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REDEFINITION OF *MUNNA* AND *UROMUNNA* (CRUSTACEA: ISOPODA: MUNNIDAE), WITH DESCRIPTIONS OF FIVE SPECIES FROM COASTAL VICTORIA

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Abstract: The subgenera *Munna* and *Uromunna* (two of five in the genus *Munna*) are elevated to generic rank on the basis of already-known and additional characters. The subgenus *Neomunna* is synonymised with *Munna*; the subgenus *Pangamunna* and the genus *Munnoides* are synonymised with *Uromunna*; and the subgenus *Metamunna* (preoccupied) remains in doubt. Five species of *Munna* and *Uromunna*, four new, the first recorded from eastern Australia, are described from coastal Victoria: *U. brevicornis* (Thomson) from seagrass in estuarine Gippsland Lakes; *M. hovelli* and *U. phillipi* from shallow benthos of Port Phillip Bay; *M. hentyi* and *U. humei* from intertidal rocky shores on Bass Strait. *Uromunna phillipi* is also recorded from eastern Tasmania. A list of species of *Munna* and *Uromunna* is appended.

The asellote isopod family Munnidae was recently confined to only four genera (*Munna* Krøyer, *Astrurus* Beddard, *Echinomunna* Vanhöffen and *Zoromunna* Menzies & George). Most of the known species have been assigned to *Munna*, the relationships of the smaller genera to *Munna* are not clear and the composition of the family somewhat uncertain (Wilson 1980). The position is further complicated by other available genus-group names: *Haliacris* Pfeffer 1887, and *Caecimunna* Richardson 1908 (usually taken to be junior synonyms of *Munna*); *Munnoides* Carvacho 1977, and five subgenera of *Munna*—*Munna*, *Uromunna* and *Neomunna* (Menzies 1962), *Metamunna* (Fresi & Mazzella 1974) and *Pangamunna* (Schultz 1979). In this contribution the systematics of the subgenera of *Munna* and the genus *Munnoides* are examined and a new generic arrangement proposed. The study is based on five new Australian species, dissection of several representatives of each of the subgenera, and examination of descriptions and figures of the remaining species known.

GENERA OF THE MUNNIDAE

Wilson (1980) discussed but left unresolved the status of *Astrurus*, *Echinomunna*, *Zoromunna*, *Haliacris* and his new genus A; this contribution adds nothing to his comments but I agree with him that 'revision of the taxon *Munna* will yield several more genera'. These will not be based on the existing subgenera which I discuss below.

Dissection of specimens of *Munna* (*Neomunna*) *kroyeri* and examination of written descriptions and figures of numerous other species of *Neomunna* lead me to believe that this subgenus and *Munna* are synonymous. The presence or absence of a hook on the uropod is the only distinguishing character but it can no longer be considered of even subgeneric value. In many species (e.g., *M. boecki*, *M. halei*, *M. lundae*, *M. maculata*, *M. urupica*) truncate or cassellate uropods are found. These tend to grade into those species previously assigned to *Neomunna* in which the uropodal hooks are poorly developed.

The subgenus *Metamunna* seems unrelated to any of the other subgenera because of the single dactyl on pereopods 2-7. It therefore requires further investigation. Incidentally, the name *Metamunna* Fresi & Mazzella 1974, is preoccupied by *Metamunna* Tattersall, a genus probably referable to the Pleurogoniidae (Tattersall 1906). Barnard (1920) synonymised *Metamunna* Tattersall with *Paramunna* Sars, a move supported by Nordenstam (1933) and Kussakin (1967). The subgenus is not considered further here.

The subgenera *Uromunna* and *Munna* are more clearly differentiated. *Uromunna* was originally diagnosed by Menzies (1962) as possessing 'leaf-like ventral uropodal ramus flattened in cross-section. Apical spines lacking'. In contrast, the subgenus *Munna* possesses 'inferior uropodal ramus rounded in cross-section, lacking recurved apical spines'. To these characters have been added: antenna 1 (Kussakin 1962), male pleopod 1, pleopod 3, and pereopod 1 (Frankenberg & Menzies 1966) and mandibular palp (Fresi & Mazzella 1974).

Most authors (Fresi & Mazzella 1974, Kensley 1980) agree that the shape of the uropodal ramus is a character of little value but that the separation of these two groups still has value. The five Australian species support this. My examination of type species, *M.* (*Munna*) *boeckii* Krøyer and *M.* (*Uromunna*) *ubiquita* Menzies, and of published descriptions of more than 60 other species justifies elevation of the subgenera *Munna* and *Uromunna* to generic rank.

Most of the characters used to separate the two genera are not new. However, the presence of integumental setae and spines, molar setae, and serrate spines on the mandibular palp in *Munna* and sexual dimorphism in pereopod 2 of *Uromunna* are newly reported. Overall, *Uromunna* has more advanced characters: a single aesthetasc, shortened mandibular palp, sexual dimorphism in pereopod 2 and absence of a distolateral projection bearing a groove on pleopod 1. In addition, some species of *Uromunna* are estuarine; all

species of *Munna* are truly marine. *Munna*'s only advanced feature is the sexual dimorphism of pereopod 1, best seen in Australian species in *M. hentyi*. There are indications that the two genera are biogeographically distinct which further supports their separation.

The genus *Munna* remains rather large and diverse (see Appendix). Wilson (1980) suggested that the generic name *Haliacris* Pfeffer might be appropriate for those species which have a huge pereopod 1 in the male and very long legs and antennae. No such division is readily apparent from examination of numerous species descriptions. Adult males of so few species have been described that allocation of species to *Haliacris* and *Munna* is not appropriate at this stage. *Munna* appears confined to cool temperate and polar seas, the Southern Ocean, southern Australia and New Zealand, southern South America, the northern Pacific, North Atlantic and Arctic Sea. Exceptions to this are records from California (northern part only) and from the Mediterranean. The largest numbers of reported species are from the northwestern Pacific (Kussakin 1962, 1972) and from islands of the Southern Ocean (Kussakin 1967). Several undescribed species are known to me from throughout Australia and the New Zealand subantarctic.

The genus *Uromunna* is smaller, with only 15 species (see Appendix). Five of these lack mandibular palps and have been placed in a separate genus (*Munnoides*) or subgenus (*Pangamunna*) herein considered junior synonyms of *Uromunna*. Diagnoses of the two are indistinguishable and I refer to this group of species as *'Munnoides'*. Loss of mandibular palps is a frequent phenomenon in janiroid isopods and considerable evidence suggests that this alone is not a useful systematic character. Species of *'Munnoides'* display no other unique advanced character and their apparent sister-group, palpate species of *Uromunna*, themselves show no unique features. All species of *'Munnoides'* are estuarine, some extending into fresh water, and most are warm temperate or tropical but this apparent homogeneity is contradicted by their wide geographic distribution. Also, estuarine species of palpate *Uromunna* are known (*U. schauinslandi* and *U. brevicornis*) as are tropical species (*U. acarina*). I suspect that a loss of mandibular palp occurred several times in estuarine or tropical *Uromunna* stock.

A further loss of mandibular palps occurred in Wilson's (1980) genus A in the southern Atlantic deep sea, this time apparently from *Munna* stock. In addition, two pleurogoniid genera have been defined on the basis of absence of mandibular palp. *Munnogonium* George & Strömberg is separated from *Austrosignum* Hodgson in this way (Bowman & Schultz 1974, Wilson 1980) as is *Coulmannia* Hodgson from *Notoxenoides* Menzies (Wilson 1980). In neither case is the separation supported by other unique character states and the palpate genera show no unique advanced features. I believe that loss of the mandibular palp, in munnids and pleurogoniids at least, is a common, independently and frequently derived phenomenon like loss of eyes in the deep sea (Wolff 1962).

In contrast to *Munna*, the genus *Uromunna* is found in temperate and tropical seas, as well as in cooler Southern Hemisphere waters. The genus is absent from cold Northern Hemisphere seas where many species of *Munna* are known.

AUSTRALIAN ASELLOTA

The asellote isopod fauna of Australia is almost totally unknown. Exceptions are four species of the genus *Stenetrium* (Nicholls 1929), one species of *Munna* from Western Australia (Thomson 1946), two incompletely described species of *Munnopsis* and *Ilyarachna* (Monod 1973), and *Prethura*, a new genus of Pleurocopidae from Queensland (Kensley 1982). The Munnidae is widespread in coastal habitats and it is not surprising that it is well represented by species in Australia. In this contribution five species from the collections of the Museum of Victoria, formerly the National Museum of Victoria (NMV), are described, and a key to separate them is presented.

Some material for this study has come from environmental surveys by the Victorian Ministry for Conservation: the Gippsland Regional Environmental Study, 1978-9 (GRES) and the Port Phillip Bay Environmental Study, 1969-73 (PPBES). Figures of limbs are drawn from permanent slides using polyvinyl lactophenol mountant. Scale lines are 0.1 mm unless marked otherwise.

Abbreviations on figures are as follows: A1, 2, antennae 1, 2; MD, mandible; MP, maxilliped; MX1, 2, maxillae 1, 2; P1-P7, pereopods 1-7; PL1-4, pleopods 1-4; PT, pleotelson; O, operculum (pleopod 2 of female); U, uropod.

KEY TO AUSTRALIAN SPECIES OF *MUNNA* AND *UROMUNNA*

1. Pereon dorsally setose. Pereopod 1 sexually dimorphic, more developed in male. Antenna 1 with 2 aesthetascs, its last article minute. Mandibular palp reaching beyond end of incisor. Male pleopod 1 with acute distolateral projections. Pleopods 3 exopod of similar width to endopod ..... *Munna* 2
— Pereon dorsally with few if any setae. Pereopod 1 of both sexes similar. Antenna 1 with 1 aesthetasc, its last article not minute. Mandibular palp not reaching to end of incisor. Male pleopod 1 simple, without distolateral projections. Pleopod 3 exopod much narrower than endopod ..... *Uromunna* 3
2. Dorsal setae in transverse rows of 10-20 per pereonite. Anterior margin of head bearing strong spines. Antenna 2 flagellum articles as long as wide. Male pereopods 1 massive, carpochelate .. *M. hentyi*
— Dorsal setae scattered, less than 10 per pereonite. Anterior margin of head bearing setae only, no spines. Antenna 2 flagellate articles elongate. Male pereopods 1 subchelate ..... *M. hovelli*
3. Pereopod 1 palm with minute spines. Eyes large, diameter about 1/6 of head width. Estuarine ..... *U. brevicornis*

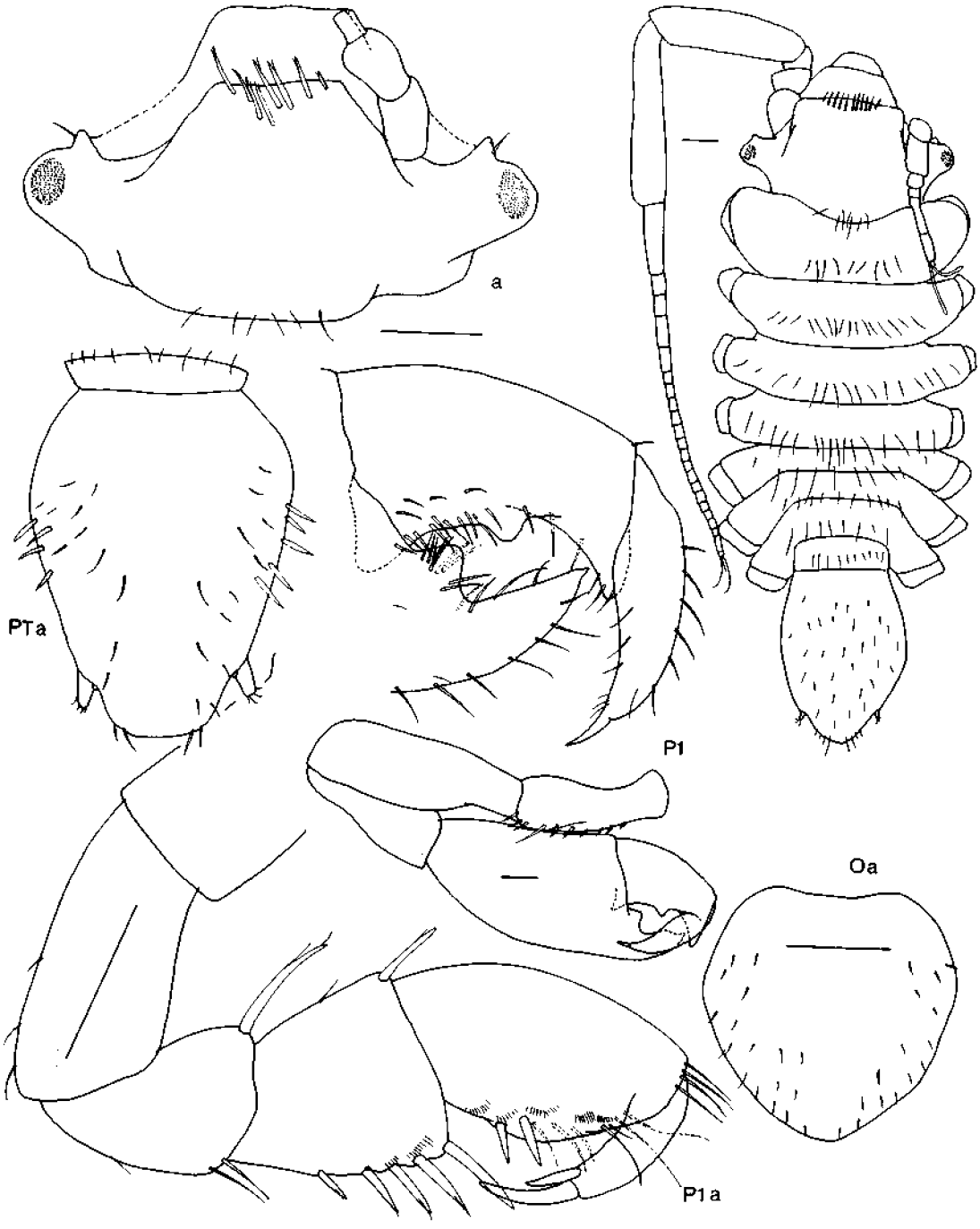

Fig. 1 – *Munna hentyi*. Male, 1.81 mm, NMVJ1083; a, female, 1.62 mm, NMVJ1082.

– Pereopod 1 palm without minute spines. Eyes small, diameter about ⅓ of head width. Marine 4
4. Head as long as 2 pereonites. Dactyls of pereopod 2 six times as long as wide, unguis very fine . *U. phillipi*
– Head as long as 4 pereonites. Dactyls of pereopod 2 three times as long as wide, unguis stout . . . *U. humei*

SYSTEMATICS

Genus **Munna** Krφyer 1839

1839 *Munna* Krφyer, p. 612.
1887 *Haliacris* Pfeffer, p. 137.
1908 *Caecimunna* Richardson, p. 79.
1962 *Munna (Munna)* Menzies, p. 32.
1962 *Munna (Neomunna)* Menzies, p. 36.

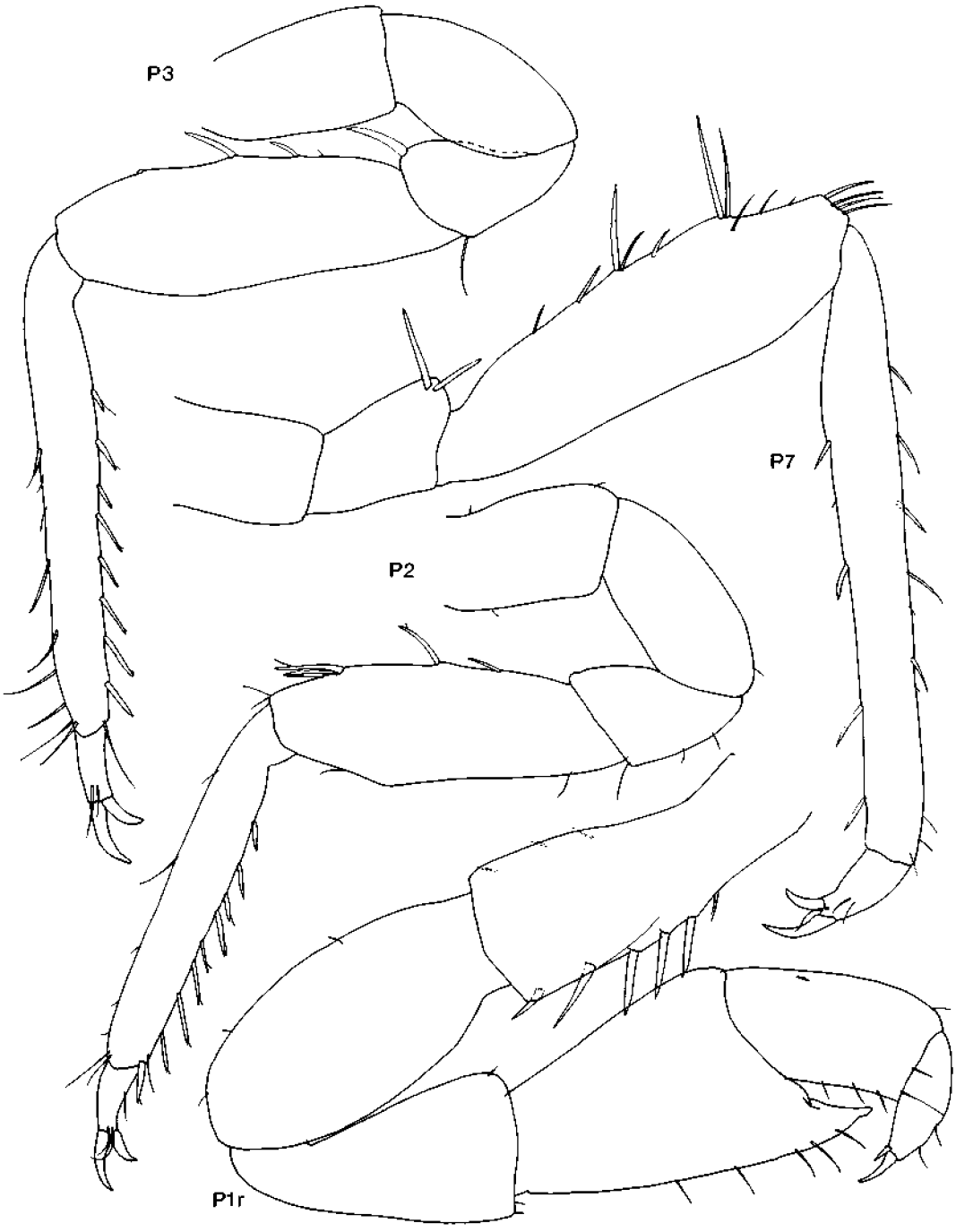

Fig. 2—*Munna hentyi*. Male, 1.81 mm, NMVJ1083 (r = right).

DIAGNOSIS: Munnidae with numerous dorsal setae and often with articulating spines on head, pleon and pleopods 1 and 2. Antenna 1 with last article of flagellum minute, it and the penultimate article each with a single aesthetasc. Mandibular molar strong and subcylindrical, its surface truncate, and bearing accessory setae; palp reaching beyond the end of the incisor, its second article bearing 1-2 serrate spines. Maxillipedal epipod with an acute apex. Pereopod 1 sexually dimorphic, in male sometimes enlarged, often massively, sometimes carpochelate. Pereopods 2-7 not (or barely) sexually dimorphic; dactyls with accessory

claws. Pleopod 1 of male with a more or less acute (often markedly projecting) distolateral angle bearing grooves. Pleopod 3 exopod with a broad second article reaching well beyond the endopod.

TYPE SPECIES (by monotypy): *Munna boeckii* Krøyer 1839.

SPECIES INCLUDED: See Appendix.

Munna hentyi sp. nov.

Figs 1-3

MATERIAL EXAMINED: *Holotype*: female, 1.96 mm, NMVJ1077. Vic., Apollo Bay (38°45'S., 143°41'E.), from *Macrocystis* holdfasts, W. F. Seed, 28 Dec 1970. *Paratypes*: Vic., type locality, NMVJ1078-80 (4 females, 2 juvenile males, 1.4-1.8 mm). Grassy Creek, 7 km N. of Lorne (38°29'S., 144°02'E.) from small rock pool, W. F. Seed, 23 Jan 1968, NMVJ1081-3 (6 females, 1 adult male, 0.9-1.8 mm). Aireys Inlet, W. F. Seed, 29 Jan 1968, NMVJ1084 (1 male, 1.0 mm).

DESCRIPTION: *Male*. First five pereonites only slightly increasing in width posteriorly, but pereonite 1 with more developed shoulders than following pereonites. Head only little narrower than pereonite 1; anterior margin concave, with row of 8-10 spines, upper lip projecting; eyelobes with anterior subterminal projection. Pleon with free first pleonite as long as pereonites; pleotelson globose, 1.5 times as long as wide. Integument with scattered brown pigment dorsally, pereon and pleotelson with transverse rows of dorsal setae.

Antenna 1 with 2 broad basal articles, 2 short narrow articles, and 3 narrow articles, last minute; last two each bear a single aesthetasc. Antenna 2 peduncle of 3 short broad articles and 2 elongate articles; flagellum of 25 articles, as long as rest of peduncle; total antenna as long as body. Mandible with 3-articled palp reaching well beyond incisor; article 1 with 1 simple seta, article 2 with 2 pectinate and 1 simple setae, article 3 with 4 fringed setae; incisor with 4-5 cusps; lacinia mobilis on one side only, with 4 teeth; spine row of 4 serrate spines; molar process prominent, with complex toothed grinding surface bearing 2 lateral setae. Maxilla 1 inner ramus with 4 spines, outer ramus with 10 spines plus setae. Maxilla 2 rami with distal simple and complex setae, extending mesially along inner ramus. Maxillipedal epipod almost triangular, reaching second palp article; endite with 6 distal spines, 5 submarginal lanceolate blades, 7 spines distomesially and 2-3 retinaculae; palp of 5 articles, first four with 1, 8, 8 and 8 setae mesially, last article with 5 setae and 2 terminal spines.

Pereopods 1 asymmetrical in only adult known. Left pereopod 1 grossly enlarged, carpochelate; article 2 with 8 spines along anterior margin; article 3 swollen; article 4 distally enlarged; article 5 swollen, with distal complex thumb bearing scattered setae; article 6 only half as long as 5, with distal recurved thumb, setose; dactyl a curved dagger closing on article 5, setose, unguis about one-fifth length of dactyl. Right pereopod 1 about two-thirds size of left, similar in general form but less swollen, notably article 6 is without distal thumb and unguis is relatively larger. Pereopods 1 symmetrical and smaller in juvenile males, similar in form to smaller pereopod of adult but differing in article 5 having 3 stout spines on triangular thumb, article 6 more rounded distally. Pereopods 2-7 increasing in length posteriorly, with more spines posteriorly. Pereopod 2 article 4 with 2 long anterodistal spines; article 5 with 1+2+2 anterior spines; article 6 is 6 times as long as wide, with 9 spines along posterior margin; dactyl with fine unguis two-thirds as long as rest of dactyl, and shorter supplementary claw. Pereopod 3 similar to 2 but more elongate. Pereopod 7 article 5 with spinose anterior margin; article 6 is 9 times as long as wide, with spines on anterior and posterior margins; dactyl with fine unguis, half as long as rest of dactyl, and smaller supplementary claw.

Pleopod 1 with strong lateral projections each with 2 setae near the apex, apical margin rounded mesially and bearing 5 setae distolaterally. Pleopod 2 apex narrowly rounded, bearing 6 submarginal setae. Pleopod 3 endopod with 3 stout terminal setae; exopod broader and longer than endopod, of 2 articles, second with 6 submarginal setae. Pleopod 4 endopod subacute, exopod of 2 articles with 2 long terminal setae.

Uropod without peduncle, lower ramus with about 6 setae; upper ramus minute and with 1 seta.

Female. Pereonites 3 and 4 widest, pereonite 1 without developed shoulders. Head as in male but spines may cover a triangular area near anterior margin. Pereon with transverse rows of setae, pleotelson with 5-6 spines laterally.

Antennae and mouthparts as in male.

Pereopods 1 smaller than other limbs, symmetrical. Pereopod 1 article 4 with 2 anterodistal spines and 1 posterodistal spine; article 5 with broad posterior lobe bearing 5 spines, with 1 anterior spine; article 6 with convex palm minutely spinose along its distal section, 2 mesial and 3 anterior spines; dactyl minutely spinose, unguis two-thirds length of rest of dactyl and with a substantial supplementary claw. Pereopods 2-7 as in male.

Pleopod 2 about as wide as long, bearing numerous setae including 16 submarginally. Pleopods 3-5 as in male.

Uropod as in male.

ETYMOLOGY: *Munna hentyi* is named for Edward Henty (1810-1878) who, in 1834 in Portland, became the first permanent settler in Victoria.

REMARKS: *Munna hentyi* is the only species so far known from Australia in which the male possesses a massive carpochelate first pereopod. In the larger male figured, the first pereopods are decidedly asymmetrical but in the smaller male only marginally so. Massive carpochelate first pereopods are common in species of *Munna*, particularly in the Southern Hemisphere (e.g., *M. neozelanica*, *M. antarctica* and *M. neglecta* (Nordenstam 1933). Of these, *M. hentyi* most resembles *M. neglecta*. The male first pereopods are similar and both species have a transverse row of spines on the head.

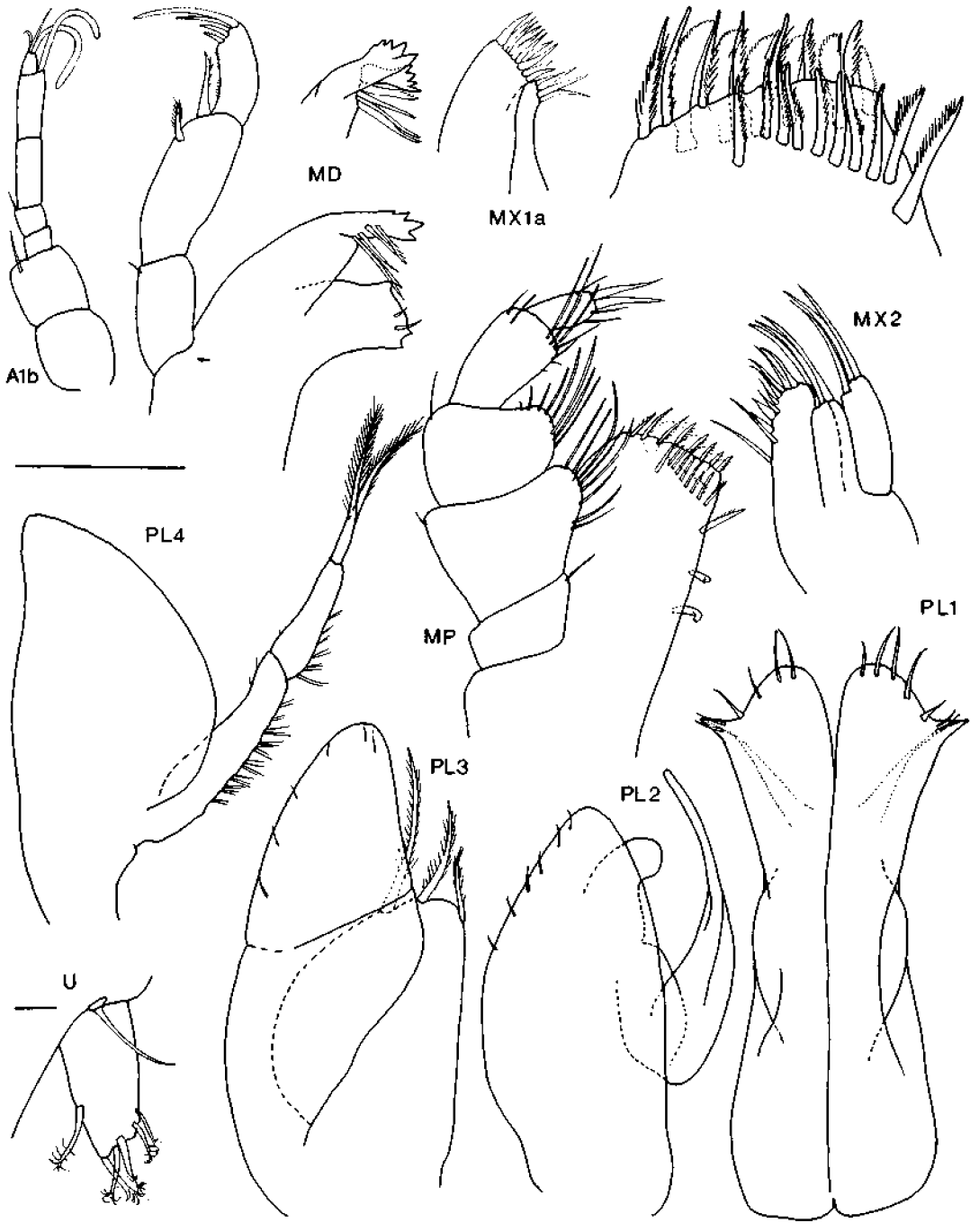

Fig. 3—*Munna hentyi*. Male, 1.81 mm, NMVJ1083; a, female, 1.68 mm, NMVJ1082.; b, male, 1.57 mm, NMVJ1080.

Munna hovelli sp. nov.

Figs 4-6

MATERIAL EXAMINED: *Holotype:* female, 1.74 mm, NMVJ1063. Vic., Port Phillip Bay, off Werribee sewage-treatment farm 145W drain, (38°00'S., 144°36'E.), shelly-sand, 5 m, G. Poore, 18 Nov 1975. *Paratypes:* Vic., type locality, NMVJ1064 (1 male, 1.6 mm) NMVJ1065-7 (6 females, 1.3-1.9 mm). Hobsons Bay, Generator Beacon, artificial substrates, 1 m, N. Holmes, 9 Feb 1976, NMVJ1068 (1 female, 1.66 mm). Hobsons Bay, Breakwater Pier, artificial

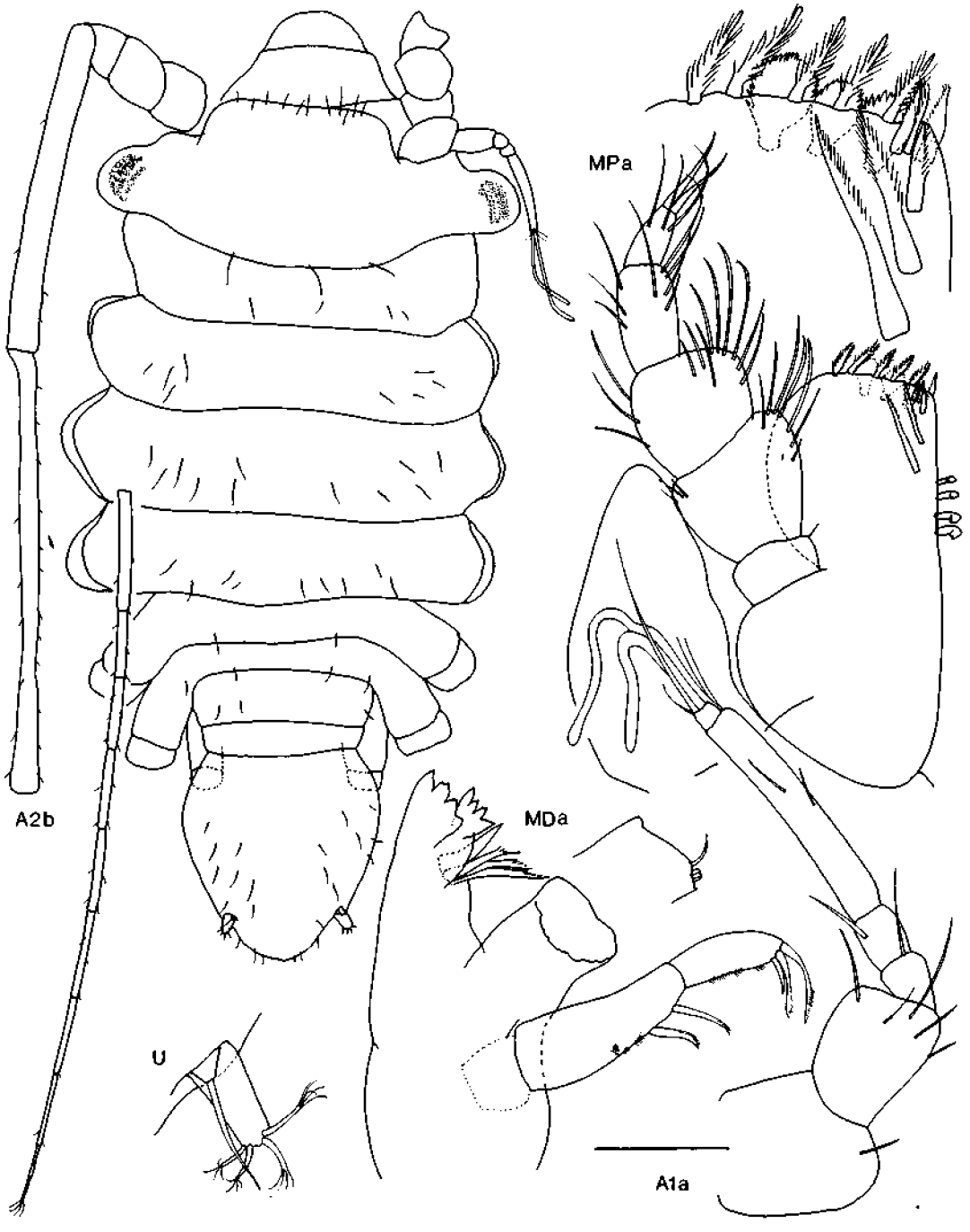

Fig. 4—*Munna hovelli*. Female, 1.64 mm, NMVJ1066; a, female, 1.75 mm, NMVJ1072; b, female, 1.74 mm, NMVJ1063.

substrates, 1 m, N. Holmes, 25 Aug 1975, NMVJ1071 (1 male, 1.66 mm), NMVJ1072 (1 female, 1.75 mm).

DESCRIPTION: *Female*. Body half as wide as long. Pereonites 3 and 4 the widest. Head wider than pereonite 1; anterior margin straight, with submarginal row of about 12 setae, upper lip projecting well in front of head. Pleon with free first pleonite; pleotelson globose, 1.3 times as long as wide. Integument of pereon with transverse rows of setae, pleon with scattered dorsal setae.

Antenna 1 with 2 broad basal articles, 2 short narrow

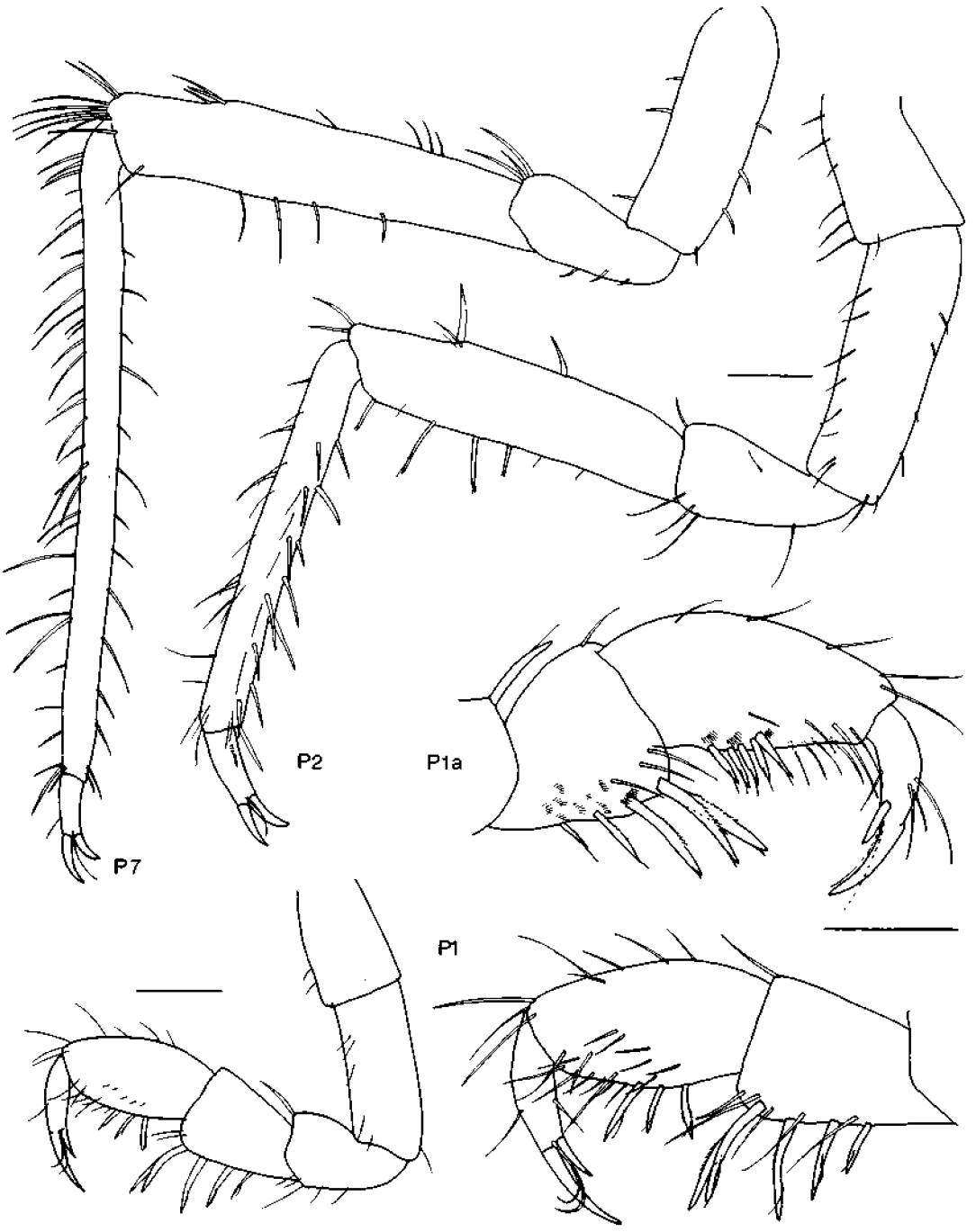

Fig. 5—*Munna hovelli*. Female, 1.85 mm, NMVJ1067; a, male, 1.66 mm, NMVJ1071.

articles, plus 1 long and 1 minute article, each bearing single aesthetasc. Antenna 2 peduncle of 3 short basal articles plus 2 extremely elongate articles; flagellum of 12 articles, about as long as last 2 articles of peduncle; total antenna 1.7 times length of body. Mandible with 3-articled palp reaching beyond incisor; article 1 with single seta, article 2 with 2 serrate setae, article 3 with 3 terminal serrate setae; incisor with 4 cusps; Lacinia mobilis on one side only, with 4 teeth; spine row of 4-5 spines; molar process tuberculate and with lateral spine. Maxillae typical of genus. Maxillipedal epipods subtriangular, reaching to third palp article; endite with 5

distal spines, 4 submarginal fan-shaped setae, 5 spines distomesially and 3-4 retinaculae; palp of 5 articles, first four with 1, 7, 9 and 5 setae mesially, last article with 3 setae and 2 terminal spines.

Pereopods 1 symmetrical, much smaller than more posterior limbs. Pereopod 1 article 5 with 5 long posterodistal spines; article 6 palm barely convex, setose, with 3 spines on margin; dactyl bearing fine unguis equal to 0.4 its length, supplementary claw acute. Pereopods 2-7 increasing in length posteriorly, more spinose posteriorly. Pereopod 2 article 5 with 4 spines on posterior margin; article 6 is 9 times as long as wide, densely spinose; dactyl with unguis only half as long as rest of dactyl, supplementary claw as long as unguis. Pereopod 7 article 5 with 4 spines posteriorly, grouped spines anteriorly; article 6 is 20 times as long as wide, densely spinose; dactyl with short unguis and shorter supplementary claw.

Pleopod 2 subcircular, setose except near midline; 4-10 stout spines proximally. Pleopod 3 endopod with 3 stout terminal setae; exopod broader and longer than endopod, of 2 articles, the second with 4-7 submarginal setae. Pleopod 4 exopod of 2 articles with 2 long apical setae.

Uropod without peduncle; lower ramus 3 times as long as wide; upper ramus minute, with single long seta.

Male. Head, pereon and pleon as in female.

Pereopod 1 more developed than in female, article 5 with 6 posterior spines; article 6 palm straight, with 5 spines on mesial face; dactyl with fine unguis equal to half its length, supplementary spine acute. Pereopods 2-7 as in female.

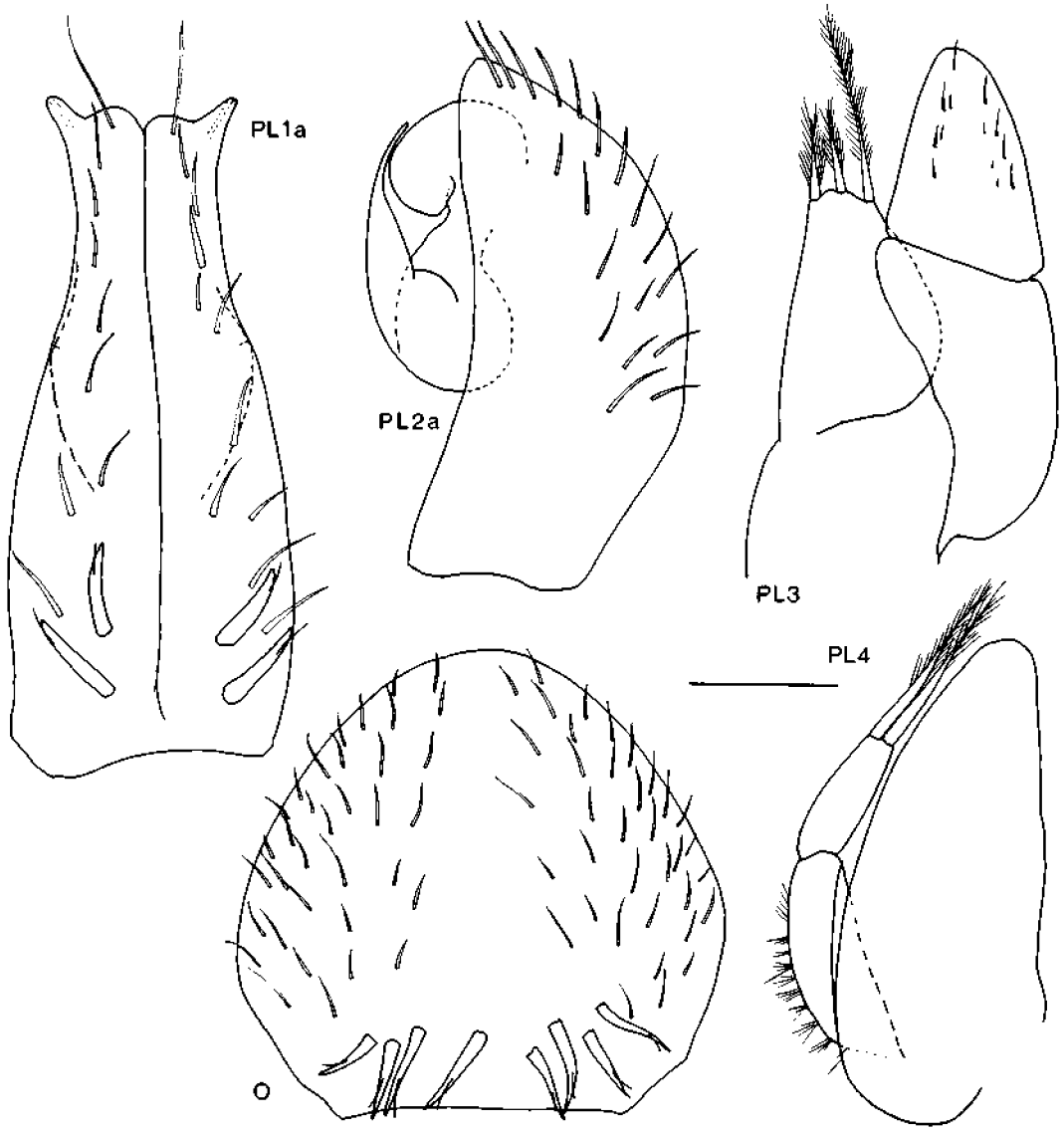

Fig. 6 – *Munna hovelli*. Female, 1.85 mm, NMVJ1067; a, male, 1.66 mm, NMVJ1071.

Pleopod 1 with strong distolateral projections, about 10 setae along each side and 2 pairs of setae proximally. Pleopod 2 broad, ventrally setose.

ETYMOLOGY: *Munna hovelli* is named for William Hilton Hovell (1786-1875) who, in 1824 with Hamilton Hume, lead an expedition from Sydney and reached Port Phillip Bay.

REMARKS: *Munna hovelli* is distinguished from other Australian species by the setose dorsal integument coupled with only moderate development of the subchelate first pereopod of the male. There is a real possibility that both males examined were immature. Few species of *Munna* lack a well-developed carpochelate male first pereopod but two species, *M. chilensis* and *M. lundae* (Menzies, 1962), apparently lack any sexual dimorphism in this limb.

Genus **Uromunna** Menzies 1962

1962 *Munna (Uromunna)* Menzies, p. 36.
1977 *Munnoides* Carvacho, p. 6.
1979 *Munna (Pangamunna)* Schultz, p. 577.

DIAGNOSIS: Munnidae with few of any dorsal setae, without dorsal articulating spines. Antenna 1 last article not minute, bearing single aesthetasc. Mandibular molar strong and subcylindrical, its truncate surface without accessory setae; palp not reaching to end of incisor, its second article without spines, or palp absent. Maxillipedal epipod oval. Pereopod 1 not sexually dimorphic, symmetrical, small. Pereopod 2 (rarely 2-7) sexually dimorphic, articles 5 and 6 of male broader than those of female; dactyls with accessory claws. Pleopod 1 of male simple, without distolateral projections, grooves terminating at or near truncate distal margin. Pleopod 3 exopod with a narrow second article barely reaching beyond endopod.

TYPE SPECIES: *Munna ubiquita* Menzies, 1952 (original designation).

SPECIES INCLUDED: See Appendix.

Uromunna brevicornis (Thomson 1946)

Figs 7-9

1946 *Munna brevicornis* Thomson, p. 50, fig. 5.
1982 *Munna brevicornis* Thomson; Poore, p. 909.

MATERIAL EXAMINED: Vic., Gippsland Lakes, Fraser Island (38°16.4'S., 147°33.3'E.), seagrass on sand, 1 m, 26 Mar. 1979 (GRES station 3073): NMVJ1054-7, J1059-62 (14 males, 1.0-1.3 mm; 25 females, 1.0-1.4 mm), NMVJ1047 (100+ specimens). Same locality, 30 Nov. 1978, NMVJ1048 (36). Same locality, 31 May. 1979, AM P32256 (36). Gippsland Lakes, Banksia Peninsula, seagrass on sand, 1 m, 29 Mar. 1979 (GRES station 3072), NMVJ1049(1). Same locality, 2 Nov. 1979, NMVJ1050(17). Gippsland Lakes, SW. end of Lake Victoria (GRES station 3071), 2 Nov. 1979, NMVJ1051(9). Gippsland Lakes, Resides Jetty, 31 May 1979, NMVJ1052(4). Same locality, 1 Mar. 1979, NMVJ1053(11). Sydenham Inlet, S. McCallum, Jan. 1979, NMVJ1058(15).

TYPE LOCALITY: WA., Freshwater Bay, Swan River, on algae.

DESCRIPTION: *Male*. Body 2.5 times as long as wide. First five pereonites more or less same width but pereonite 1 with more developed shoulders than pereonite 2. Head only little narrower than pereonite 1; anterior margin straight, upper lip distinct and projecting in front of head. Pleon with single free first pleonite; pleotelson globose, 1.3 times as long as wide. Integument largely without dorsal setae; with diffuse red-brown pigment dorsally, more pronounced as a pair of longitudinal stripes running from behind the eyes to the edges of pleonite 1.

Antenna 1 with 2 broad basal articles, 2 short and narrow articles, and 2 tapering elongate articles of which the second is little shorter than first; single aesthetasc on the terminal article. Antenna 2 peduncle of 3 short basal articles and 2 elongate articles; flagellum of 14 articles, little longer than peduncle; total antenna about as long as body. Mandible with 3-articled palp not reaching to end of incisor, first article with 1 seta, last article with 2 terminal setae; incisor of 4 cusps; lacinia mobilis on one side only, with 4 teeth; spine row of 3-4 serrate spines; molar process prominent, with tuberculate grinding surface and without setae. Maxilla 1 inner ramus with 4 spines and outer ramus with 11 spines. Maxilla 2 rami with distal simple and complex setae, extending mesially along inner ramus. Maxillipedal epipod oval, reaching second palp article; endite with 4 distal spines, 3 subterminal lanceolate spines, 2-3 setae near mesial margin and 3 retinaculae; palp of 5 articles, first four with 1, 3, 3 and 3 setae mesially, last article with 4 setae and 2 terminal spines.

Pereopods 1 symmetrical, shorter than following legs; article 4 with anterodistal spine; article 5 with 3 long posterodistal spines; article 6 with convex palm bearing row of 30-35 minute closely-set spines along most of length and 3 long acute spines on mesial face; dactyl with 1 long spine at base of unguis; unguis one-third of length of dactyl. Pereopods 2-7 increasing in length posteriorly. Pereopod 2 article 4 with long anterodistal spine; article 5 widest one-third way along, with 4 closely spaced setae proximally and 3 spines distally on posterior margin; article 6 with 5 spines along distal two-thirds of posterior margin; dactyl with fine unguis as long as rest of dactyl, and short stout supplementary claw. Pereopod 3 similar, but more elongate than pereopod 2. Pereopod 7 article 5 with 4 fine spines on posterior margin and 2 groups of 3 spines on anterodistal margin; article 6 is 15 times as long as wide, with fine spines; dactyl with fine unguis, a little shorter than rest of dactyl, and substantial supplementary claw.

Pleopod 1 strongly curving laterally at tip, each apex rounded with 2 pairs of setae along free mesial margin. Pleopod 2 apex oblique, bearing 4 terminal setae. Pleopod 3 endopod with 2 long stout plumose setae; exopod much narrower, of 2 articles, both marginally

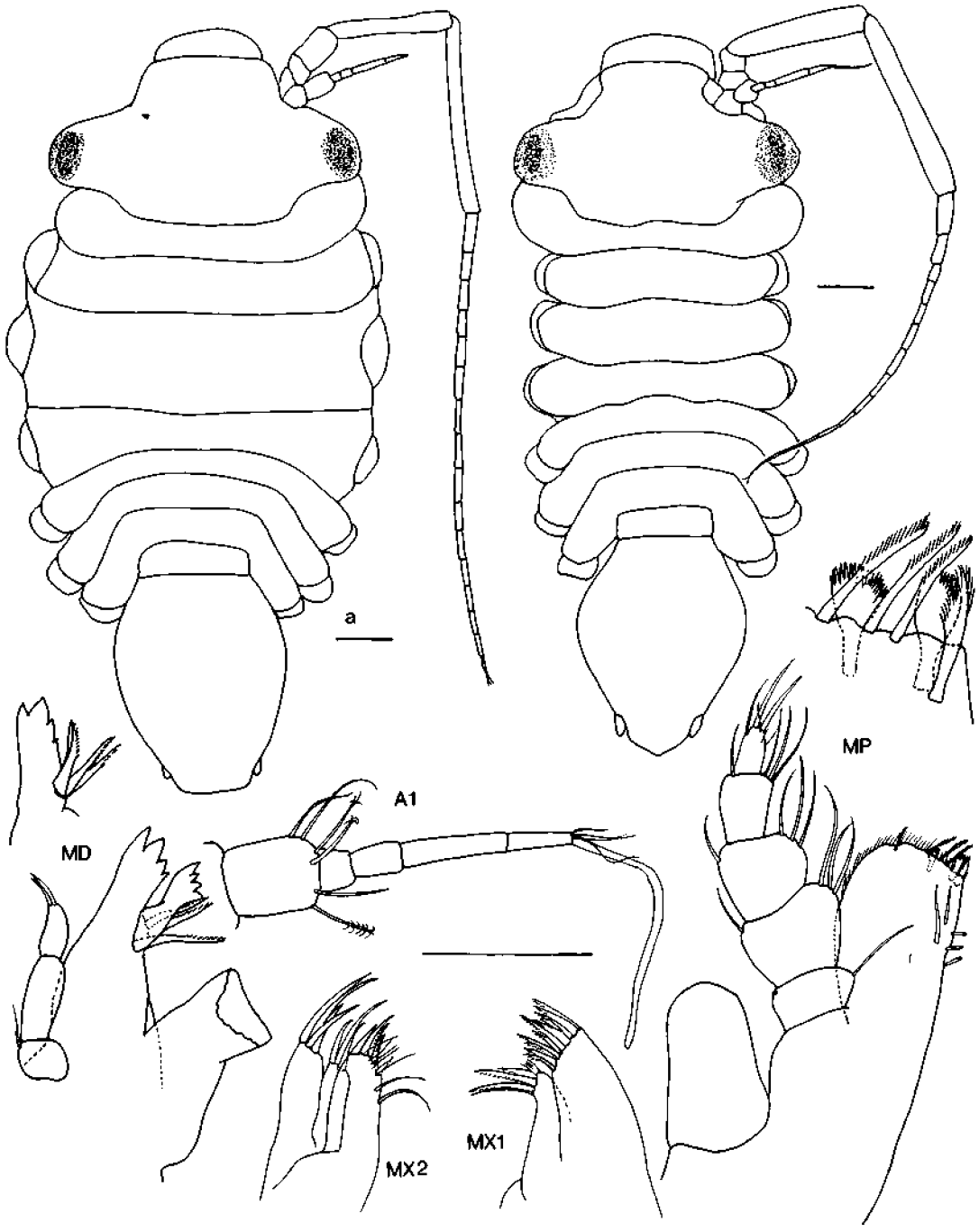

Fig. 7—*Uromunna brevicornis*. Male, 1.29 mm, NMVJ1057; a, female, 1.32 mm, NMVJ1056.

setose, 2 stronger setae on apex. Pleopod 4 with 2-articled exopod bearing 2 long setae terminally.

Uropod without peduncle; lower ramus with about 8 setae; upper ramus minute and with 1 seta.

Female. Pereon twice as long as wide; pereonites 3 and 4 wider than others, pereonite 1 without developed shoulders. Head a little wider than pereonite 1.

Antenna and mouthparts as in male.

Pereopod 1 similar to that of male but article 5 usually with 5 spines. Pereopod 2 much finer than in

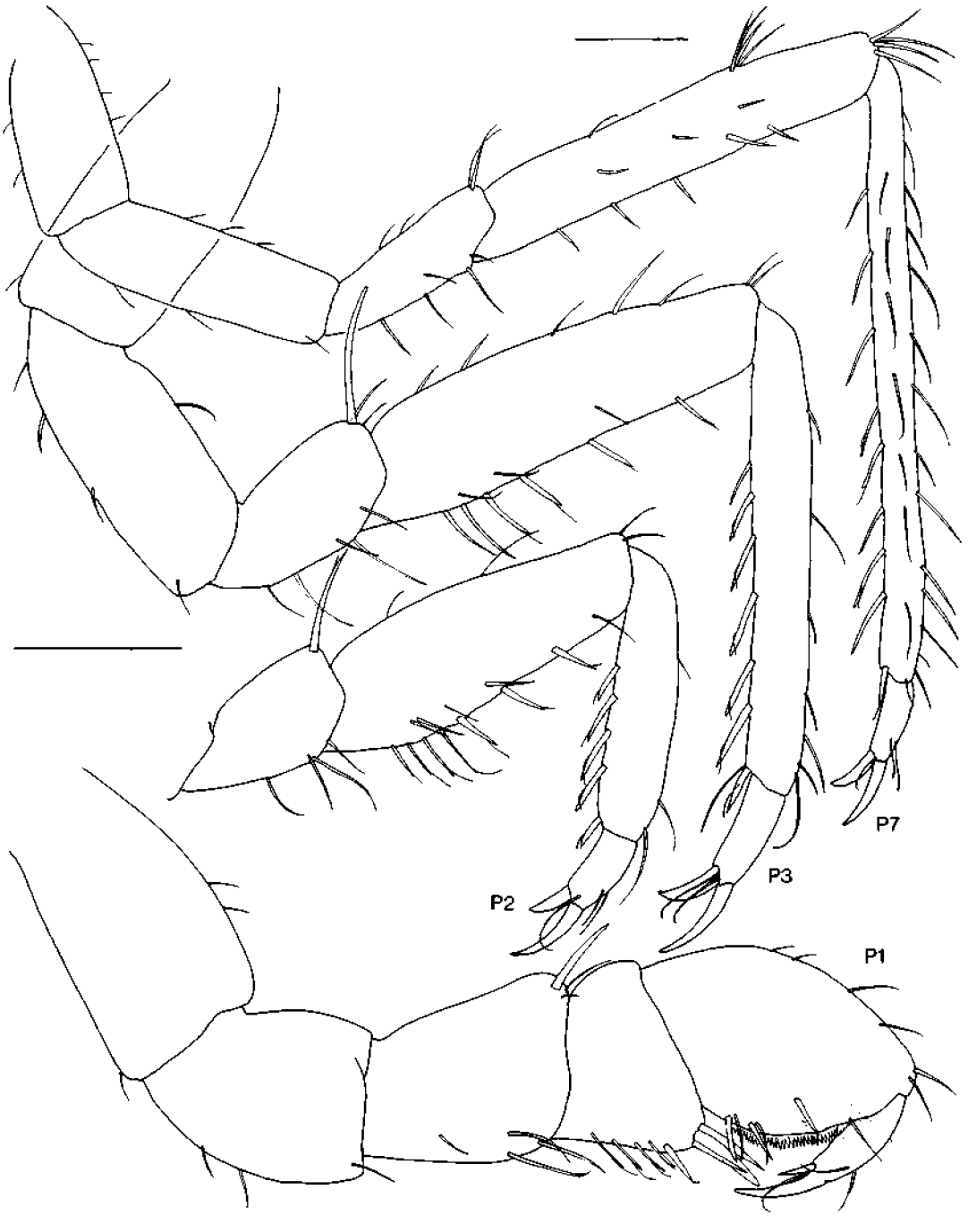

Fig. 8— *Uromunna brevicornis*. Male, 1.29 mm, NMVJ1057.

male; article 5 with 3 evenly-spaced posterior spines; article 6 with 7 evenly-spaced posterior spines. Pereopods 3-7 slightly finer than in male.

Pleopod 2 truncate-rounded, little longer than wide. Pleopods 3-5 as in male.

REMARKS: These Victorian specimens are assigned to the Western Australian species on the basis of fair resemblance to Thomson's (1946) figures and descriptions; type material can no longer be found. In particular, the dentition of the first pereopod, characteristic narrow form of the male, and form of the pleopods correspond well. Thomson's figures and description of the second pereopod are based on a male, not a female as in-

dicated. Further support for the identity of this species comes from the similar estuarine environment in which the species is found. Another estuarine isopod, *Syncassidina aestuaria* Baker, also occurs in both eastern and western Australia (Poore 1982). On the other hand *Cruranthura peroni* (Poore), also known from the Gippsland Lakes, differs in subtle ways from *C. simplicia* Thomson described from the same locality as *U. brevicornis* (Poore in press). One attempt by me in May 1983 to obtain topotypic material was unsuccessful possibly because of unusually high salinity.

Uromunna brevicornis is most similar to *U. nana* (Nordenstam) from the Falkland Islands and *U. schauinslandi* (Sars) from New Zealand. The most

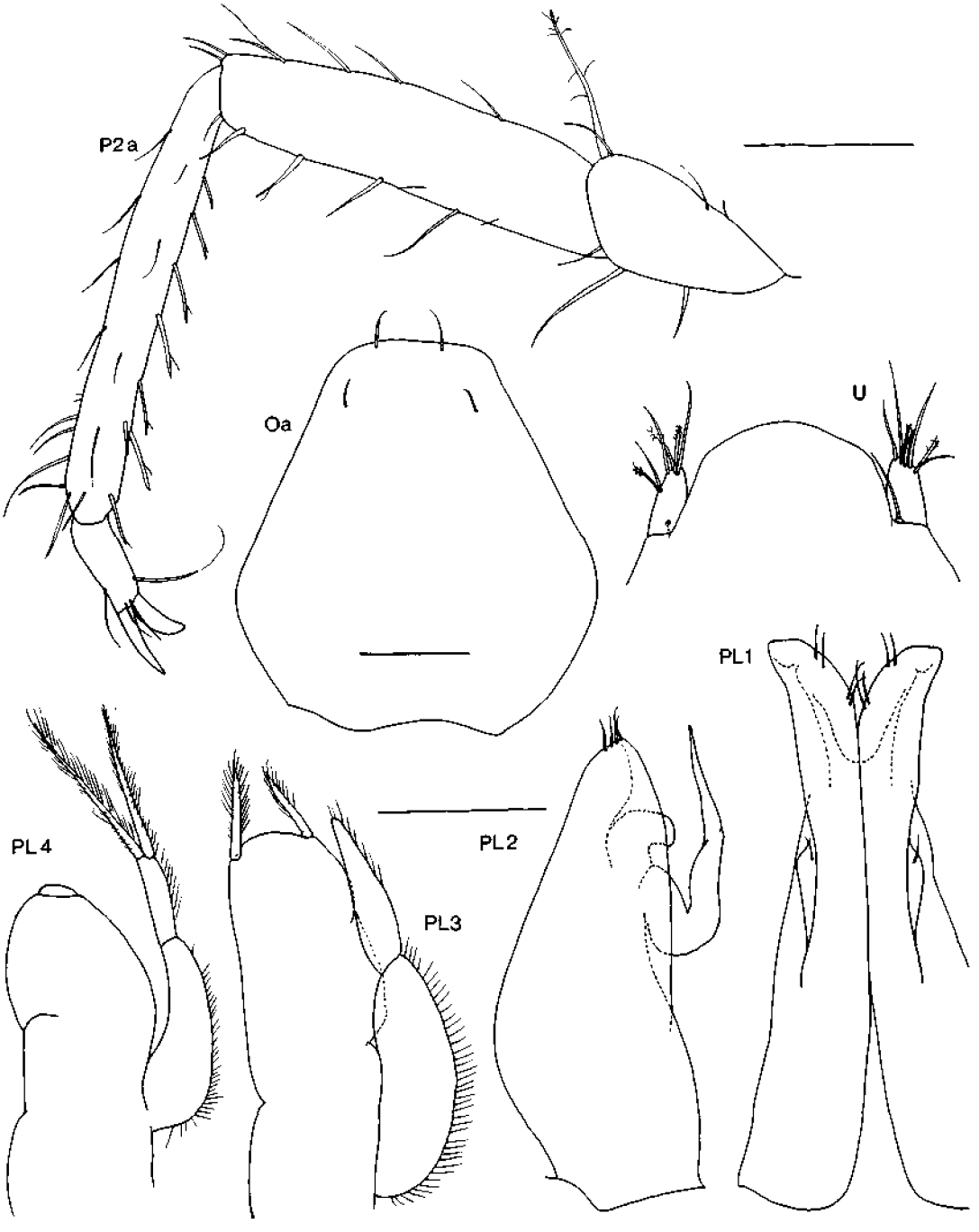

Fig. 9 – *Uromunna brevicornis*. Male, 1.29 mm, NMVJ1057; a, female, 1.29 mm, NMVJ1062.

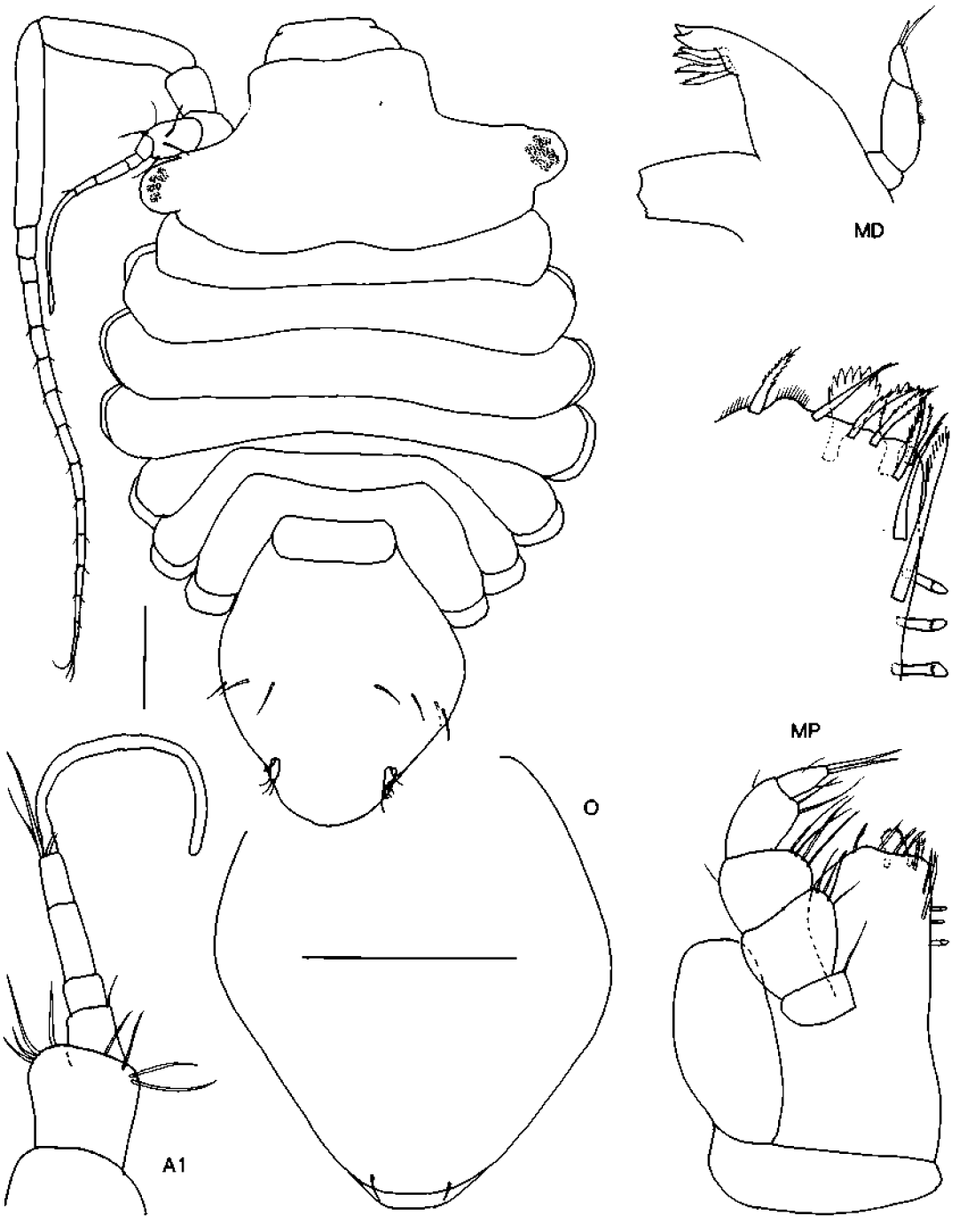

Fig. 10—*Uromunna humei*. Female, 0.74 mm, NMVJ1069.

significant difference is in development of male pereonite 1, not apparent in Menzies (1962) figures of *U. nana* nor in specimens of *U. schauinslandi* (NMVJ3701) dissected by me. *Uromunna schauinslandi* is morphologically very similar, for example in the form of pleopod 1 and pereopods, but the differences in setation are adequate to distinguish the species. Both *U. brevicornis* and *U. schauinslandi* are estuarine species.

Uromunna brevicornis shows well the sexual dimorphism of pereopod 2 which is characteristic of the genus. The species is distinguished from the other species described here by the presence of denticles on the palm of the first pereopods.

Uromunna humei sp. nov.
Figs 10-12

MATERIAL EXAMINED: *Holotype*: female, 0.74 mm, NMVJ1069. Vic., Apollo Bay (38°45'S., 143°41'E.), from coralline algae in intertidal pools, W. F. Seed, 22 Dec. 1970. *Paratype*: Vic., type locality, NMVJ1070 (1 male, 0.65 mm).

DESCRIPTION: *Female*. Body 1.5 times as long as wide. Pereonites 3-5 wider than others. Head little wider than pereonite 1; anterior margin straight, upper lip projecting anteriorly. Pleon with short free first pleonite; pleotelson globose, about as wide as long, with transverse row of 8 setae. Integument largely without setae, with brown mid-dorsal stripe on pereon.

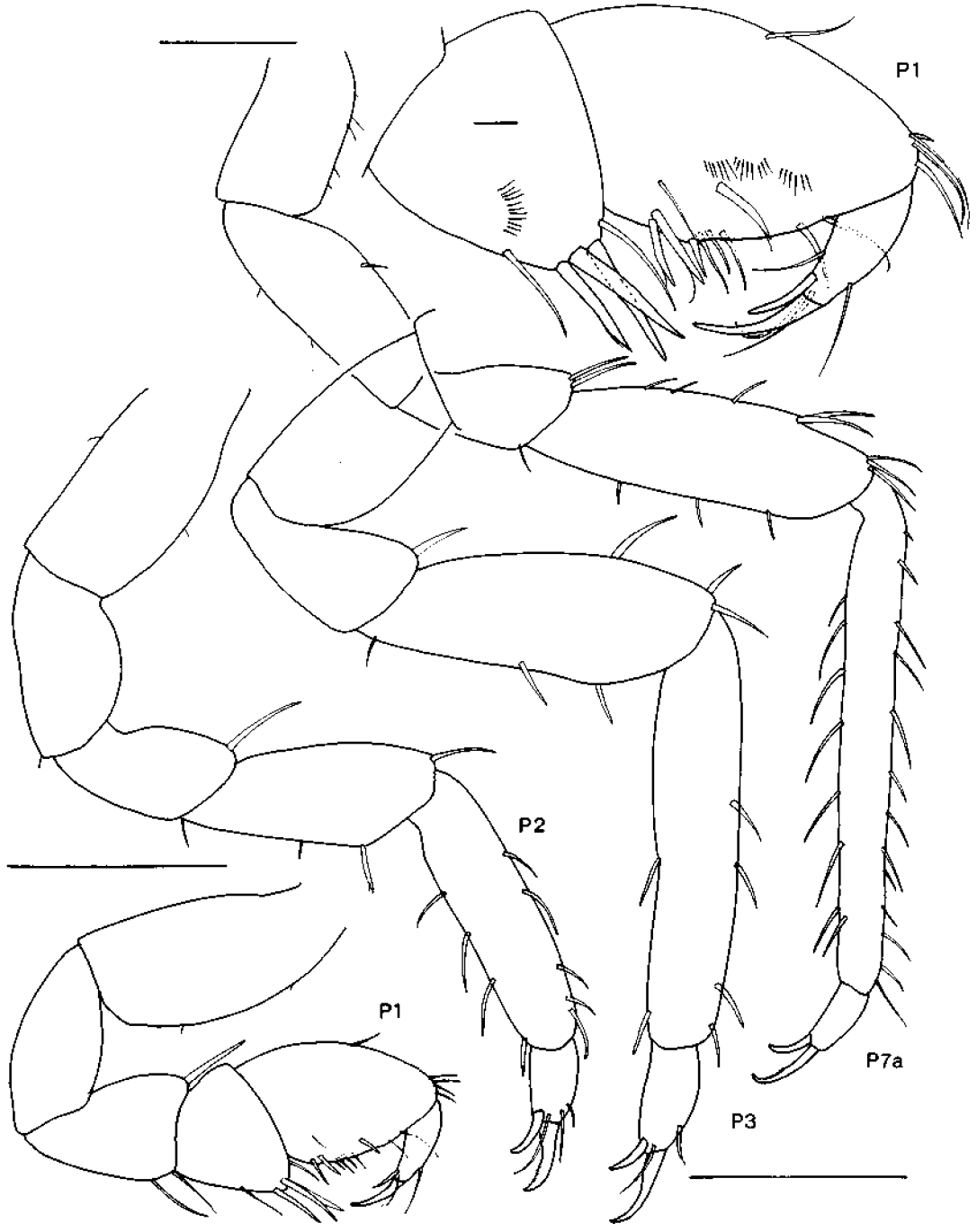

Fig. 11—*Uromunna humei*. Female, 0.74 mm, NMVJ1069; a, male, 0.65 mm, NMVJ1070.

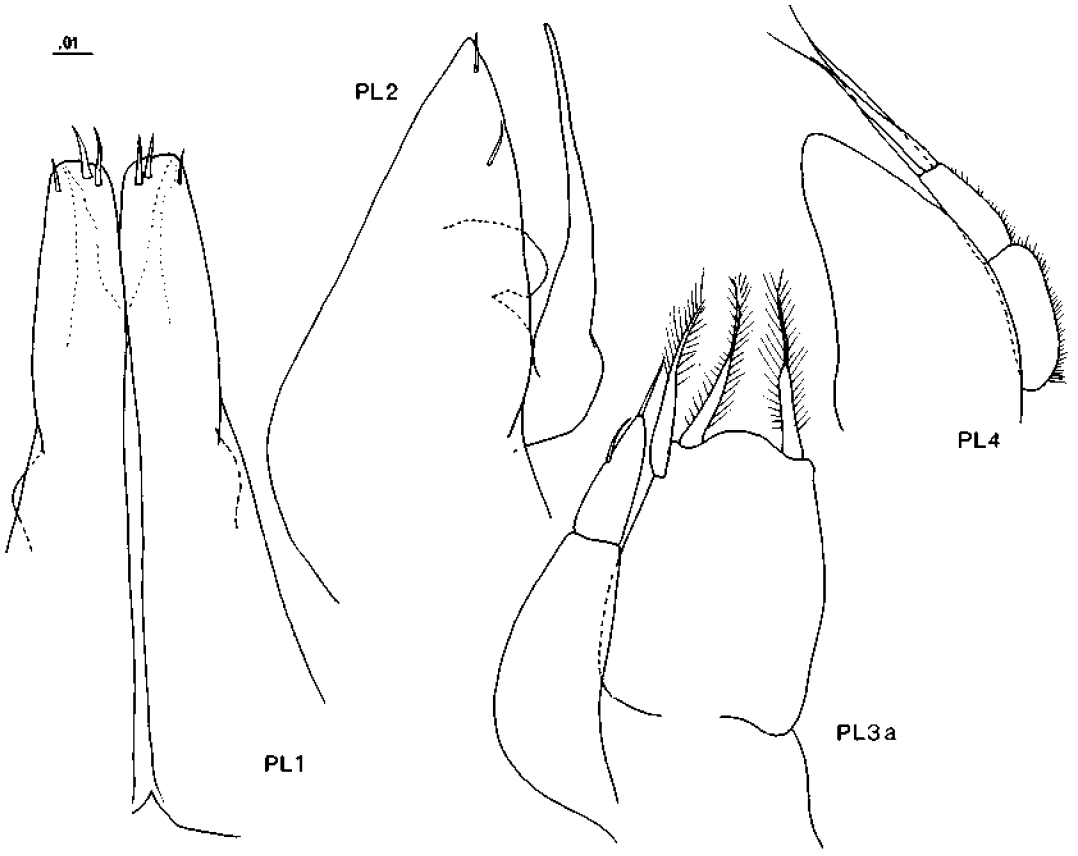

Fig. 12 – *Uromunna humei*. Male, 0.65 mm, NMVJ10; female, 0.74 m, NMVJ1069.

Antenna 1 with 2 broad basal articles, 2 short and narrower articles plus flagellum of 2 narrow tapering articles, of which the last one bears 1 aesthetasc. Antenna 1 peduncle of 3 short broad articles and 2 elongate articles; flagellum of 14 articles, as long as rest of peduncle; total length of antenna about as long as body. Mandible with a 3-articled palp, not reaching to end of incisor, the terminal article with 2 setae; incisor, lacinia mobilis and setal row typical of genus; molar tuberculate, without spines. Maxilla 1 inner ramus with 5 spines, outer ramus with 7 spines. Maxillipedal epipod oval, reaching to end of second palp article; endite with 4 distal spines, 3 submarginal fan-shaped setae, 3 setae near mesial margin and 3 retinaculae; palp of 5 articles, first four with 1, 4, 4 and 2 mesial setae, last article with 2 setae and 2 spines.

Pereopods 1 symmetrical, much smaller than other limbs. Pereopod 1 article 4 with 1 anterodistal spine; article 5 with 3 posterodistal spines; article 6 palm convex with 3 spines on mesial face, and marginal setae; dactyl with unguis about as long as rest of dactyl, plus short supplementary spine. Pereopod 2 article 4 with 1 anterior spine; article 5 with 1 anterior and 2 posterior spines; article 6 with anterior setae and 4 posterior spines; dactyl 3 times as long as wide, with fine unguis as long as rest of dactyl, plus shorter supplementary claw. Pereopod 7 similar to pereopod 2 but more elongate and with more spines; article 6 is 10 times as long as wide.

Pleopod 2 as long as wide, widest at midpoint, with 2 subapical setae. Pleopod 3 endopod with 3 stout apical setae; exopod narrower than endopod, of 2 articles of which the last is short and bears 2 setae. Pleopod 4 exopod of 2 articles, the last with 2 long apical setae.

Uropod without peduncle; lower ramus with about 6 setae; upper ramus not seen.

Male. Like female except for pleopods. Pleopod 1 evenly tapering to rounded-truncate apices; each apex with 3 subterminal setae. Pleopod 2 apex acute, with 2 setae along mesial edge. Pereopod 2 not present on only male.

ETYMOLOGY: *Munna humei* is named for Hamilton Hume (1797-1873) who, in 1824 with William Hovell, explored from Sydney as far as Port Phillip Bay.

REMARKS: *Uromunna humei* is superficially similar to *U. phillipi* described here. The most obvious differences are in the much longer head and stouter dactyls on pereopods 2-7.

Uromunna phillipi sp. nov.

Figs 13-15

1975 *Munna* sp. Poore *et al.*, pp. 32, 63.

MATERIAL EXAMINED: *Holotype*: female, 1.16 mm, NMVJ1073. Vic., Port Phillip Bay (37°57.7'S., 144°44.7'E.), sand, 5 m (PPBES stn 907), Marine Pollution Studies Group, Ministry for Conservation, 3 Feb. 1972. *Paratypes*: Vic., type locality, NMVJ1074-6 (4 females, 1.0-1.1 mm). *Other material*: Tas., Fancy Point, on algae, 3 m, G. Edgar, 10 Dec. 1980, NMVJ1580 (11 females), NMVJ1614 (1 male).

DESCRIPTION: *Female*. Pereonites 2 and 3 wider than others. Head about as wide as pereonite 1; anterior margin straight, upper lip distinct and projecting in

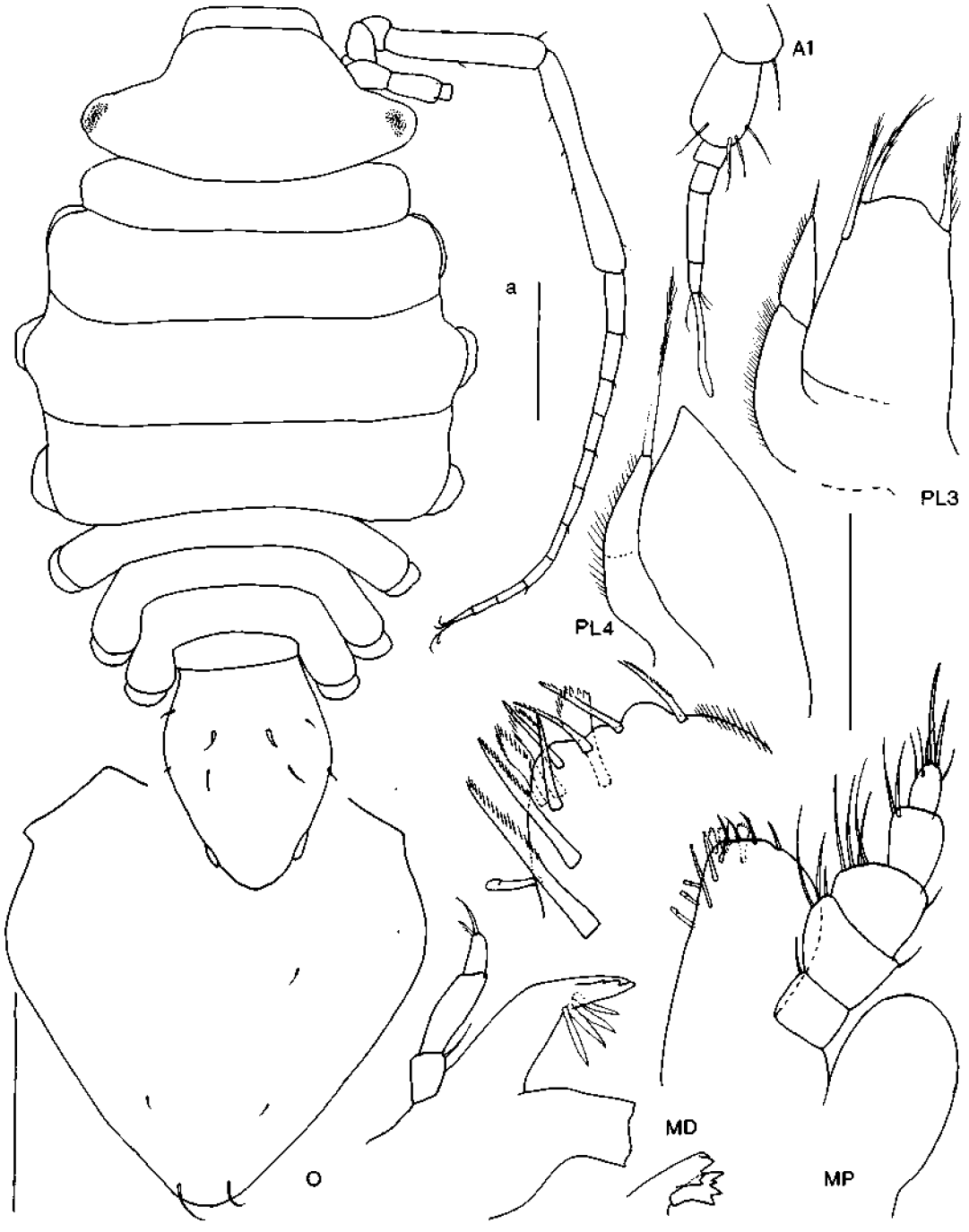

Fig. 13—*Uromunna phillipi*. Female, 1.13 mm, NMVJ1075; a, female, 0.98 mm, NMVJ1074.

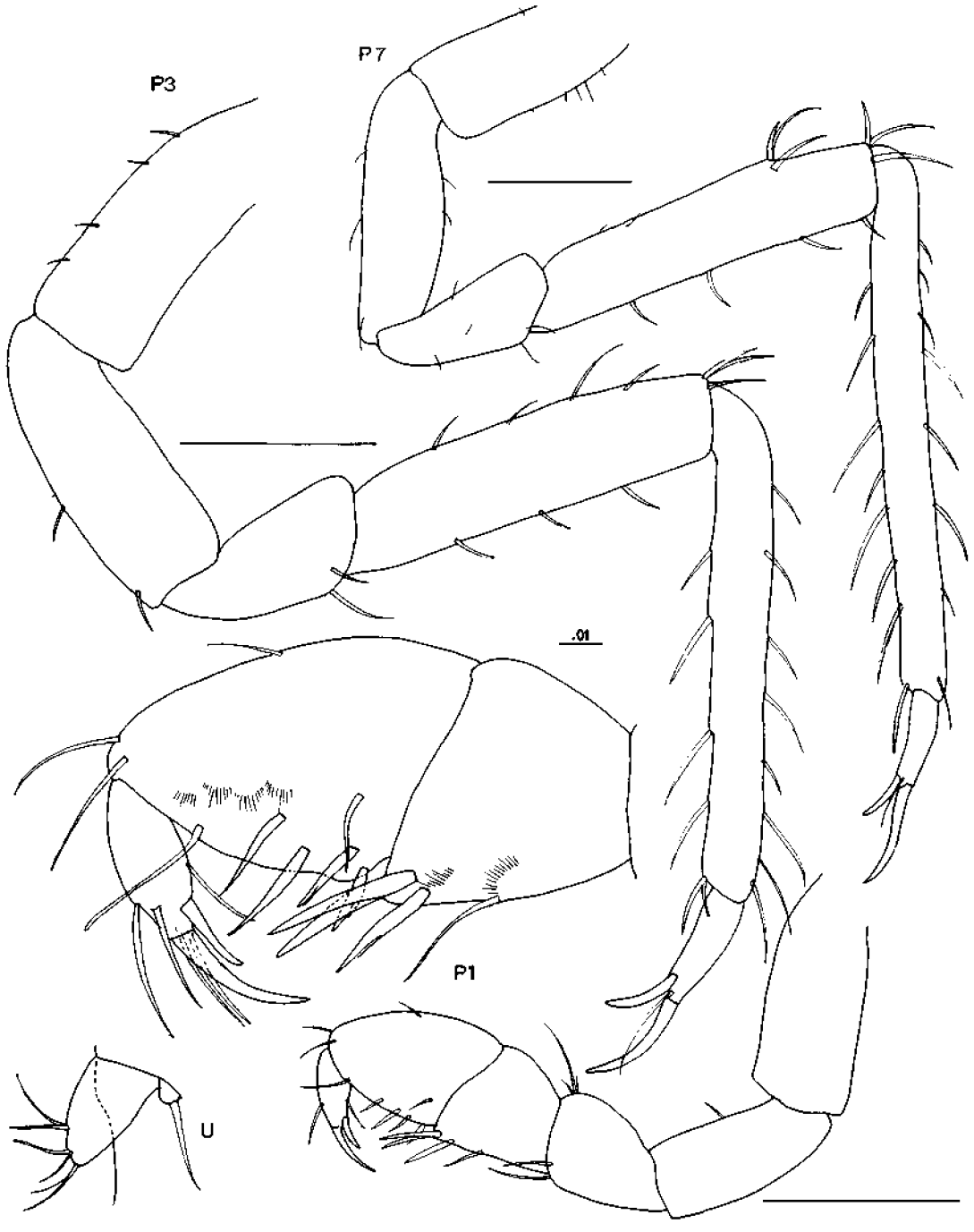

Fig. 14—*Uromunna phillipi*. Female, 1.13 mm, NMVJ1075.

front of head. Pleon with single free first pleonite; pleotelson globose, 1.3 times as long as wide. Integument largely without dorsal setae, except on pleotelson; with diffuse brown colour.

Antenna 1 with 2 broad basal articles, 2 short narrow articles, and 2 longer narrow articles of which the second is half the length of the first; aesthetasc on the end of the terminal article. Antenna 2 peduncle of 3 short basal articles and 2 elongate articles; flagellum of 12 articles, a little shorter than peduncle; total antenna about as long as body. Mandible with 3-articled palp not reaching end of incisor, first article with 1 seta, last

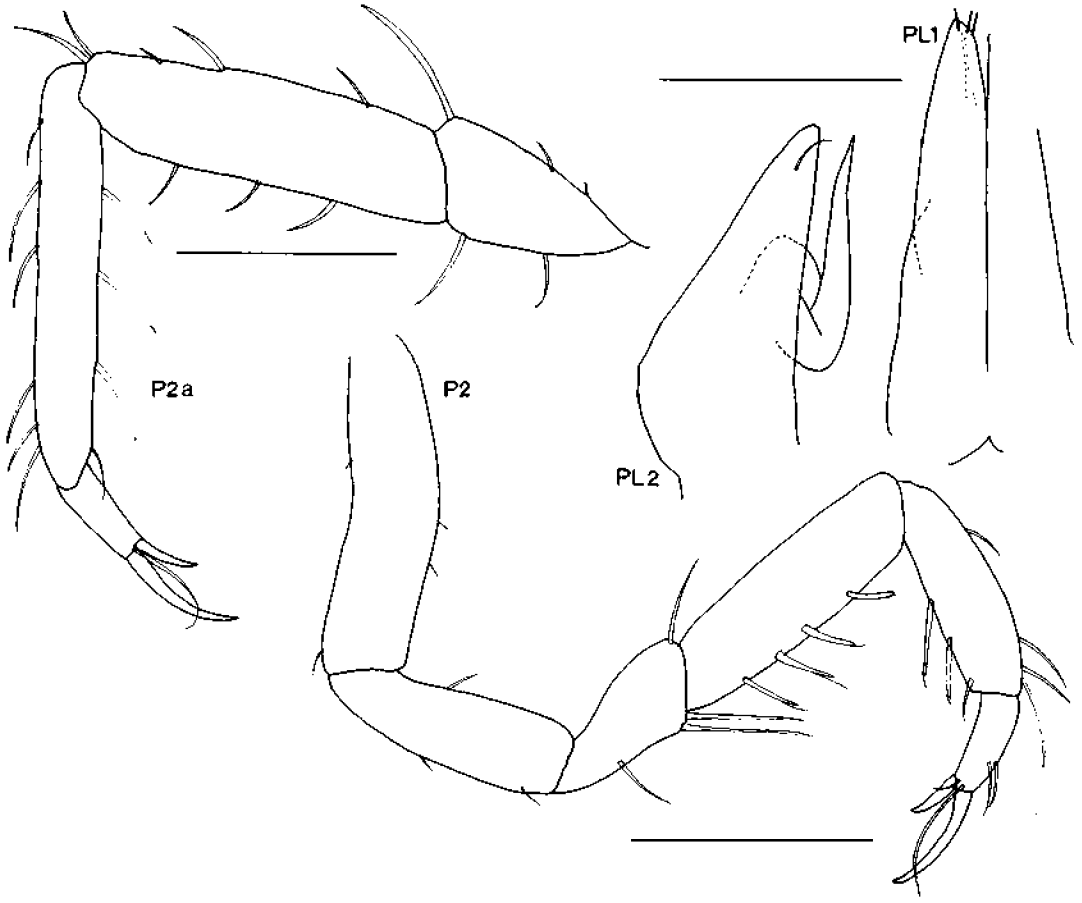

Fig. 15—*Uromunna phillipi*. Male, 0.7 mm, NMVJ1614; a, female, 1.13 mm, NMVJ1075.

article with 2 terminal setae; incisor of 4 cusps; lacinia mobilis on one side only, with 4 teeth; spine row of 3-4 spines; molar process prominent, with tuberculate grinding surface and without setae. Maxilla 1 inner ramus with 4 spines and outer ramus with 11 spines. Maxilla 2 rami with distal simple and complex setae extending mesially along inner ramus. Maxillipedal epipod oval, reaching second article of palp; endite with 4 distal spines, 3 submarginal fan-shaped setae, 3 spines along mesial margin and 3 retinaculae; palp of 5 articles, first four with 1, 3, 4 and 2 setae mesially, last article with 4 setae and 2 spines.

Pereopods 1 symmetrical, much shorter than following legs; article 4 with anterodistal spine; article 5 with 3 posterodistal spines; article 6 with barely-convex palm with 1 proximal spine, 3 spines on mesial face and 1 seta distally; dactyl with spine at base of unguis; unguis half length of dactyl. Pereopods 2-7 increasing in length posteriorly. Pereopod 2 article 4 with long anterodistal spine; article 5 with 4 evenly-spaced spines on posterior margin and 3 on anterior margin; article 6 with 4 spines on posterior margin; dactyl 6 times as long as wide, with very fine unguis as long as rest of dactyl, and shorter supplementary claw. Pereopod 3 similar, but more elongate than pereopod 2. Pereopod 7 article 4 with 2 anterodistal spines; article 5 with 4 posterior spines and 2 groups of 3 spines anteriorly; article 6 is 10 times as long as wide, with 8 spines anteriorly and 8 posteriorly; dactyl with very fine unguis a little shorter than rest of dactyl, and very fine supplementary claw.

Pleopod 2 subtriangular, with 2 subapical setae. Pleopod 3 endopod with 3 plumose setae; exopod much narrower, of 2 articles both marginally setose, 1 strong seta on apex. Pleopod 4 endopod subacute; exopod narrow, tapering, with a long terminal seta.

Uropod without a peduncle; lower ramus with 7 setae; upper ramus minute, with 1 seta.

Male. Differing from female only in pereopod 2, pleopods 1 and 2. Pereopod 2 distal articles broader than in female, article 5 with 4 spines on posterior margin, article 6 with 3 spines. Pleopod 1 tapering to simple, obliquely truncate apex, each half with 3 setae. Pleopod 2 apex rounded-acute, with 1 subterminal seta. Pleopods 3-5 as in female.

ETYMOLOGY: *Uromunna phillipi* is named for Arthur Phillip (1738-1814), first Governor of New South Wales.

REMARKS: *Uromunna phillipi* is distinguished from *U. humei* by its shorter head and finer dactyls on pereopods 2-7. The male figured is from Tasmania.

ACKNOWLEDGEMENTS

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APPENDIX

SPECIES OF *MUNNA* AND *UROMUNNA*

The list includes species assigned to *Zoromunna* (as *Munna*) but not species of *Astrurus* or *Echinomunna*. As well as those species listed several others have been described in the genus *Munna*. *Munna brandti* Zirwas 1916, *M. dentata* Vanhöffen 1914, *M. studeri* Hilgendorf 1893, are not sufficiently well described to be placed with confidence. Kensley (1975, 1976) and Wilson (1980) each listed two additional species but did not describe them. Also in this group is *M. concavifrons* (Barnard 1920), originally described as a species of *Paramunna*. Descriptions of *Munna* sp. A. Monod 1933, and *Munna* sp. Stephensen 1947, could not be obtained and they too remain unplaced. Two other species have already been removed to other genera: *Munna caeca* Richardson 1905, to *Haplomunna* Richardson (Wolff 1962) and *Munna* sp. B Monod 1933, to *Antias milleri* Menzies & Glynn 1968 (= *Santia milleri*). *Munna argentinae* Menzies 1962 differs from all other species in being without eyes, eyestalks, and mandibular palp. It is superficially not similar to *M. acanthifera*, another blind abyssal species, and its generic affiliation remains in doubt. Another problematical species is *Munna coxalis* Kussakin 1972. The flattened body, coxal projections, extraordinarily long uropods (with two articles?) suggest it too belongs in another genus.

An asterisk (*) against a species indicates that I have seen specimens of this taxon.

Species of *Munna* Krøyer

M. acanthifera Hansen 1916—Arctic; *M. aculeata* Sivertsen & Holthuis 1980—Tristan da Cunha; *M. affinis* Nordenstam 1933—South Georgia; *M. antarctica* (Pfeffer 1887)*—Antarctica; *M. armoricana* Carton 1962—France, Channel coast; *M. arnholdi* Gurjanova 1933—Kurile Islands; *M. avatshensis* Gurjanova 1936—NW Pacific; *M. bituberculata* Nordenstam 1933—South Georgia; *M. boeckii* Krøyer 1839*—NW Atlantic; *M. chilensis* Menzies 1962—S Chile; *M. chromatocephala* Menzies 1952—California; *M. chromatocephala inornata* Kussakin 1962—E USSR; *M. chromatocephala orientalis* Kussakin 1974—NW Pacific; *M. coeca* Gurjanova 1930—Spitsbergen; *M. crinata* Kussakin 1972—Kurile Islands; *M. cryophila* Vanhöffen 1914—Antarctica; *M. fernaldi* George & Strömberg 1968—Washington; *M. globicauda* Vanhöffen 1914—Antarctica; *M. greenlandica* Hansen 1916—Greenland; *M. halei* Menzies 1952—California; *M. hanseni* Stappers 1907—Iceland; *M. hentyi* sp. nov.—SE Australia; *M. hirsuta* Kussakin 1962—Kurile Islands; *M. hovelli* sp. nov.—SE Australia; *M. humei* sp. nov.—SE Australia; *M. instructa* Cleret 1971—Marion Island; *M. kroyeri* Goodsir 1942*—NE Atlantic; *M. kurilensis* Kussakin 1974—NW Pacific; *M. limicola* Sars 1868—N Europe; *M. lobata* Kussakin 1962—E USSR; *M. lukini* Kussakin & Mezhov 1979—NW Pacific; *M. lundae* Menzies 1962—S Chile; *M. macquariensis* Hale 1937*—Macquarie Island; *M. maculata* Beddard 1886—Kerguelen and Falkland Islands; *M. magnifica* Schultz 1964—California; *M. minuta* Hansen 1916—N Atlantic; *M. modesta* Kussakin 1962—E USSR; *M. nasuta* Kussakin & Mezhov 1979—NW Pacific; *M. neglecta* Monod 1931—S Atlantic; *M. neozelanica* Chilton 1892—New Zealand; *M. neozelanica* Barnard 1965—Tristan de Cunha, Gough Island; *M. ornata* Kussakin 1962—E USSR; *M. pallida* Beddard 1886—Kerguelen and Falkland Islands; *M. palmata* Liljeborg 1851—Norway; *M. parvituberculata* Kussakin 1962—E USSR; *M. pellucida* Gurjanova 1930—Barents Sea; *M. psychrophila* Vanhoffen 1914—Antarctica; *M. roemeri* Gurjanova 1930—?; *M. serrata* Kussakin 1962—E USSR; *M. setosa* Kussakin 1962—E USSR, Kurile Islands; *M. spinifera* Robinson & Menzies 1961—Gulf of Aden; *M. spinifrons* Menzies & Barnard 1959—California; *M. spitzbergensis* Gurjanova 1930—Spitsbergen; *M. stephenseni* Gurjanova 1933—Bering Sea; *M. stephenseni* Menzies 1962—California; *M. subneglecta* Gurjanova 1936—Sea of Japan; *M. tenuipes* Kussakin 1962—E USSR; *M. truncata* Richardson 1908—NW Atlantic; *M. unicincta* Kussakin & Mezhov 1979—NW Pacific; *M. urupica* Kussakin 1972—Kurile Islands; *M. varians* Sivertsen & Holthuis 1980—Tristan da Cunha; *M. vittata* Kussakin & Mezhov 1979—NW Pacific; *M. wolffi* Fresi & Mazzella 1974—Italy; *Munna* sp. Monod 1931—South Georgia.

Species of *Uromunna* Menzies

U. acarina (Miller 1941)—Hawaii; *U. brevicornis* (Thomson 1946)*—S Australia; *U. caribea* (Carvacho 1977)—Caribbean; *U. hayesi* (Robertson 1978)—Texas; *U. nana* (Nordenstam 1933)—Tristan da Cunha, Falkland, St Paul and Amsterdam Islands; *U. nana* Forma 'a' (Menzies 1962)—S Chile; *U. petiti* (Amar 1948)—Mediterranean; *U. phillipi* sp. nov.—SE Australia; *U. powelli* (Kensley 1980)*—Nigeria; *U. reynoldsi* (Frankenberg & Menzies 1966)—Gulf of Mexico, Panama Canal; *U. santaluciae* (Gascón & Mañé-Garzón 1974)—Uruguay; *U. schauinslandi* (Sars 1905)*—New Zealand; *U. schauinslandi* (Menzies 1962)—S Chile; *U. sheltoni* (Kensley 1977)*—South Africa; *U. ubiquita* (Menzies 1952)*—Washington, California.