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Article

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The deep-sea scavenging genus *Hirondellea* (Crustacea: Amphipoda: Lysianassoidea: Hirondelleidae fam. nov.) in Australian waters

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Abstract

The new lysianassoid amphipod family Hirondelleidae is established and the deep-sea scavenging genus *Hirondellea* is reported from Australian waters for the first time. Five new species are described: *H. diamantina* **sp. nov.**; *H. endeavour* **sp. nov.**; *H. franklin* **sp. nov.**; *H. kapala* **sp. nov.**; and *H. naturaliste* **sp. nov.** *Anonyx wolfendeni* Tattersall is transferred into *Hirondellea*.

Key words: Crustacea, Amphipoda, Hirondelleidae, Australia, taxonomy, new species, *Hirondellea diamantina*, *Hirondellea endeavour*, *Hirondellea franklin*, *Hirondellea kapala*, *Hirondellea naturaliste*, *Hirondellea wolfendeni*

Introduction

The hirondelleids are a world-wide group of deep-sea scavenging lysianassoid amphipods. There are currently 16 species in the family, but as the deep-sea is explored further it is highly likely that more species will be described. Based on their mouthpart morphology hirondelleids appear to be unspecialised scavengers whose relationship to other members of the lysianassoid group is not clear. In this paper we establish the family Hirondelleidae, report hirondelleids from Australian waters for the first time and describe five new species. We also transfer *Anonyx wolfendeni* Tattersall, 1909 into *Hirondellea*.

Materials and methods

The descriptions were generated from a DELTA database (Dallwitz 2005) to the hirondelleid species of the world. The material used in this study was collected by the New South Wales Fisheries Research Vessel *Kapala*, the Museum Victoria SLOPE project (Poore *et al.* 1994) and the Australian Museum SEAS project (Lowry & Smith 2003). Material is lodged in the Australian Museum, Sydney (AM) and Museum Victoria, Melbourne (MV). Standard abbreviations on the plates are: A, antenna; C, coxa; E, epistome; EP, epimeron; G, gnathopod; H, head; MD, mandible; MX, maxilla; MP, maxilliped; P, pereopod; T, telson; U, uropod. Maxilla 1 setal-tooth classification follows Lowry & Stoddart (1990, 1992, 1995). The genus *Hirondellea* was named for the *Hirondelle*, the research ship of Prince Albert the 1st, which made an immense contribution to marine taxonomy in the late (1885–1888) 19th century. The species in this paper are similarly named after scientific research ships.

Hirondelleidae fam. nov.

Diagnostic description. *Head* exposed, much deeper than long, not extending much below insertion of antenna 2, without cheek notch. *Antennae* calceoli present in male, absent in female. *Antenna 1* with

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callynophore in male and female; accessory flagellum article 1 forming a cap partially covering callynophore. *Antenna 2* peduncular article 3 without distal hook. *Epistome and upper lip* separate. *Mouthpart bundle* subquadrate. *Mandible* incisors well developed, symmetrical, convex, smooth; left lacinia mobilis rod-like, right lacinia mobilis absent; accessory setal row with 5 or less robust setae, with distal setal tuft; molar a setose tongue, occasionally with small triturating surface, or large flap-like, weakly setose; palp inserted approximately midanteriorly. *Maxilla 1* inner plate with 2 apical pappose setae, one very broad at base; outer plate with setal-teeth in 7/4 arrangement (or rarely in 8/3 crown arrangement); setal-teeth large; setal-tooth 6 slender, setal-tooth 7 slender, slightly or strongly displaced from setal-tooth 6; palp large, with apical robust setae and subterminal lateral notch. *Maxilla 2* inner plate significantly shorter than outer plate, without oblique row of facial setae. *Maxilliped* coxa and basis normal; outer plate medial setae small, blunt or bead-shaped, outer plate without apical setae; palp 4-articulate, article 4 well developed.

Gnathopod 1 subchelate or parachelate; coxa large but shorter than coxa 2 and tapering distally, or reduced; merus and carpus not rotated; ischium short; carpus short; propodus large; dactylus slightly curved. *Gnathopod 2* coxa large, subequal in size to coxa 3; carpus rectolinear or rectangular, with palmate setae; propodus rectangular, with palmate setae; dactylus minute. *Pereopods* all simple; distal spurs absent. *Pereopod 4* coxa with well developed posteroventral lobe. *Pereopod 5* coxa anterior and posterior lobes subequal. *Pereopod 6* coxa posterior lobe slightly deeper than anterior lobe, or much deeper than anterior lobe.

Uropod 2 inner ramus with or without constriction. *Uropod 3* rami biramous. *Telson* cleft.

Type genus. *Hirondellea* Chevreux, 1889.

Generic composition. Monogeneric.

Remarks. Most, if not all, hirondelleids are deep-sea scavengers. Seven of the 16 known species have been taken in baited traps. Significant modifications among scavenging lysianassoids include a fully developed 2-field callynophore in males and females, a setose tongue molar, a reduced inner plate on maxilla 2, bead-like setae on the outer plate of the maxilliped and a reduced first coxa. Most hirondelleids have a basic 7/4 setal-tooth arrangement on maxilla 1 outer plate. This is unusual among lysianassoid scavengers. Other lysianassoid scavengers have a modified 6/5 setal-tooth arrangement (tryphosines), an 8/3 crown arrangement (eurytheneids) or a 7/4 crown arrangement (uristids). Outside the lysianassoid group hirondelleids share the 7/4 setal-tooth arrangement with stegocephalid amphipods. The only other scavenging lysianassoid family with this type of arrangement is the scopelocheirid amphipods. Among non-scavenging lysianassoid families the 7/4 setal-tooth arrangement is found in the Aristiidae, lepidepecreellids and pachynids.

Family level taxa with a setose-tongue molar and bead-shaped setae on the medial margin of the outer plate of the maxilliped include the Alicellidae, cyclocarids, Endevouridae, Eurytheneidae, Hirondelleidae, Lysianassidae, Opisidae and Uristidae. Among these families the alicellids, hirondelleids, opisids and uristids have a reduced first coxa and of these only the hirondelleids and uristids have the inner plater of maxilla 2 shortened.

Apomorphies found only in hirondelleids (except *H. sindhusagar*) include the enlarged seta on the inner plate of maxilla 1 and the subterminal lateral notch on the inner margin of the palp.

Hirondelleids appear to be the least specialised lysianassoid scavengers. As such, they could be the basal scavenging lysianassoids without close relationships to other extant lysianassoid groups. The 8/3 crown setal-tooth arrangement shared between some hirondelleid species (*Hirondellea gigas, H. abyssalis, H. sindhusagar*) and species of *Eurythenes* appears to be a homoplasy, independently derived in each group, and indicates a selective pressure among flesh-eating lysianassoids to develop a crown arrangement.

Hirondellea Chevreux, 1889

Hirondellea Chevreux, 1889: 285. — Stebbing, 1906: 16. — Gurjanova, 1962: 88. — J.L. Barnard, 1969: 345. — Barnard & Ingram, 1990: 7. — Barnard & Karaman, 1991: 490.

Tetronychia Stephensen, 1923: 63. — Schellenberg, 1926: 251 [type species *Tetronychia abyssalis* Stephensen, 1923 by monotypy].

Type species. *Hirondellea trioculata* Chevreux, 1889, by original designation.

Species composition. *Hirondellea* includes 16 species: *Hirondellea abyssalis* (Stephensen, 1923); *H. antarctica* (Schellenberg, 1926); *H. brevicaudata* Chevreux, 1910; *H. diamantina* **sp. nov.**; *H. dubia* Dahl, 1959; *H. endeavour* **sp. nov.**; *H. fidenter* J.L. Barnard, 1966; *H. franklin* **sp. nov.**; *H. gigas* (Birstein & Vinogradov, 1955); *H. glutonis* Barnard & Ingram, 1990; *H. guyoti* Barnard & Ingram, 1990; *H. kapala* **sp. nov.**; *H. naturaliste* **sp. nov.**; *H. sindhusagar* Horton & Thurston, 2009; *H. trioculata* Chevreux, 1889; *H. wolfendeni* (Tattersall, 1909) **comb. nov.**

Remarks. The taxon *Hirondellea wolfendeni* is newly included here as a species of *Hirondellea.* Tattersall (1909) originally assigned it, with some doubts, to the genus *Anonyx* where it has remained ever since. The characteristic maxilla 1 with subterminal notch on the palp and one of the inner plate setae very broad at the base, clearly place this species in the genus *Hirondellea.*

Based on the misleading illustration (fig. 9) of Stephensen (1923), Gurjanova (1962), Barnard & Ingram (1990) and Horton & Thurston (2009) all key *H. abyssalis* as having the inner ramus of uropod 2 constricted. Stephensen (1923: 64) noted of uropod 2 that "… in the right side only the proximal part of outer ramus is kept, the inner ramus is totally lost; and in the left up. 2 both of the rami are very short and seem to be in regeneration ...". We have looked at Stephensen's slide and found no constriction on the uropod 2 inner ramus. We suspect that even if it were regenerating it would show some sign of the constriction. The species has never been re-collected. We cannot say for certain whether *H. abyssalis* uropod 2 inner ramus is constricted or not but the current evidence suggests that it is not constricted and that it should not be recorded as constricted.

Distribution. Hirondelleids have been recorded from all major ocean bodies except the South Atlantic Ocean, the southern Indian Ocean, the Mediterranean Sea and the North Polar Sea.

Key to Species of *Hirondellea*

1	Uropod 2, inner ramus incised	2
–	Uropod 2, inner ramus not incised	9
2	Epimeron 3, posteroventral corner subquadrate	3
–	Epimeron 3, posteroventral corner broadly rounded	4
–	Epimeron 3, posteroventral corner produced into a large spine	*H. diamantina*
3	Gnathopod 2 minutely subchelate	*H. antarctica**
–	Gnathopod 2 minutely chelate	4
–	Gnathopod 2 palm large, excavate	*H. guyoti*
4	Gnathopod 1 palm concave; dactylus with few (2) subterminal spines	*H. glutonis*
–	Gnathopod 1 minutely chelate; dactylus with many subterminal spines	*H. trioculata*
5	Gnathopod 2 minutely subchelate	6
–	Gnathopod 2 minutely chelate	7
6	Epistome strongly produced, broadly rounded; epimeron 1, anteroventral corner with a sharp, inwardly-directed point	*H. franklin*
–	Epistome weakly produced, broadly rounded; epimeron 1, anteroventral corner rounded	*H. kapala*
7	Epistome strongly produced, broadly rounded, ventrally truncate; gnathopod 1 palm slightly excavate	8
–	Epistome weakly produced, broadly rounded; gnathopod 1 palm straight	*H. wolfendeni*
8	Epimeron 1, anteroventral corner with a sharp, inwardly-directed point	*H. naturaliste*
–	Epimeron 1, anteroventral corner rounded	*H. fidenter*
9	Epimeron 3, posteroventral corner subquadrate	10
–	Epimeron 3, posteroventral corner rounded	12
–	Epimeron 3, posteroventral corner produced into a large spine	*H. endeavour*
10	Uropod 3 outer ramus article 2 very long, subequal to article 1	*H. sindhusagar*
–	Uropod 3 outer ramus article 2 long, about 0.4 × article 1	11
11	Gnathopod 1, dactyl with many subterminal spines on inner margin	*H. gigas*
–	Gnathopod 1, dactyl without subterminal spines on inner margin	*H. dubia*
12	Gnathopod 1, dactyl as long as palm	*H. abyssalis*
–	Gnathopod 1, dactyl over-reaching palm	*H. brevicaudata*

* The material recorded by K.H. Barnard (1930) as *Hirondellea antarctica* does not key out here. Barnard recorded the posteroventral margin of epimeron 3 as rounded. It may represent a separate species.

***Hirondellea diamantina* sp. nov.**
(Figs 1–3)

Type material. HOLOTYPE, male, 8.7 mm, MV J60571, 76 km south of Point Hicks, Victoria, Australia, 38°29.33'S, 149°19.98'E, 1840 m, sandy mud, fine shell, WHOI epibenthic sled, 26 October 1988, G.C.B. Poore *et al.* on RV *Franklin*, stn SLOPE 69.

Type locality. 76 km south of Point Hicks, Victoria, Australia, 38°29.33'S, 149°19.98'E, 1840 m depth.

Etymology. The specific name refers to the vessel HMAS *Diamantina* which carried out much oceanographic survey work with scientists from CSIRO; used as a noun in apposition.

Diagnosis. *Head* lobe narrowly subtriangular. *Epistome* strongly produced, subtriangular with acute apex. *Gnathopod 1* propodus palm strongly acute, slightly concave; dactylus strongly over-reaching palm, with 1 subterminal spine on inner margin. *Gnathopod 2* minutely subchelate; propodus length 1.8 × breadth. *Epimeron 1* anteroventral corner with a sharp inwardly-directed point. *Epimeron 3* posteroventral corner produced into large spine. *Uropod 2* inner ramus incised. *Uropod 3* outer ramus article 2 long, 0.4 × article 1. *Telson* length 1.5 × breadth, cleft 55%.

Remarks. As in the Australian species *H. franklin* and *H. naturaliste*, *H. diamantina* has a strongly acute palm on gnathopod 1. *Hirondellea diamantina* differs from these species in the large spine on the posteroventral corner of epimeron 3.

Distribution. South-eastern Australia in 1840 m depth.

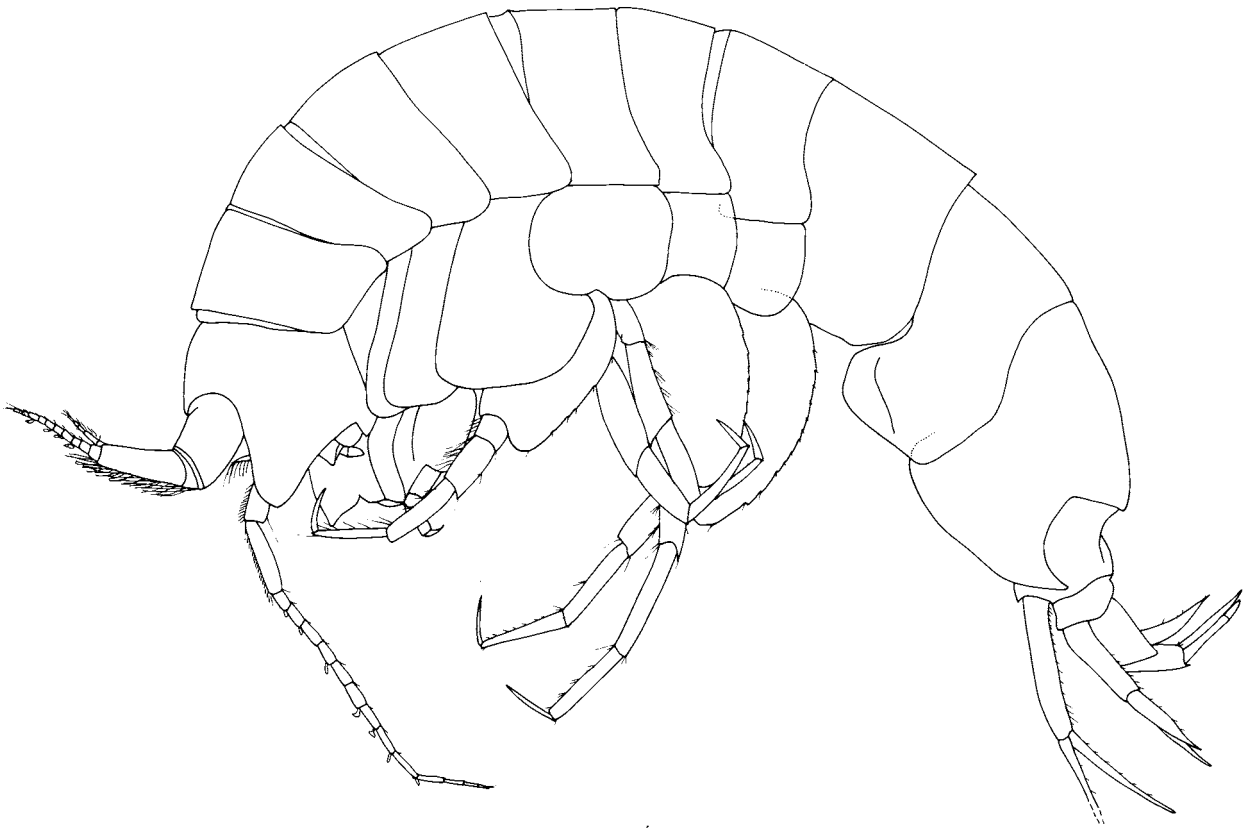

FIGURE 1. *Hirondellea diamantina* **sp. nov.** Holotype male, 8.7 mm, MV J60571.

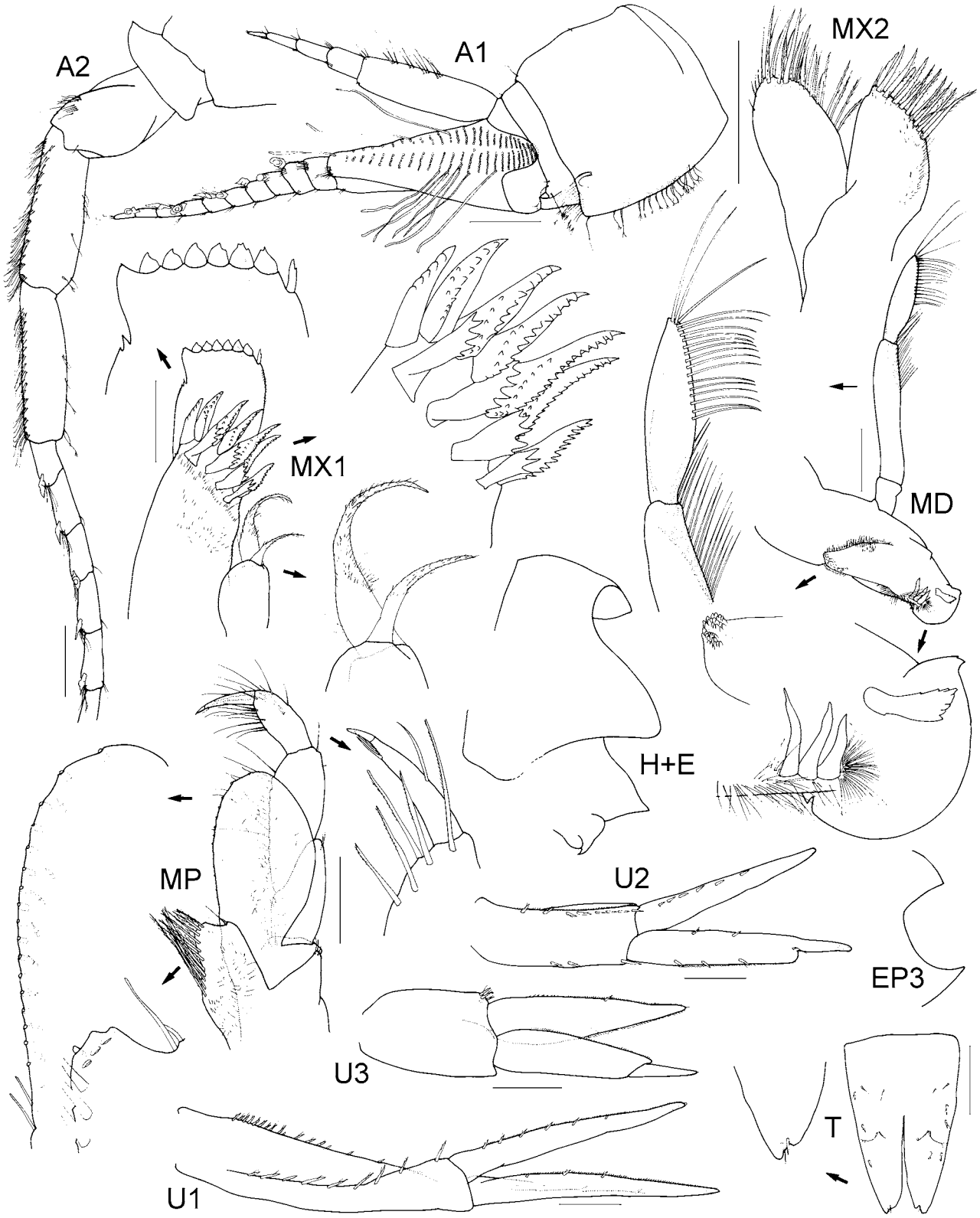

FIGURE 2. *Hirondellea diamantina* **sp. nov.** Holotype male, 8.7 mm, MV J60571. Scales represent 0.2 mm.

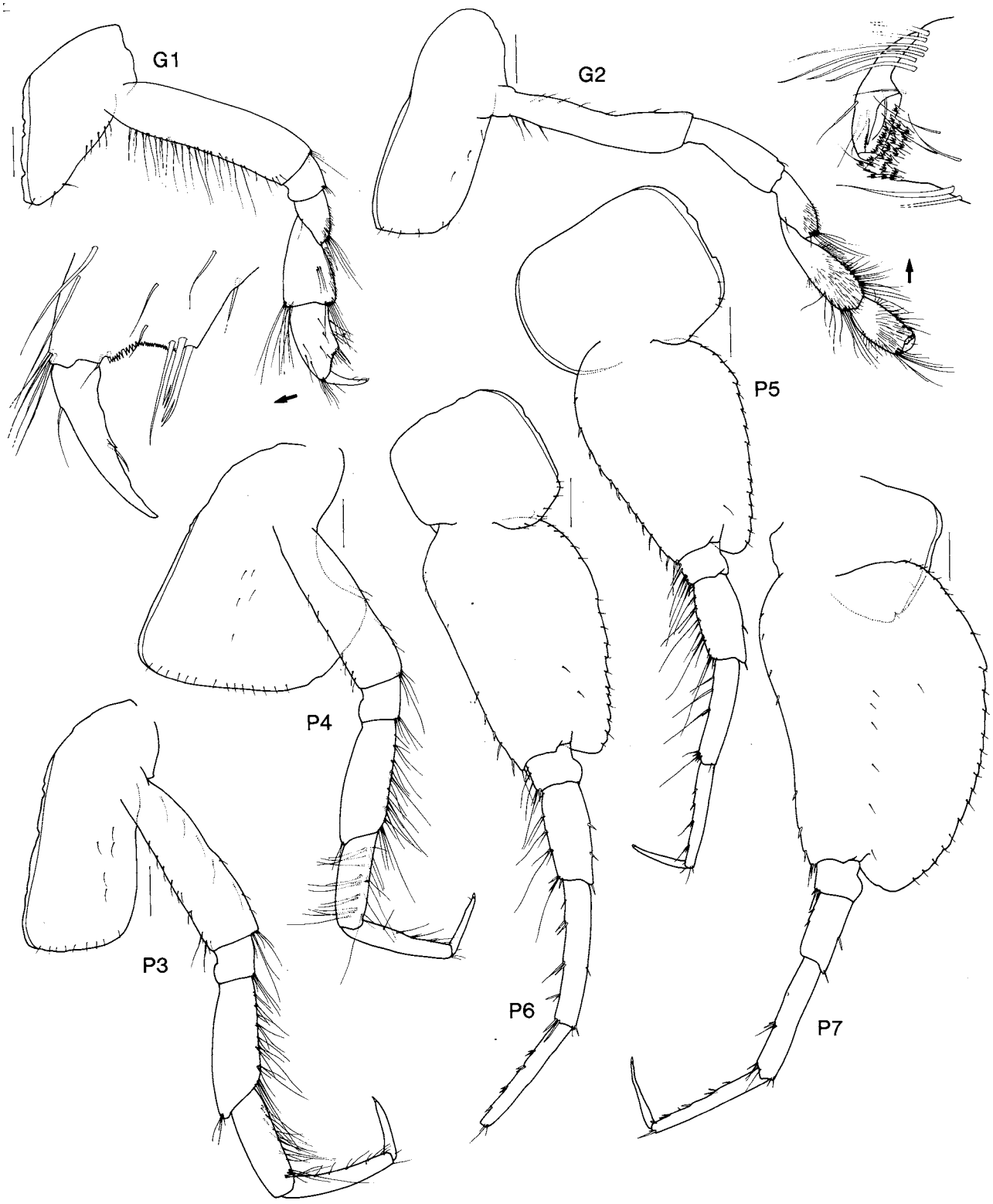

FIGURE 3. *Hirondellea diamantina* **sp. nov.** Holotype male, 8.7 mm, MV J60571. Scales represent 0.2 mm.

***Hirondellea endeavour* sp. nov.**
(Figs 4–6)

Type material. HOLOTYPE, female, 6.2 mm, MV J60572. PARATYPE, 1 specimen, MV J15792; 76 km south of Point Hicks, Victoria, Australia, 38°29.33'S 149°19.98'E, 1840 m, sandy mud, fine shell, WHOI epibenthic sled, 26 October 1988, G.C.B. Poore *et al.* on RV *Franklin*, stn SLOPE 69.

Type locality. 76 km south of Point Hicks, Victoria, Australia, 38°29.33'S 149°19.98'E, 1840 m depth.

Etymology. The specific name refers to the vessel, HM Bark *Endeavour*, on which Lieutenant James Cook was sailing when he named the nearest point to the type locality, Point Hicks; used as a noun in apposition.

Diagnosis. *Head* lobe broadly subtriangular. *Epistome* strongly produced, subtriangular with acute apex. *Gnathopod 1* propodus palm transverse, straight; dactylus slightly over-reaching palm, with 1 subterminal spine on inner margin. *Gnathopod 2* minutely subchelate; propodus length 2.2 × breadth. *Epimeron 1* anteroventral corner rounded. *Epimeron 3* posteroventral corner produced into large spine. *Uropod 2* inner ramus not incised. *Uropod 3* outer ramus article 2 long, 0.6 × article 1. *Telson* length 1.2 × breadth, cleft 38 %.

Remarks. *Hirondellea endeavour* is the only known Australian species with a transverse palm on gnathopod 1. However, *H. abyssalis*, *H. antarctica*, *H. brevicaudata* and *H. guyoti* all have transverse palms. *Hirondellea endeavour* shares a non-constricted uropod 2 inner ramus and a medium cleft telson with *H. abyssalis* and *H. brevicaudata*. It differs from both of these species in the posteroventral corner of epimeron 3 which is developed into a large spine.

Distribution. South-eastern Australia in 1840 m depth.

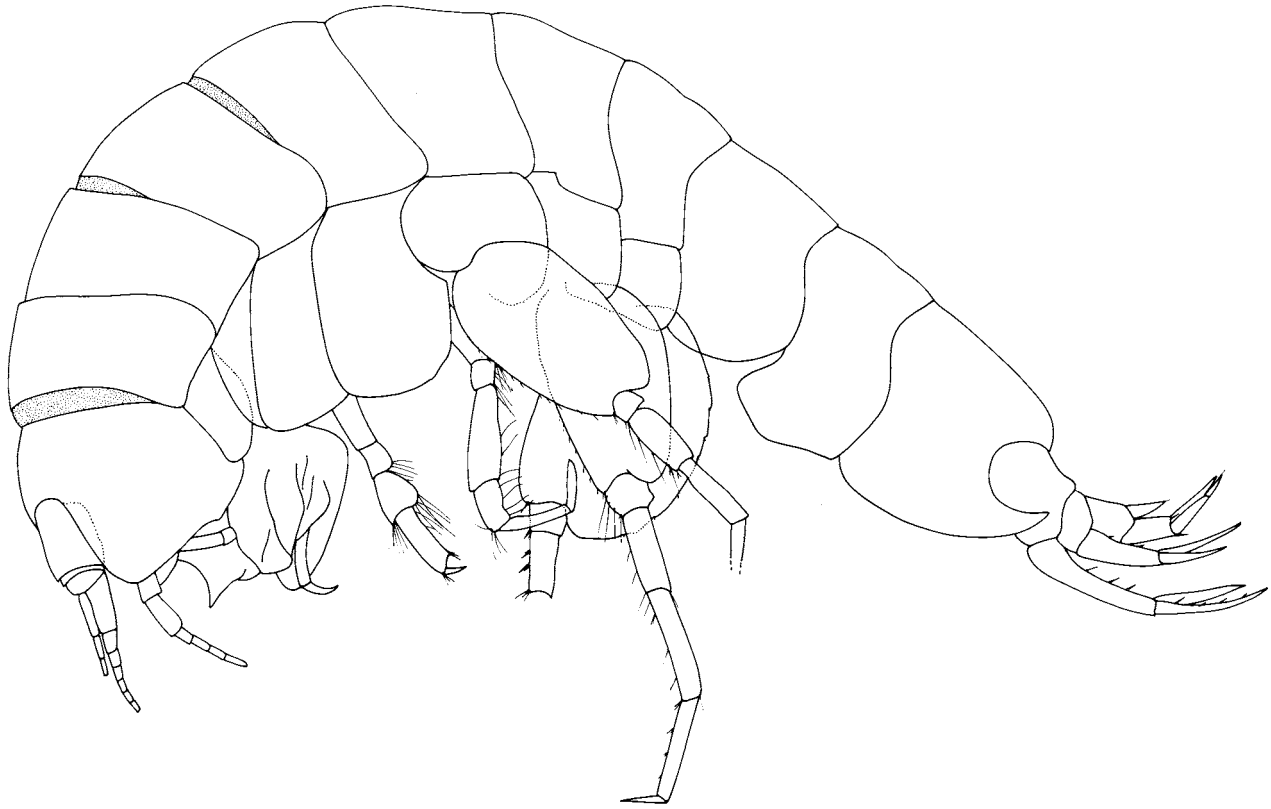

FIGURE 4. *Hirondellea endeavour* **sp. nov.** Holotype female, 6.2 mm, MV J60572.

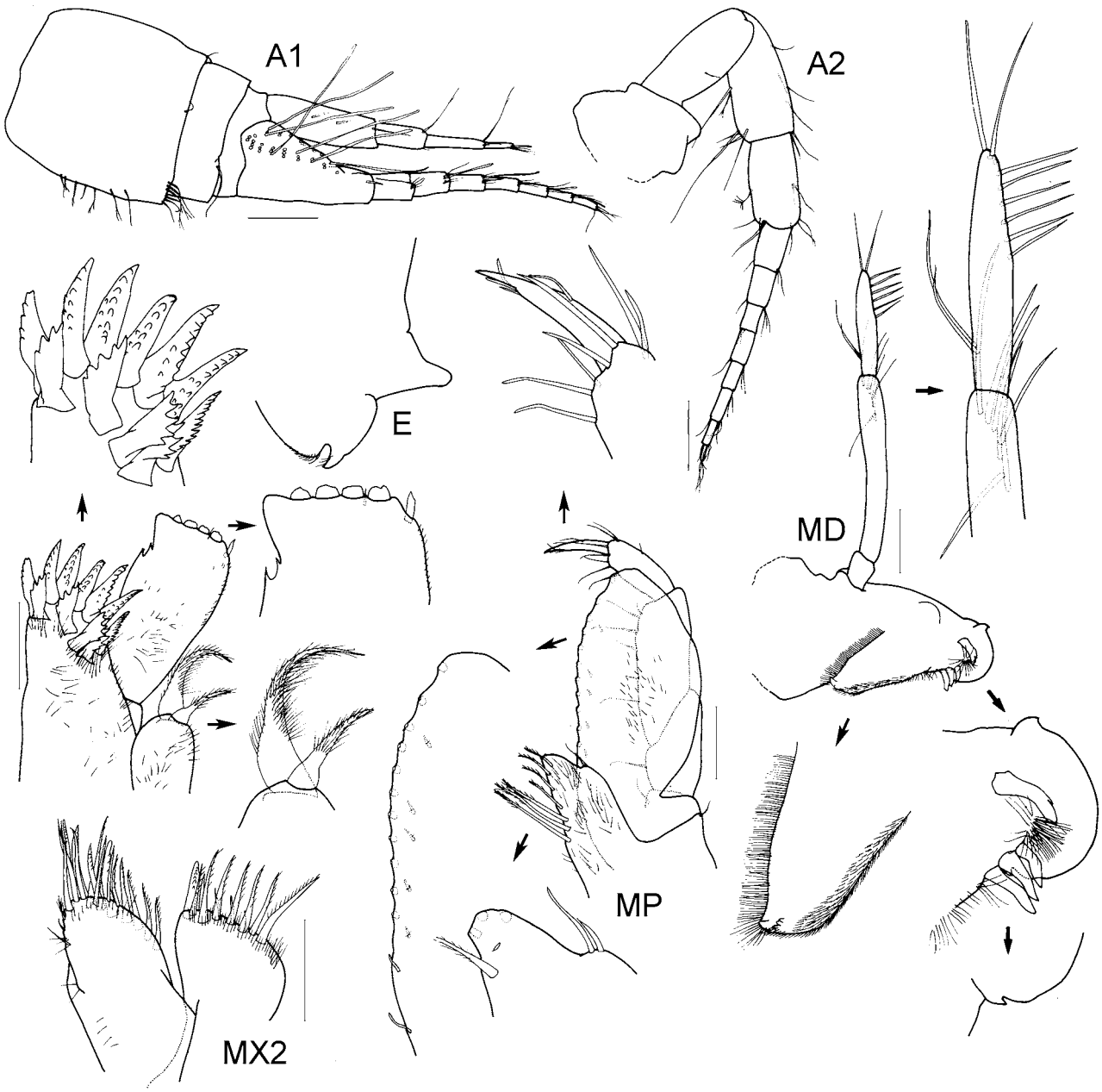

FIGURE 5. *Hirondellea endeavour* **sp. nov.** Holotype female, 6.2 mm, MV J60572. Scales represent 0.1 mm.

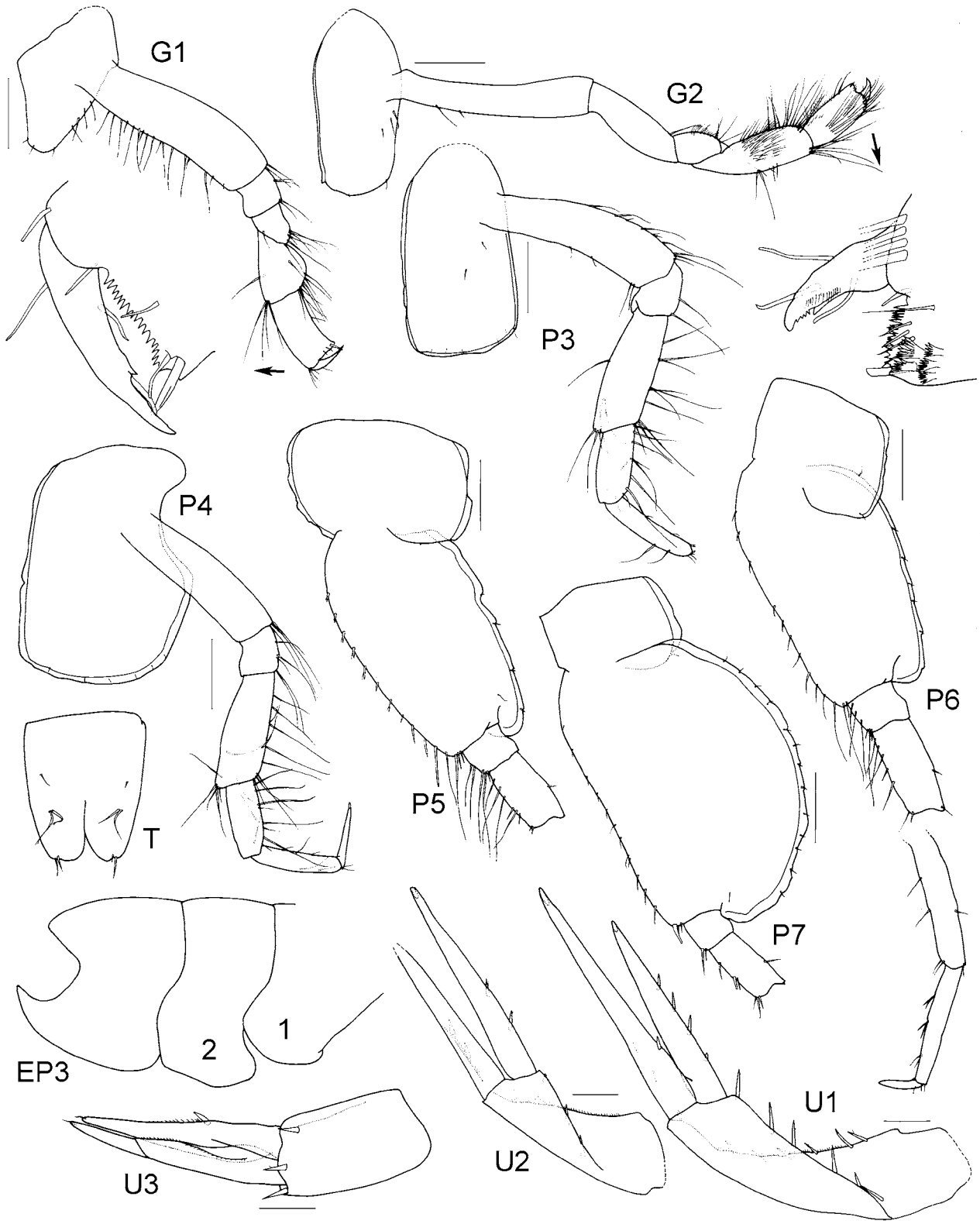

FIGURE 6. *Hirondellea endeavour* **sp. nov.** Holotype female, 6.2 mm, MV J60572. Scales for U1–3 and T represent 0.1 mm; remainder represent 0.2 mm.

***Hirondellea franklin* sp. nov.**
(Figs 7, 8)

Type material. HOLOTYPE, female, 9.5 mm, MV J60573, 76 km south of Point Hicks, Victoria, Australia, 38°29.33'S, 149°19.98'E, 1840 m, sandy mud, fine shell, WHOI epibenthic sled, G.C.B. Poore *et al.*, RV *Franklin*, 26 October 1988, stn SLOPE 69. PARATYPES: 1 female, MV J60574, type locality; 1 male, MVJ60575 , type locality; 28 specimens, MV J60576, type locality; 4 specimens, MV J60577, type locality; 2 specimens, MV J15793, type locality; 3 specimens, MV J60578, 96 km south of Point Hicks, Victoria, Australia, 38°40.29'S 149°18.06'E, 2900 m, compacted clay, WHOI epibenthic sled, 25 October 1988, G.C.B. Poore *et al.* on RV *Franklin*, stn SLOPE 66.

Additional material. 2 specimens, AM P.68977, east of Newcastle, New South Wales, Australia, 33°03.6'S 152°48.8'E, 2632–2698 m, Menzies trawl, 8 October 1982, W. Ponder & R.T. Springthorpe on RV *Tangaroa*, stn U216. — 3 immature specimens, AM P.68985, east of Cape Naturaliste, Tasmania, Australia, 40°45.94'S 149°01.62'E to 40°46.54'S 149°00.27'E, 2400–2500 m, mud, clay, 10 December 1986, R.T. Springthorpe on RV *Franklin*, stn 1086-04. — 1 specimen, MV J17165, 48 km east-north-east of Cape Tourville, Tasmania, Australia, 42°00.25'S, 148°43.55'E to 41°57.77'S, 148°42.08'E, 1264–1130 m, gravel with lumps of sandy mud aggregate, WHOI epibenthic sled, 30 October 1988, G.C.B. Poore *et al.* on RV *Franklin*, stn SLOPE 81. — 1 female, MV J60579, 54 km east-north-east of Cape Tourville, Tasmania, Australia, 41°57.30'S 148°58.54'E, 1770 m, coarse biogenic rubble, WHOI epibenthic sled, G.C.B. Poore *et al.*, 30 October 1988, RV *Franklin*, stn SLOPE 82. — 10 specimens, P.73703, Hill U, 82.8 km south-south-east of South East Cape, Tasmania, Australia, 44°19'12"S, 147°7'12"E, 1083–1448 m, baited trap, 27–28 January 1997, CSIRO party on FRV *Southern Surveyor*, stn SS01/97/41. — 20 specimens, AM P.73701, Hill D1, south-south-east of South East Cape, Tasmania, Australia, 44°23'24"S 147°16'12" E, 1942 m, baited trap, 31 January 1997, CSIRO party on FRV *Southern Surveyor*, stn SS01/97/65. — 1 specimen, AM P.75575 and 1 specimen, AM P.75742, North of Hill U Seamount, Huon Study Area, Tasmania, Australia, 44°17'32"S 147°11'36"E, 1350 m, baited trap, 7 April 2007, S.J. Keable, FRV *Southern Surveyor*, stn SS02/2007/57

Type locality. 76 km south of Point Hicks, Victoria, Australia, 38°29.33'S 149°19.98'E, 1840 m depth.

Etymology. The specific name refers to the vessel, RV *Franklin*, from which the collection of the type specimen was made; used as a noun in apposition.

Diagnosis. *Head* lobe broadly rounded. *Epistome* strongly produced, broadly rounded. *Gnathopod 1* propodus palm strongly acute, straight; dactylus strongly over-reaching palm, with 1 subterminal spine on inner margin. *Gnathopod 2* minutely subchelate; propodus length 1.7 × breadth. *Epimeron 1* anteroventral corner with a sharp inwardly-directed point. *Epimeron 3* posteroventral corner broadly rounded. *Uropod 2* inner ramus incised. *Uropod 3* outer ramus article 2 long, 0.4 × article 1. *Telson* length 1 × breadth, cleft 40 %.

Remarks. Along with *Hirondellea sindhusagar* from the northern Arabian Sea, the Australian species *H. franklin*, *H. diamantina* and *H. naturaliste* all have a strongly acute palm on gnathopod 1. *Hirondellea franklin* differs from *H. sindhusagar* and *H. diamantina* in having a rounded posteroventral corner on epimeron 3. It differs from *H. naturaliste* in the shape of the epistome, the shape of the gnathopod 1 palm (straight in *H. franklin* and slightly concave in *H. naturaliste*), the chelation of gnathopod 2 (minutely subchelate in *H. franklin* and minutely chelate in *H. naturaliste*), and the cleft of the telson, medium (40%) in *H. franklin* and deeply cleft (58%) in *H. naturaliste*.

Distribution. South-eastern Australia in 1770–2698 m depth.

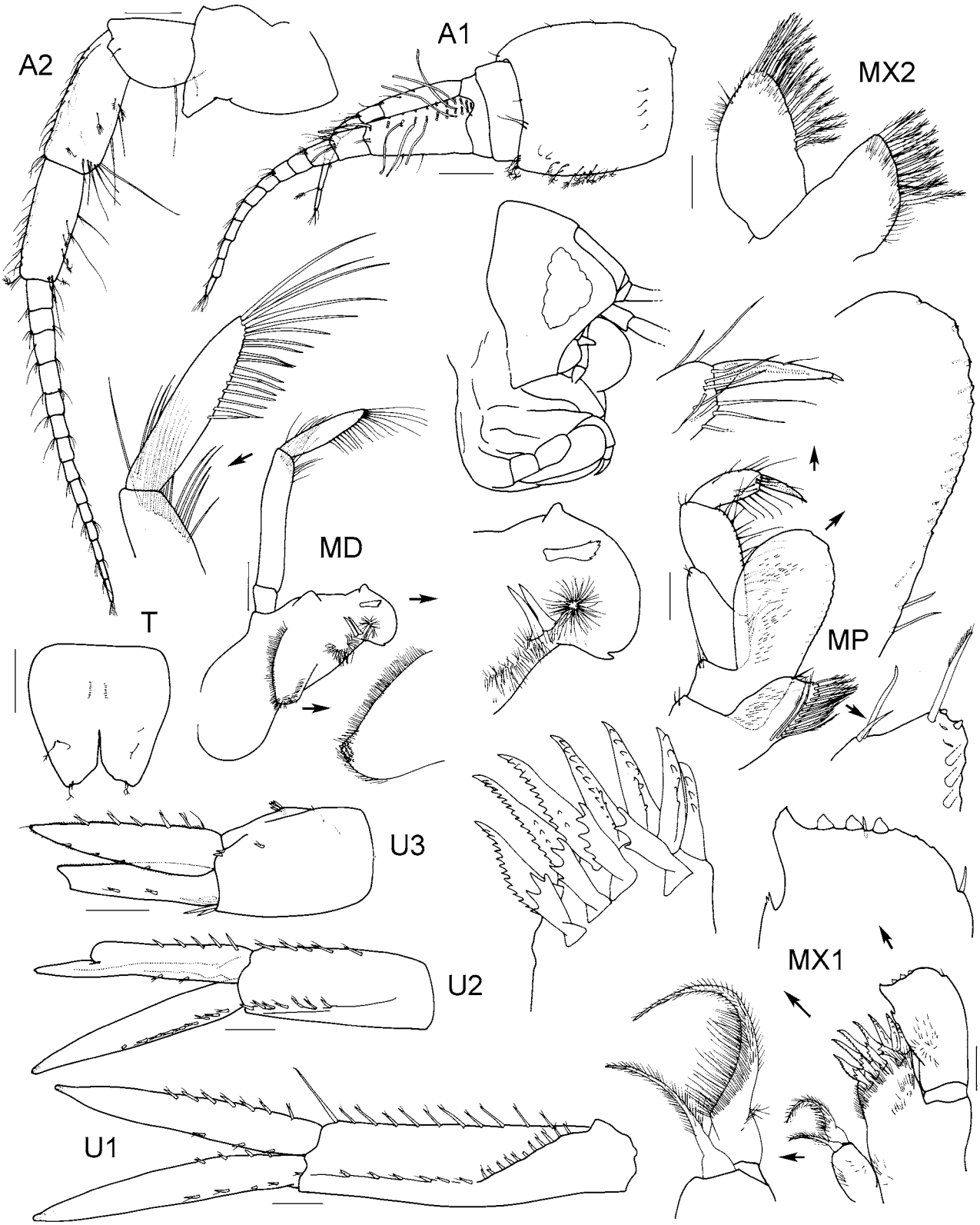

FIGURE 7. *Hirondellea franklini* **sp. nov.** Holotype female, 9.5 mm, MV J60573. Scales represent 0.2 mm.

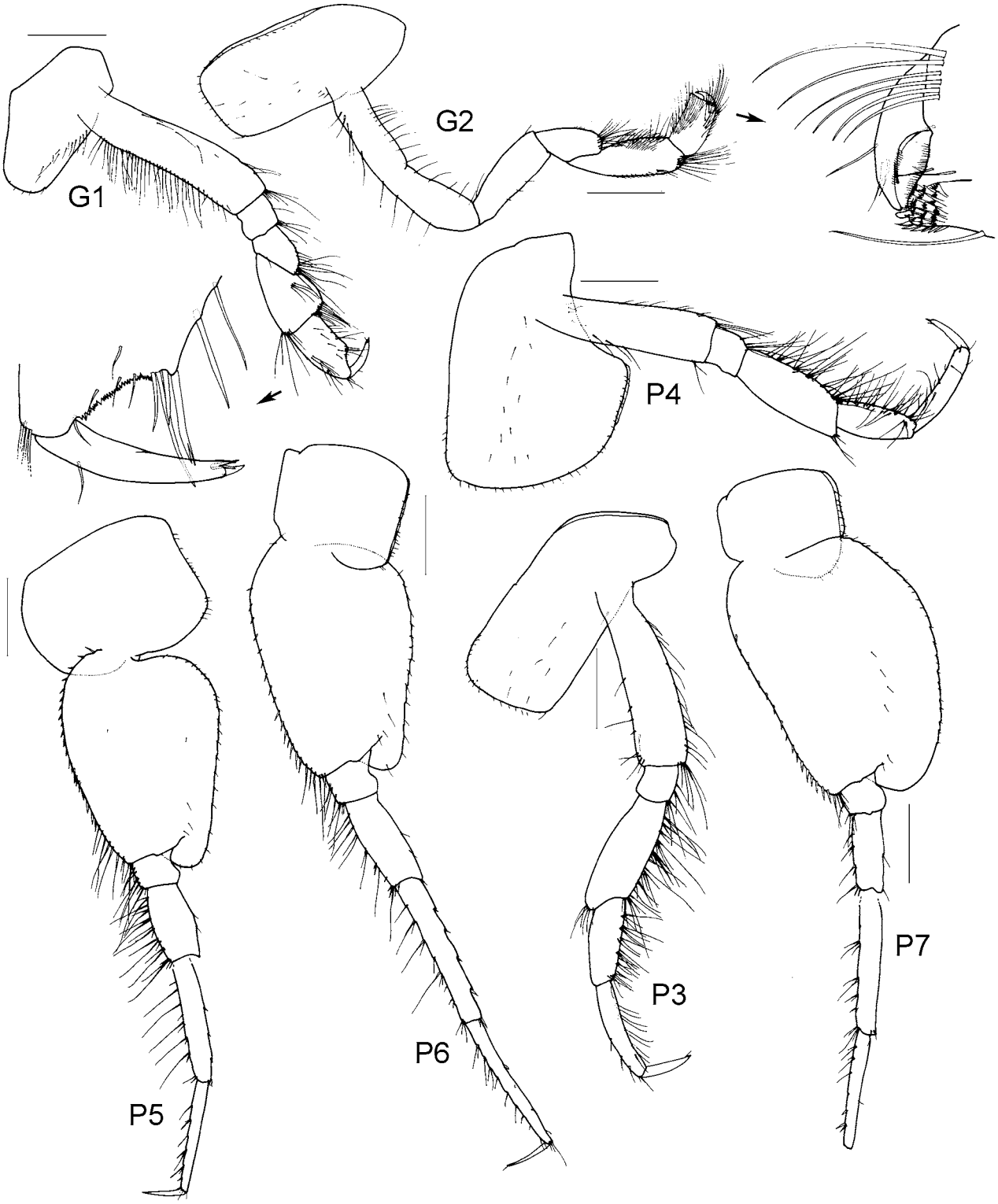

FIGURE 8. *Hirondellea franklini* **sp. nov.** Holotype female, 9.5 mm, MV J60573. Scales represent 0.5 mm.

***Hirondellea kapala* sp. nov.**
(Figs 9–11)

Type material. HOLOTYPE, male, 7.6 mm, AM P.68979, south-east of Broken Bay, New South Wales, Australia, 33°37'S, 152°04'E to 33°39'S, 152°02'E, 896–924 m, dredge, 10 December 1980, R. Springthorpe on RV *Kapala*, stn K80-20-09. PARATYPES: 1 male, AM P.68980, type locality; 1 female, ovigerous, AM P.68981, type locality; 1 female, non-ovigerous, with setose oostegites, P.68984, type locality; 1 specimen, AM P.68983, east of Broken Bay, New South Wales, Australia, 33°30'S 152°09'E to 33°33'S 152°11'E, 922–1015 m, dredge, 12 February 1986, RV *Kapala*, stn K-86-01-08; 6 specimens, AM P.68978, east of Broken Bay, New South Wales, Australia, 33°31'S 152°08'E to 33°33'S 152°07'E, 914 m, dredge, R. Springthorpe, 10 December 1980, RV *Kapala*, stn K-80-20-08; 3 specimens, AM P.68982, north-east of Port Jackson, New South Wales, Australia, 33°44'S 151°57'E, 820–889 m, beam trawl, 11 February 1986, RV *Kapala*, stn K-86-01-07.

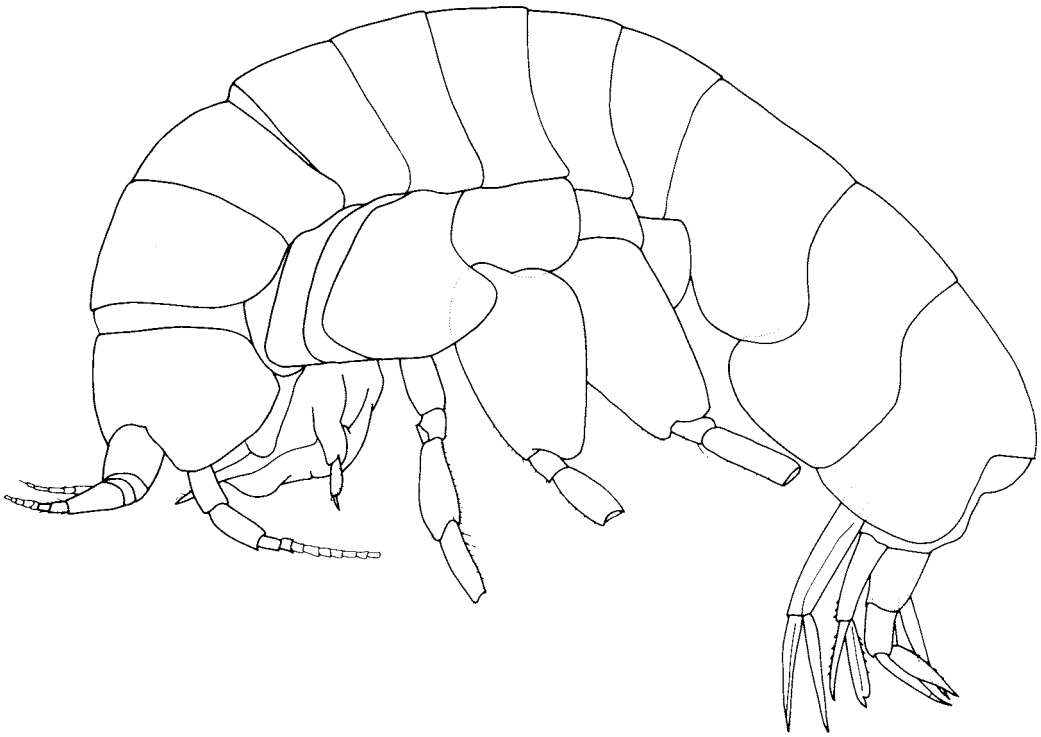

FIGURE 9. *Hirondellea kapala* **sp. nov.** Holotype male, 7.6 mm, AM P.68979.

Additional material. 6 specimens, AM P.49813, north-east of Coffs Harbour, New South Wales, Australia, 30°10.88'S 153°32.21'E, 1000 m, baited trap, 12–13 August 1993, 1030–0830 hrs, P. Berents, R.T. Springthorpe & W. Vader, MV *Cheryl Lee*, SEAS stn NSW-876. — 2 specimens, AM P.49833 and 2 specimens, AM P.56083, same data, SEAS stn NSW-877. — 21 specimens, AM P.43371, north-east of Coffs Harbour, New South Wales, Australia, 30°10.94'S, 153°32.27'E, 1000 m, baited trap, bottom temperature 7.4°C, 8–9 September 1994, J.K. Lowry & K. Dempsey, MV *Carrie Anne*, SEAS stn NSW-1000. — 2 specimens, AM P.48099, north-east of Coffs Harbour, New South Wales, Australia, 30°10.94'S 15332.27'E, 963 m, baited trap, set 1215 hrs, P. Berents, R.T. Springthorpe & W. Vader on MV *Cheryl Lee*, 11–12 August 1993, SEAS stn NSW-862. — 1 specimen, AM P.48118, same data, SEAS stn NSW-863. — 1 specimen, AM P.50072, north-east of Coffs Harbour, New South Wales, Australia, 30°10.94'S 153°32.27'E, 1000 m, baited trap, bottom temperature 7.4°C, 9–10 September 1994, J.K. Lowry & K. Dempsey on MV *Carrie Annee*, SEAS stn NSW-1021. — 77 specimens, AM P.44366, off Wollongong, New South Wales, Australia, 34°33.41'S, 151°21.35'E, 1000 m, baited trap, 6–7 May 1993, P. Freewater, S. Keable & W. Vader on MV

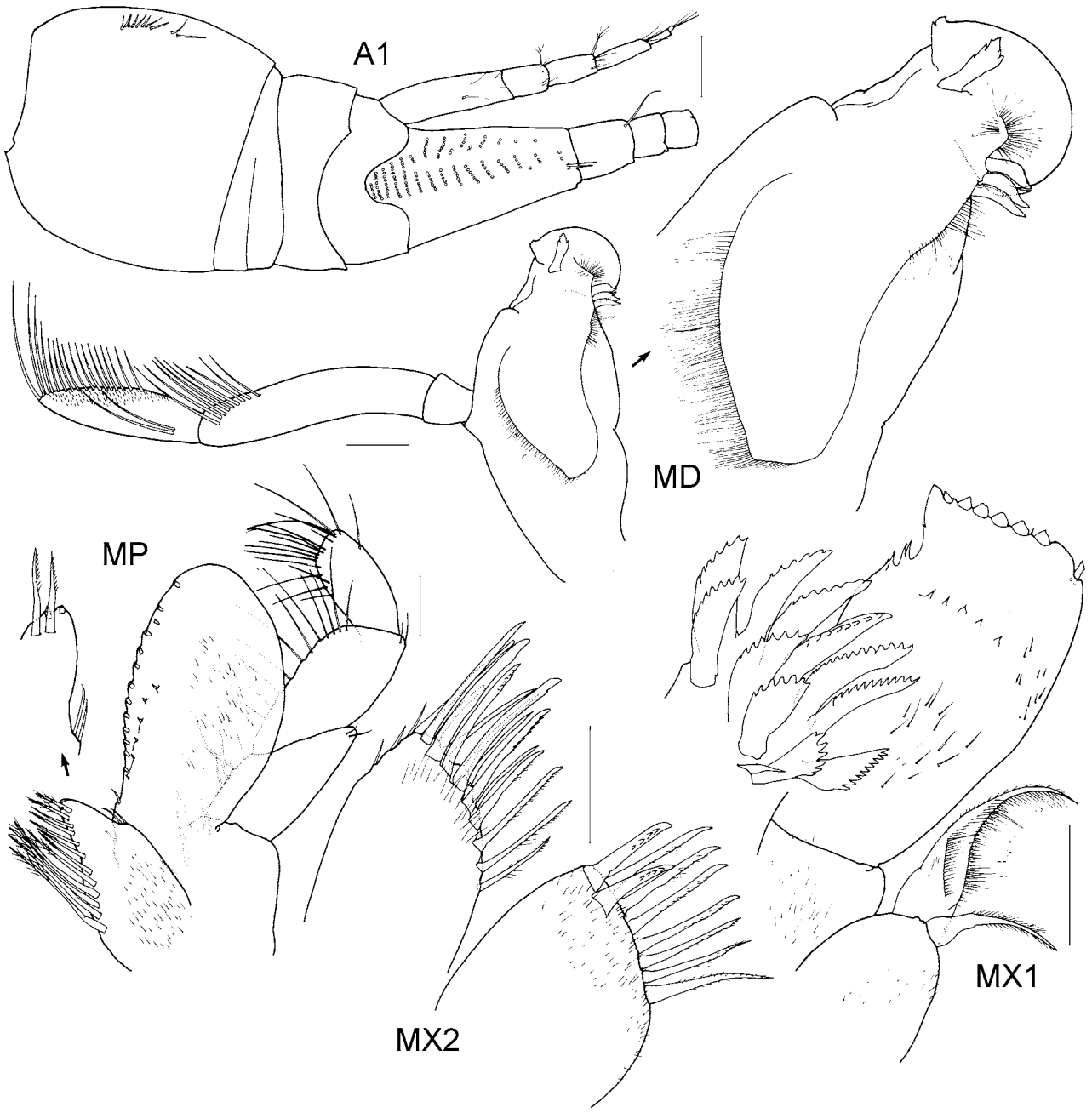

FIGURE 10. *Hirondellea kapala* **sp. nov.** Holotype male, 7.6 mm, AM P.68979. Scales represent 0.1 mm.

Robin E, SEAS stn NSW-788. — 87 specimens, AM P.44375, same data, SEAS stn NSW-789. — 2 specimens, MV J60580, south of Point Hicks, Victoria, Australia, 38°19.60'S 149°24.30'E, 930 m, rock, rubble, clay, sand, biogenic sediment, WHOI epibenthic sled, 23 July 1986, M.F. Gomon *et al.* on RV *Franklin*, stn SLOPE 33. —8 specimens, MV J60581, off Freycinet Peninsula, Tasmania, Australia, 42°0.20'S 148°37.70'E, 720 m, coarse shelly sand, WHOI epibenthic sled, 27 July 1986, M.F. Gomon *et al.* on RV *Franklin*, stn SLOPE 46. — 5 specimens, MV J60582, off Freycinet Peninsula, Tasmania, Australia, 42°2.20'S, 148°38.70'E, 800 m, coarse shelly sand, WHOI epibenthic sled, 27 July 1986, M.F. Gomon *et al.* on RV *Franklin*, stn SLOPE 45. — 1 specimen, AM P.51358, east of Fortescue Bay, Tasmania, Australia, 43°08.96'S 145°15.36'E, 1000 m, baited trap 1, 9–10 April 1994, J.K. Lowry & K. Dempsey on MV *Martrudan*, SEAS stn TAS-419. — 3 specimens, AM P.51390, same data, SEAS stn TAS-421. — 1 specimen, AM P.51384, same data, SEAS stn TAS-422. — 21 specimens, AM P.57980, same data, SEAS stn TAS-423.

Type locality. South-east of Broken Bay, New South Wales, Australia, 33°37'S 152°04'E to 33°39'S 152°02'E, 896–924 m depth.

Etymology. The specific name refers to the vessel, FRV *Kapala*, from which the collections of the type specimens were made; used as a noun in apposition.

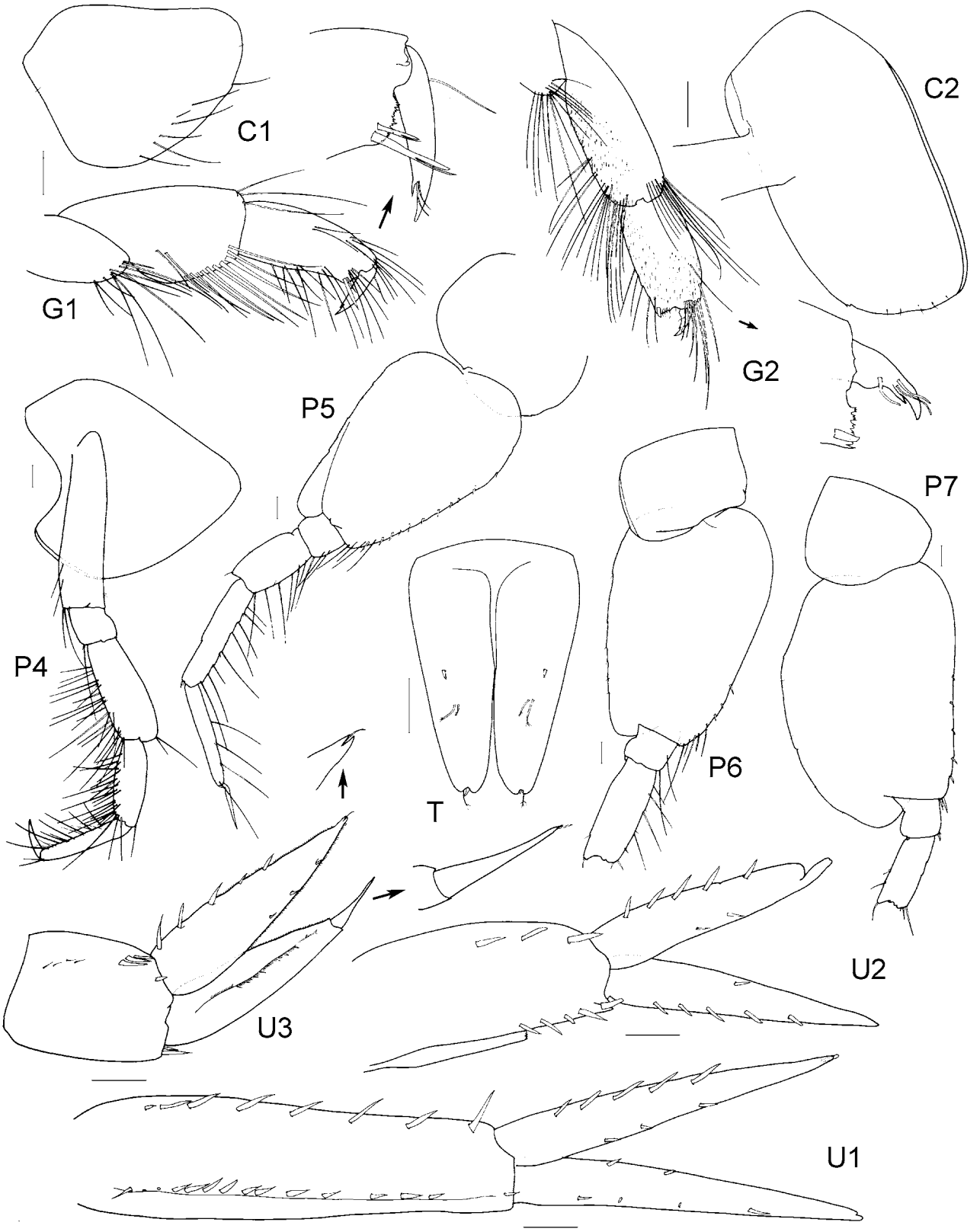

FIGURE 11. *Hirondellea kapala* **sp. nov.** Holotype male, 7.6 mm, AM P.68979. Scales represent 0.1 mm.

Diagnosis. *Head* lobe broadly rounded. *Epistome* weakly produced, broadly rounded. *Gnathopod 1* propodus palm slightly acute, straight; dactylus strongly over-reaching palm, with 1 subterminal spine on inner margin. *Gnathopod 2* minutely subchelate; propodus length 1.8 × breadth. *Epimeron 1* anteroventral corner rounded. *Epimeron 3* posteroventral corner broadly rounded. *Uropod 2* inner ramus incised. *Uropod 3* outer ramus article 2 long, 0.3 × article 1. *Telson* length 1.4 × breadth, cleft 51 %.

Remarks. *Hirondellea kapala* is the only Australian species with a slightly acute palm on gnathopod 1, but other species in the genus, such as *H. dubia* Dahl, 1959; *H. fidenter* J.L. Barnard, 1966; *H. gigas* (Birstein & Vinogradov, 1955); *H. glutonis* Barnard & Ingram, 1990; *H. trioculata* Chevreux, 1889; *H. wolfendeni* (Tattersall, 1909) all have this character. Among these species only *H. kapala*, *H. trioculata* and *H. wolfendeni* have a straight margin on the palm. *Hirondellea kapala* and *H. wolfendeni* both have the gnathopod 1 dactylus strongly overlapping the palm. Gnathopod 2 is subchelate in *H. kapala* but minutely chelate in *H. wolfendeni*.

Distribution. South-eastern Australia in 720–1000 m depth.

***Hirondellea naturaliste* sp. nov.**
(Figs 12–14)

Type material. HOLOTYPE, male, 8.0 mm, AM P.68986, east of Cape Naturaliste, Tasmania, Australia, 40°45.94’S 149°01.62’E to 40°46.54’S 149°00.27’E, 2400–2500 m, mud, clay, 10 December 1986, R.T. Springthorpe on RV *Franklin*, stn FR1086-04.

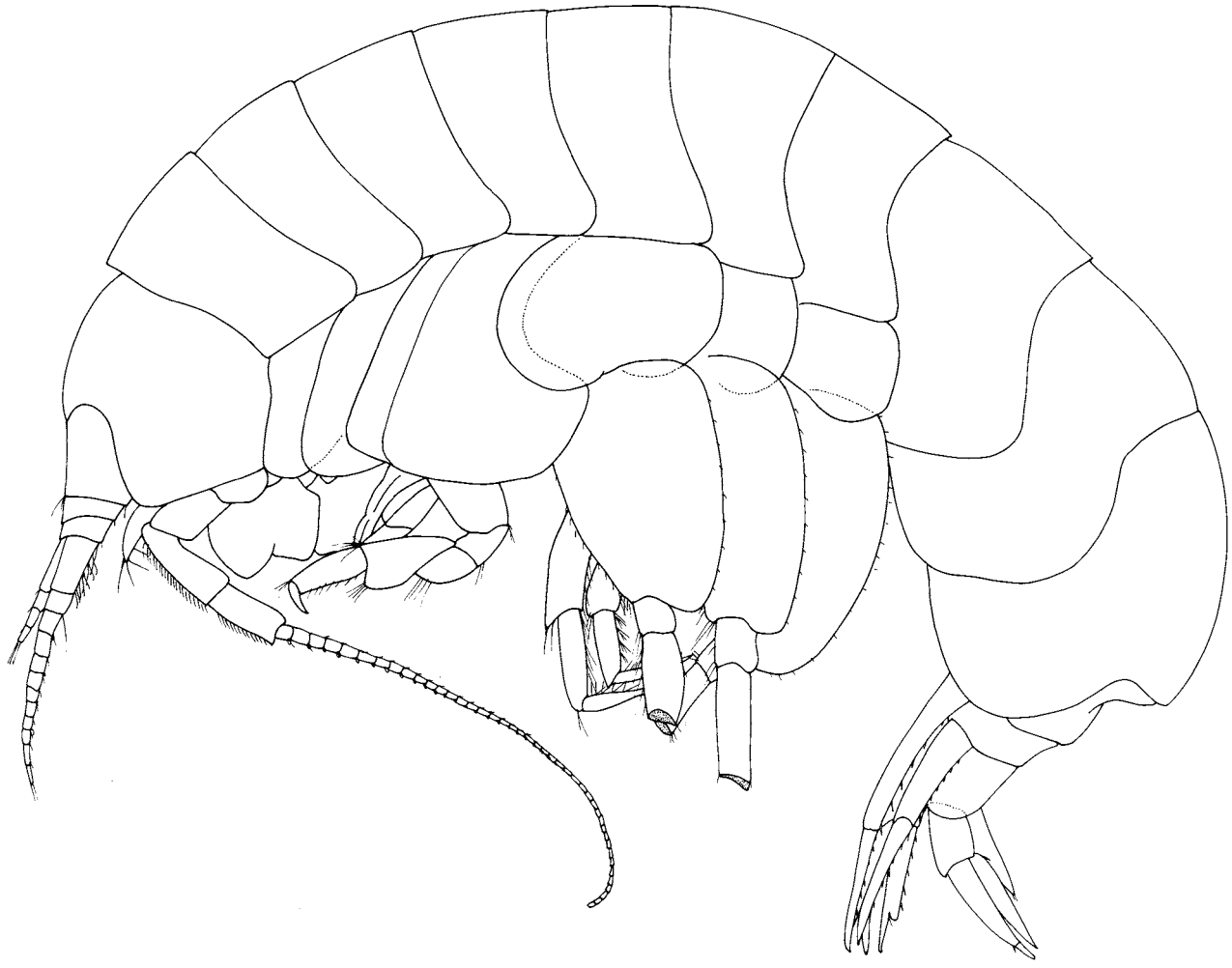

FIGURE 12. *Hirondellea naturaliste* **sp. nov.** Holotype male, 8.0 mm, AM P.68986.

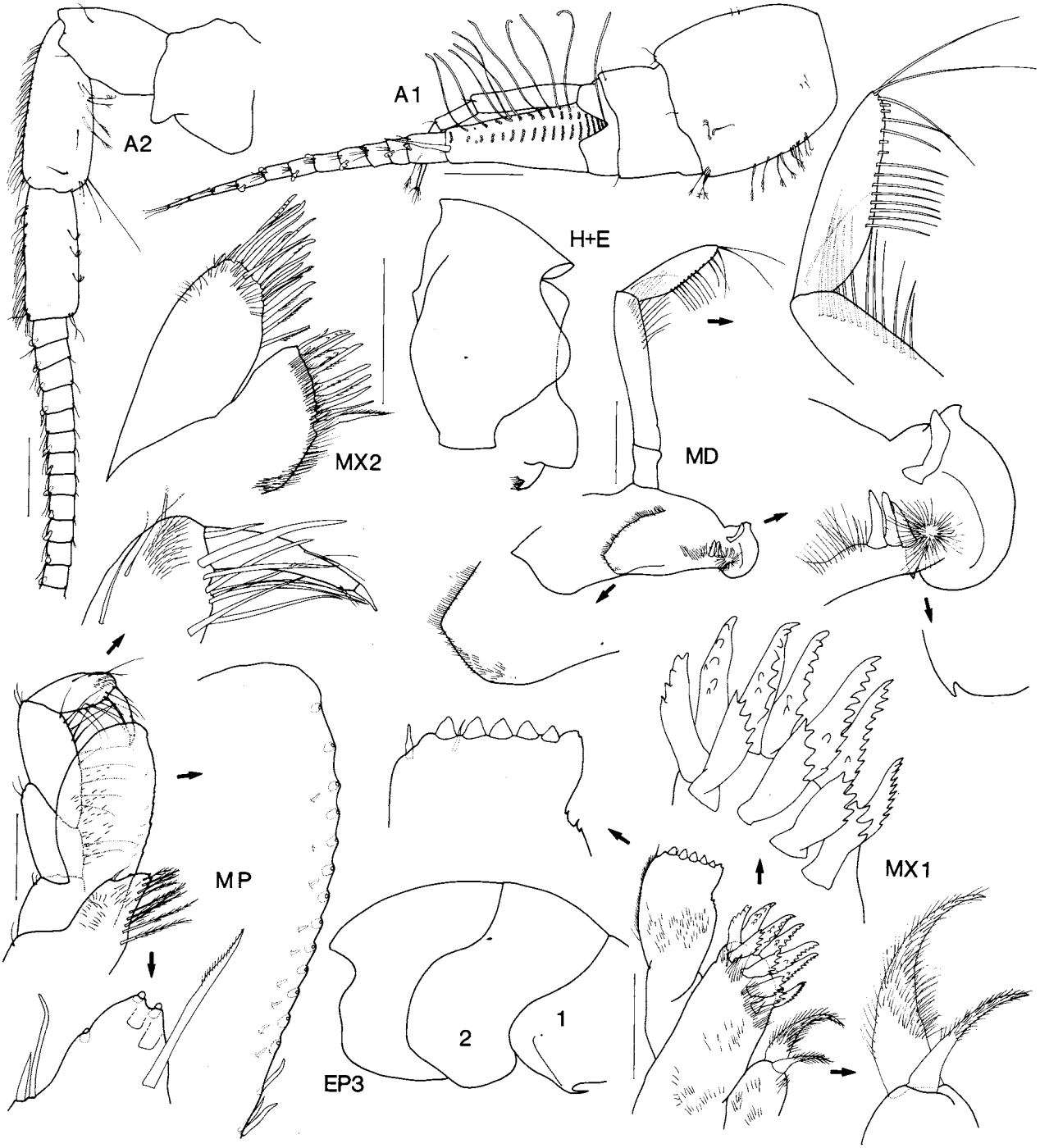

FIGURE 13. *Hirondellea naturaliste* **sp. nov.** Holotype male, 8.0 mm, AM P.68986. Scale for MX2 represents 0.1 mm; remainder represent 0.2 mm.

Type locality. East of Cape Naturaliste, Tasmania, Australia, 40°45.94'S 149°01.62'E to 40°46.54'S 149°00.27'E, 2400–2500 m depth.

Etymology. The specific name refers to the vessel, *Le Naturaliste*, after which the nearest point of land to the type locality was named.

Diagnosis. *Head* lobe broadly rounded. *Epistome* strongly produced, broadly rounded, truncate ventrally. *Gnathopod 1* propodus palm strongly acute, slightly concave; dactylus strongly over-reaching palm, with 2 subterminal spines on inner margin. *Gnathopod 2* minutely chelate; propodus length 2.2 × breadth. *Epimeron*

1 anteroventral corner with a sharp inwardly-directed point. *Epimeron 3* posteroventral corner broadly rounded. *Uropod 2* inner ramus incised. *Uropod 3* outer ramus article 2 long, 0.3 × article 1. *Telson* length 1.6 × breadth, cleft 58%.

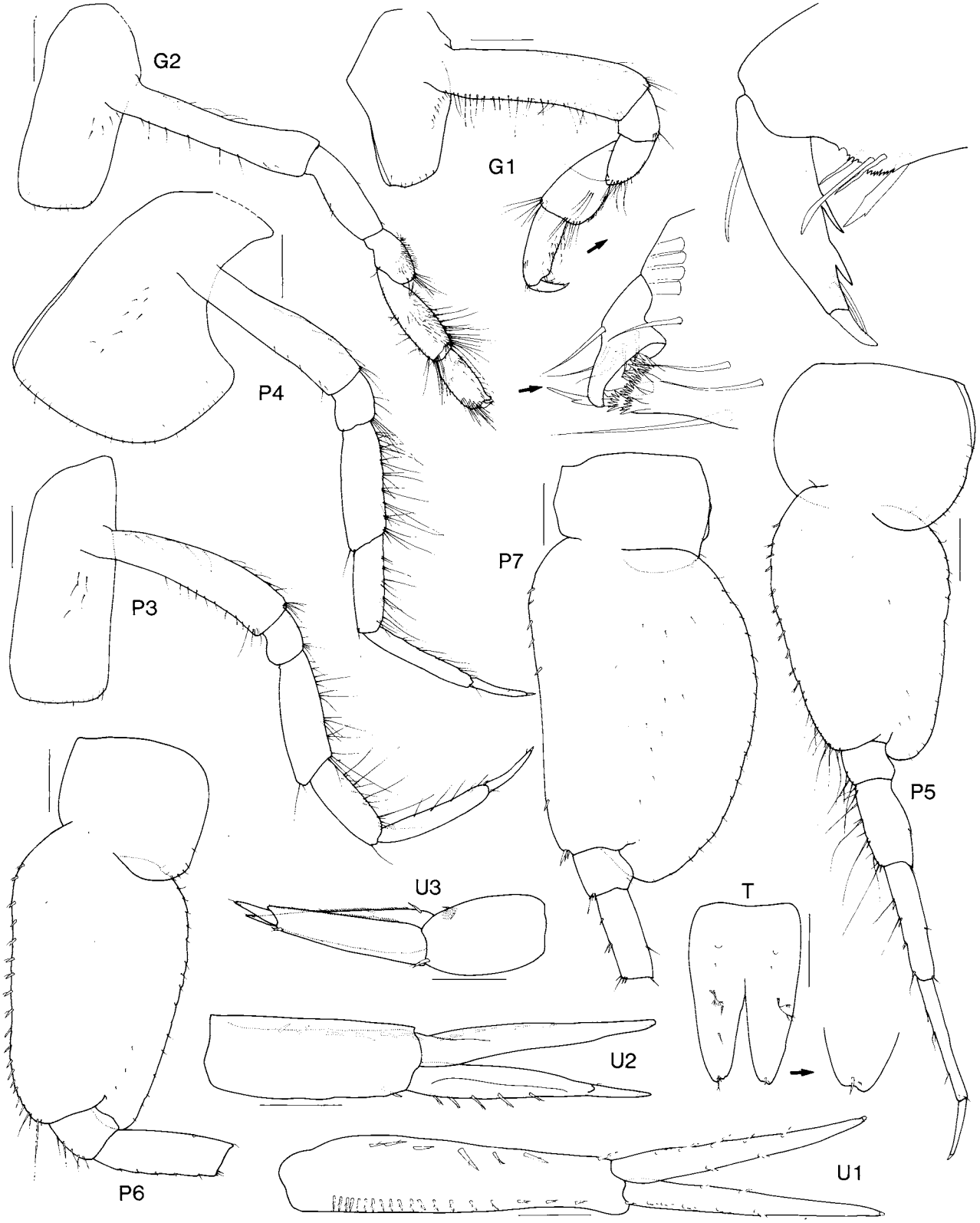

FIGURE 14. *Hirondellea naturaliste* **sp. nov.** Holotype male, 8.0 mm, AM P.68986. Scales represent 0.2 mm.

Remarks. The Australian species *H. naturaliste* and *H. franklin* are the only species in the genus with the combination of a strongly acute palm on gnathopod 1 and a rounded posteroventral corner on epimeron 3. *Hirondellea naturaliste* differs from *H. franklin* in the strongly cleft (58%) telson, medium (40%) in *H. franklin*.

Distribution. East of Tasmania, Australia in 2400–2500 m depth

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