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First valid record of *Astacilla* Cordiner, 1793 in Australia, with description of a new species (Crustacea: Isopoda: Arcturidae)

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Abstract – A new species of arcturid isopod, *Astacilla lewtonae*, is described from Western Australia. Although other Australian species have been attributed previously to this genus, this is the first record for the genus as currently diagnosed.

INTRODUCTION

The Arcturidae Dana, 1849 are a specialised group of marine isopods, which use the anterior four pairs of pereopods as a setose filtering complex extending from a cylindrical body usually elevated above the substrate. The family belongs to the isopod suborder Valvifera, which has recently been restricted by Poore (2001) who removed many genera traditionally placed in it to other families, Antarcturidae Poore, 2001 in particular.

The first description of an Australian arcturid isopod was of *Arcturus brevicornis* Haswell, 1881 from New South Wales. The types of this species are lost but it is probably a species of *Neastacilla*. Further species of *Arcturus* were described from New South Wales by Whitelegge (1904), *Arcturus alcicornis, A. dentatus, A. nodosus, A. serratulus, A. simplicissimus*, the types of all of which are also lost. All probably belong in the Antarcturidae.

The first review of Australian arcturid taxa was that of Hale (1924), who examined many specimens and established the endemic genus *Parastacilla* for two very distinctive species. He also described two other species and placed them in *Neastacilla* Tattersall (*Neastacilla algensis* and *Neastacilla deducta*). In a further, more comprehensive, review Hale (1946) described five arcturid species from the Southern Hemisphere and placed them all in *Astacilla* (*Astacilla attenuata, A. macilenta, A. sheardi* and *A. vicaria* from Australia and *A. fusiformis* from New Zealand) arguing that the genus *Neastacilla* Tattersall was poorly differentiated from *Astacilla* and should not be recognised. Hale (1946) re-examined his two previously described Australian species, *Neastacilla algensis* Hale, 1924 and *Neastacilla deducta* Hale, 1924, moving both to *Astacilla*, and included *Astacilla marionensis* Beddard, 1886 and *Astacilla kerguelensis* Vanhöffen, 1914 from the Southern Ocean in his discussion.

Guiler (1949) was also reluctant to confirm the genus *Neastacilla* and described five new Tasmanian species of *Astacilla* (*Astacilla monoseta, A. inaequispinosa, A. unicornis, A. derwenti*, and *A. oculata*). Of these, only *A. monoseta* and *A. inaequispinosa* are currently valid species (Poore *et al.*, 2002).

All southern Pacific species of *Astacilla* were removed to *Neastacilla* by Kussakin (1972) who published a new diagnosis of *Neastacilla*. A thorough review of 18 Australian species of *Neastacilla* (Lew Ton, 1980) concurred with Kussakin's conclusions, finding that *Neastacilla* was a valid Pacific genus clearly separated from *Astacilla*, which had no known representatives in Australia. So, until now the family has been represented in Australia by *Amesopous* Stebbing, 1905, *Neastacilla* Tattersall, 1921, and *Parastacilla* Hale, 1924, only the last being endemic (King, 2000; Poore *et al.*, 2002)

Although *Astacilla* is almost certainly paraphyletic (King, 2001), a useful diagnosis can be written. *Astacilla* currently comprises 32 species distributed in the northern and central North Atlantic, Mediterranean, northern North Pacific, southern Africa, and in India (Table 1). The new species described here extends the range of the genus to the eastern Indian Ocean and is the first record from Australia.

Material is deposited in the Western Australian Museum, Perth (WAM) and Museum Victoria, Melbourne (NMV).

SYSTEMATICS

Astacilla Cordiner, 1793

Astacilla Cordiner, 1793. –Sars, 1897: 87. –Monod, 1970: 1127–1142. –Kensley, 1983: 163–164.

Table 1 The species of *Astacilla* and their distributions.

Species	Distribution
A. amblyura Stebbing, 1905	Southern India (Pillai, 1963).
A. arietina Sars, 1882	Norway, North Atlantic (Sars, 1897; Kussakin, 1982).
A. axeli Castelló, 1992	Western Mediterranean (Castelló, 1997).
A. bispinata (Menzies & Kruczynski, 1983)	Gulf of Mexico.
A. bocagei Nobre, 1903	Portugal.
A. bonnierii Stephensen, 1915	Straits of Gibraltar; Mediterranean.
A. caeca Benedict, 1898	North Atlantic (Richardson, 1905; Schultz, 1969; Kussakin, 1982).
A. cinguicula Castelló & Carballo, 2000	Western Mediterranean.
A. corniger (Stebbing, 1873) Junior synonyms include: *Antarcturus ornatus*, Tattersall, 1913; *Astacilla setosa* Vanhöffen, 1914; *Arcturopsis hirsutus* Barnard, 1914; *Arcturopsis hirsutus* subglaber Barnard, 1914.	South Africa (Barnard, 1914, 1920; Kensley, 1978, 1984).
A. cymodocea Menzies & Glynn, 1968	Gulf of Mexico, Caribbean (Kensley & Schotte, 1989).
A. depressa Castelló & Poore, 1998	western Mediterranean.
A. deshayesii Lucas, 1849	Europe
A. eminentia Kensley, 1984	South Africa.
A. gibbossa Pillai, 1954	India (Pillai, 1963).
A. glabrus (Benedict, 1898)	Bering Sea, north western Pacific Ocean (Richardson, 1899, 1905, 1909; Birstein, 1963; Schultz, 1969; Kussakin, 1982).
A. gorgonophila Monod, 1925	north Africa; Mediterranean.
A. granulata (Sars, 1877)	eastern USA, United Kingdom, Norwegian Sea (Harger, 1880; Benedict, 1898; Richardson, 1905; Schultz, 1969; Kussakin, 1982). Junior synonym: *Astacilla americana* Harger, 1878.
A. intermedia (Goodsir, 1841)	United Kingdom, Scandinavia (Kussakin, 1982). Junior synonym: *Arcturus affinis* Sars, 1869.
A. laevis Castelló & Poore, 1998	western Mediterranean.
A. lauffi Menzies & Frankberg, 1966	Texas; Georgia (Schultz, 1969; Clark & Robertson, 1982).
A. lasallae Paul & Menzies, 1971	Venezuela (Kensley & Schotte, 1989).
A. longicornis (Sowerby, 1805) Junior synonyms include: *Leacia lacertosa* Johnston, 1825; *Leachia gracilis* Goodsir, 1841; *Arcturus deshayesii* Lucas, 1849; *Arcturus linearis* Stebbing, 1878.	United Kingdom; Scandinavia (Sars, 1897; Stephensen, 1948; Gruner, 1965; Naylor, 1972; Kussakin, 1982).
A. longispina (Kensley, 1978)	South Africa (Kensley, 1978; Kensley, 1984).
A. marna Kensley & Schotte, 1994	Dominica.
A. mediterranea Koehler, 1911	Mediterranean (Barnard, 1920; Kensley, 1984; Kensley, 1978; Kensley, 1984).
A. monodi Tattersall, 1925	Mauritania.
A. paucisetosa Castelló & Caballo, 2000	Western Mediterranean.
A. pusilla (Sars, 1873)	Scandinavia (Sars, 1897; Kussakin, 1982).
A. serrata Nunomura, 1998	Japan.
A. spinata (Menzies & Kruczynzki, 1983) Junior synonym: *A. regina* Kensley, 1984; (Kensley & Schotte, 1989).	Belize, Barbados, St Lucia.
A. tayronae Müller, 1993	Columbia
A. tranquilla (Kensley, 1975)	South Africa (Kensley, 1978, 1984).
Species transferred to other genera:	
A. anophthalmus Birstein, 1963	*Arcturus*.
A. attentuata Hale, 1946	*Neastacilla*.
A. bacillus Barnard, 1920	*Neastacilla*.
A. californica Boone, 1918	*Neastacilla*.
A. dilatata Richardson, 1909	preoccupied, replacement name: *Neastacilla richardsonae*.
A. dilatata Sars, 1882	type species of *Arcturella*.
A. diomedeae Benedict, 1898	*Neastacilla*.
A. estadoensis Schultz, 1981	*Neastacilla*.
A. falclandica Ohlin, 1901	type species of *Neastacilla*.
A. fusiformis Hale, 1946	*Neastacilla*.

Table 1 (cont.)

Species	Distribution
A. giardi Bonnier, 1896	*Arcturopsis.*
A. inaequispinosa Guiler, 1949	*Neastacilla.*
A. kerguelensis Vanhöffen, 1914	*Neastacilla.*
A. levis Thomson & Anderton, 1921	*Neastacilla.*
A. macilenta Hale, 1946	*Neastacilla.*
A. magellanica Ohlin, 1901	*Neastacilla.*
A. marionensis Beddard, 1886	*Neastacilla.*
A. monoseta Guiler, 1949	*Neastacilla.*
A. polita Gurjanova, 1936	*Neastacilla.*
A. setosa Vanhöffen, 1914	junior synonym of *Astacilla corniger.*
A. sheardi Hale, 1946	*Neastacilla.*
A. vicaria Hale, 1946	*Neastacilla.*
Leachia gracilis Goodsir, 1841	junior synonym of *Astacilla longicornis.*
L. granulata Sars, 1877	*Astacilla.*
L. intermedia Goodsir, 1841	*Astacilla.*
L. nodosa Dana, 1849	*Arcturella.*
Leacia lacertosa Johnston, 1825	junior synonym of *Astacilla intermedia.*

Type species

Oniscus longicornis Sowerby, 1805, subsequent designation by Fowler, 1912 (ICZN, 1986: Opinion 1369).

Diagnosis

Body strongly geniculate between pereonites 4 and 5, cylindrical, with no dorsal ridge. Antenna 2 slender, 2 or 3 flagellar articles, flagellum ending with claw. Maxillipedal palp with all segments free, palp article 3 similar width as article 2. Pereonite 4 elongate, male and female of similar length.

Pereopod 1 setose, with unguis (rarely without). Pereopods 2–4 present and functional as setose appendages, dactylus absent. Pereopods 2–4 cylindrical, held close to the mouthparts, able to extend past the mouthparts, setae in rows, setae as long as segment, flexion between the carpus and the propodus present. Pereopods 5–7 with 2 ungues, secondary unguis robust.

Penial plate narrow, apex simple. Male pleopod 1 with lateral notch, with 3 lateral setae, lateral setae of similar length. Male pleopod 2 with appendix masculina tapered, without ridge, distally not widened, straight, elongated.

Uropodal exopod present, 3 setae on inner ramus.

Female functional brood pouch majority made up of pereonite 4 (or 3 and 4). Oostegite 5 absent.

Remarks

The systematics of the genus *Astacilla* is currently unresolved, given the similarities of many species to those in the genera *Arcturella* and *Neastacilla*. In the past *Astacilla* has been successively defined by an elongate fifth pereonite (Bate & Westwood, 1868), pereopod 1 with a claw, one pair of oostegites (Sars, 1897), and the loss of dactyls on pereopods 2 to 4 (Kussakin, 1972). Examination of several species of *Astacilla* has shown that these characters are variable and in the case of the number of oostegites, incorrect. The lack of known synapomorphic character states for many arcturid genera combined with the reluctance of many authors to examine the higher systematics of the genera has lead to much confusion within arcturid taxonomy and much debate (Nordenstam, 1933; Monod, 1970; Kussakin, 1972; Schultz, 1981; Menzies & Kruczynski, 1983; Wägele, 1989; Brandt, 1991).

Astacilla lewtonae sp. nov.

Figures 1–4

Material examined

Holotype

Male, 7.3 mm, **Western Australia**, between Dampier and Port Hedland, 19°03.00'S; 119°00.00'E, 80 m, WHOI epibenthic sled, CSIRO division of Fisheries, 11 Dec 1982 (WAM C 32344).

Paratypes

Female, 6.0 mm, **Western Australia**, between Dampier and Port Hedland, 19°37.00'S; 118°53.00'E, 30 m, WHOI epibenthic sled, CSIRO division of Fisheries, 3 Jun 1983 (WAM C 32345). 2 females; 7.0–7.5 mm, 19°28.40'S; 118°55.10'E, 38 m, WHOI epibenthic sled, CSIRO division of Fisheries, 25 Oct 1983 (WAM C 32346). Immature male, 5 mm,

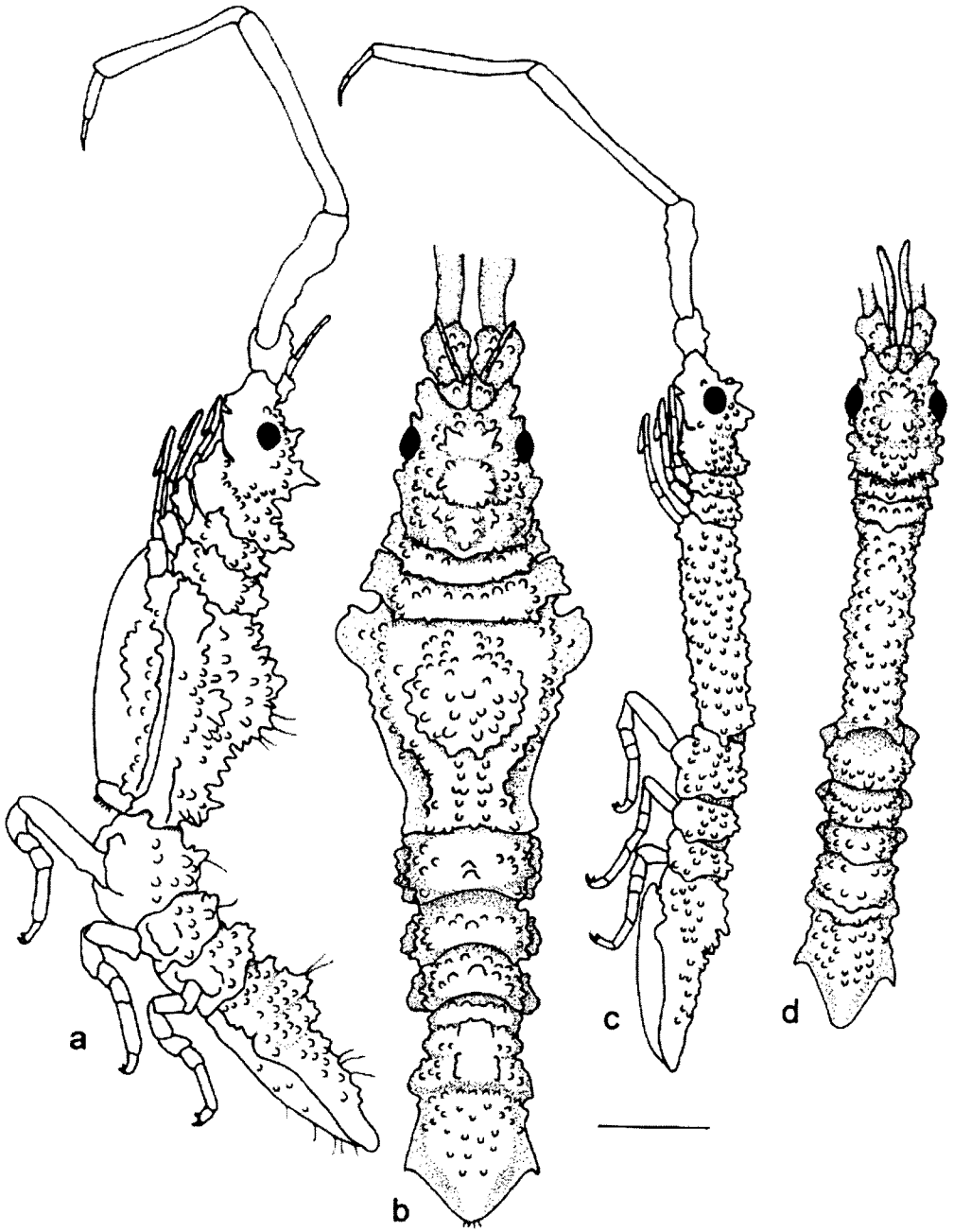

Figure 1 *Astacilla lewtonae* n.sp., female holotype (NMV J16900): a, lateral view; b, dorsal view. Male (NMV J16904): c, lateral view; d, dorsal view. Scale = 1.0 mm.

19°29.90'S; 118°52.00'E, 37 m, WHOI epibenthic sled, CSIRO division of Fisheries, 24 Oct 1983 (NMV J16651). Manca 2, 3 mm, 19°50.00'S; 118°57.90'E, 84 m, WHOI epibenthic sled, CSIRO division of Fisheries, 29 Aug 1983 (NMV J16667). 3 females; 6.5–7.0 mm, 19°29.60'S; 118°51.70'E, 40 m, WHOI epibenthic sled, CSIRO division of Fisheries, 25 Oct 1983 (NMV J16648).

Other material examined

Northern Territory, North West end, Bommies, McCluer Island, 11°02.00'S; 132°58.00'E, 8 m, SCUBA, in sponges, Lowry, J.K., 16 Oct 1982 (NMV J16582). 11°02.00'S; 132°58.00'E, 8 m, SCUBA, in hydroids, Lowry, J.K., 16 Oct 1982 (NMV J16935).

South Australia, Spencer Gulf, Douglas Bank, 32°47.18'S; 137°50.00'E, 15 m, South Australia Fisheries, Aug 1986 (NMV J16917).

Description

Female

Body geniculate and cylindrical. Anterolateral margins of head sub-truncate with medial indentation, a small rostral point evident. Fusion of head and pereonite 1 indicated by dorsolateral groove incised laterally. Head heavily tuberculate,

with 2 tuberculate dorsal elevations central and posterior to eyes, anterior tubercle with 2 apices. Pereonite 2 wider than pereonite 1, tuberculate with angular lateral margins extended. Pereonite 3 wider than pereonite 2, tuberculate with angular lateral margins extended. Pereonite 4 about 6 times longer than pereonite 3; dorsally wider than pereonite 3, tuberculate, angular lateral margins extended, with small posterior lateral extensions. Pereonites 5 to 7 progressively shorter posteriorly; heavily tuberculate, with lateral extensions. Pleon with evidence of three fused pleonites plus pleotelson; total length longer than combined lengths of pereonites 5 to 7, with small anterior lateral wings, posterior angular lateral wings and rounded apex.

Eyes round, dorsolateral. Antenna 1 reaching past distal edge of second peduncular article of antenna 2; flagellum slender with aesthetascs attached distally. Antenna 2 slender, more than half as long as body; flagellum of 2 articles plus claw, lower margin without scales.

Maxilla 1 inner lobe with 3 terminal setae; outer lobe with 10 robust setae. Maxilla 2 inner lobe with 15 plumose setae; middle lobe with 4 setae; outer lobe with 3 setae. Maxillipedal endite with 10 mesial setae; palp article 2 and 3 with mesial setal rows; article 4 with mesial and lateral setal rows; article 5 with distal setae.

Pereopod 1 propodus smaller than carpus; dactylus about twice as long as wide, bearing unguis, which is longer than dactylus. Pereopods 2–4 merus to propodus with paired rows of long setae; dactylus absent; flexion between carpus and propodus present.

Pereopods 5 to 7 progressively shorter; dactylus denticulate, unguis present with secondary unguis 2/3 length of primary unguis.

Uropod exopod not reaching mid point of endopod, with 2 setae of subequal length.

Oostegites present on pereopods 1 to 4; oostegite 4 thickened, with transverse suture delimiting posterior lobe.

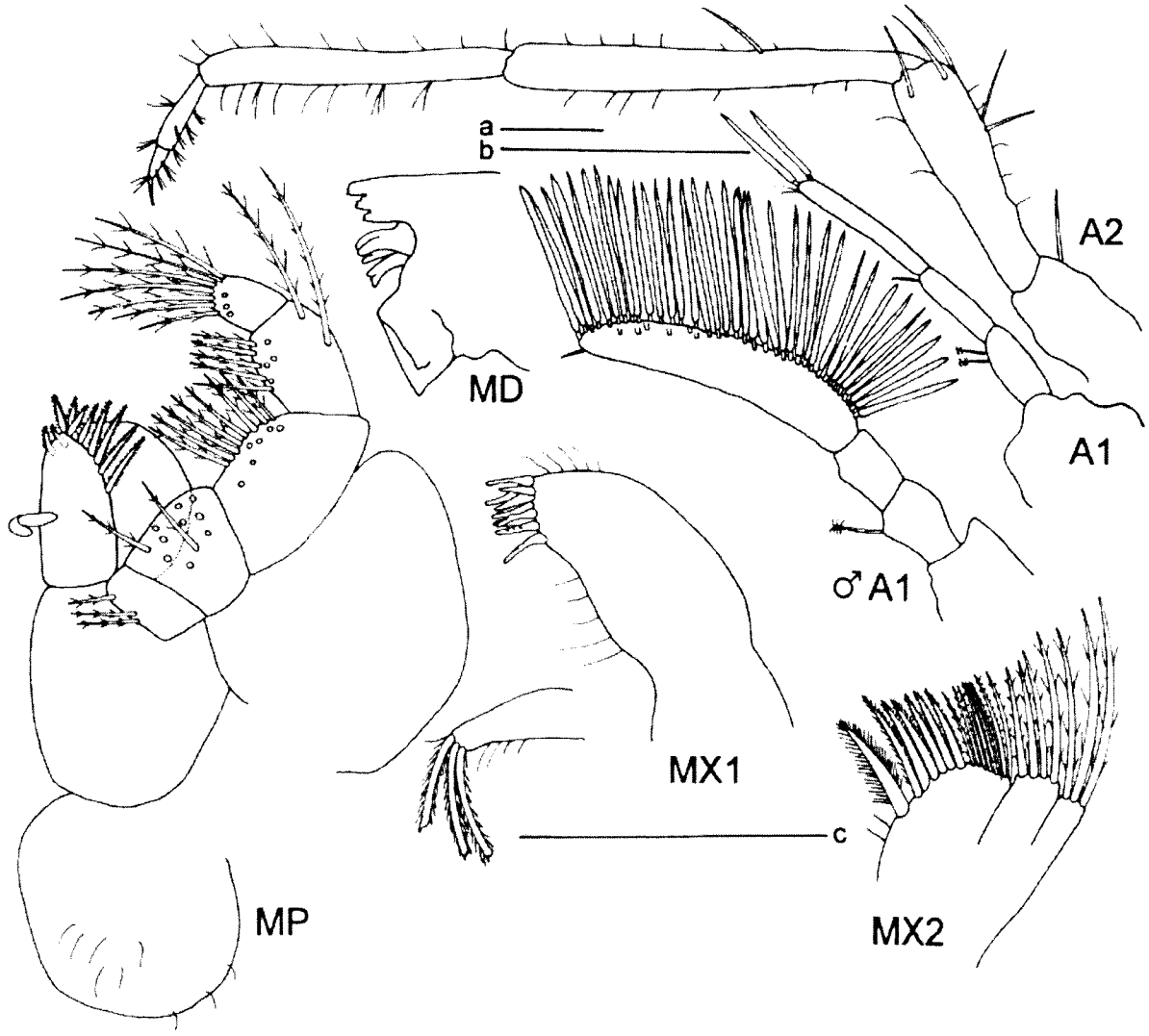

Figure 2 *Astacilla lewtonae* n.sp., female holotype (NMV J16900): left maxilliped; left maxillae 1 and 2; left mandible; antennae 1 and 2. Scales: a (A2) = 0.5 mm; b (A1, ♂A1) = 0.5 mm; c (MP, MX1, MX2, MD) = 0.5 mm.

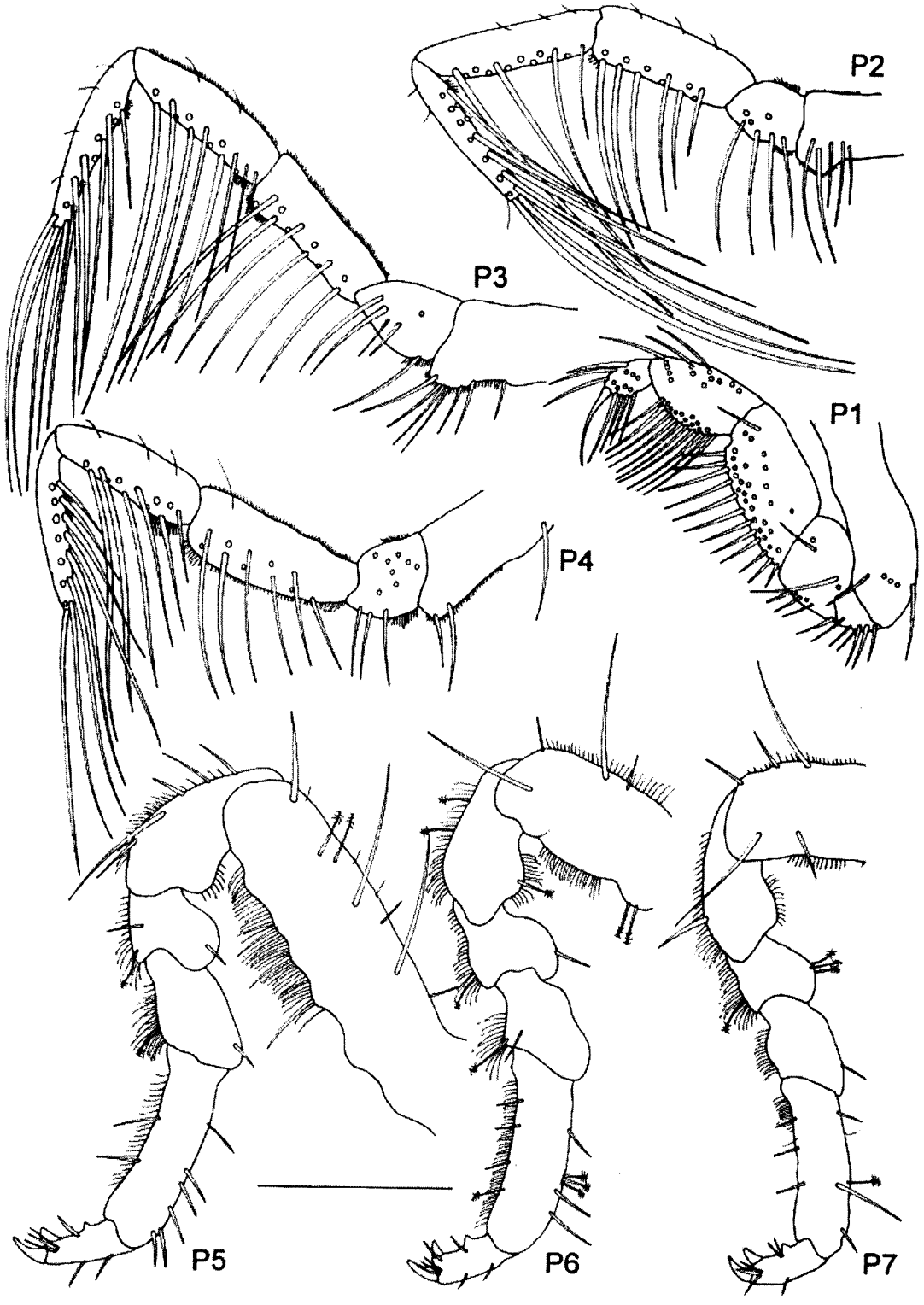

Figure 3 *Astacilla lewtonae* n.sp., female holotype (NMV J16900): pereopods 1 to 7. Scale = 0.5 mm.

Male

Body geniculate and cylindrical. Anterolateral lobes of head rounded with tuberculations, small rostral point evident. Head and pereonite 1 fused and with similar tuberculate ornamentation to female. Pereonite 2 and 3 tuberculate; lateral margins not greatly extended. Pereonite 4 around 8 times length of pereonite 3, tuberculate, lateral margins not extended. Pereonites 5 to 7 tuberculate, anterolateral margins extended. Pleon length greater than combined lengths of pereonites 5 to 7, evidence of 3 fused pleonites plus pleotelson, with small anterior lateral wings, angular posterior lateral wings and rounded apex.

Eyes round and dorsolateral. Antenna 1 extending past distal edge of second peduncular

article of antenna 2; flagellum uniarticulate and with aesthetascs attached distally and laterally along the entire length. Antenna 2 as for female.

Mouthparts as for female.

Pereopods as for female.

Pleopod 1 exopod with lateral notch and 3 plumose setae of similar lengths on posterior face. Pleopod 2 with appendix masculina straight and extending twice the length of the endopod, tapering to two filaments. Penial plate straight and simple.

Distribution

Australia: Western Australia, Northern Territory, South Australia; 8 to 84 metres.

Remarks

Although morphologically similar to Australian *Neastacilla* species, the possession of a long, straight appendix masculina is the primary reason why this species belongs in *Astacilla*. Other characteristics that support the placement of this species within *Astacilla* are the possession of flexion between the carpus and propodus and the complete lack of dactyli on pereopods 2 to 4, the presence of a dactylus on pereopod 1 and the shape of the female, which is widened and not especially elongate at pereonite 4. The dorsal and lateral sculpture of the body of this species makes it unique among the *Astacilla* species.

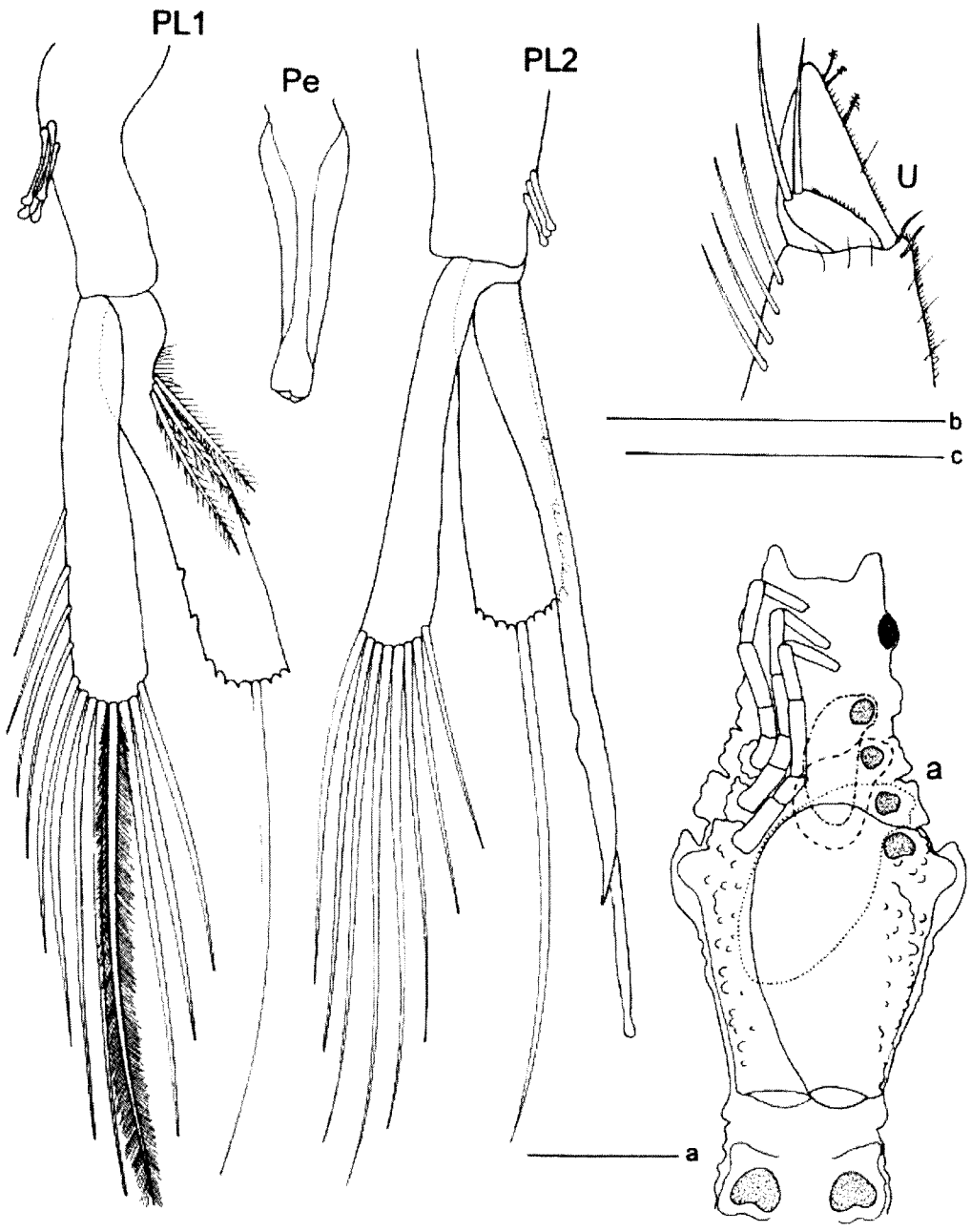

Figure 4 *Astacilla lewtonae* n.sp., male (NMV J16904): pleopods 1 and 2; penial plate. Female holotype (NMV J16900): distal end of uropod; a, ventral view with oostegites. Scales: a (PL1, PL2, Pe) = 0.5 mm; b (U) = 0.5 mm; c (e) = 1.0 mm.

Etymology

This species is named for Helen Lew Ton who detected this 'strange' species in the collections of Museum Victoria.

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