PARANTHURA (CRUSTACEA, ISOPODA, PARANTHURIDAE) FROM SOUTH-EASTERN AUSTRALIA

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Abstract

Eleven new species of Paranthura (Paranthuridae) are described from the south-eastern Australian coast and shelf: P. acacia, P. boronia, P. caesia, P. dryandra, P. epacris, P. grevillea, P. kunzea, P. lobelia, P. microtis, P. senecio and P. telopea. Paranthura ciliata Whitelegge, 1901, and P. involuta Whitelegge, 1901, are redescribed. A key to their identification is presented.

Australian species of Paranthura are sexually dimorphic; males differ from juveniles and females in antenna 1, pereopods, uropods and telson. However, the ways in which dimorphism is expressed are various.

Introduction

In two previous papers (Poore, 1978, 1981) species of six paranthurid genera from south-eastern Australia were described. These are Acicalathura Barnard, Aenigmathura Thomson, Bullowanthura Poore, Colanthura Richardson, Leptanthura Sars, and Ulakanthura Poore. Here, species of Paranthura Bate & Westwood are dealt with.

To date four Australian species have been referred to Paranthura. Paranthura australis Haswell is a nomen dubium, possibly a species of Leptanthura (Poore, 1978). Miers' (1884) specimen referred to as Paranthura australis became the type of Apanthura coppingeri Barnard, 1925. The other two, Paranthura ciliata Whitelegge and P. involuta Whitelegge, and eleven new species are dealt with here.

The genus Paranthura, although clearly distinct from other paranthurids (Poore, 1980) is remarkably homogeneous both in Australia and world-wide. Prior to this work about 28 species were known. Species are distinguished by subtle differences in the shape and proportions of articles of pereopods, uropods and telson. Setaation is generally consistent. In several cases morphological differences between juveniles of different species only became apparent after quite distinct males were found (e.g., P. acacia and P. microtis). In this study relationships between Australian species and those in other parts of the world are not explored. Given the apparent richness of the Australian fauna it is probable that other areas also possess endemic cryptic species as yet undescribed.

Sexual dimorphism occurs as in all Anthuridea (Poore, 1980), males being characterised by the possession of a multiarticulate flagellum on antenna 1, each article bearing numerous aesthetascs, and of a stylet-like appendix masculina on the endopod of pleopod 2. In the south-eastern Australian fauna new forms of modification are noted:

1. Antenna 1. In one species, P. epacris, each flagellar article possesses only two aesthetascs, not many.
2. Appendix masculina. In P. boronia the appendix masculina is exceptionally broad, half as wide as the uropodal endopod, not stylet like. The appendix reaches further in some species than in others.
3. Pereon. In P. epacris the pereon is considerably elongated compared with the female and with males of other species.
4. Pleon. The pleon of the male of P. caesia is more shortened than that of the female. Extreme shortening of the pleon is a feature of P. infundibulata Richardson from Bermuda and of P. bellicauda Miller & Menzies from Hawaii.
5. Telson. The telson may be elongated and dorsally setose as in P. caesia. Both sexes of P. infundibulata Richardson exhibit this phenomenon.
6. Pereopod 1. The mesial setae along the palm of males are more numerous than in females, as is the case in several anthurideans.
7. Pereopods 2 and 3. Article 6 is more elongate in males than in females.
8. Pereopods 4-7. Particularly in the most posterior limbs, basal articles may be either broader in females (P. acacia, P. caesia) or...
The differences between the kinds of sexual dimorphism shown raise serious questions about the taxonomic reality of the genus Paranthuria. Species groups based on morphology of males are not readily apparent. While Paranthuria epacris may be separated from all other species on male characters as well as on nonsexual features, among the others there is little correlation between male characters. For example, species with a shortened pleone include those with both broadened and elongated pereopods.

Knowledge of sexual differentiation in Anthuridea is based on work with the genus Cyathura which is a protogynous hermaphrodite (Amanieu, 1969; Burbanck and Burbanck, 1974). No similar ecological or experimental study has been attempted with any member of the Paranthuridae which, it appears, may have a different life history.

The descriptions which follow are of ovigerous females or of the largest juvenile. Smaller individuals usually have shorter, broader limbs with fewer spines and setae. After consideration of many characters, only those which are most useful in distinguishing species are used in species descriptions. For example, mouthparts have not been discussed because they are very similar throughout the genus. The written descriptions, therefore, are short, intended only to complement the figures. The sixth article of pereopod 1 bears three rows of setae; the numbers in the setal formula refer to the mesial, palmar, and lateral rows respectively. Only the first two rows mentioned are illustrated. The angle between the palm and the margin of article 5 is given in the descriptions to differentiate axial, oblique and transverse palms. The proportions of distal articles on the walking legs is a useful specific character; the length:breadth ratios used to quantify these are measured from limbs on permanent slides. Similarly, the proportions of uropodal rami and the telson are measured on flattened individuals. For males, only the differences from the main description are noted. In descriptions of the flagellum of antenna 1 the number of articles includes the short basal article and the two minute terminal articles.

Illustrations of limbs are from permanent slides (Gurr's Aquamount). Pereopod 1 is in lateral view, pereopods 2, 4 and 7 mesial views. Uropodal rami and telson are figured flattened, antennae as seen in a horizontal plane attached to head. The figure scale is 1 mm and referable to the whole animal only. In all figures the following abbreviations are used: A1, A2, antennae 1 and 2; P1-P7, pereopods 1-7; PL1, 2, pleopods 1, 2; UN, uropodal endopod; UX, uropodal exopod. Specific epithets of new species are chosen from genera of the Australian flora, used as nouns in apposition. These names allude to the stem-anthuria (flower tail) in many genera of the Anthuridea.

Material for this study has come from the following surveys and institutions:

Port Phillip Bay Environmental Study, 1969-73 (PPBES) carried out in Port Phillip Bay, Victoria, by the Marine Studies Group, Ministry for Conservation, Melbourne, Vic.;
Crib Point Benthic Survey, 1965-72 (CPBS) and Westernport Bay Environmental Study, 1973-4 (WBES), both carried out in Western Port, Victoria, by the same group;
Bass Strait Survey, 1980-3 (BSS) carried out by the National Museum of Victoria, Melbourne;
Shelf Benthic Survey, 1973 (AMSBS) carried out on the New South Wales shelf by the Australian Museum, Sydney, NSW;
Hawkesbury River Study, 1977-8 (AMHRS) carried out in the Hawkesbury River estuary by the same museum;
and other material from the Museum of Victoria (formerly National Museum of Victoria, Melbourne, NMV), the Australian Museum, Sydney (AM), the South Australian Museum, Adelaide (SAM), the Zoologisk Museum, Copenhagen (ZMC), and the Zoologisches Museum, Universitat Hamburg, West Germany (ZMH).
Key to South-Eastern Australian Species of Paranthura

1. Pereopods 1 and 2 with articles 6 of same length; telson 3 x as long as wide, more or less parallel-sided for most of length. Pereon of males grossly elongate (14 x as long as wide); male antenna 1 articles each with only 2 aesthetascs ................. 2
   - Pereopod 1 article 6 longer than that of pereopod 2; telson at most 2.5 x as long as wide, usually tapering from midpoint (if not tapering other characters apply). Pereon of males not especially elongated (about 10 x as long as wide); male antenna 1 articles each with numerous aesthetascs (males of some species not known) ........ 3
2. Uropodal endopod about as long as wide, inner angle of peduncle sharply produced; pleopod 1 exopod widest at midpoint and tapering to an acutely rounded apex ................. P. ciliata
   - Uropodal endopod shorter than wide, inner angle of peduncle square, not produced; pleopod 1 exopod widest proximally and tapering to a rounded apex ... P. epacris
3. Pleon wider than long; telson 2 x as long as pleon .................................. 4
   - Pleon longer than wide; telson at most 1.5 x as long as pleon .......................... 5
4. Pleonites 1-5 fused; telson ovate; palm of pereopod 1 almost transverse. Posterior legs and uropodal rami of male more elongate than in juveniles and females ........................................ P. telopea
   - Pleonites all free; telson tapering; palm of pereopod 1 axial-oblique. Basis of posterior legs and uropodal rami of male broader than in juveniles and females ........................................ P. senecio
5. Pleonites 2-5 fused dorsally. Basis of posterior pereopods of male broader than in females and juveniles .......... P. grevillea
   - Pleonites free. Basis of posterior pereopods of males only slightly broadened if at all .. 6
6. Telson about as long as pleon .................................. 7
   - Telson longer than pleon (usually 1.5 x as long) ........................................ 8
7. Telson parallel-sided for most of length; pereopod 1 palm moderately oblique, proximal thumb separated from cutting edge by an obtuse angle (fig. 17) ............... P. kunzea
   - Telson tapering from midpoint; pereopod 1 palm strongly oblique, proximal thumb separated from convex cutting edge by a deep angle (fig. 10) ...................... P. dryandra
8. Pereopod 1 palm oblique and stepped away from axis of limb (fig. 3); antenna 1 flagellum with 6 articles ....................... 9
   - Pereopod 1 palm more or less axial (fig. 2); antenna 1 flagellum with 7 or more articles ........................................ 10
9. Head about 0.7 x as wide as long; articles 6 of pereopods 1 and 2 similar in size; adults about 11 mm ......................... P. involuta
   - Head about as wide as long; article 6 of pereopod 1 much larger than that of pereopod 2; adults about 7 mm. Appendix masculina of male robust, one-third width of pleopodal endopod ................ P. boronia
10. Telson broad over most of length and rounded terminally (fig. 5); articles 5 and 6 of pereopods 4-7 with 2 and 3 spines respectively; antenna 1 flagellum with 7 articles. Male uropodal rami broadened, these and dorsum of telson especially setose ........................................ P. caesia
   - Telson widest proximally and tapering distally (fig. 18); articles 5 and 6 of pereopods 4-7 with 4-5 and 5-6 spines respectively; antenna 1 flagellum with 9 or more articles. Male uropodal rami narrowed or only slightly broadened, especially setose only if rami narrowed ..................... 11
11. Pereopod 7 article 6 is 3.5 x as long as broad; uropodal endopod shorter than wide. Male telson and uropodal rami mesially setose, telson proportionally longer than in female or juvenile ................. P. lobelia
   - Pereopod 7 article 6 is 4 x as long as broad; uropodal endopod longer than wide. Male telson and uropodal rami not especially setose, telson of similar proportions to female and juvenile ......................... 12
12. Uropodal endopod narrowing sharply; with little if any colour; telson moderately tapering. Posterior pereopods and uropodal rami of male slightly broader than in female and juveniles .......... P. acacia
   - Uropodal endopod broadly rounded;
Paranthuridae Menzies & Glynn, 1968

Paranthura Bate & Westwood, 1868

*Paranthura* acacia* sp. nov.

Figures 1, 2

*Material examined:* 4 males, 3 females, 7 juveniles; 9.5-16.2 mm:

- Paratypes: Vic., Western Port, Crib Point, 5-15 m, CPBS stations; stn 32N, AM P32604 (2 specimens); stn 21S, NMV J1534(2); stn 11N, NMV J1535(1); stn C4, NMV J1536(2); stn A4, NMV J1537(1); stn 300, NMV J1531(1).
- Western Port, 9-18 m, WBES stations: stn 1735, NMV J1538(1); stn 1747, NMV J1539(1).
- Other material: Vic., Western Port, Crib Point, CPBS stations: stn 32S, NMV J1540(1); stn C4, NMV J1541(1).

*Description:* Female. Head almost as wide as long. Pleon 2 × as long as pereonite 2, pleonites 1-6 free. Antenna 1 flagellum of 9 articles. Antenna 2 flagellum 0.8 × as long as last article of peduncle.

Pereopod 1 article 6 elongate, 1.6 × as long as wide; palm axial (10°); proximal thumb broad, separated from the strongly convex cutting edge by a shallow, obtuse angle; setal formula 12, 17, 45. Pereopod 2 article 6 shorter than that of pereopod 1, 1.8 × as long as broad, palm with 11 spines. Pereopod 4 articles 5 and 6 each with 5 spines, dactyl fine, 0.8 × length of article 6. Pereopod 7 articles 5 and 6 each with 5 spines; article 6 4 × as long as wide; dactyl fine, 0.6 × length of article 6.

Pleopod 1 endopod bearing 37 setae; exopod widest at mid-point and tapering distally, bearing 53 setae. Pleopod 2 endopod 3 × as long as broad, with 11 setae distally; exopod with a partial suture laterally, with 3 setae proximal to suture and 25 setae distally.

Uropodal endopod reaching just beyond end of telson, 1.2 × as long as wide, lateral margin weakly convex; exopod 2.2 × as long as wide, proximal lobe broadly rounded, distal lobe very broad, tapering to an obtuse apex; with scattered setae on mesial surface. Telson 1.3 × as long as pleon, 2.5 × as long as wide, widest proximally and tapering to an evenly rounded apex; with numerous terminal long setae, dorsal submarginal short setae on distal half, and scattered dorsal setae elsewhere.

Male. Pereon, pleon, and telson of similar proportions to female. Antenna 1 with 9
Figure 1. Paranthura acacia. Holotype female; a, male, NMV J1532.
Figure 2. *Paranthura acacia*. Holotype female.
aesthetasc-bearing articles. Pereopod 1 palm
with about 60 mesial setae. Pereopod 2 article 6
more elongate. Pereopod 7 basis slightly
broader. Uropodal rami only slightly broader,
not especially setose. Pleopod 2 with a simple
lanceolate appendix masculina, only just ex-
ceeding endopod.

**Colour:** Evenly red-brown with diffuse concen-
trations of pigment.

**Distribution:** Western Port, Victoria. Coarse
shelly-sand sediment, 5-18 m.

**Remarks:** *Paranthura acacia* is distinguished
from other south-eastern Australian species by
the combination of finer dactyls, broad
uropodal exopod, and convex palm of
pereopod 1.

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*Paranthura boronia* sp. nov.

**Material examined:** 13 males, 9 females, 9
juveniles; 4.2-6.9 mm:

Holotype: female, 6.4 mm, NMV J1542.

Vic., Port Phillip Bay, Swan Bay, (38°14.0'S,
144°39.5'E), silt-clay sediment with *Zostera*,
1 m, 23 Jan. 1973 (PPBES stn 966).

Paratypes: Vic., type-locality, NMV J1543 (1
specimen), NMV J1544(1), NMV J1545(2),
NMV J1546(1), NMV J1547(2); AM P32605(4).

Other material: Vic., Western Port, 2-8 m,
CPBS stations: stn 12N, NMV J1548(1); stn
21N, NMV J1549(1). Western Port, intertidal,
WBES stations: stn 1706, NMV J1550(2); stn
1718, NMV J1551(13). Balnarring, W. F. Seed,
12 Dec. 1968, NMV J1552(2). Apollo Bay, W.

**Description:** Female. Head as wide as long.
Pleon 2× as long as pleonite 7, pleonites 1-6
free. Antenna 1 flagellum of 6 articles. Antenna
2 flagellum 0.5× as long as fifth article of
peduncle.

Pereopod 1 article 6 elongate, 1.5× as long
as wide; palm oblique (30°); proximal thumb
acute, separated from the straight cutting edge
by a deep acute angle; setal formula 7, 10, 30.
Pereopod 2 article 6 shorter than that of
pereopod 1, 1.8× as long as broad, palm with 8
spines. Pereopod 4 articles 5 and 6 each with 3
spines; dactyl fine, 0.9× length of article 6.

Pereopod 7 articles 5 and 6 with 2 and 3 spines
respectively; article 6 3× as long as wide; dactyl
fine, 0.7× length of article 6.

Pleopod 1 endopod bearing 12 setae; exopod
widest at midpoint and tapering distally, with
26 setae. Pleopod 2 endopod 3.5× as long as
broad, with 7 setae distally; exopod with a par-
tial suture laterally, without setae proximal to
suture and with 12 setae distally.

Uropodal endopod reaching to end of telson,
1.4× as long as wide, lateral margin weakly
convex; exopod 2.1× as long as wide, proximal
lobe broadly rounded, distal lobe strongly
tapering to an acute apex. Telson 1.3× as long
as pleon, 2.4× as long as wide, widest at mid-
point and tapering to an evenly rounded apex;
with numerous terminal long setae and dorsal
submarginal short setae on distal half.

Male. Pereon, pleon, and telson of similar
proportions to female. Antenna 1 with 4
aesthetasc-bearing articles. Pereopod 1 setation
same as in female. Pereopod 2 article 6 more
elongate, but pereopod 7 of similar proportions
to female. Uropodal rami narrower than in
female but not especially setose. Pleopod 2 with
a particularly robust appendix masculina,
about half as broad as endopod and well ex-
ceeding it.

**Colour:** No pigmentation on preserved
material.

**Distribution:** Victoria, bays and coast. Inter-
tidal—8 m, muddy sediments, often with
*Zostera*.

**Remarks:** *Paranthura boronia* is distinguished
from other south-eastern Australian species by
the narrow acute uropodal exopod, narrow
endopod and the deep angle between the cutting
edge and thumb on the oblique palm of
pereopod 1.

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*Paranthura caesia* sp. nov.

**Material examined:** 10 males, 3 female, 89
juveniles; 2.0-15.4 mm:

*Paranthura punctata.* — Barnard, 1925: 154
(part from Tasmania). — Nierstrasz, 1941: 252
(part). [Not *Paranthura punctata* (Stimp-
son)—South Africa].

**Material examined:** 10 males, 3 female, 89
juveniles; 2.0-15.4 mm:
Figure 3. *Paranthura boronia*. Holotype female; a, male, 5.8 mm, NMV J1544.
Figure 4. *Paranthura boronia*. Holotype female.
Figure 5. *Paranthura caesia*. Holotype juvenile; a, male, 14.9 mm, NMV J1554.
Figure 6. Paranthura caesia. Holotype juvenile; a, male, 14.9 mm, NMV J1554.

Paratypes: Vic., type-locality, NMV J1554 (1 specimen); NMV J1555(33). Aireys Inlet, W. F. Seed, 29 Jan. 1968, AM P32606(7).


NSW, Eden, G. Hartmann and G. Hartmann-Schroeder, 2 Jan. 1976, ZMH(1); Batemans Bay, G. Hartmann and G. Hartmann-Schroeder, ZMH(2).


Description: Juvenile. Head as wide as long. Pleon 2× as long as pereonite 7, pleonites 1-6 free. Antenna 1 flagellum of 7 articles. Antenna 2 flagellum 0.9× as long as fifth article of peduncle.

Pereopod 1 article 6 elongate, 1.7× as long as wide; palm axial; proximal thumb broad, separated from the straight cutting edge by a shallow obtuse angle; setal formula 12, 14, 20. Pereopod 2 article 6 shorter than that of pereopod 1; 1.9× as long as broad, palm with 8 spines. Pereopod 4 articles 5 and 6 each with 4 spines; dactyl stout, 0.8× length of article 6. Pereopod 7 articles 5 and 6 with 2 and 3 spines respectively; article 6 3.5× as long as wide; dactyl stout, 0.6× length of article 6.

Pereopod 1 endopod bearing 12 setae. Pleopod 2 exopod widest at midpoint and tapering distally, bearing 25 setae. Pleopod 2 endopod 2.5× as long as broad, with 4 setae distally; exopod with a partial suture laterally, with 4 setae proximal to suture and 9 setae distally.

Uropodal endopod reaching just beyond end of telson, as long as wide, lateral margin strongly convex; exopod 2.2× as long as wide, proximal lobe narrowly rounded, distal lobe moderately acute. Telson 1.3× as long as pleon, 2.4× as long as wide, widest at midpoint and tapering to an evenly rounded apex; with numerous terminal long setae and dorsal submarginal short setae on distal half.

Male. Pereon of similar proportions to female, pleon shorter (1.6× as long as pereonite 7), telson longer (2.2× as long as pleon). Antenna 1 with 6 aesthetasc-bearing articles. Pereopod 1 with about 60 mesial setae. Pereopod 2 article 6 more elongate. Pereopod 7 basis moderately broadened and longer. Uropodal exopod broader, especially distally, its mesial surface and dorsal surface of the telson densely setose. Pleopod 2 with a simple appendix masculina, only just exceeding the endopod.

Colour: Distinct small red-brown chromatophores dorsally.

Distribution: Southern NSW, Victoria, South Australia and Tasmania, coastal rocky shores. Intertidal-6 m.

Remarks: Paranthura caesia is most easily recognised by its large size and distinct small brown dorsal chromatophores but in South Australia may be confused with P. microtis. Dactyls on posterior pereopods are particularly stout. The male pleon is shortened and the tail fan densely setose. Paranthura caesia is similar to the South African P. punctata (Stimpson).

Paranthura ciliata Whitelegge

Figures 7, 8


Material examined: 1 male, 1 female, 2 juveniles; 7.9-12.5 mm:

NSW, E. of Green Cape (37°18'S, 150°19'E), 156 m, trawl, 29 Oct. 1979 (Kapala stn K79-17-17), AM P32658(1). Off Eden (37°05'S, 150°05'E), 70-100 m, T. Mortensen on F.I.S. Endeavour, 30 Sep. 1914, ZMC (1 male).

Bass Strait, Eastern Bass Strait, Flinders Canyon (39°40.3'S, 148°46.5'E), 293-329 m, coarse shell, 27 Mar. 1979 (BSS stn 33), NMV J3001(2).

Description: Juvenile. Head 0.8 x as wide as long, tapering only beyond eyes. Pleon little longer than pereonite 7, pleonites 1-6 free. Antenna 1 flagellum of 6 articles. Antenna 2 flagellum 0.5 x as long as fifth article of peduncle.

Pereopod 1 article 6 globose, 1.5 x as long as wide; palm oblique (20°); proximal thumb broad, barely separated from the convex cutting edge by a shallow angle; setal formula 3, 13, 16. Pereopod 2 total length decidedly longer than pereopod 1. Article 6 as long as that of pereopod 1, 2.0 x as long as broad, palm with 10 spines. Pereopod 4 articles 5 and 6 with 4 and 5 spines respectively; dactyl fine, 0.7 x length of article 6. Pereopod 7 articles 5 and 6 with 3 and 4 spines respectively; article 6 5 x as long as wide; dactyl fine, 0.7 x length of article 6.

Pleopod 1 endopod bearing 6 setae; exopod widest at midpoint and tapering sharply to an acute apex, bearing 25 setae.

Uropodal endopod not reaching to end of telson, about as long as wide, lateral margin strongly convex (internal distal angle of peduncle prominently projecting, acute) exopod 2 x as long as wide, proximal lobe broadly rounded, distal lobe rounded. Telson 1.2 x as long as pleon, little more than 3 x as long as wide, more or less parallel-sided, ending in an evenly rounded apex with numerous terminal long setae but without dorsal short setae.

Male. Pereon, pleon and telson of similar proportions to juvenile. Antenna 1 with 4 articles, each bearing 2 aesthetascs. Pereopod 1 palm with about 25 mesial setae. Pereopod 2 article 6 more elongate. Pereopod 7 and uropodal rami not different from female. Pleopod 2 appendix musculina narrow, with an acute tip, reaching well beyond the endopod.

Distribution: Southern NSW shelf and eastern Bass Strait, 98-329 m.

Remarks: Although Whitelegge’s type-material cannot be found, these specimens clearly belong to this species. The critical features which were figured by Whitelegge (1901) are the narrow, parallel-sided telson, pleopod 1, uropodal rami, and the internal distal projection of the uropodal peduncle. A very similar species (Paranthura epacris) is described here from shallower samples in NSW and Victoria. Both are very narrow species with a short pleon, parallel-sided telson and pereopods 1 and 2 of similar size. The difference between them are discussed with remarks on P. epacris.

Barnard (1925) referred to this species under the name of the New Zealand species Paranthura flagellata (Chilton) but the telsons of the two species differ.

Paranthura dryandra sp. nov.

Figures 9, 10

Material examined: 10 males, 7 females, 39 juveniles; 2.0-7.2 mm:


Other material: Vic., Shoreham, W. F. Seed, 28 Feb. 1959, NMV J1612(5); 30 May 1962, NMV J1613(2).


Description: Female. Head 0.9 x as wide as long. Pleon almost 2 x as long as pereonite 7, pleonites 1-6 free. Antenna 1 flagellum of 6 articles. Antenna 2 flagellum 0.8 x as long as fifth article of peduncle.

Pereopod 1 article 6 globose, 1.3 x as long as wide; palm oblique (30°); proximal thumb acute, separated from the convex cutting edge
Figure 7. *Paranthura ciliata*. Juvenile, 12.5 mm, AM P32658.
by a deep, obtuse angle; setal formula 5, 9, 15.
Pereopod 2 article 6 shorter than that of pereopod 1, 1.6× as long as broad, palm with 7 spines. Pereopod 4 articles 5 and 6 each with 4 spines; dactyl stout, 0.9× length of article 6. Pereopod 7 articles 5 and 6 with 3 and 4 spines respectively; article 6 4× as long as wide; dactyl stout, 0.7× length of article 6.
Pleopod 1 endopod bearing 16 setae; exopod widest in distal half and with rounded apex, bearing 22 setae. Pleopod 2 endopod 3× as long as broad, with 6 setae distally; exopod with a partial suture laterally, with 1 seta proximal to suture and 13 setae distally.
Uropodal endopod reaching to end of telson, as long as wide, lateral margin weakly convex; exopod 2× as long as wide, proximal lobe broadly rounded, distal lobe ending in an obtuse apex. Telson as long as pleon, 2.5× as long as wide, widest at midpoint and tapering to an evenly rounded apex with numerous terminal long setae and dorsal submarginal short setae on distal half.
Male. Pereon a little more elongate than female, pleon and telson of similar proportions. Antenna 1 with 6 aesthetasc-bearing articles. Pereopod 1 palm with about 35 mesial setae. Pereopod 2 article 6 more elongate. Pereopods 4-7 more elongate, basis not broadened. Uropodal rami narrower than in female. Pleopod 2 with a simple appendix masculina, reaching well beyond the endopod.

Colour: Dorsally with dense red-brown chromatophores.

Distribution: Victoria and Tasmania. Intertidal—3 m, rocky shores in algae.

Remarks: Paranthura dryandra is notable for its small size, dark colour, and its particularly short telson (only as long as the pleon). The palm of pereopod 1 is especially oblique and its proximal thumb quite acute.

Paranthura epacris sp. nov.

Figures 11, 12

Material examined: 8 males, 12 females, 147 juveniles; 5.7-18.0 mm:
Holotype: female, 12.8 mm, NMV J1564.
Vic., Western Port, Crib Point (38°21.3'S,
Figure 9. *Paranthura dryandra*. Holotype female; a, male, 7.2 mm, NMV J1561.
Figure 10. Paranthura dryandra. Holotype female.
Figure 11. *Paranthura epacris*. Holotype female; a, male, 15.8 mm, NMV J1565.
Figure 12. *Paranthura epacris*. Holotype female.
Description: Female. Head 0.8× as wide as long, widest posteriorly. Pleon 1.3× as long as pereonite 7, pleonites 1-6 free. Antenna 1 flagellum of 6 articles. Antenna 2 flagellum 0.5× as long as fifth article of peduncle.

Pereopod 1 article 6 elongate, 1.6× as long as wide; palm oblique (20°); proximal thumb broad, separated from the convex cutting edge by a shallow obtuse angle; setal formula 6, 13, 16. Pereopod 2 total length decidedly longer than pereopod 1, article 6 as long as that of pereopod 1, 1.8× as long as broad, palm with 9 spines. Pereopod 4 articles 5 and 6 each with 5 spines, dactyl fine, 0.7× length of article 6. Pereopod 7 articles 5 and 6 with 4 and 5 spines respectively; article 6 4× as long as wide; dactyl fine, 0.7× length of article 6.

Pereopod 2 appendix masculina narrow, with an acute tip, reaching well beyond the endopod.

Paranthura epacris shares with P. ciliata a narrow non-tapering telson. It differs in several minor features: flagellum of antenna 1 is shorter; article 6 of pereopod 2 is less elongate; uropodal endopod is shorter; the inner distal angle of the uropodal peduncle is square and not produced; and the exopod of pleopod 1 is less sharply tapering. These are very small differences but so far no intermediate forms have been found.

The species overlap geographically in NSW but Paranthura epacris is not found in such deep water as P. ciliata. The male of P. epacris is especially elongate and the aesthetascs of antenna 1 are poorly developed. The male of P. ciliata is similarly specialised.

Paranthura guenillea sp. nov.

Material examined: 3 males, 5 juveniles, 3 manccas; 2.5-7.3 mm:

Holotype: juvenile, 5.6 mm, AM P24364. NSW, E. of North Head, Sydney (33°49'S, 151°18'E), 20 m, in association with the sponge Polymastea craticia, SCUBA (AMSBS station).

Paratypes: NSW, E. of North Head, Sydney, AMSBS stations; 21 m, AM P22812 (1 specimen); 21-27 m, AM P22823(1).
Other material: NSW, Lord Howe Is., Old Gulch, among algae on midlittoral boulders, J. Lowry, 17 May 1977, AM P29811(1). Lord Howe Is., between Comet Hole and reef, 2-3 m, J. K. Lowry, 10 May 1977, AM P29807(6), NMV J1533(1).

Description: Juvenile. Head 0.8 x as wide as long. Pleo 1.8 x as long as pereonite 7, pleonites 1 and 6 free, 2-5 fused dorsally. Antenna 1 flagellum of 5 articles. Antenna 2 flagellum 0.7 x as long as fifth article of peduncle.

Pereopod 1 article 6 elongate, 1.5 x as long as wide; palm oblique (30°); proximal thumb broad, separated from the convex cutting edge by a shallow obtuse angle; setal formula 5, 6, 10. Pereopod 2 total length about as long as pereopod 1; article 6 2 x as long as broad, palm with 6 spines. Pereopod 4 articles 5 and 6 each with 3 spines; dactyl stout, 0.8 x length of article 6. Pereopod 7 articles 5 and 6 with 1 and 2 spines respectively; article 6 3 x as long as wide; dactyl stout, 0.7 x length of article 6.

Pleopod 1 endopod bearing 5 setae; exopod widest in proximal half and tapering distally, bearing 15 setae. Pleopod 2 endopod 3 x as long as broad, with 3 setae distally; exopod with partial suture laterally, without setae proximal to suture and with 7 setae distally.

Uropodal endopod reaching beyond end of telson, almost as long as wide, lateral margin strongly convex; exopod 2.1 x as long as wide, proximal lobe narrowly rounded, distal lobe tapering to rounded apex. Telson 1.2 x as long as pleon, 2.5 x as long as wide, widest at midpoint and tapering to a broadly rounded apex; with numerous terminal long setae and dorsal submarginal short setae on distal half.

Male. Pleuron of similar proportions to juvenile. Pleon shorter (1.6 x as long as pereonite 7), telson longer (1.7 x as long as pleon) than in juvenile. Antenna 1 with 5 aesthetasc-bearing articles. Pereopod 1 palm with about 35 mesial setae. Pereopod 2 article 6 more elongate than in juvenile. Pereopod 7 articles (especially basis) broader than in juvenile. Uropodal rami narrower than in juvenile. Pereopod 2 with a long simple appendix masculina, well exceeding the endopod.

Colour: Scattered dorsal red-brown pigment.
Distribution: NSW shelf and Lord Howe Is., on algae and sponges. Intertidal — 27 m.

Remarks: Fused pleonites distinguish Paranthura grevillea from all other species. Like some other small species (P. boronia, P. dryandra) P. grevillea possesses an oblique palm on pereopod 1. However, the species is distinguished from these by the rounded apex to the uropodal exopod and the broadened basis in posterior pereopods of the male.

Paranthura involuta Whitelegge

Figure 15


Material examined: Holotype: juvenile, 11 mm, AM G2403. NSW, off Botany Bay, 90-93 m. (Thetis stn 37).

Description: Holotype juvenile. Head 0.7 x as wide as long, widest posteriorly. Pleon about 2 x as long as pereonite 7, pleonites 1-6 free. Antenna 1 flagellum of 6 articles. Antenna 2 flagellum 0.7 x as long as fifth article of peduncle.

Pereopod 1 article 6 elongate, 1.6 x as long as wide; palm oblique (20°); proximal thumb broad, well separated from the convex cutting edge by a shallow obtuse angle; setal formula 5, 11, 13. Pereopod 2 article 6 about as long as that of pereopod 1, 1.5 x as long as broad, palm with 10 spines. Pereopod 4 articles 5 and 6 each with 4 spines; dactyl stout, 0.6 x length of article 6. Pereopod 7 articles 5 and 6 with 3 and 4 spines respectively; article 6 5 x as long as wide; dactyl moderately stout, 0.6 x length of article 6.

Uropodal endopod 2 x as long as wide, lateral margin weakly convex; exopod 3 x as long as wide. Telson about 2.5 x as long as wide, widest at midpoint and tapering to an acute apex; with numerous terminal long setae.

Male. Unknown.

Colour: “Pale creamy-white” (Whitelegge, 1901).
Distribution: NSW shelf, 90-93 m.
Figure 13. *Paranthura grevillea*. Holotype juvenile; a, male, 7.3 mm, AM P22821.
Figure 14. Paranthura grevillea. Holotype juvenile.
Figure 15. *Paranthura involuta*. Holotype juvenile.
Remarks: Whitelegge's specimen is incomplete, the uropods, telson, and some of the limbs are missing. However, it is not possible to reconcile what remains with new material collected from the NSW shelf (P. grevillea and P. epacris). The species can be recognized by its narrow head, elongate articles on posterior pereopods and, according to Whitelegge (1901), the sharply tapering telson. Whitelegge's figure of the antennae is clearly in error.

**Paranthura kunzea** sp. nov.

Figures 16, 17

**Material examined:** 21 juveniles; 2.5-9.1 mm:

**Description:** Juvenile. Head 0.9× as wide as long. Pleon 1.4× as long as pereonite 7, pleonites 1-6 free. Antenna 1 flagellum of 6 articles. Antenna 2 flagellum 0.7× as long as fifth article of peduncle.

Pereopod 1 article 6 elongate, 1.5× as long as wide; palm oblique (25°); proximal thumb broad, separated from the straight cutting edge by a shallow obtuse angle; setal formula 13, 13, 45. Pereopod 2 article 6 shorter than that of pereopod 1, 1.8× as long as broad, palm with 10 spines. Pereopod 4 articles 5 and 6 with 5 spines each; dactyl stout, 0.9× length of article 6. Pereopod 7 articles 5 and 6 with 4 and 5 spines respectively; article 6 3.5× as long as wide; dactyl stout, 0.7× length of article 6.

Pleopod 1 endopod bearing 8 setae; exopod widest in distal half and with rounded apex, bearing 21 setae. Pleopod 2 endopod 4× as long as broad, with 6 setae distally; exopod with partial suture laterally, with 2 setae proximal to suture and 10 setae distally.

Uropodal endopod reaching little beyond end of telson, as long as wide, lateral margin strongly convex; exopod 2× as long as wide, proximal lobe as long as wide, parallel-sided for much of its length ending with an evenly rounded apex; with numerous terminal long setae and dorsal submarginal short setae on distal half.

Figure 16. *Paranthura kunzea*. Holotype juvenile.
Figure 17. *Paranthura kunzea*. Holotype juvenile.
Male. Unknown.

**Colour:** Brown on head, only small patches elsewhere dorsally.

**Distribution:** Tasmania. Algae to 3 m.

**Remarks:** *Paranthura kunzea* is a moderately-sized species best recognised by its short, relatively broad telson and short pleon. The pereopods are relatively indistinguishable.

**Paranthura lobelia** sp. nov.

Figures 18, 19

**Material examined:** 1 female, 3 males, 1 juvenile; 6.8-11.6 mm:

- Holotype: female, 10.9 mm, AM P32602. NSW, Port Stephens, off Shoal Bay (32°41'S, 152°09'E), in coarse sand with *Posidonia australis*, 2.5 m, P. Gibbs, 1 Sep. 1976.
- Paratypes: NSW, type-locality, AM P32603 (3 specimens), NMV J1556(1).

**Description:** Female. Head almost as wide as long. Pleon 1.5 x as long as pereonite 7, pleonites 1-6 free. Antenna 1 flagellum of 9 articles. Antenna 2 flagellum 0.8 x as long as fifth article of peduncle.

Pereopod 1 article 6 elongate, 1.6 x as long as wide; palm axial (0°); proximal thumb very broad, separated from the convex cutting edge by a shallow obtuse angle; setal formula 13, 13, 45. Pereopod 2 article 6 shorter than that of pereopod 1, 1.8 x as long as broad, palm with 10 spines. Pereopod 4 articles 5 and 6 with 5 spines each; dactyl stout, 0.9 x length of article 6. Pereopod 7 articles 5 and 6 with 4 and 5 spines respectively; article 6 3.5 x as long as wide; dactyl stout, 0.7 x length of article 6.

Pleopod 1 endopod bearing 21 setae; exopod widest in distal half and with rounded apex, bearing 34 setae. Pleopod 2 endopod 3.5 x as long as broad, with 9 setae distally; exopod with partial suture laterally, with 3 setae proximal to suture and 14 setae distally.

Uropodal endopod reaching to end of telson, 0.9 x as long as wide, lateral margin strongly convex; exopod 2.1 x as long as wide, proximal lobe narrowly rounded, distal lobe broad then steeply tapering. Telson 1.5 x as long as pleon, 2.6 x as long as wide, widest in proximal half and tapering gradually to a rounded apex; with

Figure 18. *Paranthura lobelia*. Holotype female; a, male, 11.6 mm, AM P32603.
Figure 19. *Paranthura lobelia*. Holotype female.
numerous terminal long setae and dorsal submarginal short setae on distal two-thirds.

Male. Pereon and pleon of similar proportions to female; telson a little longer and dorsally setose. Antenna 1 with 8 aesthetasc-bearing articles. Pereopod 1 palm with about 50 mesial setae. Pereopod 2 article 6 more elongate. Pereopod 7 not modified. Uropodal rami of similar shape to female, exopod mesially setose. Pleopod 2 with a simple lanceolate appendix masculina, only just exceeding endopod.

**Colour:** Diffuse brown pigment dorsally.

**Distribution:** NSW (Port Stephens), subtidal.

**Remarks:** *Paranthura lobelia* is similar to *P. acacia* in the form of pereopod 1 but differs in having a shorter uropodal endopod, broader exopod, broader sixth articles on pereopods 4-7, and a more tapering telson. The species shares with *P. microtis* a distinctly tapering telson.

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**Paranthura microtis** sp. nov.

Figures 20, 21

*Paranthura punctata.*—Barnard, 1925: 154 (part from South Australia).—Nierstrasz, 1941: 252 (part). [Not *Paranthura punctata* (Stimpson)—South Africa].

**Material examined:** 2 females, 3 males, 1 juvenile; 9.4-16.9 mm:

Holotype: female, 16.9 mm, SAM C3904. SA, St Vincent Gulf, 31 Jan. 1895.


**Description:** Female. Head as wide as long. Pleon 2.0 × as long as pereonite 7, pleonites 1-6 free. Antenna 1 flagellum of 10 articles. Antenna 2 flagellum 0.9 × as long as fifth article of peduncle.

Pereopod 1 article 6 elongate, 1.6 × as long as wide; palm axial (10°); proximal thumb broad, separated from the straight cutting edge by a shallow obtuse angle; setal formula 16, 15, 60. Pereopod 2 article 6 shorter than that of pereopod 1, 1.8 × as long as broad, palm with 11 spines. Pereopod 4 articles 5 and 6 with 5 and 6 spines respectively; dactyl stout, 0.8 × length of article 6. Pereopod 7 articles 5 and 6 with 5 and 6 fine spines respectively; article 6 4 × as long as wide; dactyl stout, 0.7 × length of article 6.

Pleopod 1 endopod bearing 40 setae; exopod widest in proximal half and tapering distally, bearing about 55 setae. Pleopod 2 endopod 2.8 × as long as broad, with about 30 setae distally; exopod with partial suture laterally, with 4 setae proximal to suture and 16 setae distally.

Uropodal endopod reaching beyond end of telson, 1.1 × as long as wide, lateral margin weakly convex; exopod 2.3 × as long as wide, proximal lobe narrowly rounded, distal lobe rounded. Telson 1.5 × as long as pleon, 2.4 × as long as wide, widest in proximal half and tapering sharply to an evenly rounded apex; with numerous terminal long setae and dorsal submarginal short setae on distal half.

Male. Pereon of similar proportions to female. Pleon little shorter (1.6 × pereonite 7), telson shorter (1.3 × pleon) than in female. Antenna 1 with 6 aesthetasc-bearing articles. Pereopod 1 with about 40 mesial setae. Pereopod 2 article 6 more elongate. Pereopod 7 more elongate than female. Uropodal rami narrower, not especially setose. Pleopod 2 with a simple appendix masculina reaching well beyond endopod.

**Colour:** Very dark brown dorsally on pereon of some individuals, in distinct large chromatophores on telson and uropods.

**Distribution:** South Australia.

**Remarks:** *Paranthura microtis* is very close to *P. acacia* from Victoria. The pereopods of the two species are virtually indistinguishable. However, the rich colour of this species, the more broadly rounded uropodal endopod and the more sharply tapering telson serve to separate the two. Males of *P. acacia* and *P. microtis* differ in modification of pereopods and uropodal rami.
Figure 20. Paranthura microtis. Holotype female; a, male, 13.6 mm, SAM C3905.
Figure 21. *Paranthura microtis*. Holotype female; a, male, 13.6 mm, SAM C3905.
**Paranthura senecio** sp. nov.

*Figures 22, 23*

**Material examined:** 3 males, 18 juveniles; 3.7-11.6 mm:

Holotype: juvenile, 8.7 mm, AM P33602. NSW, Jervis Bay, off Moona Moona Creek (35°00'S, 150°45'E), algae and sediment, 3 m, J. K. Lowry, 19 Jun. 1982 (station NSW-115).

Paratypes: NSW, type-locality, AM P33603 (1 male), AM P32692 (1 male, 7 juveniles). Type-locality and date, on mussel *Trichomya hirsuta* with epizoic algae and sponges on sand-covered rocks, 8 m (station NSW-113), NMV J3000 (1 male, 4 juveniles); encrusting sponge, 3 m (station NSW-112), AM P32689(1); on algae *Zonaria*, small encrusting ascidian in *Ecklonia* bed, 3 m (station NSW-114), AM P32691(5).

**Description:** Juvenile. Head about as wide as long. Pleon especially short, 1.4× as long as pereonite 7, wider than long, pleonites 1-6 free. Antenna 1 flagellum of 7 articles. Antenna 2 flagellum 0.5× as long as fifth article of peduncle.

Pereopod 1 article 6 globose, 1.5× as long as wide; palm oblique (20°); proximal thumb broad, separated from the straight cutting edge by a shallow obtuse angle; setal formula 14, 16, 29. Pereopod 2 article 6 shorter than that of pereopod 1, 1.8× as long as broad, palm with 9 spines. Pereopod 4 articles 5 and 6 each with 4 spines; dactyl moderately stout, 0.8× length of article 6. Pereopod 7 articles 5 and 6 each with 3 spines; article 6 4× as long as wide; dactyl fine, 0.6× length of article 6.

Pleopod 1 endopod bearing setae; exopod widest in proximal half and tapering distally, bearing 30 setae. Pleopod 2 endopod with 6 setae distally; exopod with partial suture laterally, with 1 seta proximal to suture and 12 setae distally.

Uropodal endopod reaching just beyond end of telson, about as long as wide, lateral margin strongly convex, exopod 1.3× as long as wide, proximal lobe broadly rounded, distal lobe acute and evenly tapering. Telson 2.1× as long as pleon, 2.6× as long as wide, widest proximally and tapering to very broadly rounded apex; with numerous terminal long setae and dorsal submarginal short setae on distal half.

Male. Pleon shorter and broader than in juvenile, telson more elongate. Antenna 1 with 5 aesthetasc-bearing articles. Pereopod 1 palm with about 60 mesial setae. Pereopod 2 article 6 more elongate. Pereopod 7 basis very broad, ovate; article 3 slightly broader than in juvenile. Uropodal rami slightly broader than in juvenile. Pleopod 2 with a hooked appendix masculina, well exceeding endopod.

**Colour:** Scattered dorsal pigment.

**Distribution:** NSW (Jervis Bay). Algae and encrusting epizoans, 3-8 m.

**Remarks:** *Paranthura senecio* is distinguished from other south-eastern Australian species mainly by its very short pleon of separate pleonites and oblique pereopod 1 palm.

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**Paranthura telopea** sp. nov.

*Figures 24, 25*

**Material examined:** 1 male, 3 females, 15 juveniles, 2.5-6.0 mm:


**Description:** Female. Head as wide as long, not tapering. Pleon 1.6× as long as pereonite 7, very short, almost 2× as wide as long, pleonites 1-5 fused, 6 free; laterally with 5 long plumose setae. Antenna 1 flagellum of 3 articles. Antenna 2 flagellum 0.3× as long as fifth article of peduncle.

Pereopod 1 article 6 globose, 1.3× as long as wide; palm oblique (50°); proximal thumb acute, separated from the convex cutting edge by a deep acute angle; setal formula 4, 11, 9. Pereopod 2 article 6 smaller than that of pereopod 1, 1.7× as long as broad, palm with 5 spines. Pereopod 4 articles 5 and 6 each with 2 spines; dactyl stout, 0.8× length of article 6. Pereopod 7 articles 5 and 6 with 2 and 3 spines respectively; article 6 2.7× as long as wide; dactyl stout, 0.8× length of article 6.
Figure 22. *Paranthura senecio*. Holotype juvenile; a, male, 11.6 mm, AM P33603; b, pleon of juvenile, 8.2 mm, AM P32692.
Figure 23. *Paranthura senecio*. Holotype juvenile; a, male, 11.6 mm, AM P33603.
Figure 24. *Paranthura telopea*. Holotype female; a, male, 4.4 mm, NMV J3003.
Figure 25. Paranthura telopea. Holotype female.
Pleopod 1 endopod bearing 4 setae; exopod widest in distal half and with rounded apex, bearing 11 setae. Pleopod 2 endopod 3× as long as broad, with 3 setae distally; exopod without a partial suture, with 9 setae distally.

Uropodal endopod reaching to end of telson, about as long as wide, lateral margin strongly convex; exopod 1.4× as long as wide, proximal lobe very broadly rounded, distal lobe extremely obtusely angled. Telson 2× as long as pleon, 2.4× as long as wide, widest distally and with a very broad rounded apex; with numerous terminal long setae and dorsal submarginal short setae on distal half.

Male. Pereopod of similar proportions to female. Pleon a little shorter (1.4× pereonite 7), and telson shorter (1.4× pleon). Antenna 1 with 4 aesthetasc-bearing articles. Pereopod 1 palm with 22 mesial setae. Pereopod 2 article 6 more elongate than in female. Pereopods 4-7 with terminal articles more elongate. Uropodal rami narrower than in female. Pleopod 2 with a hooked appendix masculina, well exceeding the endopod.

Colour: Scattered patches of pigment dorsally, most notably on anterior part of head and on pleon.

Distribution: Victoria. Intertidal rocky shore.

Remarks: Paranthura telopea is one of the more easily recognised species of this genus from the area. Its compact form and fused pleonites immediately distinguish it from most other species. Another small coloured specimen from the Victorian coastline, P. dryandra, has a longer pleon of free segments.

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