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## The Aphroditidae (Polychaeta) from Australia, together with a Redescription of the Aphroditidae collected during the Siboga Expedition

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**ABSTRACT.** The family Aphroditidae is represented in Australian waters and the Indonesian Archipelago by 34 species in five genera, of which seven are new species. Previously described species from Australia are redescribed. The Aphroditidae collected during the Siboga expedition and described by Horst (1916a,b, 1917) are also redescribed and the relationship of this fauna to the Australian fauna discussed. In addition, the characters used to distinguish genera and species within the family and the variations exhibited by these characters are discussed, to facilitate a subsequent phylogenetic study of the group. A key to the genera and species represented in the Indo-Pacific is given.

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The family Aphroditidae is poorly known from Australian waters. Day & Hutchings (1979) recorded 12 species in four genera, some of them are known only from their original descriptions, and for one of these species *Aphrodita terraereginae* no additional material has been found during this study. However, this family is well represented in Museum collections in Australia, especially those from deeper waters.

We have therefore undertaken a comprehensive study of the Australian aphroditids. We have examined all the aphroditid material available in Australian state museums and the extensive collections of aphroditids made during the Siboga Expedition and described by Horst (1916a,b, 1917). In this paper we describe 34 species in five genera, of which seven are new species. For species previously

described we have provided comprehensive descriptions as the original descriptions are typically very brief.

Apart from the material collected during the Siboga Expedition few other aphroditids have been described from the Indo-Pacific. It is surprising that there is little overlap between the aphroditid fauna of Australian waters, and those recorded from Indonesian waters, as aphroditids are typically deep water species. However it should be stressed that relatively little material was available from northern Australia, where little deep water collecting has been undertaken.

A recent revision of the genus *Palmyra* by Watson Russell (1989) has placed this genus in the family Aphroditidae. It was considered to be a member of the family Chrysopetalidae by Day (1967) and subsequently

Fauchald (1977) referred to it as belonging to the family Palmyridae. While this genus is included in the key, only a brief description of this monospecific genus is given by us, as no additional material was available other than the material recently described by Watson Russell (1989).

It may seem surprising that so many new species are present in Australian waters, but this can be explained by the fact that although aphroditids are typically large and highly conspicuous members of the benthic fauna, they are predominantly deep water species, and the Australian deep water fauna is not well known. Although many of the species have overlapping geographical distributions, we have virtually no information on the habitats in which these species occur although some species have sand or mud entangled amongst their setae indicating perhaps habitat preferences. With increasing collecting, this should be rectified. During this study we examined large amounts of material collected in the Bass Strait by the Museum of Victoria. While we were able to identify much of this fauna to species, some of the smaller individuals (2-3 mm long) could not be reliably identified to species. This was because some of the small individuals lacked particular setal types, and no studies on setal development and other structures, such as palps and tentacles, with increasing size and presumably age, have been carried out on this family. It may be that juvenile aphroditids cannot be identified to species as we believe, setal structure and composition change markedly during the initial stages of development. While some of these small individuals may represent juveniles of adults described from the region, others may represent undescribed species.

In the literature, a considerable variety of terms have been used to describe aphroditid morphology. In Figures 1, 27, 32 and 52 we illustrate a typical member of each genus considered and indicate the terminology which we have followed.

### Material and Methods

The following measurements were recorded for animals examined: total body length, maximum body width including setae and segments, and the number of parapodia. This is summarised for each species, in addition the range of total body length is given for each lot examined.

The keys to the family and genera are artificial and do not imply any phylogenetic relationships.

The following abbreviations have been used in the text: LACM-AHF – Allan Hancock Foundation, Los Angeles, California (Polychaete collections now located at the Los Angeles County Museum); AM – Australian Museum, Sydney; BMNH – The Natural History Museum, London; MTQ – Museum of Tropical Queensland, Townsville; NMV – National Museum of Victoria, now Museum of Victoria, Melbourne; NTM – Northern Territory Museum, Darwin; QM – Queensland Museum, Brisbane; SAM – South Australian Museum, Adelaide;

USNM – National Museum of Natural History, Smithsonian Institution, Washington, D.C.; WAM – Western Australian Museum, Perth; ZMA – Zoologisch Museum, Amsterdam; ZMB – Zoologisches Museum, Museum für Naturkunde der Humboldt-Universität, Berlin.

In each species description we give the known distribution of the species, localities marked \* are for localities which appear in the literature but we have not examined material from that area to confirm the identifications.

The specific names are based on Aboriginal words in several languages meaning a shield and were found by consulting 'Australian Aboriginal Words and Place Names and their Meanings' by Sydney E. Endacott (1984).

All tables referred to throughout the text are listed in the Appendix.

### The Systematics and Characters considered useful in the Family Aphroditidae

The family Aphroditidae has not been subjected to a comprehensive revision since it was erected by Malmgren (1867). Horst (1916a,b, 1917) described one new genus and 21 new species, subsequently Pettibone (1966) partly revised some of the genera and recognised an additional genus. Fauchald (1977) recognised seven genera, one of these *Tricertia* Haswell, 1883 we have synonymised with *Pontogenia* Claparède, 1868. Of the remaining six genera recognised by Fauchald (1977) we have examined representatives of all except for the monospecific genera *Hermionopsis* Seidler, 1923, and *Heteraphrodita* Pettibone, 1966. More recently, Watson Russell (1989) has placed the monospecific genus *Palmyra* Savigny, 1818 in the family Aphroditidae and she gives an expanded family diagnosis to include this genus.

We have had the opportunity in several cases to examine substantial numbers of individuals of particular species within some genera which has enabled us to study the variation of a character with respect to increasing size and presumably age. Listed below are the characters which we believe are useful in aphroditid taxonomy both at the generic and specific level and the various character states exhibited by each character. At this stage we have rarely attempted to polarise the character states. A more detailed study, including a phylogenetic analysis would resolve many problems, but is clearly beyond the scope of this study. We did not attempt to consider the relationships between the genera. Fauchald (1977) placed the family within the superfamily Aphroditacea, the sub order Aphroditiformia all within the order Phyllodocida. Fauchald gives little explanation of the characters used to determine these orders, and certainly at this time no cladistic study was undertaken, although he is currently undertaking such a study (Fauchald personal communication).

Since many members of the family have been described from deep water in other parts of the world, one would anticipate finding many new taxa from Australia, as deep water areas off this continent are poorly known, and this is indeed what we did find.

The family Aphroditidae is primarily represented by deep water species and few species occur intertidally. It is assumed that they produce a pelagic larval stage although palmyrids have large yolky eggs (300-400µm) which suggests a probable non feeding pelagic stage or direct development with limited ability to disperse (Watson Russell, 1989). No details are known for other members of the family, similarly no development studies have been undertaken of the early stages of any species of aphroditid. We examined material 2 to 3 mm in length from the Bass Strait and could not assign these individuals to species. Watson Russell (1989) indicates that juveniles of *A. australis* Baird and *Pontogenia chrysocoma* Baird collected from hard substrates in shallow water lack elytra, elytophores, dorsal tubercles and notosetal felt, the major notosetal types are relatively large compared with body size and entirely cover the body. This suggests that juvenile aphroditids are not currently identifiable to species, and the following comments apply only to the adult condition. In the following discussion we consider the constancy of characters over the size range of material examined; it should be noted that for some of the species in the four genera *Aphrodita*, *Aphrogenia*, *Laetmonice*, *Pontogenia*, only the holotype of the species was available for examination.

As no material of *Palmyra* was examined, we have not included it in the discussion below and the reader is referred to the recent study of the single species of *Palmyra*, *P. savigny* by Watson Russell (1989).

In cases where some suggestions are made as to the plesiomorphic and apomorphic condition, we have considered that possible outgroups which could be used in a cladistic study would be a family within the suborder Phyllodociformia such as the family Phyllodocidae or a family within the suborder Nereidiformia such as the family Nereididae. Recent revisions of these families have been undertaken by Glasby (1991), Fitzhugh (1987) and Pleijel (1991) which would facilitate such a study.

## Characters

### General Body Form

**1. Numbers of segments.** The numbers of body segments, equal to the number of pairs of parapodia, appears relatively constant for a particular species of *Aphrodita*. For example individuals of *A. kulmaris* n.sp. ranging from 1.8 to 10 cm in length have 38 to 46 segments, whereas *A. bamarookis* n.sp. ranging from 3 to 6 cm in length, have 49 to 52 segments. There appears to be two groups of species of *Aphrodita*, those with a relatively low number of segments (32-36) and those with

40+. Similarly in *Laetmonice* the number of segments appears to be relatively constant for a particular species. Some species have a large number such as *L. producta* Grube (41-45) whereas others have as few as 25 *L. batheia* Horst.

In the single species of *Aphrogenia* examined *A. margaritacea* Augener, the number of segments varied from 22 to 32 over a range of body sizes, suggesting that this species grows initially by increasing the number of segments. We assume that once 32 segments is reached, proliferation of body segments cease. We do not know if this pattern is valid, nor if it represents a species or genus specific pattern.

In *Pontogenia* at least for *P. araeoceras* (Haswell) and *P. macleari* (Haswell), small individuals have fewer segments than larger individuals and there is evidence that adults of these two species have varying numbers of segments. The other two species of *Pontogenia* present in the Indo-Pacific were represented by only a single specimen, so no further comments can be made for this genus.

As aphroditids presumably arose from a long multi-segmental ancestral form, one could speculate that the reduction in the number of segments is an apomorphic character. Several species studied exhibited considerable ranges in size such as *Aphrodita kulmaris* n.sp. 1.8 to 10 cm, suggesting a long lived species. We suspect that this is true for all aphroditids and that once a certain number of segments have been attained, growth occurs only by expansion of segments.

**2. Body shape.** Species of *Aphrodita*, *Aphrogenia* and *Pontogenia* all have a similar body shape although some species of *Aphrodita* have an attenuated caudal region, the significance of which is unknown, although the presence or absence of the attenuated caudal region is constant for a species.

In contrast, species of *Laetmonice* vary in their body shape from elongate, oval in shape to cigar-shaped. Whether this can be used as a specific character is doubtful.

The body shape of aphroditids appears not to be a useful generic or specific character and appears to be more of a familial character.

**3. Ventral surface.** The ventral surface of all the genera examined was papillated with the papillation becoming more pronounced in larger individuals. The value of this character is unknown although perhaps if an index of papillation in terms of structure and density could be established it could be a useful character.

**4. Prostomium.** *a) Median antenna.* The structure and shape of the median antenna is a useful specific character, and appears to be constant within a species, regardless of size. In *Aphrodita* the antennal shape varies from small knob-shaped, rod-shaped, bulbous, to an elongate antenna equal or greater in length to the prostomium. In some species of *Aphrodita* the median antenna is biarticulate with a basal ceratophore and an

elongate style, but in other species the antenna appears as a simple structure and no separation of ceratophore and style is apparent. There does not appear to be a relationship between shape and presence of articulation, however all species that have a ceratophore tend to have a long style (three-quarters to one and one-quarter length of prostomium). But not all species with a long antenna have an apparent ceratophore.

In all the other genera the median antenna is always a compound structure consisting of a basal ceratophore and a style. The relative lengths of these two structures varies among species.

In *Pontogenia* the ceratophore may be either smooth or finely papillated as in two species present in Australian waters and the shape of the style varies from those with a finely tapered articulate tip (Fig.53a) to those with a clavate tip (Fig.55a). Thus the length and structure of the ceratophore and style are useful specific characters. No other genus has papillated ceratophores, however some species of *Aphrodita* have small bulbous antenna covered with papillae.

*b) Shape of prostomium.* The shape of the prostomium is generally similar in all species of aphroditids examined, either round or oval. The development of ocular peduncles or raised ocular areas varies between genera. In *Aphrodita*, when eyes are present, the numbers of pairs may vary, some species in this genus also have low, raised peduncular areas. Eye pigment may fade over time as in the case of *A. malayana* Horst. Horst describes two pairs of eyes in 1917, while the same material today lacks any eye pigment.

Species of *Aphrogenia* have large ocular peduncles, and either possess or appear to lack eye pigment.

Similarly, species of *Laetmonice* possess ocular peduncles and may appear to completely lack eye pigment, or have two pairs of eyes which may or may not be of similar size. The ocular peduncles in *Pontogenia* vary in length, and in the small specimens of *P. araeoceras* (Haswell) the peduncles are fused to the median ceratophore. It is not clear if peduncle development is related to size or if this valuable generic character is taxonomically useful at the specific level. But the presence or absence of ocular peduncles is a useful generic character. However we regard the number of pairs of eyes in aphroditids as a poor character because of the tendency for the eye pigment to fade in alcohol. This is because that it appears that eye pigment in Aphroditids may be retained after a long period in preservative or may fade after such treatment. Thus although it may be a useful character in fresh material it may be a difficult one to interpret in preserved material because of distinguishing between species which lack eyes and those in which the pigment has completely faded and thus appear to lack eyes. This problem is a universal one which applies not within the Aphroditidae but in all polychaete families.

*c) Nuchal flaps.* The presence or absence of nuchal flaps is a useful means of distinguishing genera of aphroditids as they are absent in *Aphrogenia* and *Pontogenia*, and they may be present in *Laetmonice* and

*Aphrodita*. As nuchal flaps are absent in most species of aphroditids, presumably the lack of flaps is a plesiomorphic character, but whether all nuchal flaps in the family are homologous is unknown at this stage.

**5. Facial tubercle.** The presence of a facial tubercle is a useful family character and the length of the facial tubercle appears constant for an individual species, although this may be affected by fixation. In addition the surface of the facial tubercle may be crenulated, or finely papillated, and we suggest that the ornamentation of the facial tubercle is another useful species character.

**6. Palps.** The length of the palps is a useful character and within a species fairly constant over a broad size range. The surface of the palps may be either smooth or finely papillated. We suggest that several distinct characters can be recognised. One character is the relative length of the palps and at least in *Laetmonice* three character states are present, short, medium and long. Another character is the ornamentation of the palps. In addition perhaps the shape and density of these papillae are additional specific characters. At this stage we suggest that these characters and their associated states are unordered.

**7. Elytra.** The number of pairs of elytra is fairly constant within the genus *Aphrodita* and *Pontogenia*, whereas within *Laetmonice* and *Aphrogenia* it varies between species. Elytra were dissected in species with a good development of felt only when the species was numerically well represented. The shape and the point of attachment to the elyrophore varies along the body, and may be diagnostic of a species. In *Laetmonice*, the structure appears similar in all species, although the species differ from each other in having different elytral structures in the last two pairs. In some species of *Aphrodita* the elytra do not completely cover the body leaving the caudal region exposed. However, because of the few individuals dissected, the usefulness of this character in *Aphrodita* is unclear.

The taxonomic value of the pigmentation of the elytra in *Aphrogenia* and its constancy over time with alcohol storage is unknown and should be assessed. The elytra appear to be fairly uniform in shape within *Aphrogenia*, however the ornamentation of the elytra may be a useful character in this genus.

The genus *Laetmonice*, exhibits the greatest range in the number of pairs of elytra present and ranges from 12 pairs in *L. batheia* Horst to 20 pairs in *L. producta* Grube, within the Indo-Pacific species (see Table 6). The number of pairs of elytra at least in *L. producta* appears to be constant (18 pairs) over a size range of 2.4 to 8.1 cm with the number of segments varying from only 41 to 45. However we did not examine sufficient material of a smaller size to ascertain if this was true for animals below 2.4 cm in length.

**8. Parapodia.** All species of aphroditids have the first segment with uniramous parapodia and subsequent

parapodia biramous with either a dorsal cirrus or elytriphore. Little if any change in parapodial structure occurs along the body or between species.

The relationships between the length of dorsal and ventral cirrus, differs between species. This could perhaps be quantified, although in species with a strong development of felt, measuring the dorsal cirrus would be difficult. The shape of the neuropodia of segments 2 and 3 of *Pontogenia* differs from subsequent neuropodia, and exhibits some difference between species, although this may be a result of the fixation.

**9. Distribution and types of setae.** *a) Notosetae.* Species of *Aphrodita*, *Aphrogenia*, *Laetmonice* and *Pontogenia* have several kinds of notosetae.

i) Capillary setae which may or may not form the dorsal felt. The thickness of the dorsal felt varies according to the species, presumably because of the density of capillary setae present. A felt is present in all species of *Aphrodita*, and *Heteraphrodita* whereas in *Laetmonice* and *Pontogenia* the development of the felt varies between species. A felt is completely absent in *Aphrogenia*. However, quantifying the development of felt in genera which possess one would be extremely difficult. Thus at least two character states exist; short capillary notosetae not forming a dorsal felt, and long capillary notosetae forming a felt. As a dorsal felt is absent in other genera of the family Aphroditidae and other families making up the order Phyllodocida (Fauchald, 1977) we suggest that the presence of a felt is an apomorphic state.

ii) Iridescent capillary setae. Iridescent setae are present in some species of *Aphrodita*. These setae vary in length and strength of iridescence and may project as a distinct lateral fringe in some species. All these characters are constant over a wide range of sizes within a species. To identify the lateral fringe as present or absent is relatively easy, however, the other features mentioned are not easily determined. The plesiomorph states of these features remain unknown. We have not been able to characterise the lateral fringe based on the density of the setae. The level of iridescence is maintained with storage of alcohol, however determination of the level of iridescence is fairly subjective so that character has a limited usefulness. In *Aphrogenia* fine capillary setae in a tuft of 100+ are present on the lower surface of both the elytrigerous and cirrigerous notopodia. This feature appears to be a good generic character, similarly, species of *Pontogenia* have short capillary setae arising on the ventral surface of the notopodia. The presence of these setae is a good generic character for *Pontogenia*.

iii) Acicular spines are present in *Aphrodita* and the number and structure of these acicular notosetae vary considerably between species and are good specific characters. The notosetae vary in structure from fine slightly iridescent ones, as found in *A. bamarookis* n.sp., to others in which the shafts are covered with small tubercles, as in *A. marombis* n.sp. Thus the following character states are recognised in *Aphrodita* (see Fig.1a): a) fine acicular setae, b) stout smooth with pointed tips,

c) stout smooth with hooked tips, d) stout covered with tubercles with pointed tips, and e) stout covered with tubercles with hooked tips. Perhaps the plesiomorphic state is "a", and the apomorphic state "e". Another character is the number and distribution of acicular setae. The stout setae in *A. australis* Baird appear in two fascicles forming two distinct rows of setae along the lateral edge of the body, whereas the remaining species of *Aphrodita* examined have one fascicle only.

All species of *Laetmonice* possess simple acicular notosetae, which vary along the body and in *L. malayana* and *L. producta* numbers increase with increasing size and presumably age (see Tables 7, 8). We presume these acicular setae are homologous with those present in *Aphrodita*.

In *Pontogenia* the acicular spines are flattened, paleal in nature and their structure varies between species (see Fig.52c) and includes setae with long spines along one edge, covered in tubercles, or with denticles along the edge giving a serrated appearance. In addition the numbers of these spines on a particular segments may be a useful specific character in *Pontogenia*. It is unclear if the various types of acicular, sabre-like and harpoon notosetae present within these genera are homologous.

Species of *Aphrogenia* have stout, smooth sabre-like setae which curve over the dorsum. The number of sabre-like setae present on elytrigerous and cirrigerous notopodia vary between species and represent two useful characters. The structure of these setae differs among the Indo-Pacific species and at least two character states are present; smooth and ridged (Fig.27c). Those setae occurring on the cirrigerous notopodia are shorter than those on the elytrigerous notopodia. Whether setae of other species of *Aphrogenia* exhibit other character states is unknown. Presumably these setae are homologous with the acicular setae present in the other genera of aphroditids.

Finally, all species of *Laetmonice* possess harpoon notosetae with a series of recurved fangs on the lateral margins; the tip may be covered with a transparent sheath (Fig.32c). Shafts of harpoon notosetae vary, some are beset with spines, some tuberculated and some smooth. In *L. conchifera* (Horst) and *L. arenifera* (Horst), these notosetae are modified to form hook-like notosetae. However the number and arrangement of harpoon notosetae varies between species, and this may be a useful specific character. Harpoon notosetae are lacking in all other genera of the Aphroditidae, and within the order Phyllodocida and may represent the apomorphic state.

*b) Neurosetae.* Several different types of neurosetae occur.

i) Large number of bipinnate neurosetae are present in segments 2 to 3 in all species of *Aphrodita* (Fig.1d<sup>8</sup>) and at least in all Indo-Pacific species of *Aphrogenia* examined and in these two genera, the number and arrangement appears to vary very little from one species to the next. In *Laetmonice*, similar setae may be restricted to segments two and three, but may in some species be present on segment 4. In this genus, the number of

bipinnate setae present in upper and lower tier of neurosetae varies among species; we believe this feature to be a useful character in this genus. In *Pontogenia*, which has bipinnate setae in segments 2 to 3, the number and arrangement vary considerably among Indo-Pacific species; we believe these two features form useful specific characters in this genus. Pettibone (1966) stated that the bipinnate setae should be absent in *Pontogenia*, however we found them present in the species examined. Bipinnate setae are absent in *Heteraphrodita*.

ii) Stout neurosetae exhibit a range of variation within the family.

*Laetmonice* (Fig.32b<sup>1-8</sup>): (i) neurosetae with basal spur and distal fringe; (ii) neurosetae with basal spur and variety of additional teeth; (iii) neurosetae with basal spur and plumose edge.

*Pontogenia* (Fig.52b<sup>1-3</sup>): (i) stout with various levels of ornamentation.

*Aphrogenia* (Fig.27b<sup>1-3</sup>): (i) stout neurosetae.

*Aphrodita* (Fig.1d<sup>1-8</sup>): (i) stout neurosetae, smooth; (ii) stout neurosetae, with lateral spur; (iii) stout neurosetae, with or without slightly curved tips; (iv) stout neurosetae,

with or without hood; (v) stout neurosetae, with hood which may be frayed or pilose.

We suggest that these neurosetae represent a single character with several character states but we do not know the plesiomorphic state. An additional character is the number of these setae present in each of the three tiers in anterior, middle and posterior parapodia. It also seems likely that this may vary according to the size of the individual in one or more tiers, and this may be species specific. This latter feature may make this character unsuitable for cladistic study, unless a large amount of material is available to determine the exact changes with increasing size and presumably age.

The relative lengths of neurosetae and notosetae in aphroditids is probably related to the method of fixation and therefore provides little useful information.

**10. Other possible characters.** In addition to these external characters, other useful characters may be the structure of the nephridial gonoducts and larval development but the material available did not allow an evaluation of these characters.

### Taxonomic Account

#### Key to the Genera of Aphroditidae (\* not recorded from Australia)

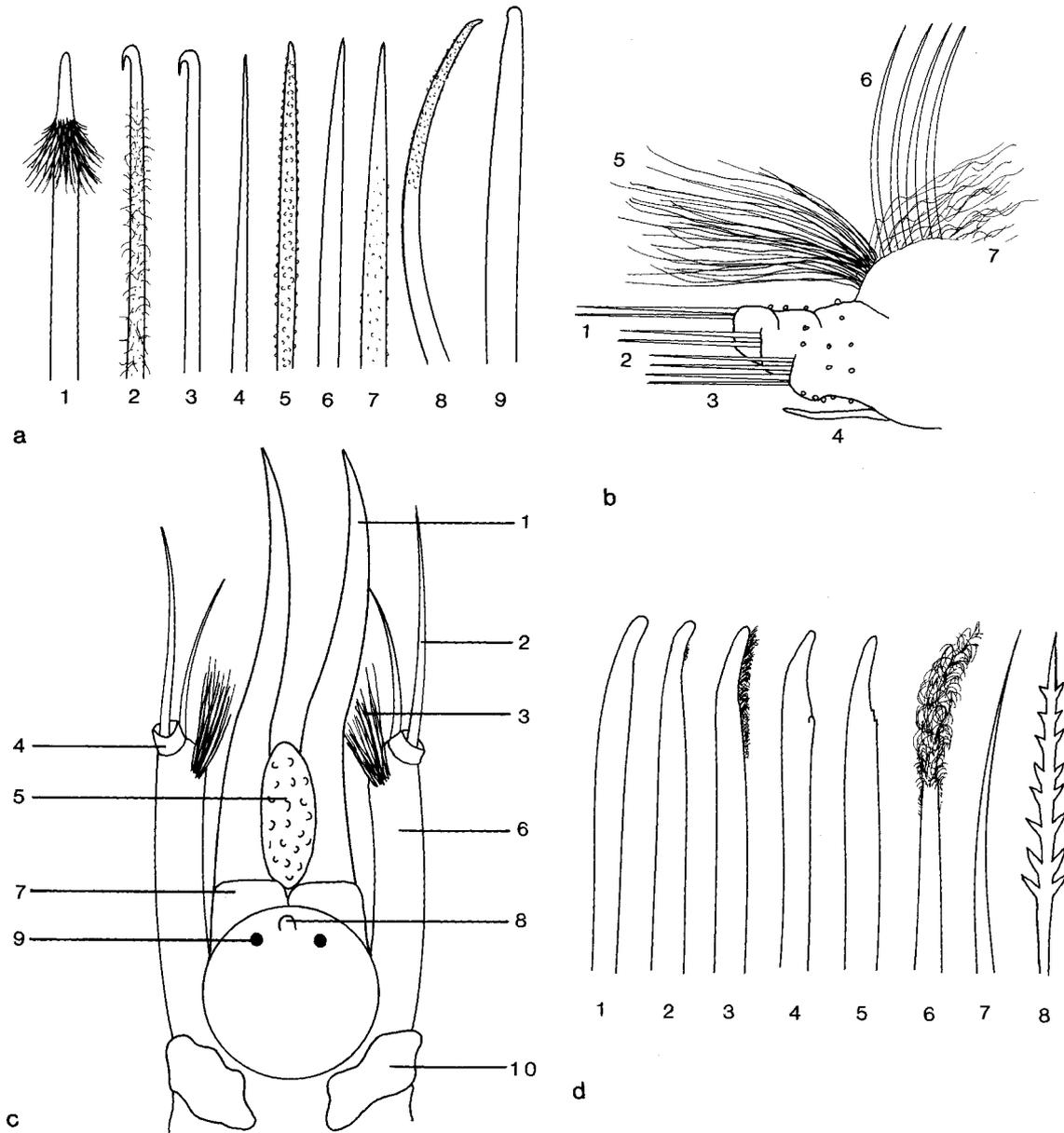
1. Dorsum covered with flattened fascicles of paleae ..... *Palmyra*
- Dorsum covered with felted notosetae or elytra; paleae absent ..... 2
2. Dorsum covered with felted notosetae; completely covering elytra ..... 3
- Dorsum without or with very few felted notosetae, elytra visible ..... 4
3. With stout protective notosetae; prostomium without ocular peduncles; papillated facial tubercle well developed; neurosetae of anterior few segments bipinnate (Fig.1) ..... *Aphrodita*
- Without stout protective notosetae; prostomium with short ocular peduncles; no facial tubercle; neurosetae of anterior few segments not bipinnate ..... *Heteraphrodita* \*
4. Some stout protective notosetae with tips in form of barbed arrow (harpoon setae); neuropodia of anterior few segment with bipinnate neurosetae (Fig.32) ..... *Laetmonice*
- Notosetae curved over dorsum; harpoon notosetae absent; neuropodia of anterior segments with or without bipinnate neurosetae ..... 5
5. Notosetae sabre-like and smooth (Fig.27) ..... *Aphrogenia*
- Notosetae flattened, marginally serrated or cylindrical and smooth ..... 6
6. Notosetae flattened and marginally serrated (Fig.52) ..... *Pontogenia*
- Notosetae cylindrical and smooth ..... *Hermionopsis* \*

*Aphrodita* Linnaeus

*Aphrodita* Linnaeus, 1758: 655.–Pettibone, 1966: 96-97.  
*Aphroditella* Roule, 1898: 191.–Horst, 1917: 4.

**Diagnosis.** Aphroditids with dorsal felt well developed, concealing elytra completely. Elytra 15 pairs,

smooth. Prostomium without ocular peduncles, with or without nuchal flaps. Facial tubercle well developed, papillated. Notosetae all smooth, of 3 kinds: capillary setae forming matted dorsal felt; iridescent capillary setae projecting laterally; dark, acicular, protective spines projecting dorsolaterally. Neurosetae, dark, stout, smooth or with lateral spur, with slightly curved tips, with or without hood sometimes frayed or pilose. Neurosetae



**Fig.1.** Generalised *Aphrodita*. a: notoseta types – 1, triangular tips with fine hairs radiating from expansion; 2, hooked tip with fine hairs and tubercles; 3, hooked tip, smooth; 4, acicular, smooth; 5, acicular, tuberculated; 6, spine, smooth; 7, spine, finely tuberculated; 8, bent with distal region densely tuberculated; 9, paleal-like, smooth. b: posterior view of parapodium – 1, upper tier of neurosetae; 2, middle tier of neurosetae; 3, lower tier of neurosetae; 4, ventral cirrus; 5, capillary notosetae; 6, acicular notosetae; 7, felt notosetae. c: dorsal view of prostomium and first segment – 1, palp; 2, tentacular cirrus; 3, setae; 4, tentaculophore; 5, facial tubercle; 6, first parapodium; 7, palpophore; 8, median antenna; 9, eye; 10, elythrofore. d: neuroseta types – 1, slightly curved tip; 2, slightly curved tip with small tuft of hairs on curved margin; 3, plumose margin; 4, slightly curved tip with small tubercle; 5, slightly curved tip with 2 small teeth; 6, pilose tipped; 7, extended tip; 8, bipinnate.

occurring in three tiers, upper tier with thicker neurosetae. Some neurosetae of segments 2-3 bipinnate.

**Type species.** *Aphrodita aculeata*, designated by Malmgren, 1867.

**Remarks.** The above generic diagnosis is based upon that given by Pettibone (1966), although we have expanded the diagnosis to include the presence or absence of nuchal flaps to accommodate our new species. We believe that the following characters are important in defining species of *Aphrodita*: number of segments, presence or absence of stout notosetae, prostomial structure, length and shape of palps, size and shape of facial tubercle and median antenna which may be reduced to a papilla in some species (Kudenov, 1975), type of neurosetae, and development of capillary notosetae. A generalised figure of *Aphrodita* is given in Figure 1 together with the types of setae present. In many of the descriptions of *Aphrodita* detailed information on the characters we consider important in

defining species of *Aphrodita* are not given and Hartman (1959, 1965) indicates that many species originally described as *Aphrodita* do not belong to this genus. Hartman (1959, 1965) and Hutchings (personal records) list 26 species of *Aphrodita*. Of these, four are described from the Indo-Pacific – *A. australis* Baird, 1865, *A. japonica* Marenzeller, 1879, *A. sondaica* Grube, 1875 and *A. watasei* Izuka, 1912 – and in addition *A. maorica* Benham, 1900 has been described. The type of *A. maorica* Benham appears to have been lost, and Benham's brief description is inadequate to define the species without the type material. All these descriptions are fairly brief, but we have included them in Table 1, indicating the characters which were given in the original descriptions, and in the case of *A. australis* an expanded description is given. A comprehensive revision of *Aphrodita* would require examination of all species currently assigned to the genus and is beyond the scope of this paper. However, in the introduction of this paper we consider in detail the characters useful in the diagnostic of species of *Aphrodita*.

#### Key to the Indo-Pacific Species of *Aphrodita*

1. Pair of nuchal flaps on posterior edge of prostomium (Fig.13a) ..... *Aphrodita kulmaris* n.sp.
- Prostomial flaps absent ..... 2
2. Notosetae with triangular shaped tips with fine hair-like spines radiating from base of expansion (Fig.19k).....*Aphrodita malkaris* n.sp.
- Notosetae without triangular shaped tips ..... 3
3. Neurosetae smooth, with slightly curved tips (Fig.3c-k) ..... 4
- Neurosetae with pilose tips (Fig.11e-j), plumose margin (Fig.24b-j) or ending in fine thread (Fig.6b-f) ..... 6
4. Notosetae short, straight, covered with small tubercles (Fig.22k) .....*Aphrodita marombis* n.sp.
- Notosetae smooth (Fig.26f) ..... 5
5. Felt thin; notosetae large paleal-like (Figs 25b, 26f), covering dorsum .....*Aphrodita terraereginae*
- Felt thick; notosetae thin, some entangled amongst felt, not covering dorsum .....*Aphrodita australis*
6. Neurosetae ending in fine thread (Fig.6b-f).....*Aphrodita bamarookis* n.sp.
- Neurosetae with pilose tips (Fig.11b-j); plumose margin (Fig.24b-j)..... 7
7. Neurosetae with pilose tips (Fig.11e-j); 14-26 neurosetae per neuropodium; palps extending to segments 7-11; eye pigment absent .....*Aphrodita goalmarris* n.sp.
- Neurosetae with plumose margin (Fig.24b-j)..... 8

8. Notosetae with distal halves densely tuberculated with hooked tips, shafts bent (Fig.8c).....*Aphrodita floresiana*
- Notosetae with hooked tips, distal regions with fine tubercles and hairs (Fig.7c), or thick spines with shafts finely tuberculated (Fig.16b)..... 9
9. Notosetae with hooked tips, distal regions with fine tubercles and hairs (Fig.7c) ..... 10
- Notosetae thick spines with shafts finely tuberculated (Fig.16b) .....*Aphrodita malayana*
10. Prostomium with raised hemispherical ocular areas, no eye pigment, 12-13 neurosetae per parapodium .....*Aphrodita limosa*
- Prostomium with raised ocular areas (Fig.23a), 2 pairs of eye spots ..... 11
11. 7-8 neurosetae per parapodium, palps extending to segment 6 .....*Aphrodita decipiens*
- 10-15 neurosetae per parapodium; palps extending to segment 3-5 .....*Aphrodita talpa*

***Aphrodita australis* Baird**

Figs 2a-f, 3a-m, 59A, Tables 1, 2

*Aphrodita paleacea* Peters, 1864: 369-371.

*Aphrodita australis* Baird, 1865: 176-177.—Haswell, 1883: 270-271.—McIntosh, 1885: 34-36, pl.VII, figs 6,7, pl.VIa, figs 4-7.—Fauvel, 1917: 165-167, fig.1.

*Aphrodita haswelli* Johnston, 1909: 241-245, pl.LXIX figs 1-8.

**Type material examined.** HOLOTYPE of *A. australis*: Australia: South Australia: Port Lincoln, 34°44'S 135°52'E (BMNH 1865:12:23.2), 10.1 cm long.

**Additional material examined.** WESTERN AUSTRALIA: Port Hedland, 20°18'S 118°35'E, 26 Aug. 1983 (AM W20185), 1.2 cm long; Shark Bay, 25°25'S 113°35'E, Sept. 1963 (WAM 52-75), 5.5 cm long; Mullaloo, 31°47'S 115°44'E, 4 June 1962 (WAM 28-75), 5.5 cm long; Little Island, 31°49'S 115°43'E, 10 Feb. 1973 (WAM 27-73), 15 cm long; Watermans Bay, 31°51'S 115°45'E, 30 Aug. 1965 (WAM 1-75), 10.5 cm long; Trigg Island, 31°52'S 115°45'E, 24 Oct. 1985 (WAM 136-86), 7.5 cm long; Cottesloe, 31°59'S 115°45'E, 1975, 8(WAM 59-75), 4.5-14 cm long; Rottneest Island, 32°00'S 115°30'E, 15 May 1960 (NMV F57194), 14 cm long; Fremantle, 32°03'S 115°44'E, 1917 (WAM 2-75), 12.5 cm long; Woodman Point, 32°08'S 115°44'E, 1967 (WAM 3-75), 10 cm long; Garden Island, 32°12'S 115°40'E, 26 Nov. 1963 (WAM 55-75), 12.5 cm long; Bunkers Bay, 33°32'S 115°02'E, 31 July 1971 (WAM 6-74), 8.5 cm long; Dunsborough, 33°36'S 115°06'E, 28 June 1969 (WAM 96-89), 3.5 cm long; Bremer Bay, 34°24'S 119°26'E, 6 Aug. 1984 (WAM 82-89), 9.5 cm long; Mistaken Island, 35°03'S 117°58'E, 21 July 1963, 31 m (WAM 23-75), 1.4 cm long. SOUTH AUSTRALIA: Saint Francis

Island, 32°31'S 133°18'E, 30 Dec. 1975, 20-30 m (NMV F57195), 13 cm long; Coffin Bay, 34°28'S 135°19'E, 17 Jan. 1984, 51.2 m (SAM E2165), 5 cm long; Port Lincoln, 34°47'S 135°51'E, 18 Mar. 1969, 11-18 m (NMV F57073), 6 cm long; Marum Island, 34°31'S 136°15'E, 10 Jan. 1984 (SAM E2169), 13.8 cm long; Cape Elizabeth, 34°20'S 136°53'E, 7 May 1989, 27 m (SAM E2163), 4.1 cm long; Corny Point, 34°54'S 137°01'E, 1912, 2(SAM E2168), 9.8-12.5 cm long; Whyalla, 33°02'S 137°35'E, 1926 (SAM E388), 13.5 cm long; Wallaroo, 33°56'S 137°38'E, 26 Sept. 1956 (SAM E2166), 6.2 cm long; Kangaroo Island, 35°50'S 138°03'E, 1966, 2-3 m (AM W5927), 9.4 cm long; Brighton, 35°01'S 138°31'E, 1939 (SAM E2164), 10.2 cm long; Glenelg, 34°58'S 138°32'E, 12 Mar. 1951 (SAM E2167), 10.5 cm long; Robe, 37°10'S 139°45'E, 12 Nov. 1966 (NMV F57070), 9 cm long. VICTORIA: Portland, 38°21'S 141°36'E, 9 Jan. 1921 (NMV G1122), 4.7 cm long; Hastings, 38°18'S 145°11'E, 29 May 1915 (NMV G1121), 14 cm long; Phillip Island, 38°28'S 145°12'E, 31 Jan. 1967 (NMV F57071), 11 cm long; Walkerville, 38°52'S 145°59'E, Apr. 1953, 33 m (AM W3590), 7.4 cm long; Lakes Entrance, 37°53'S 148°00'E, 25 Jan. 1978 (NMV F57197), 19 cm long. TASMANIA: Devonport, 41°11'S 146°21'E, 17 June 1962 (NMV F57075), 8 cm long; Flinders Island, 40°13'S 148°15'E, 2 Dec. 1970 (AM W4899), 10 cm long. NEW SOUTH WALES: Twofold Bay, 37°05'S 149°54'E, Feb. 1955, 11 m, 3(NMV F57072), 3.2-4 cm long; Botany Bay, 34°00'S 151°11'E, (AM W3183), 19 cm long; Middle Harbour, 33°45'S 151°11'E, 3 Mar. 1977, 2(AM W20168), 8.9-9 cm long; Port Jackson, 33°50'S 151°17'E, 11 m (AM W2693), 9 cm long; Balmoral, 33°03'S 151°35'E, 4 July 1901 (AM W20184), 3.4 cm long. A selection of the material examined.

HOLOTYPE of *A. haswelli*. Australia: New South Wales: Nelson Bay, 32°44'S 152°09'E, 1883, 9.1 m (AM G11394), 7.5 cm long.

TYPE of *A. paleacea*. Australia: South Australia: Gawler Bay, 34°56'S 138°36'E (ZMB 331).

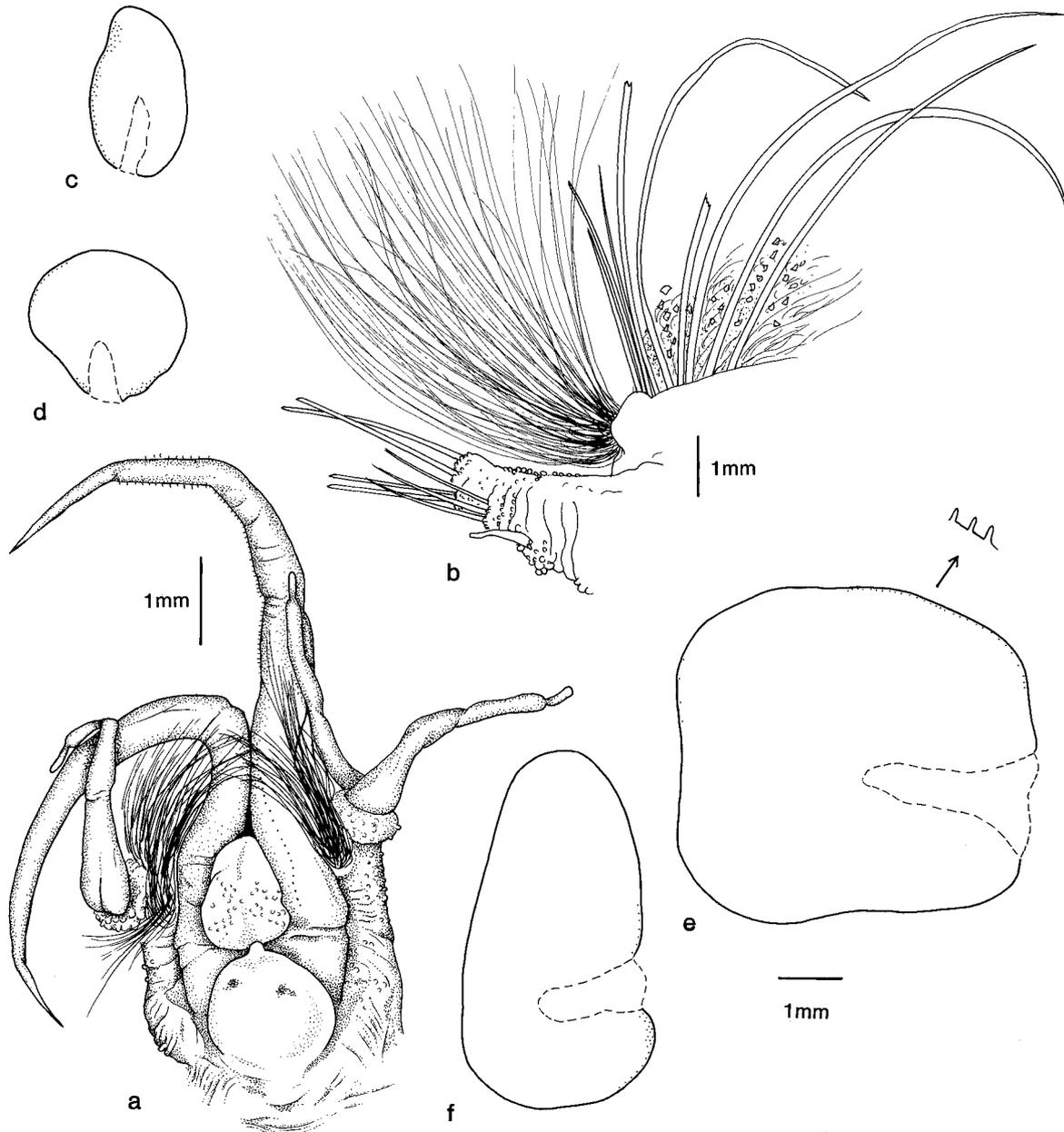
**Description.** Based upon holotype of *A. australis*, except for description of first tentacular segment and elytra, based upon the holotype of *A. haswelli* (AM G11394). Body ovate, 10.1 cm long, 5.1 cm wide, caudal region attenuated, 42 segments.

Dorsum covered in thick felt, dark grey in alcohol. Capillary notosetae iridescent, green in alcohol, forming lateral fringe extending well beyond neurosetae. Some stouter golden brown notosetae over dorsum. Ventral surface light brown, covered with rounded papillae.

Prostomium (Fig.2a) small, rounded with pair of dark grey eyes. Median antenna reduced to a small, spherical papilla. Palps weakly biarticulate, extending to sixth to eighth segment, stout basal palpophores, palps, long,

tapering, minutely papillated. Facial tubercle, wedge-shaped, length of prostomium, surface covered in rounded papillae.

Elytra 15 pairs, with firm stout attachments to elythrochlores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra smooth, opaque. First pair of elytra, small, ovate, with elythrochlore attached laterally, second pair rounded with elythrochlore attached posterolaterally, third pair rounded with elythrochlore attached anterolaterally. Subsequent elytra increasing in size to middle of body, then decreasing in size posteriorly, squarish with rounded edges, with elythrochlore attachments on lateral margin. Posterior 2 pairs elongated. Elythrochlore on terminal pair attached



**Fig.2.** *Aphrodita australis*. Holotype (BMNH 1865: 12:23.2): a, dorsal view of prostomium and first segment; b, (WAM 6-75) posterior view parapodium from segment 15; c, (AM G11394) first elytron; d, third elytron; e, eighth elytron; f, 14th elytron.

anteriolaterally. All elytra with a few sub-marginal micropapillae (Fig.2c-f).

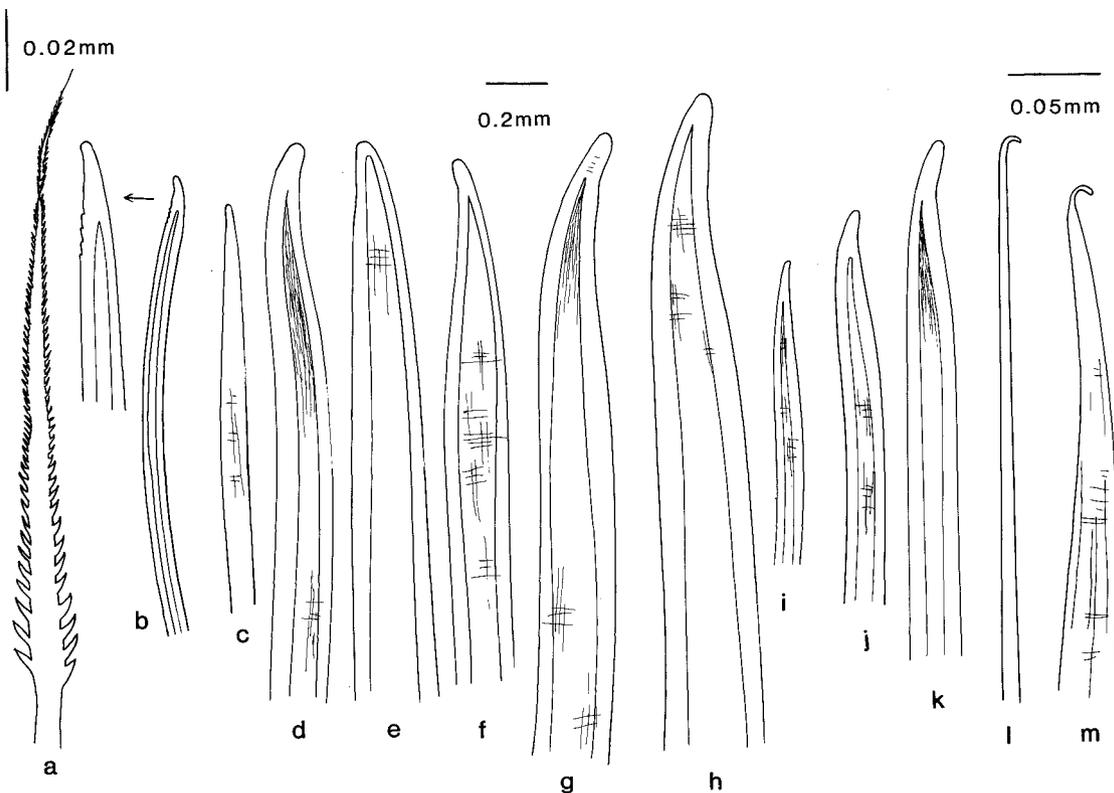
First or tentacular segment (Fig.2a) with elongated, uniramous parapodia covered with scattered globular papillae, projecting laterally and anteriorly to prostomium; with aciculae and several radiating bundles of capillary setae; 2 pairs of tentacular cirri, with large rounded tentaculophores, styles elongated, tapering, with small clavate tips, dorsal pair half length of palps, ventral pair just shorter than dorsal pair. Junction between tentaculophore and style poorly developed.

Following segments with biramous parapodia. Second segment with first pair of elytra attached on elongated elytriphore (Fig.2a). Neuropodia cylindrical covered with globular papillae; aciculae in middle part of lobe, with distal tip emerging between upper 2 neurosetae; neurosetae in 3 tiers; upper tier of 2 neurosetae longer, stouter, reddish-brown, smooth with slightly curved tips; middle tier of 2 neurosetae golden brown, smooth with slightly curved tips; lower tier of numerous (100+) neurosetae bipinnate, golden yellow (Fig.3a). Ventral cirri with large basal cirrophore, style tapering distally, with clavate tip, extending beyond distal margin of neuropodia. Notopodia squat, rectangular, on posterior face of neuropodia, small lobe with fascicle of capillary notosetae radiating around it; 2 fascicles of unidentate,

golden brown notosetal spines; upper fascicle stronger, less numerous than lower fascicle, above dorsal fascicle tuft of felt notosetae. Third segment similar to second but carries long dorsal cirri, instead of elytra.

Following parapodia similar (Fig.2b). Neurosetae unidentate with slightly curved tips; occurring in 3 tiers: upper tier with 2 neurosetae (Fig.3e,h,k), middle tier with 2 neurosetae (Fig.3d,g,j), lower tier with 3-4 neurosetae (Fig.3c,f,i), upper ones stouter, thicker and darker than lower ones. Neurosetae of lower tier of anterior segments with some small denticles (Fig.3b). Ventral cirri extending to base of middle tier of neurosetae. Notosetae smooth, entangled amongst felt, curved over dorsum, some meeting in midline. Notosetae occurring in 2 fascicles, upper with 7-8 notosetae, lower with 9-10. Dorsal cirri with stout cirrophores, long slender tapering styles, with clavate tips, not extending beyond lateral fringe.

**Variation.** Additional material examined ranging from 1.4-19 cm long, and from 0.8-7.5 cm wide. Number of segments ranging from 41-45. Dorsum ranging in colour from pale brown or grey to dark grey/brown in alcohol. Lateral fringe cream coloured and faintly iridescent in alcohol in some specimens. Ventral surface varying from cream to light brown, dark brown and some of these with faint orange tinge.



**Fig.3.** *Aphrodita australis*. Holotype (BMNH 1865: 12:23.2): a, bipinnate neuroseta from segment 3; b, (AM G11394) neuroseta with tubercles from lower tier segment 4; c, neuroseta from lower tier segment 4; d, neuroseta from middle tier segment 4; e, neuroseta from upper tier segment 4; f, neuroseta from lower tier segment 15; g, neuroseta from middle tier segment 15; h, neuroseta from upper tier segment 15; i, neuroseta from lower tier segment 30; j, neuroseta from middle tier segment 30; k, neuroseta from upper tier segment 30; l, tip notoseta (AM G11394) middle segment; m, tip notoseta.

Eyes varying from 1-2 pairs, some specimens with 2 pairs of contiguous eyes. Palps variable in length, reaching segment 5-8. Facial tubercle ranging from three-quarters the length of prostomium to just longer than prostomium. Median antenna reduced to a small papilla on all material examined, no evidence that this represents the ceratophore and that the style is missing.

In Table 2, the range in numbers of neurosetae present in each tier on segments 4, 15 and 25 for 4 size classes of *A. australis* are given. These counts indicate that the number of neurosetae in each tier does not increase with increasing size and presumably age of the individual, except perhaps for the inner tier which shows the greatest variation within a size class, and a slight tendency for numbers to increase in posterior segments with increasing size. Neurosetae of some specimens very short, only curved tip visible. Maximum length of thick upper neurosetae one and one half times length of parapodia. This variation may be due to the retraction of setae on fixation and the age of setae, as setae are regularly replaced with age.

Notosetae varying greatly in amount of dorsum they cover, ranging from half to whole dorsum, in some cases notosetae overlapping on mid-line of dorsum. Notosetae varying in thickness, some finer notosetae with small hooked tips (Johnston, 1909: pl.LXIX fig.7), (Fig.3lc). Notosetae of some specimens curving over top of dorsum and not entangled amongst felt.

**Remarks.** It had previously been reported that some juvenile *Aphrodita* have plumose neurosetae (Ushakov, 1955). The specimen of *A. australis* described by McIntosh (1885) had this type of neurosetae; however this animal was small, 2.6 cm long. All the material examined in this study, including the holotype, lack plumose neurosetae. Some of the Australian material examined was smaller than that examined by McIntosh, the smallest being 1.2 cm long and even this small individual had unidentate setae. It is unclear whether recently settled individuals possess plumose setae which are later replaced by unidentate setae, or if McIntosh was mistaken in his observation, or if his material represents another species. McIntosh's material was collected from Port Jackson, Sydney and other species of *Aphrodita* are known to occur in this area, *A. goolmarris* n.sp. and *A. kulmaris* n.sp. which have pilose tipped neurosetae. The original description by Baird (1865) states that all neurosetae were simple.

Although the type of *A. palaecea* Peters 1864 (ZMB 331) is dehydrated and therefore examination of all structures is not possible, we have synonymised *A. palaecea* Peters with *A. australis* for the following reasons. *Aphrodita australis* occurs widely in South Australia, including areas close to Gawler Bay the type locality of *A. palaecea*. No other Australian species of *Aphrodita* reaches the dimensions of *A. australis* and the type of *A. palaecea* was of similar

dimensions to large specimens of *A. australis*, and the notosetae and neurosetae exactly matched those of *A. australis*. Although Peters' name has priority, by one year, we can find no other record of his name *A. palaecea* having been used, other than the original description. The name *A. australis* has been used widely in Australia and New Zealand (see Day & Hutchings, 1979) and we are suggesting that the name *A. australis* be retained, under Article 79c of the International Code of Zoological Nomenclature 1985, Third Edition and we are preparing a submission to the Commission to substantiate this (Hutchings & McRae, in preparation). Also amongst the type material of *A. palaecea* are two members of the family Polynoidae, Peters made no mention of these two polynoids living in association with *Aphrodita* and perhaps they were added to the jar subsequently.

The holotype of *A. haswelli* Johnston agrees well with the holotype of *A. australis* Baird and for these reasons we consider the two species synonymous.

**Habitat.** The material examined was found amongst sand, mud, algae and mussels. Most specimens had sand and shell fragments trapped in amongst their felt. Found at depths of 2 to 60 m. Many of the specimens were found washed up on beaches, and are therefore without habitat or depth information.

**Distribution.** Australia (Port Hedland, WA, 20°18'S 118°35'E, to Balmoral, NSW, 33°03'S 151°35'E, Fig.59A). Also from Japan, Sagami Bay\* (Izuka, 1912), USSR, far eastern seas\* (Ushakov, 1955), New Zealand, Petre Bay\* (Knox, 1960).

#### *Aphrodita bamarookis* n.sp.

Figs 4, 5a-f, 6a-f, 59B, Table 1

**Type material examined.** HOLOTYPE: Australia: Victoria: Waratah Bay, 38°51'S 146°04'E, 20 Mar. 1969 (NMV F57074), 6 cm long, 3.2 cm wide, 51 segments. PARATYPES: South Australia: Saint Francis Island, 32°24'S 133°30'E, 5 May 1973, 42 m (USNM 148658), 5.5 cm long, 2.2 cm wide, 52 segments; Waldegrave Island, 33°36'S 134°47'E, 4 Apr. 1974 (AM W14123), 3.6 cm long, 1.8 cm wide, 51 segments; Noarlunga, 35°11'S 138°30'E, 19 Sept. 1965, 200 m (BMNH ZB1990.20), 5 cm long, 2 cm wide, 49 segments.

**Additional material examined.** WESTERN AUSTRALIA: Shark Bay, 25°25'S 113°35'E, Aug. 1965 (WAM 21-75), 3 cm long. SOUTH AUSTRALIA: Saint Francis Island, 32°31'S 133°18'E, Jan. 1975 (NMV F57190), 4.4 cm long; Venus Bay, 33°12'S 134°40'E, 1982 (SAM E2377), 4.1 cm long. VICTORIA: Waratah Bay, 38°51'S 146°04'E, 20 Mar. 1969 (NMV F57192), 5 cm long. NEW SOUTH WALES: Twofold Bay, 37°05'S 149°54'E, Feb. 1955, 11 m (NMV F57189), 3.8 cm long.

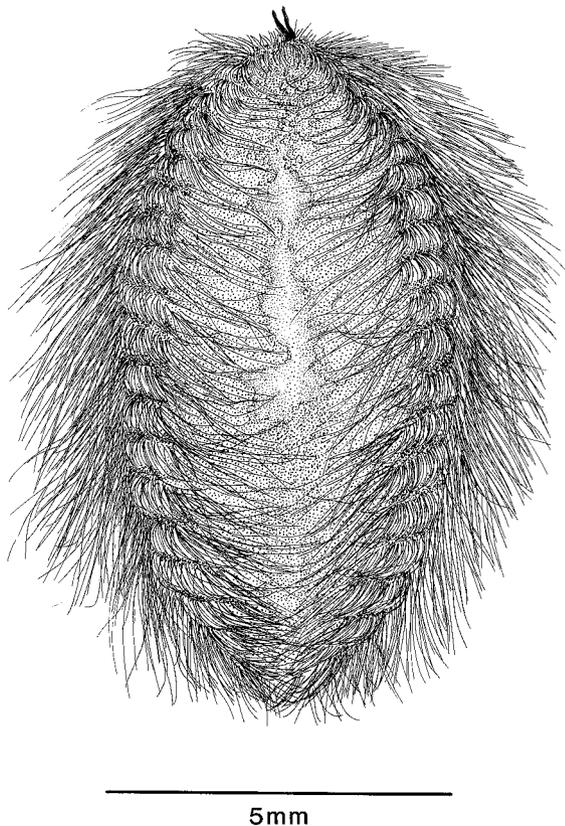
**Description.** HOLOTYPE. Body ovate, rounded anteriorly, long tapering caudal region forming a tail, 6 cm long, 3.2 cm wide, 51 segments (Fig.3).

Dorsum cream coloured in alcohol, covered in fine felt, with sand entrapped in felt giving grey appearance. Iridescent lateral fringe, creamy pink, extending well past neurosetae, forming margin around lateral edge of animal. No stout notosetae present. Ventral surface pale grey, crenulated, appearing smooth, but covered with fine spherical papillae.

Prostomium, small, rounded with 1 pair of faint grey eye spots. Median antenna reduced to small, rounded papilla, no style present on any of the material examined. Palps extending to segment 6 with large basal palpophores, stout, tapering, smooth. Facial tubercle, length of prostomium, inflated, covered in small globular papillae (Fig.5a).

Elytra 15 pairs (based on dissected paratype), firmly attached to elytraphores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra smooth, white, semi-transparent, first pair oval, with elytraphore attached centrally (Fig.5c), second pair rounded with elytraphore attached laterally. Remainder of elytra rounded with elytraphores attached laterally and slightly anteriorly (Fig.5d-f). Last 2 pairs of elytra elongated covering caudal region, leaving posterior tip uncovered.

First or tentacular segment with elongated uniramous



**Fig.4.** *Aphrodita bamarookis* n.sp. (NMV F57189): dorsal view, whole animal.

parapodia, projecting anteriorly and laterally to prostomium, with aciculae and 3 tufts of iridescent, capillary setae: 2 emerging adjacent to tentacular cirri on dorsal and ventral surface, third emerging ventrally adjacent to the mouth. Two pairs of tentacular cirri, with cylindrical tentaculophores, styles tapering with slender tips. Dorsal and ventral cirri subequal in length, just shorter than parapodia (Fig.5a).

Second segment with first pair of elytra on large elytraphores (Fig.5a), parapodia biramous, neuropodia cylindrical, tip of acicula visible between upper 2 neurosetae. Neurosetae in 3 tiers; upper consisting of 2 neurosetae, golden, slender, ending in fine thread; middle neurosetae of 6 golden yellow, ending in fine thread; lower tier of numerous (100+) bipinnate neurosetae (Fig.6a). Ventral cirri with basal cirrophore, style tapering to slender tip, extending beyond distal tip of neuropodia. Notopodia rectangular with tuft of felt notosetae and fan of fine slender notosetae tapering to hooked tips, slightly iridescent, pointing posteriorly, some curving over dorsum (Fig.6g). Ventral surface of notopodia with long iridescent capillary neurosetae forming lateral fringe.

Third segment same as second, but with dorsal cirri instead of elytra. Dorsal cirri long, slender tapering to blunt tip, just shorter than fringe.

Following segments with biramous parapodia (Fig.5b). Neurosetae, all ending in fine threads, occurring in 3 tiers, upper with 2-3 thicker, stouter, darker neurosetae (Fig.6b,e), middle with 6-7 neurosetae (Fig.6c,f), lower with 15-17 neurosetae (Fig.6d). Notosetae covering three-quarters of dorsum, merging with iridescent lateral fringe.

**Variation.** Additional material examined ranges from 3-6 cm long and from 1.5-3.4 cm wide and 49-52 segments. Palps extending to segment 4 to 6. Facial tubercle three-quarters to 1 times length of prostomium. Neurosetae numbering 2-3 in upper tier, 4-7 in middle tier, and 9-17 in lower tier.

**Remarks.** *Aphrodita bamarookis* n.sp. can be distinguished from all the other species of *Aphrodita* recorded from the Indo-Pacific by its large number of segments, the presence of fine slightly iridescent notosetae and the long iridescent cream or pink lateral fringe. Stout notosetae are absent. The neurosetae are smooth and subulate and relatively large numbers are present in comparison to other known species (see Table 1). *Aphrodita bamarookis* n.sp. is currently only known from southern Australia and these above characters clearly distinguish it from other species of *Aphrodita*, *A. goolmarris* n.sp., *A. marombis* n.sp., *A. australis* and *A. talpa* which occur in southern Australian waters.

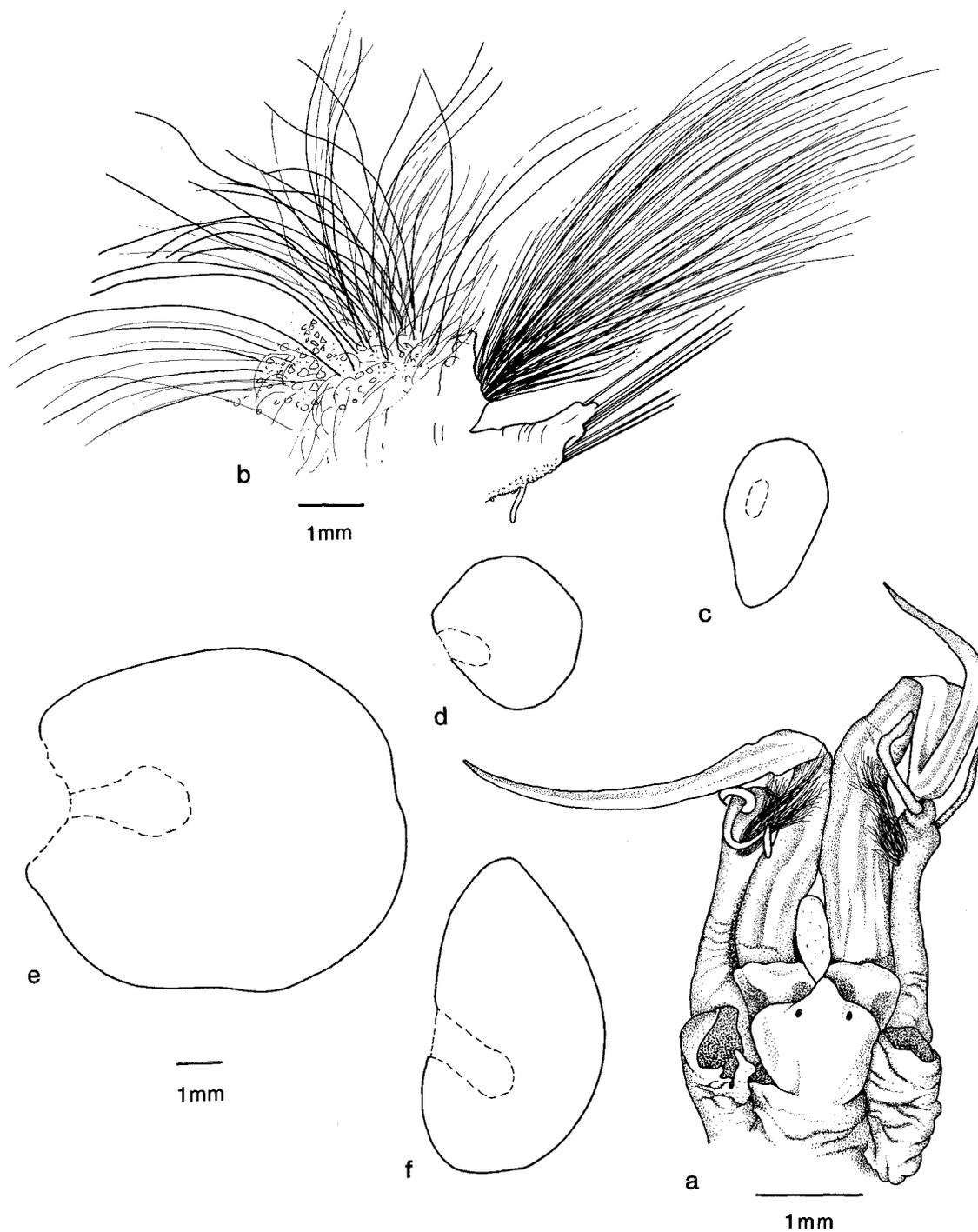
**Habitat.** No habitat information available, although sand and shell fragments were entangled amongst the felt of many of the individuals examined. Only

three specimens examined, had information as to the depths at which they were collected, these were at 11, 42 and 200 m. One specimen was found in the gut of a whiting.

**Etymology.** The specific name is from an aboriginal

word *Bamarook* which means oval shield, and this species resembles one.

**Distribution.** Australia (southern Australia from Shark Bay, WA, 25°25'S 113°35'E, to Twofold Bay, NSW, 37°05'S 149°54'E, Fig.59B).



**Fig.5.** *Aphrodita bamarookis* n.sp. Holotype (NMV F57074): a, dorsal view of prostomium and first segment; b, posterior view parapodium from segment 15; c, first elytron; d, third elytron; e, eighth elytron; f, 14th elytron.

*Aphrodita decipiens* (Horst)

Figs 7a-c, 60, Table 1

*Aphroditella decipiens* Horst, 1916b: 66-67.—Horst, 1917: 50, pl.XI figs 11,12.

*Aphroditella mongolica* Horst, 1916b: 67.—Horst, 1917: 50-51, pl.XI figs 13-16.

**Type material examined.** HOLOTYPE: Indonesian Archipelago Stn 51: Molo Strait, 8°45'S 119°46'E, 69-91 m (ZMA V.Pol 69), 1 cm long, 0.85 cm wide, 35 segments.

HOLOTYPE of *A. mongolica*. Indonesian Archipelago Stn 105: north off Sulu Island, 6°8'N 121°19'E, 275 m (ZMA V.Pol 73), 2 cm long, 1.4 cm wide, 35 segments.

**Description.** Body ovate with attenuated caudal region, 1-2 cm long, 0.85-1.4 cm wide, 35 segments.

Dorsum tan coloured in alcohol with thick sand encrusted felt. Ventral surface tan coloured, covered in spherical papillae.

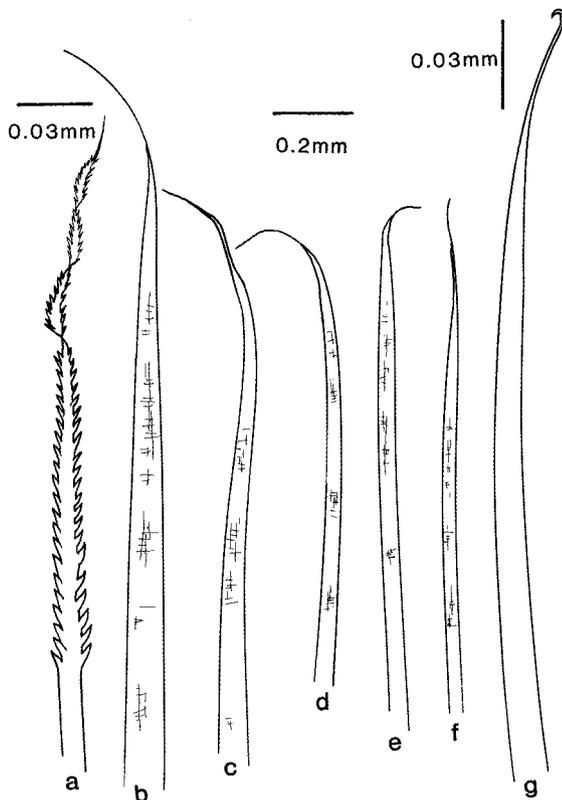
Prostomium rounded with slightly raised hemispherical ocular area, with 2 pairs of small eye spots. Median antenna with short ceratophore one-quarter length of prostomium, style thin, one and one-quarter length of prostomium. Facial tubercle inflated, covered in small rounded papillae, half length of prostomium. Palps

extending to segments 6-7, tapering, with minutely papillated margins (Horst, 1917: pl.XI fig.11).

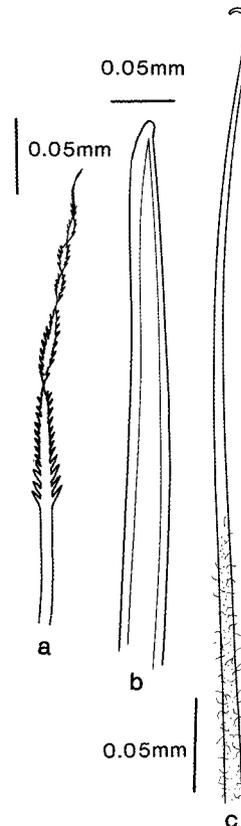
First or tentacular segment with elongate, uniramous parapodia, projecting laterally and anteriorly to prostomium with tuft of mud-covered, capillary setae on medial and posterior edge; 2 pairs of tentacular cirri, with cylindrical tentaculophores, dorsal pair missing, ventral pair tapering, length of prostomium.

Following segments with biramous parapodia. Neuropodia of segments 2 and 3 short, with 2 tiers of neurosetae, lower with many (50+) pale yellow, bipinnate neurosetae (Fig.7a), upper tier with 2-3 golden yellow neurosetae with slightly curved tips (Fig.7b). Buccal cirri and ventral cirri from segment 3 with papillated cirrophore, styles clavate-tipped, extending past distal tip of neuropodia.

Remaining parapodia with neuropodia cylindrical, covered with small rounded papillae, with 3 tiers of stout, golden brown, neurosetae with plumose margin (Horst, 1917: pl.XI fig.12), upper tier with 2 stouter, darker neurosetae, middle tier with 2-3 neurosetae, lower tier with 3 thinner neurosetae. Ventral cirri clavate-tipped, extending to distal tip of neuropodia. Ventral surface of notopodia with short tuft of mud-covered, pale yellow, capillary notosetae, not forming conspicuous fringe. Upper notosetae about 20, varying in thickness with fine hooked tips, bases thick, smooth, distal halves with fine tubercles and fine hairs (Fig.7c), entangled amongst felt,



**Fig.6.** *Aphrodita bamarookis* n.sp. Paratype (AM W14123): a, bipinnate neuroseta from segment 3; b, neuroseta from upper tier segment 15; c, neuroseta from middle tier segment 15; d, neuroseta from lower tier segment 15; e, neuroseta from upper tier segment 25; f, neuroseta from middle tier segment 25; g, notoseta from middle segment.



**Fig.7.** *Aphrodita decipiens* (ZMA V.Pol 69): a, bipinnate neuroseta from segment 2; b, upper neuroseta from segment 2; c, tip of notoseta from middle segment.

curving over dorsum.

**Remarks.** Pettibone (1966) synonymised *Aphroditella* Roule, 1898 with *Aphrodita*, quoting that the type species of the genus *A. pallida* Roule, 1898 was a young form of *Aphrodita aculeata* Linnaeus, 1758 according to Fauvel, 1923 the type species of *Aphrodita* Linnaeus, 1758, as designated by Malmgren, 1867. Pettibone (1966) did not indicate the placement of the other species which have subsequently been placed in the genus *Aphroditella*. Roule (1898) described a new species of *Aphroditella pallida* without formally describing a new genus, although Horst (1916b) provides the following generic diagnosis, "Resembling *Aphrodita*; ventral bristles however not smooth, but pilose or pinnate". Pettibone (1966) regards this character as insufficient to maintain the genus *Aphroditella* and her generic diagnosis of *Aphrodita* includes variable neurosetae including smooth, frayed pilose and bipinnate neurosetae. We agree with this and all the species of *Aphroditella* described by Horst (1916b, 1917) and redescribed in this paper, clearly belong to the genus *Aphrodita*.

We have synonymised *A. mongolica* (Horst, 1916b) with *A. decipiens* as the holotype of these two species are identical. We have expanded the species description given by Horst (1916b, 1917) to include details of setal distribution and numbers.

The main characters which distinguish this species which is known only from the two specimens examined, from other Indo-Pacific species, are the presence of notosetae with hooked tips and with the distal regions of the shafts covered with fine tubercles and hairs, and seven to eight neurosetae per parapodium and palps extending to segment 6 (see Table 1).

**Habitat.** Collected at depths of 69 to 91 m and 275 m.

**Distribution.** Indonesian Archipelago (Fig.60).

### *Aphrodita floresiana* (Horst)

Figs 8a-c, 60, Table 1

*Aphroditella floresiana* Horst, 1916b: 67-68.—Horst, 1917: 51, pl.XII figs 1-5.

**Type material examined.** LECTOTYPE: Indonesian Archipelago Stn 51: Molo Strait, 8°45'S 119°46'E, 69-91 m (ZMA V.Pol 70.2), 2.7 cm long, 1.5 cm wide, 34 segments. PARALECTOTYPES, Indonesian Archipelago Stn 51: Molo Strait, 8°45'S 119°46'E, 69-91 m (ZMA V.Pol 70.3), 0.6 cm long, 0.37 cm wide, 30 segments; Indonesian Archipelago Stn 153, north of Waigeu Island, 0°3.8'N 130°24.3'E, 141 m (ZMA V.Pol.70.1), 0.8 cm long, 0.54 cm wide, 28 segments.

**Description.** Body ovate, with attenuated caudal region, 0.8-2.7 cm long, 0.54-1.5 cm wide, 28-34 segments.

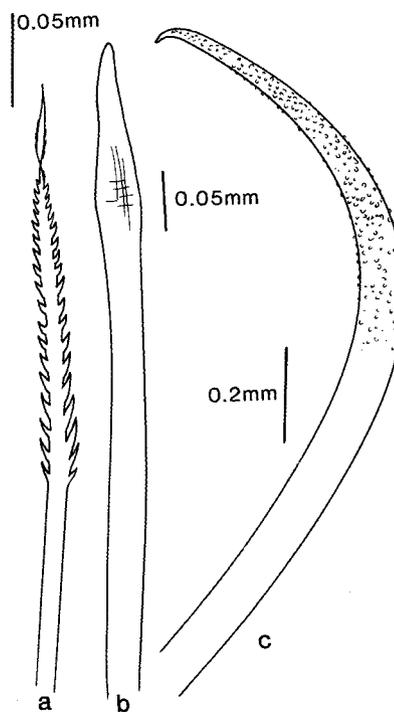
Dorsum with thick felt encrusted with sand, some grains black giving mottled tan appearance in alcohol. Ventral surface tan, covered with small spherical papillae.

Prostomium rounded with slightly raised hemispherical ocular area, with 2 pairs of small eye spots (faded, probably due to age). Median antenna with short ceratophore, style thin, three-quarters length of prostomium (style missing from holotype). Facial tubercle inflated, covered in small rounded papillae, length of prostomium. Palps extending to segments 6-7, large basal palpophores, palps, tapering, with minutely papillated margins (Horst, 1917: pl.XII fig.1).

Elytra 15 pairs, with firm stout attachments to elytraphores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra smooth, semi-transparent, first pair rounded with elytraphore attached centrally, second pair missing, remainder of elytra rounded with elytraphore attached laterally, posterior elytra elongated with elytraphores attached on anteriolateral margins.

First or tentacular segment with elongate, papillated, uniramous parapodia, projecting laterally and anteriorly to prostomium with tuft of mud-covered, capillary setae on medial and posterior edge; 2 pairs of tentacular cirri, with cylindrical tentaculophores, styles elongated, tapering, dorsal pair length of median antenna, ventral pair two-thirds length of dorsal pair.

Following segments with biramous parapodia. Neuropodia of segments 2 and 3 short, with 3 tiers of neurosetae, lower with many (100+) golden yellow, bipinnate neurosetae (Fig.8a), middle tier with 3, upper tier with 2 golden yellow neurosetae with slightly curved



**Fig.8.** *Aphrodita floresiana* (ZMA V.Pol 70.2): a, bipinnate neuroseta from segment 3; b, upper neuroseta from segment 3; c, notoseta from middle segment.

tip (Fig.8b).

Remaining parapodia with neuropodia cylindrical, covered with small rounded papillae, with 3 tiers of stout, golden brown, neurosetae with plumose margin (Horst, 1917: pl.XII fig.4a,b), upper tier with 2 stouter, darker neurosetae, middle tier with 3-5 neurosetae, lower tier with 6-9 neurosetae. Some neurosetae of anterior segments smooth, without plumose margins. Ventral cirri clavate-tipped, extending to distal tip of neuropodia. Ventral surface of notopodia with short lateral tuft of mud-covered capillary notosetae, shorter than neurosetae, not forming conspicuous fringe. Dorsal surface of notopodia with 2 types of notosetae entangled amongst felt; medially a row of about 10, stout, slightly bent, golden yellow, densely tuberculated on anterior halves, with hooked tips curving over dorsum. (Horst, 1917: pl.XII figs 2,3); laterally a row of 10-15 sharply bent, golden yellow, densely tuberculated on anterior halves, with hooked tips (Fig.8c). Paralectotypes smaller than lectotype, possessing the sharply bent notosetae only. Dorsal cirri with cylindrical cirrophores on posterior edge of notopodia, styles clavate-tipped shorter than bent notosetae.

**Remarks.** The reasons for referring this species to *Aphrodita* are given in the Remarks section of *A. decipiens*. We have expanded Horst's original description slightly but have not dissected the type material to reveal the elytra. The main characters which clearly separate this species from all other species of *Aphrodita* in the Indo-Pacific is the lack of a notosetal fringe, the presence of raised ocular areas, and the few neurosetae present (see Table 1). The species is known only from the type locality.

**Habitat.** Collected at depths of 69 to 91 m and 141 m.

**Distribution.** Indonesian Archipelago (Fig.60).

***Aphrodita goolmarris* n.sp.**

Figs 9, 10a-f, 11a-j, 59C, Tables 1, 3

**Type material examined.** HOLOTYPE: Australia: Western Australia: Rowley Shoals, 18°15'S 118°02'E, 22 Aug. 1983, 410 m (WAM 74-89), 5.4 cm long, 2.9 cm wide, 39 segments. PARATYPES: New South Wales: off Batemans Bay, 35°44'S 150°15'E, 549 m (USNM 148659), 4.8 cm long, 2.6 cm wide, 36 segments; off Batemans Bay, 35°44'S 150°15'E, 549 m (BMNH ZB1990.19), 5.8 cm long, 2.7 cm wide, 40 segments; Brush Island, 35°32'S 150°25'E, 457 m (AM W20174), 4.7 cm long, 2.5 cm wide, 39 segments.

**Additional material examined.** WESTERN AUSTRALIA: Rowley Shoals, 16°49'S 119°59'E, 19 Aug. 1983 (WAM 78-89), 5 cm long; scampi trawl grounds, 17°24'S 118°52'E, 4 Nov. 1985, 445 m, 2(NTM W4252), 4.4 cm long; scampi trawl grounds, 17°28'S 118°53'E, 8 Nov. 1985, 405 m (NTM W4254), 4.6 cm long; scampi trawl grounds, 17°52'S 118°27'E,

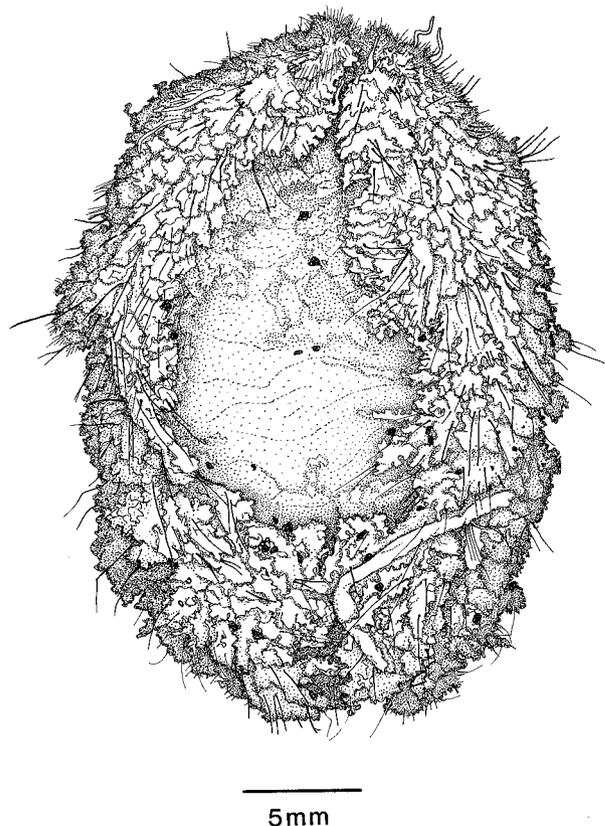
6 Nov. 1985, 420 m (NTM 4253), 5.5 cm long; Rowley Shoals, 17°56'S 118°26'E, 29 Aug. 1983, 400 m (WAM 75-89), 4.5 cm long; Rowley Shoals, 18°06'S 118°10'E, 17 Aug. 1983, 353-356 m (WAM 76-89), 4.5 cm long; Karratha, 18°44'S 116°59'E, 23 Aug. 1983 (WAM 84-89), 6 cm long. TASMANIA: Richardson Point, 41°15'S 144°08'E, 20 Oct. 1984, 520 m (SAM E2380), 3 cm long. NEW SOUTH WALES: Disaster Bay, 37°21'S 150°18'E, 14 Oct. 1984, 636 m (SAM E2379), 3.3 cm long; off Sydney, 34°24'S 151°25'E, 13 Dec. 1976, 731-768 m, (AM W20169), 4.2 cm long; Terrigal, 34°47'S 151°57'E, 7 Dec. 1978, 816 m (AM W20170), 3.5 cm long; off Newcastle, 32°56'S 151°46'E, 8 Oct. 1982, 2984-3058 m (AM W20374), 3 cm long. QUEENSLAND: Cape York, 10°29.81'S 144°00.38'E, 20 Aug. 1988, 495-534m (AM W20318).

**Description.** HOLOTYPE. Body ovate, 5.4 cm long, 2.9 cm wide, 39 segments.

Dorsum tan-brown in alcohol, stout golden brown notosetae entangled amongst felt, lateral fringe small inconspicuous (Fig.9). Ventral surface tan, covered with small spherical papillae.

Prostomium rounded with raised hemispherical ocular area, without eye pigment. Median antenna rod-shaped, one-fifth length of prostomium. Facial tubercle inflated, covered in small rounded papillae, length of prostomium. Palps extending to segment 11, large basal palpophores equal to length of prostomium, palps, long, tapering, with minutely papillated margins (Fig.10a).

Elytra 15 pairs attachments by elytraphores on

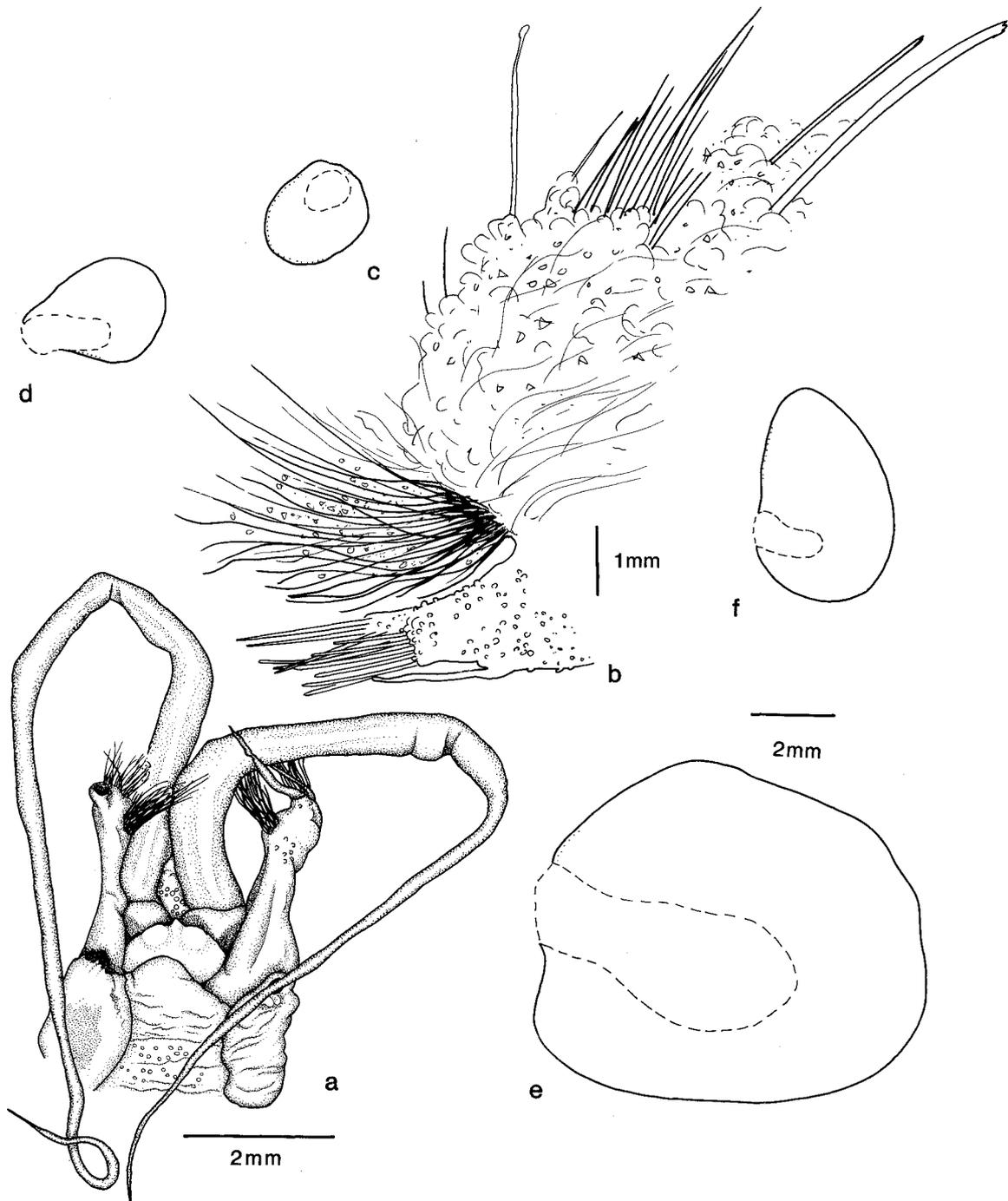


**Fig.9.** *Aphrodita goolmarris* n.sp. (AM W20374): dorsal view, whole animal.

segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. First pair rounded with elyrophore attached centrally. Remaining elytra rounded with elyrophores attached laterally, increasing in size to middle of body, then decreasing in size posteriorly. Posterior elytra ovoid with elyrophores attached anteriolaterally. All elytra with some scattered submarginal papillae (Fig.10c-f).

First or tentacular segment with elongated, flattened,

uniramous parapodia, covered in small rounded papillae, anterior margin with 2 small tentaculophores and tentacular cirri, tapering with blunt ends, dorsal and ventral pair equal to length of prostomium. Three tufts of fine, pale, faintly iridescent, mud-covered setae; tuft on inner anterior edge of parapodia, tuft on distal margin of parapodia, and small tuft ventrally emerging posterior to cirri.



**Fig.10.** *Aphrodita goolmarris* n.sp. Holotype (WAM 74-89): a, dorsal view of prostomium and first segment; b, parapodium from segment 15; c, (AM W20174) first elytron; d, third elytron; e, eighth elytron; f, 14th elytron.

Following segments with biramous parapodia. Neuropodia of segments 2 and 3 short, cylindrical, covered in small papillae, with 2 tiers of neurosetae, upper with 2-3 golden brown, stout neurosetae, lower with many (100+) golden yellow, bipinnate neurosetae (Fig.11a). Ventral cirri slender, tapering, with blunt tips, extending to tip of neuropodia.

Remaining parapodia (Fig.10b) with neuropodia cylindrical, covered with small rounded papillae, with 3 tiers of stout, golden brown, pilose-tipped, neurosetae, upper tier with 2 stouter, darker neurosetae (Fig.11g,j), middle tier with 4-9 neurosetae (Fig.11f,i), lower tier with 8-15 neurosetae (Fig.11e,h). Neurosetae of some anterior segments without pilose tips (Fig.11b-d). Ventral cirri extending to lower tier. Notopodia with short lateral tuft of faintly iridescent, mud-covered capillary notosetae, not forming fringe, upper notosetae golden brown, entangled amongst felt, curving over half the dorsum (Fig.11k). Dorsal cirri with blunt tips, as long as notosetae.

**Variation.** Additional material ranges from 2.6-6 cm long, 1.0-4.6 cm wide, with segments 35-41.

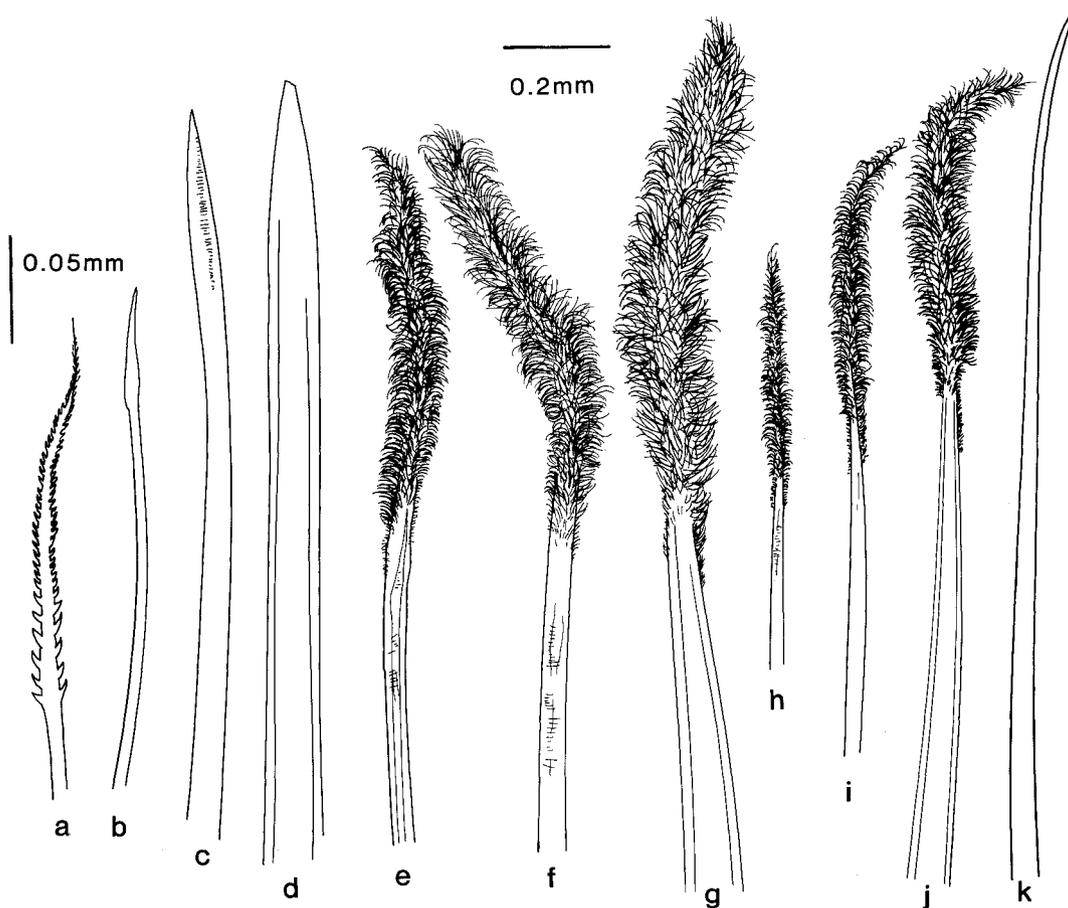
Raised hemispherical ocular areas not pronounced in some specimens. Palps extending to segments 7-11, palps, long, tapering, with smooth margins, or finely papillated. Median antenna rod-shaped up to one fifth length of prostomium, in none of the material examined was their evidence that a style was originally present.

Ventral cirri extending from lower tier to middle tier of neurosetae. Some neurosetae plumose on margin only (usually large upper setae).

Three specimens from New South Wales with elongated neurosetae up to 2 times length of neuropodia.

In Table 3, the numbers of neurosetae present in each tier on segments 4, 15 and 25 are given for three size classes of individuals. While the number of neurosetae in the upper tier remains constant with increasing size, the number in the lower and middle tier increases with increasing size and presumably age. Also the number of setae in these 2 tiers (lower, middle) is not constant over the body with larger numbers of neurosetae present on segment 15 than on segment 4 or 25.

**Remarks.** *Aphrodita goolmarris* n.sp. is characterised by stout golden brown notosetae, pilose-tipped



**Fig.11.** *Aphrodita goolmarris* n.sp. (AM W20169): a, bipinnate neuroseta from segment 3; b, neuroseta from lower tier segment 4; c, neuroseta from middle tier segment 4; d, neuroseta from upper tier segment 4; e, neuroseta from lower tier segment 15; f, neuroseta from middle tier segment 15; g, neuroseta from upper tier segment 15; h, neuroseta from lower tier segment 25; i, neuroseta from middle tier segment 25; j, neuroseta from upper tier segment 25; k, notoseta from middle segment.

neurosetae and a rod-shaped median antenna and as indicated in Table 1, no other species of *Aphrodita* from the Indo-Pacific has this combination of characters.

*Aphrodita goolmarris* n.sp. is known from Rowley Shoals in Western Australia, Tasmania, New South Wales and a single record from Queensland. Additional collecting may reveal that this species is more widespread.

**Habitat.** Found at depths of 353 to 3058 m.

**Etymology.** The specific name is from an aboriginal word *Goolmarris*, meaning a shield, as this species has the body form of a shield.

**Distribution.** Australia (from Rowley Shoals, WA, 16°49'S 119°59'E, to Cape York, Qld, 10°29.81'S 144°00.38'E, Fig.59C).

*Aphrodita kulmaris* n.sp.

Figs 12, 13a-f, 14a-l, 59B, Tables 1, 4

**Type material examined.** HOLOTYPE: Australia: Victoria: Lakes Entrance, 37°53'S 148°00'E, June 1962 (NMV F57193), 7.1 cm long, 4 cm wide, 43 segments. PARATYPES: New South Wales: Malabar, 33°58'S 151°15'E, 19 July 1972, 15.8-16.5 m (LACM-AHF 1299), 4 cm long, 3.5 cm wide, 42 segments; Manly, 33°48'S 151°17'E, 124 m (USNM 148660), 5.5 cm long, 3 cm wide, 44 segments; Newcastle, 33°13'S 152°11'E, 76.8-87.8 m (AM W20172), 5 cm long, 2.5 cm wide, 43 segments. Queensland: Flinders Island, 14°09'S 144°04'E, 26 Feb 1979, 22-28 m (BMNH ZB 1990.21), 3.9 cm long, 1.7 cm wide, 42 segments.

**Additional material examined.** WESTERN AUSTRALIA: Long Reef, 13°50'S 125°00'E, Nov. 1980, 2(WAM 92-89), 5.5-8 cm long; North West Cape, 15°00'S 124°00'E, 121-128 m (WAM 10-75), 8 cm long; Broome, 17°58'S 122°14'E, 13 m (AM W2843), 8.2 cm long; Shark Bay, 25°31'S 112°29'E, 9 Oct. 1963, 130 m, 2(WAM 108-90), 2.5-4 cm long. VICTORIA: Gabo Island, 37°34'S 149°55'E, 119 m (AM W3497), 5.5 cm long. NEW SOUTH WALES: Green Cape, 37°16'S 150°03'E, 20 July 1925, 55 m (AM W1741), 4.7 cm long; Tathra, 36°49'S 149°57'E, Mar. 1927, 73 m (AM W2363), 5.8 cm long; Ulladulla, 35°21'S 150°29'E, 73-82 m (AM W3177), 2.5 cm long; Cronulla, 34°02'S 151°09'E, 17 June 1965 (AM W20176), 2 cm long; Botany Bay, 34°00'S 151°11'E, Sept. 1921, 60-102 m, 3(AM W854), 3.5-5.5 cm long; Malabar, 33°58'S 151°15'E, 26 Mar. 1973, 66 m (AM W6881), 3.6 cm long; Broken Bay, 33°36'S 151°30'E, 10 Feb. 1986, 71-75 m, 3(AM W20177), 1.8-2 cm long; Newcastle, 33°13'S 152°11'E, 7 Dec. 1977, 146 m (AM W20178), 4.5 cm long. QUEENSLAND: Cape Moreton, 27°02'S 153°28'E, 30 Mar. 1969, 2(QM GH2850), 3.2-4 cm long; Yeppoon, 23°08'S 150°44'E, 6 Sept. 1967, 9 m (NMV F57187), 3 cm long; Bowen, 20°01'S 148°15'E, 11 June 1983, 22-26 m (AM W20179), 2.6 cm long; Abbot Point, 19°53'S 147°05'E, 1982, 5 - 10 m (QM G23030), 6.8 cm long; Townsville, 17°53'S 146°51'E, 20 Jan. 1986, 120-142 m, 2(AM W201623), 6.7 cm long; Townsville, 17°53.7'S 146°51.2'E, 21 Jan. 1985 (NTM W4300), 7 cm long.

**Description.** HOLOTYPE. Body ovate, rounded anteriorly, with tapering caudal region, 7.1 cm long, 4 cm wide, 43 segments.

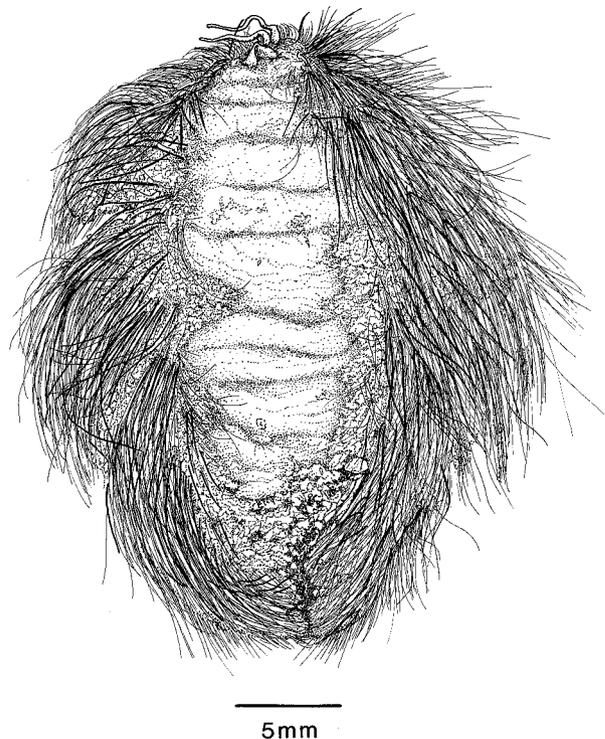
Dorsum covered in fine, pale brown felt in alcohol, with some fine sediment entrapped in felt. Iridescent lateral fringe, reddish green in alcohol, extending well beyond neurosetae, along entire length of body (Fig.12). Some dark brown stouter notosetae. Ventral surface, cream coloured, tough, slightly areolated, covered with small flattened papillae.

Prostomium, small, ovoid, with 2 pairs of almost contiguous, faint grey eye spots. Pair of prominent, free flaps, arising from indented posterolaterally margin of prostomium. Median antenna reduced to a small, spherical papilla. Palps extending to segment 7, short basal palpophores, margins finely papillated. Facial tubercle 2 times length of prostomium, surface finely crenulated, inflated (Fig.13a).

Elytra 15 pairs, with firm stout attachments on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. First pair, smooth, opaque, ovoid, attached by thickened elytraphore centrolaterally. Subsequent elytra (based upon dissected paratype), increasing in size to middle of body, then decreasing in size posteriorly. Elytra rounded, with elytraphore attachments on lateral margin. Posterior 2 pairs elongated. Elytraphore on terminal pair attached anterolaterally, all elytra with a few submarginal micropapillae (Fig.13c-f).

Proboscis (dissected), thick, muscular, without jaws, ribbed muscular walls around opening.

First or tentacular segment with elongated, uniramous parapodia, projecting anteriorly and laterally to



**Fig.12.** *Aphrodita kulmaris* n.sp. (NMV F57187): dorsal view, whole animal.

prostomium, enlarged distally, forming small rounded lobe with aciculae and several radiating bundles of notosetae, globular flattened papillae on ventral surface. Two pairs of tentacular cirri with cylindrical tentaculophores. Dorsal and ventral tentacular cirri similar in length and shape, holotype missing 1 tentacular cirrus (Fig.13a).

Following segments with biramous parapodia. Second neuropodia, stout, rectangular, trilobed, consisting of 3 descending tiers, dorsoventrally, ridged epithelium with scattered flattened papillae. Neurosetae stout, darkly chitinised emergent from each lobe, progressively thicker dorsoventrally, upper tier with 1-2 neurosetae with extended smooth tips, middle tier with 3-4 neurosetae with extended tips, lower tier with many (100+) bipinnate neurosetae (Fig.14a). Aciculum, pale yellow, blunt-tipped, emergent between dorsal and ventral lobe. Ventral cirri, elongated, pointed, extending to just beyond tip of neuropodia. Notopodia squat, rectangular, on anterior face of neuropodia, without notosetae.

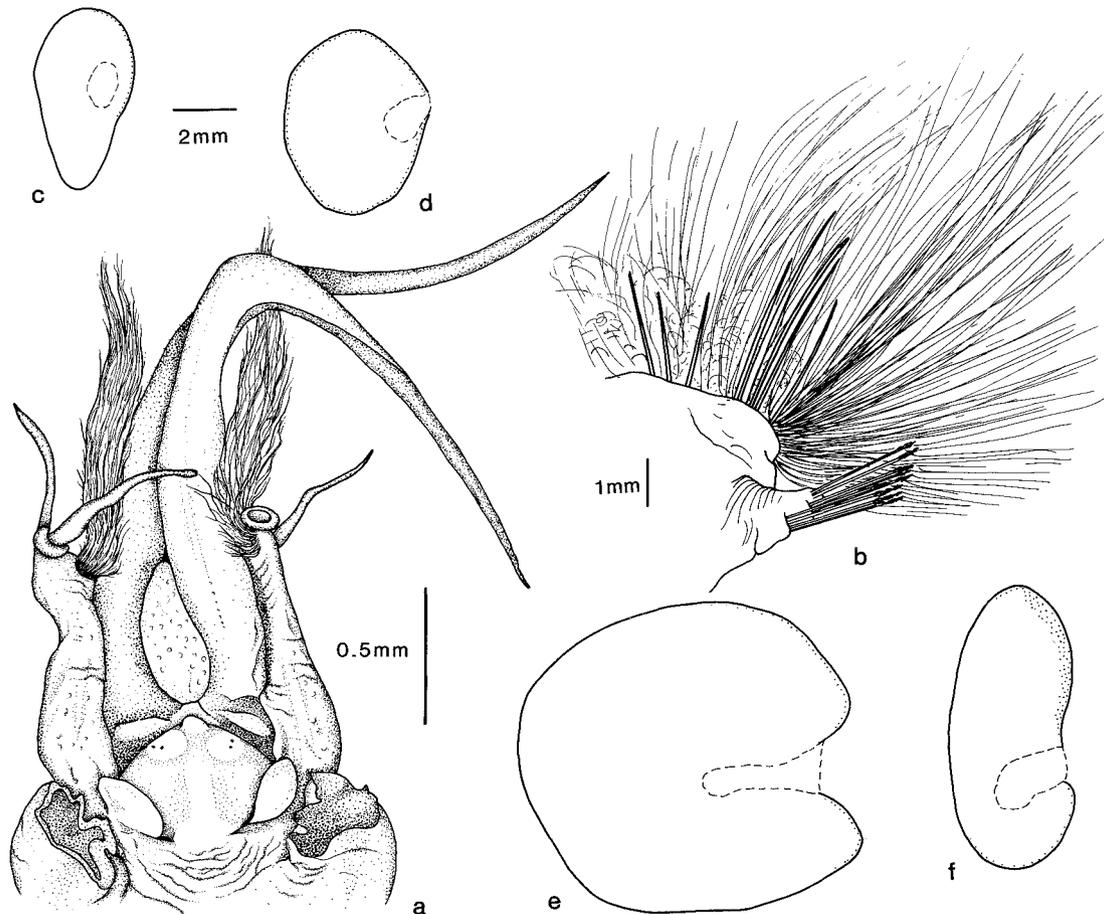
Third segment with parapodia and setae similar to those on segment 2, except slightly larger.

Following parapodia biramous (Fig.13b). Neuropodia with 3 tiers of golden brown neurosetae, many with pilose tips. Lower tier with 14-17 neurosetae (Fig.14b,e,h),

middle tier with 5-9 neurosetae (Fig.14c,f,i), upper tier with 2-3 thicker, stouter, darker neurosetae (Fig.14d,g,j). Some neurosetae from anterior and posterior segments with extended tips, no pilose tips (Fig.14b-d,h). Notopodium with 2 fascicles of 10 or more golden brown spinous notosetae, entangled in numerous iridescent fine capillaries forming lateral fringe and dorsal felt. Notosetae smooth or with very fine tubercles (Fig.14k), some tips covered with a gelatinous sheath (Fig.14l), aligned laterally along body. Dorsal cirri long, slender, between three-quarters to as long as fringe of notosetal capillaries.

**Variation.** Additional material examined ranges from 1.8-10 cm long, 0.8-4.6 cm wide, with segments 38-46. Palps extending to segment 5-7. Facial tubercle varies from 1-2 times as long as prostomium. Median antenna in all material examined covered with small spherical papilla, no evidence of a style having ever been present.

In Table 4, the numbers of neurosetae present in each tier of segments 4, 15 and 25 are given for three size classes. The number of neurosetae in the upper tier is constant along the body and over the size range studied. In contrast the lower and middle tiers have higher numbers of neurosetae present on segment 15 than on



**Fig.13.** *Aphrodita kulmaris* n.sp. (AM W201623): a, dorsal view of prostomium and first segment; b, parapodium from segment 15; c, (AM W7959) first elytron; d, third elytron; e, eighth elytron; f, 14th elytron.

segment 4 or 25 regardless of size, however there is no clear pattern of setal numbers increasing in these tiers with increasing size and presumably age.

**Remarks.** *Aphrodita kulmaris* n.sp. can be distinguished from all other species of *Aphrodita* recorded from the Indo-Pacific by a small knob-shaped median antenna, a facial tubercle one to two times the length of the prostomium, stout, golden brown notosetae, a long iridescent reddish-brown lateral fringe and pilose tipped neurosetae (see Table 1). The species occurs in eastern and western Australian waters and these above characters clearly distinguish it from other species of *Aphrodita*, *A. australis*, *A. malkaris* n.sp. and *A. talpa* which also occur in these waters.

**Habitat.** Some individuals with sand and shell fragments within their felt and others were covered in mud, and they were dredged at depths of 9 to 146 m.

**Etymology.** The specific name is from an aboriginal word *Kulmaris* which means a shield and this species

has the body of a shield.

**Distribution.** Australia (Long Reef, WA, 13°50'S 125°00'E, to Flinders Island, Qld, 14°09'S 144°04'E, Fig.59B).

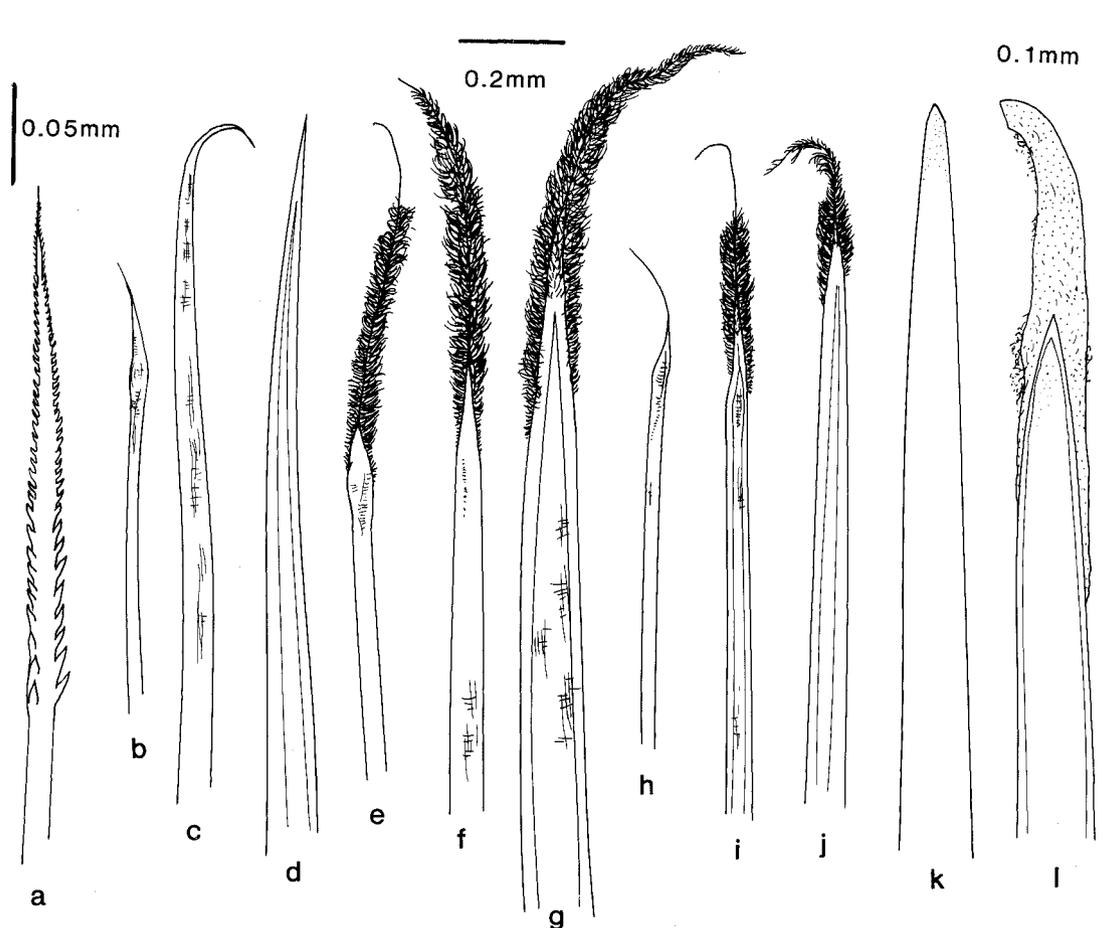
*Aphrodita limosa* (Horst)

Figs 15a,b, 60, Table 1

*Aphroditella limosa* Horst, 1916b: 68.—Horst, 1917: 49, pl.XI figs 4-7.

**Type material examined.** HOLOTYPE: Indonesian Archipelago Stn 178: north of Ceram, 2°40'S 128°37.5'E, 835 m (ZMA V.Pol 71), 2.7 cm long, 1.8 cm wide, 36 segments.

**Description.** Body ovate, rounded anteriorly, tapering caudal region forming a tail, 2.7 cm long, 1.8 cm wide, 36 segments.



**Fig.14.** *Aphrodita kulmaris* n.sp. Holotype (NMV F57193): a, bipinnate neuroseta from segment 3; b, neuroseta from lower tier segment 4; c, neuroseta from middle tier segment 4; d, neuroseta from upper tier segment 4; e, neuroseta from lower tier segment 15; f, neuroseta from middle tier segment 15; g, neuroseta from upper tier segment 15; h, neuroseta from lower tier segment 25; i, neuroseta from middle tier segment 25; j, neuroseta from upper tier segment 25; k, notoseta from middle segment; l, tip of notoseta from middle segment.

Dorsum tan coloured in alcohol, covered in thick sand entrapped felt. Notosetae entangled amongst felt, fringe short, inconspicuous. Ventral surface tan coloured, densely papillated.

Prostomium oval, with pair of large, raised, hemispherical ocular areas, without pigment. Median antenna with short ceratophore, style thin, tapering, three-quarters length of prostomium. Palps extending to segment 7 with large basal palpophores, stout, tapering, finely papillated. Facial tubercle, length of prostomium, thin, covered in rounded papillae.

Elytra 17 pairs, attached to elytraphores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 32 and 35. Elytra opaque, covered with scattered micropapillae, first pair missing, remaining large, rounded, with elytraphore attachments on lateral margin, posterior pairs elongated with elytraphores attached anteriorlaterally.

First or tentacular segment with elongated uniramous parapodia, projecting anteriorly and laterally to prostomium, with aciculae and tuft of pale yellow, capillary setae radiating from medial to posterior edge. Two pairs of tentacular cirri, with cylindrical tentaculophores, styles tapering with slender tips. Dorsal and ventral cirri subequal in length 2 times length of prostomium.

Following segments with biramous parapodia. Second and third neuropodia with 3 tiers of neurosetae: upper

tier with 2, middle tier with 2-3, thick, golden brown, unidentate neurosetae with slightly curved tips, lower tier with tuft of many (50+), golden yellow, bipinnate neurosetae (Fig.15a). Buccal cirri slender with papillated cirrophore, extending past distal tip of neuropodia.

Remaining neuropodia cylindrical with 3 tiers of long, thin, golden brown neurosetae with slightly curved tips and plumose edge; upper tier with 2 thicker, darker neurosetae (Horst, 1917: pl.XI figs 5,6), middle tier with 3-4 neurosetae, lower tier with 6 neurosetae. Ventral cirri slender, tapering, extending to distal margins of neuropodia. Notopodia with tuft of short, faintly iridescent, mud-covered, capillary notosetae on ventral surface forming short, inconspicuous, lateral fringe. Dorsal surface of notopodia with fan of about 20 long, golden brown, notosetae, varying in thickness. Notosetae with bases smooth, distal one-third with fine tubercles and hairs, tapering to hooked tips (Fig.15b). Cylindrical cirrophores on posterior edge of notopodia, styles missing.

**Remarks.** We have expanded Horst's (1916b, 1917) description of the species to include more details about the number and type of setae present. As this species is known only from the holotype and therefore we did not dissect the elytrae.

The reasons for referring this species to *Aphrodita* are given in the Remarks section of *A. decipiens*.

*Aphrodita limosa* which is known only from the holotype is characterised by the presence of relatively few neurosetae, short, mud-covered lateral fringe, a facial tubercle slightly longer than the prostomium, and smooth slightly curved tipped notosetae embedded in the felt (see Table 1).

**Habitat.** Trawled at a depth of 835 m.

**Distribution.** Indonesian Archipelago (Fig.60).

### *Aphrodita malayana* (Horst)

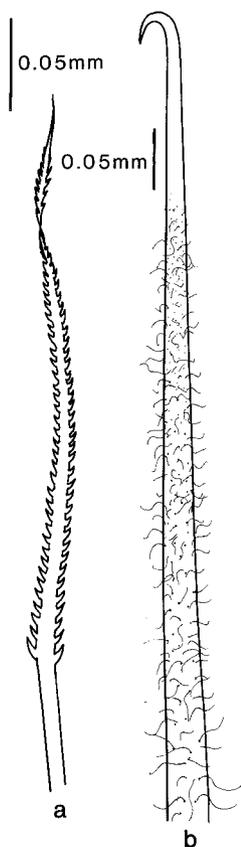
Figs 16, 60, Table 1

*Aphroditella malayana* Horst, 1916b: 65-66.—Horst, 1917: 48-49, pl.XI figs 1-3.

**Type material examined.** LECTOTYPE: Indonesian Archipelago Stn 161: east off Kofiau Island, 1°10.5'S 130°09'E, 798 m (ZMA V.Pol 72.1), 3.7 cm long, 2.7 cm wide, 38 segments. PARALECTOTYPE: Indonesian Archipelago Stn 161: east off Kofiau Island, 1°10.5'S 130°09'E, 798 m (ZMA V.Pol 72.2), 3.5 cm long, 2 cm wide, 32 segments.

**Description.** Body ovate, rounded anteriorly, tapering caudal region forming a tail, 3.5-3.7 cm long, 2-2.7 cm wide, 32-38 segments.

Dorsal felt cream coloured in alcohol with some sand entrapped, setae long, red brown. Ventral surface tan coloured, densely covered with spherical papillae.



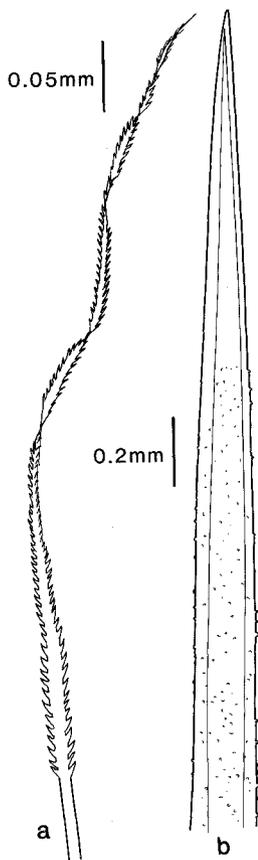
**Fig.15.** *Aphrodita limosa* (ZMA V.Pol 71): a, bipinnate neuroseta from segment 3; b, notoseta from middle segment.

Prostomium rounded with raised hemispherical ocular area, without pigment. Median antenna, slender, just longer than prostomium. Palps with large basal palpophores one-third length of prostomium, extending to segment 6, margins finely papillated. Facial tubercle covered with small spherical papillae, length of prostomium.

First or tentacular segment with elongated, uniramous parapodia, projecting anteriorly and laterally to prostomium, slightly enlarged distally, forming rounded lobe, with tuft of golden yellow, mud-covered setae, equal in length to tentacular cirri, setae emerging radially from distal margins of lobe from inner to posterior edge. Two pairs of tentacular cirri, with cylindrical tentaculophores, styles, long, tapering. Dorsal pair of tentacular cirri one and one-quarter times length of prostomium, ventral pair of cirri three-quarters length dorsal pair.

Following segments with biramous parapodia. Second and third neuropodia with 2 tiers of neurosetae, upper tier with 2-3 dark red brown neurosetae with tips slightly curved, lower tier with tuft of about 100 golden yellow, bipinnate neurosetae (Fig.16a). Ventral cirri, slender, tapering, with cylindrical, papillated cirrophores arising from base of neuropodia, extending beyond tip of neuropodia, except ventral cirri of segment 3, arising from middle of neuropodia.

Remaining neuropodia with neurosetae long, thick,



**Fig.16.** *Aphrodita malayana* (ZMA V.Pol 72.1): a, bipinnate neuroseta from segment 3; b, notoseta from middle segment.

dark red brown, with slightly curved tips and plumose edges (Horst, 1917: pl.XI fig.3). Neurosetae in 3 tiers: upper tier with 2 neurosetae, middle tier with 3 neurosetae, lower tier with 3 neurosetae.

Notopodia with tuft of 15 or more, long dark red brown, thick notosetal spines on dorsal surface, pointing posterodorsally. Notosetae with finely tuberculated shafts anteriorly, shafts thicker, smooth posteriorly (Fig.16b). Lower surface of notopodia with tuft of short, faintly iridescent, mud-covered capillary notosetae, not forming lateral fringe. Dorsal cirri one and one-quarter length of stout notosetae, blunt tipped, entangled amongst felt.

**Remarks.** We have expanded Horst's (1916b, 1917) description of *A. malayana*, however the two specimens both lack eye pigment, although possessing raised ocular areas. In Horst's description he stresses the position of the two pairs of eyes which he regards as being different to the other species he described. The unpigmented raised ocular areas are located in a similar position to the other species described by Horst. The species is characterised by its lack of a lateral fringe, low number of neurosetae, long stout dark brown notosetae and a slender median antenna which is equal to the length of prostomium (see Table 1). The species is only known from these two type specimens.

For comments regarding the synonymising of



**Fig.17.** *Aphrodita malkaris* n.sp. Holotype (WAM 88-89): dorsal view, whole animal.

*Aphroditella* with *Aphrodita*, see the Remarks section of *A. decipiens*.

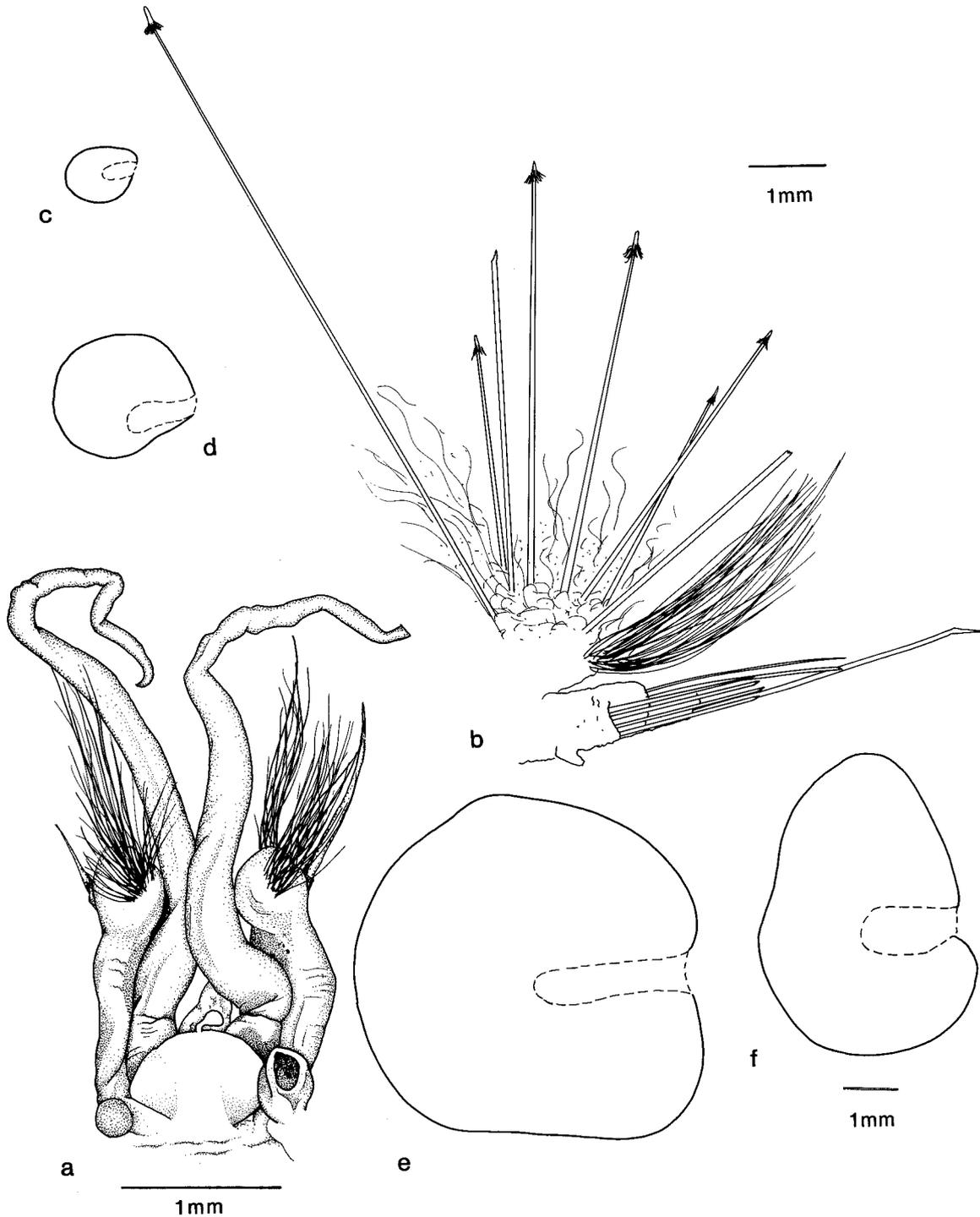
*Aphrodita malkaris* n.sp.

Figs 17, 18a-f, 19a-k, 59B, Table 1

**Habitat.** Trawled at a depth of 798 m.

**Distribution.** Indonesian Archipelago (Fig.60).

**Type material examined.** HOLOTYPE: Australia: Western Australia: Rowley Shoals, 16°58'S 120°07'E, 20 Aug. 1983, 428-432 m (WAM 88-89), 3 cm long, 2 cm wide, 35 segments.



**Fig.18.** *Aphrodita malkaris* n.sp. Holotype (WAM 88-89): a, dorsal view of prostomium and first segment; b, parapodium from segment 15; c, Paratype (AM W20284) first elytron; d, third elytron; e, eighth elytron; f, 14th elytron.

PARATYPE: Western Australia: Rowley Shoals, 16°58'S 120°07'E, 20 Aug. 1983, 428-432 m (AM W20284), 2.7 cm long, 1.5 cm wide, 33 segments.

**Description.** Body ovate, 3.0 cm long, 2.0 cm wide, 35 segments.

Dorsal felt creamy grey in alcohol, setae long, red brown (Fig.17). Ventral surface covered with small, spherical papillae.

Prostomium rounded with raised hemispherical ocular area, without pigment. Median antenna, bulbous, one-third length of prostomium. Palps extending to segment 7, margins smooth. Facial tubercle covered with small spherical papillae, just shorter than prostomium (Fig.18a).

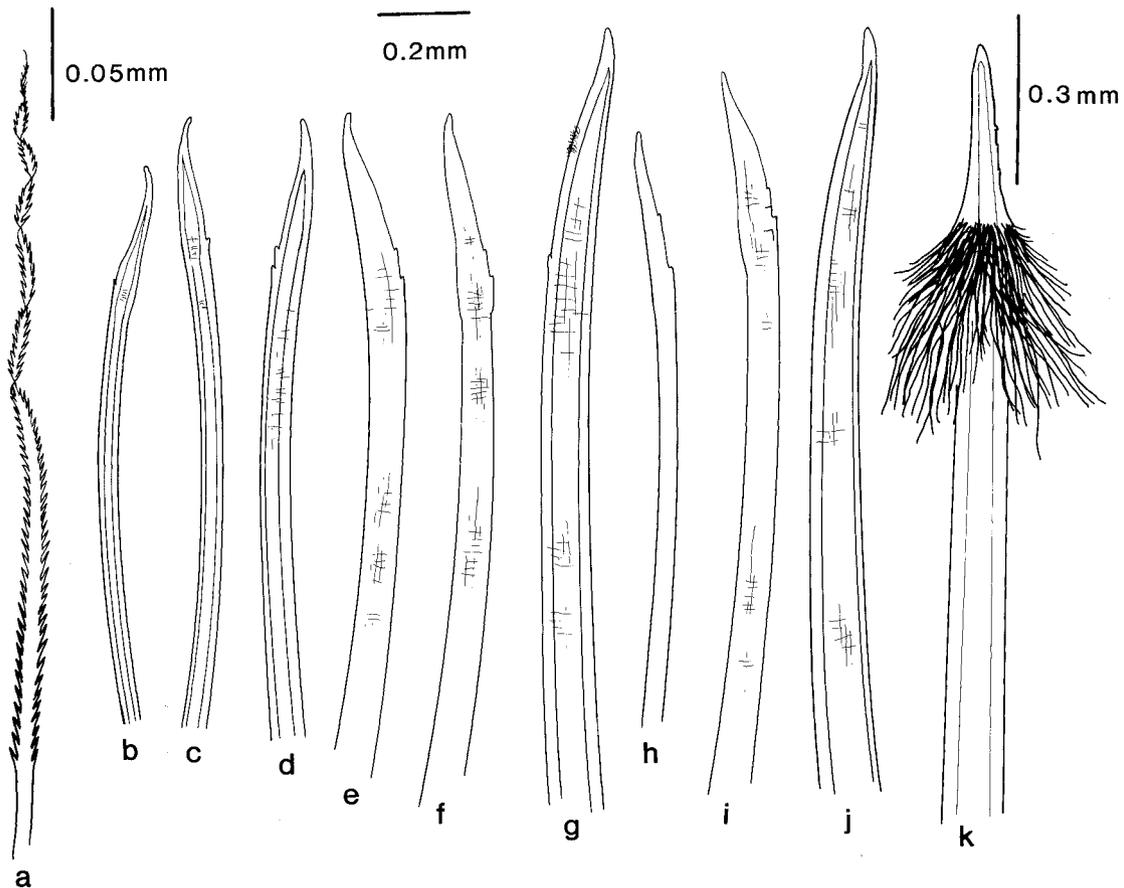
Elytra 15 pairs attached by elytophores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. First pair of elytra rounded with elytophore attached laterally. Remaining elytra squarish with rounded edges, increasing in size to middle of body, then decreasing in size posteriorly, elytophores attached laterally. Posterior elytra ovoid with elytophore attached anteriolaterally. All elytra smooth (Fig.18c-f).

First or tentacular segment with elongated, uniramous

parapodia, covered with small spherical papillae, projecting anteriorly and laterally to prostomium, enlarged distally, forming rounded lobe, with tuft of golden yellow, mud-covered setae, equal in length to tentacular cirri, setae emerging radially from distal margins of lobe. Inner edge of parapodia with tuft of fine capillary setae. Two pairs of tentacular cirri, with cylindrical tentaculophores, styles, short, tapering. Dorsal pair of tentacular cirri 2 times length of prostomium, ventral pair of cirri just shorter than dorsal pair (Fig.18a).

Following segments with biramous parapodia (Fig.18b). Second and third neuropodia with 2 tiers of neurosetae, upper tier with 2 golden brown neurosetae with tips slightly curved, lower tier with tuft of many (100+) golden yellow bipinnate neurosetae (Fig.19a). Ventral cirri, slender, tapering, with cylindrical cirrophores arising from base of neuropodia, extending beyond tip of neuropodia, except ventral cirri of segment 3, arising from middle of neuropodia.

Remaining neuropodia with neurosetae long, thick, golden brown, with slightly curved tips, some with 1-2 small extra teeth, some smooth and some with short plumose edges. Neurosetae in 3 tiers: upper tier with



**Fig.19.** *Aphrodita malkaris* n.sp. Paratype (AM W20284): a, bipinnate neuroseta from segment 3; b, neuroseta from lower tier segment 4; c, neuroseta from middle tier segment 4; d, neuroseta from upper tier segment 4; e, neuroseta from lower tier segment 15; f, neuroseta from middle tier segment 15; g, neuroseta from upper tier segment 15; h, neuroseta from lower tier segment 25; i, neuroseta from middle tier segment 25; j, neuroseta from upper tier segment 25; k, tip of notoseta from middle segment.

2 neurosetae (Fig.19d,g,j), middle tier with 4 neurosetae (Fig.19c,f,i), lower tier with 6-7 neurosetae (Fig.19b,e,h).

Notopodia with tuft of 15-20, long golden brown notosetal spines on dorsal surface. Notosetae with smooth, finely striated shafts, with triangular shaped tips with numerous fine spines radiating from base of expansion (Fig.19k). Notosetae straight, fan posteriorly across dorsum, covering three-quarters of dorsum. Lower surface of notopodia with tuft of short, faintly iridescent, mud-covered capillary notosetae, not forming lateral fringe.

**Variation.** Additional material ranging from 2.7-3.0 cm long, 1.5-2.0 cm wide, with 33-35 segments.

**Remarks.** *Aphrodita malkaris* n.sp. can be distinguished from all other species of *Aphrodita*, recorded from the Indo-Pacific, by a bulbous median antenna which is about a third the length of the prostomium, long, triangular-tipped notosetae, short faintly iridescent lateral fringe, and its relatively low numbers of body segments (see Table 1). The species is currently known only from Western Australia, and these characters clearly distinguish it from other species of *Aphrodita*, *A. kulmaris* n.sp., *A. australis* and *A. talpa* which occur in these waters.

**Habitat.** Trawled from sandy substrates at depths of 428-432 m.

**Etymology.** The specific name is from an aboriginal word *Malkaris* which means a shield, and this species has the body form of a shield.

**Distribution.** Australia (Rowley Shoals, WA, 16°58'S 120°07'E, Fig.59B).

#### *Aphrodita marombis* n.sp.

Figs 20, 21a-e, 22a-k, 59C, Table 1

**Type material examined.** HOLOTYPE: Australia: Western Australia: Leighton Beach, 31°01'S 115°44'E, 22 June 1961, 15 m (WAM 31-75), 2.2 cm long, 1 cm wide, 36 segments. PARATYPES: South Australia: Reevesny Island, 34°33'S 136°17'E, 30 Jan. 1986 (SAM E2378), 5.1 cm long, 1.9 cm wide, 33 segments. New South Wales: Shell Harbour, 34°35'S 150°52'E, Apr. 1925 (AM W1597), 2.8 cm long, 1.2 cm wide, 32 segments; Shell Harbour, 34°35'S 150°52'E, Apr. 1925 (USNM 148661), 2.5 cm long, 1.3 cm wide, 35 segments; Shell Harbour, 34°35'S 150°52'E, Apr. 1925 (BMNH ZB 1990.22), 2.5 cm long, 1.5 cm wide, 35 segments.

**Additional material examined.** NEW SOUTH WALES: Port Stephens, 32°43'S 152°08'E (AM W20190), 1.3 cm long.

**Description.** Body oval 2.2 cm long, 1 cm wide, 36

segments.

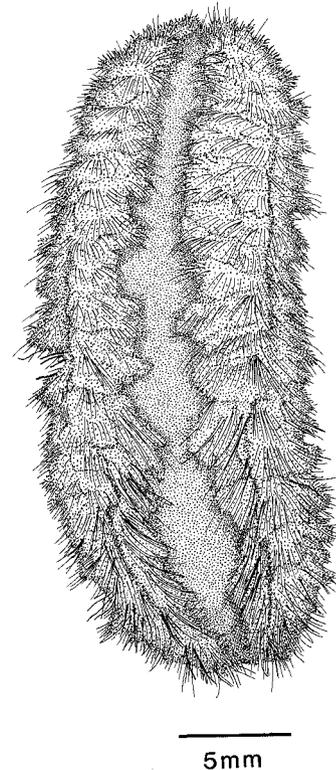
Dorsum brown in alcohol, notosetae short, straight, golden yellow, covered with minute tubercles, not visible through felt (Fig.20). Ventral surface tan, covered with small rounded papillae.

Prostomium rounded with 2 large, raised, hemispherical ocular peduncles with 2 pairs of contiguous, grey/black eyes. Median antenna reduced to a small papilla, one-third length of prostomium, covered with small papillae. Facial tubercle inflated, covered with small round papillae, same length, or longer than prostomium. Palps extending to segment 4 or 5, margins finely papillated (Fig.21a).

Elytra 15 pairs attached by elytophores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. First pair missing. Remaining elytra rounded, increasing in size to middle of body, then decreasing in size posteriorly, elytophores attached laterally. Posterior elytra ovoid with elytophores attached anterolaterally. All elytra smooth (Fig.21c-e).

First or tentacular segment with elongated, uniramous parapodia, projecting anteriorly to prostomium; with acicular and large node on inner, anterior edge. Tuft of stiff, golden yellow, mud-covered setae radiating around this node with 2 pairs of tentacular cirri, on anterior edge of parapodia, styles tapering with blunt tips. Dorsal and ventral cirri of same length, just longer than prostomium, tuft of fine, mud-covered setae on ventral surface, posterior to cirri (Fig.21a).

Following segments with biramous parapodia (Fig.21b). Second and third neuropodia cylindrical, finely



**Fig.20.** *Aphrodita marombis* n.sp. Paratype (AM W1597): dorsal view, whole animal.

papillated with 2 tiers of neurosetae; upper tier with 2 stout, golden brown neurosetae, with slightly curved tips, lower tier with tuft of many (20+) golden yellow, bipinnate neurosetae (Fig.22a). Ventral cirri with large, cylindrical, papillated cirrophore, emerging at base of neuropodia, styles with thick base and thinner blunt tip, extending past distal margins of neuropodia except ventral cirri on segment 3 emerging from middle of neuropodia.

Remaining neuropodia with 3 tiers of golden brown, stout neurosetae, with slightly curved tips, each with 2-3 neurosetae (Fig.22b-j). Some neurosetae of anterior and posterior segments with fine tubercles on curved margins (Fig.22e,h). Ventral cirri emerging from middle of neuropodia, extending between lower and middle tiers of neurosetae.

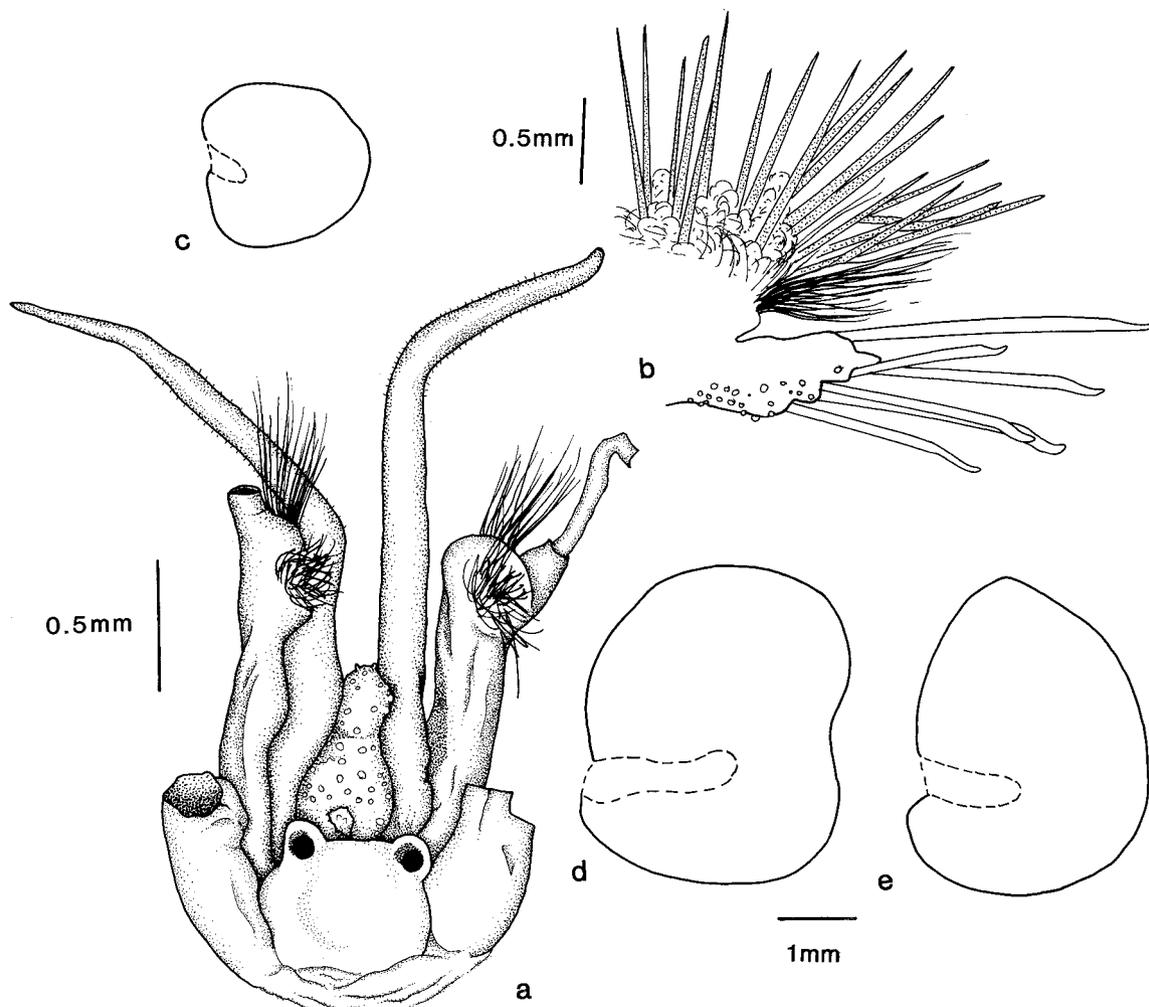
Notopodia with tuft of short, mud-covered, capillary notosetae, not forming fringe, emerging from ventral surface. Dorsal surface of notopodia with fan of about 30 straight, yellow, notosetae covered with many fine tubercles (Fig.22k), with tips just emerging from felt. Dorsal cirri tapering, with blunt tips, just longer than notosetae.

**Variation.** Additional material examined ranges from 1.3-5.1 cm long, 0.5-1.9 cm wide and 32-36 segments.

**Remarks.** *Aphrodita marombis* n.sp. can be distinguished from all other species of *Aphrodita*, recorded from the Indo-Pacific by its stout notosetae which are covered in small tubercles, stout mud-covered lateral fringe and its smooth neurosetae with slightly curved tips (see Table 1). The species is currently only known from southern Australia and these characters clearly distinguish it from other species of *Aphrodita*, *A. australis*, *A. bamarookis* n.sp., *A. goolmarris* n.sp. and *A. talpa* which also occur in these waters.

**Habitat.** Found amongst weed and rock with sand and shell fragments in their felt, and mud-covered notosetae. The only recorded depth of collecting was from 15 m.

**Etymology.** The specific name is from an aboriginal word *Marombis* which means a shield and refers to the shape of this new species.



**Fig.21.** *Aphrodita marombis* n.sp. Paratype (AM W1597): a, dorsal view of prostomium and first segment; b, (AM W20190) parapodium from segment 17; c, third elytron; d, eighth elytron; e, 14th elytron.

**Distribution.** Australia (from Leighton Beach, WA, 31°01'S 115°44'E, to Port Stephens, NSW, 32°43'S 152°08'E, Fig.59C).

Loslos and Broken Islands, west of Salawatti, 1°01'S 130°52'E, Fig.60).

*Aphrodita sibogae* (Horst)

Fig.60, Table 1

*Aphroditella sibogae* Horst, 1916b: 66.—Horst, 1917: 50, pl.XI figs 8-10.

**Material examined.** None.

**Remarks.** This species is known only from a single specimen which was not available for examination. Horst provides a brief description of this species and this has been used in Table 1. The reasons for referring this species to *Aphrodita* are given in the Remarks section of *A. decipiens*.

**Habitat.** Trawled at a depth of 18 m.

**Distribution.** Indonesian Archipelago (between

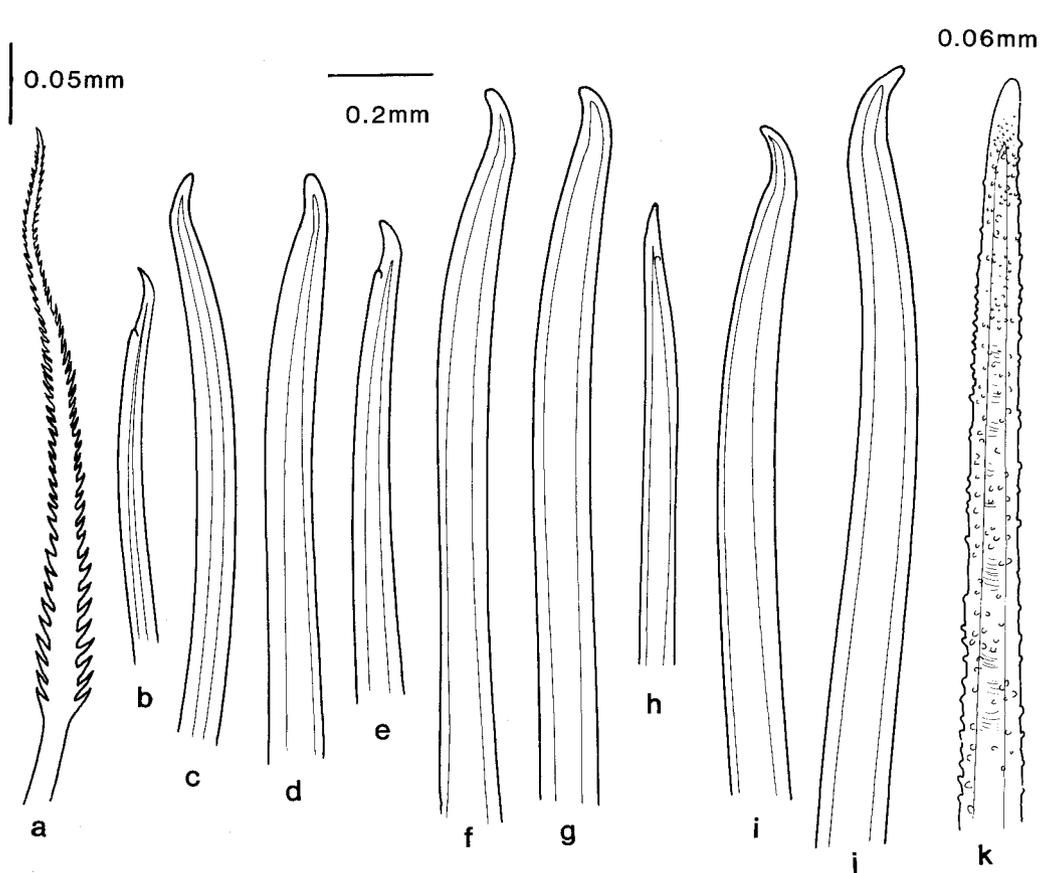
*Aphrodita talpa* Quatrefages

Figs 23a-f, 24a-k, 59C, Table 1

*Aphrodite talpa* Quatrefages, 1866: 196-197, pl.VI figs 2-4.  
*Aphrodita talpa*.—Fauvel, 1917: 167-168.—Fauvel, 1925: 140-144, fig.4.—Monro, 1936: 82-83, fig.3.

**Material examined.** WESTERN AUSTRALIA: Rottnest Island, 32°00'S 115°30'E, Mar. 1966 (WAM 53-75), 2 cm long. TASMANIA: Maria Island, 42°37'S 148°20'E, 9 Oct. 1984, 5(NMV F57203), 0.7-1.6 cm long; Falmouth, 41°32.9'S 145°35'E, 10 Oct. 1984 (NMV F57204), 1.7 cm long. NEW SOUTH WALES: Ulladulla, 35°21'S 150°29'E, 73-82 m (AM W20285), 1 cm long; Port Kembla, 34°20'S 151°18'E, 13 Dec. 1978, 161 m, 2(AM W20182), 1.1-1.2 cm long. QUEENSLAND: Shaw Island, 20°32.3'S 149°01.4'E, 19 Nov. 1977, 27 m (AM W20181), 2.3 cm long; Cape York, 12°45.6'S 143°32.2'E, 28 Sept. 1979, 19.8 m (QM GH285), 4.5 cm long.

**Additional material examined.** HOLOTYPE of *Aphrodita*



**Fig.22.** *Aphrodita marombis* n.sp. Paratype (AM W1597): a, bipinnate neuroseta from segment 3; b, neuroseta from lower tier segment 4; c, neuroseta from middle tier segment 4; d, neuroseta from upper tier segment 4; e, neuroseta from lower tier segment 15; f, neuroseta from middle tier segment 15; g, neuroseta from upper tier segment 15; h, neuroseta from lower tier segment 25; i, neuroseta from middle tier segment 25; j, neuroseta from upper tier segment 25; k, notoseta from middle segment.

*armifera*. USA: California: Monterey Bay, 36°45'N 122°00'W, 9 June 1904, 97-99 m, (USNM 16849).

**Description.** Body ovoid, with attenuated caudal region forming tail, 0.7-4.5 cm long, 0.4-2.2 cm wide, 31-38 segments.

Dorsum brown coloured in alcohol, thin felt covering elytra. Golden notosetae amongst felt. Ventral surface tan, covered with many small, spherical papillae.

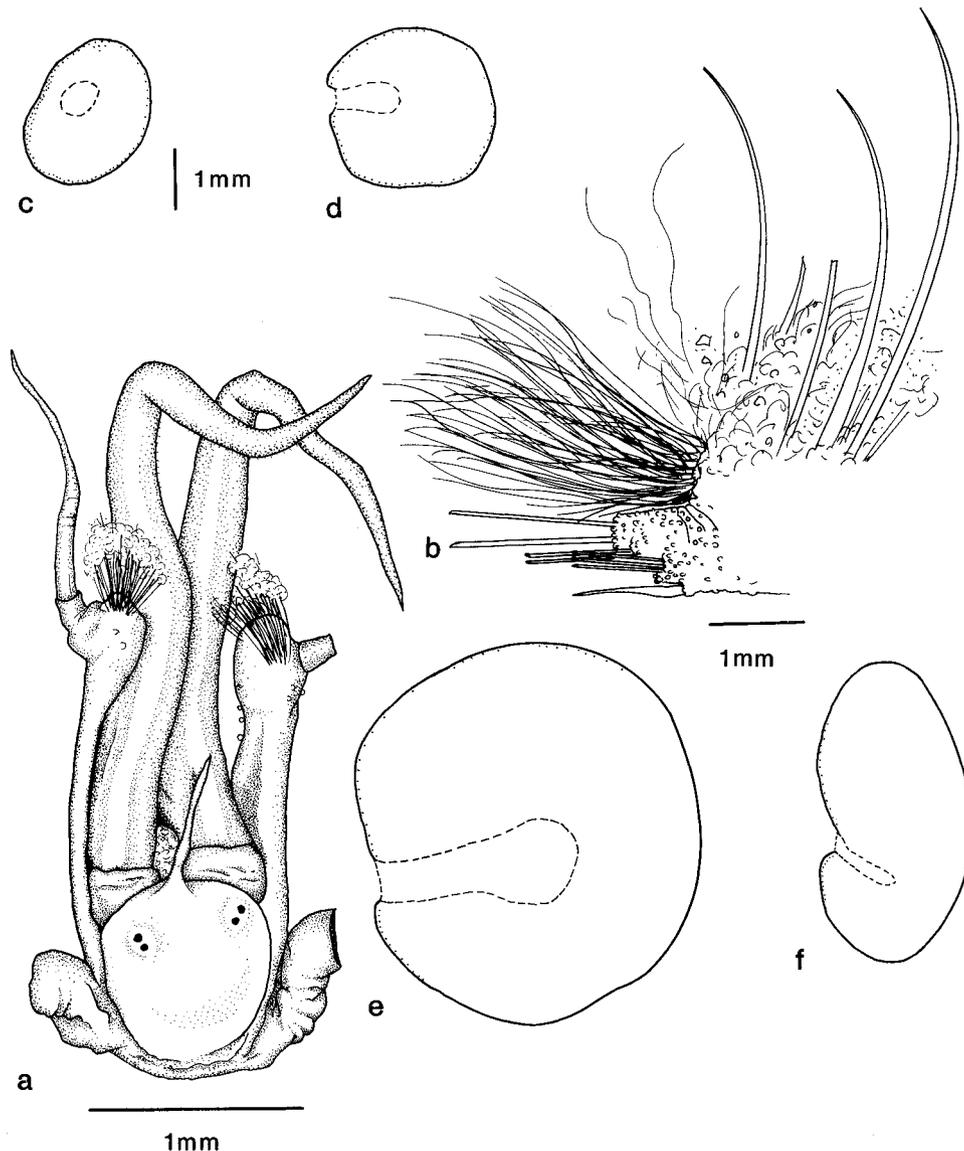
Prostomium small, rounded, with 2 raised hemispherical ocular areas with 2 pairs small black eyes of same size. Median antenna elongate with slightly enlarged tip, similar length to prostomium. Palps extending to segment 3-5, palphophores less than one-quarter length of prostomium, margins smooth. Facial tubercle three-quarters length of prostomium, covered in small spherical papillae, partly hidden by palps dorsally (Fig.23a).

Elytra 15 pairs, with firm stout attachments to

elytrophores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra opaque, first pair rounded with elytrophore attached centrally, following elytra large, rounded with elytrophores attached laterally, posterior elytra elongate with elytrophores attached anterolaterally. All elytra with some scattered micropapillae (Fig.23c-f).

First or tentacular segment with elongated, flattened, uniramous parapodia, with few scattered papillae. Inner, anterior edge of parapodia with tuft of fine, short, pale yellow, capillary setae, also tuft of fine, pale yellow setae on distal tip and ventral surface of parapodia, 2 pairs of cylindrical tentaculophores on upper edge of parapodia, tentacular cirri with slightly enlarged distal tips, dorsal and ventral pair same length, one-third length of palps (Fig.23a).

Following segments with biramous parapodia (Fig.23b). Second and 3rd neuropodia with 2 tiers of



**Fig.23.** *Aphrodita talpa* (NMV F57203): a, dorsal view of prostomium and first segment; b, parapodium from segment 15; c, (AM W20181) first elytron; d, third elytron; e, eighth elytron; f, 12th elytron.

neurosetae: upper tier with 2 golden brown, unidentate neurosetae with slightly curved tips, lower tier with tuft of many (20+), golden yellow, bipinnate neurosetae (Fig.24a). Ventral cirri slender, tapering, arising on base of neuropodia with papillated cirrophores, not extending beyond distal tip of neuropodia.

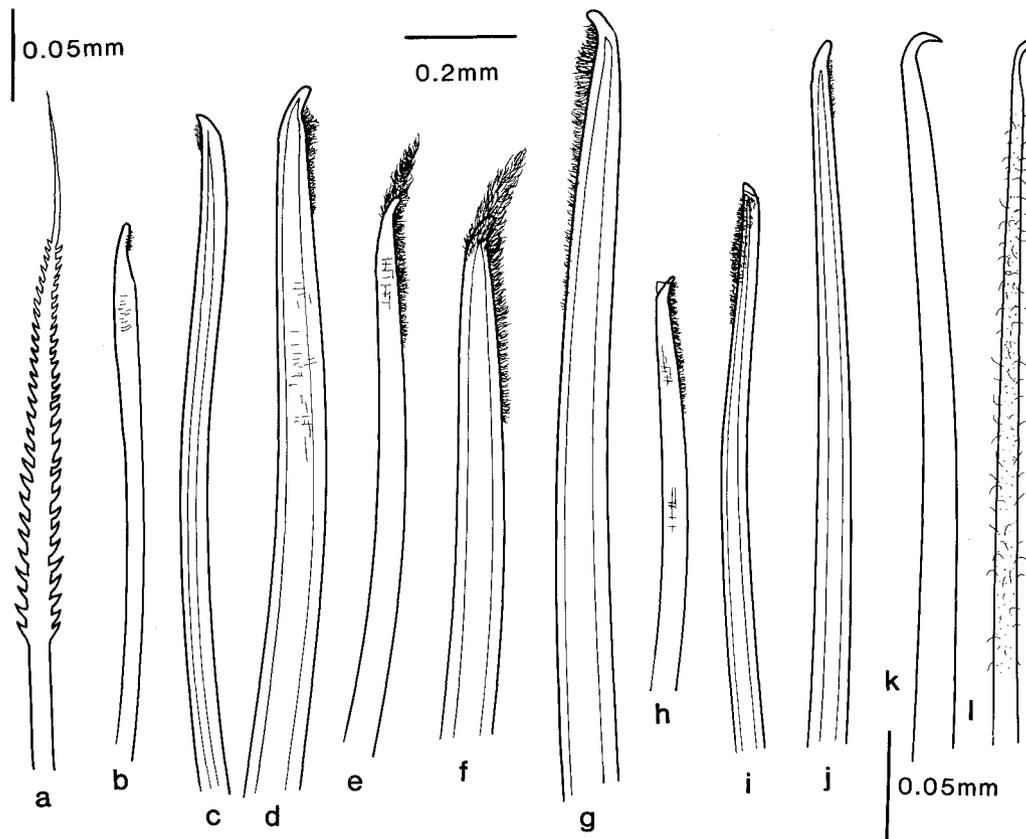
Remaining neuropodia cylindrical, covered in rounded papillae (Fig.23b), with 3 tiers of golden brown neurosetae with slightly curved tips, with short plumose beard on inner side underneath curve (Fig.24g). Upper tier with 2 stouter, thicker, darker neurosetae (Fig.24d,g,j), middle tier with 3-5 neurosetae (Fig.24c,f,i), lower tier with 5-8 neurosetae (Fig.24b,e,h). Ventral cirri delicate, elongate, arising in middle of neuropodia, not extending beyond distal tip of neuropodia.

Notopodia stout, with tuft of faintly iridescent, mud-covered, capillary notosetae, not extending past neurosetae and not forming conspicuous lateral fringe. Notosetae golden brown, tapering to hooked tips, shafts smooth (Fig.24k) or finely tuberculated with fine hairs attached (Fig.24l) occurring in 2 fascicles: lateral one with greater than 10, short, straight notosetae which fan posteriorly, tips only emergent from felt; inner one with 5-8 notosetae, long, curving over dorsum and entangled amongst felt, covering three-quarters dorsum.

Dorsal cirri blunt tipped, one-third length of longer notosetae.

**Variation.** Larger specimens with faint grey eye spots, or without pigment. Palps finely papillated, median antenna half length of prostomium.

**Remarks.** *Aphrodita talpa* was originally described by Quatrefages (1866) from New Zealand and subsequently recorded from Australia. Day & Hutchings (1979) indicated in their checklist, which was based entirely on the literature, that Fauvel's (1917) record of this species from South Australia, was not *A. talpa* Quatrefages. Fauvel (1925) in a partial review of the genus synonymised his material of *A. talpa* from South Australia with *A. armifera* Moore, 1910, a species occurring on the west coast of America. However, Fauvel (1925) clearly states on page 140 that he examined the type of *A. talpa* Quatrefages, and this closely resembled his material from South Australia. We therefore suggest that *A. talpa* Quatrefages does occur in Australia, based on Fauvel's (1925) description of his material from South Australia. However, we do not concur with his synonymising of *A. talpa* Quatrefages with *A. armifera* Moore, as the holotype of *A. armifera*



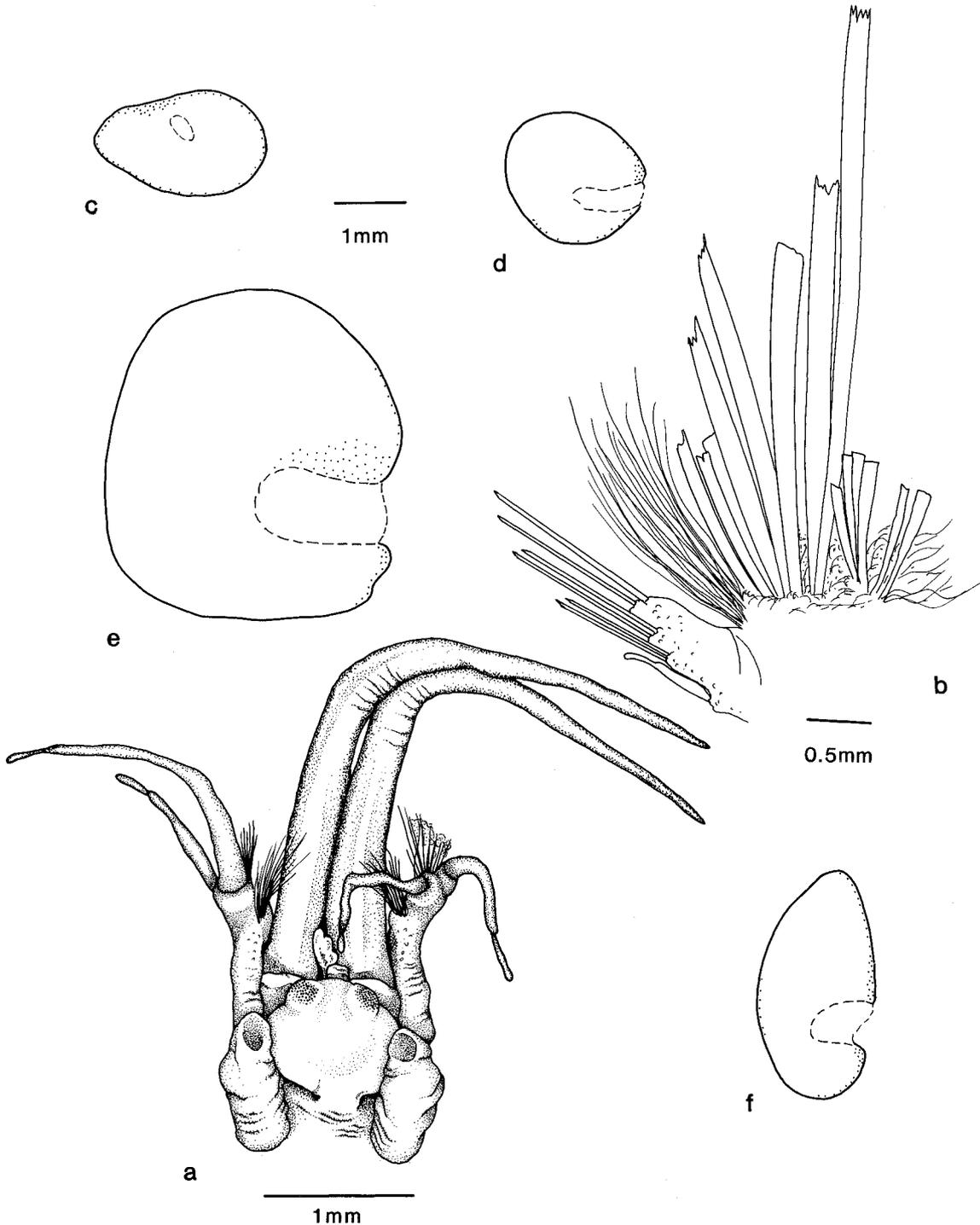
**Fig.24.** *Aphrodita talpa* (NMV F57203): a, bipinnate neuroseta from segment 3; b, neuroseta from lower tier segment 4; c, neuroseta from middle tier segment 4; d, neuroseta from upper tier segment 4; e, neuroseta from lower tier segment 15; f, neuroseta from middle tier segment 15; g, neuroseta from upper tier segment 15; h, neuroseta from lower tier segment 25; i, neuroseta from middle tier segment 25; j, neuroseta from upper tier segment 25; k, notoseta from middle segment; l, notoseta from middle segment.

(USNM 16849) was examined and clearly differs from *A. talpa*.

Other records of *A. talpa* from New Zealand by Ehlers, 1907; Benham, 1900; Augener, 1922 have not been verified by checking their material.

We have been unable to locate the type of *A. talpa* in the Museum D'Histoire Naturelle in Paris, and perhaps Fauvel did not return Quatrefages material after

examination. Unfortunately Quatrefages gives only New Zealand as the type locality which makes obtaining representative material from the type locality and the designation of a neotype impossible. However, Fauvel's (1925) description of *A. talpa* is sufficiently detailed to enable us to identify a large amount of material as belonging to this species. Only if material of *Aphrodita* from New Zealand and none was available, was found



**Fig.25.** *Aphrodita terraereginae*. Holotype (AM G11245): a, dorsal view of prostomium and first segment; b, parapodium from segment 15; c, first elytron; d, third elytron; e, eighth elytron; f, 14th elytron.

to be different to our Australian material of *A. talpa*, would we erect a new species to include the material which we have referred to as *A. talpa* Quatrefages.

*Aphrodita talpa* is characterised by the following suite of characters, smooth palps, smooth notosetae entangled in the felt, a short faintly iridescent lateral fringe, and neurosetae with slightly curved tips and a plumose edge (see Table 1). This combination of characters distinguishes it from all other species of *Aphrodita* described from the Indo-Pacific.

We have recorded *A. talpa* from a wide area of Australian waters.

**Habitat.** Trawled at depths of 19.8 to 161 m.

**Distribution.** Australia (Rottnest Island, WA, 32°00'S 115°30'E, to Cape York, Qld, 12°45.6'S 143°32.2'E, Fig.59C). Japan, Kushiro\* (Imajima, 1964); New Zealand (Quatrefages, 1866; Ehlers, 1907\*; Benham, 1900\*; Augener, 1922\*).

*Aphrodita terraereginae* Haswell

Figs 25a-f, 26a-f, 59A, Table 1

*Aphrodita terraereginae* Haswell, 1883: 271.

**Material examined.** QUEENSLAND: Cape Flinders, 14°08'S 144°14'E, 6 m (AM G11245), 2.5 cm long.

**Description.** Body elongate, oval, 2.5 cm long, 1.1 cm wide, 40 segments.

Dorsum cream coloured in alcohol, covered in thin, fine felt with thick pale yellow paleal-like notosetae. Short inconspicuous, cream coloured lateral fringe. Ventral surface coloured cream, smooth, minutely papillated.

Prostomium rounded, 1 pair large grey, slightly raised eyes. Median antenna small, rod shaped (style missing). Palps with basal palpophores extending to segment 7, with tapering ventral palps, margins finely papillated. Facial tubercle one-third length of prostomium, thin, covered with small rounded papillae (Fig.25a).

Elytra, 15 pairs, firmly attached to elythrochlores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra smooth, transparent, slightly iridescent, first pair ovoid with elythrochlore attached centrally; second pair rounded, with elythrochlores attached laterally, third pair rounded with elythrochlores attached anterolaterally. Following elytra up to segment 19 rounded with elythrochlores attached laterally, remaining elytra oval, becoming more elongated towards caudal region with elythrochlores attached anterolaterally. All elytra with a few sub-marginal micropapillae (Fig.25c-f).

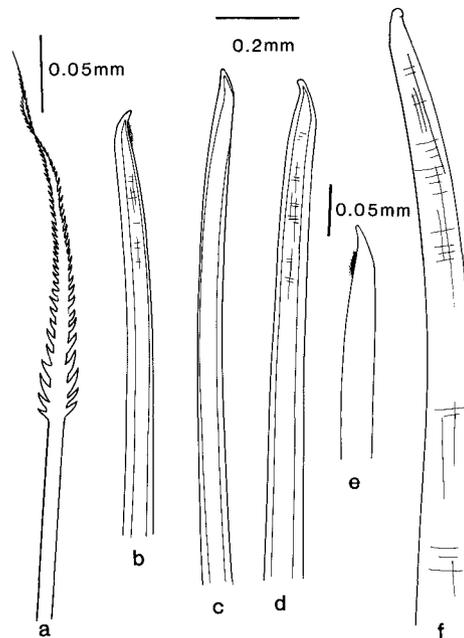
First or tentacular segment with elongated uniramous parapodia, projecting anteriorly and laterally to prostomium. Two pairs of tentacular cirri on anterior end of parapodia, with cylindrical tentaculophores, styles tapering with clavate tips, dorsal and ventral tentacular

cirri subequal, one-third length of palps. Tuft of fine capillary setae radiating around distal tip of parapodia, also small tuft of ventral setae.

Following segments with biramous parapodia (Fig.25b). Second and third neuropodia with 2 tiers of neurosetae: upper tier with 2-3 neurosetae (all broken), lower tier with tuft of many, golden yellow, bipinnate neurosetae (Fig.26a). Ventral cirri slender, clavate-tipped, 2 times length of neuropodia.

Remaining neuropodia cylindrical with 3 tiers of golden brown neurosetae with slightly curved tips; upper tier with 2 thicker, darker neurosetae (Fig.26d), middle tier with 3-4 neurosetae (Fig.26c), lower tier with 3-4 neurosetae (setae damaged). Some neurosetae of anterior segments with slightly curved tips and some fine hairs on curved margin (Fig.26d,e). Ventral cirri slender, clavate-tipped, extending just beyond distal margins of neuropodia. Notopodia with tuft of faintly iridescent, capillary notosetae covered in cream, calcareous mud on ventral surface forming short lateral fringe. Dorsal surface of notopodia with fan of 7 or more large, thick, smooth, pale yellow notosetae with most tips broken, covering entire dorsum, some posterior notosetae entire, with rounded tips (Fig.26f). Dorsal cirri clavate-tipped, one-third length of large notosetae.

**Remarks.** The species is known only from a single individual, and most of the notosetae are broken. Day & Hutchings (1979) indicated that the type was lost, however in the AM collection we discovered this single specimen labelled as the holotype of *A. terraereginae*,



**Fig.26.** *Aphrodita terraereginae*. Holotype (AM G11245): a, bipinnate neuroseta from segment 3; b, neuroseta from upper tier segment 4; c, neuroseta from middle tier segment 15; d, neuroseta from upper tier segment 15; e, neuroseta from middle tier segment 25; f, tip of notoseta from posterior segment.

collected from the same locality and of a similar size to the individual described by Haswell. This specimen was registered in 1908, by McCulloch who was the Invertebrate curator at the Australian Museum at this time. It appears that Haswell who was Professor of Zoology at Sydney University did not designate a holotype and that McCulloch subsequently designated this specimen as the holotype. While it seems likely that it is the holotype of *A. terraereginae*, we cannot categorically state that it was the specimen examined by Haswell although it agrees with Haswell's description.

*Aphrodita terraereginae* is characterised by long, finely papillated palps, a small rod-shaped antenna, thick paleal-like smooth pale yellow notosetae, short faintly iridescent lateral fringe and neurosetae with slightly curved tips (see Table 1). This suite of characters clearly distinguishes it from all the other species of *Aphrodita* described from the Indo-Pacific.

**Habitat.** No habitat information available, found at a depth of 6 m.

**Distribution.** Australia (Cape Flinders, Qld, 14°08'S 144°14'E, Fig.59A).

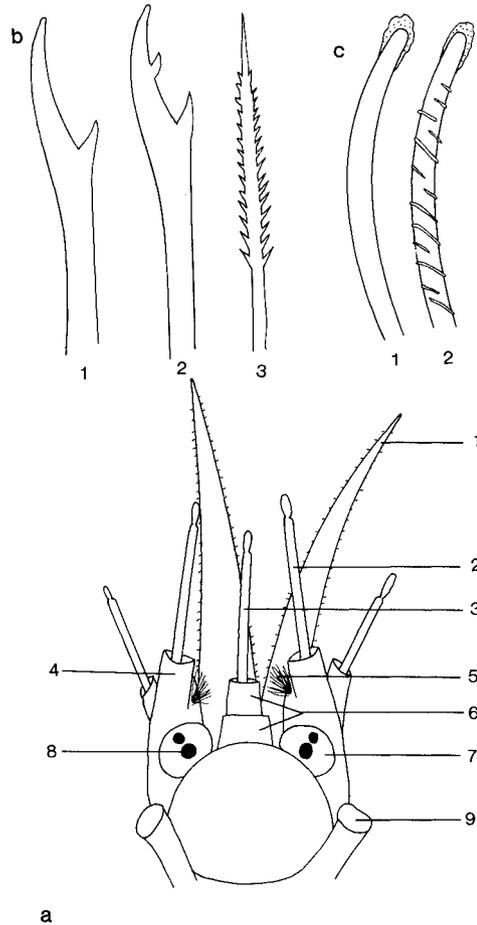
*Aphrogenia* Kinberg

*Aphrogenia* Kinberg, 1856: 382.–Pettibone, 1966: 98.

**Diagnosis.** Aphroditids without well-developed dorsal felt covering elytra. Elytra 13-15 pairs, with scattered papillae. Prostomium with globular ocular lobes. Facial tubercle present. Notosetae all smooth, of 2 kinds: stout, smooth sabre-like, long, curved over dorsum and fine capillary setae. Neurosetae, dark, stout with basal spur. Neurosetae of anterior few segments with extra teeth, some bipinnate.

**Type species.** *Aphrogenia alba* Kinberg, 1856, by monotypy.

**Remarks.** The above definition of the genus is based upon Pettibone (1966), but we have expanded the definition to include the presence of globular ocular lobes, and a variable number of elytra. A generalised figure of *Aphrogenia* is given in Figure 27 together with the types of setae present.



**Fig.27.** Generalised *Aphrogenia*. a: dorsal view of prostomium and first segment – 1, papillated palp; 2, tentacular cirrus; 3, median antenna; 4, tentaculophore; 5, setae; 6, 2-jointed ceratophore; 7, ommatophore; 8, eye; 9, elytraphore. b: neurosetal types – 1, bidentate; 2, bidentate with 1 extra tooth; 3, bipinnate. c: notosetal types – 1, sabre notoseta, smooth; 2, sabre notoseta, ridged.

**Key to the Indo-Pacific Species of *Aphrogenia***

- 1. Sabre-like notosetae smooth (Fig.29e-g) ..... 2
- Sabre-like notosetae with ridges (Fig.31c) ..... *Aphrogenia villosa*
- 2. Elytrigerous notopodia with fan of about 9 sabre-like notosetae (Fig.29e-g) ..... *Aphrogenia margaritacea*
- Elytrigerous notopodia with fan of 2-3 sabre-like notosetae, cirrigerous notopodia with black spot anteriorly ..... *Aphrogenia nigropunctata*

*Aphrogenia margaritacea* Augener

Figs 28a-f, 29a-g, 59D, Table 5

*Aphrogenia margaritacea* Augener, 1913: 93-96, fig.3, pl.II figs 1,2.

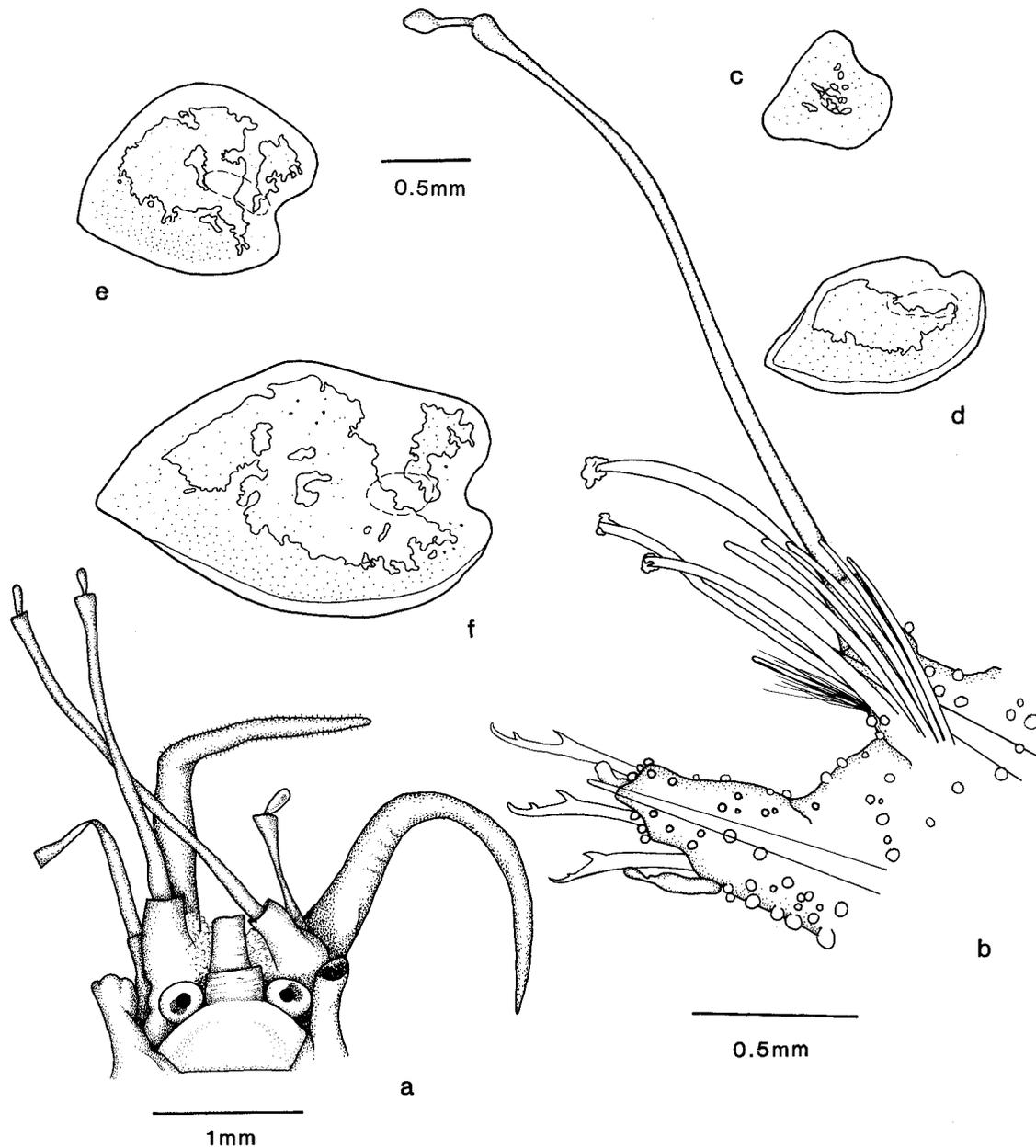
**Material examined.** WESTERN AUSTRALIA: Arthur Head, 32°03'S 115°44'E, 25 Dec. 1983, 6 m (AM W20228); Dunsborough, 33°36'S 115°06'E, 27 Dec. 1971, 16.5 m (AM W201443), 1 cm long. VICTORIA: Cribb Point, 38°21'S 145°13'E (NMV F57198), 1 cm long; Bass Strait, 39°28'S 148°48'E, 21 Nov. 1981, 84 m (NMV F57083), 1.5 cm long.

**Description.** Body oval, 0.4-1.5 cm long, 0.2-0.5 cm wide, 22-32 segments.

Dorsum yellow coloured in alcohol, elytra with pearl-like shine. Ventral surface cream coloured, covered with many rounded papillae.

Prostomium rounded with 2 large ocular lobes one-third length of prostomium, each with 2 pairs of black eyes. Median antenna with ceratophore 2-jointed just longer than prostomium; style longer than palps, 2-jointed with clavate process at tip. Facial tubercle, small, located below ceratophore visible only ventrally, covered with cylindrical papillae. Palps extending to segment 5, tapering with papillated margins (Fig.28a).

Elytra, 15 pairs, attached by elythrochlores on segments



**Fig.28.** *Aphrogenia margaritacea* (NMV F57083): a, dorsal view of prostomium ( median antenna missing) and first segment; b, posterior view of parapodium 16; c, (AM W201443) first elytron; d, third elytron; e, eighth elytron; f, 14th elytron.

2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra thin, transparent, opalescent, covered in scattered microtubercles, some with dark brown patches, first pair small, triangular with rounded edges, following elytra large, leaf-shaped with elytriphores attached laterally. All elytra covered with scattered micropapillae (Fig.28c-f).

First or tentacular segment with elongated, uniramous parapodia, projecting anteriorly to prostomium, above palps; with aciculae and large terminal asymmetrical lobe on anterior, inner edge, covered with many cylindrical papillae; short tuft of capillary setae emerging radially from distal margins of lobe, and 2 pairs of clavate-tipped cirri with large cylindrical tentaculophores, dorsal pair as long as palps, ventral pair three-quarters length of dorsal pair (Fig.28a).

Parapodia of segment 2 biramous, neuropodia cylindrical, covered with large, rounded papillae, 2 yellow bidentate neurosetae on outer end of neuropodia, between these neurosetae emerging small curved appendage, lower tuft of many (20+), yellow, bipinnate (Fig.29a) neurosetae. Ventral cirri with clavate tips emerging at base of neuropodia, extending to tuft of bipinnate neurosetae. Notopodia with tuft of fine, pale yellow notosetae emerging from, rounded, distal end.

Third segment similar to second except ventral cirri emerging just below bipinnate setae, and notopodia with sabre-like notosetae.

Following segments with biramous parapodia (Fig.28b). Neuropodia cylindrical, covered in large globular papillae, with 3-4 golden yellow neurosetae with slightly hooked tips, with basal spur and with or without distal tooth on curved margin (Fig.29b-d). Anterior and posterior neurosetae thinner, elongate. Ventral cirri, with clavate tips, emerging just below ventral setae and

extending below distal margins of neuropodia.

Elytrigerous notopodia with fan of 9 or more, pale yellow, flattened, smooth, sabre-like notosetae with rounded mud-covered tips, arching over entire dorsum (Fig.29e-g); lower surface of notopodia with small tuft of fine, mud-covered, capillary notosetae.

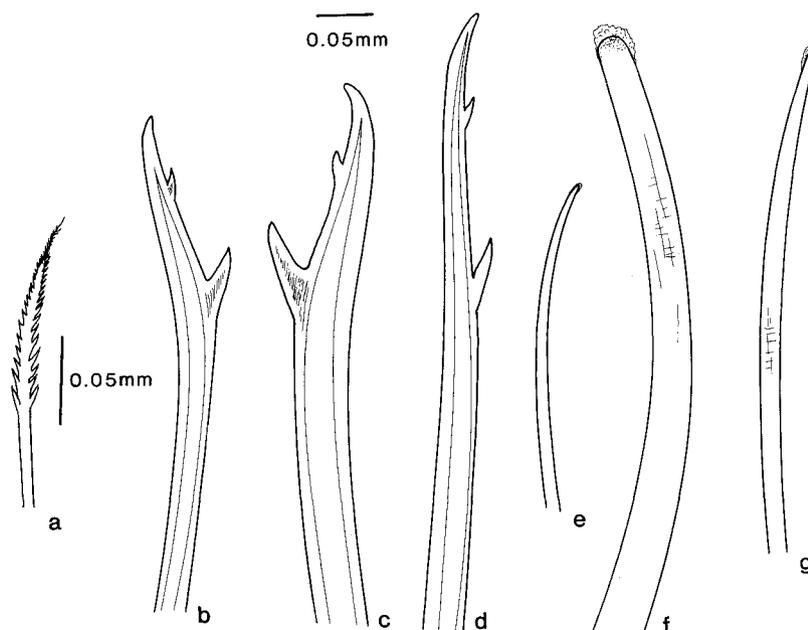
Cirrigerous notopodia with cylindrical cirrophores on distal ends of notopodia with styles of dorsal cirri with clavate tips varying in length from one-half to one and one-half times length of sabre notosetae. Dorsal surface of notopodia with fan of about 9 thin, pale sabre notosetae arching over neuropodia; notosetae shorter than sabre notosetae of elytrigerous notopodia. Lower surface of notopodia with tuft of fine, mud-covered capillary notosetae.

**Variation.** Eye pigment missing from some specimens. One specimen with bright red opalescent elytra, and ventral side pale pink in alcohol.

**Remarks.** This expands the geographical distribution of the species which was previously known only from the type locality of Western Australia. This species which is characterised by the number of sabre-like notosetae in the fan-like arrangement on elytrigerous segments, which clearly distinguishes it from other Indo-Pacific species (Table 5).

**Habitat.** Found on limestone, and coral reefs, in shelly sand, one specimen found with spirorbid polychaetes attached to dorsum. Found in depths of 6-84 m.

**Distribution.** Australia (Arthur Head, WA, 32°03'S 115°44'E to Cribb Point, Vic., 38°21'S 145°13'E, Fig.59D).



**Fig.29.** *Aphrogenia margaritacea* (AM W 201443): a, bipinnate neuroseta from segment 3; b, upper neuroseta from segment 3; c, neuroseta from segment 16; d, neuroseta from segment 25; e, notoseta from segment 4; f, notoseta from segment 16; g, notoseta from segment 25.

*Aphrogenia nigropunctata* Horst

Figs 30a,b, 60, Table 5

*Aphrogenia nigropunctata* Horst, 1916b: 77.—Horst, 1917: 64, pl.XIV fig.13.—Monro, 1924: 66-67.

*Aphrogenia villosa* var. *laevis* Horst, 1916b: 77.—Horst, 1917: 64.

**Type material examined.** HOLOTYPE: Indonesian Archipelago Stn 37: Paternoster Islands: Sailus Ketjil, 7°35'S 117°27'E, 27 m (ZMA V.Pol 78), 0.8 cm long, 0.55 cm wide, 29 segments. COTYPE: Indonesian Archipelago Stn 315: Paternoster Islands: Sailus Besar, 7°31'S 117°26'E, 36 m (ZMA V.Pol 2758), 0.5 cm long, 0.45 cm wide, 26 segments.

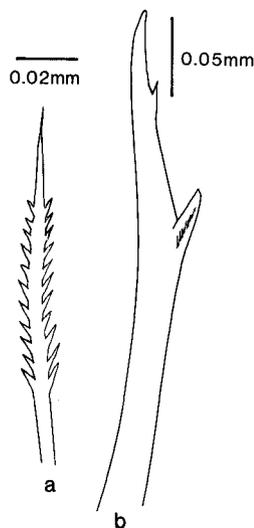
HOLOTYPE of *Aphrogenia villosa* var. *laevis* Indonesian Archipelago Stn 285: south coast of Timor, 8°39.1'S 127°4.4'E, 34 m (ZMA V.Pol 76), 0.9 cm long, 0.6 cm wide, 29 segments.

**Description.** Body oval, 0.5-0.9 cm long, 0.45-0.6 cm wide, 26-29 segments.

Dorsum creamy yellow in alcohol, elytra slightly opalescent. Ventral surface cream coloured, covered in rounded papillae.

Prostomium rounded with 2 large ocular lobes half length of prostomium, eye pigment absent. Median antenna with ceratophore 2-jointed three-quarters length of prostomium; style clavate-tipped, 5 times length of prostomium. Facial tubercle, small, located below ceratophore visible only ventrally, covered with cylindrical papillae. Palps extending to segment 7-8, tapering with finely papillated margins.

Elytra 14 pairs, attached by elytraphores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25 and 28. Elytra slightly opalescent with a mottled



**Fig.30.** *Aphrogenia nigropunctata* (ZMA V.Pol 78): a, bipinnate neuroseta from segment 3; b, neuroseta from middle segment.

cream, yellow and brown pattern, first pair small, triangular with rounded edges with elytraphore attached centrally, following elytra large, leaf-shaped with elytraphores attached centrally, last pair small, oval with elytraphore attached laterally. All elytra covered in scattered micropapillae.

First or tentacular segment with elongated, uniramous parapodia, projecting anteriorly to prostomium, above palps; with aciculae and large terminal asymmetrical lobe on anterior, inner edge, covered with many cylindrical papillae; short tuft of capillary setae on dorsal surface, and tuft on medial edge fanning posteriorly, and 2 pairs of clavate-tipped cirri with large cylindrical tentaculophores, dorsal pair half length of median antenna, ventral pair one-third length of dorsal pair.

Parapodia of segment 2 and 3 biramous, neuropodia cylindrical, covered with large, rounded papillae with 2 tiers of neurosetae. Lower tier with many (20+) pale yellow, bipinnate neurosetae (Fig.30a), upper tier with 1-3 golden yellow bidentate neurosetae some with 1-2 extra teeth (Fig.30b).

Following segments with biramous parapodia. Neuropodia cylindrical, covered in large globular papillae, with 3-4 golden yellow neurosetae with slightly hooked tips and basal spur. Ventral cirri clavate-tipped not extending to distal margins of neuropodia.

Elytrigerous notopodia with tuft of 2-3 golden yellow, flattened, smooth, sabre-like notosetae with rounded mud-covered tips, fanning across dorsum; lower surface of notopodia with small tuft of fine, mud-covered, capillary notosetae.

Cirrigerous notopodia with cylindrical cirrophores on posterior edge of notopodia, styles with clavate tips longer than sabre notosetae; anterior to cirrophores a dark brown to black spot. Lateral edge of notopodia with fan of about 6 pale sabre notosetae pointing laterally; notosetae shorter than sabre notosetae of elytrigerous notopodia. Lower surface of notopodia with tuft of fine, mud-covered capillary notosetae.

**Remarks.** The holotype of *A. nigropunctata* was a gravid individual indicating mature size. Examination of the type material of *A. nigropunctata* and *A. villosa* var. *laevis*, revealed that this species and this variety of *A. villosa* were identical and we have therefore synonymised them.

*Aphrogenia nigropunctata* is characterised by only two to three sabre-like notosetae forming a fan on elytrigerous segments and can clearly be distinguished from other Indo-Pacific species (Table 5).

This species is known only from the original description.

**Habitat.** Trawled at depths of 27-34 m.

**Distribution.** Paternoster Islands, Indonesian Archipelago (Fig.60).

*Aphrogenia villosa* Horst

Figs 31a-c, 60, Table 5

*Aphrogenia villosa* Horst, 1916b: 76-77.—Horst, 1917: 63, pl.XIV figs 10-12.

**Type material examined.** HOLOTYPE: Indonesian Archipelago Stn 273: Aru Islands: east of Pulu Jedan, 5°23'S 134°41'E, 13 m (ZMA V.Pol 334), 1.3 cm long, 0.87 cm wide, 32 segments.

**Description.** Body oval, 1.3 cm long, 0.87 cm wide. 32 segments.

Dorsum with elytra tan orange in alcohol, with pale yellow notosetae fanning across them. Ventral surface tan coloured covered in spherical papillae.

Prostomium rounded with 2 ocular lobes half length of prostomium, each with pair of dark grey eyes. Median antenna with ceratophore one-third length of prostomium; style with clavate process at tip, 6 times length of prostomium. Palps extending to segment 8, tapering with papillated margins. Facial tubercle small, situated below ceratophore therefore visible only ventrally, covered in rounded papillae.

Elytra 14 pairs, attached by elytraphores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25 and 28. Elytra slightly opalescent, first pair missing, remaining elytra large, leaf-shaped with some scattered micropapillae with elytraphores attached laterally (Horst, 1917: pl.XIV fig.10).

First or tentacular segment with elongated, uniramous parapodia, projecting anteriorly to prostomium, with aciculae and large terminal asymmetrical lobe on anterior, inner edge; short tuft of capillary setae emerging

radially from inner distal and ventral margins of lobe. Two pairs of clavate-tipped cirri with large cylindrical, papillated tentaculophores, dorsal pair two-thirds length median antenna, ventral pair two-thirds length of dorsal pair.

Parapodia of segment 2 and 3 biramous, neuropodia cylindrical with some (20+) bipinnate neurosetae present (Fig.31a).

Following segments with biramous parapodia. Neuropodia cylindrical, with papillated appendix on distal tip (Fig.31b), covered in large rounded papillae, with 3 golden brown neurosetae with slightly hooked tips, with basal spur (Horst, 1917: pl.XIV fig.12). Ventral cirri, with clavate tips, emerging just below distal margins of neuropodia.

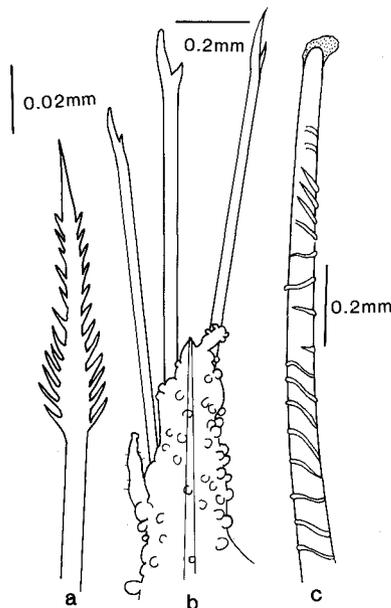
Elytrigerous notopodia with fan of about 6 pale yellow, flattened, ridged, sabre-like notosetae with rounded mud-covered tips (Horst, 1917: pl.XIV fig.11) (Fig.31c), arching over dorsum, meeting mid-dorsally.

Cirrigerous notopodia with cylindrical, papillated cirrophores on posterior edge of notopodia with styles of dorsal cirri with clavate tips about half length of sabre notosetae. Dorsal surface of notopodia with fan of about 10 thin, pale sabre notosetae fanning laterally; notosetae half length of sabre notosetae of elytrigerous notopodia. Lower surface of notopodia with tuft of short, fine, mud-covered capillary notosetae.

**Remarks.** This species which is known only from the holotype is characterised by the development of ridges on the sabre-like notosetae and this character clearly distinguishes it from other Indo-Pacific species (Table 5).

**Habitat.** Trawled at a depth of 13 m.

**Distribution.** Aru Islands, Indonesian Archipelago (Fig.60).



**Fig.31.** *Aphrogenia villosa* (ZMA V.Pol 334): a, bipinnate neuroseta from segment 3; b, neuropodia from middle segment; c, notoseta from middle segment.

*Laetmonice* Kinberg, 1856

*Hermione* Blainville, 1828: 457. Preoccupied, see Pettibone, 1966 for details.

*Laetmonice* Kinberg, 1856: 7.

*Laetmatonice* Kinberg, 1856: 7.

*Letmonicella* Roule, 1898: 191-192.

*Halogenia* Horst, 1916a: 63-64.—Buzhinskaja, 1982: 30.

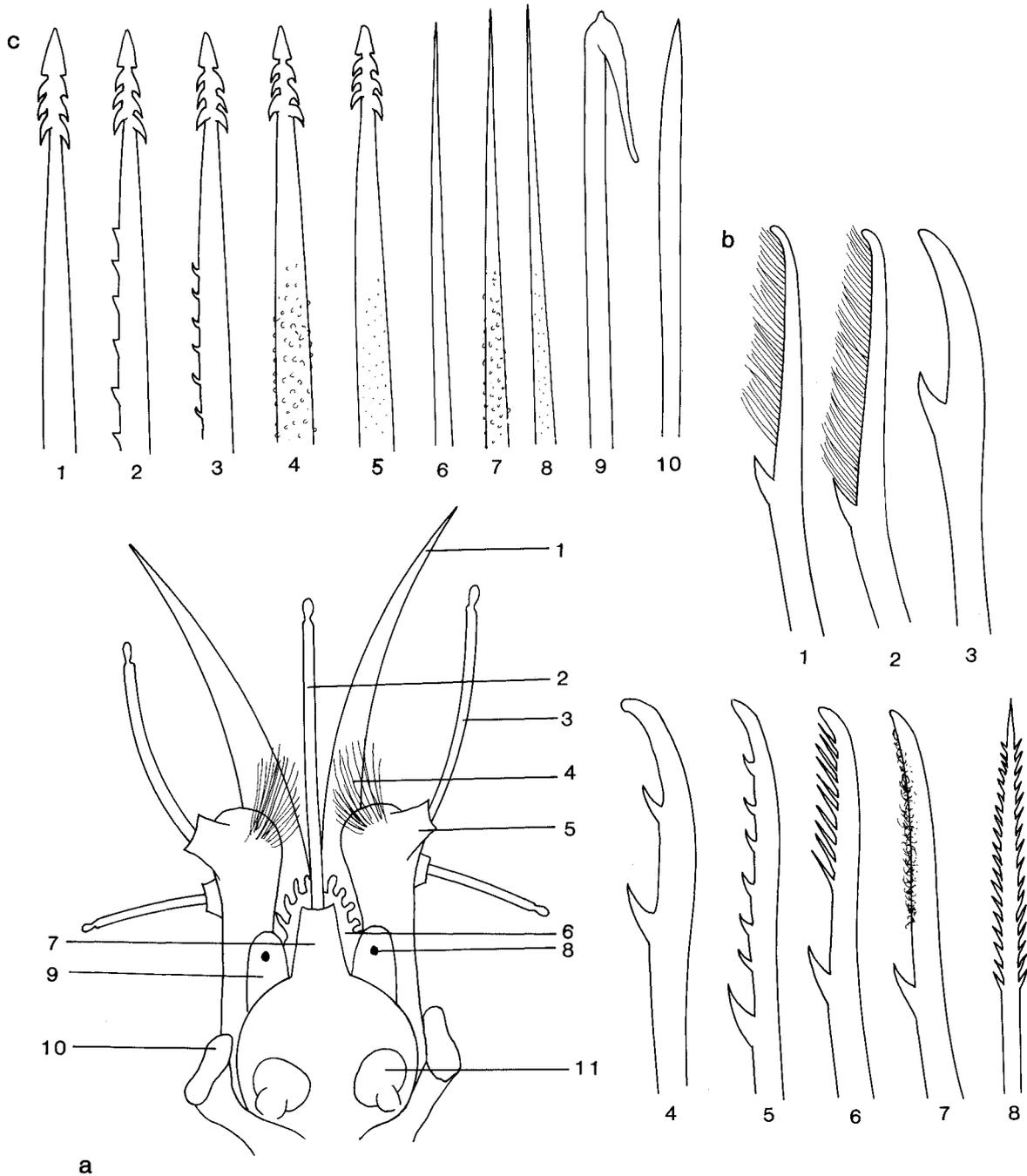
*Hermonia* Neave, 1939: 625.—Hartman, 1959: 56. New name for *Hermione* Blainville, pre-occupied.—Day, 1967: 31-32.

**Diagnosis.** Aphroditids with dorsal feltage poorly developed, not completely covering elytra. Elytra up to 20 pairs, smooth. Prostomium with short ocular peduncles. Facial tubercle well developed, papillated. Notosetae of 3 kinds: acicular, smooth or granular, arched over dorsum; stout, long, with tips in form of barbed arrow (harpoon setae); short or long capillary setae, sometimes forming poorly developed dorsal feltage. Neurosetae dark, stout with slightly curved tips, with lateral spur, some with accessory denticles under

rostrum or with unilateral fringe of long stiff filaments. Some bipinnate neurosetae on few anterior segments.

**Type species.** *Laetmonice filicornis* Kinberg, 1856, by monotypy.

**Remarks.** We have followed the generic diagnosis given by Pettibone, (1966) and the synonymies which she suggested. The name *Hermione* Blainville, 1828 is preoccupied as pointed out by Claparède, 1868 as the name has been used by Meigen (1800) in Diptera, *vide*



**Fig.32.** Generalised *Laetmonice*. a: dorsal view of prostomium and first segment – 1, palp; 2, median antenna; 3, tentacular cirrus; 4, setae; 5, tentaculophore; 6, facial tubercle; 7, ceratophore; 8, eye; 9, ommatophore; 10, elytophore; 11, nuchal flap. b: neurosetal types – 1, basal spur with gap to distal fringe of hairs; 2, basal spur without gap to distal fringe of hairs; 3, bidentate; 4, bidentate with 1 extra tooth; 5, basal spur with many extra teeth; 6, basal spur and distal short thick hairs; 7, basal spur with plumose edge; 8, bipinnate. c: notosetal types – 1, harpoon, shaft smooth; 2, harpoon, shaft with series of thorns; 3, harpoon, shaft with acute tubercles; 4, harpoon, shaft tuberculated; 5, harpoon, shaft finely tuberculated; 6, acicular, smooth; 7, acicular, tuberculated; 8, acicular, finely tuberculated; 9, hooked; 10, developing harpoon.

Neave, 1939. Neave (1939) suggested the use of the name *Hermonia*. Buzhinskaja (1982) used the name *Halogenia*, and has therefore not accepted Pettibone's (1966) recommendations and Day (1967) continued to use the name *Hermonia* as proposed by Hartman (1959). For these reasons a synopsis is given below of the discussion given by Pettibone (1966) for the use of the name *Laetmonice*. Not only was the name *Hermione* preoccupied but there are problems with the identity of the material identified by Blainville, 1828.

Claparède (1868) suggested that the descriptions and figures of Blainville (1828) should perhaps be referred to *Pontogenia chrysocoma* (Baird, 1865) and that the preoccupied name of *Hermione* Blainville be abandoned and replaced by that of *Laetmonice* Kinberg 1856. This was not generally adopted and Hartman (1959) proposed a new name of *Hermonia* to replace the preoccupied name of *Hermione* following Neave (1939). However this did not take into account the confused identity of Blainville's type species. As no type material is available, the true identity of Blainville's species cannot be established. Pettibone (1966) quotes the work of Claparède (1868) who suggests that the species described under the name *Hermione hystrix* by Blainville was not the same as *Halithea hystrix* Savigny, in Lamarck, 1818 the type species of the genus *Hermione*. Pettibone (1966) formalised the suggestions made by Claparède (1868) that the confused name of *Hermione* Blainville be abandoned and replaced by that of *Laetmonice* Kinberg since they appeared to be generically synonymous.

The main difference between species assigned to the genus *Hermione* and *Laetmonice* according to Pettibone (1966) is the structure of the neurosetae, hooked but without a fringe of hairs in the former genus and hooked but with a fringe of hairs in the latter genus. Pettibone (1966) suggests that these are specific differences and not generic differences and we concur with her interpretation, and have therefore followed Pettibone's recommendations that species of *Hermione* Blainville, 1828 should be referred to the genus *Laetmonice* Kinberg, 1856. We believe that the following characters are important at the species level, number of segments, number of pairs of elytra, prostomial structure, presence or absence of eyes, length of ocular peduncles, palps and median antenna, type of neurosetae, and harpoon notosetae and these are discussed in detail in the Introduction of this paper.

Hartman (1956, 1965) and Hutchings (personal records) list 21 valid species of *Laetmonice* of which 16 are Indo-Pacific species. We have summarised all these characters for Indo-Pacific species where possible in Table 6. As with the genus *Aphrodita* many of the early descriptions are brief and not all these characters are discussed although in some cases they can be inferred from the figures given. In Figure 32 we provide a labelled stylised *Laetmonice* and setal types to indicate the various structures described in the text. Some harpoon notosetae from anterior segments are smooth and not exhibiting the recurved fangs, such as in *L. producta* and *L. malayana*.

#### Key to the Indo-Pacific Species of *Laetmonice*

1. Hooked type notosetae present (Figs 33f,37c).....2
  - Hooked type notosetae absent .....3
2. Neurosetae with basal spur and distal short thick hairs (Fig.33c).....*Laetmonice arenifera*
  - Neurosetae with basal spur and 2-3 extra teeth (Fig.37b).....*Laetmonice conchifera*
3. Neurosetae with basal spur and fringe of distal hairs (Fig.46c,d); or fringe reduced to short pinnae or plumose edge (Fig.36d) .....4
  - Neurosetae with basal spur and with one or more distal teeth (Figs 44b, 47b) .....10
4. Neurosetae with basal spur and distal fringe of long hairs (Fig.46c,d).....5
  - Neurosetae with basal spur and distal plumose edge (Fig.36c,d); small appendix on distal margin of neuropodia (Fig.35b).....*Laetmonice brachyceras*
5. 18 or more pairs of elytra.....*Laetmonice producta*
  - Up to 15 pairs of elytra .....6

6. Prostomium with pair of purse-like nuchal flaps on posterior edge of prostomium (Fig.49a).....*Laetmonice wonda* n.sp.  
 — Prostomium without purse-like nuchal flaps.....7
7. Neurosetae without gap between basal spur and distal fringe (Fig.48c).....*Laetmonice viridescens*  
 — Neurosetae with gap between basal spur and distal fringe (Fig.40b,c).....8
8. Harpoon notosetae with shafts beset with a series of thorns (Fig.40g,i).....*Laetmonice malayana*  
 — Harpoon notosetae with shafts smooth or beset with acute tubercles.....9
9. Harpoon notosetae with shafts smooth (Fig.51g).....*Laetmonice yarramba* n.sp.  
 — Harpoon notosetae with shafts beset with acute tubercles (Fig.34c).....*Laetmonice batheia*
10. Neurosetae with basal spur and 1-3 distal teeth (Fig.44b); palps papillated.....11  
 — Neurosetae with basal spur and 3-5 distal teeth (Fig.47b); palps smooth.....*Laetmonice rugosa*
11. Harpoon notosetae and notosetal spines with shafts finely tuberculated (Fig.44c).....*Laetmonice parva*  
 — Harpoon notosetae and notosetal spines with shafts smooth.....12
12. Elytra completely covered by notosetae; harpoon notosetae directed dorsally.....*Laetmonice moluccana*  
 — Elytra not completely covered by notosetae; harpoon notosetae directed posteriorly.....*Laetmonice dolichoceras*

***Laetmonice arenifera* (Horst)**

Figs 33a-g, 60, Table 6

*Halogenia arenifera* Horst, 1916a: 63, fig.1.—Horst, 1917: 60, pl.XII figs 17-19.

*Laetmonice arenifera* Pettibone, 1966: 97.

**Type material examined.** HOLOTYPE: Indonesian Archipelago Stn 49A: East Sapeh Strait, 8°23.5'S 119°4.6'E, 69 m (ZMA V.Pol 343), 1.3 cm long, 1 cm wide, 31 segments.

**Description.** Body elongate, oval, 1.3 cm long, 1 cm wide. 31 segments.

Dorsum tan coloured in alcohol, with long golden brown notosetae on lateral edge, without felt covering elytra. Ventral surface tan coloured, covered thickly with spherical papillae.

Prostomium rounded with 2 ocular peduncles, one-

third length of prostomium, Horst (1917) states that a large black eye spot present, not visible now, probably faded in alcohol storage. Median antenna with short 2-jointed ceratophore, style missing. Palps long, tapering, finely papillated, extending to segment 10. Facial tubercle small situated below ceratophore therefore visible only ventrally, covered in cylindrical papillae.

Elytra 15 pairs, attached to elytophores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra thin, semi-transparent, fragile, first pair missing, following elytra larger, leaf-shaped, attached to elytophores laterally, posterior pairs small, oval, attached to elytophore anterolaterally.

First or tentacular segment with elongated uniramous parapodia, projecting anteriorly and laterally to prostomium, enlarged distally, forming rounded lobe, with tuft of short, mud-covered setae, emerging from medial and dorsal margins. Two pairs of tentacular cirri with cylindrical tentaculophores and styles long,

slender, clavate-tipped, dorsal pair 3 times length of prostomium, ventral pair three-quarters length of dorsal pair.

Following segments with biramous papapodia. Second, third and fourth neuropodia with 2 tiers of neurosetae. Lower tier consisting of numerous (20+) golden yellow, bipinnate neurosetae (Fig.33a); upper tier with 1-2 golden yellow neurosetae with basal spur short, thick hairs (Fig.33b).

Remaining neuropodia cylindrical, papillated. Neuropodia with 3 golden yellow neurosetae with basal spur and fringe of short, thick hairs (Horst, 1917: pl.XII fig.19) (Fig.33c). Ventral cirri long, tapering, arising in middle of neuropodia, not extending to distal tip of neuropodia.

Elytrigerous notopodia with tuft of short, pale yellow, unidentate notosetae, one-fifth length of harpoon notosetae also fine capillary notosetae entrapping many large sand grains. Lateral to this tuft bundle of about 10 harpoon notosetae, directed posterolaterally, with shafts smooth, tapering abruptly below tip with 2-3 recurved fangs on lateral margins, some tips covered with gelatinous sheaths (Horst, 1917: pl.XII fig.18) (Fig.33d,e). Harpoon notosetae intermingled with 20 or more thin, notosetae with pale shafts and brown hooked tips (Horst, 1917: pl.XII fig.17) (Fig.33f,g).

Cirrigerous notopodia with cylindrical cirrophore, dorsal cirri long, clavate tipped, one-third length of harpoon notosetae. Dorsal surface of notopodia with fan of pale yellow, unidentate notosetae and tuft of capillary

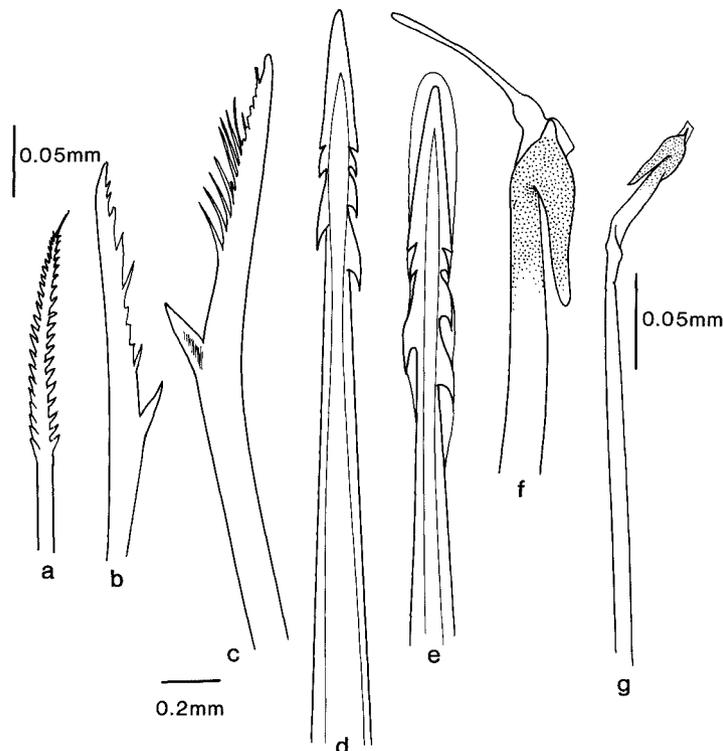
notosetae entrapping large sand grains.

**Remarks.** Pettibone (1966) synonymised *Halogenia* Horst (1916a) with *Laetmonice* Kinberg 1856, and Hartman (1959) had designated *Halogenia arenifera* Horst, 1916a as the type species of the genus. Horst described *H. arenifera* as belonging to a new genus because although it closely resembled *Laetmonice*, it differed in the shape of the notosetae. These notosetae we regard as just another type of notosetae, and this single character is insufficient to warrant the retention of the genus *Halogenia* and we agree with Pettibone's synonymy of this genus with *Laetmonice*. She states that Horst's publication date was 1915, whereas the publication is clearly dated 1916.

We have expanded Horst's original description to give details on the numbers of setae present. Horst (1917) states that there is a folded ridge at right and left hand side of the prostomium, and these are the elytriphores of segment 2. The species is known only from the holotype. This species can be separated from other described species of *Laetmonice* by the presence of hooked type notosetae and neurosetae with a basal spur and distal fringe of thick hairs which distinguishes it from other described species of *Laetmonice*, see Table 6.

**Habitat.** Trawled at 69 m.

**Distribution.** Indonesian Archipelago (Fig.60).



**Fig.33.** *Laetmonice arenifera* (ZMA V.Pol 343): a, bipinnate neuroseta from segment 3; b, upper neuroseta from segment 3; c, neuroseta from middle segment; d, harpoon notoseta from middle segment; e, tip of harpoon showing sheath; f, tip of hooked notoseta; g, hooked notoseta.

*Laetmonice batheia* Horst

Figs 34a-c, 60, Table 6

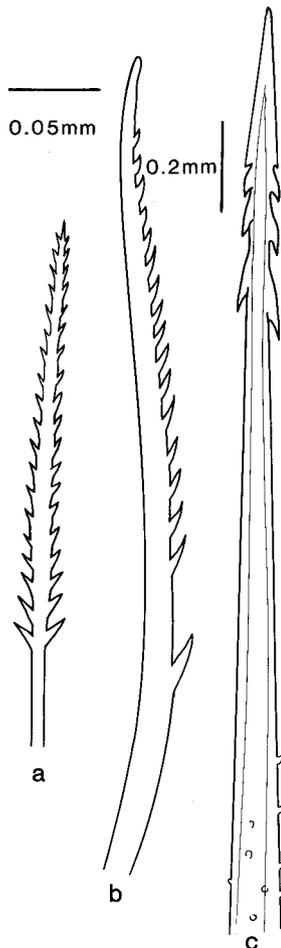
*Laetmonice batheia* Horst, 1916b: 75-76.—Horst, 1917: 58, pl.XIII figs 14,15.

**Type material examined.** LECTOTYPE: Indonesian Archipelago Stn 221: east-south-east of Binongka Island, 6°24'S 124°39'E, 2798 m (ZMA V.Pol 482), 2.6 cm long, 0.9 cm wide, 33 segments.

**Description.** Body elongate, oval, 1.9 cm long not including notosetae, 2.6 cm long including notosetae, 0.9 cm wide. 33 segments.

Dorsum cream coloured in alcohol. Horst (1917) states a mud-covered dorsal felt occurs, this was not observed on the lectotype probably due to the poor condition of the specimen. Ventral surface creamy yellow, covered with small spherical papillae.

Prostomium rounded with 2 ocular peduncles, without eye pigment, half length of prostomium. Median antenna with thick ceratophore, half length prostomium, style



**Fig.34.** *Laetmonice batheia* (ZMA V.Pol 482): a, bipinnate neuroseta from segment 2; b, upper neuroseta from segment 2; c, harpoon notoseta from middle segment.

missing. Palps long, tapering, finely papillated, extending to segment 14. Facial tubercle small, situated below median antenna, visible only ventrally, covered in small rounded papillae.

Elytra 14 pairs (Horst, 1917 states 12 pairs present), attached to elytophores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25 and 28. Elytra smooth, semi-transparent, first pair missing, following elytra rounded, attached to elytophores laterally, posterior elytra small, oval, attached to elytophore laterally.

First or tentacular segment with short uniramous parapodia equal to length of prostomium, projecting anteriorly and laterally to prostomium, enlarged distally, forming rounded lobe, with tuft of short capillary setae, emerging radially from medial to posterior margins. Two pairs of cylindrical tentaculophores, all tentacular cirri missing.

Following segments with biramous parapodia. Second, third and fourth neuropodia with 3 tiers of neurosetae. Lower tier consisting of numerous (20+) golden yellow, bipinnate neurosetae (Fig.34a); middle tier with 3-4 neurosetae with basal spur and 8-16 extra teeth; upper tier with 2 golden yellow neurosetae with basal spur and 8-16 extra teeth (Fig.34b).

Remaining neuropodia cylindrical, smooth, with 3 golden yellow neurosetae. Neurosetae with basal spur and gap to distal fringe (Horst, 1917: pl.XIII fig.15). Ventral cirri long, thin, arising from medial edge of ventral surface of neuropodia, extending below distal margins of neuropodia.

Elytrigerous notopodia with short tuft of 10 or more, fine, pale yellow, mud-covered notosetae, one-quarter length of harpoon notosetae, pointing posteriorly. Lateral to this tuft occurs tuft of 5, golden brown harpoon notosetae with darker tips. Harpoon notosetae extending past posterior edge of body, with shafts scattered with acute tubercles, tips with 3 recurved fangs on lateral margins (Fig.34c).

Cirrigerous notopodia with cylindrical cirrophores, with tuft of many short, pale yellow, mud-covered, unidentate notosetae pointing laterally.

**Remarks.** This species is only known from two individuals examined by Horst (1916b, 1917) of which only one was available for examination. We have considerably expanded the original description although the original felt appears to be lost, and the specimen examined is not in good condition.

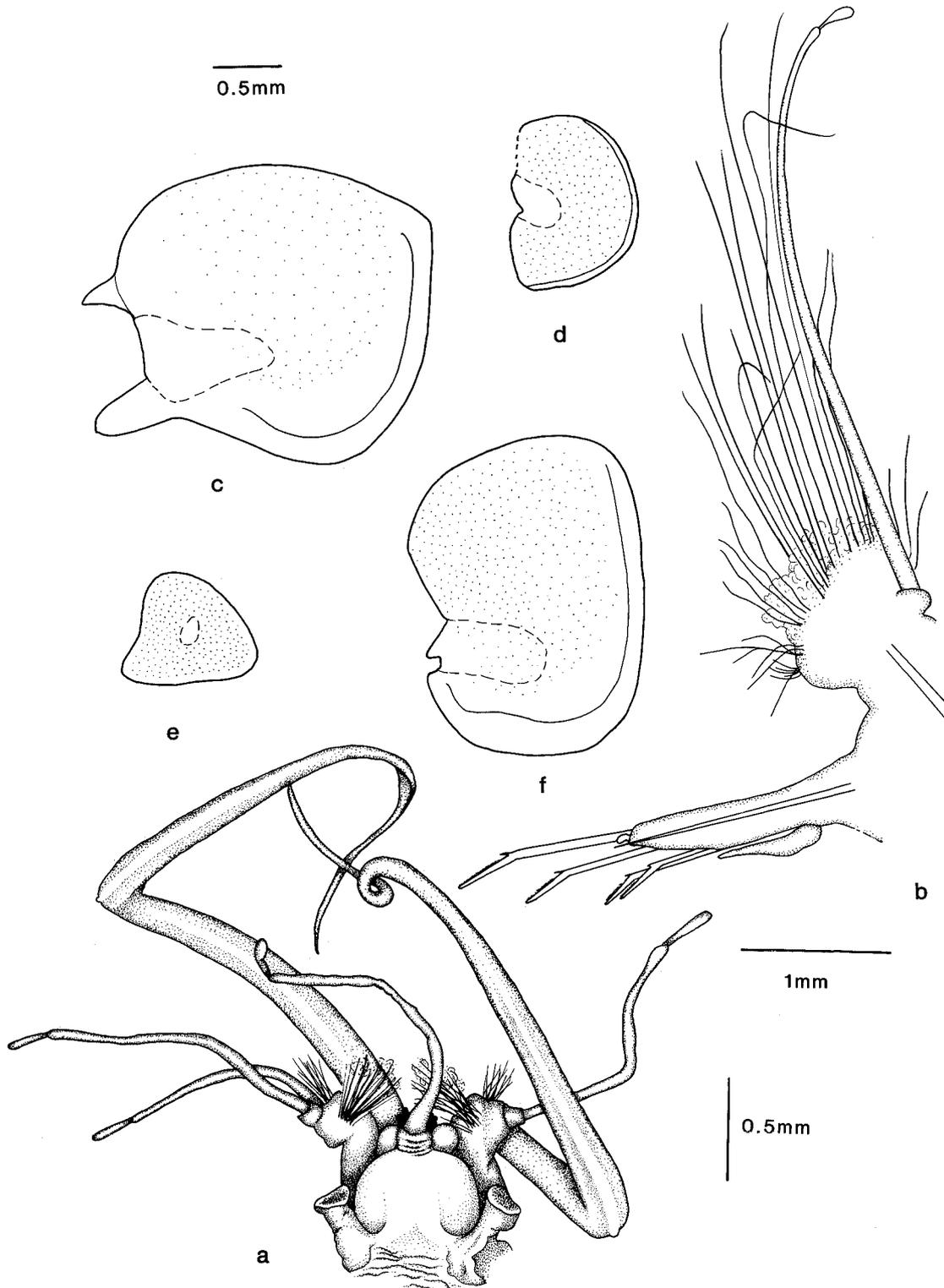
This species is characterised by harpoon shaped notosetae with shafts ornamented by tubercles, which distinguishes it from other species of *Laetmonice*, see Table 6.

**Habitat.** Trawled at 2798 m.

**Distribution.** Binongka Island, Indonesian Archipelago (Fig.60).

*Laetmonice brachyceras* (Haswell)

Figs 35a-f, 36a-j, 59F, 60, Table 6

*Hermonia brachyceras* Hartman, 1959: 56.*Laetmonice breve-pinnata* Horst, 1916b: 75.—Horst, 1917: 57-58, pl.XIII fig.13.—Monro, 1924: 65-66, figs 1,2.*Hermione brachyceras* Haswell, 1883: 272, pl.VII figs 1-3.**Type material examined.** HOLOTYPE: Australia: Queensland:

**Fig.35.** *Laetmonice brachyceras* (AM W20189): a, dorsal view of prostomium and first segment; b, posterior view of parapodium 16; c, (NTM W271) eighth elytron; d, third elytron; e, first elytron; f, 14th elytron.

Port Molle, 20°20'S 148°51'E, Sept. 1908 (AM G11241), 2.1 cm long.

**Additional material examined.** NORTHERN TERRITORY: Oxley Island, 11°00'S 138°48.5'E, 21 Oct. 1982, 15 m, 2(NTM W0272), 1.3-1.45 cm long; Oxley Island, 11°00'S 138°48.5'E, 21 Oct. 1982, 15 m, 3(NTM W271), 1.2-2.6 cm long. WESTERN AUSTRALIA: Port Hedland, 20°18'S 118°35'E, 24 Oct. 1983, 36-37 m (AM W20188), 0.8 cm long. QUEENSLAND: Bowen, 19°53'S 148°05'E, 11 June 1983, 15.5-17 m (AM W20187), 3 cm long; Bowen, 19°53'S 148°05'E, 19 June 1982, 5-6 m (AM W20189), 1.9 cm long.

HOLOTYPE, *Laetmonice breve-pinnata*, Indonesian Archipelago Stn 311: Sapeh Bay: East coast of Sumbawa, 8°30'S 117°25'E, 36 m (ZMA V.Pol 483), 2.7 cm long, 1.2 cm wide, 36 segments.

**Description.** Body cigar shaped, 0.8-3 cm long, 0.6-1.2 cm wide, 34-36 segments.

Dorsum cream coloured in alcohol, without felt covering elytra. Ventral surface creamy yellow, transparent, covered with minute spherical papillae.

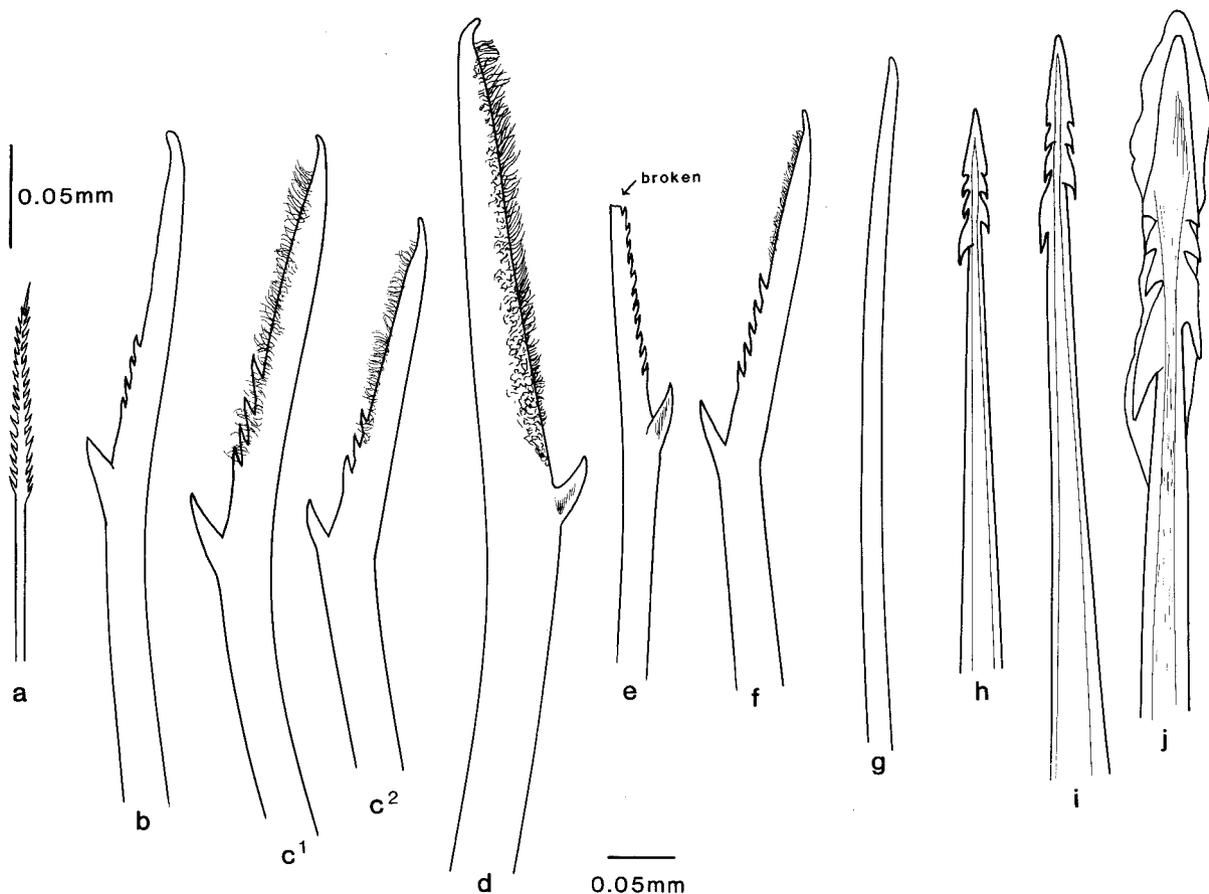
Prostomium rounded with 2 small ocular peduncles, without eye pigment, one-quarter length of prostomium. Median antenna with short ceratophore, style long, 2-

4 times length of prostomium, slender, tapering with clavate tip (missing on holotype, but scar visible). Palps long, tapering, smooth, extending to segment 9-11. Facial tubercle small, situated below median antenna, visible only ventrally, covered in small cylindrical papillae (Fig.35a).

Elytra 15 pairs, attached on elythrochore on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra thin, transparent, faintly iridescent, first pair small, triangular with rounded edges, with elythrochore attached centrally, following elytra large, oval to leaf-shaped, with elythrochore attached laterally, posterior elytra small, rectangular with rounded edges with elythrochore attached anterolaterally (Fig.35c-f).

First or tentacular segment with elongated uniramous parapodia, projecting anteriorly and laterally to prostomium, enlarged distally, forming rounded lobe, with tuft of short, yellow, mud-covered setae, emerging radially from distal margins. Two pairs of long slender, clavate-tipped tentacular cirri, dorsal pair one-quarter length of palps, ventral pair shorter than dorsal pair (Fig.35a).

Following segments with biramous parapodia (Fig.35b). Second, third and fourth neuropodia with 2 tiers of



**Fig.36.** *Laetmonice brachyceras* (NTM W271): a, bipinnate neuroseta from segment 3; b, neuroseta from segment 4; c<sup>1,2</sup>, neuroseta from middle segment; d, neuroseta from segment 16; e, neuroseta from segment 32; f, posterior neuroseta; g, acicular notoseta from segment 4; h, harpoon notoseta from segment 5; i, harpoon notoseta from segment 17; j, tip of harpoon showing sheath.

neurosetae. Lower tier consisting of numerous (30+) golden yellow, bipinnate neurosetae (Fig.36a); upper tier with 2-3 golden yellow neurosetae with long shaft, smooth or finely plumose with short pinnae, one-third below unidentate tip, with basal spurs and distal teeth. Ventral cirri swollen basally, with tapering tips, extending just past distal margins of neuropodia.

Remaining neuropodia cylindrical, smooth, with small curved appendix emerging from distal tip (Fig.35b). Neuropodia with 2-4 golden yellow neurosetae of varying types, anterior ones with basal spur and 4-7 distal teeth (Fig.36b), middle neurosetae with basal spur, pilose edge and 1-4 extra teeth (Fig.36c<sup>1,2</sup>,d), posterior neurosetae with basal spur and 5-11 distal teeth, sometimes with pilose edge (Fig.36e,f). Ventral cirri swollen basally with tapering tips, extending to just below distal margin of neuropodia.

Elytrigerous notopodia with dorsal fan of 6-8 fine, pale yellow, smooth notosetae (Fig.36g), and below tuft of 10 or more, dark brown, harpoon notosetae pointing posterolaterally, with shafts smooth, tapering abruptly below tip with 2-4 recurved fangs on lateral margins forming harpoon tips, many tips covered in transparent sheaths (Fig.36h-j). Lower surface of notopodia with tuft of short, fine, yellow notosetae.

Cirrigerous notopodia dorsal cirri with clavate tips as long as notosetae, with tuft of yellow, unidentate, mud-covered notosetae, harpoon notosetae lacking. Ventral surface of notopodia with short tuft of fine, yellow, unidentate notosetae.

**Remarks.** This species is the same as *Laetmonice breve-pinnata* Horst (1916b, 1917), which has also been reported by Monro (1924), based on the presence of similar neurosetae, the thick ventral cirri, and the small appendix on the tip of the neuropodia. This combination of characters has not been reported in any other described species of *Laetmonice* although *L. dolichoceras* (Haswell) has a small appendix on the tip of the neuropodia. For these reasons we have synonymised the two species. We have not examined Monro's (1924) material and for this reason we have marked the record in the distribution of the species with an asterisk.

The holotype of *H. brachyceras* is not in a good condition, with many setae broken, therefore the description is a composite one, based upon the holotype and other material examined.

**Habitat.** One specimen was found in sand, trawled at depths of 5-37 m.

**Distribution.** Australia (Port Hedland, WA, 20°18'S 118°35'E to Bowen, Qld, 19°53'S 148°05'E, Fig.59F). Soembawa, Indonesian Archipelago (Horst, 1916b) (Fig.60). Hong Kong\* (Monro, 1924).

### *Laetmonice conchifera* (Horst)

Figs 37a-c, 60, Table 6

*Halogenia conchifera* Horst, 1916a: 64, fig.2.—Horst, 1917: 60-61, pl.XII figs 20,21.

**Type material examined.** HOLOTYPE: Indonesian Archipelago Stn 334: west of Great Kei Island, 5°36'S 132°55.2'E, 90 m (ZMA V.Pol 344), 0.95 cm long, 0.7 cm wide, 28 segments.

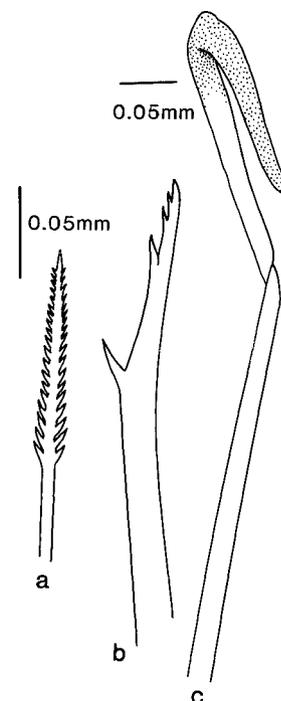
**Description.** Body ovate, 0.95 cm long, 0.7 cm wide, 28 segments.

Dorsum creamy yellow in alcohol, fine, sand encrusted felt covering elytra. Ventral surface cream coloured covered with small rounded papillae.

Prostomium rounded with 1 pair of small rounded ocular peduncles, one-third length of prostomium, eye pigment absent. Ceratophore of median antenna half length of prostomium, style slender, clavate-tipped, 5 times length of prostomium. Facial tubercle papillated, located below ceratophore visible only ventrally. Palps smooth, tapering, extending to segment 6.

Elytra 15 pairs, attached on elytriphores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra thin, transparent, first pair small, rounded, elytriphore attached centrally, following elytra large, leaf-shaped with elytriphore attached laterally, posterior pairs small, elongated with elytriphore attached anteriolaterally.

First or tentacular segment with uniramous parapodia,



**Fig.37.** *Laetmonice conchifera* (ZMA V.Pol 344):a, bipinnate neuroseta from segment 3; b, neuroseta from middle segment; c, hooked notoseta from middle segment.

projecting anteriorly and laterally to prostomium, enlarged distally, forming rounded lobe, with tuft of short, fine, mud-covered setae, emerging from medial to posterior margins. Two pairs cylindrical tentaculophores with style of dorsal tentacular cirri long, slender, clavate-tipped, one and one-quarter times length of prostomium, ventral tentacular cirri missing.

Following segments with biramous parapodia, second, third neuropodia with 2 tiers of neurosetae. Lower tier consisting of numerous (20+) golden yellow bipinnate neurosetae (Fig.37a); upper tier with 1-2 golden yellow neurosetae with basal spur and 4 extra teeth. Ventral cirri on segment 2 slender, tapering, arising at base of neuropodia, extending past distal margins of neuropodia. Ventral cirri on segment 3 arising in middle of neuropodia, extending past distal margins of neuropodia.

Remaining neuropodia cylindrical, elongate, papillated with 2-3 pale yellow neurosetae, with basal spur and 2-3 extra teeth (Horst, 1917: pl.XII fig.21) (Fig.37b). Ventral cirri slender, swollen basally, tapering to blunt tip, arising from middle of neuropodia, not extending to distal tip of neurosetae.

Elytrigerous notopodia with short tuft of fine capillary notosetae, entrapping mud and sand grains. Lateral to this tuft, a tuft of about 20 hooked notosetae on anterior lateral edge of notopodia, pointing laterally, stems pale yellow, smooth, hooked tips reddish brown (Horst, 1917: pl.XII fig.20) (Fig.37c). Harpoon notosetae absent.

Cirrigerous notopodia with cylindrical cirrophores, dorsal cirri clavate-tipped, 2 times length of hooked notosetae. Ventral side of notopodia with fan of pale yellow, mud-covered notosetae, directed laterally. Dorsal surface of notopodia with tuft of mud-covered notosetae.

**Remarks.** This species was originally described as *Halogenia conchifera*, and Pettibone (1966) synonymised the type species of *Halogenia*, *H. arenifera* Horst (1916a) with *Laetmonice*. *H. conchifera* is also a species of *Laetmonice* and we have transferred it to this genus as the type of notosetae present resemble those found in *L. arenifera*. For additional comments on the synonymising of the genus *Halogenia* with *Laetmonice*, see the Remarks section of *L. arenifera*. The species is known only from the holotype and we have considerably expanded the description of the species.

*Laetmonice conchifera* is characterised by the presence of hooked-shaped notosetae, absence of harpoon type notosetae and neurosetae with a basal spur and 2-3 distal teeth, and these characters distinguish it from other described species of *Laetmonice*, see Table 6.

**Habitat.** Trawled at a depth of 90 m.

**Distribution.** Indonesian Archipelago (Fig.60).

### *Laetmonice dolichoceras* (Haswell)

Figs 38a-f, 39a-k, 59E, Table 6

*Hermione (Aphrogenia) dolichoceras* Haswell, 1883: 273-274, pl.VII figs 4-7.

*Aphrogenia dolichoceras* Hartman, 1959: 54.—Day & Hutchings, 1979: 85.

**Type material examined.** HOLOTYPE: Australia: Queensland: Port Molle, 20°20'S 148°51'E, Sept. 1908, 27.4 m (AM G11285), 2.1 cm long.

**Additional material examined.** QUEENSLAND: Lizard Island, 14°40'S 145°28'E, 1978 (AM W20234), 1.2 cm long.

**Description.** Body elongate, oval, 2.5 cm long, 0.8 cm wide. 35 segments.

Dorsum creamy grey in alcohol, no felt covering elytra. Ventral surface pale tan, covered with large globular papillae.

Prostomium rounded with 1 pair of rounded ocular peduncles, half length of prostomium, 2 pairs of eyes, small dorsal pair faint grey, larger ventral pair dark grey. Ceratophore of median antenna equal to length of prostomium, style slender with clavate tip, longer than palps (missing on holotype). Facial tubercle located below ceratophore visible only ventrally, covered with cylindrical papillae. Palps, extending to segment 8, tapering finely papillated (Fig.38a).

Elytra 15 pairs, attached on elytriphores of segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra cream coloured, semi-transparent, slightly iridescent in alcohol, fragile, first pair rounded, attached medially on elytriphore, following elytra larger, leaf-shaped attached laterally on elytriphores, posterior elytra elongated with elytriphores attached anterolaterally. All elytra covered with many micropapillae (Fig.38c-f).

First or tentacular segment with flattened, uniramous parapodia, covered with cylindrical papillae on ventral surface, tuft of yellow setae on anterior end of dorsal surface, and short tuft of setae on ventral surface. Two pairs of tentacular cirri occurring dorsally and ventrally with long, cylindrical tentaculophores, styles long tapering with clavate tips (only left ventral present on outer edge of parapodia).

Following segments with biramous parapodia (Fig.38b). Second and third neuropodia with 2 tiers of neurosetae; lower tier consisting of numerous (20+) bipinnate neurosetae (Fig.39a); upper tier with 2 neurosetae. Ventral cirri slender, tapering, arising from base of neuropodia, extending past distal margins of neuropodia. Notopodia small, rounded with short tuft of pale yellow notosetae.

Remaining neuropodia elongate, covered with large globular papillae with 3 golden yellow neurosetae with basal spur, slightly curved tip with 1-3 distal teeth (Fig.39b,c). Neurosetae of anterior and posterior segments more elongated (Fig.39d). Ventral cirri arising just below

most ventral neurosetae, not extending past distal tip of neuropodia.

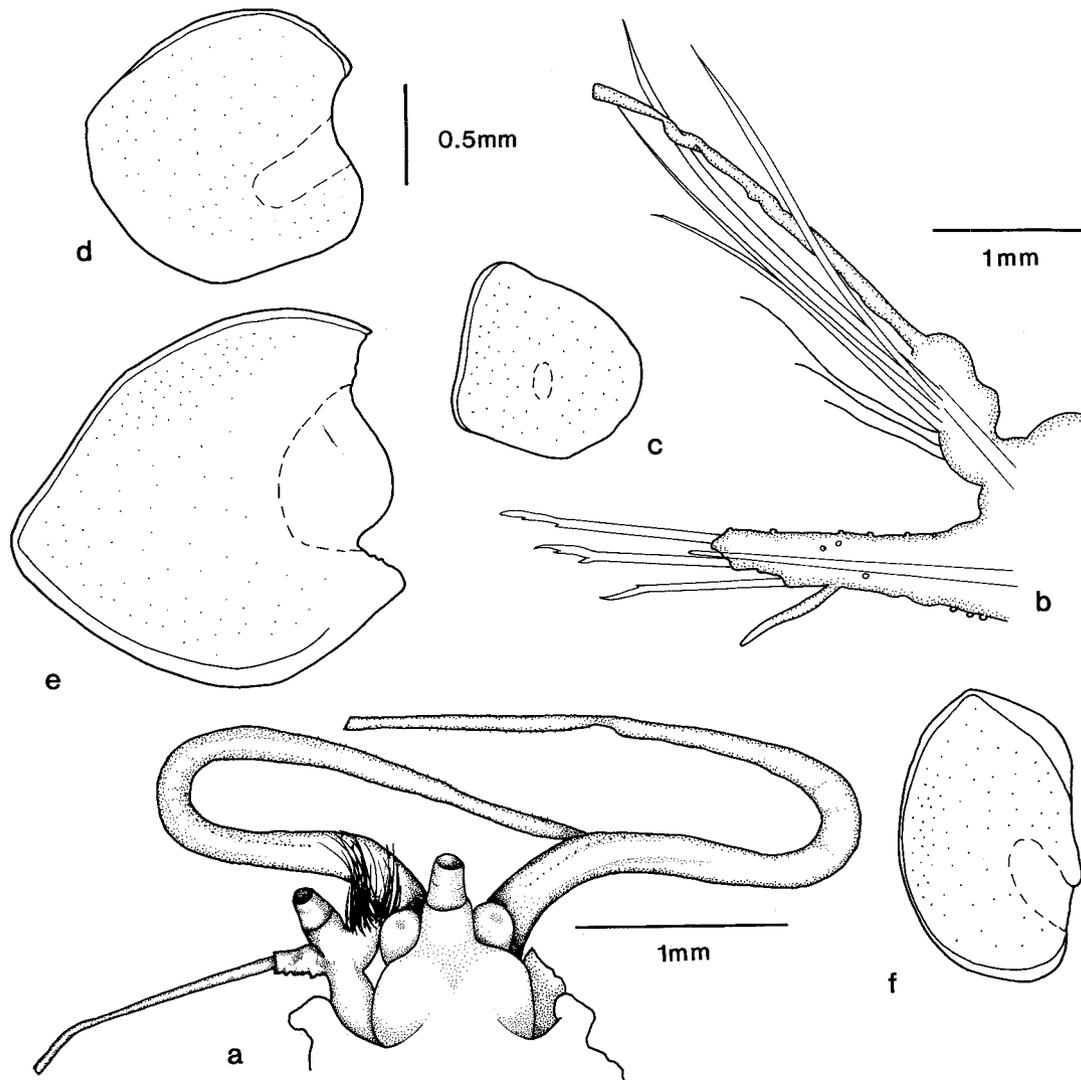
Elytrigerous notopodia with fan of 6 pale yellow notosetal spines (Fig.39f,h,j), fanning across elytra, not covering elytra completely. Lateral to this fan tuft of 17 or more, golden yellow, harpoon notosetae, length of body width, directed posteriorly along lateral edge of body. Harpoon tips with 2-4 recurved fangs on lateral margins (Fig.39e,g,i), many tips covered in transparent sheaths (Fig.39k), shafts smooth.

Cirrigerous notopodia with cylindrical cirrophores of dorsal cirri located on posterior side of notopodia, styles clavate-tipped, length of harpoon notosetae (all cirri missing on holotype). Ventral side of notopodia with tuft of pale yellow notosetae, directed posterolaterally.

**Variation.** Additional material examined 1.2 cm long, 0.6 cm wide, and 32-35 segments.

**Remarks.** The elytra on the holotype are extremely fragile, presumably a result of long term storage in alcohol.

In their literature review, Day & Hutchings (1979) indicate that *Hermione dolichoceras* belongs in the genus *Aphrogenia* and that this was substantiated by Kudenov (personal communication). However, it appears that Kudenov never published his justification for this transfer of the species to the genus *Aphrogenia* and our examination of the type indicates that it clearly belongs in the genus *Laetmonice* rather than *Aphrogenia* because of the presence of harpoon notosetae. *Aphrogenia* is characterised by sabre-like smooth notosetae. *Laetmonice dolichoceras* is characterised by 15 pairs of elytra, not covered by felt, notosetae which are bidentate although some have accessory teeth, and harpoon notosetae with recurved fangs covered in sheaths (Table 6).



**Fig.38.** *Laetmonice dolichoceras*. Holotype (AM G11285): a, dorsal view of prostomium and first segment; b, posterior view of parapodium 16; c, (AM W20234) first elytron; d, third elytron; e, eighth elytron; f, 14th elytron.

**Habitat.** Trawled at a depth of 27.4 m.

**Distribution.** Australia (Port Molle, Qld, 20°20'S 148°51'E to Lizard Island, Qld, 14°40'S 145°28'E, Fig.59E).

*Laetmonice malayana* Horst

Figs 40a-n, 60, Tables 6, 7

*Laetmonice malayana* Horst, 1916b: 73-74.—Horst, 1917: 56, pl.XIII figs 4-6.

**Type material examined.** LECTOTYPE: Indonesian Archipelago Stn 161: north off Misool, 1°10.5'S 130°9'E, 798 m (ZMA V.Pol 486.4), 5 cm long, 2.2 cm wide, 34 segments. PARALECTOTYPES: Indonesian Archipelago Stn 52: south off Flores, 9°3.4'S 119°56.7'E, 959 m, 4(ZMA V.Pol 486.3), 3.5-3.8 cm long, 2.1-2.5 cm wide, 33 segments; Stn 178: north off Ceram, 2°40'S 128°37.5'E, 835 m, 14(ZMA V.Pol 486.1), 1.5-2.7 cm long, 0.6-2 cm wide, 31-34 segments; Stn 161: north

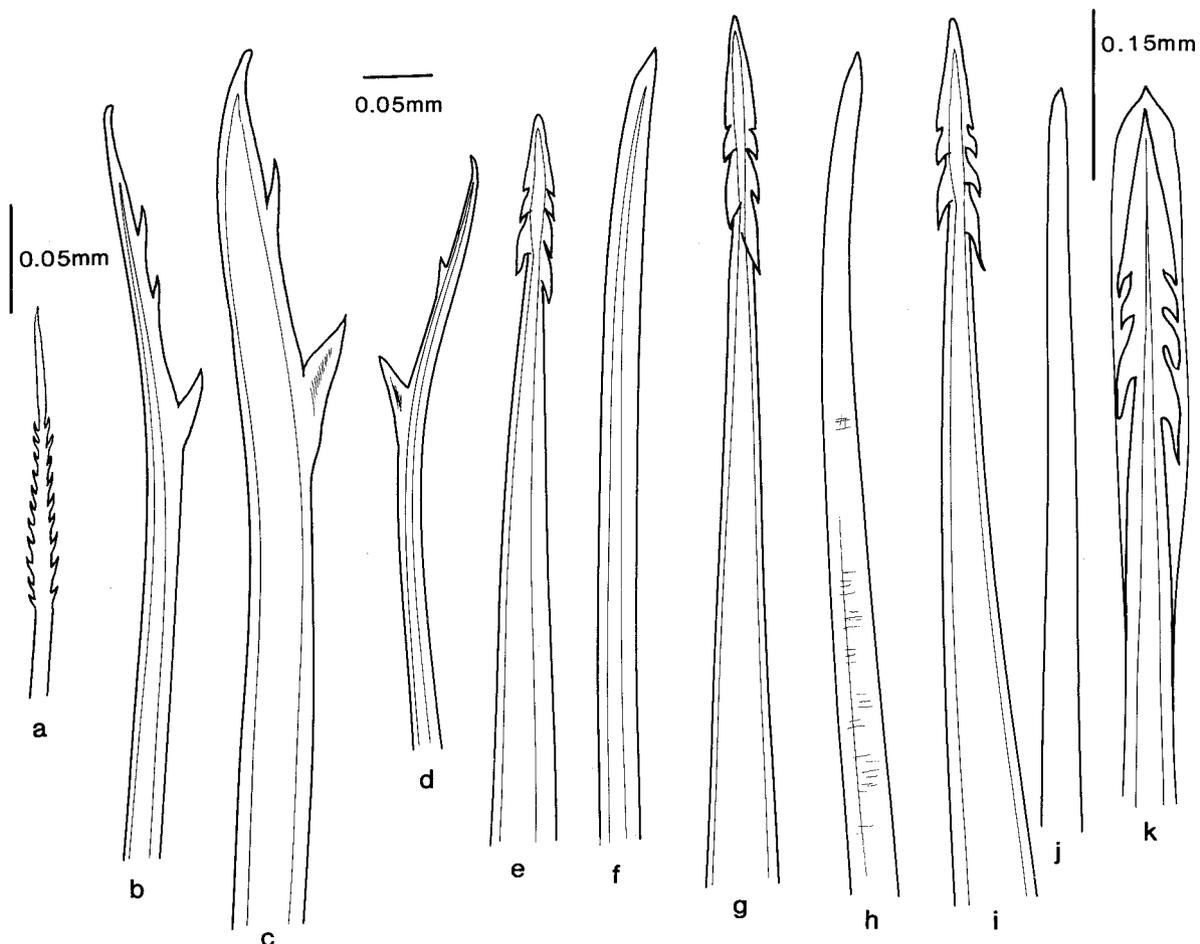
off Misool, 1°10.5'S 130°09'E, 798 m (ZMA V.Pol 486.2), 4.3-4.5 cm long, 2-2.6 cm wide, 34 segments.

**Description.** Body elongate oval, 1.5-4.5 cm long, 0.8-2.5 cm wide, 30-34 segments.

Dorsum cream coloured in alcohol, no felt covering elytra. Ventral surface creamy yellow, covered with minute papillae.

Prostomium rounded with rounded ocular peduncles two-thirds length of prostomium, eye pigment absent. Median antenna with ceratophore half length of prostomium, style, long, slender, blunt tipped 3 times length of prostomium. Palps extending to segment 9-10, finely papillated. Facial tubercle located below ceratophore visible ventrally, covered in small cylindrical papillae.

Elytra 15 pairs, attached on elytophores of segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28, then 31. Elytra thin, semi-transparent slightly overlapping, meeting mid-dorsum or leaving mid-dorsum uncovered, first pair small, rounded with elytophore attached centrally, following elytra large, ovoid, with elytophores



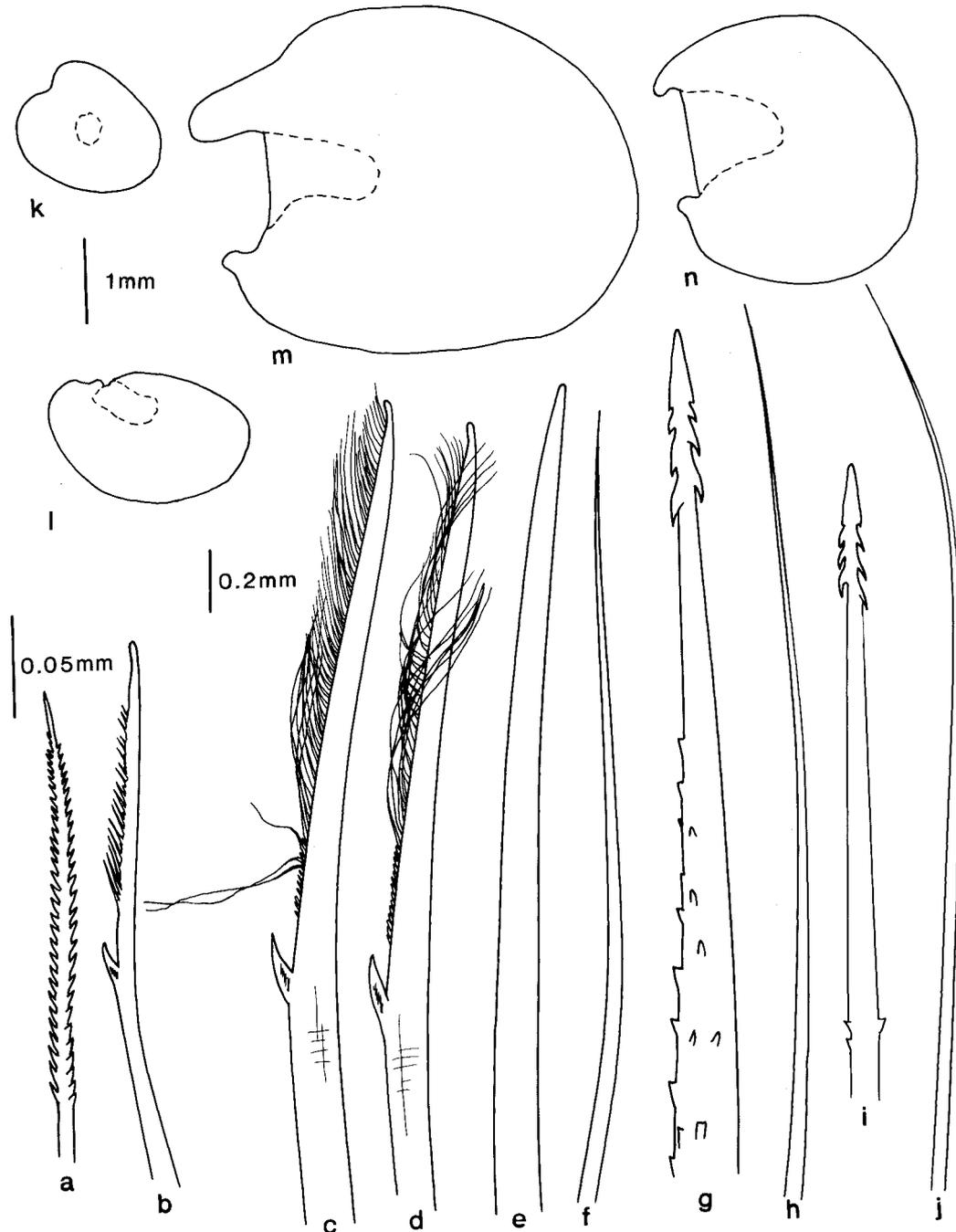
**Fig.39.** *Laetmonice dolichoceras* (AM W20234): a, bipinnate neuroseta from segment 3; b, neuroseta from segment 4; c, neuroseta from segment 16; d, neuroseta from segment 29; e, harpoon notoseta from segment 5; f, acicular notoseta from segment 4; g, harpoon notoseta from segment 15; h, acicular notoseta from segment 16; i, harpoon notoseta from segment 29; j, acicular notoseta from segment 30; k, tip of harpoon showing sheath.

attached anterolaterally, last pair small, elongated with elytrephore attached laterally (Fig.40k-n).

First or tentacular segment with elongated uniramous parapodia, projecting anteriorly and laterally to prostomium, enlarged distally, forming rounded lobe, with tuft of fine capillary setae emerging medially and tuft of setae emerging posteriorly. Two pairs of tentacular cirri occurring dorsally and ventrally with large, cylindrical tentaculophores and styles long,

subequal with slender, tapering, blunt tips, two-thirds length of median antenna.

Following segments with biramous parapodia. Second, third and fourth neuropodia with 2 tiers of neurosetae; lower tier with numerous (50+) golden yellow, bipinnate setae (Fig.40a); upper tier 2 neurosetae with basal spur and distal fringe (Fig.40b). Buccal cirri on segment 2 tapering, arising on base of neuropodia, swollen basally and extending to distal margin of neuropodia.



**Fig.40.** *Laetmonice malayana* (ZMA V.Pol 486.1): a, bipinnate neuroseta from segment 4; b, upper neuroseta from segment 4; c, neuroseta from segment 16; d, neuroseta from segment 25; e, smooth harpoon notoseta from segment 4; f, acicular notoseta from segment 5; g, harpoon notoseta from segment 16; h, acicular notoseta from segment 16; i, harpoon notoseta from segment 25; j, acicular notoseta from segment 25; k, first elytron; l, third elytron; m, eighth elytron; n, 14th elytron.

Remaining neuropodia elongate, smooth with 3-4 golden brown neurosetae with basal spur and distal fringe (Horst, 1917: pl.XIII fig.6). Ventral cirri swollen basally with tapering tips, not extending to distal tip of neuropodia.

Elytrigerous notopodia with tuft of about 10 golden brown, notosetal bristles (Fig.40f,h,j). Lateral to this tuft occurs tuft of 3-5 dark brown, thick harpoon notosetae, those on more posterior segments extending past posterior edge of body (Horst, 1917: pl.XIII fig.4). Harpoon notosetae pointing posteriorly, with 2-3 recurved fangs on lateral margins with shafts beset with a series of thorns (Horst, 1917: pl.XIII fig.5) (Fig.40g,i). Some anterior harpoon notosetae are smooth (Fig.40e). Ventral surface of notopodia with tuft of fine, pale yellow capillary notosetae.

Cirrigerous notopodia dorsal cirri with blunt tips one-third length harpoon notosetae, with tuft of golden brown, unidentate, mud-covered notosetae, harpoon notosetae lacking. Ventral surface of notopodia with short tuft of fine, pale yellow, unidentate notosetae.

**Variations.** In Table 7 we indicate the variation in numbers of different types of setae along the body on elytrigerous segments in four size classes. The numbers of neurosetae is constant over the body and with increasing size. In contrast the number of acicular notosetae is greatest on the middle segments and increases with increasing size and presumably age of the specimen. The number of harpoon notosetae varies slightly along the body with more occurring on anterior and middle segments and little evidence to demonstrate that numbers increase with increasing size of the individuals.

**Remarks.** We have considerably expanded Horst's original description, giving some indication of the variation existing within the species. The species has not been recorded since it was originally described.

The species is characterised by harpoon notosetae with shafts covered with a series of thorns which distinguishes it from other described species of *Laetmonice*, see Table 6.

**Habitat.** Trawled from depths of 798-959 m.

**Distribution.** Indonesian Archipelago (Fig.60).

*Laetmonice moluccana* (Horst)

Figs 41, 42a-f, 43a-j, 59E, 60, Table 7

*Hermione moluccana* Horst, 1916b: 70.—Horst, 1917: 52, pl.XII figs 6-10.

*Hermonia moluccana* Hartman, 1959: 56.

**Type material examined.** LECTOTYPE: Indonesian Archipelago Stn 138: east coast of Kajoa Island, 0°05'S 127°25'E (ZMA V.Pol 419.1), 2.3 cm long, 1.2 cm wide, 35

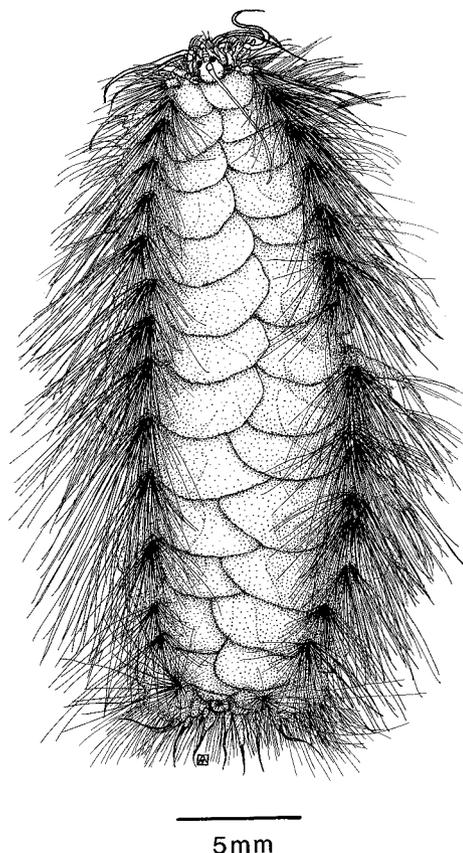
segments. PARALECTOTYPE: Indonesian Archipelago Stn 220: west coast of Binongka: Pasir Pandjang, 5°58'S 124°00'E (ZMA V.Pol 419.2), 2.5 cm long, 1.3 cm wide, 35 segments.

**Additional material examined.** Australia: NORTHERN TERRITORY: Port Essington, 11°04.5'S 132°05'E, 16 Sept. 1985, 8-9 m (NTM W3838), 2.5 cm long; Sandy Island, 11°05'S 132°16.5'E, 2 May 1982, 14 m (NTM W0206), 2.6 cm long; Darwin, 12°25'S 130°49.3'E, 3 Apr. 1986, 9 m (NTM W3928), 2.6 cm long; Channel Island, 12°33.3'S 130°52.4'E, 7 Dec. 1986 (NTM W4061), 0.42 cm long; Shell Island, 12°29.5'S 130°53.5'E, 2 July 1929, 6-13 m (LACM-AHF POLY 1301), 1.5 cm long, 0.5 cm wide, 32 segments; Mandora, 12°27'S 130°50'E, 22 Nov. 1972 (AM W5438), 2.4 cm long; Mandora, 12°27'S 30°50'E, 20 Nov. 1972 (AM W5440), 3 cm long, 1.2 cm wide, 35 segments. WESTERN AUSTRALIA: Broome, 17°51'S 122°14'E, 25 Oct. 1972 (AM W5436), 2.8 cm long, 1.5 cm wide, 34 segments. QUEENSLAND: Capricorn Group, 23°30'S 152°00'E, May 1930 (USNM 148662), 2.9 cm long, 1.5 cm wide, 32 segments; Heron Island, 23°27'S 151°55'E, 24 July 1975 (BMNH ZB 1990.27), 2.2 cm long, 1.2 cm wide, 32 segments.

**Description.** LECTOTYPE. Body elongate oval, 2.3 cm long, 1.2 cm wide. 35 segments.

Dorsum yellow coloured in alcohol, no felt covering elytra. Ventral surface creamy grey in alcohol, covered with spherical papillae (Fig.41).

Prostomium rounded with rounded ocular peduncles, one-third length of prostomium each with 2 contiguous



**Fig.41.** *Laetmonice moluccana* (AM W5440): dorsal view, whole animal.

dark grey eyes, dorsal one smaller, than larger ventral one. Median antenna with ceratophore 2-jointed, one third length of prostomium, style slender, clavate-tipped 5x length of prostomium. Palps extending to segment 6, margins finely papillated. Facial tubercle located below ceratophore visible ventrally, covered in small cylindrical papillae (Fig.42a).

Elytra 15 pairs, attached on elythrophones of segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28, then 31. Elytra thin, opaque, imbricating, first pair small, rounded with elythrophone attached in centre, following elytra large, ovoid with elythrophones attached laterally.

All elytra covered in micropapillae (Fig.42c-f).

First or tentacular segment with elongated, uniramous parapodia, covered in large globular papillae, projecting anteriorly and laterally to prostomium. Dorsal surface of parapodia with tuft of golden yellow spines on inner distal edge, fanning towards prostomium. Two pairs of slender tentacular cirri on outer, distal edge of parapodia; dorsal pair three-quarters length of median antenna; ventral pair just shorter than dorsal pair. Ventral surface of parapodia with small tuft of fine, yellow setae.

Following segments with biramous parapodia. Second

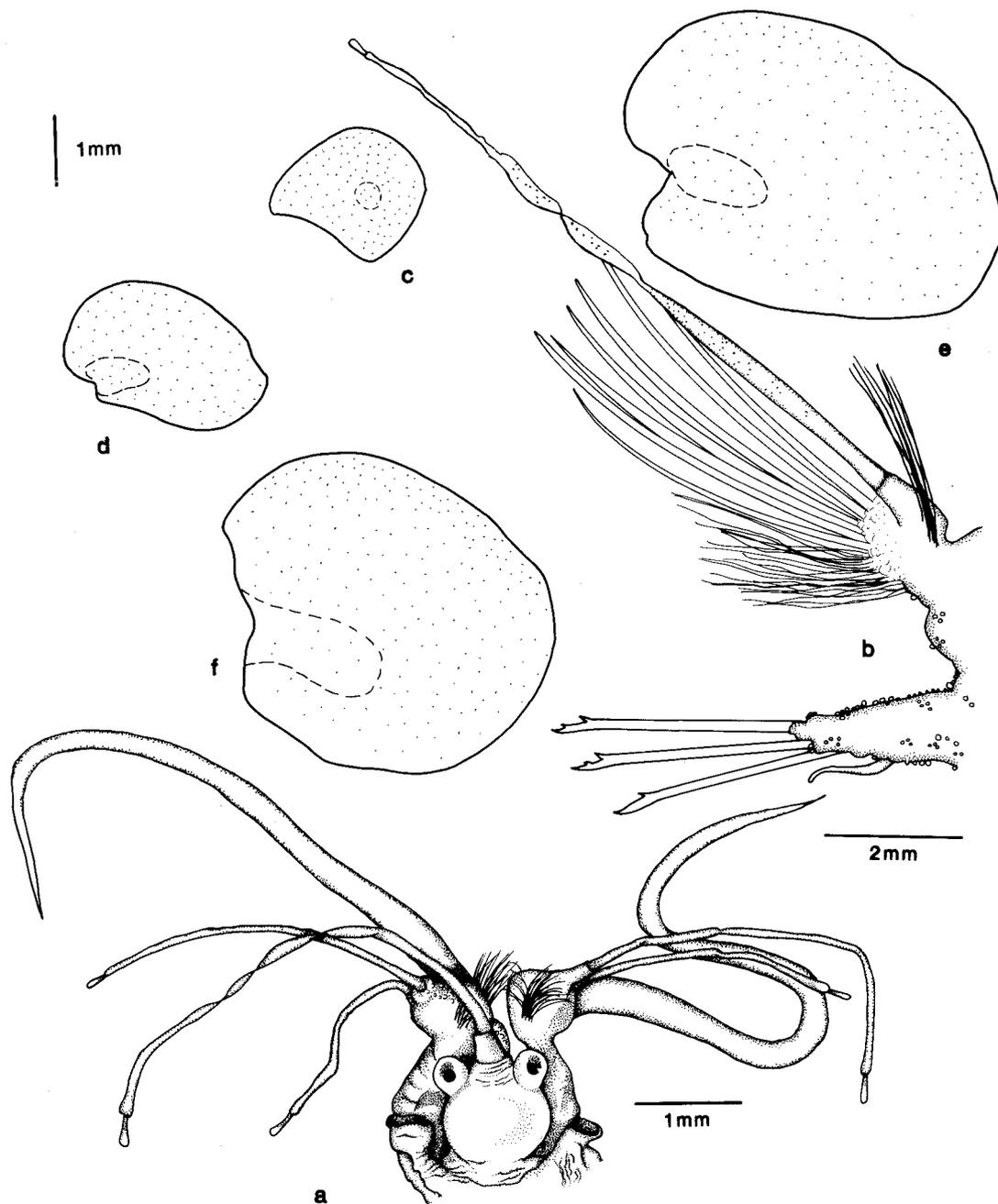


Fig.42. *Laetmonice moluccana* (AM W5436): a, dorsal view of prostomium and first segment; b, posterior view of parapodium 16; c, (AM W5432) first elytron; d, third elytron; e, eighth elytron; f, 14th elytron.

and third neuropodia with 2 tiers of neurosetae; lower tier with tuft of many (50+), golden yellow, bipinnate neurosetae (Fig.43a); upper tier with 2 golden yellow, neurosetae. Ventral cirri on second neuropodium arises from its base.

Remaining neuropodia elongate, covered with many large, rounded papillae, with 3-4 golden yellow neurosetae. Neurosetae with basal spur, slightly curved tip with 1-2 distal teeth (Fig.43c<sup>1,2</sup>). Neurosetae of anterior and posterior segments thinner, elongated (Fig.43b,d). Ventral cirri tapering to fine point, emerging below neurosetae extending to tip of neuropodia.

Elytrigerous notopodia with fan of smooth, yellow, acicular notosetae directed flat across elytra, completely covering dorsum (Fig.43e,h,j). Lateral to this fan occurring bundle of many harpoon notosetae, half body width, directed dorsally and slightly posteriorly, concealing dorsal surface. Harpoon notosetae with shafts smooth, tapering abruptly below tips with 3-4 recurved fangs on lateral margins forming darker harpoon tips, usually covered in clear sheaths (Fig.43f,g,i).

Cirrigerous notopodia with tuft of fine, short notosetal spines, directed dorsally and slightly posteriorly. Lateral to this tuft occurring fan of yellow, mud-covered notosetal spines fanning over neuropodia and covering neurosetae. Dorsal cirri with cirrophore emerging posterior to notosetae, styles

long, slender, with clavate tips, equal to length of harpoon notosetae.

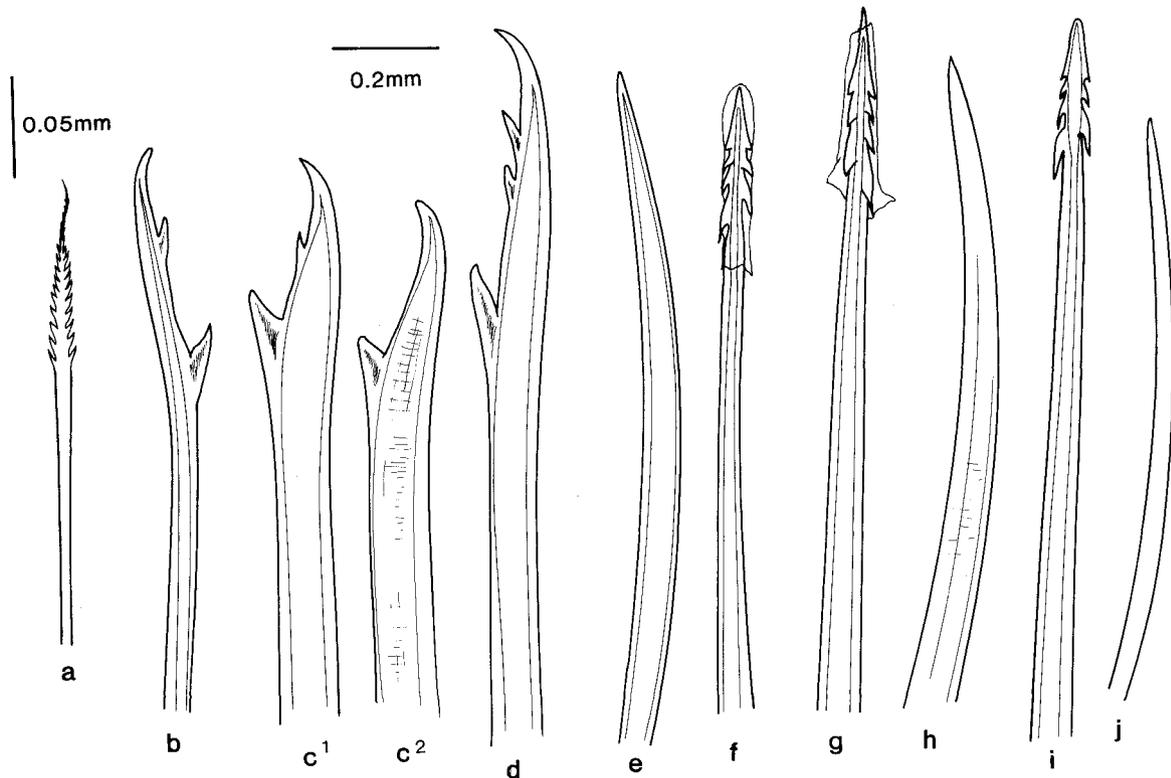
**Variation.** Additional material examined ranging from 0.42-3.0 cm long, 0.27-1.5 cm wide, 20-35 segments.

**Remarks.** *Laetmonice moluccana* is characterised by the elytra being completely covered by notosetae, and neurosetae with a basal spur and one to three distal teeth. These characters clearly distinguish it from all other species from the Indo-Pacific, see Table 6. For a discussion of the reasons why we have transferred this species to the genus *Laetmonice* see the Remarks section following the generic diagnosis of *Laetmonice*.

This is currently the only species of *Laetmonice* present in both the Indonesian Archipelago and northern Australian waters, and also the only Horst species which has subsequently been recorded since it was originally described.

**Habitat.** Found under rocks at low tide and also in muddy, shallow subtidal areas (6-14 m in depth).

**Distribution.** (Northern Australia from Broome, WA, 17°51'S 122°14'E to Capricorn Group, Qld, 23°30'S 152°00'E, Fig.59E). Indonesian Archipelago (Fig.60).



**Fig.43.** *Laetmonice moluccana* (AM W5432): a, bipinnate neuroseta from segment 4; b, upper neuroseta from segment 4; c<sup>1,2</sup>, neuroseta from segment 16; d, neuroseta from segment 32; e, acicular notoseta from segment 4; f, harpoon notoseta from segment 5; g, harpoon notoseta from segment 16; h, acicular notoseta from segment 15; i, harpoon notoseta from segment 30; j, acicular notoseta from segment 31.

*Laetmonice parva* (Horst)

Figs 44a-g, 60, Table 6

*Hermione parva* Horst, 1916b: 70.—Horst, 1917: 53, pl.XII figs 14-16.*Hermonia parva* Hartman, 1959: 56.

**Type material examined.** LECTOTYPE: Indonesian Archipelago Stn 65A: north off Tanah Djampeah, 7°05'S 120°42'E, 400 m (ZMA V.Pol 420), 1.5 cm long, 0.92 cm wide, 33 segments.

**Description.** Body elongate, oval, 1.5 cm long, 0.92 cm wide, 33 segments.

Dorsum tan, orange in alcohol, no felt covering elytra. Pharynx everted, large, without terminal papillae, terminal edge pilose. Ventral surface tan coloured, covered with spherical papillae.

Prostomium rounded with rounded ocular peduncles, half length of prostomium each with 2 faint grey eyes due to age, dorsal one smaller, than larger ventral one. Median antenna with ceratophore three-quarters length of prostomium, style slender, clavate-tipped 3 times length of prostomium. Palps extending to segment 7, margins finely papillated. Facial tubercle located below ceratophore visible ventrally, covered in cylindrical papillae.

Elytra 15 pairs, attached on elytophores on segments

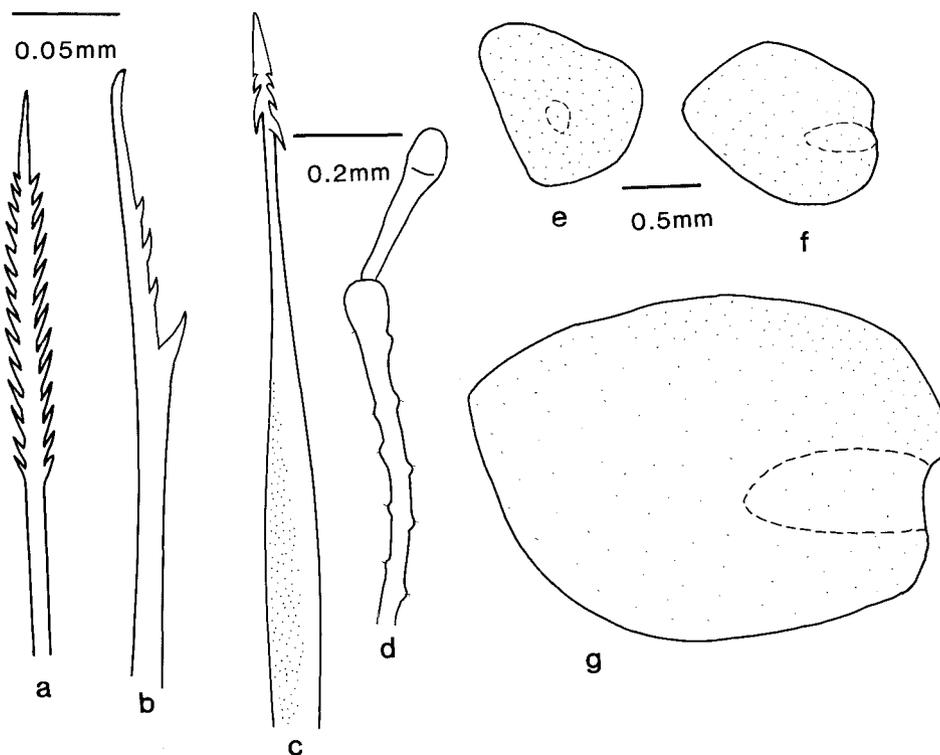
2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra slightly opalescent, first pair small, triangular with rounded edges with elytophore attached centrally, following elytra large, leaf-shaped, with elytophore attached laterally, posterior elytra oval with elytophore attached anterolaterally (Fig.44e-g).

First or tentacular segment with elongated uniramous parapodia, projecting anteriorly and laterally to prostomium, enlarged distally, forming rounded lobe, with tuft of short, fine setae, emerging radially from distal margins. Two pairs of tentacular cirri occurring dorsally and ventrally with, cylindrical tentaculophores and styles long, papillated, dorsal pair one and one-third times length median antenna, ventral pair half length of dorsal pair.

Following segments with biramous parapodia. Second, third and fourth neuropodia with 2 tiers of neurosetae; lower tier with tuft of many (100+), golden yellow, bipinnate neurosetae (Fig.44a); upper tier with 2 golden yellow, neurosetae with basal spur and 1-3 extra teeth (Fig.44b). Ventral cirri on second neuropodium arising from its base.

Remaining neuropodia elongate, cylindrical, papillated, with 2-3 golden yellow neurosetae. Neurosetae with basal spur and 1-2 extra teeth (Horst, 1917: pl.XII fig.16a,b). Ventral cirri slender, tapering, arising from middle of ventral surface of neuropodia, extending to distal margins of neuropodia.

Elytrigerous notopodia with dorsal fan of 6 or more golden yellow, unidentate notosetal spines, covered with



**Fig.44.** *Laetmonice parva* (ZMA V.Pol 420): a, bipinnate neuroseta from segment 3; b, upper neuroseta from segment 3; c, harpoon notoseta from middle segment; d, tip of dorsal cirri; e, first elytron; f, anterior elytron; g, middle elytron.

fine tubercles, pointing medially, lying flat across elytra. Lateral to this fan is tuft of about 13 long, golden brown, harpoon notosetae pointing dorsoposteriorly. Harpoon notosetae with shafts, covered in fine tubercles, tapering abruptly below tips with 2-3 recurved fangs on lateral margins forming harpoon tips, usually covered in clear sheaths (Horst, 1917: pl.XII fig.14), (Fig.44c).

Cirrigerous notopodia with fan of golden yellow, notosetal spines, directed medially and lying flat across dorsum. Lateral to this fan occurring tuft of about 25 longer, slightly curved, notosetal spines, beset with small papillae, directed posterolaterally (Horst, 1917: pl.XII fig.15). Dorsal cirri with large cylindrical cirrophores, styles long, tuberculated, slender, clavate tipped (Fig.44d).

**Remarks.** Pettibone (1966) synonymised the type species of *Hermione* Blainville 1828, *Halithea hystrix* Savigny in Lamarck, 1818 with *Laetmonice* Kinberg, 1856. This name was preoccupied and Hartman (1959) suggested the name *Hermonia* for this genus. For further comments see Remarks section after the generic diagnosis of *Laetmonice*.

*Hermonia parva* is also a species of *Laetmonice*, and we have considerably expanded the original description given by Horst (1916b, 1917). The species is known only from the type material.

The species is characterised by harpoon notosetae and notosetal spines with tuberculated shafts, and neurosetae with basal spur and one to three distal teeth, which distinguishes from other species of *Laetmonice* (see Table 6).

**Habitat.** Trawled at depths of 23 and 400 m.

**Distribution.** Indonesian Archipelago (Fig.60).

### *Laetmonice producta* Grube

Figs 45a-f, 46a-j, 59E, Tables 6, 8, 9

*Laetmonice producta* Grube, 1878: 512-513.—McIntosh, 1885: 39-44, pl.VI fig.2, pl.IVa figs 1-8.—Horst, 1917: 54-56, pl.XIII figs 1-3.—Moore, 1903: 420.—Izuka, 1912: 82-84.

**Material examined.** TASMANIA: Sandy Cape, 41°25'S 144°45'E, 20 July 1987, 800 m, 9(AM W20235), 5.8-7.7 cm long; St Patricks Head, 41°35'S 148°14'E, 760-790 m, 3(AM W20233), 7 cm long; Maria Island, 42°44'S 148°01'E, Aug. 1921, 2377 m (AM W681), 8.2 cm; Southern Tasmania, 43°47.4'S 147°50.9'E, 20 Feb. 1976, 755 m (AM W9102), 5.4 cm long. VICTORIA: Gabo Island, 38°07.9'S 149°59.1'E, 14 Oct. 1984, 656-648 m, 2(NMV F56416), 7.1-7.8 cm long; Point Hicks, 38°16.4'S 149°27.6'E, 23 July 1986, 800 m, 2(NMV F56521), 7-7.8 cm long; Point Hicks, 38°21.9'S 149°20'E, 23 July 1986, 1000 m (NMV F56520), 5.6 cm long. NEW SOUTH WALES: off Nowra, 34°55'S 151°13'E, 12 Dec. 1978, 823 m, 68(AM W16563), 4-8.1 cm long; off Nowra, 34°54.68'S 151°11.36'E, 15 July 1986, 800-850 m, 11(NMV

F56527), 2.4-6.6 cm long; south-east off Sydney, 34°24'S 151°25'E, 13 Dec. 1976, 731-768 m, 25(AM W16562), 4-6.6 cm long; off Bulli, 34°18'S 151°26'E, 29 May 1975, 457-476 m (AM W20230), 7.5 cm long; Broken Bay, 33°38'S 151°57'E, 2 Apr. 1975, 786-805 m, 16(AM W7254), 4-5.7 cm long; Broken Bay, 33°34'S 151°18'E, 731 m (AM W201612), 5 cm long; off Avoca, 33°41'S 152°00'E, 11 Feb. 1986, 819-889 m (AM W20232), 4.2 cm long; off Terrigal, 33°47'S 151°57'E, 7 Dec. 1978, 816 m, 63(AM W16564), 2.8-6 cm long.

HEARD ISLAND: 52°46.68'S 73°55.03'E, 19 June 1990, 3 m, (AM W20598).

**Description.** Body cigar shaped, 2.4-8.1 cm long, 1.2-3.5 cm wide, 41-45 segments.

Dorsum cream coloured in alcohol, with purple stripe running anteroposteriorly on dorsum. No felt covering elytra. Ventral surface cream coloured, covered in fine rounded papillae.

Prostomium rounded with 1 pair of large ocular peduncles, half length of prostomium without eye pigment. Median antenna with 2-jointed ceratophore half length of prostomium, with style slender, clavate-tipped antenna two and a half times length of prostomium. Palps with small basal palpophores, tapering and extending to segment 9-11, margins finely papillated. Facial tubercle located below ceratophore, covered in long conical papillae. Pair of prominent, free nuchal flaps, arising from posterior region of prostomium, variable in size (Fig.45a).

Elytra 18 pairs with firm stout attachments on elytophores of segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28, 31, 34, 37 and 40. Elytra smooth, opaque, purple colouration on inner half, first pair small, triangular with rounded edges, with elytophore attached in centre, following elytra large, ovoid, with elytophore attached laterally, posterior elytra rounded with elytophores attached laterally (Fig.45c-f).

First or tentacular segment with elongated, flattened, uniramous parapodia, projecting anteriorly and laterally to prostomium, with tuft of short, fine, stiff golden yellow bristles, fanning around distal margin of parapodia. Two pairs of long dorsal and ventral tentacular cirri with cylindrical tentaculophores and styles long, subequal with slender, tapering, bulbous tips, half length of palps.

Following segments with biramous parapodia (Fig.45b). Second, third and fourth neuropodia with 2 tiers of neurosetae; lower tier with numerous (100+) golden yellow, bipinnate neurosetae (Fig.46a); upper tier with 2 neurosetae with basal spur and distal fringe (Fig.46b). Ventral cirri on segments 2 and 3, slender, tapering, arising on base of neuropodia and extending past distal margins of neuropodia.

Remaining neuropodia elongate, cylindrical, with 3 golden yellow neurosetae. Neurosetae with basal spur and distal fringe (Fig.46c,d). Ventral cirri slender, tapering, arising from middle of ventral surface of neuropodia, extending below distal margins of neuropodia.

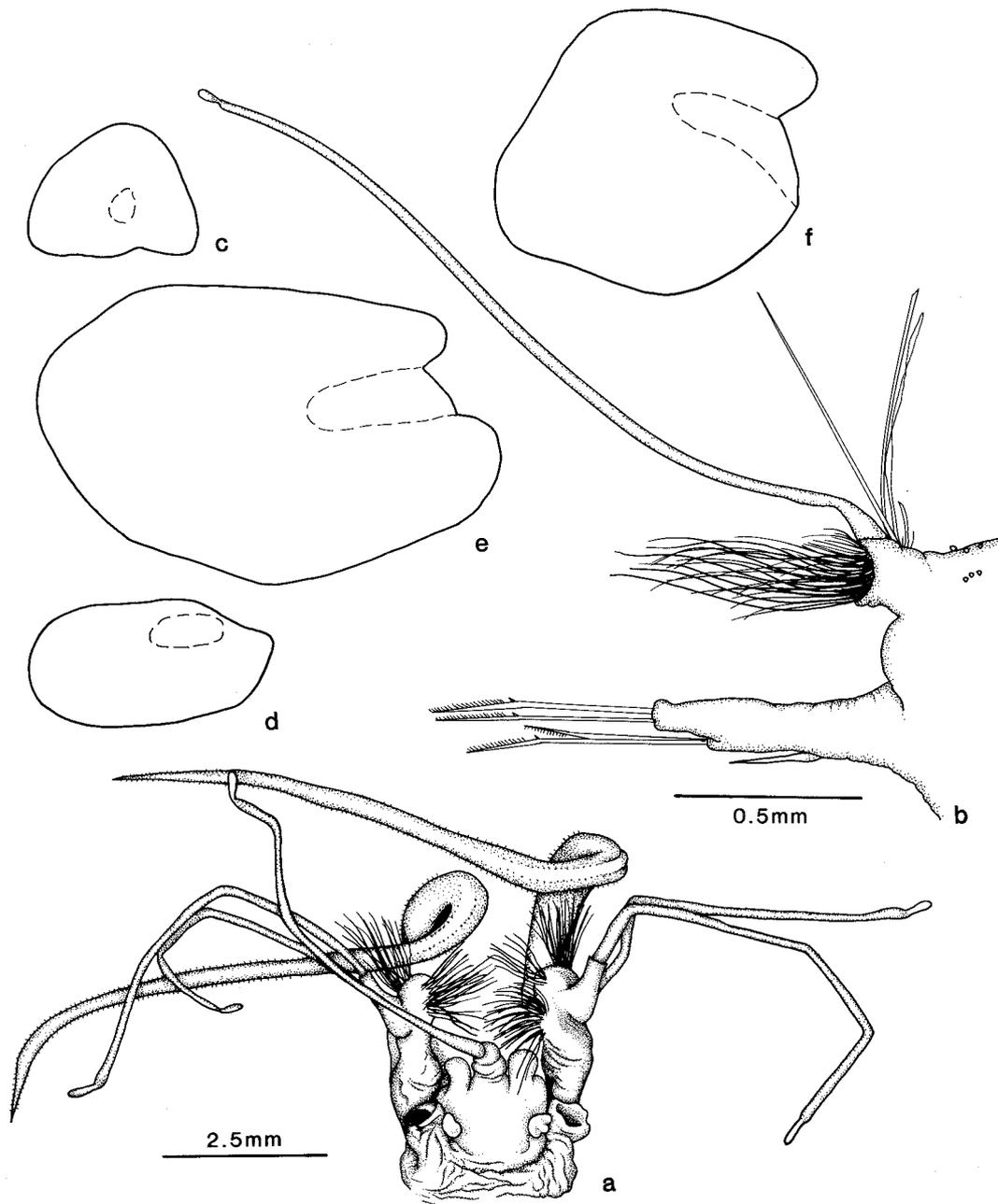
Elytrigerous notopodia with dorsal surface with tuft of about 15 or more golden yellow, acicular notosetae, varying in width. Lateral to this tuft occurs tuft of 10

or more, golden brown harpoon notosetae with tips darker (missing from most specimens), small tuft of pale yellow, unidentate notosetae anterior to harpoon notosetae. Harpoon notosetae length of body width, with shafts smooth, tapering abruptly below tips with 3-5 recurved fangs on lateral margins (Fig.46g). Some harpoon notosetae are smooth (Fig.46f). Ventral surface of notopodia with lateral-ventral tuft of short, fine, mud-covered capillary notosetae.

Cirrigerous notopodia with dorsal surface with tuft of about 20 golden yellow, smooth, acicular notosetae three-quarters length of harpoon notosetae (Fig.46e,h), anterior to this tuft, is tuft of fine, pale yellow,

unidentate notosetae. Ventral surface of notopodia with tuft of fine mud-covered capillary notosetae. Cirrophore cylindrical, arising dorsolaterally on posterior side of notopodia, cirri long, thin, tapering with bulbous tips (Fig.45b).

**Variation.** Specimen NMV F56520 although externally appearing the same as other specimens from the same locality differs in possessing only 16 pairs of elytra, and in the arrangement and ornamentation of the elytra. Elytrigerous notopodia possess a fan of 16 or more harpoon notosetae with shafts densely tuberculated (Fig.46i,j), no acicular notosetae present. Cirrigerous



**Fig.45.** *Laetmonice producta* (AM W20235): a, dorsal view of prostomium and first segment; b, posterior view of parapodium 16; c, (NMV F56416) first elytron; d, third elytron; e, eighth elytron; f, 16th elytron.

notopodia with a fan of 20 or more densely tuberculated acicular notosetae.

The specimens from Heard Island differs in possessing pale elytra without the purple stripe, 20 pairs of elytra and much larger nuchal flaps present.

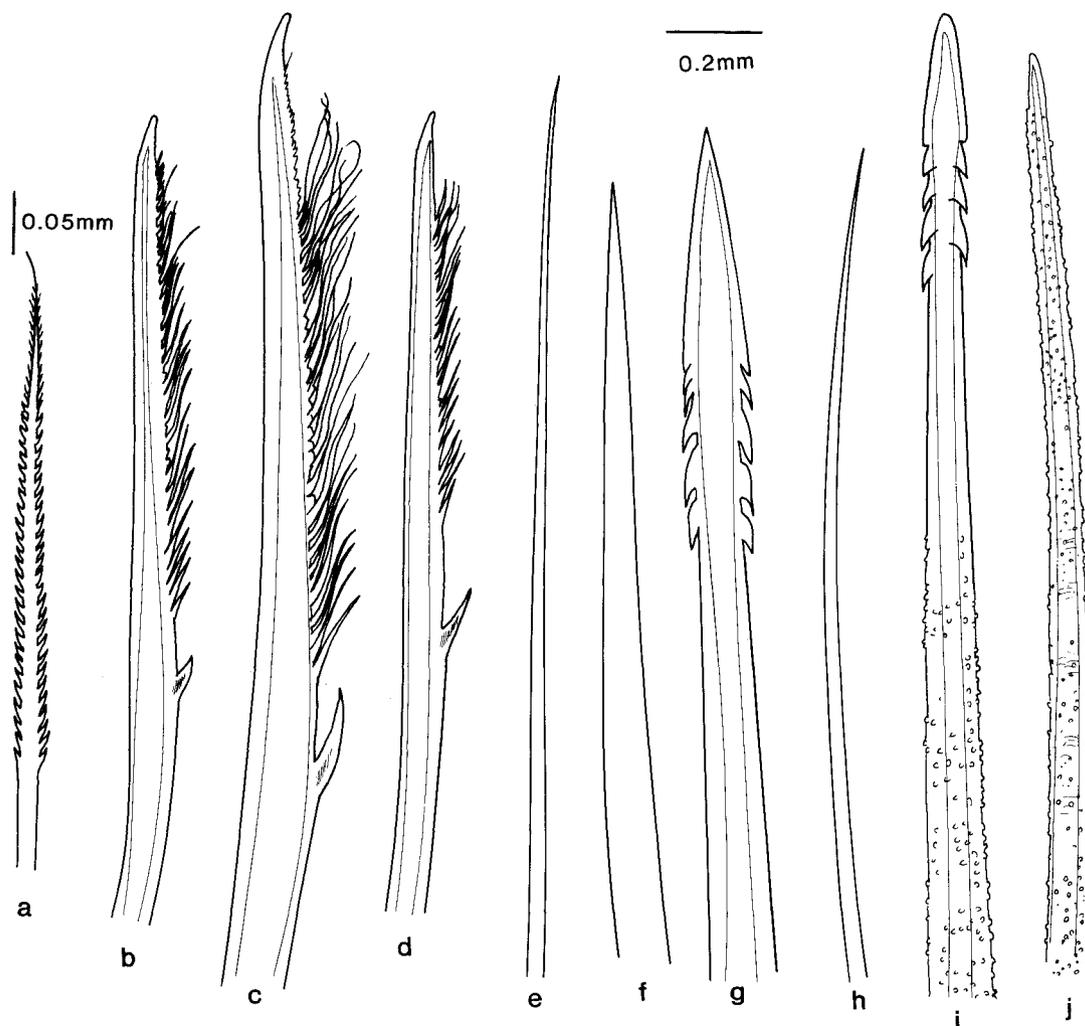
In Table 8, we give the number of different types of setae along the body in 4 size classes. The number of neurosetae present is constant along the body and is independent of the size of the animal. The number of acicular notosetae varies along the body and generally the greatest number is found on middle parapodia, although considerable variation occurs within a size class, but there is a general trend of numbers increasing with increasing size and presumably age. Harpoon notosetae show a similar pattern to that exhibited by the acicular notosetae.

**Remarks.** The stem species *Laetmonice producta* was originally described by Grube (1878), from Kerguelen Islands. Subsequently McIntosh (1885, 1900) described four varieties on the basis of general proportions of the

prostomium and ocular peduncles, eye pigment, length of and ornamentation of the setae, and the amount of papillation of the ventrum (see Table 9).

McIntosh (1885:45) states that the "number of scales is however, of comparatively little moment, however we have however found them to be constant over a large size range with individuals as small as 2.4 cm possessing 18 pairs of elytra. Horst (1917) who identified four specimens as *L. producta* but refers to them as a variety, without giving the variety a name. He suggests that because *L. producta* has such a wide geographical distribution and is found at different depths, that it is not surprising that several varieties occur. We suggest that if these varieties were examined in detail these would be found to belong to separate species.

It may be that our variations belong to another species but as McIntosh's type material was not available for examination at this stage we prefer to refer our specimens to the stem species *L. producta*. A reappraisal of the validity of the varieties needs to be



**Fig. 46.** *Laetmonice producta* (AM W20235): a, bipinnate neuroseta from segment 3; b, neuroseta from segment 4; c, neuroseta from segment 16; d, neuroseta from segment 35; e, acicular notoseta from segment 5; f, smooth harpoon notoseta from segment 5; g, harpoon notoseta from segment 15; h, acicular notoseta from segment 15; i, (NMV F56320) harpoon notoseta middle segment; j, acicular notoseta middle segment.

undertaken, taking into account the consistency of elytral numbers and the geographical distributions, as two of McIntosh's varieties, *benthaliana* and *willemoesi* have extensive geographical distributions.

**Habitat.** Trawled at depths of 457-2377 m.

**Distribution.** Australia (South-east Australia from Sandy Cape, Tas., 41°25'S 144°45'E to Broken Bay, NSW, 33°34'S 151°18'E, Fig.59E).

*Laetmonice rugosa* Horst

Figs 47a-d, 60, Table 6

*Laetmonice rugosa* Horst, 1916b: 74.—Horst, 1917: 56-57, pl.XIII figs 7-9.

**Type material examined.** LECTOTYPE: Indonesian Archipelago Stn 302: north off Rotti Island, 10°27.9'S 123°28.7'E, 216 m (ZMA V.Pol 488.1), 3.6 cm long, 2.1 cm wide, 35 segments. PARALLECTOTYPE: Indonesian Archipelago Stn 302: north off Rotti Island, 10°27.9'S 123°28.7'E, 216 m (ZMA V.Pol 488.2), 1.7 cm long, 1.1 cm wide, 32 segments.

**Description.** Body elongate oval, 1.7-3.6 cm long, 1.1-2.1 cm wide, 32-35 segments.

Dorsum cream coloured in alcohol, elytra covered with fine felt (damaged on lectotype). Ventral surface cream covered with many spherical papillae giving rugose appearance.

Prostomium rounded with 2 large ocular peduncles, without eye pigment, half length prostomium. Median antenna with 2-jointed ceratophore, styles now missing on both specimens. Horst (1917) states style long, clavate tipped, just shorter than palps. Palps, tapering, smooth, extending to segment 8. Facial tubercle small, situated below median antenna, visible only ventrally, covered in rounded papillae.

Elytra 15 pairs, attached on elytraphores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra thin, semi-transparent, slightly opalescent, first pair small, rounded with elytraphore attached centrally, following elytra large, leaf-shaped, with elytraphore attached laterally, posterior pairs small, rounded with elytraphore attached laterally. All elytra with some scattered micropapillae.

First or tentacular segment with elongated uniramous parapodia, projecting anteriorly and laterally to prostomium, enlarged distally, forming rounded lobe, with tuft of fine setae, emerging radially from medial to posterior margins. Two pairs of tentacular cirri with cylindrical tentaculophores and styles long, slender, clavate-tipped, dorsal pair 3 times length of prostomium, ventral pair three-quarters length of dorsal pair.

Following segments with biramous papapodia. Segments 2-4 with 2 tiers of neurosetae. Lower tier with tuft of many (20+) golden yellow bipinnate neurosetae

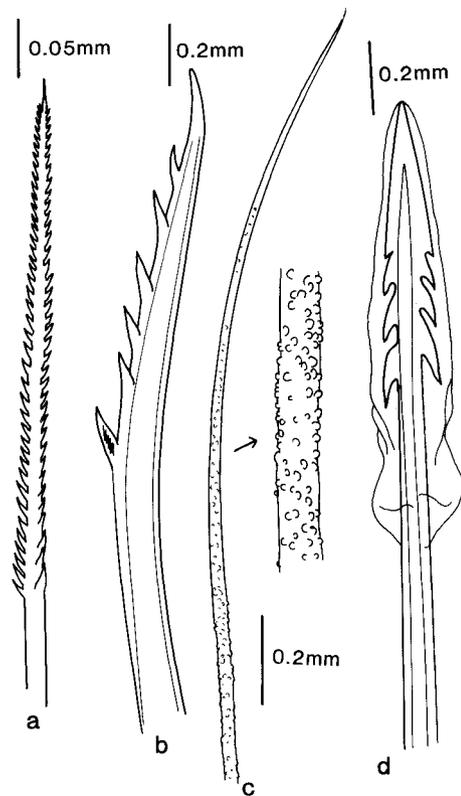
(Fig.47a); upper tier with 2 golden yellow neurosetae with basal spur and 0-4 distal teeth.

Remaining neuropodia elongate, cylindrical, papillated with 2-4 golden yellow neurosetae with basal spur and 3-5 additional teeth (Horst, 1917: pl.XIII fig.8) (Fig.47b). Ventral cirri swollen basally with tapering tips, extending below distal margin of neuropodia.

Elytrigerous notopodia with dorsal fan of 10 or more golden brown, tuberculated, unidentate notosetal spines (Fig.47c). Lateral to this fan tuft of long, golden brown, harpoon notosetae pointing dorsoposteriorly, extending past posterior edge of body, with shafts smooth or with some fine tubercles, with 3 recurved fangs on lateral margins forming harpoon tips, many tips covered in transparent sheaths (Fig.47d).

Cirrigerous notopodia dorsal cirri with blunt tips, with tuft of golden brown, unidentate notosetal spines covered in fine papillae, pointing dorsolaterally, harpoon notosetae lacking. Ventral surface of notopodia with short tuft of fine, unidentate notosetae.

**Remarks.** We have considerably expanded Horst's descriptions (1916b, 1917) including indicating the numbers of different types of setae present. The species is known only from the type material. The species is characterised by having neurosetae with a basal spur and three to five distal teeth, and by having a ventral surface covered with many spherical papillae, these



**Fig.47.** *Laetmonice rugosa* (ZMA V.Pol 488.1): a, bipinnate neuroseta from segment 3; b, neuroseta from middle segment; c, acicular notoseta from middle segment; d, tip of harpoon notoseta from middle segment.

features distinguish it from other species of *Laetmonice*, see Table 6.

**Habitat.** Trawled at a depth of 216 m.

**Distribution.** Rotti Island, Indonesian Archipelago (Fig.60).

*Laetmonice viridescens* Horst

Figs 48a-c, 60, Table 6

*Laetmonice viridescens* Horst, 1917: 58-59, pl.XIV figs 1,2.

**Type material examined.** LECTOTYPE: Indonesian Archipelago Stn 137: channel between Makjan and Halmahera, 0°23.8'N 127°29'E, 472 m (ZMA V.Pol 489.1); 1.9 cm long, 1.1 cm wide, 32 segments. PARALECTOTYPE: Indonesian Archipelago Stn 137: channel between Makjan and Halmahera, 0°23.8'N 127°29'E, 472 m (ZMA V.Pol 489.2), 1.4 cm long, 0.9 cm wide, 31 segments.

**Description.** Body cigar shaped, 1.4-1.9 cm long, 0.9-1.1 cm wide, 31-32 segments.

Dorsum tan coloured in alcohol, with thin sandy felt covering elytra. Ventral surface cream, covered with minute spherical papillae.

Prostomium rounded with 2 large ocular peduncles, without eye pigment, half length prostomium. Median antenna with large ceratophore, three-quarters length prostomium, style long, slender, clavate-tipped, 6 times length prostomium. Palps long, tapering, finely papillated, extending to segment 12. Facial tubercle situated below median antenna, visible only ventrally, covered in small rounded papillae.

Elytra 14-15 pairs, attached to elytophores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra transparent, faintly iridescent, meeting mid-dorsally, first pair small, rounded, elytophore attached centrally, following elytra large, rounded, with elytophore attached laterally, posterior pairs small, ovate with elytophore attached laterally.

First or tentacular segment with elongated uniramous parapodia, projecting anteriorly and laterally to prostomium, enlarged distally, forming rounded lobe, with tuft of fine, mud-covered setae, emerging from medial to posterior margins. Two pairs of tentacular cirri with cylindrical tentaculophores and styles long, slender, clavate-tipped, dorsal pair half length of median antenna, ventral pair shorter than dorsal pair.

Following segments with biramous papapodia. Second, third and fourth neuropodia with 2 tiers of neurosetae. Lower tier consisting of numerous (20+) bipinnate neurosetae (Fig.48a); upper tier 2 neurosetae with basal spur and 10 extra teeth (Fig.48b) or with basal spur and distal fringe of short hairs, separated by an interval. Ventral cirri on segment 2-3, thin, tapering extending past distal tip of neuropodia; ventral cirri on segment 4 extending to distal tip of neuropodia.

Remaining neuropodia elongate, cylindrical, with 3 golden yellow neurosetae. Neurosetae with basal spur and distal fringe not separated by an interval (Horst, 1917: pl.XIV fig.2) (Fig.48c). Ventral cirri slender, tapering, arising from base of ventral surface of neuropodia, extending below distal margins of neuropodia.

Elytrigerous notopodia with dorsal tuft of about 5 fine, pale yellow, mud covered notosetae. Lateral to this tuft occurs tuft of about 7 long, golden brown, harpoon notosetae pointing dorsoposteriorly, with shafts tapering abruptly below tip with 3 recurved fangs on lateral margins forming dark brown harpoon tips (Horst, 1917: pl.XIV fig.1).

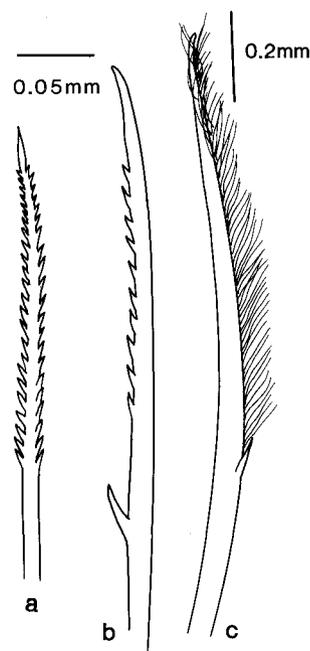
Cirrigerous notopodia with dorsal cirri long, thin, with tuft of long, pale yellow, unidentate, mud-covered notosetae pointing laterally, harpoon notosetae lacking. Ventral surface of notopodia with short tuft of fine, mud-covered, unidentate notosetae.

**Remarks.** We have considerably expanded the original description by Horst (1917), giving details of the number and structure of the various setal types present. The species is known only from the two specimens described by Horst.

The species is characterised by neurosetae with a basal spur adjacent to the distal fringe and can be distinguished from other species of *Laetmonice* using Table 6.

**Habitat.** Trawled at depths of 835 and 959 m.

**Distribution.** Indonesian Archipelago (Fig.60).



**Fig.48.** *Laetmonice viridescens* (ZMA V.Pol 489.1): a, bipinnate neuroseta from segment 3; b, upper neuroseta from segment 3; c, neuroseta from middle segment.

*Laetmonice wonda* n.sp.

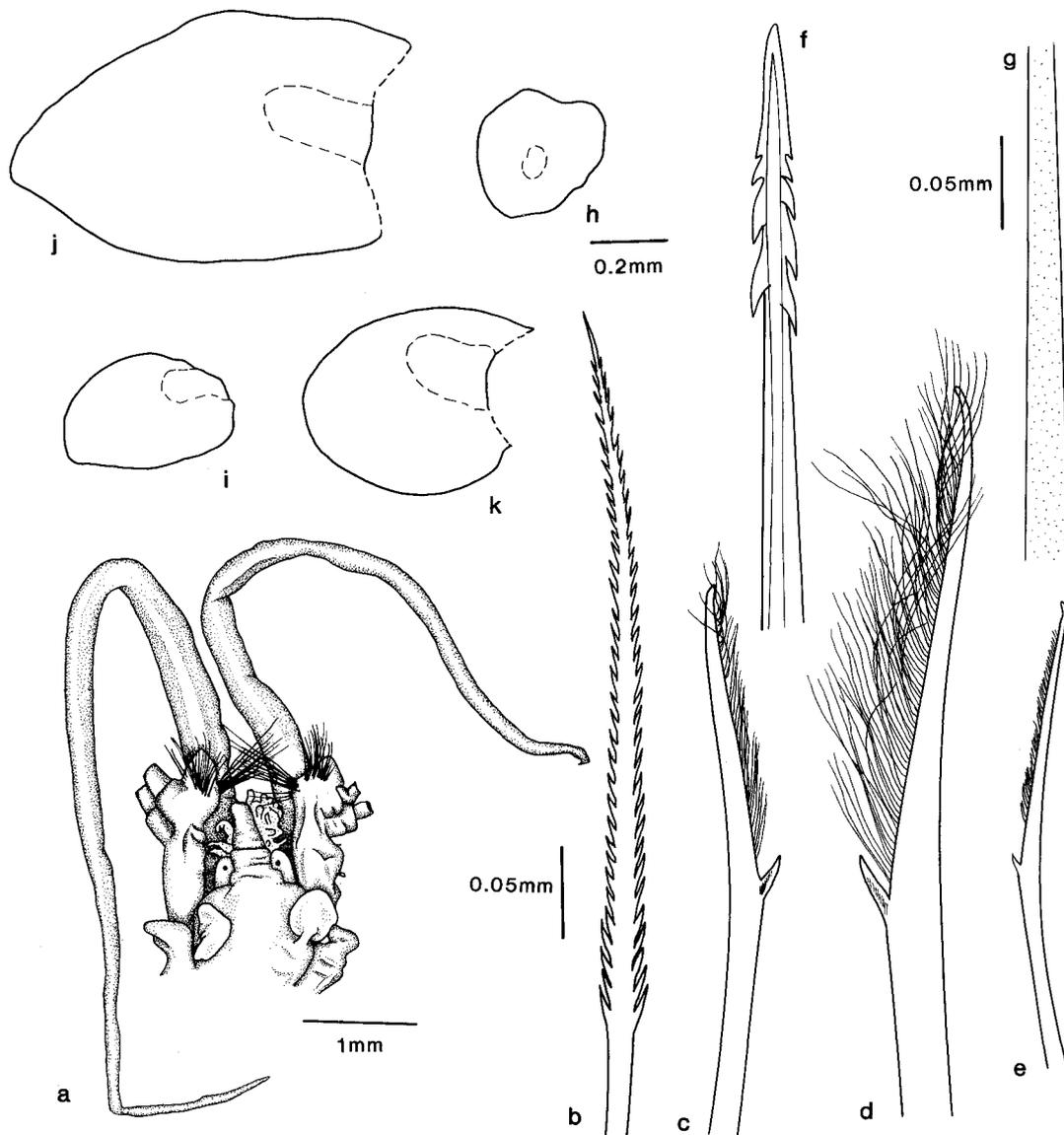
Figs 49a-k, 59F, Table 6

**Type material examined.** HOLOTYPE: Australia: Western Australia: west-south-west of Lancelin, 31°04'S 113°50'E, 23 Mar. 1972, 256 m (WAM 134-72), 3.3 cm long, 1.7 cm wide, 35 segments. PARATYPES: Western Australia: west-south-west of Lancelin, 31°04'S 113°50'E, 23 Mar. 1972, 256 m (BMNH ZB 1990.28), 2 cm long, 1 cm wide, 34 segments; Lancelin, 31°04'S 113°50'E, 23 Mar. 1972, 256 m (AM W20375), 2.5-3.5 cm long, 34 segments; Lancelin, 31°04'S 113°50'E, 23 Mar. 1972, 256 m (WAM 107-90), 2.5-3.5 cm long, 34 segments; Beagle Island, 49°43'S 114°17'E, 20 Mar. 1972, 274-283 m (USNM 148663), 3.8 cm long, 1 cm wide, 34 segments.

**Description.** Body cigar shaped, 3.3 cm long, 1.7 cm wide, 35 segments.

Dorsum cream coloured in alcohol, no felt covering elytra. Ventral surface cream coloured, covered with small, spherical papillae.

Prostomium rounded with 2 small ocular peduncles, equal in length to one-quarter of prostomium each with dorsal and ventral pale grey eyes. Median antenna ceratophore 2-jointed, one-third length of prostomium style missing. Facial tubercle ranging from three-quarters length of prostomium to length of prostomium, covered in long tapering papillae. Palps with small palpophores, extending to 13th segment, long, tapering, margins finely papillated. Pair of prominent, free nuchal flaps arising from posterolateral region of prostomium



**Fig.49.** *Laetmonice wonda* n.sp. Holotype (WAM 134-72): a, dorsal view of prostomium and first segment; b, bipinnate neuroseta from segment 3; c, neuroseta from segment 4; d, neuroseta from segment 16; e, neuroseta from segment 32; f, tip of harpoon notoseta from middle segment; g, part of distal half of acicular notoseta from middle segment; h, (AM W20374) first elytron; i, third elytron; j, eighth elytron; k, 14th elytron.

(Fig.49a).

Elytra 15 pairs, attached to elytophores on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra imbricating, semi-transparent, smooth, cream coloured, first pair small, rounded attached to elytophores in centre, following elytra larger, leaf-shaped, attached to elytophores laterally, posterior elytra small, oval, attached to elytophore laterally (Fig.49h-k).

First or tentacular segment with rectangular, elongated, uniramous parapodia, enlarged distally with short tuft of yellow setae on inner distal margins and longer tuft of setae on anterior end (Fig.49a).

Following segments with biramous parapodia, second, third and fourth neuropodia with 2 tiers of neurosetae; lower tier with tuft of numerous (100+) yellow, bipinnate neurosetae (Fig.49b); upper tier with 1-2 neurosetae with basal spur and fringe of hairs distally (Fig.49c). Ventral cirri on segment 2 slender, tapering, arising at base of neuropodia, extending past distal margins of neuropodia. Ventral cirri on segments 3 and 4 arising in middle of neuropodia, extending past distal margins of neuropodia.

Remaining neuropodia thin, cylindrical, elongate, with 3 golden yellow neurosetae, with basal spur and distal fringe of hairs (Fig.49d). Neurosetae of anterior and posterior segments with hairs of the fringe much shorter (Fig.49e). Ventral cirri slender, tapering, arising near base of neuropodia, extending to base of neurosetae.

Elytrigerous notopodia 3-13 with fan of 20 or more, fine, yellow, acicular notosetae with bases smooth and distal halves minutely tuberculated (Fig.49g) above elytophore attachment and lateral tuft of 6-7 long harpoon notosetae, half body width, with shafts, thick, smooth, golden brown, tips small, dark brown, 3-4 recurved fangs on lateral margins of setae (Fig.49f). Elytrigerous notopodia 2-15, with fan of fine yellow, unidentate notosetal spines. First elytrigerous notopodia without notosetae.

Cirrigerous notopodia with tuft of long, fine, pale yellow, mud-covered notosetae on posterior surface of notopodia. Dorsal cirri with long, cylindrical, 2-jointed cirrophore on distal tip of notopodia, style missing. Ventral surface of notopodia with fan of short, yellow notosetae, directed laterally.

**Variation.** Additional material examined ranges from 2.4-4.1 cm long, 1.5-1.9 cm wide and 34-35 segments. Some harpoon notosetae beset with minute tubercles, occurring half way down shaft.

**Remarks.** *Laetmonice wonda* n.sp. is characterised by purse-like nuchal flaps on the prostomium, neurosetae with a fringe of hairs on the longer branch and harpoon notosetae which have shafts ornamented with tubercles. Only one other species of *Laetmonice* from the Indo-Pacific has purse-like flaps on the prostomium, *L. producta* Grube, but this species has smooth shafted harpoon notosetae in contrast to the tuberculated shafts present in *L. wonda* n.sp. This

combination of characters present in *L. wonda* n.sp. clearly distinguishes it from all other described species of *Laetmonice* from the Indo-Pacific (see Table 6).

**Habitat.** Trawled at depths of 256-283 m.

**Etymology.** The specific name is from an aboriginal word *Wonda* meaning a shield, which refers to the shape of the new species.

**Distribution.** Australia (south-west Australia from Lancelin, WA, 31°04'S 113°50'E to Beagle Island, WA, 49°43'S 114°17'E, Fig.59F).

### *Laetmonice yarramba* n.sp.

Figs 50a-e, 51a-h, 59F, Table 6

**Type material examined.** HOLOTYPE: Australia: New South Wales: Botany, 34°00'S 151°11'E, 60-102 m (AM W850), 1.8 cm long, 0.6 cm wide, 31 segments. PARATYPES: New South Wales: Botany Bay, 34°00'S 151°11'E, 60-102 m (USNM 148664), 1.7 cm long, 0.6 cm wide, 29 segments; Malabar, 33°58'S 151°15'E, Mar. 1974, 4(BMNH ZB1990.23-26), 1.8-2 cm long, 0.8-1.2 cm wide, 33 segments; Lake Macquarie, 33°05'S 151°40'E, 31 July 1959, 139-146 m, 4(LACM-AHF POLY 1300), 2.5-4 cm long, 0.8-1.5 cm wide, 34 segments.

**Additional material examined.** WESTERN AUSTRALIA: Shark Bay, 25°31'S 112°29'E, 9 Oct. 1963, 130 m, 4(WAM 24-75), 1.4-1.9 cm long. NEW SOUTH WALES: off Woy Woy, 33°29'S 152°06'E, 11 Feb. 1986, 492-523 m (AM W20231), 1.5 cm long.

**Description.** Body cigar shaped, 1.8 cm long, 0.6 cm wide, 31 segments.

Dorsal surface cream in alcohol. Ventral surface cream coloured, covered with small rounded papillae. Felt absent.

Prostomium rounded with ocular peduncles one-third length of prostomium without eye pigment. Median antenna with ceratophore half length of prostomium, style blunt tipped, 5 times length of prostomium. Palps extending to segment 9-11, margins very finely papillated. Facial tubercle located under ceratophore, visible only ventrally, covered with small cylindrical papillae. Prostomial nuchal flaps absent (Fig.50a).

Elytra 13-15 pairs, with elytophores attached on segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. Elytra cream coloured, opaque, smooth, first pair missing, following elytra larger, ovoid to leaf-shaped, attached to elytophores laterally, posterior elytra small, triangular with rounded edges attached to elytophore laterally (Fig.50c-e).

First or tentacular segment with elongated, flattened, uniramous parapodia, projecting anteriorly and laterally to prostomium, rectangular, flattened with short tuft of fine yellow setae on inner edge. Dorsal and ventral

tentacular cirri with tentaculophores on outer edge of parapodia, slender, tapering with blunt tips, one-third length of palps.

Following segments with biramous parapodia (Fig.50b). Second, third and fourth neuropodia with 2 tiers of neurosetae. Lower tier consisting of numerous (50+) yellow, bipinnate neurosetae (Fig.51a), upper tier with 2 yellow neurosetae with basal spur and distal fringe of hairs (Fig.51b,c). Ventral cirri with bulbous base, tips tapering to fine point, extending past distal tips of neuropodia.

Remaining neuropodia elongated, covered in small rounded papillae, with 3-4 golden yellow neurosetae,

with basal spur and distal fringe of hairs (Fig.51d,e). Ventral cirri with bulbous base, arising in middle of neuropodia, not extending beyond ventral neurosetae.

Elytrigerous notopodia with tuft of stiff, yellow, smooth, mud-covered notosetae (Fig.51h), one-third length of harpoon notosetae. Lateral to this tuft, bundle of harpoon notosetae, as long as body width directed posterolaterally, with shafts smooth, tapering abruptly below tip with 3 recurved fangs on lateral margins (Fig.51f,g).

Cirrigerous notopodia with tuft of stiff, yellow, mud-covered notosetae on dorsal surface of notopodia, directed laterally and slightly posteriorly, as long as

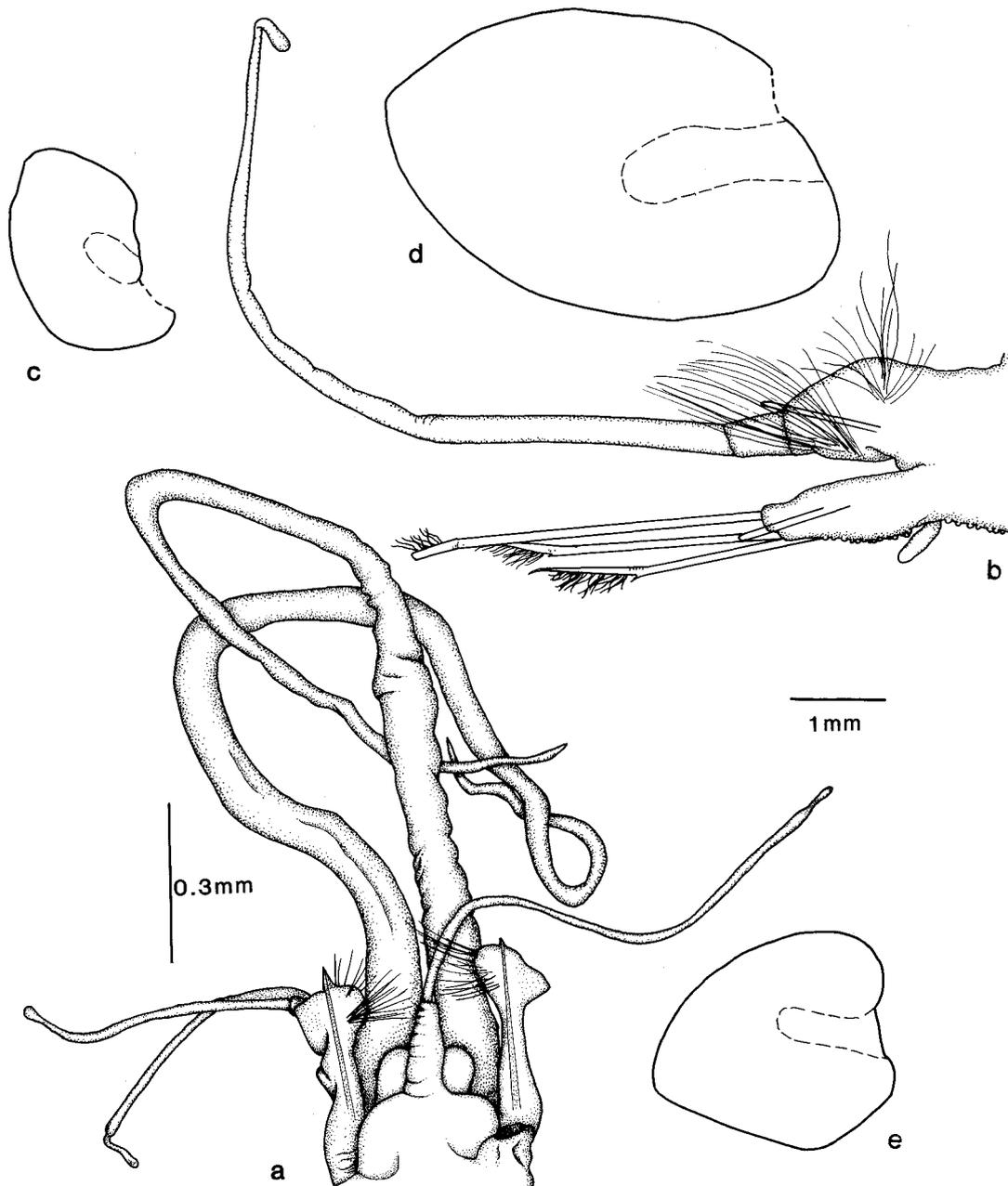


Fig.50. *Laetmonice yarramba* n.sp. Holotype (AM W850): a, dorsal view of prostomium and first segment; b, posterior view of parapodium 16; c, third elytron; d, eighth elytron; e, 14th elytron.

neuropodia. Ventral surface of notopodia with tuft of fine, mud-covered notosetae. Distal tip of neuropodia with cylindrical cirrophore, dorsal cirri posterior to notopodia and equal in length to harpoon notosetae, with blunt tips (Fig.50b).

**Variation.** Additional material examined ranges from 1.7-4 cm long, 0.6-1.5 cm wide, 29-34 segments. Some shafts of harpoon setae covered with small tubercles. Some specimens with transparent elytra and ventral surfaces without visible papillae.

**Remarks.** *Laetmonice yarramba* n.sp. is characterised by 13 to 15 pairs of elytra not covered in felt, finely papillated palps extending to ninth to 11th segment, three to four neurosetae with a fringe of hairs on the longer branch, harpoon notosetae with three recurved fangs, and some with tuberculated shafts (see Table 6). This combination of characters clearly distinguishes it from all other described species of *Laetmonice* from the Indo-Pacific.

**Habitat.** Trawled at depths of 60-523 m.

**Etymology.** The specific name is from an aboriginal word *Yarramba* meaning a shield, which refers to the shape of the new species.

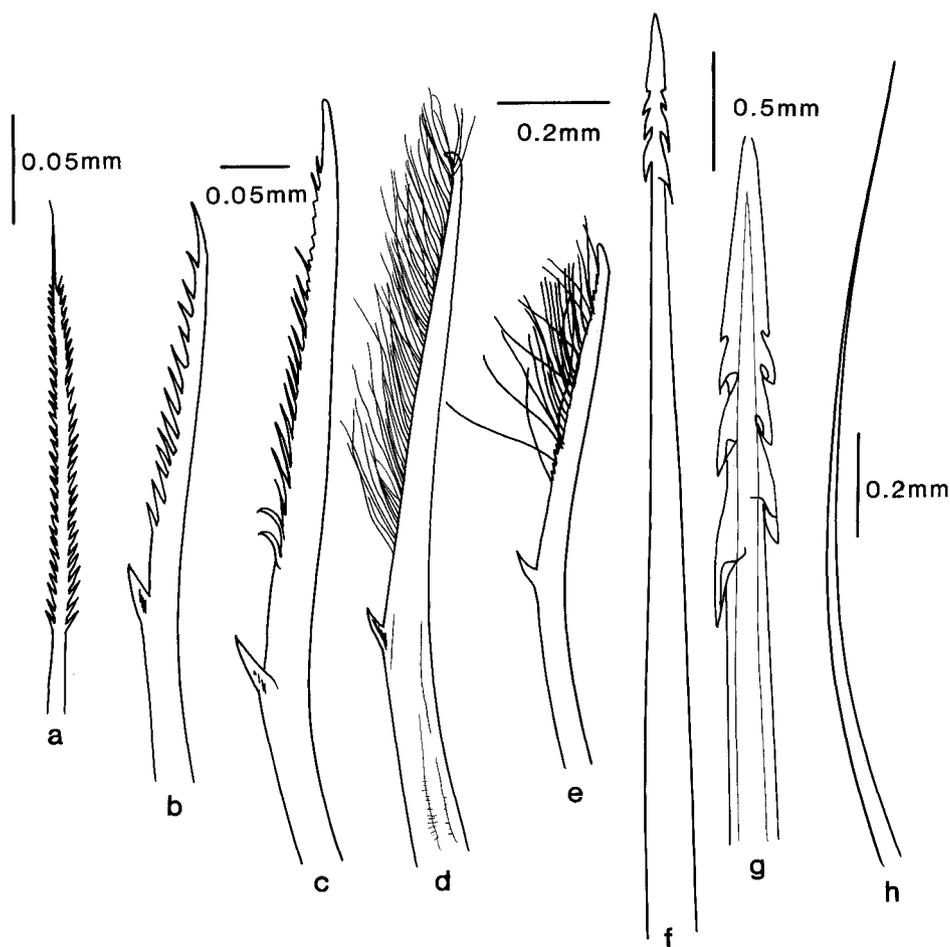
**Distribution.** Australia (Shark Bay, WA, 28°31'S 112°29'E to Lake Macquarie, NSW, 33°05'S 151°40'E, Fig.59F).

### *Palmyra* Savigny

*Palmyra* Savigny in Lamarck, 1818: 20.—Watson Russell, 1989: 40.

*Palmyropsis* Potts, 1910: 326 (fide Watson Russell, 1989: 40).

**Diagnosis.** Body broad, rectangular, with less than 40 segments. Thick epidermis with globular papillae. Prostomium with median antenna; 2 pairs of raised peduncles; 2 long palps; large facial tubercle. Segment 1 fused to prostomium with 2 pairs of tentacular cirri; short erect paleae fascicle, 2 fascicles of capillary notosetae. Large, flattened fascicles of broad paleae



**Fig.51.** *Laetmonice yarramba* n.sp. Holotype (AM W850): a, bipinnate neuroseta from segment 3; b, upper neuroseta from segment 3; c, neuroseta from segment 4; d, neuroseta from segment 16; e, neuroseta from segment 25; f, harpoon notoseta from middle segment; g, tip of harpoon notoseta from middle segment; h, acicular notoseta from middle segment.

which imbricate down and across dorsum. Lateral small notopodial lobes with capillary setae. Paleal fans and dorsal cirri alternate. Neurosetae bipinnate and bidentate.

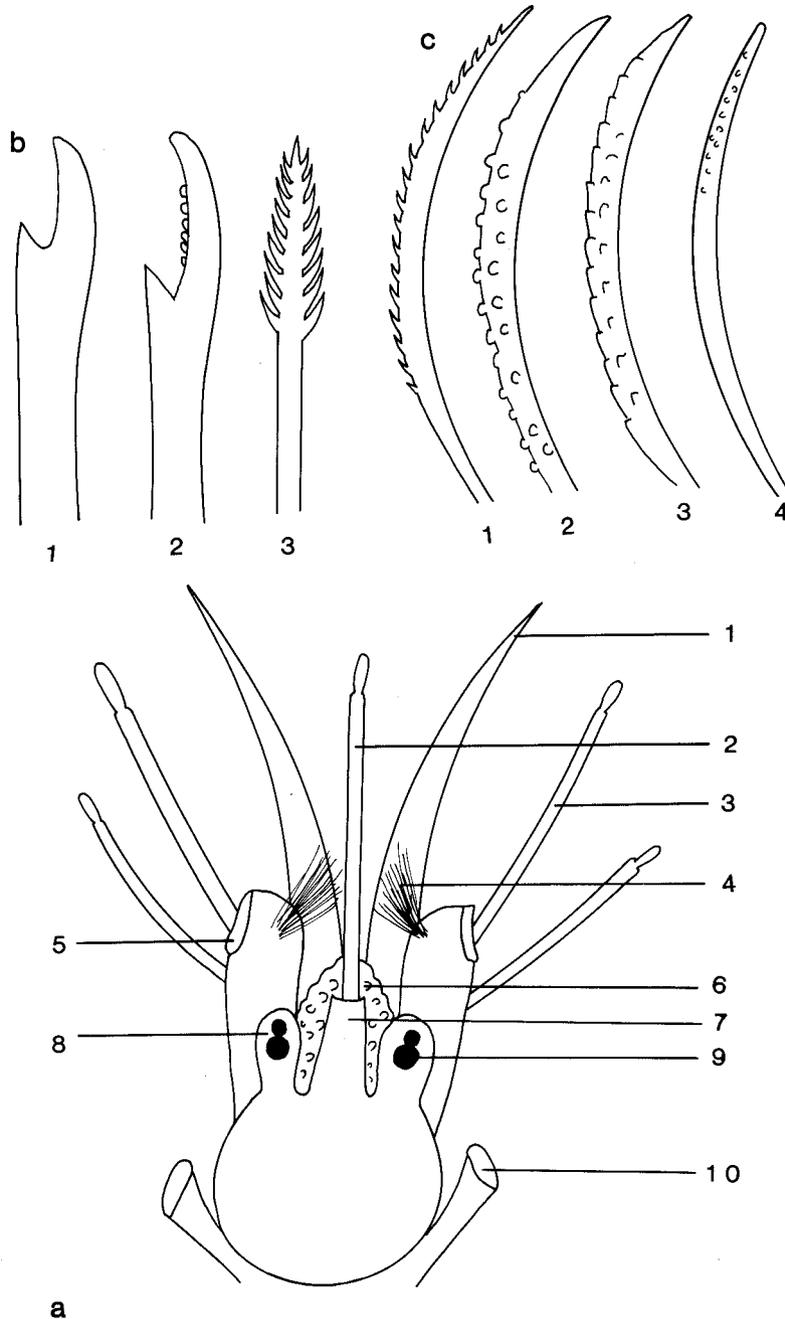
**Type species.** *Palmyra aurifera* Savigny, 1818, by monotypy.

**Remarks.** Watson Russell (1989) transferred this monospecific genus from the Chrysopetalidae to the

Aphroditidae. She suggests that this genus is most closely related to *Pontogenia*.

***Palmyra aurifera* Savigny**

*Palmyra aurifera* Savigny in Lamarck, 1818: 305.—Watson Russell, 1989: 44-51, pl.1a,b figs 1a-k, 2a-i, 3a-k, 4a-j, tables 1,2.



**Fig.52.** Generalised *Pontogenia*. a: dorsal view of prostomium and first segment - 1, palp; 2, median antenna; 3, tentacular cirrus; 4, setae; 5, tentaculophore; 6, facial tubercle; 7, ceratophore; 8, ommatophore; 9, eye; 10, elyrophore. b: neurosetal types - 1, bidentate; 2, bidentate with many small tubercles; 3, bipinnate. c: notosetal types - 1, paleal with long spines; 2, paleal, tuberculated; 3, paleal, serrated; 4, paleal, denticulated.

**Material examined.** None.

**Remarks.** Watson Russell (1989) has examined in detail the 13 Museum specimens known to exist of this species.

**Habitat.** Restricted to cracks and crevices in sponges, calcareous algae and corals.

**Distribution.** Western Indian Ocean, eastern Indian Ocean and Pacific Ocean (Watson Russell, 1989: fig.5).

*Pontogenia* Claparède

*Pontogenia* Claparède, 1868: 371-372.—Pettibone, 1966: 98.  
*Tricertia* Haswell, 1883:274.  
*Pontogenessa* Monro, 1924: 68-69.

**Diagnosis.** Aphroditids with dorsal felt poorly

developed, not covering elytra completely. Elytra up to 18 pairs, smooth. Prostomium with club-like ocular peduncles. Facial tubercle well developed, papillated. Noto setae of 3 kinds: long, capillary setae; large flattened paleal setae arched over dorsum, serrated or papillated along margin; short capillary setae. Neurosetae stout, with slightly curved tips, smooth or with lateral spur.

Some neurosetae of anterior few segments bipinnate.

**Type species.** *Hermione chrysocoma* Baird, 1865, by monotypy.

**Remarks.** The above generic diagnosis is based upon Pettibone (1966), who synonymised *Pontogenessa* Monro, 1924 with *Pontogenia*. We have synonymised the monospecific genus *Tricertia* Haswell with *Pontogenia* as the type species of the genus *T. araeoceras* Haswell is clearly a species of *Pontogenia* as the notosetae are flattened and marginally serrated. In Figure 52 we figure a generalised *Pontogenia* and the types of setae present.

**Key to the Indo-Pacific Species of *Pontogenia* \***

- 1. Ceratophore longer than prostomium .....2
- Ceratophore shorter than prostomium .....3
- 2. Paleal notosetae tuberculated (Fig.54e-g), about 23 present .....*Pontogenia araeoceras*
- Paleal notosetae with small denticles, about 14 present .....*Pontogenia villosa*
- 3. Paleal notosetae about 10-25, denticulated giving serrated appearance (Fig.56e-g) .....*Pontogenia macleari*
- Paleal notosetae about 25 with long spines on each edge (Fig.57b) .....*Pontogenia spinosa*

\* We have not included *P. indica* Grube in the key as the original description is incomplete and we were not able to examine any material of this species.

***Pontogenia araeoceras* (Haswell)**

Figs 53a-f, 54a-h, 59D, Table 10

2(AM W20757), 0.95-1.7 cm long; Outer Yonge Reef, 14°36'S 145°38'E, 15 Jan. 1977, 20 m, 2(AM W20756), 3.3-4.3 mm long.

*Tricertia araeoceras* Haswell, 1883: 274-275, pl.VIII figs 8-13, pl.VIII figs 1,2.

**Type material examined.** HOLOTYPE: Australia: Queensland: Port Molle, 20°20'S 148°51'E, Sept. 1908, 27.4 m (AM G11273), 2.5 cm long, 0.9 cm wide, 46 segments.

**Additional material examined.** WESTERN AUSTRALIA: Cathedral Rocks, 32°00'S 115°30'E, 15 Jan. 1991, 6 m (AM W20758), 1.5 cm long. QUEENSLAND: Outer Yonge Reef, 14°36'S 145°38'E, 15 Jan. 1977, 10 m (AM W20759), 1.6 mm.; Outer Yonge Reef, 14°36'S 145°38'E, 15 Jan. 1977,

**Description.** Body elongate oval, 0.16-2.5 cm long, 0.08-0.9 cm wide, 14-46 segments.

Dorsum cream coloured in alcohol, fine white felt notosetae covering elytra. Ventral surface cream, covered with many minute spherical papillae.

Prostomium rounded, 2 long ocular peduncles, half length of prostomium, 1 pair of grey eyes. Ceratophore, just longer than prostomium, median antenna with finely tapered articulate tip, one-quarter times longer than palps. Facial tubercle, papillated, located below ceratophore, visible only ventrally. Palps extending to sixth segment, margins covered in fine hairs (Fig.53a).

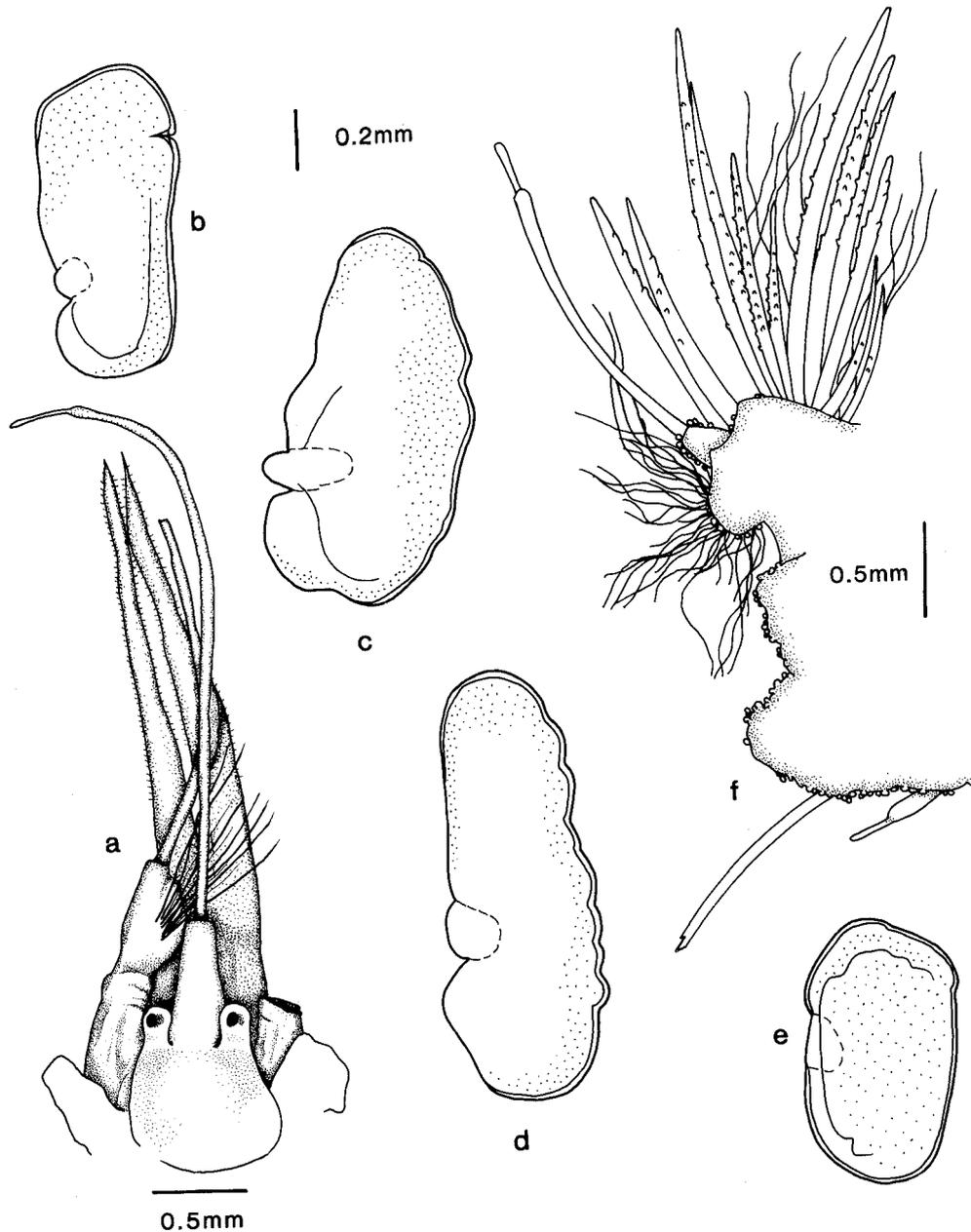
Elytra 15 pairs, attached on elythrophones of segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 28 and 31. First pair of elytra oval with elythrophone attached laterally, remaining elytra large, oblong with rounded edges, convoluted on margins, elythrophones attached anteriolaterally (Fig.53b-e).

First or tentacular segment with elongated uniramous parapodia, with asymmetrical terminal lobe. Tuft of pale yellow, fine, unidentate setae emerge radially from distal margins of lobe. 2 pairs of cirri with finely tapered articulate tips, both arising from anterior tip of parapodia,

dorsal pair three-quarters length of palps, ventral pair shorter than dorsal pair.

Following segments with biramous parapodia (Fig.53f). Second and third neuropodia squat, papillated, with 2 tiers of neurosetae; lower tier with small tuft of about 10 bipinnate neurosetae (Fig.54a); upper tier with 2-4 golden yellow, bidentate neurosetae with small tubercles on curved margins (Fig.54b).

Following segments with neuropodia stout, triangular, covered with small spherical papillae, with 3-4 golden yellow, stout, bidentate neurosetae (Fig.54c, d). Ventral



**Fig.53.** *Pontogenia araeoceras*. Holotype (AM G11273): a, dorsal view of prostomium and first segment; b, (AM W20757) third elytron; c, eighth elytron; d, 14th elytron; e, first elytron; f, posterior view of parapodium.

cirri with proximal region thick, distal region thin, extending to just below tip of neuropodia, except for ventral cirri on segment 2, which has long cirrophores, covered in cylindrical papillae, twice length of neuropodia. Notopodia stout with 2 kinds of notosetae, unidentate, mud-covered setae, and paleal setae arranged in 3 rows, fanning over dorsal surface of notopodia. Notosetal paleae golden brown, covered in minute tubercles (Fig.54e-h) arranged as follows; lateral group of 8 paleae which fan over neuropodia; 2 inner groups consisting of 6 and 9 paleae which fan over dorsum, almost touching mid-dorsally. Dorsal cirri with finely tapered articulate tips, length of paleal notosetae.

**Variation.** Ocular peduncles present on holotype only, the smaller remaining specimens with ocular peduncles fused to median ceratophore. Paleal notosetae on holotype large, cover the entire dorsum, smaller specimens with large paleal notosetae on anterior segments only, middle and posterior segments with small paleal notosetae, pointing medially, covered by felt.

**Remarks.** In his original description Haswell (1883) mentions the specimen having three tentacles emerging from the prostomium. However, the two outer tentacles are actually the dorsal cirri of the first tentacular segments. In Day & Hutchings (1979) the synonymy of *Tricertia araeoceras* with *P. araeoceras* was indicated by Kudenov, fide personal communication. Kudenov does not appear to have subsequently published this synonymy but we support his conclusions.

Pettibone's (1966) generic description of *Pontogenia* states that bipinnate neurosetae are absent on the anterior few segments. However, bipinnate neurosetae

are present on the smaller specimens, the holotype was in a poor condition and bipinnate neurosetae were not observed.

**Habitat.** Found on dead coral substrate, coralline algae and reef limestone at depths of 10-27.4 m.

**Distribution.** Australia (Cathedral Rocks, WA, 32°00'S 115°30'E to Outer Yonge Reef, Qld, 14°36'S 145°38'E, Fig.59D).

*Pontogenia macleari* (Haswell)

Figs 55a-f, 56a-g, 59D, 60, Table 10

*Hermione macleari* Haswell, 1883: 273.

*Hermonia macleari* Hartman, 1959: 56.

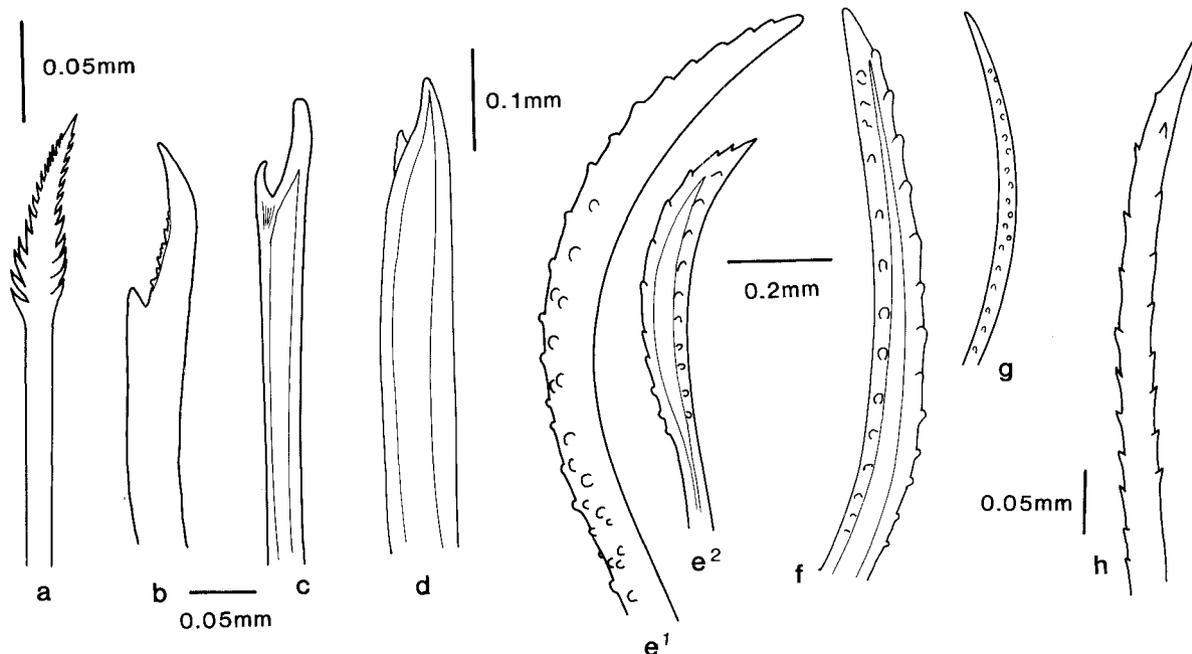
*Pontogenia nuda* Horst, 1917: 62, pl.XIV figs 5-7.

**Type material examined.** HOLOTYPE: Australia: Queensland: Port Molle, 20°20'S 148°51'E, Sept. 1908, 25.6 m (AM G11272), 4.3 cm long, 1.1 cm wide, 39 segments.

**Additional material examined.** VICTORIA: Discovery Bay, 38°13'S 141°14'E, July 1969, 82-91 m (NMV F57188), 0.7 cm long. NEW SOUTH WALES: Balls Pyramid, 31°33'S 159°05'E, 22 Nov. 1960, 91-183 m (AM W20226), 0.9 cm long.

LECTOTYPE of *Pontogenia nuda*. Indonesian Archipelago: Stn 204: east of Buton Strait, 75-94 m (ZMA V.Pol 1189), 3.1 cm long, 1.1 cm wide, 37 segments.

NEW CALEDONIA: Kunie Island, 22°50'S 167°34'E, 8 May 1971, 274 m, 2(AM W20227), 1.6 cm long.



**Fig.54.** *Pontogenia araeoceras* (AM W20757): a, bipinnate neuroseta from segment 3; b, neuroseta from segment 4; c, neuroseta from segment 36; d, neuroseta from segment 16 (Holotype); e<sup>1,2</sup>, notoseta from segment 4; f, notoseta from middle segment (Holotype); g, notoseta from segment 16; h, notoseta from segment 36.

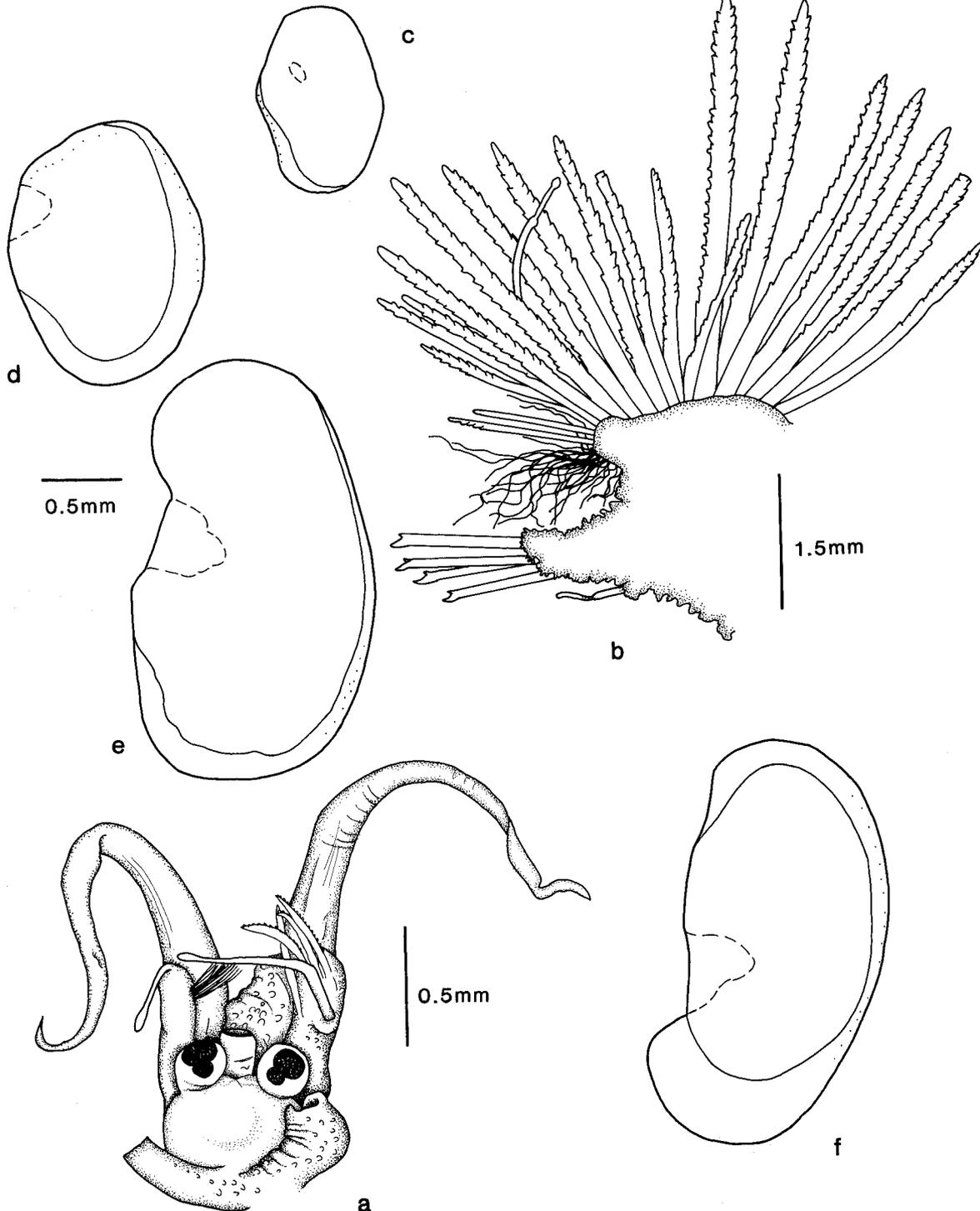
**Description.** Body elongate oval, 0.9-4.3 cm long, 0.3-1 cm wide, 29-39 segments.

Dorsum covered in fine creamy grey felt covering elytra. Whole dorsum covered by golden brown notosetae. Ventral surface grey in alcohol, covered with many, small spherical papillae.

Prostomium small, rounded with two ocular peduncles, three-quarters length of prostomium, with one pair of

large, dark grey eyes. Ceratophore just shorter than prostomium, median antenna (missing on holotype, but scar visible) 2 times length of prostomium with clavate tip. Palps extending to fifth segment, margins finely papillated. Facial tubercle covered in elongate papillae, equal to length of prostomium (Fig.55a).

Elytra 15 pairs, attached on elytraphores of segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27 and



**Fig.55.** *Pontogenia macleari*. Holotype (AM W5436): a, dorsal view of prostomium and first segment; b, posterior view of parapodium; c, (AM W20226) first elytron; d, third elytron; e, eighth elytron; f, 14th elytron.

30. Elytra thickened medially with thin edges, first pair rounded with elythrochore attached centrally, following elytra large, oval with elythrochore attached laterally. All elytra with some scattered micropapillae (Fig.55c-f).

First or tentacular segment with elongated, uniramous parapodia, projecting anteriorly and laterally to prostomium. Inner distal edge of parapodia with fan of stiff, golden brown paleae. Two pairs of slender, clavate-tipped tentacular cirri on distal margins of parapodia, dorsal cirri, half length of palps, longer than ventral cirri. Posterior to ventral pair of tentacular cirri occurs tuft of short, fine, mud-covered setae (Fig.55a).

Following segments with biramous parapodia (Fig.55b). Second and third neuropodia squat, papillated, with 2 tiers of neurosetae; lower tier with small tuft of about 20 bipinnate neurosetae (Fig.56a); upper tier with 2-4 golden yellow, bidentate neurosetae. Large papillated cirrophore arises at base of neuropodia, ventral cirri clavate-tipped, 2 times length of neuropodia, except ventral cirri on 3rd neuropodia not extending to distal margin of neuropodia.

Remaining neuropodia stout, rectangular, densely papillated, with 2-4 golden yellow, stout, bidentate neurosetae (Fig.56b,c). Posterior neurosetae thinner,

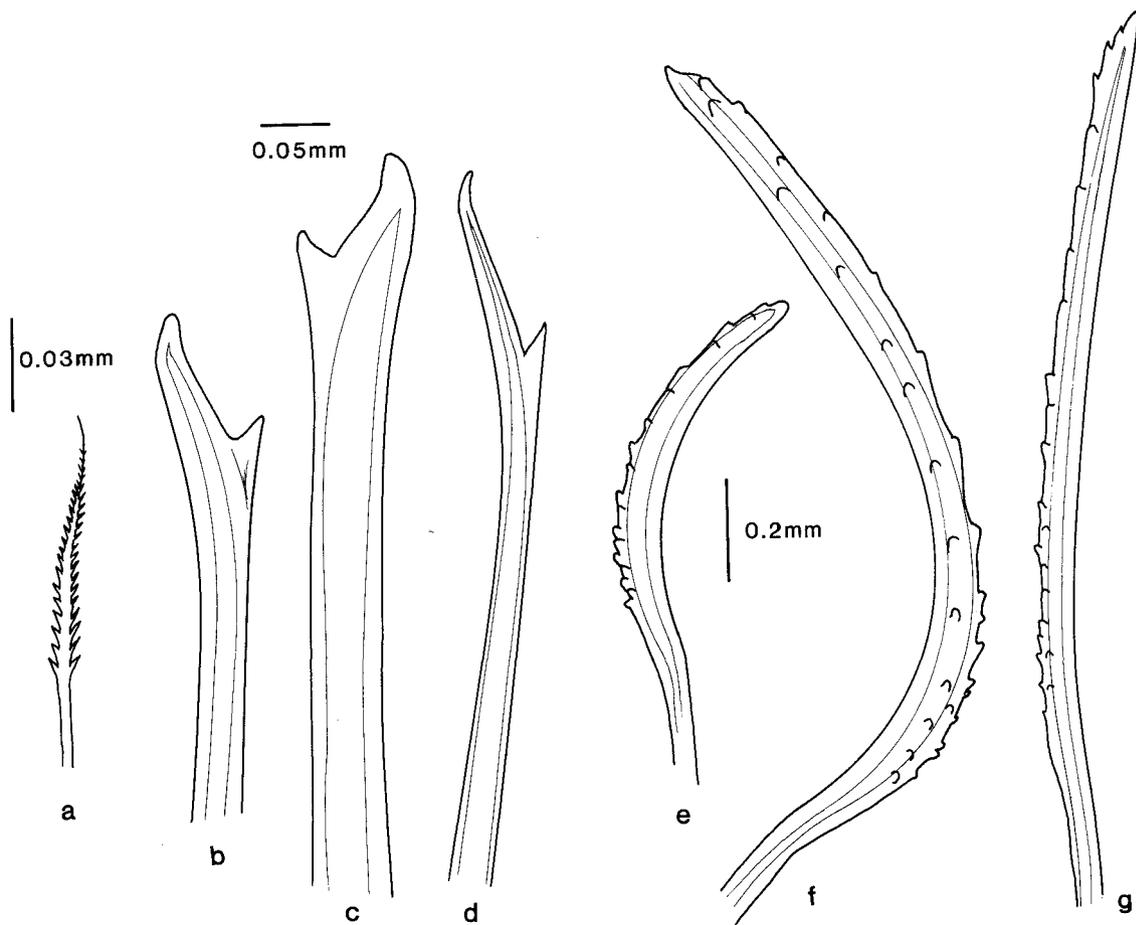
elongate (Fig.56d). Ventral cirri, clavate-tipped, not extending past distal tip of neuropodia (Fig.55b).

Remaining notopodia squat, with tuft of fine, mud-covered, capillary setae on ventral surface, length of neuropodia (not including neurosetae). Dorsal surface of notopodia with fan of 10-25, golden brown, notosetal paleae with denticles along each edge, giving serrated appearance, pointing posteriorly (Fig.55b, 56e-g). Tuft of fine, short, mud-covered, capillary notosetae arising from middle of each fan of paleae. Dorsal cirri with clavate tips, length of notosetal paleae (Fig.55b).

**Variation.** Ocular peduncles with two pairs of large grey, contiguous eyes, lateral pair larger on specimens from Balls Pyramid and one of the specimens from New Caledonia.

**Remarks.** The holotype is in poor condition, broken in two pieces, with fragile elytra, probably due to long term storage in alcohol. The description is therefore a composite one being based upon the holotype and other material examined.

Although Haswell (1883) originally described this species as belonging to *Hermione* Blainville, 1828, the



**Fig.56.** *Pontogenia macleari* (AM W20226): a, bipinnate neuroseta from segment 3; b, neuroseta from segment 4; c, neuroseta from segment 16; d, neuroseta from segment 30; e, notoseta from segment 4; f, notoseta from segment 16; g, notoseta from segment 30.

species clearly belongs in the genus *Pontogenia* Claparède, 1868; as harpoon notosetae are absent. The presence of such setae is diagnostic for *Laetmonice* Kinberg, 1856 (which incorporates *Hermionia*, see Pettibone, 1966 and comments on *Laetmonice* in this paper). Even though the type is in poor condition, it is certain that harpoon notosetae are completely lacking in the type specimen and we therefore have placed the species in the genus *Pontogenia*.

We have also synonymised *P. nuda* Horst, 1917 with *P. macleari* Haswell, 1883 as both type specimens are similar in all respects *Pontogenia nuda* Horst, 1917 was so called because of its lack of a dorsal felt, the holotype of *P. macleari* also lacks a dorsal felt, these specimens are both large individuals. The smaller specimens examined did possess a fine dorsal felt suggesting that the felt deteriorates with size and presumably age. In Table 10 we give the diagnostic characters of the Indo-Pacific species of *Pontogenia*.

**Habitat.** No habitat information given, found at depths of 25.6-274 m.

**Distribution.** Australia (Balls Pyramid, NSW, 31°33'S 159°05'E to Port Molle, Qld, 20°20'S 148°51'E, Fig.59D). New Caledonia; Indonesian Archipelago (Fig.60).

*Pontogenia spinosa* Horst

Figs 57a,b, 60, Table 10

*Pontogenia spinosa* Horst, 1917: 62-63, pl.XIV figs 8,9.

**Type material examined.** LECTOTYPE: Indonesian Archipelago Stn 154: Waigeu Island, 0°7.2'N 130°25.5'E, 83 m (ZMA V.Pol 1190), 2.5 cm long, 0.65 cm wide, 35 segments.

**Description.** Body elongate, oval, 2.5 cm long, 0.65 cm wide, 35 segments.

Dorsum cream coloured in alcohol, covered with felt. Ventral surface cream coloured, densely papillated.

Prostomium rounded with 2 large ocular peduncles, two-thirds length of prostomium, 2 pairs of dark grey eyes, anterior pair larger. Ceratophore cylindrical, covered in fine papillae, two-thirds length of prostomium, median antenna 3 times length of prostomium, clavate-tipped. Palps smooth, tapering, extending to segment 5. Facial tubercle situated below median ceratophore, therefore visible only ventrally, covered in elongate papillae.

Elytra 15 pairs, attached on elytophores of segments 2, 4, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27 and 30. Elytra thin, semi-transparent, first pair rounded with elytophore attached laterally, following elytra large, oval with elytophores attached laterally, posterior elytra small elongate with elytophores attached anterolaterally.

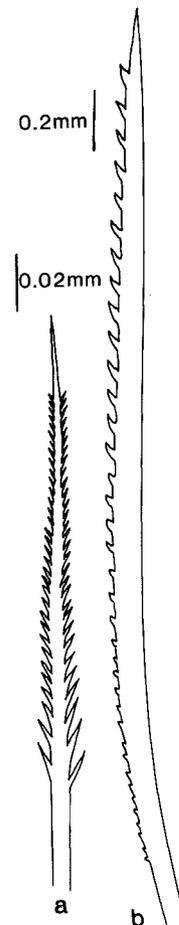
First or tentacular segment with uniramous parapodia, distal tip with tuft of mud-covered, fine capillary setae

and short paleal setae. Two pairs of cylindrical tentaculophores covered in elongate papillae, styles clavate tipped, dorsal pair one-third length of median antenna, ventral cirri just shorter than dorsal cirri.

Following segments with biramous parapodia. Second and third neuropodia squat, papillated, with 2 tiers of neurosetae; lower tier with small tuft (20+) of bipinnate neurosetae (Fig.57a); upper tier with 2-3 neurosetae, all broken.

Remaining neuropodia stout, densely papillated, with 3-4 pale yellow, stout, bidentate neurosetae. Ventral cirri, clavate-tipped, extending to distal tip of neuropodia.

Remaining notopodia squat, with fan of fine, mud-covered, pale yellow capillary setae on ventral surface. Lateral edge with fan of 10 or more, short, pale yellow paleal notosetae, most broken. Dorsal surface of notopodia with 3 fans of about 25, golden yellow, notosetal paleae with long spines along each edge (Horst, 1917: pl.XIV fig.8) (Fig.57b), medial notosetae finer, fanning across dorsum, remaining pointing dorsoposteriorly. Dorsal cirri with clavate tips, length of notosetal paleae, emerging from posterior edge of notopodia.



**Fig.57.** *Pontogenia spinosa* (ZMA V.Pol 1190): a, bipinnate neuroseta from segment 3; b, notoseta from middle segment.

**Remarks.** The species is known only from Horst's material, and the diagnostic features of this species are given in Table 10.

**Habitat.** Trawled at a depth of 83 m.

**Distribution.** Waigeu Island, Indonesian Archipelago (Fig.60).

*Pontogenia villosa* Horst

Figs 58, 60, Table 10

*Pontogenia villosa* Horst, 1917: 95, figs 1,2.—Monro, 1931: 3-4, fig.1a-c.

**Type material examined.** LECTOTYPE: Indonesian Archipelago Stn 131: Karakelang Islands: Beo, 4°14'N 126°47'S (ZMA V.Pol 1691), 2.4 cm long, 1 cm wide, 34 segments.

**Description.** Body elongate, oval, 2.4 cm long, 1 cm wide, 34 segments.

Dorsum tan coloured in alcohol, covered with thick felt obscuring paleal notosetae. Ventral surface tan coloured, finely papillated.

Prostomium partly hidden by segment 2, rounded with 2 large ocular peduncles, same length as prostomium, 2 pairs of dark grey eyes, ventral pair larger. Ceratophore cylindrical, covered in fine, elongate papillae, twice length of prostomium, median antenna same length as median ceratophore, but looks like it is broken. Facial tubercle small situated below median ceratophore, therefore visible only ventrally, covered in elongate papillae. Palps short, finely papillated.

First or tentacular segment with uniramous

parapodia, removed from specimen, distal tip with tuft of fine, mud-covered, setae. Two pairs of cylindrical tentaculophores covered in elongate papillae, styles sub-equal in length, clavate-tipped with some small papillae.

Following segments with biramous parapodia. Neurosetae on segments 2-4 broken off, therefore presence or absence of bipinnate neurosetae cannot be determined.

Remaining neuropodia with 4 golden yellow, stout, bidentate neurosetae (Horst, 1917: fig.2). Ventral cirri, clavate-tipped, not extending to distal tip of neuropodia.

Remaining notopodia with dorsal surface with fan of about 14 golden yellow, slightly curved notosetal paleae with small denticles (Horst, 1917: fig.1) (Fig.58), also long felt notosetae, some jointed. Ventral surface of notopodia with tuft of fine, unidentate, mud-covered notosetae also mud-covered capillary notosetae. Dorsal cirri with elongate cylindrical cirrophores with small papillae, styles with clavate tips, shorter than notosetal paleae.

**Remarks.** Specimen gravid indicating mature size. Elytra were not described as only one specimen was available for examination with the dorsal felt still intact. The main diagnostic characters of this species, which is only known from Horst's material are given in Table 10.

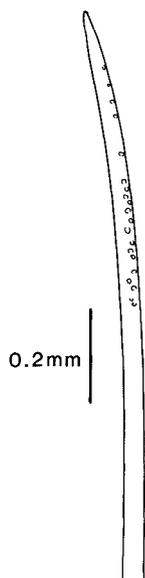
**Habitat.** Trawled, depth not recorded.

**Distribution.** Karakelang Islands, Indonesian Archipelago (Fig.60).

## Discussion

While this study of Australian aphroditids has revealed several new species together with new records of species previously known only from the original record, one Australian species is only known from the single original record, *Aphrodita terraereginae* Haswell. This is probably a reflection of the lack of collecting from offshore areas in Australia rather than their limited distribution. We also anticipate that additional species are present in Australian waters.

Of the 18 species of Aphroditidae presently recorded from Australian waters, only five are known to occur outside Australian waters. We anticipate this will change with increased collecting in the Indo-Pacific region. Of these five species, four occur in the Indonesian Archipelago and one occurs in New Zealand waters. The remaining 16 species are currently known only from the original type material collected in the Indonesian Archipelago. As many of these species occur in deep water, one might have expected more species to occur in both the Indonesian Archipelago and Northern Australia, and this perhaps is



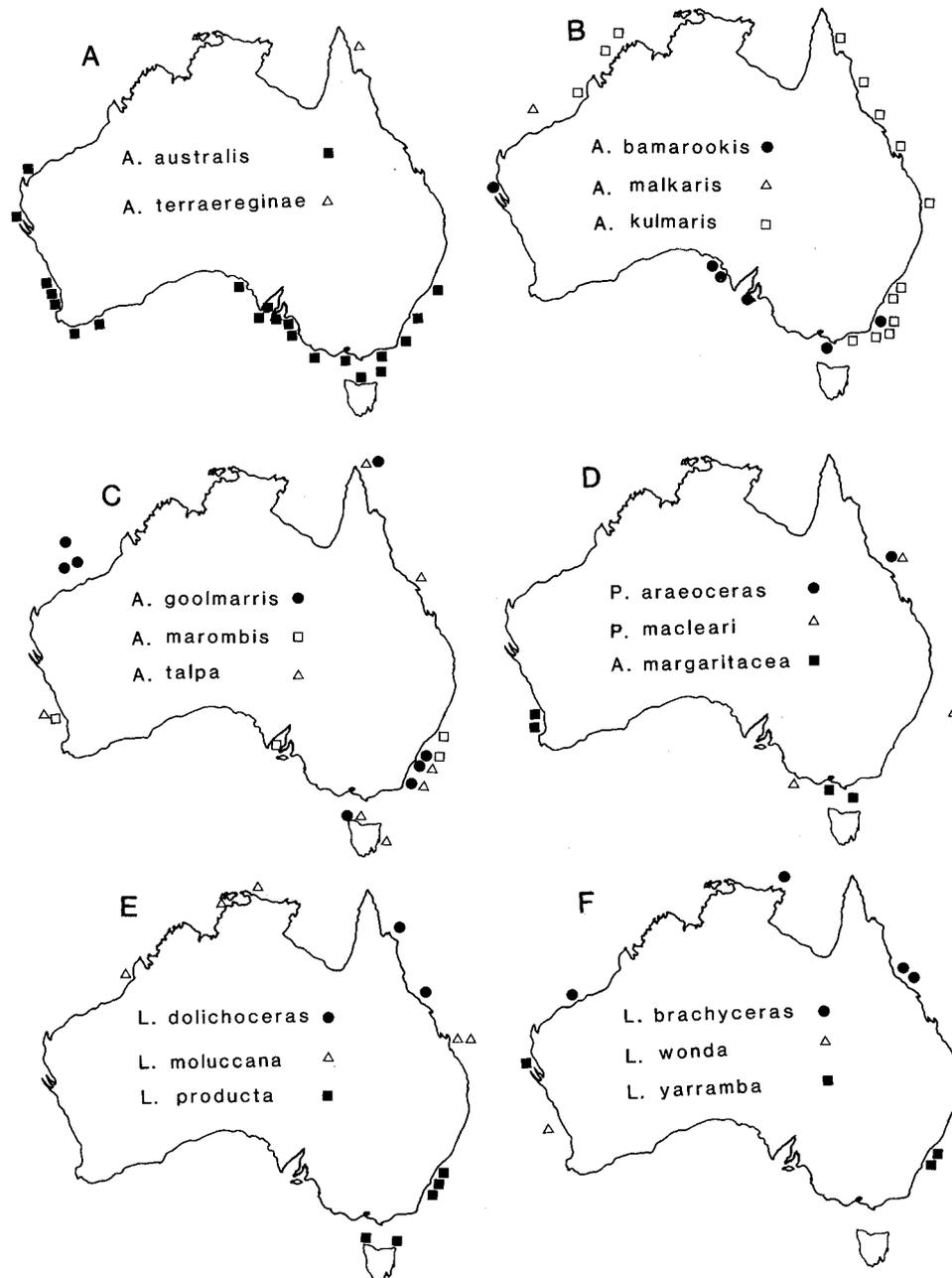
**Fig.58.** *Pontogenia villosa* (ZMA V.Pol 1691): notoseta from middle segment.

a reflection of the limited collecting carried out offshore in northern Australia.

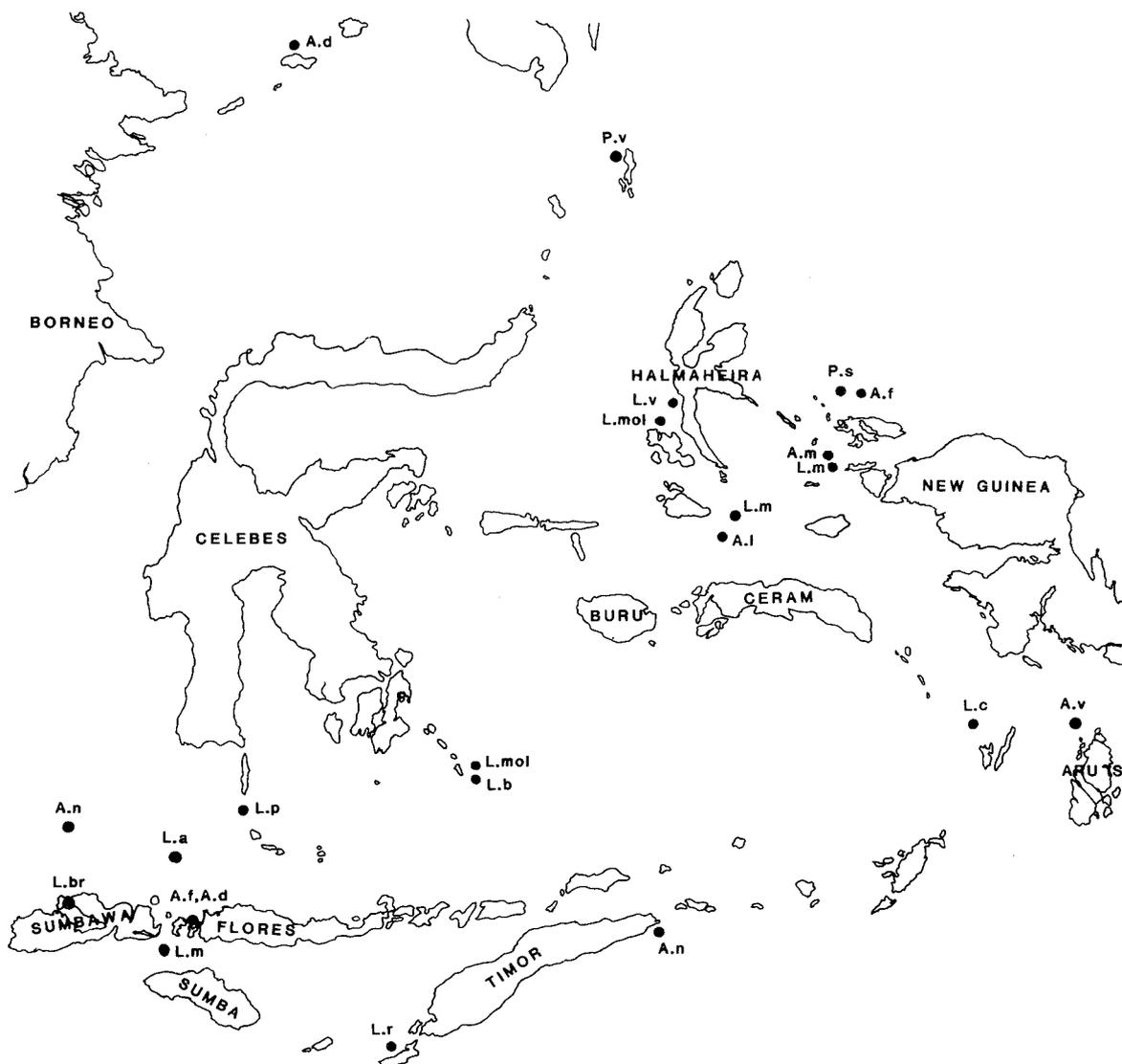
Currently the Australian species exhibit three major geographical patterns, species with extensive geographical ranges such as *A. australis* Baird and *A. goolmarris* n.sp., and those with a restricted distribution such as *L. dolichoceras* (Haswell) and *L. wonda* n.sp. and those which are currently known only from one locality, *A. malkaris* n.sp. Unfortunately, no recent survey of aphroditids has occurred elsewhere, so we cannot put our study into a

broader biogeographical context. Although the family Terebellidae, which is well represented in Australian waters both at depth and in shallow waters exhibits similar patterns (Hutchings & Glasby, 1991).

Our study has also highlighted the need for generic revisions within this family, all the genera were described in the late 1800s and early 1900s as aphroditids are typically large and conspicuous. The type species of the genera need to be re-examined and we suspect that several undescribed genera are present within the family.



**Fig.59.** The Australian distribution of A-C, *Aphrodita* spp; D, *Pontogenia* spp and *Aphrogenia* spp; E, F, *Laetmonice* spp.



**Fig.60.** Indonesian Archipelago showing type localities of Horst's Siboga material of family Aphroditidae: A.d. = *Aphrodita decipiens*, A.f. = *Aphrodita floresiana*, A.l. = *Aphrodita limosa*, A.m. = *Aphrodita malayana*, A.n. = *Aphrogenia nigropunctata*, A.v. = *Aphrogenia villosa*, L.a. = *Laetmonice arenifera*, L.b. = *Laetmonice batheia*, L.br. = *Laetmonice brachyceras*, L.c. = *Laetmonice conchifera*, L.m. = *Laetmonice malayana*, L.mol. = *Laetmonice moluccana*, L.p. = *Laetmonice parva*, L.r. = *Laetmonice rugosa*, L.v. = *Laetmonice viridescens*, P.n. = *Pontogenia nuda*, P.s. = *Pontogenia spinosa*, P.v. = *Pontogenia villosa*.

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Table 1. Distinguishing characters of Australian and Indo-Pacific species of *Aphrodita*.

Species name	Length (cm)	No. of segments	Eyes	Median antenna	Palps (extending to setiger no.)	Facial tubercle	Notosetae	Lateral Fringe	Neurosetae	No. of Neurosetae	Distribution
<i>Aphrodita australis</i> Baird, 1865	1.4-19	41-45	1-2 pairs, large contiguous	small spherical papilla	5-8 finely papillated	3/4 to length of prostomium	smooth, thick, golden brown	long, iridescent green	smooth with slightly curved tips	7-8	Australia Japan* New Zealand*
<i>Aphrodita bamarookis</i> n.sp.	3-6	49-52	1 pair, small, grey	small papilla	4-6 smooth	length of prostomium	fine, slightly iridescent	long iridescent, cream/pink	smooth subulate	24-27	Southern Australia
<i>Aphrodita decipiens</i> (Horst, 1916b)	1-2	35	2 pairs raised, ocular area	1 slender length prostomium	6-7 finely papillated	length prostomium	golden brown, covered in tubercles with fine hooked hairs, tip	short mud covered	slightly curved with plumose edge	7-8	Indonesian Archipelago
<i>Aphrodita floresiana</i> Horst, 1916b	0.8-2.7	28-34	2 pairs, small raised ocular area	small ceratophore style thin, 3/4 length prostomium	6-7 finely papillated	length of prostomium	stout, short, covered in tubercles bent, slightly hooked tips	short mud covered	slightly curved with plumose edge	11-16	Indonesian Archipelago
<i>Aphrodita goolmarris</i> n.sp.	2.6-6	35-41	absent, raised ocular area	rod-shaped, 1/5 prostomium	7-11 smooth or finely papillated	length of prostomium	stout, golden brown	short, faintly iridescent	pilose tipped	14-26	Australia
<i>Aphrodita japonica</i> Marenzeller, 1879	4.7-15.1	36-42	2 pairs, small slightly raised	1 1/3 x length of prostomium	* 4 length prostomium, finely papillated	shorter than prostomium	smooth, thick entangled in felt	iridescent reddish	slightly curved tips	16-21	Southern Japan <sup>†</sup>
<i>Aphrodita kulmaris</i> n.sp.	1.8-10	38-46	2 pairs, grey	small papilla	5-7 papillated	1-2x length prostomium	stout, golden brown, smooth	long, iridescent red/green	some pilose tipped	21-29	Eastern and western Australia
<i>Aphrodita limosa</i> (Horst, 1916b)	2.7	36	absent raised ocular area	thin 3/4 length of prostomium	finely papillated 7	length of prostomium	smooth bases distal regions with fine tubercles and hairs hooked tips, entangled in felt	short mud covered	slightly curved tips with plumose edge	11-12	Indonesian Archipelago

Table 1 (cont'd).

<i>Aphrodita malayana</i> (Horst, 1916b)	3.5-3.7	32-38	absent raised ocular area	slender just longer than prostomium	6, finely papillated	length of prostomium	long, stout, dark brown, finely tuberculated	cream mud covered shorter than neurosetae	slightly curved tips with plumose edge	8	Indonesian Archipelago
<i>Aphrodita malkaris</i> n.sp.	2.7-3	33-35	absent, raised ocular area	bulbous, 1/3 prostomium	7 smooth	shorter than prostomium	long with triangular tips	short, faintly iridescent	slightly curved ends, extra teeth or plumose edge	12-13	Western Australia
<i>Aphrodita maorica</i> Benham, 1900	6.3	?	?	?	?	?	long, bronze	short yellow mud covered	stout, brown	15	New Zealand'
<i>Aphrodita marombis</i> n.sp.	1.3-2.8	32-36	2 pairs, slightly raised ocular area	small papilla 1/3 length prostomium	4-5 finely papillated	length of prostomium	stout, covered in small tubercles	short, mud-covered	smooth with slightly curved tips	6-9	Southern Australia
<i>Aphrodita sibogae</i> (Horst, 1916b)	2.2	?	2 pairs raised ocular area	thin, just shorter than prostomium	smooth 5x length prostomium	3/4 length of prostomium	slender	?	slightly curved tips with plumose edge	?	Indonesian Archipelago'
<i>Aphrodita sondaica</i> Grube, 1875	8.0	39	1 pair, pale	blunt, tipped, 1/3 length prostomium	*3x length prostomium	?	stout, in fan shape, entangled in felt	iridescent mud covered	smooth, slightly curved tips	9-11 inferior tier	North Borneo'
<i>Aphrodita talpa</i> Quatrefages, 1866	0.7-4.5	31-38 40* (Monro)	2 pairs, small black	elongate, slightly enlarged tip, length of prostomium	3-5 smooth	3/4 length of prostomium	smooth entangled in felt	short faintly iridescent	slightly curved tips with plumose edge	10-15	Australia New Zealand
<i>Aphrodita terraereginae</i> Haswell, 1883	2.5	40	1 pair, large, grey, slightly raised	small, rod shaped	7 finely papillated	1/3 length prostomium	thick, paleal like, smooth pale yellow	short faintly iridescent	slightly curved tips inconspicuous	8-10	Northern Australia
<i>Aphrodita watasei</i> Izuka, 1912	5.5-7	34-38	absent	long slender	* 5x length median antenna	short	stout, entangled in felt	short mud covered	smooth, curved tips	20	Japan'

\* Original description does not indicate the setiger number to which palps extend, only length in relation to prostomium or median antenna.

' Indicates that these geographical records have not been checked by examination of material.

Table 2. Numbers of neurosetae present in different size classes of *Aphrodita australis*.

Length cm	Segment number	Lower tier (no. setae)	Middle tier (no. setae)	Upper tier (no. setae)
1-3 (n=4)	4	3	2	2
	15	3-6	2-4	2
	25	2-4	2	2-3
4-7 (n=4)	4	3-4	2-3	2
	15	3-5	2-3	2-3
	25	2-3	2-3	2
8-11 (n=5)	4	2-4	2-3	2
	15	3-5	2-3	2-3
	25	2-4	2-3	2-3
12-19 (n=4)	4	3-5	2-3	2
	15	4-7	2-4	2
	25	3-6	2-4	2

n = number of animals sampled

Table 3. Numbers of neurosetae present in different size classes of *Aphrodita goolmarris* n.sp.

Length (cm)	Segment number	Lower tier (no. setae)	Middle tier (no. setae)	Upper tier (no. setae)
1-3 (n=4)	4	3-6	2-4	2
	15	3-7	2-6	2
	25	2-3	2	1-2
4 (n=4)	4	8-9	3-6	2
	15	7-14	2-7	2-3
	25	2-4	3-4	1-2
5 (n=3)	4	8-9	3-6	2
	15	10-11	5-6	2
	25	4-6	2-3	2

n = number of animals sampled

Table 4. Numbers of neurosetae present in different size classes of *Aphrodita kulmaris* n.sp.

Length cm	Segment number	Lower tier (no. setae)	Middle tier (no. setae)	Upper tier (no. setae)
3-4 (n=3)	4	7-9	3-5	2
	15	12-17	4-7	2
	25	5-6	2-4	2
5-6 (n=5)	4	7-12	3-5	2
	15	12-21	6-10	2
	25	6-10	3-5	2
7-9 (n=5)	4	5-11	3-4	2
	15	9-19	3-8	2
	25	5-12	3-5	2

n = number of animals sampled

Table 5. Distinguishing characters of Australian and Indo-Pacific species of *Aphrogenia*.

Species name	Length (cm)	No. of segments	Elytra (pairs)	Ocular peduncles	Eyes	Median antenna	Ceratophores	Palps (extending to)	Sabre-like notosetae (elytrigerous segment)	Neurosetae	Sabre-like notosetae (cirrigerous segment)	Distribution
<i>Aphrogenia margaritacea</i> Augener, 1913	0.4-1.5	22-32	15 opalescent yellow/cream	1/3 length prostomium	2 pairs	clavate, tipped, just longer than palps	2 - jointed just longer than prostomium	5, papillated	9 or more, smooth fanning across dorsum	3-4 bidentate, some with 1 extra tooth	fan of sabre notosetae arching over entire dorsum	South-eastern and South-western Australia
<i>Aphrogenia nigropunctata</i> Horst, 1916b	0.5-0.9	26-29	14 slightly opalescent yellow/brown	1/2 length prostomium	absent	clavate tipped, 5x length prostomium	2-jointed 3/4 length prostomium	7-6 finely papillated	2-3 smooth fanning across dorsum	3-4, bidentate, some anterior with 1-2 extra teeth	black spot on dorsal surface of notopodia, 6 smooth setae fanning laterally	Indonesian Archipelago
<i>Aphrogenia villosa</i> Horst, 1916b	1.3	32	slightly opalescent tan/orange	1/2 length prostomium	1 pair	6x length prostomium clavate tipped	1/3 length prostomium	8 papillated	6-7 shafts ridged fanning across dorsum	3, bidentate	about 10, shafts ridged, fanning laterally	Indonesian Archipelago

Table 6. Distinguishing characters of Australian and Indo-Pacific species of *Laetmonice*. \* Characters defined based on figures

Species Name	Length (cm)	No. of segments	Elytra (pairs)	Eyes	Purse-like flaps on prostomium	Median antenna	Neurosetae	Ocular peduncles	Palps (extending to)	Harpoon notosetae	Distribution
<i>Laetmonice arenifera</i> Horst, 1916a	1.3	31	15	1 pair	absent	missing	3, fringe of short hairs on longer branch	1/3 length prostomium	10th setiger, finely papillated	2-3 recurved fangs	Indonesian Archipelago
<i>Laetmonice batheia</i> Horst, 1916b	2.6	33	14, covered by felt but no longer present on type	absent	absent	missing	3, fringe of hairs on longer branch	length prostomium	14th setiger, finely papillated	3 recurved fangs, shaft covered with acute tubercles	Indonesian Archipelago
<i>Laetmonice brachyceras</i> (Haswell, 1883)	1.2-3	34-36	15, no felt	absent	absent	2-4x length prostomium, clavate tipped	3-4, shaft smooth, or with plumose edge, some with many extra teeth	length prostomium	9-11th setiger, smooth	2-4 recurved fangs	Northern Australia, Indonesian Archipelago
<i>Laetmonice brevihastata</i> Ehlers, 1918	1.65	29	14	absent	?	2x length prostomium, clavate tipped	7-8, longer shaft short, fine pinnae	small	10th setiger, smooth	* 3 recurved fangs	New Guinea
<i>Laetmonice ciridescens</i> Horst, 1917	1.4-1.9	31-32	14-15, thin felt	absent	absent	6x length prostomium, clavate tipped	3, basal spur and distal fringe	length prostomium	12th setiger, finely papillated	3 recurved fangs	Indonesian Archipelago
<i>Laetmonice conchifera</i> (Horst, 1916a)	0.95	28	15	absent	absent	length prostomium, clavate tipped	2-3, bidentate with 2-3 accessory teeth	1/3 length prostomium	6th setiger, smooth	absent	Indonesian Archipelago
<i>Laetmonice dolichoceras</i> (Haswell, 1883)	2.5	35	15, no felt	2 pairs, faint grey	2 pairs	longer than palps, clavate tipped	3, bidentate some with 1-3 accessory teeth	length prostomium	8th setiger, finely papillated	2-4 recurved fangs many covered in sheaths	North-eastern Australia

Table 6 (cont'd).

Species Name	Length (cm)	No. of segments	Elytra (pairs)	Eyes	Purse-like flaps on prostomium	Median antenna	Neurosetae	Ocular peduncles	Palps (extending to)	Harpoon notosetae	Distribution
<i>Laetmonice dubiosa</i> Horst, 1916b	2.8	35	15	* present	* absent	?	fringe of hairs on longer branch	* length prostomium	* smooth, long	3 recurved fangs, smooth shaft	Indonesian Archipelago
<i>Laetmonice malayana</i> Horst, 1916b	1.5-4.5	30-34	15, no felt	absent	absent	3x length prostomium, blunt tipped	3-4, fringe of hairs on longer branch	2/3 length prostomium	9-10th setiger finely papillated	3-5 recurved fangs, shaft beset with thorns	Indonesian Archipelago
<i>Laetmonice moluccana</i> (Horst, 1916b)	0.42-3.0	20-35	15, no felt	2 pairs	absent	5x length prostomium, clavate tipped	3-4, bidentate, with 1-2 distal teeth	1/3 length prostomium	6th setiger, finely papillated	3-4 recurved fangs usually covered in sheaths	Northern Australia, Indonesian Archipelago
<i>Laetmonice nitida</i> Treadwell, 1926	1.5-2.2	35	15	2 pairs, dorsal and ventral pair same size	* absent	broken	bidentate with 1-4 extra teeth	* 1/3 length prostomium	8-10x length prostomium, finely papillated	3 recurved fangs	Philippines
<i>Laetmonice parva</i> (Horst, 1916b)	1.5	33	15	2 pairs, dorsal pair smaller	absent	3x length prostomium, clavate tipped	2-3, bidentate with 1-2 accessory teeth	length prostomium	7th setiger, finely papillated	2-3 fangs shaft covered with minute tubercles	Indonesian Archipelago
<i>Laetmonice producta</i> Grube, 1877	2.6-8.1	41-45	18, no felt	absent	present	2 x length prostomium, clavate tipped	3, fringe of hairs on longer branch	length prostomium	9-11th setiger, smooth	3-5 recurved fangs	South-eastern Australia
<i>Laetmonice rugosa</i> Horst, 1916b	1.7-3.6	32-35	15, covered by felt	absent	absent	just shorter than palps, clavate tipped	2-4, bidentate with 3-5 accessory teeth	length prostomium	8th setiger, smooth	3 recurved fangs, shaft smooth or covered with fine tubercles	Indonesian Archipelago
<i>Laetmonice violascens</i> Grube, 1875	1.3-2.0	33	15, pale violet	absent	?	1/3 length of palps	?	small	?	4 recurved fangs	China Sea

Table 6 (cont'd).

Species Name	Length (cm)	No. of segments	Elytra (pairs)	Eyes	Purse-like flaps on prostomium	Median antenna	Neurosetae	Ocular peduncles	Palps (extending to)	Harpoon notosetae	Distribution
<i>Laetmonice viridescens</i> Horst, 1917	1.4-1.9	31-32	14-15, thin felt	absent	absent	6x length prostomium, clavate tipped	3, basal spur and distal fringe	length prostomium	12th setiger, finely papillated	3 recurved fangs	Indonesian Archipelago
<i>Laetmonice wonda</i> n.sp.	2.4-4.1	34-35	15, no felt	2 pairs, pale greys	present	missing	3, fringe of hairs on longer branch	1/4 length prostomium	13th setiger, finely papillated	3-4 recurved fangs on some shafts with tubercles	South-western Australia
<i>Laetmonice yarramba</i> n.sp.	1.7-4	29-34	13-15, no felt	absent	absent	5x length prostomium, blunt tipped	3-4, fringe of hairs on longer branch	1/3 length prostomium	9-11th setiger, finely papillated	3 recurved fangs, some shafts with tubercles	Eastern and western Australia

Table 7. Numbers of notosetae present in different size classes of *Laetmonice malayana*.

Length (cm)	Elytrigerous segment number	Number of neurosetae	Number of notosetae (acicular)	Number of notosetae (harpoon)*
1-2 (n=2)	5	2-3	6-8	2-4
	15	3-4	7-11	3-4
	25	2	6-7	2
2.1-3 (n=5)	5	3	6-12	3-9
	15	3	10-18	3-6
	25	3	6-14	3-6
3.1-4 (n=4)	5	3-4	8-12	6-9
	15	3	12-14	5-7
	25	3	10-13	4-5
4.1-5 (n=5)	5	3-4	7-12	3-6
	15	3	11-16	4-5
	25	3-4	7-14	2-4

n = number of animals sampled

\* Where harpoon notosetae were missing setal scars were counted.

Table 8. Numbers of notosetae present in different size classes of *Laetmonice producta*.

Length (cm)	Elytrigerous segment number	Number of neurosetae	Number of notosetae (acicular)	Number of notosetae (harpoon)
4.1-5 (n=2)	5	3	16	7
	15	3	10-15	4-7
	28	3	12-18	4
5.1-6 (n=3)	5	3	10-15	6
	15	3	12-19	9-10
	28	3	8-12	6-8
6.1-7 (n=3)	5	3	14-20	4-11
	15	3	11-28	7-9
	28	3-4	17-20	5-8
7.1-8 (n=2)	5	3-4	17	4-6
	15	3	17-22	9-12
	28	3	14-16	7

n = number of animals sampled.

Note. Although many *L. producta*'s were available for examination, the majority were missing both their harpoon and acicular notosetae. Due to their large size, numbers of harpoon notosetae could be determined by the presence of setal scars, however the acicular notosetae being smaller left no setal scars. As a result only specimens that had sufficient acicular notosetae remaining along the body could be sampled.

Table 9. Distinguishing features of McIntosh, 1885 varieties of *Laetmonice producta*.

Species Name	Greatest length (cm)	Number of segments	Nuchal flaps	Ventral surface	Eyes	Palps	Elytra no. of pairs	Notosetae	Neurosetae	Distribution
<i>L. producta</i>	5	44-47	present	papillated	1 pair	minutely papillated	20	shafts minutely tuberculated, 5-6 recurved fangs	thick pinnae	Southern Indian Ocean
<i>L. producta</i> var. <i>wyvillei</i>	4.3	43	present, small	thickly papillated	absent	finely papillated	18	shafts thickly tuberculated, 3-4 recurved fangs	pinnae slender, numerous, elongate	Southern Indian Ocean, southern Atlantic Ocean
<i>L. producta</i> var. <i>benthaliana</i>	4.8	33	present, small	smooth	absent	finely papillated	15-18	shafts with small tubercles and fine hairs, 3-4 recurved fangs	pinnae, fine, short	Southern Indian Ocean, northern Pacific Ocean
<i>L. producta</i> var. <i>willemoesi</i>	3.3	35	absent	finely papillated	absent	papillated	15	shafts with many prickles, 3-4 recurved fangs	pinnae long, slender, spur sometimes bifid	Northern and southern Atlantic, southern Indian Ocean, northern Australia and New Zealand.
<i>L. producta</i> var. <i>assimilis</i>	3.5	35	absent	papillated	absent	papillated	15	shafts smooth, 3-4 recurved fangs	pinnae long, slender	North Atlantic Ocean

Table 10. Distinguishing characters of Australian and Indo-Pacific species of *Pontogenia*.

Species name	Length (cm)	No. of segments	Ocular peduncles	Eyes	Median antenna	Palps (extending to)	Length of median ceratophore	Paleal Notosetae	Neurosetae	Felt	Distribution
<i>Pontogenia araeoceras</i> (Hawvell, 1883)	0.16-2.5	14-46	length prostomium	1 pair	1 length palps tapered articulate tip	6th setiger, finely papillated	just longer than prostomium	23, tuberculated	3-4, bidentate	present	Northern Australia
<i>Pontogenia indica</i> Grube, 1875	2.6	43	short	?	more than 5x length of prostomium	finely papillated	?	curved, with sub-terminally tooth, 18	3-4, bidentate	?	Philippine Islands
<i>Pontogenia macleari</i> (Haswell, 1883)	0.9-4.3	29-39	3/4 length prostomium	1 pair	2x length prostomium	5th setiger, finely papillated	just shorter than prostomium	10-25 denticulated, giving serrated appearance	2-4, bidentate	present	Eastern Australia, Indonesian Archipelago
<i>Pontogenia spinosa</i> Horst, 1917	2.5	35	2/3 length prostomium	2 pairs	3x length prostomium clavate tipped	5 setiger smooth	2/3 length prostomium papillated	25 with long spines on each edge	3-4, bidentate	present	Indonesian Archipelago
<i>Pontogenia villosa</i> Horst, 1917	2.4	34	length prostomium	2 pairs	broken	finely papillated	2x length prostomium papillated	14 with small denticles	4, bidentate	present (thick)	Indonesian Archipelago