Glasby, 1986, in press), and by examining all the collections of terebellids housed in Australian Museums we have considerably expanded the polycirrine fauna of Australia. In this paper we describe 11 new species and synonymise the genus *Litancyra* Hutchings with the genus *Polycirrus* Grube.

The sizes of animals examined were measured as total body length excluding tentacles, maximum body width excluding notopodia, and the number of body segments. The Australian distribution of each species is indicated at the end of each species account, and exact localities are shown in Fig. 12. In cases where species are recorded from outside Australia, all existing records are indicated.

The following abbreviations have been used.

AHF Allan Hancock Foundation, Los Angeles  
AM Australian Museum, Sydney  
BMNH British Museum Natural History, London  
CSIRO Commonwealth Scientific and Industrial Research Organisation, North Beach, Perth

HZM Zoologisches Institut und Zoologisches Museum der Universität, Hamburg  
NMV National Museum of Victoria, now Museum of Victoria  
NMW Naturhistorisches Museum, Wien  
NSWSF New South Wales, Department of Agriculture, Fisheries Division  
QM Queensland Museum, Brisbane  
USNM National Museum of Natural History, Smithsonian Institution, Washington  
UZM Universitets Zoologiska Museum, Uppsala  
WAM West Australian Museum, Perth  
ZMA Zoologisch Museum, Amsterdam  
ZMB Zoologisches Museum, Museum für Naturkunde der Humboldt — Universität, Berlin  
ZMO Zoologisk Museum, Oslo

### Polycirrinae (Malmgren)

Polycirridae Malmgren, 1865: 390.—Caullery, 1944: 189-191.  
Polycirrinae Hesse, 1917: 219.

**Description.** Expanded tentacular membrane. Branchiae absent. Notopodia if present with capillary

setae often ornamented. Neuropodia if present with either elongated avicular uncini or short acicular spines. Neurosetae always arranged in single rows and neuropodial tori poorly developed. All types of setae may be completely absent.

**Comments.** We have followed the definition of Polycirrinae given by Hessle (1917) and subsequently

used by Fauchald (1977): all members of this subfamily lack branchiae and thoracic uncini (if present) occur in single rows. We have rejected Day's (1967) revised definition of Polycirrinae, which included all abbranchiate genera regardless of the arrangement of the uncini, since we consider the arrangement of the uncini to be a far more important character than the presence or absence of branchiae.

**Key to the genera of Polycirrinae**  
(after Fauchald, 1977)

1. Setae lacking on all segments. . . . . *Hauchiella*  
— Setae present on some segments. . . . . 2
2. Neurosetae lacking on all setigers. . . . . 3  
— Neurosetae present on some setigers. . . . . 4
3. Thoracic notopodia vascularised and in part furcate or branched. . . . *Enoplobranchus\**  
— Thoracic notopodia sometimes vascularised but never branched or furcate. . . . *Lysilla*
4. Neurosetae short handled uncini, present on thorax and or abdomen. . . . . *Polycirrus*  
— Neurosetae long handled spines, present only on abdomen. . . . . *Amaeana*

\*Genus not recorded from Australia.

***Amaeana* Hartman**

*Amaea* Malmgren, 1866: 392.

*Amaeana* Hartman, 1959: 495.

**Type species.** *Polycirrus trilobata* Sars, 1863, designated by Malmgren 1866.

**Description.** Tentacular membrane trilobed. Nine to 13 thoracic segments; notopodia from segment 3, with smooth or barbed notosetae. Thoracic neurosetal uncini absent; abdominal neurosetae long shafted spines.

**Comments.** The genus *Amaeana* in Australia is

represented by two estuarine species, *A. apheles* (Hutchings) new combination and *A. trilobata* (Sars), and one marine species *A. antipoda* (Augener). All species occur widely although discontinuously, and *A. apheles* and *A. trilobata* occur in the same habitat. The discontinuous distributions of all three species, especially marked for *A. antipoda*, reflects the sparse offshore collecting so far carried out in Australia.

To date, three of the six known species of *Amaeana* have been recorded from Australian waters: *A. apheles* is restricted to Australia, *A. antipoda* to Australasia and *A. trilobata* has apparently a cosmopolitan distribution.

**Key to Australian species of *Amaeana***

1. 11 pairs of notopodia; notosetae smooth, wingless capillaries. . . . . *A. antipoda*  
— 9–10 pairs of notopodia; notosetae smooth, wingless capillaries. . . . . 2
2. Achaetous region of 3–8 segments between thorax and abdomen; 9–10 pairs of notopodia. . . . . *A. apheles*  
— Achaetous region of about 12 segments between thorax and abdomen; 10 pairs of notopodia. . . . . *A. trilobata*

***Amaeana antipoda***

Figs 1a,b; 12A

*Amaea antipoda* Augener, 1926: 241, fig. 17.

**Material examined.** Western Australia: Dampier

Archipelago, Mermaid Sound 2(WAM 17-84). Queensland: Great Barrier Reef, Stn D25 (16°40.7'S 146°1.0'E), 1(BMNH ZB 1985.220); Stn D26 (16°41.1'S 146°0.8'E) 2(BMNH ZB 1985.222). One complete specimen (BMNH ZB 1985.220), about 56 segments, 21 mm long, 1.1 mm maximum width.

**Description.** Body with swollen, papillate thorax; long, tapering abdomen. Irregular patches of brown pigment scattered over body. Midventral groove deep on thorax, more shallow on abdomen, containing a series of narrow, glandular ventral pads. Thoracic notopodia slender, cylindrical, decreasing in length slightly after first few, total of 11 pairs. Notosetae fine, smooth capillaries, without wings (Fig. 1a), arranged in a single tier, increasing in length distally. Nephridial papillae small, present at base of each notopodium. Gonopores present on setigers 4–8 in mature specimens. Achaetous region extending posteriorly from thorax for 6–8 segments, approximately equal in length to thoracic region. Abdominal neuropodia papilliform, approximately 36 pairs; neurosetae slightly tapered, slender, acicular spines with blunt tips (Fig. 1b), 2–3 per fascicle.

**Remarks.** The present material agrees well with Augener's description. This is the first record of this species from Australia, which was previously known only from Lyttelton, New Zealand.

**Habitat.** Queensland material found in 22 and 27 m in calcareous mud with many bivalves (D25), and muddy sand with many foraminiferans (D26).

**Distribution.** Western Australia and Queensland (Fig. 12A). Lyttelton, New Zealand.

#### *Amaeana apheles* new combination

Figs 1c–e; 12A

*Lysilla apheles* Hutchings, 1974: 190–191, fig. 5A; 1977: 10–11.—Hutchings & Murray, 1984: 90.

*Amaeana trilobata*.—Hutchings, 1977: 9 (in part). Not Sars.

**Material examined.** HOLOTYPE (AM W5239), PARATYPES (AM W5237, W5238) from Wallis Lake, New South Wales. Western Australia: North West Shelf, off Port Hedland, many (AM W199562), many (AM W199580). New South Wales: Hawkesbury River 1(AM W195861), 1(AM W195875), 4(AM W195878). Queensland: Moreton Bay, Stn 46, 1(AM W7086), Stn 47, 1(AM W7095), Stn 54, 1(AM W7093); Nerang River 1(AM W10864); Calliope River 2(AM W8519), 3(AM W10338), 3(AM W13480), 1(AM W13482); Auckland River 1(AM W13187); Gladstone, 59(AM W199448); Mary River, Kangaroo Island 3(AM W5384); Townsville, Halifax Bay 3(AM W199446), 4(AM W199444), 1(AM W199440), 12(AM W199447), 2(AM W199445), 2(AM W199441), 1(AM W199439). Specimens mostly incomplete, range in width from 0.9–2.1 mm. Material examined from North West Shelf represents a selection of that available.

**Description.** Thorax with 9–10 pairs of notopodia from segment 3; last 1–2 pairs reduced in size; notosetae smooth capillaries, appearing very narrowly winged under 100x (Fig. 1c,d). Thorax without neuropodia. Achaetous region with about 12 segments, 1–2 times length of thorax. Abdomen with papilliform neuropodia, up to 70–80 pairs; neurosetae robust, highly tapered acicular spines, 1–2 spines per fascicle (Fig. 1e).

**Remarks.** Type material of *Lysilla apheles* Hutchings, 1974, from Wallis Lake and other material from

Moreton Bay (Hutchings, 1977) was re-examined. All specimens lacked the posterior part of the abdomen and therefore the abdominal neurosetae. Hutchings (1977) referred the specimens to the genus *Lysilla*, since they lacked branchiae, thoracic neurosetae and apparently also lacked abdominal neurosetae. Examination of whole specimens from similar environments on the east coast of Australia showed that the species does have abdominal neurosetae, which are absent from an initial achaetous abdominal region of up to twice the length of the thorax. *Lysilla apheles* is therefore transferred to the genus *Amaeana*.

The abdominal neurosetal spines of *A. apheles* are relatively thick at the base and highly tapered, and there are usually only 1–2 per neuropodial fascicle. *Amaeana trilobata* (Sars), a widespread Australian species, has 3–15 spines per neuropodial fascicle, and the spines are more slender than those found in *A. apheles* and a shorter achaetous region. Where the two species co-occur, such as in the Hawkesbury and Calliope Rivers and on the North West Shelf, they may also be distinguished by size and colouration. Preserved specimens of *A. apheles* are often smaller and more highly pigmented (brown-purple) than *A. trilobata*. The variation in the number of pairs of notopodia does not appear to be related to the size of the animal.

*Amaeana apheles* differs from other species in the genus in the number of pairs of notopodia and type of thoracic notosetae. *Amaeana accraënsis* (Augener, 1918) has 11–13 pairs of notopodia with smooth and barbed notosetae; *A. antipoda* (Augener, 1926) has 11 pairs of notopodia with smooth notosetae; and *A. occidentalis* (Hartman, 1944) has 12 pairs of notopodia with smooth notosetae (see key in Hartman, 1944). *Amaeana coleii* (McIntosh, 1926) is known only from an anterior fragment of 5–6 segments. Its generic status is questionable as the type description equally well fits the genus *Lysilla*.

**Habitat.** Estuarine and protected marine embayments, often amongst seagrass beds; in 40–80 m on North West Shelf in sandy and gravelly sand sediments.

**Distribution.** Western Australia, New South Wales and Queensland (Fig. 12A).

#### *Amaeana trilobata*

Figs 1f–i; 12A

*Polycirrus trilobatus* Sars, 1863: 305.

*Amaeana trilobata*.—Malmgren, 1866: 392, pl. XXV fig. 70; Fauvel, 1927: 285–286, fig. 99a–e.

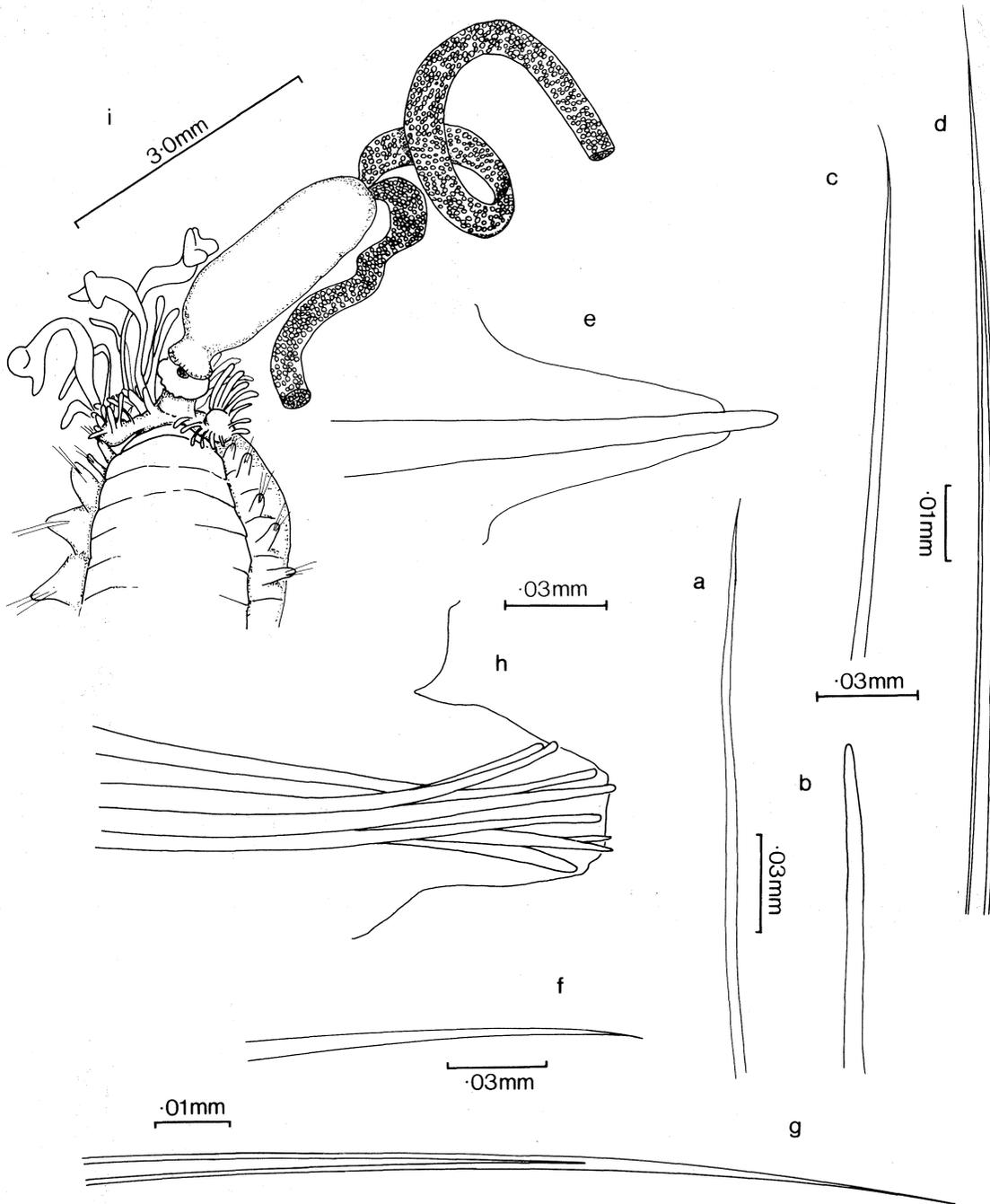
*Amaeana trilobata*.—Day, 1961: 533–534; 1967: 718–719, fig. 36.3e–h; 1973: 122, fig. 16d–f; Hutchings, 1977: 9 (in part); Hutchings & Murray, 1984: 90.

**Material examined.** TYPES (ZMO C3207a,b C3208) Christiansund (Største eks); Slaatholmen i Lofoten (de 2 minster) and Drøbak, Norway. Western Australia: North West Shelf, off Port Hedland 1(AM W199557). South Australia: Streaky Bay, Little Beach 1(AM W199014); Robe, Karatta

Beach 1(AM W199018). Victoria: Port Phillip Bay 1(AM W16115), 1(AM W16116); Western Port Bay 8(NMV F50357), 6(NMV F50356); Bass Strait 1(NMV F50355), 1(NMV F50354). Tasmania: Maria Island 1(AM W199019). New South Wales: Port Hacking 1(AM W195239); Botany Bay 1(AM W195744); Hawkesbury River 1(AM W195869), 2(AM W195860); South West Solitary Island 1(AM W199030); Lennox Head 1(AM W199031). Queensland: Moreton Bay 1(AM W5082-4), 1(AM W5066), 1(AM W7047), 1(QM G6701); Gladstone, Calliope River 1(AM W10340), 1(AM

W10341), 1(AM W13476); Townsville, Halifax Bay 1(AM W199027).

**Description.** Ten pairs of thoracic notopodia from segment 3. Notosetae fine, smooth, capillaries, appear very narrowly winged under high power (Fig. 1f,g) and, in some cases finely hirsute distally, perhaps as a result of wear. Achaetous region between thorax and abdomen with 3-8 segments, less than or equal to length of thorax. Abdomen of larger animals (eg. QM G6701)



**Fig. 1.** *Amaeana antipoda*: a, midthoracic notoseta; b, midabdominal neuroseta. *Amaeana apheles*: c,d, midthoracic notoseta; e, midabdominal neuropodium and neuroseta. *Amaeana trilobata*: f,g, midthoracic notoseta; h, midabdominal neuropodium and neurosetae; i, head end showing reproductive structure (AM W10341).

with up to 70–80 pairs of abdominal neuropodia and 15 slender acicular spines per neurosetal fascicle (range 3–15) (Fig. 1h).

**Remarks.** The material examined varied more than indicated in previous descriptions with regard to the number of achaetous segments between thorax and abdomen.

*Amaeana trilobata* (Sars, 1863), originally described from Norway, has since been reported from around the world. Material labelled as types of *A. trilobata* has been re-examined and, although posteriorly incomplete, closely resembles the Australian material, with 10 pairs of notopodia and about five achaetous segments between the thorax and the abdomen. Prominent nephridial papillae are present on setigers 4–10 with the last two pairs being very small. The ventrum is highly papillated, and the notosetae are broad bladed, narrow winged capillaries.

A few sexually mature females (eg. AM W7047, W10341), collected in December and October respectively from Moreton Bay and Calliope River in Queensland, showed a peculiar reproductive structure. Two long, cylindrical and transparent egg tubes were attached distally to a larger, thicker walled sac which was in turn attached by a narrow neck to the tentacular membrane. A duct connected this structure with the coelom (Fig. 1i). The egg tubes in both specimens contained embryos at the 3-segment stage, and the proximal sac, which was presumably secreted later, contained embryos in the late cleavage–early blastula stage. We have seen no examples of similar structures in other terebellids, although Thorson (1946) reports *Nicolea zostericola* (Oersted) having transparent egg tubes attached to the outer surface of the female tube. The significance of this reproductive adaptation is unclear, but it is a fragile structure which would be easily dislodged by rough initial sorting. Thus it may be more widespread than our material indicates.

**Habitat.** Bays and marine areas of estuaries, in coarse sediment and mud, often associated with seagrass in shallower areas; intertidal to 20 m. Also from Bass Strait and off east coast of Tasmania in 40–91 m, and the North West Shelf in 40–80 m in sandy and gravelly sand sediment.

**Distribution.** Western Australia, South Australia, Tasmania, Victoria, New South Wales and Queensland (Fig. 12A). Arctic; Norway; North Carolina, USA; Mediterranean; Japan.

#### *Hauchiella* Levinsen

*Hauchiella* Levinsen, 1893: 351.

**Type species.** *Polycirrus tribullata* McIntosh, 1869, by monotypy.

**Description.** Shape of body typical of subfamily, except that all notopodia, neuropodia and setae are lacking. Tentacular membrane expanded, with 2 types of tentacles. Thorax of about 10 segments; usually about 70 segments in total.

#### Key to Australian species of *Hauchiella*

- Body with papillated ventral epidermis on first 10 segments; 9–15 pairs of nephridia from segments 3–6. . . . . *H. renilla*
- Body with ventrum smooth anteriorly; 4 pairs of nephridia from segment 5. . . . . *H. tribullata*

To date, only 2 species of this genus have been described.

#### *Hauchiella renilla* n. sp.

Figs 2a,b; 12B

**Material examined.** HOLOTYPE: Australian Capital Territory, Wreck Bay, Cemetery Point (35°10'S 150°41'E) 15 m, (AM W199607), coll. P. Hutchings, 27 Feb 1976, complete, about 52 segments, 8.5 mm long, 1.3 mm wide. PARATYPES: Queensland, One Tree Island (23°30'S 152°05'E) 10 m, 1(AM W199613), 1(AM W199614), 1(AHF Poly 1452); Lizard Island (14°40'S 141°28'E) 10 m, 1(AM W199610), 1(AM W199612), 1(AM W199611), 1(AM W199608), 1(AM W199609), 1(BMNH ZB 1985.223), 1(USNM 098818). Specimens range in width from 0.3–1.4 mm. Material examined from Lizard Island represents a selection of material available.

**Description.** Colour of alcohol-preserved material pale yellow, with some irregular patches of light brown pigment on tentacles and body. Body fragile, generally of uniform width, except inflated midanteriorly; posterior body with segments short, crowded. Epidermis dorsally smooth and ventrally minutely papillate on segments 2–7 (Fig. 2a). Midventral–medial groove poorly defined as 2 narrow, glandular streaks extending posteriorly from peristomium, faintly segmented anteriorly and posteriorly. Tentacular membrane expanded, weakly trilobate, with lateral lobes merely slight thickenings of basal margins of medial lobe. Tentacles with a shallow medial groove, with variable degrees of subdistal inflation (Fig. 2a).

Peristomium about 3 times length of segment 2 middorsally, slightly inflated ventrally, forming a minute, rounded lower lip. Succeeding segments without setae, acicula or podial projections. Nephridia elongate, curved sacs visible through body wall from segment 6, 10 pairs (Fig. 2a); nephridial papillae absent, pores minute and visible on some segments.

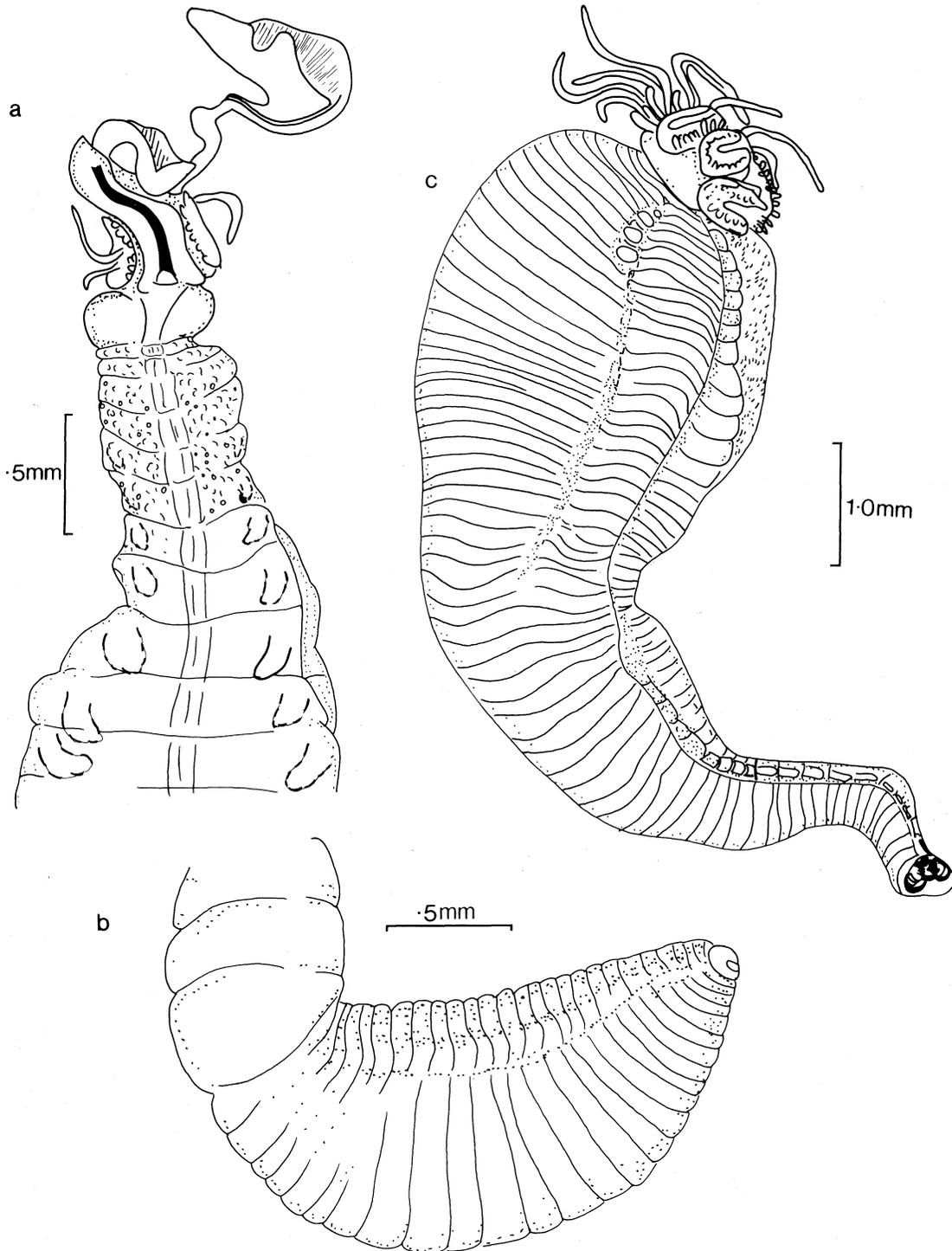
Pygidium with a small ventral papilla partially covering anus; anus terminal (Fig. 2b).

**Variation.** Variations not included for the holotype include: dorsal epidermis in larger specimens faintly tessellated anteriorly; ventral epidermis with papillae becoming smaller and more sparse beyond segment 10. Lower lip small, oval to crescent shaped. Nephridia first present from segments 3–6, extending to segments 12–17, present in all paratypes, thus the number of pairs of nephridia varies from 9 to 15 pairs. Nephridial pores minute, visible laterally on all nephridial segments in larger specimens. Mature females (AM W199610,

BMNH ZB 1985.223, AM W199611, AM W199609) have the body wall distended with eggs, and nephridial pores as described for the holotype.

**Comments.** The genus *Hauchiella* lacks setae, which are typically used to separate species within a genus of Polycirrinae, either in terms of where the setae begin,

or numbers of pairs of parapodia, and in some cases the shape or ornamentation of the setae are important specific characters. Therefore the only character which can be used as a specific character in *Hauchiella* is the number and arrangement of the nephridiopores. *Hauchiella renilla* n. sp. can be distinguished on this basis from *H. tribullata* (McIntosh, 1869), the only



**Fig. 2.** *Hauchiella renilla* n. sp., holotype: **a**, ventral view of head end; **b**, ventrolateral view of tail end. *Hauchiella tribullata* (NMV F50350): **c**, ventrolateral view of entire animal.

other species known. *Hauchiella renilla* has 9–15 pairs of nephridia occurring from segments 3–6, whereas *H. tribullata* has four pairs of nephridia present from segment 5.

**Habitat.** Dead coral substrata at Lizard Island and One Tree Island, Great Barrier Reef; in coralline algae at Cemetery Point; 5–10 m.

**Distribution.** Australian Capital Territory and Queensland (Fig. 12B).

**Etymology.** Specific name derived from the Latin, *renis*, for kidney, referring to the numerous, minute nephridial pores.

### *Hauchiella tribullata*

Figs 2c; 12B

*Polycirrus tribullata* McIntosh, 1869: 424.

*Lysilla inermis* Ehlers, 1913: 567–568, pl XLIV figs 14–16.

*Hauchiella tribullata*.—Hessle, 1917: 233, with synonymy; McIntosh, 1922: 201–202, pl CXXXVIII figs 13, 13a, 13b, with synonymy; Monro, 1930: 197; 1936: 184–185; Hartman, 1966: 103–105, pl. XXXV fig.1.

**Material examined.** Victoria: Bass Strait, Stn 183 (39°07.0'S 143°14.6'E), 84 m, 1(NMV F50350) complete, about 44 segments, 8.2 mm long, 2.9 mm wide. HOLOTYPE: (BMNH ZK 1921.5-1-4120) dredged off St Magnus Bay, Shetland, in 90 fm, muddy sand, coll. J. Gwyn Jeffreys, July 1867.

**Description.** Body short, fusiform, widest midanteriorly, gradually tapering abdomen. Segments biannulate throughout except for first few (Fig. 2c). Midventral groove shallow, segmented, broad anteriorly. Tentacular membrane expanded with convoluted, frilly margin. Lower lip small, pentagonal. Setae absent. Segments 5–8 each with a pair of swollen papillae laterally, probably nephridial, first pair slightly smaller. Pygidium with a pair of rounded papillae laterally; anus terminal (Fig. 2c).

**Comments.** The holotype is in two pieces, very damaged, and with part of the thorax removed. The Bass Strait specimen has three pairs of white glandular patches, present laterally on segments 6–8, and a pair of minute papillae on segment 5 which are probably nephridiopores and which closely resemble the holotype. For these reasons the material from Bass Strait is referred to *H. tribullata* (McIntosh, 1869). Until now, all specimens of *Hauchiella* have been referred to *H. tribullata*, and probably a selection of this material should be re-examined to confirm if this species is really as widespread as the literature suggests. In many cases, material identified as *H. tribullata* has not been deposited in a museum for subsequent verification, so it is not possible to check most records. However, when sufficient material becomes available, the number and arrangement of the nephridia should be carefully checked. It would also be helpful if additional material in good condition could be collected from the type locality to determine the range, if any, in the distribution and number of pairs of nephridia in *H. tribullata*.

**Habitat.** Continental shelf, 84 m in sandy shell sediment.

**Distribution.** Bass Strait (Fig. 12B). North-west Europe, Britain, South Georgia and off Antarctic mainland.

### *Lysilla* Malmgren

*Lysilla* Malmgren, 1866: 392.

**Type species.** *L. loveni* Malmgren, 1866, by monotypy.

**Description.** Expanded tentacular membrane, trilobed, with 2 types of buccal tentacles. six to 12 thoracic segments, notopodia from segment 3; notosetae either smooth, hirsute or pinnate capillaries. Neurosetae completely absent.

### Key to Australian species of *Lysilla*

1. Tentacular membrane posterodorsally fringed; notosetae hirsute capillaries. . . . . *L. laciniata*
- Tentacular membrane posterodorsally smooth; notosetae smooth or pinnate capillaries. . . . . 2
2. Lower lip bilobed; 8–10 pairs of notopodia, notosetae pinnate. . . . . *L. bilobata*
- Lower lip not bilobed; 8–13 pairs of notopodia, notosetae pinnate or smooth. . . . . 3
3. 8–10 pairs of notopodia, notosetae smooth. . . . . *L. jennacubinae*
- 11–13 pairs of notopodia, notosetae pinnate. . . . . *L. pacifica*

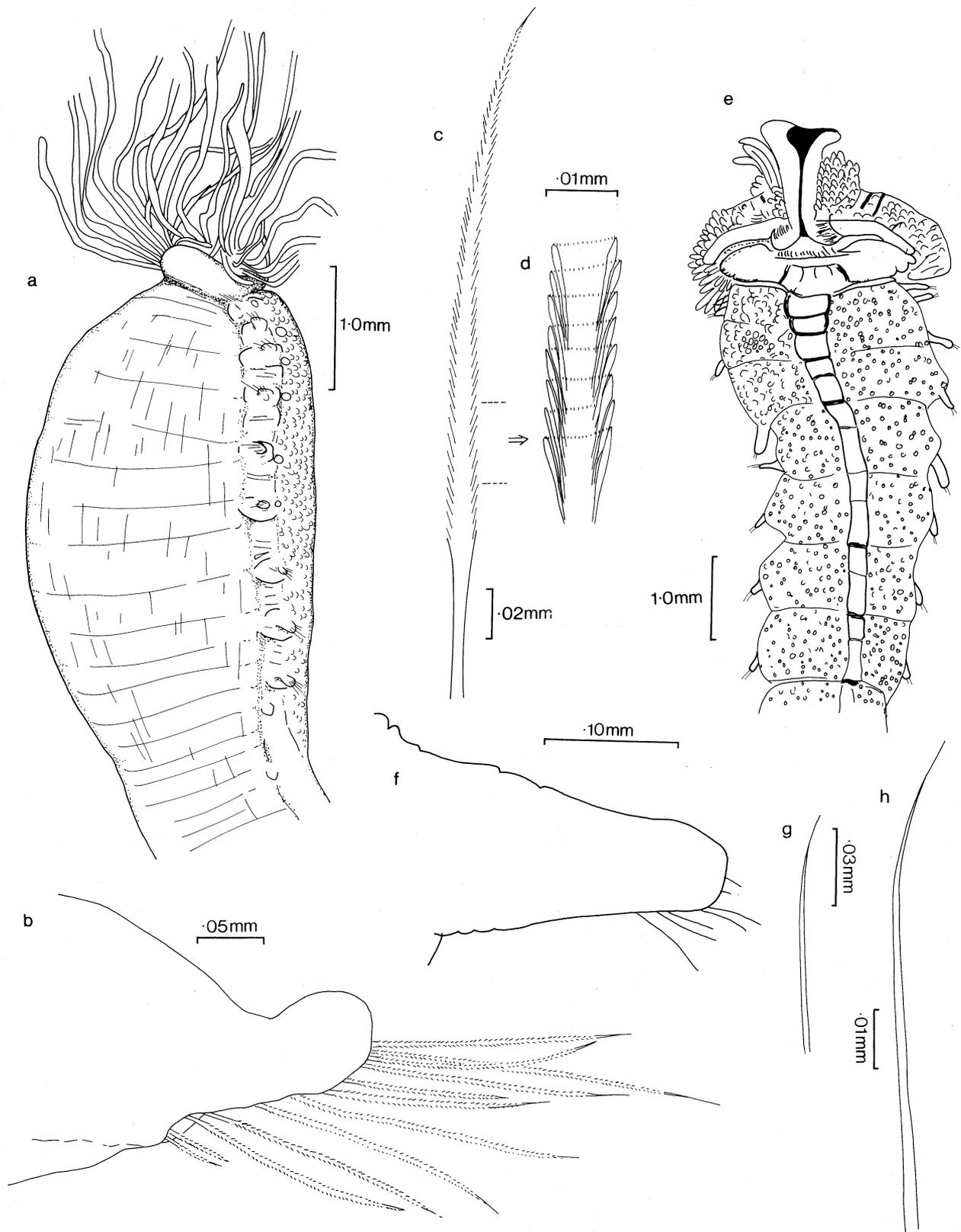
### *Lysilla bilobata* n. sp.

Figs 3a–d; 4a,b; 12C

*Lysilla pacifica*.—Hutchings, 1974: 191 (in part); 1977: 11. Not Hessle.

**Material examined.** HOLOTYPE: New South Wales, Stn 81, Woolooware Bay, Georges River (33°05'S 151°06'E), (AM W7586), coll. L. Collett, NSWFS, posteriorly incomplete, about 40 segments, 15.5 mm long, 2.0 mm wide. PARATYPES: New South Wales, Wallis Lake (32°17'S 152°29'E), 1(BMNH ZB 1985.224), 1(AHF Poly 1453); Woolooware Bay, Georges River 2(AM W199531); Botany Bay (33°06'S 150°59'E), 3(AM W195770), 7(AM W18947), 1(AM W195466), 1(AM W13973); Avoca Reef (33°28'S 151°26'E), 1(USNM 098819); Port Stephens (32°37'S 152°04'E), 2(AM W12429). Paratypes range in width from 1.0–2.2 mm.

**Additional material examined.** Western Australia: North West Shelf off Port Hedland 2(AM W199530), 1(AM W199522), 1(AM W199524); Mermaid Sound, Dampier Archipelago 1(WAM 18-84); 8 km north-west of Dongara 1(WAM 40-84). South Australia: Karatta Beach, Robe 1(AM W199515). Victoria: Bass Strait, Stn 81 (39°28'S 143°17'E) 103 m, 1(NMV F50349). Queensland: Nerang River, Gold



**Fig. 3.** *Lysilla bilobata* n. sp., holotype: **a**, lateral view of head end; **b**, anterior view of notopodium 2, left side. *Lysilla jennacubinae* n. sp., holotype: **c,d**, notoseta; **e**, ventral view of head end; **f**, anterior view of notopodium 5, left side; **g,h**, notoseta from same.

Coast 1(AM W10870); Moreton Bay several(AM W7040-4); Gladstone, Auckland River 1(AM W10330), 2(AM W13185), 1(AM W13287), 1(AM W13479); Calliope River 1(AM W8520), 1(AM W10337), 1(AM W13479).

**Description.** Body fragile, thorax and posterior abdomen inflated slightly. Segments faintly annulated anterodorsally, annulations more distinct on posterior abdomen, 3-4 per segment. Thoracic epidermis faintly tessellated dorsally, densely papillated ventrally; first 3 setigers with very large papillations medially (Fig. 3a). Midventral groove shallow, divided into many short, smooth glandular pads on thorax and abdomen. Tentacular membrane trilobed, medial lobe with a deep longitudinal cleft dorsally, lateral lobes much smaller than medial lobe. Tentacles long, grooved, thickness variable, subdistally expanded, densely intertwined. Peristomium obscured dorsally, forms a bilobed lower lip ventrally, with grooved lobes projecting anteroventrally.

Segment 2 achaetous, about 0.5 times width of segment 3 dorsally and laterally, partially obscured ventrally due to contracted state of animal. Notopodia from segment 3, 9 pairs; short, similar length throughout, distally with a long, globular presetal lobe and shorter, triangular postsetal lobe (Fig. 3b). Segments 12-14 each with a pair of low rounded papillae in place of notopodia (Fig. 3a). Notosetae short, relatively stout, capillaries; shafts emerging from notopodia smooth, nearly 0.5 times width of proximal ornamented region (Fig. 3c,d). A scanning electron microscope photograph of one specimen shows the bilobed lower lip and capillaries with whorls of spines along the tip (Fig. 4a,b).

Nephridial papillae small, at ventral base of notopodia of setigers 1-6 (Fig. 3a); nephridial pore only at base of notopodia 7-9.

**Variation.** The paratypes and additional material examined exhibit the following variation: number of notopodia ranged from 8-10 pairs; in some smaller specimens nephridial papillae are absent, in the larger specimens 3 pairs of large gonopores are present on setigers 4-6 at the ventral base of the notopodia, in place of the nephridial papillae.

**Comments.** *Lysilla bilobata* was not differentiated from *L. pacifica* Hesse by Hutchings, 1974, who described material of both species from Wallis Lake as belonging to *L. pacifica*, with 9-13 pairs of notopodia.

*Lysilla bilobata* is smaller than *L. pacifica*. It has: a bilobed lower lip; 8-10 pairs of short notopodia with notosetae with whorls of spines along the tip, and with markedly thinner shafts than *L. pacifica*; some larger specimens have three pairs of large gonopores at the base of notopodia on setigers 4-6. *Lysilla pacifica* has a small semi-circular, dome shaped lower lip, 11-13 pairs of elongate notopodia, notosetae with slightly less coarsely spined capillaries and thicker shafts than those of *L. bilobata*. On the larger specimens of *L. pacifica*, elongate nephridial papillae occur at the base of each notopodium.

Both *L. bilobata* and *L. pacifica* are recorded from Botany Bay, Wallis Lake and Port Stephens. In these areas, they appear to occupy similar niches, in association with seagrasses in muddy sand sediment. In Wallis Lake, the two species have been collected in the same samples. *Lysilla bilobata* is the more widespread of the two species in Australian waters, occurring offshore in Bass Strait and off Port Hedland, Western Australia, in 40-80 m, as well as in shallow coastal waters on the east coast.

**Habitat.** River mouths, sheltered bays, continental shelf, 4-80 m, mud to coarse sand, associated with the seagrasses *Zostera* and *Posidonia* in shallow waters.

**Distribution.** Western Australia, South Australia, Bass Strait, New South Wales and Queensland (Fig. 12C).

**Etymology.** The specific name *bilobata* is derived from the Latin *bi* and *lobus*, an elongated projection or protruberance, referring to the peculiar double lobed lower lip of the peristomium.

#### *Lysilla jennacubinae* n. sp.

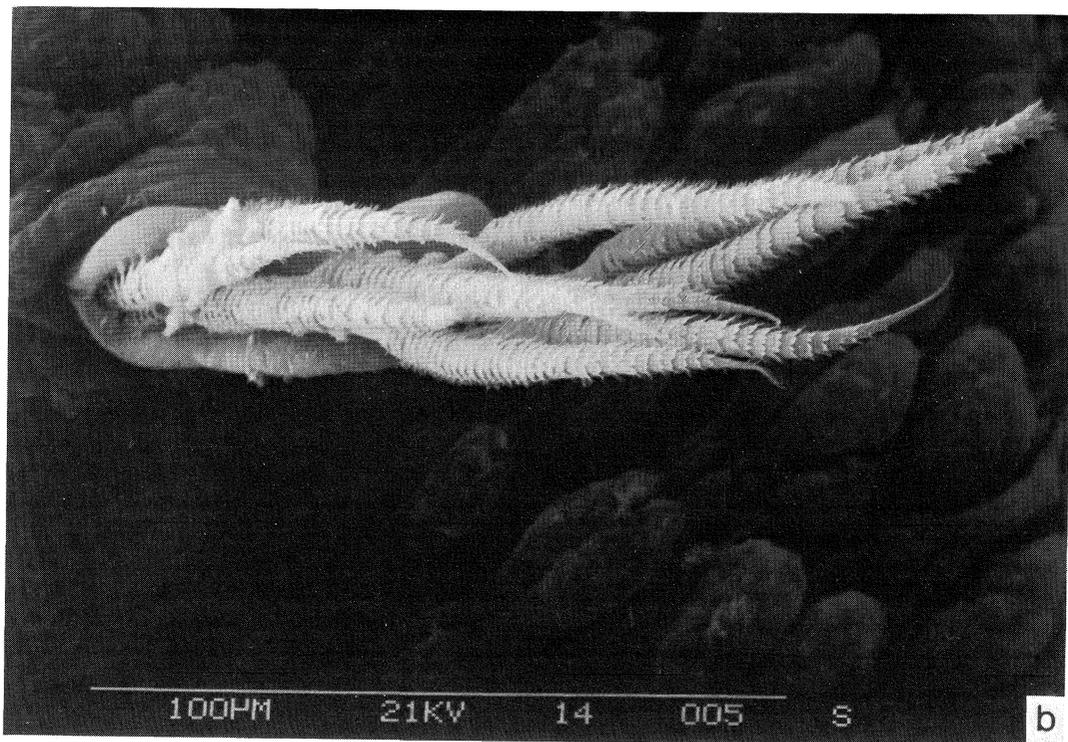
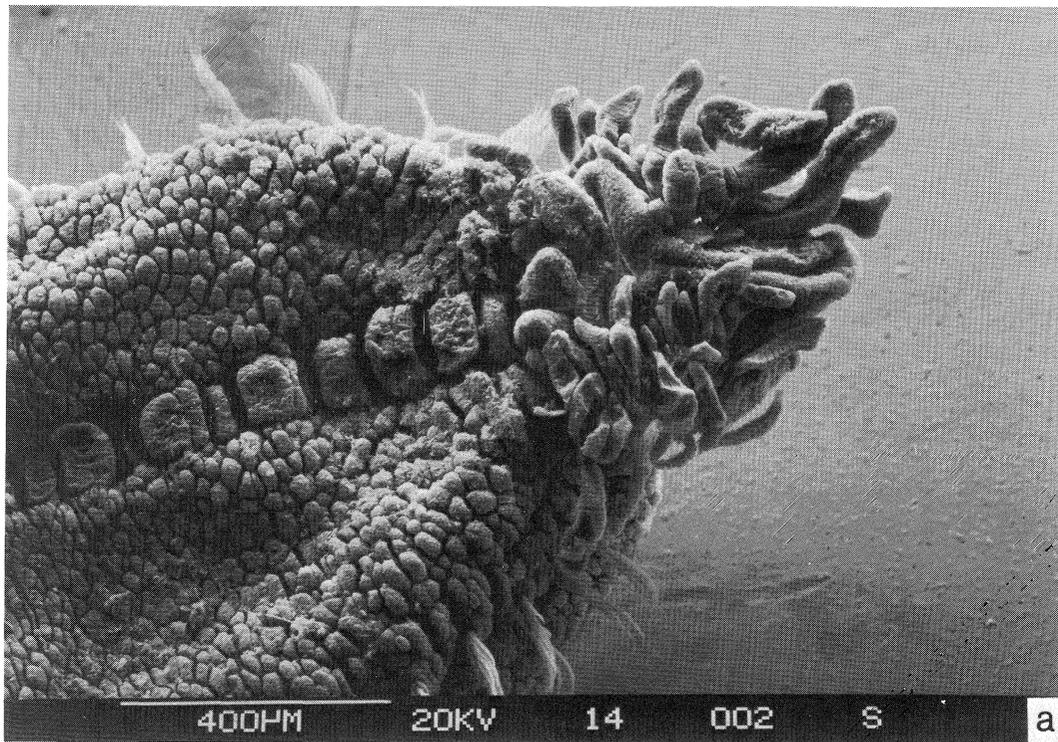
Figs 3e-h; 12c

**Material examined.** HOLOTYPE: Queensland, Caloundra (26°48'S 153°08'E), (AM W199643), coll. I. Loch, 20 Oct 1976; complete, about 84 segments, 21 mm long, 2.0 mm wide. PARATYPE: New South Wales, Woolgoolga (30°07'S 153°21'E), (AM W199644), coll. F. Rost, 5 Nov. 1963; complete, 2 fragments, about 93 segments total, 21 mm long, 1.2 mm wide.

**Description.** Body coiled, widest at anterior abdomen, posterior abdomen slightly inflated; abdomen long with numerous very short segments. Colour in alcohol reddish brown. Dorsal epidermis faintly tessellated with weak transverse grooves, 5-7 per segment anteriorly, number increasing up to 15 per segment on posterior thorax to midabdomen, reducing to 2-5 per segment on posterior abdomen. Ventral thoracic epidermis coarsely papillated; midventral groove smooth, shallow, divided into distinct glandular pads to pygidium (Fig. 3e). Tentacular membrane trilobed, lobes approximately equal in size, laterally extending almost to tip of anterior notopodia. Buccal tentacles largely missing. Peristomium approximately twice the width of segment 2 dorsally, reduced laterally, ventrally smooth, slightly inflated with a thin, broad, longitudinally grooved lower lip.

Segment 2 achaetous, reduced laterally and ventrolaterally; ventrally forms a large glandular pad projecting anteriorly into peristomial segment. Notopodia from segment 3, 10 pairs, last pair papilliform, without notosetae; notopodial lobes elongate, some distally recurved, reducing in length after first few (Fig. 3f). Notosetae few, slender, smooth, wingless capillaries, present in graded lengths (Fig. 3g,h).

Nephridial papillae present on anterior base of



**Fig. 4.** *Lysilla bilobata* n. sp.: **a**, S.E.M. ventral view of head end; **b**, notopodial fascicle showing emergent notosetae, S.E.M. photograph.

notopodia on segments 6–12 and in equivalent position on next 3–5 segments which lack notopodia; increasing in size from minute papilliform projections initially to large, globular processes on segments 14 and 15. Pygidium with a rounded ventral papilla; anus terminal.

**Variation.** The paratype showed the following variations. Posterior abdomen with a shallow, middorsal groove; tentacular lobe with lateral lobes slightly longer than medial lobe; buccal tentacles with a deep medial groove, faintly annulated. Notopodia from segment 3, continuing for 8 pairs. Nephridial papillae on the anteroventral base of notopodia on segments 3–9; on segments 9–10 large white glandular swellings ventral to notopodia, perhaps gonopores although no pore visible.

**Comments.** *Lysilla jennacubinae* is described as a new species as it differs from the other described species of *Lysilla* in having 8–10 pairs of notopodia with smooth capillary setae. The other species of *Lysilla* with smooth setae (*L. alba* Webster, 1879, *L. loveni* Malmgren, 1865, *L. loveni macintoshi* Gravier, 1907 and *L. pambanensis* Fauvel, 1928) can be distinguished from *L. jennacubinae* by the number of pairs of notopodia. *Lysilla loveni* and *Lysilla loveni macintoshi* both have a maximum of six pairs of notopodia, and *Lysilla pambanensis* Fauvel has 13–18 pairs of thoracic notopodia.

*Lysilla alba* Webster apparently has very few pairs of notopodia according to Webster who found only one fascicle amongst the syntypes. He figures a seta which differed from *L. jennacubinae* in having well developed lateral wings which appear finely striated, although smooth in outline. In our examination of the syntypes of *L. alba* (USNM 435) from Virginia, USA, we found no trace of any setae or notopodia, although some specimens had large sections of the thorax removed. Clearly more animals of this species need to be examined to ascertain whether it belongs to *Lysilla* or perhaps the asetigerous genus *Hauchiella*.

**Habitat.** Rock pools on platforms of exposed rocky headlands.

**Distribution.** New South Wales and Queensland (Fig. 12C).

**Etymology.** The specific name *jennacubine* is derived from a Western Australian aboriginal tribal name for a salt water pool.

### *Lysilla laciniata* n. sp.

Figs 5a–e; 12C

**Material examined.** HOLOTYPE: (AM W199626), complete, about 80 segments, 43 mm long, 3.4 mm wide, sexually mature female. PARATYPES: 10(AM W199627), 1(AHF Poly 1454), 1(BMNH ZB 1985.225), 1(USNM 098820), range in size from about 55 segments, 22 mm long and 1.4 mm wide to about 69 segments, 53 mm long and 4.0 mm wide. All types from South Australia, Coffin Bay (34°28' S 135°19' E), coll. I. Thomas, 1 Dec 1978.

**Description.** Body large, tapering gradually posteriorly from an inflated anterior thorax. Dorsal

epidermis smooth anteriorly and on midbody segments, with a posteriorly broad transverse band of minute papillae on each segment. Ventral epidermis heavily papillated on anterior thorax, faintly papillated on remaining thorax, smooth thereafter; midventral groove shallow, with smooth glandular segments extending from posterior thorax to pygidium (Fig. 5b). Tentacular membrane trilobate, lobes approximately equal in size; posterodorsal edge fringed, forming 2 lappets, just extending over anterior edge of peristomium (Fig. 5a). Buccal tentacles consisting of 2 types: thin, slightly subdistally expanded; and longer, greatly subdistally expanded types; both types of tentacles shallowly grooved distally. Peristomium about equal in length to segment 2 dorsally, ventrally forms a semispheroidal lower lip, which is longitudinally grooved.

Segment 2 achaetous, very short, ventrally projects slightly into peristomium. Notopodia from segment 3, continuing for 10 pairs; notopodia short, distally blunt, slightly recurved dorsally (Fig. 5c), approximately equal lengths throughout. Notoetae few, slender, hirsute capillaries (Fig. 5d,e), arranged in graded lengths.

Nephridial papillae small, present at anteroventral base of all notopodia, emerge from centre of a small, white glandular swelling. Posteroventral surface of pygidium with a rounded papilla; anus terminal.

**Variation.** Paratype material closely resembles the holotype. Variations not included in the description of holotype include the following: thorax of some small specimens are not anteriorly inflated; posterodorsal edge of tentacular segment with fringe forming 2–5, ill-defined lappets ranging in size from a slight thickening to lappets which extend over anterior portion of peristomium; notopodia from segments 3, 9–11 pairs; 1 paratype (AHF) with 1 reduced notopodium, slightly dorsally displaced, on left side of segment 2. All paratypes with small nephridial papillae at base of notopodia, smaller specimens without associated glandular swelling.

**Comments.** *Lysilla laciniata* is described as a new species because of the unique development of the fringe on the tentacular membrane. No such structure has been described from any of the other described species and one subspecies of *Lysilla*. The only other species of *Lysilla* having hirsute notosetae, *L. albomaculata* Caullery, 1944, appears to be similar to *L. laciniata* in general body shape and in the number of pairs of notopodia (12), although this species appears to have a smooth ventral epidermis and no nephridial papillae on the first three setigers although they are present on setigers thereafter, and this species has only been recorded from abyssal depths off Indonesia. Caullery also does not mention any fringe on the tentacular membrane.

**Habitat.** Amongst the roots of the seagrass *Zostera* at low tide levels.

**Distribution.** South Australia (Fig. 12C).

**Etymology.** Specific name derived from the latin, *lacinia* (feminine), meaning fringe or lappet on the

border of a garment, referring to the peculiar fringe on the posterodorsal edge of the tentacular membrane.

*Lysilla pacifica*

Figs 5f-i; 12C

*Lysilla pacifica* Hesse, 1917: 232-233, fig. 66.—Okuda, 1940: 22; Imajima & Hartman, 1964: 348; Hutchings, 1974: 191 (in part); Hutchings & Rainer, 1979: 786; Hutchings & Murray, 1984: 90-91.

*Lysilla ubianensis* Caullery, 1944: 197, fig. 156a-e.—Day, 1957: 114; 1967: 721, fig. 36.3i-j.

(?)*Polycirrus boholensis*.—Rullier, 1965: 196. Not Grube.

**Material examined.** New South Wales: Jervis Bay 1(AM W5219); Port Hacking, Maianbar 1(AM W11044); Botany Bay 6(AM W12290), 1(AM W194917), 2(AM W12360); Careel Bay 2(AM W5745), 2(AM W5771), 1(AM W10505), 1(AM W10508); Cowan Creek 1(AM W196784); Lake Macquarie 1(AM W17845); Port Stephens, Myall River 1(AM W6129); Broughton Island 1(AM W13062); Wallis Lake many(AM W4209), 1(AM W5136). Queensland: Stradbroke Island, Dunwich 1(QM G3606); Hervey Bay 1(AM W5349).

Japan: 1(UZM nr. 181a), 1(UZM nr 181b), Misaki; 1(UZM nr 181c) Port Lloyd, Bonin Islands (Ogasawara-guntó); all SYNTYPES, collected by Dr Sixten Bocks, Japan Expedition, 1914.

**Comments.** The Australian material examined appears almost identical to the syntypes of *Lysilla pacifica*, collected from Japanese waters. Australian specimens are slightly larger and have 11-13 pairs of notopodia whereas the syntypes have 10-11 pairs of notopodia (Fig. 5f,g). The notosetae are pinnate capillaries arranged in graded lengths along the ventral side of the notopodia (Fig. 5h,i). In the type description, Hesse states that there are 9-12 pairs of notopodia and that this variation may occur between the left and right sides in the one individual. Such a variation in number of pairs of notopodia within an animal was not observed in our Australian material. The number of pairs of notopodia, however, did appear to increase with body size, although no animals were observed with less than 11 pairs of notopodia. One previous description of *Lysilla pacifica* (Hutchings, 1974) stated that as few as 9 pairs of notopodia may be present. However in these cases the two species *L. pacifica* and *L. bilobata* were confused.

The holotype of *Lysilla ubianensis* Caullery, 1944, from the Philippines (ZMA V.pol 1537) was also examined and would appear to be synonymous with *L. pacifica* (see Hutchings, 1974). The holotype is posteriorly incomplete, with about 26 segments, 13 mm long, 1.8 mm wide and characterised by having a densely papillated thoracic ventrum, a small dome shaped lower lip, 11 pairs of notopodia with slender, pinnate, capillaries and large nephridial papillae on the anteroventral base of notopodia on segments 3-14, which falls within the variation exhibited by *L. pacifica*.

One specimen from Dunwich, Queensland (QM G3606), tentatively identified by Rullier (1965) as *Polycirrus boholensis* Grube, was re-examined and is

referred to *Lysilla pacifica*.

**Habitat.** Coastal lagoons, sheltered bays and estuaries in shallow mud-sandy areas often associated with the seagrasses *Zostera* and *Posidonia*.

**Distribution.** New South Wales (widespread) and Queensland (Fig. 12C). Japan, Philippines, South Africa and Solomon Islands.

*Polycirrus* Grube, emended

*Aphlebina* Quatrefages in Milne Edwards, 1844: 18.

*Torquea* Leidy, 1855: 146.

*Apneuma* Quatrefages, 1865: 380.

*Leucariste* Malmgren, 1866: 390.

*Ereutho* Malmgren, 1866: 391.

*Cyaxares* Kinberg, 1866: 348.

*Dejoces* Kinberg, 1867: 348.

*Anisocirrus* Gravier, 1905: 437.

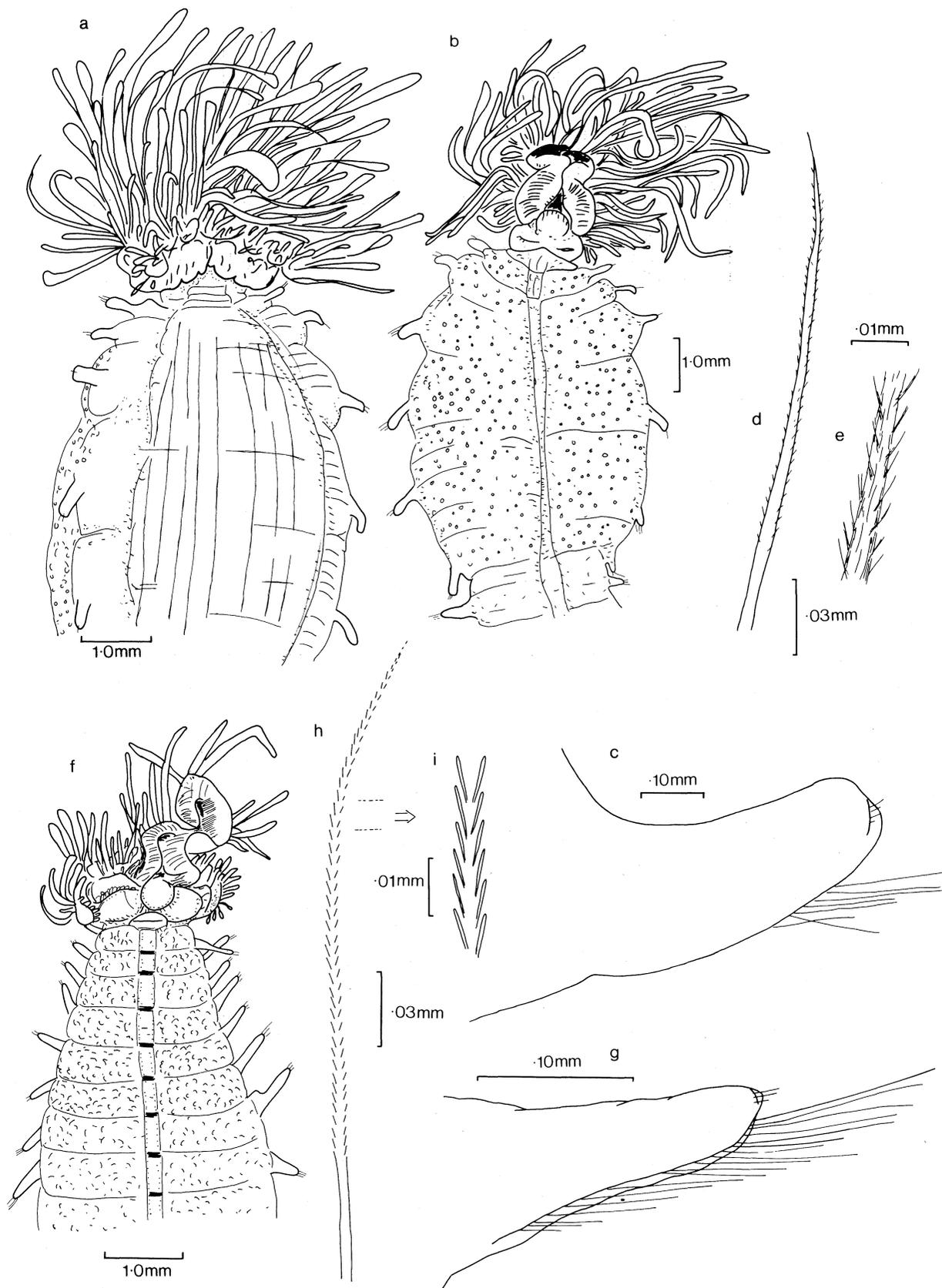
*Litancyra* Hutchings, 1977: 10.

**Type species.** *P. medusa* Grube, 1850, by monotypy.

**Description.** Expanded tentacular membrane trilobate, sometimes with lateral lobes reduced, with 2 types of buccal tentacles. Thorax with a variable number of setigers, notopodia from segment 2 or 3. Neuropodia first present from segments 7-18. Notosetae variable; include pinnate, hirsute, smooth winged or smooth wingless capillaries, but only 1 or 2 types of setae present in any one species.

**Comments.** The generic diagnosis is expanded to include the form of the tentacular membrane. The tentacular region, derived from the prostomium, is expanded anteriorly along the medial axis and laterally to form a trilobate membrane. The degree of lateral and medial expansion is variable. Tentacles are attached along the distal margin of the membrane, which is often convoluted. The upper lip is fused fully or partially with the ventral surface of the tentacular membrane or may remain free. Posteriorly, the tentacular membrane is thickened as a ridge dorsally and laterally. The peristomium is visible dorsally and is about the same length of segment 2 middorsally, but usually the peristomium is absent laterally and ventrally. The ventral lower lip, which varies in its development, is derived from the peristomium.

The type species of *Polycirrus*, *P. medusa*, has notopodia beginning on segment 3. Since the genus was erected, other species with notopodia beginning on segment 2 have been included: *P. albicans* (Malmgren, 1866), *P. arenivorus* Caullery, 1915, *P. aurantiacus* Grube, 1860, *P. caliendrum* Claparède, 1878, *P. carolinensis* Day, 1973, *P. denticulatus* Saint-Joseph, 1894, *P. eximius dubius* Day, 1973, *P. haematodes* (Claparède, 1864), *P. hamiltoni* Benham, 1921, *P. hesslei* Monro, 1930, *P. latidens* Eliason, 1962, *P. pallidus* (Claparède, 1864) and *P. plumosus* (Wollebaek, 1912). However the generic definition was never formally expanded to include this variation. Only two species described from Australia, *P. broomensis* Hartmann-Schröder, 1979, and *P. nephrosus* n. sp.,



**Fig. 5.** *Lysilla laciniata* n. sp., holotype: **a**, dorsal view of head end; **b**, ventral view of head end; **c**, anterior view of notopodium 5, left side; **d**, **e**, notoseta from same. *Lysilla pacifica* (AM W194917): **f**, ventral view of head end; **g**, anterior view of notopodium 9, left side; **h**, **i**, notoseta from same.

have notopodia present from segment 2, although there are problems in interpreting the numbering of anterior segments in these particular species. In most species of *Polycirrus* the numbering of segments can be clearly determined by examining the animal dorsally, but in the two above species anterior segmentation on the dorsal surface is obscure. We have expanded the definition of *Polycirrus* to include species with notopodia beginning on segment 2 or 3. Finally, we have included in the generic description the variety of notosetae which may occur within the genus.

Until this study, the genus *Polycirrus* contained 39 species (Fauchald, 1977), and since then an additional two species, *P. broomensis* Hartmann-Schröder and *P. rosea* Hutchings & Murray, 1984, have been described. Examining many of these species, together with the seven new species and one new combination described in this paper, has enabled us to evaluate the relative importance of the specific characters which have been used to distinguish between species of *Polycirrus*. The most important specific characters are as follows: (a) Numbers of pairs of notopodia, although only gross differences are of diagnostic value. The absolute number of pairs of notopodia tends to decrease with increasing body size. (b) First segment on which the uncini appear, but it is necessary to give the range over which this occurs for the species. The absolute number of uncini per row tends to increase with increasing body size. (c) Degree of epidermal papillations or tessellations. (d) The degree of segmentation and approximate numbers of ventrolateral glandular pads, although these may vary somewhat with increasing size of animal. (e) Form of notosetae. (f) Form of uncini, and the range of dental formulae present.

Banse (1980) used characters a,d,e,f, to separate species of *Polycirrus* and suggested that the form of the

notopodia was also important. The form of the notopodia is a highly variable character even within an individual: the pre- and postdistal setal lobes may be retracted or extended depending on the state of preservation and therefore we do not regard it as a very useful character. Banse also suggested that the dentition of the uncini as seen from a frontal view is useful in differentiating species. We have also used this character, however we stress that, as the dentition of the uncini is highly variable in some species, the dental formula should give the range, or a number of frontal views of uncini should be illustrated within a species. Finally, Banse also considered the number of pairs of nephridia to be an important specific character. We use this character cautiously as it depends on the size and/or sexual maturity of the animal, which should be taken into account when describing a new species.

Many of the species currently described in the genus *Polycirrus* are inadequately described, and details such as the types of notosetae present, the dental formulae of uncini and the range over which notopodia and neuropodia occur are often not included in this description. A full revision of the genus *Polycirrus* was beyond the scope of this study, however we did examine, wherever possible, type material of species recorded from the general vicinity of the South Pacific and South East Asia. Thus our comments on the similarity of a new species to previously described species are mainly restricted to those other species occurring in the vicinity of Australasia.

The key below is an artificial key, and we have used the structure of the notosetae for convenience. We suggest that users refer to the diagrams of the setae drawn for each species to ensure the correct interpretation of our notosetal terminology.

#### Key to Australian species of *Polycirrus*

1. Notosetae include some ornamented capillaries (under 40x objective). . . . . 2
  - Notosetae smooth-winged capillaries (under 40x objective). . . . . 8
2. 14 or more pairs of notopodia. . . . . 3
  - 9-12 pairs of notopodia. . . . . 5
3. 2 types of notosetae in each fascicle, pinnate and smooth; small species. . . *P. bicrinalis*
  - 1 type of notosetae in each fascicle, pinnate (or whorled spination) or hirsute; large species. . . . . 4
4. Hirsute notosetae only; some thoracic segments with 2 pairs nephridial papillae. . . . . *P. nephrosus*
  - Pinnate (whorled spination) notosetae only; thoracic segments each with 1 pair nephridial papillae. . . . . *P. aquila*\*
5. Neuropodia from segment 5-7. . . . . *P. porcata*
  - Neuropodia from segment 10-15. . . . . 6

- 6. Notosetae mixed – pinnate (whorled spination) and hirsute – in each fascicle.  
 ..... *P. broomensis*
- Notosetae of single type within a fascicle. .... 7
- 7. Notosetae include pinnate (whorled spination) type in first few fascicles, then  
 hirsute types in mid and posterior fascicles. .... *P. disjunctus*
- All notosetae pinnate (whorled spination) only. .... *P. boholensis*
- 8. 8–9 pairs of notopodia; uncini with few teeth surmounting main fang. .... 9
- More than 9 pairs of notopodia; uncini with many teeth surmounting main  
 fang. .... 10
- 9. Uncini with teeth surmounting main fang, arranged in a vertical series.  
 ..... *P. octoseta*
- Uncini with teeth surmounting main fang, arranged in a tranverse series.  
 ..... *P. paucidens*
- 10. Glandular ventrolateral pads on first 5–7 setigers; ventrum essentially smooth. .... 11
- Glandular ventrolateral pads absent or present on first 6–13 setigers; ventrum  
 with obvious irregular papillations or tessellations laterally. .... 12
- 11. Uncini from segment 10, maximum of 8–10 uncini per neuropodium. .... *P. rosea*
- Uncini from segment 12–18, maximum of 15–30 uncini per neuropodium. ... *P. parvus*
- 12. Uncini from segment 15–19; uncinus with 1–2 rows of teeth surmounting  
 main fang. .... *P. variabilis*
- Uncini from segment 10–16; uncinus with 3 rows of teeth surmounting main  
 fang. .... *P. tesselatus*

\* *Polycirrus aquila* Caullery, 1944, has been included in the key as it seems likely that it will be found in northern Australia.

***Polycirrus aquila* (Caullery)**

*Polycirrus (Ereutho) aquila* Caullery, 1944: 192, fig. 152a–d.

**Material examined.** HOLOTYPE (ZMA V. pol 1532), Banda, Siboga Expedition Stn 240 (1936), 9–36 m; complete, about 68 segments, 19.1 mm long, 2.5 mm wide, mature male.

**Description.** Body with inflated thorax, short, tapering abdomen; first 8 setigers and abdomen with short, crowded segments. Epidermis dorsally smooth except for faint transverse grooves, ventrally lightly papillated on setigers 1–6, ventrolateral pads only slightly raised, barely discernable on setigers 1–6. Tentacular membrane small, distinctly trilobed with lateral lobes recurved anteriorly and extending to just short of tips of notopodia. Upper lip free from tentacular membrane. Midventral groove shallow on setigers 1–8, deeper thereafter. Peristomium about ½ length of segment 2 dorsally, absent laterally, forms an elongate, tongue-like projection.

Segment 2 achaetous, visible dorsally, laterally and ventrally. Notopodia from segment 3, 16 pairs. Notopodia slim, short processes, distally without pre- or postsetal lobes; last few notopodia slightly shorter. Notosetae pinnate capillaries as figured by Caullery (1944). Uncini from segment 16 occur on short rectangular lamellae; lamellae increase in size over first

few uncinigerous segments, then remain relatively constant in size up to the pygidium. Uncini with a long neck and broad, concave base as figured by Caullery (1944); dental formula MF: 3. Uncini occur in short rows, with about 10 per row in midabdominal neuropodia.

Nephridial papillae small, present on the anterior base of the notopodia on setigers 2–16.

**Comments.** *Polycirrus aquila* is redescribed here as the original description is inadequate and as it seems likely that the species will be found in northern Australia, at least in offshore waters. Other species of terebellids occur in both regions.

**Habitat.** Sediment, 9–36 m.

**Distribution.** Malay Archipelago. Currently only known from the type locality.

***Polycirrus bicrinalis* n. sp.**

Figs 6a–f; 12D

**Material examined.** HOLOTYPE: Queensland, Lizard Island, 14°40' S 141°28' E, (AM W199637); complete with about 72 segments, 5.1 mm long, 0.5 mm wide. PARATYPES: Lizard Island 2(AM W199640), 1(AHF Poly 1455), 1(BMNH ZB 1985.226), 1(USNM 098821); Western Australia, North West Shelf, off Port Hedland, 20°23' S 118°37' E, 1(AM W199638),

1(AM W199639). One complete paratype (USNM 098821) about 85 segments, 10.5 mm long, 0.6 mm wide. Others range in width from 0.4–0.9 mm.

**Description.** Body filiform, coiled, uniformly wide throughout, tapering over last few segments; abdominal segments very short. Epidermis faintly tessellated on anterior dorsum, ventrally with large, rounded, glandular protruberances on setigers 1–7 then minute papillae on next few segments. Ventrolateral pads absent (Fig. 6a). Midventral glandular streak shallow, extends from setiger 8 to pygidium. Tentacular membrane expanded anteriorly along medial axis, lateral lobes reduced. Upper lip fused with tentacular membrane. Peristomium an incomplete ring, difficult to discern dorsally, forms a large, oval shaped longitudinally grooved lower lip ventrally (Fig. 6a).

Segment 2 achaetous, reduced dorsally, just visible laterally and ventrally as a thin wedge. Notopodia from segment 3, 16 pairs; notopodia short, slender with an elongate, digitiform postsetal lobe (Fig. 6b); all notopodia similar in size. Notosetae arranged in 2 tiers; 6–7 long, winged capillaries with blades appearing minutely striated under 100x (Fig. 6c), and 6–9 shorter, pinnate capillaries (Fig. 6d). Neuropodia minute rectangular lamellae present from about first abdominal segment (segment 19), and then continuing to pygidium. Uncini arranged in single, curved rows with up to 15 per row. Uncini with a broad, flat base and short, thick neck (Fig. 6e), dental formula consistent for uncini from all setigers, MF: 1:7–9 with distal most row arranged in an arc above a larger tooth (Fig. 6f).

Nephridial papillae absent. Pygidium with anus terminal.

**Variation.** Paratypes with body filiform, usually straight rather than coiled, ventrum of first 7–8 setigers with glandular protruberances, thereafter papillations minute. Notopodia extend for 14–16 segments. Uncini from near first abdominal segment (segment 17–20), increase up to 15–25 per row; dental formula consistent within an individual but varying between individuals from MF: 1:5–9 to MF: 1:7–10. Nephridial papillae absent.

**Comments.** *Polycirrus bicrinalis* most closely resembles *P. broomensis* Hartmann-Schröder, 1979, *P. plumosus* (Wollebaek, 1912) and *P. hamiltoni* Benham, 1921. It differs from *P. broomensis* in the number of pairs of notopodia, the type of notosetae and the segment on which the notosetae begin (see Table 1). *Polycirrus hamiltoni* has notopodia from segment 2, on a specimen from the type locality (AM W824) which is probably the holotype, and they continue over most of the body length whereas in *P. bicrinalis* only 14–16 pairs of notopodia are present. *Polycirrus plumosus*, described from Norway, has similar notosetae to *P. bicrinalis* but the notopodia begin on segment 2 rather than on segment 3. In addition the structure of the tentacular lobe is tripartite in *P. plumosus* whereas in *P. bicrinalis* it is expanded anteriorly along the medial axis with lateral lobes reduced.

*Polycirrus bicrinalis* can be distinguished from other species of *Polycirrus* occurring in Australia (Table 1).

**Habitat.** Coral substrata at Lizard Island, and muddy sediments in 40–80 m on North West Shelf.

**Distribution.** Western Australia and Queensland (Fig. 12D).

**Etymology.** The specific name *bicrinalis* is derived from the latin for two, *bi*, and for hair, *crinis* (masculine), referring to the two types of setae occurring in each notopodial fascicle.

### *Polycirrus bohollensis*

Figs 6g–l; 12F

*Polycirrus bohollensis* Grube, 1878: 242–243, pl. XIII fig.7.

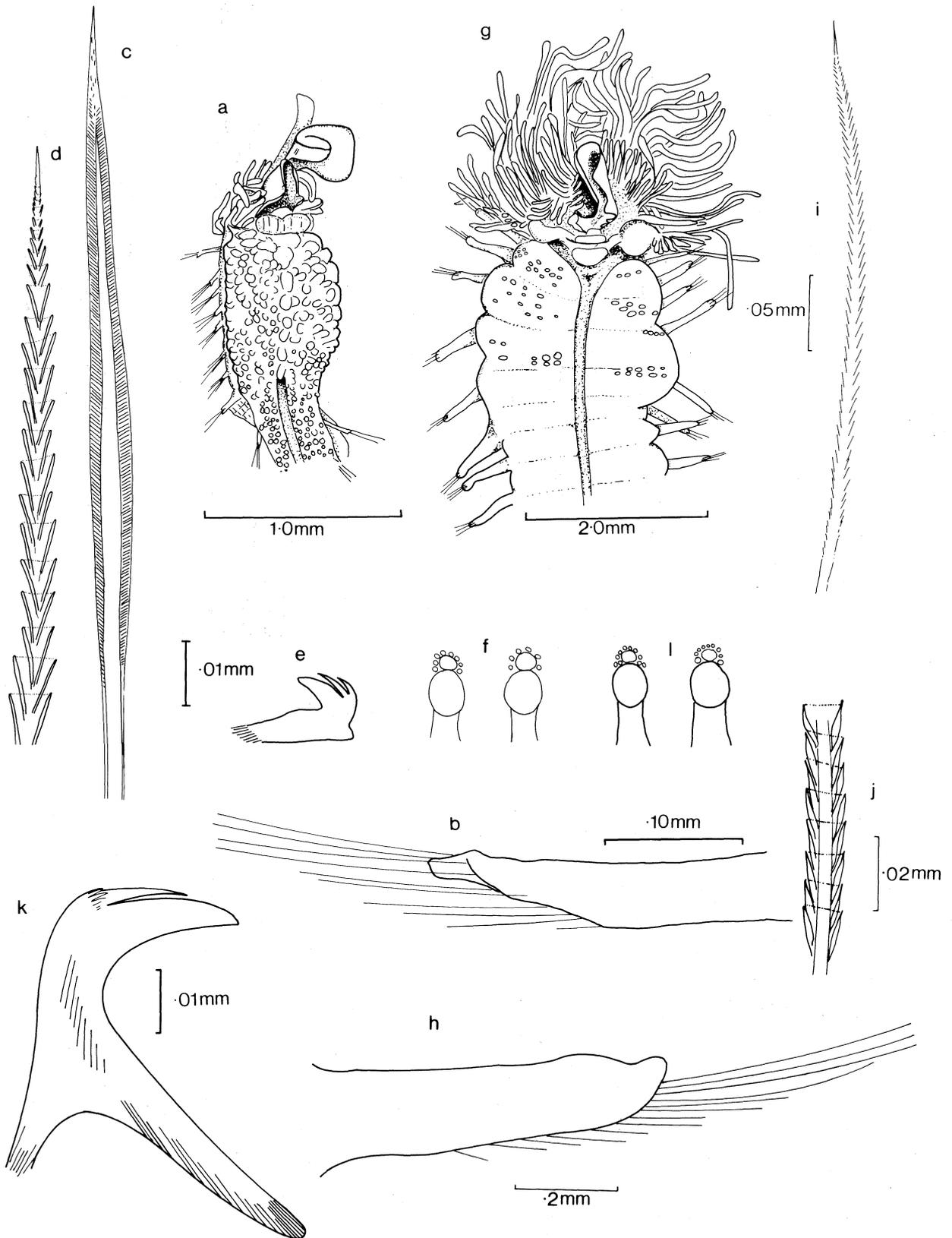
**Material examined.** HOLOTYPE (ZMB 10654), Bohol, Philippines, coll. Grube; fragmented, in poor condition, total length about 11.9 mm for 46 segments, maximum width about 1.8 mm. Queensland: One Tree Island, 23°30'S 152°05'E, 1(AM W199624), 1(AM W199625), 1(AM W199532); Lizard Island, 14°40'S 141°28'E, 1(AM W199533), 3(AM W199537), 1(AM W199535), 2(AM W199534), 1(AM W199623), 2(AM W199536). Specimens range in size from 27 segments, 8.3 mm long, 1.8 mm wide to 57 segments, about 18 mm long, 2.2 mm wide.

**Description.** Body coiled, widest anteriorly, gradually tapering over abdomen; a deep midventral groove present throughout. Epidermis smooth on dorsum, a few low papillae present on lateral ventrum (Fig. 6g). Ventrolateral pads indistinct. Tentacular membrane trilobed, each lobe approximately equal in size. Upper lip distally free from tentacular membrane, peristomium an incomplete ring, just less than length of segment 2 dorsally, absent ventrally, and forming a small, posteriorly recurved lower lip (Fig. 6g).

Segment 2 achaetous, reduced laterally, absent ventrally. Notopodia from segment 3, 10–11 pairs; notopodia elongate slightly tapered, occasionally with a small rounded suprasetal lobe (Fig. 6h). Notosetae apparently pinnate under 40x objective, consisting of a stack of inverted cones nestled one on top of the other (Fig. 6i,j). Neuropodia, rectangular lamellae from segment 13–15; lamellae slightly elevated from body wall initially, increasing in length over next few segments then remaining at same degree of elevation to pygidium. Uncini with a concave base and long narrow neck (Fig. 6k); dental formula MF: 1:3–12 (Fig. 6l). Uncini arranged in single, short rows throughout, maximum of 7–10 per neuropodial row.

Nephridial papillae present on setigers 1–11 or setigers 2–11 at anterior base of notopodia, absent in small specimens. Pygidium with a low, rounded papillae on ventral margin; anus terminal.

**Comments.** We have expanded Grube's description of the species and put a greater emphasis on characters we consider important (p.330). This species may be distinguished from other species of *Polycirrus* in having pinnate notosetae, uncini with a very long secondary tooth surmounting the main fang and a variable number



**Fig. 6.** *Polycirrus bicrinalis* n. sp., holotype: **a**, ventral view of head end; **b**, anterior view of notopodium 2, right side; **c,d**, two types of notosetae from same; **e**, lateral view of anterior uncinus; **f**, frontal views from same (schematic). *Polycirrus bohollensis* (AM W199624): **g**, ventral view of head end; **h**, anterior view of notopodium 3, left side; **i,j**, notoseta from same; **k**, lateral view of midabdominal uncinus; **l**, frontal views from same (schematic).

of minute teeth surmounting this, and the ventrolateral region of the thorax with very few papillae. Grube stated that the species has 11–12 (possibly 13) pairs of notopodia, although we could only detect 10–11 pairs on his specimen. The structure of both the notosetae and uncini of the holotype closely resembles the Australian material. *Polycirrus boholensis* can be separated from other Australian species using the characters shown in Table 1.

**Habitat.** Coral reef substrata, lagoon and reef slope, in 3–12 m.

**Distribution.** Queensland (Fig. 12F). Philippines. First record of species since the original description.

*Polycirrus broomensis*

Fig. 7a–c

*Polycirrus broomensis* Hartmann-Schröder, 1979: 148–149, fig. 352–354; 1980: 78.

**Material examined.** HOLOTYPE: (HZM P-15532), Western Australia, Broome; incomplete, about 35 mm long according to Hartmann-Schröder, with about 32 segments, 2.5 mm wide.

**Description.** Body large, coiled. Dorsum faintly annulated on first few segments. Ventrums glandular laterally on setigers 1–9, distinct ventrolateral pads absent, except for a single reduced pad present on setiger 10. Epidermis of lateral ventrum smooth, irregularly dissected. Midventral groove deep, wide on thorax, narrowing posteriorly, extends along entire body. Tentacular membrane trilobed, free from upper lip distally, with numerous tentacles of varying thickness.

Notopodia from segment 2–3; it is difficult to decide the numbering of segments on the holotype as segmentation is very poorly defined, probably because of the lack of anterior septa; 12 pairs of notopodia. Notopodia large, stout rectangular processes longest on midthorax, with notosetae arranged in a wide transverse series, in 2 tiers; long narrow winged capillaries appearing faintly hirsute under 40x (Fig. 7a) and shorter (about 1/2 length) pinnate setae (Fig. 7b); approximately equal numbers of each setal type. Uncini from first abdominal segment (segment 14–15) arranged on broad, rectangular pinnules, similar sized throughout. Each neuropodial row with many uncini, posterior ones with more than 100. Uncini with flat base and short thick neck and a characteristic upward projecting button below main fang (Fig. 7c); dental formula MF: 1:1, occasionally MF: 1:1–2.

Nephridial papillae minute at the ventral base of the notopodia present on setigers 3–8.

**Comments.** The original description of *P. broomensis* has been somewhat expanded to include additional comments on setae and ornamentation of the epidermis. Hartmann-Schröder was also unable to ascertain the segment of first appearance of the notopodia, stating that it could be segment 2 or 3. Surprisingly there has only been one additional record of the species (Hartmann-Schröder, 1980), despite the sampling of

similar habitats to the type locality along the Western Australian coast.

**Habitat.** Mangrove mud flats, associated with plant detritus.

**Distribution.** Broome, Western Australia (Fig. 12F).

*Polycirrus disjunctus* n. sp.

Figs 7d–l; 12D

**Material examined.** HOLOTYPE: New South Wales, Solitary Island, 29°56'S 153°25'E, (AM W199632); complete, 52 segments, 13.8 mm long, 1.6 mm wide. PARATYPES: New South Wales, Seal Rocks, 32°28'S 152°33'E, 1(AM W199633); South West Rocks, 32°25'S 152°32'E, 1(BMNH ZB 1985.27); Angourie Point, 29°29'S 153°22'E, 1(USNM 098822), 2(AM W199634). Paratypes range in width from 0.6–1.0 mm. BMNH ZB 1985.27 is ovigerous.

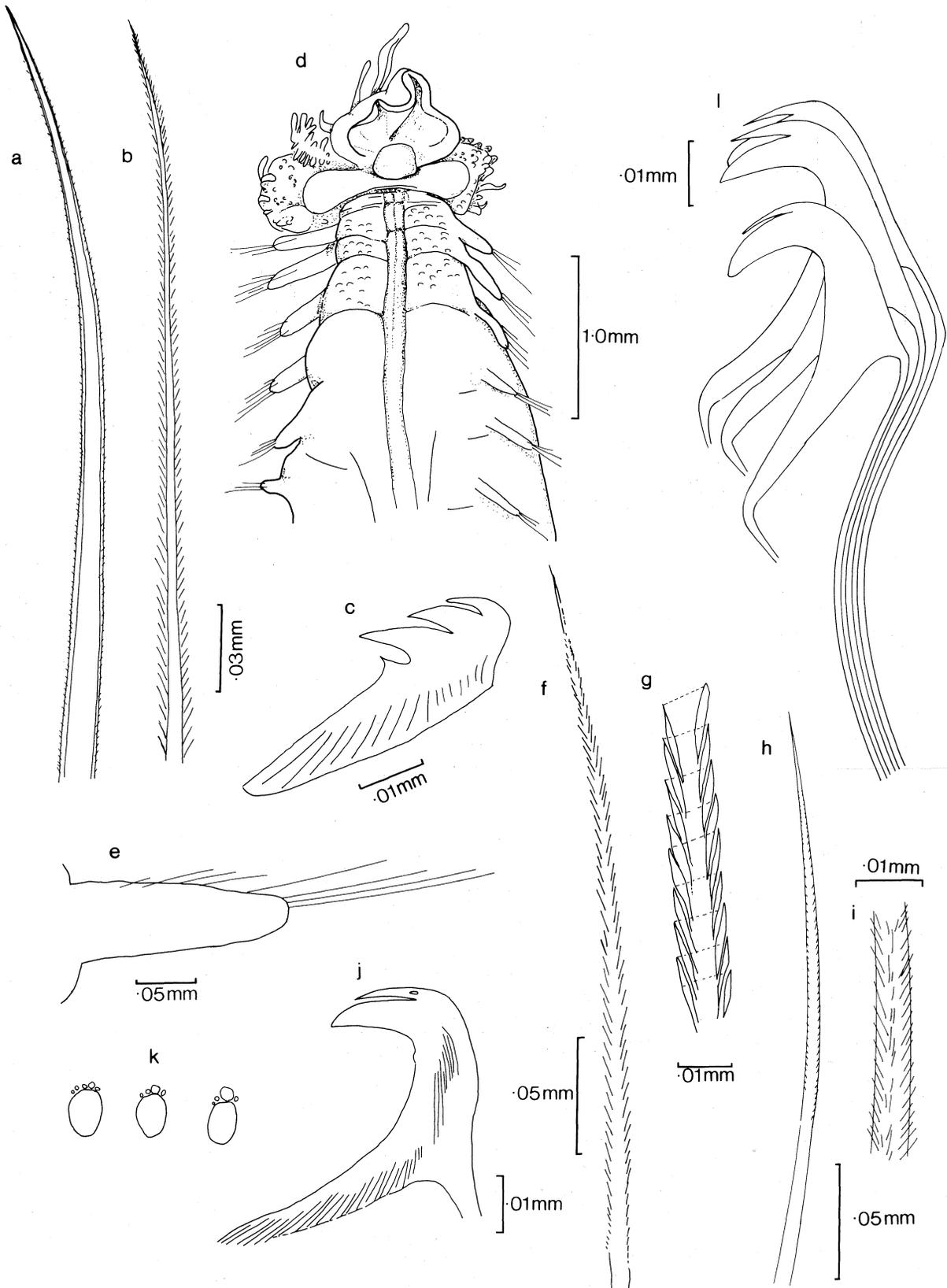
**Description.** Body gradually tapering from midthorax to end of body, a shallow midventral glandular streak throughout. Thoracic epidermis smooth dorsally, lightly papillated ventrally. Ventrolateral glandular pads extend from setigers 1–3 (Fig. 7d). Tentacular membrane trilobate with convoluted lateral lobes; free from upper lip distally. Peristomium difficult to discern dorsally and laterally, ventrally forms a small bluntly conical projecting lower lip (Fig. 7d).

Segment 2 achaetous, indistinct dorsally, 1/4–1/3 of the length of segment 3 ventrally. Notopodia from segment 3, 11 pairs; notopodia reduced in length posteriorly to about 2/3 length of anterior ones (Fig. 7e). Notosetae of segments 3–5 (setigers 1–3) long pinnate capillaries with smooth shafts, graded in length (Fig. 7f,g); notosetae of segments 6–13 (setigers 4–11) shorter, hirsute, graded in length (Fig. 7h,i). Neuropodia from segment 15 (setiger 13) continue to pygidium; neuropodial lobes elongate, rectangular lamellae, becoming slightly more elongate posteriorly. Uncini with broad concave base, long narrow neck (Fig. 7j), dental formula MF: 3–6 (Fig. 7k); initially 7–9 uncini per row, increasing up to 11–12 uncini per neuropodial row on midabdomen.

Nephridial papillae minute, arising from raised areas at the base of notopodia on setigers 5–9. Pygidial segment minute, anus terminal.

**Variation.** Paratypes with ventrolateral glandular pads on first 2–3 setigers. Segment 2 not visible in some specimens. Notopodia extending for 10–11 segments; notopodial lobes either smooth, rounded distally or with a small, rounded postsetal lobe. Notosetae are long pinnate capillaries on setigers 1–3, slightly shorter, hirsute capillaries on setigers 4–11 on all paratypes. Uncini from segment 10–14, show slightly greater variations in the number of teeth in the second row than the holotype, MF: 3–8. All uncini from paratype material with delicate tendons attached to the base and extending into the neuropodia (Fig. 7l); these tendons not seen in the holotype.

Nephridial papillae elongate, minute, present on the



**Fig. 7.** *Polycirrus broomensis*, holotype: **a, b**, two types of notoseta; **c**, lateral view of midabdominal uncinus. *Polycirrus disjunctus* n. sp., holotype: **d**, ventral view of head end; **e**, anterior view of notopodium 3, right side, **f, g**, notoseta from same; **h, i**, notoseta from notopodium 10; **j**, lateral view of midabdominal uncinus; **k**, frontal views from same (schematic); **l**, lateral view of uncini showing tendons attached (striations omitted).

anteroventral base of notopodia 7–11 in an ovigerous specimen.

**Comments.** *Polycirrus disjunctus* can be distinguished from other Australian species of *Polycirrus* using the characters as shown in Table 1. It differs from *P. aquila* Caullery, 1944, described from the Malay Archipelago, and *P. nervosus* Marenzeller, 1884, from Japan, with regard to the numbers of pairs of notopodia and the type of notosetae present.

**Habitat.** Intertidal to 15 m, rocky substrata, associated with ascidians, or in one case, on algal mat exposed to surf.

**Distribution.** New South Wales (Fig. 12D).

**Etymology.** The specific name is derived from the latin *disjunctus* meaning separate, distinct, different, remote referring to the separate occurrence of the two types of setae, one from the anterior and one from subsequent notopodial fascicles.

*Polycirrus nephrosus* n. sp.

Figs 8a–f; 12E

*Polycirrus boholensis*.—Augener, 1914: 102–106, text fig. 14a–c. Not Grube.

**Material examined.** HOLOTYPE: New South Wales, Port Hacking, Ship Rock, 34°04'S 151°06'E, (AM W199641); complete, 37 segments, 27 mm long, width 1.2 mm. PARATYPES: Western Australia, Port Gregory, 28°12'S 114°15'E, 1(USNM 098823), King George Sound, Albany, 35°03'S 117°58'E, 1(BMNH ZB 1985.228); New South Wales, Towra Point, Botany Bay, 33°58'S 150°59'E, 2(AM W199642); Queensland, Stradbroke Island, Myora, 27°31'S 152°35'E, 1(QM G4056). Paratypes range in width from 1.3–2.7 mm.

**Description.** Body long, slender, gradually tapering posteriorly from posterior thorax. Segments relatively long, up to twice body width anteriorly. Dorsum anteriorly annulated with up to 12 rings per segment, faintly tessellated; ventrum with a deep midventral groove, extending from segment 2 posteriorly; lateroventrum smooth, inflated, pads absent (Fig. 8a), tentacular membrane large, trilobate, lateral lobes convoluted, extending back to first pair of notopodia. Upper lip free from tentacular membrane. Peristomium ventrally forming a protruding triangular lower lip (Fig. 8a).

Notopodia from segment 2–3, 18 pairs, last 2–3 with very few, short setae; notopodia elongate, distally knobbed and slightly recurved (Fig. 8b), decreasing in length from almost equal body width initially to ½ body width by setiger 7 to papilliform processes by setiger 14. Notosetae long, slender, coarsely hirsute capillaries (Fig. 8c,d). Neuropodia from setiger 12, present on all subsequent segments; neuropodial lobes initially papilliform, located at ventral base of notopodia, increasing in size slightly, posteriorly. Uncini with broad slightly concave base, moderate length, slender neck (Fig. 8e) and dental formula MF: 3–7, with medial tooth

(teeth) largest (Fig. 8f). Uncini arranged in single, very short rows (8–15 per row).

Nephridial papillae paired lateral processes on setigers 2–14 positioned as follows – setiger 2: anterior base of parapodia; setigers 3–9: anterior base of parapodia plus 1 pair of internotopodial papillae; setigers 10–14: 2 pairs of internotopodial papillae (Fig. 8a).

Pygidium with an encircling ring of small papillae situated around terminal anus.

**Variation.** Paratypes (USNM 098823, QM G4056) significantly larger than holotype. The following variation was shown in the paratypes: annulations extending on to ventrum, irregular papillation on ventrolateral inflated areas; lower lip tongue-like, distally rounded, recurved posteriorly; notopodia with elongate dorsally directed lobes, 14–26 pairs; uncini from segment 12–16, no greater variation in dental formula than for holotype. Arrangement of nephridial papillae variable, Port Gregory specimen as follows – setiger 2: anterior base of parapodia; setigers 3–12: anterior base of parapodia plus 1 pair of interparapodial; setigers 13–15: anterior and posterior base of parapodia and 1 pair of interparapodial. Myora specimen (QM G4056) as follows – setiger 2: anterior base of parapodia; setigers 3–7: anterior base of parapodia plus 1 pair of inter-parapodial; setigers 8–9: anterior base of parapodia plus 2 pairs of interparapodial; setiger 10: anterior, posterior base of parapodia; setigers 11–14: ventral base of parapodia plus 2 pairs of interparapodial papillae. Paratypes from Botany Bay (AM W199642) and King George Sound (BMNH ZB 1985.228) show a similar arrangement of nephridia with most thoracic segments having 2 pairs each of large nephridial papillae.

**Comments.** *Polycirrus nephrosus* has notopodia beginning on either segment 2 or 3. The precise numbering of segments in this region of *P. nephrosus* is difficult to interpret because of the lack of a clear demarcation of segments dorsally at least from the exterior. No attempt was made to examine the segmentation histologically.

The type material of *P. nephrosus* represents a considerable variation in size, and all the material regardless of size shows a similar development of nephridial papillae which are particularly conspicuous in this species. However it is not known whether very small individuals possess such well developed nephridial papillae. This species reaches a considerable size in comparison to other species of *Polycirrus* recorded from Australia, and in this species the number of pairs of notopodia does not tend to decrease with increasing body size, as in other Australian *Polycirrus* species.

*Polycirrus nephrosus* can be distinguished from other species of Australian *Polycirrus* using the characters given in Table 1. It can be distinguished from *P. aquila* Caullery, 1944, by the type of notosetae, which are coarsely hirsute in *P. nephrosus* and pinnate in *P. aquila*, and by the arrangement of nephridial papillae.

**Habitat.** In association with sponges, soft and hard

corals, empty mussel shells, algae; intertidal to 10 m.

**Distribution.** Western Australia, New South Wales and Queensland (Fig. 12E).

**Etymology.** The specific name refers to the large number of nephridial papillae present.

*Polycirrus octoseta* new combination

Figs 8g-l; 12D

*Litancyra octoseta* Hutchings, 1977: 10, fig. 4a-d.

**Material examined.** HOLOTYPE: Queensland, Moreton Bay, Serpentine Creek (AM W6852). PARATYPE: New South Wales, Belmont Beach (AM W8127). Western Australia, North West Shelf, off Port Hedland, 20°23'S 118°37'E, 1(AM W199545), 1(AM W199547), 2(AM W199546), 1(AM W199548); Bass Strait, 39°08'S 143°24'E, 77 m, 1(NMV F50351); 39°28'S 143°17'E, 103 m, 1(NMV F50352), 3(NMV F50353). Material ranged in size from 39 segments, 3.0 mm long, 0.5 mm wide to about 66 segments, 22 mm long, 0.9 mm wide.

**Comments.** Both the holotype and paratype were examined and compared with the present material. The North West Shelf material has nine pairs of notopodia, beginning on segment 3, whereas the Bass Strait material has eight pairs of notopodia, like the types. Notosetae in the present material consist of winged, spatulate capillaries and shorter, slender, tapered capillaries, appearing smooth under 40x (Fig. 8g) and hirsute under 100x objective (Fig. 8h,i). Uncini have four rows of teeth surmounting a small main fang (Fig. 8j), appearing identical to those of the types. The dental formula is difficult to discern as the teeth are very small and close together in each row (Fig. 8k). Bass Strait specimens showed the following variation in the dentition of the uncini MF: 1-3:1-3:2:1; maximum number of uncini per row 32-38.

Hutchings (1977) erected the genus *Litancyra* for a species with long handled uncini and lacking well defined midventral pads. It now appears, however, that the long, slender tendons attached to the base of each uncinus extending through the neuropodia are present in all *Polycirrus* examined herein (eg. Figs 7l,8l). The tendons are easily broken and much more slender than the long handled uncini found in some members of the Amphitritinae.

The degree of development of ventral glandular pads appears to be a variable character within the Polycirrinae. In the species of *Amaeana* and *Lysilla* examined, midventral pads are well developed, yet in the genus *Polycirrus* the ventrolateral areas are more glandular and pad-like, although the degree of development of these ventrolateral pads is variable. The lack of well defined midventral glandular pads in *Litancyra* is therefore not now considered a valid generic character, and *L. octoseta* is transferred to the genus *Polycirrus*, and the genus *Litancyra* is synonymised with *Polycirrus*.

*Polycirrus octoseta* may be distinguished from other

*Polycirrus* species in having a very long, medially expanded tentacular lobe, fused with the upper lip and without lateral lobes; notosetae of two types: slender, tapered capillaries and spatulate capillaries; and uncini with four rows of teeth surmounting the main fang, each row with a few teeth. In this latter respect it resembles *P. latidens* Eliason, 1962, from Skagerak, Denmark, which has teeth arranged in a vertical series above the main fang.

**Habitat.** Intertidal estuarine and exposed beaches of eastern Australia, and in 36-41 m off North West Shelf.

**Distribution.** Western Australia, Bass Strait, New South Wales and Queensland (Fig. 12D).

*Polycirrus parvus* n. sp.

Figs 9a-e; 12E

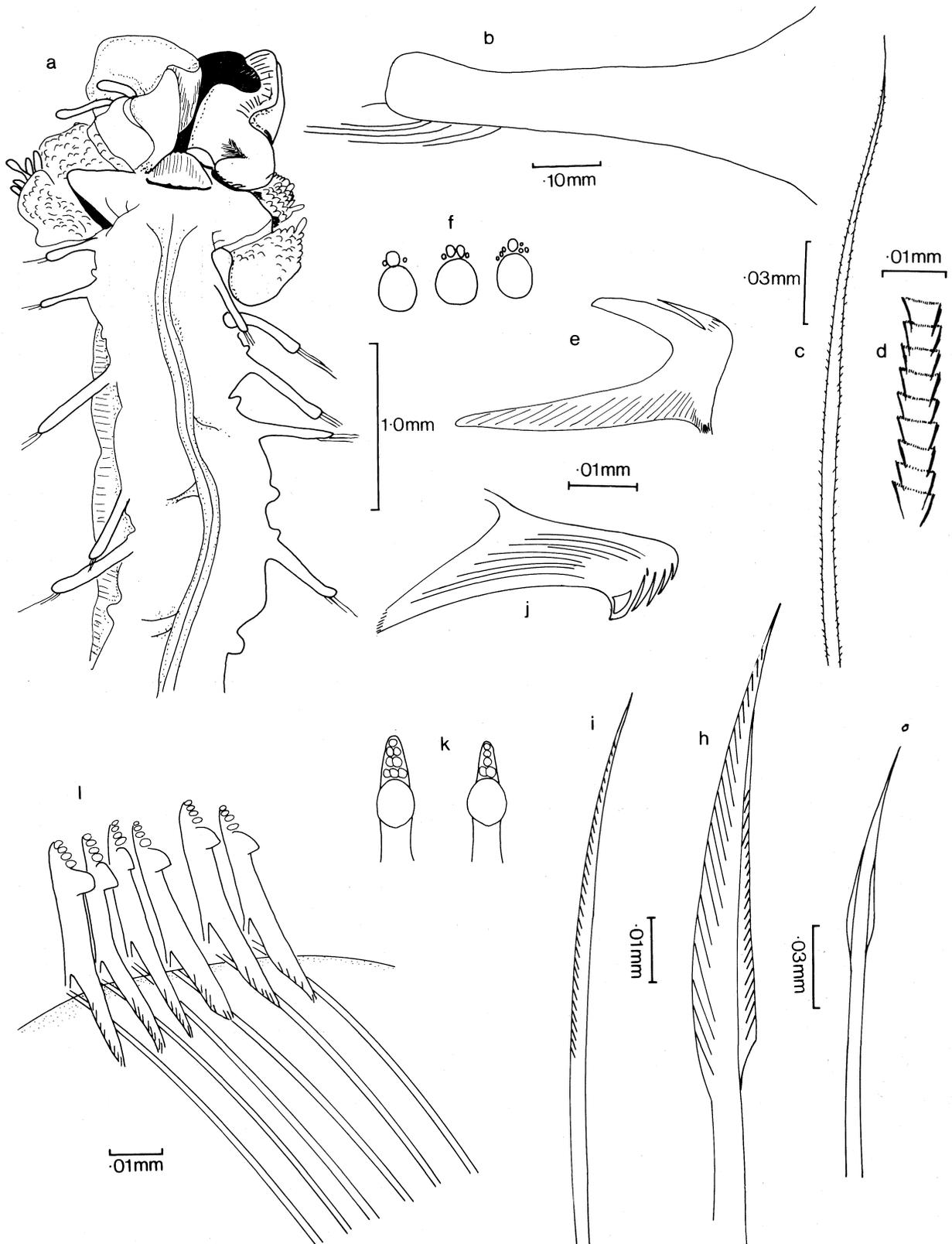
**Material examined.** HOLOTYPE: Western Australia, North West Shelf, off Port Hedland, 20°23'S 118°37'E, (AM W199628); incomplete, 27 segments, 5.1 mm long, 0.7 mm wide. PARATYPES: North West Shelf, off Port Hedland 2(AM W199631), 1(AM W199630), 1(AHF Poly 1456), 1(BMNH ZB 1985.229), 1(USNM 098824). Paratypes range in size from about 38 segments, 2.5 mm long, 0.3 mm wide to about 45 segments, 6.2 mm long, 0.7 mm wide.

**Description.** Body very small, tapering gradually posteriorly from about the midthoracic region, and slightly inflated on posterior abdomen. Epidermis of anterior dorsum faintly tessellated. Ventrolateral glandular pads on setigers 1-7 smooth, separated by a shallow midventral groove which extends along the entire body (Fig. 9a). Tentacular membrane weakly trilobate, lateral lobes reduced to a small tubercle, medial lobe fused with upper lip; posteriorly the tentacular membrane forming a slightly raised dorsal collar. Peristomium equal in length to segment 2 dorsally, ventrally it forms a pentagonal lower lip (Fig. 9a).

Segment 2 achaetous, reduced laterally to a small wedge-shaped pad, absent ventrally. Notopodia from segment 3, 10 pairs; notopodial lobes similar throughout, short with an elongate, digitiform postsetal lobe and a very small, pointed presetal lobe (Fig. 9b). Notosetae slender, winged capillaries, expanded slightly subdistally, distally minutely hirsute, setae arranged in graded lengths (Fig. 9c). Neuropodia from segment 14, extending posteriorly to at least segment 27; neuropodial lobes elongate, rectangular lamellae, increasing in length posteriorly to extend just beyond posterior edge of segment. Uncini with a flat base, short, thick neck and slight hump below the main fang (Fig. 9d); dental formula MF: 2-5:5-6, with the medial tooth in the first row largest (Fig. 9e). Uncini arranged in single, curved rows, initially about 20 per row increasing to about 30 per row on midabdomen; attachment tendons of uncini distinct, visible with x10 magnification, and extending to the base of neuropodial lobe.

Nephridial papillae absent.

**Variation.** Paratypes often with thorax inflated and



**Fig. 8.** *Polycirrus nephrosus* n. sp., holotype: **a**, ventral view of head end; **b**, posterior view of notopodium 3, left side; **c, d**, notoseta from notopodium 2; **e**, lateral view of midabdominal uncinus; **f**, frontal views from same (schematic). *Polycirrus octoseta* n. comb., paratype (AM W8127): **g, h**, winged type notoseta; **i**, wingless type notoseta; **j**, lateral view of uncini from midabdomen; **k**, frontal views from same (schematic); **l**, frontolateral view of uncini in situ showing tendons (details of dental formula omitted).

abdomen uniformly tapered. Thoracic epidermal pattern indistinct on small animals; one paratype with some irregularly arranged small papillae on ventrolateral pads. Ventrolateral pads on first 5–7 setigers occasionally meet medially, depending on state of contraction of body. Notopodia extending from segment 9 to 13; shape of podia variable, occasionally with distal lobes retracted. Uncini commence on segments 12–18, extending to pygidium; maximum number of uncini per row 15–30; dental formula varies from MF: 2–5:3–6 to MF: 3–6:5–7. Nephridial papillae absent.

**Comments.** *Polycirrus parvus* can be distinguished from other Australian species of *Polycirrus* by the characters shown in Table 1. The species is characterised by its small size, relatively few pairs of notopodia and the single type of notoseta present.

**Habitat.** Sandy sediments in 40–80 m.

**Distribution.** Western Australia (off Port Hedland) (Fig. 12E).

**Etymology.** The specific name is derived from the latin *parvus* meaning 'little' referring to the small size of the species.

*Polycirrus paucidens* n. sp.

Figs 9f–l; 12D

**Material examined.** HOLOTYPE: Bass Strait (NMV F50348); complete, about 50 segments, 10.2 mm long, 1.2 mm wide. PARATYPES: Bass Strait 1(AM W199635), 1(AM W199636), 1(USNM 098825), 2(BMNH ZB 1985.218), 1(NMV F50358). Paratypes incomplete, range in width from 0.4–1.0 mm. All type material from Stn 202, 39°00'2S 144°33'9E, 60 m.

**Description.** Body short, thorax slightly inflated, abdomen gradually tapering; a deep segmented midventral glandular groove throughout. Thoracic epidermis heavily papillated dorsally and anteroventrally (Fig. 9f,g). Ventrolateral glandular pads poorly developed. Tentacular membrane trilobate, medial lobe largest, fused with upper lip; tentacular membrane dorsally transversely grooved, distal margins entire, becoming convoluted proximally; lateral lobes of tentacular membrane extremely reduced. Peristomium equal in length to segment 2 dorsally, absent laterally, forming an oval shaped lower lip ventrally (Fig. 9f).

Segment 2 achaetous, half the length of segment 3 laterally and ventrally. Notopodia from segment 3, small, with a minute digitiform postsetal lobe, 7 pairs (Fig. 9h). Notosetae smooth, slender, wingless capillaries (Fig. 9i). Neuropodia from segment 14; neuropodial lobes rectangular lamellae directed posteriorly from body wall, extending to posterior edge of segment. Uncini with a broad, slightly concave base and short, thick neck (Fig. 9j,k), dental formula MF: 1–3 (Fig. 9l); uncini arranged in single, straight rows on distal edge of neuropodial lobes; maximum number of uncini per row 8–22.

Pygidial segment minute, anus terminal.

**Variation.** Paratypes with ventrolateral region of thorax glandular, but not forming distinct pads. Shape of medial lobe of tentacular membrane variable, often highly elongated. Notopodia extend for 7–9 segments; postsetal notopodial lobe may be retracted. Notosetae wingless capillaries, usually showing a slight subdistal expansion. Uncini begin on segment 13–17, continuing to near pygidium; dental formula shows no greater variation than for holotype. Nephridial papillae absent.

**Comments.** *Polycirrus paucidens* can be separated from the other Australian species of *Polycirrus* using the characters shown in Table 1. It most closely resembles *P. octoseta* (Hutchings, 1977) but can be distinguished from it by the type of notosetae present, and the papillated dorsum of *P. paucidens* in contrast to the smooth dorsum of *P. octoseta*.

**Habitat.** Continental Shelf at 27–171 m depth, from clayey sand to very coarse sand with shell fragments.

**Distribution.** Bass Strait (Fig. 12D).

**Etymology.** The specific name is derived from the latin *paucus*, meaning few or little, and *dens*, meaning tooth, referring to the small number of teeth surmounting the main fang of the uncinus.

*Polycirrus porcata*

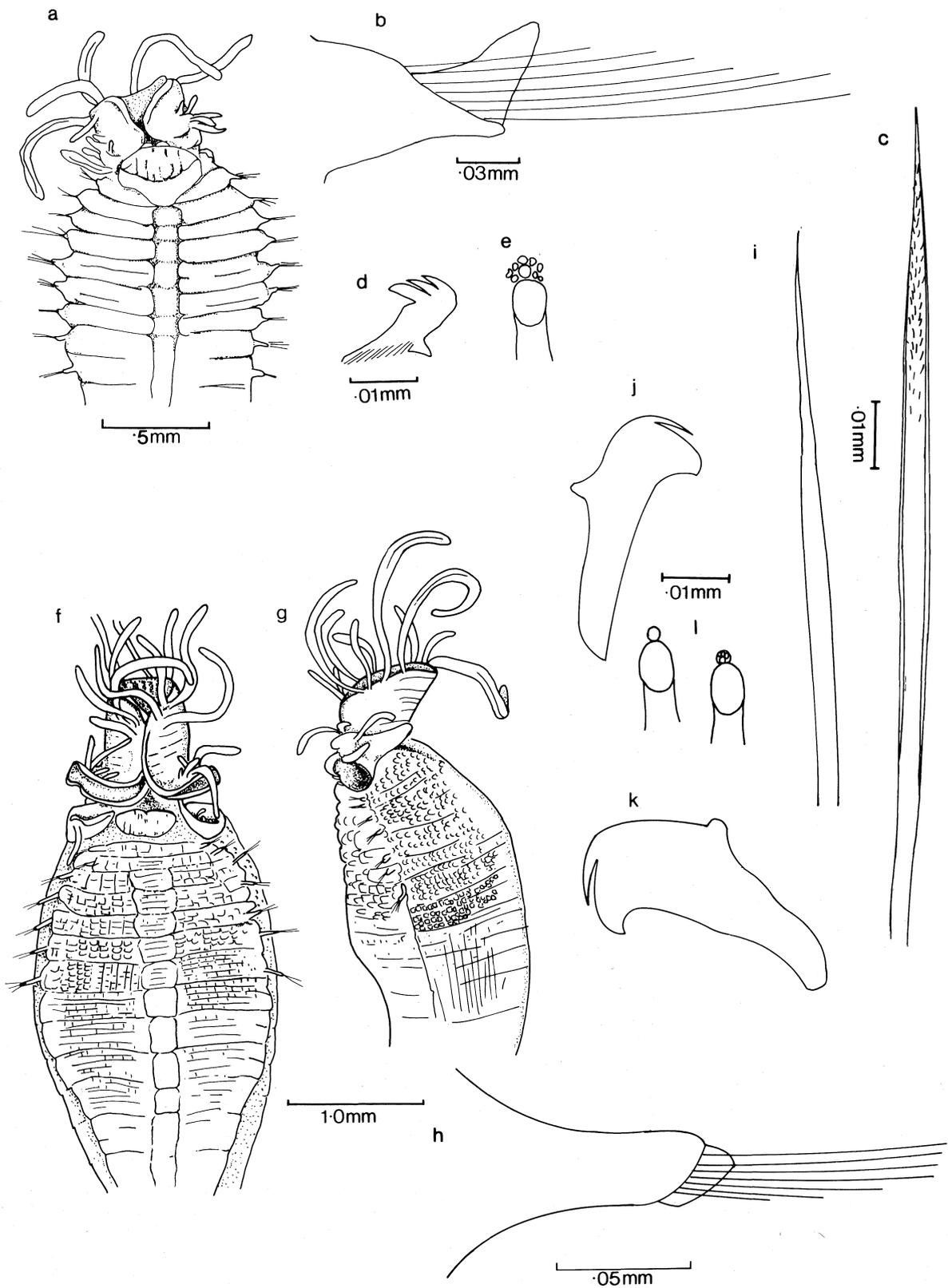
Figs 10a–d; 12F

*Polycirrus porcata* Knox & Cameron, 1971: 36, figs 30–31. *Polycirrus* sp. 1 Mahon, 1973: 371.

**Material examined.** HOLOTYPE: (NMV G1757), Quiet Corner, Port Phillip Bay, Victoria. South Australia: Little Island 8(AM W199485); Kangaroo Island, Western River Cove 1(AM W199483). Tasmania: Maria Island 1(AM W199484). Bass Strait: 1(NMV F60338), many(NMV F50340), 1(NMV F50339). Victoria: Port Phillip Bay 1(AM W16128), 1(AM W16129), 1(AM W16130), 5(AM W16223), 1(NMV F50341), 8(NMV F50343); Western Port Bay, Crib Point 1(NMV F50344), 2(NMV F50342), 1(NMV F50347), Crawfish Rock 2(NMV F50346), 1(NMV F50345). Specimens ranged in size from about 25 segments, 2.0 mm long, 0.8 mm wide, to an ovigerous female about 71 segments, 34 mm long, 3.6 mm wide.

**Comments.** The type description given by Knox & Cameron (1971) differs somewhat from the holotype which was re-examined. Uncini first appear on segment 6 (setiger 4) not segment 10 (setiger 8) as stated by Knox & Cameron, and they occur at the ventral base of the notopodia. Thoracic uncini have a dental formula MF: 3–4 and appear to have, in profile, a single elongate tooth surmounting the main fang (Fig. 10a). Abdominal uncini are much larger than thoracic ones and show greater development of a tooth below the main fang. They appear to have a second row surmounting the main fang consisting of a series of minute teeth (Fig. 10b).

Thoracic notosetae appear finely hirsute under 40x, significantly so under 100x, and do not appear to be winged as suggested by Knox & Cameron (Fig. 10c,d). There are 12 pairs of notopodia beginning on segment 3. Nephridial papillae are prominent as elongated



**Fig. 9.** *Polycirrus parvus* n. sp., holotype: **a**, ventral view of head end; **b**, anterior view of notopodium 4, right side; **c**, notoseta from same; **d**, lateral view of uncinus from midabdomen; **e**, frontal view from same (schematic). *Polycirrus paucidens* n. sp., holotype: **f**, ventral view of head end; **g**, lateral view of same; **h**, anterior view of notopodium 3, left side; **i**, notoseta from same; **j, k**, lateral views of uncini from anterior and midabdomen respectively; **l**, frontal views of uncini from midabdomen (schematic).

processes occurring on the anterior base of notopodia on setigers 2–12, ie. 11 pairs of papillae are present, not 9 pairs as reported by Knox & Cameron (1971).

Other material examined was generally much smaller than the holotype and exhibited the following variations: ventrolateral glandular pads absent or slightly developed on first 4 setigers; epidermis irregularly and lightly papillated. Notopodia from segment 3, extending for 9–11 segments with the numbers appearing to increase with increasing body size. Uncini from segment 5–7, initially 3–5 uncini per neuropodium, increasing up to 8–10 uncini in abdominal segments. Uncini increase in size posteriorly; dental formula MF: 3–5 (thorax) (Fig. 10e), MF: 1:6–12 (abdomen) with the most distal teeth minute. Nephridial papillae prominent, absent in smallest specimens, beginning on setiger 1–4, extending to last notosetigerous segment.

*Polycirrus porcata* can be distinguished from other Australian species of *Polycirrus* using the characters shown in Table 1. The distribution and habitats from which the species has been recorded have been considerably expanded from the original type locality of Port Phillip Bay.

**Habitat.** Intertidal to about 100 m, sheltered bays and on the continental shelf; mainly from soft sediments ranging from silty clay-sand to sandy gravel and coarse shell. Associated with the seagrass *Posidonia* in some shallow water areas.

**Distribution.** South Australia, Victoria, Bass Strait and Tasmania (Fig. 12F).

#### *Polycirrus rosea*

*Polycirrus rosea* Hutchings & Murray, 1984: 91–92, fig. 25, 1–5.

**Comments.** No additional material was found during this survey of Australian Polycirrinae.

**Habitat.** Estuarine mud at a depth of 4 m in a salinity of 33.4‰.

**Occurrence.** Known only from Hawkesbury River, New South Wales.

#### *Polycirrus tessellatus* n. sp.

Figs 10f–l; 12E

**Material examined.** HOLOTYPE: Victoria, Western Port Bay, 38°26'S 145°08'E, (NMV F50337); incomplete, 18 segments, 8.0 mm long, 2.0 mm wide. PARATYPES: South Australia, Elliston Reef, 33°39'S 134°53'E, 5(AM W199468), 1(AM W199469), Stokes Bay, 35°37'S 137°12'E, 1(AM W199470); Bass Strait Stn 170, 38°52.6'S 148°25.2'E, 140 m, 1(USNM 098826), Stn 164, 40°40.7'S 148°36.9'E, 67 m, 1(BMNH ZB 1985.219), Stn 115, 40°40'S 145°15'E, 32 m, 2(NMV F50332, F50333), Stn 113, 40°24'S 145°32'E, 65 m, 2(NMV F50334, F50335); Victoria, Western Port Bay, Crib Point, Stn 31N, 38°20.94'S 145°13.62'E, 15 m, 1(NMV F50336), Stn 32N, 38°20.83'S 145°13.49'E, 13 m, 1(AHF Poly 1457). Complete specimens range from about 40 segments, 10.0 mm long, 0.5 mm wide to about 80 segments,

15.5 mm long, 1.8 mm wide. Remaining paratypes range in width from 0.5–2.6 mm.

**Additional material examined.** South Australia: Kangaroo Island, Western River Cove, 1(AM W199472). Bass Strait: 1(NMV F50422), 1(NMV F50423), 1(NMV F50324), 1(NMV F50325), 1(NMV F50327), 1(NMV F50328), 2(NMV F50326), 1(NMV F50329), 1(NMV F50330). Victoria: Gabo Island 1(AM W199473). New South Wales: Minnie Water 1(AM W199471), Angourie Point 1(AM W199474).

**Description.** Thorax robust, tapering slightly beyond setiger 10. Dorsum of segments 1–5 and anterior segment 6 deeply tessellated, thereafter weakly annulated (Fig. 10f). Ventrums with a shallow glandular groove and lateral glandular pads on setigers 1–10 irregularly, deeply grooved, tessellated on lateral and medial margins; pads on setigers 8–9 reduced, barely visible on setiger 10 (Fig. 10g). Tentacular membrane expanded, fused with upper lip, distally with a frilly margin. Peristomial segment an incomplete ring; equal in length to segment 2 dorsally; absent laterally; forming a large, longitudinally grooved, crescent shaped lower lip ventrally (Fig. 10g).

Segment 2 achaetous; reduced laterally and ventrally to a thin glandular pad; absent midventrally. Notopodia from segment 3, 10 pairs; large triangular pre- and postsetal lobes (Fig. 10h). Notosetae narrow winged capillaries, smooth, some distally irregularly hirsute along one side as if worn (Fig. 10i,j). Neuropodia from segment 15; first few neuropodial lobes minute, lamellate, directed posteriorly. Uncini with slightly convex base and short, thick neck (Fig. 10k); dental formula MF: 1:6–12 (Fig. 10l); uncini arranged in single, straight rows, maximum number of uncini per row 22–40.

Nephridial papillae absent.

**Variation.** Paratypes exhibited considerable variation as follows: ventrolateral glandular pads deeply dissected or smooth, extending to setigers 7–13, with the last few reduced in size; midventral groove in this region present or obscured by pads. Segment 2 partially or wholly obscured ventrally by lower lip. Notopodia extending for 10–16 pairs depending on size of animal (see initial discussion of the genus *Polycirrus*); notosetae, narrow winged capillaries, appearing smooth or minutely hirsute under 40x objective, distinctly hirsute under 100x objective; wings occasionally splayed from wear, appearing irregularly hirsute; uncini from segment 10–16, dental formula highly variable between and within animals as follows: MF: 1–5: 5–17:α, with teeth in most distal row minute.

Abdomen of paratypes often slightly inflated with a shallow midventral groove; middle and posterior segments short, crowded; neuropodial lobes rectangular lamellae, almost equal to segmental length on posterior abdomen, extending to pygidial segment. Pygidium minute, anus terminal. Nephridial papillae present on some specimens on setigers 1–6 at the posteroventral base of notopodia.

**Comments.** *Polycirrus tessellatus* exhibits considerable

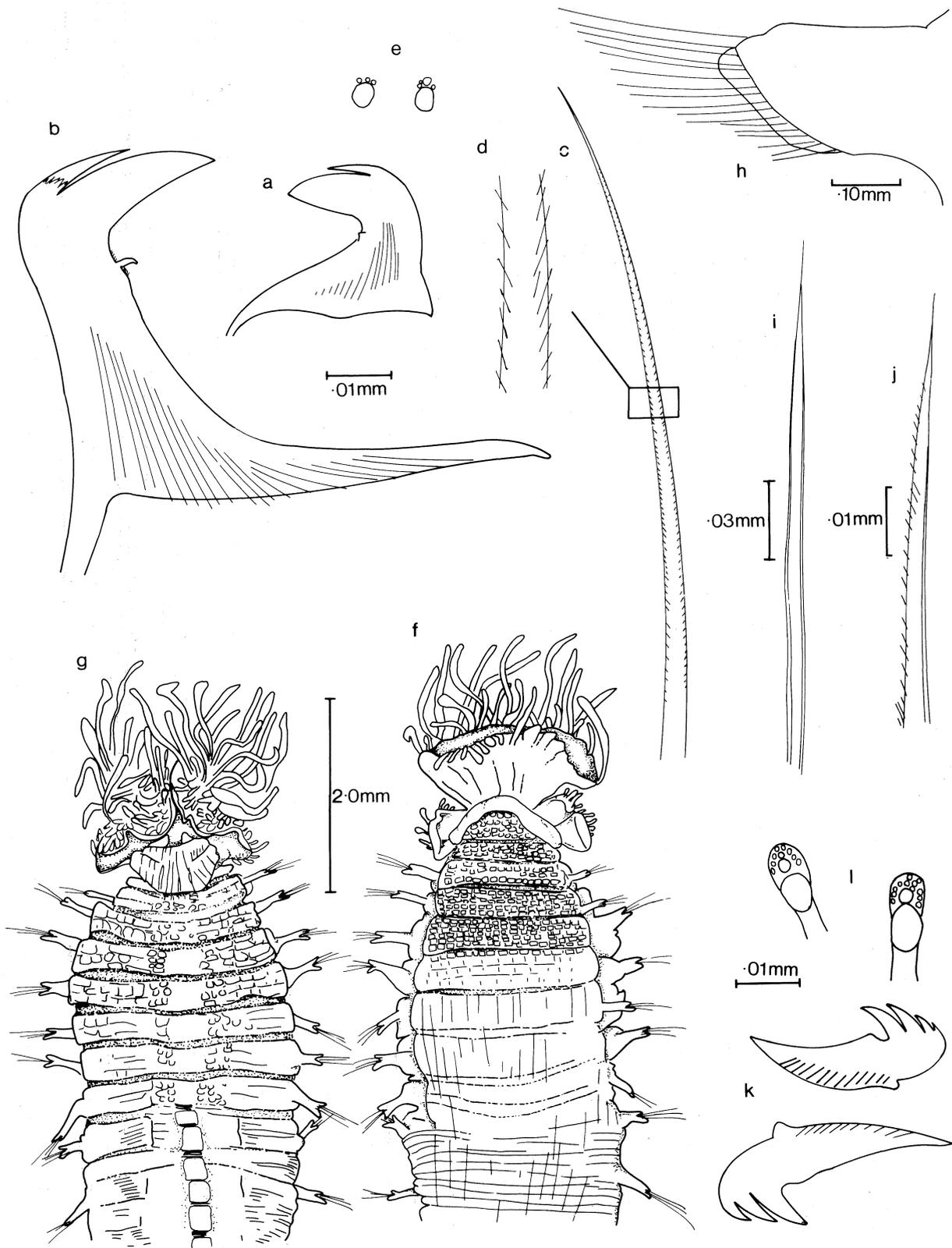


Fig. 10. *Polycirrus porcata*, holotype: a, lateral view of uncini from segment 7; b, lateral view of uncini from mid abdomen; c, d, notoseta from segment 7; e, frontal view of uncini from same. *Polycirrus tessellatus* n. sp., holotype: f, dorsal view of head end; g, ventral view of same; h, anterior view of notopodium 5, right side; i, j, notoseta from same; k, lateral views of uncini from midabdomen; l, frontal views of uncini from same (schematic).

variation within the material examined, in the numbers of pairs of notopodia present and the segment on which the uncini first appear. This is probably related to the size of the animal as explained in the initial discussion of the genus. It is therefore essential to look at a variety of other characters (Table 1) in order to distinguish this species from other Australian species of *Polycirrus*.

**Habitat.** Found on continental shelf in 27–130 m depth in sediment ranging from muddy sand to coarse sand. Also from exposed and sheltered rocky shores underneath rocks and associated with algal mats.

**Distribution.** South Australia, Victoria, Bass Strait and New South Wales (Fig. 12E).

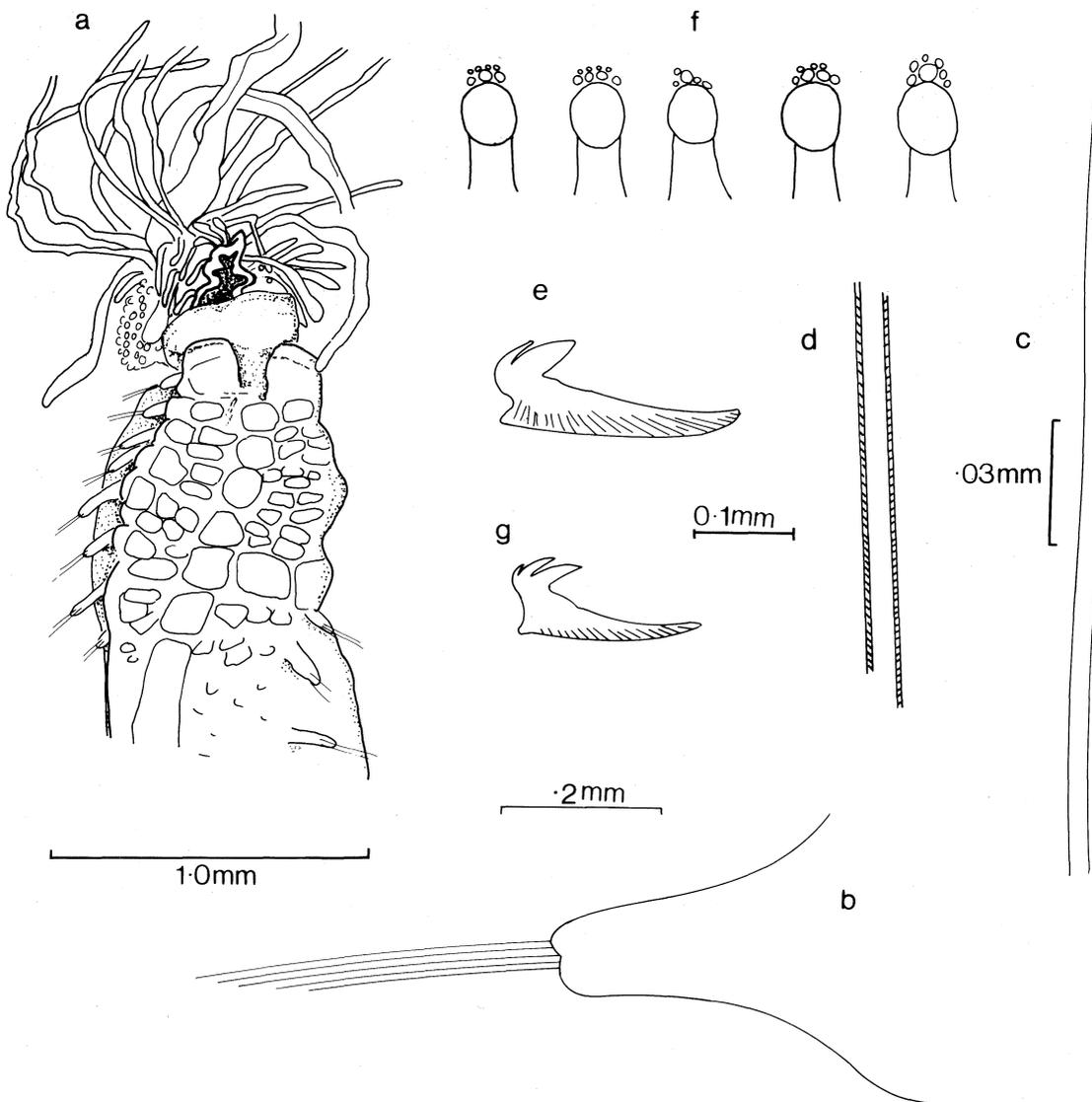
**Etymology.** The specific name *tesselatus* is derived from the latin meaning inlaid with small square stones or mosaic, and refers to the epidermal pattern on the anterior dorsum.

*Polycirrus variabilis* n. sp.

Figs 11a–g; 12E

**Material examined.** HOLOTYPE: Queensland, Lizard Island, 14°40'S 141°28'E, (AM W199538); complete, 57 segments, 10.6 mm long, 0.8 mm wide. PARATYPES: Lizard Island 1(USNM 098827), 1(AM W199540), 4(AM W199541), 2(AM W199539), 3(AM W199543), 1(AM W199544), 1(AHF Poly 1458), 1(AM W199477), 1(BMNH ZB 1985.230). Paratypes range in size from about 60 segments, 4.7 mm long, 0.4 mm wide to about 80 segments, 14.5 mm long, 0.8 mm wide.

**Description.** Body slender, filiform, gradually tapering posteriorly from midthorax. Dorsum faintly papillated anteriorly, ventrum glandular, deeply dissected on setigers 1–8. Ventrolateral pads absent. Midventral, glandular groove shallow, extending along entire body length (Fig. 11a). Tentacular membrane expanded medially, partially fused with upper lip, lateral



**Fig. 11.** *Polycirrus variabilis* n. sp., holotype: a, ventral view of head end; b, anterior view of notopodium 6, right side; c, d, notoseta from same; e, lateral view of uncinus from anterior abdomen; f, frontal views of uncini from same (schematic); g, lateral view of anterior abdominal uncinus from paratype (AM W199477).

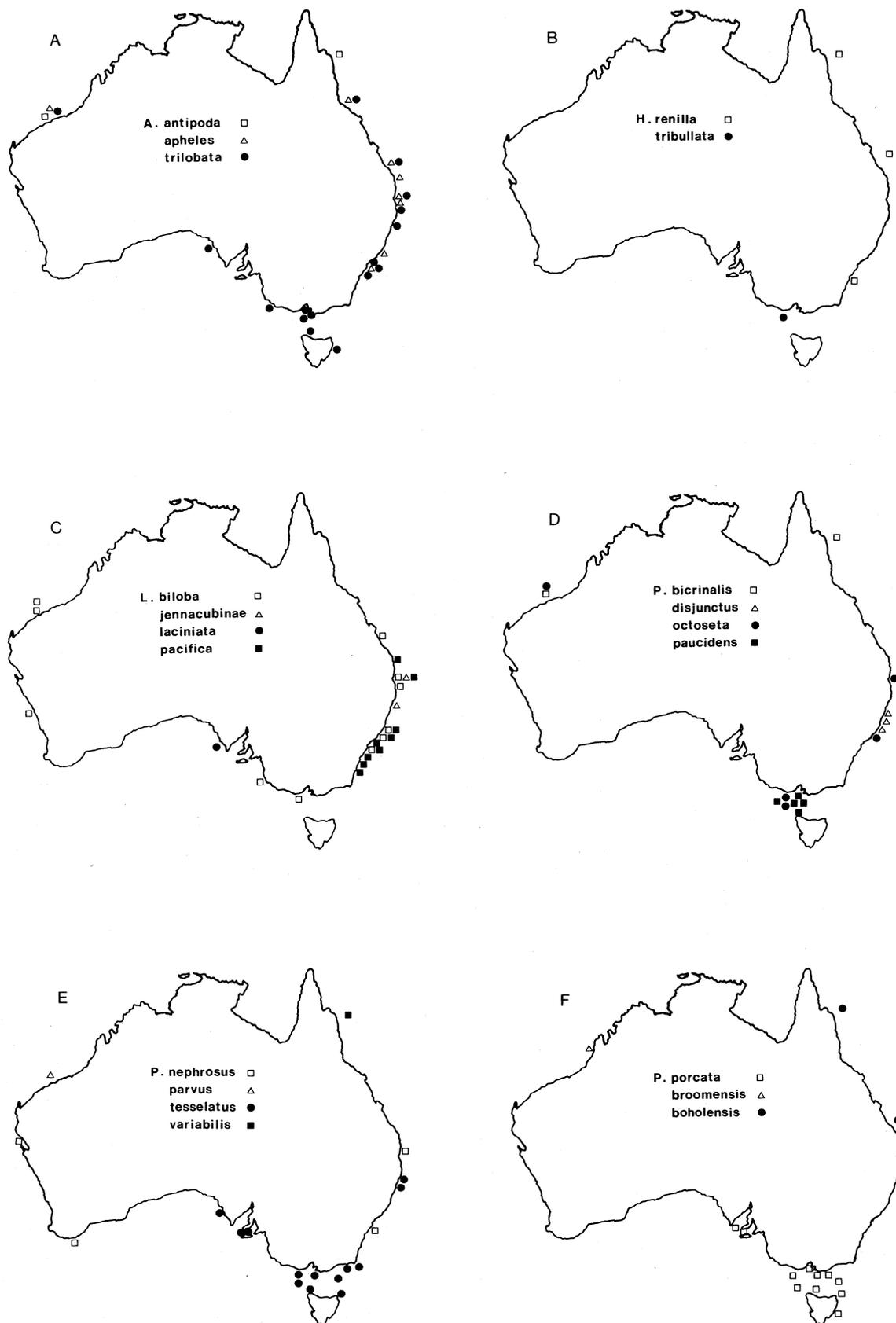


Fig. 12. The Australian distribution of A, *Amaeana* species; B, *Hauchiella* species; C, *Lysilla* species; D-F, *Polycirrus* species.

lobes reduced. Peristomium very short dorsally, ventrally appearing bulbous, inflated; lower lip not distinct (Fig. 11a).

Segment 2 achaetous, reduced. Notopodia from segment 3, 15 pairs; notopodia short, slender, with minute rounded pre- and postsetal lobes (Fig. 11b). Notosetae slender, narrow winged capillaries, wings appear faintly striated under 100x objective (Fig. 11c,d). Neuropodia from segment 18 arranged in single, curved rows with 7–11 per row initially, increasing to about 22 on midabdomen; neuropodia rectangular lamellae initially, becoming longer and distally broader posteriorly. Uncini with a broad, flat to slightly convex base and short, thick neck (Fig. 11e); dental formula variable, as follows: MF: 1–5 :2–6, with medial tooth in first row often the largest (Fig. 11f).

Nephridial papillae absent. Pygidium with a minute ventral anal cirrus; anus terminal.

**Variation.** In smaller paratypes dorsal papillation not apparent. First 6–10 setigers ventrally glandular, in some cases the large glandular papillations resemble a body wall distended with eggs. Notopodia extending for 10–17 segments; some notosetae with faintly hirsute wings under 40x objective appear distally worn. Notopodia often with a small rounded presetal and slightly larger postsetal lobe. Uncini from segment 15–19, initially 6–8 per row, increasing up to 12–22 per row. Uncini sometimes with a minute second row visible in profile (Fig. 11g). Nephridial papillae absent.

**Comments.** *Polycirrus variabilis* can be separated from other Australian species of *Polycirrus* using the characters shown in Table I. The species most closely resembles *P. nervosus* Marenzeller, 1884, from Japan, especially in the form of the notosetae and uncini. The syntypes of this species (NMW Inv. no.1794) were examined and compared with *P. variabilis*. The two species differ most notably in the form of the ventrolateral glandular region, which is smooth and divided into distinct pads in *P. nervosus*, whereas in *P. variabilis* these pads are absent. Also, one syntype has 37–40 pairs of notopodia, significantly more than the number present in *P. variabilis*.

**Habitat.** Coral substrata in 7–12 m.

**Distribution.** Queensland, Lizard Island (Fig. 12E).

**Etymology.** The specific name *variabilis* is derived from the latin meaning changeable, referring to the large variation occurring in the dental formula of the uncini.

### Discussion

The subfamily Polycirrinae is well represented in Australian waters, with 21 species in four genera. As mentioned in the introduction it seems likely that additional species occur in Australian waters. Exemplifying this potentially undescribed fauna, limited collections from the Bass Strait and North West Shelf, areas not well collected previously, have yielded two and three species respectively.

The genera *Lysilla*, *Amaeana* and *Hauchiella* contain relatively few species, and of these at least half of the known species in the world occur in Australia. The genus *Polycirrus* is well represented in Australian waters. At this stage it is difficult to ascertain what percentage of the *Polycirrus* fauna occurs in Australia because many of the currently described species may need to be synonymised. In some cases species may be *nomina nuda* unless additional material is collected, as some of the early descriptions are totally inadequate (Hutchings & Glasby, in prep). Other workers have also suggested the genus is in need of revision (Hartman, 1969; Banse, 1980). *Polycirrus* may also contain undescribed species as we suspect that some records have been confused in the literature.

Earlier workers divided *Polycirrus* into a number of subgenera. Caullery (1944) discussed in detail the three subgenera erected by Malmgren (1865), *Ereutho*, *Leucariste* and *Polycirrus*, and concluded that these subdivisions, based on the type and number of pairs of notopodia and the segment on which the uncini began, were valid. Our data clearly show (Table 1) that within a species there is sometimes a considerable range of segments over which the uncini begin and in the number of pairs of notopodia. This is partially related to the size of the animal and hence presumably age of the individual. Thus the subgenera as accepted by Caullery are not considered to be very useful. It seems likely that the segment on which the notopodia begin is a phylogenetic character, and should be used to split the genus into two. This should be confirmed by examining juvenile stages and will necessitate the detailed examination of the anterior segments of all species of *Polycirrus*. This is currently being undertaken (Hutchings & Glasby, in prep).

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**Table 1.** Character states in *Polycirrus* species found, or expected to be found, in Australia. 1. General types of *Polycirrus* notosetae: A, Pinnate (e.g Figs 6i,j); B, Hirsute (e.g Figs 10c,d); C, Smooth, with narrow wings or wingless (e.g Figs 8g,h; 9i;11c,d). 2. General types of *Polycirrus* uncini: A, Concave base; long narrow neck; long main fang (e.g Fig.7j); B, Flat or slightly curved base; short, thick neck; short main fang (e.g Fig.10k).

Species	No. animals examined (max. width mm)	Ventrolateral glandular pads (No. pairs)	Notosetae			Uncini				Nephridial papillae (occurrence on setigers)
			Appearance (seg.)	No. pairs	Type 1	Appearance (seg.)	Max. No. per row	Dental formula	Type 2	
<i>P. aquila</i>	1(2.5)	poorly (6) developed	3	16	A	16	10	MF:3	A	present (2-16)
<i>P. bicrinalis</i>	8(0.9)	absent	3	14-16	A, C	17-20	15-25	MF:1:5-9	B	absent
<i>P. boholensis</i>	14(2.2)	indistinct	3	10-11	A	13-15	7-10	MF:1:3-12	A	present (1-11 or 2-11)
<i>P. broomensis</i>	1(2.5)	indistinct	2 or 3	12	A, B	14-15	>100	MF:1:1-2	B	present (3-8)
<i>P. disjunctus</i>	6(1.6)	present (2-3)	3	10-11	A, B	10-14	11-12	MF:3-8	A	present (7-11)
<i>P. nephrosus</i>	6(2.7)	absent	2 or 3	14-26	B	12-16	8-15	MF:3-7	A	present (2-15) most setigers with 2 pairs each
<i>P. octoseta</i>	12(0.9)	present (7)	3	8-9	C	11-12	32-38	MF:1-3:1-3:2-1	B	absent
<i>P. parvus</i>	7(0.7)	present (5-7)	3	9-13	C	12-18	15-30	MF:2-5:3-6	B	absent
<i>P. paucidens</i>	6(1.2)	indistinct	3	7-9	C	13-17	8-22	MF:1-3	B	absent
<i>P. porcata</i>	38(3.6)	poorly developed (4)	3	9-12	B	5-7	8-10	MF:3-5 (thorax) MF:1:6-12 (abdomen)	A	present (2-12)
<i>P. rosea</i>	1(0.5)	poorly (6) developed	3	10	C	10	8-10	MF:5-7:5-8	B	absent
<i>P. tessellatus</i>	15(2.6)	present (7-13)	3	10-16	C	10-16	22-40	MF:1-5:5-17	B	present (1-6)
<i>P. variabilis</i>	18(0.8)	poorly developed (6-10)	3	10-17	C	15-19	12-22	MF:1-5:2-6	B	absent

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