

Re-description of *Chevalia aviculae* Walker, 1904, five new species and new records of Chevaliidae from Australia and New Zealand (Crustacea: Peracarida: Amphipoda: Senticaudata)

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ABSTRACT. The amphipod family Chevaliidae Myers & Lowry, 2003 (Amphipoda: Senticaudata) contains two genera: *Chevalia* Walker, 1904 (13 species), and *Bryoconversor* Lörz, Myers & Gordon, 2014 (1 species). *Chevalia* is a marine genus with a cosmopolitan distribution in circumtropical and temperate waters. Prior to this study, records of *Chevalia* from Australian waters were limited. Here, we describe five new species of *Chevalia* from Australian waters, *C. bardi* sp. nov., *C. burrewarra* sp. nov., *C. csiro* sp. nov., *C. freycinet* sp. nov. and *C. sprightly* sp. nov. The original description of *Chevalia aviculae* no longer adequately defined the species and is redescribed based on syntypic material from East Cheval Paar, Sri Lanka. Additionally, new distribution records are provided for the New Zealand species *Bryoconversor tutus* Lörz, Myers & Gordon, 2014. Material reported is from both shallow and deep-water samples from 1–660 m depth. The prevalence of various gender and intersex states within specimens of chevaliids is discussed. An updated key to the 19 world species of Chevaliidae and a field guide to the seven known Australian and New Zealand species is provided.

Keywords: taxonomy, intersex, identification key, field guide

ZooBank registration: urn:lsid:zoobank.org:pub:D618B128-19D9-42AC-82D3-D32180E70778

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Submitted: 22 March 2024 **Accepted:** 8 May 2024 **Published:** 26 June 2024 (in print and online simultaneously)

Publisher: The Australian Museum, Sydney, Australia (a statutory authority of, and principally funded by, the NSW State Government)

Citation: Springthorpe, R. T., and L. E. Hughes. 2024. Re-description of *Chevalia aviculae* Walker, 1904, five new species and new records of Chevaliidae from Australia and New Zealand (Crustacea: Peracarida: Amphipoda: Senticaudata). *Records of the Australian Museum* 76 (3): 157–194. <https://doi.org/10.3853/j.2201-4349.76.2024.1903>

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Introduction

The amphipod family Chevaliidae was established by Myers & Lowry (2003) and included only one genus, *Chevalia* Walker, 1904, until the recent addition of *Bryoconversor* Lörz, Myers & Gordon, 2014, from New Zealand waters. Chevaliids have been recorded from depths ranging from 1–1500 m and a variety of habitats including washings from pearl oysters, macroalgae, coarse shelly sand, muddy sand, coral rubble and bryozoans (Lörz *et al.*, 2014). In *Chevalia* the structure of pereopods 5, 6 and 7, uropods and telson suggest a possible tubiculous habit (Walker, 1904: 290).

The type genus *Chevalia* was established by Walker in 1904 for the species *Chevalia aviculae* Walker, 1904 from the pearl oyster beds of Sri Lanka. Until 1987, the genus *Chevalia* included only four known species from Sri Lanka, Belize, and the United States of America (California and Florida) (Barnard & Thomas, 1987). The original description of *Chevalia aviculae* did not adequately define the species. Consequently, there have been a number of mis-identifications of *Chevalia aviculae* that are probably new species (Barnard & Thomas, 1987; Souza-Filho *et al.*, 2010), and a number of unconfirmed records of unillustrated and undescribed material from South Africa (K.H. Barnard, 1916; Griffiths, 1973, 1974a, 1974b, 1975, 1976, 1977), Mozambique (K.H. Barnard, 1955), the Red Sea (K.H. Barnard, 1937), Gulf of Mexico (Thomas, 1993; Paz-Rios & Ardisson, 2013) and Cuba (Ortiz & Lalana, 2010). Barnard and Thomas (1987) recognised that many of the earlier records of *Chevalia aviculae* warranted further consideration recognising a potential species complex and this hypothesis was later supported by other *Chevalia* workers (Lazo-Wasem, 1999; Myers, 2009). Recent works by Lazo-Wasem (1999), Myers (1995, 2009), and Souza-Filho *et al.* (2010) have expanded the number of *Chevalia* species to 13. Additional records for the New Zealand chevaliid species, *Bryoconversor tutus* Lörz, Myers & Gordon, 2014 have also been discovered.

The present study aims to clarify the identity of the type species *Chevalia aviculae*, describe new taxa of *Chevalia* from Australian waters, provide new records for *Bryoconversor tutus* from New Zealand and develop an updated key to all species of Chevaliidae. Distribution maps and a field guide to the Australian and New Zealand *Chevalia* species are provided, together with an updated list of Chevaliid species.

Materials and methods

Samples used in this study were initially fixed in 5% formalin and transferred to 80% ethanol. Material is lodged in the Australian Museum, Sydney (AM), Museums Victoria, Melbourne (NMV), the Western Australian Museum, Perth (WAM) and the Natural History Museum, London (NHMUK). Specimens were dissected in 80% ethanol and slides were made using Aquatex mounting agent. Illustrations were made using Leitz Laborlux K and Wilde Heerbrugg stereomicroscopes fitted with camera lucida.

For this study we were able to access Walker's original type material. Walker names two reefs (paars) as the type locality, East Cheval and Muttuvaratu. As there is only one vial in the collection and multiple original slide preparations, it could be concluded that specimens from both locations

were combined. Indeed, during the Pearl Fishery Survey many of the sampling stations represent multiple dredging events combined (Herdman, 1903). Walker did not designate a holotype and the collection is considered syntypic. Owing to the limited state of the original slides, additional wet specimens were dissected and the redescription of *C. aviculae* is based on a male and 2 female specimens from the syntype series.

Standard abbreviations on the plates are: A, antenna; af, accessory flagellum; EP, epimeron; G, gnathopod; H, head; LL, labium; MD, mandible; MX, maxilla; MP, maxilliped; P, pereopod; ped, peduncle; T, telson; U, uropod; UL, labrum; UR urosomite; L, left; R, right. Lower case a, b, c refers to individual specimens.

Systematics

Order Amphipoda Latreille, 1816

Suborder Senticaudata Lowry & Myers, 2013

Superfamily Chevalioidea Myers & Lowry, 2003

Family Chevaliidae Myers & Lowry, 2003

Bryoconversor

Lörz, Myers & Gordon, 2014

Bryoconversor Lörz, Myers & Gordon, 2014: 4.

Type species. *Bryoconversor tutus* Lörz, Myers & Gordon, 2014.

Diagnosis. Modified from Lörz *et al.* (2014). Head lateral cephalic lobes weakly produced, subtriangular, apically subacute; anteroventral margin moderately recessed, moderately excavate. Eye present or absent. Labrum lacking epistome. Antenna 1 and 2 subequal in length. Gnathopod 2 larger than gnathopod 1, subchelate. Pereopods 5–7 coxae shallow. Epimera rounded. Urosomites 1 and 2 coalesced. Uropods 1–2 biramous, inner ramus longer than peduncle, weakly curved, with or without longitudinal ridges, lacking setae. Uropod 2 peduncle posterior margin with strongly developed flange with a pitted edge. Sexual dimorphism absent.

Composition. *Bryoconversor tutus* Lörz, Myers & Gordon, 2014 (monotypic).

Distribution. New Zealand.

Bryoconversor tutus

Lörz, Myers & Gordon, 2014

(Figs 1–6)

Bryoconversor tutus Lörz, Myers & Gordon, 2014: 5, figs 3–8.

Material examined. Male, 8 mm, AM P.25854, Taiaroa Canyon, off the Otago Peninsula, South Island, New Zealand, 45°46'S 171°05'E, 600–660 m, Agassiz trawl, muddy sand, coll. P. K. Probert, RV *Munida*, 25 March 1974, station MU 74/95; male, 5.6 mm, AM P.25890, Papanui Canyon off the Otago Peninsular, South Island, New Zealand 45°52'S 171°01'E, 500 m, Agassiz trawl, coll. P. K. Probert, RV *Munida*, 7 November 1974, station MU 74/202.

Type locality. New Zealand, 45°27'S 171°24'E.

Remarks. The Australian Museum specimens were collected from within 45 km of the type locality. These specimens closely agree with the description of Lörz *et al.* (2014) except for the striations on the inner rami of uropods 1 and 2 which are absent in these specimens. Also notable is the large difference in body size between the type specimens and the present specimens. The Australian Museum specimens are two males, 8 mm and 5.6 mm in length, whereas the specimens of Lörz *et al.* (2014) are 1.72 mm (holotype female) and 0.64 mm (paratype male). Lörz *et al.* (2014) discuss the relationship between the bryozoan host and the amphipods and suggest that the amphipods may exit the bryozoan under certain circumstances and then may recolonise another bryozoan. This suggests that *Bryoconversor* enjoys a free-living stage outside the bryozoan host and therefore would be able to grow to a larger size without constraints.

Distribution. New Zealand (Lörz *et al.*, 2014).

Chevalia Walker, 1904

Chevalia Walker, 1904: 288.—J. L. Barnard, 1969: 271.—J. L. Barnard, 1973: 16.—Conlan, 1983: 60.—Barnard & Thomas, 1987: 532.—Barnard & Karaman, 1991: 182.
Neophotis Stout, 1913: 653.

Type species. *Chevalia aviculae* Walker, 1904.

Diagnosis. (Modified from Barnard & Thomas, 1987; Souza-Filho *et al.*, 2010). Antenna 1 peduncle article 3 shorter than article 1, accessory flagellum 1–3 articulate. Mandible palp article 3 slightly shorter or subequal to article 2, weakly clavate. Maxilla 2 inner plate with oblique facial row of setae. Gnathopod 1 feeble, subchelate, carpus elongate. Gnathopod 2 large, carpus lobate, propodus large, subrectangular, palm defined by a spine, dactyl thick. Dactylus of pereopod 3–4 simple, of pereopods 5–7 strongly curved and with a large accessory spine. Pereopods 5–7 short, stout, increasingly elongate. Urosomites 1–2 fused, urosomite 3 free. Inner rami of uropods 1–2 styliform and unarmed apically. Uropod 1 inner ramus with a row of medial serrate spines. Uropod 3 rami subequal in length, setose apically. Telson subquadrate, as broad as long, dorsally setose.

Remarks. The generic diagnosis is modified from Souza-Filho *et al.*, 2010 in order to accommodate *C. freycinet* sp. nov. and *C. sprightly* sp. nov. The expanded character range includes: the mandible with article 3 slightly shorter and now includes subequal to article 2; and also, coxae 1 to 7 being either disjunct or contiguous. The character of coxae 1 and

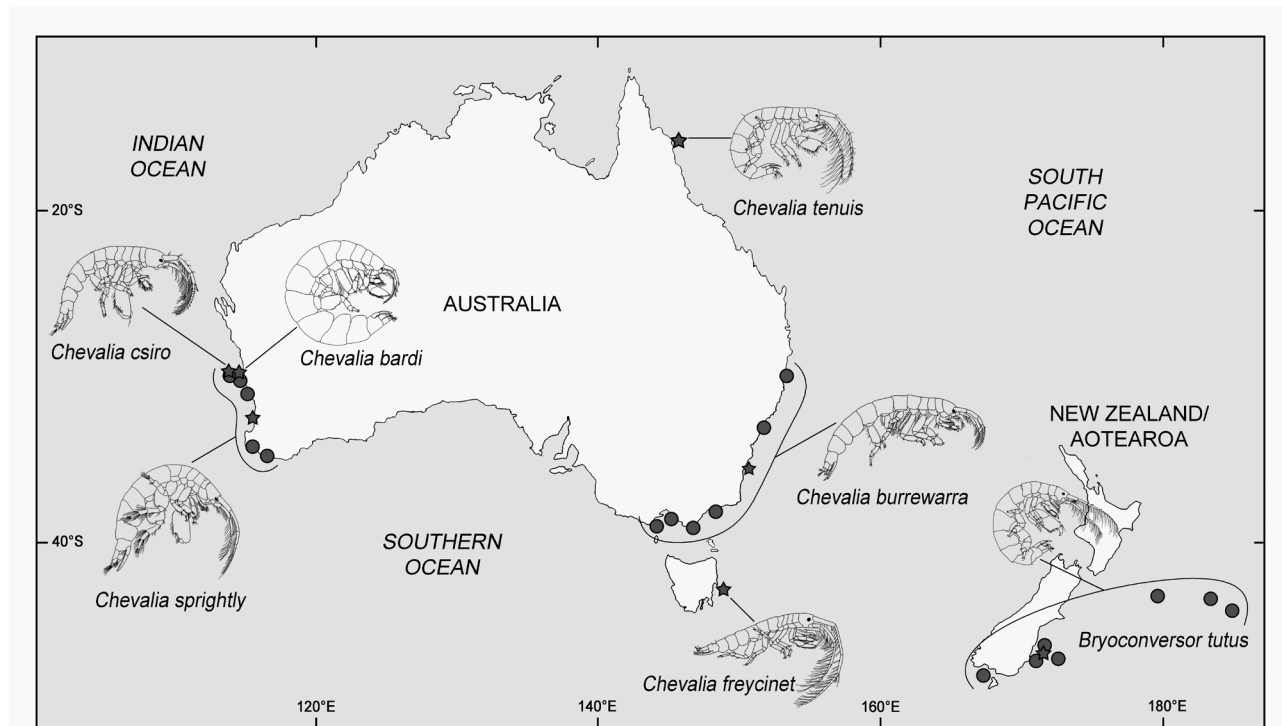
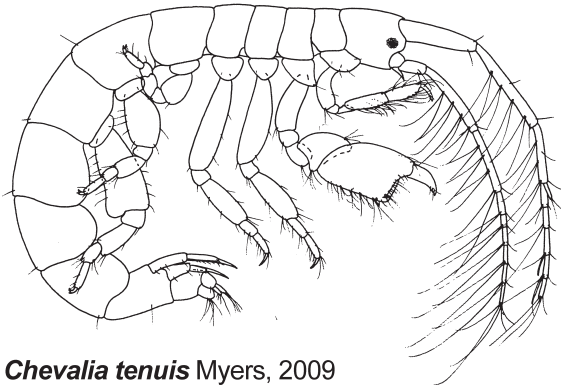


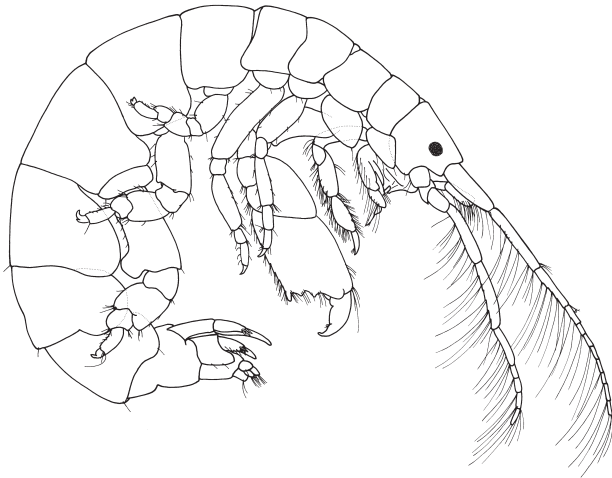
Figure 1. Distribution map of Australian and New Zealand Chevaliidae species. Stars represent type localities; circles represent additional data points.



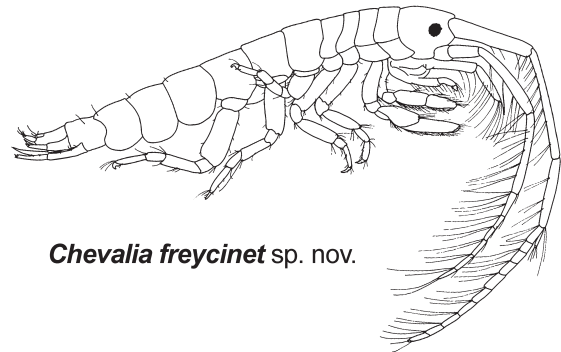
Chevalia tenuis Myers, 2009



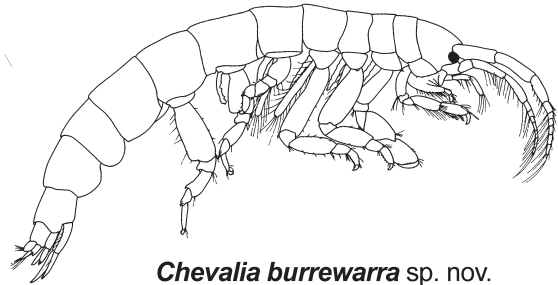
Chevalia sprightly sp. nov.



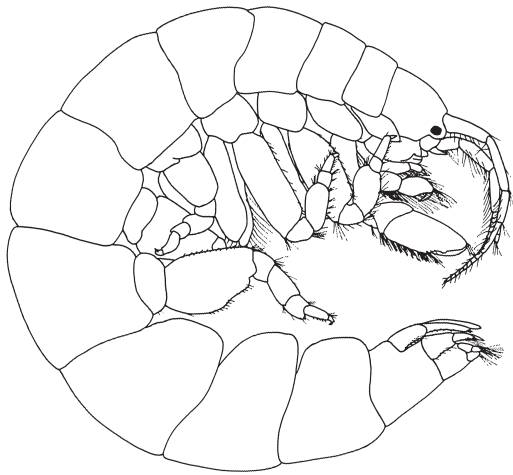
Bryoconservor tutus Lörz, Myers & Gordon, 2014



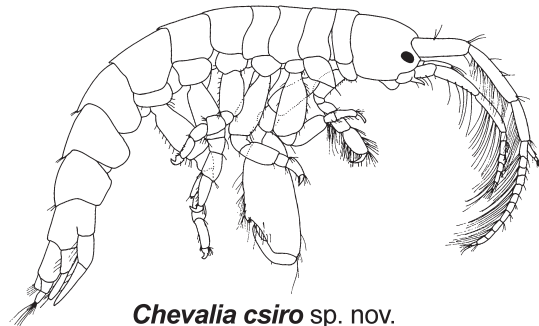
Chevalia freycinet sp. nov.



Chevalia burrewarra sp. nov.



Chevalia bardi sp. nov.



Chevalia csiro sp. nov.

Figure 2. Field guide to Australian and New Zealand Chevaliidae species.

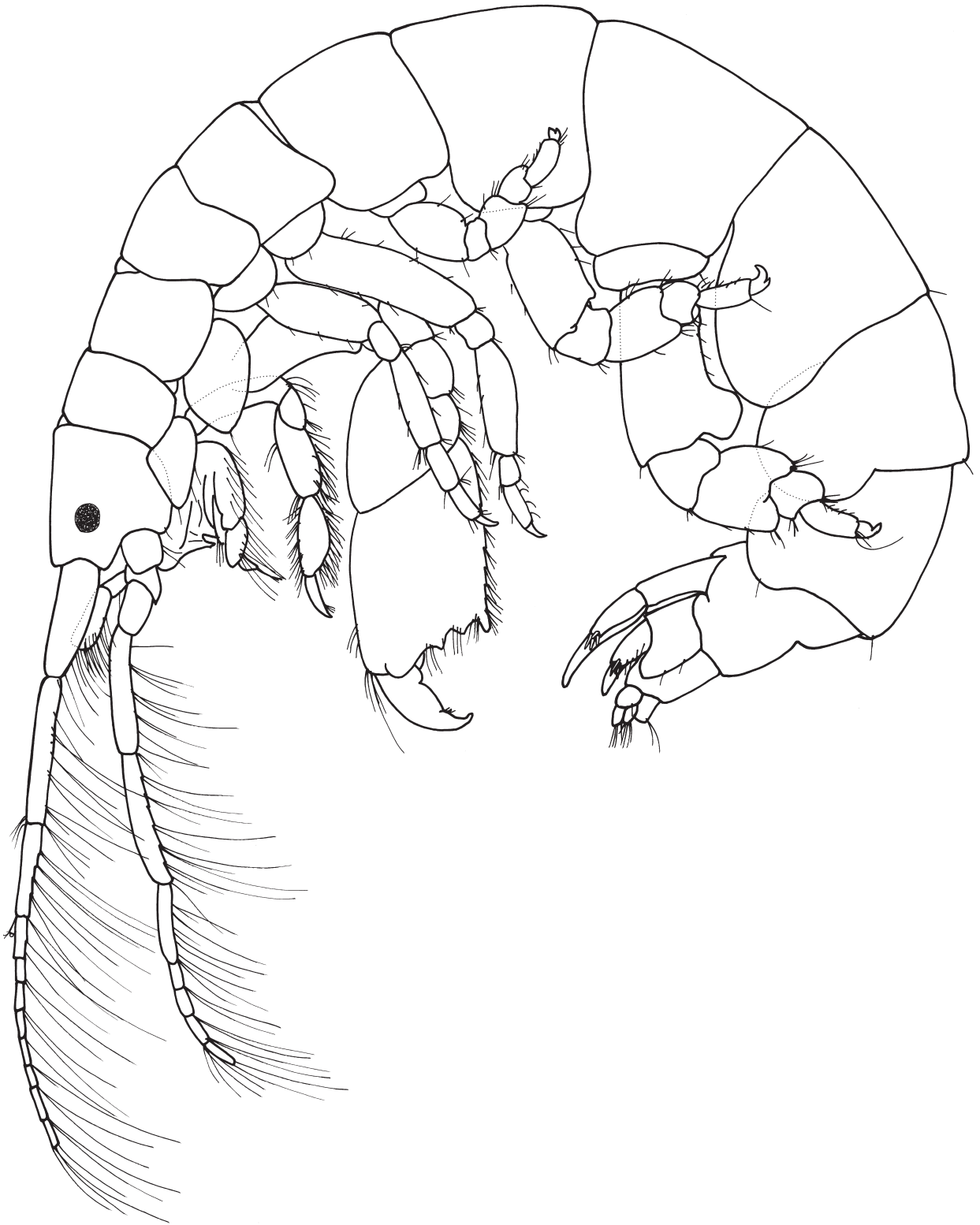


Figure 3. *Bryoconverter tutus* Lörz *et al.*, 2014, male, 8 mm, AM P.25854, Taiaroa Canyon, New Zealand.

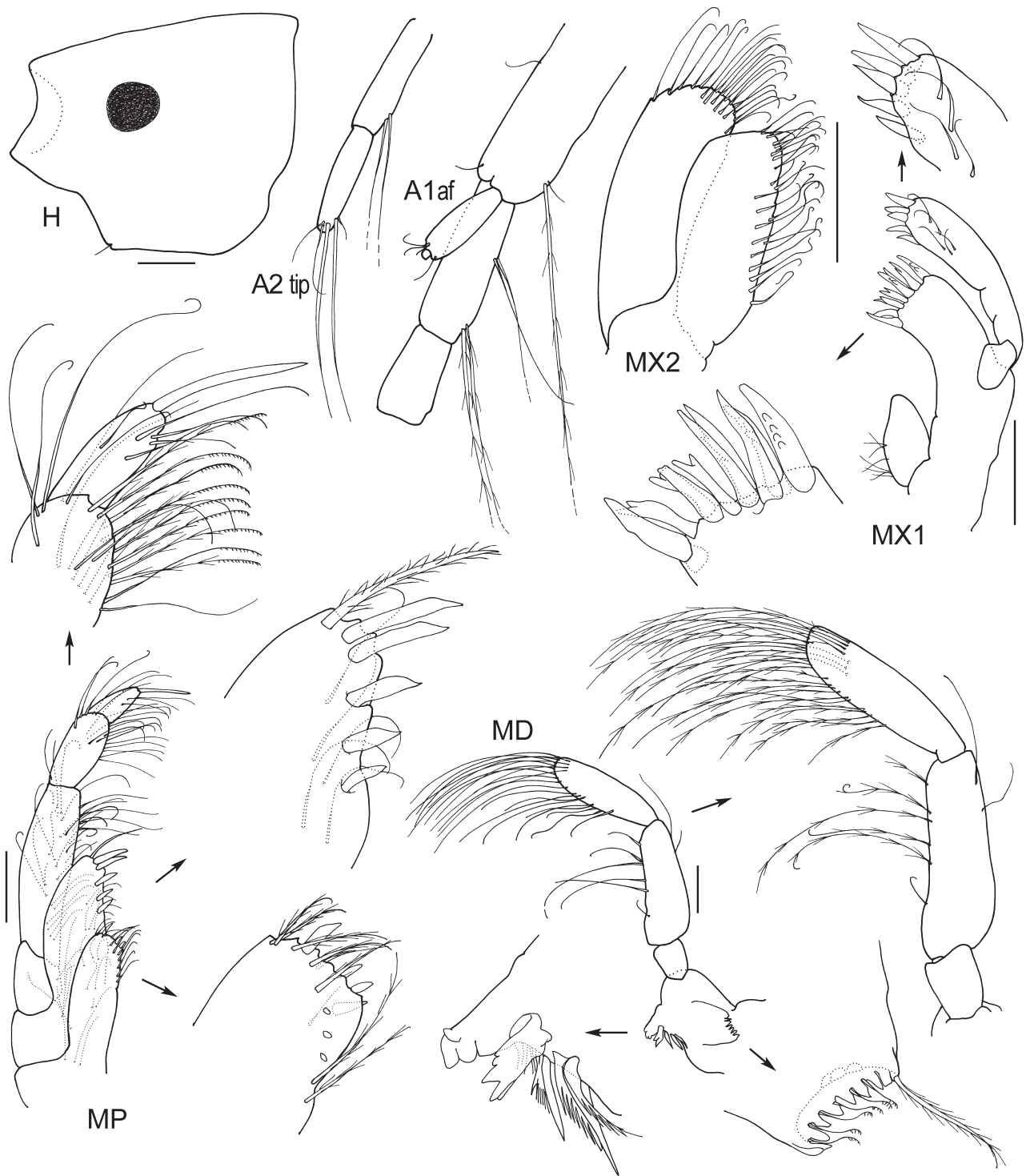


Figure 4. *Bryoconversor tutus* Lörz *et al.*, 2014, male, 8 mm, AM P.25854, Taiaroa Canyon, New Zealand. Scale lines represent 0.1 mm except H represents 0.5 mm.

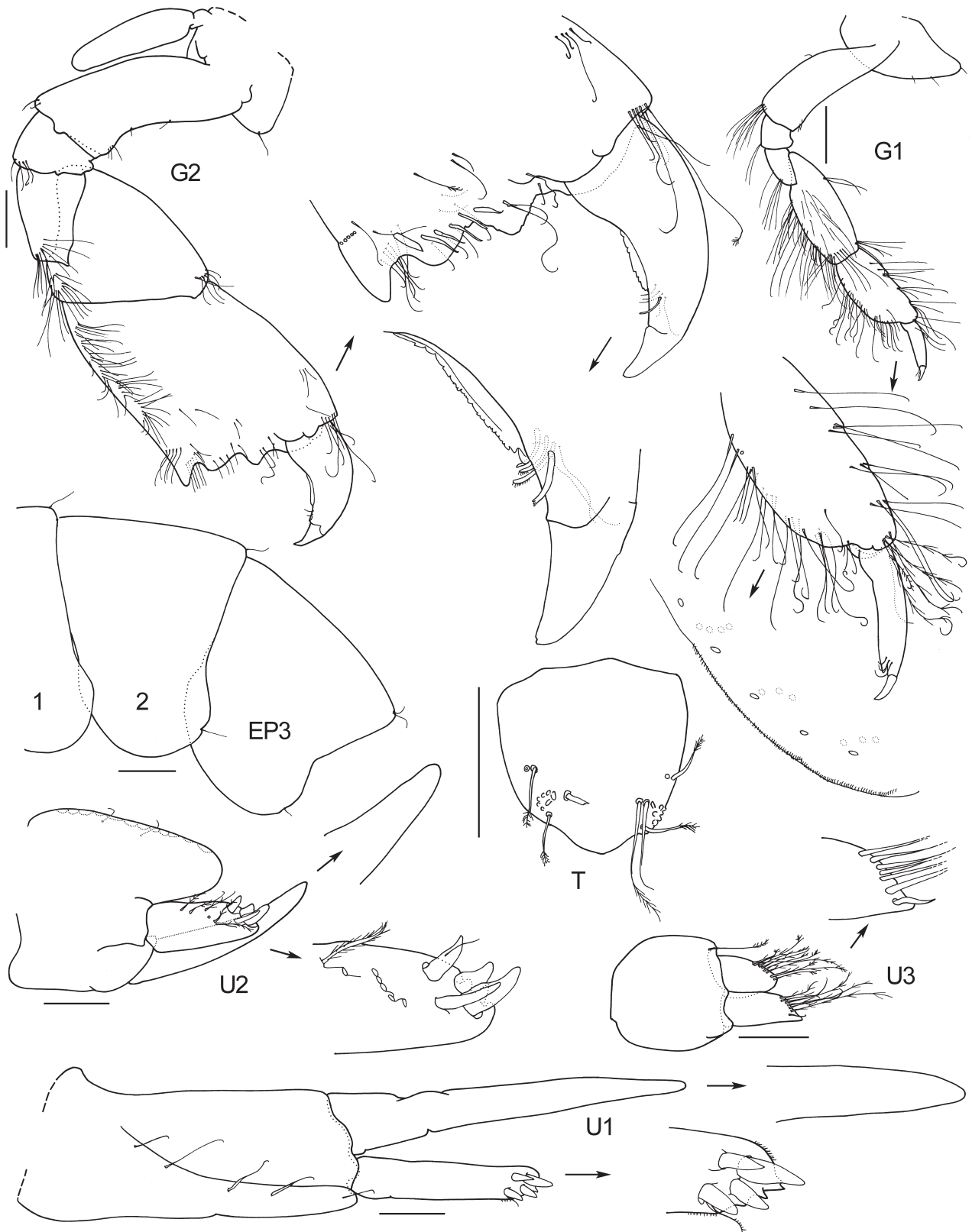


Figure 5. *Bryoconversor tutus* Lörz *et al.*, 2014, male, 8 mm, AM P.25854, Taiaroa Canyon, New Zealand. Scale lines represent 0.1 mm except G1, G2, EP 1–3 represents 0.2 mm.

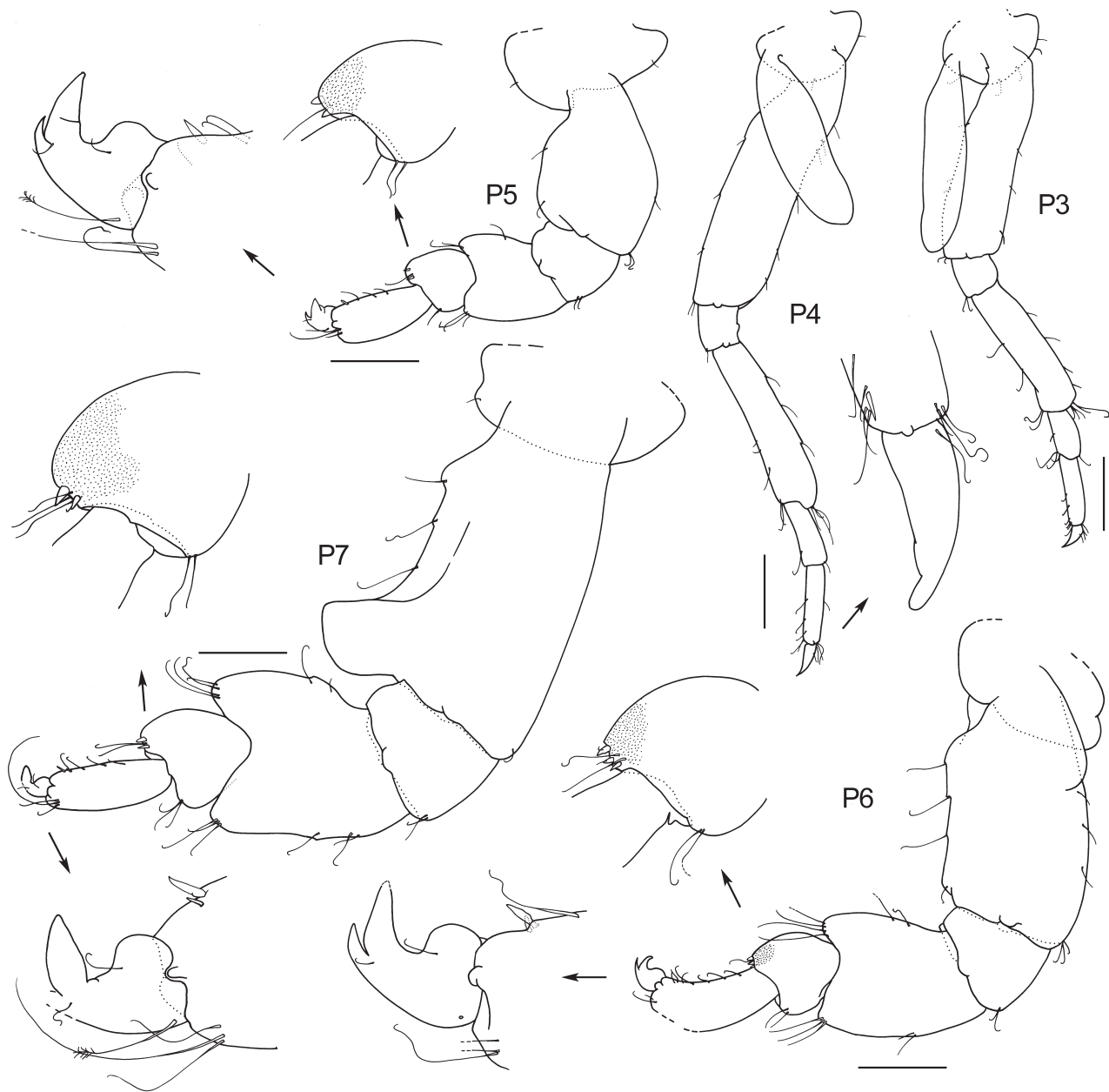


Figure 6. *Bryoconversor tutus* Lörz *et al.*, 2014, male, 8 mm, AM P.25854, Taiaroa Canyon, New Zealand. Scale lines represent 0.2 mm.

2 being larger than coxae 3 to 7 is excluded from the generic diagnosis on the basis of non-conformity observed in *C. bardi* sp. nov., *C. burrewarra* sp. nov., and *C. csiro* sp. nov.

Given the recognised prevalence of intersex specimens, the character state of gnathopod 2 similar in males and females is a difficult concept to apply and therefore not treated here as generically diagnostic.

***Chevalia aviculae* Walker, 1904**

(Figs 7–10)

Chevalia aviculae Walker, 1904: 288, pl. 7, fig. 50, pl. 8 fig. 50.—Walker, 1909: 341.—Nayar, 1966: 159, fig. 17b.—Ledoyer, 1967: 133, fig. 19.—Ledoyer, 1972: 233, fig. 53B.—Ledoyer, 1982: 198, fig. 68.—Barnard & Thomas, 1987: 533.

Not *Chevalia aviculae*.—Shoemaker, 1921: 101 (Barbados) (= *C. mexicana* Pearse, 1912, according to Barnard & Thomas, 1987).—Shoemaker, 1942: 39 (California) (= *C. inaequalis* (Stout, 1913), according to Barnard & Thomas, 1987).—J.L. Barnard, 1962: 17, fig. 5 (California) (= *C. inaequalis* (Stout, 1913), according to Barnard & Thomas, 1987).—J.L. Barnard, 1970: 166, fig. 107 (Hawaii) (= *Chevalia* sp., according to Barnard & Thomas, 1987).—J.L. Barnard, 1979: 24 (Galapagos) (= *Chevalia* sp., according to Barnard & Thomas, 1987).—Conlan, 1983: 61, fig. 32 (British Columbia) (= *C. inaequalis* (Stout, 1913), according to Barnard & Thomas, 1987) (= *Chevalia* sp. according to Barnard & Karaman, 1991).—Myers, 1985: 76, fig. 59 (Fiji) (= *Chevalia pacifica*, according to Myers, 1995) (= *Chevalia* sp. according to Lazo-Wasem, 1999).—Myers, 1989: 66 (Society Islands) (= *Chevalia aviculae* of J. L. Barnard, 1970: 166, fig. 107 (Hawaii) (= *Chevalia* sp., according to Barnard & Thomas, 1987)).

?*Chevalia aviculae*.—K.H. Barnard, 1916: 252 (south coast, South Africa).—K.H. Barnard, 1937: 169, fig. 15 (Red Sea, south Arabian coast). —K.H. Barnard, 1955: 7 (Mozambique, species list).—Griffiths, 1973: 287 (East coast, South Africa).—Griffiths, 1974a: 243 (East coast, South Africa).—Griffiths, 1974b: 278 (southeast coast, South Africa).—Griffiths, 1975: 109 (west coast, South Africa).—Griffiths, 1976: 30 (South Africa, key only).—Griffiths, 1977: 106 (east coast, South Africa, list only).—Ledoyer, 1979: 28 (Madagascar).—Wakabara *et al.*, 1991: 73 (Brazil).—Thomas, 1993: 35 (Florida).—Wakabara & Serejo, 1998: 565 (Brazil).—Ortiz & Lalana, 2010: 77 (Cuba).—Paz-Rios & Ardisson, 2013: 150 (Gulf of Mexico).

Syntypes: Four microscope preparations (mountant receding and in poor condition), undissected male, lacking urosome, NHMUK 1905.2.18.405, East Cheval Paar; undissected male (originally labelled as female) urosome separated from body, NHMUK 1905.2.18.406 (T.90), E. Cheval Paar; dissected female (originally labelled as male), NHMUK 1905.2.18.407 (T. 75), Ceylon; dissected mouthparts (corresponding carcass unknown), NHMUK 1905.2.18.408 (T. 90), Cheval Paar; 15 specimens (wet), include male “a”, 3.8 mm, female “b”, 3.8 mm, NHMUK 1905.2.18.225–234, Pearl oyster washings, East Cheval and Muttuvaratu Paars, Ceylon, coll. W.A. Herdman, 1902, SS *Lady Havelock*.

Type locality. East Cheval (*ca.* 8°40'N 79°46'E) and Muttuvaratu (*ca.* 7°40'N 79°45'E) Paars, Sri Lanka (originally cited as Ceylon).

Diagnosis. Antenna 1 length 0.3 times body length, accessory flagellum 2-articulate. Gnathopod 1 coxa subequal to coxa 2, with anterodistal corner slightly produced. Gnathopod 2 carpus subequal to propodus length, propodus palm transverse, sinuous, without posterodistal shelf, defined by subquadrate corner. Pereopod 7 basis subrectangular, posterodistal corner broadly rounded, carpus with 1

submarginal robust seta. Epimeron 3 posteroventral margin broadly rounded. Uropod 3 rami subequal in length to peduncle Telson apical margin concave with rounded central projection.

Description. Based on syntype male “a”, 3.8 mm, syntype female “b”, 3.8 mm, (wet specimens) NHMUK 1905.2.18.225–234, syntype female “c”, (microscope slide), NHMUK 1905.2.18.407.

Head. Eyes of medium size, partially situated in lateral lobe of the head, lateral cephalic lobe subacute. Antennae densely setose. Antenna 1 length 0.3 times body length; peduncular article 1 longer than article 3; primary flagellum with more than 6 articles; accessory flagellum 2-articulate, article 2 rudimentary. Antenna 2 slightly shorter than antenna 1; article 4 length 1.2 times article 5; article 5 length 0.8 times flagellum; flagellum with 7 articles. Mandible palp, article 1 length 0.3 times article 2, article 2 length 1.1 times article 3; incisor with 4 teeth, lacinia mobilis with 3 teeth, accessory setal row with 4 setae, molar triturate. Lower lip, inner lobes and outer lobes separated, inner lobes large and fleshy. Maxilla 1 inner plate with few marginal setae; outer plate with 10 robust setae; palp 2-articulate with 5 apical robust setae and 2 subapical setae. Maxilla 2 inner plate shorter than outer plate, with oblique facial row of plumose setae on outer margin. Maxilliped inner plate subrectangular, apical margin with 4 robust setae and several plumose setae, medial margin without plumose setae; outer plate shorter than palp article 2, with 4 robust setae and row of plumose setae on medial and facial margins, with 2 apical plumose setae; palp, article 2 longer than articles 3 and 4 combined, article 4 with 1 long distal seta.

Pereon. Gnathopod 1 coxa subequal to coxa 2, with anterodistal corner slightly produced, subacute; basis

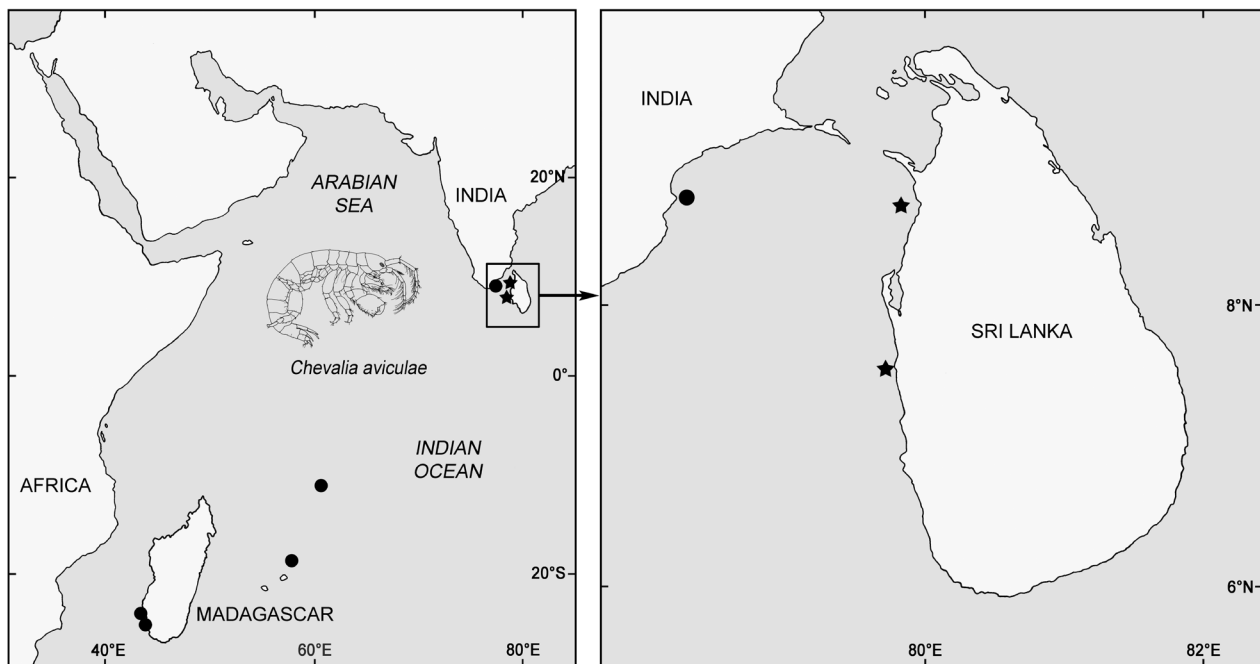


Figure 7. Distribution map of *Chevalia aviculae* Walker, 1904. Stars represent type localities; circles represent additional data points.

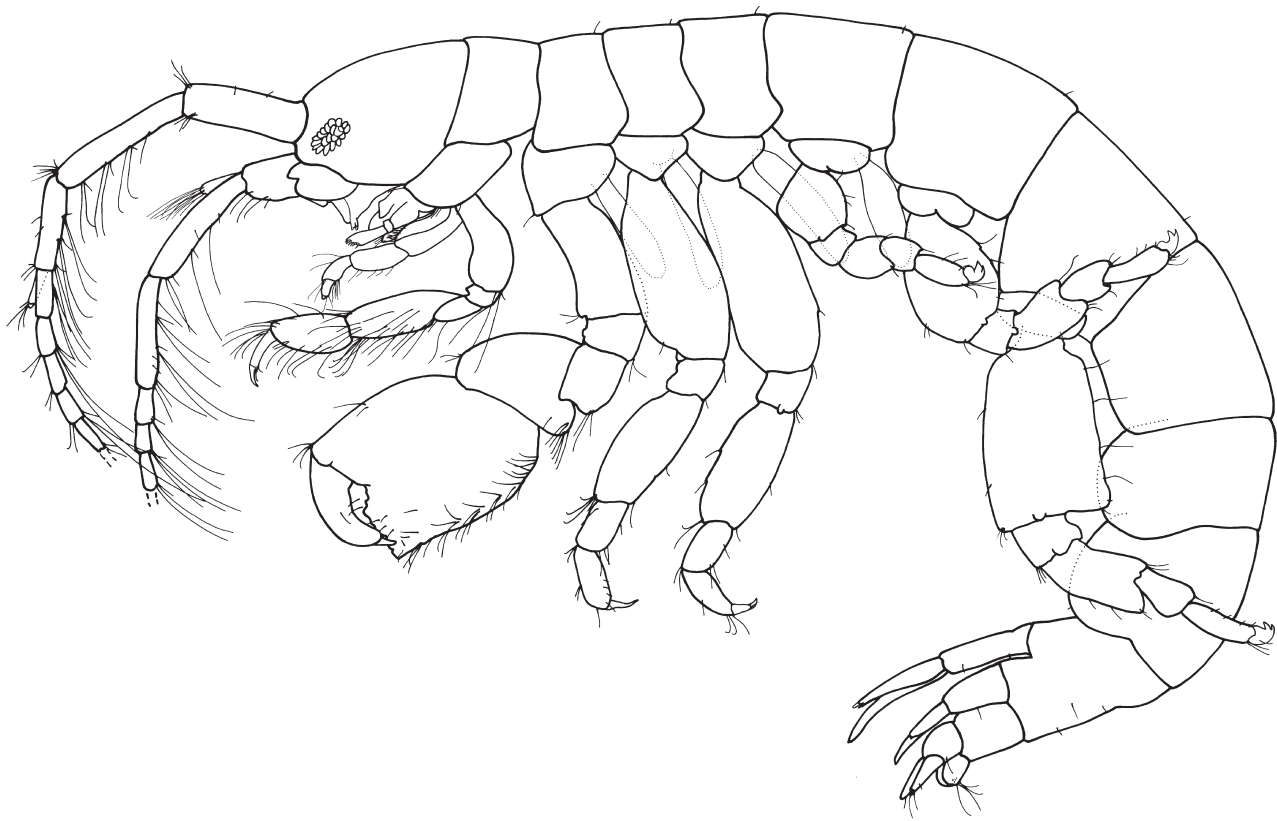


Figure 8. *Chevalia aviculae* Walker, 1904, male “a”, syntype, 3.8 mm, NHMUK 1905.2.18.225–234, East Cheval Paar, Sri Lanka.

anterior margin concave, posterior margin convex, with few setae; carpus length 2.8 times breadth, 1.6 times propodus length, posterior margin setae absent; propodus length twice breadth, margins lined with setae, palm acute, not defined by corner or robust setae; dactylus recurved. Gnathopod 2 coxa with anterodistal margin produced, subacute, ventral margin concave; basis anterior margin slightly concave, posterior margin straight, with few slender setae; carpus length subequal to breadth, 0.9 times propodus; propodus subchelate, massive, posterior margin parallel to anterior margin, palm transverse, sinuous, without posterodistal shelf, defined by subquadrate corner; dactylus not reaching palm corner, with proximal hump. Pereopod 3 basis subovate, length 2.2 times breadth; merus subovate; carpus length 1.7 times breadth; propodus length 2.4 times breadth. Pereopod 4 basis subovate, length 2.2 times breadth; merus subovate; carpus length 1.9 times breadth; propodus length twice breadth. Pereopods 5–7 merus distal corners weakly produced; dactylus anterior margin with accessory spine. Pereopod 5 basis subovate, length subequal to breadth; merus length 1.3 times breadth; carpus length 1.2 times breadth, posterodistal corner with 1 submarginal robust seta; propodus length twice breadth. Pereopod 6 basis subovate, length 1.5 times breadth; merus length 1.5 times breadth; carpus length 1.1 times breadth, posterodistal corner with 1 submarginal robust seta; propodus length 2.1 times breadth. Pereopod 7 basis subrectangular, length 1.8 times breadth, posterodistal corner broadly rounded, not produced; merus length 1.2 times breadth; carpus length 1.1 times breadth, posterodistal corner with 1 submarginal robust seta; propodus length 2 times breadth.

Pleon. Epimeron 3 posteroventral margin broadly rounded, posterodistal corner without notch. Urosomites 1–2 fused. Uropod 1 peduncle length 2.2 times breadth, subequal to outer ramus, dorsal margin with 2 setae; inner ramus inner margin lined with barbed setae, length 5 times breadth, 1.2 times length outer ramus, without apical robust setae; outer ramus outer margin lined with minute spines, apical third of inner margin lined with minute spines, with 3 apical robust setae. Uropod 2 peduncle length 1.3 times outer ramus; inner ramus length 7 times breadth, 1.3 times outer ramus, without robust setae; outer ramus dorsal margin without setae, apical margin cuticle with 3 teeth and with 3 apical robust setae. Uropod 3 peduncle length 1.1 times breadth, 0.9 times length inner ramus; inner ramus 1.1 times outer ramus, with long apical plumose setae, without robust seta; outer ramus with long apical plumose setae and 1 apical robust seta. Telson subquadrate, with a pair of lateral denticular patches; with 3 pairs of dorsal plumose setae; apical margin concave with rounded central projection.

Female (sexually dimorphic characters). Based on syntype female, 3.8 mm, NHMUK 1905.2.18.225–234. Pereopods 3–5 oostegites present, length about 8 times breadth. Pereopod 7 basis subrectangular, length 1.9 times breadth.

Remarks. The re-illustration and redescription of *Chevalia aviculae*, bring this species into a modern context, allowing comparison with the 18 species described since the original publication of Walker (1904), which established *Chevalia* as a new genus. The illustration of all mouthparts and antennae are now documented from the syntype series, which were not included in the original description. Gnathopod 2 propodus

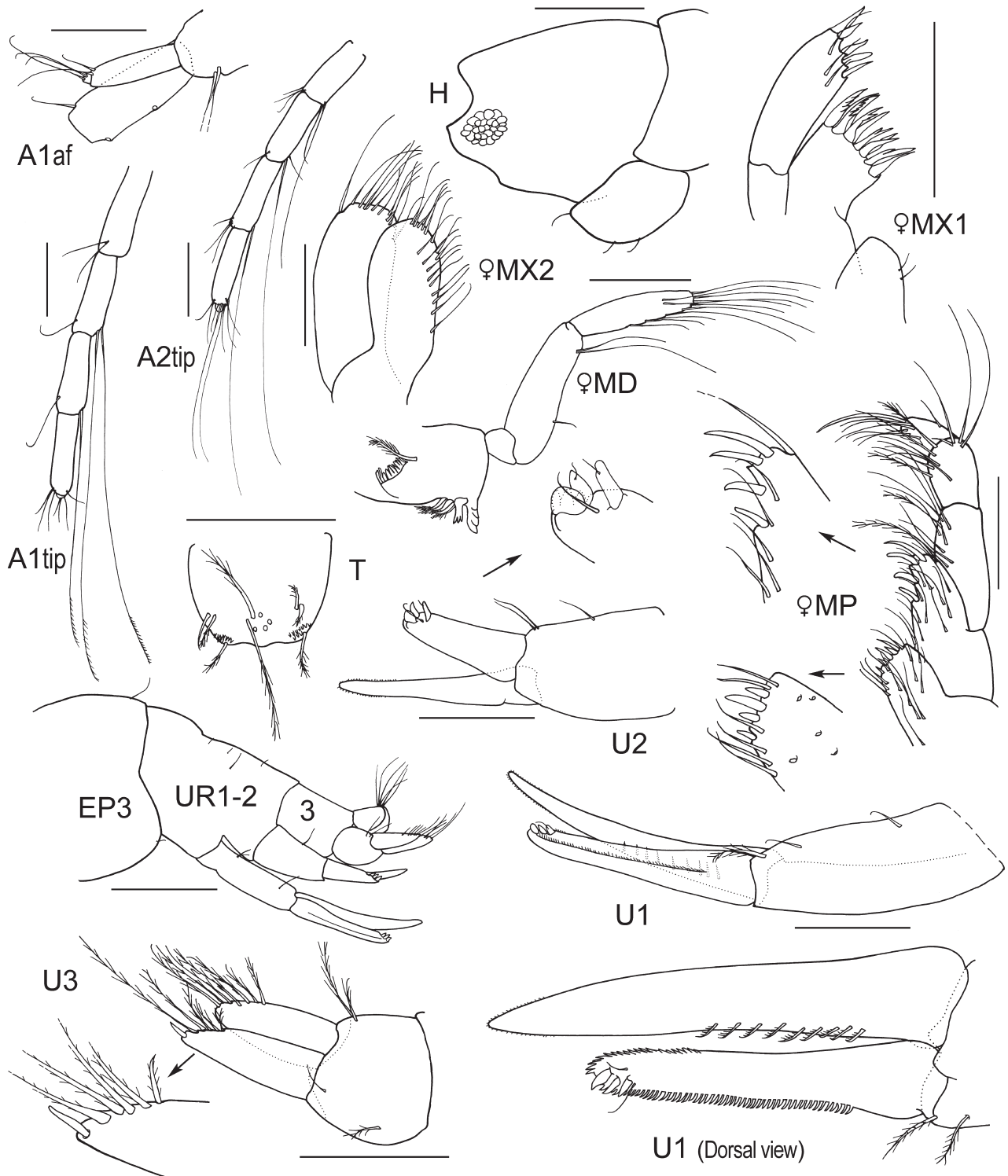


Figure 9. *Chevalia aviculae* Walker, 1904, male “a”, syntype, 3.8 mm, NHMUK 1905.2.18.225–234, East Cheval Paar, Sri Lanka; female “c”, syntype, NHMUK 1905.2.18.408, East Cheval Paar, Sri Lanka. Scale lines represent 0.1 mm except H, UR represent 0.2 mm.

palm is now considered transverse, where previously it was considered oblique and the shape of pereopod 7 basis posterodistal corner is broadly rounded and not produced.

From 1921 to 1989 the scientific name *Chevalia aviculae* has been applied to material from locations throughout the Indo-Pacific creating what is now acknowledged as a *Chevalia aviculae* complex (Shoemaker, 1921, 1942; J.L.

Barnard, 1962, 1970, 1979; Ledoyer, 1982; Conlan, 1983; Myers, 1985). Prior to the current redescription several working groups have also contributed to the refining of species delimitation within the complex (Barnard & Thomas, 1987; Myers, 1995; Lazo-Wasem, 1999). The current study enables further disambiguation, though stops short of formalizing additional new scientific names without a

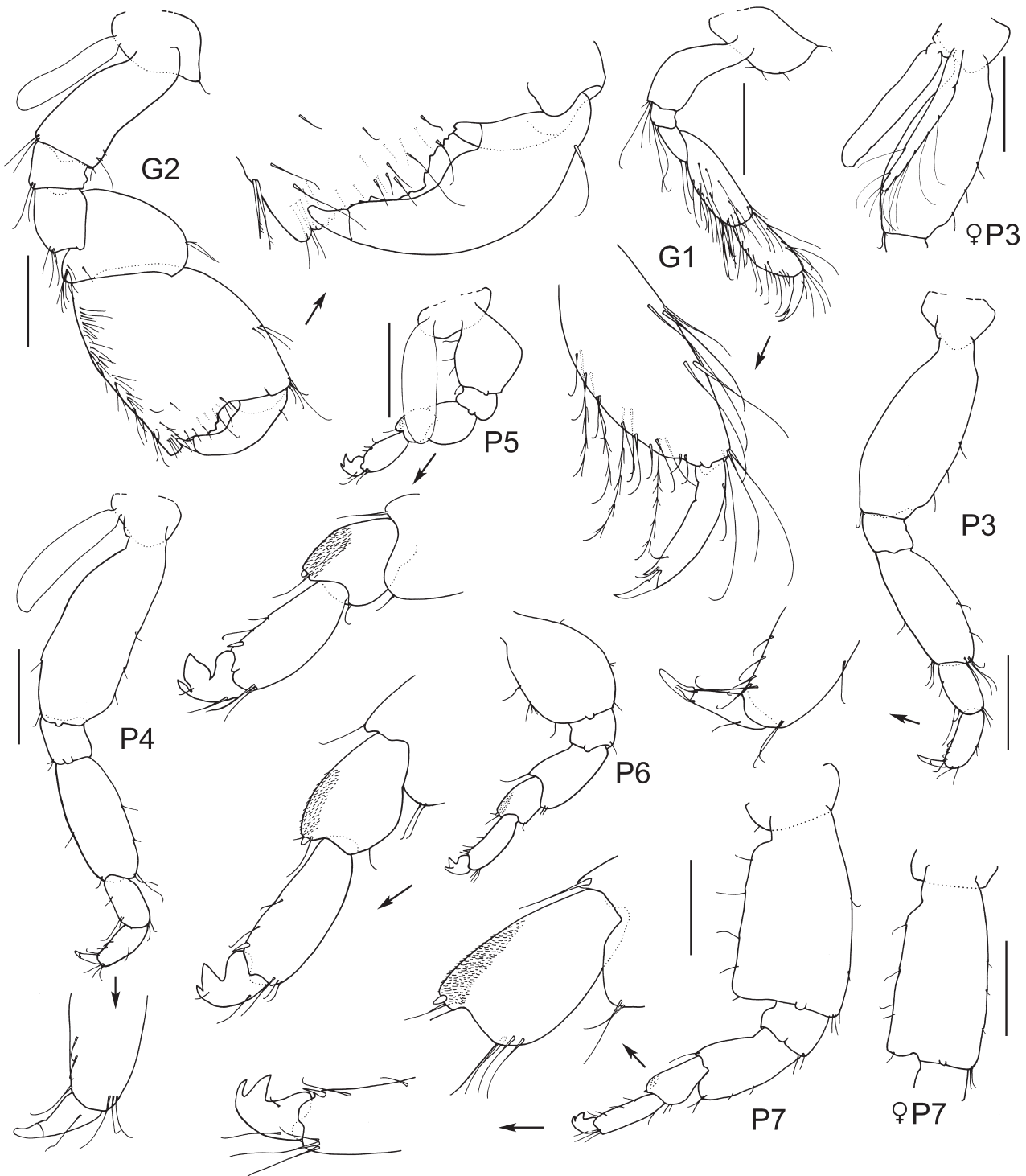


Figure 10. *Chevalia aviculae* Walker, 1904, male “a”, syntype, 3.8 mm; female “b”, syntype, 3.8 mm, NHMUK 1905.2.18.225–234, East Cheval Paar, Sri Lanka. Scale lines represent 0.1 mm.

comprehensive redescription of outstanding groups which would need mouthpart redescription and also benefit from further field collecting to better understand local variation.

Based on characters of gnathopod 2 coxa, basis and propodus, shape of pereopod 7 basis, and telson apical margin, *Chevalia aviculae* is most similar to *C. thomasi*. *Chevalia aviculae* differs from *C. thomasi* in antenna 1 accessory flagellum is 2-articulate (3-articulate in *C. thomasi*), and the shape of uropod 3 peduncle, which is

broader than long in *Chevalia aviculae* (longer than broad in *C. thomasi*).

Distribution. Sri Lanka (Walker, 1904, Nayar, 1966); Southern India (Nayar, 1966); The Saya de Malha Bank and Cargados, Western Indian Ocean (Walker, 1909); Madagascar (Ledoyer, 1967, 1972, 1982).

***Chevalia bardi* sp. nov.**

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(Figs 1–2, 11–13)

Holotype: Female, ovigerous, 20 mm, dissected, (carcass and 4 slides), AM P.100381, about 90 km west of Dongara, Western Australia, ca. 29°S 114°E, ca. 100 m, RV *Sprightly*, 10 November 1976, station 31.

Type locality. About 90 km west of Dongara, Western Australia, ca. 29°S 114°E.

Etymology. ‘Bardi’ from the regional Aboriginal name for the witchetty grub, in reference to the general impression and size of the species in comparison to other known species of *Chevalia*; used as a noun in apposition.

Diagnosis. Antenna 1 length 0.2 times body length, accessory flagellum 3-articulate. Gnathopod 1 coxa with anterodistal corner weakly produced, rounded. Gnathopod 2, propodus palm oblique or transverse, with posterodistal shelf, with distal round excavation, defined by corner with subacute tooth. Pereopods 5–7 merus, carpus and propodus distal margins without long slender plumose setae. Pereopod 7 basis subovate, carpus posterodistal corner with 5 submarginal robust setae. Uropod 2 outer ramus dorsal margin with row of 9 long plumose setae. Uropod 3 rami shorter than peduncle inner ramus shorter than outer ramus. Telson apical margin convex.

Description. Based on holotype female, ovigerous, 20 mm, AM P.100381.

Head. Eyes of large size, partially situated in lateral lobe of the head, lateral cephalic lobe rounded. Antennae moderately setose. Antenna 1 length 0.2 times body length; peduncular article 1 longer than article 3; primary flagellum with 9 articles; accessory flagellum 3-articulate, article 1 shorter than article 2, article 3 rudimentary. Antenna 2 slightly shorter than antenna 1; article 4 sub-equal in length to article 5; article 5 length subequal to flagellum; flagellum with 6 articles. Mandible palp article 1 less than 0.4 times article 2, article 2 sub-equal in length to article 3; incisor with 4 teeth, lacinia mobilis with 4 teeth, accessory setal row with 3 setae, molar triturative. Lower lip, inner lobes and outer lobes separated, inner lobes large and fleshy. Maxilla 1 inner plate with marginal setae; outer plate with 9 robust setae; palp 2-articulated with 6 apical robust setae and 4 subapical setae. Maxilla 2 inner plate shorter than outer plate, with oblique facial row of plumose setae on outer margin; outer plate with a row of apical plumose setae. Maxilliped inner plate subrectangular, apical margin with 4 robust setae and several plumose setae, medial margin lined with many plumose setae; outer plate sub-equal in length to palp article 2, with 7 robust setae and row of plumose setae on medial and facial margins, with 3 apical plumose setae; palp, article 2 longer than articles 3 and 4 combined, article 4 with 1 long distal seta.

Pereon. Gnathopod 1 coxa subequal to coxae 2–4, with anterodistal corner weakly produced, rounded; basis anterior margin concave, posterior margin convex, margins setose; carpus length 1.9 times breadth, 1.2 times propodus length, margins lined with dense setae; propodus length 1.9 times breadth, margins lined with dense setae, subchelate,

straight, palmar margin defined by corner without robust setae; dactylus slightly overreaching palm. Gnathopod 2 oostegite present; basis anterior and posterior margins straight, with few slender setae; carpus length subequal to breadth, 0.6 times propodus; propodus subchelate, massive, posterior margin parallel to anterior margin, palm oblique to transverse, with posterodistal shelf, distal round excavation, defined by corner with subacute tooth; dactylus reaching palm corner. Pereopod 3 oostegite present; basis rectilinear, broad, length 2.5 times breadth; merus rectilinear; carpus length subequal to breadth; propodus length 1.9 times breadth. Pereopod 4 oostegite present; basis rectilinear, broad, length 1.9 times breadth; merus rectilinear; carpus length 1.1 times breadth; propodus length 2.2 times breadth. Pereopods 5–7 merus, carpus and propodus distal margins without long slender plumose setae; merus distal corners produced; dactylus anterior margin with accessory spine. Pereopod 5 oostegite present; basis subovate; merus length subequal to breadth; carpus length subequal to breadth, posterodistal corner with 4 submarginal robust setae; propodus length 2.1 times breadth. Pereopod 6 basis subovate, length 1.4 times breadth; merus length 1.2 times breadth; carpus length subequal to breadth, posterodistal corner with 4 submarginal robust setae; propodus length 2.4 times breadth. Pereopod 7 basis subovate, length 1.4 times breadth, proximally broad and distally narrow, posterodistal projection absent; merus length 1.3 times breadth; carpus length 1.3 times breadth, posterodistal corner with 5 submarginal robust setae; propodus length 2.1 times breadth.

Pleon. Epimeron 3 posterodistal corner without notch. Urosomites 1–2 fused. Uropod 1 peduncle length 1.1 times breadth, 0.6 times outer ramus, dorsal margin with long plumose setae; rami outer margins minutely pectinate, inner margins lined with sub-serrate teeth; inner ramus length 7.9 times breadth, 1.3 times outer ramus, with 4 apical robust setae; outer ramus outer margin lined with 6 slender setae, with 4 apical robust setae. Uropod 2 peduncle length 0.9 times outer ramus; inner ramus length 6.7 times breadth, 1.1 times outer ramus, without robust setae; outer ramus dorsal margin with row of 9 long plumose setae, apical margin cuticle with 3 teeth and with 4 apical robust setae. Uropod 3 peduncle length subequal to breadth, 2.3 times length inner ramus; inner ramus 0.7 times outer ramus, with long apical plumose setae, without robust seta; outer ramus with long apical plumose setae. Telson with pair of minute apical robust setae, apical margin convex with 3–5 pairs of plumose setae and a few short plumose setae.

Remarks. *Chevalia bardi* sp. nov. can be differentiated from *C. burrewarra* sp. nov., *C. csiro* sp. nov., *C. freycinet* sp. nov. and *C. sprightly* sp. nov. by the presence of many setae on the basis of gnathopod 2. In *C. bardi* sp. nov. the gnathopod 1 basis has convex margins while the gnathopod 2 basis margins are straight separating it from other species (in this study) where the gnathopod bases have a similar shape. *Chevalia bardi* sp. nov. can be separated from *C. csiro* sp. nov. by the subovate bases of pereopods 5 to 7 whereas *C. csiro* sp. nov. has subrectangular bases. *Chevalia bardi* sp. nov. has a much larger body size, 20 mm, than *C. csiro* sp. nov., 5.8 mm, with which it co-occurred.

Distribution. Australia. Western Australia: west of Dongara (current study).

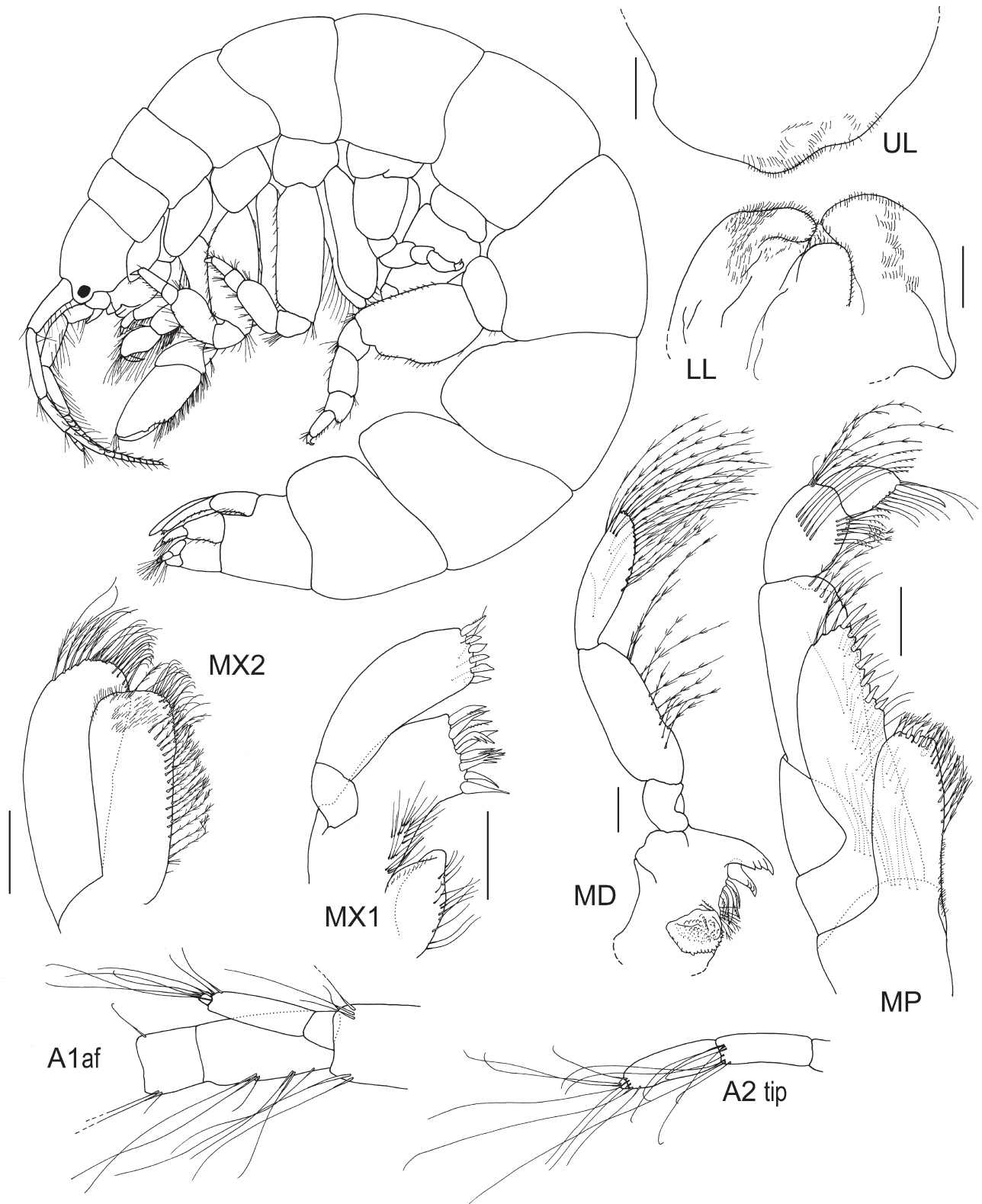


Figure 11. *Chevalia bardi* sp. nov., female ovigerous, holotype 20 mm, AM P.100381, west of Dongara, Western Australia. Scale lines represent 0.2 mm.

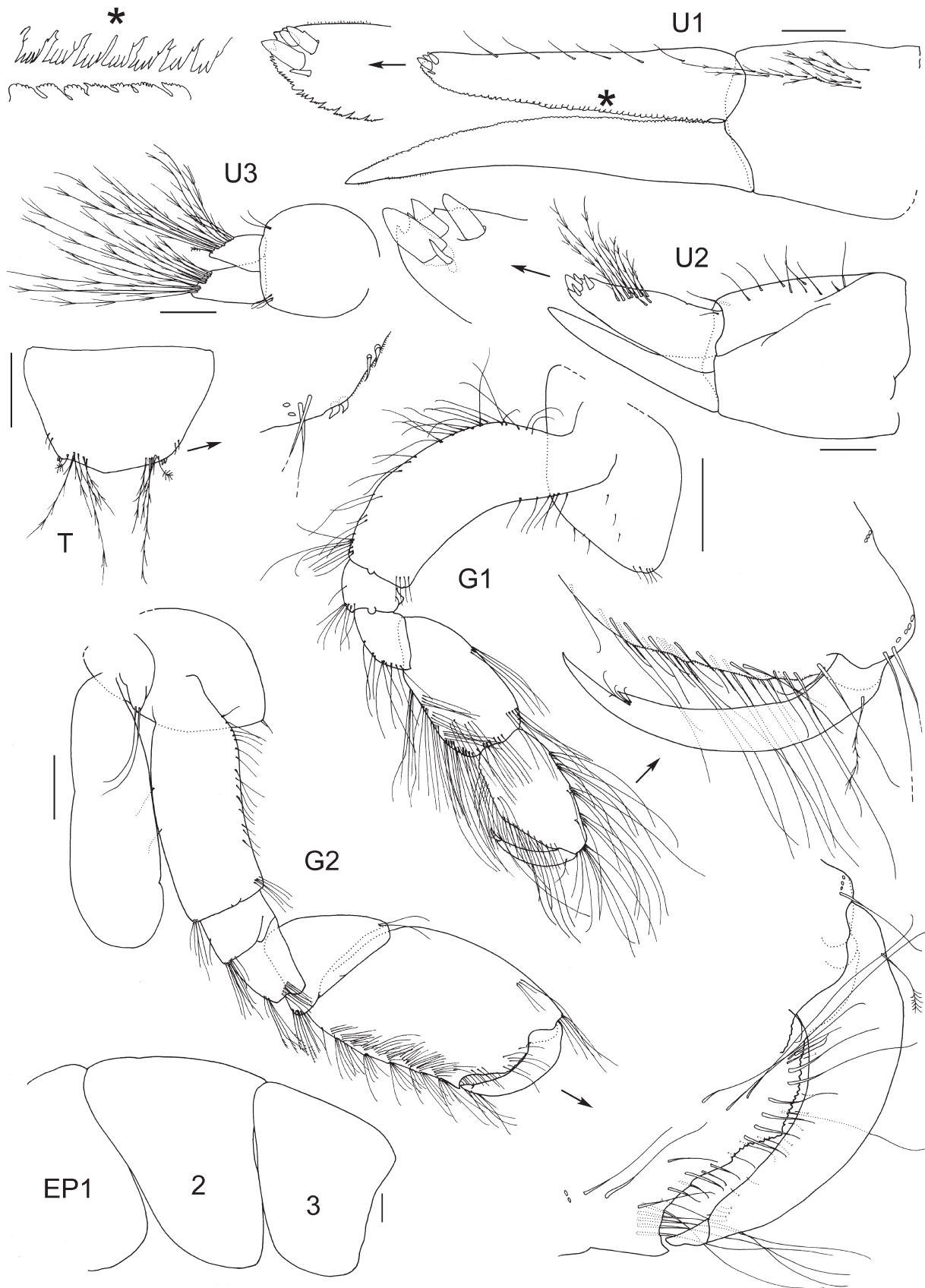


Figure 12. *Chevalia bardi* sp. nov., female ovigerous, holotype 20 mm, AM P.100381, west of Dongara, Western Australia. Scale lines for U2, U3, T represent 0.2 mm, remainder represent 0.5 mm.

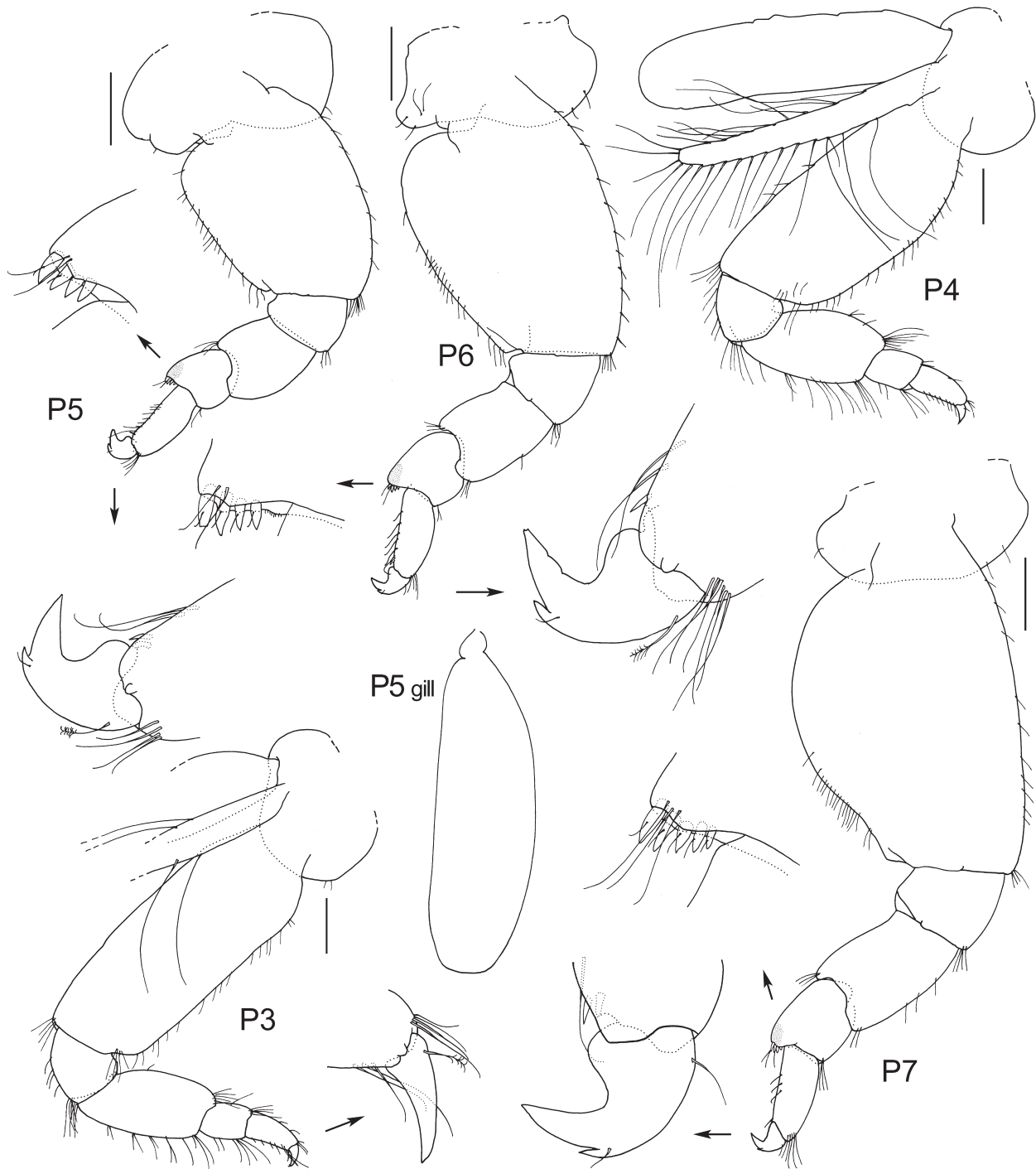


Figure 13. *Chevalia bardi* sp. nov., female ovigerous, holotype, 20 mm, AM P.100381, west of Dongara, Western Australia. Scale lines represent 0.5 mm.

***Chevalia burrewarra* sp. nov.**

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(Figs 1–2, 14–16)

Holotype: Male, 4.4 mm, dissected (carcass and 2 slides), AM P.100382, East Wall, north of Burrewarra Point, New South Wales, 35°50.024'S 150°14.161'E, from macroalga *Curdia crassa* Millar, 1990, with small amount of *Martensia australis* Harvey, 1855, by hand on SCUBA, 25 m, coll. G. Wilson, A. Millar and N. Yee, 25 October 2002, station NSW 1986. **Paratypes:** female, ovigerous, 5.6 mm, dissected (carcass and 1 slide), AM P.100383; 3 ovigerous females, 4 females with oostegites, 4 immature specimens, AM P.100384, same location as holotype; 1 male specimen, AM P.100385, East Wall, north of Burrewarra Point, New South Wales, 35°50.024'S 150°14.161'E, from macroalga *Peyssonelia nova-hollandiae* Kützing, 1847, by hand on SCUBA, 25 m, coll. G. Wilson, A. Millar and N. Yee, 25 October 2002, station NSW 1985; 8 females, 12 male specimens, AM P.100386, gutters, north of Burrewarra Point, New South Wales, 35°49.822'S 150°14.083'E, from macroalga *Styopodium flabelliforme* Weber-van Bosse, 1913, by hand on SCUBA, 24 m, coll. G. Wilson, A. Millar and N. Yee, 27 October 2002, station NSW 1992; 1 specimen, AM P.100387, gutters, north of Burrewarra Point, New South Wales, 35°49.865'S 150°14.083'E, from macroalga *Martensia australis* Harvey, 1855, by hand on SCUBA, 23 m, coll. G. Wilson, A. Millar and N. Yee, 27 October 2002, station NSW 1999; 1 male (carcass and 2 slides), 1 female (carcass and 1 slide), AM P. 100388, gutters north of Burrewarra Point, New South Wales, 35°49.822'S 150°14.083'E, from macroalga *Pachymenia prostrata* Agardh, 1890, by hand on SCUBA, 24 m, coll. G. Wilson, A. Millar, N. Yee, 27 October 2002, station NSW 1993.

Additional material examined. *New South Wales.* 12 specimens, AM P.100389, same locality as holotype; 1 male specimen, AM P.72655, north of Burrewarra Point, 35°49.867'S 150°14.083'E, gutters, macroalga *Codium lucasii* Setchell in Lucas, 1935, by hand on SCUBA, 23 m, coll. G. Wilson, A. Millar and N. Yee, 27 October 2002, station NSW 1997; 1 male specimen, AM P.23986, east of Long Reef, 33°44'S 151°19'E, 24 m, Australian Museum Shelf Benthic Survey, 27 April 1972; 7 specimens, AM P.56703, 100 m north west of Split Solitary Island, 30°14.0'S 153°10.8'E, plate coral, solitary ascidian, gorgonian and sponges, 17 m, coll. G.D.F. Wilson, 7 March 1992, station NSW 687.

Victoria. 14 specimens, AM P.30186, Crib Point, Western Port, 38°22'S 145°14'E, sponge on reef, 13 m, Fisheries & Wildlife Division, Victoria, February 1973, station CPBS 33S; 2 immature specimens, NMV J51338, central Bass Strait, 38°30.198'S 144°15.0'E, 40 m, Smith-McIntyre grab, 13 May 1998, station VC 18 C3; 4 males, 5 females, 3 immature specimens, NMV J28715, eastern Bass Strait, 12.4 km west-south-west of Point Ricardo, 37°51.11'S 148°29.93'E, 32 m, sand-shell, Smith-McIntyre grab, 20 September 1990.

Type locality. East Wall, north of Burrewarra Point, New South Wales, 35°50.024'S 150°14.161'E.

Etymology. Named from the type locality as a noun in

apposition.

Diagnosis. Antenna 1 length 0.3 times body length, accessory flagellum 2-articulate. Gnathopod 1 coxa anterodistal corner produced. Gnathopod 2 carpus subequal to propodus, propodus palm near transverse, without posterodistal shelf, defined by distal dactylar socket and subacute tooth. Pereopod 7 basis rectilinear, posterodistal corner subquadrate or rounded, not produced; carpus posterodistal corner with 1 submarginal robust seta. Uropod 2 outer ramus dorsal margin with 2 apical robust setae. Uropod 3 rami subequal in length to peduncle. Telson apical margin convex.

Description. Based on holotype male, 4.4 mm, AM P.100382.

Head. Eyes of small size, partially situated in lateral lobe of the head, lateral cephalic lobe rounded. Antennae densely setose. Antenna 1 length 0.3 times body length; peduncular article 1 longer than article 3; primary flagellum with 7 articles; accessory flagellum 2-articulate, article 2 rudimentary. Antenna 2 slightly shorter than antenna 1; article 4 length 1.2 times article 5; article 5 length 0.7 times flagellum; flagellum with 7 articles. Mandible palp, article 1 length 0.3 times article 2, article 2 length 1.1 times article 3; incisor with 4 teeth, lacinia mobilis with 3 teeth, accessory setal row with 5 setae, molar triturative. Lower lip, inner lobes and outer lobes separated, inner lobes large and fleshy. Maxilla 1 inner plate without setae; outer plate with 10 robust setae; palp 2-articulated with 4 apical robust setae and 2 subapical setae. Maxilla 2 unknown. Maxilliped inner plate subrectangular, apical margin with 3 robust setae and several plumose setae, medial margin without plumose setae; outer plate shorter than palp article 2, with 3 robust setae and row of plumose setae on medial and facial margins, with 2 apical plumose setae; palp, article 2 longer than articles 3 and 4 combined, article 4 with 1 long distal seta.

Pereon. Gnathopod 1 coxa subequal to coxa 2, with anterodistal corner not produced, rounded to subquadrate; basis anterior margin concave, posterior margin convex, margins with few setae; carpus length 3.7 times breadth, 1.3 times propodus length, posterior margin lined with setae; propodus length 2.5 times breadth, margins lined with setae, palm acute, not defined by corner or robust setae; dactylus distally expanded, blunt. Gnathopod 2 basis anterior margin straight and posterior margins weakly convex, with few slender setae; carpus length 1.9 times breadth, subequal to propodus; propodus subchelate, massive, posterior margin parallel to anterior margin, palm near transverse, without posterodistal shelf, defined by distal dactylar socket and subacute tooth; dactylus not reaching palm corner. Pereopod 3 (based on female) basis subovate, length 2.6 times breadth; merus subovate; carpus length 1.4 times breadth; propodus length 2.4 times breadth. Pereopod 4 (based on female) basis rectilinear, length 4.1 times breadth; merus subovate; carpus length 1.2 times breadth; propodus length 2.4 times breadth. Pereopods 5–7 merus distal corners weakly produced; dactylus anterior margin with accessory spine. Pereopod 5 basis proximally narrow distally broad; merus length 1.3 times breadth; carpus length 1.3 times breadth, posterodistal corner with 1 submarginal robust seta; propodus length 3.3 times breadth. Pereopods 6–7 merus distal margins with one long slender plumose seta. Pereopod 6 basis proximally narrow distally broad, length 1.8 times breadth; merus length

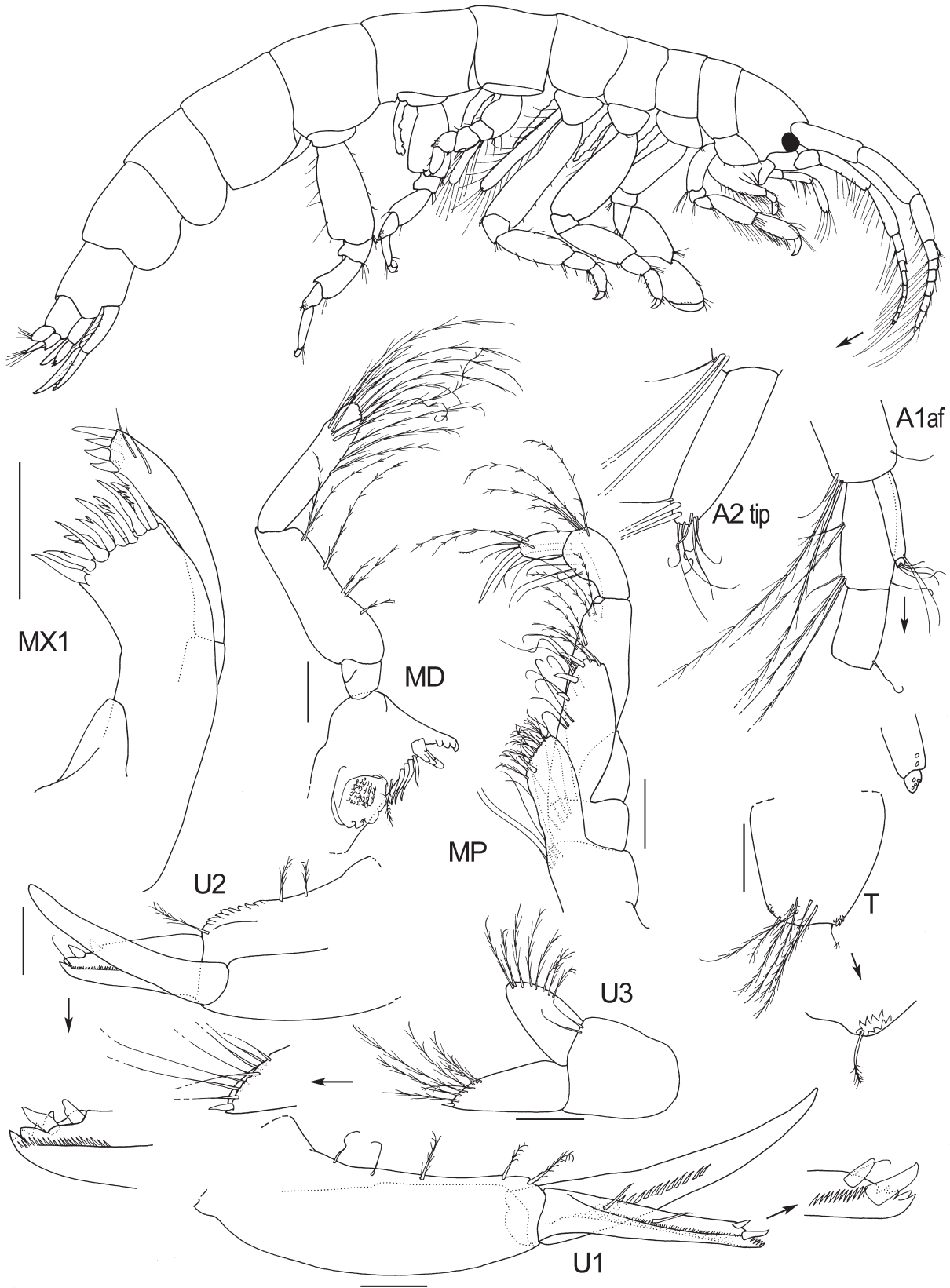


Figure 14. *Chevalia burrewarra* sp. nov., male, holotype, 4.4 mm, AM P.100382, Burrewarra Point, New South Wales. Scale lines represent 0.1 mm.

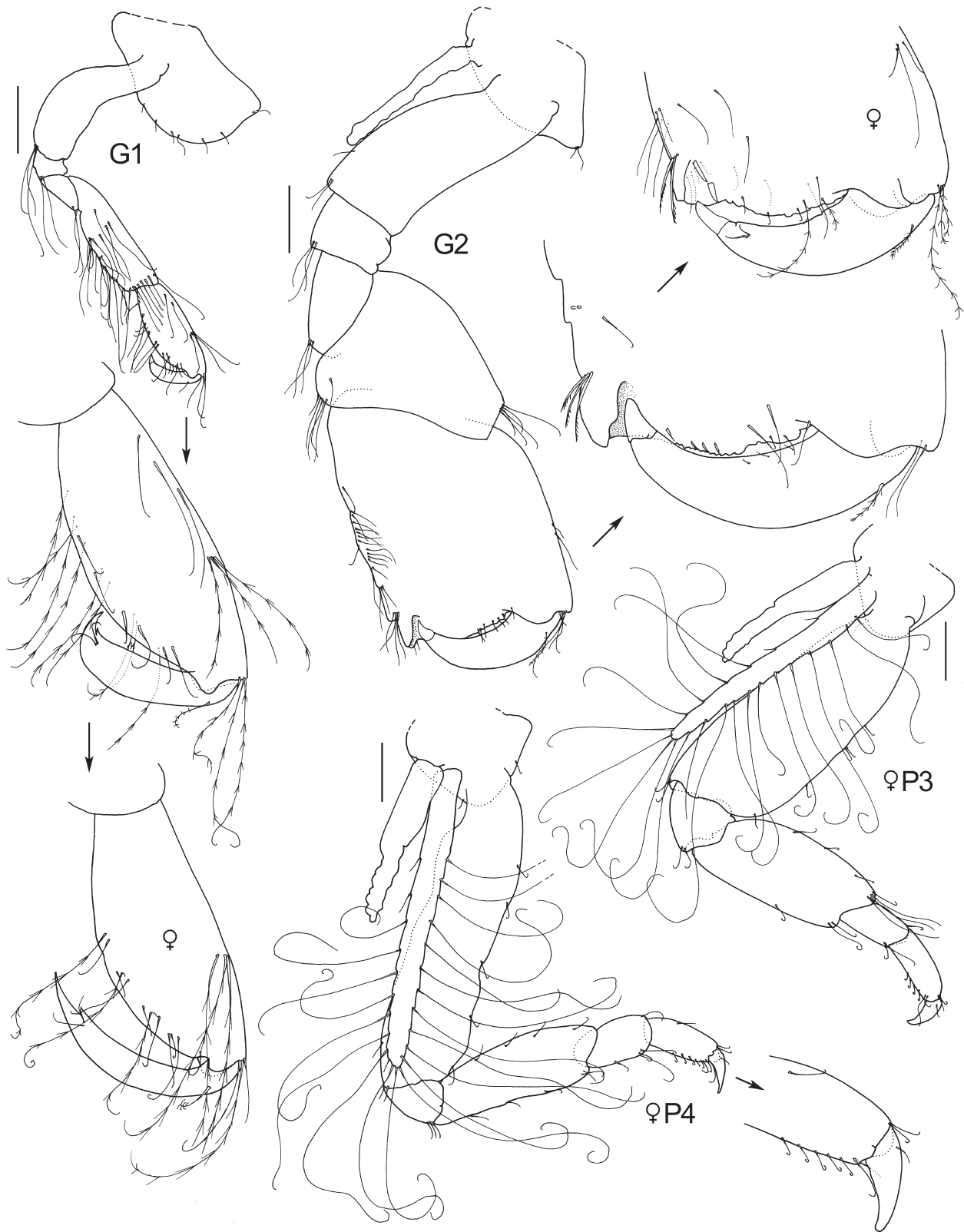


Figure 15. *Chevalia burrewarra* sp. nov., male, holotype, 4.4 mm, AM P.100382, Burrewarra Point, New South Wales; ovigerous female, paratype, 5.6 mm, AM P.100383, Burrewarra Point, New South Wales. Scale lines represent 0.2 mm.

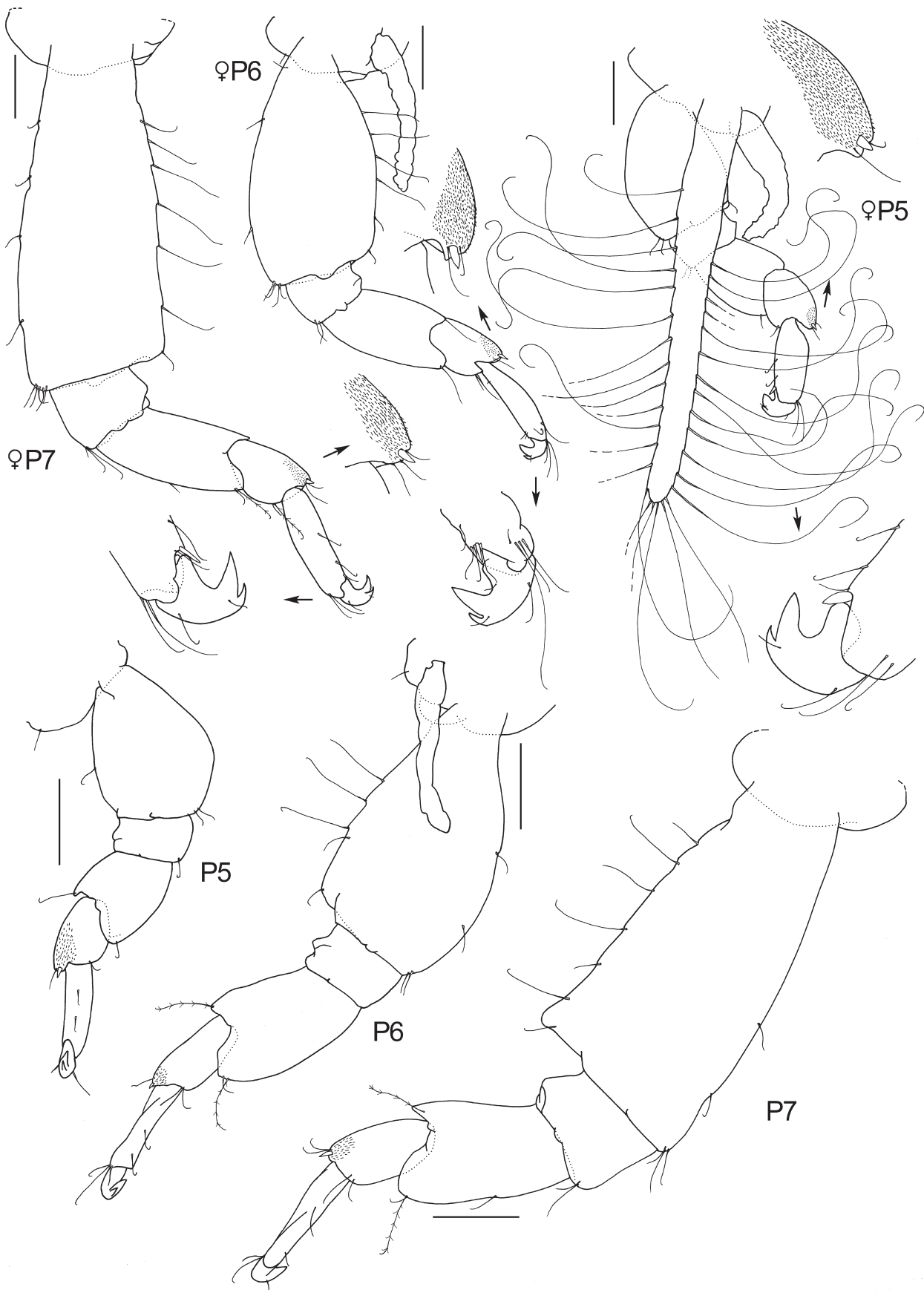


Figure 16. *Chevalia burrewarra* sp. nov., male, holotype, 4.4 mm, AM P.100382, Burrewarra Point, New South Wales; ovigerous female, paratype, 5.6 mm, AM P.100383, Burrewarra Point, New South Wales. Scale lines represent 0.2 mm.

1.7 times breadth; carpus length twice breadth, posterodistal corner with 1 submarginal robust seta; propodus length 5 times breadth. Pereopod 7 basis rectilinear, length twice breadth, posterodistal projection present; merus length 1.8 times breadth; carpus length 1.8 times breadth, posterodistal corner with 1 submarginal robust seta; propodus length 4.2 times breadth.

Pleon. Epimeron 3 posterodistal corner broadly rounded, without notch. Urosomites 1–2 fused. Uropod 1 peduncle length 2.8 times breadth, 1.3 times outer ramus, dorsal margin with plumose setae; rami outer margins minutely pectinate apically, inner margins lined with setae; inner ramus length 6 times breadth, 1.3 times outer ramus, without apical robust setae; outer ramus outer margin with 2 slender setae, with 2 apical robust setae. Uropod 2 peduncle length 1.4 times outer ramus, with 3 long plumose setae; inner ramus length 7.5 times breadth, 1.5 times outer ramus, without robust setae; outer ramus dorsal margin, apical margin cuticle with 3 teeth and with 2 apical robust setae. Uropod 3 peduncle length 1.1 times breadth, 1.4 times length inner ramus; inner ramus 1.4 times longer than outer ramus, with long apical plumose setae, without robust seta; outer ramus with long apical plumose setae and 1 apical robust seta. Telson with pair of denticular patches; apical margin convex with 2–3 pairs of plumose setae.

Female (Sexually dimorphic characters). Based on paratype female, 5.6 mm, AM P.100383. Pereopods 3–5 oostegites present. Gnathopod 1 dactylus recurved. Pereopod 7 basis posterodistal corner without projection.

Remarks. The combination of the simple palm with broad dactylus in gnathopod 1 and the transverse palm of gnathopod 2 separate *Chevalia burrewarra* sp. nov. from the other *Chevalia*. The gnathopod 1 of *Chevalia burrewarra* sp. nov. is distally broad giving a falcate appearance while other species the dactylus is more typically recurved and narrowing distally. *Chevalia burrewarra* sp. nov. has an extremely long basis on pereopod 4. the length being more than 4 times breadth (other species are about twice). Only *Chevalia burrewarra* sp. nov., *C. freycinet* sp. nov. and *C. tenuis* have a simple gnathopod 1 separating them from other Indo-Pacific *Chevalia* species. In *C. burrewarra* sp. nov., *C. sprightly* sp. nov. and *C. bardi* sp. nov. the gnathopod 1 basis is convex along both margins while only convex or weakly so in *C. csiro* and *C. freycinet* sp. nov.

Distribution. Australia. New South Wales: Burrewarra Point, Long Reef and Split Solitary Island (current study). Victoria: Western Port and Bass Strait (current study).

Chevalia csiro sp. nov.

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(Figs 1–2, 17–19)

Holotype: Male, 5.8 mm, dissected, (carcass and 2 slides), AM P.100390, about 90 km west of Dongara, Western Australia, ca. 29°S 114°E, ca. 100 m, RV *Sprightly*, 10 November 1976, station 31. **Paratypes:** ovigerous female, 6.7 mm, dissected, (carcass and 1 slide), AM P.100391; 4 males, 5.8–6.7 mm, 4 females, 5.8–6.7 mm, 4 ovigerous females, 5.8–6.7 mm, 5 juveniles, 5 mm, WAM C71209,

same location as holotype; many specimens, AM P.100392, same location as holotype.

Type locality. About 90 km west of Dongara, Western Australia, ca. 29°S 114°E.

Etymology. Named for the Commonwealth Scientific and Industrial Research Organisation (Fisheries Division) (CSIRO) for their donations of amphipod collections over many years.

Diagnosis. Antenna 1 length 0.52 times body length. accessory flagellum 3-articulate. Gnathopod 1, with anterodistal corner not produced, rounded. Gnathopod 2 propodus palm transverse to oblique, with posterodistal shelf, distal round excavation large, defined by corner with subacute tooth. Pereopod 7 basis rectilinear; carpus posterodistal corner with 4 submarginal robust setae; Uropod 1 peduncle slightly longer than broad; Uropod 2 outer ramus dorsal margin with row of 4 long plumose setae. Uropod 3 rami shorter than peduncle. Telson apical margin convex.

Description. Based on holotype male, 5.8 mm, AM P. 100390 and paratype ovigerous female, 6.7 mm, AM P.100391.

Head. Eyes of large size, partially situated in lateral lobe of the head, lateral cephalic lobe subacute. Antennae densely setose. Antenna 1 length 0.52 times body length; peduncular article 1 longer than article 3; primary flagellum with 11 articles; accessory flagellum 3-articulate, article 1 shorter than article 2, article 3 rudimentary. Antenna 2 slightly shorter than antenna 1; article 4 length 1.1 times article 5; article 5 length 0.8 times flagellum; flagellum with 8 articles. Mandible palp, article 1 length 0.2 times article 2, article 2 sub-equal in length to article 3; incisor with 4 teeth, lacinia mobilis with 2 teeth, accessory setal row with 3 setae, molar triturative. Lower lip, inner lobes and outer lobes separated, inner lobes large and fleshy. Maxilla 1 inner plate with a few marginal setae; outer plate with 9 robust setae; palp 2-articulated with 5 apical robust setae and 1 slender subapical seta. Maxilla 2 inner plate shorter than outer plate, with oblique facial row of plumose setae on outer margin; outer plate with a row of apical plumose setae. Maxilliped inner plate subrectangular, apical margin with 3 robust setae and several plumose setae, medial margin lined with many plumose setae; outer plate shorter than palp article 2, with 7 robust setae and row of plumose setae on medial and facial margins, with 2 apical plumose setae; palp, article 2 longer than articles 3 and 4 combined, article 4 with 1 long distal seta.

Pereon. Gnathopod 1 coxa shorter than coxa 2, with anterodistal corner not produced, rounded; basis anterior margin straight, posterior margin convex, margins weakly setose; carpus length 2.2 times breadth, 1.2 times propodus length, posterior margin lined with setae; propodus length 1.8 times breadth, margins lined with dense setae, palm subchelate, weakly convex, palm distal section with 4 evenly spaces robust setae, without palm defining corner; dactylus slightly overreaching palm. Gnathopod 2 basis anterior and posterior margins straight, with few slender setae; carpus length 1.2 times breadth, 0.5 times propodus; propodus subchelate, massive, posterior margin parallel to anterior margin, palm oblique, with posterodistal shelf, distal round excavation large, defined by corner with subacute tooth;

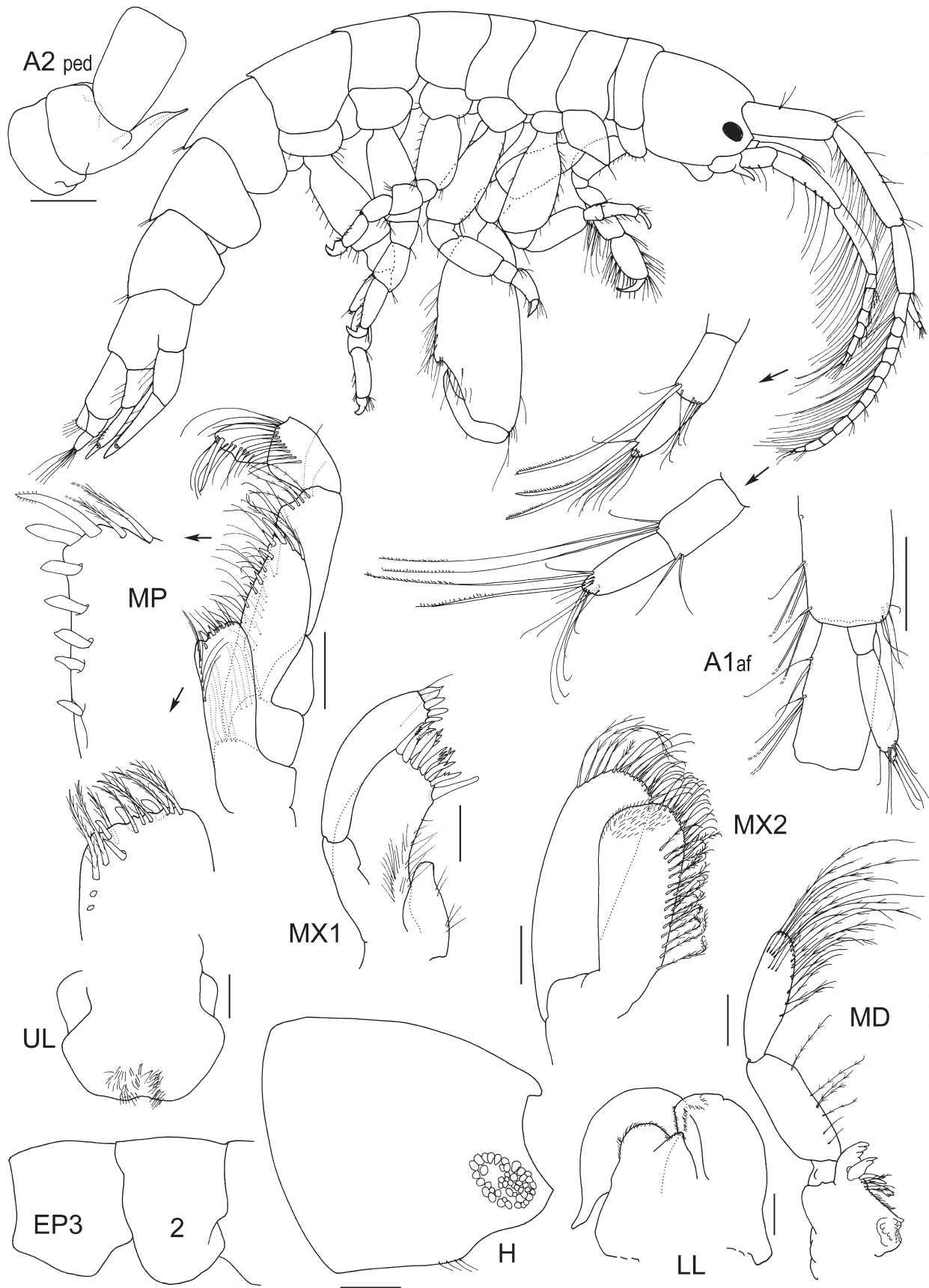


Figure 17. *Chevalia csiro* sp. nov., male, holotype, 5.8 mm, AM P.100390, west of Dongara, Western Australia. Scale lines for UL, MX1, MX2, LL, represent 0.1 mm, remainder represent 0.2 mm.

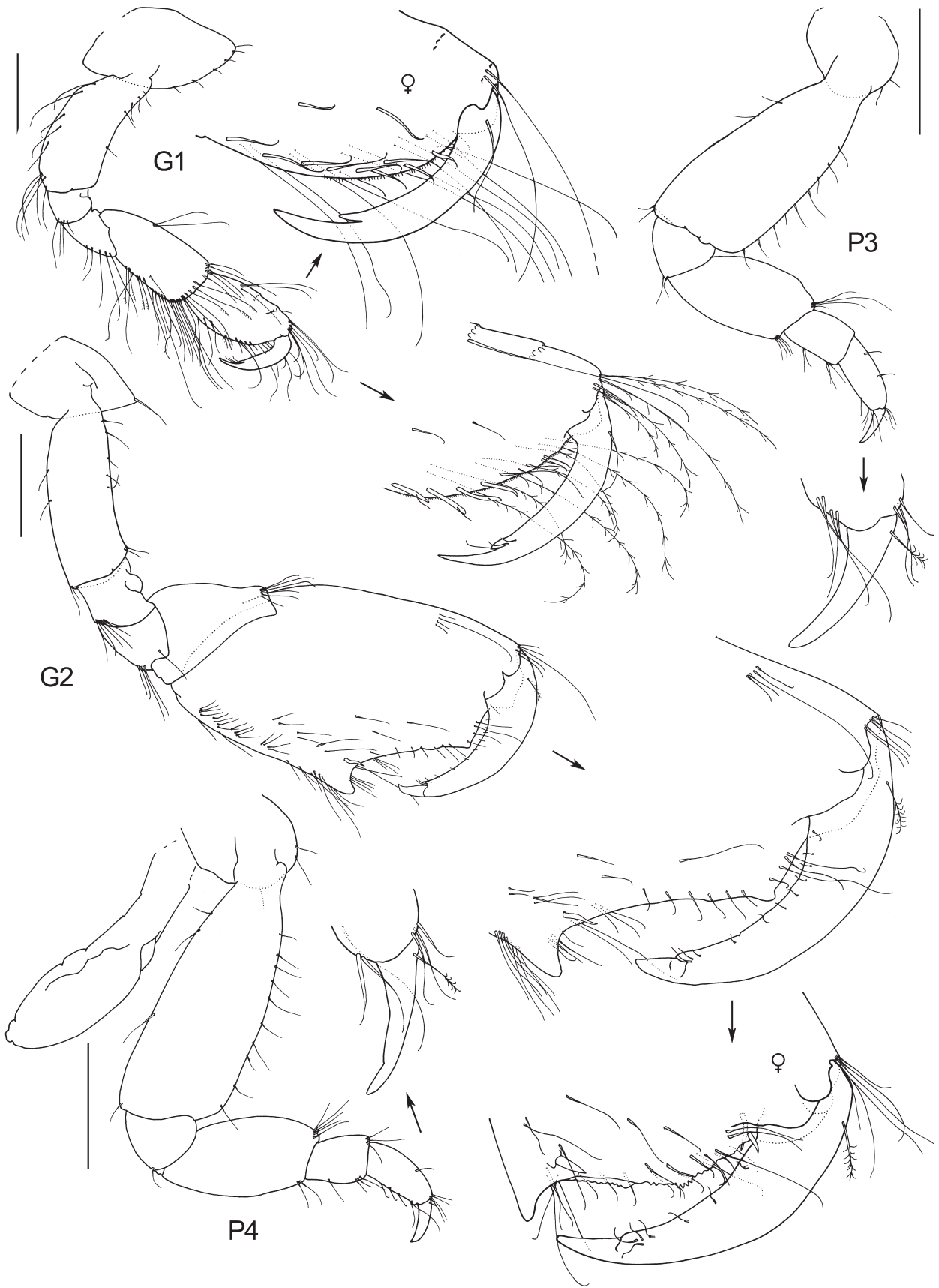


Figure 18. *Chevalia csiro* sp. nov., male, holotype, 5.8 mm, AM P.100390, west of Dongara, Western Australia; ovigerous female, paratype, 6.7 mm, AM P.100391, west of Dongara, Western Australia. Scale lines represent 0.5 mm.

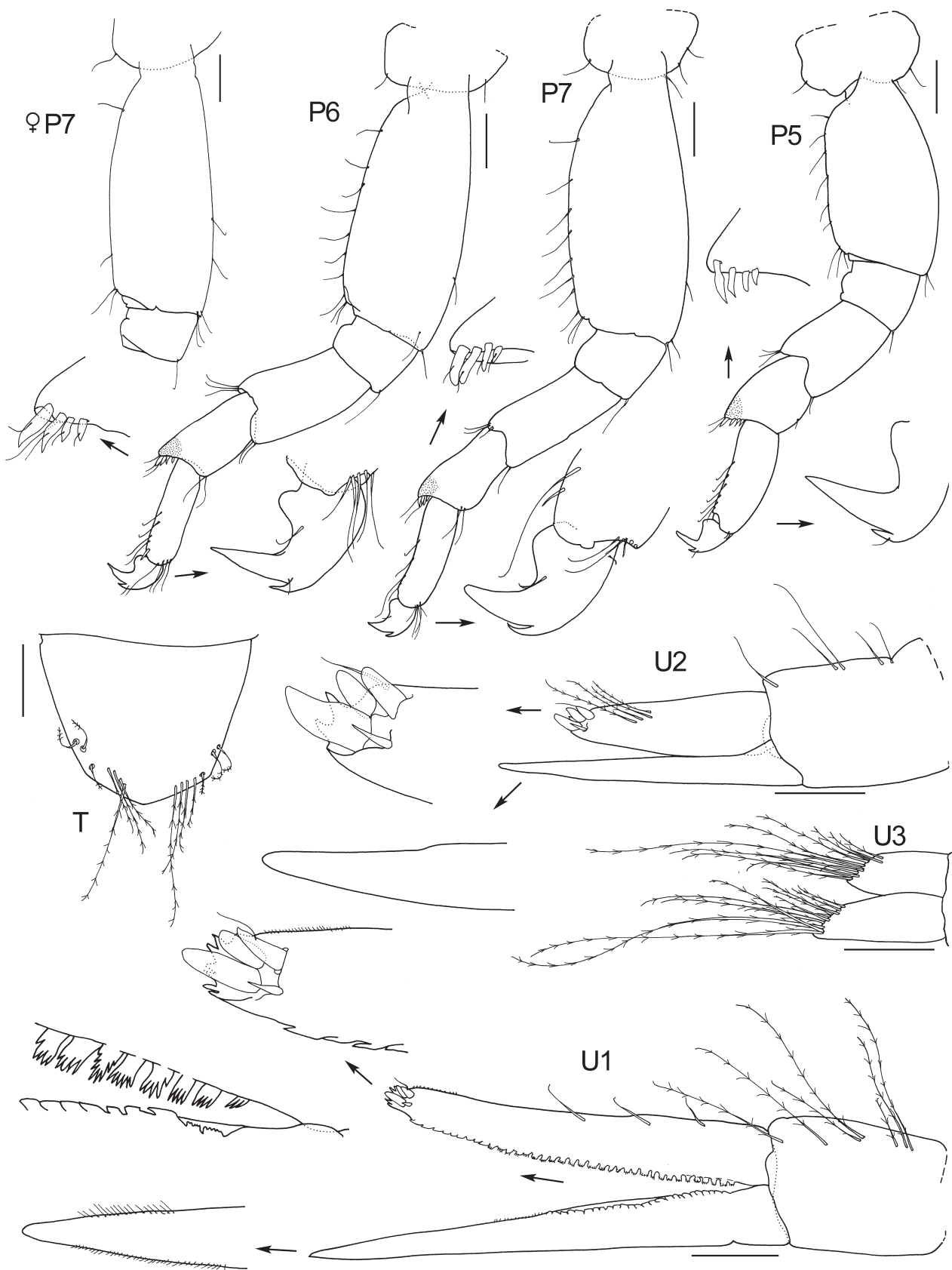


Figure 19. *Chevalia csiro* sp. nov., male, holotype, 5.8 mm, AM P.100390, west of Dongara, Western Australia; ovigerous female, paratype, 6.7 mm, AM P.100391, west of Dongara, Western Australia. Scale lines represent 0.2 mm.

dactylus not reaching palm corner. Pereopod 3 oostegite present; basis proximally narrow distally broad, length 2.3 times breadth; merus subovate; carpus length 1.2 times breadth; propodus length 2.4 times breadth. Pereopod 4 oostegite present; basis proximally narrow distally broad, length 2.3 times breadth; merus subovate; carpus length 1.1 times breadth; propodus length 2.3 times breadth. Pereopods 5–7 merus, carpus and propodus distal margins without long slender plumose setae; merus distal corners weakly produced; dactylus anterior margin with accessory spine. Pereopod 5 oostegite present; basis rectilinear; merus length 0.9 times breadth; carpus length 1.4 times breadth, posterodistal corner with 4 submarginal robust setae; propodus length 2.7 times breadth. Pereopod 6 basis rectilinear, length 2.4 times breadth; merus length 3 times breadth; carpus length twice breadth, posterodistal corner with 4 submarginal robust setae; propodus length 3.1 times breadth. Pereopod 7 basis rectilinear, length 2.5 times breadth, posterodistal projection absent; merus length 2.3 times breadth; carpus length 1.9 times breadth, posterodistal corner with 4 submarginal robust setae; propodus length 3.3 times breadth.

Pleon. Epimeron 3 posterodistal corner narrowly rounded, without notch. Urosomites 1–2 fused. Uropod 1 peduncle length 1.3 times breadth, 0.4 times outer ramus, dorsal margin with long plumose setae; rami outer margins minutely pectinate apically, inner margins lined with sub-serrate teeth; inner ramus length 10.6 times breadth, 1.2 times outer ramus, without apical robust setae; outer ramus outer margin lined with 3 slender setae, with 4 apical robust setae. Uropod 2 peduncle length 0.9 times outer ramus; inner ramus length 9.5 times breadth, 1.4 times outer ramus, without robust setae; outer ramus dorsal margin with row of 4 long plumose setae, apical margin cuticle with 3 teeth and with 4 apical robust setae. Uropod 3 peduncle length subequal to breadth, 2.3 times length inner ramus; inner ramus 0.8 times outer ramus, with long apical plumose setae, without robust setae; outer ramus with long apical plumose setae. Telson apical margin convex with 4 pairs of plumose setae.

Remarks. *Chevalia csiro* sp. nov. and *C. freycinet* sp. nov. have the bases of pereopods 5 to 7 rectangular while other species have more ovate bases. In *C. csiro* sp. nov. the gnathopod 2 palm excavation is more pronounced with a distal shelf present where in *C. freycinet* sp. nov. the shelf is absent, and the palmar excavation is poorly developed.

Distribution. Australia. Western Australia: west of Dongara (current study).

Chevalia freycinet sp. nov.

urn:lsid:zoobank.org:act:C5C0AFDE-6B3C-4CF3-BA83-C3F9A770694F

(Figs 1–2, 20–23)

Holotype: Female, non-ovigerous, 4.8 mm, dissected, (carcass and 1 slide), NMV J71520, off Freycinet Peninsula, Tasmania, 42°02.2'S 148°38.7'E, 500 m, coarse shelly sand, WHOI epibenthic sled, coll. M.F. Gomon *et al.*, 27 July 1986, station SLOPE 45. **Paratypes:** male, 4.4 mm, dissected, NMV J71521, same location as holotype; 3 males, 2 females, 2 immature specimens, NMV J21723, same location as holotype.

Type locality. Off Freycinet Peninsula, Tasmania, 42°2.2'S 148°38.7'E.

Etymology. Named from the type locality as a noun in apposition.

Diagnosis. Antenna 1 subequal to body length, accessory flagellum 3-articulate. Maxilliped outer plate with 3 robust setae. Gnathopod 1 coxa with anterodistal corner not produced. Gnathopod 2 propodus palm oblique, without posterodistal shelf, defined by corner with subacute tooth; Pereopods 5–7 merus, carpus and propodus distal margins with a few long slender plumose setae. Pereopod 7 basis rectilinear, posterodistal corner excavate; carpus posterodistal corner with 3 submarginal robust setae. Uropod 2 outer ramus dorsal margin with row of 3 long plumose setae. Uropod 3 rami longer than peduncle; Telson apical margin truncate.

Description. Based on holotype, female, 4.4 mm, NMV J71520.

Head. Eyes of small size, situated away from lateral cephalic lobe, lateral cephalic lobe subacute. Antennae densely setose. Antenna 1 subequal to body length; peduncular article 1 longer than article 3; primary flagellum with 9 articles; accessory flagellum 3-articulate, article 1 shorter than article 2, article 3 rudimentary. Antenna 2 length 0.7 times length antenna 1; article 4 length subequal article 5; article 5 length 0.9 times flagellum; flagellum with 7 articles. Mandible palp, article 1 length 0.2 times article 2, article 2 length 1.1 times article 3; incisor with 4 teeth, lacinia mobilis with teeth, accessory setal row present, molar triturative. Lower lip, inner lobes and outer lobes separated, inner lobes large and fleshy. Maxilla 1 inner plate with a few marginal setae; outer plate with 10 robust setae; palp 2-articulated with 4 apical robust setae and 2 subapical setae. Maxilla 2 inner plate shorter than outer plate, with oblique facial row of plumose setae on outer margin; outer plate with a row of apical plumose setae. Maxilliped inner plate subrectangular, apical margin with 4 robust setae and several plumose setae, medial margin with several plumose setae; outer plate shorter than palp article 2, with 3 robust setae and few plumose setae on medial and facial margins, with 2 apical plumose setae; palp, article 2 longer than articles 3 and 4 combined, article 4 with 1 long distal seta.

Pereon. Gnathopod 1 coxa longer than coxa 2, with anterodistal corner not produced, rounded; basis anterior margin straight, posterior margin convex, margins weakly setose; carpus length 3 times breadth, 1.2 times propodus length, posterior margin lined with setae; propodus length 2.5 times breadth, margins lined with dense setae, palm acute, weakly straight, palm with row of 3 robust setae, without palm defining corner; dactylus recurved. Gnathopod 2 basis anterior margin concave, posterior margin convex, with few slender setae; carpus length 1.6 times breadth, 0.8 times propodus; propodus subchelate, enlarged, posterior margin parallel to anterior margin, palm oblique, without posterodistal shelf, defined by corner with subacute tooth; dactylus not reaching palm corner. Pereopod 3 oostegite present; basis subovate, length 2.4 times breadth; merus rectilinear; carpus length 1.7 times breadth; propodus length 3.3 times breadth. Pereopod 4 oostegite present; basis subovate, length 2.7 times breadth; merus rectilinear;

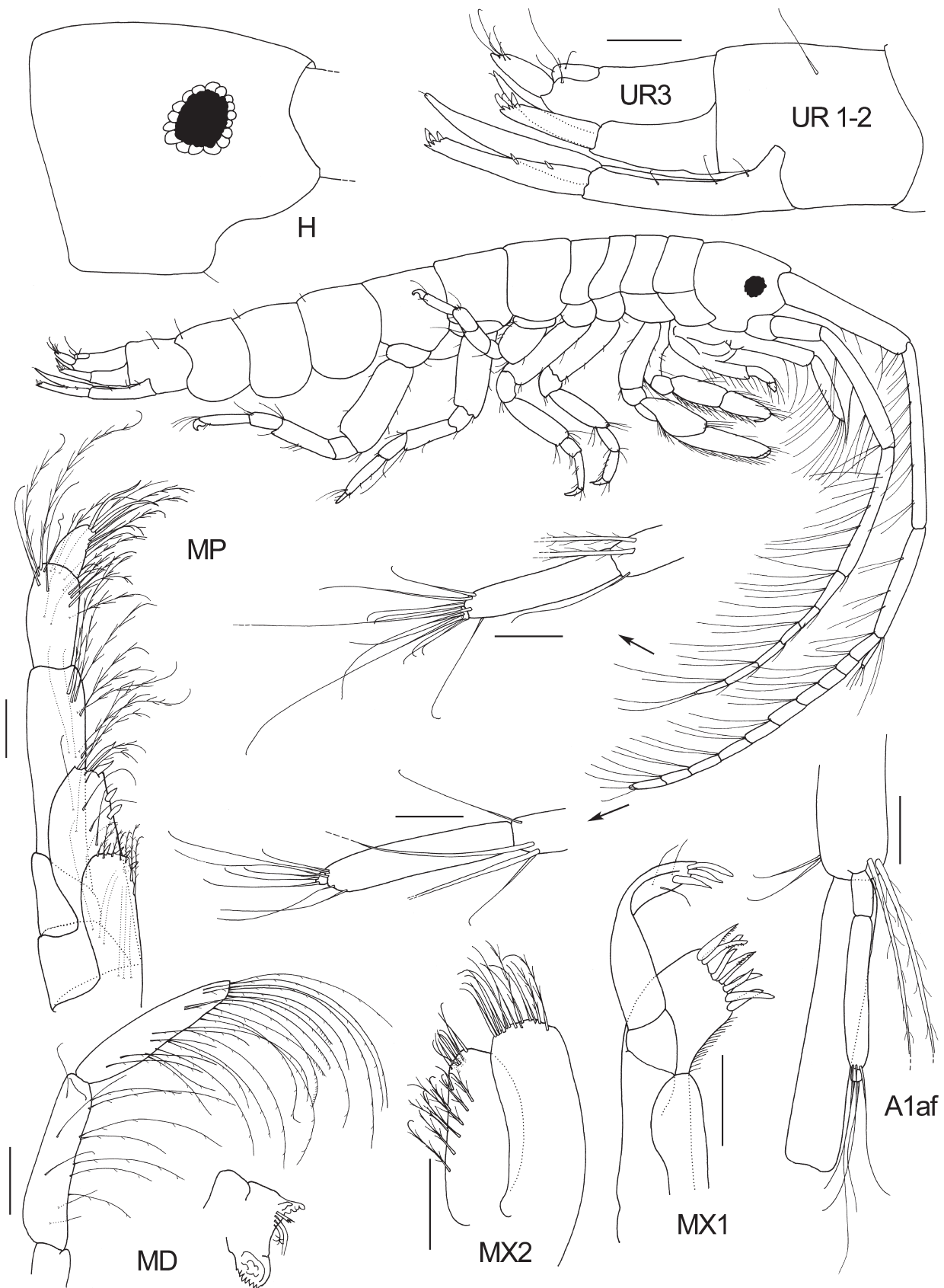


Figure 20. *Chevalia freycinet* sp. nov., female, holotype, 4.8 mm, NMV J71520, Freycinet Peninsula, Tasmania. Scale lines for A1, A2, MX1, MX2 represent 0.1 mm, remainder represent 0.2 mm.

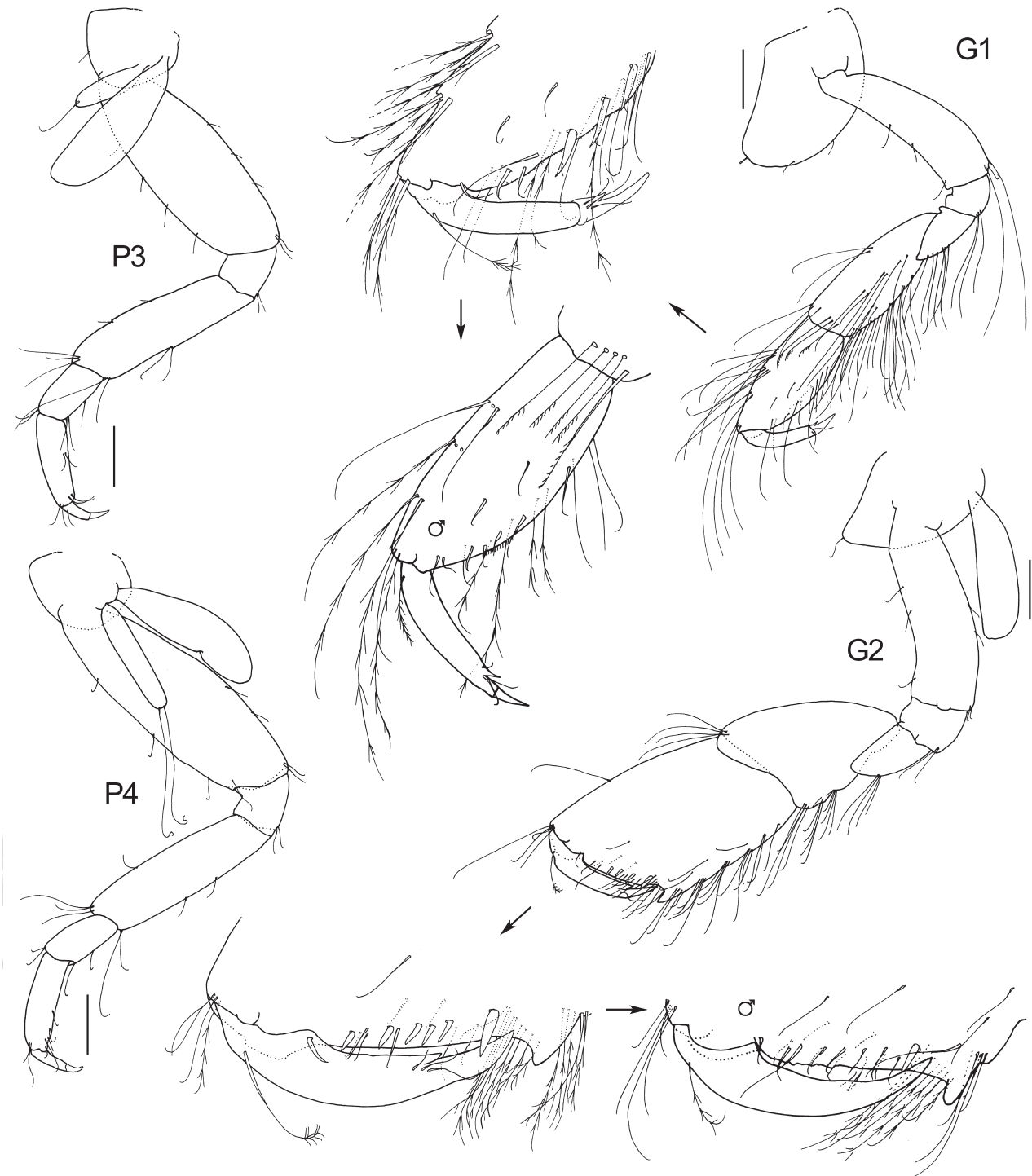


Figure 21. *Chevalia freycinet* sp. nov., female, holotype, 4.8 mm, NMV J71520, Freycinet Peninsula, Tasmania; male, paratype, 4.4 mm, NMV J71521, Freycinet Peninsula, Tasmania. Scale lines represent 0.2 mm.

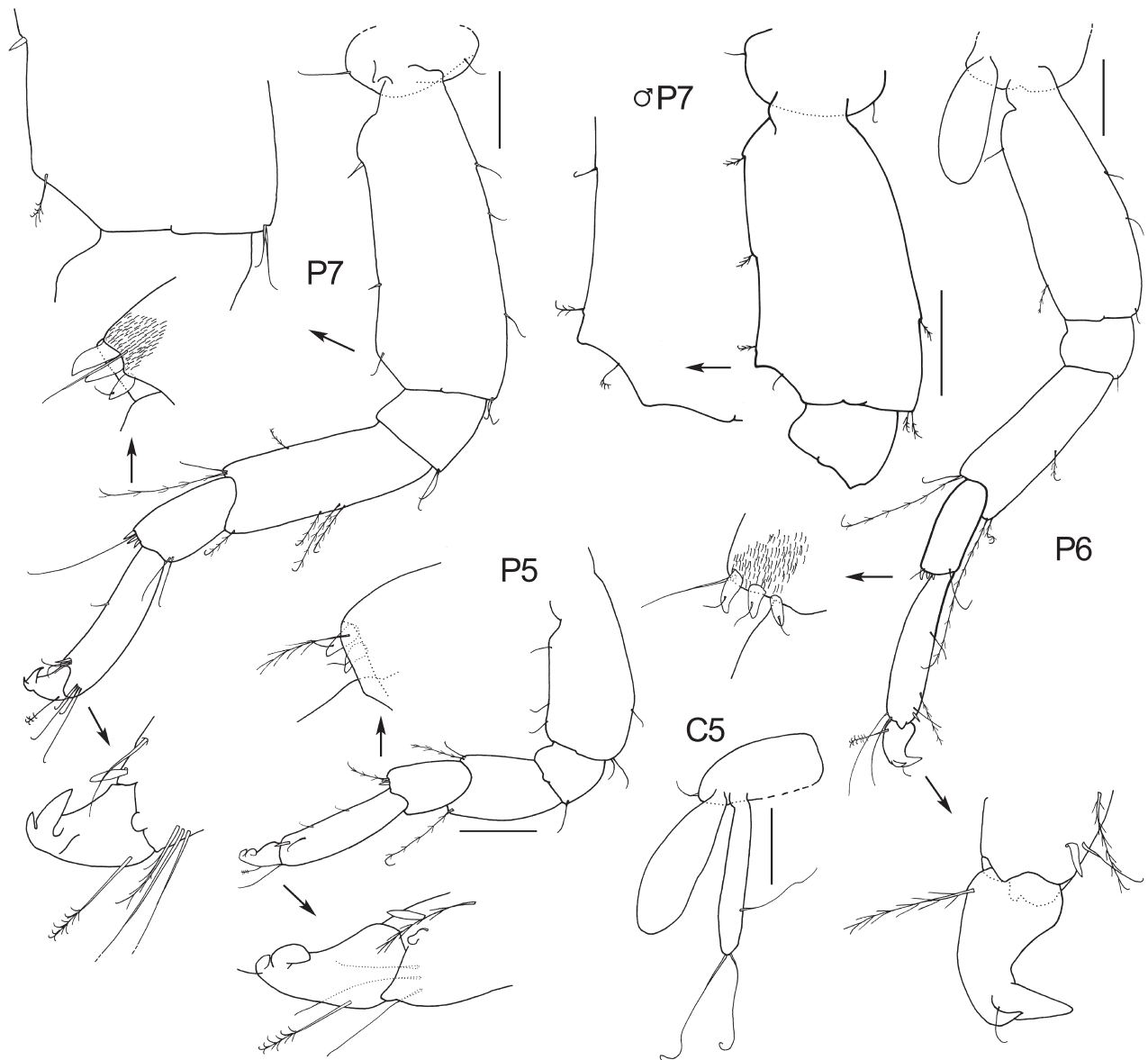


Figure 22. *Chevalia freycinet* sp. nov., female, holotype, 4.8 mm, NMV J71520, Freycinet Peninsula, Tasmania; male, paratype, 4.4 mm, NMV J71521, Freycinet Peninsula, Tasmania. Scale lines represent 0.2 mm.

carpus length 1.7 times breadth; propodus length 3.7 times breadth. Pereopods 5–7 merus, carpus and propodus distal margins with a few long slender plumose setae; merus distal corners not produced; dactylus anterior margin with accessory spine. Pereopod 5 oostegite present; basis rectilinear; merus length 1.5 times breadth; carpus length 0.4 times breadth, posterodistal corner with 2 submarginal robust setae; propodus length 3.3 times breadth. Pereopod 6 basis rectilinear, length 2.6 times breadth; merus length 5 times breadth; carpus length 2.2 times breadth, posterodistal corner with 3 submarginal robust setae; propodus length 4.7 times breadth. Pereopod 7 basis rectilinear, length 2.6 times breadth, posterodistal projection absent, corner excavate; merus length 2.8 times breadth; carpus length 3.3 times breadth, posterodistal corner with 3 submarginal robust setae; propodus length 4.3 times breadth.

Pleon. Epimeron 3 posterodistal corner broadly rounded, without notch. Urosomites 1–2 fused. Uropod 1 peduncle

length 3.2 times breadth, subequal to outer ramus length, dorsal margin without long plumose setae; rami outer margins minutely pectinate apically, inner margins lined with sub-serrate teeth; inner ramus length 6.9 times breadth, 1.1 times outer ramus, without apical robust setae; outer ramus outer margin with robust seta, without slender setae, with 5 apical robust setae. Uropod 2 peduncle length 1.2 times outer ramus; inner ramus length 7.7 times breadth, 1.1 times outer ramus, without robust setae; outer ramus dorsal margin with row of 3 long plumose setae, apical margin cuticle with 3 teeth and with 4 apical robust setae. Uropod 3 peduncle length 1.3 times breadth, 0.8 times length inner ramus; inner ramus 1.1 times outer ramus, with long apical plumose setae, with robust seta; outer ramus with long apical plumose setae. Telson without pair of denticular patches, apical margin truncate with 2 pairs of plumose setae.

Male (sexually dimorphic characters). Based on paratype, male, 4.4 mm, NMV J71521. Pereopods without oostegites.

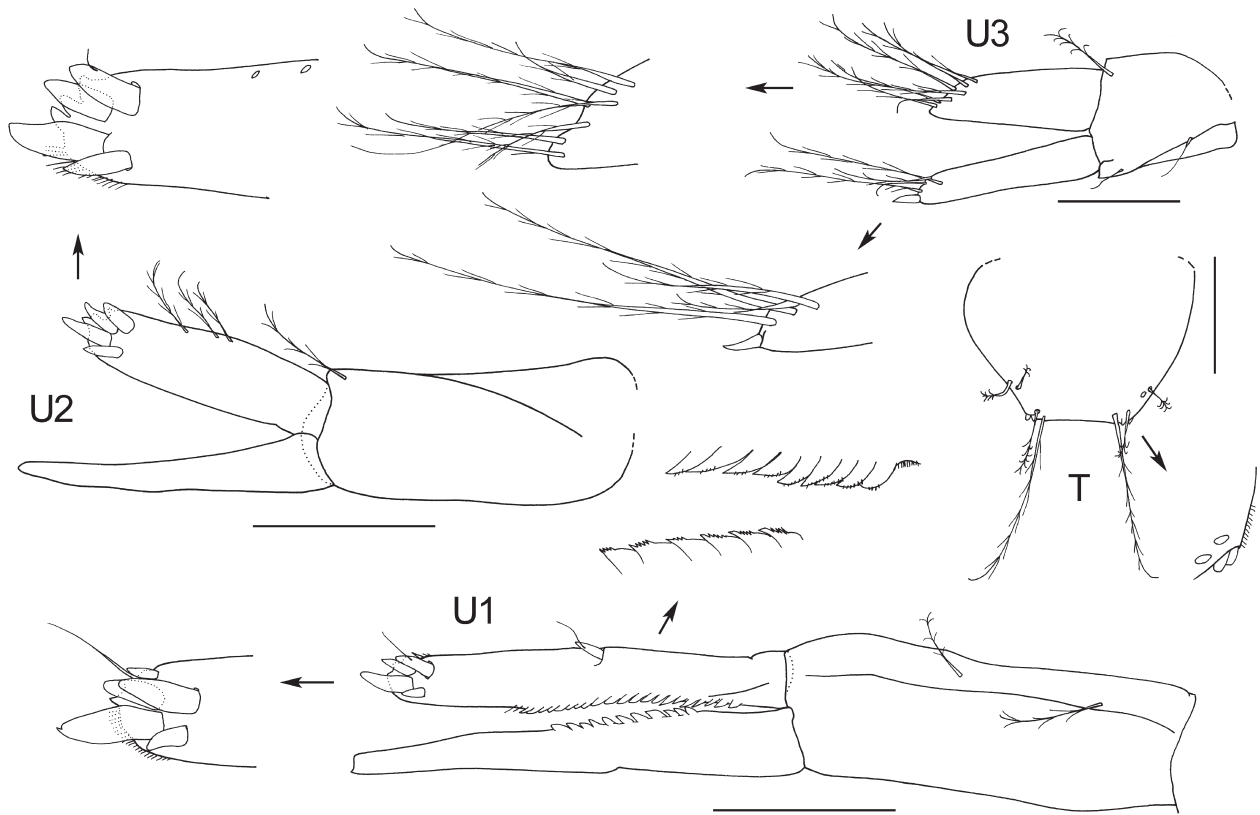


Figure 23. *Chevalia freycinet* sp. nov., female, holotype, 4.8 mm, NMV J71520, Freycinet Peninsula, Tasmania. Scale lines represent 0.2 mm.

Pereopod 7 basis length 1.9 times breadth, posterodistal corner bevelled.

Remarks. *Chevalia freycinet* sp. nov. has a very long antenna 1 which is as long as the body, while all other species from Australia and New Zealand have the antenna 1 at around half or less than the body length. Also, the pereopod 4 propodus is more elongate in *C. freycinet* sp. nov. being 3.7 times length to breadth in comparison to other species. *Chevalia freycinet* sp. nov. is similar to *C. csiro* sp. nov. in the gnathopod 2 acute palm and rectangular basis of pereopods 5 to 7. *Chevalia freycinet* sp. nov. and *C. csiro* sp. nov. can be separated by the chelation of gnathopod 1, which is simple in *C. freycinet* sp. nov. while subchelate in *C. csiro* sp. nov. Both *C. csiro* sp. nov. and *C. freycinet* sp. nov. are known from deeper waters at 100 m and 500 m respectively. Both *C. freycinet* sp. nov. and *C. tenuis* have a slender overall appearance in body plan in comparison to other *Chevalia*. These species can be easily separated by the length of the gnathopod 2 dactylus which is much shorter in *C. tenuis* being only around half the length of the palm.

Distribution. Australia. Tasmania, off Freycinet Peninsula (current study).

Chevalia sprightly sp. nov.

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(Figs 1–2, 24–27)

Holotype: Hermaphrodite “a”, non-ovigerous, 13.3 mm, dissected, 3 slides, AM P.100393, Three Mile Reef, City Beach, Perth, Western Australia, 31°46.817'S 115°40.733'E, 10.5 m, coll. Neville Coleman, 16 March 1972. **Paratypes:** hermaphrodite “b”, non-ovigerous, 8.3 mm, dissected, 1 slide, AM P.100394, same location as holotype; hermaphrodite “c”, ovigerous, 10 mm, dissected, 1 slide, AM P.100395, same location as holotype; 1 hermaphrodite, ovigerous, 10 mm, 21 hermaphrodites, 8.3–12.5 mm, 32 females, 7.5–12.5 mm, 3 females, ovigerous, 9.2–11.7 mm, 9 immature, 4.2 mm, AM P.100396, same location as holotype; 1 female, non-ovigerous, 13.3 mm, AM P.100397, 35 km south-west of Cliff Head, Western Australia, 29°40'S 114°42'E, 44 m, coll. RV *Sprightly*, 17 February 1976, station 17; 1 female, 16.7 mm, AM P.100398, south-west of Dongara, Western Australia, 29°49'S 114°24'E, 128–131 m, HMAS *Diamantina*, CSIRO Fisheries, 11 October 1963, station Dm6/63/214; 2 hermaphrodites, 10.8–12.5 mm, 1 female, 10 mm, WAM C71210, north-west of Bluff Point, Western Australia, 27°18'S 113°16'E, 54 fathoms (98 m), Beam Trawl, CSIRO Fisheries, 9 October 1963, station 204; 35 males, 5–10 mm, 3 females, ovigerous, 8.3–9.2 mm, 21 females, 5–11.7 mm, 5 juveniles, 4.2–5.8 mm, AM P.100399, south-east of Foul Bay, Western Australia, 35°12'S, 117°00'E, orange-peel grab, coll. HMAS *Gascoyne*, CSIRO Fisheries, 8 August 1962, station G3/62/160; 10 specimens, WAM C71211, south of Cape Leeuwin, Western Australia, 34°32'S 115°01'E, 73 m, HMAS *Gascoyne*, CSIRO Fisheries, 9 August 1962, station G3/62/170.

Additional material examined. *Western Australia.* Many specimens, AM P.18294, south-east of Foul Bay, 35°12' S, 117°00'E, orange-peel grab, coll. HMAS *Gascoyne*, CSIRO Fisheries, 8 August 1962, station G3/62/160; 1 hermaphrodite, AM P.18273, north-west of Perth, 30°45' S 114°52'E, 60 m, HMAS *Gascoyne*, CSIRO Fisheries, 11 August 1962, station G3/62/179.

Type locality. Three Mile Reef, City Beach, Perth, Western Australia, 31°46.817'S 115°40.733'E.

Etymology. Named for RV *Sprightly*, in recognition of her great contribution to marine science in Australia.

Diagnosis. Antenna 1 length 0.4 times body length, accessory flagellum 3-articulate. Gnathopod 1 coxa anterodistal corner produced Gnathopod 2 propodus palm transverse, with posterodistal shelf with tooth, distal round excavation, defined by corner with subacute tooth. Pereopods 5–7 merus, carpus and propodus distal margins with numerous long slender plumose setae. Pereopod 7 basis subovate, carpus posterodistal corner with 6 submarginal robust setae. Uropod 2 outer ramus dorsal margin with row of long plumose setae

(20+). Uropod 3 rami subequal in length to peduncle. Telson apical margin convex.

Description. Based on holotype, hermaphrodite, non-ovigerous, 13.3 mm, AM P.100393.

Head. Eyes of large size, partially situated in lateral lobe of the head, lateral cephalic lobe subacute. Antennae densely setose. Antenna 1 length 0.4 times body length; peduncular article 1 longer than article 3, primary flagellum with 18 articles; accessory flagellum 3-articulate, article 1 shorter than article 2, article 3 rudimentary. Antenna 2 slightly shorter than antenna 1; article 4 sub-equal in length to article 5; article 5 length 0.7 times flagellum; flagellum with 13 articles. Mandible palp, article 1 less than 0.25 times article 2, article 2 sub-equal in length to article 3; incisor with 5 teeth, lacinia mobilis with 3 teeth, accessory setal row with 3 setae, molar triturative. Lower lip, inner lobes and outer lobes separated, inner lobes large and fleshy. Maxilla 1 inner plate with marginal setae; outer plate with 11 robust setae; palp 2-articulate with 5 apical robust setae and 1 subapical seta. Maxilla 2 inner plate shorter than outer plate, with

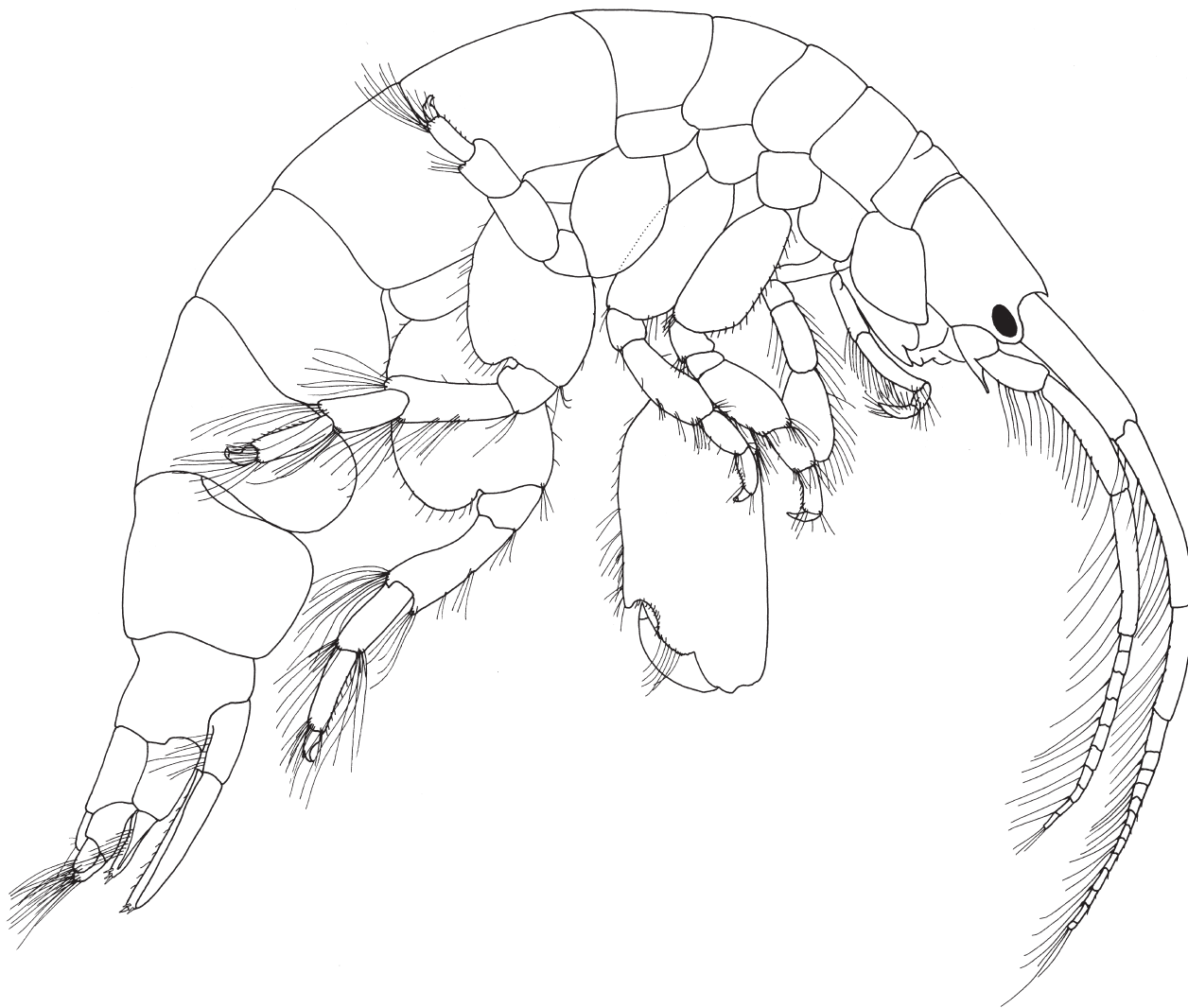


Figure 24. *Chevalia sprightly* sp. nov. hermaphrodite "a", holotype, 13.3 mm, habitus, AM P.100393, City Beach, Perth, Western Australia.

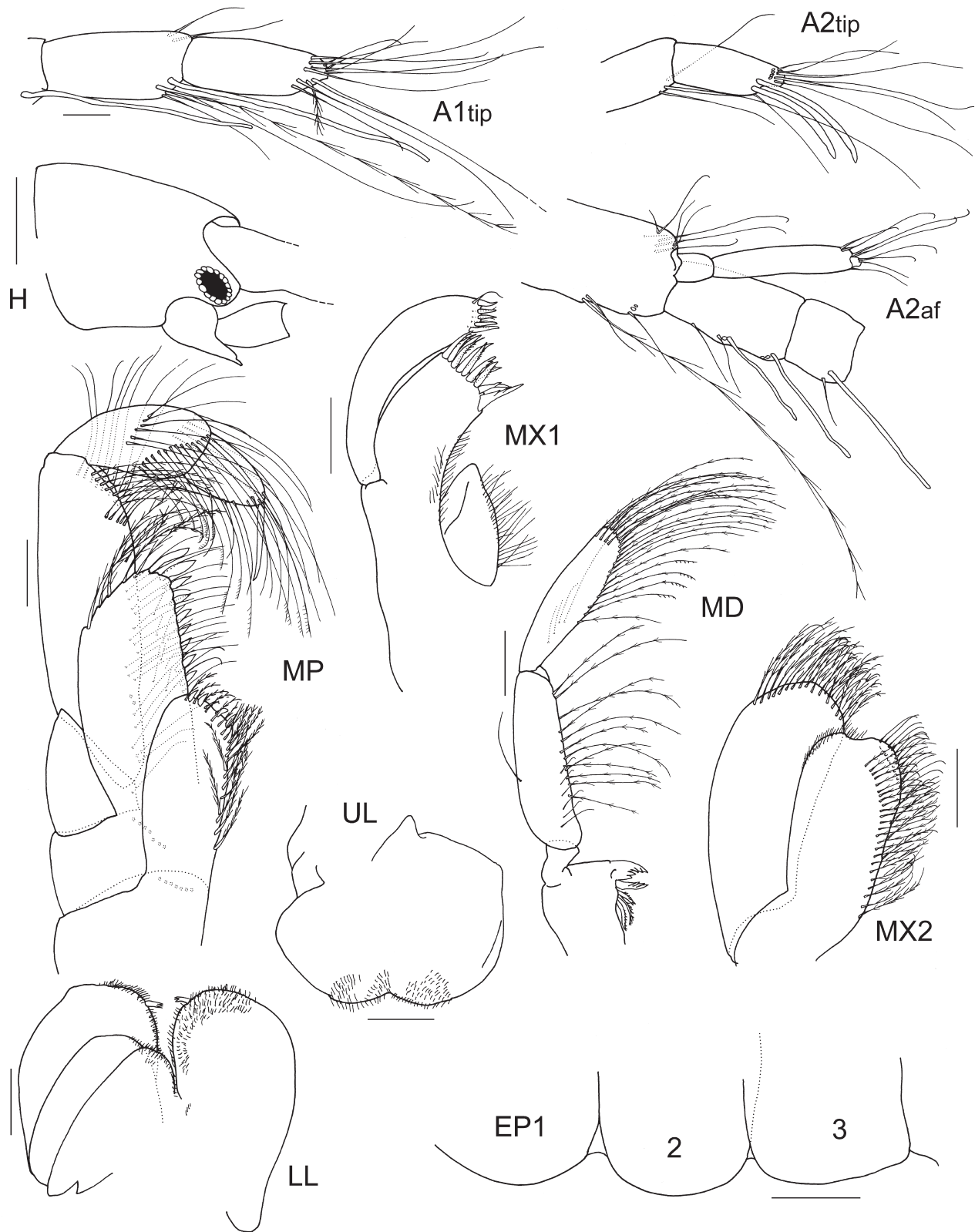


Figure 25. *Chevalia sprightly* sp. nov., hermaphrodite "a", holotype, 13.3 mm, AM P.100393, City Beach, Perth, Western Australia. Scale lines for EP1–3, H represent 0.5 mm, remainder represent 0.2 mm.

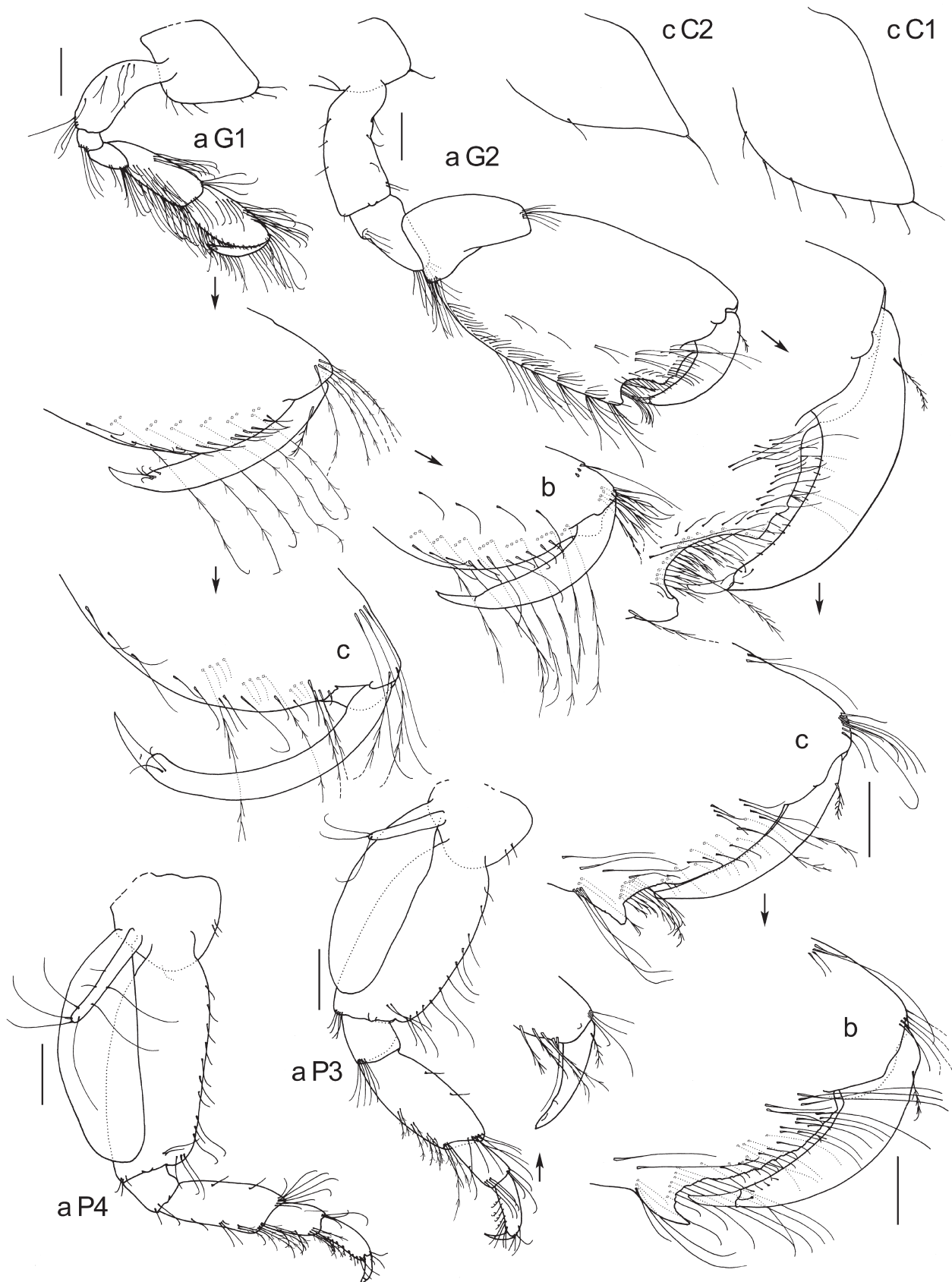


Figure 26. *Chevalia sprightly* sp. nov., hermaphrodite "a", holotype, 13.3 mm, AM P.100393, City Beach, Perth, Western Australia; hermaphrodite "b", paratype, 8.3 mm, AM P.100394, City Beach, Perth, Western Australia; hermaphrodite "c", ovigerous, paratype, 10 mm, AM P.100395, City Beach, Perth, Western Australia. Scale lines represent 0.5 mm.

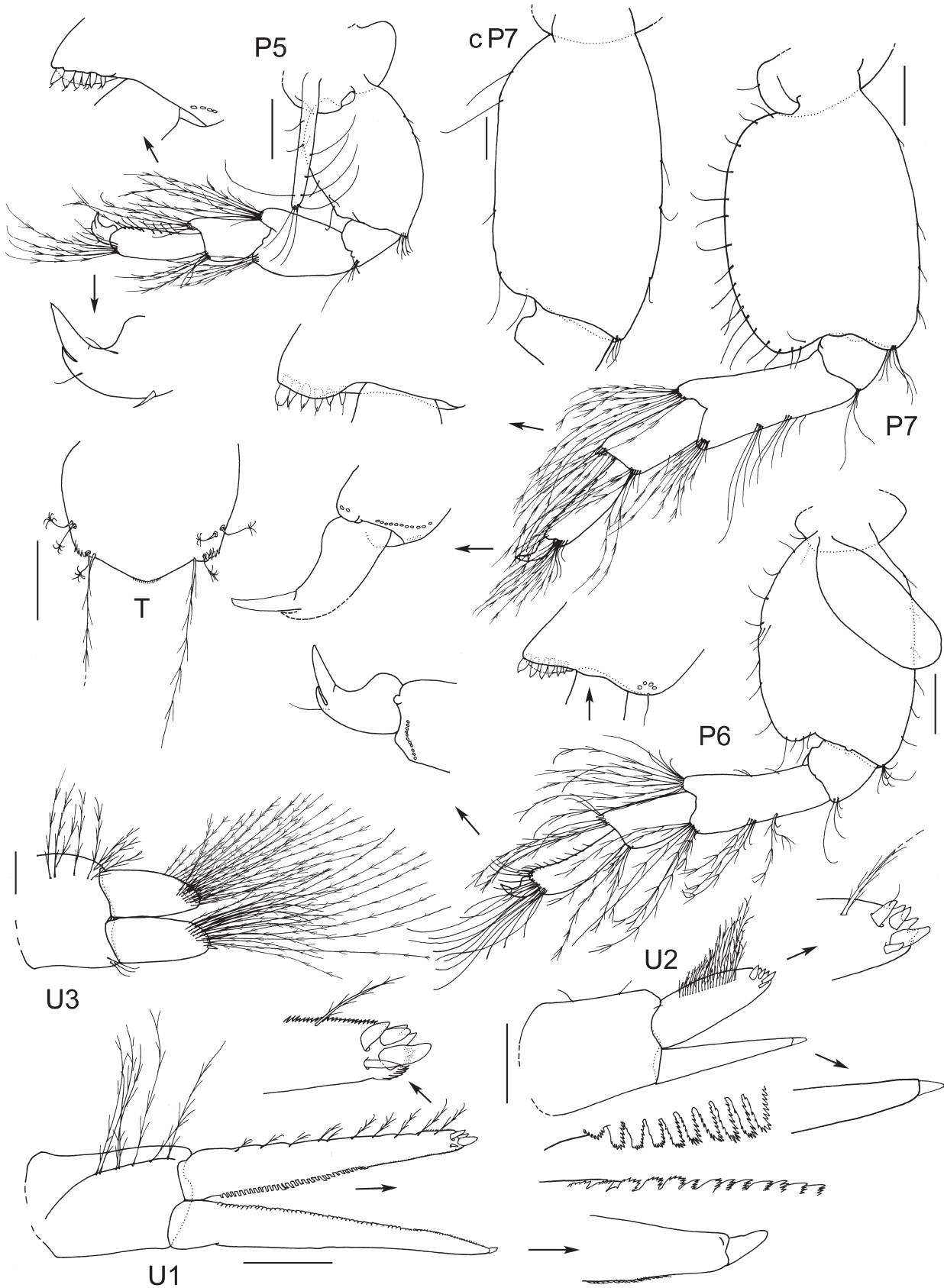


Figure 27. *Chevalia sprightly* sp. nov., hermaphrodite "a", holotype, 13.3 mm, AM P.100393, City Beach, Perth, Western Australia; hermaphrodite "c", ovigerous, paratype, 10 mm, AM P.100395, City Beach, Perth, Western Australia. Scale lines for P5–7 represent 0.5 mm, remainder represent 0.2 mm.

oblique facial row of plumose setae on outer margin; outer plate with a row of apical plumose setae. Maxilliped inner plate subrectangular, apical margin with 4 robust setae and several plumose setae, medial margin lined with many plumose setae; outer plate sub-equal in length to palp article 2, with 9 robust setae and row of plumose setae on medial and facial margins, with 5 apical plumose setae; palp, article 2 longer than articles 3 and 4 combined, article 4 with 1 long distal seta.

Pereon. Gnathopod 1 coxa larger than coxae 2–4, with anterodistal corner weakly produced, rounded; basis anterior margin concave, posterior margin convex, margins weakly setose; carpus length 3.1 times breadth, carpus 1.2 times propodus length, margins lined with dense setae; propodus length twice breadth, margins lined with dense setae, palm subchelate, convex, palmar margin not defined by corner or robust setae; dactylus closing along palm. Gnathopod 2 basis anterior and posterior margins weakly convex, with few slender setae; carpus length 1.1 times breadth, 0.5 times propodus; propodus subchelate, massive, posterior margin parallel to anterior margin, palm transverse, with posterodistal shelf with tooth, distal round excavation, defined by corner with subacute tooth; dactylus not reaching palm corner. Pereopod 3 oostegite present; basis rectilinear, broad, length 1.8 times breadth; merus rectilinear; carpus length 1.5 times breadth; propodus length 3.3 times breadth. Pereopod 4 oostegite present; basis rectilinear, broad, length 2.1 times breadth; merus rectilinear; carpus length 1.3 times breadth; propodus length 2.8 times breadth. Pereopods 5–7 merus, carpus and propodus distal margins with numerous long slender plumose setae; merus distal corners produced; dactylus anterior margin with accessory spine. Pereopod 5 oostegite present; basis subovate; merus length 1.7 times breadth; carpus length subequal to breadth, posterodistal corner with 6 submarginal robust setae; propodus length 3 times breadth. Pereopod 6 basis subovate, length 1.6 times breadth; merus length 2.3 times breadth; carpus length twice breadth, posterodistal corner with 6 submarginal robust setae; propodus length 3 times breadth. Pereopod 7 basis subovate, length 1.2 times breadth, proximally and distally broad, posterodistal projection absent; merus length 2.6 times breadth; carpus length 1.5 times breadth, posterodistal corner with 6 submarginal robust setae; propodus length 2.8 times breadth.

Pleon. Epimeron 3 posterodistal corner narrowly rounded, without notch. Urosomites 1–2 fused. Uropod 1 peduncle length 1.7 times breadth, 0.6 times outer ramus, dorsal margin with long plumose setae; rami outer margins minutely serrate, inner margins lined with sub-serrate teeth; inner ramus length 10 times breadth, 1.2 times outer ramus, with one apical robust seta; outer ramus outer margin lined with 10 plumose setae, with 4 apical robust setae. Uropod 2 peduncle length 1.1 times outer ramus, 0.8 times inner ramus; inner ramus length 8.2 times breadth, longer than outer ramus, with apical robust seta; outer ramus dorsal margin with row of long plumose setae (20+), apical margin cuticle with 4 teeth and with 4 apical robust setae. Uropod 3 peduncle length 0.9 times breadth, 0.9 times length inner ramus; inner ramus subequal to outer ramus, with long apical plumose setae and one robust seta; outer ramus with long apical plumose setae. Telson with pair of denticular patches, apical margin convex with single pair of plumose setae and a few short

plumose setae.

Variation. The gnathopod 1 coxa anterior margin can be either produced or subquadrate to weakly produced (produced, paratype hermaphrodite “c”, AM P.100395; subquadrate to weakly produced, holotype, hermaphrodite “a”, AM P.100393). The gnathopod 2 propodus palm appears to vary with growth stage, with the palm posterodistal shelf becoming more pronounced in larger specimens (8.3 to 13.3 mm, AM P.100393 and AM P.100394, respectively).

Remarks. The shape of pereopods 6 to 7 bases in *C. sprightly* sp. nov., is ovate, the merus, carpus and propodus have bunches of long, distal plumose setae, the carpus posterodistal corner has 6 submarginal robust setae and uropod 2 outer ramus has a brush of about 20 plumose setae on the outer ramus. This set of characters separate *C. sprightly* sp. nov. from all other Australian species.

Distribution. Australia. Western Australia: City Beach, Dongara, Bluff Point and Cliff Head, (current study).

Discussion

The absence of Chevaliid species in the Australian and New Zealand biogeographic regions was notable enough to gain mention in Barnard’s 1972 summary of region biodiversity. In the present study, investigation of material from Western Australia, Victoria, Tasmania and New South Wales, has recognised 5 new species, *Chevalia bardi* sp. nov., *C. burrewarra* sp. nov., *C. csiro* sp. nov., *C. freycinet* sp. nov. and *C. sprightly* sp. nov., described here in. Seven species have now been recognised from Australia and New Zealand bringing the total number of Chevaliid species to 19 (Table 1). An identification key to separate all 19 species of Chevaliidae is provided.

The New Zealand species, *Bryoconversor tutus* is known from seven localities giving some insight that Chevaliid species may have large distribution ranges. Similarly, *Chevalia burrewarra* ranges from northern New South Wales to southern Victoria. Also, three species, *C. bardi* sp. nov., *C. csiro* sp. nov. and *C. sprightly* sp. nov., in Western Australia are from nearby collection localities, indicating that species co-occur.

The sexual dimorphism for *Chevalia* species described here include female, male and intersex. Males were defined as those individuals with enlarged gnathopods, penes present and oostegites absent. Females as individuals with either large or small gnathopods, penes absent, oostegites present. Females included both ovigerous and non-ovigerous specimens, where ovigerous females appeared to have a broader basis on pereopod 7. Intersex was defined as individuals with enlarged gnathopods, penes and oostegites present, ovigerous or non-ovigerous.

It is unclear from the specimens at hand if individuals maintain as a single sex or transition from one gender to another during their lifecycle (either as a progressive development or environmentally induced need in the absence of the opposite sex). Intersex material has been documented elsewhere for closely aligned Corophioidea, Corophiidae and Ischyroceridae (Sexton & Reid, 1951; Just pers. comm. 2008) and more distant groups such as Lysianassoids and Hadzioids, namely Conicostomatidae, Gammaridae and

Maeridae (Lowry & Stoddart, 1983; Pastorinho *et al.*, 2009; Hughes, 2011). Within the Amphipoda there may be naturally occurring, parasitic or environmentally induced intersex individuals (Ford & Fernandez, 2005). Intersex amphipods have been shown as reproductively functional (McCurdy *et al.*, 2004) and the existence of two intersex states, having either an internal or external phenotype, for feminized males (Short *et al.*, 2012). Reproductive strategy

is little known from most amphipod species yet given the frequency of intersex in the material observed here and previously for the original records of *B. tutus* by Lörz *et al.*, 2014, a functional reproductive strategy or high parasitic load are more plausible intersex drivers within the Family Chevaliidae, based on intersex individuals being from multiple locations and across species.

Key to world species of Chevaliidae

1. Uropod 2 peduncle posterior margin with strongly developed flange *Bryoconversor tutus* Lörz *et al.*, 2014
- Uropod 2 peduncle posterior margin without strongly developed flange 2
2. Pereopod 7 basis rectangular 3
- Pereopod 7 basis ovate 14
3. Gnathopod 2 palm transverse 4
- Gnathopod 2 palm oblique 12
4. Pereopod 7 basis posterodistal corner produced 5
- Pereopod 7 basis posterodistal corner subquadrate or rounded, not produced 7
5. Gnathopod 2 dactylus less than half length of propodus, without inner proximal hump *C. tenuis* Myers, 2009
- Gnathopod 2 dactylus more than half length of propodus, with inner proximal hump 6
6. Pereopod 7 basis broad, about twice as long as wide, epimeron 3 posterior margin straight *C. caetes* Souza-Filho *et al.*, 2010
- pereopod 7 basis narrow, about three times as long as wide, epimeron 3 posterior margin broadly rounded *C. mexicana* Pearse, 1912
7. Gnathopod 1 coxa anterodistal corner not produced 8
- Gnathopod 1 coxa anterodistal corner produced 9
8. Uropod 1 peduncle slightly longer than broad female *C. csiro* sp. nov.
..... (Male has oblique palm, see elsewhere in key)
- Uropod 1 peduncle more than three times as long as broad *C. pacifica* Myers, 1995
9. Gnathopod 2 carpus much shorter than propodus length *C. sprightly* sp. nov.
- Gnathopod 2 carpus subequal to propodus length 10
10. Telson distal margin evenly convex *C. burrewarra* sp. nov.
- Telson distal margin with central process 11
11. Antenna 1 accessory flagellum 2-articulate, uropod 3 peduncle broader than long *C. aviculae* Walker, 1904
- Antenna 1 accessory flagellum 3-articulate, uropod 3 peduncle longer than broad *C. thomasi* Souza-Filho *et al.*, 2010
12. Pereopod 7 basis posteroventral corner excavate *C. freycinet* sp. nov.
- Pereopod 7 basis posteroventral corner subquadrate 13

13. Gnathopod 2 propodus palm excavate, concave male *C. csiro* sp. nov.
 (Female has transverse palm see elsewhere in key)
- Gnathopod 2 propodus palm not excavate, oblique
 and straight *C. inaequalis* (Stout, 1913)
14. Uropod 1 rami subequal in length *C. marajoara* Souza-Filho *et al.*, 2010
- Uropod 1 rami differing in length 15
15. Pereopods 6–7 basis posterior margin with dense setae *C. hirsuta* Lazo-Wasem, 1999
- Pereopods 6–7 basis posterior margin without dense setae 16
16. Telson distal margin evenly convex 17
- Telson distal margin with central process 19
17. Uropod 3 rami longer than peduncle *C. convexa* Souza-Filho *et al.*, 2010
- Uropod 3 rami subequal to or shorter than peduncle 18
18. Pereopods 6–7 merus, carpus and propodus with
 bunches of long, distal plumose setae *C. sprightly* sp. nov.
- Pereopods 6–7merus, carpus and propodus without
 bunches of long, distal plumose setae *C. bardi* sp. nov.
19. Pereon and pleon lined with many long slender setae *C. setosa* Souza-Filho *et al.*, 2010
- Pereon and pleon lined with a few or no long slender setae 20
20. Gnathopod 2 propodus palm defined by rounded tooth,
 dactylus shorter than propodus palm *C. carpenteri* Barnard & Thomas, 1987
- Gnathopod 2 propodus palm defined by subacute tooth
 dactylus subequal to propodus palm *C. anomala* Souza-Filho *et al.*, 2010

Table 1. List of world Chevaliidae species.

Bryoconversor tutus Lörz, Myers & Gordon, 2014, New Zealand
Chevalia anomala Souza-Filho, Souza & Valério-Berardo, 2010, Brazil
Chevalia aviculae Walker, 1904, Sri Lanka
Chevalia bardi sp. nov., Australia
Chevalia burrewarra sp. nov., Australia
Chevalia caetes Souza-Filho, Souza & Valério-Berardo, 2010, Brazil
Chevalia carpenteri Barnard & Thomas, 1987, Belize
Chevalia convexa Souza-Filho, Souza & Valério-Berardo, 2010, Brazil
Chevalia csiro sp. nov., Australia
Chevalia freycinet sp. nov., Australia
Chevalia hirsuta Lazo-Wasem, 1999, Seychelles
Chevalia inaequalis (Stout, 1913), USA
Chevalia marajoara Souza-Filho, Souza & Valério-Berardo, 2010, Brazil
Chevalia mexicana Pearse, 1912, USA
Chevalia pacifica Myers, 1995, Papua New Guinea
Chevalia setosa Souza-Filho, Souza & Valério-Berardo, 2010, Brazil
Chevalia sprightly sp. nov., Australia
Chevalia tenuis Myers, 2009, Australia
Chevalia thomasi Souza-Filho, Souza & Valério-Berardo, 2010, Brazil

ACKNOWLEDGEMENTS. We thank Alex Hegedus, Stephen Keable, Claire Rowe and Helen Stoddart (all AM), Jo Taylor (NMV) and Andrew Hosie (WAM) for curatorial assistance; the Australian Museum Research Institute for providing resources making this work possible; and two anonymous referees whose comments greatly improved the manuscript.

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