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The **cover illustration** shows detail of form and decoration of arrows from the Highlands of Papua New Guinea. The drawings, by anthropologist Thelma Bush, were published in her 1985 paper in *Records of the Australian Museum.* The entire work may be read online at the Australian Museum Scientific Publications website:

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The background image is the actinal view of the echinoderm *Asterodiscides elegans belli,* the specimen was collected by Thurston in Madras, India, in 1890, for the British Museum, and subsequently donated to the Australian Museum. Museum malacologist, F.W.E. Rowe, revised the taxonomy of the genus in a 1977 *Records of the Australian Museum* publication and determined this specimen to be representative of a separate subspecies that he named *belli*; Birtles reported the presence of this subspecies in waters off northeastern Australia.

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Trapdoor Spiders of the Genus *Misgolas* (Mygalomorphae: Idiopidae) in the Sydney Region, Australia, With Notes on Synonymies Attributed to *M. rapax*

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ABSTRACT. This paper reports on the species of the Idiopid trapdoor spider genus *Misgolas* Karsch, 1878 found in the Sydney Region of New South Wales, Australia. They comprise seven new species: *M. lynabra* n.sp., *M. cliffi* n.sp., *M. trangae* n.sp., *M. wayorum* n.sp., *M. rodi* n.sp., *M. beni* n.sp. and *M. michaeli* n.sp.; and four species which are rediagnosed or redescribed here: *Arbanitis gracilis, Dyarcyops maculosus, D. melancholicus* and *Megalosara villosa*. The latter two species, plus *Arbanitis fuscipes, Dyarcyops ionthus, Dyarcyops montanus* and *Arbanitis chisholmi* are removed from synonymy with *M. rapax*. Their current or revised status is listed. This latter species, popularly known as the Sydney Brown Trapdoor Spider, is shown not to occur in the Sydney Region. A key for males of species within the region is presented, as well as distribution maps and comments on taxonomy and natural history.

WISHART, GRAHAM, 2006. Trapdoor spiders of the genus *Misgolas* (Mygalomorphae: Idiopidae) in the Sydney region, Australia, with notes on synonymies attributed to *M. rapax*. *Records of the Australian Museum* 58(1): 1–18.

Trapdoor spiders of the genus *Misgolas* are burrowing ground-dwellers which rarely have a trapdoor at the burrow entrance [*M. kirstiae* Wishart, 1992 and *M. gracilis* (Rainbow & Pulleine, 1918) are exceptions]. Two species have the burrow entrance as an aerial tube attached to rocks or vegetation [*M. robertsi* (Main & Mascord, 1974) and *M. mascordi* Wishart, 1992]. The spiders are sedentary and, with the exception of the mature male, nocturnal, they wait at the burrow entrance for foraging opportunities. Different entrance structures possibly indicate differences in foraging behaviour. Tree-dwelling *Misgolas* species are unknown.

The genus is distributed along the entire eastern coast of Australia to Tasmania and South Australia. Raven (1985) synonymized the New Zealand genus, *Cantuaria* Hogg, 1902, with *Misgolas* but this is under review. Colouration varies from light tan to dark brown and in some large species the male is almost black (Wishart & Rowell, 1997). Most species have carapace and some limb segments covered with shining golden hair and many have dark brown blotches on lateral limb surfaces. The most consistent generic characters are (*a*) ocular area not more than twice as wide as long, and (*b*) low somewhat elongated carapace. There is much variation in size ranging from body length (including chelicerae) of 8.7 (AM KS5679) to 39.5 (AM KS51817).

The holotype specimen of *M. rapax* Karsch, 1878 (examined) was studied by Main (1985a) who, because of its poor condition, found it difficult to distinguish many useful features. The type locality is specified as "New South Wales", a large area not helpful in identifying the animal. Recently DNA analysis has shown that *M. rapax* and *M. hubbardi* Wishart, 1992—a species not present in the Sydney Region—are conspecific. Consequently *Misgolas*

Table 1. Revised status of *Misgolas* species removed, in the present work, from Main's (1985) synonymy with *Misgolas rapax*.

	nominal species (in original combination)	current or revised status
♀	*Misgolas rapax* Karsch, 1878	*Misgolas rapax* Karsch, 1878
♂	*Megalosara villosa* Rainbow, 1914	*Misgolas villosus* (Rainbow, 1914) **n.comb**.
♀	*Arbanitis fuscipes* Rainbow, 1914	identity uncertain
♂ ♀	*Dyarcyops melancholicus* Rainbow & Pulleine, 1918	*Misgolas melancholicus* (Rainbow & Pulleine, 1918) **n.comb**.
♀	*Dyarcyops ionthus* Rainbow & Pulleine, 1918	identity uncertain
♂ ♀	*Arbanitis montanus* Rainbow & Pulleine, 1918	*Misgolas montanus* (Rainbow & Pulleine, 1918) **n.comb**.
♀	*Arbanitis chisholmi* Hickman, 1933	identity uncertain

hubbardi Wishart, 1992 will be recognized as a junior synonym of *Misgolas rapax* Karsch, 1878 in Rowell, Brownlie & Wishart (in prep.). Prior to this, *M. rapax* was commonly known as the Sydney Brown Trapdoor Spider and regarded as widespread in the Sydney Region. However, its actual distribution is now shown to be confined to the Illawarra region south of Sydney. As part of the same work Rowell *et al.* determined the "Gerringong population" of "*M. hubbardi*" (now treated as *M. rapax*) to be a different species to that nominated as the "Berry population" of "*M. hubbardi*" (Wishart & Rowell, 1997), and the spiders of the twelve other "population groups" of "*M. hubbardi*" nominated therein are therefore most likely different species also.

The latter half of the nineteenth century was a period when natural history specimen collectors, in particular Edward Damel and Emily Dietreich, distributed their finds amongst different European museums. This, combined with possible communication difficulties and a reliance on female characters, led to confusion among taxonomists of the day whereby different *Misgolas* species were placed in a variety of genera. The work of Dr Barbara York Main (1977, 1985a,b) was a massive step forward. It did much to address this confusion and provided a foundation for this work.

Main (1985b), faced with the problem of poorly preserved types and character-poor female material, placed the following species in synonymy with *Misgolas rapax*: *Arbanitis fuscipes* Rainbow (1914) ♀, *Megalosara villosa* Rainbow (1914) ♂, *Arbanitis chisholmi* Hickman (1933) ♀, *Dyarcyops ionthus* Rainbow & Pulleine (1918) ♀, *Dyarcyops melancholicus* Rainbow & Pulleine (1918) ♂ ♀ and *Arbanitis montanus* Rainbow & Pulleine (1918) ♂ ♀. These species are here removed from synonymy with *M. rapax*. They belong in the genus *Misgolas* but their specific status is revised according to Table 1.

The area of the Sydney Region taken for this study is approximately bounded by the foothills of the Blue Mountains to the West, the Hawksbury River to the North and Port Hacking to the South. The human population of the region is c. 4 million—a major source of spider inquiries at the Australian Museum. Among the most frequent inquiry are those concerning the *Misgolas* trapdoor spider group, not only because they are often confused with the dreaded funnelweb spider (*Atrax robustus* Cambridge [1877]), but also because of the large size of some species. Prompted by this interest this work is part of a series dealing with the genus *Misgolas* in Eastern Australia.

Material and methods. All specimens are deposited in the Australian Museum, Sydney unless referred to otherwise. Measuring points are taken from Coyle (1971).

Whilst at rest the bulb of the male palpal organ is folded into the ventral excavation of the palpal tibia. Usually the brown sclerotized convex side is uppermost against the tibia cavity and is considered here to be the dorsal surface. The weakly chitinized flange is retrolaterally situated on the basal part of the embolus. The configuration of the embolus of the male bulb (e.g., straight or bent) is described from dorsal aspect. Measurements and counts refer to the characters on the right side of the specimen with data for the left side given in brackets. Notation of spines is taken from Forster & Wilton (1968).

Terminology

Width/Length Ratio: ratio of maximum width to length of ocular area; only rarely, and then only marginally, is this greater than 2 (Main, 1985a). *Retroventral Tibial Apophysis* (RTA, Fig. 3H): male palpal tibia always includes a prominent apophysis projecting generally forward from c. midway. *Distal Tibial Apophysis* (DTA, Fig. 3H): male palpal tibia often includes a small, often hooked, apical apophysis positioned retro dorsally. *Tibial Excavation Mound* (TEM, Fig. 3H): a usually pallid mound within tibial excavation, of variable prominence, adjacent to or contiguous with the RTA. *Tibial Excavation Texture* (TET, Fig. 3H,I): an area appearing textured within palpal tibial excavation and encroaches upon TEM. This character is believed to be unique to *Misgolas* species. It has been suggested to be a stridulatory accessory and is not present on palps of females.

Other abbreviations used throughout the text are: *ALE*, anterior lateral eyes; *AM*, Australian Museum, Sydney; *AME*, anterior median eyes; *d*, dorsal; *GW*, collected by Graham Wishart; *p*, prolateral; *pd*, prodorsal; *PLE*, posterior lateral eyes; *PME*, posterior median eyes; *PMS*, posterior median spinnerets; *pv*, proventral; *r*, retrolateral; *rd*, retrodorsal; *rv*, retroventral; *v*, ventral.

Key to males of species in the genus *Misgolas* from the Sydney Region

1 Embolic apophysis absent; embolus not modified 2
—— Embolic apophysis present or embolus modified 3

2 Large spider; embolus straight, narrow; embolic flange with about 7 folds, edge straight; DTA hooked .... *M. villosus*
—— Very small spider; embolus curved; embolic flange with about 5 folds, edge gently convexly curved; DTA absent .... *M. lynabra* n.sp.

3 Embolus with twisted ridge; embolic flange with one prominent fold; DTA straight .... *M. gracilis*
—— Embolus without prominent ridge; embolic flange with multiple folds 4

4 Small spider; embolic apophysis placed midway; cymbium with dorsal bristles (not spines) .... *M. cliffi* n.sp.
—— Cymbium with dorsal spines (not bristles) 5

5 Embolic apophysis placed about midway .... *M. melancholicus*
—— Embolic apophysis proximal or subdistal, (not placed midway) 6

6 Embolic apophysis proximal, adjacent to embolic flange .... *M. trangae* n.sp.
—— Embolic apophysis subdistal 7

7 Embolus sinuous; embolic flange with about 4–5 folds, at least 3 quite distinct .... *M. wayorum* n.sp.
—— Embolus straight; embolic flange with about 6–9 folds; embolic apophysis rl placed 8

8 Cymbium dorsal spines inclined forward .... *M. rodi* n.sp.
—— Cymbium dorsal spines erect or almost so 9

9 Venter pale with few brown spots .... *M. beni* n.sp.
—— Venter entirely black .... *M. michaeli* n.sp.

The male of *M. maculosus* is unknown. It is presumed to be a very small spider (similar to *M. trangae*) with characters as follows: carapace length c. 4.0–5.5 mm, rd surface of metatarsi IV bare of spines or with weak spinules; venter with scattered brown spots.

Species determination from female characters is difficult and most conveniently undertaken by reference to distribution data and the figures provided. Note differences in venter patterns and, less reliably, the presence or absence of spines on the rd surface of metatarsi IV.

Misgolas Karsch, 1878

Type species. *Misgolas rapax* Karsch, 1878: 821, New South Wales. Diagnoses for *Misgolas* and the closely related genus *Arbanitis* are provided in Raven & Wishart (2005).

Misgolas villosus (Rainbow, 1914)

Figs. 1A–F, 12A–B

Megalosara villosa Rainbow, 1914: 206, figs. 16–22.
Misgolas villosa (Rainbow, 1914).–Main, 1985b: 25 (*villosus* in Platnick [2004]).
Not *Misgolas rapax* Karsch, 1878.–Main, 1985b: 25; removed from synonymy in the present work.

Material examined. Holotype ♂, AM KS7178. Enfield NSW.

Other material. Males: AM KS3572, Cattai (33°33'S 150°55'E), 25 Sep. 1979, R.H. Eastment; AM KS4462, Mortdale (33°58'S 151°05'E), 4 Feb. 1980, D. Day; AM KS5124, Croydon (33°52'S 151°06'E), 16 Apr. 1981, G. Howard; AM KS5905, Annangrove (33°39'S 150°56'E), 15 Sep. 1980; AM KS8787, Newtown (33°37'S 151°11'E), 22 Mar. 1982; AM KS9989, Glenorie (33°35'S 151°00'E), 15 Sep. 1982; AM KS10431, Willoughby (33°47'S 151°12'E), 22 Nov. 1982, I. Sippel; AM KS10980, Cremorne (33°48'S 151°13'E), 19 Mar. 1983, G. Copp; AM KS16541, Tempe (33°55'S 151°09'E), 28 Apr. 1986; AM KS17786, Mt Kuring-gai (33°45'S 151°04'E), 19 Oct. 1987; AM KS31958, Glebe (33°52'S 151°11'E), 20 May 1992; AM KS34393, North Rocks (33°46'S 151°01'E), 12 Aug. 1992, Mrs Bussel; AM KS36566, Manly (33°47'S 151°16'E), 6 May 1975, J. Marsh; AM KS38521, Panania (33°57'S 151°00'E), 14 Feb. 1972, M. Taylor; AM KS38536, North Sydney (33°50'S 151°12'S), 8 Feb. 1950, B. Adamson; AM KS40627 Narrabeen (33°43'S 151°18'E), 15 Mar. 1994, M.R. Fleming; AM KS43700, Hurstville (33°58'S 151°06'E), 15 Feb. 1971, A. Holland; AM KS44362, Galston (33°38'S 151°04'E), 28 Oct. 1991, T. Dixon; AM KS49357, New Lambton (32°54'S 151°42'E), 26 Mar. 1997, L. Abra; AM KS49381, Avoca Beach (33°27'S 151°26'E), 24 Apr. 1997, L. Abra; AM KS50029, Revesby (33°57'S 151°00'E), 15 May 1984, D.A. Pharm; AM KS50082, Chatswood (33°48'S 151°11'E), 4 Sep. 1997, R. Hendricks; AM KS51110, Gosford (33°25'S 151°20'E); 23 Jan. 1998, L. Abra; AM KS51163, Avalon (33°37'S 151°19'E), 12 Feb. 1998, L. Abra. Females: AM KS5329, Peakhurst (33°58'S 151°04'E), B. Smith; AM KS35576, Summer Hill (33°53'S 151°08'E), 19 Jul. 1993, K. Dorrian; AM KS44222, Burwood (33°52'S 151°06'E); AM KS44224, Gladesville (33°49'S 151°07'E), 15 Feb. 1929.

Diagnosis. Large brown spiders; rd surface of metatarsi IV without spines (Fig. 1E). Venter entirely pallid, brown pigmented pattern absent (Fig. 1D,F). In female: Carapace

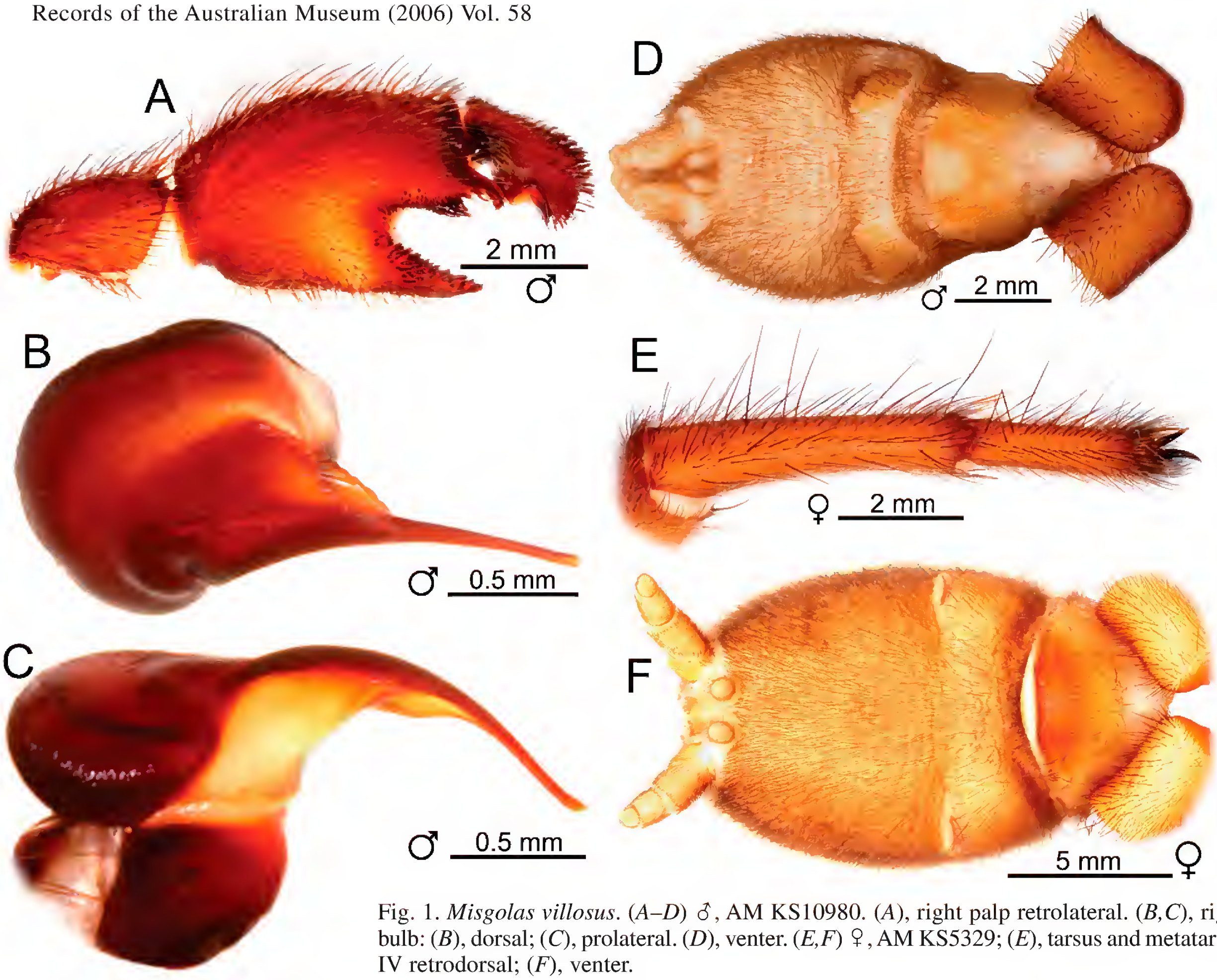

Fig. 1. *Misgolas villosus*. (*A–D*) ♂, AM KS10980. (*A*), right palp retrolateral. (*B,C*), right bulb: (*B*), dorsal; (*C*), prolateral. (*D*), venter. (*E,F*) ♀, AM KS5329; (*E*), tarsus and metatarsus IV retrodorsal; (*F*), venter.

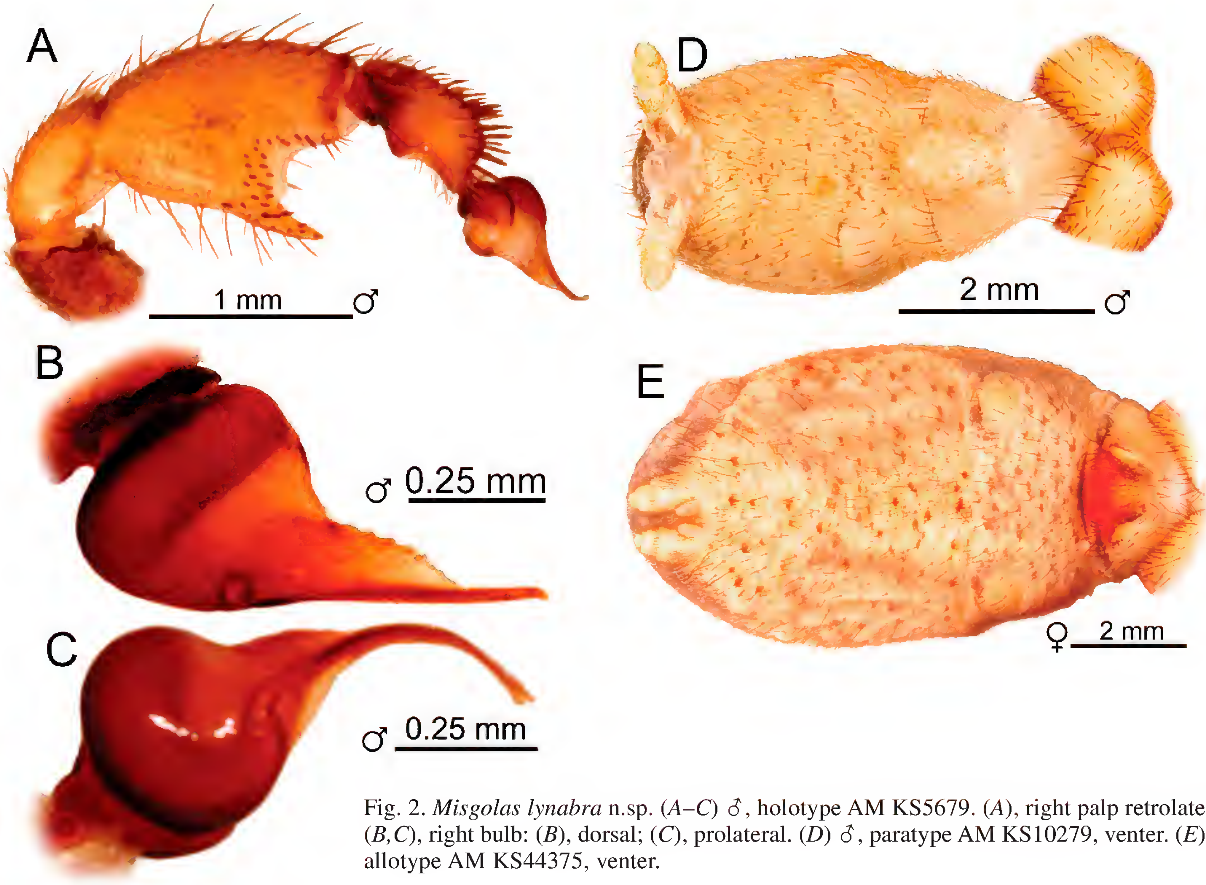

Fig. 2. *Misgolas lynabra* n.sp. (*A–C*) ♂, holotype AM KS5679. (*A*), right palp retrolateral. (*B,C*), right bulb: (*B*), dorsal; (*C*), prolateral. (*D*) ♂, paratype AM KS10279, venter. (*E*) ♀, allotype AM KS44375, venter.

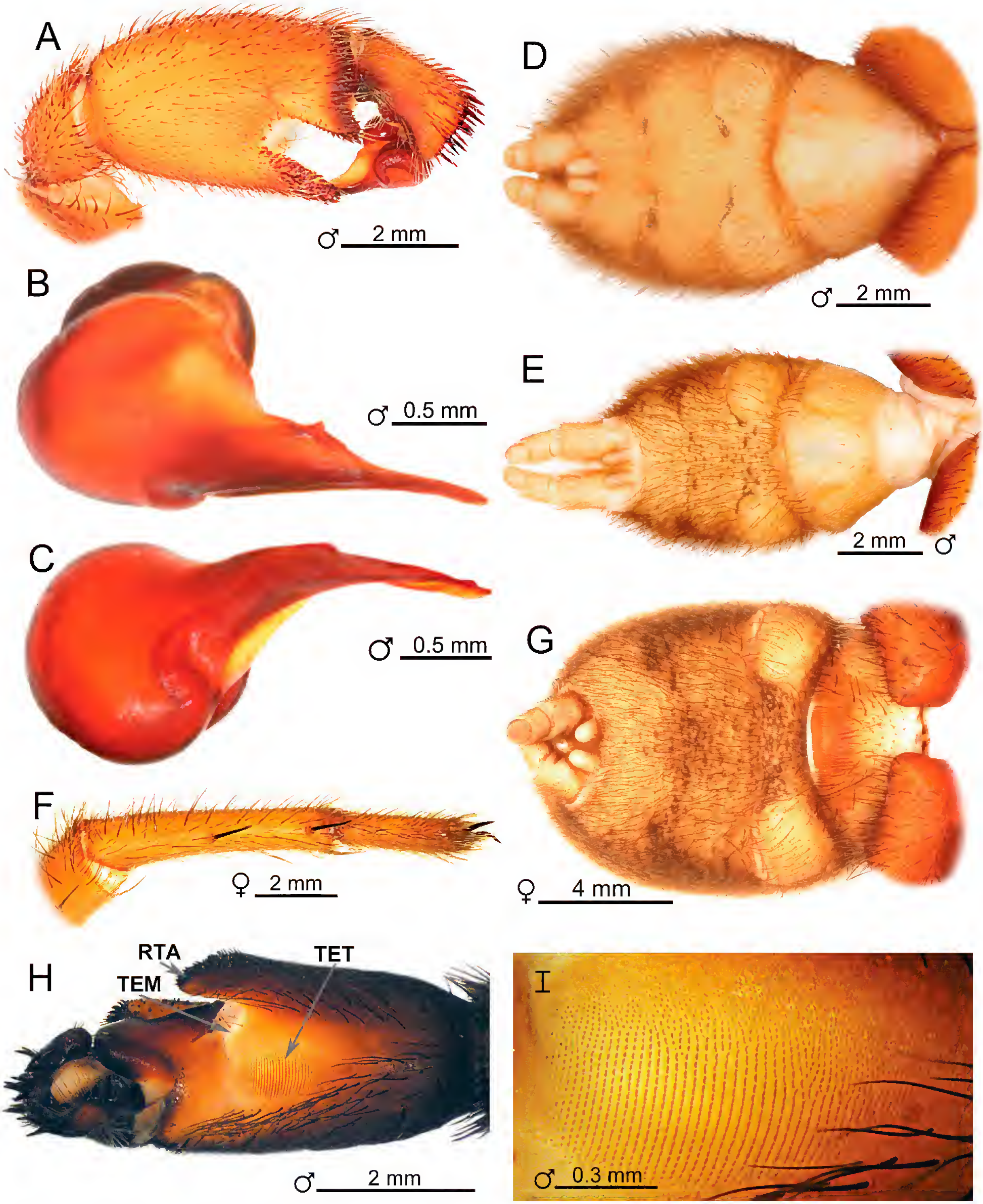

Fig. 3. *Misgolas gracilis*. (*A–D*) ♂, AM KS22910. (*A*), right palp retrolateral. (*B,C*), right bulb: (*B*), dorsal; (*C*), prolateral. (*D*), venter. (*E*) ♂, AM KS34720, venter. (*F,G*) ♀, AM KS44339; (*F*), tarsus and metatarsus IV retrodorsal; (*G*), venter. (*H,I*) ♂, AM KS86211; (*H*), ventral aspect, palpal tibia excavation; (*I*), tibial excavation texture.

length c. 8–12. In male: Carapace length c. 8–10; embolus of bulb narrow, straight, with minute d subdistal raised mound; rl flange with c. 7 folds, edge straight (Fig. 1B,C). Conformation of palp as figured (Fig. 1A). TEM raised, pallid, rl surface slightly textured.

Remarks. The female (holotype, *A. fuscipes* Rainbow) and male (holotype, *Megalosara villosa* Rainbow) were redescribed by Main (1985a). However, the identity of the female specimen could be in doubt. The presence of a spine on the rd surface of metatarsi IV of this specimen points to the possibility that it may belong to *Misgolas gracilis*. Should this be the case the absence of a discernible venter pattern in the female specimen could be due to preservation effects. The weakly chitinized area extending onto the pleuron below the clypeus is more prominent in *Misgolas* *villosus* than in other *Misgolas* species found in the Sydney Region, this is especially so in males. Spines on the dorsal surface of the cymbium are usually pointed and projected gently forward; some rare variations of this have been observed. Very rarely a venter pattern is present.

Distribution and natural history (Fig. 12A,B). *Misgolas villosus* is unknown south of George's River, north of Hunter River Valley or west of 150°55'E longitude. The spider is not found in the area east of the Prince's Highway to the south of Port Jackson, perhaps due to sandy soil. Collection dates of 198 male specimens (AM) indicate males wander throughout the year. The burrow entrance is figured by Mascord (1970) showing a leaf attached in the manner of the burrow of *M. rapax* (= *Misgolas hubbardi* Wishart 1992).

Misgolas lynabra n.sp.

Figs. 2A–E, 12C

Type material. HOLOTYPE ♂, AM KS5679, Fox Valley, Wahroonga, (33°42'S 151°08'E), 5 Mar.–25 Apr. 1980 pitfall trap site 1675, B. Henke. ALLOTYPE ♀, AM KS44375, Gordon, (33°44'S 151°09'E), 6 Oct.–4 Nov. 1982 pitfall trap site 2109, C. Horseman. PARATYPES ♂♂: AM KS13301, Gordon, (33°44'S 151°09'E) 9–29 Sep. 1983 pitfall trap site 2404. C. Horseman; AM KS10279, details same as AM KS44375; AM KS12645, Gordon 07 Jul.–04 Aug. 1983

Diagnosis. Very small brown spider; rd surface of metatarsi IV without spines. Venter pattern as figured (Fig. 2D,E). In female: Carapace length less than 6.0. In male: Carapace length less than 4.0. Palpal bulb with rl embolic flange with 4–6 folds, margin gently convexly curved; embolus not modified, apophysis absent (Fig. 2B,C). Conformation of palp as figured (Fig. 2A).

Description

Male holotype (Fig. 2A–D). *Size*. Carapace length 3.52, width 2.93. Abdomen length 4.18, width 2.31. *Colour*. Carapace, legs, palps and chelicerae brown, when dry carapace bedecked with golden hirsute sheen, caput blotched darker, ocular area dark brown. Palps and anterior legs with indistinct darker brown smudges on lateral surfaces of proximal segments. Abdomen dorsum brown with narrow pale bands in bilateral series of seven. Venter pale with sparse dark brown speckles most concentrated between posterior book lungs and along median. *Carapace*. Edge fringed with black bristles which encroach onto posterior ⅓ of post foveal surface. Line of 3 median bristles anteriorly inclined on caput arch. Group of 3 posteriorly inclined bristles on clypeus; 2 small anteriorly inclined bristles between PME. Weakly chitinized area extends onto pleuron membrane below clypeus. Fovea width 0.41, straight. *Eyes*. Raised on mound; anterior width 0.71, posterior width 0.66, length 0.38, width/length ratio 1.87. Line joining posterior edge of ALE bisects AME. Posterior row straight in front, recurved behind. *Chelicerae*. Rastellum single row of 5(5) long spines. Intercheliceral tumescence present. Fang groove with 6(6) promarginal teeth and 4(4) smaller retromarginal/intermediate row teeth. Serrated fang keels suspended along pl edges. *Labium*. Bulbous, length 0.35, width 0.54. Labiosternal suture narrow. *Maxillae* c. 18(19) fusiform antero-ental cuspules. *Sternum*. Length 1.91, width 1.43. Sigilla all small, round and indistinct; posterior sigilla 1.5 diameters from margin; others submarginal. *Legs*. Tibia I with apical bifid apophysis; distal process with 2(2) short spines, proximal process with 2(2) long and 1(1) short spines.

	Palp	I	II	III	IV
Femur	1.61	3.21	2.89	2.19	3.05
Patella	0.79	1.68	1.48	1.13	1.56
Tibia	1.27	1.90	2.22	1.38	2.98
Metatarsus	—	2.35	2.04	1.76	2.65
Tarsus	0.71	1.51	1.30	1.14	1.43
Total	4.38	10.65	9.93	7.60	11.67

Palp (Fig. 2A). Cymbium with c. 36 long blunt inclined spines distributed over distal ⅔ of d surface. RTA not swollen basally, covered with d and rd short fusiform spines which continue along rv edge of tibial excavation; DTA absent. TEM contiguous with RTA; surface smooth, TET not evident. *Bulb* (Fig. 2B,C). Embolus straight not modified, apophysis absent; rl embolic flange with c. 5 folds. *Scopula*. Moderately dense on tarsi I and distal ⅓ of metatarsi I; sparse on tarsi II and distal ⅙ of metatarsi II; absent on legs III and IV. *Trichobothria*. Palp: tarsi 4, tibia pd3 rd3. Leg I: tarsi 7, metatarsi 7, tibia pd4 rd4. Leg II: tarsi 6, metatarsi 6, tibia pd4 rd4. Leg III: tarsi 6, metatarsi 5, tibia pd3 rd4. Leg IV: tarsi 6, metatarsi 6, tibia pd5 rd5. *Leg Spination*. Leg I: metatarsi rv0112; tibia v011112. Leg II: tarsi rv12 spinules in file adjacent to scopula; metatarsi v0121112; tibia v01112. Leg III: tarsi v23; metatarsi v9, d0220; tibia v01110, d0220; patella pl3. Leg IV: tarsi v9 plus many bristles, metatarsi v6; tibia v4. *Abdomen*. Cover of fine hairs. Dorsum with median band of fine bristles. Left PLS missing

Female allotype (Fig. 2E). *Size*. Carapace length 5.77, width 4.18. Abdomen length 9.60, width 5.39. *Colour*. As for male; all lateral surfaces of limbs with more extensive darker smudges, ocular area unicolourous excepting darker between anterior and posterior eyes and some bilateral shading extending along caput arch. *Carapace*. Surface textured, not smooth. Edge sparsely fringed with some weak bristles which encroach onto posterior ⅕ of post foveal surface. Line of 5 median bristles anteriorly inclined on caput arch. Group of 3 long posteriorly inclined hairs on clypeus. Weak chitinized area extends onto pleuron membrane below clypeus. Fovea width 1.27 gently procurved. *Eyes*. Placed on low mound; anterior width 1.07, posterior width 1.04, length 0.54, width/length ratio 1.98. Line joining posterior edge of ALE transects anterior ¼ of AME. Posterior row straight in front, recurved behind. *Chelicerae*. Rastellum 5(6) long strong spines in anterior row, few others retreating along pd edge. Fang groove with 5(7) promarginal teeth and 6(5) smaller retromarginal/intermediate row teeth. Fang keel as for male. *Labium*. As for male, length 0.74, width 1.07. Labiosternal suture narrow. *Maxillae* c. 37(32) antero-ental fusiform cuspules, many broken away. *Sternum*. Length 3.00, width 2.35. Sigilla as for male. *Legs*

	Palp	I	II	III	IV
Femur	3.09	2.66	3.44	2.58	3.64
Patella	1.68	2.45	2.22	1.76	2.52
Tibia	1.78	2.88	2.37	1.33	3.72
Metatarsus	—	2.24	1.99	1.68	2.88
Tarsus	1.91	1.40	1.27	1.15	1.15
Total	8.46	11.63	11.29	8.50	14.16

Scopula. Moderately dense on almost entire v surface of palpal tarsi and tarsi I; sparse on distal ⅕ of metatarsi I; moderate on entire pv surface only of tarsi II; absent on legs III and IV. *Trichobothria*. Palp: tarsi 7, tibia pd3 rd3. Leg I: tarsi 9, metatarsi 10, tibia pd4 rd4. Leg II: tarsi 8, metatarsi 10, tibia pd4 rd4. Leg III: tarsi 7, metatarsi 7, tibia pd4 rd4. Leg IV: tarsi 8, metatarsi 7, pd4 rd5. *Leg spination*. Palp: tarsi pv01000, rv01000, tibia pv0112, rv02. Leg I: metatarsi v0112; tibia v0112. Leg II: metatarsi v012; tibia v0110. Leg III: tarsi v4 scattered on distal half; metatarsi v012, d0220; patella pd3. Leg IV: tarsi v4 scattered on distal half; metatarsi v01113. *Abdomen*. As for male. *Genitalia*. Sclerotized lip of epigynum uniformly recurved.

Etymology. The species is named in recognition of Mrs Lyn Abra one time spider curator at the Reptile Park, Gosford, NSW.

Distribution and natural history (Fig. 12C). Known only from small pockets of natural parkland within the densely settled urban region north of Sydney Harbour. Collection has been through placement of pitfall traps. Small size may not have lent itself to encouraging public interest and collection from that source is unknown. Pitfall traps were set amongst leaf litter and indicated male wandering time ranges from March to October. The burrow is unknown.

Misgolas gracilis (Rainbow & Pulleine, 1918)

Figs. 3A–I, 12A–B

Arbanitis gracilis Rainbow & Pulleine, 1918:110, pl. 22, figs. 57–58.
Arbanitis villosus Rainbow, 1920, p. 77–85, **new synonym**.
Arbanitis bradleyi Rainbow, 1920, p. 77–85, **new synonym**.
Dyarcyops gracilis.–Main, 1977:71 (from *Arbanitis*).
Misgolas gracilis.–Main, 1985b:24 (from *Dyarcyops*).

Material examined. HOLOTYPE ♀, AM KS6262, The Domain, Sydney (33°52'S 151°13'E), R.H. Pulleine.

Other material. Males: AM KS2170, Randwick (33°55'S 151°15'E), 19 Dec. 1978, N. Coroneds; AM KS3044, Mudgee (32°36'S 149°35'E), 31 May 1979, Mudgee Pastures Protection Board; AM KS6246, Annandale (33°52'S 151°10'E), 14 Dec. 1980; AM KS8511, Kendall (31°38'S 152°42'E), 15 Dec. 1981, C. Dick; AM KS8813, Tamworth (31°05'S 150°56'E), 15 Dec. 1981; AM KS10804, Berowra Waters (33°35'S 151°07'E), 15 Mar. 1983; AM KS18393, Blakehurst (33°59'S 151°06'E), 6 Jan. 1988; AM KS21512, Heathcote (34°05'S 151°01'E), 28 Feb. 1989; AM KS22785, Harbord (33°46'S 151°17'E), 9 Dec. 1989; AM KS22910, Narrabeen (33°43'S 151°18'E), 24 Apr. 1929, E. Mitchell; AM KS30221, Tarago (35°04'S 149°39'E), 15 Feb. 1990, E. Gibson; AM KS34720, Glebe (33°53'S 151°11'E), 28 Jan. 1993; AM KS35042, Potts Point (33°51'S 151°13'E), 20 Mar. 1993, Scott Barnes; AM KS36577, Bundeena (34°05'S 151°09'E), 18 Dec. 1973; AM KS38530, Windsor (33°37'S 150°49'E), 11 Oct. 1929; AM KS50061, Jamberoo (34°39'S 150°44'E), 15 Dec. 1995, L. Mitchell-Smith; AM KS69954, Bateau Bay (33°22'S 151°29'E), 20 Mar. 1999, L. Abra; AM KS86211, Symes Bay (32°21'S 152°30'E), 1 Mar. 2002, G. McKay. Females: AM KS7856, Warrumbungle National Park (31°13'S 149°05'E), 1 Feb. 1969, M. Gray; AM KS44339, Yowie Bay (34°00'S 151°06'E), 23 Nov. 1994, Milton Way; AM KS49338, Towler's Bay (33°37'S 151°19'E), 6 Feb. 1997, GW; AM KS69955, Pott's Point (33°51'S 151°13'E), T. Leslie.

Diagnosis. Medium to large dark brown spiders, eye group as narrow or narrower in front than behind; rd surface of metatarsi IV with a file of 1–4 long black spines (Fig. 3F). Venter pattern usually as figured (Fig. 3D), occasionally variable (Fig. 3E,G or black). In female: Carapace length c. 8–13.2. In male: Carapace length c. 5–10.2; embolus of bulb and rl embolic flange as figured (Fig. 3B,C). Conformation of palp as figured (Fig. 3A). TEM exiguous, pl surface chitinized and bearing strong TET.

Remarks. The female holotype of this species was described from a specimen collected from The Domain, parkland on the southern shore of Sydney Harbour near the central business district. Three female paratypes are lost (Main, 1985b). The holotype, preserved in alcohol, is a small female specimen, epigynum only moderately sclerotized. It is in poor condition, carapace damaged, abdomen detached, most limbs fractured and some segments missing. Markings on venter, described nature of burrow lid and precise locality where found allowed identification. No other *Misgolas* specimens are known from the type locality. An adult male collected from Potts Point, neighbouring the type locality of *M. gracilis*, is taken to be conspecific and is that described here.

Description of male AM KS35042 (Fig. 3A–E). *Size*. Carapace length 8.82, width 6.37. Abdomen length 8.72, width 5.68. *Colour*. Carapace and limbs brown concolourous, dark brown smudges on limbs absent. Abdomen dorsum dark brown with distinct pale bands in bilateral series of eight. Venter pale with dark brown markings concentrated marginally to and between ental edges of posterior book lungs and others forming a broken transverse mid-line. *Carapace*. Edge fringed with long black bristles which encroach onto posterior half of post foveal surface. Sparse cover of pale hairs and weak black bristles; hairs extend onto limbs. Group of c. 10 bristles on clypeus. Weakly chitinized area with 3 setae extends onto pleuron membrane below clypeus. Fovea width 1.19, slightly recurved. *Eyes*. Raised on a mound; anterior width 1.31, posterior width 1.38, length 0.92, width/length ratio 1.50. Line joining posterior edge of ALE transects anterior ⅓ of AME. Posterior row straight in front, recurved behind. *Chelicerae*. Rastellum 6(5) spines on antero-ental edge. Intercheliceral tumescence present. Fang groove with 7(7) promarginal teeth and 8(8) smaller retromarginal/intermediate row teeth. Weak serrated fang keel on pl edge. *Labium*. Bulbous. Length 0.84, width 1.07. Labiosternal suture divided. *Maxillae*. Cuspules c. 33(34) antero-ental stick-like, none surmounted by fine hair. *Sternum*. Length 5.16, width 3.07 appearing elongate. First and second pair sigilla round, submarginal; third pair oval, c. one diameter from margin. *Legs*. Tibia I with apical bifid apophysis; distal process with 2(2) short pointed spines, proximal process with 4(3) longer pointed spines.

	Palp	I	II	III	IV
Femur	5.03	7.94	7.35	6.26	8.53
Patella	2.46	4.12	3.78	3.25	4.11
Tibia	4.11	5.89	5.34	4.42	7.74
Metatarsus	—	6.32	5.84	5.83	8.42
Tarsus	2.03	3.25	3.19	3.13	3.56
Total	13.63	27.52	25.50	22.89	32.36

Palp (Fig. 3A). Cymbium with c. 46 long strong anteriorly inclined, almost prostrate, spines widespread on distal ⅓ of d surface. RTA covered with d and rd short spines which continue along rl and rv edge of tibial excavation; DTA not hooked, covered with pointed short strong spines. TEM exiguous, with 3 hairs, pl surface chitinized and bearing strong TET. *Bulb* (Fig. 3B,C). Embolic rl flange thick, opaque, narrow, with one prominent fold, c. 4 small corrugations, twists under, around and along embolus terminating as a subdistal d mound. *Scopula*. Complete on

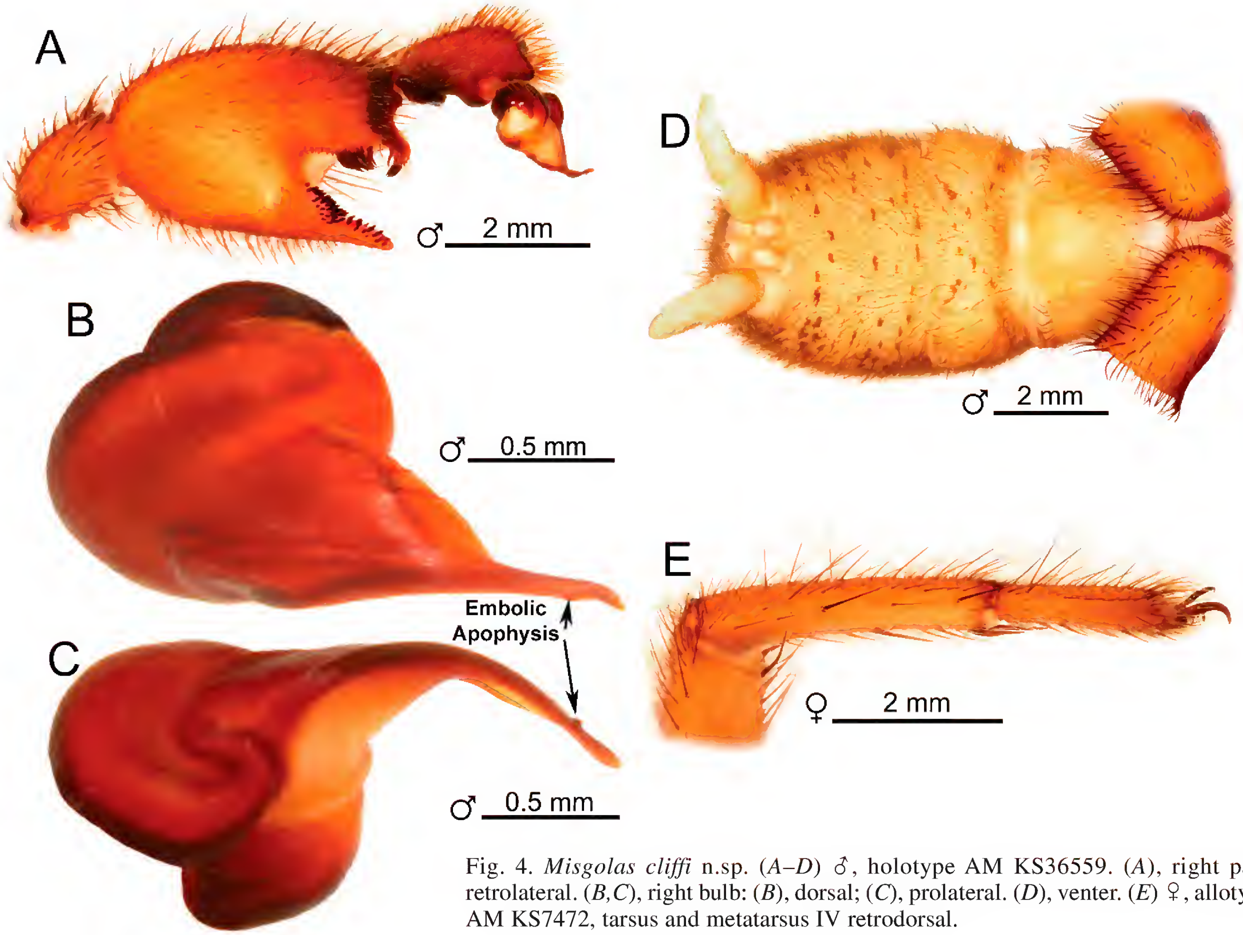

Fig. 4. *Misgolas cliffi* n.sp. (*A–D*) ♂, holotype AM KS36559. (*A*), right palp retrolateral. (*B,C*), right bulb: (*B*), dorsal; (*C*), prolateral. (*D*), venter. (*E*) ♀, allotype AM KS7472, tarsus and metatarsus IV retrodorsal.

all tarsi, dense on tarsi I and II, weak on III and IV; incomplete and sparse on all metatarsi. *Trichobothria*. Palp: tarsi 11, tibia pd6 rd6. Leg I: tarsi 12, metatarsi 16, tibia pd8 rd7. Leg II: tarsi 12, metatarsi 16, tibia pd7 rd7. Leg III: tarsi 12, metatarsi 13, tibia pd7 rd7. Leg IV: tarsi 12, metatarsi 17, tibia pd8 rd8. *Leg spination*. Leg I: metatarsi v012; tibia v0112, pd010. Leg II: tarsi rl row 7 small black spines; metatarsi rv0111113, pv011, pd000010; tibia v0113; pd01110. Leg III: tarsi v24 scattered; metatarsi pv6, rv8, d002220; tibia v0114, pl00110, rl00110; patella pd4. Leg IV: tarsi v17 strong scattered spines; metatarsi v8 strong spines, rd010; tibia v012. *Abdomen*. Dorsum with cover of fine bristles with underlying cover of fine hairs extending over venter.

Taxonomic note. Of 361 male specimens examined 31 (7.6%) bore no distal bifid tibial apophysis on leg I or else the apophysis was greatly reduced. The spiders were all of small size but not all small specimens were affected. These neotenic appearing forms were collected from widespread localities. The aberration has not been observed in other *Misgolas* species.

Distribution and natural history (Fig. 12A,B). This spider is the most widespread of any known *Misgolas* species found in NSW, ranging from Kendall and Tamworth in the north, west to the Warrumbungle Range, south to Mudgee and Tarago and thence east to Jamberoo (Fig. 12A,B). This distribution encompasses a variety of environments.

Collection dates of 361 male specimens held by AM indicate males wander throughout the year.

Burrow structure is given by Jordan (2001): Soil and silk burrow, door flap-like and fragile, semi-circular in shape, flattened on hinge side and silk lined below; a mature female burrow door measured c. 2 thick, 31 wide and 21 at right angles to hinge; thick silk around entrance rim; base of burrow enlarged and bulbous. This description concurs with burrow from which specimen AM KS49338 was excavated. Jordan (2001) noted *M. gracilis* hunted at entrance, door resting on caput. Tarsi of palps, legs I and II rest on rim visible beyond edge of door. Main (1976) records micro-habitat preference and syntopic association with another *Misgolas* species.

Misgolas cliffi n.sp.

Figs. 4A–E, 12C

Material examined. Holotype ♂, AM KS36559, Eastwood (33°47'S 151°05'E), 6 Aug. 1973, Mrs B. Stevenson. Allotype ♀, AM KS7472, Dundas (33°48'S 151°02'E), 3 May 1981, J. Carr. Abdomen in poor condition. Paratypes ♂♂: AM KS785, Dundas, (33°48'S 151°02'E), 15 Jun. 1977, A. Kearney; AM KS5106, Carlingford (33°47'S 151°03'E), 6 May 1980, A. Bastian; AM KS5876, West Pennant Hills, (33°44'S 151°00'E), 23 Jun. 1980; AM KS7680, Blacktown (33°46'S 150°54'E), 31 May 1981; AM KS10881, Gordon (33°45'S 151°09'E), 4 Apr. 1983, C. Horseman; AM KS36540, Neutral Bay (33°50'S 151°13'E), 29 Apr. 1971, K. Fields; AM KS36546, Springwood (33°42'S 150°34'E), 24 Jun. 1973, H. Christie; AM KS38535, Cambridge Park (33°45'S 150°44'E), 15 Jul. 1958; AM KS50005, West Pennant Hills (33°44'S 151°00'E), 25 May 1997, R. Saunders; AM KS50021, West Pennant Hills (33°44'S 151°00'E), 8 Jun. 1997, R. Saunders; AM KS51822, Dundas (33°48'S 151°02'E), 3 May 1981, J. Carr; AM KS69950, Dundas (33°48'S 151°02'E), 3 May 1981, J. Carr; AM KS35085, Concord (33°50'S 151°05'E), 17 May 1993, A. Batkin.

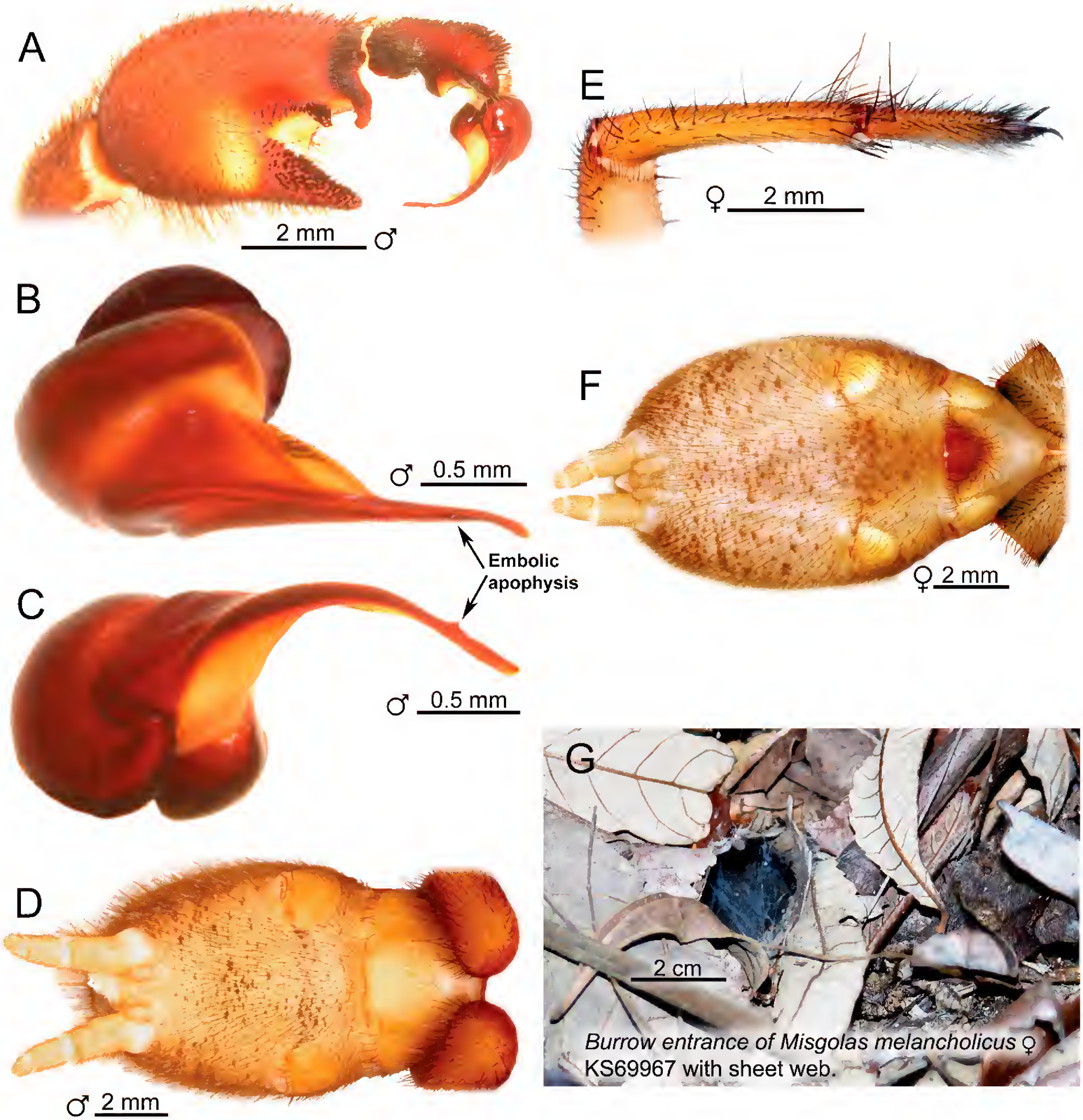

Fig. 5. *Misgolas melancholicus*. (*A–D*) ♂, AM KS6222. (*A*), right palp retrolateral. (*B,C*), right bulb: (*B*), dorsal; (*C*), prolateral. (*D*), venter. (*E,F*) ♀, AM KS69967. (*E*), tarsus and metatarsus IV retrodorsal; (*F*), venter. (*G*), burrow entrance.

Diagnosis. Medium sized brown spider; rd surface of metatarsi IV with 1 to 3 weak spines. Venter pattern as figured (Fig. 4D). In male: Carapace length c. 6–8.6. Palpal bulb with rl embolic flange with c. 5 folds, margin gently convexly curved; embolic apophysis pd placed midway on embolus (Fig. 4B,C). Cymbium dorsum with many long bristles, spines absent. Conformation of palp as figured (Fig. 4A).

Description

Male holotype (Fig. 4A–D). *Size*. Carapace length 7.64, width 5.78. Abdomen length 8.13, width 4.41. *Colour*. Carapace, limbs and chelicerae brown, when dry carapace bedecked with golden hirsute sheen, ocular area black. Darker brown lateral smudges on limbs not apparent. Abdomen dorsum brown with pallid bands in a bilateral series of c. 7, dorsum appearing more or less maculated. Venter pale with scattered arrangement of c. 20 evenly distributed dark spots. *Carapace*. Edge fringed with black bristles which encroach onto posterior ⅓ of post foveal surface. Two anteriorly inclined bristles on caput arch. Few golden hairs and c. 7 small bristles between PME; 8 posteriorly inclined bristles on clypeus. Weak chitinized area with some brown hairs extends onto pleuron membrane below clypeus. Fovea width 1.13, recurved at extremities. *Eyes*. Placed on a mound; anterior width 1.23, posterior width 1.07, length 0.77, width/length ratio 1.60. Line joining posterior edge of ALE transects anterior ⅙ of AME. Posterior row straight in front recurved behind. *Chelicerae*. Rastellum row of 6(7) spines, a few retreating along pd edge.

Intercheliceral tumescence brown, not pallid. Fang groove with 9(9) promarginal teeth and 5(7) small retromarginal teeth; intermediate row absent. Fangs armed with smooth pl keels. *Labium*. Bulbous, length 0.90, width 1.20. Labiosternal suture broad narrowing medially. *Maxillae* c. 35(32) small pointed fusiform antero-ental cuspules, most surmounted with a fine hair. *Sternum*. Length 4.38, width 3.08. Sigilla round; first and second pair small, third pair larger; first pair submarginal, second pair one diameter from margin, third pair two diameters from margin. *Legs*. Tibia I with apical bifid apophysis; distal process with 2(2) short pointed and proximal process with 3(3) longer pointed spines.

	Palp	I	II	III	IV
Femur	4.17	7.31	6.63	5.34	7.00
Patella	1.78	3.68	3.38	2.58	3.19
Tibia	4.05	5.28	5.03	3.38	6.20
Metatarsus	—	5.77	5.46	4.97	6.45
Tarsus	1.96	3.44	3.38	3.19	3.50
Total	11.96	25.48	23.88	19.46	26.34

Palp (Fig. 4A). Cymbium with many long weak attenuate bristles distributed over distal ⅔ of d surface; spines absent; lateral surfaces covered with long pallid hairs. RTA with sub-basal rd swelling; covered with d short spines. Mid-region of rv surface of tibial excavation bears an extended brush of c. 15 long pointed spines; DTA hooked terminated with c. 12 short pointed spines. TEM contiguous with RTA; pv surface weakly textured. *Bulb* (Fig. 4B,C). Embolus tip with slight pl bend; thorn-like d embolic apophysis placed c. midway; rl embolic flange with 5 major folds. *Scopula*. Dense on tarsi I and II, sparse on tarsi III and IV, sparse and incomplete on metatarsi I, II and III. *Trichobothria*. Palp: tarsi 11, tibia pd6 rd6. Leg I: tarsi 12, metatarsi 16, tibia pd8 rd7. Leg II: tarsi 12, metatarsi 16, tibia pd7 rd7. Leg III: tarsi 12, metatarsi 13, tibia pd7 rd7. Leg IV: tarsi 12, metatarsi 17, tibia pd8 rd8. *Leg spination*. Leg I: metatarsi v012, tibia v0112, pd010. Leg II: tarsi rl row of 7 small black spines, metatarsi rv0111113, pv011, pd000010; tibia v0113; pd01110. Leg III: tarsi v24 scattered; metatarsi pv6 scattered, rv8 scattered, d002220; tibia v0114, pl00110, rl00110; patella pd4. Leg IV: tarsi v17 scattered, metatarsi v8 scattered, rd010; tibia v012. *Abdomen*. Dorsum covered with brown bristles, sides and venter covered with pallid hairs.

Female allotype (Fig. 4E). *Size*. Carapace length 6.75, width 4.97. Abdomen length 13.00, width 7.15. *Colour*. Carapace, limbs and chelicerae light brown. Palps, legs I and II with some lateral dark brown smudges. When dry carapace bedecked with golden hirsute sheen. Abdomen dorsum darker brown with indistinct pallid bands in bilateral series of c. 7, dorsum appearing maculated. Venter pale with scattered arrangement of c. 26 dark spots. *Carapace*. Edge fringed with pale brown hairs which encroach onto posterior ¼ of post foveal surface. Two anteriorly inclined bristles on caput arch; c. 8 small bristles between PME; 4 posteriorly inclined bristles and many pallid hairs on clypeus. Weakly chitinized area with some small bristles and pallid hairs extends onto pleuron membrane below clypeus. Fovea width 1.33, straight. *Eyes*. Placed on low mound; anterior width 1.10, posterior width 1.00, length 0.69, width/length ratio 1.59. Line joining posterior edge of ALE transects anterior ⅕ of AME. Posterior eyes straight in front, recurved behind. *Chelicerae*. Rastellum single row of 5(5) spines with a few short spines forming a second row. Fang groove with 7(7) promarginal teeth and 8(7) small retromarginal teeth; intermediate row absent. Fangs armed with smooth pl keels. *Labium*. Bulbous, length 1.02, width 1.28. Labiosternal suture broad narrowing medially. *Maxillae* c. 38(37) short thick blunt cuspules. *Sternum*. Length 3.99, width 3.00. Sigilla all small round; first pair submarginal, second pair 1 diameter and third pair 2 diameters from margin. *Legs*

	Palp	I	II	III	IV
Femur	4.05	5.40	4.61	3.56	4.85
Patella	2.15	3.07	2.82	2.21	3.07
Tibia	2.27	3.25	2.82	1.84	4.18
Metatarsus	—	2.88	2.58	2.33	3.62
Tarsus	2.64	1.84	1.59	1.65	1.84
Total	11.11	16.44	14.42	11.59	17.56

Scopula. Dense on almost entire v surfaces of palpal tarsi, and legs I and II, sparse and incomplete on metatarsi I and II, absent on legs III and IV. *Trichobothria*. Palp: tarsi 9, tibia pd6 rd6. Leg I: tarsi 10, metatarsi 11, tibia pd8 rd7. Leg III: tarsi 11, metatarsi 12, tibia pd7 rd6. Leg IV: tarsi 11, metatarsi 13, tibia pd8 rd7. *Leg spination*. Palp: tarsi v02000; tibia v02214. Leg I: metatarsi v011, pl01; tibia v0111. Leg II: metatarsi v 01113; tibia v01111. Leg III: tarsi v11 scattered, pl0112, rl0110; patella pd7. Leg IV: v17 scattered; metatarsi v13 scattered, pl0010010. *Abdomen*. Dorsum hirsute with few small median bristles. Venter covered with weak bristles. *Genitalia*. Sclerotized lip of epigynum with median indentation.

Etymology. The species is named in recognition of author's second son, Cliff Wishart.

Distribution and natural history (Fig. 12C). This species is restricted to coastal areas of northern Sydney through to densely settled urban western suburbs and Springwood in the Blue Mountains.

Evidence from some home pool collections suggests this spider is well established. However being small in size, it has received little attention and collections by the public have been rare. The burrow is unknown.

Misgolas melancholicus (Rainbow & Pulleine, 1918) n.comb.

Figs. 5A–G, 12A–B

Dyarcyops melancholicus Rainbow & Pulleine, 1918:106, pl. 12, fig. 10.
Not *Misgolas rapax*.–Main, 1985b: 25.

Material examined. SYNTYPES ♂ and ♀ AM KS1631, Clifton Gardens, NSW (33°50'S 151°15'E), Aug. 1910, R. Pulleine.

Other material. Males: AM KS5328, Tamworth (31°05'S 150°55'E), 19 Jun. 1980, M. Keys; AM KS6222, Nth Balgowlah (33°48'S 151°15'E), 10 Dec. 1980; AM KS7222, Narrabeen (33°43'S 151°18'E), 26 Mar. 1981, J. Williams; AM KS8316, Springwood (33°41'S 150°34'E), 3 Feb. 1979, L. Abra; AM KS13618, North Ryde (33°47'S 151°07'E), 4 Jan. 1984, R. Nolan; AM KS16306, Hornsby Heights (33°39'S 151°05'E), 2 Feb. 1985; AM KS30220, Mt Tomah (33°33'S 150°25'E), 26 Feb. 1989, collector unknown; AM KS36673, Katoomba (33°42'S 150°19'E), 6 Aug. 1957, L. Abra; AM KS38551, Balmain (33°50'S 151°10'E), 7 Sep. 1975, G. Taylor; AM KS38632, Stewarts Brook (31°55'S 151°24'E), 18 Feb. 1993, M. Gray & G. Cassis; AM KS43695, Engadine (34°03'S 151°01'E), 24 Nov. 1972; AM KS43697, Waverly (33°55'S 151°03'E), 15 Dec. 1970;

AM KS44414, Gordon (33°44'S 151°09'E), 1 Mar. 1984; AM KS49366, New Lambton (32°54'S 151°42'E), 10 Apr. 1997, L. Abra; AM KS49369, Gosford(33°25'S 151°20'E), 10 Apr. 1997, L. Abra; AM KS49384, Harbord (33°47'S 151°18'E), 24 Apr. 1997, L. Abra; AM KS51161, Wisemans Ferry (33°22'S 150°59'E), 12 Feb. 1998, L. Abra; AM KS51785, Spring Ridge (32°16'S 149°21'E), 9 Jul. 1954, A. MacPherson; AM KS69956, Newport (33°38'S 151°18'E), 15 Sep. 1973, J.A. Wright; S8992 (QM), Armidale (30°30'S 151°39'E), 15 Jun. 1979, D. Piggot. Females: AM KS49389, Gosford (33°36'S 151°20'E), 24 Apr. 1997, L. Abra; AM KS49397, Umina (33°31'S 151°18'E), 12 May 1997, L. Abra; AM KS69966, Clifton Gardens (33°50'S 151°15'E), 9 Apr. 2003, G.Wishart; AM KS69967, details same as AM KS69966.

Diagnosis. Large dark brown spiders; rd surface of metatarsi IV without spines (Fig. 5E). Venter pattern dark scattered spots (Fig. 5D,F). In female: Carapace length c. 7.2–11.2. In male: Carapace length c. 5.5–10.5. Embolus of bulb with rl flange with c. 6 folds, margin almost straight; embolus tip with pl bend (Fig. 5B); embolic d apophysis with a rl lean placed midway (Fig. 5B,C). Conformation of palp as figured (Fig. 5A).

Comment. Main (1977) suggested this species should be synonymized with *M. rapax* and later (Main, 1985b) determined accordingly. Conformation of male bulb and brown marks on venter are characters not shared by type specimen for *Megalosara villosa* Rainbow (1914) and the validity of *M. melancholicus* is restored in this work.

Distribution and natural history (Fig. 12A,B). A widespread species in NSW, rarely found south of Port Jackson, extending north to Armidale, west to Spring Ridge and Katoomba. Occupies a variety of habitats.

Collection dates of 216 male specimens (AM) indicate the majority (55%) were wandering during the period January to April.

At the type locality the burrow entrance is raised above ground level, the lip is attached to, and partially supported by, leaves (Fig. 5G).

Misgolas trangae n.sp.

Figs. 6A–D, 12C

Material examined. HOLOTYPE ♂, AM KS49026, Jamieson Park, Narrabeen, NSW (33°43'S 151°18'E), 5–19 March, 1996 pitfall trap site 1, M.R. Gray and H.M. Smith. PARATYPES ♂♂, AM KS50019, details same as holotype; AM KS22843, Balgowlah, NSW (33°47'S 151°15'E), 16 Apr. 1963, P.F. Gambrill.

Diagnosis. Males are small brown spiders, carapace length c. 5.5; rd surface of metatarsi IV without spines; venter pale with pattern of distinct brown spots (Fig. 6D). Palpal bulb (Fig. 6B,C) with rl embolic flange with 4 folds, margin convexly curved; small dorsal embolic apophysis placed adjacent to embolic flange. Conformation of palp as figured (Fig. 6A). Female unknown.

Description

Male holotype (Fig. 6A–D). *Size*. Carapace length 5.34, width 3.99. Abdomen length 4.79, width 2.89. *Colour*. Caput and chelicerae dark brown, thorax lighter brown. Limbs brown, dark laterally with some faint darker smudges. When dry carapace bedecked with golden hirsute sheen. Abdomen dorsum pale with brown bands in a bilateral series of c. 7 appearing more or less maculated. Venter pale with evenly scattered arrangement of dark brown spots. *Carapace*. Edge fringed with black bristles which encroach onto posterior ⅕ of post foveal surface. One anteriorly inclined bristle on caput arch. Bristles absent between PME; 3 posteriorly inclined bristles on clypeus. Weakly chitinized area extends onto pleuron membrane below clypeus. Fovea width 0.7, slightly recurved, posterior rim distorted. *Eyes*. Placed on a mound; anterior width 0.87, posterior width 0.77, length 0.51, width/length ratio 1.71. Line joining posterior edge of ALE transects anterior ¼ of AME. Posterior row recurved in front, straight behind. *Chelicerae*. Rastellum first row of 5(5) spines, second row of 2(2) spines. Intercheliceral tumescence present. Fang groove with 5(6) large promarginal teeth and 4(2) (perhaps more obscured) small retromarginal/intermediate row teeth. Fang keels smooth. *Labium*. Bulbous, length 0.44, width 0.72. Labiosternal suture broad narrowing medially. *Maxillae* c. 25(21) small fusiform antero-ental cuspules. *Sternum*. Length 2.74, width 2.05. Anterior and middle pair sigilla small, round, submarginal; posterior pair larger, ovate, one diameter from margin. *Legs*. Tibia I with apical bifid apophysis; distal process with 2(2) short blunt and proximal process with 3(3) longer pointed spines.

	Palp	I	II	III	IV
Femur	2.51	4.61	4.05	3.32	4.98
Patella	1.23	2.33	2.15	1.66	2.27
Tibia	2.56	3.44	3.13	2.15	4.24
Metatarsus	—	3.32	3.07	2.89	4.18
Tarsus	1.10	2.03	1.96	1.96	2.33
Total	7.20	15.73	14.36	11.98	17.50

Palp (Fig. 6A). Cymbium with dense cluster of long weak ensiform spines distributed over distal ⅔ of d surface. RTA swollen midway; covered with d and rd short spines; extended brush of c. 22 longer pointed spines on rv surface of mid region of tibial excavation; DTA hooked, terminated with c. 12 short spines. TEM contiguous with RTA; pv surface weakly textured. *Bulb* (Fig. 6B,C). Embolus broad, gently bent and twisted with small d embolic apophysis basally placed contiguous with rl embolic flange; flange with 4 folds, margin strongly convexly curved. *Scopula*. Dense on Tarsi I and II, sparse on tarsi III and IV, incomplete on metatarsi I and II. *Trichobothria*. Palp: tarsi 8, tibia pd5 rd5. Leg I: tarsi 12, metatarsi 11, tibia pd6 rd5. Leg II: tarsi 11, metatarsi 11, tibia pd5 rd5. Leg III: tarsi 10, metatarsi 10, tibia pd5 rd5. Leg IV: tarsi 11, metatarsi 12, tibia pd7 rd7. *Leg spination*. Leg I: metatarsi v01002; tibia v0112. Leg II: metatarsi v0202; tibia v0113. Leg III: tarsi rv001110; metatarsi v02212, d002020; tibia v0122, d0220; patella pd3. Leg IV: tarsi v12; metatarsi v8; tibia v0223. *Abdomen*. Bilateral cover of fine hairs. Venter and dorsum with larger hairs; dorsum with anteriorly placed group of c. 30 long bristles.

Taxonomic note. May be confused with *M. maculosus* for which the male is unknown. Because of the maculate d abdominal colouration, arrangement of brown spots on venter, absence of spines on rd surface of metatarsi IV and littoral location consideration was given for this spider being the male of *M. maculosus* (Rainbow & Pulleine, 1918). Because the 30Km distance and the intersection of Sydney Harbour separating the respective localities this spider is determined here a good species.

Etymology. The species is named in recognition of the author's second daughter, Trang Wishart.

Distribution and natural history (Fig. 12C). This spider is known only from Sydney's coastal suburbs north of Port Jackson. The burrow is unknown.

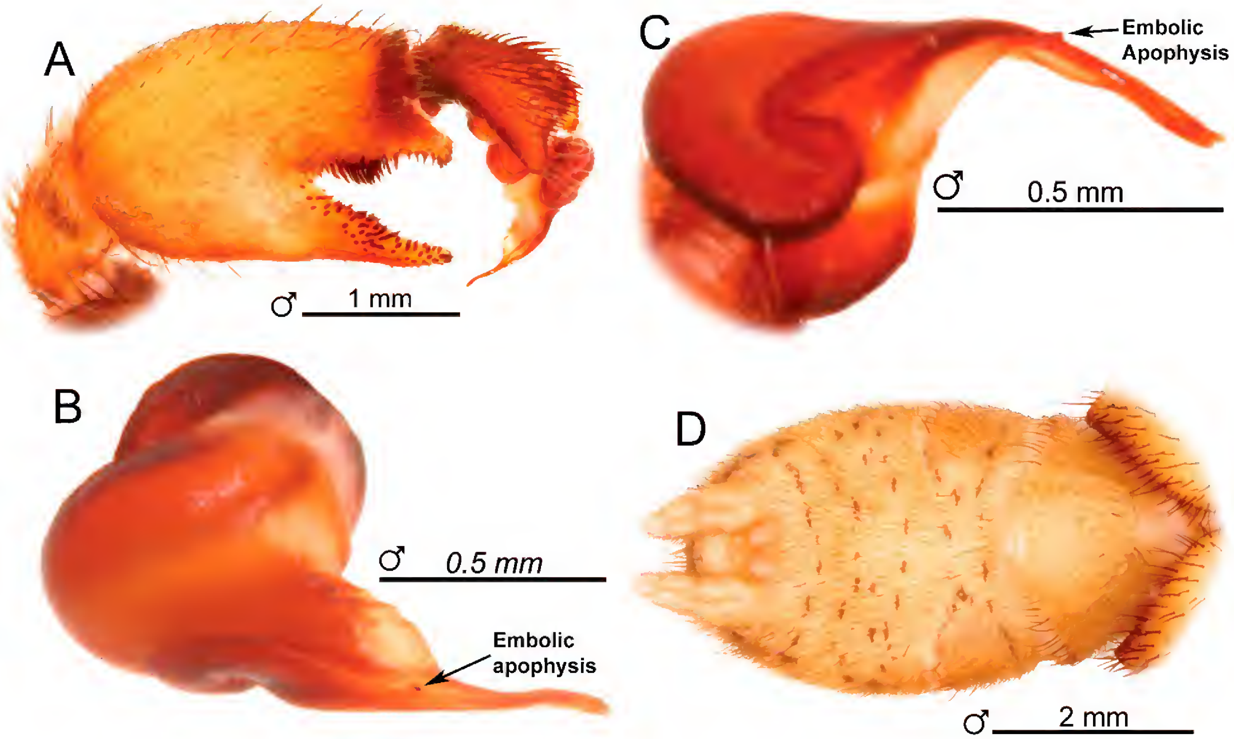

Fig. 6. *Misgolas trangae* n.sp. (*A–D*) ♂, holotype AM KS49026. (*A*), right palp retrolateral. (*B,C*), right bulb: (*B*), dorsal; (*C*), prolateral. (*D*), venter.

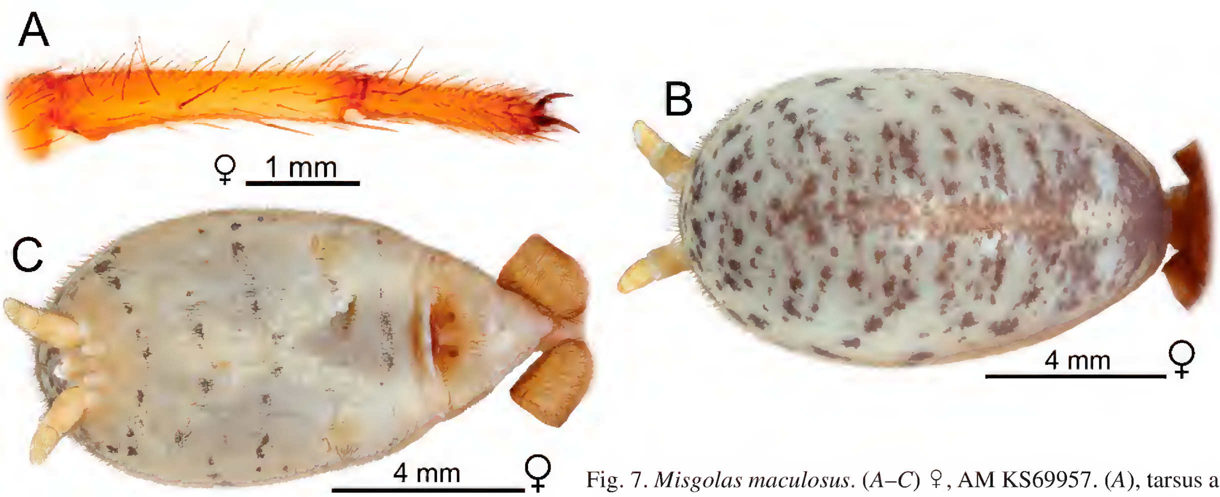

Fig. 7. *Misgolas maculosus*. (*A–C*) ♀, AM KS69957. (*A*), tarsus and metatarsus IV retrodorsal; (*B*), abdomen dorsum; (*C*), venter.

Misgolas maculosus (Rainbow & Pulleine, 1918)

Figs. 7A–C, 12C

Dyarcyops maculosus Rainbow & Pulleine, 1918:108, fig. 2–3.
Misgolas maculosus.–Main, 1985a: 53, 56; 1985b, 24.

Material examined. SYNTYPES ♀, AM KS15532 and AM KS15533 (♀♀♀). The syntypes evidently have deteriorated, venters of all but one spider are devoid of dark brown spots. The syntype AM KS15532 does however conform to the original description

Females: AM KS10981, Diamond Bay nr Vaucluse (33°51'S 151°17'E), 27 Apr. 1983, D. Markus; AM KS12495, Long Bay (33°57'S 151°15'E), 19 Jun. 1983, R. Mascord; AM KS69957, Malabar (33°57'S 151°14'E), 1 Aug. 1965, R. Mascord.

Diagnosis. In female: Small brown spiders, carapace length c. 4.2–7.6; rd surface of metatarsi IV usually without spines or with one weak spinule (Fig. 11A). Dorsum (Fig. 11B) with dark brown median band, lateral surfaces maculated; venter (Fig. 11C) with dark brown spots more or less arranged in 2–4 transverse rows. Male unknown.

Remarks. Similar to *M. trangae* for which only the male is known. The type specimens AM K41614 (1♀) and AM K41615 (3♀) were considered lost (Main, 1985b) but have been recovered in the AM collections. The additional material examined here has been determined as conspecific on the basis of proximity of localities from which collected, small size, consistency of venter markings and maculated appearance of dorsum.

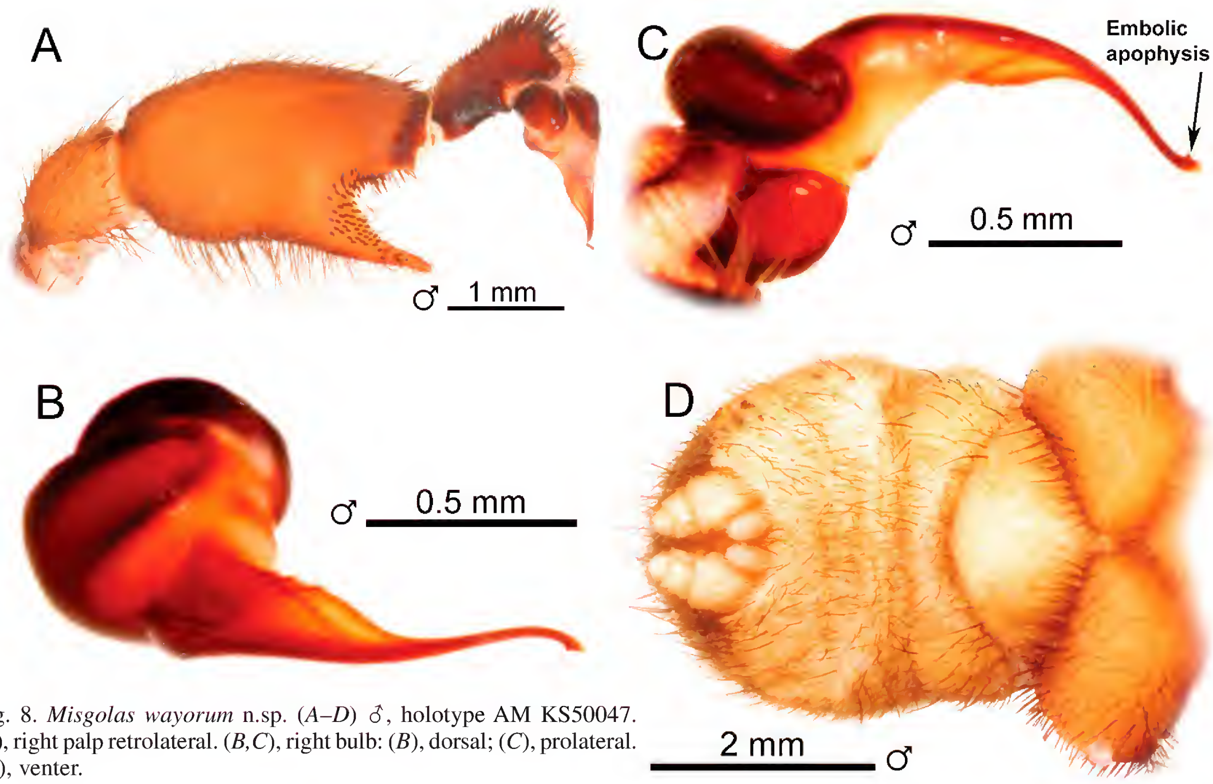

Fig. 8. *Misgolas wayorum* n.sp. (*A–D*) ♂, holotype AM KS50047. (*A*), right palp retrolateral. (*B,C*), right bulb: (*B*), dorsal; (*C*), prolateral. (*D*), venter.

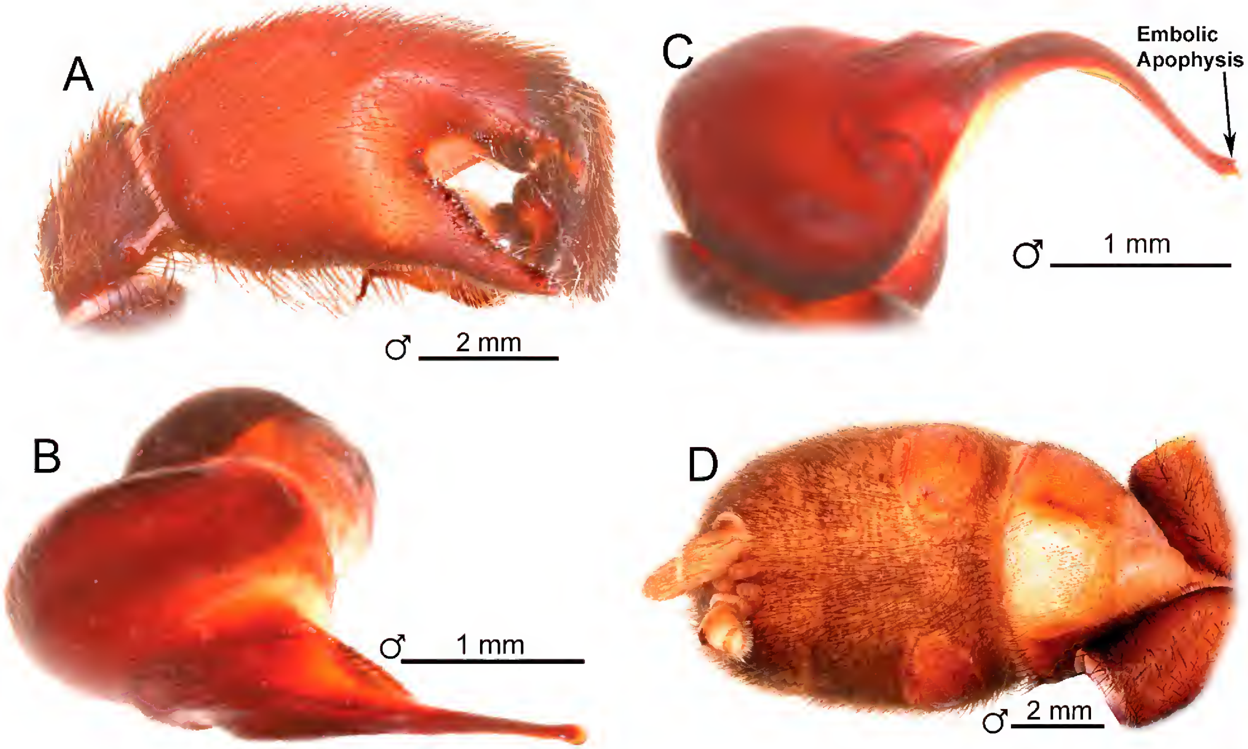

Fig. 9. *Misgolas rodi* n.sp. (*A–D*) ♂, holotype AM KS50083. (*A*), right palp retrolateral. (*B,C*), right bulb: (*B*), dorsal; (*C*), prolateral. (*D*), venter.

Distribution and natural history (Fig. 12C). This spider was first collected in 1918 and is only known from Sydney's Eastern Suburbs East of the Princes Highway between Port Jackson and Botany Bay. Evidently it is confined to sandy soils, a region which excludes *M. villosus*. The burrow is unknown.

Misgolas wayorum n.sp.

Figs. 8A–D, 12C

Material examined. HOLOTYPE ♂, AM KS50047, Woolooware, NSW (34°03'S 151°09'E). 6 July, 1997, Mrs Heather Sercombe.

Diagnosis. In male: Small brown spider, carapace length c. 5.5; rd surface of metatarsi IV without spines; venter entirely pale (Fig. 8D). Embolus of bulb (Fig. 8B,C) narrow and sinuous, with pd distal apophysis; rl flange with 4 folds. Conformation of palp as figured (Fig. 8A). Female unknown.

Description

Male holotype (Fig. 8A–D). *Size*. Carapace length 5.51, width 4.26. Abdomen length 4.69, width 3.24. *Colour*. Chelicerae dark brown. Carapace brown, ocular area almost black, narrow bilateral dark band along caput arch. Legs dark brown with weak dark lateral smudges. Abdomen pallid; d surface with longitudinal dark band, 5 or 6 transverse bilateral bands; venter not patterned. *Carapace*. Edge fringed with black bristles, many encroach onto posterior half of post foveal surface. Line of 10 anteriorly inclined dark bristles on length of caput arch. Group of 5 anteriorly inclined bristles between PME; 4 large posteriorly inclined and a few small bristles on clypeus. Weakly chitinized area with some setae extends onto pleural membrane below clypeus. Fovea width 0.99, slightly recurved. *Eyes*. Raised on low tubercle; anterior width 0.95, posterior width 0.87, length 0.46, width/length ratio 2.06. Line joining posterior edge of ALE bisects AME. Posterior row straight. *Chelicerae*. Rastellum single row of 5(4) long strong spines. Intercheliceral tumescence clearly visible. Fang groove with 5(6) large promarginal teeth and 7(7) small retromarginal/intermediate row teeth. Fang keels not smooth. *Labium*. Bulbous, length 0.56, width 0.82. Labiosternal suture broad narrowing medially. *Maxillae* c. 20(16) antero-ental small, pointed cuspules most surmounted by fine hair. *Sternum*. Length 2.87, width 2.10. Sigilla all small, round, sub-marginal. *Legs*. Tibia I with apical bifid apophysis; both processes with 2(2) spines.

	Palp	I	II	III	IV
Femur	2.76	5.40	4.67	3.62	(5.28)
Patella	1.28	2.64	2.33	1.84	(2.58)
Tibia	2.73	4.23	3.56	2.27	(4.85)
Metatarsus	—	3.81	3.44	3.07	(4.60)
Tarsus	1.18	2.39	2.27	2.15	(2.70)
Total	7.95	18.47	16.27	12.95	(20.01)

Palp (Fig. 8A). Cymbium with many anteriorly inclined peg shaped spines distributed over distal half of d surface. RTA narrow, finger-like, covered with d and rd short fusiform spines which continue along rv edge of excavation becoming progressively longer and attenuate. DTA absent. TEM contiguous with RTA. Tibial excavation pv surface textured extending onto pallid TEM. *Bulb* (Fig. 8B,C). Embolus narrow and sinuous with pd distal apophysis; rl embolic flange, narrow with c. 5 folds, margin slightly convexly curved. *Scopula*. Weak on tarsi I, tarsi II, and distal ⅙ of metatarsi I; sparse on tarsi III. *Trichobothria*. Palp: tarsi 6, tibia pd3 rd4. Leg I: tarsi 9, metatarsi 9, tibia pd5 rd4. Leg II: tarsi 9, metatarsi 9, tibia pd4 rd4. Leg III: Tarsi 8, metatarsi 7, tibia pd4 rd3. Leg IV: tarsi (8), metatarsi (10), tibia pd(5) rd(5). *Leg spination*. Leg I: metatarsi v013; tibia v0112. Leg II: tarsi row of 14 small spines along rv edge of scopula; metatarsi v02113; tibia v0112. Leg III: tarsi v27; metatarsi v6, d00120; tibia v0112, rd0011; patella pd2. Leg IV: tarsi v(22), metatarsi v(10). *Abdomen*. Cover of fine hairs; broad d band of long setae reducing in size and extending laterally to venter.

Etymology. The species is named in recognition of the Way family of Yowie Bay, and collectors of many spider specimens.

Distribution and natural history (Fig. 12C). This spider is known only from the type location. It was found wandering in a house on the corner of Dolan's and Caringbah Roads at Woolooware a suburb of Sydney situated on a peninsular between Botany Bay and Port Hacking. The area has been urbanized for some fifty years yet the type specimen is the only known example of the species. The burrow is unknown.

Misgolas rodi n.sp.

Figs. 9A–D, 12C

Material examined. HOLOTYPE ♂, AM KS50083, Kurrajong, NSW (33°34'S 150°40'E), 14 Feb. 1997, A. Dollin. (Brittle specimen, preserved in ethyl alcohol [75%]; probably desiccated prior to preservation).

Diagnosis. In male: Large blackish-brown spider, carapace length c. 10–11, rd surface metatarsi IV without spines; venter entirely black (Fig. 9D). Palpal bulb (Fig. 9B,C) with rl embolic flange with c. 9–10 fine folds, margin straight; embolus with subdistal d apophysis. Cymbium with many blunt anteriorly inclined d spines on c. ⅓ of distal surface. Conformation of palp as figured (Fig. 9A). Female unknown.

Description

Male holotype (Fig. 9A–D). *Size*. Carapace length 10.58, width 8.92. Abdomen length 10.68, width 6.88. *Colour*. Dark brown almost black. When dry carapace and proximal segments of limbs bedecked with hairs. Abdomen dorsum with some narrow bilateral marks. Venter entirely black. *Carapace*. Edge fringed with black bristles which lengthen posteriorly and encroach onto posterior half of post foveal surface. Line of c. 13 hairs and bases of missing hairs along entire length of caput arch. Group of 3 bristles between PME; c. 12 posteriorly inclined bristles on clypeus. Weakly chitinized area with few setae extends onto pleural membrane below clypeus. Fovea width 2.18, straight. *Eyes*. Raised on distinct mound; anterior width 1.72, posterior width 1.66, length 1.02, width/length ratio 1.69. Line joining posterior edge of ALE transects anterior ⅙ of AME. Posterior row slightly procurved in front, recurved behind. *Chelicerae*. Rastellum anterior row of 7(7) spines, c. 8(9) behind. Intercheliceral tumescence present. Fang groove difficult to view, marginal teeth not counted. Fang keels absent. *Labium*. Bulbous, length 1.28, width 1.54. Labiosternal suture narrow, undivided. *Maxillae* c. 42(39) small pointed antero-ental cuspules. *Sternum*. Length 6.26, width 4.54. All sigilla ovate; posterior pair twice diameter from margin, others by one diameter. *Legs*. Tibia I with apical bifid apophysis; distal process with 2(2) blunt spines, proximal process with 4(4) longer pointed spines.

	Palp	I	II	III	IV
Femur	6.45	10.29	9.41	7.64	10.39
Patella	2.82	5.16	4.85	3.81	4.73
Tibia	5.95	7.35	6.70	4.91	9.11
Metatarsus	—	7.45	7.12	6.82	9.31
Tarsus	2.95	3.92	4.05	4.79	4.91
Total	18.17	34.17	32.13	27.97	38.45

Palp (Fig. 9A). Cymbium with many blunt closely packed anteriorly inclined spines distributed over distal ⅓ of d surface; many long brown hairs projected forward from outer sides of cymbium lobes. RTA sub-basally swollen, covered with d short spines. Midregion of rv surface of tibial excavation bears brush of c. 14 longer attenuate spines; DTA hooked, terminated with c. 14 short spines. TEM pallid, large and contiguous with RTA; pv surface weakly textured. *Bulb* (Fig. 9B,C). Embolus straight, not twisted, with small thorn-like subdistal d embolic apophysis terminating a narrow d ridge concurrent with embolus; rl embolic flange with c. 9 fine folds, margin straight. *Scopula*. Dense on tarsi I and II, less dense on tarsi III and IV, incomplete and dense on metatarsi I and II, incomplete and sparse on metatarsi III and IV. *Trichobothria*. Palp: tarsi 11, tibia pd7 rd7. Leg I: tarsi 15, metatarsi 20, tibia pd7 rd7. Leg II: tarsi 17, metatarsi 18, tibia pd9 rd8. Leg III: tarsi 18, metatarsi 15, tibia pd8 rd8. Leg IV: tarsi 14, metatarsi 16, tibia pd9 rd8. *Leg spination*. Leg I: tibia v011111. Leg II: metatarsi v010; tibia v01111, pd0110; patella pd2. Leg III: metatarsi v031, d002120; tibia v0112, pl00110, rl00110; patella pd7. Leg IV: metatarsi v8 scattered; tibia v0112. *Abdomen*. Entirely covered with long dark hairs.

Etymology. The species is named in recognition of the author's fourth son, Rod Wishart.

Distribution and natural history (Fig. 12C). Known only from the type locality. The burrow is unknown.

Misgolas beni n.sp.

Figs. 10A–D, 12C

Material examined. HOLOTYPE ♂, AM KS38550, Camden, NSW (34°03'S 150°42'E), June, 1975, collector unknown.

Diagnosis. In male: Large brown spider, carapace length c. 8–9; rd surface of metatarsi IV without spines; venter pale with few sparse brown spots most concentrated between posterior book lungs (Fig. 10D). Palpal bulb (Fig. 10B,C) with rl embolic flange with c. 6 folds, margin convexly curved; embolus with small subdistal d apophysis. Cymbium with many squat blunt erect d spines on c. ⅞ of distal surface. Conformation of palp as figured (Fig. 10A). Female unknown.

Description

Male holotype (Fig. 10A–D). *Size*. Carapace length 8.24, width 7.06. Abdomen length 8.23, width 5.49. *Colour*. Cephalothorax, chelicerae and limbs dark brown. When dry carapace bedecked with golden hirsute sheen. Abdomen dorsum dark brown with pattern of small pale bands in bilateral series of six. Venter pale with very few small scattered dark brown spots most concentrated between posterior book lungs. *Carapace*. Edge fringed with black bristles which encroach onto post foveal surface. Line of c. 14 remaining bases of missing setae along entire length of caput arch. Group of 4 bristles between PME; c. 5 posteriorly inclined bristles on clypeus. Weakly chitinized area with a few setae extends onto pleural membrane below clypeus. Fovea width 1.67, straight. *Eyes*. Raised on a distinct mound; anterior width 1.33, posterior width 1.22, length 0.69, width/length ratio 1.92. Line joining posterior edge of ALE transects anterior ⅓ of AME. Posterior row recurved in front and behind. *Chelicerae*. Rastellum first row of 7(7) spines, second row of 8(6) spines and some smaller spines retreat along pd cheliceral edge. Intercheliceral tumescence present. Fang groove with 10(10) promarginal teeth and 16(16) smaller retromarginal/intermediate row teeth. Fang keels absent. *Labium*. Bulbous, length 0.97, width 1.20. Labiosternal suture narrow, undivided. *Maxillae* c. 51(64) fusiform antero-ental cuspules, c. half surmounted by a fine hair. *Sternum*. Length 4.61, width 3.63. All sigilla ovate; posterior pair twice diameter from margin, others by one diameter. *Legs*. Tibia I with apical bifid apophysis; distal process with 2(1) short pointed spines, proximal process with 3(3) longer pointed spines.

	Palp	I	II	III	IV
Femur	4.73	7.94	7.12	5.77	7.55
Patella	2.24	3.82	3.56	2.89	3.68
Tibia	3.99	5.71	5.10	3.38	6.63
Metatarsus	—	5.71	5.22	4.73	6.87
Tarsus	2.05	3.32	3.13	3.13	3.75
Total	13.01	26.50	24.13	19.90	28.48

Palp (Fig. 10A). Cymbium with many squat blunt erect spines distributed over distal ⅞ of dorsal surface; a few brown hairs projected forward from outer sides of cymbium lobes. RTA with slight sub-basal swelling, covered with d and rd short spines; distal half of rv surface of tibial excavation with an extended brush of c. 22 longer attenuate spines; DTA hooked with c. 16 short spines. TEM pallid, large and contiguous with RTA; pv surface weakly textured. *Bulb* (Fig. 10B,C). Embolus straight, not twisted, with thorn-like subdistal d embolic apophysis terminating a narrow d ridge concurrent with the embolus; rl embolic flange with 6 folds, margin convexly curved. *Scopula*. Dense on tarsi I and II, less dense on tarsi III and IV, incomplete and dense on metatarsi I and II, incomplete and sparse on metatarsi III and IV. *Trichobothria*. Palp: tarsi 9, tibia pd5 rd6. Leg I: tarsi 11, metatarsi 11, tibia pd8 rd7. Leg II: tarsi 11, metatarsi 12, tibia pd7 rd7. Leg III: tarsi 8, metatarsi 10, tibia pd6 rd6. Leg IV: tarsi 11, metatarsi 12, tibia pd6 rd7. *Leg spination*. Leg I: metatarsi v011; tibia v0112. Leg II: metatarsi v032; tibia v0112. Leg III: metatarsi v8 scattered, d011220; tibia v0113, pl00110, rl00110, patella pd6. Leg IV: metatarsus v8 scattered; tibia v6 scattered, rd011110. *Abdomen*. Abdomen covered with long dark bristles interspersed with pale hairs. Venter densely covered with pale hairs.

Etymology. The species is named in recognition of the author's third son, Ben Wishart.

Distribution and natural history (Fig. 12C). Known only from the type localities. The burrow is unknown.

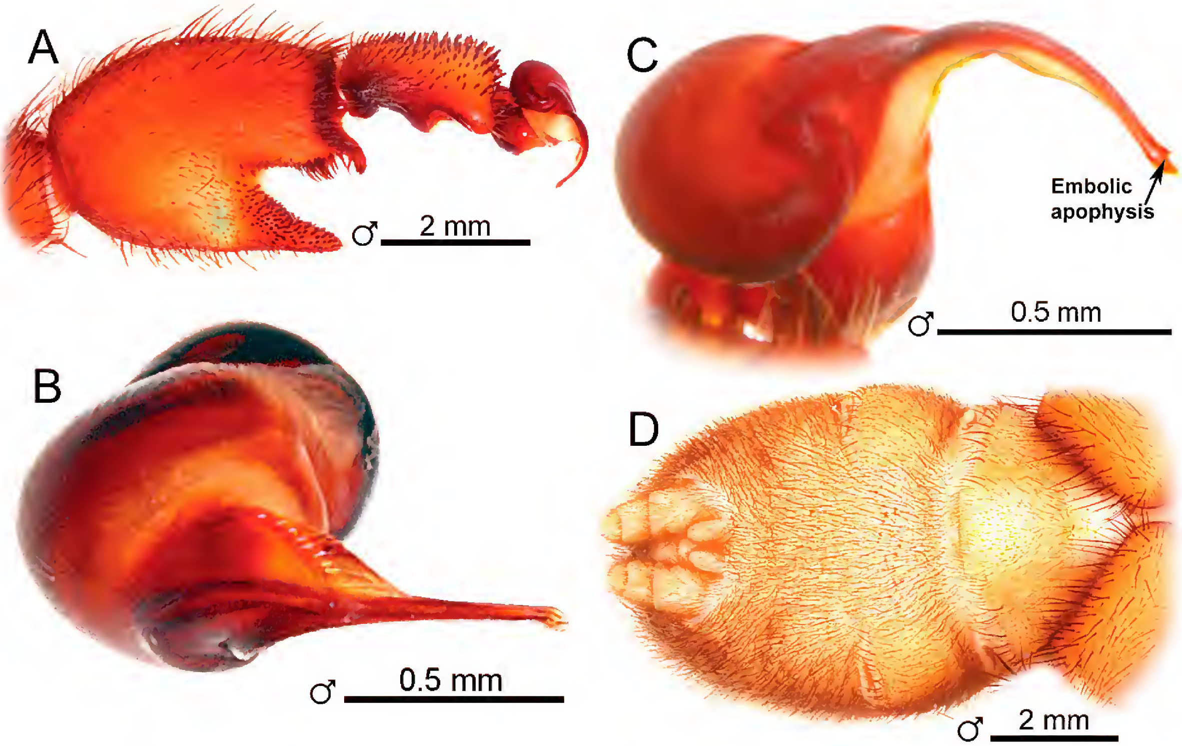

Fig. 10. *Misgolas beni* n.sp. (*A–D*) ♂, holotype AM KS38550. (*A*), right palp retrolateral. (*B,C*), right bulb: (*B*), dorsal; (*C*), prolateral. (*D*), venter.

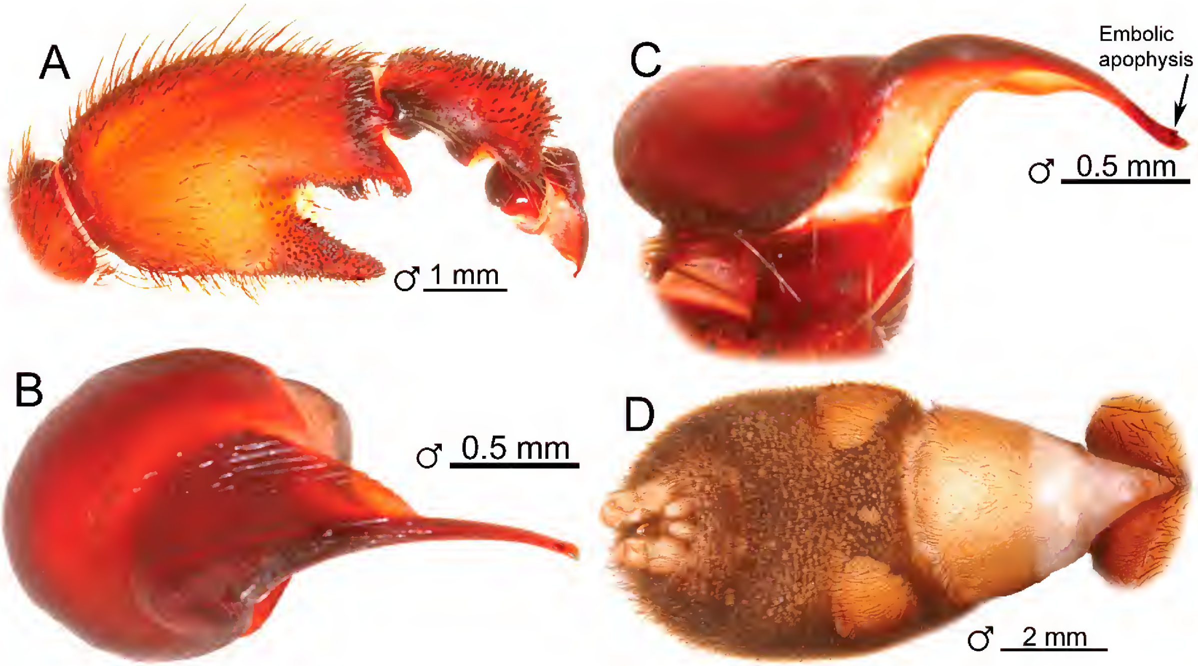

Fig. 11. *Misgolas michaeli* n.sp. (*A–C*) ♂, paratype AM KS51820. (*A*), right palp retrolateral. (*B,C*), right bulb: (*B*), dorsal; (*C*), prolateral. (*D*) ♂, holotype AM KS51819, venter.

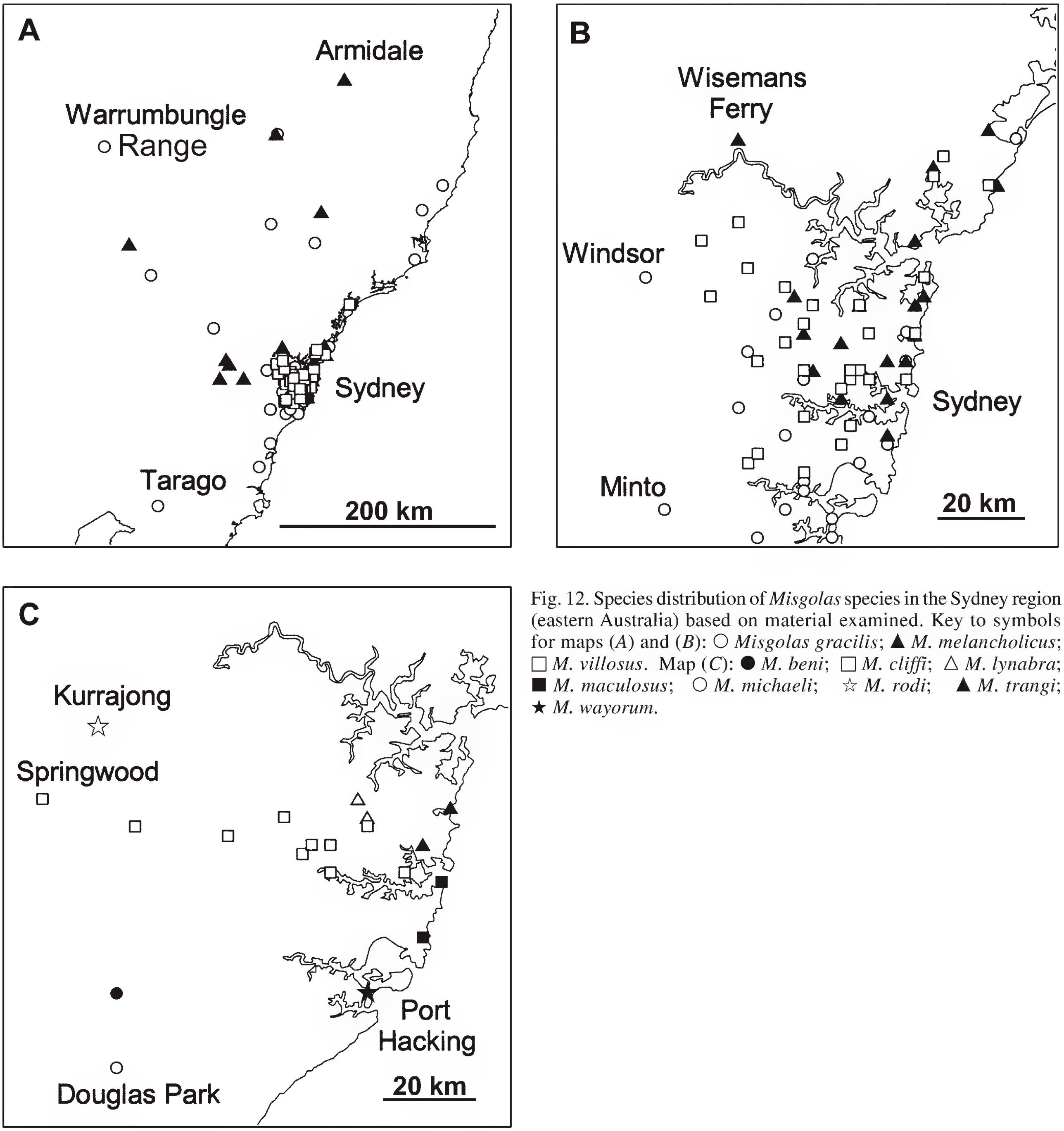

Fig. 12. Species distribution of *Misgolas* species in the Sydney region (eastern Australia) based on material examined. Key to symbols for maps (*A*) and (*B*): ○ *Misgolas gracilis*; ▲ *M. melancholicus*; □ *M. villosus*. Map (*C*): ● *M. beni*; □ *M. cliffi*; △ *M. lynabra*; ■ *M. maculosus*; ○ *M. michaeli*; ☆ *M. rodi*; ▲ *M. trangi*; ★ *M. wayorum*.

Misgolas michaeli n.sp.

Figs. 11A–D, 12C

Material examined. HOLOTYPE ♂, AM KS51819, Douglas Park, NSW (34°11'S 150°42'E), 28 Nov. 2000, Julie Samphier. PARATYPE ♂, AM KS51820, 28 Oct. 2000, other details as for holotype.

Description

Diagnosis. In male: Very large dark brown spider, carapace length c. 9–10, rd surface metatarsi IV without spines; venter entirely black (Fig. 11D). Palpal bulb (Fig. 11B,C) with rl embolic flange with c. 5–6 folds, margin straight; embolus with subdistal d apophysis. Cymbium with many short blunt sub-erect slightly anteriorly inclined d spines on c. ⅞ of distal surface. Conformation of palp as figured (Fig. 11A). Female unknown.

Male holotype (Fig. 11A–D). *Size*. Carapace length 9.51, width 7.55. Abdomen length 9.12, width 5.88. *Colour*. Dark brown almost black. When dry carapace seen to have golden interstrial hairs. Abdomen dorsum with narrow bands in bilateral series of c. 6. Venter entirely black. *Carapace*. Edge fringed with black bristles which lengthen posteriorly and encroach onto posterior half of post foveal surface. Line of c. 12 hairs along entire length of caput arch. Group of c. 8 bristles between PME; c. 14 posteriorly inclined bristles on clypeus. Weakly chitinized area with few setae extends onto pleuron membrane below clypeus. Fovea width 1.70, straight. *Eyes*. Placed on low mound; anterior width 1.54, posterior width 1.38, length 0.82, width/length ratio 1.88. Line joining posterior edge of ALE transects anterior ¼ of AME. Posterior row recurved in front and behind. *Chelicerae*. Rastellum anterior row of 6(6) spines, 2(2) behind. Intercheliceral tumescence present. Fang groove with 10(9) promarginal teeth and 12(13) smaller retro-marginal/intermediate row teeth. Fang keels absent. *Labium*. Bulbous, length 0.97, width 1.47. Labiosternal suture broad, undivided. *Maxillae* c. 55(51) fusiform antero-ental cuspules, a few surmounted by a fine hair. *Sternum*. Length 5.03, width 3.93. All sigilla small, round; c. 1.5 diameters from margin. *Legs*. Tibia I with apical bifid apophysis; distal process with 2(1) pointed spines and proximal process with 3(3) longer pointed spines.

	Palp	I	II	III	IV
Femur	4.54	8.04	7.25	5.78	7.64
Patella	2.25	4.02	3.62	3.04	3.82
Tibia	4.07	5.39	5.00	3.53	6.86
Metatarsus	—	5.59	5.29	4.80	6.57
Tarsus	2.17	3.23	3.23	2.94	3.72
Total	13.03	26.27	24.39	20.09	28.61

Palp (Fig. 11A). Cymbium with many short blunt sub-erect slightly anteriorly inclined spines distributed over distal ⅞ of dorsal surface; some brown hairs projected forward from outer sides of cymbial lobes. Tibial rv apophysis swollen sub-basely, covered with d and rl short spines; distal half of rv surface of tibial excavation with an extended brush of c. 18 longer attenuate spines; DTA hooked with c. 14 short spines. TEM pallid large and contiguous with RTA; pv surface weakly textured. *Bulb* (Fig. 11B,C). Embolus straight, not twisted, with thorn-like subdistal d embolic apophysis terminating narrow d ridge concurrent with embolus; rl embolic flange with c. 5–6 folds, margin straight. *Scopula*. Dense on all tarsi. Incomplete on all metatarsi. *Trichobothria*. Palp: tarsi 9, tibia pd 5, rd 6. Leg I: tarsi 12, metatarsi 11, tibia pd 7, rd 7. Leg II: tarsi 11, metatarsi 12, tibia pd 7, rd 7. Leg III: tarsi 12, metatarsi 9, tibia pd 6, rd 6. Leg IV: tarsi 12, metatarsi 13, tibia pd 7, rd 7. *Leg spination*. Leg I: metatarsi v0100; tibia v010102. Leg II: metatarsi rv011100, tibia v00012. Leg III: metatarsi d0121220; v1213; tibia pl00110, rl00110, patella pd5; v0114. Leg IV: tarsi pv01010; metatarsi v011214; tibia v0112. *Abdomen*. Entirely covered in long dark hairs. Dorsum with understorey of fine golden hairs.

Etymology. The species is named in recognition of the author's colleague and mentor Dr Michael Gray.

Distribution and natural history (Fig. 12C). Known only from the type locality. The burrow is unknown.

Remarks. This species may be confused with *A. beni* n.sp. and *A. rodi* n.sp but is separable from them by reference to conformation of dorsal spines on cymbium, erect *M. beni,* anteriorly inclined *M. rodi*.

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A New Genus for the New Caledonian Scincid Lizard *Lygosoma euryotis* Werner, 1909, and the Description of a New Species

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ABSTRACT. The generic allocation and alpha systematics of the New Caledonian scincid lizard *Lygosoma euryotis* Werner are reviewed. The species was known only from the type specimen for most of the last century, and was most recently placed in the genus *Marmorosphax* in 1986 (type species *Lygosoma tricolor* Bavay). The recent acquisition of additional specimens from the type locality on the Isle of Pines and from the far north of the Grande Terre has provided additional information on scalation, osteology, and mode of reproduction. These data in combination with mitochondrial and nuclear DNA sequence data indicate the current generic allocation for *Lygosoma euryotis* is inappropriate, and that it cannot be placed with confidence in any existing genus. A new genus is here proposed to accommodate the species. Further, *L. euryotis* is here recognized as comprising two widely allopatric species, *euryotis* from the Isle of Pines and a new species from the far north of the main island. Both species are regarded as threatened and categorized as Vulnerable, with the species from the north of the main island particularly at risk.

RÉSUMÉ. La position générique et la systématique alpha du lézard scincidé *Lygosoma euryotis* Werner de Nouvelle-Calédonie sont revus. L'espèce, qui n'était connue que par son spécimen-type durant la majeure partie du siècle passé, a été récemment placée dans le genre *Marmorosphax* en 1986 (espèce-type *Lygosoma tricolor* Bavay). L'acquisition récente de spécimens supplémentaires provenant de la localité-type sur l'Île des Pins et de l'extrême nord de la Grande Terre fourni des informations complémentaires sur l'écaillure, l'ostéologie et le mode de reproduction de ce lézard. Ces données, en combinaison avec les séquences d'ADN nucléaire et mitochondrial, montrent que l'attribution générique de *Lygosoma euryotis* n'est pas correcte et qu'il ne peut être placé avec fiabilité dans aucun des genres actuels. Nous proposons ici un nouveau genre pour cette espèce. De plus, nous montrons que *L. euryotis* comprend deux espèces nettement allopatriques, *euryotis* de l'Île des Pins et une nouvelle espèce de l'extrême nord de l'Île principale. Les deux espèces sont considérées comme menacées et classées dans la catégorie «vulnérable», l'espèce du nord de la Grande Terre étant particulièrement menacée.

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The scincid lizard *Lygosoma euryotis* was described by Werner in 1909 from a single specimen collected from the Isle of Pines, off the southern tip of New Caledonia. The species was only known from the type for over 75 years. The name has not appeared widely in literature, either in taxonomic accounts or regional inventories. Roux (1913) examined the type specimen and gave an account of the species as *Lygosoma (Leiolopisma) euryotis*. Greer (1974) listed it as one of 33 species in the genus *Leiolopisma*, which at the time included species from Australia (including Tasmania), New Zealand, New Caledonia, Vanuatu, Lord Howe Island, and Round Island (Mauritius).

A review of the New Caledonian scincid lizards by Sadlier (1986) assigned the majority of New Caledonian species previously included in *Leiolopisma* to a number of putatively monophyletic genera. Among the genera proposed was *Marmorosphax*, consisting of *Lygosoma tricolor* Bavay (type species) and *Lygosoma euryotis* Werner. At this time *M. euryotis* was only known from two specimens, Werner's type from the Isle of Pines, and a second skink from near Ouaième in northeastern New Caledonia, approximately 340 km distant.

The acquisition of a large series of specimens from the Isle of Pines (Bauer & Sadlier, 1994) provided data on aspects of osteology, reproduction, and variation in scalation for the type population of *euryotis* not previously available. Comparison of these skinks with the two older specimens discussed by Sadlier (1986), as well as an additional specimen from the mainland (AMNH 62685 from Tao on the northeast coast) revealed colouration differences between mainland (Grande Terre) and insular populations. Although Bauer & Sadlier (1994) tentatively considered all the material to be referrable to a single species, they noted that such differences, as well as the highly disjunct distribution of *M. euryotis* could be indicative of non-conspecificity.

The discovery of *Marmorosphax montana* from Mt Ouin in the Province Sud, in all aspects of appearance and behaviour the sister species to *Marmorosphax tricolor*, led Sadlier & Bauer (2000) to review the composition of the genus. In particular the generic allocation of *euryotis*, which lacks the viviparity and unfused atlantal arches characteristic of both *M. tricolor* and *M. montana*, within *Marmorosphax* was regarded as questionable. On this basis "*Lygosoma*" *euryotis* was regarded as incertae sedis within the *Pseudemoia* group of Greer (1989) pending further investigation (Sadlier & Bauer, 2000; Bauer & Sadlier, 2000).

The recent acquisition of additional specimens of "*euryotis*" from northern New Caledonia, and the availability of genetic techniques for assessing relationships now permit the re-evaluation of both the specific status of the disjunct populations currently assigned to *euryotis* and their generic allocation. The removal of *euryotis* from *Marmorosphax* also necessitates a re-diagnosis of that genus.

Materials and methods

Abbreviations. Institutional abbreviations are as follows: American Museum of Natural History, New York (AMNH); Australian Museum, Sydney (AMS); California Academy of Sciences, San Francisco (CAS); Institut Royal des Sciences Naturelles de Belgique, Brussels (IRSNB); Museum of Comparative Zoology, Harvard (MCZ); Muséum national d'Histoire naturelle, Paris (MNHN); and Queensland Museum, Brisbane (QM).

The full suite of morphological characters listed below was scored for each specimen where possible.

Measurements. Snout to vent length (SVL)—measured from tip of snout to caudal edge of anal scales; axilla to groin distance—measured from middle of base of forelimb to middle of base of hindlimb; forelimb to snout length—measured from tip of snout to middle of base of forelimb; hindlimb length—measured from middle of base of hindlimb to tip of fourth toe including nail; tail length—measured from caudal edge of anal scales to tip of tail, on complete original tails only as determined from X-rays. Body measurements (axilla to groin, forelimb to snout, hindlimb, and tail lengths) are for all specimens, Sexual maturity was determined by reproductive maturity (presence of enlarged yolked ovarian follicles or eggs in females, and presence of enlarged testes and distinctive colouration in males) and/or obvious size classes, and are expressed as percentages of snout to vent length in the taxon accounts.

Scalation. Midbody scale rows—number of longitudinal scale rows around body counted midway between axilla and groin; paravertebral scale rows—number of scales in a paravertebral row from first scale posterior to parietal scale to last scale at level of vent opening; fourth finger and toe scales—number of dorsal scales on fourth digit of hand and foot, distal scale contains claw, basal scale broadly contacts adjacent basal scale of third finger or toe; fourth finger and toe lamellae—number of ventral scales on fourth digit of hand and foot, distal scale contains claw, basal scale is last largely undivided scale at, or proximal to, a point level with intersection of third and fourth digits. Bilateral scalation characters were scored on both sides and the mean value used. Sexual dimorphism in paravertebral scales (the scalation character most likely to exhibit this trait) was assessed using independent two-sample *t*-test in the largest single sample from a single location. Variation between populations was assessed using independent two-sample *t*-tests for all scalation characters.

Osteology. Specimens were radiographed using an Eresco AS2 X-ray machine to determine phalangeal formulae and the number of presacral vertebrae and postsacral vertebrae (complete original tails only) at exposures of 30 sec at 30 kV. Condition of the atlantal vertebrae was assessed from dried skeletal material.

Genetic studies. As part of a broad-scale phylogenetic study of the endemic reptiles of New Caledonia, we have obtained mitochondrial and nuclear DNA sequences (514bp of ND2 and 830bp of rag-1) from the majority of New Caledonian skink species (including all but one genus) and representatives of related lygosomine skink lineages from Africa, Australia and New Zealand. Our phylogenetic analysis includes two representatives of *euryotis* and three of the new species described from the northwest of the main island, and 18 specimens of *Marmorosphax tricolor* and *M. montana* from 10 localities, including regionally sympatric samples of *M.* cf. *tricolor* (n = 2) and the new species (n = 2) from Mt Taom in northwest New Caledonia.

Molecular data were analysed within maximum parsimony and Bayesian frameworks using PAUP* (b4v10 Swofford, 1999) and Mr Bayes v3 (Hulsenbeck & Ronquist, 2001) respectively. Support for nodes on the optimal topologies was assessed using bootstrap and Bayesian posterior probability values.

Systematics

From the available data we have attempted to identify monophyletic lineages for the taxa studied here. The assignment of *Lygosoma euryotis* Werner and *Lygosoma tricolor* Bavay to *Marmorosphax* was based on these species sharing a unique, but limited, suite of seven derived characters (Sadlier, 1986). At that time the state of two key characters, mode of reproduction and condition of the first cervical vertebrae, could not be determined for *Lygosoma euryotis* from the material available. A live-bearing mode of reproduction was reported for *Marmorosphax tricolor* at the time the genus was proposed, but was not listed among the apomorphies diagnosing it, as the mode of reproduction for *Lygosoma euryotis* was unknown. The first cervical vertebra of *M. tricolor* consists of three elements, the two lateral atlantal arches and the basal intercentrum—the pleisiomorphic condition among members of the *Eugongylus* group of skinks (Greer, 1989). The condition of the atlantal vertebrae cannot readily be determined without some damage, and given that only two specimens of *euryotis* were known to exist at that time (one of which was the type) such an examination was not attempted.

Specimens from recent field collections show *euryotis* and a sibling species from the north of the Grande Terre both have an egg-laying mode of reproduction and the atlantal arches of the first cervical vertebra fused to the intercentrum. Also, recently collected specimens of *Marmorosphax montana* show this species has a live-bearing mode of reproduction similar to its sister species *M. tricolor*.

In the light of this new information retention of *euryotis* within *Marmorosphax* would imply evolution of both viviparity (*tricolor* + *montana*) and fusion of the atlantal arches to the intercentrum (*euryotis*) within only certain members of the genus. This has not been observed in any New Caledonian genus of skinks.[1]

Phylogenetic studies in progress using mitochondrial and nuclear DNA sequences recognize *euryotis* + the sibling species described in this paper as a monophyletic lineage, and *M. tricolor* + *M. montana* + two undescribed species as an independent monophyletic lineage, with no support for the two being especially closely related with respect to each other.

The morphological and genetic data in combination indicate *Lygosoma euryotis* Werner cannot be placed with confidence in any existing monophyletic genus within the *Eugongylus* group of skinks, and that a new genus is warranted to accommodate the species *euryotis*, apparently restricted to the Isle of Pines, and a newly recognized sibling species from the north of the Grande Terre.

Celatiscincus Sadlier, Smith, & Bauer, n.gen.

Type species. *Lygosoma euryotis* Werner, 1909:271.

Diagnosis. The following suite of apomorphic characters in combination will distinguish *Celatiscincus* from all other genera in the *Eugongylus* group of Greer (1979): frontoparietal scales fused; naris positioned in a single large nasal scale, with no evidence of scale or postnasal suture; anterior loreal reduced, either contacting upper labials narrowly, or present as a semilunar scale failing to contact upper labials; contact between lower eyelid and adjacent upper labials interrupted by the presence of complete subocular scale row; parietal scales each bordered by a single enlarged upper temporal scale and 2 (rarely 3) equal sized nuchal scales no larger than the surrounding dorsal scales; lower eyelid with an obvious, centrally located semi-transparent disc; ear lobules barely distinguishable from blunt conical scales around upper, lower, and posterior edges of ear opening; premaxillary teeth 13; atlantal arches of first cervical vertebrae fused to intercentrum.

The genus sharing the greatest number of derived features with *Celatiscincus* is *Sigaloseps*. However, *Sigaloseps* lacks the elevated number of premaxillary teeth and has each parietal bordered by an enlarged upper secondary temporal and transversely enlarged nuchal scale, rather than an enlarged upper secondary temporal and two (or more) smaller equal sized scales seen in *Celatiscincus*. Further, *Sigaloseps* has smooth body scales, whereas *Celatiscincus* has keeled body scales. The polarity of this latter character has yet to be determined. Comparison to the two closest outgroups: New Zealand+Australian *Eugongylus* group species and *Eugongylus*+*Emoia*+*Leiolopisma* (based on genetic evidence—Smith, 2001) would indicate smooth scales are the pleisiomorphic state at the level of the New Caledonian radiation.

Etymology. The name *Celatiscincus* is derived from *celatus*, the Latin for concealed and *scincus*, a Latinized version of a Greek word for lizard, particularly applied to skinks or other "shiny-scaled" lizards, and alludes to the isolation of the ranges of the constituent species and the fact that the identity and affinities of these taxa remained "hidden" to systematists for so long. The name is masculine.

Recognized species. *Celatiscincus euryotis* (Werner, 1909); and *Celatiscincus similis* n.sp. Sadlier, Smith, & Bauer.

The two species of *Celatiscincus* are similar in overall appearance. They are small in size with long tails and relatively long limbs, and share the same basic configuration of head scalation that includes: prefrontals moderately large and moderately to widely separated; frontoparietals fused; interparietal distinct; parietals each bordered by a single large upper secondary temporal and two (rarely three) equal sized scales no larger than the surrounding dorsal scales; nasals well separated; loreals two, anterior narrowly contacting labials, occasionally present as a semilunar scale failing to contact the labials; supraciliaries usually 7; upper labials usually 7; a complete subocular row between preocular and pretemporal scales; primary temporal single; lower secondary temporal single; tertiary temporals two; postlabials two; lower eyelid with an obvious, centrally located semi-transparent disc. Both species are sexually dimorphic in adult colour (see Bauer & Sadlier, 2000, pl. 18C–F), and adult females of both species typically have a

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[1] Only in the Australian genus *Niveoscincus* as proposed by Hutchinson *et al.* (1990) are both conditions present. However, although the generic diagnoses provided for *Niveoscincus* and other genera proposed by Hutchinson *et al.* are based on morphological characters, the framework within which these diagnoses were formulated was determined by immunological data alone. As such the morphological data do not provide an independent test for the monophyly of groups identified by the immunological study.] The species *euryotis* and its sibling species from the north of the Grande Terre shares some apomorphic characters with *Sigaloseps* Sadlier, but none in particular, or even all in combination, are sufficiently compelling to infer a level relationship that would suggest they are congeneric.

Fig. 1. *Celatiscincus euryotis*, an adult male (above) and adult female (below) from Waa Mé Bay, Isle of Pines, New Caledonia.

narrow, white hip stripe (dark-edged above) that extends over the hindlimbs and along basal portion of tail that is not present in adult males.

Diagnoses and descriptive data for *Celatiscincus euryotis* have been published by: Werner (1909, as *Lygosoma euryotis*); Sadlier (1986, as *Marmorospha* × *euryotis*); and Bauer & Sadlier (1994, as *Marmorospha* × *euryotis*); and Bauer & Sadlier (2000, as *"Lygosoma" euryotis*). However, the species accounts of Sadlier (1986) and Bauer & Sadlier (2000) were composite, including information from specimens from both the Isle of Pines and from the north of the Grande Terre. We here redefine *C. euryotis* and diagnose and describe a second member of the genus to accommodate the mainland New Caledonian populations previously subsumed within *C. euryotis*.

Celatiscincus euryotis Werner, 1909

Figs. 1, 2

Material examined. AMS R138528–46, R138569–70, R138572–77, R138620, CAS 182089–108, 182118–27, 182140–45, 182181, 182186–88, 182199 New Caledonia, Province Sud, Isle of Pines, Gite Kodjeue on Waa Mé Bay, 22°34'S 167°25'E; AMNH 81783 New Caledonia, Province Sud, Isle of Pines, Vao; and CAS 80889 and IRSNB 2.025 Isle of Pines—no specific locality.

Diagnosis. *Celatiscincus euryotis* is distinguished in morphology from *Celatiscincus similis* n.sp. (the only other species in the genus) by differences in adult colouration and osteology. Adult male *Celatiscincus similis* n.sp. have a bright russet flush to the body around the area of the hindlimbs, and adult females a bright russet flush to the whole of the tail, whereas these colours are muted in *Celatiscincus euryotis* (see also Bauer & Sadlier [1994] for a discussion of colour in *C. euryotis*). *Celatiscincus euryotis* has fewer presacral vertebrae (mode 28) than *Celatiscincus similis* n.sp. (mode 29). These differences in colouration and osteology are supported by DNA sequence data (see section on relationships below).

Description. Based on 28 specimens (33.0–42.0 mm SVL) in the AMS collection, comprising 12 adult males, 14 adult females, and 2 subadults.

Measurements: maximum SVL of males 42.0 mm, females 40.0 mm; distance from axilla to groin 48.5–56.4% of SVL ($\bar{x}$ = 52.0%, n = 28); distance from forelimb to snout 37.5–45.5% of SVL ($\bar{x}$ = 41.2%, n = 28); hindlimb length 38.1–44.3% of SVL ($\bar{x}$ = 41.1%, n = 27); tail length 151.4% of SVL for adult individual with most complete tail.

Scalation: Midbody scale rows 30–36 ($\bar{x}$ = 33.1±1.26, n = 28); paravertebral scales 49–57 ($\bar{x}$ = 52.4±2.20, n = 28)—no sexual dimorphism between 12 males and 14 females ($\bar{x}$ 52.33 *vs* 52.57, $t_{24} = -0.27$, $P<0.792$); scales on top of fourth finger 8–10 ($\bar{x}$ = 8.9±0.38, n = 27); lamellae beneath fourth finger 15–18 ($\bar{x}$ = 16.2±0.68, n = 26); scales on top of fourth toe 11–13.5 ($\bar{x}$ = 12.75±0.57, n = 36); lamellae beneath fourth toe 30–40 ($\bar{x}$ = 35.3±1.87, n = 33).

Osteology: presacral vertebrae 28 (n = 14)–29 (n = 3); postsacral vertebrae 41 (specimen with most complete tail showing no evidence of regeneration); phalangeal formula for manus and pes 2.3.4.5.3 and 2.3.4.5.4 respectively.

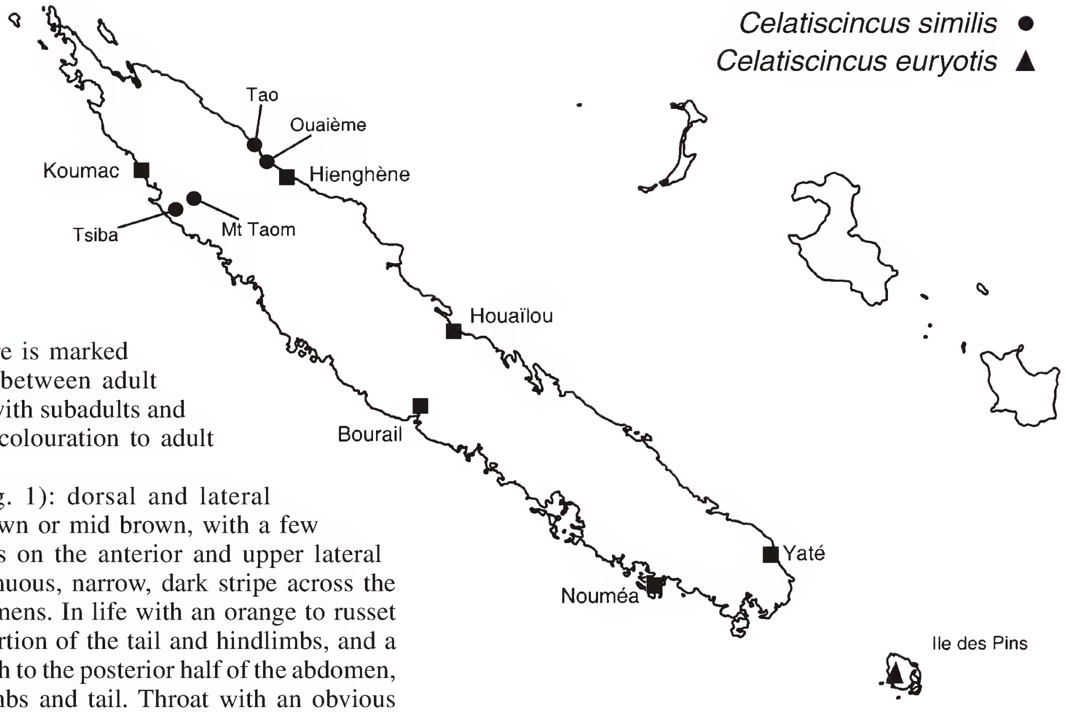

Fig. 2. Distribution of *Celatiscincus euryotis* and *Celatiscincus similis* n.sp. in New Caledonia.

Colouration: There is marked sexual dimorphism between adult males and females, with subadults and juveniles similar in colouration to adult females.

Adult males (Fig. 1): dorsal and lateral surface tan-light brown or mid brown, with a few scattered dark flecks on the anterior and upper lateral surface, and a continuous, narrow, dark stripe across the snout in some specimens. In life with an orange to russet flush to the basal portion of the tail and hindlimbs, and a moderate yellow flush to the posterior half of the abdomen, underside of hindlimbs and tail. Throat with an obvious pattern of dark transverse markings on the outer chinshields and throat scales, and a variably defined, narrow, dark, longitudinal streak on the throat and chest.

Adult females (Fig. 1): body usually two-toned, but the degree of differentiation between the dorsal and lateral surfaces varies. Dorsal surface of the body dull light-brown or mid-brown. Lateral surface light-mid grey with scattered dark flecking overall, boldly marked individuals with these darker markings covering most of the lateral surface and contrasting markedly with the paler dorsal colour. Dark markings on dorsal surface aligned as a concentration of longitudinal flecks along dorsolateral margin, tending to form a continuous, narrow, dark stripe along the temporal margin, and across the snout in some specimens. A narrow, white, hip stripe (dark-edged above) extends along basal portion of tail and over the hindlimbs, continuing as a pale, narrow upper edge (paler than hip stripe) to the dark dorsolateral markings, extending to near the temporal region in some specimens. In life with a dull orange flush to the lateral, dorsal, and ventral areas of the entire tail, remainder of underside of body and hindlimbs white.

Subadults—overall body colouration usually darker with dark lateral flecking extending over most of the lateral surface, otherwise subadult males have a colour pattern typical of adult females and juveniles including a weak to obvious pale hip stripe and a continuous concentration of dark flecks along the dorsolateral margin in the shoulder region—ventral colouration of pale.

Reproduction: The series collected during the wet season in early March 1992 contained a high proportion of gravid females which consistently showed an egg laying mode of reproduction with a clutch size of 2–3 shelled oviducal eggs.

Distribution and habitat. The species is known only from the Ile of Pines, approximately 50 km southeast of the southern coast of the Grande Terre (Fig. 2). Its distribution on the island and surrounding islets may be very localised. A recent survey of islets off the Ile of Pines did not reveal the presence of the species at any of those examined.

Celatiscincus similis Sadlier, Smith & Bauer, n.sp.

Figs. 2–5

Type material. HOLOTYPE: MNHN 2003.1006 (formerly AMS R153524); New Caledonia, Province Nord, Tsiba, c. 3 km north of Ouaco, 20°48'14"S 164°28'19"E; collected by R.A. Sadlier, M. Christy & M. Thurlow, 25.xi.1998. PARATYPES: AMS R153504–23, R153525, same location and date of collection as holotype; AMS R153559–66, CAS 226168–69, 226170–72, MCZ R183656, same location and collectors as holotype, 26.xi.1998; AMS R153585–86, CAS 226173, New Caledonia, Province Nord, Massif Ouazangou-Taom, Mt Taom, 20°45'35"S 164°32'51"E, collected by R.A. Sadlier, M. Christy & M. Thurlow, 26.xi.1998; AMS R164185, R164188, New Caledonia, Province Nord, Massif Ouazangou-Taom, Mt Taom summit, 20°46'52"S 164°34'46"E, collected by R.A. Sadlier & G.M. Shea, 7.xii.2004.

Additional material. In addition to the type material the following specimens referable to *Celatiscincus similis* were examined but do not form part of the type series or description: AMS R161164–65, R161184, Massif Ouazangou-Taom, Gomen Mine Mt Taom, 20°46'36"S 164°33'44"E; QM J37441 Ouaième via Hienghène, 20°37'S 164°51'E; AMNH 62685 Tao 20°33'S 164°48'E—note the specimens from Ouaième (Sadlier,1986) and Tao (Bauer & Sadlier, 1994) were originally reported as *C. euryotis*.

Diagnosis. See diagnosis for *Celatiscincus euryotis* above.

Etymology. The epithet *similis* is Latin for similar or resembling, and refers to the great overall similarity of the new species to *C. euryotis*.

Description. Based on the type series of 41 specimens (32.0–45.5 mm SVL), comprising 16 adult males, 19 adult females, and 6 subadults.

Measurements. Maximum SVL of males 43.0 mm, females 45.5 mm; distance from axilla to groin 48.8–58.8% of SVL ($\bar{x}$ = 53.9%, n = 41); distance from forelimb to snout 37.4–43.4% of SVL ($\bar{x}$ = 40.6%, n = 41); hindlimb length 40.0–48.7% of SVL ($\bar{x}$ = 4.0%, n = 35); tail length 167.6% of SVL for adult individual with most complete tail.

Scalation (Fig. 3): prefrontals moderately large and moderately to widely separated; frontoparietals fused; interparietal distinct; parietals each bordered by a single large upper secondary temporal and two (rarely three) equal sized scales no larger than the surrounding dorsal scales; nasals well separated; loreals two, anterior narrowly contacting labials, occasionally present as a semilunar scale failing to contact the labials; supraciliaries usually 7 (95%), rarely 6 (3.8%) or 8; upper labials usually 7; a complete subocular row between preocular and pretemporal scales; primary temporal single; lower secondary temporal single; tertiary temporals two; postlabials two; lower eyelid with an obvious, centrally located semi-transparent disc.

Midbody scale rows 30–32 ($\bar{x}$ = 31.0±1.00, n = 41); paravertebral scales 49–56 ($\bar{x}$ = 52.4±1.75, n = 41)—no sexual dimorphism between 13 males and 15 females ($\bar{x}$ 52.38 *vs* 52.25, $t_{34} = 0.202$, $P<0.99$); scales on top of fourth finger 8–11 ($\bar{x}$ = 9.5±0.61, n = 39); lamellae beneath fourth finger 15–20 ($\bar{x}$ = 17.2±1.02, n = 39); scales on top of fourth toe 12–15 ($\bar{x}$ = 13.3±0.63, n = 35); lamellae beneath fourth toe 30–40 ($\bar{x}$ = 35.4±1.87, n = 35).

Osteology: presacral vertebrae 29 (n = 37)–30 (n = 2); postsacral vertebrae 40 (specimen with most complete tail showing no evidence of regeneration); phalangeal formula for manus and pes 2.3.4.5.3 and 2.3.4.5.4 respectively.

Colouration: There is marked sexual dimorphism between adult males and females, with subadults and juveniles similar in colouration to adult females.

Adult males (Fig. 4): dorsal and lateral surface tan-light brown or mid brown, with a few scattered dark flecks on the anterior and upper lateral surface, and a continuous, narrow, dark stripe across the snout in some specimens. In life with a bold russet flush to the lateral, dorsal, and ventral areas at the base of the tail and hindlimbs, and a dull to moderate orange to yellow flush to the posterior half of the abdomen. Throat and chest pale and without an obvious pattern of dark transverse markings on the outer chinshields and throat scales, and a variably defined, narrow, dark, longitudinal streak on the throat and chest.

Adult females (Fig. 4): body usually two-toned. Dorsal surface of the body a dull light-brown or mid-brown. Lateral surface light-mid grey with scattered dark flecking overall, boldly marked individuals with these darker markings covering most of the lateral surface and contrasting markedly with the paler dorsal colour. Dark markings on dorsal surface occasionally aligned in longitudinal rows in the paravertebral region, and as a concentration of longitudinal flecks along dorsolateral margin, tending to form a more continuous, narrow, dark stripe along the temporal margin and across the snout in some specimens. A narrow, white, hip stripe (dark-edged above) extends along basal portion of tail and over the hindlimbs, continuing as a pale, narrow upper edge (paler than hip stripe) to the dark dorsolateral markings, variably extending forward to near the temporal region. In life with a bold orange to russet flush to the lateral, dorsal, and ventral areas of the entire tail, remainder of underside of body and hindlimbs white.

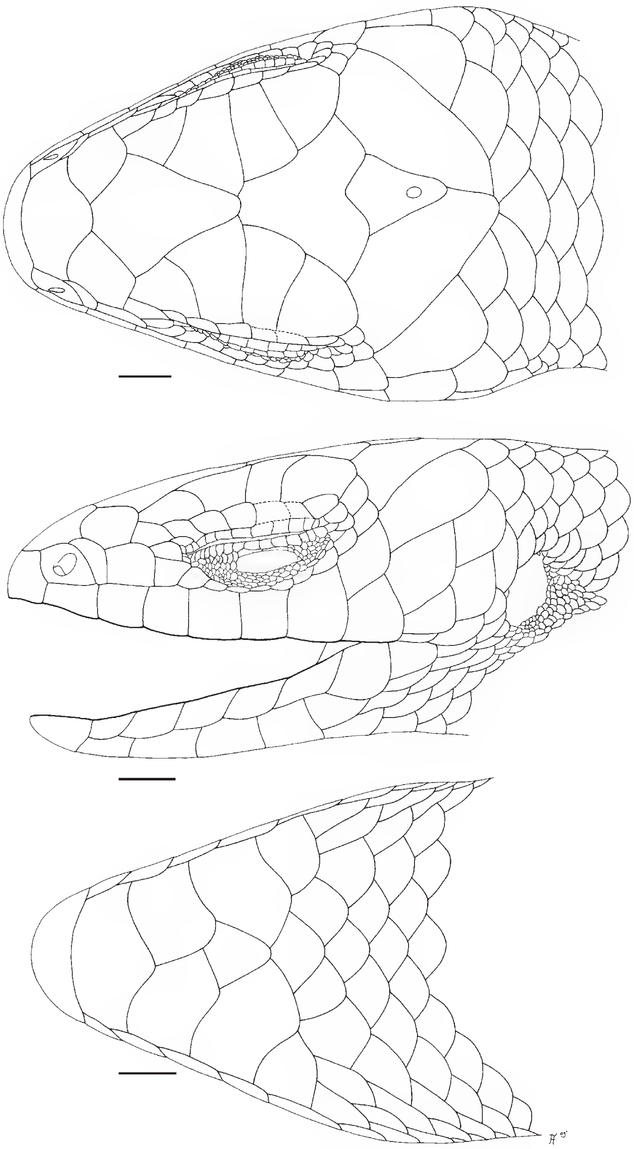

Fig. 3. Dorsal (upper), lateral (middle), and ventral (lower) views of the headshields of the holotype of *Celatiscincus similis* n.sp. (MNHN 2003.1006).

Subadults—overall body colouration usually darker with dark lateral flecking extending over most of the lateral surface, otherwise subadult males have a colour pattern typical of adult females and juveniles including a weak to obvious pale hip stripe and a continuous concentration of dark flecks along the dorsolateral margin in the shoulder region.

Note—The features of colouration along the dorsolateral margin mentioned by Sadlier (1986) for the specimen from Ouaième on the northeast coast are similar to those seen in some of the more boldly marked female specimens from the northwest coast.

Reproduction: The series of specimens collected at the very end of the dry season in late November 1998 contained four gravid females which consistently showed an egg laying mode of reproduction with a clutch size of 2 shelled oviducal eggs, one in each oviduct. Three other adult females collected at this time had 2 enlarged yolked ovarian follicles (one in each oviduct), and one individual 3 (one in the left oviduct and 2 in the right).

Distribution and habitat. The species is known from two locations on the far northwest coast and two on the far northeast coast (Fig. 2).

The two sites in the northwest of the main island, the Ouazangou-Taom Massif and Tsiba just north of Ouaco, are approximately 15 km apart. In this region the species was collected at both low (Tsiba 220 m; Mt Toam 275 m) and moderately high (Mt Toam 850 & 1000 m) elevation. At low elevations it was collected in remnant patches of low closed vegetation, usually located in steep gullies, on ultramafic ranges. They were observed active amongst leaf litter in sunlit patches. These patches were surrounded by extensive area of maquis shrubland, the heath-like vegetation endemic to this soil type. At higher elevations it was collected in maquis/forest at 850 m, and near the summit of Mt Toam in low moderately dense maquis (1000 m). It is worth noting that individuals collected at low elevation sites appeared to have low levels of heat tolerance in comparison to locally sympatric skink species (*Caledoniscincus austrocaledonicus* and *Caledoniscincus haplorhinus*) of similar size. The species occurrence in the more open maquis habitat at higher elevations is most likely due to the more moderate conditions present at higher elevations in temperature and humidity.

There is no precise information regarding the site of collection or habitat for the two specimens from Ouaième and Tao on the northeast coast of the main island. Opportunistic field research by the authors in this region over a number of years has not located further specimens from either area or any surrounding areas searched. However, the habitat searched in this region has nearly always been closed humid forest, and it is possible the species is restricted to a different habitat type which has not yet been sampled, perhaps similar to that occupied on the northwest coast.

The species occurrence on both the northwest and northeast coast could suggest a wider distribution in the north of the island. However, extensive field research in recent times covering a wide range of habitats in the northwest from Sommet Poum south to Massif du Boulinda (Whitaker Consultants, in prep.) has failed to locate it at any site other than Mt Taom and nearby Tsiba.

Conservation status

Celatiscincus similis satisfies the criteria for inclusion into one of the threatened species categories under a modified IUCN classification system (see Sadlier & Bauer, 2003). It is currently known from only four locations, and from what is known of the two populations on the northwest coast the species is at risk from a range of threats.

The preferred habitat of *C. similis* on the northwest coast is severely fragmented, and the size of the patches of remnant closed vegetation on the ultramafic massifs is very small, particularly at lower elevations—the extent of suitable habitat at Tsiba (Fig. 5) is estimated at about 1 hectare. These isolated sub-populations are undergoing a decline in extent of occurrence as a result of the impact of burning of adjacent maquis shrubland, and from activities associated with mining (Fig. 6). The extent of the species' overall distribution on the western side of the island may ultimately prove to be much broader (i.e. extend further south and north in suitable habitat on ultramafic soils), but its area of occupancy (by virtue of the patchy and relictual nature of its preferred habitat) will most likely remain small.

Due to the fragmented and relictual nature of its distribution, the threats posed by the presence or potential for mining (some sites), and the impact of frequent firing, *C. similis* could be conservatively ranked as Vulnerable under the modified IUCN classification system (Sadlier & Bauer, 2003) used for the New Caledonian lizard fauna (area of occupancy <500 km^2, severely fragmented i.e. isolated sub-populations with a reduced probability of colonization, if once extinct; number of locations <5; continuing decline in area and extent of occurrence as indicated by a continuing decline in quality of habitat at some sites). It could be placed at a higher level of threat if continued declines in the area, extent and/or quality of habitat in the species very narrow range persist. Targeted field research is required, particularly in the northeast coast of the main island to fully assess the species' distribution and habitat preferences in the region. Assessing the species status on the northeast coast of the main island is problematic due to a lack of precise information on the species preferred habitat in this region. It is probably similarly restricted in its habitat preferences, even though ultramafic soils do not occur in this region (Paris, 1981; Sautter, 1981).

Celatiscincus euryotis is known only from two sites on the Isle of Pines, one a remnant of closed forest near Waa Mé Bay on the west side of the island, and the second at Vao. The main island of the Ile des Pins has a total area of 152 km^2, and the likely area of suitable habitat (excluding maquis shrubland and introduced plantations) is considerably less than this. It had previously been regarded as Secure by Bauer & Sadlier (2000) but given its extremely limited distribution it has been reassessed and conservatively ranked as Vulnerable (Sadlier & Bauer, 2003). The species distribution on the island and the threats likely to impact on the species need to be established to fully evaluate its conservation status.

Relationships

Our interpretations as to the generic distinctiveness of *Celatiscincus* and the specific distinction between *C. euryotis* and *C. similis* are based on a combination of evidence from the morphological information and DNA sequence data.

Intergeneric Relationships: Both ND2 and Rag-1 support the monophyly of the two species of *Celatiscincus*. Mitochondrial ND2 haplotypes of *C. euryotis* from two individuals from the Isle of Pines and five individuals (from two localities) of *C. similis* show a high level of sequence divergence between populations (12.5%), and no or very low levels of divergence within each population (southern: 0, northern: 0.16%). This level of genetic differentiation suggests the two widely allopatric populations represent two distinct evolutionary lineages, and is comparable with between-species divergence in other genera (e.g., *Marmorosphax* 12.1%, *Caledoniscincus* 12.9%). No single scalation character will allow unequivocal assignment to one species or the other. However, significant differences were detected between the two species which showed a trend towards *C. similis* having: fewer midbody scale rows ($\bar{x}$ 30.9 *vs* 33.1, $t_{67} = 7.92$, $P<0.01$); more scales on top of fourth finger ($\bar{x}$ 9.5 *vs* 8.9, $t_{64} = -4.58$, $P<0.01$); more lamellae beneath fourth finger ($\bar{x}$ 17.2 *vs* 16.2, $t_{63} = -4.60$, $P<0.01$); more scales on top of fourth toe ($\bar{x}$ 13.3 *vs* 12.75, $t_{59} = -3.60$, $P<0.01$); and

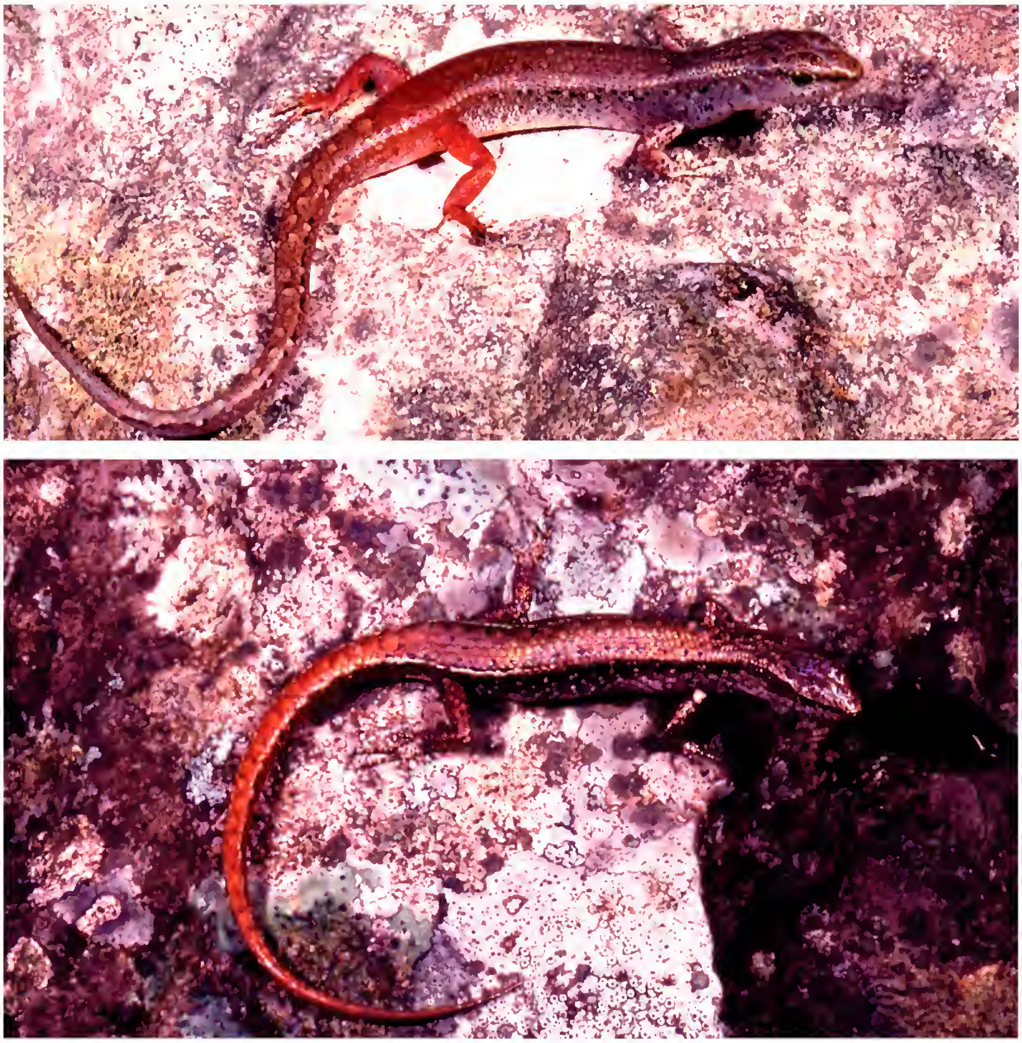

Fig. 4. *Celatiscincus similis* n.sp., an adult male (upper—AMS R153524) and adult female (lower—AMS R153525) from Tsiba, northwest New Caledonia.

more lamellae beneath fourth toe ($\bar{x}$ 35.4 *vs* 32.2, $t_{58} = -7.10$, $P<0.01$)—see Table 1. Further, there were significant differences in the modal number of presacral vertebrae between the two species, but again these were not unequivocal.

We recognize that an arbitrary degree of genetic differentiation alone is an inappropriate measure of specific distinctness (Ferguson, 2002; Sites & Marshall, 2003), however, we here use such measures in support of diagnostic features of colour and osteology outlined in the diagnoses. While colour may be regarded by some as too highly labile to serve alone as an adequate diagnostic feature, the relatively large samples of *C. euryotis* and *C. similis* demonstrate the consistency of this feature. Minor differences in colour, scalation, and proportion are also diagnostic of some other New Caledonian skinks that show similar levels of genetic differentiation between species (i.e. certain *Caledoniscincus* and *Marmorosphax*), including instances of broad sympatry between sister or "sibling" species (Bauer & Sadlier, 2000).

Based on both intensive and extensive sampling by the authors over a period of more than 20 years, the large geographic gap separating the two species of *Celatiscincus* from one another appears to be real. This disjunction is certainly great enough to completely isolate the populations from one another. As such, the two species, diagnostic differences aside, are certainly evolving as separate lineages on independent trajectories and would in any case meet the criteria for phylogenetic species (Frost *et al.*, 1992; Grismer, 1999; McKitrick & Zink, 1988). This disjunction remains enigmatic. No other sister taxa pair of New Caledonian reptiles exhibits this particular distribution pattern, or such a degree of geographic separation. It is difficult to surmise what historical factors may have contributed to such a pattern. The geological and ecological dissimilarity of the areas where the two species occur argues against their ever having shared a common continuous range, and their apparent intolerance of heat and exposure suggest that they are not likely to have achieved their current distribution through dispersal. It is perhaps most likely that *Celatiscincus* was once a more speciose and widely distributed genus and that differential extinction of geographically intervening species may have resulted in the pattern observed today.

Intrageneric Relationships: A phylogenetic analysis of all New Caledonian skink taxa using the mitochondrial gene ND2 (514 bp) and the nuclear gene Rag-1 (830 bp) suggests that most described New Caledonian endemic lygosomine genera are strongly supported monophyletic lineages, but reveals little regarding intergeneric relationships (Smith *et al.*, in prep.). *Celatiscincus* is one of many generic level lineages with long

Fig. 5. Tsiba near Ouaco, the small population of *Celatiscincus similis* n.sp. at this site was located in low closed vegetation in the centre of the photo.

Fig. 6. Ultramafic ranges south of Pouembout in northwestern New Caledonia, showing impact of strip mining on the environment.

independent histories that form a basal polytomy within Australo-Pacific *Eugongylus* group skinks. There is no evidence to suggest that *Celatiscincus* is more closely related to *Marmorosphax* or *Sigaloseps* than to other New Caledonian skink genera. As such, we regard the genetic data as supporting our morphological interpretation of the distinctiveness of *Celatiscincus*. Although we remain ignorant of the position of *Celatiscincus* within the New Caledonian *Eugongylus* group, we believe that the erection of a new genus serves an important purpose: to highlight *Celatiscincus* as a distinctive, monophyletic lineage that must be considered separately from all others in future phylogenetic analyses.

A revised diagnosis for *Marmorosphax* Sadlier

The transfer of *Lygosoma euryotis* Werner to the newly erected genus *Celatiscincus* Sadlier, Smith and Bauer necessitates a redefinition of *Marmorosphax* Sadlier. Also the recent acquisition of a gravid specimen of *Marmorosphax montana* that contains developing embryos allows a live bearing mode of reproduction to tentatively be added to the suite of apomorphic characters diagnosing the genus.

The revised diagnosis below for *Marmorosphax* provides a suite of apomorphic character states to diagnose this genus from all other genera in the *Eugongylus* group of skinks.

Marmorosphax Sadlier, 1986

Type species. *Lygosoma tricolor* Bavay, 1868: 17.

Diagnosis. The following combination of characters will distinguish *Marmorosphax* from all other genera in the *Eugongylus* group of skinks as defined by Greer (1979): frontoparietals fused; supranasal scale or postnasal suture absent; anterior loreal present as a semilunar scale failing to contact upper labials; subocular scale row complete; lower eyelid with an obvious, centrally located semi-transparent disc; ear lobules barely distinguishable from blunt conical scales around upper, lower, and posterior edges of ear opening; enlarged pairs of chinshields two, third pair of chinshields divided obliquely such that they are separated by five scales; premaxillary teeth 13; live-bearing mode of reproduction confirmed in *M. tricolor* and *M. montana*.

Recognized species. *Marmorosphax tricolor* Sadlier, 1986, and *Marmorosphax montana* Sadlier & Bauer, 2000.

Table 1. Comparison of key scalation characters between *Celatiscincus euryotis* and *C. similis*.

	C. euryotis	*C. similis*
midbody scale rows range	30–36	30–32
mean±sd (N)	33.1±1.26 (28)	31.0±1.00 (41)
t_{67} = 7.92, P<0.01		
paravertebral scale rows range	48–57	49–56
mean±sd (N)	52.4±2.20 (28)	52.4±1.75 (41)
t_{66} = 0.089, P=0.93		
fourth finger scales range	8–10	8–11
mean±sd (N)	8.9±0.38 (27)	9.5±0.61 (39)
t_{64} = -4.58, P<0.01		
fourth finger lamellae range	15–18	15–20
mean±sd (N)	16.2±0.68 (26)	17.2±1.02 (39)
t_{63} = -4.60, P<0.01		
fourth toe scales range	11–14	12–15
mean±sd (N)	12.75±0.57 (26)	13.3±0.63 (35)
t_{59} = -3.60, P<0.01		
fourth toe lamellae range	29–36	30–40
mean±sd (N)	32.2±1.49 (25)	34.5±1.87 (35)
t_{58} = -7.10, P<0.01		

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Appendix 1. List of specimens of *Celatiscincus* examined for genetic study (bracketed numbers are tissue collection numbers).

Celatiscincus euryotis: AMS R138573 (NR810); AMS R138574 (NR811)—see listing of comparative material examined for location details.

Celatiscincus similis: AMS R153504 (NR7360); AMS R153505 (NR7361)—see listing of paratypes for location details. AMS R161164 (EBU15288); AMS R161165 (EBU15289); AMS R161184 (EBU15308)—see additional material referable to *C. similis* for location details.

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A New Species of *Nannoscincus* Günther (Squamata: Scincidae) from High Elevation Forest in Southern New Caledonia

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ABSTRACT. A new species of *Nannoscincus* from relictual high elevation closed forest is described from southern New Caledonia. This species is most similar in appearance to *Nannoscincus gracilis*, but can be distinguished by its large size and a suite of distinctive scalation characters. Further, it is the only species of *Nannoscincus* recorded as being able to vocalise. The species is known only from closed forest patches on Pic Ningua and adjacent Mt Çidoa at around 1000 m in altitude. The overall extent of this habitat is small, fragmented, and in an area that is actively mined. As such the species is regarded as at risk, and the level of threat as Vulnerable.

Une nouvelle espèce de *Nannoscincus* provenant d'une forêt relique fermée d'altitude est décrite du sud de la Nouvelle-Calédonie. Cette espèce est d'apparence similaire à *Nannoscincus gracilis*, mais peut s'en différencier par sa grande taille et une série de caractères d'écaillure distinctifs. De plus, c'est la seule espèce de *Nannoscincus* capable de vocaliser. Cette espèce n'est connue que des lambeaux de forêt fermée du Pic Ningua et du Mt Çidoa voisin, à environ 1000 m d'altitude. La répartition actuelle de ce type d'habitat est limitée, fragmentée, et localisée dans une zone fortement soumise à l'impact minier. Pour toutes ces raisons, cette espèce est considérée comme sensible et placée à un niveau de menace «vulnérable».

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Recent studies on the endemic lizard fauna of New Caledonia have revealed the presence of species endemic to high elevation forests on various peaks along the length of the island. In the central and northeast ranges two species appear to be found only at elevations greater than 900 m, the diminutive scincid *Nannoscincus rankini* from Mont Aoupinié (Sadlier *et al*., 2002), and the gecko *Bavayia madjo* from Mont Panié and Mont Ignambi in the Panié Range (Bauer *et al*., 2000). The forest at both Mont Aoupinié and the Panié Range is more or less continuously distributed from mid elevation (400 m) to the summits.

By contrast, high elevation forest on the ultramafic peaks in the south and northwest of the island generally are present as isolated patches, separated from lowland forest by

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extensive areas of maquis shrubland, which covers much of the mid and lower elevation slopes of these massifs. Our knowledge of the lizard fauna of forests on the peaks of the southern ultramafic massifs is heavily biased by accessibility. Mont Ouin and Mont Mou in the region of Dumbéa are part of a network of interconnected ranges with peaks over 1000 m elevation. Field research on these mountains has revealed a particularly rich endemic lizard fauna in high elevation forests, including two species of scincid lizard, *Sigaloseps ruficauda* and *Marmorosphax montana* (Sadlier & Bauer, 1999, 2000), and an undescribed gecko (*Bavayia*) restricted to this habitat.

Further to the north isolated patches of high elevation forest occur on the various ultramafic peaks from the Massif du Humboldt north and west to Mont Do, however, most of these are relatively inaccessible and the composition of their lizard faunas is in most instances unknown. Collections made on the ultramafic peaks of Pic Ningua and nearby Mont Çidoa (formerly Mont Sindoa) are particularly interesting. They include not only a suite of species typical of forests on ultramafic soils but also some taxa usually associated with forests on soil types typical of the central and northern ranges. This is, perhaps, not surprising, as these two peaks lie at the extreme northern edge of the large southern ultramafic block that occupies the southern third of New Caledonia (Paris, 1981; Sautter, 1981). Among species in the latter group is a distinctive new species of *Nannoscincus* that is most similar in appearance to *Nannoscincus gracilis*. This new species of *Nannoscincus* is the largest member of the genus and differs from all other members of the genus in having seven, rather than six, upper labial scales.

Materials and methods

Abbreviations. Specimen abbreviations are prefixed as follows: Auckland Museum (AIM); Australian Museum, Sydney (AMS); California Academy of Sciences, San Francisco (CAS); Museum of Comparative Zoology, Harvard (MCZ); Muséum national d'Histoire naturelle, Paris (MNHN).

The full suite of morphological characters listed below were scored for each specimen where possible.

Measurements. The following characters were scored: snout to vent length (SVL)—measured from tip of snout to caudal edge of anal scales; axilla to groin distance—measured from middle of base of forelimb to middle of base of hindlimb; forelimb to snout length—measured from tip of snout to middle of base of forelimb; hindlimb length—measured from middle of base of hindlimb to tip of fourth toe including nail; tail length—unless otherwise stated is measured from caudal edge of anal scales to tip of tail, on complete original tails only as determined radiographs. Body measurements are expressed as percentages of snout to vent length in the taxon accounts.

Scalation. Head scalation generally follows Taylor (1935) as described and figured by Sadlier (1986) and also includes: pre-temporals—enlarged scales following on from supraciliary series and positioned along lateral edge upper secondary temporal and upper anterior edge of primary temporal; post-ocular scales—enlarged scales following on from pre-temporal series along edge of lower eyelid and bordering lower anterior edge of primary temporal and upper edge of penultimate upper labial; post-temporals—number of scales positioned posterior to lower secondary temporal and ear opening; midbody scale rows—number of longitudinal scale rows around body counted midway between axilla and groin; paravertebral scales—number of scales in a row down the body from first scale posterior of parietal scale to last scale at level of vent opening; fourth finger and toe scales—number of dorsal scales on fourth digit of hand and foot, distal scale contains claw; basal scale of fourth finger is usually present as a single large scale common to the base of the fourth, third, and second finger; basal scale of fourth toe broadly contacts basal scale of adjacent third toe; fourth finger and toe lamellae—number of ventral scales on fourth digit of hand and foot, distal scale contains claw and basal scale is last largely undivided scale at a point level with intersection of third and fourth digits. Bilateral scalation characters were scored on both sides and the mean value used.

Osteology. Radiographs were prepared using a Eresco AS2 X-ray machine to determine phalangeal formulae and the number of presacral vertebrae and postsacral vertebrae (complete original tails only), at exposures of 30 sec at 30 kV.

Species account

The genus *Nannoscincus* has been identified as a member of the Australasian *Eugongylus* group of lygosomine skinks (Greer, 1979). It is distinguished from other genera in the group by a combination of morphological synapomorphies that includes: fusion of the atlantal arches and intercentrum of the first cervical vertebra into a single element; an elongate body with 29 or more presacral vertebrae; phalanges of digits of the forelimbs reduced, with a phalangeal formula of 2.3.4.4.3 or less for the manus (Sadlier, 1990; Bauer & Sadlier, 2000).

The Australian species, *Siaphos maccoyi* Lucas & Frost, 1894, has previously been considered congeneric with the New Caledonian species of *Nannoscincus* by virtue of its sharing a similar pattern of phalanx reduction (Sadlier, 1990). However, this pattern has also been found in the recently described Australian species *Lampropholis elongata* Greer, 1997 and clearly represents a case of independent evolution of this particular character state. This independent derivation calls into question the significance of this character as a unifying synapomorphy for *maccoyi* and the New Caledonian *Nannoscincus*. Further, mitochondrial and nuclear DNA sequence data (S. Smith *et al*., unpublished data in preparation) are inconsistent with a close relationship between these taxa. We therefore remove the species *maccoyi* from *Nannoscincus*, which we regard as a strictly New Caledonian genus. The formal placement of the Australian species into a separate genus is required and will need additional research in a broad comparative context.

Wells & Wellington (1984) provided a new generic name, *Anepischetos*, for *maccoyi* and a new species, *A. sharmani* (the latter as type species). Subsequently recognizing that the name was preoccupied (*Anepischetos* Smith, 1900; Lepidoptera), Wells & Wellington (1985) proposed a replacement generic name, *Anepischetosia*, and added a new species, *A. brindabellaensis* to the genus. Both *A. sharmani* and *A. brindabellaensis* were subsequently (Shea & Sadlier, 1999) referred to the synonymy of *Nannoscincus maccoyi* due to the inadequacy of the diagnoses for differentiating the three putative species. *Anepischetosia* has precedence

Fig. 1. Paratype of *Nannoscincus garrulus* n.sp. (AMS R163457).

over *Nannoseps* (type species *Saiphos maccoyi*) proposed by Sadlier (1990) as a subgenus of *Nannoscincus*, and hence we use the combination *Anepischetosia maccoyi* for the Australian species previously referred to *Nannoscincus*.

Within *Nannoscincus* two monophyletic species groups have been recognized on the basis of morphological data (Sadlier, 1990; Sadlier *et al.*, 2002). One group contains the species *N. mariei, N. rankini, N. greeri, N. hanchisteus, N. humectus, N. exos*, and *N. manaueti* (a recently described species from the Massif de Kopéto), and the other group the species *N. gracilis, N. slevini*, and the species described here from Pic Ningua and Mont Çidoa. Although mitochondrial DNA sequence data are equivocal with respect to the monophyly of the first group, that of the latter is well supported (S. Smith *et al.*, unpublished data). The species in this group are all superficially similar in that they have very elongate bodies and a markedly two-toned colour pattern. They also share a suite of distinctive apomorphic characters, two of which, a reduction in the number of phalanges of the third and fourth fingers to yield a phalangeal formula for the manus of 2.3.3.3.3 or less, and a highly elevated number of presacral vertebrae, are unique to this group within the context of all *Nannoscincus*.

Nannoscincus garrulus n.sp.

Figs 1–5

Type material. HOLOTYPE: MNHN 2003.1002 Pic Ningua, 17.0 km south of Nakaré, Province Sud, New Caledonia (21°44'25"S 166°09'21"E), collected by R.A. Sadlier, A.M. Bauer, T. Jackman, & C.C. Austin on 27 September 2002. PARATYPES: AMS R163451–52, CAS 226164–65, MCZ R183655 same collection data as holotype; AMS R163453–57, CAS 226166–67 Pic Ningua, 17.0 km south of Nakaré, Province Sud, New Caledonia (21°44'36"S 166°09'02"E), collected by R.A. Sadlier, A.M. Bauer, T. Jackman, & C.C. Austin on 26 September 2002.

Additional material. The following specimens referable to *N. garrulus* were collected in wet pit traps on both Pic Ningua and Mont Çidoa in 1993–1995, but do not form part of the type series: AMS R151490–97, R151499–511, R151513–17, R151520–26, R151528–34, R151536–46, AIM 1702, 1704, 1733, 1735–39, 1775–78, 1783–98, 1800–02,1815–18, 1820–21 from a range of sites (n = 7) between 970–1110 m elevation on Pic Ningua; AIM 1703, 1705, 1734, 1799, 1814, 1819 Mont Çidoa (21°44'S 166°13'E).

Diagnosis. *Nannoscincus garrulus* is a large and elongate member of the genus with a two-toned colour pattern on the body (Fig. 1). It can be distinguished from all other members of the genus by the following combination of characters: frontoparietals divided; two loreals, anterior loreal a small semilunar scale positioned off the postero-dorsal edge of the enlarged nasal scale and failing to contact the labials; seven or more upper labial scales; left and right oviduct present in females; lower eyelid "scaled"; ear opening minute; body scales striated; adult dorsal colour two-toned; ear opening positioned four scales posterior to lower secondary temporal; presacral vertebrae 33–34; phalangeal formula for manus 2.3.3.3.3; phalangeal formula for pes 2.3.4.4.3.

The first four characters will distinguish *N. garrulus* from *N. rankini, N. greeri, N. hanchisteus, N. humectus, N. exos*, and *N. manaueti*, all of which have fused frontoparietals, a

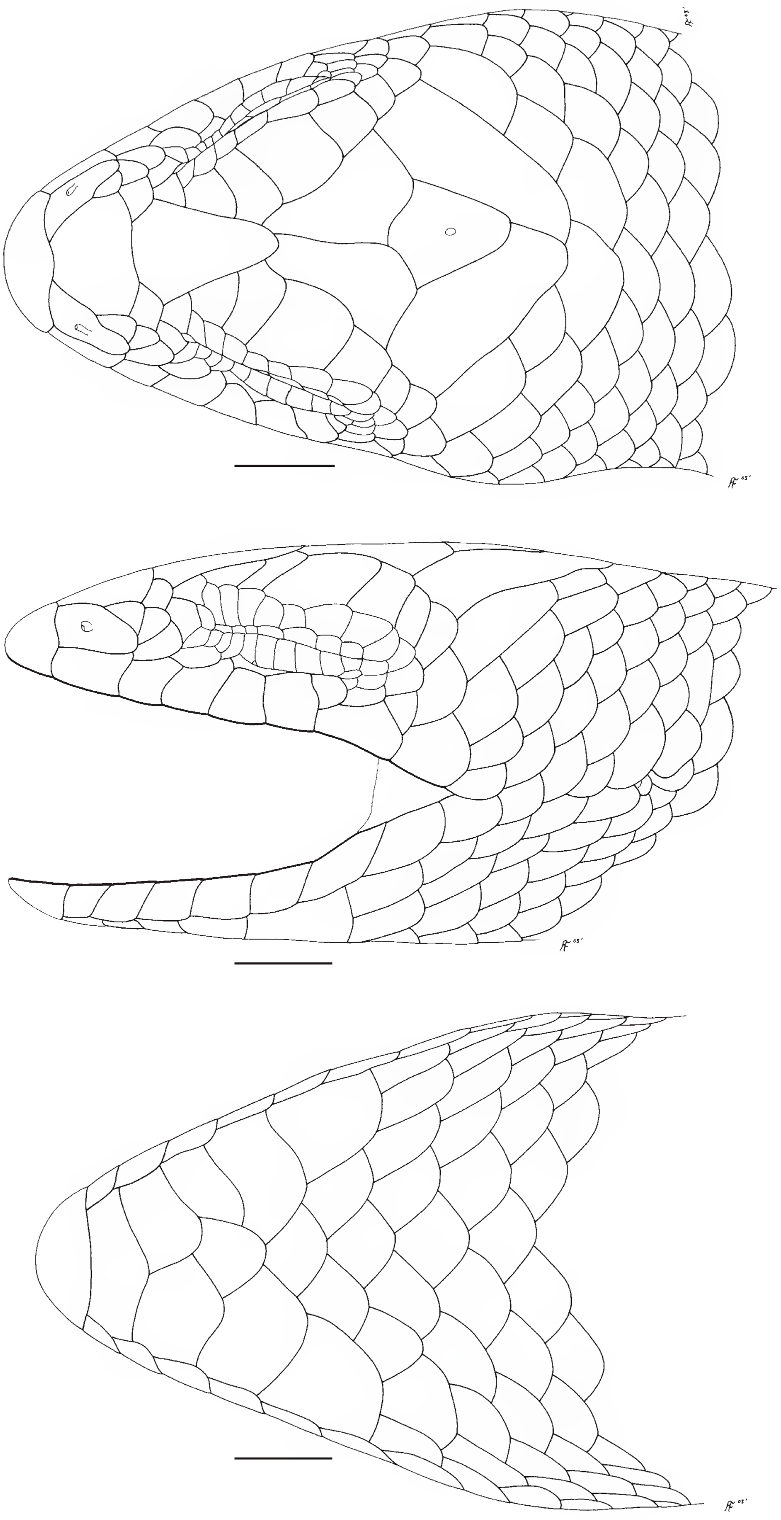

Fig. 2. Dorsal (upper), lateral (middle), and ventral (lower) views of the head of holotype of *Nannoscincus garrulus* n.sp. (MNHN 2003.1002) showing scalation.

single loreal, a windowed lower eyelid, and the oviduct present on the right side only. It can be further distinguished from these species by having fewer phalanges on the third and fourth fingers of the manus.

Nannoscincus mariei is somewhat intermediate between the two morphologically-defined species groups, in possessing the derived character state of a single loreal and loss of the left oviduct, but retaining the primitive character state of divided frontoparietals. It also has a "scaled" lower eyelid similar to *N. gracilis, N. slevini*, and *N. garrulus*, the structure and possible polarity of which has been discussed elsewhere (Sadlier, 1990). *Nannoscincus garrulus* is readily

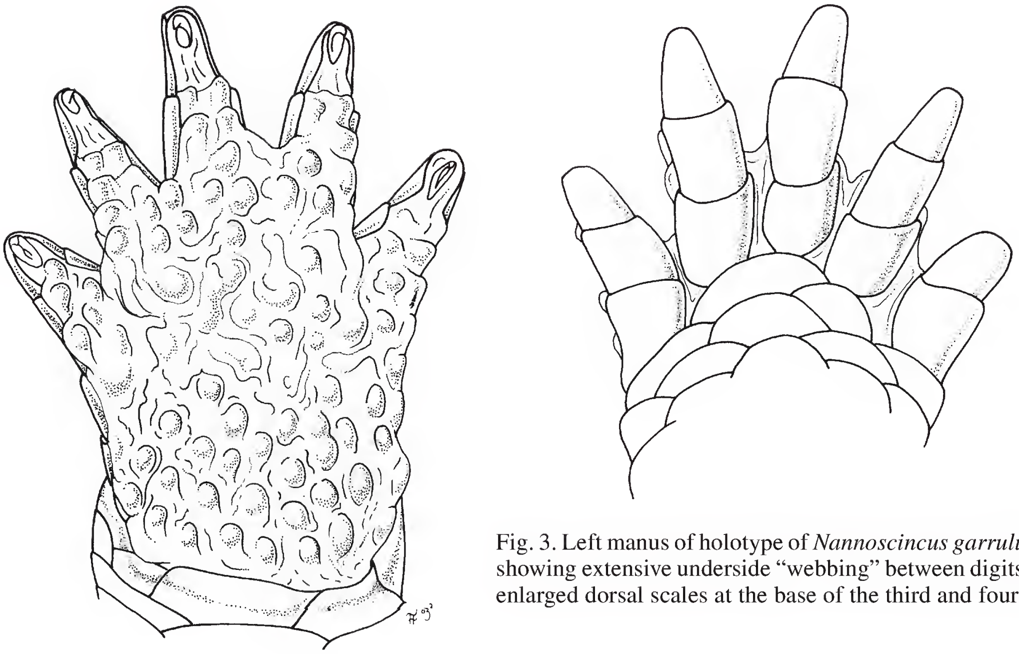

Fig. 3. Left manus of holotype of *Nannoscincus garrulus* n.sp. (MNHN 2003.1002) showing extensive underside "webbing" between digits of the forelimbs (right) and enlarged dorsal scales at the base of the third and fourth digits (left).

distinguished from *N. mariei* by the presence of two (*vs* one) loreal scales, and the presence of a small but obvious ear opening (*vs* ear opening absent).

Nannoscincus garrulus most resembles *N. gracilis* and *N. slevini*. It is noticeably larger (maximum SVL 52.5 mm) than either *N. gracilis* (SVL 49.0 mm) or *N. slevini* (SVL 43.0 mm), and has seven or more upper labial scales whereas both *N. gracilis* and *N. slevini* have six. It can be further distinguished from *N. slevini* by the presence of five (*vs* four) digits on the manus, and from *N. gracilis* in having more phalanges on the fifth digit of the manus (2.3.3.3.3 *vs* 2.3.3.3.2).

Etymology. The specific epithet is the Latin word *garrulus*, meaning talkative, and is in reference to the tendency for this species to emit a squeaking sound when distressed (Bauer *et al*., 2004).

Description. Based on the holotype and 12 paratype specimens comprising six adult males, three adult females, and four subadults—measurements are for adult specimens only. Mean values of certain characteristics are reported

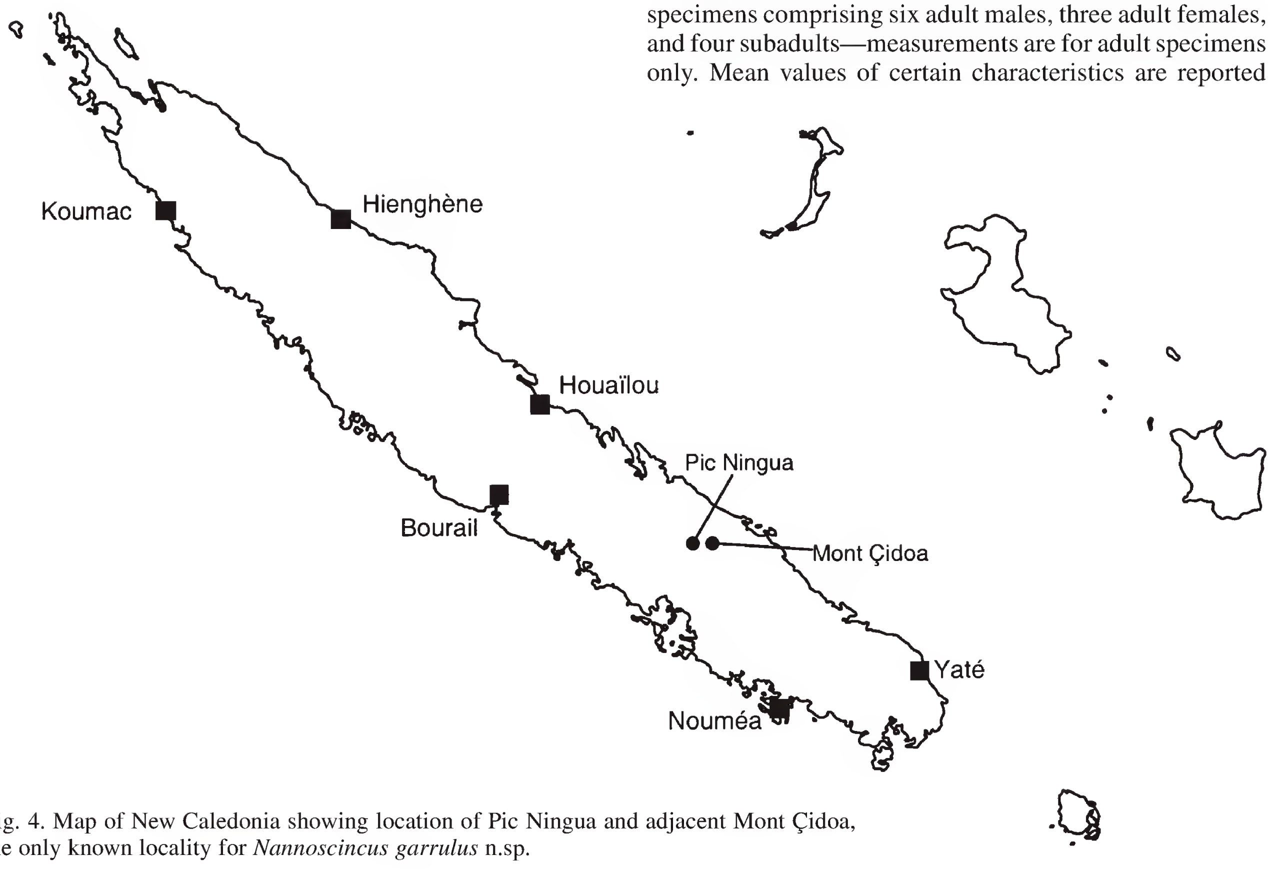

Fig. 4. Map of New Caledonia showing location of Pic Ningua and adjacent Mont Çidoa, the only known locality for *Nannoscincus garrulus* n.sp.

Fig. 5. Isolated closed forest patch on Mont Çidoa, typical of habitat in the area from which the types of *Nannoscincus garrulus* n.sp. were collected.

with standard deviations. *Measurements*: SVL 45.0–52.5 mm; distance from axilla to groin 64.4–66.7% of SVL ($\bar{x}$ = 65.4); distance from forelimb to snout 28.6–31.3% of SVL ($\bar{x}$ = 29.9); hindlimb length 19.0–22.2% of SVL ($\bar{x}$ = 20.6); tail length 106.1% of SVL (estimated from individual with most complete tail). *Scalation*: Head (Fig. 2): nasals moderately separated, very large and extending laterally along the side of the head; frontonasal broader than long; prefrontals very small and widely separated; supraciliaries 7 (81%), rarely 8, with the first supraciliary contacting frontal (thereby excluding contact between the prefrontal and first supraocular); frontal short, almost as broad as long; supraoculars four; frontoparietals paired; interparietal distinct; parietals each usually bordered by a single nuchal and upper secondary temporal scale (73%) but showing some fragmentation of scales in this region such that nuchals (19%) or upper secondary temporals (8%) are sometimes divided to form two scales; upper labials 7 (96%), rarely 8; lower labials 7; two loreals, anterior loreal reduced to a small semilunar scale positioned off posterodorsal edge of enlarged nasal scale, posterior loreal also semilunar in shape, either contacting the labials narrowly (42%) or excluded from contact by extension of posterior edge of large nasal back to contact lower preocular; single large anterior subocular; pretemporals two; postoculars 3 (77%) or 4; primary temporal single (46%), or divided to form two similar sized scales; upper secondary temporals usually single (92.7%), occasionally divided to form two scales; lower secondary temporals single; tertiary temporals two; postlabials two; ear opening positioned four scales posterior to lower secondary temporal; postmental contacting first and second lower labial; chinshields three, first pair in broad contact. *Body*: scales striated, midbody scale rows 22–24 ($\bar{x}$ = 22.8±1.01); paravertebral scales 60–73 ($\bar{x}$ = 66.7±3.5). *Limbs*: scales on top of fourth finger 4–5 ($\bar{x}$ = 4.05±0.14); lamellae beneath fourth finger 4–5 ($\bar{x}$ = 4.1±0.30), rudimentary interdigital webbing at base of fingers (Fig. 3); scales on top of fourth toe 6–7 ($\bar{x}$ = 6.05±0.14), the basal scale present as a large scale at base of third and fourth toes; lamellae beneath fourth toe 13–16 ($\bar{x}$ = 13.77± = 0.83). *Osteology*: presacral vertebrae 33 or 34 (54%, n = 13); postsacral vertebrae 37–38 (n = 2) phalangeal formula for manus and pes 2.3.3.3.3 and 2.3.4.4.3 (n = 13), respectively.

Colouration (in preservative): dorsal colour light to mid brown, with scattered dark flecks aligned along vertebral axis to form a broken longitudinal line; nape with a variably defined pale blotch with a dark posterior edge. Lateral surface noticeably darker than dorsal, unmarked. Dorsal and lateral surfaces defined by a dark brown to black (darker than lateral colour) dorsolateral stripe, pale-edged above. Dark dorsolateral stripe extends from back of eye (inflected over tympanic region) to level of hindlimbs, breaking up and becoming poorly defined along tail. Head slightly darker at sides than adjacent areas of body, dark colouring extending around lower edge of rostral scale and inflecting upwards to form a dark midrostral streak in boldly marked individuals, subocular labials with pale markings. Ventral surface pale with a light to heavy concentration of scattered brown markings at edges and regular brown markings to throat region.

Distribution and habitat. At present known only from Pic Ningua and Mont Çidoa, at the northern edge of the extensive ultramafic block that covers much of the southern third of New Caledonia (Fig. 4). Closed forest habitat (Fig. 5) is restricted to the top of these mountains from about 900 m elevation. All specimens were collected under logs and rocks in the vicinity of a small, shallow gully. The forest floor was generally dry at the time of collection, the island not having had significant rainfall since the previous wet season (January–March). The apparent absence of individuals away from the gully could indicate the species concentrates in areas where soil moisture is present, such as the gullies, during periods of seasonal dryness. Like all members of the genus, *N. garrulus* is highly desiccation-prone (Bauer & Sadlier, 2000).

The nearest records of the allied *Nannoscincus gracilis* are from mid elevation forest at Col de Nassirah (348 m) 10 km to the south and west, and Col de Petchécara (435 m) 15 km to the north and east, whereas *N. slevini* has been recorded from Mt Canala and Plateau de Dogny 25 km to the north and east.

Natural history. All specimens made faint but distinctive squeaks when handled, presumably as a defensive measure (Bauer *et al.*, 2004). This is the only *Nannoscincus*, and only New Caledonian scincid, for which vocalization has been documented (under the name *N.* cf. *gracilis*—Bauer *et al.*, 2004). One adult female collected in January, the summer wet season, contained two large yolked oviducal eggs (one in the left oviduct and one in the right), and another specimen two large yolked ovarian follicles.

Conservation status. *Nannoscincus garrulus* has an extremely restricted distribution, being known only from the type locality at Pic Ningua and adjacent Mont Çidoa. That it was not recorded from high elevation on forest on nearby Mt Do indicates the species is not necessarily likely to be more widely distributed. Closed forest habitat occurs at Bwa Bwi (19 km ESE of Pic Ningua and 9 km SSE of Mont Çidoa) and possibly Dent de St-Vincent (20 km SSE of Pic Ningua), both of which lie along a more or less continuous high elevation ridge. However, neither site has yet been surveyed. The size of high elevation forest patches in this area of the southern ultramafic block is extremely small, especially on Pic Ningua and Mont Çidoa.

The forest on Pic Ningua has been set aside as a special reserve. An access road to the mining operation passes along one edge of the forest. Given the very steep relief of the terrain and the small size of the forest patches, any mining activity through or adjacent to the forest has the potential to alter a significant proportion of the overall area of the forest. The mid slopes of the ranges in this part of the island are covered with maquis, and there is a very narrow transition zone between this and the high elevation closed forest. Frequent burning of maquis shrubland, particularly in areas near settlement or development, and its impact upon the forest edge is considered a significant threat to the overall size and quality of isolated closed forest patches in New Caledonia (Fig. 5).

Given the species' highly restricted distribution, the relatively small size of the remaining moist forest on Pic Ningua and Mont Çidoa, and the threat to this habitat from fire, the species would be ranked as Endangered under a modified IUCN classification system (Sadlier & Bauer, 2003) where area of occupancy <100 km^2, number of populations = 2, and there is an apparent continuing decline in area, extent and/or quality of habitat.

Relationships. A previous scheme of relationships for *Nannoscincus* (Sadlier, 1990) identified two groups, the *N. gracilis* group comprising *N. gracilis* + *N. slevini*, and the *N. mariei* group comprising the species *N. mariei* + *N. rankini* + *N. greeri*. The species *N. hanchisteus, N. humectus*, and *N. exos* were subsequently added to the latter group (Sadlier *et al.*, 2002), and later *N. manaueti* (Sadlier *et al.*, 2004).

The *N. mariei* group is a well diagnosed clade, characterized by loss of the left oviduct in females, loss of the anterior loreal scale, and a reduced number of lower labial scales. The *N. gracilis* group also constitutes a clade characterized by a reduction in the number of phalanges in the third and fourth digits of the manus, a pattern of scale reduction in the loreal region resulting in both the anterior and posterior loreals being reduced to small semilunar scales, and a tendency towards greater elongation of the body as seen in the greatly increased number of presacral vertebrae.

Nannoscincus garrulus is clearly a member of the *N. gracilis* group. It is also very distinct from either *N. gracilis* or *N. slevini* in having a number of unusual scalation characteristics including: fragmentation in the region of the primary temporal such that two scales rather than one are often present; fragmentation in the region of the nuchal such that two or more scales rather than one are sometimes present; an increased number of post temporal scales such that four, rather than three or fewer, scales occur between the lower secondary temporal and the ear opening; a tendency for displacement of the posterior loreal by contact between the lower preocular and nasal to exclude contact between the posterior loreal and upper labial scales on occasions; an increased number of lower labial scales such that seven scales border the lip between the mental scale and angle of the jaw; and the presence of seven upper labial scales with three rather than two labial scales positioned below the eye in the area between the anterior preocular scale and postsubocular scales (the fourth wholly bordering the lower eyelid, the third and fifth partially). It is likely that the condition seen in *N. garrulus* for the first three of these characters is apomorphic. The polarity of the upper labial scale character in *N. garrulus* is, however, less clear. All other species of *Nannoscincus* tend to have only two scales (more or less similar in size) positioned immediately below and wholly or partially bordering the lower eyelid. It is possible the extra upper labial bordering the lower eyelid of *N. garrulus* is derived from a division of one of the two upper labial scales usually seen in other species of *Nannoscincus* that are positioned immediately below and bordering the lower eyelid.

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Ebinania australiae, a New Species of Fathead Sculpin from Southern Australia (Scorpaeniformes: Psychrolutidae)

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ABSTRACT. A sixth species of *Ebinania* is described from nine specimens collected at depths of 982–1170 off southern Australia. Eight of the specimens were from the vicinity of Tasmania and the nearby mainland, and the ninth is from near Perth, Western Australia. The new species differs from its congeners in having cirri on the head, well-developed orbital rims, cranial arch 3 twisted upwards, prevomerine teeth in a continuous band, a single terminal chin pore, obsolete lateral line pores, and an overall pale colour. This is the third species of psychrolutid known from off continental Australia. Variation in important characters used in diagnosis of species of *Ebinania* is reported and problems of the characters in diagnosing these species are discussed. A key to species of *Ebinania* is provided.

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Introduction

The genus *Ebinania* was erected for a new psychrolutid from Japan, *E. vermiculata*, by Sakamoto (1932). *Ebinania* remained monotypic until Nelson (1982) reassigned *E. brephocephala* (Jordan & Starks, 1903) and *E. costaecanariae* (Cervigón, 1961) from *Cottunculus*, and described two new species, *E. macquariensis* and *E. malacocephala*. Since then, no other species have been assigned to *Ebinania*. Psychrolutids have been known from off continental Australia since *Psychrolutes marcidus* (McCulloch, 1926) was described from off southeastern Australia. Until now, only one other psychrolutid, *Psychrolutes occidentalis* Fricke, 1990, has been found off continental Australia (off northeastern Australia). Herein we describe a new species of *Ebinania* from off Australia's southern coast.

Materials and methods

Counts and measurements follow Nelson (1980). Measurements of soft anatomy are approximate because of the easily distorted bodies of these fish. Vertebral counts were obtained from radiographs. Osteology follows Jackson & Nelson (1998) except that the tabulars and supratemporals are referred to as extrascapulars, following Harrington (1955), and further named according to their associated sensory canal. The extrascapular supporting the lateral portion of the supratemporal canal is the lateral extrascapular, and the extrascapular supporting the transverse portion of this canal is the transverse extrascapular. Although arches 5 and 6 are lateral and transverse extrascapulars, respectively, they are referred to by their arch designation herein to facilitate comparison with previous psychrolutid work. Type specimens are deposited in the Australian National Fish Collection (formerly the I.S.R. Munro Ichthyological

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Collection), Hobart, Tasmania (CSIRO) and the Museum of Victoria, Australia (NMV). Institutional abbreviations follow Leviton *et al.* (1985).

Genus *Ebinania* Sakamoto, 1932

Diagnosis. Species of *Ebinania, Neophrynichthys*, and *Psychrolutes* (collectively Psychrolutinae) are distinguished from other psychrolutids in sharing a soft interorbit with the frontal laterally expanded to form a thin flexible orbital rim (Jackson & Nelson, 1998). Species of *Ebinania* differ from those of *Neophrynichthys* and *Psychrolutes* in having prevomerine teeth.

Ebinania australiae n.sp.

Figs 1–2, Tables 1–2

Type material. HOLOTYPE, CSIRO T 412, 206 mm Standard Length (SL), off Cape Sorell, Tasmania, 42°16'S 144°40'E to 42°22'S 144°42'E, 991–548 m, 14 July 1982. PARATYPES: CSIRO T 502, 218 mm SL, off Beachport, South Australia, 37°54'S 139°40'E to 37°50'S 139°36'E, 1000–1000 m, 3 April 1983; CSIRO T 504, 296 mm SL, data same as T 502; CSIRO T 505, 266 mm SL, data same as T 502; CSIRO T 506, 406 mm SL, data same as T 502; CSIRO T 536, 285 mm SL, off Cape Martin, South Australia, 37°51'S 139°40'E to 37°48'S 139°33'E, 1007–960 m, 25 April 1983; NMV A1977, 112 mm SL, off Cape Naturaliste, Western Australia, 33°17.9'S 114°12.6'E to 33°15.8'S 114°11.1'E, 982 m, 14 February 1991; NMV A2741, 358 mm SL, off Cape Bridgewater, Victoria, Australia, 38°36'S 140°59'E to 38°38'S 141°07'E, 1040–1170 m, 27 June 1982; NMV A2758, 284 mm SL, off Cape Bridgewater, Victoria, Australia, 38°38'S 141°04'E to 38°35'S 140°56'E, 990–1100 m, 27 June 1982.

Diagnosis. A species of *Ebinania* with cirri on the head, well-developed thin and flexible orbital rims, cranial (frontal) arch 3 high and twisted upwards, prevomerine teeth in a continuous band, a single terminal chin pore, obsolete lateral line pores, and an overall pale colour.

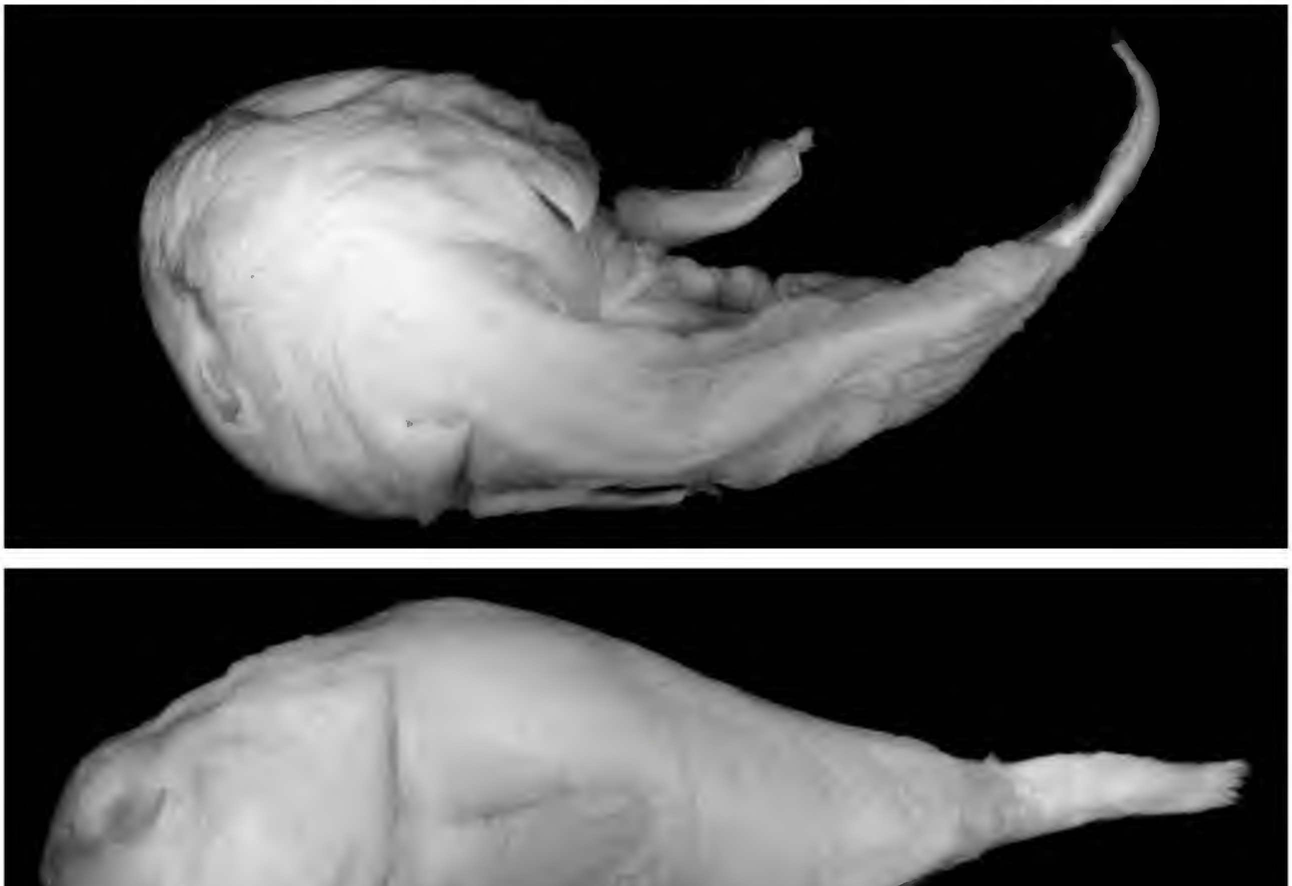

Fig. 1. Holotype of *Ebinania australiae*, CSIRO T 412, 206 mm standard length. Top: dorsal aspect, bottom: lateral aspect. Scale: 10 mm.

Description. Ratios and counts are given in Tables 1 and 2. Body tadpole shaped. Head large, trunk short and tapering to a small tail. Head depressed at orbits and sloping dorsally to a moderately depressed nape. Trunk round, tapering to a moderately compressed peduncle. Orbits forward, snout blunt and wide. Interorbit wide and soft. Mouth large, terminal, and oblique. Jaws equal or upper jaw slightly

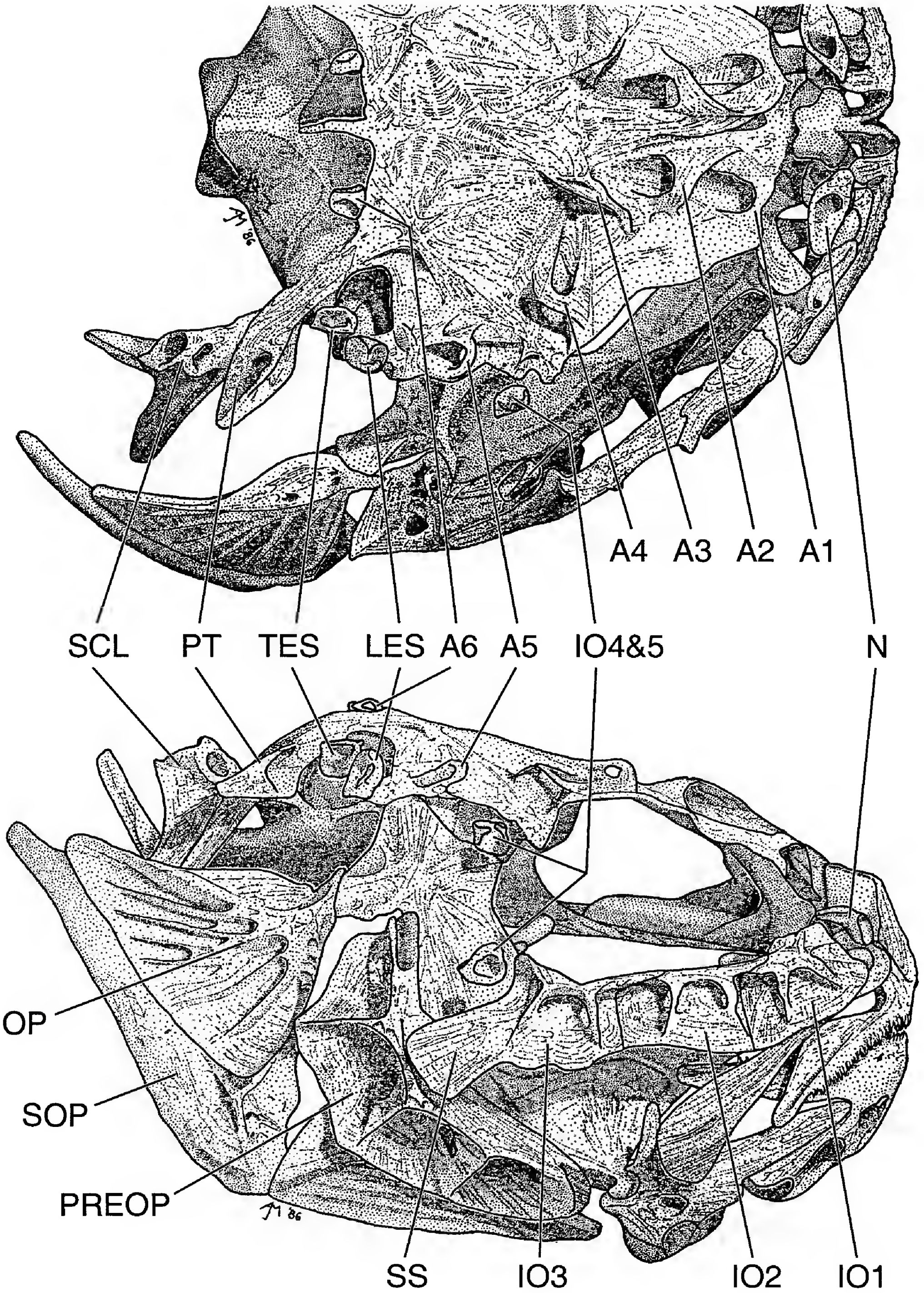

Fig. 2. Superficial cranium of *Ebinania australiae*, CSIRO T 505. Top: dorsal aspect, bottom: lateral aspect. Scale: 10 mm. *A1–A6*, cranial arches 1–6; *IO1–5*, infraorbitals 1–5; *LES*, lateral extrascapular; *N*, nasal; *OP*, opercular; *PREOP*, preopercular; *PT*, posttemporal; *SCL*, supracleithrum; *SOP*, subopercular; *SS*, suborbital (infraorbital) stay; *TES*, transverse extrascapular.

protruding. Premaxilla and dentary with a band of villiform teeth in 5–6 (premaxilla) and 4–5 (dentary) irregular rows; prevomer with villiform teeth in a contiguous band of 2–3 irregular rows. Skin thin, gelatinous, very loose, and smooth (lacking prickles). Cirri small, simple or multiheaded, and present around the jaw and less frequently on the snout and head where magnification may be required to detect them. Anterior nostril raised on a tube, posterior nostril flush or only slightly raised on a tube. Terminal chin pore fused and minute. Lateral line pores obsolete.

All fins covered with loose skin. Dorsal fin without a deep notch between spinous and soft rayed parts. Dorsal fin spines barely discernible externally, with only minute nibs at the top of the embedded flabby fin. Lower pectoral fin with notches between ray tips. Caudal fin truncate.

Colour in alcohol very pale amber-brown. Irregular large-scale mottling apparent, though differences between darkest and lightest areas slight; pectoral fins darkest. Peritoneum brown with dark flecks.

Frontals laterally expanded into a thin orbital rim. Frontal with four large arches. All arches, particularly arch 3, are strongly bilaterally asymmetric. Arch 3 high and twisted upwards. Arch 5 (anteriormost lateral extrascapular) borne upon and fused with pterotic. Arch 6 (medialmost transverse extrascapular) free from parietal. Five infraorbitals, first three well developed and articulated to form a suborbital bar, third with a stay extending to preopercle, last two simple and free tubular bones. Extrascapulars and posterior tubular infraorbitals each with a delicate or incomplete arch.

Variation. Nine specimens of *Ebinania australiae*, four of *E. brephocephala*, and two of *E. vermiculata* were examined. Morphometric and meristic data were also noted from Nelson (1982) and Quéro (2001). Variation of counts for all species of *Ebinania* is shown in Table 1. No single meristic trait or combination of meristic traits separates any of the species of *Ebinania*. However, when more specimens are available, pectoral fin ray counts may prove useful in separating species of this genus as they have been with the genus *Neophrynichthys* (Jackson & Nelson, 2000). Pectoral fin ray counts vary from 19 to 24 amongst the species of *Ebinania* (Table 1). Specimens of *E. vermiculata* span the entire range of the genus in pectoral counts: the two specimens of *E. vermiculata* examined here had 21 and 24 rays, Sakamoto (1932) counted 22 pectoral rays on the holotype, and Watanabe (1960) counted 19 to 21 rays amongst 12 specimens of *E. vermiculata*. It is possible that Watanabe's (1960) counts may be low because the upper rays of the pectoral fin are very closely spaced and must be counted after dissection of the skin at the pectoral base. Morphometric variation is great (Table 2), probably because of the easily distortable nature of these fishes' bodies. The morphometrics of the nine specimens of *Ebinania australiae* overlap with those of the other species of *Ebinania*, and no morphometric character is useful for the diagnosis.

Table 1. Vertebral and fin counts of *Ebinania australiae* and comparison with counts of other species of *Ebinania*. Number of specimens observed with a particular count given for *E. australiae*. Specimens unknown for a given count indicated with a dash (—). Specimens known from literature and additional material examined with a given count indicated with a plus (+). Specimens known from literature with a given, though questionable, count indicated with a question mark (?).

	count	*E. australiae*	*E. brephocephala*	*E. costaecanariae*	*E. macquariensis*	*E. malacocephala*	*E. vermiculata*
vertebrae	31	2	+	—	—	+	—
	32	7	—	—	—	—	—
	33	—	—	—	+	—	+
dorsal spines	6	2	—	—	—	—	—
	7	7	—	—	+	+	—
	8	—	+	+	—	—	+
	9	—	—	—	—	—	+
dorsal rays	15	1	+	—	—	—	—
	16	1	—	+	—	—	+
	17	5	—	—	—	+	+
	18	2	—	—	+	—	—
anal rays	11	—	—	—	—	—	+
	12	3	—	—	+	+	+
	13	5	+	+	—	—	—
	14	1	+	—	—	—	—
pectoral rays	19	—	+	—	—	—	?
	20	—	+	—	—	+	?
	21	3	—	—	—	—	+
	22	6	—	+	—	—	+
	23	—	—	—	—	—	—
	24	—	—	—	+	—	+

Table 2. Ratios of *Ebinania australiae* given as percent of standard length. Sample size was 9 (holotype and 8 paratypes) for all measurements except for soft tissue snout length (n = 7).

	mean	range
standard length (mm)	270	112–406
body depth	27.5	23.5–32.5
peduncle depth	6.91	5.91–8.23
head length	40.8	34.6–49.5
head width	36.4	29.4–40.7
interorbital width*	14.1	11.7–16.1
upper jaw length	19.0	17.9–20.5
snout length	9.25	6.56–11.1
snout length*	12.9	11.9–13.6
orbit diameter	10.8	9.46–11.8
eye diameter*	5.21	3.84–6.16

* Measured to edge of skin that covers much of the eye.

Two traits used in the diagnosis of *Ebinania australiae* were observed to vary within some species: condition of the terminal chin pore and arrangement of the prevomerine teeth. All specimens of *E. australiae* examined had the terminal chin pore fused and medial, as opposed to paired. Although chin pore state has not been reported to vary within the other species of *Ebinania*, it varied in the specimens of *E. brephocephala* we examined (fused in HUMZ 74774, paired in HUMZ 74784, and indeterminable in the two cleared and stained specimens). The state of this pore is used herein (in conjunction with colour) to separate *E. australiae* from *E. vermiculata*; however, this may not be reliable if it is found to vary in either of these two species as it does in *E. brephocephala*. All specimens of *E. australiae* examined had prevomerine teeth in a continuous band, as opposed to in two blocks separated by a distinct gap. Although the prevomerine teeth state has not been reported to vary within the other species of *Ebinania*, variation was observed in the two specimens of *E. vermiculata*, with teeth in two distinct blocks in HUMZ 34249 and teeth in a continuous band with only a slight medial constriction in HUMZ 78141. The condition of the prevomerine teeth is used herein to separate *E. australiae* from *E. brephocephala* and *E. costaecanariae*; other characters separate these two species should prevomerine teeth be found to vary.

Ebinania australiae is distinguished from *E. brephocephala* and *E. costaecanariae* in having cirri on the head and prevomerine teeth in a continuous band as opposed to two patches separated by a distinct gap at the symphysis. It is distinguished from *E. macquariensis* in having well-developed orbital rims and cranial arch 3 high and twisted upwards as opposed to low and flat. It is distinguished from *E. malacocephala* in having obsolete lateral line pores rather than pores raised in tubules and prevomerine teeth in a continuous band. It is distinguished from *E. vermiculata* in having a single terminal chin pore and an overall light grey brown body colour as opposed to a medium brown blotchy colour.

Distribution. *Ebinania australiae* is known from southern Australia off the tip of Western Australia (one specimen), off southern South Australia and Victoria (7 specimens), and off Tasmania (one specimen) at 982–1170 m (Fig. 3). The geographically closest congeneric species of *Ebinania australiae* is *E. macquariensis* from Macquarie Island, 1500 km southeast of Tasmania, and the next closest species is *E. malacocephala* from the far southern middle Pacific (54°49.5'S 129°47'W) (both described by Nelson, 1982). Two species, *E. brephocephala* and *E. vermiculata*, are known from the Northwest Pacific off Japan. The sixth species of *Ebinania, E. costaecanariae* is known from the eastern Atlantic off Spain (Quéro, 2001) and Africa (Nelson, 1982).

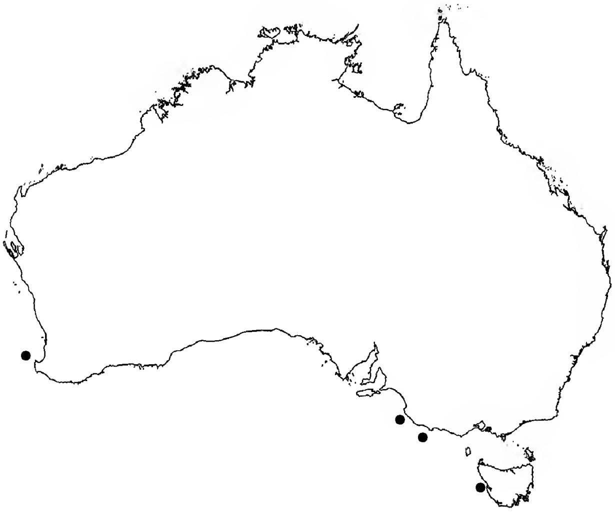

Fig. 3. Locality records for *Ebinania australiae*.

Etymology. The specific name *australiae* refers to the known occurrence of this species. Given the paucity of outwardly apparent specific characteristics within this genus, geographic names seem fitting for newly described allopatric species of this wide ranging genus. Gender feminine.

Discussion

Ebinania australiae is the sixth species to be assigned to the genus *Ebinania*. The species of this genus differ little from each other. In skin ornamentation, cirri are notably reduced to microscopic proportions in *E. brephocephala* and *E. costaecanariae*. Cirri of varying length and of irregular pattern are present in the other four species of *Ebinania*, and they cannot be used to distinguish these four species from each other. Five of the six species have very similar crania, and only *E. macquariensis* is markedly different in this regard, with a relatively narrow interorbit in which the frontals are not greatly expanded into orbital rims. Nelson (1982) also noted the condition of cranial arch 3 as being unique in *E. macquariensis*: low and flat versus high and twisted upwards. This character should be treated carefully because of the large degree of plasticity in the development of these arches within this genus, and because this species was described from a single specimen. The prevomerine teeth of *E. australiae* are like those of *E. macquariensis* and one specimen of *E. vermiculata* examined, with these teeth being in a continuous band versus in two separate elliptical blocks as in the other specimen of *E. vermiculata* and other species of *Ebinania*. The terminal chin pore is paired in the holotype of the Japanese *E. brephocephala* (Kurt Bruwelheide, NMNH, pers. comm., though variable in the specimens examined here) and *E. vermiculata*, and single in all other species of *Ebinania*. Lateral line pores amongst most species of *Ebinania* are not apparent, although in one species, *E. malacocephala*, these pores are well developed and raised in tubules. In colouration, *E. costaecanariae* stands out with its overall dark pigmentation. As its name implies, *E. vermiculata* has vermiculated pigmentation, although some pattern is also apparent to a lesser and fainter degree in *E. brephocephala* and *E. australiae* (and probably also in *E. macquariensis* and *E. malacocephala*; Nelson, 1982).

Taken individually, the above mentioned characters distinguish three species of *Ebinania*: *E. costaecanariae* (deep colouration), *E. macquariensis* (narrow interorbit), and *E. malacocephala* (lateral line pores raised on tubules). The remaining three species are distinguished by combinations of characters, as is *E. australiae* in its diagnosis above. Morphologically, the new species appears to be most similar to *E. macquariensis*, differing from it only in the condition of the cranium (interorbit), and to *E. vermiculata*, differing from it in the condition of the terminal chin pore and colouration.

Geographically, *Ebinania australiae* is isolated from its nearest congeners. It is more than 1500 km from *E. macquariensis*. The next closest species, *E. malacocephala*, is considerably more isolated in the extreme southern-central Pacific. For the most part, continental waters connect Australia with Southeast Asia, and Japan, where *E. brephocephala* and *E. vermiculata* occur. The sixth and most geographically distant species, *E. costaecanariae*, has the widest geographic range within the genus, being found from northern Spain to southern Africa. *Liparoides beauchampi*, possibly a species of *Ebinania*, was collected off India, but unfortunately, the holotype of this enigmatic species is lost (Stein, 1978).

Ebinania australiae fits the generic diagnosis for *Ebinania* and does not challenge the validity of its subfamily or family. This new species brings the number of psychrolutids known from off continental Australia to three, *Psychrolutes marcidus* (McCulloch, 1926), *Psychrolutes occidentalis* Fricke, 1990, and now *Ebinania australiae*. Two other psychrolutids, *Ambophthalmos magnicirrus* and *Ebinania macquariensis* are known from Macquarie Island, Australia. The family now includes 34 species. Two of the three species found off continental Australia were described within the last 15 years and five of the six New Zealand psychrolutids were described since 1977 (Jackson & Nelson, 2000). The Southern Hemisphere is a fertile ground for discovery of new psychrolutids; material from a new locality, possibly *Psychrolutes microporos*, has already been collected from the Lord Howe Plateau and Wanganella Bank east of Australia (Martin Gomon, NMV, pers. comm.).

Key to the species of *Ebinania*

1 Cirri, if present, microscopic on head and body; prevomerine teeth in two patches in adults 2
—— Short cirri on head; prevomerine teeth continuous or in two patches 3

2 Dorsal rays 24–25; pectoral rays 22–24; fresh colour dark brown to black .... *Ebinania costaecanariae* (Cervigón, 1961)
—— Dorsal rays 20–23; pectoral rays 17–19; fresh colour light brown .... *Ebinania brephocephala* (Jordan & Starks, 1903)

3 Lateral line pores distinct; prevomerine teeth in two patches in adults; pectoral rays about 20 .... *Ebinania malacocephala* Nelson, 1982
—— Lateral line pores obsolete; prevomerine teeth continuous; pectoral rays usually more than 20 4

4 Paired chin pores .... *Ebinania vermiculata* Sakamoto, 1932
—— Terminal chin pore 5

5 Cranial arches 2 and 3 distant from edge of well-developed orbital rim; pectoral rays 21–22 .... *Ebinania australiae* n.sp.
—— Cranial arches 2 and 3 close to edge of orbital rim; pectoral rays 24 .... *Ebinania macquariensis* Nelson, 1982

Comparative material examined

Ebinania brephocephala: HUMZ 51823, cleared and stained, Owase, Mie, Japan, 350 m, 13 March 1976; HUMZ 52187, cleared and stained, Japan, 25 March 1976; HUMZ 74774, 110 mm SL, Kochi, Japan; HUMZ 74784, 108 mm SL, Kochi, Japan. *Ebinania vermiculata*: HUMZ 34249, 302 mm SL, 42°1.0'N 143°43.6'E, 380 m, 18 April 1974; HUMZ 78141, 232 mm SL, 39°10.3'N 142°25.0'E, 1000 m, 19 August 1978.

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A Revision of the Genus *Poltys* in Australasia (Araneae: Araneidae)

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ABSTRACT. The genus *Poltys* C.L. Koch is revised in Australia and partly examined in the wider Australasian region. *Poltys coronatus* Keyserling, *P. keyserlingi* Keyserling, *P. multituberculatus* Rainbow and *P. penicillatus* Rainbow are synonymized with *P. illepidus* C.L. Koch; *P. microtuberculatus* Rainbow is synonymized with *P. stygius* Thorell; *P. bimaculatus* Keyserling, *P. mammeatus* Keyserling and *P. salebrosus* Rainbow are synonymized with *P. laciniosus* Keyserling; *P. sigillatus* Chrysanthus is synonymized with *P. frenchi* Hogg. Five new species are described, four from Australia, *P. grayi, P. jujorum, P. milledgei* and *P. noblei*, and *P. timmeh* from New Caledonia. Notes on the biology of Australian species are given and a key is provided. DNA COI and ITS2 sequence data are used to test the species separations. A checklist of all *Poltys* types from the region, including illustrations, is provided.

SMITH, HELEN M., 2006. A revision of the genus *Poltys* in Australasia (Araneae: Araneidae). *Records of the Australian Museum* 58(1): 43–96.

Poltys C.L. Koch is a rather distinctive araneid genus that can be recognized by a combination of widely separated lateral eyes and a pear-shaped carapace, where the "stalk" of the pear is an eye tubercle. The Australian species for which some biological information is known are nocturnally active, building finely meshed orb webs at night and reingesting them around dawn. Adult males are small and do not make webs; females are medium to large spiders. Moths are the most frequent prey. The spiders are cryptically camouflaged and during the day they hide motionless on vegetation with the legs drawn tightly around the prosoma and just the median eyes, which are situated on the anterior of the eye tubercle, protruding between the legs. In this position they often resemble part of a dead twig, a gall or a broken piece of wood. Most Australian species are rather variable in abdominal shape and colouration. This has led to confusion in the identification of species and inconsistencies in taxonomic descriptions.

Historical information

The original specimen described as *Poltys illepidus* C.L. Koch, came from "Bintang, Singapore" and was sent to Koch from the collection of Professor Reich of Berlin. The combination of carapace characters seemed so strange that Koch felt justified in making this a new genus, despite the fact that the specimen was incomplete, without an abdomen. Although this description was somewhat inadequate, at least at the specific level, the epithet soon became associated with a widely distributed and variable species with a rather tubercled, shield-shaped abdomen. The name "illepidus" means rude, rough or disagreeable and was probably thought to be appropriate to these rather lumpy and irregularly shaped specimens.

Some other species, which were subsequently described, had tall and sometimes bizarrely shaped abdomens. Others were similar to these, or the assumed *P. illepidus*, but showing variations in shape and colour. All of these types were female, or subadult female. Of the early authors only Simon (1895) described a (juvenile) male from Ceylon (Sri Lanka), although he was unsure as to which species this belonged. [The description was attached to *P. idae* (Ausserer) by Roewer (1942) and this was followed by Platnick (2005), but apparently this association was not intended by Simon]. More recently, males of some species have been figured in a number of works (e.g., Davies, 1988; Chikuni, 1989), but there has been no thorough description for any species.

Poltys species have been described from most parts of the old-world tropics and sub-tropics with the greatest number of species from SE Asia. In Australia, nine species of *Poltys* were described from the Australian mainland (eight species from Queensland, one from Western Australia) and one from Lord Howe Island in the Tasman Sea. Simon (1899) suggested several synonymies but none of these are reported by Roewer (1942) or Platnick (2005) and they have not been followed in this study.

Close to Australia, several species have been described from New Guinea and the Moluccas. Unfortunately, *P. sigillatus* Chrysanthus is the only one of these species that can be positively identified. The types of *P. dromedarius* (Bradley) and *P. papuensis* (Bradley) from New Guinea and of *P. moluccum* (Doleschall) from Amboina [Ambon] have not been found. Except for *P.idae* from Borneo there is then a geographical gap in described species northwards to Singapore, the area from where *P. illepidus* was described. From Sumatra northwards into mainland Asia there are then another 16 described species. All of these types are summarized in Appendix 1.

Koch was uncertain of the familial placement of *Poltys* and suggested the eye pattern might align the genus with the "Mithraen" (presumably *Mithras* C.L. Koch species, which are now listed under *Hyptiotes* Walckenaer in Uloboridae). As the genus became better known, its familial affinities were recognized. Simon (1895) placed *Poltys* into his Argiopidae as the nominative member of a new subfamily, the Poltyinae, which also included the genera *Cyphalonotus* Simon, *Homalopoltys* Simon, *Kaira* O.P.-Cambridge and *Pycnacantha* Blackwall. Later in the same work this taxon was demoted to tribal status in the Argiopinae (now essentially the family Araneidae). This tribe is now referred to as the Poltyini to conform to the International Code of Zoological Nomenclature. Informal use of this grouping has continued to the present, but as more becomes known of these genera it now seems unlikely that this is a monophyletic grouping (Smith, 2005).

Aims and scope

The original aim of this study was the taxonomic revision of the Australian *Poltys* species including a phylogenetic analysis and complementary behavioural studies (which will be reported separately). Initially, species separation was problematic due to unexpectedly wide intra-specific variations in abdominal shape (Smith, 2003). Once the specific features were better understood, and as more material became available, it became apparent that most of the northernmost Australian species were also present outside Australia, some as far north as mainland Asia. This meant that the original scope of the study had to be widened to include much more of the SE Asian fauna and many more types needed to be examined.

It was decided not to make any more formal descriptions or redescriptions of species based on females alone. All confirmed Australian species have been matched to males, and most pairings have been confirmed by raising the males from egg sacs. Only a few males are available for study from the SE Asian region and currently, other than the new species described here from New Caledonia, only those recognisable from Australian species can be matched to females. Some characters of a number of named non-Australian species have been figured with a summary of their details to aid future work in this region (Appendix 1, Figs 223–247). Except where somatic details may be diagnostic, only mature types have been illustrated.

A detailed generic description is not usually required for a partial generic revision. It was decided that due to the lack of previous knowledge of males and several instances of misidentification of other genera with *Poltys*, such detail would be useful in this case.

In this paper a revision of all the Australasian *Poltys* species with known males is presented. Support for these species' delimitation is then examined using within and between-species variations in base sequences of a short section from two genes.

Material and methods

Specimen examinations, measurements and drawings were made using a Wild M5 microscope with graticule and drawing attachment. Half-tone drawings were made on coarse-grade coquille board, using a range of graphite pencils and an ink outline. Stipple drawings are of ink onto drafting film. All plates were made up using Adobe Photoshop® 5.0 LE, including the addition of white lines on half-tone drawings. Specimen preparations for scanning electron microscopy (SEM) were either air dried from 70% alcohol (legs), air dried from 100% acetone after dehydration through a series of alcohol solutions (more robust male palps and spinnerets) or dried by critical point drying after the acetone/alcohol series (delicate male palps).

Poltys are often awkward to examine and draw as the legs are often tightly bunched and the dorsally extended abdomens may be difficult to handle. In order to damage no more specimens than necessary, the primary figured female specimens of each species group are the ones that have been used for DNA extractions, so 3–4 legs have been removed from one side (sometimes including coxae on smaller specimens). All lateral views are from the left (image reversed if necessary). On dorsal and ventral drawings any missing coxae were copied in from the entire side to balance the drawing. The point of leg excision is representational. Leg I has been manipulated so that a flat lateral view is shown to illustrate the proportion to the carapace; leg II femur length is in correct proportion to leg I. Legs III and IV are drawn as seen.

The range of abdominal variation within each species may be large but is similar in any one species group. This is illustrated for each group with exemplars drawn from the different species and in addition the abdomen of each holotype is illustrated. The particular abdominal shape shown for any particular species should therefore NOT be considered specifically diagnostic within the group (but see discussion for comments on the *P. columnaris*-group and some other non-Australian species).

Male palpal organs are rather small and details are often difficult to discern under a light microscope. The drawings

Figs 1–4. 1–3: *Poltys illepidus*. 1–2, day-time hiding positions; 3, frontal view showing bowed front tibiae. 4, *P. stygius*, day-time hiding position hanging beneath dead leaf. Arrows on Figs 1, 2 and 4 point to the anteromedial tip of the abdomen.

are intended to convey only the information that can be seen using a standard binocular setup. SEM images are also provided to fill in details. Some palpal characters are rather subtle and the only way to positively identify some species is by direct comparison with other material. To facilitate this, males and females of all the species found in each Australian state will be deposited with the major museum of that state, if none already exists in the collections.

To examine the epigyne of a specimen with a tall abdomen, it is useful to have an examination bowl with a deep layer of substrate such as sand or glass beads so that the apex of the abdomen can be gently buried to hold the specimen in position. It is also useful to have a range of small objects to hand that can be used as supports. Sometimes the posterior epigynal face can be seen without surgery, but often, however, the epigynal plate needs to be lifted or removed. For a brief examination, it is often possible to just lift the epigyne by making a small incision on each side to free it from the epigynal fold. Some epigynes, *P. frenchi* Hogg, in particular, are rather delicate and require extreme caution.

Abbreviations and definitions. For convenience, species are arranged in informal species groups based on morphology. Each grouping appears to comprise two or three sister species, but this relatedness is not tested here. Hence at present the characters given merely serve to "paint a picture" of the species in question but in the future they may also prove to be useful in a phylogenetic context.

The group containing the type species is treated first, followed by the other groups in alphabetical order. Within each group the nominal species is first (if it is dealt with in detail), others are in alphabetical order.

Abbreviations of institutions and collections. *AM*, Australian Museum, Sydney, Australia; *BMNH*, The Natural History Museum, London, UK; *BPBM*, Bernice P. Bishop Museum, Honolulu, USA; *CLD*, C.L. Deeleman-Reinhold; *HNHM*, Hungarian Natural History Museum, Budapest, Hungary; *JAM*, J. Murphy; *JK*, J. Koh; *MMUS*, Macleay Museum, University of Sydney, Sydney, Australia; *MNHNP*, Muséum national d'Histoire naturelle, Paris, France; *MRAC*, Koninklijk Museum voor Midden Afrika, Tervuren, Belgium; *MSNG*, Museo Civico di Storia Naturale "G. Doria", Genoa, Italy; *NHMW*, Naturhistorisches Museum, Wien, Austria; *NHRM*, Swedish Museum of Natural History, Stockholm, Sweden; *NMV*, Museum Victoria, Melbourne, Australia; *NTM*, Museums and Art Galleries of the Northern Territory, Darwin, Australia; *OUM*, Oxford University Museum, Oxford, UK; *QM*, Queensland Museum, Brisbane, Australia; *RBIN*, Royal Belgian Institute of Natural Sciences, Brussels, Belgium; *RMNH*, National Museum of Natural History, Leiden, The Netherlands; *SAMA*, South Australian Museum, Adelaide, Australia; *WAM*, Western Australian Museum, Perth, Australia; *ZMH*, Zoologisches Institut und Zoologisches Museum der Universität Hamburg, Hamburg, Germany; *ZMUC*, Zoological Museum, University of Copenhagen, Copenhagen, Denmark.

Registration prefixes at Australian institutions. Specimen numbers prefixed *KS* are in the AM, prefixed *N* or *NN* are in SAMA, *S* or *W* are in QM, *WA* are in WAM, and others are as indicated.

Abbreviations of collectors. *G,M&S*: Gray, Milledge and Smith; *HMS*: H.M. Smith; *M&S*: Milledge and Smith; *MRG*: M.R. Gray. Collector's names that only appear once or twice are not abbreviated.

Other abbreviations. *ac*, aciniform spigot(s); *agg*, aggregate spigot(s); *ALE*, anterior lateral eye(s); *ALS*, anterior lateral spinneret(s); *AME*, anterior median eye(s); *BH*, basal haematodocha; *CD*, copulatory duct; *Co*, conductor; *COI*, cytochrome oxidase *c* subunit I; *Cy*, cymbium; *cyl*, cylindrical spigot(s); *DH*, distal haematodocha; *E*, embolus; *FD*, fertilization duct; *fl*, flagelliform spigot; *I, II, III, IV*, Roman numerals used for legs 1–4; *ITS2*, internal transcribed spacer 2; *LLs* and *LsLS*, large-large-small and large-small-large-small (prolateral cheliceral teeth); *MA*, median apophysis; *mAP*, minor ampullate spigot; *MAP*, major ampullate spigot; *mtDNA*, mitochondrial DNA; *nu*, nubbin; *P+TL*, patella and tibia overall combined length, dorsal; *Pc*, paracymbium; *pir*, piriform spigot(s); *PLE*, posterior lateral eye(s); *PLS*, posterior lateral spinneret(s); *PM*, paramedian apophysis; *PME*, posterior median eye(s); *PMS*, posterior median spinneret(s); *S*, stipes; *TA*, terminal apophysis.

Measurements and descriptions. Carapace length ranges are taken from Australian specimens only and are based on all records, or a sub-sample of 20–30 individuals for more numerous species. All measurements are given in millimetres. Sternum and abdominal length measurements are along the centre line and so, for the sternum they start posterior to the labium and for the abdomen they ignore any humeral tubercles. As far as possible, typical specimens have been selected for descriptions but it should be noted that all species are variable in most characters, especially abdominal shape, carapace shape and eye positions, and leg lengths. Many figure references in descriptions are to the typical specimens that are used for the primary figures and so are not actually the specimens being described (see *Material and methods* section). Eyes increase less than other body parts with growth, so larger specimens tend to have smaller eyes relative to carapace length than smaller ones. For this reason eye measurements are not given. Species descriptions do not reiterate the generic description unless there is interspecific variation within a character.

Distribution maps and records. Adults only are included except where a juvenile record is the only occurrence for a state or territory or otherwise extends the recorded range of the species. Records with only a country name and no detailed locality are not included on maps unless there are no others from the area. If such records are used the symbol is arbitrarily placed in the centre of the named area. Records are listed ordered by State or Country, then by locality name for each repository (alphabetically on initials). Type data are given in full, data for other material examined are abridged and only selected records are given for common species (but including any drawn or described specimens). The full list of material examined is shown on maps (exceptions as discussed above). It should be noted that many specimens (both males and females) collected by the author have matured in captivity after the capture date given.

Molecular sequences. Methods are described in the section "Separation of Australian species using molecular characters".

Taxonomy

Genus *Poltys* C.L. Koch

Poltys C.L. Koch, 1843: 97. Type species *Poltys illepidus* C.L. Koch by monotypy. Simon, 1885: 448, 1895: 888; Keyserling, 1886: 123; Pocock, 1900: 235; Rainbow, 1909: 230; Roewer, 1942: 904; Bonnet, 1958: 3746; Barrion & Litsinger, 1995: 579; Platnick, 2005.

Pleuromma Doleschall, 1859: 44. Type species *Pleuromma moluccum* Doleschall. First synonymized by Thorell, 1878: 28.

Cyphagogus Günther, 1862: 2. Type species *Cyphagogus mouhoti* Günther. (Preoccupied in Coleoptera).

Cyphonethis Thorell, 1869: 37. Replacement name for *Cyphagogus*. Not recognized by Simon, 1885: 449, who synonymized *Cyphagogus* with *Poltys*.

Mastigosoma Ausserer, 1871: 817. Type species *Mastigosoma idae* Ausserer. First synonymized by Simon, 1885: 449.

Gerrosoma Bradley, 1876a: 223. Type species *Gerrosoma papense* Bradley. First synonymized by Thorell, 1881: 59, but disputed by Simon, 1885: 449.

Rhyncharachne Bradley, 1876b: 240. Type species *Rhyncharachne dromedaria* Bradley. First synonymized by Thorell, 1881: 59.

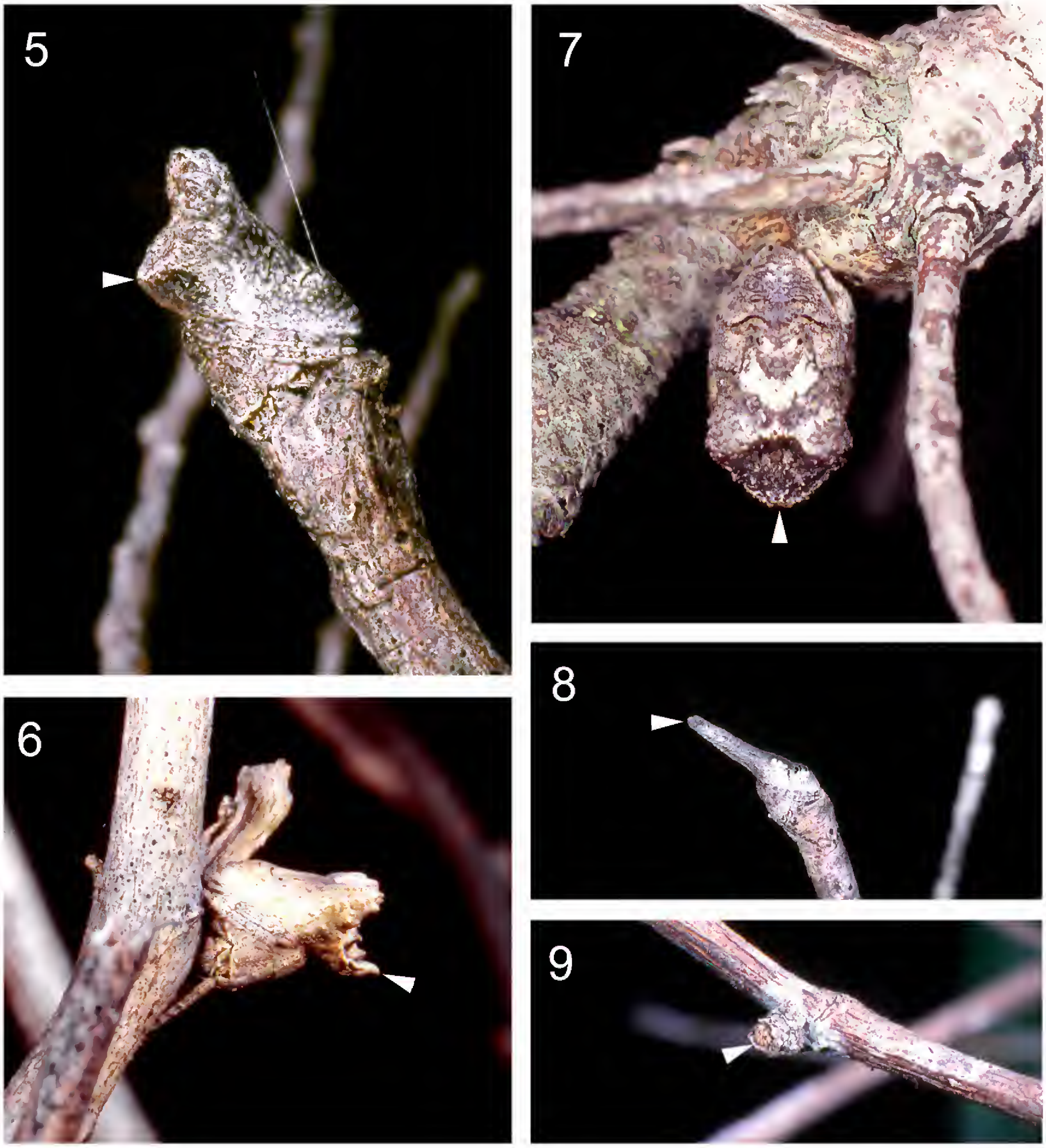
Remarks. The generic synonymies listed above have not been questioned in this work. Only two of the type specimens involved (*P. mouhoti* and *P. idae*) have been located (see

Appendix 1). Although these females share many *Poltys* characters (Fig. 244), these taxa cannot be fully evaluated until males are known. Of the others, the original descriptions and figures do not contradict identification with *Poltys*.

On *Poltys illepidus*: at least six *Poltys* species are now known to occur in the area around Bintang, the type locality of *P. illepidus* (see Appendix 1). Koch's type specimen, from the collection of Herr Professor Reich of Berlin, has not been located, nor apparently has that of *Atea incerta* C.L. Koch, described from material in the same box, which is now listed as *nomen dubium* under *Araneus* Clerk (Platnick, 2005). Even if the *Poltys* type were found, it might not be possible to identify the species, as the "female" specimen was missing its abdomen. Despite this, the identity of the genus itself is not in doubt. The combination of carapace shape, size and eye arrangement is distinctive. It is hoped that future work on the Asian *Poltys* species (or rediscovery of the type) will resolve this issue. For the time being, the species referred to as *P. illepidus* is one of the most common and widespread, has definitely been recorded from the general area of the type locality, and is that which most people associate with the name *P. illepidus* (e.g., Chrysanthus, 1961; Davies, 1988 [female only]). Continuing this association would therefore seem prudent unless better evidence becomes available.

Diagnosis. **Females**. All Australian *Poltys* species are medium to large spiders (carapace length 2.69–8.75) with a distinct eye tubercle and a pear-shaped carapace in dorsal view (Fig. 35). Viewed laterally, the carapace is doubly-domed (Fig. 33). The median eyes form an anterior quadrangle on the eye tubercle, ALE are a variable distance posterior to these towards the base. The PLE are well separated from the ALE on the outer radius of the anterior carapace (Fig. 35). In Asia, some species of the *P. mouhoti*-group have a reduced eye tubercle (as Fig. 244 or shorter), but eye arrangement and carapace shape are still distinctive. *Heurodes* Keyserling (Australian) and *Cyphalonotus* Simon (non Australian) are most frequently confused with *Poltys* but can be separated by the eye positions and genitalia. In *Heurodes*, the lateral eyes are adjacent (the "normal" araneid arrangement). In *Cyphalonotus*, the eyes may be slightly separated and are sometimes on an eye tubercle, but both lateral eyes are on, or at the base of, the eye tubercle (rather than the PLE being far away on the carapace). In both genera the epigyne has a bulbous basal part with a thinner extended scape. *Micropoltys* Kulczyński (northeastern Australia and New Guinea) also have separated lateral eyes but the females are as small as males and have no distinct eye tubercle. **Males**. Small compared to females (carapace length 0.78–1.41); the lateral eye separation is distinctive when combined with the absence of secondary sexual characters such as endite teeth and coxal hooks (Figs 56, 59). The eye tubercle is not always clearly differentiated. *Micropoltys* is similar in size and appearance, but *Micropoltys* have a more complex palpal organ with a large TA, plus endite teeth and coxal hooks. Although sometimes misidentified as *Poltys, Heurodes* and *Cyphalonotus* males are large (almost the same size as females) and also have endite teeth and coxal hooks. Males and females of *Cyphalonotus* and *Micropoltys* are illustrated in Smith (2005); *Heurodes* is illustrated in Davies (1988).

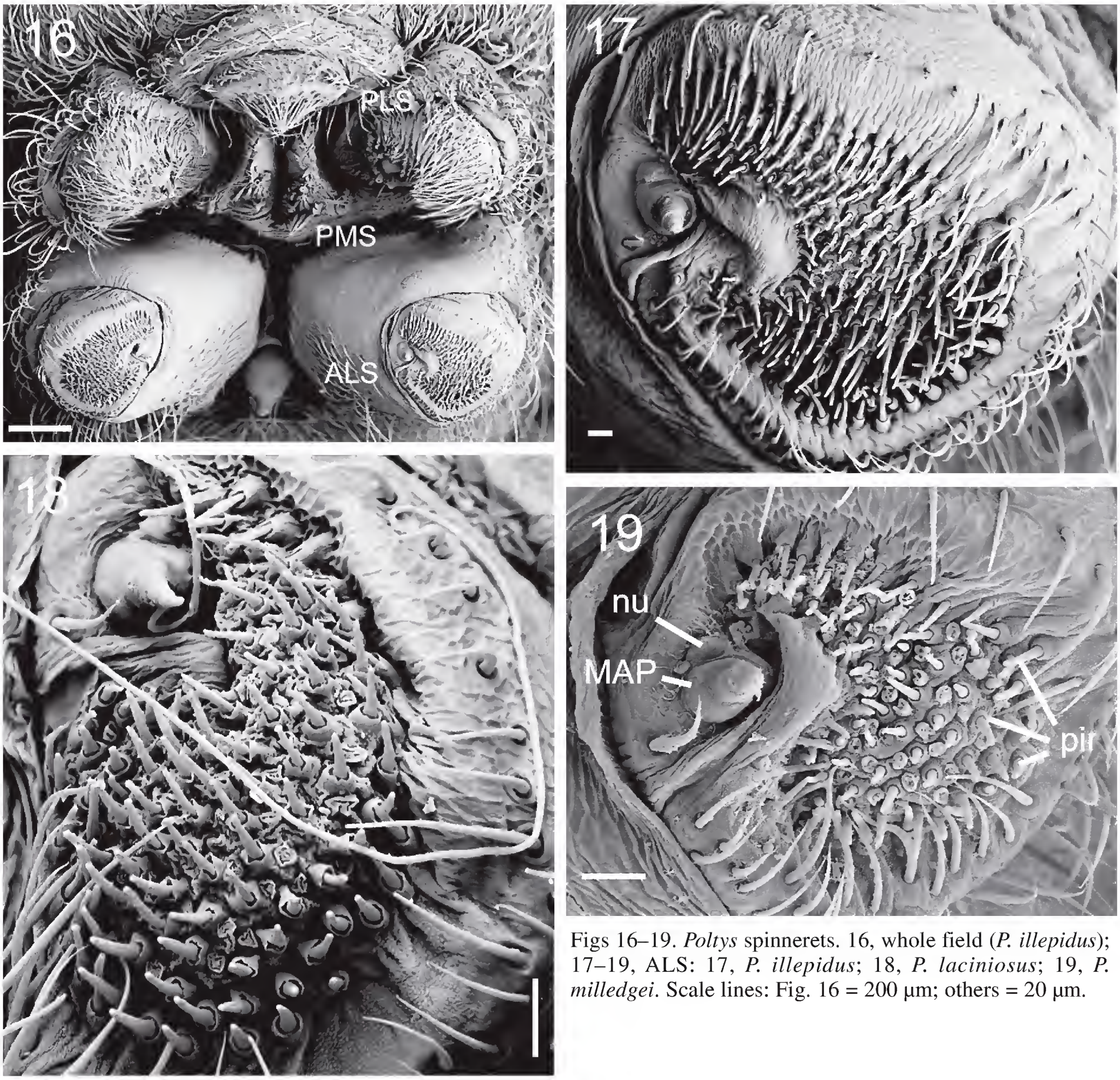
Description (Australian species). **Females**. *Prosoma*. Carapace pear-shaped in dorsal view, usually convex at coxa I (Fig. 35) (except *P. frenchi*, Fig. 130), widest between coxae II and III, longer than wide with a distinct eye tubercle anteriorly. In profile, carapace usually highest immediately anterior to fovea, double-domed (Fig. 69); fovea a deep pit; eye tubercle level to distinctly elevated (occasionally higher than thorax), sometimes with small protrusions above PME (Fig. 174). Eye tubercle and parts of caput hirsute, posterior carapace more or less glabrous (Fig. 69). Chilum two slender curved plates (Fig. 129). Chelicerae robust with three (*P. laciniosus*-group) or four (most other groups) promarginal teeth, few to several retromarginal teeth and a varying number of denticles in the cheliceral groove (Fig. 77). Cheliceral fang well developed, quite long, usually with tips crossed in mouth recess between maxillae. Labium wider than long (Figs 75, 129), strongly rebordered with white margin. Maxillae robust, with serrula, cupping deeply recessed mouth, medial borders white. Sternum cordate with anterior concavity for labium, tip pointed between coxae IV. Sternum carries sclerotized articulating extensions at bases of posterior legs (and sometimes also leg II, Fig. 129). • *Eyes*. Median eyes in a roughly equilateral quadrangle at or near anterior of eye tubercle, widest at either AME or PME (Figs 3, 162); AME often partially or wholly directed ventrally (Fig. 75). ALE on lateral eye tubercle, often partially directed ventrally on small one-sided tubercle; PLE well separated from ALE on lateral anterior carapace, directed posterolaterally. Tapeta in all secondary eyes: PME reduced to a sliver in base of eye-cup, ALE tapetum c. ⅓ in anterodorsal position in cup, PLE c. ¼ in anterior cup. • *Legs*. 1243. Front femora varying in shape from a normal, slightly broadened cylinder (*P. illepidus*-group, Fig. 33) to distinctly expanded dorsoventrally, with greatest diameter ½ to ⅔ distance to apex (e.g., Fig. 73); femur III fairly robust but short, femur IV longer and slender; few macrosetae on dorsal and prolateral faces of femora. Apical and lateral patellar macrosetae sometimes modified by flattening (Figs 37, 123). Anterior tibiae with characteristic shape: in lateral view sinuously curving towards apex (Fig. 33), with a "D" shape in cross-section, in dorsal view also curving laterally (Fig. 3); dorsal surface almost flat with regularly spaced short macrosetae, prolaterally with numerous short and long curved erectile macrosetae that continue to the distal metatarsus (Fig. 73); tibia ventrally smooth and glabrous (this is usually held close against the femur and cephalothorax when in cryptic day-time resting position, Figs 3, 5, 6). Anterior metatarsi gently curved, macrosetal patterns continuing from tarsi but also with paired macrosetae on ventral surface. Tarsi without macrosetae but on legs I and II a prolateral row of slightly stronger setae bear one or more basally notched teeth. One or more nearby hair rows also toothed but these are less specialized. Tarsi III and IV bear similar setae (Fig. 24, example of notched tooth arrowed). Tarsal claws. Three claws, main claws pectinate with 6–8 teeth. Toothed accessory hairs near claws (Fig. 22); on retrolateral tarsus IV the accessory hairs are enlarged but untoothed (not examined on legs II and III) (Fig. 23). Female pedipalps are variable in dimensions, and in development of macrosetae. • *Abdomen*. Certain shapes are characteristic of a particular species group but generally variable within and between species. Often with humps and tubercles and smooth and roughly haired patches. Also often with well-developed small sclerotized plates ("micro-sigillae") scattered over the abdomen surface, especially in



Figs 5–9. *Poltys laciniosus*-group and *P. frenchi*, day-time hiding positions. 5–6, *P. grayi* (5 is holotype); 7–8, *P. noblei* (7, photo: David Hain); 9, *P. frenchi*. Arrows point to the anteromedial tip of the abdomen.

P. illepidus-group and *P. frenchi*-group (Fig. 38). The pedicel is situated in the posterior half of the abdomen, so the abdomen is held at a steep angle overhanging the cephalothorax (Figs 53, 73). Book lung covers yellow with approximately nine main grooves. • *Spinnerets*. Normal araneid conformation (Coddington, 1989; Scharff & Coddington, 1997; Griswold *et al.*, 1998). ALS: MAP and nubbin medial (Figs 16, 19); piriform field widely distributed, but a large variation between checked species with approximately 225 spigots counted in the illustrated *P. illepidus* (Fig. 17), 95 in *P. laciniosus* Keyserling (Fig. 18), and 80 in *P. milledgei* n.sp. (Fig. 19). PMS: all spigots on anterior two-thirds of area; mAP + nubbin posterior; aciniform brush relatively sparse, about 14 spigots, grouped in anteromedial corner (Fig. 20). PLS with basally placed cylindrical spigots, closely grouped triad and approximately 30–40 aciniform spigots (Fig. 21). • *Epigyne*. Short and broad or a longer triangular or diamond-shaped plate (Figs 26, 28, 30, 32). Anterior plate rebordered giving a deep rim around the distal margin and laterally to a varying extent (Figs 46, 195). Most species with a distal bulge at the midline in lateral view (Figs 54, 191), and/or a pair of secondary bulges (Figs 47–48) that may appear as lobes (Fig. 140–141). Posteriorly with a median plate at least basally, reduced to a ridge of variable height away from the base in species with medium–long epigynes (Figs 47, 196); broad and fused with, or closely adjacent to, the lateral plates for much of the length in *P. columnaris*-group (Fig. 105). Foveal shape diagnostic for most species. Glandular spermathecae lie at the base of epigyne just within the abdomen. Copulatory ducts either lost or appearing as a posterior lobe of the spermathecae in the *P. illepidus*-group, with only pores leading away from the visible external parts of the epigyne (Fig. 26). In other groups there are short to medium length copulatory ducts along the lines where posterior lateral plates fuse with the median plate (Figs 28, 30, 32). • *Colour*. Variable. The only fairly consistent areas of colouration are those that are not involved in cryptic

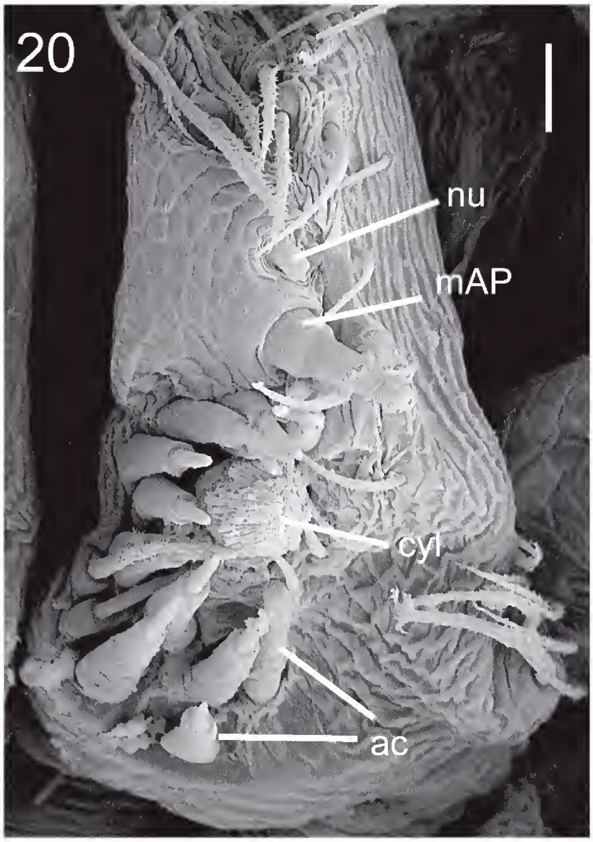
Figs 10–15. 10, *Poltys laciniosus*, in web at night, two eggsacs on twig at left (arrowed); 11, *P. laciniosus*, showing bright bands on anterior femora; 12, *P. frenchi* web of adult female; 13, *P. illepidus*, eggsac attached to dead leaf (photo: Ramon Mascord); 14, *P. milledgei*, eggsac on twig (photo: Carl Bento, Australian Museum); 15, *P. grayi*, eggsac on twig.

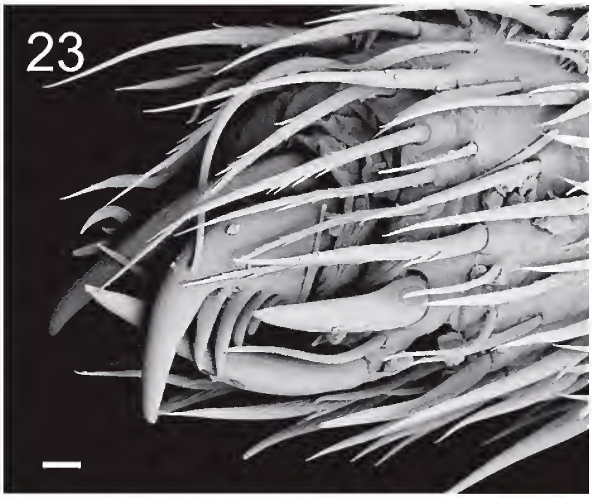


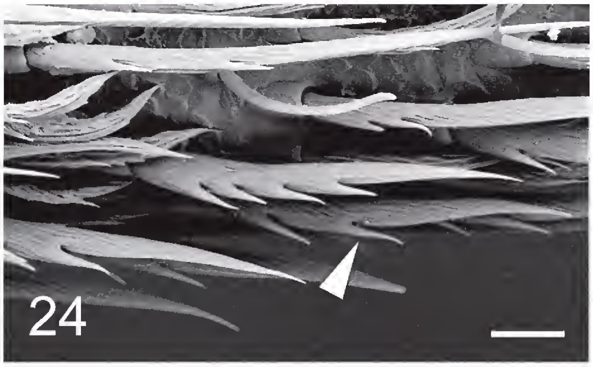
Figs 16–19. *Poltys* spinnerets. 16, whole field (*P. illepidus*); 17–19, ALS: 17, *P. illepidus*; 18, *P. laciniosus*; 19, *P. milledgei*. Scale lines: Fig. 16 = 200 µm; others = 20 µm.

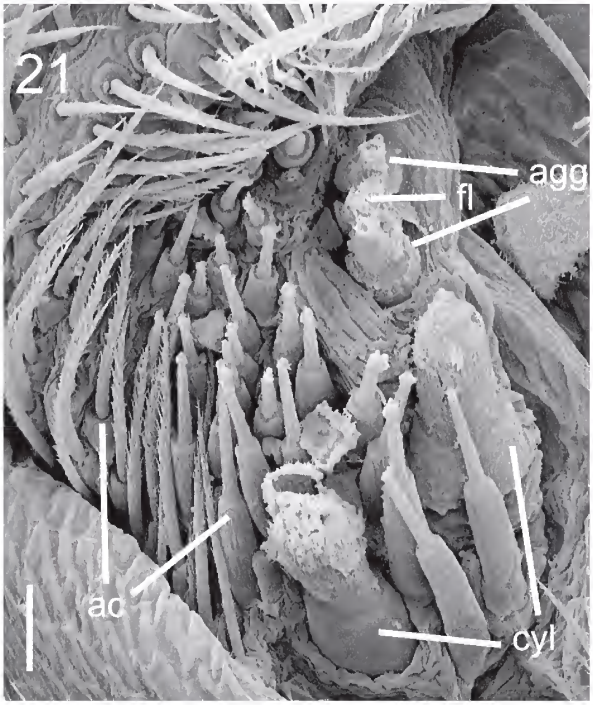
camouflage: most species have at least some black colouration around the secondary eyes, especially on the slightly tubercular lateral eyes; dorsal eye tubercle and adjacent areas of caput usually orange to creamy-yellow, remaining carapace is usually dark in the *P. illepidus*-group and *P. laciniosus*, paler in others; caput hairs always pale, usually appear whitish at least in alcohol specimens; ventral femora of *P. illepidus*-group usually dark with a deep blue refractive shine. The femora of other species groups are pale or yellow–orange contrasting with one or more dark bands, where the blue shine may again be apparent. Green pigments occur in some specimens both on the abdomen and on the legs, most commonly in tropical species but also as paler bluey-green lichen-like patches in southern species. Green pigments quickly break down in alcohol.

Males. Many features are like juvenile females at a similar stage of development (2–4 moults). In somatic characters, early maturing males can be quite different from late maturing males of the same species (e.g., as shown Figs 203–206). • *Prosoma*. Carapace. Mostly pear-shaped in dorsal view, widest between coxae II and III, longer than wide with a poorly to well-defined eye tubercle anteriorly (Figs 58, 98), sometimes with small protrusions above PME (Fig. 198). In profile (Fig. 56) carapace more-or-less level or highest at eye tubercle. Chelicerae similarly proportioned to female. Cheliceral fangs short to medium. Labium and maxillae similar to female with white or pale edges, endite tooth absent (Fig. 59). Sternum similar shape to that of female but reinforced by sclerotization that continues around between coxal bases to meet similar continuations from areas dorsal to the coxal bases. • *Eyes*. As female but ocular area more compact and eyes relatively larger (Fig. 59) and rather variable in relative sizes. • *Legs*. 1243. No coxal hooks. Femora almost straight in most species, slightly broadened in *P. columnaris*-group (Figs 95, 100); macrosetae as female. Patellar macrosetae as female. Anterior tibiae almost straight (Fig. 56); dorsal macrosetae may be flattened as on patellae (Fig. 99); prolaterally with a few macrosetae. Larger males, which have been through more moults, have a few more macrosetae (Fig. 207), but juvenile females are developing mature female-like legs with more macrosetae by this stage. Metatarsi also with only a few macrosetae. • *Abdomen*. Book lung covers smooth. Abdominal shape similar to females of similar size, i.e. some differentiation of shapes developing but still basically ovoid



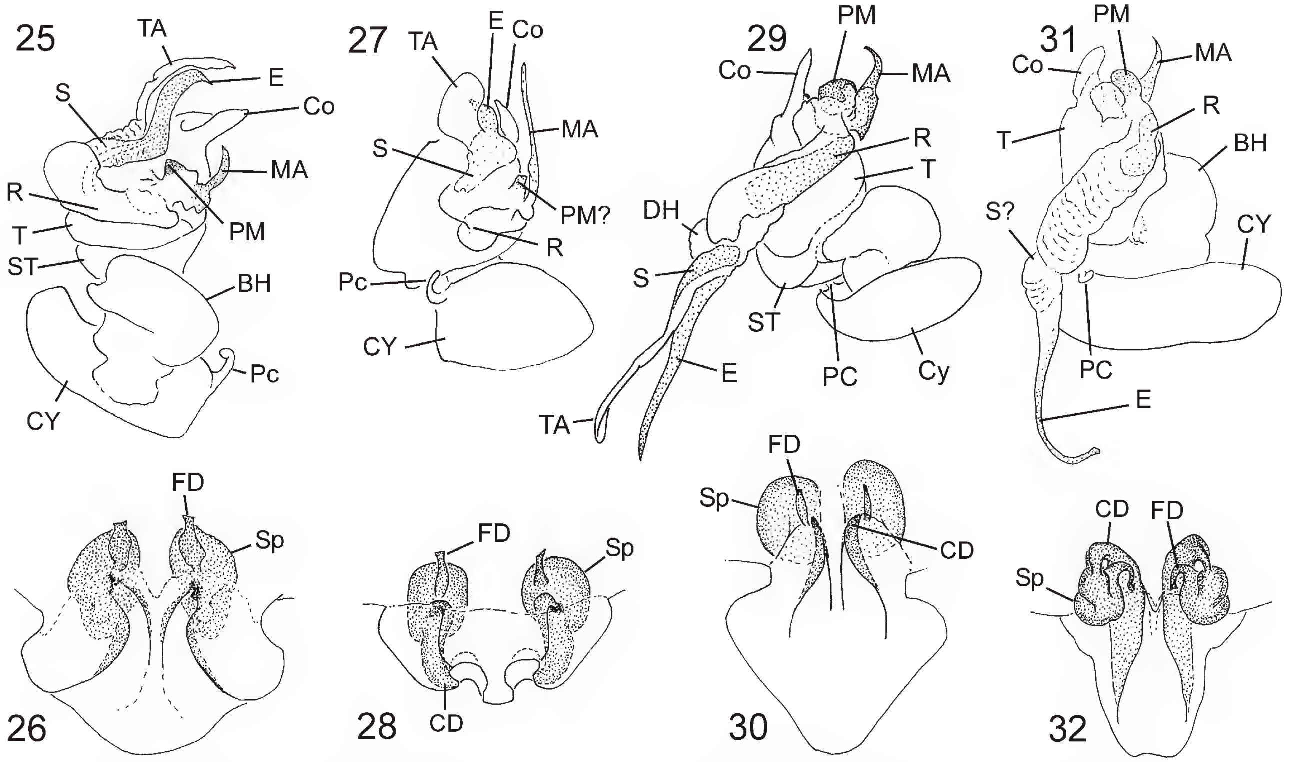






Figs 20–24. 20–21, *Poltys milledgei*, spinnerets: 20, PMS; 21, PLS. 22–24, *P. laciniosus*, tarsal claws and setae: 22–23, claws and accessory setae legs I and IV, retrolateral; 24, proventral tarsus IV. Scale lines = 20 µm.

(Figs 199, 202). • *Palpal organ*. A more or less full complement of typical araneid sclerites is present in most species but some structures (especially TA where present) are rather simplified. Expanded views of the Australian species groups are shown in Figs 25, 27, 29, 31. Of the tegular sclerites, all species have a long slender MA with a broad base (Figs 70, 208); a conductor is present that is reduced in the *P. columnaris*-group but is sturdy in others (Figs 118, 218); and a third sclerite is labelled here as a paramedian apophysis (PM). This is closely associated with the base of the MA and is possibly a separated section of that sclerite. The PM is well developed in *P. frenchi* and *P. laciniosus*-groups (Figs 125, 219), is smaller in the *P. illepidus*-group (Fig. 70) and extremely small or absent in *P. columnaris*-group (a small sclerotized patch with label "PM?" on Fig. 27). This sclerite appears to be homologous between these *Poltys* species-groups, but is not necessarily homologous to the PM of other taxa (see Scharff &



Figs 25–32. *Poltys* genitalic characters, expanded male palp and epigyne internal structure, posterior view. 25–26, *P. illepidus*; 27–28, *P. milledgei*; 29–30, *P. frenchi*; 31–32, *P. laciniosus*. Not to scale.

Coddington, 1997, for a discussion). In the embolic division all taxa have a radix; a stipes and distal haematodocha is definitely present in *P. illepidus* and *P. frenchi*, probably also in other species (Figs 25, 29, 67); a long, narrow TA that widens to a lamina distally is present in *P. illepidus*-group and *P. frenchi*-group (Figs 25, 29, 126), is shorter but broad in *P. columnaris*-group (Figs 27, 118) but absent in *P. laciniosus*-group (Figs 31, 218); the embolus varies between a short, stout rod in *P. columnaris*-group (Fig. 118) to a long, wire-like, grooved structure in *P. laciniosus*-group (Fig. 218). The paracymbium is a well-developed hook (Fig. 25). Femoral tubercles are absent. Macrosetae are absent from the palpal patella. • *Colour*. Less variable than females. Most species have at least some black colouration around the secondary eyes. Prosoma and legs mostly pale olive/brown, usually with black markings in centre of carapace and orange or yellow on the dorsal eye tubercle. Distal metatarsi and tarsi usually pale with dark rings. Larger males usually more strongly coloured than smaller specimens. Abdomens a pattern of brown/grey and black on white.

Biology. Most observations have been carried out on the *P. laciniosus*-group; a more detailed account will be provided separately (Smith, unpublished data). Except for adult males, all Australian species of *Poltys* make a web at night, which is usually ingested around dawn. The sticky spirals and radii are closely placed (Figs 10, 12). Moths are a major prey item, but other insects are also taken. The spiders seem to prefer openings in the vegetation, which may form natural flight corridors for moths and other prey. Webs have been recorded at heights between 0.2 m to around 4 m from the ground. The daylight hours are spent resting in a cryptic position on a nearby twig, tree-trunk, in low herbage (Figs 1–2, 3–9) or in a curled leaf (Robinson *et al.*, 1974). Dead twigs are preferred, especially by southern Australian species, but tropical species are more frequently associated with living vegetation. Egg sacs are laid on twigs or leaves (Figs 10 (arrowed), 13–15).

Distribution. *Poltys* species are found from equatorial western and southern Africa through southern Asia and south to mainland Australia, north to Japan and on at least some southern Pacific islands. Within Australia half of the species are only present in the far north. No *Poltys* have been recorded from either Tasmania or New Zealand.

Relationships. Within the Araneidae, *Poltys* appears to be a rather uniquely derived taxon with no close sister groups yet identified. Data from a study using the araneid matrix developed by Scharff & Coddington (1997) suggest that *Poltys* is most likely placed in the basal araneines and may be related to some or all of the taxa from Scharff & Coddington's "*Hypsosinga* clade" (Smith, 2005). As reported, however, by Scharff & Coddington and corroborated by another study based on this data set, some elements in the basal Araneidae are rather labile, especially when additional taxa are added (Kuntner, 2002). In particular, there is some equivocal evidence with respect to the relationships between argiopines and the basal araneines. For instance, the apparently distinctive character seen on femur IV of *Poltys elevatus* Thorell (Fig. 243) is also present in *Caerostris* Thorell (Grasshoff, 1984), which is an "argiopoid" genus; Scharff & Coddington commented that the "argiopine clade" genera frequently appeared in the basal "araneines" in their data set; Smith (2005) found that *Arachnura* Vinson and *Witica* O.P.-Cambridge frequently moved into this area. The placement of *Poltys* in the basal araneines should therefore be considered provisional.

Key to Australian *Poltys* species

Note that some coloration characters are good for recent specimens in alcohol but may be confusing for older material. Unfortunately, due to intraspecific variation in somatic morphology, most key characters are genitalic.

1	Male	2
——	Female	9
2(1)	TA present in palp; embolus fairly stout; PM absent–small and does not project dorsally between MA and conductor (Fig. 61–62), or if PM large then a rounded curved plate (Fig. 153)	3
——	TA absent from palp; embolus long and thin with groove (Fig. 209); PM heavily sclerotized and projecting between MA and conductor like a clenched fist (Fig. 209)	(*P. laciniosus*-group) 6
3(2)	TA of palp flanks embolus retrolaterally, both more-or-less equal length; conductor large (Figs 61, 154). Anterior eye tubercle gently curved between median eyes, not obviously extended to a blunt point (Fig. 150)	4
——	Visible part of palp TA dorsal to embolus (Fig. 108); conductor reduced and displaced towards MA, beneath embolus (Fig. 108). Eye tubercle long and ends in blunt point (accentuated by tufted setae) between median eyes (Fig. 98)	(*P. columnaris*-group) 8
4(3)	Embolus and TA arise retrolaterally in palp, not obscured by cymbium (Fig. 154); PM a large curved plate (Fig. 153). Eye tubercle well defined, narrow at base in lateral view (Fig. 148); carapace creamy-white, bright yellow–orange on dorsal eye tubercle; sternum pale with dark border (NE Qld)	*P. frenchi*
——	Embolus and TA origin in palp obscured by cymbium (Fig. 63); PM an angular sclerotized bump (Figs 61–62). Eye tubercle short and broad; carapace and sternum usually olive-brown (usually with some orange on eye tubercle) (Figs 56, 58)	(*P. illepidus*-group) 5
5(4)	Embolus sharply curved in prolateral view of palp (Figs 61, 68)	*P. illepidus*
——	Embolus longer and more openly curved (Figs 64, 70)	*P. stygius*
6(2)	Palpal conductor strongly twisted towards the prolateral (Figs 209, 219); embolus long and strongly curved distally, curve radius usually outside cymbium in ventral view (Fig. 209); usually with well-developed protrusions above PME on dorsal eye tubercle (Figs 200–201)	*P. laciniosus*
——	Palpal conductor less twisted, more or less directed apically; embolus shorter and gently curved, radius usually within cymbium in ventral view (Figs 212, 215); with or without protrusions above PME on dorsal eye tubercle	7
7(6)	Tip of embolus with large translucent but strongly reflective flange (Fig. 215 arrowed, 220). Protrusions above PME variable (eastern coast of Australia)	*P. noblei*
——	Tip of embolus with only small flange or barb (Figs 212, 222). Without protrusions above PME (Lord Howe Island)	*P. grayi*
8(3)	Eye tubercle massive, clypeus >1× AME (Figs 95, 98), usually with leaf-shaped macrosetae on distal patellae (Fig. 99) (northeastern Queensland)	*P. jujorum*
——	Eye tubercle less massive, clypeus <1× AME (Figs 100, 102); often with elongate flattened macrosetae on distal patella (Fig. 103) (northern NT and Kimberley)	*P. milledgei*

9(1) Epigyne widest point not at base, or if basal, then much wider than long (Figs 46, 104). Four prolateral cheliceral teeth (alternate large small large small—LsLs, Fig. 44) 10

—— Epigyne widest at base, usually long (Fig. 182). Usually only three prolateral cheliceral teeth (missing first small tooth—LLs, Fig. 163) ..... (*P. laciniosus*-group) 13

10(9) Epigyne much wider than long; foveae rounded pockets (Fig. 105). Eye tubercle long and ends in blunt point between median eyes (accentuated by tufted setae) (Fig. 84). Glossy black maculae on dorsal abdomen just anterior to spinnerets (Fig. 94) ..... (*P. columnaris*-group) 15

—— Epigyne as wide as long or up to 2× wider; foveae elongate, more-or-less open (Figs 51, 139). Anterior eye tubercle gently curved between median eyes, not obviously extended to a blunt point (Fig. 130). Dorsal abdomen without glossy black maculae 11

11(10) Epigyne spade-like (as in cards), often only lightly sclerotized and delicate, widest point at less than half length (Figs 138, 140); foveae wide and shallow (Figs 139–140). Eye tubercle well defined; carapace usually pale creamy-grey (Figs 127, 130) (northeastern Queensland) ..... *P. frenchi*

—— Epigyne widest point usually at half length or further, spade to fan-shaped; foveae narrow and angled or wide and deep (Figs 46–55). Eye tubercle broader at base; carapace usually dark (except variable amount of orange–yellow on and posterior to eye tubercle) (Figs 33, 35) ..... (*P. illepidus*-group) 12

12(11) Epigynal foveae narrow and often boomerang-shaped; median plate and ridge often quite short (Figs 47, 49–51) ..... *P. illepidus*

—— Epigynal foveae wide and deep, often paddle-shaped; median plate and ridge often longer, extending more deeply into epigynal groove (Fig. 53, 55) ..... *P. stygius*

13(9) Epigyne tip broad and bluntly rounded (but rim often translucent and may confuse the outline) (Figs 182, 184); median ridge strongly reduced away from base (less so in Kimberley specimens), producing a single large fovea (Figs 183, 185, 188). Carapace dark; usually with well-developed protrusions above PME on dorsal eye tubercle (Figs 159, 174) ..... *P. laciniosus*

—— Epigyne tip bluntly to sharply pointed (but some exceptions) (Figs 189, 195); median plate continues from base as a strong ridge, producing two distinct foveae (Figs 192, 194). Carapace fuscous to creamy-white; with or without protrusions above PME on dorsal eye tubercle (Figs 172–173) 14

14(13) Epigyne margins converge almost straight from base to tip, forming neat triangular plate, tip often quite acute (Figs 193, 195). Protrusions above PME variable (eastern coast) ..... *P. noblei*

—— Epigyne margins usually parallel near base before converging towards tip, tip usually a rounded point (Fig. 189). Without protrusions above PME (Fig. 175) (Lord Howe Island) ..... *P. grayi*

15(10) ALE almost midway between median eyes and PLE (Fig. 85) (northeastern Queensland) ..... *P. jujorum*

—— ALE distinctly closest to median eyes (Fig. 90) (northern NT and Kimberley) ..... *P. milledgei*

The *Poltys illepidus* species group

This group contains the "typical" species that are most commonly associated with the name *Poltys*. In Australasia at least two identifiable named species are found: *P. illepidus* and *P. stygius* Thorell. Both occur from Australia to the Asian mainland and a third, which may belong to this group, *P. pannuceus* Thorell, is recorded from Sumatra to Burma (see Appendix 1). Other species that are unmistakably of this group are found from Africa to Japan and the Caroline Islands (females in BPBM). Female characters that unite the group include a relatively broad abdomen, a low broadly domed carapace with medium to short eye tubercle, long quite slender legs (with less broadening of the femora than is seen in *P. columnaris*-group, for instance), and the epigyne well developed into a broad fan-shaped plate. In the two Australian species, the posterior lateral epigynal plates are relatively flat and there are no obvious copulatory ducts leading off the foveae. The internal epigynal structure of *P. pannuceus* has not been investigated but externally it appears intermediate between these species and the *P. columnaris*-group (Fig. 247). Males are less easily differentiated from those of some other groups, but the eye tubercle is broad and poorly defined and the palpal organ has a long thick embolus, originating dorsally, and a well-developed TA. A male of unknown species, but apparently belonging to the *P. illepidus*-group, has been examined from Genting, Malaysia (JAM 19143).

The two Australian species are of similar appearance and can be difficult to separate, even using genitalia, without side-by-side comparison. They are, however, well separated genetically (in the COI gene) and the egg sacs are different in colour.

Poltys illepidus C.L. Koch

Figs 1–3, 13, 16–17, 25–26, 33–41,
46–51, 56–63, 67–69, 71.

Poltys illepidus C.L. Koch, 1843: 97, fig. 821. Female(?) holotype, "East India, Singapore, Bintang"; not located. Simon, 1885: 448, 1895: 892. Chrysanthus, 1961: 211. Davies, 1988: 316, female only. The specimens discussed or figured by Pocock (1900: 236), Chikuni (1989), Barrion & Litsinger (1995: 579), and Ogasawara (2000) require confirmation, see below.

Poltys coronatus Keyserling, 1886: 128, fig. 10. Female holotype from Cape York Queensland, Australia; "in Bradley's collection", not located. **New synonym.**

Poltys keyserlingi Keyserling, 1886: 129, pl. 10, fig. 3. Juvenile holotype from Gayndah, Queensland, Australia; in ZMH, examined. **New synonym.**

Poltys multituberculatus Rainbow, 1898: 82, pl. 18, fig. 2. Female holotype from Cooktown, Australia; in AM, KS8696, examined. Rainbow, 1916: 118. **New synonym.**

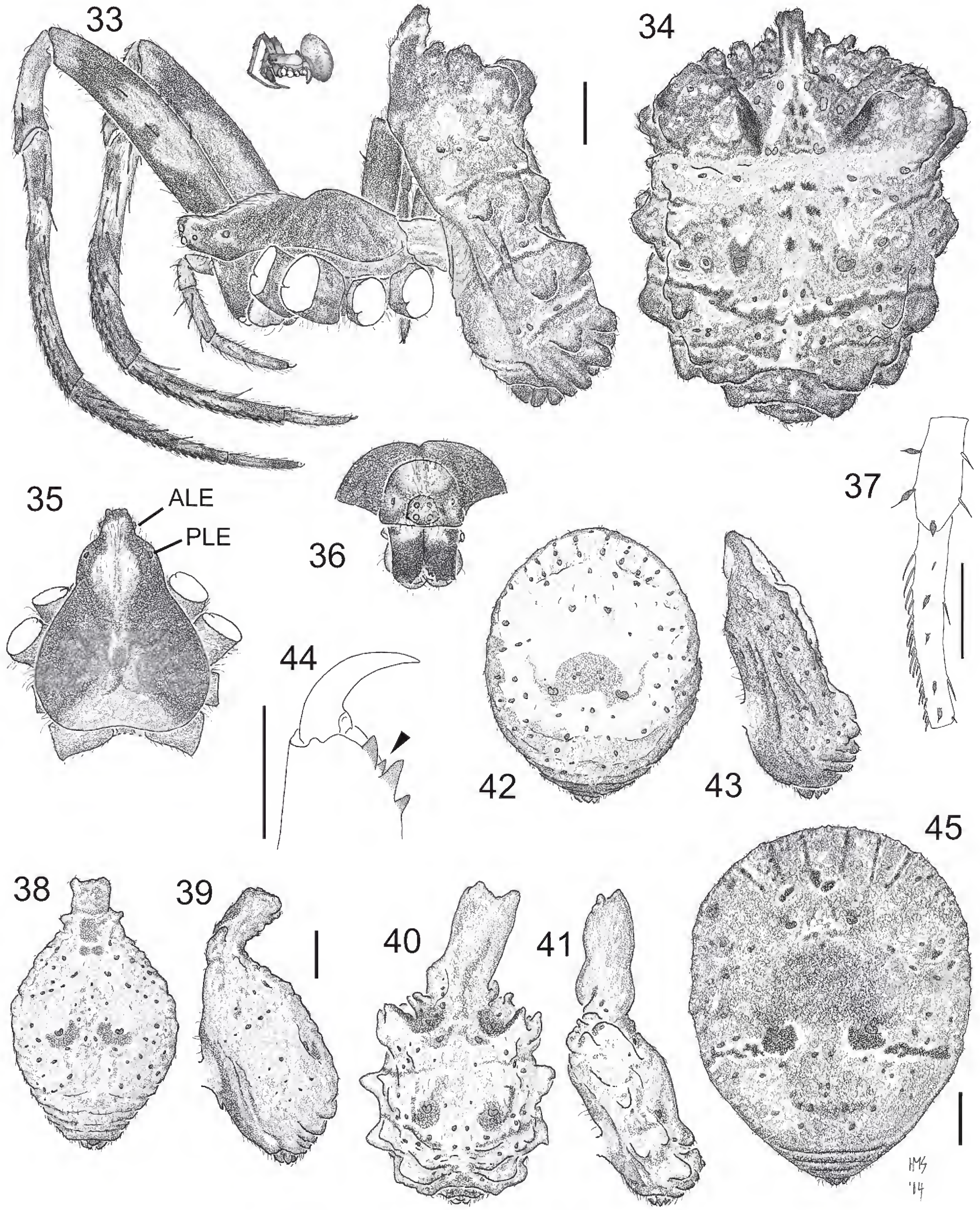
Poltys penicillatus Rainbow, 1920: 249, pl. 29, fig. 57. Female holotype from Lord Howe Island, Australia, Dec 1915–Jan. 1916, A.M. Lea; in SAMA, N1981313, examined. **New synonym.**

Remarks. *Poltys keyserlingi* and *P. coronatus* Keyserling were tentatively synonymized with *P. illepidus* by Simon (1899). Only Bonnet (1958), however, accepted these synonymies so Platnick (2005) has been followed and these are considered new synonymies here. Despite the type of *P. keyserlingi* being a juvenile, only one species in the *P. illepidus*-group has been recorded from SE Queensland, where this specimen was collected, so it seems a reasonable assumption. *Poltys coronatus* also cannot be identified with absolute certainty as Keyserling only figured the anterior view of the epigyne; but it is more likely to be this species than *P. stygius*.

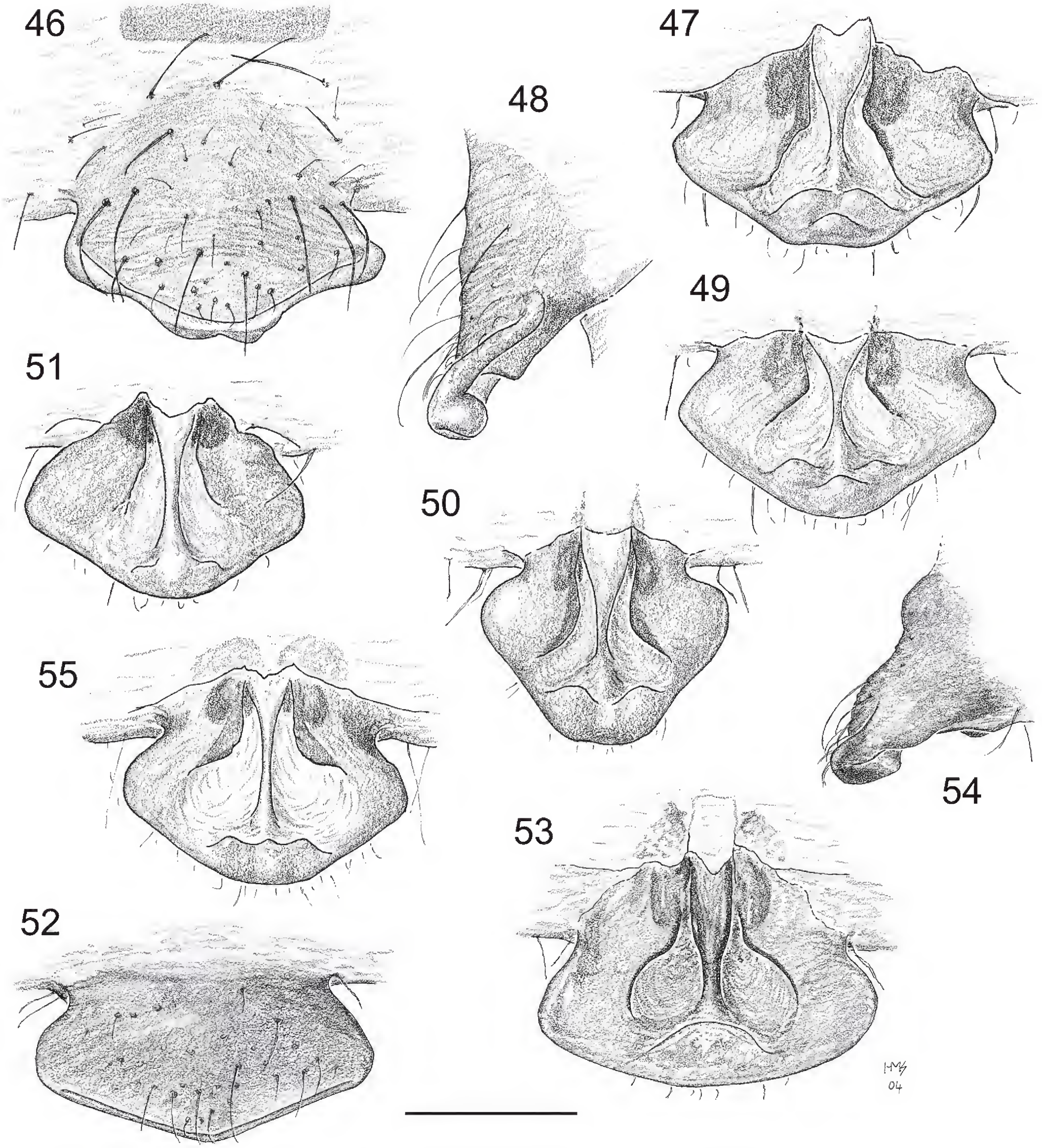
The type of *P. moluccum*, which was also synonymized with *P. illepidus* by Simon (1885), has not been located. However both the figures and the described habit suggest it is not *P. illepidus* as described here. (See also under *P. frenchi*).

Females previously identified as *P. illepidus* have been collected from several areas that border the geographical range accepted here. These require males for verification as the epigynes are consistently outside the range of variation seen in areas where males have been checked. For instance, while the specimen redescribed by Barrion & Litsinger (1995) from the Philippines has not been examined, two other specimens from this area (ZMUC, the epigynes of which could be interpreted as the illustration given) are more likely a separate species. Several specimens from India and Sri Lanka (as discussed by Pocock, 1900) have also been examined and again are most likely different. The Japanese species illustrated by Ogasawara (2000) and identified as *P. illepidus* also does not appear to fit within the species as recognized here, and is probably the same species that is photographically illustrated by Chikuni (1989). Chikuni's male is certainly from the *P. illepidus*-group but the palpal organs are so similar between species it is not possible to ascertain the species without comparing specimens.

Selected material examined. AUSTRALIA: NEW SOUTH WALES: ♀ S42578, Lismore, 28°49'S 153°16'E, 26 Jun. 1961. NORFOLK ISLAND: ♀ KS33926, Norfolk Island, 29°05'S 168°00'E, 17 Feb. 1938; ♀ KS34803, Point Howe, 29°05'S 168°00'E, 3 Aug. 1992. NORTHERN TERRITORY: ♂ KS55734, Darwin, East Point, 12°25'S 130°49'E, 21 May 1999; ♀ KS55732, Litchfield NP, Florence Falls, 13°09'S 130°46'E, Aug. 1998; ♀ S42523, West Alligator Mouth, 12°11'S 132°16'E, 22 Jul. 1979; ♀♀ WA98/1985–86, Cahills Crossing, 12°25'S 132°58'E, 29 May 1992. QUEENSLAND: ♀ KS33923, Cairns District; ♀ KS33927, Cooktown, 15°28'S 145°15'E; ♂ KS58019, near Dalrymple NP, 19°49'29"S 146°03'48"E, 12 May 2000; ♀ KS33929, ♂ KS73156, Edmonton, 17°01'S 145°44'E, 14 May 1972 and 20 Sep. 1976; ♀ KS90970, 4.3 km W of junct. Hopevale & Lakefield NP rds, 15°18'26"S 145°00'48"E, 17 May 2000; ♂ KS58028, 9 km S of Ilbilbie, 21°47'05"S 149°22'12"E, 26 May 2000; ♂♀ KS70353–54, 7.8 km E of Lakeland, 15°49'59"S 144°53'41"E, 15 May 2000; ♂ KS58025, N of Marlborough, 22°41'08"S 149°37'20"E, 26 May 2000; ♂ KS58020 nr Mt Elliot NP, 19°23'50"S 147°00'54"E, 25 May 2000; ♀ KS90971, Rockhampton, Kershaw Gardens, 23°21'36"S 150°31'02"E, 27 May 2000; ♂♀ KS58034–35, Rockhampton, Naughton St, 23°22'08"S 150°29'11"E, 26 May 2000; ♀♂ KS75537–38, Trinity Park, track to Earl Hill via Reed Rd, 16°47'59"S 145°42'33"E, 6 Jan. 2002; ♀ KS86258, ♂ KS86253, Trinity Park, 16°48'S 145°42'E, 17–18 Sep. 2003; ♀ (MMUS), Caloundra, 26°48'S 153°08'E, 15 Jun. 1941; Beaudesert, 27°59'S 152°59'E, 29 Jun. 1980; ♀ S20786, Chelmer, Brisbane, 27°30'S 152°58'E, 2 Dec. 1992; ♀ S42575, Bundaberg, 24°52'S 152°21'E, 11 May 1962; ♀ S25387, Deepwater NP, 24°18'S 151°56'E, 26 Sep. 1992; ♀ S42530, Flinders Is, 14°10'S 144°15'E, 18 Aug. 1979; ♀ S42572, Hammond Is, Torres Strait, 10°32'S 142°12'E, 8 Jul. 1974; ♀ S42623, Jardine River, Cape York, 11°18'S 142°37'E, 28 Aug. 1985; ♀ S42549, Magnetic Island, 19°08'S 146°50'E, Jun. 1965; ♀ S42568, Mt Cook, NEQ, 15°30'S 145°16'E, 12 Nov. 1975; ♀ S42563, Port Stewart, 14°04'S 143°01'E, 23 May 1973; ♀ S42602, Stradbroke Is, 27°36'S 153°27'E; ♀ S42538, Taringa, 27°29'S 152°59'E, 19 Oct. 1923; ♀ S42573, Terry Beach, Prince of Wales Island, 10°41'S 142°04'E, 2 Jul. 1976; ♀ S42531, Toowoomba, 27°33'S 151°57'E, 26 Mar. 1980. WESTERN AUSTRALIA: ♀ KS55746, King Leopold Range, Silent Grove camp site, 17°04'S 125°14'E, 5 Jun. 1999; ♀ NN12182, Cape Wellington, 15°09'S 124°50'E, 17 Jul. 1999; ♀ NN12181, Careening Bay, 15°06'S 125°00'E, 22 Jul. 1999; ♀ NN12184, Roebuck Bay, Broome, 17°58'34"S 122°13'50"E, 10 Jul. 1998; ♀ WA99/244, Barrow Island, Mattress Point, 20°44'43"S 116°28'27"E, 29 Oct. 1998; ♀ WA99/243, Derby, 17°18'S 123°37'E, 17 Sep. 1998; ♀ WA98/1969, Theda Pass campsite, 14°47'S 126°38'E, 13 Jun. 1992. INDONESIA: WEST PAPUA: ♀ (HNHM), Enarotali, 13 Jul. 1962; ♀♀ 8180 (RMNH), Merauke, 1956–57 (illustrated by Chrysanthus, 1961). JAVA: ♀ 6087 (MNHNP), "Savu"; ?♀ 192/1025 (NHRM), Sindanglaya; ♀♀ 20.305 (NHMW) Krakatau: Lang Island; ♀♀ (3) (RMNH), Surabaya, 1933–



Figs 33–45. *Poltys illepidus*-group, female characters. 33–41, *P. illepidus*, 42–45, *P. stygius*. 33, female general lateral view with male at same scale; 34, abdomen, dorsal; 35, carapace and coxae, dorsal; 36, frontal carapace and chelicerae; 37, left patella and tibia I of a juvenile female showing flattened macrosetae; 38–43, examples of variation in abdominal shape seen in *P. illepidus-group*, dorsal and lateral; 44, left chelicera and fang, prolateral. 45, *P. stygius*, dorsal abdomen of holotype. Scale lines: Figs 33–36, 38–43, 45 = 2 mm; Fig. 37 = 1 mm; Fig. 44 = 0.5 mm.



Figs 46–55. *Poltys illepidus*-group epigynes. 46–51, *P. illepidus*: 46–48, anterior, posterior, lateral; 49–51, examples of variation, posterior views (51, type of *P. penicillatus*). 52–55, *P. stygius*: 52–54, holotype, epigyne anterior, posterior and lateral; 55, variant, posterior. Scale line = 0.5 mm.

38. Lombok: ♂♀ (RMNH ex coll. CLD), Kute, 12–14 Jan. 1990 & 8–19 Feb. 1990. Sumatra: ♀ 20.304 (NHMW), Medan. Malaysia: Pinang: ♂ 8313 (JAM), Penang, 13–16 Aug. 1979. Papua New Guinea: Central: ♀ 20.303 (NHMW), Yule Island. East Sepik: ♀ KS8015, Kairiru Island, near lake, 3°20'S 143°33'E, 23 May 1976. Morobe: ♀♀ N1998780–81, Lae, 6°45'S 147°00'E, Jul. & Aug. 1954. Solomon Islands: Central ♀ (BMNH), Tulagi. Thailand: ♀ 1968.2.20.3 (BMNH), Thailand, 17 Apr. 1961; ♀ 7615 (MNHNP) "Bankok".

Reared specimens deposited in Australian museums: ex♀ KS86257, QLD, Trinity Park, N side of Moores Gully, "The Haul" Rd, 16°48'S 145°42'E, 17 Sep 2003, M&S: ♂ to SAMA NN21923; ♂ to WAM T62876; ex♀ KS86259, QLD, Trinity Park, S side of Moores Gully 16°48'S 145°42'E, 18 Sep 2003, M&S: ♂ to QM S66571; ♂♀ to NTM; ex♀ KS58036, QLD, Rockhampton, Kershaw Gardens, 23°21'S 150°31'E, 27 May 2000, M&S: ♂ to QM S66572.

Diagnosis. **Females**. From other species groups by fan-shaped epigyne (Fig. 46), broad, low, darkly coloured carapace (Figs 35–36), no or little broadening of front femora (Fig. 33) and relatively broad, rounded abdomen (Figs 34, 38–41). From *P. stygius*: epigynal foveae relatively narrow and often boomerang-shaped (Figs 49–51); posterior lobes of spermathecae often visible level with or distal to the margin of the epigynal furrow in posterior view (Figs 47, 49–50). **Males**. From other species groups except some *P. laciniosus*-group specimens by short, poorly defined eye tubercle (Figs 56, 58), from *P. laciniosus*-group by presence of TA in palpal organ (Fig. 62). From *P. stygius*: difficult without direct comparison, but *P. illepidus* have a shorter, more sharply curved embolus and a shorter conductor (Figs 61–63, 68).

Description. **Female**. Carapace length range 4.17–8.75. As commented above, the holotype has not been located. The figured female is used as an exemplar. *Drawn specimens* Figures: 26, KS33929; 33–36, KS86258 (male from Fig. 56); 37, AM juvenile ex Cooktown; 38–39, KS33929; 40–41, KS33923; 46–47, S20786; 48, KS75537; 49, KS90970 (DNA spec.); 50, KS55732 (DNA spec.); 51, N1981313 (type of *P. penicillatus*).

Female KS86258. *Prosoma*. Carapace: length 7.33, width 5.83, height 1.92; dome broad and low (Fig. 36); eye tubercle distinct but broad basally both in dorsal and lateral views (Figs 33, 35). Chelicerae: paturon with 4 promarginal teeth (as *P. stygius*, Fig. 44). Labium: length 0.86, width 1.27. Sternum: length 2.86, width 2.98; deeply indented anteriorly for labium; sternal extensions at bases of legs II–IV. • *Eyes*. (Figs 33, 36), AME>PME=PLE≥ALE; ALE c. 1× its own diameter from AME, ventral margin of ALE is level with mid point of AME. • *Legs*. (Figs 33). P+TL I: 11.50, II: 10.50, III: 6.83, IV: 8.42; front femora only slightly broadened and usually at greatest diameter at, or basal to, mid-point of length; patellal and tibial macrosetae not flattened (but may be in juveniles, e.g., Fig. 37, and adult females from SE Asia). • *Abdomen*. (Figs 33–34). Length 13.33, width 10.42; equally broad at humeral and posterior tubercles; "microsigillae" well developed. • *Epigyne*. A broad fan-shaped plate, widest point at about half length (Fig. 46); foveae form narrow–medium width grooves, partly covered basally, separated by a strong median ridge (Fig. 47); rim well formed on distal margin of anterior plate, distinct to the broadest point, expanding posteriorly into bulges near distal tip (Figs 46–48); posterior lobe of spermathecae visible through posterior cuticle level with the external edge of the epigynal groove (Fig. 47); no copulatory ducts visible (Fig. 26); spermathecae separated by half a spermatheca width or less. • *Colour in alcohol*. Carapace mostly rich dark brown with red pro-foveal suture; dorsal caput, eye tubercle and patches anterior to PLE orange; caput hairs golden. Chelicerae with basal yellow patch, rest brown, darkening distally. Labium and maxillae orange-brown. Sternum yellow anteriorly, otherwise brown. Pedipalps yellow with black markings. Femora I and IV mostly black–brown with orange patches and a strong blue shine on glabrous areas; femur II slightly lighter; III mostly yellow with dark distal band; all distal legs mottled orange-brown–black. Abdomen ventrally black around pedicel, ringed by white then dorsal colouration; dorsally a rich tapestry of browns, yellow–orange and black; patterns accentuated by tufts of coloured setae.

Male. Carapace length range 1.00–1.27. *Drawn specimens* Figures: 25, KS58033; 56–63, KS86253.

Male KS86253. *Prosoma*. Carapace: length 1.14, width 0.84, height 0.39; eye tubercle poorly defined, broad and almost without any dip between caput and eye tubercle in lateral view (Figs 56, 58–59). Labium: length 0.10, width 0.19. Sternum: length 0.53, width 0.49. • *Eyes*. (Figs 56, 59). AME≥PME>PLE≥ALE; ALE c. ⅓× its own diameter from AME; ventral margin of ALE is at mid point of AME. • *Legs*. (Fig. 56). P+TL I: 1.35, II: 1.25, III: 0.69, IV: 0.94; distal patellal and tibial macrosetae of legs I and II flattened into leaf-like blades (Fig. 60). • *Abdomen*. (Figs 56–57) Length 1.57, width 1.12; a rather skewed ellipsoid, widest point near apex. • *Palpal organ*. Radix–stipes joint retrolateral, almost all of stipes hidden by cymbium; embolus and TA arise dorsally (normally obscured by cymbium, Fig. 63); embolus a stout, sharply curved rod, tapering to a point after the curve (Fig. 61, 68); TA narrow at base, flanking the embolus, broadens to a lamina and free of embolus apically (Fig. 67); PM a pointed sclerotized bump (Fig. 61–62, 68). • *Colour in alcohol*. Carapace olive-grey with black median markings; dorsal eye tubercle yellow-orange. Chelicerae as carapace with fuscous markings. Labium, maxillae and sternum olive-grey. All femora pale basally to dark distally; distal legs mottled fuscous turning into distinct dark banding on distal metatarsi and tarsi; underside of patella–metatarsus III and IV with large black spots that merge together. Abdomen ventrally dark with white patches posterior to book lung covers; dorsally with dark pattern on a white ground. Palpal cymbium mottled black apically and down dorsal centre-line, rest olive-grey; apicodorsal points of tibia, patella and, to a lesser extent, femur mottled black, rest lighter mottling to creamy-white on femur.

Variation. As well as the variation in female abdominal shape shown (Figs 33–34, 38–41, also with taller humeral tubercles and as shown for *P. stygius*, Figs 42–43, 45), there is considerable variation in features such as relative leg lengths, length of eye tubercle, epigyne shape (Figs 47, 49–51) and development of macrosetae. One feature, which seems to be geographically linked, is the presence of dark, flattened macrosetae on some patellae and front tibiae. In the northwest (Northern Territory and Western Australia), all juvenile and male specimens show this feature (Figs 37, 60). In northeast Queensland specimens, however, these flattened macrosetae are sometimes small or absent on one or more legs, and they become progressively less frequent moving southwards. No individuals with strongly developed flattened macrosetae were found anywhere south of Edmonton (17°S). In Australia, the flattened macrosetae do not persist in adult females, but elsewhere some females have been recorded with genitalia consistent with *P. illepidus* but bearing varying numbers of large flattened macrosetae. Presence of similar macrosetae also appears to be variable in *P. stygius*.

The northern and more southerly eastern Australian populations show a consistent genetic differentiation in the examined fragment of the COI gene (see Fig. 248 and section "Separation of the Australian *Poltys* species using COI"). No consistent morphological differences could be found, but with only three females tested from each population and the inherent variability within *Poltys* species, there may not be enough data available to find patterns in the few known specimens. Except for spination, no differences were found in males from the two areas. This differentiation may represent two separate species but, at present, both the morphology and the lack of differentiation in the ITS2 gene suggest that this is not the case. If these populations are ever separated at the specific level, the types of both *P. keyserlingi* and *P. penicillatus* will require re-examination.

Only two males of *P. illepidus* from outside of Australia have been examined (from Penang in Malaysia and Lombok, Indonesia) but these both match the northern Australian males well.

Remarks. Intensive searching in 2000–2001 only recorded one species of *Poltys* on Lord Howe Island (*P. grayi* n.sp.). If *P. illepidus* currently occurs there, it is rare. It is also possible that the specimen Rainbow described (as *P. penicillatus*) was mislabelled. Lea, the collector, also visited Norfolk Island on the same collecting trip and there the species appears to be established.

Biology. Adult females spin a fine orb web 30–40 cm in diameter between trees or low herbage at night, in a space up to 4 m wide. A strong golden-coloured bridge thread is left in place during the day but the main web is usually taken down towards dawn (but see comments in Robinson *et al.*, 1974). The webs may be round, taller than wide or wider than tall, depending on the available supports. The webs of juvenile spiders are usually between dead twigs as in most other Australian *Poltys* species. Egg sacs are of fluffy yellow silk (Fig. 13). On two occasions they have been found laid in rolled up leaves at one end of the spanning web line, but several searches for egg sacs associated with females thought likely to have already laid eggs were unsuccessful, suggesting they may travel some distance to find a suitable place, or are good at hiding them. Smaller juvenile spiders and males usually mimic part of a dead twig during the day but large juveniles and females are more often on living or dead tree trunks or even down in low herbage. Individuals with spiky abdomens were found on the trunk of a tree and on a broken branch (Figs 1–2). Another was taken in a sweep net hiding in low herbage. Two rounded specimens were found like knobs or galls on a branch, another was in a dead flower head on a tree. One specimen from Lae, New Guinea, was reportedly found on potato and Robinson *et al.*, 1974 report *Poltys* specimens tentatively identified as *P. illepidus* hiding in curled leaves by day. Subadult females of the *P. illepidus*-group have been found in (unidentified) wasp-larders from nests in Bogor, Indonesia (RMNH) and were also recorded in several *Sceliphron laetum* F. Smith (Sphecidae) nest chambers from Madang, Papua New Guinea (Elgar & Jebb, 1999; vouchers in WAM).

Distribution. Northern Australia, New Guinea and SE Asia at least as far north as Thailand (Fig. 71). Also recorded from Norfolk and Lord Howe Islands to the east of Australia and probably also present on New Caledonia (juvenile of this species group seen in HNHM material). Records outside of this area such as Sri Lanka, India, the Philippines and Japan require examination of males for verification.

Poltys stygius Thorell

Figs 4, 42–45, 52–55, 64–66, 70, 72.

Poltys stygius Thorell, 1898: 344. Female holotype from Malewoon, Tenasserim, Burma, L. Fea; in MSNG, examined.

Poltys microtuberculatus Rainbow, 1916: 118, pl. 22, f.44. Juvenile holotype from Gordonvale, Queensland; in AM KS8693, examined. **New synonym**.

Remarks. Rainbow's type is a juvenile and cannot be said to be this species (rather than *P. illepidus*) with complete confidence. It has, however, the combination of physical features that are particularly common in this species and *P. stygius* is frequent today in this geographical area.

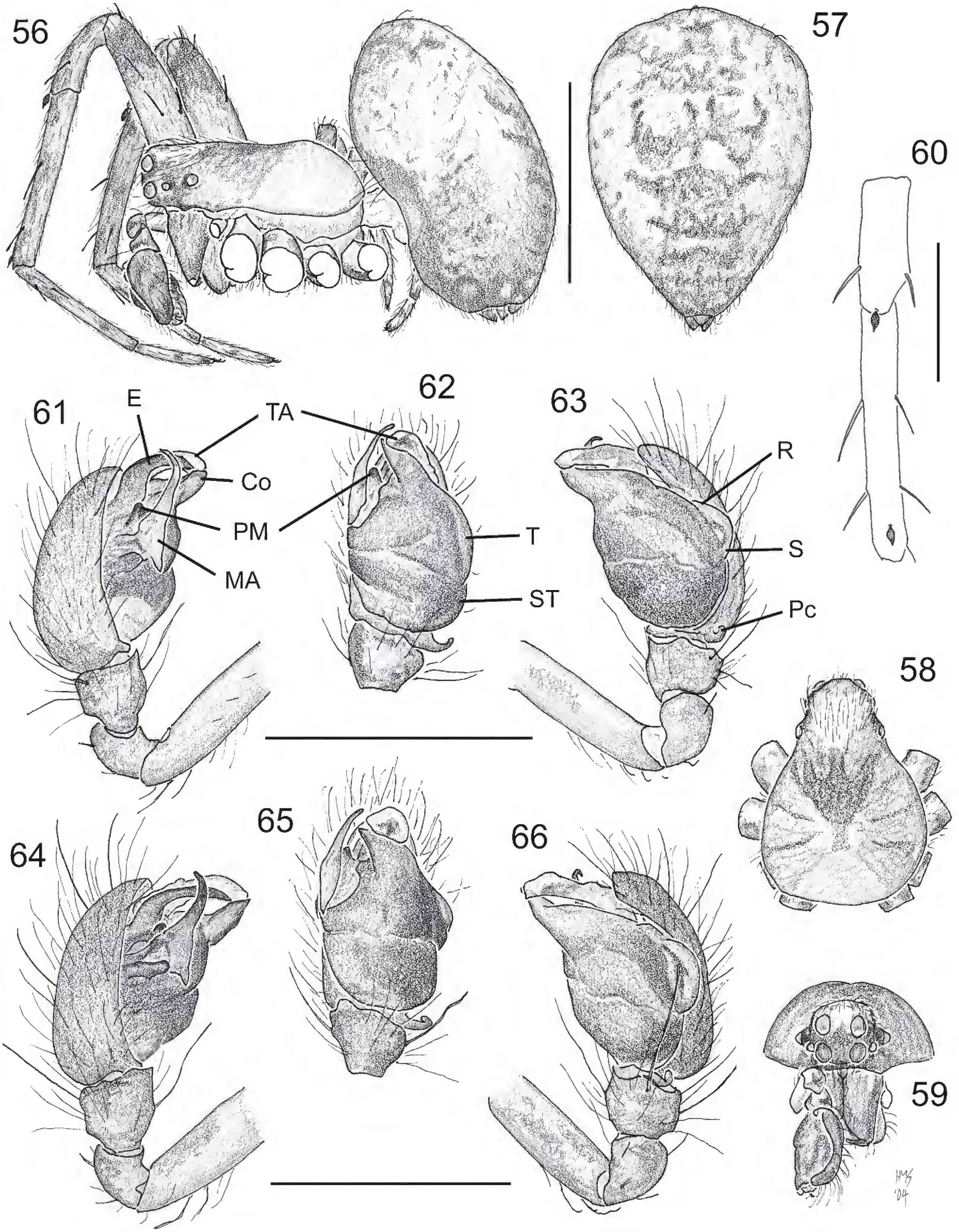
Material examined. AUSTRALIA: QUEENSLAND: ♂♂ KS86247–8, Cape Kimberley, track to lookout W of caravan park, 16°16'28"S 145°28'05"E, 21 Sep. 2003; ♀♀ KS33937, KS33934, KS33916, KS33842, KS86261, Edmonton, 17°01'S 145°44'E, 14 & 16 May 1972, Dec. 1969, 29 Aug. 1970, 18 Sep. 2003; ♂ KS58024,♀ KS70357, Goldsborough Valley SF, side track to quarry, 17°12'43"S 145°44'56"E, 22 May 2000; ♀ S42529, Rokeby Stn, Cape York, 13°40'S 142°40'E, 31 May 1973; ♂ KS73155, Trinity Park, track to Earl Hill via Reed Rd, 16°47'59"S 145°42'33"E, 21 May 2000; ♂ KS75631,♀ KS86260, ♂ KS86092, Trinity Park, 16°48'17"S 145°42'04"E, 7 Jan. 2002, 16 & 18 Sep. 2003; ♀ KS90969, Trinity Park, *Melaleuca* swamp, 16°48'12"S 145°42'04"E, 14 May 2000; ♀ (MMUS) Cairns, N Queensland. INDONESIA: SUMATRA: ♀ ex 21303 (MNHNP) Sumatra. MALAYSIA: PINANG: ♀ (BMNH), Penang, Glugor Estate, Banyan Lepas, 25 Jun. 1960. SABAH: ♂ (RMNH ex coll. CLD, 2000-704), Mt Kinabalu NP, Poring Hot Springs, 6°02'N 116°50'E, 22 Mar. 1996; ♂ (RMNH ex coll. CLD, 2000-704), Crocker Range, 5°26'N 116°08'E, 19 Feb. 2001. PAPUA NEW GUINEA: EAST SEPIK: ♀ KS8065, Kairiru Island near waterfall, 3°20'S 143°33'E, 12 Jun. 1976. MADANG: ♂♂ (RBIN) Baiteta forest, 5°01'S 145°45'E, 21 Apr. 1994 & 13 Jul. 1996. SINGAPORE: ♂ 20982 (JAM), Kranji, Singapore, 7 July 1992. COUNTRY NOT GIVEN: (RMNH) China Sea Islands, May 1894.

Reared specimens deposited in other institutions: ex ♀ KS86260: ♂ to QM S66573, ♂ to MSNG.

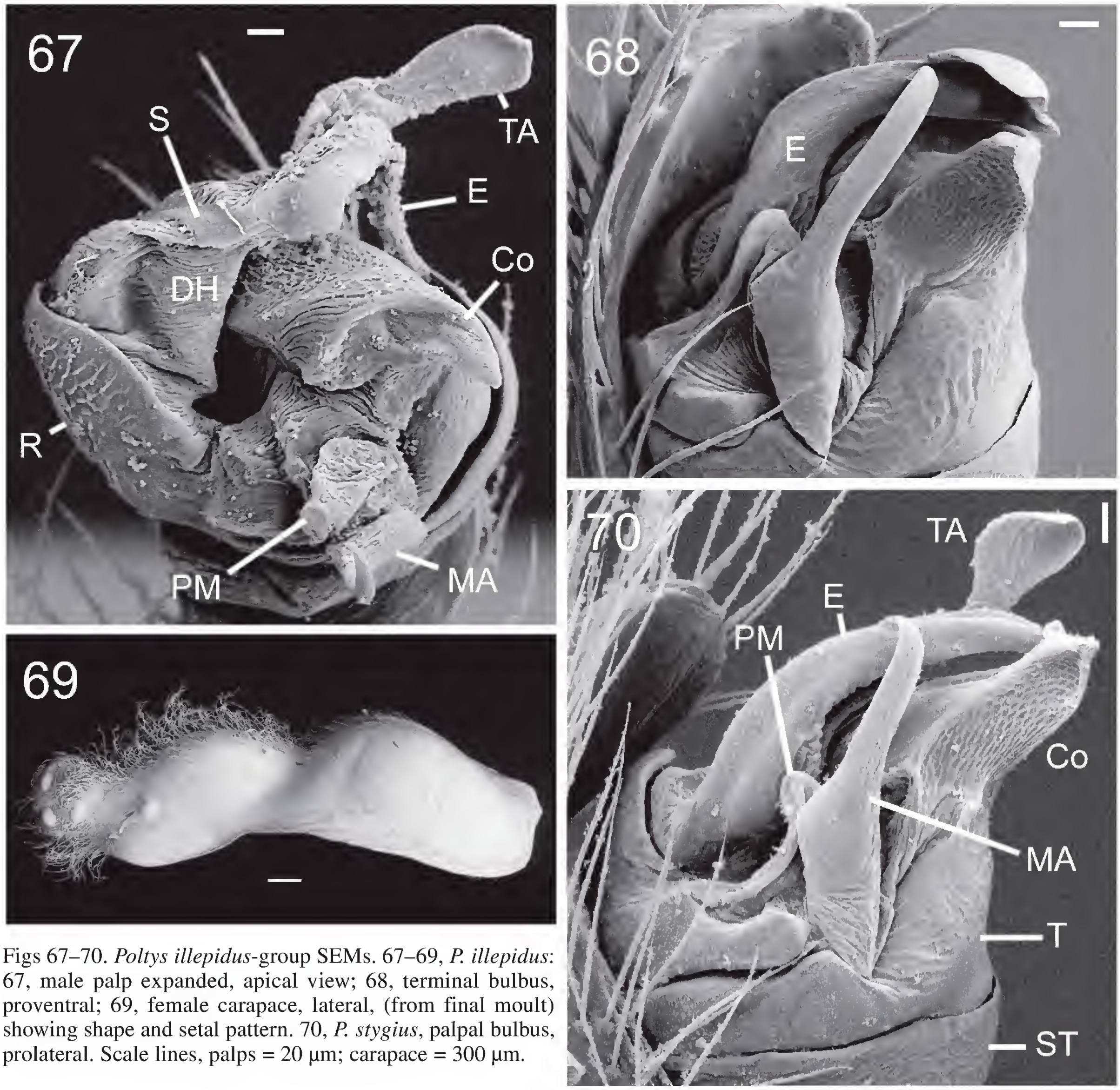
Diagnosis. **Female**. As *P. illepidus* (Figs 33–45) but with deep and wide foveae that are often distinctly paddle shaped (Figs 53, 55); posterior epigyne long, extending into the epigynal fold; posterior lobes of spermathecae usually visible entirely dorsal to the margin of the epigynal furrow in posterior view. **Male**. As *P. illepidus* (Figs 56–60), but with a longer, gently curving embolus and correspondingly longer conductor (Figs 64, 66, 70).

Description. **Female**. Carapace length range 6.25–7.50. *Drawn specimens* Figures: 42–43 KS86260; 44, 55, KS70357, 45, 52–54, MSNG (holotype). General characters see *P. illepidus*.

Female MSNG (holotype). *Prosoma*. Carapace: length 7.08, width 5.92, height 1.92; broad and low; eye tubercle distinct but short, broad basally both in dorsal and lateral views. Chelicerae: paturon with 4 promarginal teeth (Fig. 44). Labium: length 0.90, width 1.35. Sternum: length 2.86, width 2.98; deeply indented anteriorly for labium; sternal extensions at bases of legs II–IV. • *Eyes*. AME>PME≥ PLE>ALE; ALE c. 1× its own diameter from AME; ventral margin of ALE is ventral of mid point of AME. • *Legs*. P+TL I: 11.67, II: 10.42, III: 6.67, IV: 8.42; front femora slightly broadened; patellal and tibial macrosetae not flattened (but may be in juveniles and adults from some areas). • *Abdomen*. (Fig. 45). Length 14.83, width 12.08; broadest anterior to main apodemes; "microsigillae" well developed. • *Epigyne*. A broad fan-shaped plate, widest point about half-way in anterior view (Fig. 52); foveae broad, deep, paddle-shaped hollows, narrowing and partly overhung basally, separated by a long, strongly developed median ridge (Fig. 53, see also Fig. 55); posterior lobe of spermathecae visible dorsal to line of epigynal groove (Fig. 53); no copulatory ducts visible; spermathecae separated by half a spermatheca width or less; well sclerotized overall. • *Colour in alcohol*. Carapace dark reddish-chestnut,



Figs 56–66. *Poltys illepidus*-group males. 56–63, *P. illepidus*: 56, general lateral view; 57, abdomen, dorsal; 58, carapace and coxae, dorsal; 59, frontal carapace, right palpal organ and chelicerae; 60, left patella and tibia I, showing flattened macrosetae; 61–63, male palp, prolateral, ventral, retrolateral. 64–66, *P. stygius*, male palp, views as previous. Scale lines: 1 mm for Figs 56–59; 0.5 mm for Figs 60, 61–66.

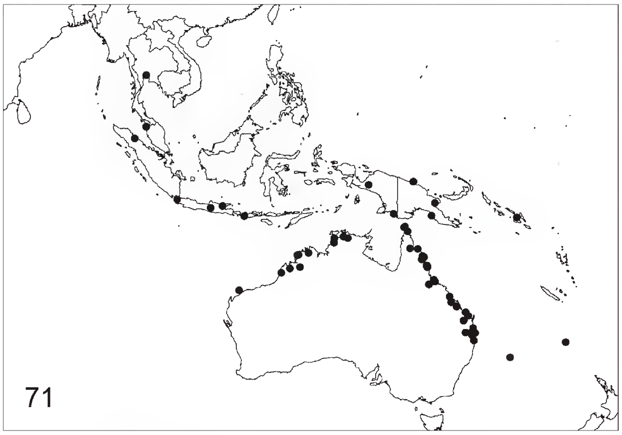


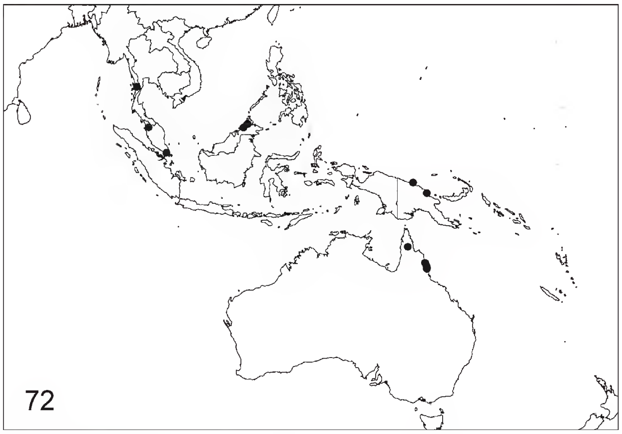
Figs 67–70. *Poltys illepidus*-group SEMs. 67–69, *P. illepidus*: 67, male palp expanded, apical view; 68, terminal bulbus, proventral; 69, female carapace, lateral, (from final moult) showing shape and setal pattern. 70, *P. stygius*, palpal bulbus, prolateral. Scale lines, palps = 20 µm; carapace = 300 µm.

slightly paler on dorsal caput and anterior eye tubercle. Chelicerae dark yellow basally, darkening distally to deep chestnut. Labium, maxillae and sternum orange-brown. Pedipalps yellow at femora darkening to black distally. Femora I, II and IV deep chestnut with a blue shine; femur III paler orange-brown; distal legs dark, mottled orange with copious brown–black. Abdomen ventrally fawn around pedicel, ringed by paler area then dorsal colouration, also pale around spinnerets; dorsally blackish background with paler patches and brown markings edged with yellow; remains of whitish patches on flanks.

Male. Carapace length range 0.98–1.41. *Drawn specimen* Figs 64–66, KS86092. General characters see *P. illepidus*.

Male KS86092. *Prosoma*. Carapace: length 1.33, width 0.96, height 0.47; eye tubercle poorly defined, broad and almost without any dip between caput and eye tubercle in lateral view. Labium: length 0.11, width 0.18. Sternum: length 0.53, width 0.51. • *Eyes*. AME>PME>PLE=ALE; ALE c. ⅓× its own diameter from AME; height of ventral margin of ALE is at mid point of AME. • *Legs*. P+TL I: 1.57, II: 1.49, III: 0.82, IV: 1.10; macrosetae of distal patella and tibia of legs I and II slightly flattened basally. • *Abdomen*. Length 1.75, width 1.20; a rather skewed ellipsoid, widest point near apex. • *Palpal organ*. (Figs 64–66, 70). Radix–stipes joint retrolateral, almost all of stipes hidden by cymbium, embolus and TA arise dorsally (normally obscured by cymbium, Fig. 66); embolus a stout, evenly curving rod, tapering slowly then abruptly (Figs 64, 70); TA narrow at base, flanking the embolus, broadens to a lamina and free of embolus apically (Fig. 70); PM a pointed sclerotized bump (Figs 64–65, 70). • *Colour in alcohol*. Carapace dark olive, most of caput dark brown–black; dorsal eye tubercle and part of caput orange. Chelicerae as carapace with light prolateral V near tip. Labium, maxillae and sternum dark olive. All femora orange basally darkening to dark olive-brown distally; distal legs orange with black markings, tarsi cream with black rings. Abdomen ventrally olive ringed by black; white flanks; dorsal with dark pattern on a white ground. Palpal cymbium black, edges brownish; tibia, and patella with black on cream, femur mainly creamy-white.





Figs 71–72. Distribution of *Poltys illepidus*-group. 71, *Poltys illepidus*; 72, *Poltys stygius*.

Remarks. On average *P. stygius* have longer legs than *P. illepidus*. Many *P. stygius* females have a more extensive pale patch on the caput than most *P. illepidus* and a shorter eye tubercle. Not all specimens, however, have either character and both are within the variation range of *P. illepidus*.

Variation. Few specimens are available for examination but there appears to be a similar range of variation to that seen in *P. illepidus*. Examined adult females from Australia and New Guinea have lacked flattened macrosetae on the patellae. Some Australian males and both the male from Singapore and the adult female from Sumatra have these flattened macrosetae but otherwise appear identical.

Biology. The webs of *P. stygius* appear to be similar to those of *P. illepidus*. A female collected at Trinity Park was hiding hung beneath a dead curled leaf on a living sapling during the day (Fig. 4). The species seems to prefer moist habitats, with a narrower habitat range than *P. illepidus*. Egg sacs have not been seen in the wild by the author but one laid in captivity was a white fluffy inner sac overlaid with rose pink silk. The unidentified egg sac shown in Clyne (1969: fig. 152) appears to belong to this species. This egg sac is pictured on the underside of a green leaf.

Distribution. Coastal far northeast Queensland through Sumatra and Borneo to Burma (Fig. 72).

The *Poltys columnaris* species group

The *Poltys columnaris*-group appears to be rather complex. The genitalia of the two Australian species are similar, especially in females, but the huge eye tubercle of *P. jujorum* n.sp. is distinctive, being far longer than in *P. milledgei*. These two species are also well separated genetically, at least in COI sequences. At least six species from the *P. columnaris*-group have been described from SE Asia and the Asian mainland. Three of these species, *P. columnaris* Thorell, *P. turriger* Simon and *P. squarrosus* Thorell, are similar in characters and may prove to be conspecific but the variation in eye position in these individuals almost bridges the gap between the two Australian species. Although existing names should be used if possible, both Australian species have been described as new because neither perfectly matches any of these types and it may be many years before suitable material is available to resolve this problem. A single male from Borneo, which may belong to one of these Asian species, is discussed below; this is definitely distinct from the Australian species. Another closely related SE Asian type is *P. pogonias* Thorell from the Nicobar Islands. This subadult female is also close to *P. milledgei*, except that there is no sign of the sclerotized eyespot-like maculae, which are visible on the abdomen of every other specimen examined (see below), and the eye arrangement is outside the variation seen in other specimens. Given the isolation of the Nicobar Islands, and several other apparent cases of speciation seen in island *Poltys* specimens examined during the course of this study, there is a good chance that this is an endemic species.

All *Poltys columnaris*-group species females have an extremely short and broad epigyne and most have rows of shiny black maculae on the dorsal abdomen, just anterior to the spinnerets (Figs 94, 124). These "eyespots" are smooth clear cuticular lenses that lie over black pigment spots. In living and well-preserved specimens, these can be extremely prominent and they may be used to deter predators as (at least from a human perspective down a microscope) they resemble rows of black, beady eyes. Some *P. columnaris*-group species also possess modified patellal spines, which as well as being flattened distally, are elongate and appear to have a weak fracture zone near the base of the shaft, at least in females (Fig. 123, arrowed). Females of both Australian species have these spines, as well as most males of *P. milledgei*. Most of the older types are missing many spines and have not been assessed for this character. The two Australasian *P. columnaris*-group species, and four out of the other six described species, have a rather elongate eye tubercle with an anterior protuberance between the anterior eyes (Figs 121, 223, 226, 229, 238). The remaining two species, *P. turritus* Thorell and *P. raphanus* Thorell (which will probably prove to be conspecific) have only a tiny bump between the PME (Figs 232, 235). In the Australian species, at least, female abdominal shape is rather less variable than in the other species groups dealt with here.

Matched males are known only for the two Australasian species. The *P. columnaris*-group male mentioned above from Borneo (RMNH ex coll. CLD) has eye tubercle proportions quite different to the Australian species. The palpal organs of this specimen show the same general features as seen in the two Australian species, with a proportionately long MA, a broad, dorsal TA, and a reduced, prolaterally displaced, conductor. The palpal characters are intermediate between the two Australian species, but somatic features are distinctive.

Poltys jujorum n.sp.

Figs 73–79, 84–88, 95–99,
104–109, 116–118, 121–124.

Etymology. Named in honour of Judy Thompson and John Olive, whose generous hospitality has greatly facilitated several trips to northern Queensland.

Type material. AUSTRALIA: QUEENSLAND: HOLOTYPE ♀ S66574 (ex KS58080), Goldsborough Valley SF, side track to quarry, 17°12'S 145°44'E, 22 May 2000, M&S, webs on dead twigs at night, open woodland. PARATYPES ♂ KS58074, ♀ KS58078, data as holotype; ♂ KS58064, lane W of Capt. Cook H'way, c. 2.5 km W of Trinity Beach, 16°47'S 145°40'E, 14 May 2000, M&S, beating; ♀ KS84328, ♂ S66575, Abergowrie SF, Broadwater Creek camping area, 18°25'S 145°56'E, 24 May 2000, M&S (♀ night coll., ♂ beating); ♀ S42574, Scraggy Point, Hinchinbrook Is., 18°17'S 146°06'E, 5 Jan. 1986, P. Myroniul?[sic], dune and swale system.

Other material. AUSTRALIA: QUEENSLAND: ♀♀ KS58066 (2), KS58067–9, ♂♂ KS58070–1, Abergowrie SF, 18°25'S 145°56'E, 24 May 2000; ♀♀ KS58065, 2.5 km W of Trinity Beach, 16°47'S 145°40'E, 14 May 2000; ♀♀ KS33931, KS33941, Edmonton, 17°01'S 145°45'E, 29 May 1973, 1 Apr. 1973; ♂ KS58073, ♀♀ KS58075–77, KS58079, KS58080 (3), Goldsborough Valley SF, 17°12'S 145°44'E, 22 May 2000; ♀ KS33849, Kuranda, 16°49'S 145°38'E, 15 Aug. 1971; ♀ KS33940, Mareeba, 17°00'S 145°26'E, 8 Sep. 1974; ♀ KS58063, Tam O'Shanter SF, 0.9 km W Limbo Ck, Tully–Mission Beach Rd, 17°55'S 146°04'E, 23 May 2000; ♂ S42559, Black Mountain, NEQ, summer 1971–2; ♀ S42619, Iron Range, 12°39'S 143°17'E, 30 Jun. 1976; subadult ♀ S42504, Lockerbie Scrub, 10°48'S 142°28'E, 18 Apr. 1973; ♀ S42579, Shiptons Flat, 15°48'S 145°15'E, 22 Apr. 1982.

Remarks. There are no definite records for this species outside Australia. A subadult female from Kinabalu NP, N. Borneo (RMNH ex coll. CLD) that is comparable in eye tubercle proportions and general appearance, might indicate a wider distribution.

Diagnosis. **Females**. From other species groups: carapace profile relatively high and narrow (Fig. 76), extended and pointed eye tubercle (Fig. 84), front femora relatively short and distinctly broadened (Fig. 73), epigyne much wider than long (Fig. 104). From *P. milledgei*: eye tubercle larger and more elongate and ALE well separated from AME (Fig. 85); copulatory ducts are short so spermathecae are directly basal to the foveae in posterior view (Fig. 105). **Males**. From other species groups by extended and pointed eye tubercle (Fig. 98), short embolus and reduced conductor (Fig. 107–108). From *P. milledgei*: eye tubercle massive (Fig. 98), flattened leg macrosetae are usually short and rounded (Fig. 99), the conductor wraps further prolaterally and is adpressed to the embolus so that it may be difficult to distinguish in ventral view. In lateral view, an open space is usually present between the MA and the other sclerites (compare Figs 107 and 113, 118 and 120).

Description. **Female**. Carapace length range 2.94–3.67. *Drawn specimens* Figures: 73–77, 84–85, KS58077 (male from Fig. 95); 78–79, KS58067; 86–87, 106, S66574 (holotype); 88, KS58080; 104–105, KS58078.

Holotype. *Prosoma*. Carapace: length 4.00, width 2.69, height 1.10; long and narrow (Figs 73, 76); eye tubercle well developed, strongly elevated (Fig. 85); produced into a rounded protuberance between PME; eye tubercle sagittate in dorsal view due to tufts of flattened setae that arise on the tip of the eye tubercle and posterior to the PME (Figs 121–122). Chelicerae: paturon with 4 promarginal teeth (Fig. 77). Labium: length 0.39, width 0.65. Sternum (Fig. 75): length 1.37, width 1.43; sternal extensions at bases of legs III–IV. • *Eyes*. (Figs 76, 85). AME=PME>PLE>ALE; ALE > 2× its own diameter from AME, almost half way towards PLE position; ventral margin of ALE is more ventral than AME; both pairs of anterior eyes are set looking ventrally on eye tubercle (Fig. 85). • *Legs*. P+TL I: 4.78, II: 4.33, III: 2.90, IV: 3.47; front femora distinctly broadened with greatest diameter c. ⅗ way to apex (Fig. 73); some patellal and tibial macrosetae on all legs flattened, distal patellal macrosetae usually elongate (Fig. 88), but often broken at weak point (Fig. 123, arrowed). • *Abdomen*. Length 10.83, width 2.75; broadest just anterior to main apodemes; on dorsal surface just anterior to spinnerets there are two rows of shiny, black maculae, 6 on a posteriorly pointing fold, 4 immediately anterior, and two anterior lateral pairs (Figs 86–87). • *Epigyne*. Much broader than long, most of the anterior surface is covered by a broad "lip" (Figs 104, 106); posterior plates short; median posterior plate not reduced but fused or closely adjacent to lateral plates over much of their lengths, then narrows to a bridge between pocket-like distal foveae (Fig. 105); copulatory ducts exit foveae laterally, ducts usually shorter than *P. milledgei*; spermathecae separated by about a spermatheca width. • *Colour in alcohol*. Carapace yellow, caput fuscous brown with darker patches anterior to PLE, stripes of pale yellow lead onto orange-brown eye tubercle; dark brown ventral to main eyes. Chelicerae brown, paler V distally. Labium, maxillae and sternum yellow-brown. Pedipalps creamy-yellow, sparsely mottled with brown. Femora I and II with a small amount of black basally, then all yellow except for a broad black terminal band; femur III pale yellow, mottled with black, to black distally; femur IV mostly dark; all dark areas with blue shine; distal legs mottled with yellow and brown. Abdomen ventrally dark grey around pedicel and posteriorly to spinnerets except paler book lung covers; white flanks then laterally and anteriorly to dorsal colour pattern of black and brown over some white.

Male. Carapace length range 1.04–1.12. *Drawn specimen* Figs 95–99, 107–109, KS58074.

Male KS58074. *Prosoma*. Carapace: length 1.14, width 0.71, height 0.33 (at fovea); lightbulb-shape in dorsal view (Fig. 98); highest at eye tubercle, latter massive and elevated (Fig. 95); eye tubercle anterior a blunt point; in dorsal view eye tubercle sagittate as in female. Clypeus >1× AME. Labium: length 0.09, width 0.19. Sternum: length 0.42, width 0.42. • *Eyes*. (Figs 95, 97) AME≥PME>PLE≥ALE; ALE >1× its own diameter from AME; ventral margin of ALE is ventral to that of AME. • *Legs*. (Fig. 95). P+TL I: 1.04, II: 0.98, III: 0.57, IV: 0.73; all patellae and some tibiae with some macrosetae flattened into a leaf-shape (Fig. 99). • *Abdomen*. (Figs 95–96). Length 1.57, width 0.88; a tall, rather lumpy ellipsoid, with slightly extended rounded apex, widest at mid-height; small tufts of setae arise from bumps; apodemes visible. • *Palp*. (Figs 107–109, 117–118). Tegulum rather angular (Fig. 108); conductor wispy and adpressed to proventral embolus (Figs 107, 117–118); MA filiform, broad basally (Figs 107, 118); small PM possibly present (see *P. milledgei*, Fig. 27) but if so, normally hidden by MA; radix–stipes joint dorsal, totally hidden by cymbium (Fig. 109); TA a broad membranous flap (Figs 108, 117–118); embolus short and stout (Figs 108, 118). • *Colour in alcohol*. Lateral carapace light olive, caput darkens slightly to eye tubercle, latter orange dorsally, carapace and caput with black median markings; dark brown on ventral eye tubercle, around AME and ALE and under PLE (Fig. 97). Chelicerae, labium, maxillae and sternum fuscous olive; chelicerae, with yellow distally. Femora I and II pale creamy-olive darkening distally; femur III olive-white basally, with spots and terminal band; femur IV olive with white patch retrolaterally; distal legs I and II with dark olive rings and marks to mid metatarsus, then white with black marks; legs III and IV olive-white dorsally and black maculation ventrally. Palpal cymbium dark brown, contrasts with white tibia, patella and femur, tibia and patella with black tips. Abdominal book lung covers and epigastric area pale, otherwise ventrally dark grey; dorsum mostly grey–white with black speckling and a pair of black scroll-like lines.

Variation. In some females the eye tubercle is higher than the main carapace. Female abdominal shape is less variable than in other species groups, all are elongate to a greater or lesser extent and none has been seen with humeral tubercles (Figs 73–74, 78–79, also as in *P. milledgei*, 80–83 and 91–92). Abdominal "eye spots" are rather variable in size and number. Epigynes are rather variable and often difficult to distinguish from *P. milledgei*.

Biology. The spiders make a typical fine web at night on dead twigs; tropical woodland appears to be the main habitat of the species. The egg sac is a fluffy white sac overlaid with cream and strands of brown or grey, laid on the underside of a dead twig (similar to that of *P. milledgei*, Fig. 14). Chloropid flies emerged from the field-collected egg sac from Goldsborough Valley SF.

Distribution. Coastal far northeast Queensland and possibly further northwards (Fig. 116).

Poltys milledgei n.sp.

Figs 14, 19–21, 27–28, 80–83, 89–94,
100–103, 110–115, 116, 119–120.

Etymology. This species is named in honour of Graham Milledge who has assisted me on many collecting trips.

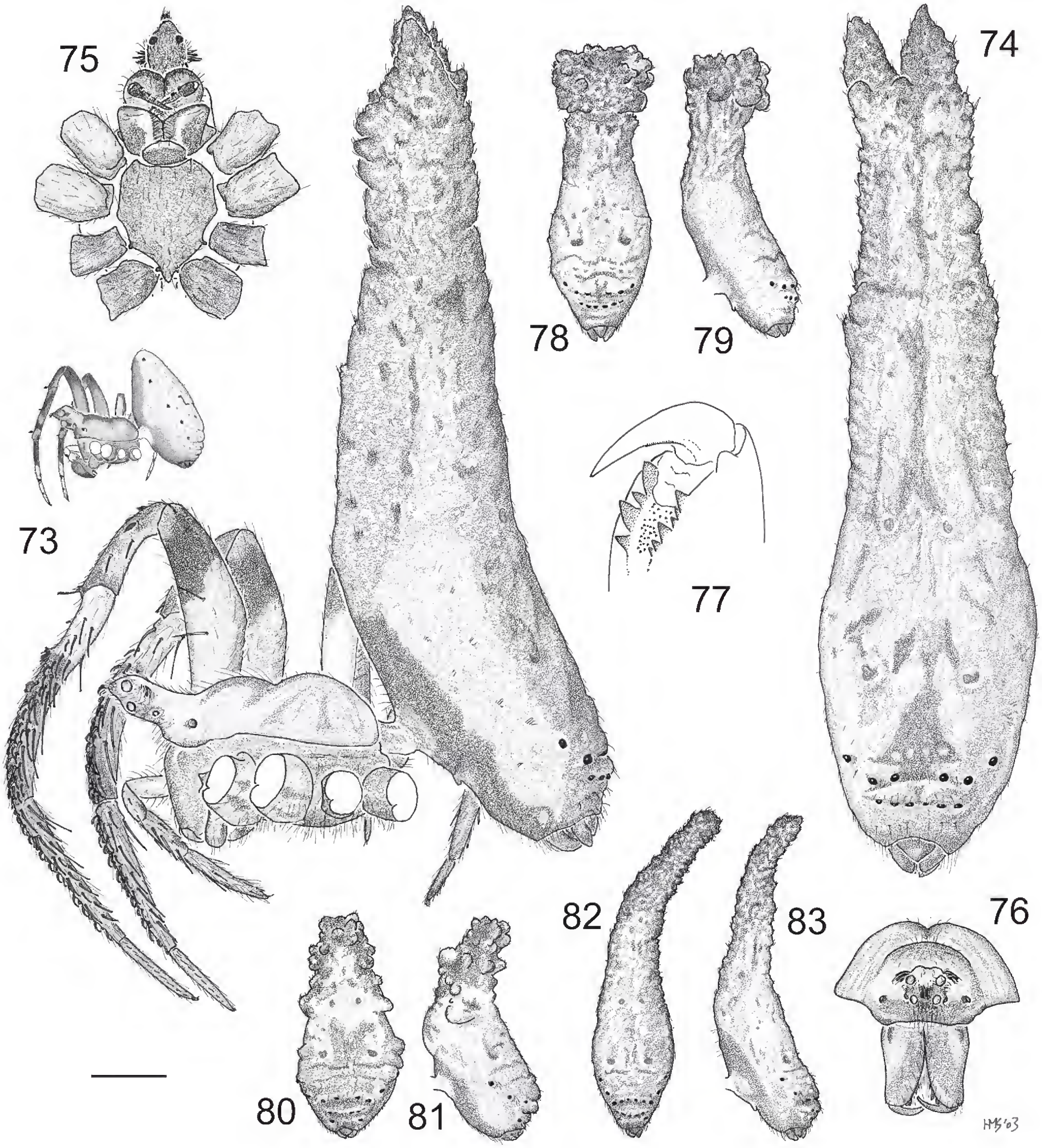
Type material. AUSTRALIA: NORTHERN TERRITORY: HOLOTYPE ♀ KS84110, Humpty Doo, Solar Village, 12°35'S 131°05'E, 20 May 1999, G,M&S & J. Webber, night collecting. PARATYPES ♂ KS55728, Litchfield NP, Florence Falls, 13°09'S 130°46'E, 19 May 1999, G,M&S; ♂ WAM T62875 (ex KS55740) 23 May 1999, on silk line between dead twigs at night; ♂ NTM A952, as KS55740, 19 May 1999, G,M&S, hanging in dead tree near subadult♀ at night; ♀ KS55738, Litchfield NP, Wangi Falls, 13°09'S 130°40'E, 22 May 1999, G,M&S; ♀ NTM A953, Duncans Douglas, nr Daly River Research Station, 13°50'S 131°11'E, 18 May 1991, J. Webber; ♀ WA98/1981, Cahills Crossing, 12°25'S 132°58'E, 29 May 1992, M.S. Harvey, J.M. Waldock.

Other material examined. AUSTRALIA: NORTHERN TERRITORY: ♂ KS55735, Darwin, East Point, 12°25'S 130°49'E, 21 May 1999; ♀♀ KS55726 (3), Humpty Doo, Solar Village, 12°35'S 131°05'E, 20 May 1999; ♂ KS53838, ♀ KS53839, ♂♀ KS53840, ♀ KS53841, Litchfield NP, Florence Falls, 13°09'S 130°46'E, 5–6 Aug. 1998; ♀♀ KS55730–31, ♀♀ KS55739 (3), ♂ KS55740, ♂♀ KS55741, ♂ KS55743, Litchfield NP as previous record, May 1999; ♂ KS59254 ex eggsac laid by one of KS55739, matured 14 Sep. 1999; ♀♀ (3) KS55736, Litchfield NP, Wangi Falls, 13°09'S 130°40'E, 22 May 1999; ♀ (NTM), Melville Island, 11°33'S 130°56'E, 3 Aug. 1975; ♀ (NTM), Wangi Station, 13°09'S 130°38'E, 22 Aug. 1975; ♂ S42555, South Alligator Inn, 12°40'S 132°30'E, Nov. 1979; ♂♀ S42556, West Alligator River mouth, 12°15'S 132°16'E, 12 Nov. 1979; ♀♀ S42581, West Alligator mouth, 12°11'S 132°16'E, 22 July 1979; ♀♀ WA98/1982–3, Cahills Crossing, 12°25'S 132°58'E, 29 May 1992. QUEENSLAND: subadult♀ S42587, Rokeby Station, 13°40'S 142°40'E, 30 May 1973 (eye tubercle proportions appear to match this species). WESTERN AUSTRALIA: ♀ KS55747, Lake Argyle Rd, 9 km N of campsite, 16°02'S 128°46'E, 9 June 1999; ♀ WA98/1972, Walcott Inlet (South), 18°27'S 124°45'E, May 1996. INDONESIA: BALI: ♀ & juveniles (RMNH ex coll. CLD), Ambengan, N. Bali, 21 Jan. 1990. SUMBAWA: ♀♀ & juveniles (RMNH ex coll. CLD), Samokat, 20 hrs from Besar, 3 Jan. 1990.

Diagnosis. As *P. jujorum* but with a more delicate and less elongate eye tubercle (Figs 90, 100). **Females**. Epigynal copulatory ducts are relatively long so the spermathecae are separate from the foveae in posterior view (Fig. 111). **Males**. The flattened macrosetae of patellae I and II are usually elongate (ovate in males of *P. jujorum*) (Fig. 103); the free part of the membranous palpal conductor is visible separate from the embolus in lateral view, partially filling the space between the MA and the other sclerites (compare Figs 113 and 107, 120 and 118).

Description. **Female**. Carapace length range 2.69–3.80. *Drawn specimens* Figures: 28, S42581; 80–81, KS55736; 82–83, KS53841; 89–90, 94, KS55747; 91–92, 110–111, KS84110 (holotype); 93, WAM 98/1982; 112, KS55726. General features as *P. jujorum*, except for eye tubercle.

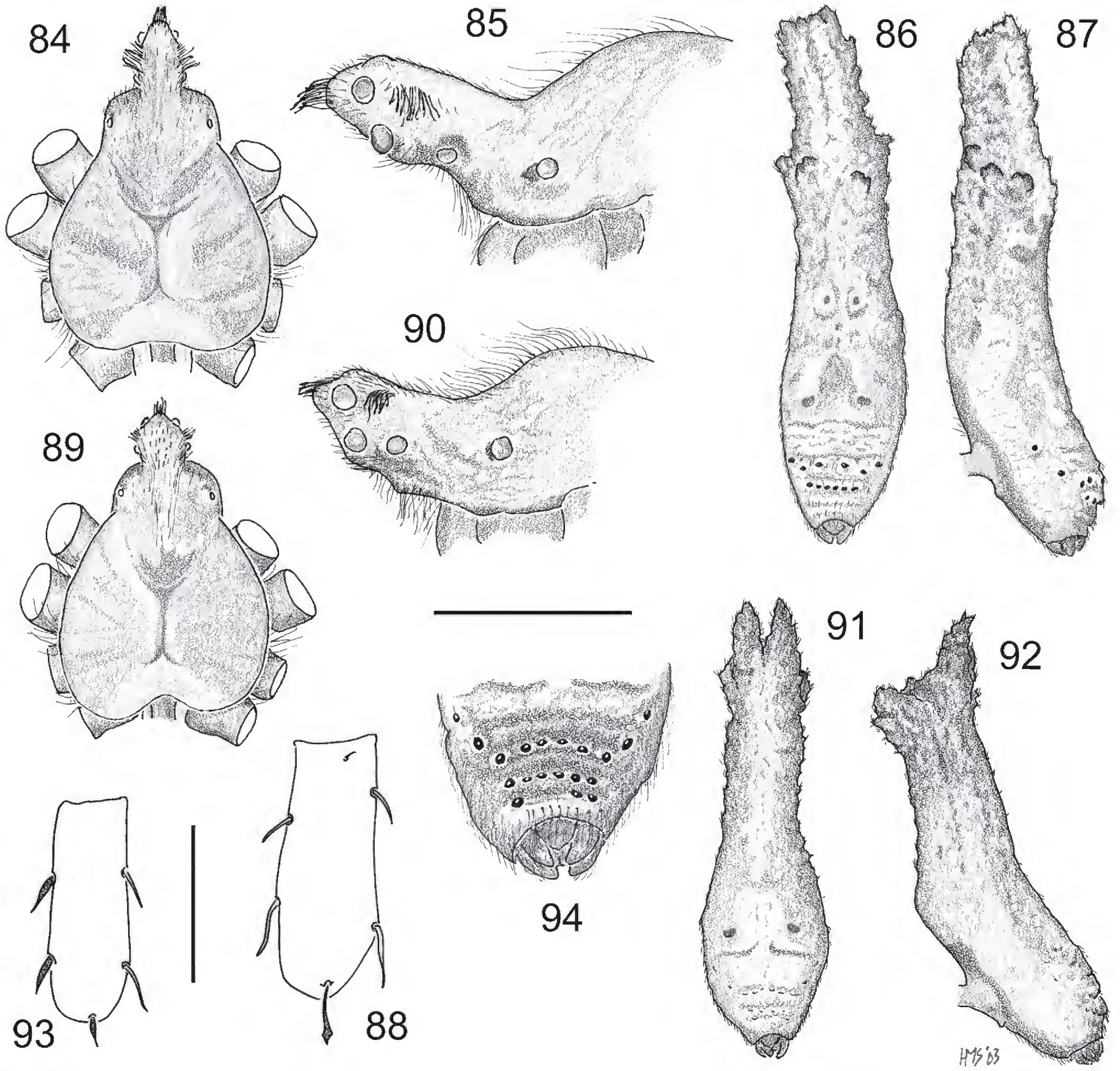
Holotype. *Prosoma*. Carapace: length 3.22, width 2.29, height 0.97; long and narrow; eye tubercle well developed, distinctly elevated (Figs 89–90); produced into a rounded protuberance between the PME; eye tubercle sagittate in dorsal view due to tufts of flattened setae that arise on the tip of the eye tubercle and laterally posterior to the PME (as in *P. jujorum*, Figs 121–122). Chelicerae: fang medium length; paturon with 4 promarginal teeth. Labium: length 0.37, width 0.57. Sternum: length 1.37, width 1.31; sternal extensions at bases of legs III–IV. • *Eyes*. (Fig. 90) AME>PME>PLE>ALE; ALE c. 1× its own diameter from AME; height of ventral margin of ALE is level with ventral margin of AME. • *Legs*. P+TL I: 4.37, II: 4.08, III: 2.65, IV: 3.31; front femora distinctly broadened with greatest diameter c. ⅗ way to apex; some patellar and tibial macrosetae on all legs flattened distally (Fig. 93), macrosetae on distal patellae usually short. (In *P. jujorum* these are usually long in females, although often broken. This is the opposite to the relative states in males.) • *Abdomen*. (Fig. 91–92). Length 10.01, width 3.28; broadest just anterior to main apodemes; on dorsal surface just anterior to spinnerets there are two rows of 6 shiny, black maculae on posterior pointing folds, plus a partial row of two posterior to these and two additional lateral pairs anteriorly. (Not well preserved on holotype, typical arrangement better illustrated by Fig. 94). • *Epigyne*. Much broader than long, most of the anterior surface is covered by a broad "lip" (Fig. 110); posterior plates short but usually longer than in *P. jujorum*; median posterior plate not reduced, appears almost fused to lateral plates over much of their lengths, then narrows to a bridge between pocket-like distal foveae (Figs 111–112); copulatory ducts and spermathecae often visible through cuticle, former can be



Figs 73–83. *Poltys columnaris*-group, female characters. 73–77, *P. jujorum*: 73, general lateral view with male at same scale; 74, abdomen, dorsal; 75, ventral prosoma and coxae; 76, frontal carapace and chelicerae; 77, left chelicera showing denticles. 78–83, examples of variation in abdominal shape seen in both Australian species, dorsal and ventral (78–79, *P. jujorum*, 80–83, *P. milledgei*). Scale line: 2 mm for Figs 78–83; 1 mm for Figs 73–76; 0.25 mm for Fig. 77.

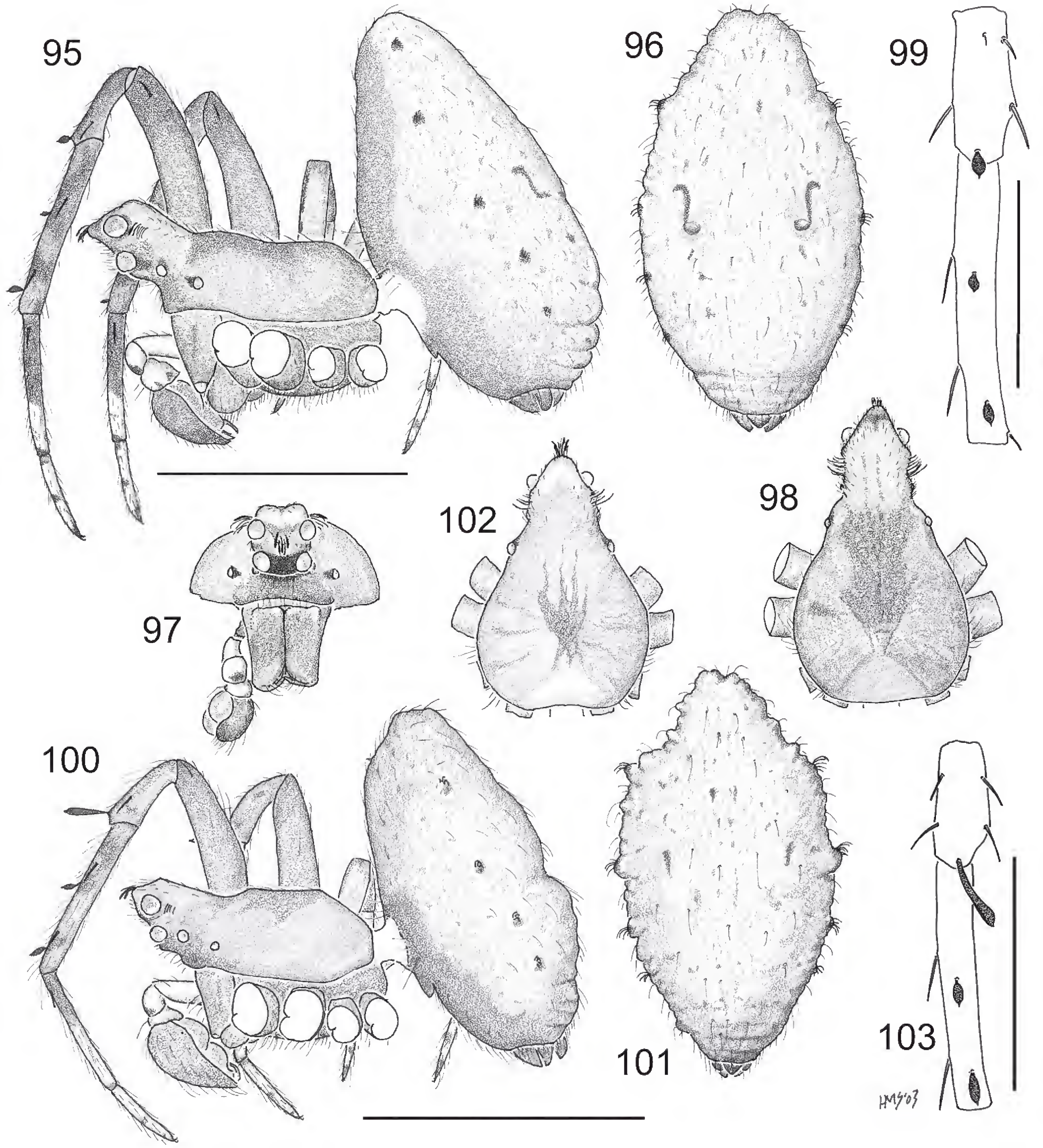
seen to be longer than in *P. jujorum*; spermathecae separated by about a spermatheca width. • *Colour in alcohol*. Carapace yellow, caput and eye tubercle orange-brown, with yet darker patches anterior to PLE and on posterior caput; black around secondary eyes, dark brown ventral to main eyes. Chelicerae brown, yellow V distally. Labium, maxillae and sternum mid brown. Pedipalps creamy-yellow, sparsely mottled with brown. Femora I to III with a small amount of black basally, then all yellow except for a broad black terminal band; femur IV mostly dark brown; distal legs mottled with yellow and brown. Abdomen ventrally dark grey around pedicel and posteriorly to spinnerets except paler book lung covers; laterally and anteriorly then to dorsal colour pattern of black and brown over fawn and white; darkest at anterior.

Male. Carapace length range 0.78–0.96. *Drawn specimens* Figures: 27, KS55740; 100–102, 113–115, KS55741; 103, KS59254.



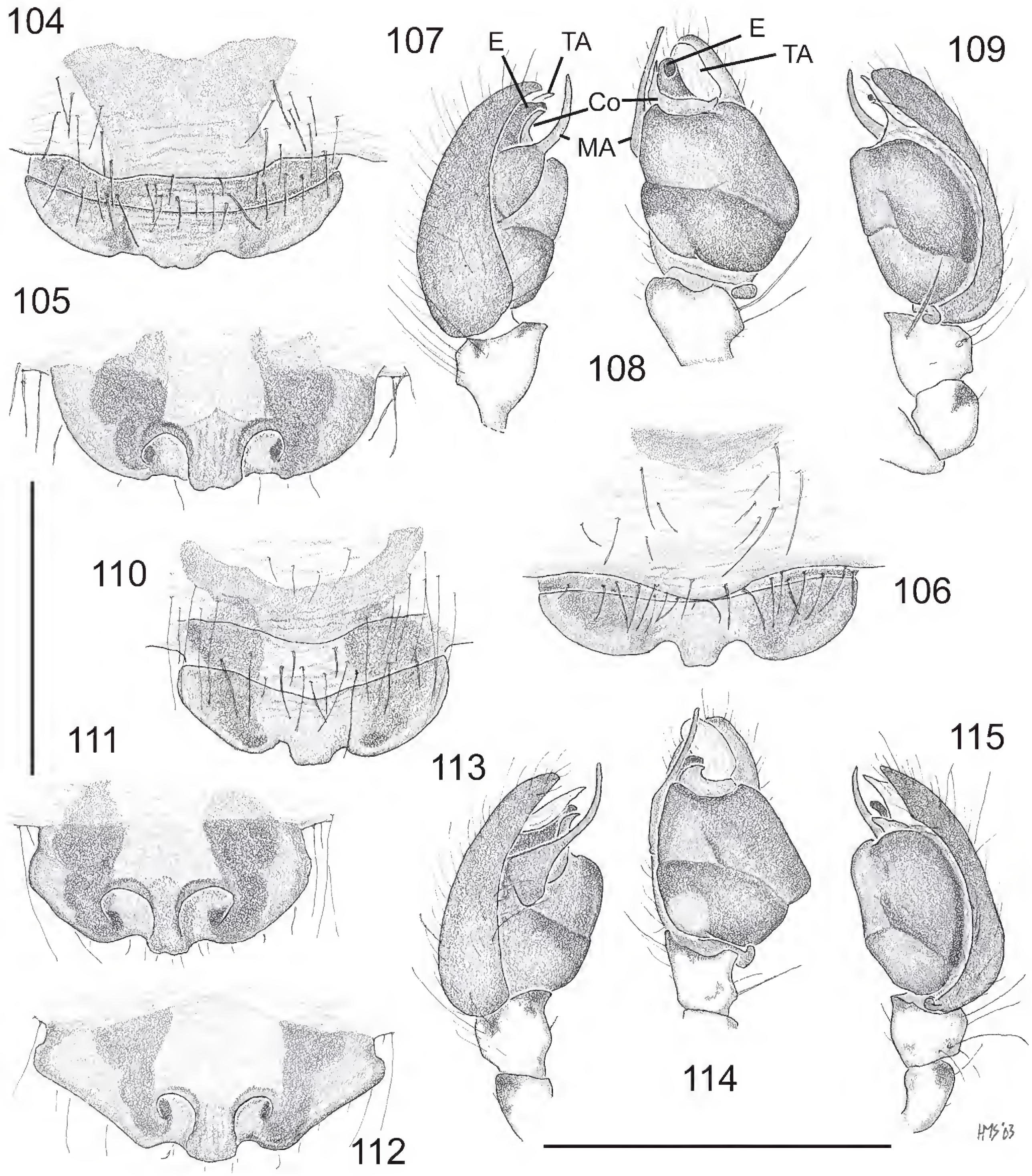
Figs 84–94. Australian *Poltys columnaris*-group females. 84–88, *P. jujorum*: 84, carapace and coxae, dorsal; 85, eye region, lateral; 86–87, holotype abdomen, dorsal and lateral; 88, spination, leg I dorsal patella. 89–94, *P. milledgei*: subjects as 84–88, 94, abdominal maculae, posterodorsal. Horizontal scale: 3 mm for abdomens; 2 mm for Figs 84, 89, 94; 1 mm for Figs 85, 90. Vertical scale = 1 mm for patellae.

Male KS55728. *Prosoma*. Carapace: length 0.86, width 0.55, height 0.31; lightbulb-shape in dorsal view (Fig. 102); highest at eye tubercle; eye tubercle elongate with distinct "v" between caput and posterior eye tubercle in lateral view (Fig. 100); eye tubercle anteriorly a broadly rounded point; eye tubercle sagittate in dorsal view as in female. Labium: length 0.08, width 0.15. Sternum: length 0.35, width 0.34. • *Eyes*. (Fig. 100). PME=AME>PLE≥ALE; ALE c. ⅛× its own diameter from AME; ventral margin of ALE is just dorsal to that of AME. • *Legs*. (Fig. 100). P+TL I: 0.84, II: 0.76, III: 0.47, IV: 0.61; distal patellar setae of legs I and II flattened and elongate (Fig. 103), distal patellar setae legs III and IV and some dorsal tibial macrosetae on all legs flattened to an elongate leaf-shape. • *Abdomen*. (Figs 100–101). Length 1.24, width 0.73; a tall, rather lumpy, ellipsoid, with slightly extended rounded apex, widest at mid-height; tufts of setae arise from bumps. • *Palpal organ*. (Figs 113–115, 119–120). Tegulum rather angular (Fig. 114); conductor a small membranous crescent, basal part difficult to discern clearly under a light microscope (Figs 114, 119); MA longer and more slender than in other species (Figs 113, 120); PM hidden (if present, see Fig. 27); radix–stipes joint dorsal, totally hidden by cymbium (Fig. 115); TA a broad membranous flap (Figs 114, 119–120); embolus short and stout (Fig. 120). • *Colour in alcohol*. Lateral carapace light yellowish-olive, caput darkens slightly to eye tubercle,



Figs 95–103. Australian *Poltys columnaris*-group males. 95–99, *P. jujorum*: 95, general lateral view; 96, abdomen, dorsal; 97, frontal carapace, right palpal organ and chelicerae; 98, carapace and coxae, dorsal; 99, left patella and tibia I showing flattened macrosetae. 100–103, *P. milledgei*: 100, general lateral view; 101, abdomen, dorsal; 102, carapace and coxae, dorsal; 103, left patella and tibia I showing flattened macrosetae. Horizontal scales: 1 mm for Figs 95–98, 100–102; vertical scales 0.5 mm for legs.

latter orange over the PME, carapace with black median markings; dark brown round AME, extends round ALE and under PLE. Labium and maxillae fuscous. Chelicerae yellow with fuscous centre. Sternum yellow-brown with black edges. Femora pale creamy-olive with fuscous markings; distal legs I and II with brown rings and marks to mid metatarsus, then white with black marks; legs III and IV olive-white dorsally and almost solid black maculation proventrally. Palpal cymbium dark brown, contrasting with white tibia, patella and femur; tibia and patella with black tips. Abdominal book lung covers pale, white towards spinnerets; surrounding ventral areas grey; dorsum mostly grey–white with black speckling, black on the bumps and black "cello" marks.



Figs 104–115. Australian *Poltys columnaris*-group genitalia. 104–109, *P. jujorum*: 104–106, epigynes, 104, 106, anterior, 105, posterior (106, holotype); 107–109, male palp: prolateral, ventral, retrolateral. 110–115, *P. milledgei*: 110–112, epigynes, 110, anterior, 111–112, posterior (110–111, holotype); 113–115, male palp: prolateral, ventral, retrolateral. Scale lines = 0.5 mm: vertical line for epigynes, horizontal for palps.

Variation. As in *P. jujorum*, the female abdominal "eye spots" are rather variable in size and number. Female abdominal shapes and epigynes also feature a similar range of variation. One male from Darwin (KS55735) has all the flattened macrosetae short and rounded (like *P. jujorum* males).

Biology. The spiders make a typical fine web made at night on dead twigs and vines; only recorded from monsoon rainforest and woodland. The egg sac is like that of *P. jujorum*, a small white "sac" with overlay of cream, and sometimes grey or brown silk (Fig. 14), laid on the underside of a dead twig.

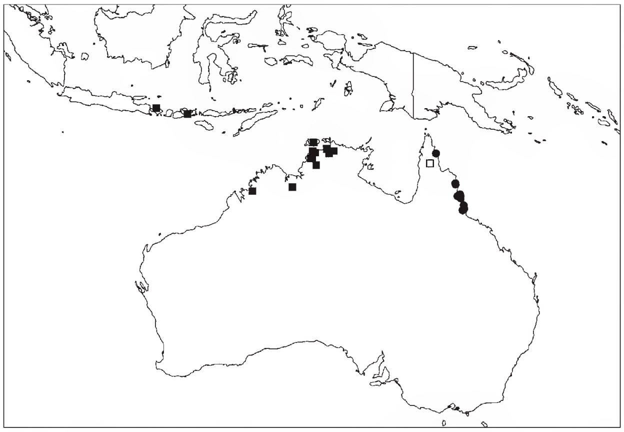


Fig. 116. Distribution of Australian *Poltys columnaris*-group species: *Poltys jujorum* (●); *Poltys milledgei* (adult records, ■; subadult, □).

Distribution. The far north of Western Australia, the Northern Territory, southern Indonesia and possibly Queensland (Fig. 116).

The *P. frenchi* species group

Morphologically, these species appear to be the link between the *P. illepidus*-group and the *P. laciniosus*-group. There are usually four prolateral cheliceral teeth (LsLs) in *P. frenchi*, but this is often reduced to three (LLs) in *P. timmeh* n.sp. Specimens of *P. frenchi* are variable in build. Heavier bodied females look rather like *P. illepidus*-group animals, especially when the abdomen is swollen with eggs, but lightly built specimens are much more slender, more like the *P. laciniosus*-group. There is also a similar range of variation in abdominal shapes as in the *P. laciniosus*-group. Males are extremely lightly built, even more so than *P. laciniosus*-group species. The genitalia also show some intermediate characters: like the *P. illepidus*-group, the male palp has a distinct TA, but the embolus arises retrobasally, as in *P. laciniosus*-group species (Fig. 29); the PM is also well developed, although quite different in form to either group (Fig. 125). In females, the spade-shaped epigyne is intermediate in shape and there appears to be a distinct, although short and narrow, copulatory duct that is formed similarly to that in the *P. laciniosus*-group (Fig. 30). No modification of patellal macrosetae has been noted.

Only two species are currently recognized, *P. frenchi*, which occurs from Australia to the southern Indonesian islands and *P. timmeh*, from New Caledonia and nearby islands. A single examined female from the highlands of West Papua (RMNH), if not teratogenic, may also be in the *P. frenchi*-group but its rather unique epigyne is difficult to place at present.

Poltys frenchi Hogg

Figs 9, 12, 29–30, 125–135, 138–143, 148–154, 158.

Poltys frenchi Hogg, 1899: 143, pl.13, f.2. Female holotype, Upper Endeavour River, Queensland, Australia; in NMV (K953), examined.

Poltys sigillatus Chrysanthus, 1961:211, fig. 74–77. Female holotype, Mindiptana area, (locality marked "Y" on map in Chrysanthus, 1971), 1959, Br. Monulfus, in RMNH (#970); examined. **New synonym**.

Remarks. Doleschall's *P. moluccum* and Bradley's *P. papuensis* may be senior synonyms of this species. The types, however, have not been located, and neither are definitively identifiable from the original descriptions. The specimen that Thorell (1878) probably used in his redescription of *P. moluccum* has been examined (NHRM, 1026). It is a juvenile from the *P. illepidus*-group and is not referable to the present species.

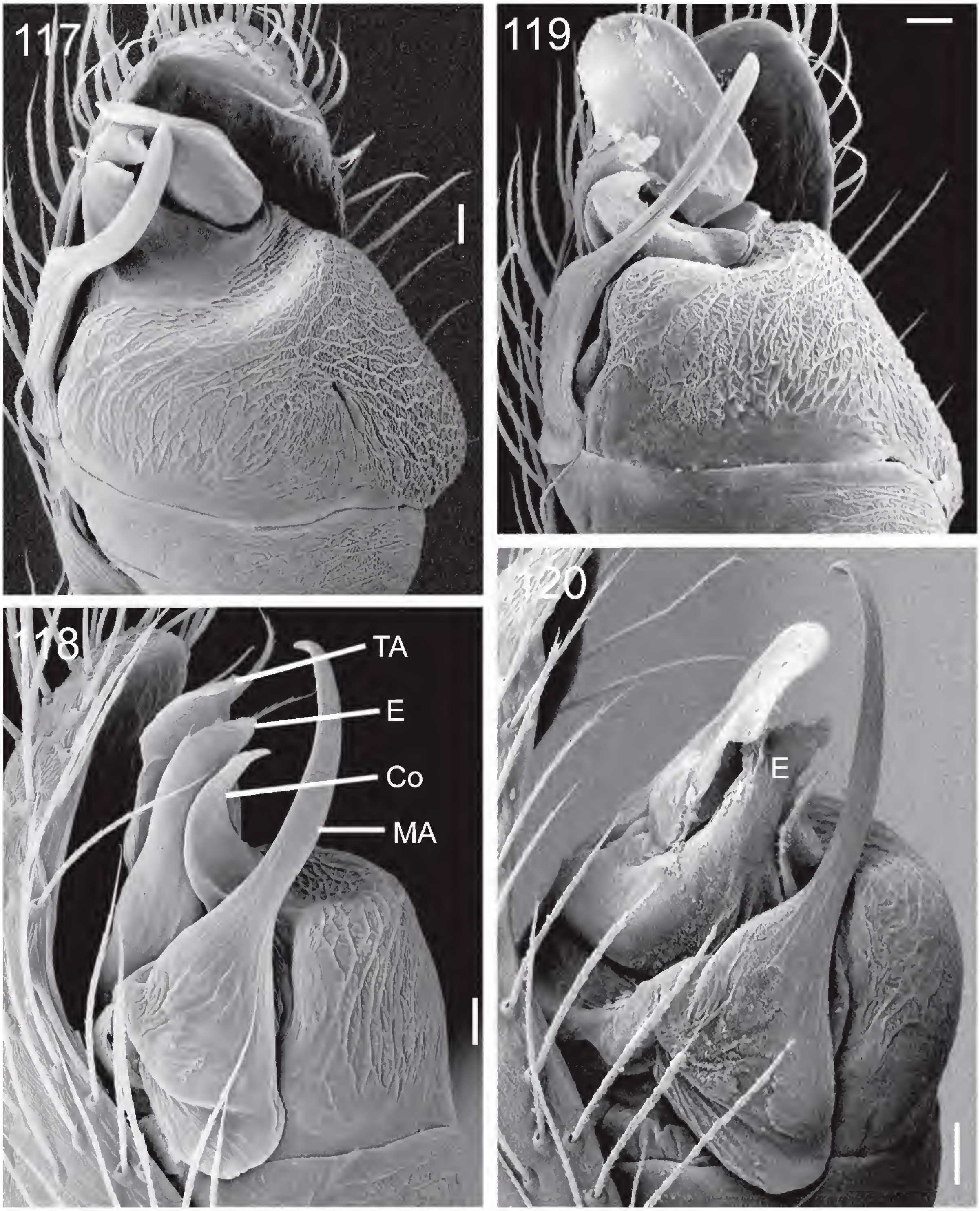
Material examined. AUSTRALIA: QUEENSLAND: ♂♂ KS86341, KS86342–44, ♀♀ KS86345–46, Cape Kimberley, track to lookout W of campsite, 16°16'28"S 145°28'05"E, 21 Sep. 2003; ♀♀ KS33928, KS33938, KS33958, KS33968–69, Edmonton, 17°01'S 145°44'E, 20 Sep. 1976, 8 Jun. 1975, 28 Aug. 1970, 2 Sep. 1976, 28 Aug. 1976; ♂♂ KS86338–40, ♂♀ KS86350–51, ♂ KS86491, Edmonton, as previous record, 18 Sep. 2003; ♂♂ KS58026–7, KS70356, Trinity Park, S side of Moores Gully, 16°48'12"S 145°42'04"E, 14 May 2000; ♂ KS86353, as previous record, 18 Sept. 2003; ♂♂ KS86254, KS86352, KS86492, Trinity Park, S end of Panguna Rd, 16°48'46"S 145°41'20"E, 24 Sep. 2003; ♀ KS86490, Wonga Beach, near caravan park, 16°19'58"S 145°25'19"E, 20 Sep. 2003; ♀ S42562, Cooktown, 15°28'S 145°15'E, Dec. 1975; ♀ S42620, Jacky Jacky Ck, Cape York, c. 12°36'S 143°12'E, 28 Aug. 1985; ♀ S42503, Lockerbie, 10°48'S 142°28'E, 30 Jan. 1975. INDONESIA: MOLUCCAS [MALUKU]: ♀ (RMNH) Aru Is, Manoembai, 11–14 Oct 1929, Snellius expedition. PAPUA NEW GUINEA: MADANG: ♂♂ (RBIN) Baiteta forest, 5°01'S 145°45'E, 4 Jun. 1993 & 15 Jun. 1995. SANDAUN: ♀ (HNHM) Feramin, NE (sic) Telefomin, 1450 m, 26–27 Aug. 1963. SIMBU: ♀ (HNHM) Karimui, 9–16 Jul. 1963.

Reared specimens deposited in other institutions: ex female KS86346: ♂ to QM S66576, ♂ to NMV K8897.

Diagnosis. **Females**. From other species groups: epigyne an inverted spade-shape, as long or longer than wide, but widest away from the base (Figs 138–140); carapace profile low and broad, pale in colour, with a well defined eye tubercle (Figs 127, 130); front femora with distinct broadening (Fig. 127); four prolateral cheliceral teeth. From *P. timmeh* (non Australian) by narrower, less marginal epigynal foveae (Figs 139–140). **Males**. From other species groups by well defined, but almost flat-fronted, eye tubercle (Fig. 148) (recently collected specimens with bright orange–yellow on creamy-white carapace dorsally, Fig. 150); legs without flattened macrosetae; male palp embolus arises prolaterally (like *P. laciniosus*-group) but has distinct TA (Fig. 154). From *P. timmeh* by straight, solid conductor (Figs 152– 154) and that most of the sclerites are smaller in proportion to the tegulum and subtegulum (compare ventral views, Figs 153 and 156).

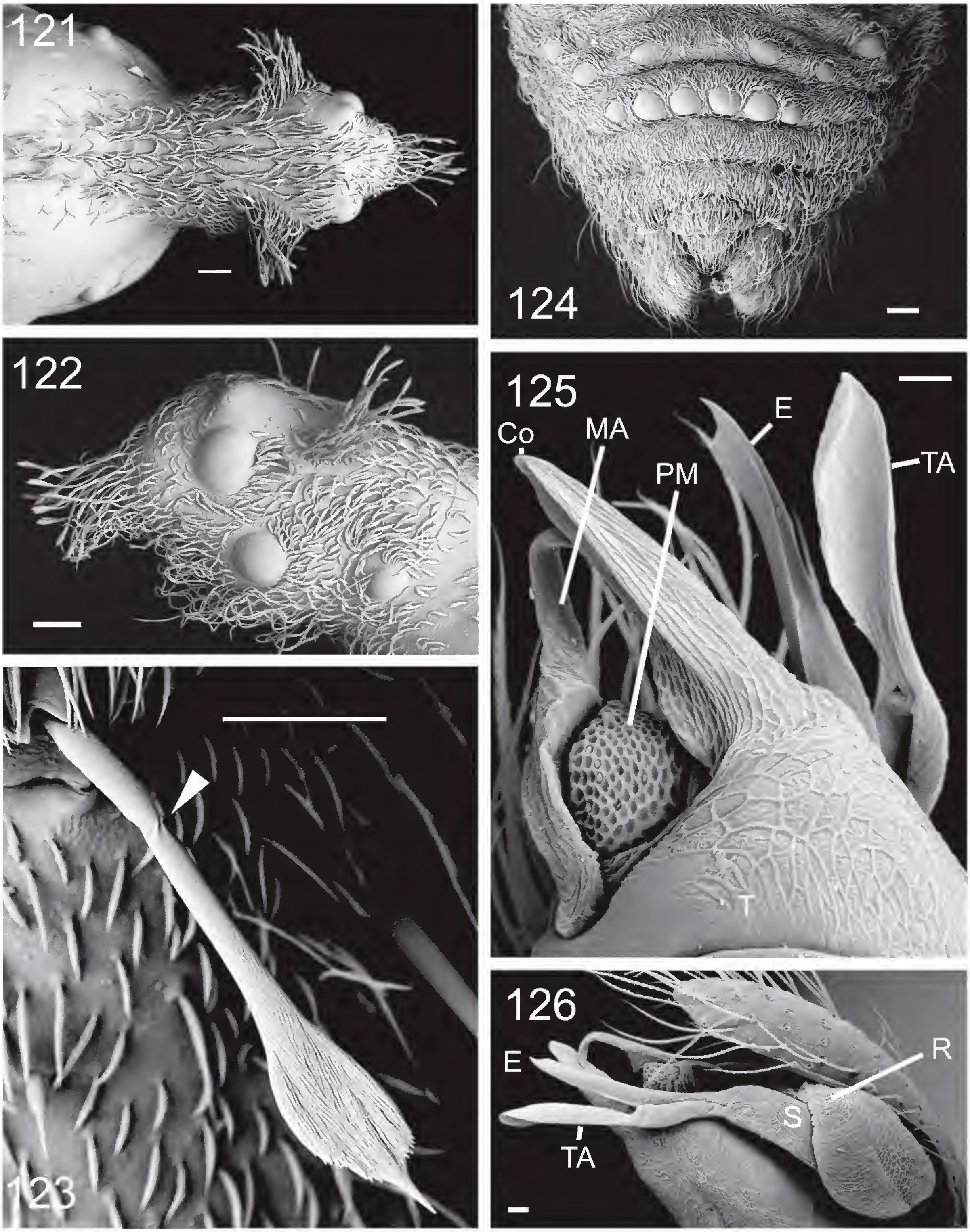
Description. **Female**. The holotype is in poor condition and is fragile. A more recently collected specimen, which is a good physical match for the holotype (except in abdominal shape), is described here. Carapace length range: 4.00–5.83. *Drawn specimens* Figures: 30, 127–131, KS86345 (male from Fig. 148); 132–133, S42562; 134–135, 138–139, S42503; 140–143, holotype (NMV).

Female S42562. *Prosoma*. Carapace (Figs 127, 130–131), length 5.83, width 4.17, height 1.47; broad and low (Fig. 131), lateral margins at coxa I straight or concave (Fig. 130); eye tubercle well developed, relatively slender and slightly elevated (Fig. 127). Chelicerae: paturon with 4 promarginal teeth. Labium: length 0.65, width 1.0. Sternum: length 2.37, width 2.37; sternal extensions at bases of legs II–IV (Fig. 129). • *Eyes*. (Figs 127, 131). AME>PME>ALE>PLE; ALE c. 0.5× its own diameter from AME; ventral margin of ALE is just ventral to mid point of AME. • *Legs*. (Figs 127). P+TL I: 8.58, II: 7.92, III: 4.67, IV: 6.08; front



Figs 117–120. Australian *Poltys columnaris*-group male palps, ventral and prolateral terminal bulbus. 117–118, *P. jujorum*. 119–120, *P. milledgei*. Scale lines = 20 µm.

femora distinctly broadened with greatest diameter c. ⅗ way to apex. • *Abdomen*. (Figs 127–128, [holotype Figs 142–143]). Length 11.25, width 8.00; broadest at small tubercles just anterior to main apodemes; "microsigillae" well developed. • *Epigyne*. (Holotype). Spade-like (as in cards), widest point less than half-way to tip (Fig. 140); distal tip expanded into paired lobes posteriorly (Figs 140–141); foveae wide and relatively shallow but well separated from lateral margins (Fig. 140, also see Fig. 139), narrowing into short copulatory ducts basally (as in Fig. 30); spermathecae closely spaced; epigyne often lightly sclerotized compared to *P. illepidus*-group and *P. laciniosus*-group. • *Colour in alcohol*. (S42562) Carapace yellow, pro-foveal suture red, eye tubercle orange brown, carapace margins ventral to lateral eyes brown. Chelicerae orange-brown with pale patch basally. Labium and maxillae orange-brown. Pedipalps yellow-olive.



Figs 121–126. 121–124, *Poltys jujorum* female: 121–122, anterior carapace and eye tubercle (from moult), dorsal and lateral, showing tufts of setae; 123, flattened macroseta from dorsal patella; 124, posterodorsal abdomen showing maculae. 125–126, *P. frenchi* male palp: 125, terminal bulbus, ventral; 126, bulbus, retrolateral. Scale lines: Figs 121–124 = 100 µm; Figs 125–126 = 20 µm.

Femora I and II orange-yellow with darker distal band; femur III mottled pale and brown; femur IV pale basally to dark distally; distal legs mottled orange–brown. Sternum orange-brown. Abdomen ventrally fawn, dorsally with brown and black markings on a pale ground. Fresh specimens usually have pale creamy-grey dorsal carapace.

Male. Carapace length range: 0.94–1.10. *Drawn specimens* Figures: 29, KS86338; 148–151, KS86342; 152–154, KS86338.

Male KS86342. *Prosoma*. Carapace: length 1.04, width 0.78, height 0.33; broad pear-shape in dorsal view but lateral margins at coxa I straight to concave (usually straight–convex in other species) (Fig. 150); eye tubercle well defined with distinct "v" between caput and eye tubercle in lateral view, slightly elevated (Fig. 148). Labium: length 0.10, width 0.18. Sternum: length 0.45, width 0.44. • *Eyes*. (Figs 148, 151). AME≥PME>ALE≥PLE; ALE c. ½ × its own diameter from AME; height of ventral margin of ALE is at mid point of AME; AME prominent on slight tubercles. • *Legs*. (Fig. 148). P+TL I: 1.29, II: 1.18, III: 0.63, IV: 0.88. • *Abdomen*. (Figs 148–149). Length 1.63, width 1.00; a narrow ellipsoid, broadest at ⅔ height. • *Palpal organ*. Radix–stipes joint retrolateral (Fig. 153), stipes directed apically, not hidden by cymbium; embolus and TA arise retroapically (Figs 126, 154); embolus a slender slightly curved rod, ventral groove visible under SEM (Fig. 125–126, 152); TA adpressed to embolus basally, free retrolaterally apically (Figs 126, 154); PM a curved plate with reticulated surface, less heavily sclerotized than *P. laciniosus*-group (Fig. 125, 153). • *Colour in alcohol*. Carapace pale olive-grey with black median markings; eye tubercle bright orange, with black around eyes and between AME, giving "masked" appearance. Chelicerae as carapace with fuscous markings. Labium pale with fuscous edging to basal part, maxillae darker. Femora I, II and IV pale basally to dark distally (IV darkest); distal legs mottled fuscous, turning into distinct dark banding on distal metatarsi and tarsi; underside of tibia–metatarsus III with large black spots that merge together. Sternum pale anteriorly with dark lateral and posterior borders. Abdomen ventrally greyish-fawn, dorsally with dark pattern on a white ground.

Variation. The types of *P. frenchi* and *P. sigillatus*, plus the described Cooktown specimen (S42562), correspond in width of epigynal foveae, colouration and general build. All the other females examined are slightly more lightly built, the carapace is more lightly coloured, and the epigynal foveae are narrower (Fig. 139). The abdominal shape of the figured female (Fig. 128) seems to be common in *P. frenchi* specimens in Australia but overall the variations in shape are similar to those seen in the *P. laciniosus*-group, including tall twig-like forms (Fig. 134) and ones with dual humeral tubercles and central "tower". More darkly coloured and heavily built specimens can also resemble *P. illepidus*-group, especially when swollen with eggs.

Biology. The biology of *P. frenchi* appears to be as described for other Australian *Poltys* species except that many webs have a slight extension at the top made by adding an extra zigzag of sticky spirals (although other species may have uneven webs to fit the available space). Only one adult female web has been observed, 17 cm high× 14 cm wide, with the hub fully eaten out (Fig. 12). These spiders are less reliant on dead vegetation than most other Australian species, often being found on living or dead vines as well as other twigs, and commonly with green pigmentation in the cuticle and on the abdomen. Two egg sacs laid in captivity were of cream-coloured silk with lemon-yellow covering; one had a sparse outer layer, the other was rather thicker and smoothly finished (*P. illepidus* egg sacs are always loosely finished). In Australia, *P. frenchi* is restricted to low-altitude, but mostly slightly scrubby, rainforest with openings (*P. noblei* n.sp. is restricted to higher altitudes at a similar latitude). One female (S42562) was collected from the larval provisions in a mudwasp nest.

Distribution. Northern Australia, New Guinea and southern Moluccas (Indonesia) (Fig. 158).

Poltys timmeh n.sp.

Figs 136–137, 144–147, 155–157, 158.

Etymology. The specific name is an arbitrary combination of letters.

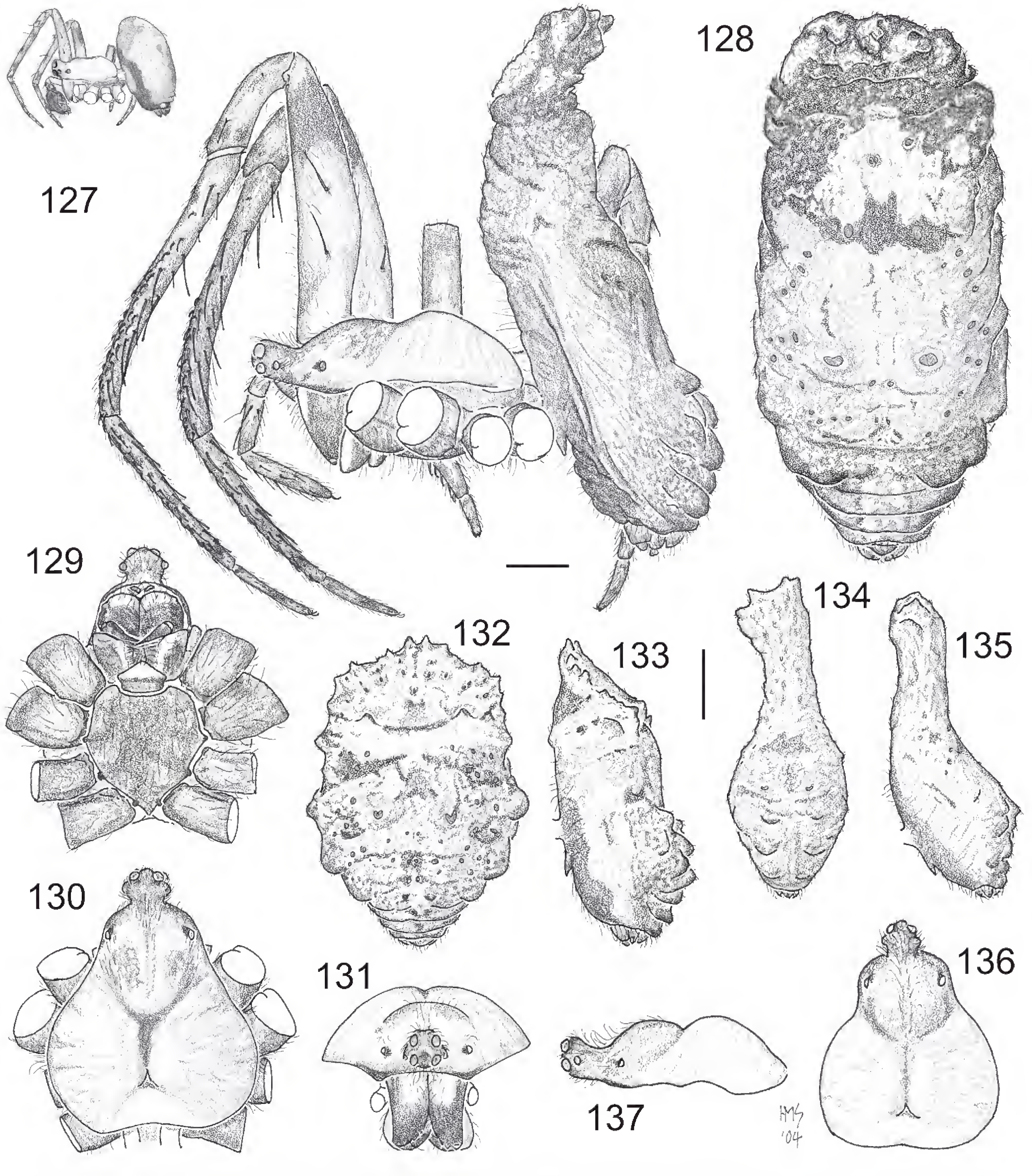
Type material. NEW CALEDONIA: HOLOTYPE ♀ (HNHM), Lifou, Loyalty Islands, c. 20°43'S 167°15'E, 16 Aug. 1982, rainforest, beating. PARATYPES ♂ (HNHM), data as holotype; ♀ KS86349, Tiea Reserve, 5 km E of Pouembout, 21°08'06"S 164°56'11"E, 4 Nov. 2001, T. Moulds, 36 m; ♂ (BPBM), Lifou, Loyalty Islands, 26–27 Mar. 1968, J.L. Gressitt & T.C. Maa; ♂♀ (AR14306–7 MNHNP, ex HNHM), Maré, Loyalty Islands, c. 21°30'S 168°00'E, 26 May–8 Jun. 1987 and 7 Jun. 1986 respectively, *Araucaria*; ♂ (HNHM), Farino, 21°40'S 165°46'E, 25 Aug. 1982; ♀ S66578, New Caledonia, Foret Nord, site 2, 22°19'S 166°55'E, 2 Dec. 2004, QM party, rainforest, 200 m, night hand collecting.

Other material examined. ♀ S69840, New Caledonia, Pic du Grand Kaori, site 2, 22°17'S 166°53'E, 22 Nov. 2004, QM party, rainforest, 250 m, night hand collecting.

Diagnosis. **Females**. From other species groups, as *P. frenchi*, except number of prolateral cheliceral teeth is variable. From *P. frenchi* by broader and longer epigynal foveae that extend basally almost to the position of the spermathecae (Fig. 144), also by carapace shape (Figs 136–137), and rather shorter legs with more distinctly broadened femora. **Males**. From other species groups, as *P. frenchi* for palpal characters (no recently collected specimens seen to comment on colouration). From *P. frenchi* by longer, lobed conductor with distinct basal kink (Figs 155, 157) and that most of the sclerites are longer in proportion to the tegulum and subtegulum (compare ventral views, Figs 156 and 153).

Description. **Female**. Carapace length range: 2.94–3.67. *Drawn specimens* Figures: 136–137, KS86349; 144–147, holotype (HNHM) ex Lifou.

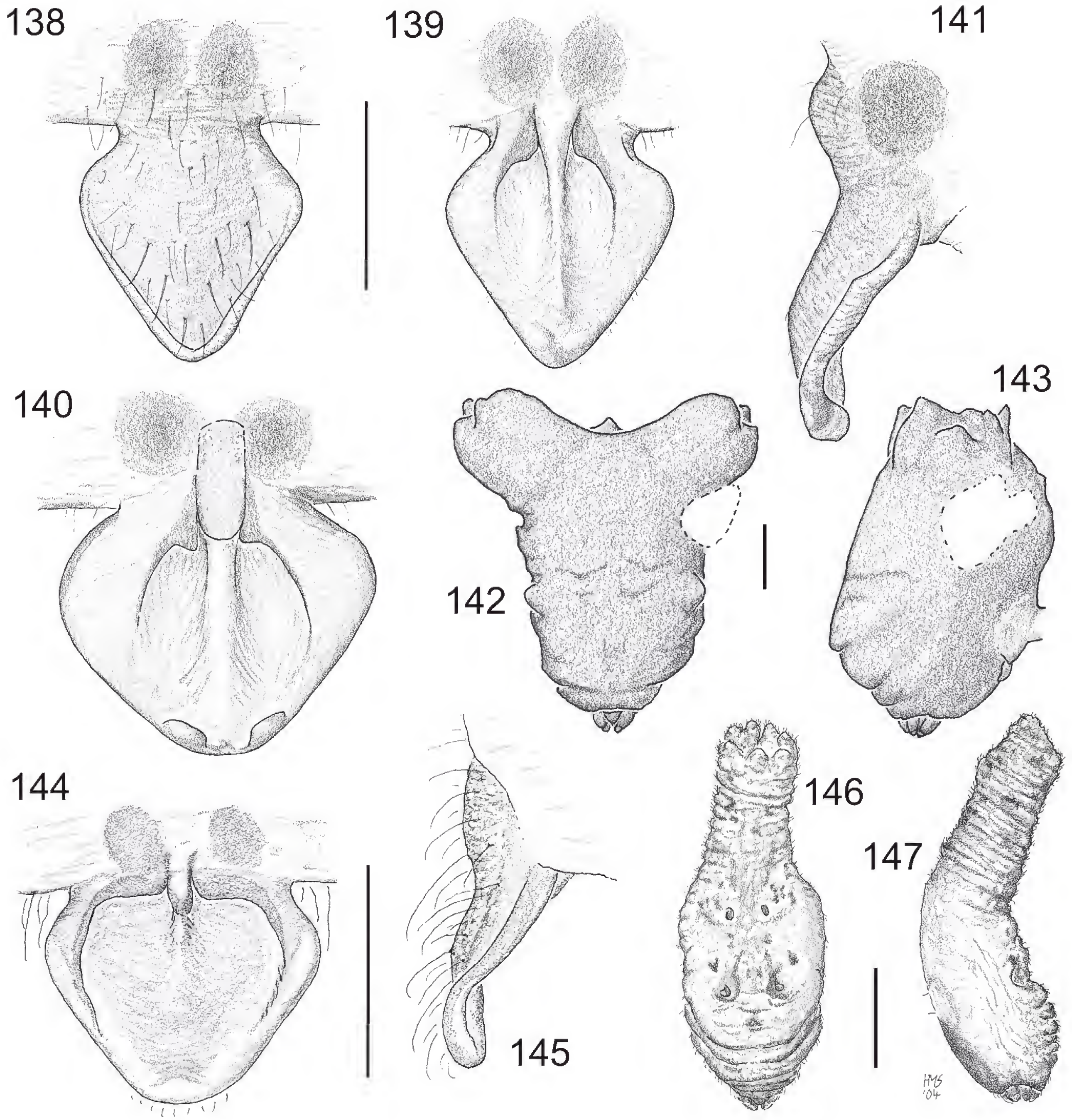
Holotype. *Prosoma*. Carapace: length 3.67, width 2.90, height 0.82; broad and relatively low, rear of caput slopes steeply into pro-foveal suture; eye tubercle well developed, slender basally, slightly enlarged anteriorly, slightly elevated (Figs 136–137). Chelicerae: paturon with 3 promarginal teeth. Labium: length 0.43, width 0.61. Sternum: length 1.67, width 1.55; sternal extensions at bases of legs III–IV. • *Eyes*. (Fig. 137). AME>PME>PLE≥ALE; ALE c. ⅔× its own diameter from AME; ventral margin of ALE level with mid point of AME. • *Legs*. P+TL I: 4.90, II: 4.57, III: 2.90, IV: 3.67; front femora distinctly broadened with greatest diameter c. ⅗ way to apex leg I, or ½ way leg II; legs distinctly shorter than *P. frenchi*. • *Abdomen*. (Figs 146–147). Length 7.92, width 3.00; broadest at anterior apodemes; some "microsigillae" visible but not strongly developed. • *Epigyne*. (Figs 144–145). Spade-like (as in cards), widest point less than half-way to tip; foveae broad and shallow (thin in lateral view, Fig. 145), occupying almost the entire posterior surface, narrowing abruptly into short, narrow copulatory ducts basally (Fig. 144); spermathecae closely spaced. • *Colour in alcohol*. Carapace creamy-white, caput straw yellow, black around all eyes. Chelicerae cream, labium, maxillae and sternum yellow. Pedipalps cream. Femora I and II pale creamy-yellow with remains of dark distal band (with blue shine on recent specimen); femur III almost all cream; femur IV paler basally and distally, dark brown between; distal legs mottled yellow–cream, faint dark bands on distal metatarsi and tarsi of I and II. Abdomen ventrally blackish posteriorly, dorsally and anteroventrally with brown and black markings on a pale ground.



Figs 127–137. *Poltys frenchi*-group, female characters. 127–135, *P. frenchi*: 127, general lateral view with male at same scale; 128, abdomen, dorsal; 129, prosoma and coxae, ventral; 130, carapace and coxae, dorsal; 131, frontal carapace and chelicerae; 132–135, examples of variation in abdominal shape, dorsal and lateral (also see group holotypes, Figs 142, 146). 136–137, *P. timmeh*, carapace, dorsal and lateral. Scale line: 1 mm for Figs 127–131, 136–137; 2 mm for Figs 132–135.

Male. Carapace length range: 0.98–1.43. *Drawn specimen* Figs 155–157 (BPBM) ex Lifou.

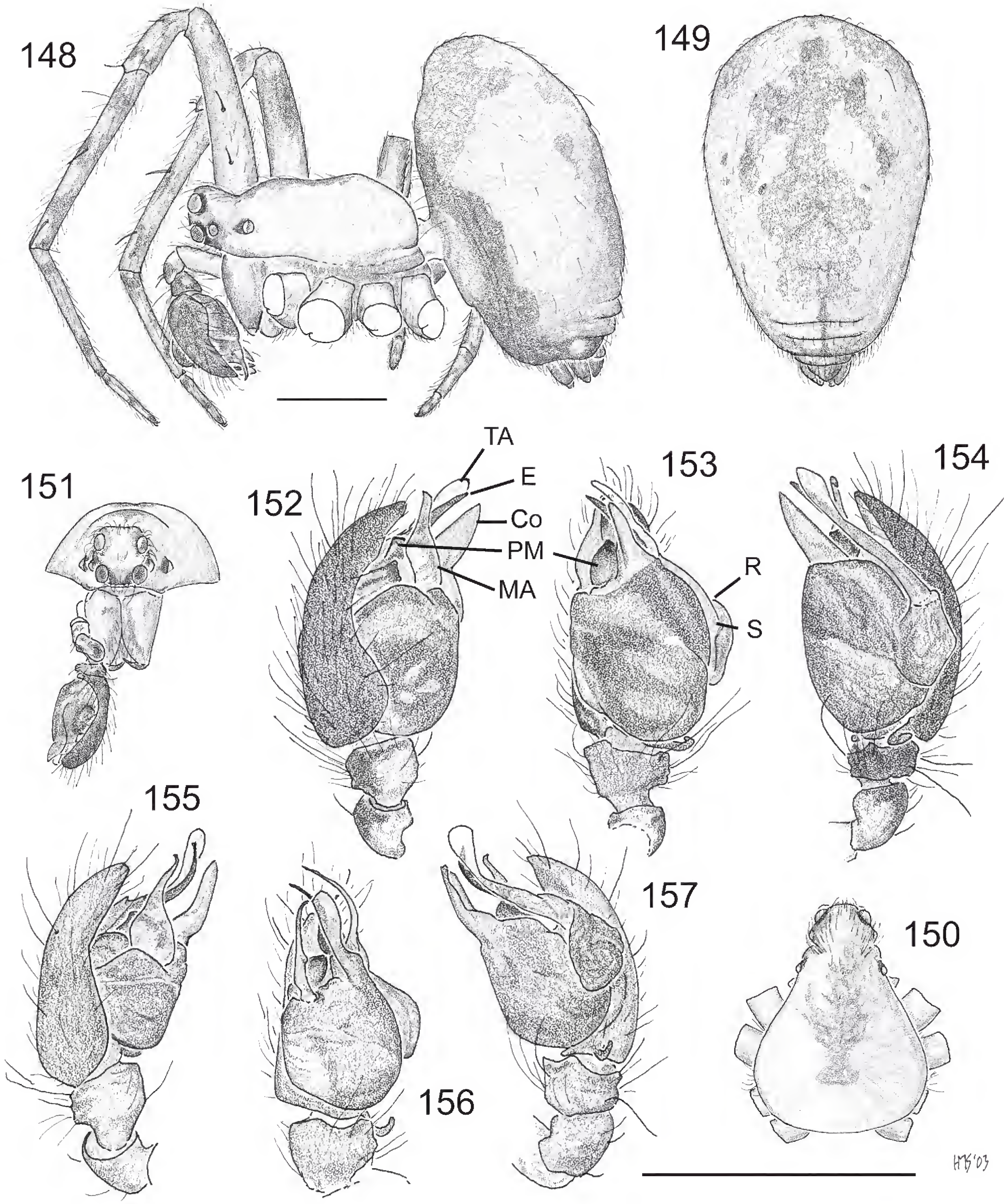
Male (HNHM) ex Lifou. *Prosoma*. Carapace: length 1.43, width 0.98, height 0.41; broad pear-shape in dorsal view; eye tubercle well defined both in lateral and dorsal views (carapace similar shape to that shown for larger *P. noblei* male, Fig. 204), slightly elevated and PME slightly overhanging AME. Labium: length 0.14, width 0.26. Sternum: length 0.61, width 0.57. • *Eyes*. AME>PME≥PLE>ALE; ALE almost touching AME; height of ventral margin of ALE is just ventral to mid point of AME; AME prominent on slight tubercles. • *Legs*. P+TL I: 1.76, II: 1.65, III: 0.86, IV: 1.12. • *Abdomen*. AL 1.61, width 1.06; an almost evenly elongate ellipsoid; anterior margin slightly crenate, with submarginal "microsigillae"; apodemes well developed for a male. • *Palpal organ*. (Figs 155–157).



Figs 138–147. *Poltys frenchi*-group epigynes and holotype abdomens. 138–143, *P. frenchi*: 138–139, narrow form, epigyne anterior then posterior view; 140–143, holotype: 140–141, epigyne posterior and lateral; 142–143, abdomen, dorsal and lateral (missing section is damaged). 144–147, *P. timmeh* holotype: 144–145, epigyne, posterior and lateral; 146–147, abdomen, dorsal and lateral. Scale lines: 0.5 mm for epigynes; 2 mm for abdomens.

Radix–stipes joint retrolateral, stipes directed apicoventrally, not hidden by cymbium; embolus and TA arise retroapically (Figs 156–157); conductor deeply grooved, retrolaterally expanded into rounded flap (Fig. 156), distinctly kinked basally (Fig. 155, 157); embolus longer than in *P. frenchi*, a slender sinuously curved rod (but not examined under SEM, so groove may be present, as in *P. frenchi*) (Fig. 155); TA adpressed to embolus basally, free retrolaterally apically (Fig. 157); PM a curved plate (Fig. 156), appears similar to that of *P. frenchi* but microstructure unknown. • *Colour in alcohol*. Carapace amber brown with darker caput; eye tubercle with orange dorsally, secondary eyes with black around, AME surround pale. Chelicerae brown to yellow distally. Sternum dark yellow with dark margins. Femora amber-olive; lower front legs yellow-olive dorsally, dark ventrally; rear legs mottled; all legs with distinct dark banding on distal metatarsi and tarsi. Abdomen dark ventrally and dorsal margins; main dorsal area pale with uneven central brown patch.

Variation. Some female specimens of *P. timmeh* have three promarginal cheliceral teeth whilst others have four. The range of abdominal variation is probably similar to that seen in *P. frenchi*.



Figs 148–157. *Poltys frenchi*-group males. 148–154, *P. frenchi*: 148, general lateral view; 149, abdomen, dorsal; 150, carapace and coxae, dorsal; 151, frontal carapace, right palpal organ and chelicerae. 152–154, male palp: prolateral, ventral, retrolateral. 155–157, *P. timmeh*, male palp, views as previous. Scale lines = 0.5 mm, upper line for Figs 148–151, lower for palps.

Biology. Tim Moulds, the collector of the AM specimen informs me he was beating mainly living plants in lowland vine scrub. Some other labels give rainforest as the habitat. These descriptions would agree with the favoured habitat of *P. frenchi* in Australia. Several other specimens (including some unlisted juveniles in HNHM) were collected on *Araucaria*.

Distribution. Only recorded from New Caledonia and the Loyalty Islands (Fig. 158).

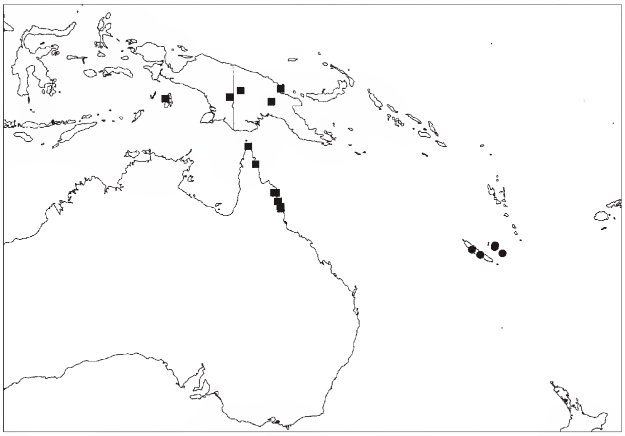


Fig. 158. Distribution of *Poltys frenchi*-group species: *Poltys frenchi* (■); *Poltys timmeh* (●).

The *Poltys laciniosus* species group

This is a distinct species group that appears to be endemic to Australia. The group is united by several characters: a reduced prolateral cheliceral tooth pattern; females with a more steeply domed carapace than normally found in other groups; long, roughly triangular epigynes with rolled in lateral posterior plates; relatively long copulatory ducts; and no TA in the male palp. Along with the (presumed) loss of a TA, associated palpal organ structures such as stipes and distal haematodocha are difficult to distinguish and may, or may not be present. For convenience, the basal part of the embolus, which expands into a membranous sac, has been termed stipes in the following descriptions. No modification of patellal macrosetae has been noted in the group. The three species are all variable in abdominal shape (see Smith, 2003) and colouration. This level of variation may be an adaptation to avoid predation in their often exposed day time hiding positions on dead twigs.

Poltys laciniosus Keyserling

Figs 10–11, 18, 22–24, 31–32, 159–163, 169–171, 174, 176–177, 182–188, 198–201, 208–210, 217, 218–219.

Poltys laciniosus Keyserling, 1886: 123, pl. 9, fig. 7. Female holotype from Peak Downs, Queensland, Australia; in BMNH (1890/2050), examined.

Poltys mammeatus Keyserling, 1886: 125, pl. 10, fig. 1. Female holotype from Peak Downs, Queensland, Australia; in ZMH (labelled as the type of *P. laciniosus*, see remarks below), examined. **New synonym**.

Poltys bimaculatus Keyserling, 1886: 131, pl. 10, fig. 4. Juvenile holotype from Peak Downs, Queensland, Australia; in ZMH, examined. **New synonym**.

Poltys salebrosus Rainbow, 1904: 104, fig. 28–29. Juvenile holotype from Freemantle [sic], Western Australia, Australia; in AM (KS8697). **New synonym**.

Remarks. Both BMNH and ZMH hold types listed as the holotype of *P. laciniosus*. The BMNH specimen is a good match for the specimen illustrated by Keyserling under this name. A designated type of *P. mammeatus* has not been located but the ZMH specimen matches the colour pattern of the illustration. The shape is difficult to match with certainty, as the apex of the abdomen is inclined sharply over the prosoma, and posterior tubercles are not obvious. The specimen, however, is not in good condition and the abdomen has obviously been damaged. The ZMH type, therefore, has apparently been mislabelled as *P. laciniosus* and should read *P. mammeatus*. The subadult types of *P. bimaculatus* and *P. salebrosus* are both from areas where no other *Poltys* species have been recorded and have features typical of *P. laciniosus*.

Selected other material examined. AUSTRALIA: NEW SOUTH WALES: ♂ KS84599, 60 km W of Cobar, 31°33'04"S 145°12'56"E, 26 Mar. 2002; ♂ KS84600, 62 km W of Nyngan, 31°33'31"S 146°32'49"E, 26 Mar. 2002; ♂ KS70366, The Battery rest area, 32°12'S 150°28'E, 29 Oct. 2000; ♀ KS78296, Cocoparra NP, 34°04'46"S 146°13'23"E, 15 Mar. 2002; ♂♂ KS78293–94, Conimbla NP, 33°47'47"S 148°26'53"E, 14 Mar. 2002; ♀ KS33847, Euchora, Springwood, 33°42'S 150°34'E; ♀ KS33845, Gara Station, via Armidale, 31°36'S 148°54'E; ♂ KS72253, Gilwarny Forest Rd, 30°25'20"S 147°53'57"E, 15 Dec. 1999; ♂ KS74967, ♀ KS75494, Pilliga Forest Way, 30°31'11"S 149°37'25"E, 13 Nov. 2001; ♀ KS58687, Royal National Park, 34°08'S 151°04'E, 29 Oct. 1998; ♀♂ KS74960–61, Warrumbungle NP, 31°18'S 149°00'E, 9 Nov. 2001. NORTHERN TERRITORY: ?♀ KS55745, Gregory NP, Victoria H'way, 15°31'04"S 131°18'23"E, 25 May 1999. QUEENSLAND: ♂♂ KS5806, Blackwood NP, 21°28'41"S 146°43'33"E, 11 May 2000; ♂ KS58043, ♀ KS84601, Clermont, 22°48'25"S 147°38'22"E, 9 May 2000; ♂ KS58060, ♀ KS58059, Isla Gorge, campsite area, 25°11'32"S 149°58'25"E, 7 May 2000; ♂ KS58051, ♀♀ KS58050 (3), Peak Range NP via 'Limestone', 22°45'26"S 148°08'03E, 10 May 2000; ♂♂ KS5804, ♀ KS58042, Taunton NP, 23°29'33"S 149°16'39"E, 9 May 2000; ♂ KS58056, Theodore, 24°56'41"S 150°04'24"E, 10 May 2000; ♀ (MMUS) Duaringa, 23°41'S 149°40'E; ♀ (MMUS), Innot Hot Springs, 17°40'S 145°14'E; ♀ S42616, Altonvale Station, 28°01'S 149°15'E, 10 Jan. 1979; ♂ S42558, Blackdown Tableland, 23°47'S 149°04'E, 6 Feb. 1981; ♀♀ S42501, Camel Creek, 18°50'S 145°28'E, 5 Dec. 1955; ♀♀ ex S42608–09, Camira, 27°38'S 152°55'E, 23 Nov. 1986; ♀ S42500, Crows Nest, 27°16'S 152°03'E, 27 Jan. 1973; ♀ S42612, Dulacca, 26°38'S 149°48'E, 1 May 1928; ♀ S42551, Eidsvold, 25°22'S 151°07'E, Feb. 1915; ♀ S42591, Goondiwindi, 28°32'S 150°18'E, Jan. 1951; ♀ S42560, Mt Moffat NP, 24°53'S 147°57'E, 15 Dec. 1987; ♀ W1444, Purga, 27°41'S 152°42'E, 15 Dec. 1941; ♀ W1503, Rockhampton, 23°22'S 150°30'E, 26 Jun. 1942; ♀ W434, Toogoolawah, 27°05'S 152°22'E; ♀ S42550, Yandaburra, 24°13'S 148°00'E, 16 May 1976. SOUTH AUSTRALIA: ♀ KS78314, Arden Vale Rd, 5.1 km from Quorn, 32°18'08"S 138°00'49"E, 24 Mar. 2002; ♂ KS84596, Cocata Conservation Reserve, 33°17'28"S 135°18'59"E, 22 Mar. 2002; ♀ KS78310, nr Coffin Bay NP, 34°37'26"S 135°27'04"E, 22 Mar. 2002; ♂ KS78309, ♀ KS85050, Lake Gilles NP, 33°01'56"S 136°47'45"E, 21 Mar. 2002; ♂ KS84598, ♀ KS78313, Lincoln H'way, 41 km N of Cowell, 33°21'28"S 137°03'58"E, 24 Mar. 2002; ♂ KS84597, ♀♀ KS78311, Lincoln NP, 34°47'11"S 135°55'04"E, 23 Mar. 2002; ♀ KS78304, Millbrook Reservoir, 34°50'S 138°49'E, 19 Mar. 2002; ♂ KS91165, raised from female KS78304, Millbrook Reservoir, matured 30 Nov. 2002; ♀ KS78307, Mt Remarkable NP, 32°50'45"S 138°01'41"E, 20 Mar. 2002; ♀♂ KS78301–02, Ngarkat Conservation Park, 35°38'17"S 140°46'50"E, 17 Mar. 2002; ♂ KS84593, Scorpion Springs CP, 35°25'10"S 140°53'20"E, 17 Mar. 2002; ♀ NN12173, Billiatt CP, 34°59'23"S 140°28'24"E, 19 Nov. 1996; ♀ NN12178, Calpatanna Waterhole CP, 33°00'S 134°21'E, 27 11 1995; ♀ N1998771, Gawler Ranges, 32°22'S 135°34'E, Sep. 1972; ♀ N1998778, 13 km N Keilira Station, 36°37'S 140°10'E, 22 Mar. 1992; ♀♀ (4) (SAMA), Munyaroo CP, 13.7 km SE Moonabbie, 33°21'34"S 137°21'03"E, 30 Sep. 2002; ♀ NN12166, Murvio Homestead, 36°12'41"S 140°07'46"E, 3 Oct. 2000; ♀ NN12176, Pinkawillinie CP, 33°03'S 135°50'E, 23 Nov. 1995; ♀ N1998775, Tailem Bend, 35°15'S 139°28'E, Mar. 1947; ♀ N1998776, 4 miles E Wellington, 35°18'S 139°27'E, 13 Aug. 1994. VICTORIA: Juvenile ♀, Boinka Flora Reserve, 35°11'46"S 141°36'39"E, Oct. 1999 (probably this species, close to recorded distribution in SA). WESTERN AUSTRALIA: ♂ KS59255, Eucla roadhouse, 31°41'S 128°52'E, 7 Oct. 1999; ♂ KS59256, Pemberton, 34°27'S 116°02'E, 10 Oct. 1999; ?♀ WA98/1957, Beta Ck, 14°16'S 127°19'E, 20 Sep. 1996; ♀ WA98/1959, Gnowangerup, 33°56'S 118°00'E, 15 Nov. 1965; ♀ WA98/1960, Grasspatch, 33°14'S 121°43'E, 24 Dec. 1988; ♀ WA36/68, Lowden, 33°32'S 115°58'E, 10 Jan. 1936; ♀ WA39/2340, Maddington, 32°03'S 115°59'E, 27 Sep. 1939; ♀ WA98/1966, South Yardie Well, Cape Range, 22°25'S 113°46'E, 24 May 1995; ♀ WA98/1970, Torndirrup NP, 35°05'S 117°55'E, 25 Apr. 1990; ♀ WA27/305, Wooroloo, 31°48'S 116°19'E, Mar. 1927.

Reared specimens deposited in Australian museums: ex female KS78304: ♂♀ to NTM, ♂ to QM S66577, ♂ to SAMA NN21924, ♂ to WAM T63010; ex female KS78313: ♂ to NMV K8898, ♀ to NMV K8899, ♂ to SAMA NN21925.

Diagnosis. **Females**. From other species groups: epigyne as long or longer than wide, widest at base (Fig. 182); prolateral cheliceral teeth usually LLs (i.e. missing one small tooth, Fig. 163); carapace profile relatively high (Fig. 162); well defined eye tubercle (Fig. 159); front femora with distinct broadening. From *P. noblei* and *P. grayi*: carapace dark (Fig. 159), broadly blunt tip to epigyne and (except Kimberley and Northern Territory specimens) almost total reduction of the posterior median plate distal to the base (Figs 182–185). **Males**. From other species groups by the male palp: the embolus arises prolaterally without a terminal apophysis (Figs 210, 218). From *P. noblei* and *P. grayi* by longer embolus without a terminal flange (Fig. 209); conductor tip angled strongly towards prolateral (Figs 209, 219). Length of embolus slightly shorter in Western Australian specimens. Males are unknown from the Kimberley and Northern Territory, but the embolus length may be reduced where females have a short epigyne.

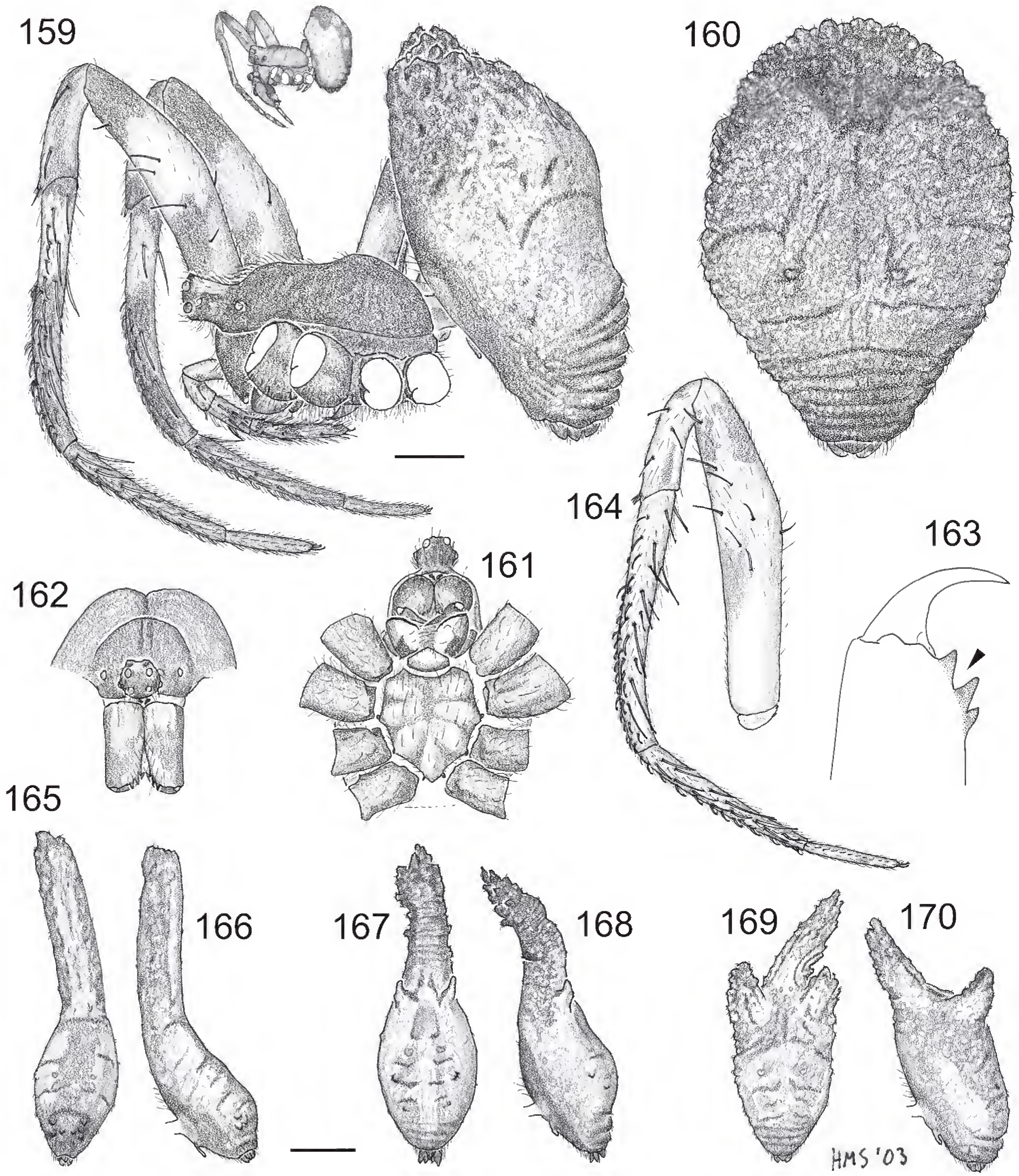
Description. **Female**. Carapace length range 2.82–4.49. *Drawn specimens* Figures: 32, KS78299; 159–161, KS78300 (male from Fig. 198); 162, 171, 174, 176–177, 182, 186, BMNH1890/2050 (holotype); 163, KS85050; 169–170, NN12173; 183, KS58050; 184–185, KS78310; 187–188, KS55745 (?*P. laciniosus*).

Holotype. *Prosoma*. Carapace: length, 3.80, width 2.82, height 1.18; relatively wide but tall (Figs 171, 162); eye tubercle well developed, slender basally, slightly elevated, with well developed dorsal protrusions above PME that point anteriorly (Figs 159, 174). Chelicerae: paturon with 3 promarginal teeth (Fig. 163). Labium: length 0.41, width 0.78. Sternum: (Fig. 161) length 1.59, width 1.55; sternal extensions at bases of legs III–IV. • *Eyes*. (Figs 162, 174). AME=PME>ALE=PLE; ALE <0.2× its own diameter from AME; ventral margin of ALE is just ventral of mid point of AME. • *Legs*. (Fig. 159). P+TL I: 5.92, II: 5.50, III: 3.00, IV: 4.00; front femora distinctly broadened with greatest diameter c. ⅗ way to apex in leg I, or ½ way, leg II. • *Abdomen*. (Figs 176–177, also see other shapes shown for the group in Figs 159–160, 165–170 and 178–181). Length 8.70, width 4.78; broadest at humeral tubercles; some "microsigillae" visible but not strongly developed. • *Epigyne*. Tongue-like, widest point at base; lip broad either side of tip (Fig. 182); foveae merged almost from base into single, deep opening (Figs 183, 186); lateral plates curve ventrally either side of slight ridge of reduced median plate, basally forming tubes that lead into copulatory ducts; ducts not examined in holotype but usually pass anterior to spermathecae then wrap around dorsally to enter dorsally or posteriorly (Fig. 32); ducts separated along whole width; spermathecae separated by at least a single spermatheca width. • *Colour in alcohol*. Carapace and most of caput olive-brown, anterior caput colour fades into yellow patch on dorsal eye tubercle. Chelicerae brown, paler basally and with orange on distal inner faces. Labium, maxillae and sternum orange-tan. Pedipalps yellow, mottled with brown distally. Femur I dark brown and orange with broad yellow band (dark areas with strong blue sheen on recent specimens); femur II similar but yellow band rather vague; femur III mottled to dark distally; femur IV dark to paler in distal third; distal legs mottled with yellow/orange and brown, distinct dark bands on distal metatarsi and tarsi of I and II. Abdomen generally dark grey ventrally except paler book lung covers; dorsally with grey, brown and black markings on a pale ground. Note in recent specimens the yellow/orange against black banding on the front femora can be striking and may be used to startle potential predators (Fig. 11). The dorsal carapace and caput are usually a rich dark brown against which the white hairs on the caput stand out strongly.

Male. Carapace length range 0.78–1.31. *Drawn specimens* Figures: 31, KS91165; 198–201, KS58060; 208–210, KS58051.milledg

Male KS58060. *Prosoma*. Carapace: length 0.86, width 0.69, height 0.31; a broad pear-shape in dorsal view (Fig. 200); height subequal at eye tubercle and fovea; eye tubercle well defined with distinct "v" between caput and eye tubercle in lateral view (Fig. 198), less well defined in dorsal view; with strongly developed dorsal protrusions above PME, pointed anteriorly (Figs 198, 200–201). Labium: length 0.08, width 0.18. Sternum: length 0.40, width 0.44. • *Eyes*. (Figs 198, 201) AME≥PME>ALE≥PLE; ALE almost touching AME; ventral margin of ALE is ventral to mid point of AME. • *Legs*. (Fig. 198) P+TL I: 1.08, II: 1.00, III: 0.55, IV: 0.69. • *Abdomen*. (Figs 198–199, also see 202). Length 1.25, width 0.98; ellipsoid, broadest at ⅔ height. • *Palpal organ*. Radix–stipes joint almost basal, stipes wraps margin of retrobasal subtegulum, not hidden by cymbium (Figs 209–210, 218); no TA; distal embolus wire-like, long, grooved and strongly arcing over apex of palp, roughly parallel to edge of cymbium, ending in a small barb (Figs 209, 218); PM a sculptured curving structure looking like a clenched fist, extending ventrally almost to edge of tegulum, heavily sclerotized (Figs 209, 219). • *Colour in alcohol*. Lateral carapace pale olive, caput darker olive, both with black median markings; eye tubercle orange, with brown points to protrusions dorsal to PME; dark brown round AME. Chelicerae, labium, maxillae and sternum olive. Sternum with fuscous edges and median streak. Femora pale olive, darkening distally; distal legs mottled fuscous turning into dark banding on distal metatarsi and tarsi. Palpal cymbium olive brown with darker patches, tibia fuscous, patella fuscous dorsally, femur and ventral patella creamy-white. Abdominal book lung covers and posterior to epigastric fold pale, surrounding ventral areas olive darkening to black at spinnerets; dorsally with olive–brown and black pattern on a pale ground.

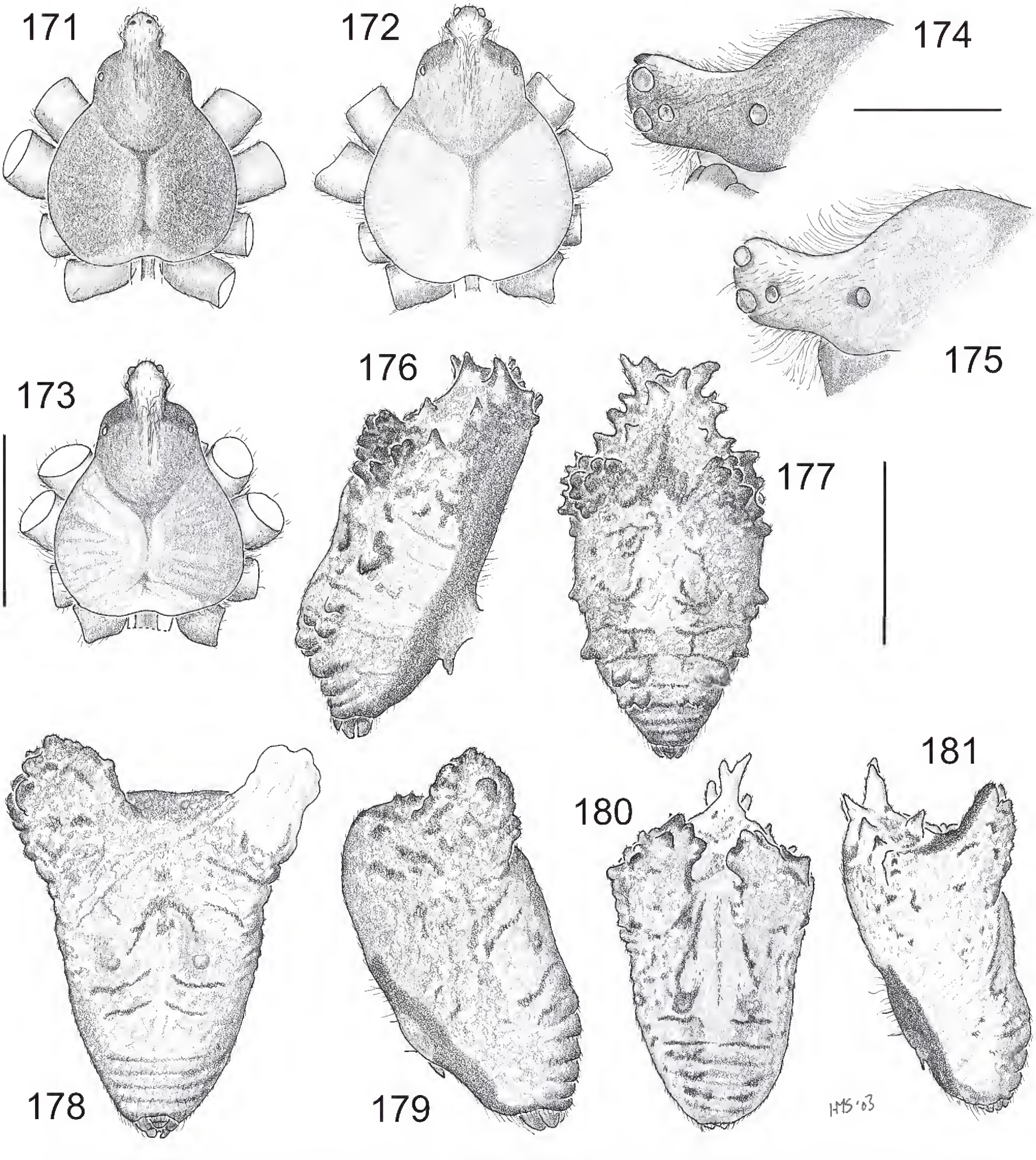
Variation. There is considerable variation in epigyne size and shape of *P. laciniosus* females. Specimens from all parts of Australia and representing all extremes of epigyne shape were included in the COI DNA analysis. Although this showed some minor variations in sequences, no consistent differences were found. The partial reduction of the posterior median plate and the unusually short length of the epigynes of the two specimens from the Northern Territory and the Kimberley (Figs 187–188) are unique characters amongst the *P. laciniosus* specimens examined. Before the results for the DNA sequence were obtained these two specimens had been assumed to be of a different species, but the sequences indicate that all the tested specimens are conspecific. It is possible that contamination has occurred (unlikely as sequencing was repeated from the original extract) or that the one short sequence examined is not useful in this case. The status of these specimens should be re-examined when males are available from the area or if further



Figs 159–170. *Poltys laciniosus*-group, female characters. 159–163, *P. laciniosus*: 159, general lateral view with male at same scale; 160, abdomen, dorsal; 161, prosoma and coxae, ventral; 162, carapace and chelicerae, frontal (holotype); 163, left chelicera and fang, prolateral. 164, *P. grayi*, leg I, prolateral. 165–170, examples of variation in abdominal shape seen in all species, dorsal and lateral (also see holotypes, Figs 176–181), (165–166, *P. noblei*; 167–168, *P. grayi*; 169–170, *P. laciniosus*). Scale lines: upper 1 mm for Figs 159–162, 164; 0.25 mm for Fig. 163; lower line 2 mm for Figs 165–170.

DNA studies are carried out.

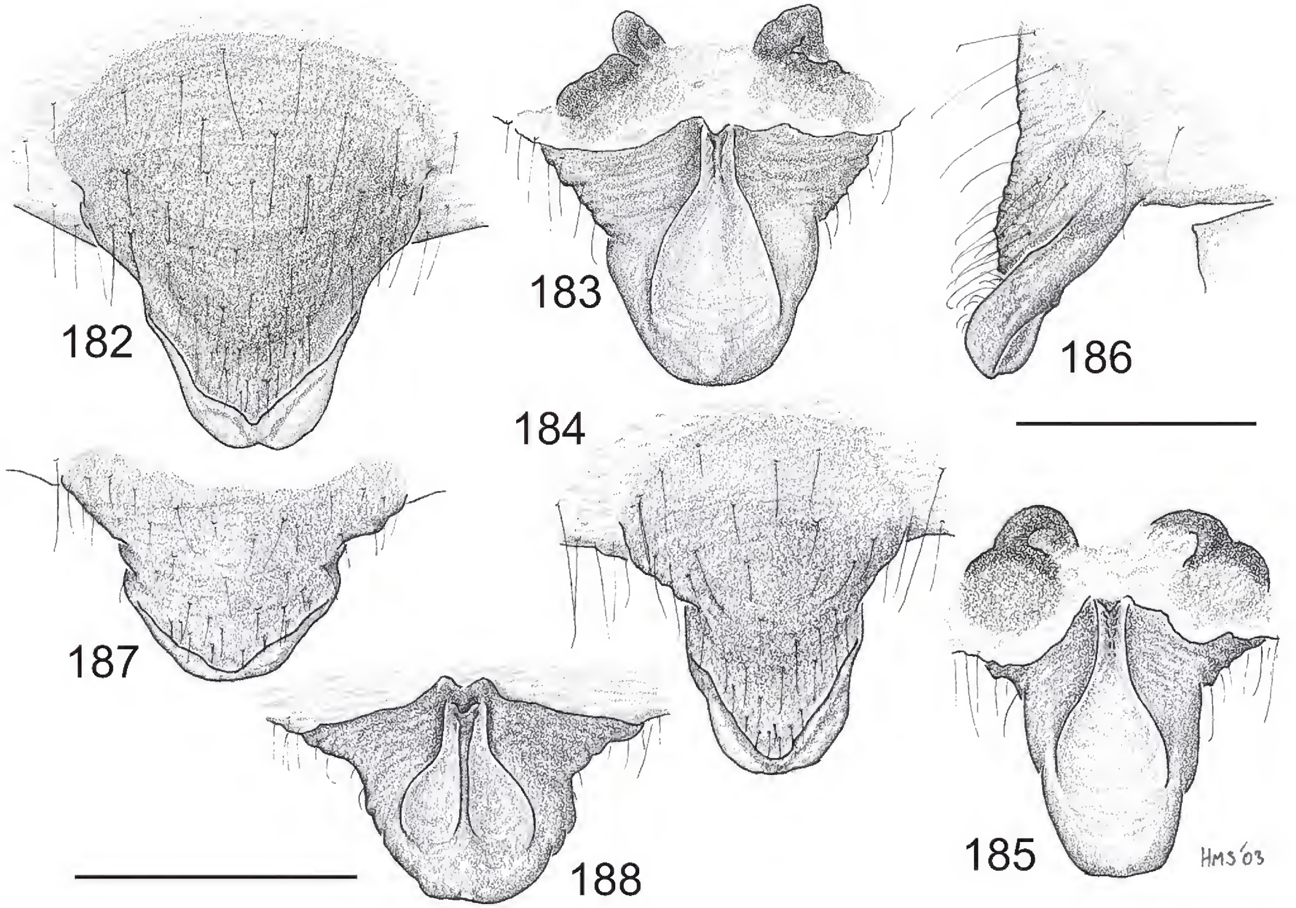
As with other *Poltys* species, all morphological features are quite variable in shape and colouration, especially the abdomen. Some examples (taken from different species but representative of all within the group) are shown in Figs 5–8, 165–170 and 176–181. Male abdomens show only slight variation, some being more rounded (Fig. 199) and others tending towards taller and narrower (example from *P. noblei*, Fig. 202). There is considerable variation in male carapace shape and relative eye sizes (as illustrated in *P. grayi*, Figs 203–206). The protrusions dorsal to the PME (Figs 200–201) are variable but usually prominent in *P. laciniosus*.



Figs 171–181. *Poltys laciniosus*-group females. 171–173, carapace and coxae, dorsal: 171, *P. laciniosus* (holotype), 172, *P. grayi*, 173, *P. noblei*. 174–175, eye region, lateral, of specimens shown in 171–172. 176–181, abdomens of holotypes, dorsal and lateral: 176–177, *P. laciniosus*; 178–179, *P. grayi* (right humeral tubercle damaged); 180–181, *P. noblei*. Scale lines: lower right, 3 mm for Figs 176–181; upper right, 2 mm for Figs 171–172, 1 mm for Figs 174–175; left, 2 mm for Fig. 173.

Biology. *Poltys laciniosus* construct a fine orb web between dead twigs at night (Fig. 10), which is typically about 25cm in diameter for an adult female; the hub may be left entire or bitten out to varying degrees. The web is taken down towards dawn and the spiders mimic part of a dead twig during the day. Egg sacs are grey/brown silk with a sparse overlay of white, sometimes finished off with a light bobble of silk. These are made along the underside of a twig, commonly where there is some other bump or a fork to disguise the shape (2 egg sacs are on the left of Fig. 10—arrowed). Females of this species and *P. noblei* have been collected together from mud wasp nests in southeastern Queensland (S42608–09), but *P. laciniosus* mostly seems to occur in less humid areas.

Distribution. Probably present over much of mainland Australia where tree or scrub cover is reasonably extensive. Away from centres of population, the distribution shown



Figs 182–188. *Poltys laciniosus* epigynes. 182–185, normal range of variation, anterior then posterior view. 186, lateral (182, 186, holotype). 187–188, *P. laciniosus*? ex Kimberley region. Scale lines = 0.5 mm, lower left for Figs 187–188 only.

(Fig. 217) mostly represents collecting trips made by museum arachnologists. Not recorded on trips through the drier interior of Australia (Broken Hill, Coober Pedy, Uluru etc.) and uncommon on the east coast where *P. noblei* is dominant.

Poltys grayi n.sp.

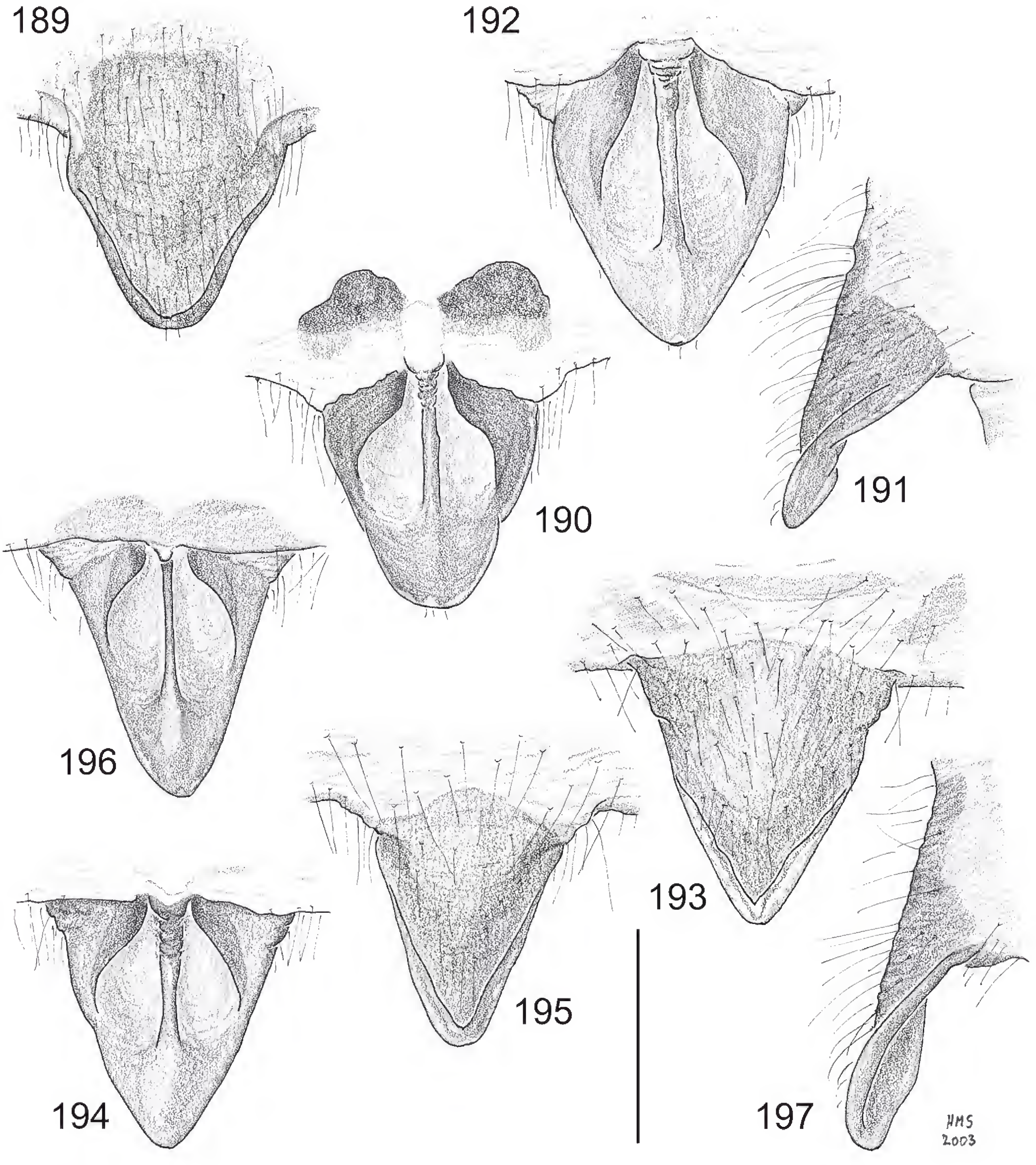
Figs 5–6, 15, 164, 167–168, 172, 175, 178–179, 189–192, 203–207, 211–213, 217, 222.

Etymology. This species is named in honour of Dr Mike Gray, who first collected this species.

Type material. AUSTRALIA: NEW SOUTH WALES: LORD HOWE ISLAND: HOLOTYPE ♀ KS71139, between War Memorial and Lord Howe Island Board, 31°31'53"S 159°04'02"E, 15 Dec. 2000, HMS, in web feeding on one moth, second wrapped at side of web, night. PARATYPES ♂ KS71127, track to start of Gower Walk, 31°33'54"S 159°04'29"E, 10 Dec. 2000, HMS, night coll.; ♂ KS71130, jnct of tracks on Smoking Tree Ridge, 31°33'20"S 159°05'09"E, 3 Dec. 2000, HMS & C. Reid, beating dead twigs; ♀ KS70616, track to start of Mt Gower walk, S end Salmon Beach, 31°33'50"S 159°04'30"E, 1 Mar. 2001, G. Milledge, night coll.; ♂♀ KS70351, Middle Beach Rd–Anderson Rd track, 31°31'36"S 159°04'08"E, 8 Dec. 2000, HMS, ♂ on edge of ♀ web, night coll; ♂♀ KS70352, start of Transit Hill track opp. Board yard, 31°31'48"S 159°04'05"E, 6 Dec. 2000, HMS, at night, courting.

Other material. AUSTRALIA: NEW SOUTH WALES: LORD HOWE ISLAND: ♂ KS71140, ♀♀ KS71136, KS71138, KS70347, Bowker Ave, 31°31'47"S 159°04'08"E, 9 & 14 Dec. 2000; ♀ KS70344, Capella South, 31°33'13"S 159°04'50"E, 11 Dec. 2000; ♂ KS71132, Gower–Lidgbird Ridge, 31°34'49"S 159°04'58"E, 12 Dec. 2000; ♂ KS71134, ♀ KS90967, start of Gower walk, 31°33'54"S 159°04'29"E, 10 Dec. 2000; ♀♀ KS71137, KS70340, KS70343, KS90953, KS90955, KS90968, sites along Lagoon Rd, 31°31'S 159°04'E, 6–15 Dec. 2000 (KS90968 and KS90953 laid eggsacs "A" and "B" in Smith 2003, respectively); ♂ KS71131, opposite LHI Board office, 31°31'49"S 159°04'05"E, 4 Dec. 2000; ♂♂ KS71126, KS71133, Max Nichols Memorial Boardwalk, 31°31'3"S 159°03'35"E, 11 Dec. 2000; ♂♀ KS70350, Middle Beach Rd, 31°31'40"S 159°04'07"E, 24 Nov. 2000; ♀ KS70341, Middle Beach Rd–Anderson Rd track, 31°31'36"S 159°04'08"E, 8 Dec. 2000; ♀ KS90954, Palm Nursery, 31°31'S 159°03'E, Feb. 2001; ♂ KS33924, trail on N face of North Hummock, 31°32'48"S 159°04'54"E, 6 Feb. 1971; ♀♀ KS70348 (2), KS71135, Research Centre, 31°31'37"S 159°03'58"E, 24 Nov. 2000; ♀ KS70342, ♂ KS71129, Smoking Tree Ridge, 31°33'17"S 159°05'09"E, 3 & 10 Dec. 2000; ♀♀ KS70346, KS70349, KS70345, Steven's Reserve, 31°31'34"S 159°03'49"E, 5 & 15 Dec. 2000; ♂♂ KS71128, KS71141, Transit Hill, 31°32'09"S 159°04'43"E, 8 Dec. 2000; ♀ KS71142, Windy Point, 31°32'05"S 159°04'08"E, 14 Dec. 2000.

Diagnosis. Use *P. laciniosus*-group diagnosis to separate specimens from other species groups. **Females**. From *P. laciniosus* by long V-shaped epigyne with distinctly separate foveae (Fig. 190), and pale carapace without projections above PME (Figs 172, 175). From *P. noblei* by epigyne margins parallel at base before converging and tip usually more rounded (Figs 190, 192). **Males**. Conductor not as strongly twisted as *P. laciniosus* (Fig. 212); embolus shorter than *P. laciniosus* but terminal flange absent or small cf. *P. noblei* (Figs 212, 222).



Figs 189–197. *Poltys laciniosus*-group epigynes. 189–192, *P. grayi*: 189–191, holotype: anterior, posterior and lateral; 192, variant, posterior. 193–197, *P. noblei*: 193–194, broad example, anterior and posterior; 195–197, narrow example, anterior, posterior and lateral. Scale line = 0.5 mm.

Description. **Female**. Carapace length range 3.27–4.29. *Drawn specimens* Figures: 164, 172, 175, KS70346; 167–168, KS71138; 178–179, 189–191, KS71139 (holotype). 192, KS70341. General characters see *P. laciniosus*.

Holotype. *Prosoma*. Carapace: length, 3.92, width 3.06, height 1.14; relatively wide but tall; eye tubercle well developed, slender basally, slightly enlarged anteriorly, slightly elevated (Figs 172, 175). Chelicerae: paturon with 3 promarginal teeth. Labium: length 0.45, width 0.75. Sternum: length 1.71, width 1.63; well formed sternal extensions at bases of legs III–IV, also a slight point at II. • *Eyes*. (Fig. 175). PME≥AME>ALE=PLE; ALE c. 0.3× its own diameter from AME; ventral margin of ALE is just ventral of mid point of AME. • *Legs*. (Fig. 164). P+TL I: 5.67, II: 5.42, III: 3.25, IV: 4.08; front femora distinctly broadened with greatest diameter c. ⅗ way to apex leg I, or

½ way leg II. • *Abdomen*. (Figs 5, 178–179). Length 7.58 (not including humeral tubercles), width 7.08; broadest at humeral tubercles; some "microsigillae" visible but not strongly developed. • *Epigyne*. Tongue-like, widest point at base, sides more or less parallel before converging to a bluntly rounded tip (Fig. 189); distal median bulge variable, but usually distinct (Fig. 191); foveae separated by a strong median ridge, foveae broader basally than *P. noblei* (usually visible through lateral plates) in posterior view (Figs 190, 192); lateral plates curve ventrally either side of basal median plate, forming tubes into the copulatory ducts; ducts pass anteromedially between spermathecae then turn outwards to enter dorsomedially; ducts broadly separated along whole width; spermathecae separated by about 1.5× a spermatheca width. • *Colour in alcohol*. Carapace pale creamy-yellow, caput fuscous laterally and with darker patches anteriorly, yellow patch on dorsal caput and eye tubercle, dark brown around main eyes. Chelicerae brown, orange on cheliceral boss and distal inner faces. Labium, maxillae and sternum orange-tan. Pedipalps creamy-yellow, sparsely mottled with brown. Femora I and II pale basally then with two brown bands almost surrounding yellow band (Fig. 164); femur III pale mottled to darker distally; femur IV dark to paler in distal third; distal legs mottled with yellow and brown, distinct dark bands on distal metatarsi and tarsi of I and II. Abdomen ventrally dark grey around pedicel and posteriorly to spinnerets except paler book lung covers, laterally and anteriorly with band of cream; dorsally overall white, with black and grey markings.

Male. Carapace length range 0.90–1.22. *Drawn specimens* Figures: 203–204, 207, KS71134; 205–206, KS71140. 211–213, KS71127. General characters see *P. laciniosus*.

Male KS71127. *Prosoma*. (Figs 205–206). Carapace: length 1.00, width 0.78, height 0.37; eye tubercle well defined with distinct dip between caput and eye tubercle in lateral view. Labium: length 0.11, width 0.19. Sternum: length 0.45, width 0.46. • *Eyes*. (Figs 205). AME>PME>PLE>ALE; ALE almost touching AME; height of ventral margin of ALE is at mid point of AME. • *Legs*. P+TL I: 1.22, II: 1.12, III: 0.61, IV: 0.78. • *Abdomen*. Length 1.31, width 0.88; a tall ellipsoid, rounded apex, widest at mid-height; main two pairs of apodemes well developed for a male. • *Palpal organ*. (Figs 211–213, 222). Radix–stipes joint retrobasal, obscures margin of retrobasal subtegulum, sclerites not hidden by cymbium (Figs 212, 213); no TA; distal embolus wire-like, grooved and curving towards tip of MA, ending in a small barb (Figs 212, 222); PM a sculptured curving structure looking like a clenched fist, extending ventrally almost to edge of tegulum, heavily sclerotized; conductor thumb-like, with only slight angle towards prolateral (Figs 211–212). • *Colour in alcohol*. Lateral carapace light olive, caput darker, both with black median markings and fuscous margin; eye tubercle orange; dark brown round AME. Chelicerae, labium and maxillae olive: chelicerae, paler basally and distally. Sternum yellow-brown with fuscous edges. Femora fuscous olive-black, pale basally; femur III with darker partial banding; patella to upper metatarsus of all legs dark orange-olive dorsally, darker or blackened ventrally, dark banding on distal metatarsi and tarsi. Palpal cymbium and tibia dark olive, cymbium black distally, patella and femur creamy-white marked with black. Abdominal book lung covers pale, darker towards spinnerets; surrounding ventral areas black with orange maculation in area anterior to pedicel; dorsum with vague olive-brown and black pattern on a lighter ground.

Remarks. The only previous records of a *Poltys* species from Lord Howe Island were by Rainbow (1920) who described *Poltys penicillatus* and Gray (1974) who collected a male and ascribed it to Rainbow's species. Rainbow's description was based on a female specimen collected by A.M. Lea on an expedition to Lord Howe and Norfolk Islands. This specimen actually represents *P. illepidus*, which is recorded from Norfolk Island, but has not since been found on Lord Howe. Gray's male specimen is the first record of the new species described here.

Variation. Whilst some female specimens of *P. grayi* are similarly coloured to typical *P. noblei*, many are almost totally lacking carapace pigmentation and also have extremely pale abdominal camouflage and reduced dark areas on legs (Fig. 164). The variation in somatic characters is similar to other species in the group. The epigyne varies in shape, especially the acuteness of the point (Figs 190, 192). The flange on the tip of the male embolus is also variable and in some specimens is large enough to reflect light in the same way as *P. noblei*.

Biology. The biology of *P. grayi* is similar to that of *P. laciniosus* and *P. noblei*, the spider making a fine web at night and mimicking part of a dead twig during the day (Figs 5 (holotype), 6). Egg sacs are of white silk with an overlay of brown, usually finished off with a dark brown bobble of silk (Fig. 15), and are laid along the underside of a twig as in *P. laciniosus*.

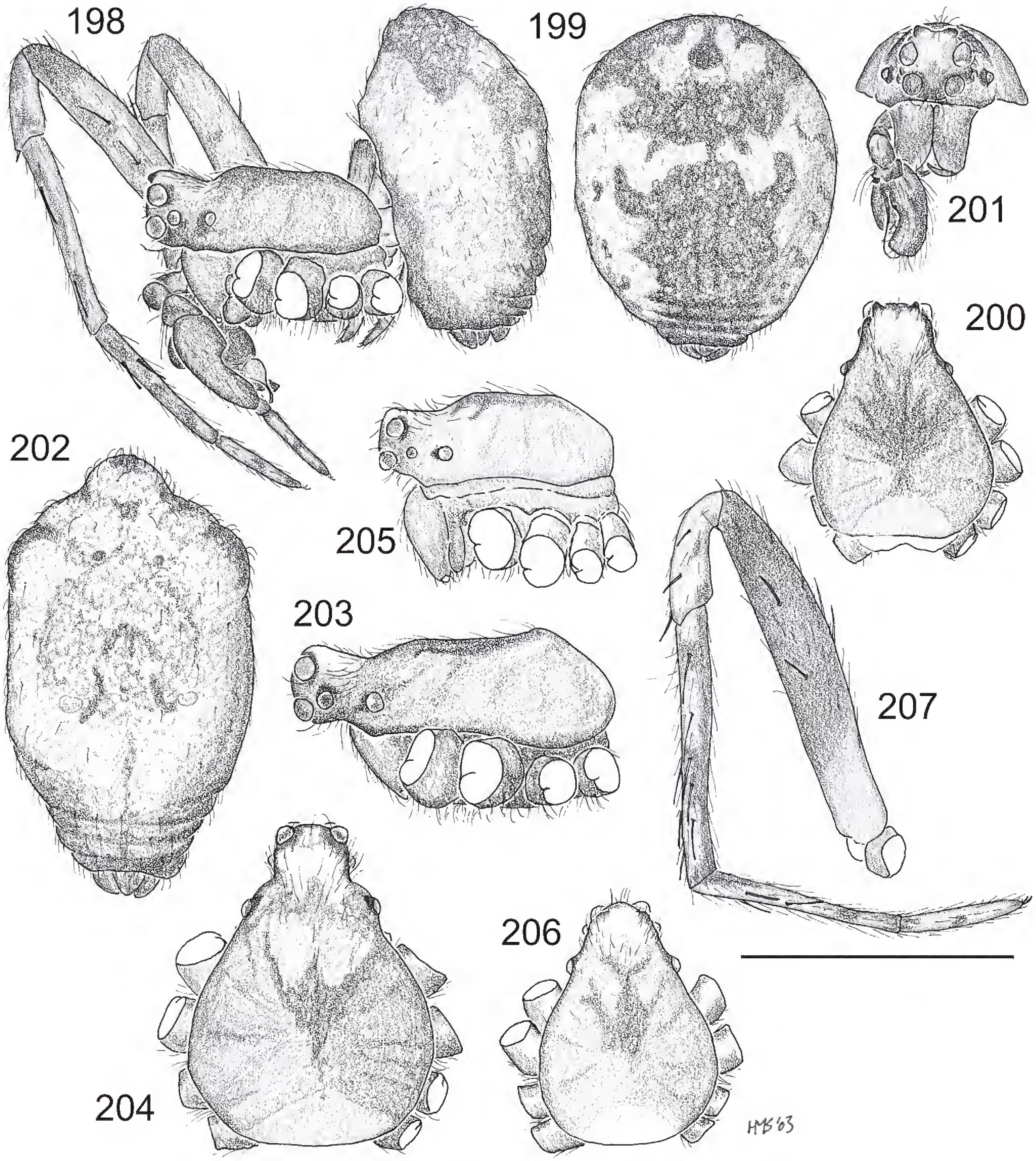
Distribution. Only recorded from Lord Howe Island in the Tasman Sea (Fig. 217).

Poltys noblei n.sp.

Figs 7–8, 165–166, 173, 180–181,
193–197, 202, 214–217, 220–221.

Etymology. This species is named in honour of John Noble, who has collected many specimens for the Australian Museum collections, including *Poltys*.

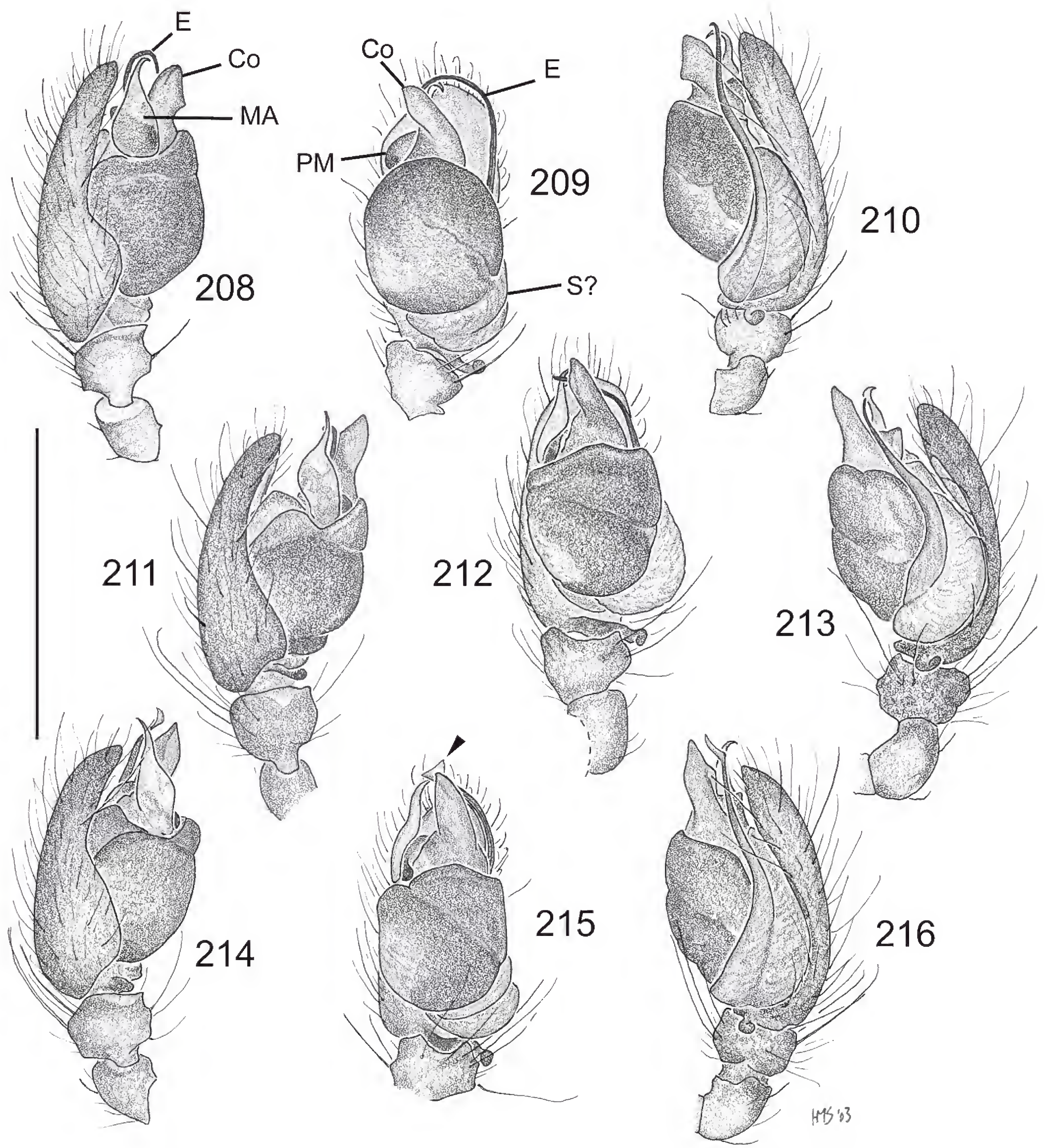
Type material. Australia: New South Wales: Holotype ♀ KS34412, Beecroft, Sydney, 33°45'S 151°04'E, 3 Aug. 1992, J. Noble. Paratypes ♂ KS52216, Beecroft, Sydney, 33°45'S 151°04'E, Mar. 1998, J. Noble, matured late May 1998; ♀ (and non-type juveniles) KS33957, ♂ (and non-type juveniles) KS72255, Broken Bay, 33°34'S 151°19'E, 10 Apr. 1966, Mascord Collection; ♂ KS55718, King's H'way, 12 km W Batemans Bay, 700 m N along rd to Shallow Crossing, Tourist drive 3, 35°37'S 150°08'E, 30 Mar. 1999, HMS, beating dead *Acacia decurrens*?, as juvenile, matured 28 Apr. 1999; ♂ KS54368, Ku-ring-gai Chase NP, Powerline Track, 33°40'21"S 151°08'09"E, 4 Jan. 1999, MRG & HMS, hanging on silk line from dead twig; ♀ KS55708, as KS54368, 29 Dec. 1998, MRG, at night in webs on living prickly *Hakea*; ♂ NMV K-8895, Long Beach Rd, 1.4 km off Princes H'way on sidetrack to NE, 35°41'S 150°14'E, 30 Mar. 1999, HMS, beating dead *Acacia decurrens*?, as juvenile, matured 28 Apr. 99; ♀ KS55685, Mystery Bay, Council bushland near beach, 36°18'S 150°07'E, 12 Jan. 1999, HMS, at night in dead twigs, laid eggsac, 15 Jan. 99; ♀ KS53844, Royal National Park, Lady Carrington Drive, 34°08'50"S 151°01'45"E, 15 Oct. 1998, HMS, twigs at night; ♂ KS70368, Royal National Park, Sir Bertram Stevens Drive, c. 0.3 km E Artillery Hill, 34°04'59"S 151°03'20"E, 20 Dec. 1999, HMS, ex dead twigs, beating. Queensland: ♂ KS58062, Forty Mile Scrub NP, 18°07'56"S 144°48'40"E, 12 May 2000, M&S, beating; ♀ (and non-type juvenile) KS313, Mt Dryander (lower slopes) N of Proserpine, 20°15'S 148°32'E, Apr. 1975, MRG & C. Horseman, 120 m; ♀ S42496, Fig Tree Pocket, Roedean St, 27°31'S 152°57'E, 14



Figs 198–207. *Poltys laciniosus*-group males. 198–201, *P. laciniosus*: 198, general lateral view; 199, abdomen, dorsal (rounded variant); 200, carapace and coxae, dorsal; 201, frontal carapace, right palpal organ and chelicerae. 202–207, extent of variation throughout species group: 202, abdomen dorsal, elongate variant (*P. noblei*); 203–204, 207, large specimen: 203, prosoma lateral; 204, dorsal; 207, spination prolateral leg I; 205–206, small specimen: 205, prosoma lateral; 206, dorsal (203–207 all *P. grayi*). Scale line = 1.0 mm.

Dec. 1974, V.E. Davies; ♂ S42547, Upper Brookfield, SEQ, 27°28'S 152°51'E, 17 Jun. 1981, V.E. Davies, R.J. Raven. VICTORIA: ♀ NMV K-8896, Ninety Mile Beach, half way between Seaspray and Paradise Beach, 38°20'S 147°20'E, 10 Jan. 1999, HMS, in web at night on dead *Banksia*.

Selected other material examined. AUSTRALIA: NEW SOUTH WALES: ♂ KS55714, Ashfield, 33°53'S 151°08'E, 4 Feb. 1999; ♀ KS33920, Avalon, 33°38'S 151°20'E, 8 Dec. 1957; ♂ KS72254, ♀ KS78144, Beecroft, Sydney, 33°45'S 151°04'E, 8 Apr. 2001 & 14 Apr. 2002; ♀ KS56886, Bodalla SF, 1.5 km S of Bodalla on Princes H'way, 36°06'50"S 150°03'28"E, 18 Feb. 1999; ♀ KS10162, Bonny Hills, 31°36'S 152°51'E, 9 Dec. 1981; ♂ KS70369, Cordeaux Dam Rd, 34°18'S 150°49'E, 26 Oct. 2000; ♀ KS56887, Dampier SF, 36°07'S 149°57'E, 19 Feb. 1999; ♂ KS57786, Heathcote NP, jnct Woronora Dam Rd and Old Prince's Hwy, 34°09'30"S 150°58'10"E, 8 Dec. 1999; ♂♀ KS52215, Mt Warning camp site, Wallaby Track, 28°24'S 153°16'E, 17 May 1998; ♂ KS56885, Murramarang NP, North Head Rd, 35°41'52"S 150°16'37"E, 17 Mar. 1999; ♀ KS69653, Nadgee hut area, 37°22'S 149°55'E, 1973. QUEENSLAND: ♂ KS86249, ♀ KS86250, SW of Malanda, Merragallan



Figs 208–216. *Poltys laciniosus*-group male palps. 208–210, *P. laciniosus*: prolateral, ventral, retrolateral; 211–213, same for *P. grayi*; 214–216, same for *P. noblei*. Scale line = 0.5 mm.

Rd, 17°25'08"S 145°32'37"E, 22 Sep. 2003; ♀ S42552, Black Mountain, NEQ, 1972; ♀ S42494, Brisbane, 27°28'S 153°01'E, 10 Apr. 1974; ♀♀ S42609 (3), Camira, 27°38'S 152°55'E, 7 Dec. 1985; ♀ S42553, Cooloola, 25°27'S 153°05'E, 7 Nov. 1976; ♀ S42497, Closeburn, 27°20'S 152°52'E, 20 Dec. 1970; ♀ S42597, Double Is Pt, 25°55'S 153°11'E, 4 Aug. 1985; ♀ S42499, Godwins Beach, Deception Bay, 27°11'S 153°01'E, 19 Jan. 1979; ♀ S42592, Mailaybrook, 26°51'S 151°34'E, 7 Mar. 1976; ♀ S42495, Mt Cootha, 27°29'S 152°57'E, 1 Jan. 1974; ♀ S55610, N Stradbroke Island Enterprise, 27°37'S 153°26'E, 10 Jan. 2002; ♀ W165 (QM), Red Hill, Gympie, 26°11'S 152°39'E, 4 Jun. 1925.

Diagnosis. Use *P. laciniosus* diagnosis to separate from other species groups. **Females**. From *P. laciniosus* by long V-shaped epigyne with distinctly separate foveae (Figs 193–196), and rather paler carapace. From *P. grayi* by epigyne margins that converge from base in almost straight line, tip often acutely pointed (Figs 194, 195). **Males**. Embolus with large terminal flange (difficult to see directly, but reflects light strongly) (Figs 215, 220), conductor almost straight (Fig. 215).

Description. Female. Carapace length range 2.78–4.45. *Drawn specimens* Figures: 165–166, S42495; 173, KS78144; 180–181, KS34412 (holotype); 193–194, KS55685; 195–197, KS313. General characters see *P. laciniosus*.

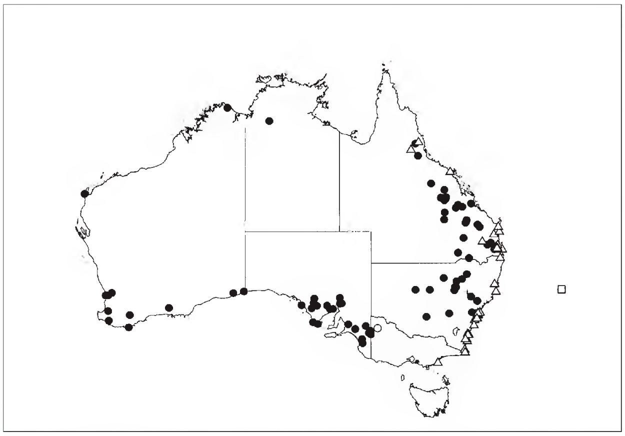


Fig. 217. Distribution of *Poltys laciniosus*-group species: *Poltys laciniosus* (adult records, ●; juvenile, ○); *Poltys grayi* (□); *Poltys noblei* (△).

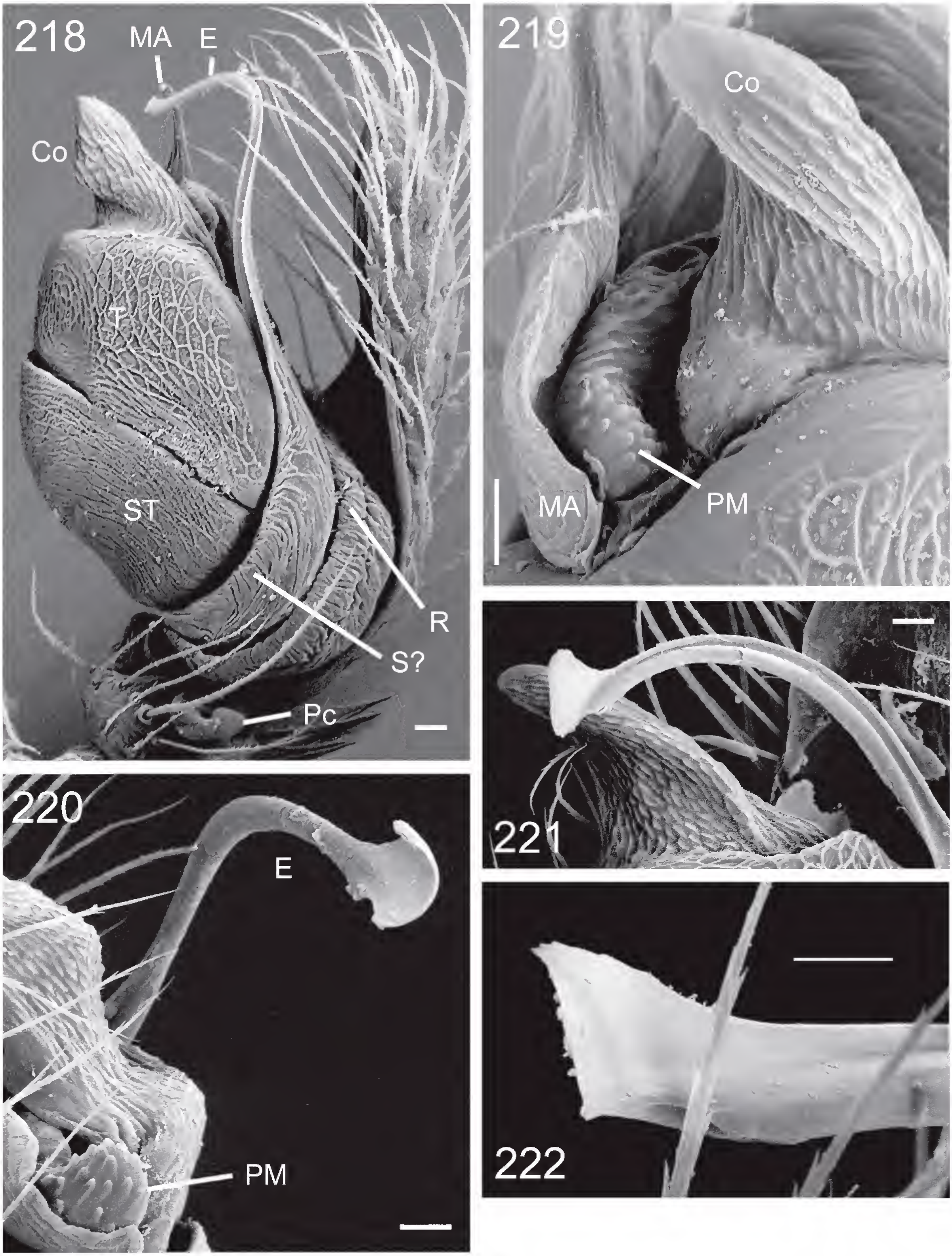
Holotype. *Prosoma*. Carapace (Fig. 173), length, 3.67, width 2.94, height 1.14; relatively wide but tall; eye tubercle well developed, slender basally, slightly enlarged anteriorly, slightly elevated; dorsal protrusions above PME moderately well developed. Chelicerae: paturon with 3 promarginal teeth. Labium: length 0.41, width 0.71. Sternum: length 1.63, width 1.55; sternal extensions at bases of legs II–IV. • *Eyes*. AME≥PME>PLE>ALE; ALE c. 0.3× its own diameter from AME; ventral margin of ALE is just ventral to mid point of AME. • *Legs*. P+TL I: 5.75, II: 5.42, III: 3.17, IV: 4.08; front femora distinctly broadened with greatest diameter c. ⅗ way to apex leg I, or ½ way leg II. • *Abdomen*. (Figs 180–181). Length 8.33, width 4.75; broadest at humeral tubercles; some "microsigillae" visible but not strongly developed. • *Epigyne*. A triangular plate, widest point at base, sides converge from base to a more or less pointed tip (Figs 193, 195); with a prominent distal bulge in lateral view (Fig. 197; basally epigyne often deeper than shown); foveae narrower than those of *P. grayi* basally, separated by a strong median ridge of variable height (Figs 194, 196); lateral plates curve either side of basal median plate, forming tubes into the copulatory ducts; ducts of holotype not examined but usually pass anteromedially between spermathecae then turn outwards to enter basomedially; ducts separate, but closer together than *P. grayi* until they turn laterally; spermathecae separated by about two spermatheca widths. • *Colour in alcohol*. Carapace amber, caput darker, with yet darker patches anteriorly; yellow patch on dorsal caput deepens to orange on eye tubercle; protrusions dorsal to PME tipped brown; dark brown ventral to main eyes. Chelicerae brown, orange on cheliceral boss and distally. Labium, and maxillae orange-tan. Sternum brown. Pedipalps yellow, sparsely mottled with brown. Femur I mostly dark brown from base except for yellow band; femur II colouration less distinct; femur III pale, distally dark retrolaterally; femur IV dark to paler in distal third; distal legs mottled with yellow and brown, distinct dark bands on distal metatarsi and tarsi of I and II. Abdomen ventrally black around pedicel and posteriorly to spinnerets except paler book lung covers, and a rectangular patch anterior to pedicel, laterally and anteriorly creamy-white; dorsally with a cream point and extending down the median line (like the centre of a broken twig), surrounded by black and grey markings on a greyish background.

Male. Carapace length range 0.84–1.20. *Drawn specimens* Figures: 202, KS72254; 214–216, KS52216. General characters see *P. laciniosus*.

Male KS52216. *Prosoma*. Carapace: length 1.12, width 0.80, height 0.41; eye tubercle well defined with distinct "v" between caput and eye tubercle in lateral view; with well-developed dorsal protrusions above PME. Labium: length 0.10, width 0.20. Sternum: length 0.50, width 0.48. • *Eyes*. AME=PME>ALE=PLE; ALE about ⅙ its own diameter from AME; height of ventral margin of ALE is at mid point of AME. • *Legs*. P+TL I: 1.57, II: 1.25, III: 0.69, IV: 0.90. • *Abdomen*. (Fig. 202). Length 1.57, width 0.96; a tall ellipsoid, slightly pointed at apex and with slight humeral bumps; widest at humeral bumps. • *Palpal organ*. (Figs 214–216, 220–221). Radix–stipes joint almost basal, stipes wraps margin of retrobasal subtegulum, not hidden by cymbium (Figs 215–216); no TA; distal embolus wire-like but thicker than *P. laciniosus*, grooved and gently arcing towards tip of MA, flaring into a curved apical flange at tip (arrowed in Fig. 215, Figs 220–221); conductor thumb-like, almost straight; PM a sculptured curving structure looking like a clenched fist, extending ventrally almost to edge of tegulum, heavily sclerotized (Figs 215, 220). • *Colour in alcohol*. Lateral carapace pale olive, caput darker olive, both with black median markings and fuscous margin; eye tubercle orange, with brown points to protrusions dorsal to PME; dark brown round AME. Chelicerae, labium, maxillae and sternum olive: chelicerae, paler basally and distally, sternum with fuscous edges. Femora pale olive, darkening distally; femur I with pale yellow band as seen on females; femur III with darker partial banding; patella to upper metatarsus of all legs pale olive dorsally, blackened ventrally, dark banding on distal metatarsi and tarsi. Palpal cymbium olive-brown with darker patches; tibia fuscous, patella fuscous dorsally, femur and ventral patella mostly creamy-white. Abdominal book lung covers and posterior to epigastric fold pale, two white patches anterior to spinnerets; surrounding ventral areas black changing to brown apically; dorsum with vague olive–brown and black pattern on a white ground.

Variation. As in *P. laciniosus*, a wide range of female abdominal shapes has been recorded for *P. noblei* (see Smith, 2003). The variation in the analysed section of COI, however, was found to be small over the entire N–S range of the species and apparently is not related to abdominal shape. The development of the dorsal protrusions above the PME is variable but usually less pronounced than in *P. laciniosus*. Some epigynes approach a shape more typical of *P. grayi*, but the foveae still narrow more sharply into the copulatory ducts (often visible through the lateral plates in posterior view).

Biology. Like *P. laciniosus*, these spiders build a fine web at night and mimic part of a dead twig during the day (Figs 7–8). In an adult female web, the sticky spiral area measures up to approximately 25 cm in diameter; and is often taller than wide due to increasing spiral spacing, especially in the upper section. Egg sacs are of fawn to grey silk with an overlay of brown, and are usually finished off with a dark brown silk bobble, and are laid along the underside of a twig as in *P. laciniosus*. Moths are the main prey caught except possibly by spiderlings, but many other types of non-dangerous prey are also taken, e.g., lacewings (Neuroptera) and termites. Several southeastern Queensland records are of specimens found in mud wasp nests (some identified as



Figs 218–222. *Poltys laciniosus*-group male palpal characters. 218–219, *P. laciniosus*: 218, bulbus, retrolateral; 219, detail of terminal bulbus, ventral. 220–221: *P. noblei*, embolus and terminal flange, prolateral and ventral views. 222, *P. grayi*, embolus tip, ventral. Scale lines = 20 µm.

belonging to *Sceliphron laetum*). In two specimen lots from a locality in southeastern Queensland, there were specimens of both *P. noblei* and *P. laciniosus*, presumably taken from the same wasp nest. This species appears to prefer more humid areas than *P. laciniosus*.

Distribution. Locally abundant along the East coast of Australia, from southern Victoria northwards (Fig. 217). In far northern Queensland, it is displaced to moist habitats at higher altitude (and *P. frenchi* takes its place in lowland rainforest areas).

Australasian species currently considered *nomina dubia*

Poltys moluccum (Doleschall, 1859:45, fig. 1). Indonesia: Amboina. The type specimen could not be found in unsorted material in RMNH, the most likely repository. This species was synonymized with *P. illepidus* by Simon (1885) but the illustration and mention of an elongate web suggest it is not that species. If the type is found the name may prove to be a senior synonym of *P. frenchi*, but the fauna of this area is insufficiently known to assert this with any certainty at present.

Poltys dromedarius (Bradley, 1876b:249, fig. 2). New Guinea: Hall Sound (Chevert Expedition). Most Chevert Expedition material is in the MMUS, but the type could not be located there.

Poltys papuensis (Bradley, 1876a:223, fig. 2). New Guinea: Hall Sound (Chevert Expedition). As above, this type should be in the MMUS, but could not be located there. Bradley's figure of this species shows an elongate epigyne, so if found this type could prove to be a senior synonym of *P. frenchi*. The *Poltys* fauna of New Guinea, however, is insufficiently known at present.

Notes on southeast Asian *Poltys* species

In addition to the species discussed under the *P. illepidus* and *P. columnaris*-group headings above, the *Poltys* fauna of SE Asia contains at least two species, or species groups, which are not represented in the Australian fauna.

One of these contains three described species, *P. mouhoti, P. idae* and *P. longitergus* Hogg, the females of which have extremely elongate, curled and club-tipped abdomens. These types were not examined in detail to avoid unnecessary handling as the abdomens are easily damaged. Two non-type specimens from India (BMNH) and Malaysia (JK coll.) were examined, however, and one of these is figured here (Figs. 244–246). Various unmatched males have been examined, but none stands out as being likely to belong to this group.

The other *Poltys* taxon that is not represented in Australia is currently only recorded from Sumatra and Singapore. The outstanding feature of *P. elevatus* is a dense brush of setae on retrolateral femur IV, with flattened setae proximally (Fig. 243). This setal patch appears to meet with long setae on the lateral flanks of the abdomen adjacent to the book lung covers. Together they may form a stridulatory organ. I have not seen any other signs of similar modification in other *Poltys* species, but a similar character is found in *Caerostris* (Grasshoff, 1984).

All the described species of *Poltys* from the SE Asian region with a known overlap with the Australian fauna are listed in Appendix 1. Some basic illustrations of epigynes and other possibly diagnostic features are also shown in Figs 223–247. All figures except 243 and 244–246 are of type specimens.

Separation of Australian species using molecular characters

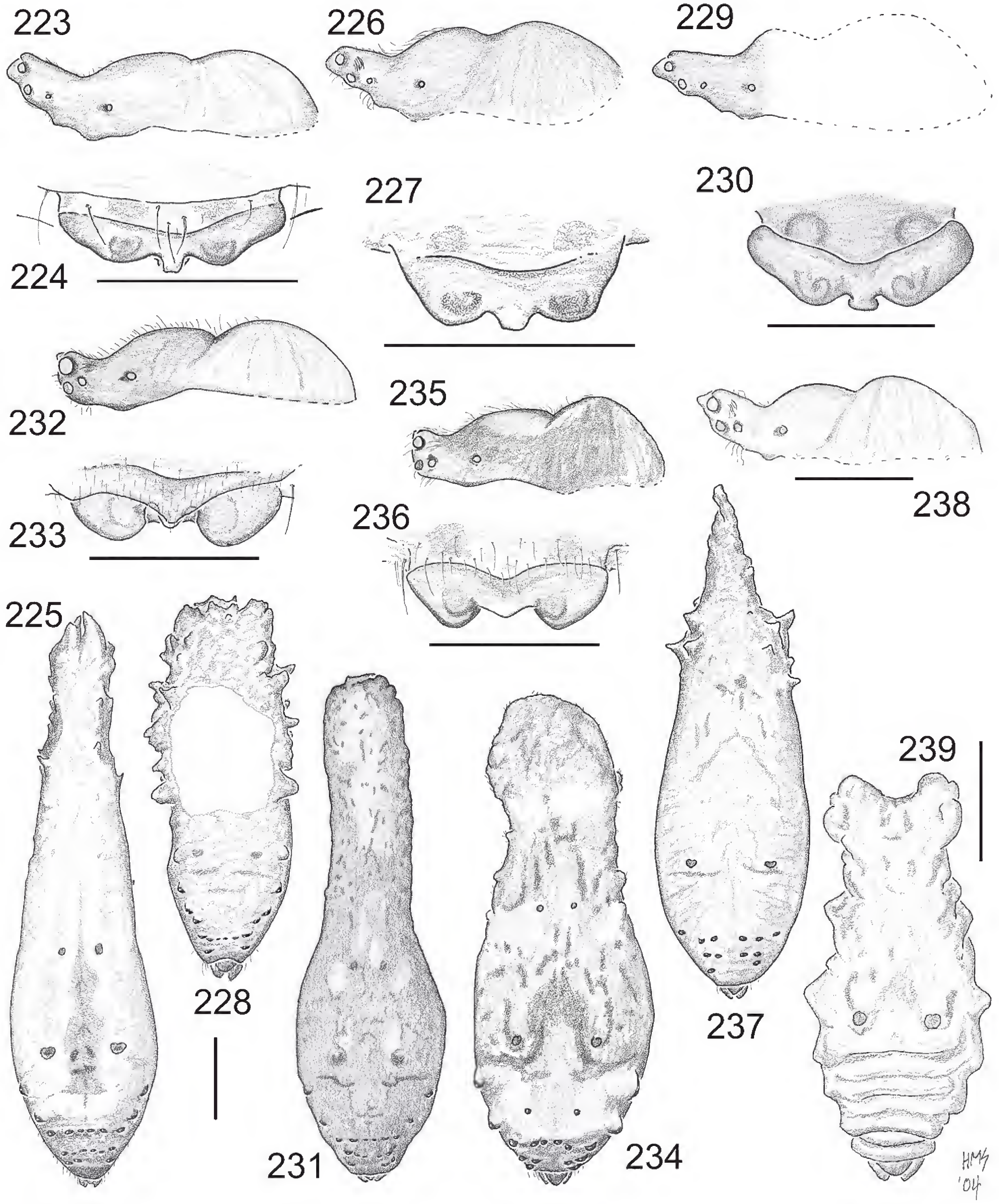
Background. There are at least five situations where it has been demonstrated that morphological attributes alone may not provide adequate information for species identification (Baverstock & Moritz, 1996). Four of these appear to be relevant to one or more species or species-groups within the Australian *Poltys* fauna:

1 Two sympatric or parapatric species may be so similar in morphology that specific status is not detected (*Poltys noblei* cf. *P. laciniosus*).
2 Two allopatric populations may be morphologically different but it is unclear whether they are biologically distinct. (*Poltys grayi* cf. *P. noblei*; *P. laciniosus* ex the NT/Kimberley region).
3 Two parapatric populations may be morphologically distinct but show clinal variation. (Epigynal size and shape in *P. laciniosus*; modified patellar spines in *P. illepidus*).
4 Two (or more) morphologically distinct forms may represent polymorphisms within a single interbreeding population. (Any of the species with distinct variations of abdominal shape; investigated specifically in *P. noblei*).

The variability of mitochondrial DNA (mtDNA) sequences has made certain areas of this genome a target for phylogeographic, population and interspecific analyses. There has been some discussion on the suitability of non-recombining loci for species separation in the phylogenetic sense (e.g., Davis & Nixon, 1992; Moritz *et al.*, 1992); nonetheless mtDNA has been demonstrated to be a useful tool to aid or confirm species recognition in a number of invertebrate studies such as Hedin (1997b, araneoid spiders), Trewick (2000, onychophorans) and Pawson *et al.* (2003, carabid beetles).

Recently broad success has been claimed in using COI sequences as "species barcodes" (Hebert *et al.*, 2002, 2003, 2004). In particular, Hebert *et al.* (2003) demonstrated that more than 98% of congeneric species pairs of animals showed more than 2% divergence (uncorrected pairwise comparisons), and that for chelicerates (1249 pairs of taxa examined) the mean interspecific divergence was 14.4%. In contrast, intraspecific divergences for the varied taxa used as examples by Avise (2000) were reported to be rarely greater than 2% and often less than 1% [interpreted by Hebert *et al.* (2003): the original studies have not been checked here]. These figures make a useful baseline for the use of mtDNA in confirming, or guiding, problematic species separations in *Poltys* when considered with information from a nuclear gene (ITS2) and morphological studies.

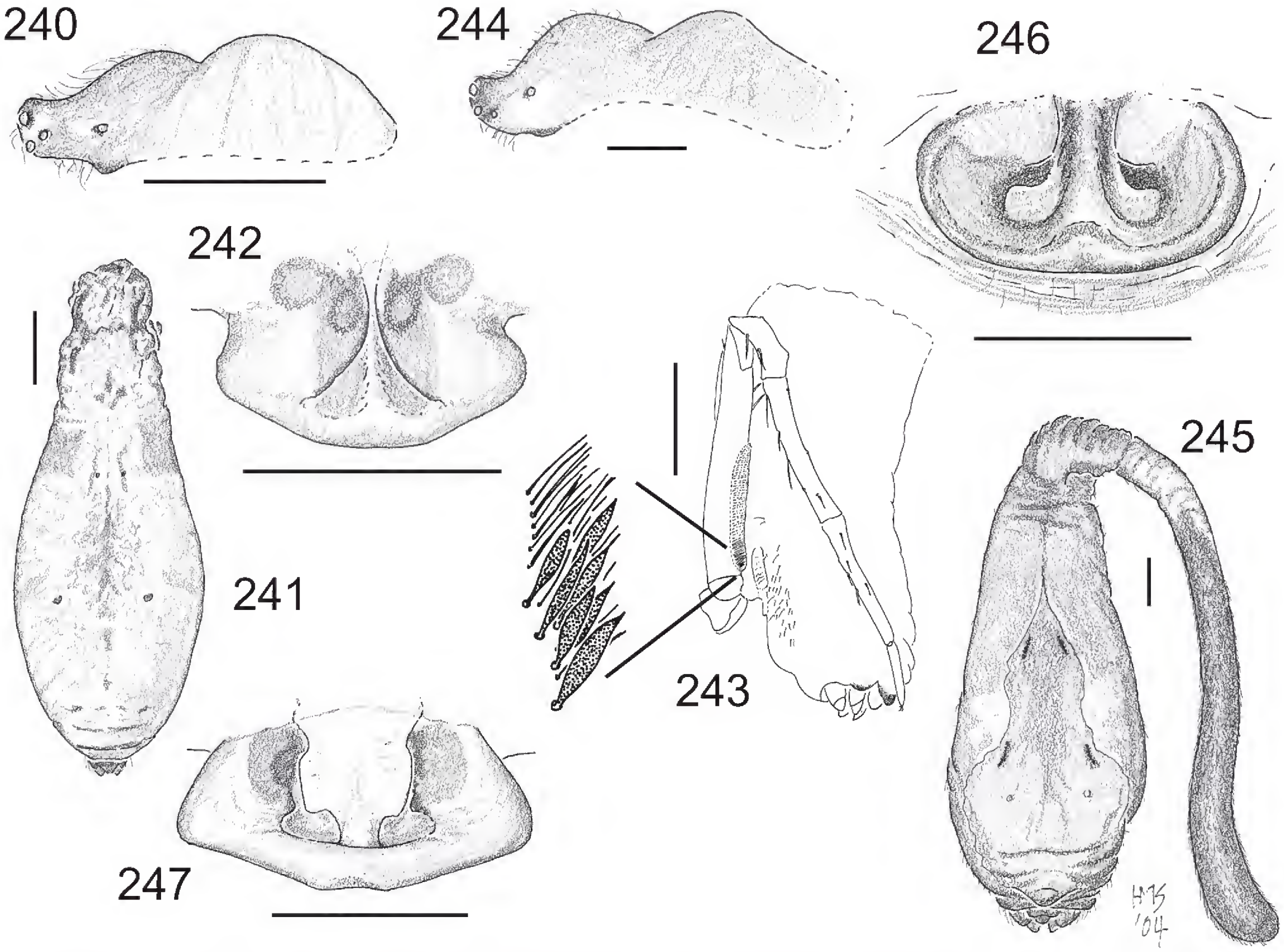
Methods. A 212 base pair section of the mitochondrial gene, cytochrome c oxidase subunit I (COI) and the entire length of the nuclear ribosomal internal transcribed spacer 2 (ITS2) along with its immediately flanking 28S and 5.8S coding regions, were sequenced (ranging from 394–403 base pairs in total). DNA sequencing methods and the primers for the COI sequence were given in Smith (2003). The ITS2 protocol and primers were based on information given in Hedin (1997a). Sequences were edited and assembled using Sequencher® 4.1. Sequences were aligned using Se-Al v.2.0 (Rambaut, 1996) and ClustalX (Thompson *et al.*, 1997), edited manually if required (see below for details of ITS2



Figs 223–239. SE Asian *Poltys columnaris*-group type specimens: carapace lateral, epigyne anterior (except *P. pogonias*), abdomen, dorsal. 223–225, *P. columnaris*; 226–228, *P. squarrosus*; 229–231, *P. turriger*; 232–234, *P. turritus*; 235–237, *P. raphanus*; 238–239, *P. pogonias* (juvenile). Scale lines: Figs 238 & 239 = 1.0 mm; scale below Fig. 228 applies to all other carapaces and abdomens, 1.0 mm for carapaces, 2.0 mm for abdomens; epigynes with individual lines, all = 0.5 mm.

method) then output in NEXUS format for analysis using PAUP* 4.0b10 (Swofford, 2001). Voucher specimens and GenBank accession numbers are listed in Appendix 2.

COI alignment was straightforward as this is a coding sequence and there were no unmatched sections between samples. ITS2 was more problematic because this is a non-coding gene and hence has rather variable areas that require the addition of gaps for alignment. A simplification of the alignment method outlined by Mindell (1991) was used. The alignment was initiated with the two most similar



Figs 240–247. Other SE Asian species. 240–242, *Poltys elevatus* type specimen: 240, carapace lateral; 241, abdomen, dorsal; 242, epigyne posterior. 243: *P. elevatus* ex Singapore (BMNH), left leg IV and part of abdomen, showing brush of hairs on posteroventral femur. 244–246, example of *P. mouhoti*-group ex Malaysia (JK coll.): 244, carapace lateral; 245, abdomen, dorsal; 246, epigyne posterior. 247, *P. pannuceus*, type specimen, epigyne posterior. Scale lines: epigynes and fig. 243 inset = 0.5 mm, others, and main part of Fig. 243 = 2.0 mm.

sequences and each remaining sequence was added and aligned in turn according to its similarity to the first. Sequence alignment in ClustalX used gap penalties of 15 to open a gap and 6.6 for lengthening. A few further adjustments to the alignment were made manually. The manual adjustments were each tested and those that produced the shortest tree in a simple parsimony analysis were accepted.

The majority of sequencing effort was directed at the COI gene. Each putative *Poltys* taxon was represented by at least two samples from geographically separated sites (if possible). Species that exhibited interspecific variation in characters other than abdominal shape were represented by a wider range of samples. The ITS2 sequences could not be amplified for two species and so complete taxon representation was not achieved. Original sequence data are available from GenBank (Appendix 2). For each gene, PAUP* was used to compare the sequences from each individual sampled to all others to obtain uncorrected pairwise overall similarity percentages (100× number of substitutions/total number of bases).

Results. For COI (Fig. 248) within-species variation is 0–5.19% (mean=1.81), if the two populations of *P. illepidus* are considered as conspecific. If the nine *P. illepidus* North to South pairwise comparisons are removed (but the within population figures retained) the range is 0–2.36% (mean=0.93). Between species, the range is 7.55–20.75% (mean=14.49) if *P. illepidus* is considered as a single species, or 4.25–20.75% (mean=14.26) if the two populations are considered separately. These figures are the basis for the histogram, Fig. 248. They are slightly different to those summarized in Table 1 (below diagonal), which are averaged within a species or population. Either of the above interspecific values is comparable with those reported for chelicerates by Hebert *et al.* (2003). The intraspecific values are also comparable to those reported by other studies, but suggest that based on this COI data set, two cryptic species might be present within the Australian distribution of *P. illepidus*. Other than this, the species as defined in the taxonomy section are supported by this analysis.

For ITS2 (Table 1, above diagonal) no variation was found between specimens of the same species (including between northern and southern *P. illepidus*). No complete sequences were obtained for *P. milledgei* or *P. noblei*. *Poltys illepidus* and *P. stygius* were extremely close, differing by only 0.75%, but other species varied between 5.84% (*P. laciniosus* v. *P. grayi*) and 12.18% (*P. jujorum* v. *P. grayi*). The mean interspecific difference is 9.57%

Table 1. Mean uncorrected pairwise differences ×100% for COI and ITS2 (averaged between specimens within populations or species).

ITS2 above COI below	*P. frenchi*	*P. grayi*	*P. illepidus* (northern)	*P. illepidus* (southern)	*P. jujorum*	*P. laciniosus*	*P. milledgei*	*P. noblei*	*P. stygius*
P. frenchi	—	10.91	10.69	10.69	12.05	6.92	no data	no data	10.94
P. grayi	11.79	—	11.08	11.08	12.18	5.84	no data	no data	11.84
P. illepidus (N)	13.36	12.66	—	0	8.84	10.46	no data	no data	0.75
P. illepidus (S)	15.25	13.60	4.56	—	8.84	10.46	no data	no data	0.75
P. jujorum	18.71	16.90	13.52	12.42	—	10.80	no data	no data	9.09
P. laciniosus	12.55	10.05	10.63	10.91	13.43	—	no data	no data	11.22
P. milledgei	19.50	16.43	15.41	16.51	14.47	16.67	—	no data	no data
P. noblei	14.15	7.78	12.89	14.31	16.98	10.75	15.57	—	no data
P. stygius	16.51	15.80	14.47	14.31	15.57	13.49	15.88	15.09	—

Discussion

Problems of *Poltys* species separation and the application of data derived from DNA. The separation of species by morphology presented in the taxonomic section is consistent with DNA evidence overall. The COI data alone, however, are equivocal for the northern and southern populations of *P. illepidus* and give different levels of separation for some taxon pairs to that suggested by other data (e.g., *P. illepidus* c.f. *P. stygius*, Table 1). Such non-concordance of data from different genes has been reported in a number of studies such as that by Navajas & Boursot (2003) who also used COI and ITS2. Yet another example emphasizes the need for the cautionary approach, which requires evidence from several sources, as espoused by several authors (e.g., Moritz *et al*., 1992; Sperling & Harrison, 1994).

As discussed at the start of this section, there are certain problems in the separation of some *Poltys* species using morphological characters alone. These problems can now be more effectively addressed by also considering molecular evidence, as follows:

1 Cryptic taxa. The possible presence of cryptic taxa in *P. laciniosus* was certainly resolved by COI, and *P. noblei* has now been separated. In retrospect, these were not truly cryptic species, but the variation present in abdominal shape is far more obvious, and in opposition to, the more subtle signals found in the epigyne morphology. Once the results from the initial DNA sequencing validated the levels of variation present within one species (Smith, 2003), and males of *P. laciniosus* were finally collected, the problem dissolved. The results also indicate a possible cryptic taxon in the southern populations of *P. illepidus*; this is discussed further under 3, below.

2 Morphological variation between populations. Whether the allopatric populations of *P. noblei* v. *P. grayi* and *P. laciniosus* from the Kimberley v. elsewhere, are separate species is not completely resolved, due to a lack of ITS2 data for critical specimens. Overall, the data support separation of *P. grayi* and *P. noblei*, although with 7–8% difference in COI sequences, they are the most closely related species amongst the taxa examined. The morphological differences are subtle, but quite definite considering the lack of genitalic differentiation shown between some other species pairs. A partial ITS2 sequence obtained for *P. noblei* also appeared to have a few base changes compared to *P. grayi*, but this could not be corroborated due to the high noise level in the data. The case of conspecificity of *P. laciniosus* from the NT and Kimberley regions with those from the rest of Australia is less strongly defined. COI indicates that there is no specific differentiation, yet the morphology of the epigynes of the two recorded females is quite distinctive. No males are yet known from this area. The DNA extraction from the 75% ethanol preserved NT specimen was not assayed for the ITS2 gene as attempts from other specimens of a similar age had not been successful. Further work needs to be carried out in this area.

3 Clinal variation. The problem of interpreting clinal variation in the genitalia of *P. laciniosus* and the modified leg macrosetae of *P. illepidus* is also only partially resolved. Specimens of *P. laciniosus* from across Australia showed a variation of approximately 1–2% in the COI gene (many more specimens than shown in Appendix 2 were actually sequenced; the five shown here were chosen as exemplars as they covered the range of variation in COI, in epigynal features and also represented most regions of Australia). There was no obvious pattern to the COI variation, either geographically, or with respect to epigyne morphology. With the possible exception of the NT specimen, discussed above, it is highly probable that *P. laciniosus* has an Australia-wide distribution. Conversely, some uncertainties remain with respect to *P. illepidus*. Overall, given the lack both of morphological variation, and of differentiation in the sequences of ITS2 examined, these are most likely to be a single species despite the consistent 4–5% variation in COI. When suitably preserved specimens are available from the geographic area between the two extremes sampled so far for DNA, it would be desirable to carry out further work. Cloning of ITS2 samples to examine intra-individual variation might also provide useful information as there were certain base positions that consistently showed a strong secondary signal under the consensus sequence that has been used here.

4 Polymorphic species. This has indirectly been dealt with under 1, above, as it was the basis for the possible presence of one or more cryptic species. It is now apparent that this situation is not really applicable to

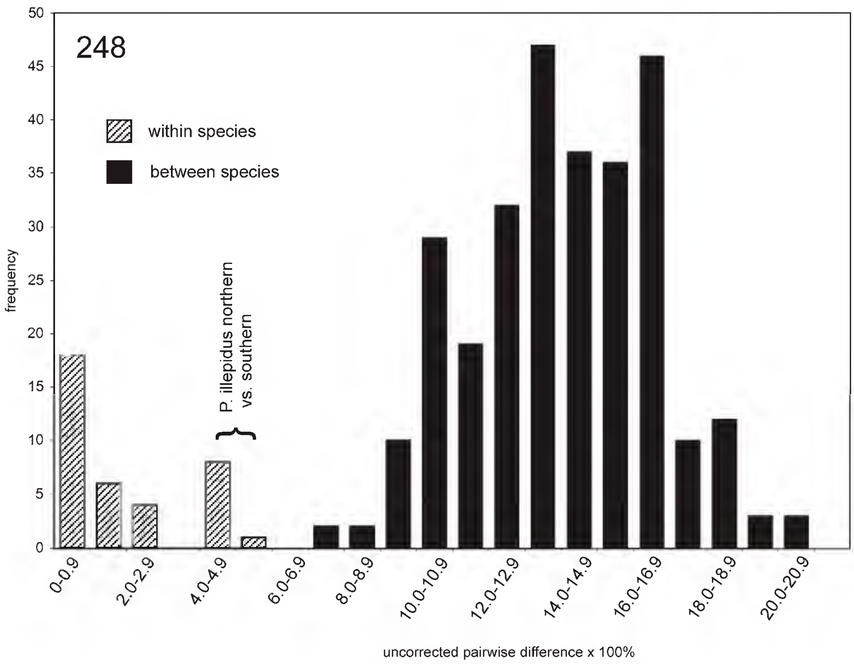


Fig. 248. Frequency histogram of within and between species distances (% difference) calculated from uncorrected pairwise distances.

Poltys, as the abdominal variation can be seen to be continuous, rather than discretely polymorphic, once enough specimens have been examined. Historically, however, it has certainly caused confusion, and resulted in the species recognized here as *P. laciniosus* being described four times, whilst *P. noblei* was overlooked. Evidence for the variable morphology within several *Poltys* species was supported by the COI data, and was backed up by other morphological data and rearing experiments (Smith, 2003 and further unpublished data.).

Comments on some characters and aspects of *Poltys* biology. There are a number of characters that might also prove to be of interest, either within the context of *Poltys* species-groups or more widely in araneids as a whole. For instance, the arrangement of leg macrosetae has stood out as being quite distinct in some genera, and the sturdy, untoothed accessory hairs shown in Fig. 23 may also be of interest. The spinnerets, both in morphological and genetic aspects may also offer opportunities. At present only single representatives from the three main *Poltys*-groups within Australia have been investigated with respect to spinneret spigots, but the variation in piriform spigot numbers on the ALS is striking (Figs 17–19). The silk from these forms the basal attachment disc for the dragline. The larger size of *P. illepidus* and associated larger webs made in bigger gaps would necessitate stronger lines and attachment points; but there is also a difference in behaviour between these and the smaller species of the *P. laciniosus*-group. Whilst a spider is concealed during the day it is attached to a silk disc on the tree or twig. *Poltys illepidus* are usually reluctant to move if touched and carry on the pretence of being an inanimate lump of twig as far as possible. The *P. laciniosus*-group animals, however, usually shuffle around the twig in response to an initial probing finger and often launch themselves off the twig with continued disturbance. The much greater number of spigots of *P. illepidus* may reflect this habit of remaining firmly attached. It would be interesting to quantify this behaviour experimentally and investigate other *Poltys* species more fully, as well as other araneids with similar behavioural traits.

Silk producing gland proteins have also received increasing attention in recent times (e.g., Gatesy *et al*., 2001; Hayashi *et al*., 2004). Whilst requiring extraction from live material and hence being impractical for poorly known or rare taxa, the properties of *Poltys* silk have potential to be most interesting. It has not been possible to analyse the mechanical properties of *Poltys* silk as part of this project, but some informal observations suggest that it is far softer than many araneid silks yet is brittle when suddenly stressed. Webs, at least of the *P. laciniosus*-group species, are of fine stretchy silk. This helps entangle "flappy" prey such as Lepidoptera, Neuroptera and Isoptera, whilst fast flying hard insects such as Coleoptera often pass straight through, leaving a neat hole without pulling the rest of the web down. An accidental sharp knock against the branch supporting the web has sometimes resulted in the whole web disintegrating as if exploding, leaving nothing but a few frame lines. This disconcerting disappearing trick may be dependent on moisture content, but I have not noticed it happening to the webs of other taxa. These properties may point towards an unusual composition of silk proteins, which could give useful comparative data as silk libraries are built up.

Finally, and leading on from the discussion of variable morphology above, the occurrence of this variability in Australian species may be of evolutionary significance. Little is currently known about intraspecific variation outside of the Australian species, but specimens that have been examined in the broader context of this study suggest that variation is far more limited in the *P. columnaris* species group, in *P. elevatus* and in the *P. mouhoti*-group. In each of these putative taxa, variations have been observed in the length of the abdomen and in striking colour patterns, but no specimens have been seen with the humeral projections that create the potential for so much variety in the *P. illepidus*-group, in *P. frenchi* and the *P. laciniosus*-group species. Whilst the scrubby rainforest habitat preferences of *P. frenchi* overlap with the members of other species groups, and *P. noblei* also favours moister coastal habitats, *P. laciniosus* seems to have successfully moved in to much more hostile, more open country. *Poltys laciniosus*, and also the other species, are patchy on a local scale, but can be abundant. The key to this success, as well as an explanation for their patchiness, may lie in the variability of individual specimens. From a research point of view, this variability holds great potential for future work in the Australian *Poltys*, not to mention the many other unexplored aspects of the biology and behaviour of the taxon and the taxonomy of the rest of the genus.

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Appendix 1. Summary checklist of described Southeast Asian and Australasian *Poltys* species. The following abbreviations have been used: *f*., figure(s); *pl*., plate(s); *syn*., synonym; *s/syn*., senior synonym.

species	type locality or country	type repository	sex of primary type	status (Platnick, 2005)	status assigned in current work	known distribution and notes
Australia						
P. bimaculatus Keyserling, 1886:131, pl.10, f.4	Peak Downs, Qld	ZMH	juvenile	current	syn. = *P. laciniosus*	
P. coronatus Keyserling, 1886:128, f.10	Cape York, Qld	not located	female	current	syn. = *P. illepidus*	described from a specimen in Bradley's collection.
P. frenchi Hogg, 1899:143, pl.13, f.2	Endeavour River, Qld	NMV	female	current	no change	northern Australia, New Guinea and southern Moluccas
P. grayi n.sp.	Lord Howe Island	AM	female	—	new species	Lord Howe Island
P. jujorum n.sp.	Goldsborough, Qld	QM	female	—	new species	northeastern Australia
P. keyserlingi Keyserling, 1886:129, pl.10, f.3	Gayndah, Qld	ZMH	juvenile	current	syn. = *P. illepidus*	
P. laciniosus Keyserling, 1886:123, pl.9, f.7	Peak Downs, Qld	BMNH	female	current	no change	Australian mainland
P. mammeatus Keyserling, 1886:125, pl.10, f.1	Peak Downs, Qld	ZMH	female	current	syn. = *P. laciniosus*	
P. microtuberculatus Rainbow, 1916:118, pl.22, f.44	Gordonvale, Qld	AM	juvenile	current	syn. = *P. stygius*	
P. milledgei n.sp.	Darwin, NT	AM	female	—	new species	northern Australia and southern Indonesia
P. multituberculatus Rainbow, 1898:82, pl.18, f.2	Cooktown, Qld	AM	female	current	syn. = *P. illepidus*	
P. noblei n.sp.	Sydney, NSW	AM	female	—	new species	eastern coast of Australia
P. penicillatus Rainbow, 1920:249, pl.29, f.57	Lord Howe Island	SAMA	female	current	syn. = *P. illepidus*	
P. salebrosus Rainbow, 1904:104, f.28–29	Fremantle, WA	AM	juvenile	current	syn. = *P. laciniosus*	
New Caledonia						
P. timmeh n.sp.	New Caledonia	HNHM	female	—	new species	New Caledonia and the Loyalty Islands
New Guinea						
P. dromedarius (Bradley, 1876b:249, f.2)	Hall Sound, PNG	not located	probably juvenile	current	*nomen dubium*	should be in MMUS
P. papuensis (Bradley, 1876a:223, f.2)	Hall Sound, PNG	not located	probably adult	current	*nomen dubium*	should be in MMUS; may be s/syn. of *P. frenchi*
P. sigillatus Chrysanthus, 1961:211, f.74–77	West Papua (Indonesia)	RMNH	female	current	syn. = *P. frenchi*	

species	type locality or country	type repository	sex of primary type	status (Platnick, 2005)	status assigned in current work	known distribution and notes
Malaysia and Indonesia						
P. apiculatus Thorell, 1892:228	Singapore	not located	unknown	current	no change (not studied)	
P. columnaris Thorell, 1890:87	Sumatra	OUM	female	current	no change (not studied)	Sumatra, Burma probably Vietnam, possibly N Borneo
P. elevatus Thorell, 1890:82	Sumatra	OUM	female	current	no change (not studied)	Sumatra, Singapore. Very distinctive brush of hairs on retrolateral femur IV—may be stridulatory
P. idae (Ausserer, 1871:817, pl.5, f.1–3)	Borneo	NHMW	?female (not checked)	current	no change (not studied)	*P. mouhoti*-group
P. illepidus C.L. Koch, 1843:97, f.821	P.Bintan, Indonesia	not located	unknown	current	no change	northern Australia to at least Thailand. Solomon Is. and oceanic islands to the east of Australia
P. longitergus Hogg, 1919:95, pl.10, f.7	Sumatra	BMNH	juvenile	current	no change (not studied)	*P. mouhoti*-group
P. moluccum (Doleschall, 1859:45, f.1)	Amboina [Ambon]	not located	unknown	syn.= *P. illepidus*	*nomen dubium* (not *P. illepidus*)	may be s/syn. of *P. frenchi*
Nicobar Islands						
P. pogonias Thorell, 1891:54	Nicobar Is	ZMUC	juvenile	current	no change (not studied)	*P. columnaris*-group
Burma, Laos and Vietnam						
P. acuminatus Thorell, 1898:346	Burma	MSNG	juvenile	current	no change (not studied)	*P. illepidus*-group, probably not identifiable
P. dubius (Walckenaer, 1842:198)	Vietnam	not located	probably juvenile	current	no change (not studied)	probably not identifiable
P. mouhoti (Günther, 1862:2, pl.8, f.A)	Laos	BMNH	female	current	no change (not studied)	similar or conspecific species recorded from Borneo to India
P. pannuceus Thorell, 1895:167	Burma	BMNH	female	current	no change (not studied)	Burma to Sumatra, ?*P. illepidus*-group
P. raphanus Thorell, 1898:348	Burma	MSNG	female	current	no change (not studied)	probably = *P. turritus*
P. squarrosus Thorell, 1898:350	Burma	MSNG	female	current	no change (not studied)	*P. columnaris*-group
P. stygius Thorell, 1898:344	Burma	MSNG	female	current	no change	northern Australia to Burma
P. turritus Thorell, 1898:347	Burma	MSNG	female	current	no change (not studied)	*P. columnaris*-group
P. turriger Simon, 1897:480	Vietnam	MNHNP	female	current	no change (not studied)	*P. columnaris*-group
P. unguifer Simon, 1909:117	Vietnam	MNHNP	juvenile	current	no change (not studied)	*P. illepidus*-group, may not be identifiable

Appendix 2. Specimens used for DNA sequencing. Most adult *Poltys* are also included in Material Examined in Taxonomic section. Juvenile specimens have field numbers (prefixed FN) but are not fully registered. All vouchers are in AM unless stated. GenBank accession numbers are appended. Where two specimens share exactly the same sequence only one is submitted to GenBank.

Mitochondrial DNA data (COI)

Poltys illepidus (northern)
♀ KS90970, Hopevale Rd, Qld. GenBank AY997634
♀ KS75537, Trinity Park, Qld. GenBank AY997635
♀ KS55732, Litchfield NP, NT. Seq. as KS75537

Poltys illepidus (southern)
♀ KS90971, Rockhampton Qld. GenBank AY997636
♀ S20786 (QM), Brisbane, Qld. GenBank AY997637
juv FN14984, Rockhampton, Qld. Seq. as S20786

Poltys stygius
♀ KS86261, Edmonton, Qld. GenBank AY997638
♀ KS90969, Trinity Park, Qld. Seq. as KS86261

Poltys jujorum
♀♀ KS58065, Trinity Park, Qld. GenBank AY997639–40
♀ KS58066, Abergowrie SF, Qld. GenBank AY997641

Poltys milledgei
♀ KS55726, Humpty Doo, NT. GenBank AY997642
♀ KS53839, Litchfield NP, NT. GenBank AY997643
♀ KS55747, Lake Argyle, WA. GenBank AY997644

Poltys frenchi
♀ KS86345, Cape Kimberley, Qld. GenBank AY997645
juv FN14677, Trinity Park, Qld. Seq. as KS86345
juv FN14782, Cape Tribulation, Qld. Seq. as KS86345

Poltys laciniosus
♀ KS75494, Pilliga SF, NSW. GenBank AY997646
♀ KS55745, Gregory NP, NT. GenBank AY997647
♀ KS70365, Clermont, Qld. GenBank AY997648
♀ KS78310, Coffin Bay, SA. GenBank AY997649
♀ WAM 98/1970, Torndirrup, WA. GenBank AY997650

Poltys grayi
♀ KS90968, Lagoon Rd, LHI. GenBank AY997652
♀ KS90967, start Gower track, LHI. GenBank AY997653

Poltys noblei
♀♀ KS90958-66, Sydney specimens from Smith (2003, all identical sequences). GenBank AY997651 (nominally for KS90958). Also see partial sequences presented in Smith (2003, ex Ninety Mile Beach, Victoria, and Forty Mile Scrub, Queensland) for variation

Ribosomal DNA data (ITS2)

Poltys illepidus (northern)
♀ KS90970, Hopevale Rd, Qld. GenBank AY997626
♀ KS55732, Litchfield NP, NT. Seq. as KS90970

Poltys illepidus (southern)
♀ KS90971, Rockhampton Qld. Seq. as KS90970

Poltys stygius
♀ KS86261, Edmonton, Qld. GenBank AY997627
♀ KS90969, Trinity Park, Qld. Seq. as KS86261

Poltys jujorum
♀ KS86347, Trinity Park, Qld. GenBank AY997628

Poltys frenchi
♀ KS86345, Cape Kimberley, Qld. GenBank AY997629

Poltys laciniosus
♀ KS74960, Warrumbungles NP, NSW. GenBank AY997630
♀ KS78315, Quorn, SA. Seq. as KS74960

Poltys grayi
♀ KS90968, Lagoon Rd, LHI. GenBank AY997631

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The Amphipod Genus *Arcitalitrus* (Crustacea: Amphipoda: Talitridae) of New South Wales Forests, With Descriptions of Six New Species

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ABSTRACT. Until now, the genus *Arcitalitrus* has been restricted to three species, *Ar. bassianus* Friend, 1987, *Ar. dorrieni* (Hunt, 1925) and *Ar. sylvaticus* (Haswell, 1879). We redescribe the type species *Ar. sylvaticus* (Haswell, 1879) and describe six new species (*Ar. belbucca, Ar. bundeena, Ar. moonpar, Ar. nana, Ar. orara*, and *Ar. thora*) from New South Wales state forests and the Royal National Park, near Sydney.

PEART, R., & J.K. LOWRY, 2006. The amphipod genus *Arcitalitrus* (Crustacea: Amphipoda: Talitridae) of New South Wales forests, with descriptions of six new species. *Records of the Australian Museum* 58(1): 97–118.

Including this paper, 32 species of terrestrial Talitridae (landhoppers) are described from Australia (Haswell, 1879; Bousfield, 1976; Friend, 1979, 1982, 1987). Most species are known from Tasmania (Friend, 1979, 1987). Apart from introduced terrestrial species, the New South Wales fauna appears to be restricted to species of *Arcitalitrus* and *Agilestia* and species of the former apparently dominate the amphipod component of the forest floor community. Including the new taxa described here, 12 species of talitrids are known from New South Wales: *Arcitalitrus belbucca* n.sp., *Ar. bundeena* n.sp., *Ar. dorrieni* (Hunt, 1925), *Ar. moonpar* n.sp., *Ar. nana* n.sp., *Ar. orara* n.sp., *Ar. sylvaticus* (Haswell, 1879), *Ar. thora* n.sp., *Agilestia hylaea* Friend, 1982, *Parorchestia gowerensis* Bousfield, 1976, from Lord Howe Island, and the introduced species *Talitroides alluaudi* (Chevreux, 1901) and *T. topitotum* (Burt, 1934).

Hurley (1975) established the subgenus *Talitrus (Arcitalitrus)* for *T. sylvaticus* Haswell, 1879, a terrestrial species originally known from Rooty Hill, just west of Sydney, New South Wales. Friend (1987) elevated the subgenus to generic status and included two additional species, *Arcitalitrus dorrieni* (Hunt, 1925) from Blackheath, New South Wales and *Ar. bassianus* Friend, 1987, from Victoria and northwestern Tasmania. The type species, *Ar. sylvaticus* (Haswell, 1879) has never been precisely described. In this paper, we redescribe *Ar. sylvaticus* based on new collections from the type locality and establish a neotype to distinguish it from other closely related species.

Arcitalitrus appears to have two groups. The "Sylvaticus" species group is defined by gill 6 that has a convoluted anterior margin and a subapically incised posterior margin and the rami of pleopod 3 that are subequal in length to the peduncle. This group contains *Ar. bassianus, Ar. belbucca, Ar. nana, Ar. orara*, and *Ar. sylvaticus*. The "Dorrieni" species group contains *Ar. dorrieni* and *Ar. moonpar* and is defined by epimeron 2 that is longer than epimeron 3, a subquadrate posteroventral corner on epimeron 3 and an entire telson. The long epimeron 2 and the subquadrate corner of epimeron 3 are homoplastic characters that also occur in *Ar. bassianus. Arcitalitrus bundeena* and *Ar. thora* apparently belong in neither group. Neither species has the characters that define the "Sylvaticus" and "Dorrieni" species groups.

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The taxonomic descriptions and diagnoses presented in this paper were generated from a DELTA (Dallwitz *et al.*, 1993) database of Australian talitrid amphipod species. Each species is diagnosed against all other species in the genus *Arcitalitrus*. Bold phrases in the descriptions indicate diagnostic characters. Material included in this study is lodged in the Australian Museum, Sydney (AM), the Natural History Museum, London, (BMNH) and the National Museums of Canada, Ottawa (NMC). The following abbreviations are used on the plates: *A*, antenna; *EP*, epimeron; *gi*, gill; *G*, gnathopod; *LL*, lower lip; *MD*, mandible; *MP*, maxilliped; *MX*, maxilla; *O*, oostegite; *P*, pereopod; *PL*, pleopod; *T*, telson; *UL*, upper lip; *U*, uropod; *l*, left; *r*, right.

Taxonomy

Arcitalitrus Hurley

Arcitalitrus Hurley, 1975: 161.–Friend, 1987: 35.

Type species. *Talitrus sylvaticus* Haswell, 1879, original designation.

Diagnosis. Gnathopod 2 not sexually dimorphic. Maxilliped outer plate distally acute/arcuate. Pleopods 1 and 2 well developed, pleopod 3 reduced.

Species composition. *Arcitalitrus* contains nine species: *Ar. bassianus* Friend, 1987; *Ar. belbucca* n.sp.; *Ar. bundeena* n.sp.; *Ar. dorrieni* (Hunt, 1925); *Ar. moonpar* n.sp.; *Ar. nana* n.sp.; *Ar. orara* n.sp.; *Ar. sylvaticus* (Haswell, 1879); *Ar. thora* n.sp.

Key to the species of the genus *Arcitalitrus*

1 Epimeron 3 posteroventral margin serrulate .... *Arcitalitrus bassianus*
— Epimeron 3 posteroventral margin smooth 2

2 Epimeron 2 subequal in length to epimeron 3 3
— Epimeron 2 longer than epimeron 3 6

3 Gill 6 anterior margin convoluted, subapically incised 4
— Gill 6 posterior margin convoluted, apically incised .... *Arcitalitrus thora*

4 Pleopod 3 rami absent 5
— Pleopod 3 uniramous .... *Arcitalitrus nana*

5 Telson entire .... *Arcitalitrus orara*
— Telson apically incised .... *Arcitalitrus sylvaticus*
— Telson deeply incised .... *Arcitalitrus belbucca*

6 Epimeron 3 posteroventral corner with subacute tooth .... *Arcitalitrus bundeena*
— Epimeron 3 posteroventral corner rounded .... *Arcitalitrus moonpar*
— Epimeron 3 posteroventral corner subquadrate .... *Arcitalitrus dorrieni*

Arcitalitrus bassianus Friend

Talitrus sylvaticus.–Chevreux, 1901: 392, fig. 7.
Arcitalitrus bassianus Friend, 1987: 35, figs 30–35.

Type material. HOLOTYPE, ♀ AM P37350, 10 February 1979, J.A. Friend. PARATYPES, male AM P37351; 3♀♀, 1 juvenile AM P37352; 1♂, 2♀♀, 1 juvenile BMNH; 1♂, 2♀♀, 1 juvenile NMC. Paratypes are all from type locality.

Type locality. 1.5 km NNE of Kate's Point, Robbins Island, northwestern Tasmania (40°40'S 144°55'E), in swampy area beside creek.

Description. *Body* shape laterally compressed; cuticle calcification absent. *Eye* medium (⅕–⅓ head length). *Antenna 2* longer than head and first 3 pereonites; peduncular articles narrow. *Mandible* left lacinia mobilis 4 dentate. ***Maxilliped outer plate distally acute/arcuate***; palp dactylus present and distinct. *Pereonite 1* sternite without papillose process. *Gnathopod 1* not sexually dimorphic; simple; merus and carpus not expanded; propodus subrectangular; palm absent; dactylus longer than palm. *Gnathopod 2* not sexually dimorphic; chelate; basis narrow; merus and carpus expanded posteriorly; propodus "mitten-like"; palm obtuse; smooth; dactylus shorter than palm. *Pereopods 3–7* long (½ length of body); simplidactylate. *Pereopod 4* carpus similar in length to pereopod 3 carpus, dactylus similar to pereopod 3 dactylus. *Pereopod 7* basis posterodistal lobe present. *Gill 2* lobate, not incised. *Gills 3–5* lobate, smaller than gills 2 and 6. ***Gill 6*** lobate, anterior margin convoluted, ***subapically incised along posterior margin***. *Oostegites* long (length greater than 2× width), weakly setose, setae with simple smooth tips. *Epimera 1 to 3* not convergent. *Epimeron 2* longer than epimeron 3. ***Epimeron 3* posteroventral margin *serrulate***, posteroventral corner subquadrate. *Pleopod 1* well developed, biramous, rami subequal in length to peduncle; inner ramus with 5 articles; outer ramus with 9 articles. ***Pleopod 2 reduced***, biramous, rami shorter than peduncle; inner ramus with 4 articles, inner ramus with 1–5 articles; outer ramus with 6 articles. *Pleopod 3* reduced, biramous, rami shorter than peduncle; inner ramus with 2 articles; outer ramus with 5 articles. *Uropod 1* not sexually dimorphic; peduncle with 3 robust setae on peduncle; inner ramus subequal in length to outer ramus, with 3 robust setae on the margins, with 3 apical robust setae; outer ramus without marginal robust setae, with 3 apical robust setae. *Uropod 2* not sexually dimorphic; peduncle with 3 robust setae; inner ramus subequal in length to outer ramus, with 2 marginal robust setae, 5 apical robust setae; outer ramus without marginal robust setae, with 2 apical robust setae. *Uropod 3* peduncle with 1 robust seta; ramus shorter than peduncle, ramus linear (narrowing), with 2 robust setae. *Telson* as broad as long, apically incised, with marginal and apical robust setae, with 3–5 robust setae per lobe.

Habitat. Leaf and log litter, in bracken, under stones, swampy ground, wet sclerophyll, eucalyptus regrowth.

Remarks. *Arcitalitrus bassianus* is a member of the "Sylvaticus" species group and is the only Australian landhopper found on both mainland Australia and Tasmania. It differs from other species in the group in having a long epimeron 2, a subquadrate corner on epimeron 3, reduced numbers of articles on the inner ramus of pleopod 2 and a biramous pleopod 3. It is similar to *Ar. belbucca* and *Ar. nana* in having 6–10 articles on the outer ramus of pleopod 2. *Arcitalitrus bassianus* and *Ar. sylvaticus* both have subequal rami on uropod 1 and an apically incised telson.

Distribution. Tasmania: Teatree swamp near Togari; King and Robbins Islands (Friend, 1987). Victoria: Mount Donna Buang; Marysville; Cement Creek; Nelson; Lake Purrumbete; Snobs Creek (Friend, 1987).

Arcitalitrus belbucca n.sp.

Figs. 1, 8–10

Type material. HOLOTYPE, ♀, 14.0 mm, AM P60959, 11 November 1999, M. Gray, G. Milledge and H. Smith. PARATYPES, 65 specimens AM P60967. Paratypes are all from the type locality.

Type locality. Belbucca Road, 1.5 km from junction with Middle Ridge Road, Irishman State Forest (30°32'58"S 152°40'14"E), west of Sydney, New South Wales, Australia.

Description. Based on holotype female. *Body shape* normally laterally compressed; cuticle calcification absent. *Eye* medium (⅕–⅓ head length). *Antenna 2* longer than head and first 3 pereonites; peduncular articles narrow. *Mandible* left lacinia mobilis 4 dentate, or 5 dentate. *Maxilliped* outer plate distally acute/arcuate; palp dactylus present and distinct. *Pereonite 1* sternite without papillose process. *Gnathopod 1* not sexually dimorphic; simple; merus and carpus not expanded; propodus subrectangular; palm absent; dactylus longer than palm. *Gnathopod 2* not sexually dimorphic; chelate; basis narrow; merus and carpus expanded posteriorly; propodus "mitten-like"; palm obtuse; smooth; dactylus shorter than palm. *Pereopods 3–7* long (½ length of body); simplidactylate. *Pereopod 4* carpus similar in length to pereopod 3 carpus, dactylus similar to pereopod 3 dactylus. *Pereopod 7* posterodistal lobe present. Gill 2 lobate, not incised. *Gills 3–5* lobate, smaller than gills 2 and 6. *Gill 6* lobate, anterior margin convoluted, subapically incised along posterior margin. ***Oostegites*** long (length greater than 2× width), ***weakly setose***, setae with simple smooth tips. *Epimera 1 to 3* not convergent. *Epimeron 2* subequal in length to epimeron 3. *Epimeron 3* posteroventral margin smooth, posteroventral corner with small subacute tooth. *Pleopod 1* well developed, biramous, rami subequal in length to peduncle; inner ramus with 13 articles; outer ramus with 9 articles. ***Pleopod 2*** well developed, biramous, ***rami subequal in length to peduncle***; inner ramus with 8 articles; outer ramus with 7 articles. *Pleopod 3* reduced, rami absent. *Uropod 1* not sexually dimorphic; peduncle with 8 robust setae on peduncle; inner ramus shorter than outer ramus, with 3 robust setae on the margins, with 5 apical robust setae; outer ramus without marginal robust setae, with 3 apical robust setae. *Uropod 2* not sexually dimorphic; peduncle with 3 robust setae; inner ramus subequal in length to outer ramus, with 2 marginal robust setae, 4 apical robust setae; outer ramus without marginal robust setae, with 4 apical robust setae. *Uropod 3* peduncle with 1 robust setae; ramus shorter than peduncle, ramus linear (narrowing), with 2 robust setae. ***Telson*** longer than broad, ***deeply incised***, with marginal and apical robust setae, with more than 10 robust setae on whole telson.

Etymology. Named after Belbucca Road, in Irishman State Forest, the type locality and treated as a noun in apposition.

Remarks. *Arcitalitrus belbucca* is a member of the "Sylvaticus" species group. It is the only *Arcitalitrus* with a deeply incised telson. *Arcitalitrus belbucca* and *Ar. nana* appear to be sister taxa. They share many characters and both have more than 10 dorsal robust setae on the telson.

Distribution. New South Wales: Irishman State Forest, west of Sydney.

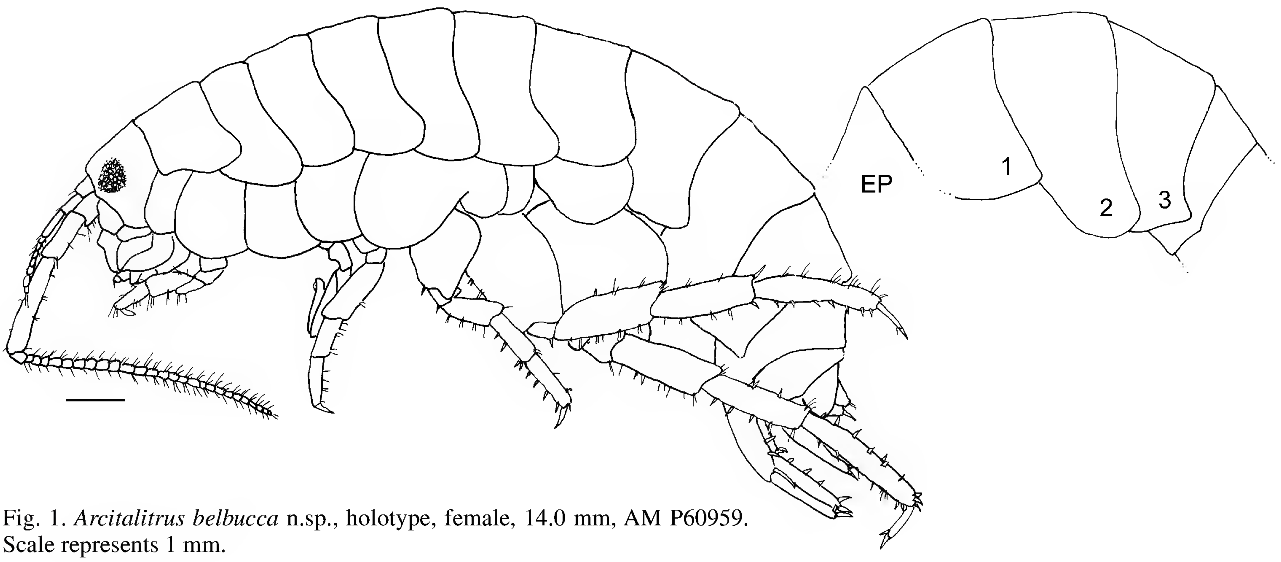

Fig. 1. *Arcitalitrus belbucca* n.sp., holotype, female, 14.0 mm, AM P60959. Scale represents 1 mm.

Arcitalitrus bundeena n.sp.

Figs. 2, 11–14

Type material. HOLOTYPE, ♀, 15 mm, AM P60957, December 1999, M. Gray, G. Milledge and H. Smith. PARATYPES, many specimens, AM P60958. Paratypes are all from the type locality.

Type locality. Beside the Hacking River, Lady Wakehurst Drive, Royal National Park (34°9'47"S 151°0'55"E), New South Wales, Australia.

Other material examined. New South Wales, Australia: near locked gate, Fire road No. 95 Junction with Darkes Forest Road (34°11.820'S 150°54.600'E), 2 specimens, 8 December 1999, found in leaf litter, M. Gray, G. Milledge and H. Smith; Fire road No. 9, Woronora Dam catchment (34°11'53"S 150°54'32"E), many specimens, 8–22 December 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; Fire road No. 9, east of Bee Creek, Woronora Dam catchment (34°08'53"S 150°55'37"E), 10 specimens, 8–22 December 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; 0.1 km northwest of Southern Freeway Overpass, Princes Highway, Woronora Dam catchment (34°11'31"S 150°57'58"E), 11 specimens, 8–22 December 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith.

Description. Based on holotype female. *Body* shape normally laterally compressed; cuticle calcification absent. *Eye* large (greater than ⅓ head length). *Antenna 2* longer than head and first 3 pereonites; peduncular articles narrow. *Mandible* left lacinia mobilis 4 dentate. *Maxilliped* outer plate distally acute/arcuate; palp dactylus present and distinct. *Pereonite 1* sternite without papillose process. *Gnathopod 1* not sexually dimorphic; simple; merus and carpus not expanded; propodus subrectangular; palm absent; dactylus longer than palm. *Gnathopod 2* not sexually dimorphic; chelate; narrow; merus and carpus expanded posteriorly; propodus "mitten-like"; palm obtuse; smooth; dactylus shorter than palm. *Pereopods 3–7* long (½ length of body); simplidactylate. *Pereopod 4* carpus similar in length to pereopod 3 carpus, dactylus similar to pereopod 3 dactylus. *Pereopod 7* posterodistal lobe present. *Gill 2* lobate, not incised. *Gills 3–5* lobate, smaller than gills 2 and 6. ***Gill 6*** lobate, ***anterior and posterior margins smooth, apically incised***. *Oostegites* long (length greater than 2× width), strongly setose, setae with simple smooth tips. *Epimera 1 to 3* not convergent. *Epimeron 2* longer than epimeron 3. *Epimeron 3* posteroventral margin smooth, posteroventral corner with small subacute tooth. *Pleopod 1* well developed, biramous, rami shorter than peduncle; inner ramus with 11 articles; outer ramus with 11 articles, outer ramus with more than 10 articles. ***Pleopod 2*** well developed, biramous, ***rami subequal in length to peduncle***; inner ramus with 12 articles, ***inner ramus with more than 10 articles***; outer ramus with 12 articles. *Pleopod 3* reduced, uniramous, rami shorter than peduncle; inner ramus with 1 articles; outer ramus without articles. *Uropod 1* not sexually dimorphic; peduncle with 5 robust setae on peduncle; inner ramus subequal in length to outer ramus, with 4 robust setae on the margins, with 4 apical robust setae; outer ramus without marginal robust setae, with 4 apical robust setae. *Uropod 2* not sexually dimorphic; peduncle with 4 robust setae; inner ramus subequal in length to outer ramus, with 3 marginal robust setae, 4 apical robust setae; outer ramus without marginal robust setae, with 4 apical robust setae. *Uropod 3* peduncle with 1 robust setae; ramus shorter than peduncle, ramus linear (narrowing), with 2 robust setae. *Telson* longer than broad, incised to half the length, with marginal and apical robust setae, with 3–5 robust setae per lobe.

Etymology. Named after the town Bundeena, located on the edge of the Royal National Park, near the type locality, and treated as a noun in apposition.

Remarks. *Arcitalitrus bundeena* appears to be isolated from other *Arcitalitrus* species. It is excluded from the "Sylvaticus" species group because it has smooth anterior and posterior margins on gill 6 without an apically incised posterior margin, and the rami of pleopod 1 are shorter than the peduncle. It is excluded from the "Dorrieni" species group because of the small posteroventral cusp on epimeron 3. It is excluded from both groups by the large number of articles in the outer ramus of pleopod 2 and the large number of robust setae on the inner ramus of uropod 2. *Arcitalitrus bundeena* differs from all species in the genus, except *Ar. nana*, in having the telson incised about halfway.

Distribution. New South Wales: Royal National Park; Woronora Dam catchment.

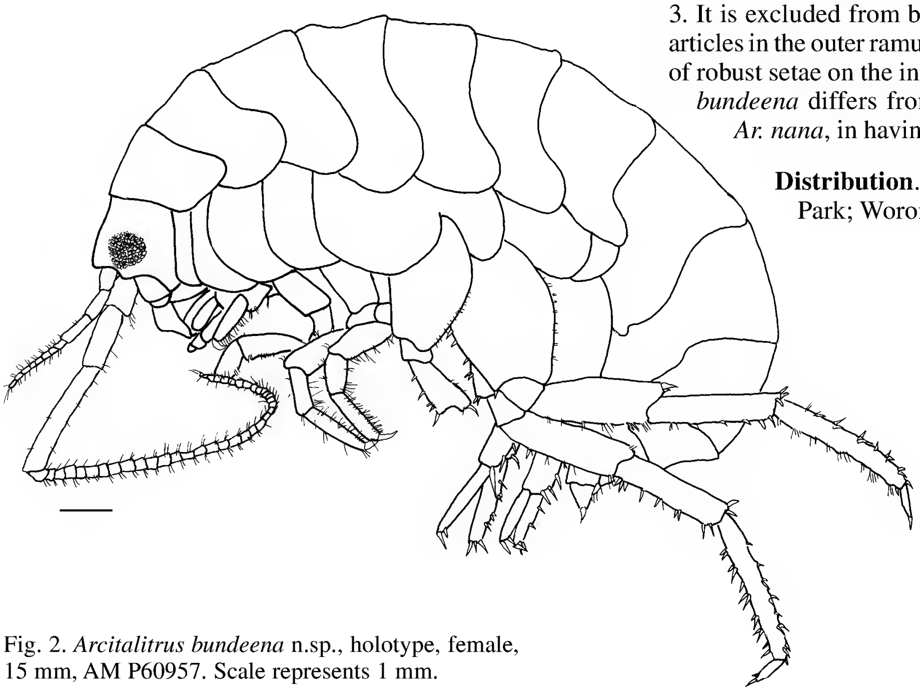

Fig. 2. *Arcitalitrus bundeena* n.sp., holotype, female, 15 mm, AM P60957. Scale represents 1 mm.

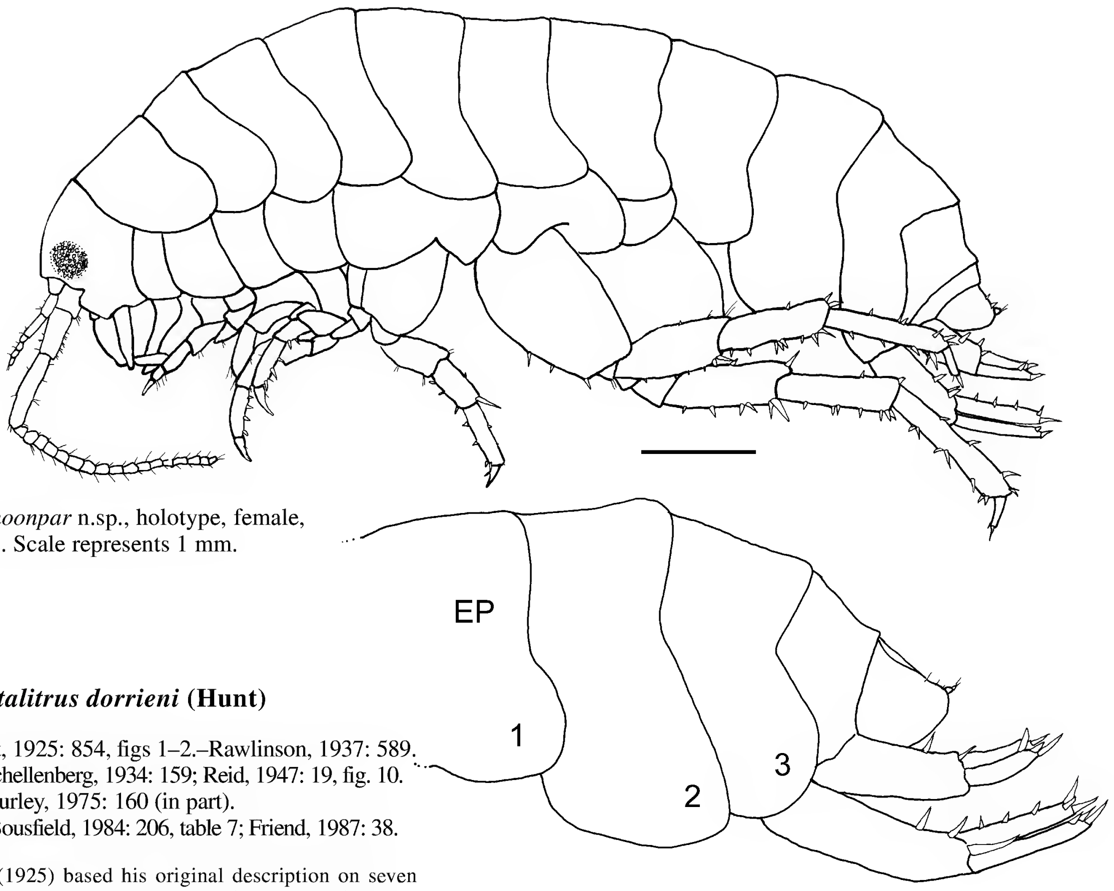

Fig. 3. *Arcitalitrus moonpar* n.sp., holotype, female, 9.0 mm, AM P60962. Scale represents 1 mm.

Arcitalitrus dorrieni (Hunt)

Talitrus dorrieni Hunt, 1925: 854, figs 1–2.–Rawlinson, 1937: 589.
Talitroides dorrieni.–Schellenberg, 1934: 159; Reid, 1947: 19, fig. 10.
Talitrus sylvaticus.–Hurley, 1975: 160 (in part).
Arcitalitrus dorrieni.–Bousfield, 1984: 206, table 7; Friend, 1987: 38.

Type material. Hunt (1925) based his original description on seven specimens, two males, four females and one juvenile. He described and illustrated one of the adult males, a specimen 13 mm in length; partially described and made a habitus illustration of one adult female, a specimen 15 mm in length, and partially described the immature specimen. All of this material should be considered as a syntype series, the whereabouts of which is unknown.

Type locality. Among moist humus and under dead leaves in the gardens of Tresco Abbey, Scilly Isles, Great Britain.

Diagnosis. Gill 6 apically incised. Pleopod 3 rami absent. Uropod 3 peduncle with 2 robust setae. Telson entire, with more than 10 robust setae.

Remarks. *Arcitalitrus dorrieni* was in synonymy with *Ar. sylvaticus* until Bousfield (1984) resurrected it as a valid species. Friend (1987) distinguished it from *Ar. sylvaticus* by gill 6 that is strongly cleft in *Ar. dorrieni*. This species was originally described from the Scilly Isles, but is apparently native to New South Wales, where it is known from Blackheath, in the Blue Mountains (Schellenberg, 1934). Material from Cambewarra Mountain, near Nowra, in the collections of the Australian Museum was identified as *Ar. dorrieni* by Dr A. Friend. *Arcitalitrus dorrieni* does not occur in any areas studied during this project.

Arcitalitrus dorrieni differs from the only other species in the "Dorrieni" species group in having strongly setose oostegites, a subquadrate posteroventral corner on epimeron 3, more than 5 articles on the rami of pleopods 1 and 2, no rami on pleopod 3 and more than 10 dorsal robust setae on the telson.

Distribution. New South Wales: Blackheath, Blue Mountains (Schellenberg, 1934); Cambewarra Mountain, near Nowra (AM).

Arcitalitrus moonpar n.sp.

Figs. 3, 15–17

Type material. HOLOTYPE, ♀, 9.0 mm, AM P60962, December 1999, M. Gray, G. Milledge and H. Smith. PARATYPES, 30 specimens AM P60963. Paratypes are all from the type locality.

Type locality. Three km southwest of Mangrove Mountain (33°22'28"S 151°15'39"E), New South Wales.

Other material examined. New South Wales, Australia: end of Darkes Forest, Woronora Dam Catchment (34°12'51"S 150°54'E), 8 specimens, 8–22 December 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; junction of Urumbilum Creek road and Loudens road, Orara State Forest (30°19'35"S 152°55'00"E), 3 specimens, 9–23 December 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; end of Little North Arm road, west bank of Rosewood River, Dorrigo National Park (30°24'06"S 152°46'18"E), 35 specimens, 10–24 November 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; beside Hacking River, Lady Wakehurst Drive, Royal National Park (34°09'47"S 151°00'55"E), 40 specimens, 6–20 December 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; junction of Moonpar and Mills roads, Moonpar State Forest (30°14'36"S 152°37'32"E), 15 specimens, 9–23 December 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; 2 km south southwest of Bostobrick, Christophersons Mountain (30°17'45"S 152°37'04"E), 55 specimens, 9–23 November 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; nearly 0.3 km east of Artillery Hill, Sir Bertram Stevens Drive, Royal National Park (34°04'55"S 151°03'40"E), 1 specimen, 6–20 December 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; Horseshoe road, 3.5 km southeast of Thora, Scotchman State Forest (30°26'25"S 152°47'30"E), 1 specimen, 10–24 November 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith.

Description. Based on holotype female. *Body* shape normally laterally compressed. Cuticle calcification absent. *Eye* medium (⅕–⅓ head length). *Antenna 2* longer than head and first 3 pereonites; peduncular articles narrow. *Mandible* left lacinia mobilis 4 dentate. *Maxilliped* outer plate distally acute/arcuate; palp dactylus present and distinct. *Pereonite 1* sternite without papillose process. *Gnathopod 1* not sexually dimorphic; simple; merus and carpus not expanded; propodus subrectangular; palm absent; dactylus longer than palm. *Gnathopod 2* not sexually dimorphic; chelate; narrow; merus and carpus expanded posteriorly; propodus "mitten-like"; palm obtuse; smooth; dactylus shorter than palm. *Pereopods 3–7* long (½ length of body); simplidactylate. *Pereopod 4* carpus similar in length to pereopod 3 carpus, dactylus similar to pereopod 3 dactylus. *Pereopod 7* posterodistal lobe present. *Gill 2* lobate, not incised. *Gills 3–5* lobate, smaller than gills 2 and 6. *Gill 6* lobate, anterior and posterior margins smooth, apically incised. ***Oostegites*** long (length greater than 2× width), ***weakly setose***, setae with simple smooth tips. *Epimera 1 to 3* not convergent. *Epimeron 2* longer than epimeron 3. ***Epimeron 3*** posteroventral margin smooth, ***posteroventral corner rounded***. *Pleopod 1* well developed, biramous, rami shorter than peduncle; inner ramus with 6 articles; outer ramus with 5 articles, outer ramus with 1–5 articles. *Pleopod 2* well developed, biramous, rami shorter than peduncle; inner ramus with 5 articles, inner ramus with 1–5 articles; outer ramus with 4 articles. *Pleopod 3* reduced, uniramous, rami shorter than peduncle; inner ramus with 1 articles; outer ramus without articles. ***Uropod 1*** not sexually dimorphic; peduncle with 4 robust setae on peduncle; inner ramus shorter than outer ramus, with 3 robust setae on the margins, with 4 apical robust setae; ***outer ramus*** without marginal robust setae***, with 2 apical robust setae***. *Uropod 2* not sexually dimorphic; peduncle with 3 robust setae; inner ramus subequal in length to outer ramus, with 1 marginal robust seta, 5 apical robust setae; outer ramus without marginal robust setae, with 4 apical robust setae. *Uropod 3* peduncle with 1 robust seta; ramus shorter than peduncle, ramus bud-like (broad), with 2 robust setae. *Telson* as broad as long, entire, with marginal and apical robust setae, with 3–5 robust setae per lobe.

Etymology. Named after Moonpar State Forest, within the range of *Ar. moonpar* and treated as a noun in apposition.

Habitat. Forest floor leaf-litter.

Remarks. *Arcitalitrus moonpar* is a member of the "Dorrieni" species group. It differs from the only other species in the group, *Ar. dorrieni*, in having weakly setose oostegites, a rounded posteroventral corner on epimeron 3, a reduced number of articles on the outer ramus of pleopod 1 and both rami of pleopod 2, a uniramous pleopod 3 and 8 (6 to 10) dorsal robust setae on the telson.

Distribution. New South Wales: southwest of Mangrove Mountain; on the shores of the Hacking River, Royal National Park; Woronora Dam Catchment; Orara State Forest; Dorrigo National Park; Moonpar State Forest; Christophersons Mountain; Scotchman State Forest.

Arcitalitrus nana n.sp.

Figs. 4, 18–20

Type material. Holotype, ♀, 15.0 mm, AM P60956, December, 1999, M. Gray, G. Milledge and H. Smith. Paratypes, male AM P60955; 35 specimens, AM P60964. Paratypes are all from the type locality.

Type locality. Five km ENE of Lowanna, Nana Creek State Forest (30°11'51"S 152°56'53"E) New South Wales.

Other material examined. New South Wales, Australia: Junction of Urumbilum Creek road and Loudens road, Orara State Forest (30°19'35"S 152°55'00"E), 5 specimens, 9–23 December 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; nearly 2 km east of Mount Kariong, Brisbane Water National Park (33°27'50"S 151°17'04"E), 40 specimens, 1–15 December 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; end of Little North Arm road, west bank of Rosewood River, Dorrigo National Park (30°24'06"S 152°46'18"E), 25 specimens, 10–24 November 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; Reids Creek road, Gladstone State Forest (30°31'01"S 152°48'29"E), 20 specimens, 12–25 November 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; beside Hacking River, Lady Wakehurst Drive, Royal National Park (34°09'47"S 151°00'55"E), 35 specimens, 6–20 December 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; approximately 0.3 km east of Artillery Hill, Sir Bertram Stevens Drive, Royal National Park (34°04'55"S 151°03'40"E), 28 specimens, 6–20 December 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith; 3 km northwest of Caledonia Knob, Bagawa State Forest (30°08'44"S 152°55'47"E), 37 specimens, 10–23 November 1999, collected from pitfall traps, M. Gray, G. Milledge and H. Smith.

Description. Based on holotype female. *Body* shape normally laterally compressed; cuticle calcification absent. *Eye* large (greater than ⅓ head length). *Antenna 2* longer than head and first 3 pereonites; peduncular articles narrow. *Mandible* left lacinia mobilis 4 dentate. *Maxilliped* outer plate distally acute/arcuate; palp dactylus present and distinct. *Pereonite 1* sternite without papillose process. *Gnathopod 1* not sexually dimorphic; simple; merus and carpus not expanded; propodus subrectangular; palm absent; dactylus longer than palm. *Gnathopod 2* not sexually dimorphic; chelate; narrow; merus and carpus expanded posteriorly; propodus "mitten-like"; palm obtuse; smooth; dactylus shorter than palm. *Pereopods 3–7* long (½ length of body); simplidactylate. *Pereopod 4* carpus similar in length to pereopod 3 carpus, dactylus similar to pereopod 3 dactylus. *Pereopod 7* posterodistal lobe present. *Gill 2* lobate, not incised. *Gills 3–5* lobate, smaller than gills 2 and 6. ***Gill 6* lobate, *anterior margin convoluted, subapically incised along posterior margin***. *Oostegites* long (length greater than 2× width), weakly setose, setae with simple smooth tips. *Epimera 1 to 3* not convergent. *Epimeron 2* subequal in length to epimeron 3. *Epimeron 3* posteroventral margin smooth, posteroventral corner with small subacute tooth. ***Pleopod 1*** well developed, biramous, rami subequal in length to peduncle; inner ramus with 13 articles; outer ramus with 11 articles, ***outer ramus with more than 10 articles***. *Pleopod 2* well developed, biramous, rami shorter than peduncle; inner ramus with 8 articles; outer ramus with 6 articles. *Pleopod 3* reduced, uniramous, rami shorter than peduncle; inner ramus with 1 articles; outer ramus without articles. *Uropod 1* not sexually dimorphic; peduncle with 4 robust setae on peduncle; inner ramus shorter than outer ramus, with 4 robust setae on the margins, with 4 apical robust setae; outer ramus without marginal

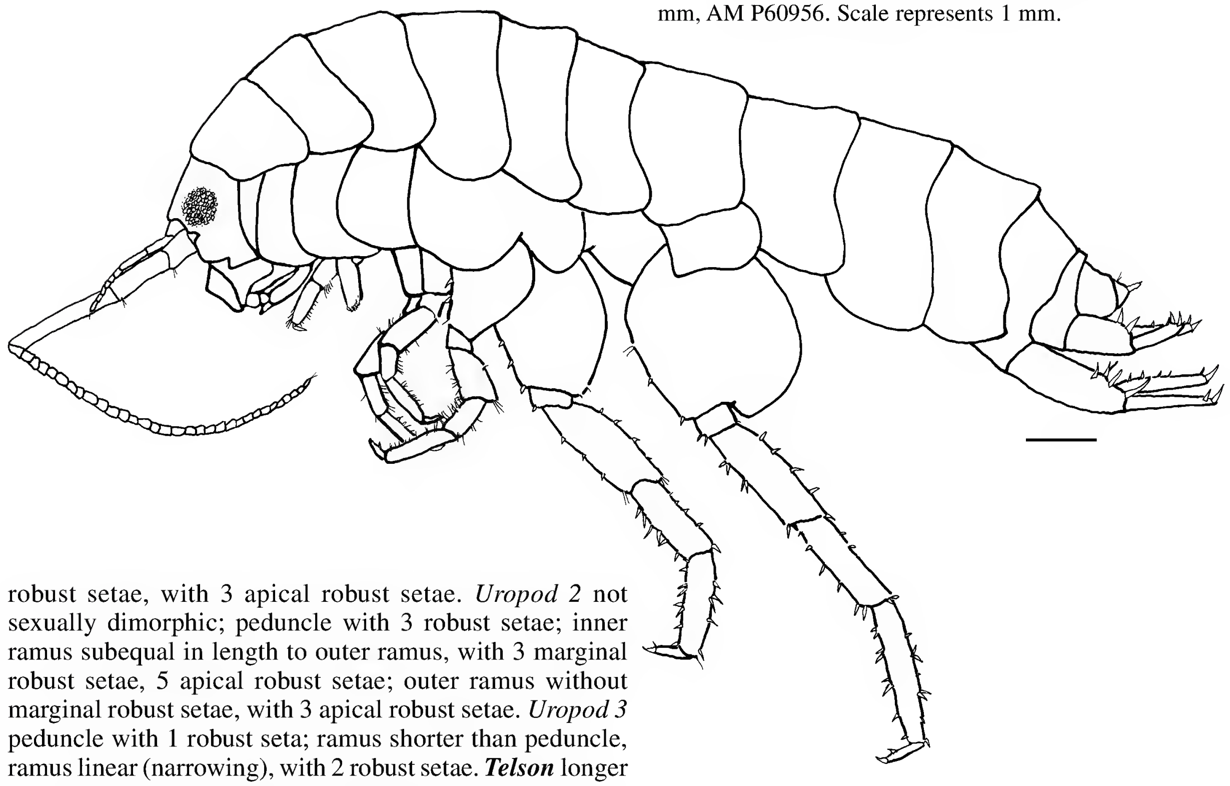

Fig. 4. *Arcitalitrus nana* n.sp., holotype, female, 15.0 mm, AM P60956. Scale represents 1 mm.

robust setae, with 3 apical robust setae. *Uropod 2* not sexually dimorphic; peduncle with 3 robust setae; inner ramus subequal in length to outer ramus, with 3 marginal robust setae, 5 apical robust setae; outer ramus without marginal robust setae, with 3 apical robust setae. *Uropod 3* peduncle with 1 robust seta; ramus shorter than peduncle, ramus linear (narrowing), with 2 robust setae. ***Telson*** longer than broad, ***incised to half the length***, with marginal and apical robust setae, with more than 10 robust setae.

Etymology. Named for Nana Creek State Forest, the type locality and treated as a noun in apposition.

Habitat. Forest floor leaf-litter.

Remarks. *Arcitalitrus nana* is a member of the "sylvaticus" species group. It differs from other species in the group in having a uniramous pleopod 3, in having 3–5 marginal robust setae on the inner ramus of uropod 2 and in having the telson incised halfway. *Arcitalitrus nana* and *Ar. orara* both have large eyes. *Arcitalitrus nana* and *Ar. belbucca* both have more than 10 dorsal robust setae on the telson and both species, plus *Ar. orara*, have the inner ramus of uropod 1 shorter than the outer. *Arcitalitrus nana* and *Ar. belbucca* and *Ar. bassianus* all have pleopod 2 outer ramus with 6–10 articles.

Distribution. New South Wales: Lowanna, Nana Creek State Forest; Caledonia Knob, Bagawa Creek State Forest; Orara State Forest; Brisbane Water National Park; Dorrigo National Park; Gladstone State Forest; Royal National Park.

Arcitalitrus orara n.sp.

Figs. 5, 21–23

Type material. HOLOTYPE, ♀, 11.0 mm, AM P60954, December 1999, M. Gray, G. Milledge and H. Smith. PARATYPES, ♀ AM P60953; 3 specimens, AM P60952. Paratypes are all from the type locality.

Type locality. Junction of Urumbilum Creek road and Loudens road, Orara State Forest (30°19'35"S 152°55'00"E), New South Wales.

Other material examined. New South Wales, Australia: approximately 1.2 km south of Killiekrankie Mountain, Horseshoe road, Oakes State Forest (30°30'10"S 152°32'15"E), 7 specimens, 11–24 November 1999, collected using pitfall traps, M. Gray, G. Milledge and H. Smith; America Bay Track, Kuring-gai Chase National Park (33°36'10"S 151°16'16"E), 10 specimens, 2–16 December 1999, collected using pitfall traps, M. Gray, G. Milledge and H. Smith; nearly 2 km east of Mount Kariong, Brisbane Water National Park (33°27'50"S 151°17'04"E), 42 specimens, 1–15 December 1999, collected using pitfall traps, M. Gray, G. Milledge and H. Smith; end of Little North Arm road, west bank of Rosewood River, Dorrigo National Park (30°24'06"S 152°46'18"E), 35 specimens, 10–24 November 1999, collected using pitfall traps, M. Gray, G. Milledge and H. Smith; Rickersby road, Gladstone State Forest (30°32'46"S 152°45'07"E), 10 specimens, 12–25 November 1999, collected using pitfall traps, M. Gray, G. Milledge and H. Smith; 0.5 km north northeast of junction with Zeehan road, Cooks Creek Trail (30°31'30"S 152°44'40"E), 27 specimens, 12–25 November 1999, collected using pitfall traps, M. Gray, G. Milledge and H. Smith; junction of Moonpar and Mills road, Moonpar State Forest (30°14'36"S 152°37'33"E), 19 specimens, 9–23 December 1999, collected using pitfall traps, M. Gray, G. Milledge and H. Smith; 2 km south southwest of Bostobrick, Cristophersons Mountain, 30°17'45"S 152°37'04"E, 30 specimens, 9–23 November 1999, collected using pitfall traps, M. Gray, G. Milledge and H. Smith; Pacific Highway, 0.7 km southeast of Bird Gully Swamp, Muogamarra Nature Reserve (33°33'42"S 151°11'15"E), 45 specimens, 2–16 December 1999, collected using pitfall traps, M. Gray, G. Milledge and H. Smith; Sirius road, approximately 2 km from junction with Horseshoe road, Oakes State Forest (30°29'19"S 152°35'27"E), 15 specimens, 11–24 November 1999, collected using pitfall traps, M. Gray, G. Milledge and H. Smith; Horseshoe road, approximately 0.5 km north of Scotchman Peak, Diehappy State Forest (30°28'30"S 152°39'43"E), 3 specimens, November 1999, collected using pitfall traps, M. Gray, G. Milledge and H. Smith; Horseshoe road, 3.5 km southeast of Thora, Scotchman State Forest (30°26'25"S 152°47'30"E), 9 specimens, 10–24 November 1999, collected using pitfall traps, M. Gray, G. Milledge and H. Smith.

Description. Based on holotype female. *Body* shape normally laterally compressed; cuticle calcification absent. *Eye* large (greater than ⅓ head length). *Antenna 2* longer than head and first 3 pereonites; peduncular articles narrow.

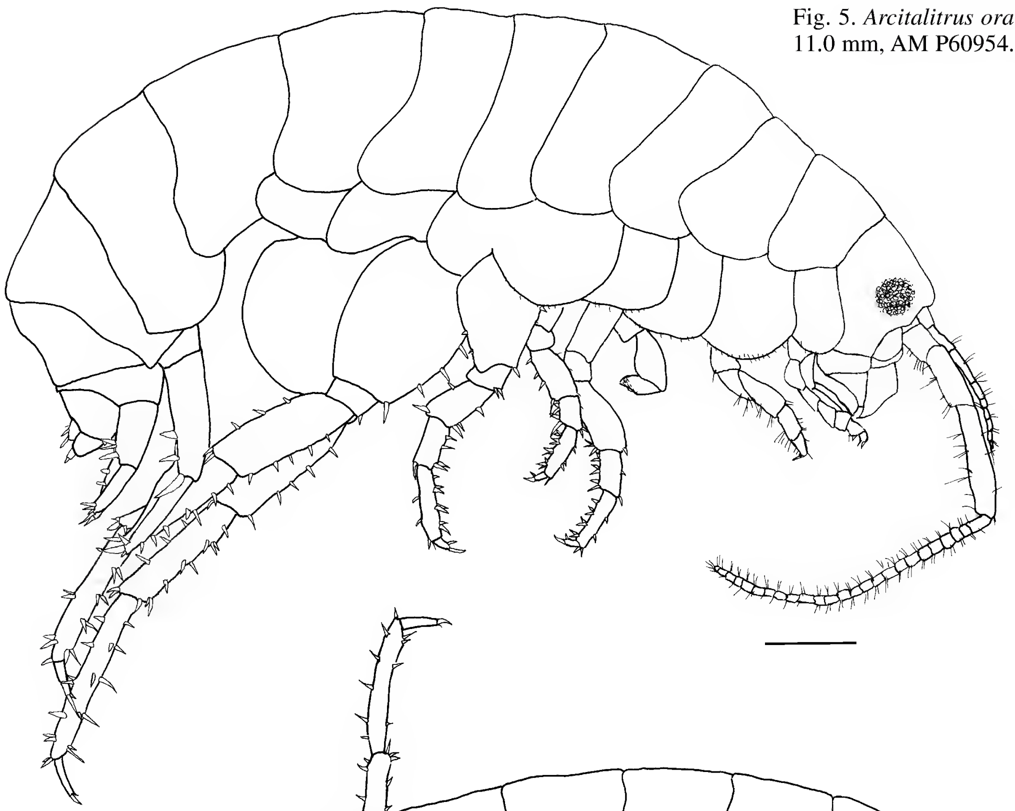

Fig. 5. *Arcitalitrus orara* n.sp., holotype, female, 11.0 mm, AM P60954. Scale represents 1 mm.

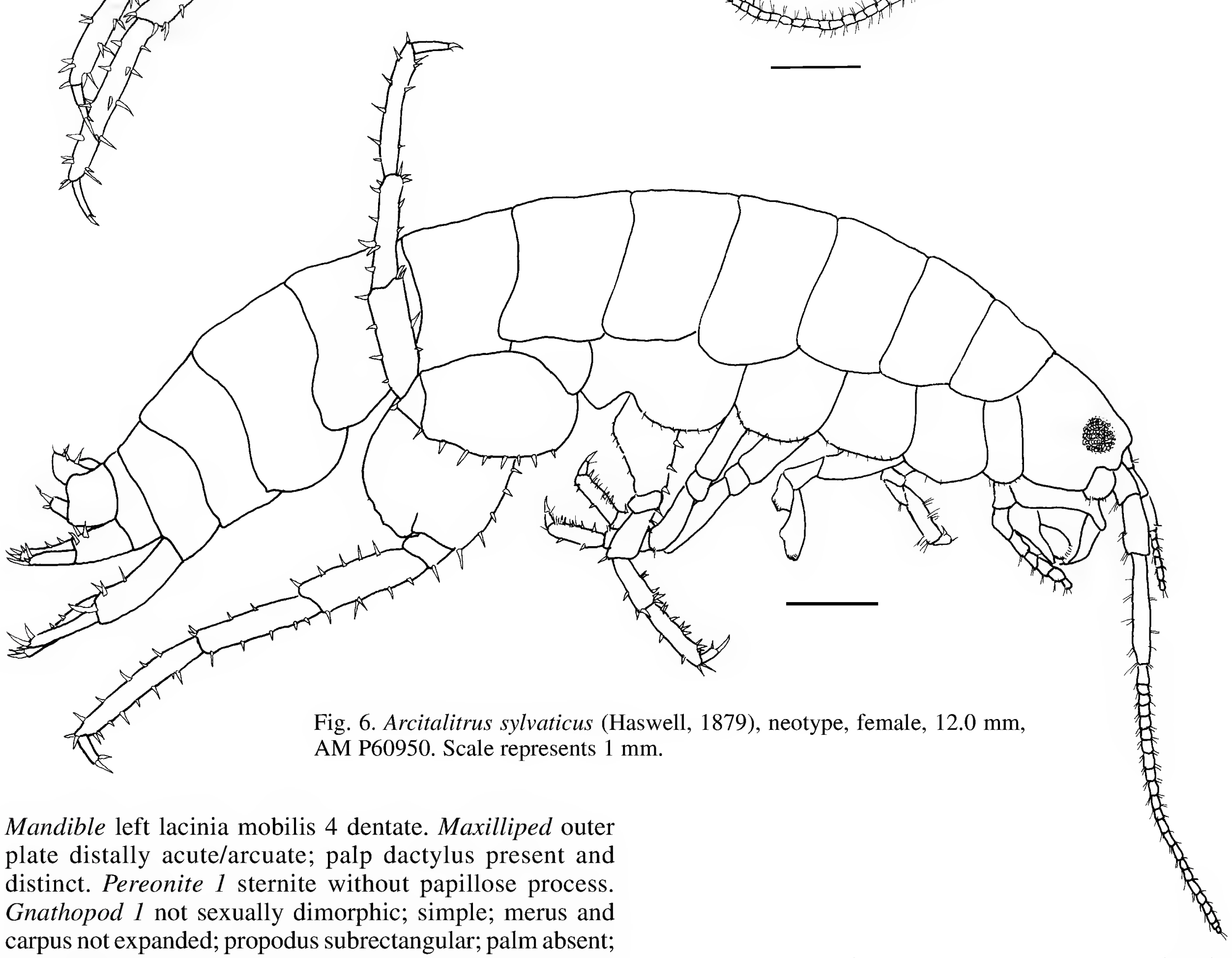

Fig. 6. *Arcitalitrus sylvaticus* (Haswell, 1879), neotype, female, 12.0 mm, AM P60950. Scale represents 1 mm.

Mandible left lacinia mobilis 4 dentate. *Maxilliped* outer plate distally acute/arcuate; palp dactylus present and distinct. *Pereonite 1* sternite without papillose process. *Gnathopod 1* not sexually dimorphic; simple; merus and carpus not expanded; propodus subrectangular; palm absent; dactylus longer than palm. *Gnathopod 2* not sexually dimorphic; chelate; narrow; merus and carpus expanded posteriorly; propodus "mitten-like"; palm obtuse; smooth; dactylus shorter than palm. *Pereopods 3–7* long (½ length of body); simplidactylate. *Pereopod 4* carpus similar in length to pereopod 3 carpus, dactylus similar to pereopod 3 dactylus. *Pereopod 7* posterodistal lobe present. *Gill 2* lobate, not incised. *Gills 3–5* lobate, smaller than gills 2 and 6. ***Gill 6*** lobate, anterior margin convoluted, ***subapically incised along posterior margin***. *Oostegites* long (length greater than 2× width), weakly setose, setae with simple smooth tips. *Epimera 1 to 3* not convergent. ***Epimeron 2 subequal in length to epimeron 3***. *Epimeron 3* posteroventral margin smooth, posteroventral corner with small subacute tooth. *Pleopod 1* well developed, biramous, rami subequal in length to peduncle; inner ramus with 11 articles; outer ramus with 8 articles, outer ramus with 6–10 articles. *Pleopod 2* well developed, biramous, rami shorter than peduncle; inner ramus with 7 articles; outer ramus with 5 articles. *Pleopod 3* reduced, rami absent. *Uropod 1* not sexually dimorphic; peduncle with 6 robust setae on peduncle; inner ramus shorter than outer ramus, with 3 robust setae on the margins, with 3 apical robust setae; outer ramus without marginal robust setae, with 3 apical robust setae. *Uropod 2* not sexually dimorphic; peduncle with 3 robust setae; inner ramus subequal in length to outer ramus, with 2 marginal robust setae, 4 apical robust setae; outer ramus without marginal robust setae, with 3 apical robust setae. ***Uropod 3*** peduncle with 1 robust setae; ramus shorter than peduncle, ***ramus bud-like (broad)***, with 2 robust setae. ***Telson*** as broad as long, ***entire***, with marginal and apical robust setae, with 3–5 robust setae per lobe.

Etymology. Named for Orara State Forest, the type locality and treated as a noun in apposition.

Habitat. Forest floor leaf-litter.

Remarks. *Arcitalitrus orara* is a member of the "sylvaticus" species group. It differs from other species in the group in having bud-like rami on uropod 3, an entire telson and, except for *Ar. nana*, in having a large eye. *Arcitalitrus orara* and *Ar. sylvaticus* both have reduced numbers of articles on the outer ramus of pleopod 2. Arcitalitrus orara, *Ar. belbucca* and *Ar. nana* all have the inner ramus of uropod 1 shorter than the outer.

Distribution. New South Wales: Orara State Forest; Oakes State Forest; Kuring-gai Chase National Park; Brisbane Water National Park; Dorrigo National Park; Gladstone State Forest; Cooks Creek Trail; Moonpar State Forest; Cristophersons Mountain; Muogamarra Nature Reserve; north of Scotchman Peak, Diehappy State Forest; Scotchman State Forest.

Arcitalitrus sylvaticus (Haswell)

Figs. 6, 24–26

Talitrus sylvaticus Haswell, 1879: 246, pl. 7, fig. 1; Stebbing, 1906: 524; Sayce, 1909: 30; Chilton, 1916: 83; Clark, 1955: 253–257; Ingle, 1958: 591–592 (probably *Ar. dorrieni*); Shoemaker, 1936; Bousfield & Carlton, 1967: 282; Bousfield, 1975: 353 (key).

Talitrus (Arcitalitrus) sylvaticus.–Hurley, 1975: 161.

Arcitalitrus sylvaticus.–Bousfield, 1982: 55; Bousfield, 1984: 206, table 7; Lazo-Wasem, 1983: 213; Lazo-Wasem, 1984: 343; Friend, 1987: 35, 38; Duncan, 1994: 11, pl 1.

Not *Talitrus sylvaticus*.–Thomson, 1893: 59, pl. iv, figs 1,2,4,7,9,10 (part= *Mysticotalitrus cryptus* Friend, 1987; part= *Keratroides vulgaris* Friend, 1979). Chevreux, 1901: 392, fig. 7 (= *Arcitalitrus bassianus* Friend, 1987). Smith, 1909: 79. Hale, 1929: 218, fig. 216 (= *Austrotroides crenatus* Friend, 1982). Ruffo, 1949: 206 (part = *Keratroides vulgaris* Friend, 1979).

Type material. *Neotype*. Female, 12.0 mm, AM P60950.

Type locality. Nurragingy Reserve, Rooty Hill (33°46'S 150°51'E), Sydney, Australia.

Description. Based on neotype female. *Body* shape normally laterally compressed; cuticle calcification absent. *Eye* medium (⅕–⅓ head length). *Antenna 2* longer than head and first 3 pereonites; peduncular articles narrow. *Maxilliped* outer plate distally acute/arcuate; palp dactylus present and distinct. *Pereonite 1* sternite without papillose process. *Gnathopod 1* not sexually dimorphic; simple; merus and carpus not expanded; propodus subrectangular; palm absent; dactylus longer than palm. *Gnathopod 2* not sexually dimorphic; chelate; narrow; merus and carpus expanded posteriorly; propodus "mitten-like"; palm obtuse; smooth; dactylus shorter than palm. *Pereopods 3–7* long (½ length of body); simplidactylate. *Pereopod 4* carpus similar in length to pereopod 3 carpus, dactylus similar to pereopod 3 dactylus. *Pereopod 7* posterodistal lobe present. *Gill 2* lobate, not incised. *Gills 3–5* simple or lobate, smaller than gills 2 and 6. ***Gill 6*** lobate, ***anterior margin convoluted, subapically incised along posterior margin***. ***Oostegites*** long (length greater than 2× width), ***strongly setose***, setae with simple smooth tips. *Epimera 1 to 3* not convergent. *Epimeron 2* subequal in length to epimeron 3. *Epimeron 3* posteroventral margin smooth, posteroventral corner with small subacute tooth. ***Pleopod 1*** well developed, biramous, ***rami subequal in length to peduncle***; inner ramus with 13 articles; outer ramus with 10 articles. *Pleopod 2* well developed, biramous, rami subequal in length to peduncle; inner ramus with 8 articles; outer ramus with 3 articles, outer ramus with 1–5 articles. *Pleopod 3* reduced, rami absent. ***Uropod 1*** not sexually dimorphic; peduncle with 4 robust setae on peduncle; inner ramus subequal in length to outer ramus, with 2 robust setae on the margins, ***with 1–2 robust setae***, with 5 apical robust setae; outer ramus without marginal robust setae, with 4 apical robust setae. *Uropod 2* not sexually dimorphic; peduncle with 3 robust setae; inner ramus subequal in length to outer ramus, with 2 marginal robust setae, 5 apical robust setae; outer ramus without marginal robust setae, with 3 apical robust setae. *Uropod 3* peduncle with 1 robust seta; ramus shorter than peduncle, ramus linear (narrowing), with 2 robust setae. *Telson* as broad as long, apically incised, with marginal and apical robust setae, with 3–5 robust setae per lobe.

Habitat. Found in leaf litter under *Eucalyptus* trees.

Remarks. This specimen was collected in the Nurragingy Reserve, Rooty Hill, that is within the area described as the type locality. The habitat is extremely modified, but populations of *Ar. sylvaticus* occur beneath the weeds near the stream which runs through the reserve.

Arcitalitrus sylvaticus is a member of the "sylvaticus" species group, but it apparently has no special affinities with other species in the group. Within the group, only *Ar. sylvaticus* has strongly setose oostegites, only *Ar. sylvaticus* and *Ar. belbucca* have the subequal rami on pleopod 2 and only *Ar. sylvaticus* and *Ar. bassianus* have subequal rami on uropod 1 and an apically incised telson.

The species described as *Talitrus assimilis* Haswell, 1880 has been referred to at times (Haswell, 1885) as *Ar. sylvaticus*. Friend (1987) doubted the validity of *T. assimilis* and stated that it may be in the genus *Keratroides* or *Mysticotalitrus*.

Distribution. Along the Great Dividing Range of New South Wales and Victoria (Haswell, 1879; Sayce, 1909; Chilton, 1916; Schellenberg, 1934; Sandel, 1977; Friend, 1982; 1987).

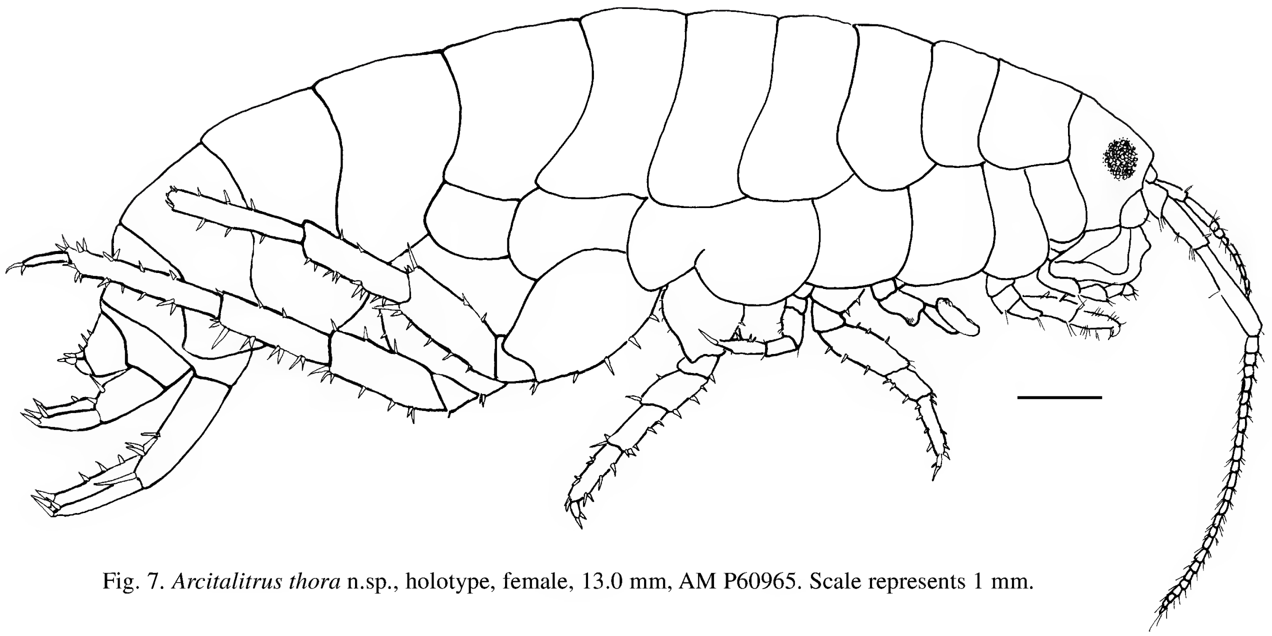

Fig. 7. *Arcitalitrus thora* n.sp., holotype, female, 13.0 mm, AM P60965. Scale represents 1 mm.

Arcitalitrus thora n.sp.

Figs. 7, 27–29

Type material. HOLOTYPE, ♀, 13.0 mm, AM P60965, M. Gray, G. Milledge and H. Smith December 1999. PARATYPES 15 specimens AM P60966. Paratypes are all from the type locality.

Type locality. Horseshoe Road, 3.5 km southeast of Thora, Scotchman State Forest (30°26'25"S 152°47'30"E).

Description. Based on holotype female. *Body* shape normally laterally compressed; cuticle calcification absent. *Eye* large (greater than ⅓ head length). *Antenna 2* longer than head and first 3 pereonites; peduncular articles narrow. *Mandible* left lacinia mobilis 5 dentate. *Maxilliped* outer plate distally acute/arcuate; palp dactylus present and distinct. *Gnathopod 1* not sexually dimorphic; simple; merus and carpus not expanded; propodus subrectangular; palm absent; dactylus longer than palm. *Gnathopod 2* not sexually dimorphic; chelate; narrow; merus and carpus expanded posteriorly; propodus "mitten-like"; palm obtuse; smooth; dactylus shorter than palm. *Pereopods 3–7* long (½ length of body); simplidactylate. *Pereopod 4* carpus similar in length to pereopod 3 carpus, dactylus similar to pereopod 3 dactylus. *Pereopod 7* posterodistal lobe present. *Gill 2* lobate, not incised. *Gills 3–5* lobate, smaller than gills 2 and 6. ***Gill 6*** lobate, ***posterior margin convoluted, apically incised***. ***Oostegites*** long (length greater than 2× width), ***weakly setose***, setae with simple smooth tips. *Epimera 1 to 3* not convergent. ***Epimeron 2 subequal in length to epimeron 3***. *Epimeron 3* posteroventral margin smooth, posteroventral corner with small subacute tooth. *Pleopod 1* well developed, biramous, rami shorter than peduncle; inner ramus with 12 articles; outer ramus with 9 articles. *Pleopod 2* well developed, biramous, rami shorter than peduncle; inner ramus with 12 articles; outer ramus with 11 articles, outer ramus with more than 10 articles. *Pleopod 3* reduced, rami absent. ***Uropod 1*** not sexually dimorphic; peduncle with 4 robust setae on peduncle; inner ramus subequal in length to outer ramus, with 3 robust setae on the margins, ***with 3–5 robust setae***, with 4 apical robust setae; outer ramus without marginal robust setae, with 4 apical robust setae. *Uropod 2* not sexually dimorphic; peduncle with 3 robust setae; inner ramus subequal in length to outer ramus, with 2 marginal robust setae, 3 apical robust setae; outer ramus without marginal robust setae, with 3 apical robust setae. *Uropod 3* peduncle with 1 robust setae; ramus shorter than peduncle, ramus bud-like (broad), with 2 robust setae. *Telson* longer than broad, apically incised, with marginal and apical robust setae, with 3–5 robust setae per lobe.

Etymology. Named for the village of Thora, near Scotchman State Forest, the type locality and treated as a noun in apposition.

Habitat. Forest floor leaf-litter.

Remarks. *Arcitalitrus thora* appears to be isolated from other *Arcitalitrus* species. It is excluded from the "sylvaticus" species group because it has smooth anterior margin on gill 6 with an apical incision, and the rami of pleopod 1 are shorter than the peduncle. It is excluded from the "Dorrieni" species group because epimeron 2 is subequal in length to epimeron 3, epimeron 3 has a small postero-ventral cusp and the telson is apically incised. It is excluded from both groups by the convoluted posterior margin on gill 6 and the large number of articles in the outer ramus of pleopod 2 and the large number of robust setae on the inner ramus of uropod 2.

Distribution. New South Wales: Scotchman State Forest.

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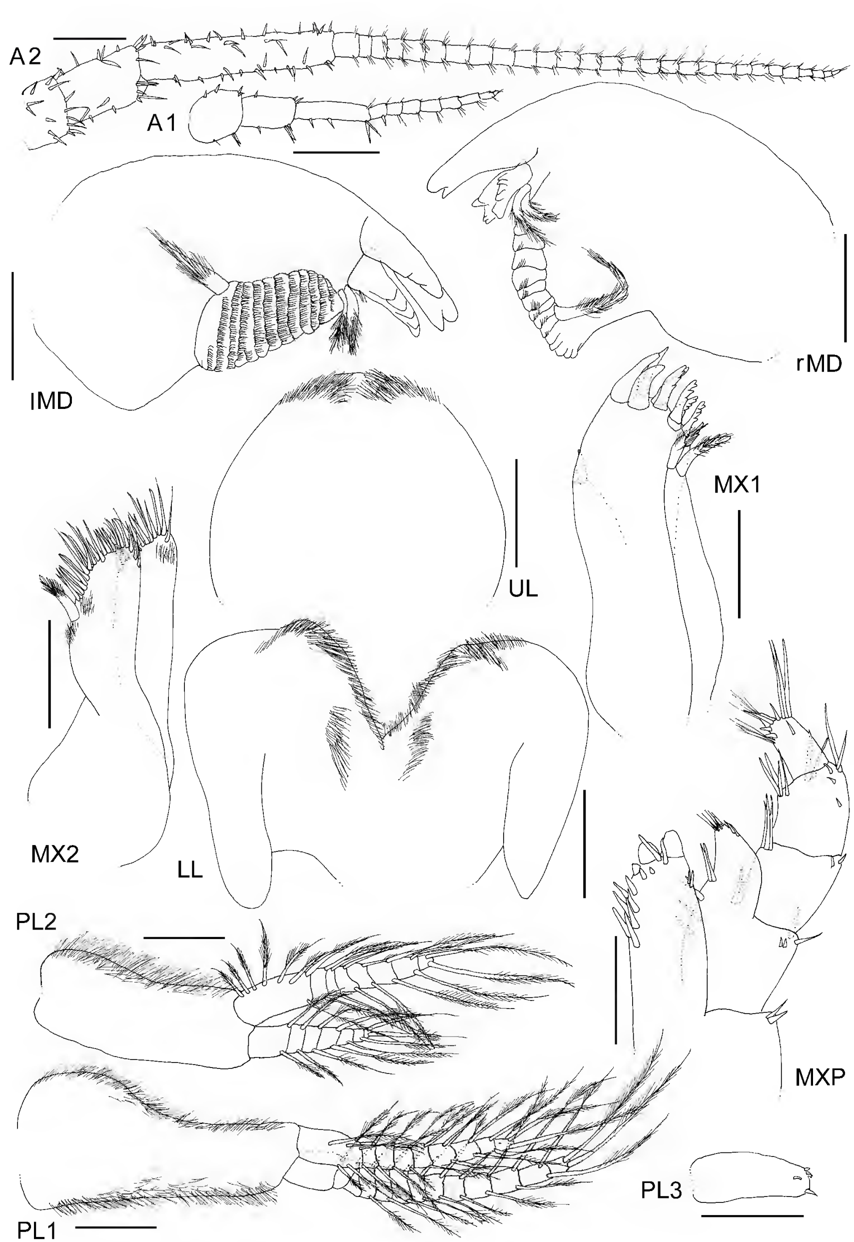

Fig. 8. *Arcitalitrus belbucca* n.sp., holotype, female, 14.0 mm, AM P60959. Scales represent 0.5 mm for antennae 1–2 and 0.2 mm for mouthparts and pleopods.

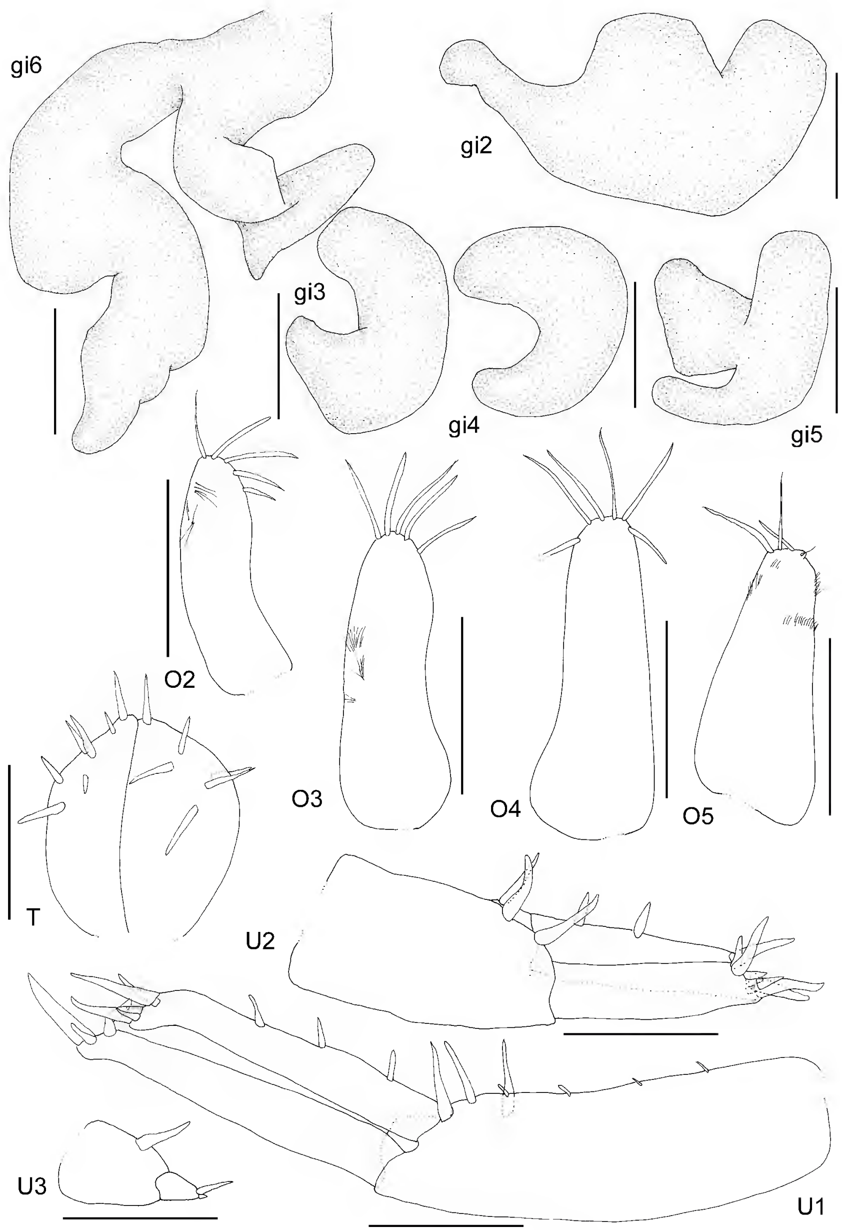

Fig. 9. *Arcitalitrus belbucca* n.sp., holotype, female, 14.0 mm, AM P60959. Scales represent 0.5 mm.

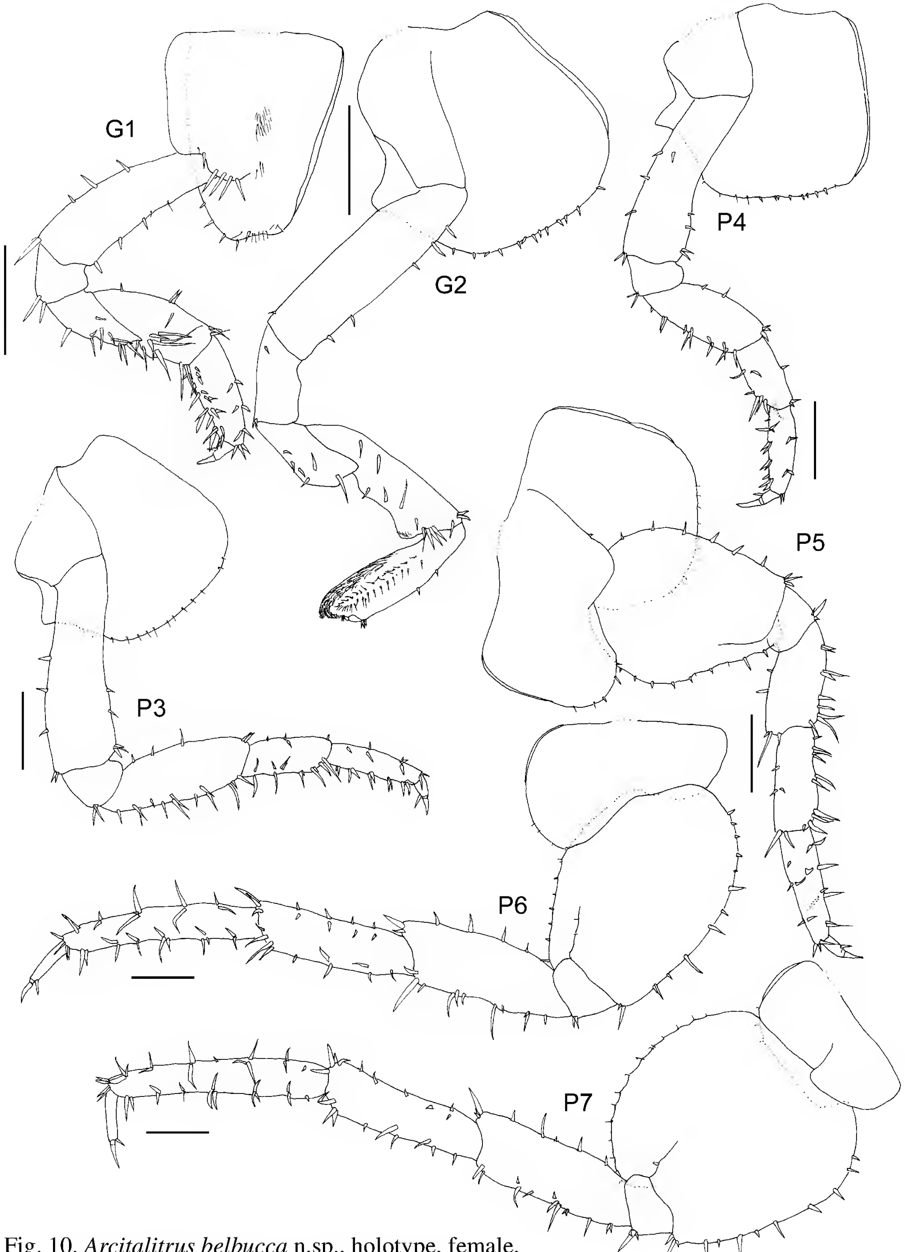

Fig. 10. *Arcitalitrus belbucca* n.sp., holotype, female, 14.0 mm, AM P60959. Scales represent 0.5 mm.

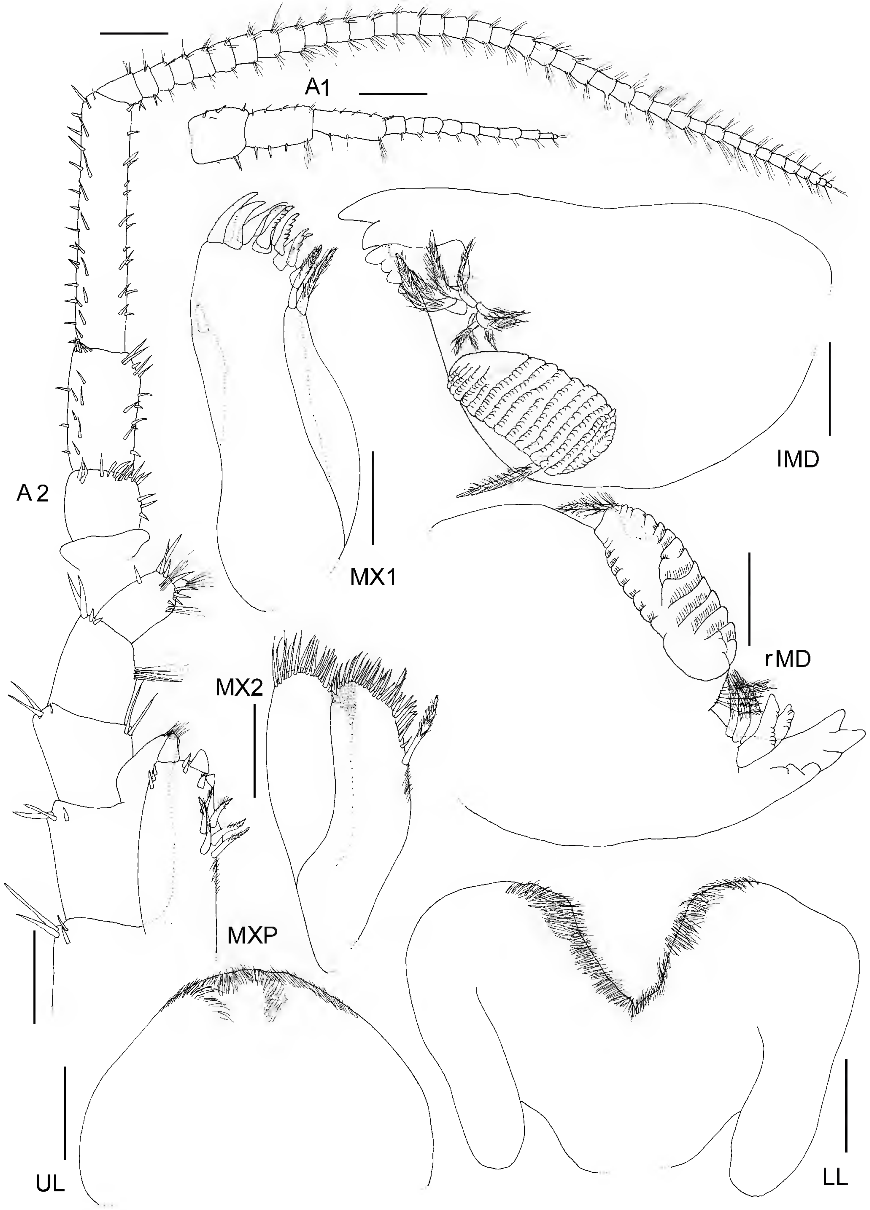

Fig. 11. *Arcitalitrus bundeena* n.sp., holotype, female, 15 mm, AM P60957. Scales represent 0.5 mm for antennae 1–2 and 0.2 mm for mouthparts.

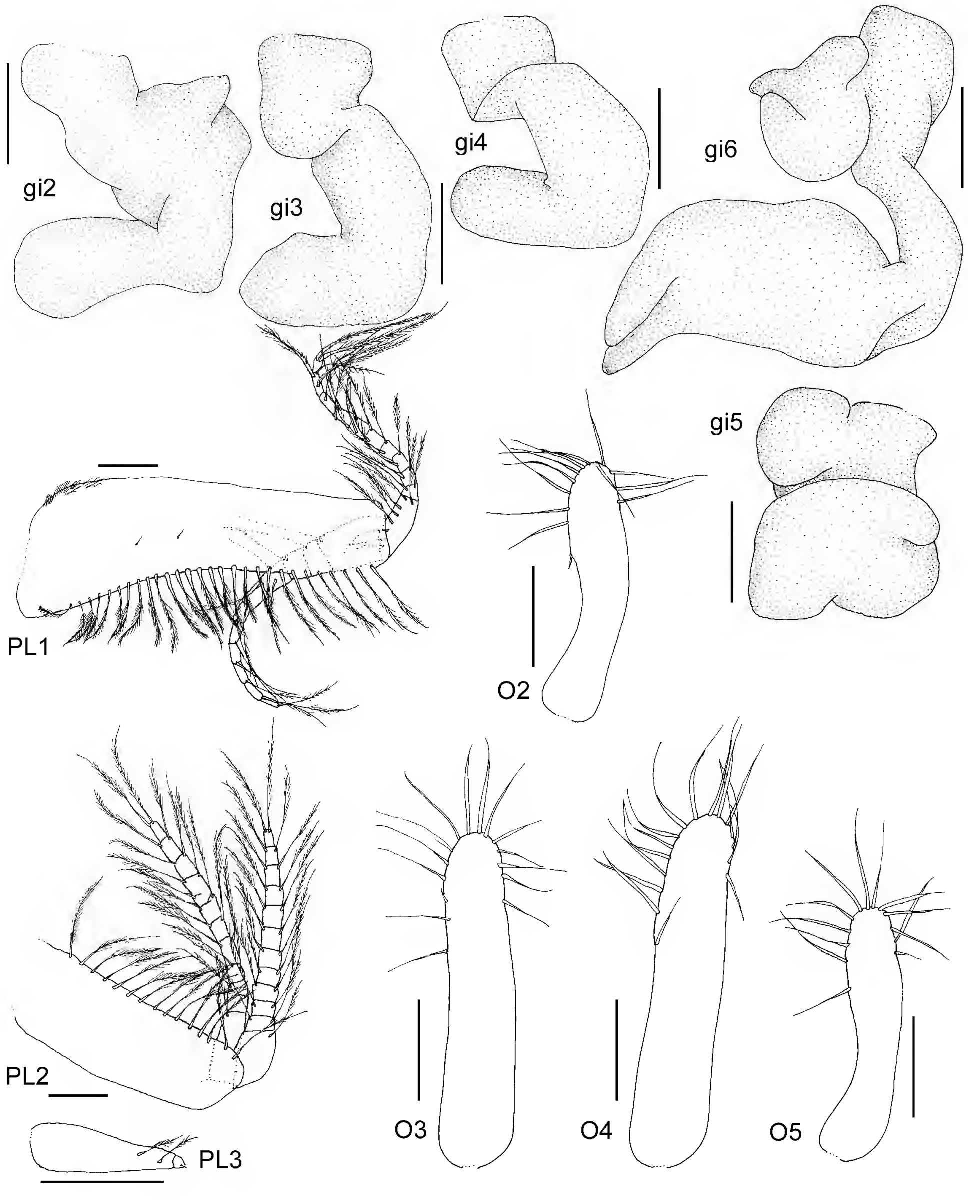

Fig. 12. *Arcitalitrus bundeena* n.sp., holotype, female, 15 mm, AM P60957. Scales represent 0.2 mm for pleopods 1–3 and 0.5 mm for gills 2–6 and oostegites 2–5.

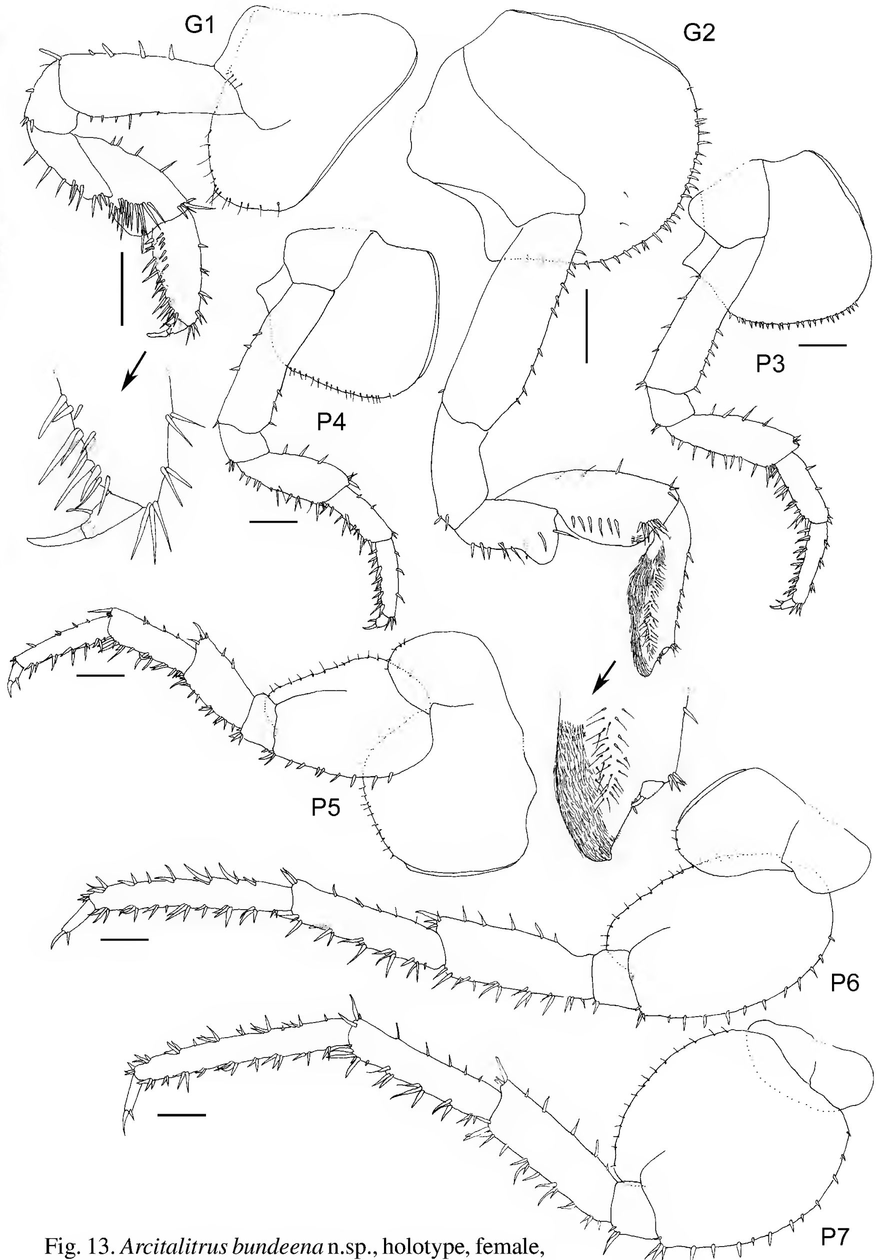

Fig. 13. *Arcitalitrus bundeena* n.sp., holotype, female, 15 mm, AM P60957. Scales represent 0.5 mm.

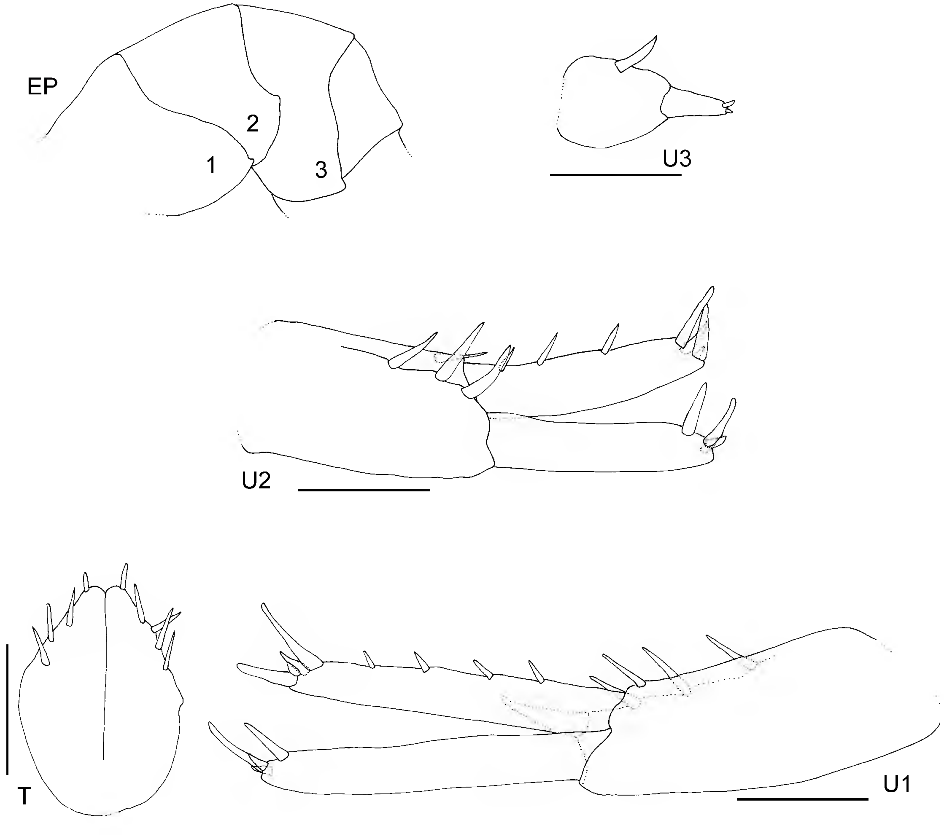

Fig. 14. *Arcitalitrus bundeena* n.sp., holotype, female, 15 mm, AM P60957. Scales represent 0.5 mm.

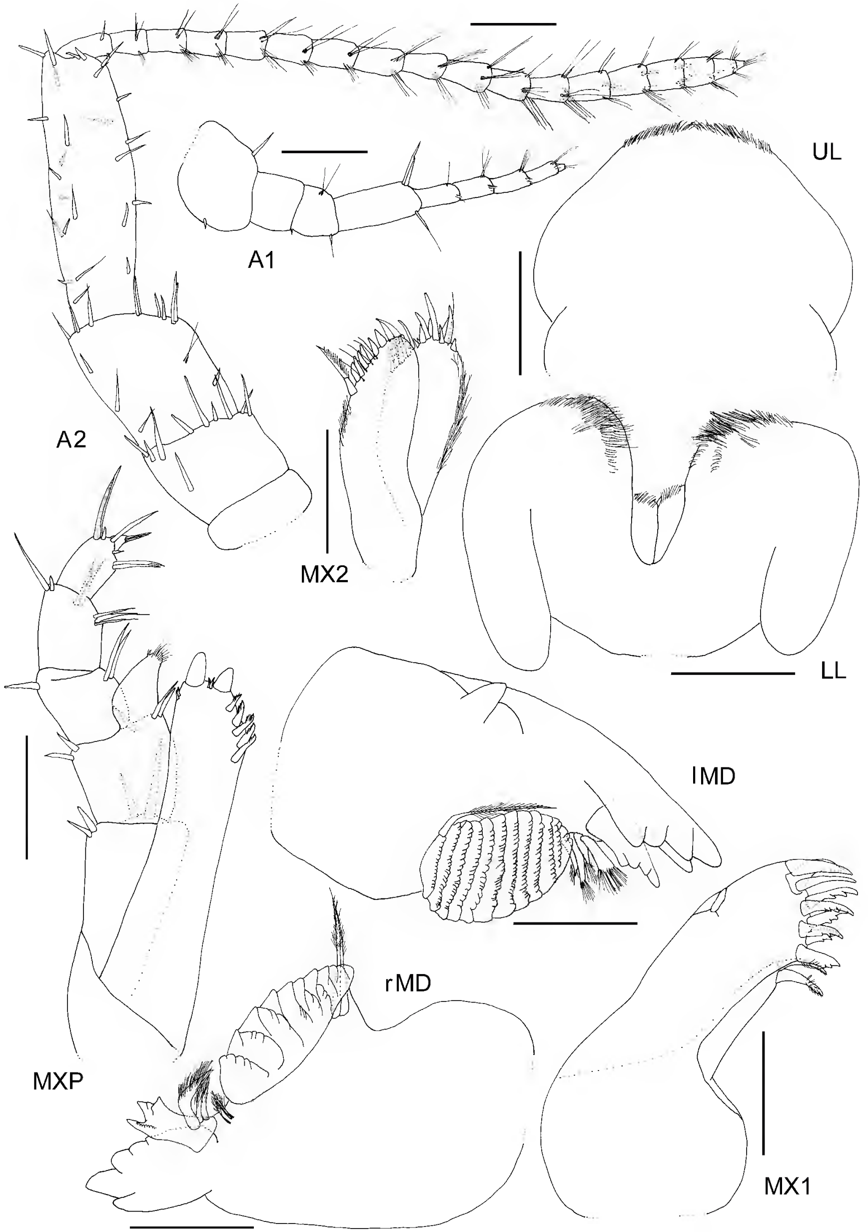

Fig. 15. *Arcitalitrus moonpar* n.sp., holotype, female, 9.0 mm, AM P60962. Scales represent 0.2 mm.

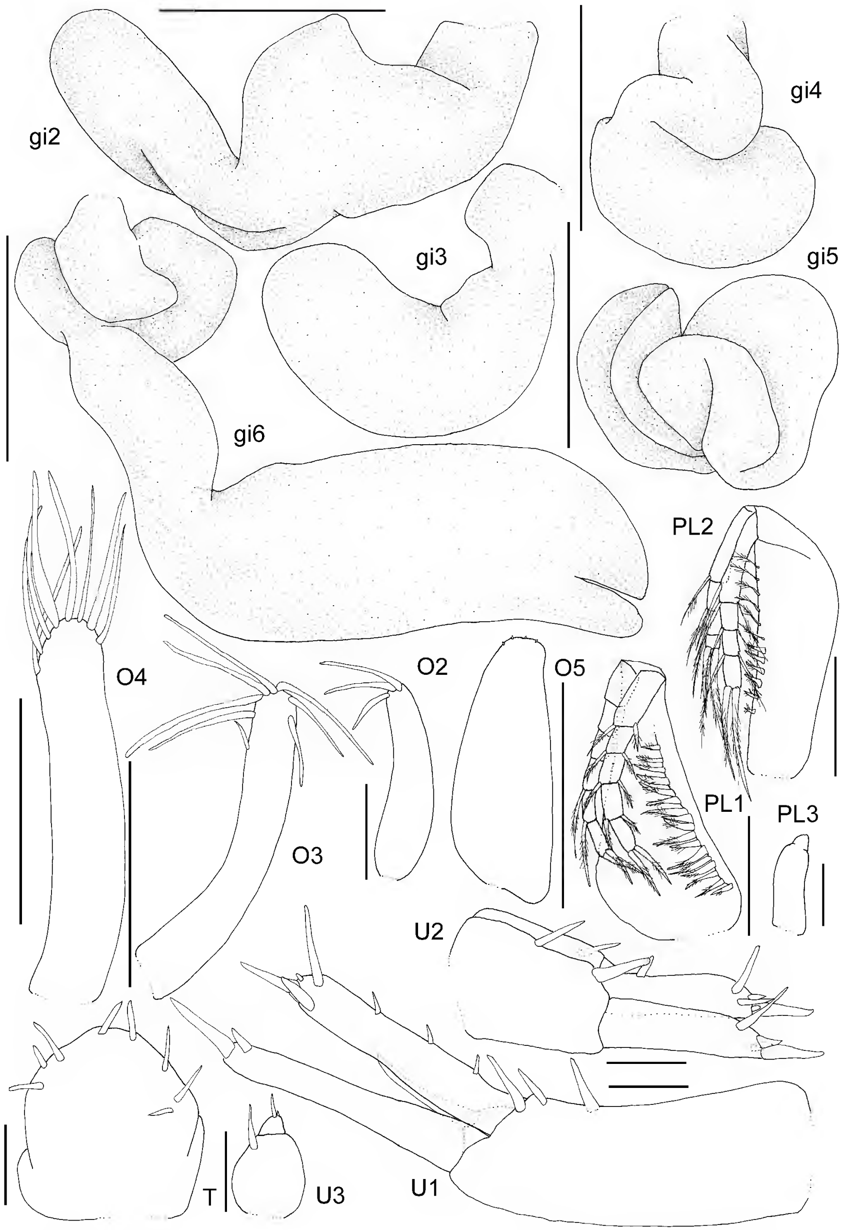

Fig. 16. *Arcitalitrus moonpar* n.sp., holotype, female, 9.0 mm, AM P60962. Scales represent 0.2 mm for uropods 1–3, telson, pleopods 1–3 and oostegite 2 and 0.5 mm for gills 2–6 and oostegites 3–5.

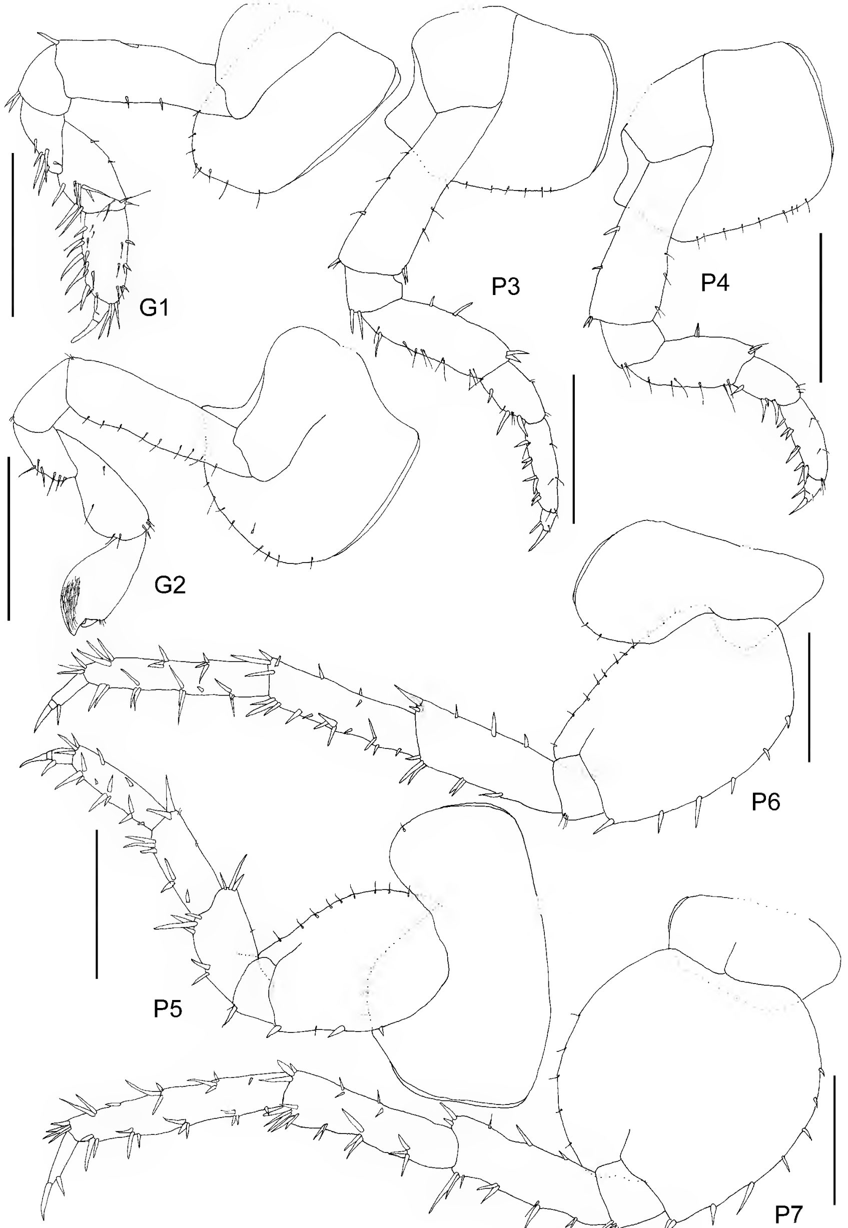

Fig. 17. *Arcitalitrus moonpar* n.sp., holotype, female, 9.0 mm, AM P60962. Scales represent 0.5 mm.

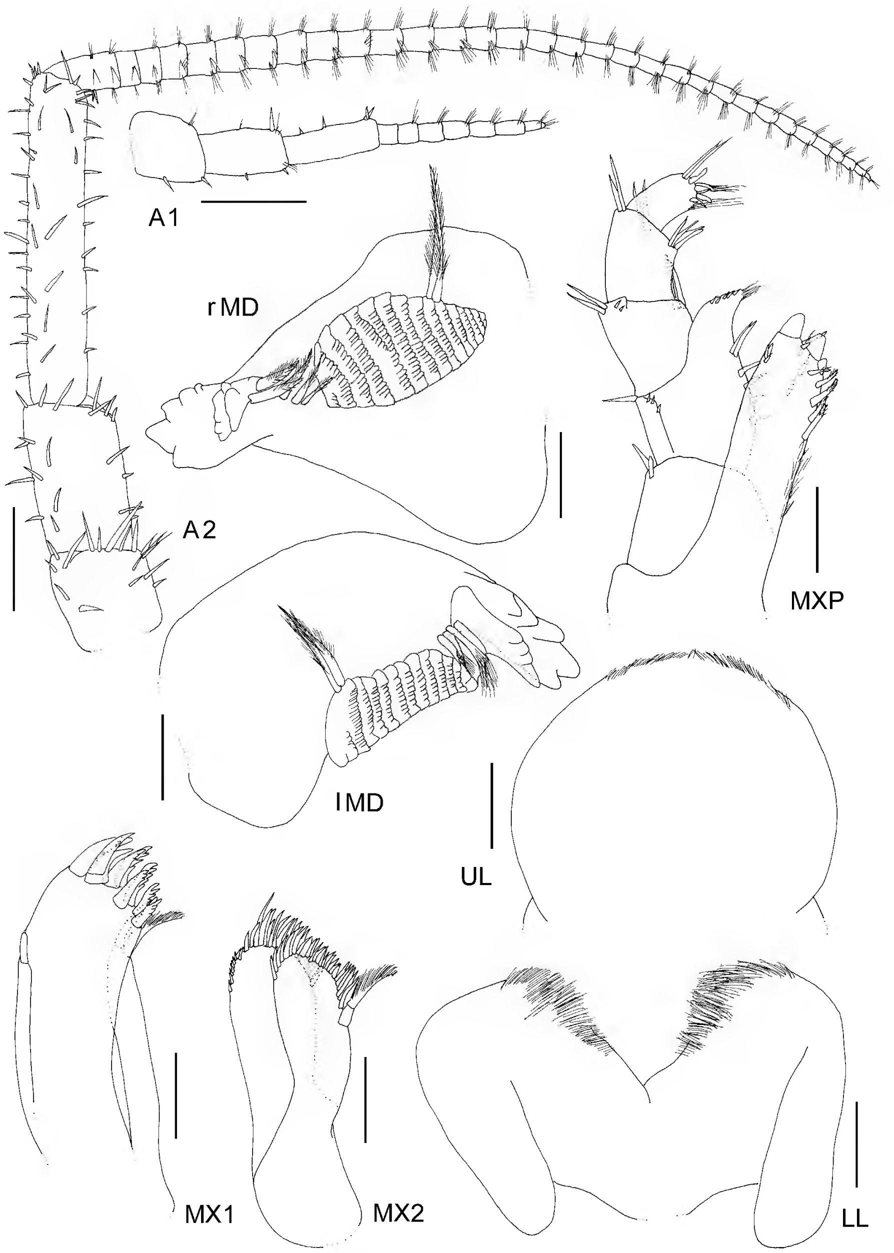

Fig. 18. *Arcitalitrus nana* n.sp., holotype, female, 15.0 mm, AM P60956. Scales represent 0.5 mm for antennae 1–2 and 0.2 mm for mouthparts.

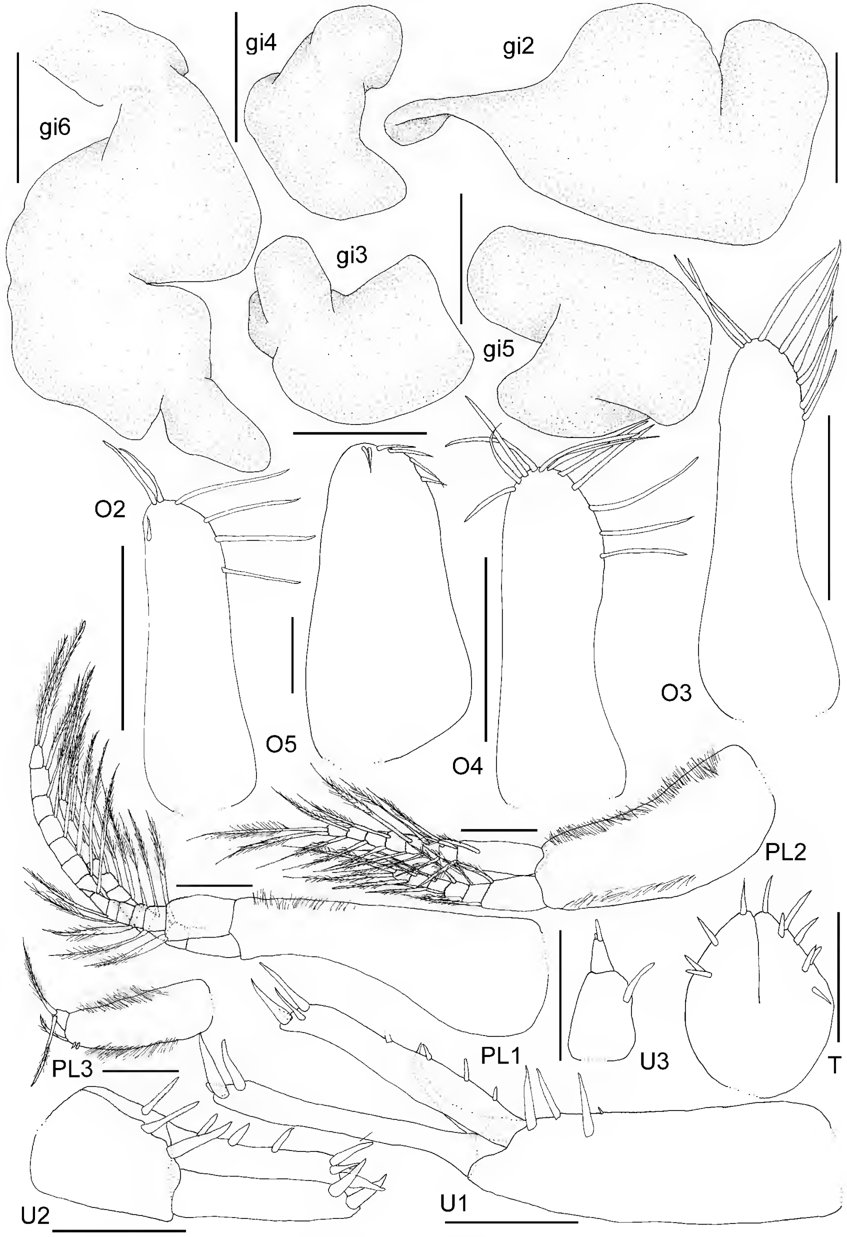

Fig. 19. *Arcitalitrus nana* n.sp., holotype, female, 15.0 mm, AM P60956. Scales represent 0.2 mm for pleopods 1–3 and 0.5 mm for the other parts.

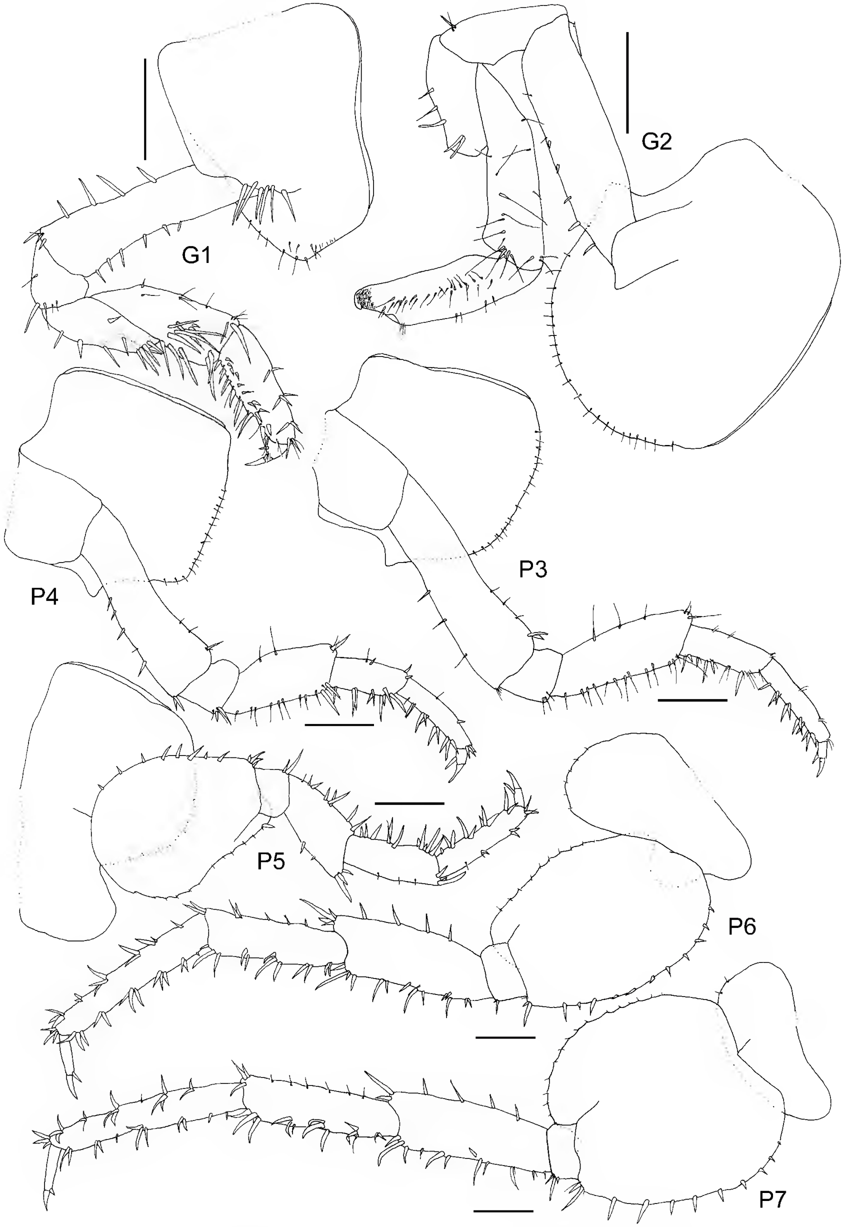

Fig. 20. *Arcitalitrus nana* n.sp., holotype, female, 15.0 mm, AM P60956. Scales represent 0.5 mm.

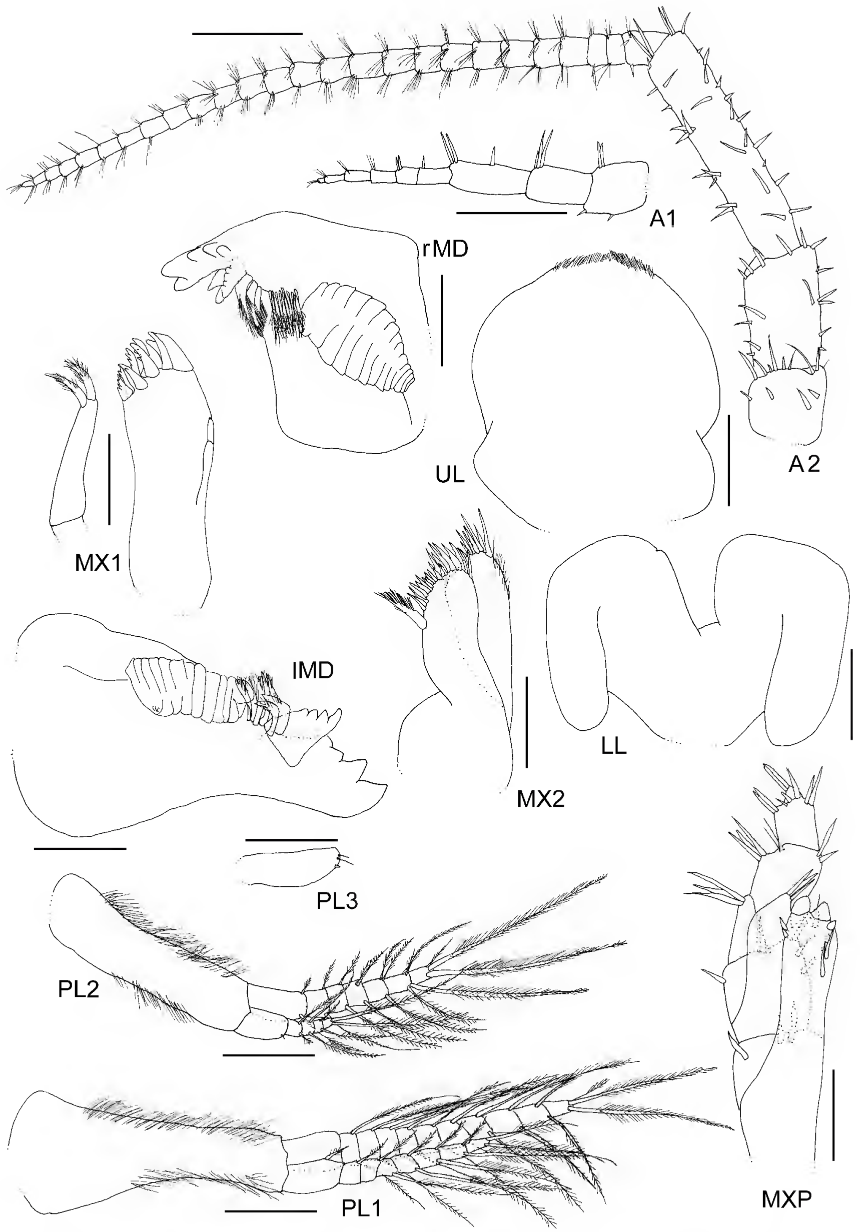

Fig. 21. *Arcitalitrus orara* n.sp., holotype, female, 11.0 mm, AM P60954. Scales represent 0.5 mm for antennae 1–2 and 0.5 mm for mouthparts.

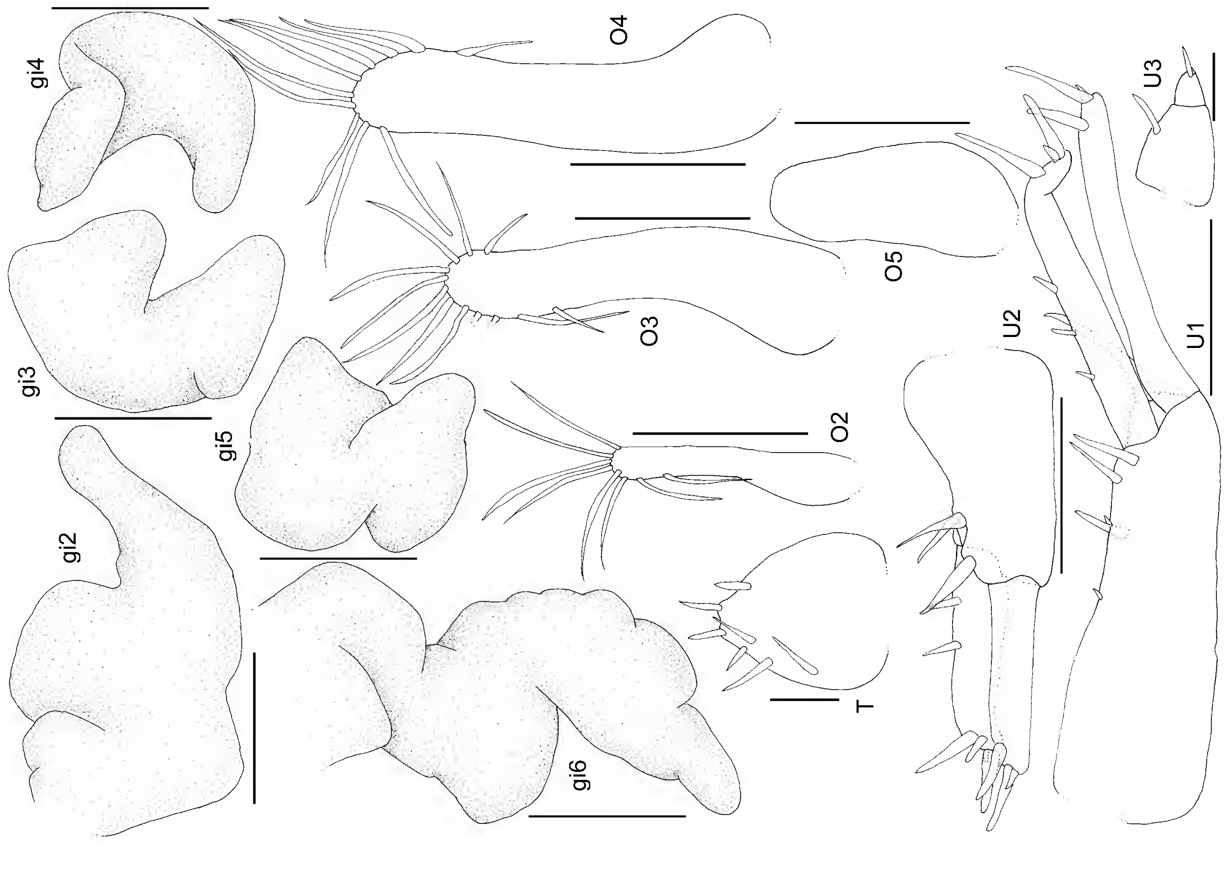

Fig. 22. *Arcitalitrus orara* n.sp., holotype, female, 11.0 mm, AM P60954. Scales represent 0.5 mm.

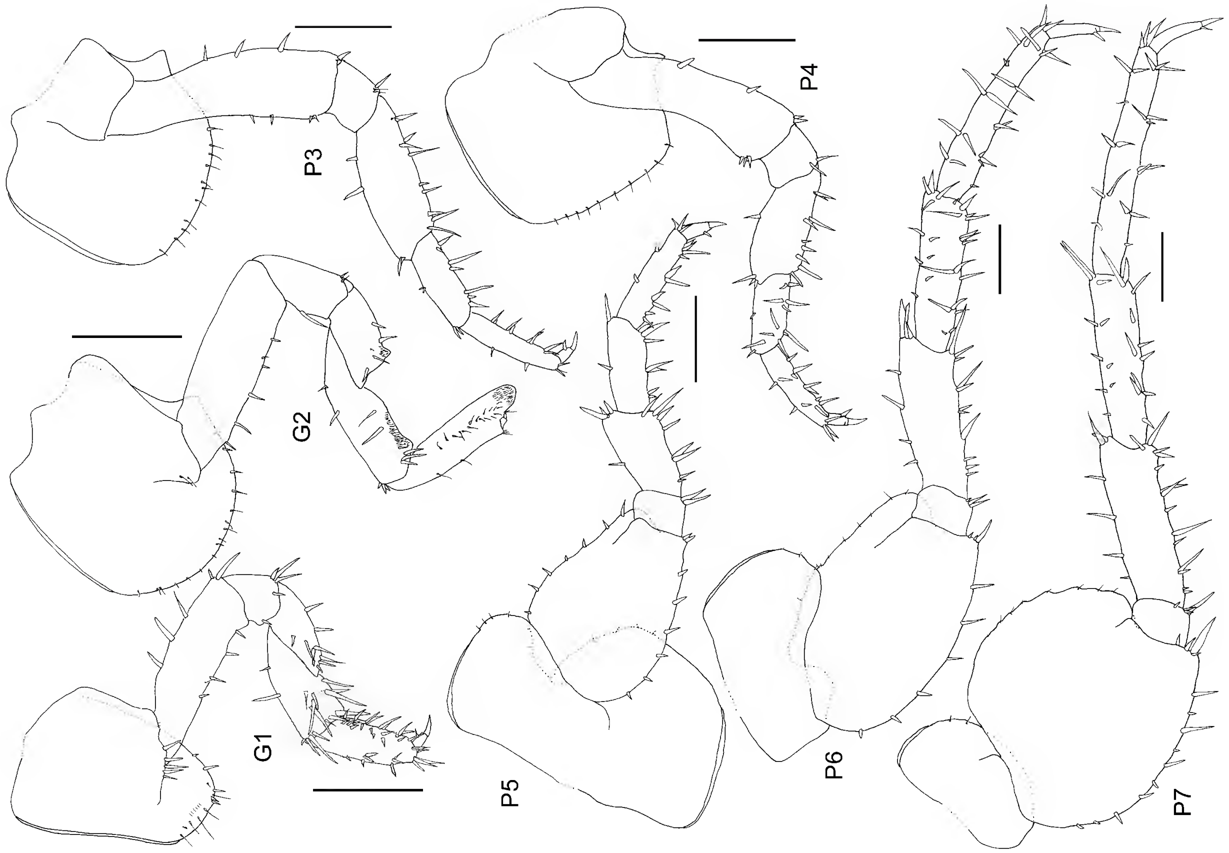

Fig. 23. *Arcitalitrus orara* n.sp., holotype, female, 11.0 mm, AM P60954. Scales represent 0.5 mm.

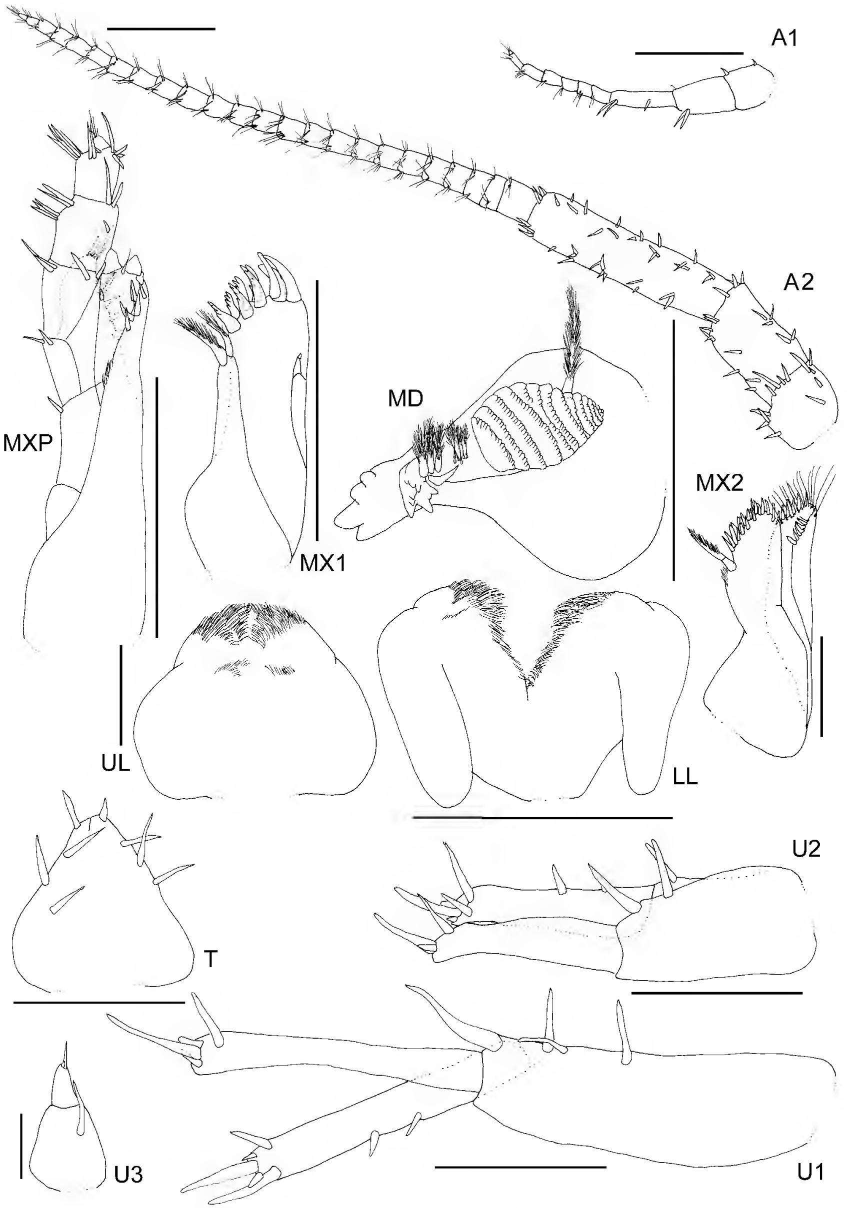

Fig. 24. *Arcitalitrus sylvaticus* (Haswell, 1879), neotype, female, 12.0 mm, AM P60950. Scales represent 0.5 mm.

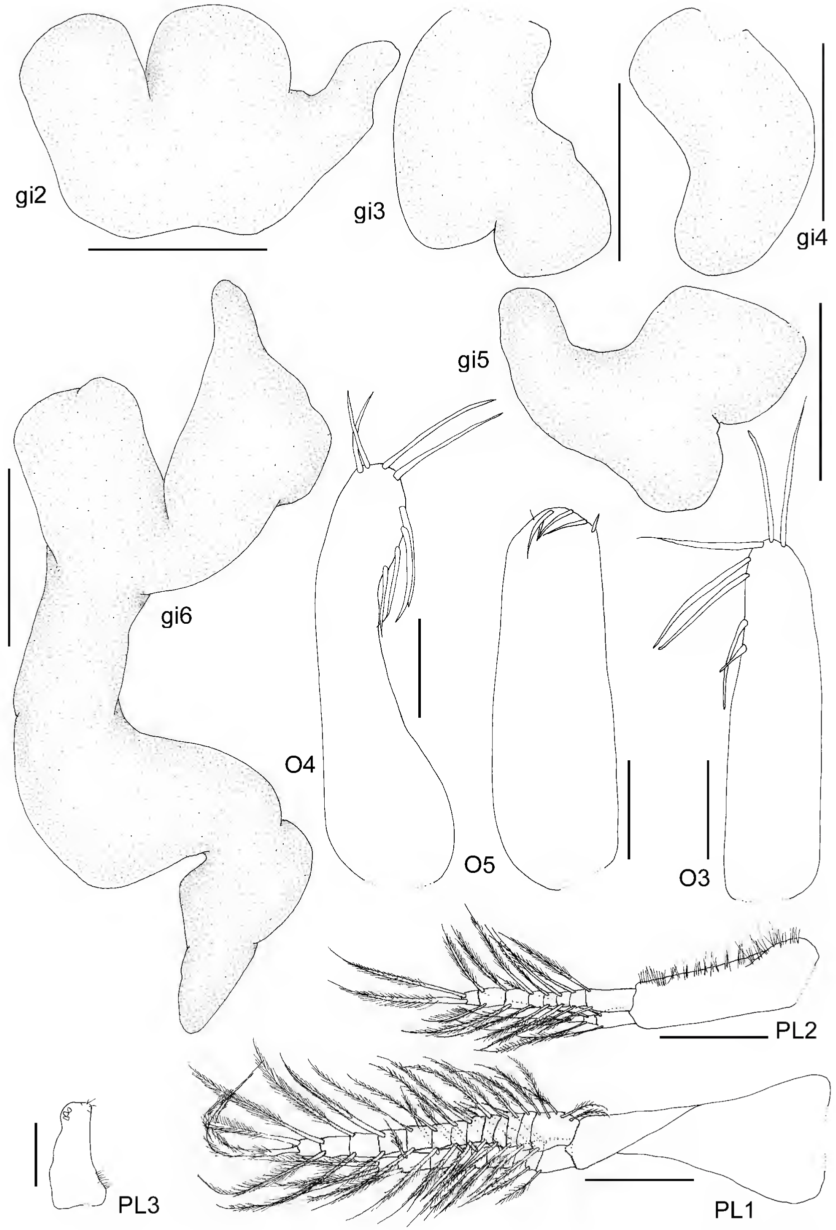

Fig. 25. *Arcitalitrus sylvaticus* (Haswell, 1879), neotype, female, 12.0 mm, AM P60950. Scales represent 0.5 mm for gills 2–6 and 0.2 mm for oostegites 2–5 and pleopods 1–3.

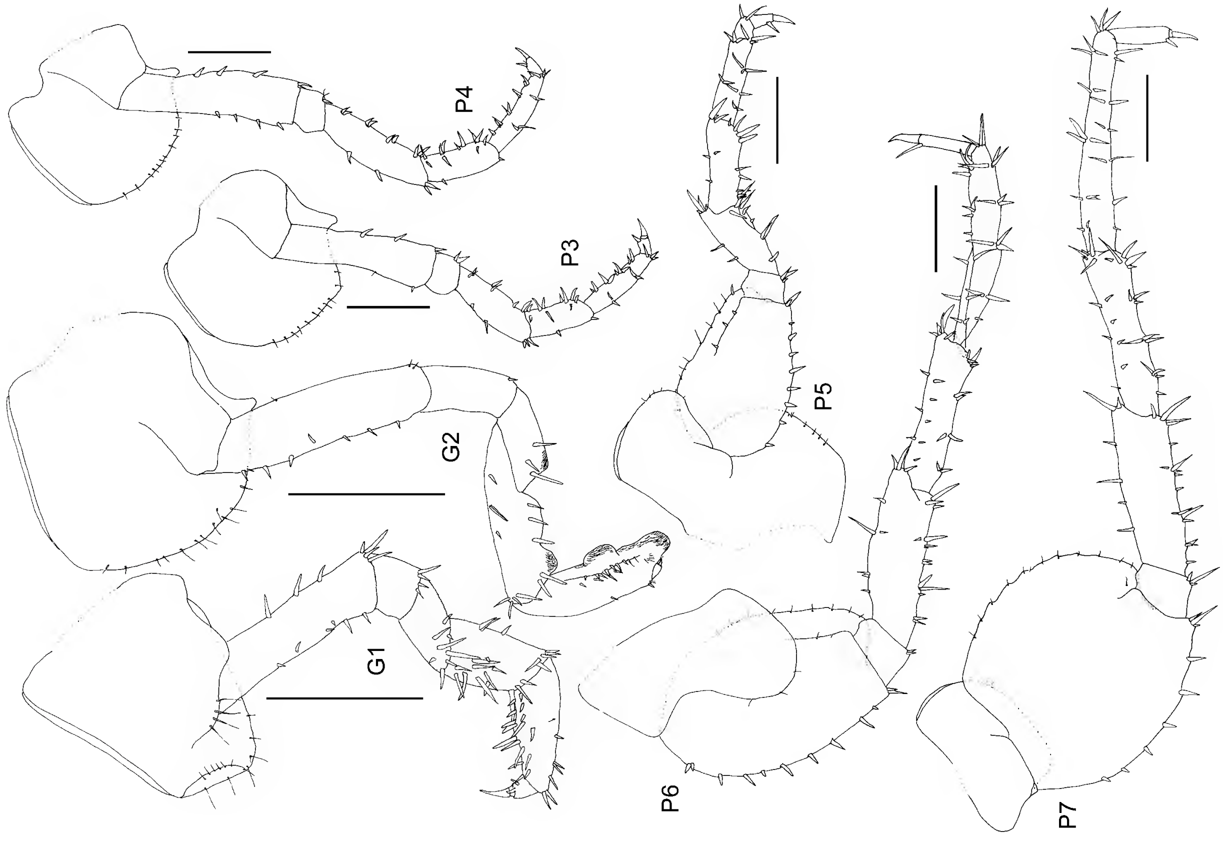

Fig. 26. *Arcitalitrus sylvaticus* (Haswell, 1879), neotype, female, 12.0 mm, AM P60950. Scales represent 0.5 mm.

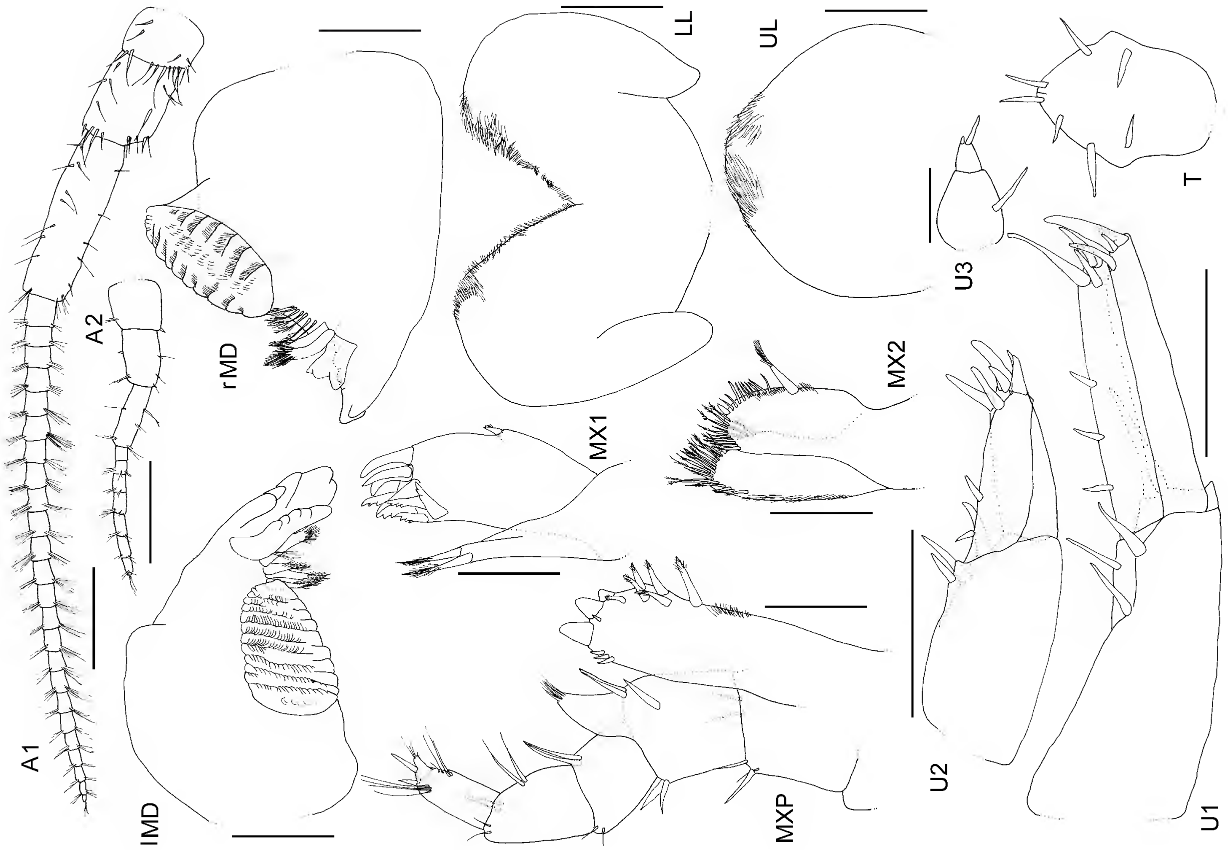

Fig. 27. *Arcitalitrus thora* n.sp., holotype, female, 13.0 mm, AM P60965. Scales represent 0.5 mm for antennae 1–2 and 0.2 mm for mouthparts, uropods 1–3 and telson.

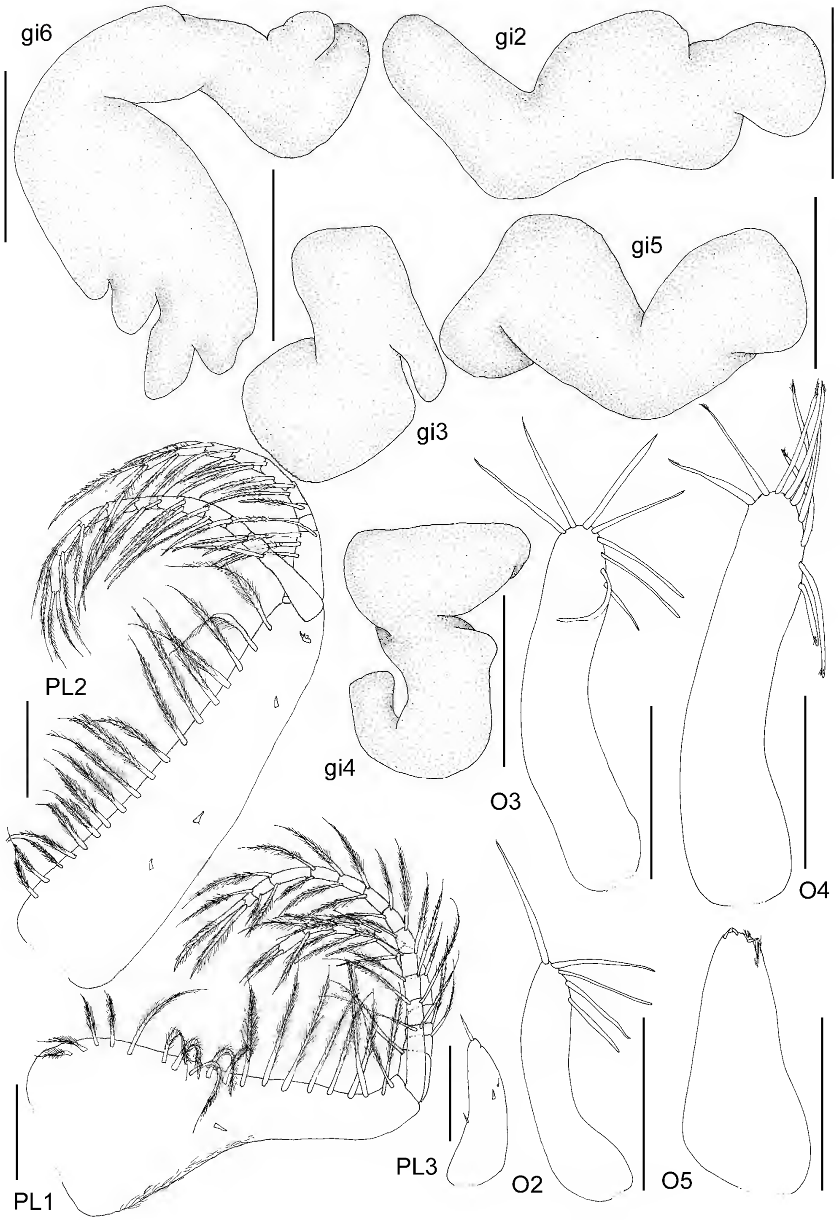

Fig. 28. *Arcitalitrus thora* n.sp., holotype, female, 13.0 mm, AM P60965. Scales represent 0.2 mm for pleopods 1–3 and 0.5 mm for all others.

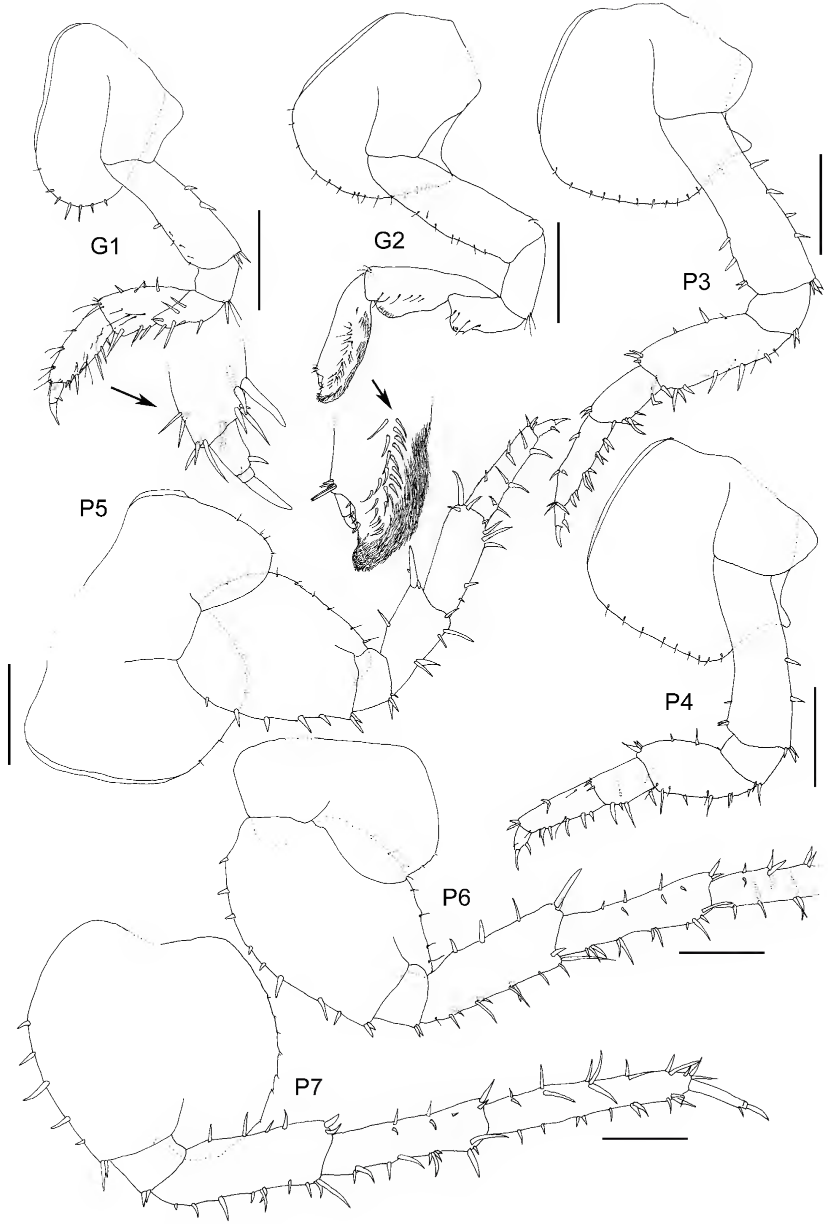

Fig. 29. *Arcitalitrus thora* n.sp., holotype, female, 13.0 mm, AM P60965. Scales represent 0.5 mm.

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Eugowra, A New Fly Genus from Australia (Empididae: Empidinae)

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ABSTRACT. *Eugowra* n.gen. (Diptera: Empididae: Empidinae: Hilarini) from southeastern Australia and Tasmania comprises three new species: *E. colei, E. fusca*, and *E. uniseta*. Males have a distinctive genitalic structure, with the hypandrium reduced to a narrow curved channel that barely covers a mostly free aedeagus. Species fly during the cooler months, and *E. colei* was collected throughout the winter in Tasmania. This genus is part of the *Hilara-Hilarempis* complex of genera.

BICKEL, DANIEL J., 2006. *Eugowra*, a new fly genus from Australia (Empididae: Empidinae). *Records of the Australian Museum* 58(1): 119–124.

This paper describes *Eugowra* (Diptera: Empididae: Empidinae), a new genus comprising three new species from southeastern Australia and Tasmania. The genus is within the *Hilara–Hilarempis* complex, characterized by having swollen male fore basitarsi, ostensibly used to produce silk for wrapping nuptial gifts. *Eugowra* is cool adapted, and species fly during the winter months. The hypandrium of the male genitalia is reduced to a narrow curved channel that is distally free from the epandrium, and which barely covers the aedeagus along its length.

Materials and methods

This study is based on material from Australian collections (see Acknowledgments for repositories and their abbreviations). Morphological terminology follows J.F. McAlpine (1981) except that of the male terminalia, which follows Cumming *et al.* (1995). Common features are listed in the introductory description and not repeated in species descriptions unless needing clarification. Measurements are in millimetres and based on representative dry specimens. The position of features on elongate structures such as leg segments is given as a fraction of the total length, starting from the base. The relative lengths of the podomeres are representative ratios and not measurements, and are presented in the following formula and punctuation: trochanter + femur; tibia; tarsomere 1/ 2/ 3/ 4/ 5.

The following abbreviations and terms are used: *FSSC*, female secondary sexual character(s), non-genitalic characters found only on female body; *MSSC*, male secondary sexual character(s), non-genitalic characters found only on male body; *I, II, III*, pro-, meso-, metathoracic legs; *C*, coxa; *T*, tibia; *F*, femur; *ac*, acrostichal setae; *ad*, anterodorsal; *av*, anteroventral; *dc*, dorsocentral setae; *dv*, dorsoventral; *pd*, posterodorsal; *pv*, posteroventral; *t*, tarsus; $t_{1\text{–}5}$, tarsomeres 1 to 5.

Genus *Eugowra* n.gen.

Etymology. *Eugowra*, the locale of the type species, is a geographic place name of Australian Aboriginal origin. The gender is feminine.

Type species. *Eugowra uniseta* n.sp.

Diagnosis. Subfamily Empidinae, tribe Hilarini, with the following tribal characters (Bickel, 1996): laterotergite bare; male basitarsus I enlarged or swollen; costa circumambient; vein R_1 distinctly swollen before joining costa; tibia I with anteroapical comb of 8–10 short even setae; male cercus small and desclerotized, and fused laterally with the surstylus and epandrium.

The genus is characterized by: mesonotum without distinct cuticular patterns or bands; vein Sc incomplete, not upturned to costa; hypandrium reduced to narrow curved channel, joined to epandrium only at base, and which barely covers aedeagus along its length; female TIII slightly flattened laterally, with posterior surface from ⅕ to ⅚ slightly concave and bare of normal short vestiture (FSSC).

Description. (based on three included new species); body length 3.0–3.7. *Head* (Fig. 1a): spheroidal with convex postcranium; row of pale postorbitals present, short ventrally, becoming longer dorsally; postcranium with scattered pale setae; post-occiput, vertex, frons and face mostly dark brown and covered with grey pruinosity; setae brown with yellowish reflections; ocellar triangle with 2–3 pairs of posterior setulae, and pair of diverging setae anteriad of lateral ocelli; frons with four strong setae along lateral margin; frons only slightly narrower than ocellar triangle; eyes notched laterad of antennae; face about as wide as frons, covered with grey pruinosity; palp yellow, elongate and curved, and with some long pale ventral setae; proboscis dark brown, slightly curved and stout; labrum brown with some yellow basal areas; scape and pedicel brown, subequal; postpedicel and style black; postpedicel flask-shaped with two-segmented style, and distal segment of style just slightly shorter than postpedicel. *Thorax* mostly uniform brown or black with grey pruinosity, without distinct mesonotal cuticular or pruinose patterns or bands; thoracic setae mostly yellowish; ac either biseriate or comprising band 3–4 setae wide; dc as row of short pale setae, with 4–6 longer setae along posterior mesonotal slope, and 12–15 setae anteriad; 1 short postalar (pa) seta and row of 4–5 short supra-alar (sa) setae present; 2–3 posterior notopleural (npl) setae, with 4–5 short setulae anteriad; strong sr seta and shorter humeral seta present; some additional setae present on anterior thorax just mediad of humeral callus; pronotum with two pairs of pale diverging setae; prosternum with group of pale hairs; scutellum with 4 pairs of marginal setae. *Legs* vestiture mostly yellow or brownish; CI with anterior and anterolateral setae; CII with anterior setae; CIII with some weak anterior setae, and 2–3 short lateral setae, and 2–3 posterior setae; tibia I with distinct anteroapical comb of 8–10 short, equal length setae of both sexes; tibia I often with long dorsal setae; male It_1 greatly swollen (Figs 1b,d,g), female unmodified; femora II and III often with long dorsal and ventral setae; female TIII slightly flattened laterally, with posterior surface from ⅕ to ⅚ slightly concave and bare of normal short vestiture (FSSC). *Wing* (Fig. 1e) membrane hyaline; costa circumambient, although reduced in thickness along posterior margin; Sc incomplete, and straight, not upturned to costa; R_1 slightly swollen before join with costa; faint stigma present; costa haired, but other veins bare; R_{4+5} branched, R_4 in gentle curve; R_5 straight and ending at wing apex; M_1, M_2, and CuA_1 all joining margin; CuA_2, which closes cell cup, strongly recurrent; A_1 present distally only as fold, and arising midway along cell cup; A_2 present as trace; anal angle weak. *Abdomen* mostly brown or black with pruinosity; setae longer along posterior margins of each tergum; hypopygium (Fig. 1c,f); cercus distinct and divided into sclerotized short basal cercal plate and digitiform clasping cercus; epandrium with elongate posteriorly projecting setae; aedeagus elongate and conforming to curvature of hypandrium; hypandrium reduced reduced to narrow curved channel (and with median pointed projection), joined to epandrium only at base, and which barely covers aedeagus along its length; distinct surstylus not evident.

Female oviscapt relatively unmodified, with subequal terga and sterna on segments 9 and 10, and with pair elongate apical cerci projecting posteriorly.

Remarks. *Eugowra* has a southern temperate distribution in Australia, and is known from lowland sites in Tasmania, Victoria, and southern interior New South Wales. Moreover, adults are decidedly cool-adapted, with all known specimens collected between April and September. Further, mating pairs of *E. colei* were taken in July, mid-winter in Hobart, Tasmania. It should be noted that southern Australia and Tasmania have more winter-flying Diptera than commonly assumed. There is a distinct bias against winter collecting, and indeed, visible insect activity is much reduced during cold days and frosty nights, especially when compared with the peak activity period from October–January. However, samples from passive traps in western Tasmania (unpublished data), reveal a rich winter Diptera fauna with many undescribed taxa. Mackerras (1950) noted that cool-temperate Australian Diptera (often with Gondwanan affinities) emerge in winter to early spring in the northern part of their range, but later in montane or southern localities. In this light, truly winter fauna, such as *Eugowra*, are even more likely to be Gondwanan.

Mating behaviour is unknown. However, males have swollen fore basitarsi which probably produce silk for wrapping nuptial gifts, characteristic of the *Hilara-Hilarempis* complex of genera.

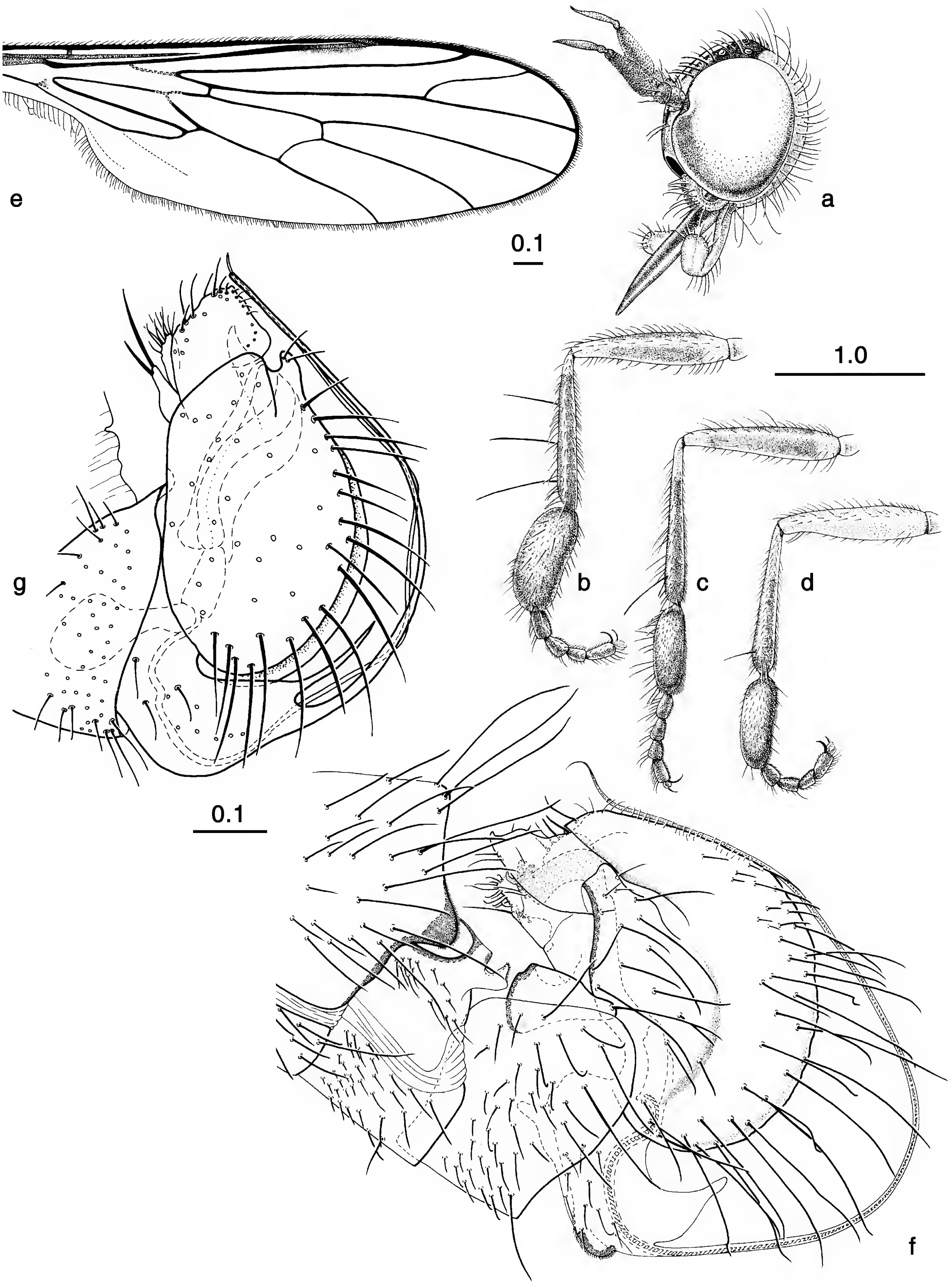

Fig. 1. *Eugowra uniseta*: (*a*) male head, left anterolateral; (*b*) male left leg I, posterior; (*c*) hypopygium, left lateral. *Eugowra colei*: (*d*) male left leg I, posterior; (*e*) male wing, dorsal; (*f*) hypopygium, left lateral. *Eugowra fusca*: (*g*) male left leg I, posterior.

Key to males of *Eugowra* species

Eugowra is a member of the tribe Hilarini with the following characters: mesonotum without distinct cuticular patterns or bands; male basitarsus I swollen; Sc incomplete, and not upturned to costa; hypandrium reduced to narrow band, leaving aedeagus almost free.

1 Face (Fig. 1a) with pair of fine setae between antennal base and clypeal margin (both sexes); tibia I (Fig. 1b) with single strong black dorsal seta at ⅞ (NSW, Vic.) .... *E. uniseta* n.sp.

—— Face bare of setae; tibia I with at least 3 strong dorsal setae 2

2 TI (Fig. 1d) with 3 black dorsal setae at ⅖, ⅗, and ⅞, which distally increase in size; basitarsus I swollen with some scattered short dorsoapical setae (Tas., Vic.) .... *E. colei* n.sp.

—— TI (Fig. 1g) with row of dorsal setae with some outstanding longer setae on distal half, especially at ⅞; It_1 swollen with shaggy appearance from dorsal and lateral hairs (Vic.) .... *E. fusca* n.sp.

Eugowra uniseta n.sp.

Type material. HOLOTYPE ♂ ANIC, PARATYPES 7♂♂, 5♀♀, all New South Wales, 2.4 km NE of Eugowra, 24.iv.1971, Z. Liepa (ANIC).

Additional material. New South Wales: 3♂♂, 4♀♀, Conargo, Billabong Ck., 23–30.iv.1978; 1♀ Gerogery, 14.vi.1961. Victoria: 1♂, 2♀♀, 7 km W of Dimboola, 8.viii.1968 (ANIC).

Description. *Male* length: 3.0–3.1; wing: 3.3× 1.2. *Head* (Fig. 1a); frons and face dark brown and covered with uniform grey pruinosity; black pruinosity on ocellar triangle, ending as triangle on dorsal postcranium, and as stripe along lateral frons; face with pair pale setae between antennal base and clypeal margin. *Thorax* dark brown with grey pruinosity; thoracic setae yellow; ac comprising band 3–4 setae wide extending to anterior margin of posterior slope; dc as row of pale setae, with 5 longer setae along posterior mesonotal slope, and 15 setae anteriad; field of short pale seta present from mesonotal suture to humeral callus. *Legs* CI mostly yellow but infuscated basally; CII and CIII mostly brown with grey pruinosity, but yellow distally; femora and tibia are mostly yellow (some specimens with tibiae infuscated); tarsomeres dark brown; coxae with pale setae; I: 3.7; 3.2; 1.8/ 0.7/ 0.4/ 0.3/ 0.5; TI (Fig. 1b) with single strong black dorsal setae at ⅞ (MSSC); It_1 swollen with some short distal setae; II: 3.5; 3.7; 1.2/ 0.4/ 0.3/ 0.2/ 0.5; TII with pale dorsal and ventral setae, and stronger pale dorsal seta at ⅞; III: 4.5; 4.7; 1.5/ 0.5/ 0.4/ 0.3/ 0.5; FIII with row of pale av and pv setae, becoming longer and slightly curved towards apex; TIII with pale dorsal and ventral setae, with strong subapical dorsal seta. *Wing* hyaline, without infuscation; stigma faint yellow; lower calypter yellow with pale setae; halter yellow with brownish club. *Abdomen* mostly brown with pale vestiture; setae longer along posterior margins of each tergum; hypopygium (Fig. 1c) mostly brown; median basal projection of hypandrium needle-like.

Female: similar to male except as noted: tibia I lacks strong dorsal seta at ⅞; female also with pair of setae on face between antennae and clypeal margin.

Remarks. *Eugowra uniseta* is distinguished from congeners by the single strong subapical dorsal seta on tibia I and the paler colouration, the legs being more yellow, and the wing hyaline, not smoky. This species is apparently widespread in the Murray River drainage of southern New South Wales and western Victoria. All specimens were collected in cool months, late April to July. Both sexes have a pair of short pale setae between the antennal base and clypeal margin.

Eugowra colei n.sp.

Type material. HOLOTYPE ♂, PARATYPES, 30♂♂, 4♀♀, Tasmania: Hobart, 1.vii.1917, C.E. Cole; PARATYPES, same as holotype but as noted: 3♂♂, 3.vi.1917; 1♂, 2♂–♀ mating pairs, 12.viii.1916; 2♂♂, 1♀, 29.viii.1916; 4♂♂, 26.viii.1916; 2♂♂, 12.v.1917; 3♂♂, 13.v.1917; 2♂♂, 20.v.1917; 2♂♂, 3♀♀, 25.vi.1916; 1♀, 1.x.1916 (MVM).

Additional material. Tasmania: 2♂♂, Ridgeway, 3.ix.1916, C.E Cole (MVM). Victoria: 2♂♂, Bayswater, iv.1928, 1♀, Ferntree Gully, 15.iv.1928, 2♂♂, Ringwood, iv.1928 (all F.E. Wilson, MVM).

Description. *Male* length 3.6–3.7; wing: 3.8. *Head* frons, postcranium face mostly black with grey pruinosity, but darker around ocellar triangle; face bare of setae. *Thorax* mostly dark brown with brownish pruinosity dorsally and greyish pruinosity on pleura, but no distinct patterns present; ac biseriate and extending to posterior slope of mesonotum. *Legs* CI yellow but infuscated basally; CII and CIII mostly brownish but distally yellow, and with grey pruinosity; femora and tibiae mostly yellow, but appearing darker and brownish in some specimens; tarsi dark brown; vestiture pale yellow except where noted; I 3.7; 3.3; 2.1/ 0.5/ 0.4/ 0.3/ 0.4; TI (Fig. 1d) with 3 black dorsal setae at ⅖, ⅗, and ⅞, which distally increase in size, with distalmost seta ⅔ length of TI (MSSC); It_1 greatly swollen, and with some short dorsoapical setae (MSSC); II: 4.0; 4.3; 1.3/ 0.4/ 0.3/ 0.2/ 0.5; TII with outstanding dorsal setae at ¾ and ⅞ (MSSC); IIt_1 setose; III 5.2; 5.0; 1.8/ 0.7/ 0.4/ 0.3/ 0.5; FIII with some long dorsal and av setae. *Wing* (Fig. 1e) membrane slightly smoky; halter yellowish with distinctly brown club. *Abdomen* almost entirely dark brown with yellow to brownish setae; setae on tergum I and posterior margins of remaining terga relatively long; male postabdomen (Fig. 1f); median basal projection of hypandrium broadly triangular.

Female: similar except as noted. femora with only short pale ventral setae; TI and TII without strong dorsal setae; It_1 unmodified; TIII only weakly flattened laterally.

Remarks. *Eugowra colei* is readily distinguished from congeners by the three strong dorsal setae on tibia I. This species is known from Tasmania and southern Victoria. All specimens were collected in cool months, from April to October, and mating pairs were captured during July in Hobart. This species is named for C.E. Cole, whose extensive collections of Tasmanian Diptera are deposited at the Museum of Victoria.

Eugowra fusca n.sp.

Type material. HOLOTYPE ♂, PARATYPE ♀, Victoria: Darriman, 22.vii.1952, G.W. Douglas (MVM).

Additional material. Victoria: ♂, Ocean Grove, 5.viii.1960, J. Martin (MVM).

Description. *Male* length 2.7; wing 3.7× 1.3. *Head* mostly black with some grey pruinosity; orbitals short, becoming longer dorsally; face bare of setae. *Thorax* dorsally black, mostly shiny with some grey/brownish pruinosity; pleurae covered with grey pruinosity; ac short, biseriate. *Legs* Coxae yellowish to brownish and covered with grey pruinosity; femora mostly yellowish; TI and TII yellowish basally but becoming dark brown distally, TIII dark brown; tarsi dark brown or black; I: 3.5; 3.2; 1.8/ 0.4/ 0.3/ 0.3/ 0.5; (Fig. 1g) TI with row of dorsal setae with some outstanding longer setae on distal half, especially at ⅞ (MSSC); It_1 swollen with shaggy appearance from dorsal and lateral hairs (MSSC); II: 4.3; 4.0; 1.2/ 0.3/ 0.3/ 0.2/ 0.5; FII with rows of av and pv hair-like setae; TII with some dorsal setae, slightly increasing in size towards the apex; IIt_1 not swollen but with some dorsal setae; III: 4.7; 4.7; 1.5/ 0.7/ 0.4/ 0.3/ 0.6. *Wing* distinctly smoky; brownish stigma present; halter with brownish stem and brown club. *Abdomen* dark brown with brown to dark brown setae and the posterior margins of the terga have longer hairs; hypopygium not figured, but median basal projection of narrow and pointed, similar to Fig. 1c. *Female* similar except as noted; TI and TII without strong dorsal setae; It_1 unmodified.

Remarks. *Eugowra fusca* is known from two locales in southern Victoria: Gippsland, and the Geelong district. Specimens were collected in winter months, July and August.

Notes on morphology and systematic position of *Eugowra*

With the large number of undescribed hilarine taxa, both in Australia and throughout the world, it is premature to attempt any phylogenetic analysis of the tribe. However three morphological characters related to *Eugowra* should be discussed.

1 Vein Sc: complete/ incomplete. The plesiomorphic condition is considered to be Sc complete and fusing with the costa, with varying degrees of reduction ("incompleteness") being derived. However, this character is variable throughout the Empidinae, and the incomplete Sc is probably homoplasious, and possibly is subject to reversal.

2 Female tibia III: unmodified/ flattened laterally, and with posterior surface from ⅕ to ⅚ faintly concave and bare of normal vestiture, but with fine pile. This modification also occurs in many species of Australian *Hilara s.l.*. This modification functions in aerial display and species recognition, as the fine hairs of the pile appear to have a reflective function, and on some of the *Hilara* species the hairs are silvery.

3 Hypandrium: forming curved hood joined to epandrium and completely covering aedeagus/reduced to a narrow curved channel which is distally free from the epandrium, and which barely covers the aedeagus along its length.

In the Hilarini, the hypandrium usually forms a curved convex hood covering the aedeagus along the distal hypopygial margin to the surstylus. By contrast, in the tribe Empidini the hypandrium is often highly reduced and covers only the aedeagal base, leaving body of the aedeagus exposed and free (e.g., see figures of *Empis* species in Chvála, 1994).

At first glance, *Eugowra* also appears to have a free aedeagus. However, closer examination shows the hypandrium has been reduced to a narrow curved gutter which follows and barely covers the aedeagus along its length parallel to the distal hypopygial margin. This unique autapomorphy defines *Eugowra* as a monophyletic group.

Needless to say, the relationship of this genus to the rich and disparate *Hilara-Hilarempis* complex of species is not clear. I have decided to give these three species generic status rather than assigning them to a species group or subgenus in either of the two poorly defined genera, *Hilara* or *Hilarempis*. At least *Eugowra* is clearly defined by a distinct suite of synapomorphies, and its ultimate phylogenetic position can be defined in the future.

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