

Systematic revision of the spider wasp genus *Sphictostethus* Kohl (Hymenoptera: Pompilidae: Pepsinae) in Australia with description of nine new species

LARS KROGMANN & ANDREW D. AUSTIN

Abstract

The Australian members of the genus *Sphictostethus* Kohl, 1884 are revised. Previously this genus was only known to occur in Australia from two species, both restricted to Tasmania. Here we recognize 13 species from the continent. Nine species are described as new, viz. *S. dorrigoensis*, *S. gadali*, *S. geevestoni*, *S. haoae*, *S. insularis*, *S. montanus*, *S. picadillycirus*, *S. walteri*, and *S. yidyam* **n. spp.** Two species are here transferred to the genus, *S. infandus* (Smith) **n. comb.** and *S. connectens* (Turner) **n. comb.**, while *S. aliciae* (Turner) and *S. xanthochrous* (Turner) are redescribed. Australian *Sphictostethus* species are distributed throughout the tropical and temperate wet forests along the east coast of the mainland and also show a significant radiation in the cool temperate forests of Tasmania, where six species are recorded. *Sphictostethus insularis* **n. sp.** is described from Lord Howe Island, where it is apparently endemic and represents only the second described pompilid species from this small and isolated volcanic landmass. The distribution of the genus *Sphictostethus* and its putative Gondwanan origin are briefly discussed with reference to the new findings.

Key words: Systematics, *Sphictostethus*, new species, Australia, Tasmania, Lord Howe Island, Gondwanan distribution.

Zusammenfassung

Die australischen Vertreter der Gattung *Sphictostethus* Kohl, 1884 werden revidiert. Bislang war diese Gattung in Australien nur von zwei Arten bekannt, die beide ausschließlich auf Tasmanien vorkommen. In dieser Arbeit weisen wir 13 Arten auf dem Kontinent nach. Neun neue Arten werden beschrieben: *S. dorrigoensis*, *S. gadali*, *S. geevestoni*, *S. haoae*, *S. insularis*, *S. montanus*, *S. picadillycirus*, *S. walteri* und *S. yidyam* **n. spp.** Zwei Arten, *S. infandus* (Smith) **n. comb.** und *S. connectens* (Turner) **n. comb.**, werden in die Gattung überführt und zusammen mit *S. aliciae* (Turner) und *S. xanthochrous* (Turner) wiederbeschrieben. Die australischen *Sphictostethus*-Arten sind in den tropischen und gemäßigten Feuchtwäldern entlang der Ostküste Australiens verbreitet und weisen zudem eine große Artenvielfalt in den kühl-temperierten Wäldern Tasmaniens auf, wo wir insgesamt sechs Arten nachweisen konnten. *Sphictostethus insularis* **n. sp.** wird von Lord Howe Island beschrieben. Diese Art ist hier wahrscheinlich endemisch und stellt erst die zweite beschriebene Pompilide von dieser kleinen, isolierten Vulkaninsel dar. Basierend auf den neuen Ergebnissen werden die Verbreitung der Gattung *Sphictostethus* und ihr möglicher Gondwana-Ursprung kurz diskutiert.

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1 Introduction

The spider wasp genus *Sphictostethus* Kohl, 1884 has a restricted southern hemisphere distribution and is known from the Neotropics (Chile and Argentina), New Zealand and Australia (HARRIS 1987, ROIG-ALSINA 1987, ELLIOTT 2007). It was considered a subgenus of *Priocnemis* by TOWNES (1957), but HARRIS (1987) in his treatment of the New Zealand Pompilidae resurrected *Sphictostethus* as a genus. HARRIS (1987) recognized three species from New Zealand and transferred two Tasmanian species to *Sphictostethus*, thus recognizing the genus from Australia for the first time. No biological data is available for Australian *Sphictostethus*, but HARRIS (1987) provides detailed information on the biology of the three species from New Zealand, *S. calvus*, *S. fugax*, and *S. nitidus*. These species take their spider hosts to natural cavities (e. g. in trees or rotten logs) or under stones and construct single-celled or multi-celled nests (HARRIS 1987). Here we revise the Australian members of *Sphictostethus* and recognize 13 species from the continent. Nine species are described as new and two previously described species are transferred to the genus. We document and discuss the distribution of *Sphictostethus* in Australia and provide an identification key that covers both sexes. Male genitalic structures are described in detail for all Australian species and its usefulness as tool for pompilid systematics is discussed.

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2 Material and Methods

Terms for morphological structures follow DAY (1988), HARRIS (1987) and GOULET & HUBER (1993). Images of the specimens were taken with a Leica DXM 1200 digital camera attached to a Leica MZ 16 APO microscope and processed using Auto-Montage (Syncroscopy) software. Images of male genitalia and subgenital plates were done under a Keyence VHX 600 digital

microscope. All images were edited with Adobe Photoshop CS3 and figure plates assembled with Adobe Illustrator CS3. The species descriptions are based on all available specimens and represent the known morphological variation of each species. Females are described in greater detail, while the descriptions of males focus on the differences between the sexes.

Specimens were borrowed from and/or are deposited in the following collections (acronyms used throughout the text):

AM	Australian Museum, Sydney, Australia
ANIC	Australian National Insect Collection, CSIRO, Canberra, Australia
BMNH	The Natural History Museum, London, United Kingdom
BPBM	Bernice P. Bishop Museum, Honolulu, Hawaii, U.S.A.
QDPIF	Queensland Department of Primary Industries and Fisheries Collection, Indooroopilly, Australia
QM	Queensland Museum, Brisbane, Australia
SMNS	Staatliches Museum für Naturkunde, Stuttgart, Germany
UQIC	University of Queensland Insect Collection, Brisbane, Australia
WINC	Waite Insect and Nematode Collection, University of Adelaide, Australia
ZMHB	Museum für Naturkunde, Humboldt-Universität Berlin, Germany

The following abbreviations for frequently used morphological terms are used throughout the text:

S	metasomal sternite (for example S1 is the first metasomal sternite)
T	metasomal tergite (for example T1 is the first metasomal tergite)

3 Generic diagnosis of *Sphictostethus*

Genus *Sphictostethus* Kohl, 1884.

Sphictostethus Kohl, 1884: 37, 47. Type-species: *Pompilus gravesii* Curtis in HALIDAY 1837 by original designation.

Haploneura Kohl, 1884: 37, 47. Type species: *Haploneura apogona* Kohl, 1884 by original designation [preoccupied Loew, 1850; synonymy by TOWNES 1957: 81].

Haploneurion Kohl, 1884: 163 [nom. nov. for *Haploneura* Kohl, 1884].

Sphictonotus: BERTKAU 1885: 169 [lapsus calami for *Sphictostethus* Kohl, 1884].

Chrysocurgus Haupt, 1937: 134. Type species: *Sphex nitida* Fabricius, 1775 by original designation [placed as synonym of *Chirodamus* by TOWNES 1957: 11, generic transfer by HARRIS 1987: 63].

Anapriocnemis Haupt, 1959: 25–26, 60. Type species: *Pompilus flavipes* Guérin-Méneville, 1836 by original designation [synonymy by EVANS 1973: 214–215].

Specimens with three submarginal cells and vein M always reaching the outer wing margin, at least as spectral vein (Fig. 1A). Lateral mesopleuron often distinctly produced laterally (sometimes only in males) (Fig. 1E). Hind tibiae in females nearly always with toothed scales, at least indicated in proximal half (Fig. 1C). Metasoma in males (usually also in females) tubularly petiolate (Fig. 1A).

4 Key to the Australian species of *Sphictostethus*

This key is based on all available material of *Sphictostethus* and covers all known Australian species. The key works best for females, which can be easily identified without genital dissections. Males of *Sphictostethus* are more difficult to identify as they show less distinct differences and a higher level of morphological variation. For the identification of males, genital dissections are necessary and so the key is based on differences in the subgenital plate and male genitalic structures. Males of four species are unknown and not covered by the key (*S. connectens*, *S. dorriigoensis*, *S. picadillycircus* and *S. xanthochrous*).

- 1 Antenna 12-segmented; metasoma with six visible tergites [females]. 2
- Antenna 13-segmented; metasoma with seven visible tergites [males]. 14
- 2 Foretibia without distinctly elongate apical spine (Fig. 1F). 3
- Foretibia with distinctly elongate apical spine (Fig. 1G). 12
- 3 Brachypterous species; metapostnotum enlarged, more than 3 times as long as metascutellum (Fig. 1H). *S. walteri* n. sp.
- Macropterous species; metapostnotum much less enlarged relative to metascutellum, always less than twice as long as metascutellum (Fig. 1E). 4
- 4 Propodeum with distinct posterolateral tubercles (Fig. 1E). 5
- Propodeum without posterolateral tubercles. 6
- 5 Large species, body length more than 20 mm; forewing orange without dark infuscations; body bicoloured, with distinct black/orange colouration (Fig. 3G). *S. infandus* (Smith) n. comb.
- Smaller species, body length less than 15 mm; forewing whitish, with three dark bands of infuscation (Fig. 1A); body colouration more or less uniform, black to dark purple. *S. yidyam* n. sp.
- 6 Mesosoma light orange-brown to red-brown. 7
- Mesosoma dark brown to black. 8
- 7 Large species, body length ~15 mm; head dorsally produced (Fig. 1L); first metasomal segment orange, contrasting with brown of the remaining metasoma (Fig. 3D). *S. dorriigoensis* n. sp.
- Smaller species, body length ~10 mm; head dorsally not produced (Fig. 2I); first metasomal segment brown, like the remaining metasoma (Fig. 3E). *S. montanus* n. sp.
- 8 Forewing hyaline, without infuscation; head, antennae and body uniformly dark brown (Fig. 4E). *S. insularis* n. sp.
- Forewing orange or hyaline, always with distinct bands of infuscation (Fig. 3B, C); body colouration different. 9
- 9 Forewing hyaline (Fig. 3B); ventral clypeal margin straight, not incised medially (Fig. 2A). *S. geevestoni* n. sp.
- Forewing light orange to orange; clypeal margin at least slightly incised medially. 10
- 10 Metasoma black with broad orange band along posterior half of first metasomal segment and most of second metasomal segment (Fig. 3A); hind tibia with distinct toothed scales (Fig. 1B). *S. aliciae* (Turner)
- Metasoma dark brown to black, without broad orange band across first and second metasomal segments; hind tibia with inconspicuous toothed scales. 11
- 11 Antennae uniformly dark brown (Fig. 3C); clypeus uniformly dark brown to black (Fig. 2P); metapostnotum without median sulcus. *S. xanthochrous* (Turner)
- Antennae uniformly orange (Fig. 3H); ventral margin of clypeus distinctly orange (Fig. 1K), extent of clypeus colouration varies from less than half to three-quarters height of clypeus; metapostnotum with median sulcus. *S. connectens* (Turner) n. comb.
- 12 Ventral clypeal margin deeply but narrowly incised medially, lateral corners with distinct edges (Fig. 2C); forewing without greyish apical wing margin (Fig. 4A); hind tibia without toothed scales. *S. haoae* n. sp.
- Ventral clypeal margin otherwise, i.e. either slightly and narrowly incised medially or broadly incised; forewing with greyish apical wing margin (Fig. 4C); hind tibia with toothed scales at least indicated in proximal half (Fig. 1C). 13
- 13 Ventral clypeal margin slightly incised medially (Fig. 1M). *S. gadali* n. sp.
- Ventral margin deeply and broadly incised medially (Fig. 2K). *S. picadillycircus* n. sp.
- 14 Subgenital plate broad, with distinctly elongate setae, tubercles present submedially, tip blunt, slightly incised medially (Fig. 6I). *S. walteri* n. sp.
- Subgenital plate much narrower and tip always rounded apically, setae less elongate, tubercles absent or positioned laterally (Fig. 6A–H). 15
- 15 Subgenital plate with distinct lateral tubercles for articulation of S6 (Fig. 6E–H). 16
- Subgenital plate without distinct lateral tubercles (Fig. 6A–D). 19
- 16 Lateral tubercles on subgenital plate slightly extended and distinctly pointed (Fig. 6H). *S. infandus* (Smith) n. comb.
- Lateral tubercles on subgenital plate compressed, not extended and not pointed (Fig. 6E–G). 17
- 17 Male genitalia with paramere broad and flap-like, setation on paramere restricted to outer margins (Fig. 7E). *S. montanus* n. sp.
- Male genitalia with paramere only slightly broadened, setation not restricted to outer margins (Fig. 7F, G). 18
- 18 Paramere medially slightly broadened and with distinct peg-like setae, distal portion of paramere with normal setation (Fig. 7F). *S. aliciae* (Turner)
- Paramere slightly broadened throughout whole length, with long and normal setation (Fig. 7G). *S. insularis* n. sp.
- 19 Male genitalia with digiti volsellares medially extended and adjacent to each other, apical portions bent inwards (Fig. 7D). *S. yidyam* n. sp.
- Male genitalia with digiti volsellares straight (Fig. 7A–C). 20
- 20 Male genitalia with lamina volsellaris having one large and blunt distal hook, proximal hook absent, parameres uniformly setose (Fig. 7C). *S. gadali* n. sp.
- Male genitalia with lamina volsellaris having two hooks, parameres medially with reduced setation (Fig. 7A, B). 21
- 21 Male genitalia with aedeagus much shorter than parapepial lobe and digitus volsellaris, the latter slightly longer than parapepial lobe (Fig. 7A). *S. geevestoni* n. sp.
- Male genitalia with aedeagus about the same height as parapepial lobe, digitus volsellaris distinctly longer than aedeagus and parapepial lobe (Fig. 7B). *S. haoae* n. sp.

5 The Australian species of *Sphictostethus*

5.1 *Sphictostethus aliciae* (Turner, 1914) (Figs. 1B, I, J; 3A; 5A; 6F; 7F)

Calopompilus aliciae Turner, 1914: 617.

Priocnemis aliciae: TURNER 1915b: 334 [generic transfer].

Sphictostethus aliciae: HARRIS 1987: 64 [generic transfer]; ELLIOTT 2007 [cat.].

Holotype ♀, Australia, South Tasmania, Mount Wellington, 1300–2300 ft, 15.I.–6.II.1913, R. E. TURNER (BMNH). – Other specimens examined: 1 ♀, 1 ♂, same data as holotype (BMNH); 1 ♀, Australia, Tasmania, Lake St. Clair, 26.I.1949, E. F. RIEK (ANIC); 1 ♀, Australia, Tasmania, 7 km Southwest by West of Derwent Bridge, 42°10'S 146°10'E, Malaise/ethanol, 16.I.–2.II.1983, I. D. NAUMANN & J. C. CARDALE (SMNS); 2 ♀♀, Australia, Tasmania, 9 km West-Southwest of Derwent Bridge, 42°10'S 146°08'E, ex yellow tray, 21.I.1983, I. D. NAUMANN & J. C. CARDALE (ANIC, WINC); 1 ♂, Australia, Tasmania, 14 km South of Bronte Park, 42°15'S 146°29'E, Malaise/ethanol, 15.I.–3.II.1983, I. D. NAUMANN & J. C. CARDALE (ANIC); 1 ♀, Australia, Tasmania, Mount Barrow, 41°22'S 147°25'E, 1000 m, 23.I.1992, G. & A. DANIELS (UQIC Reg. no. 91448); 1 ♂, Australia, Tasmania, Meredith Road, 12 miles from Corinna, 6.I.1954, T. G. CAMPBELL (ANIC); 1 ♂, Australia, Tasmania, Barrow Creek, 8 km Northeast of Nunamara, 41°21'S 147°22'E, Malaise trap, 12.I.–6.II.1983, I. D. NAUMANN & J. C. CARDALE (SMNS).

Diagnosis: Forewing yellowish with two brown bands of infuscation and greyish apical wing margin; metasoma with broad orange band along posterior half of first metasomal segment and most of second metasomal segment (Figs. 3A; 5A). Foretibia in female without elongate apical spine. Hind tibia in female with distinct toothed scales (Fig. 1B). Male parameres with peg-like setae (Fig. 7F).

Description, female (Fig. 3A): **Body length:** 10.47–11.23 mm, head plus mesosoma: 4.88–5.37 mm. **Colour:** Head, mesosoma and coxae black, antennae dark brown to black, legs (apart from coxae) orange, metasoma black with orange band along posterior half of first metasomal segment and most of second metasomal segment. **Head** (Fig. 1I): Head sculpture finely punctate, with dense white setation. One row of elongate setae present along upper inner eye margin. Inner eye margin slightly incised medially, eye 1.90–2.26 times as long as wide. Malar space absent. Clypeus 2.63–2.79 times as wide as high, with dense white setation and irregular row of elongate setae near ventral margin, setae arising from distinct punctures; ventral clypeal margin incised medially. First flagellomere 4.0–4.86 times as long as wide and 1.12–1.22 times as long as second flagellomere. **Mesosoma:** Pronotum very short, posterior margin deeply incised, surface finely punctate. Mesonotum finely punctate, mesoscutum with parapsidal sulcus, parascutal carina not raised. Mesoscutellum with medially distinct scutoscuteellar sulcus. Mesopleuron ventrolaterally

not distinctly produced. Metanotum relatively long, with distinct but not raised metascutellum. Metapostnotum medially constricted, median length about 0.67–0.70 times as long as metascutellum, dorsal surface with distinct transverse striae, median sulcus indicated posteriorly. Propodeum very high, apically rounded, with distinct declivity, propodeal spiracles elongate but narrow, without raised margin; propodeal surface finely reticulate without transverse rugae. **Wings:** Macropterous, forewing yellowish, with two brown bands of infuscation and greyish apical wing margin, distal brown band covering SMC2 and SMC3 completely. SMC3 longer and distinctly higher than SMC2. Terminal abscissa of vein M reaches wing margin as hardly visible, relict spectral vein. **Legs:** Tarsal claws pectinate, elongate, not strongly curved, with ventral tooth that is slightly shorter than claw. Tarsal plantulae present. Foretibia without elongate apical spine. Hind tibia with distinct toothed scales. **Metasoma:** T1 not distinctly petiolate anteriorly, metasomal terga with fine reticulation and dense short setation. S2 with shallow transverse groove. Apex of metasoma with long setae.

Description, male (Fig. 5A): **Body length:** 4.31–5.61 mm, head plus mesosoma: 2.40–3.05 mm. **Colour** as in female. **Head** (Fig. 1J): Eye 2.11–2.16 times as long as wide. Clypeus 2.75–2.83 times as wide as high, without row of elongate setae near ventral margin. First flagellomere 2.47–2.82 times as long as wide and 0.89–0.93 times as long as second flagellomere. **Mesosoma:** Mesopleuron slightly produced posterolaterally. Metapostnotum 0.80–1.08 times as long as metascutellum. Propodeum dorsally less rounded than in female. **Metasoma:** Subgenital plate (Fig. 6F) with broad base and compressed lateral tubercle for insertion with S6; apically with short dense setation, tip broadly rounded. Male genitalia (Fig. 7F) with aedeagus apically narrowed, slightly shorter than parapenial lobe and digitus volsellaris. Digitus volsellaris about as long as parapenial lobe. Lamina volsellaris with two hooks, which are about the same size. Paramere long and slender, medially slightly broadened and with distinct peg-like setae, distal portion of paramere with normal setation.

Comments: This species is only known from Tasmania, where it is widely distributed (Fig. 8J).

5.2 *Sphictostethus connectens* (Turner, 1915) **n. comb.** (Figs. 1K; 3H)

Calopompilus connectens Turner, 1915: TURNER 1915a: 66.

Priocnemis connectens: TURNER 1915b: 334 [generic transfer]; ELLIOTT 2007 [cat.].

Holotype ♀, Australia, South Tasmania, Mount Wellington, 1300–2300 ft, January, R. E. TURNER (BMNH Reg. no. 19.193). – Other specimens examined: 2 ♀♀, Australia, Tasmania, Mount Barrow Road, 890 m, 15.–17.II.1980, *Nothofagus* etc., flight

intercept window trap 581, A. NEWTON, M. THAYER (ANIC); 1 ♀, Australia, Tasmania, Mount Field National Park, Lake Dobson Road, 240 m, 30.I.–5.II.1980, wet sclerophyll, window-pane gutter trap, A. NEWTON, M. THAYER (SMNS); 1 ♀, Australia, Tasmania, Mount Field National Park, I.–II.1983, I. GAULD (BMNH); 2 ♀♀, Australia, Tasmania, 10 km East-Northeast of Nunamara, 41°22'S 147°24'E, ex pantrap, 12.I.–6.II.1983, I. D. NAUMANN & J. C. CARDALE (WINC).

Diagnosis: Female with antennae uniformly orange (Fig. 3H); ventral margin of clypeus distinctly orange (Fig. 1K); foretibia without apical spine; forewing light orange, with two brown bands of infuscation and greyish apical wing margin; metapostnotum with median sulcus; metasoma uniformly dark brown to black.

Description, female (Fig. 3H): **Body length:** 7.46–10.47 mm, head plus mesosoma: 4.0–5.3 mm. **Colour:** Head, mesosoma and metasoma dark brown to black, coxae, trochanters and proximal half of tibiae dark brown (some specimens have the tibiae completely orange), rest of legs orange, antennae orange, ventral margin of clypeus orange (extent of clypeus colouration varies from less than half to three-quarters height of clypeus). **Head** (Fig. 1K): Head sculpture finely punctuate, with dense short, white setation, that is more conspicuous on lower face. One row of elongate setae present along upper inner eye margin. Inner eye margin slightly incised medially, eye 1.78–1.85 times as long as wide. Malar space very short. Clypeus 2.71–2.90 times as wide as high, with dense white setation and irregular row of elongate setae near ventral margin, setae arising from distinct punctures; ventral clypeal margin slightly incised medially. First flagellomere 5.86–6.80 times as long as wide and 1.17–1.51 times as long as second flagellomere. **Mesosoma:** Pronotum very short, posterior margin deeply incised, surface finely punctuate. Mesonotum finely punctuate, mesoscutum with parapsidal sulcus, parascutal carina not distinctly raised. Mesoscutellum with medially distinct scutoscuteellar sulcus. Mesopleuron ventrolaterally slightly produced. Metanotum relatively long, with distinct metascutellum. Metapostnotum well developed, median length about 0.71–0.88 times as long as metascutellum, dorsal surface with distinct transverse striae, median sulcus present. Propodeum high, apically rounded, with distinct declivity, propodeal spiracles elongate but narrow, without raised margin; propodeal surface finely reticulate without transverse rugae. **Wings:** Macropterous, forewing light orange, with two brown bands of infuscation and greyish apical wing margin, distal brown band covering SMC2 and proximal half of SMC3, area between distal brown band and apical wing margin light orange. SMC3 distinctly longer and higher than SMC2. Terminal abscissa of vein M reaches wing margin as spectral vein. **Legs:** Tarsal claws pectinate, elongate, not strongly curved, with ventral tooth that is about as high as claw. Tarsal plantulae

present. Foretibia without elongate apical spine. Hind tibia with inconspicuous toothed scales. **Metasoma:** T1 slightly petiolate anteriorly, metasomal terga with fine reticulation and dense short setation. S2 with shallow transverse groove. Apex of metasoma with long setae.

Male, unknown.

Comments: We transfer this species to *Sphictostethus* as it shows the diagnostic features of the genus. *Sphictostethus connectens* seems to be closely related to the morphologically similar species *S. aliciae* and *S. xanthochrous*, all of which are only known from Tasmania (Fig. 8J, K, M).

5.3 *Sphictostethus dorrigoensis* n. sp. (Figs. 1L; 3D)

Holotype ♀: Australia, New South Wales, Dorrigo National Park, 12.II.1968, D. H. COLLESS (ANIC).

Etymology: Named after the type locality.

Diagnosis: Large species with conspicuous bicolouration: antennae, mesosoma, legs and first metasomal segment orange, rest of metasoma and head dark brown (Fig. 3D); head dorsally produced (Fig. 1L); foretibia without apical spine.

Description, female (Fig. 3D): **Body length:** 12.56 mm, head plus mesosoma: 6.99 mm. **Colour:** Antennae, mesosoma, legs and first metasomal segment orange, rest of metasoma and head dark brown. **Head** (Fig. 1L): Head sculpture finely punctuate, with very short white setation, that is most conspicuous on lower face. One row of elongate setae present along upper inner eye margin. Setation absent along back of head. Occipital carina distinctly raised. Inner eye margin slightly incised medially, eyes ventrally diverging, eye 1.84 times as long as wide. Malar space very short. Clypeus 2.49 times as wide as high and densely covered with distinct setae, setation absent ventromedially; row of elongate setae present near ventral margin, setae arising from distinct punctures; ventral clypeal margin convex, i.e. incised medially. Anterior tentorial pits deep and conspicuous. First flagellomere 9.7 times as long as wide and 1.26 times as long as second flagellomere. Vertex conspicuously produced dorsally. **Mesosoma:** Pronotum short, posterior margin deeply incised. Mesoscutum with parapsidal sulcus, parascutal carina slightly raised. Mesoscutellum raised medially, with distinct scutoscuteellar sulcus. Metanotum with flattened, indistinct metascutellum. Mesopleuron ventrolaterally produced, but not into distinct tubercles. Metanotum short, with raised metascutellum. Median length of metapostnotum 1.4 times as long as metascutellum, dorsal surface with distinct transverse striae and median sulcus. Propodeum slightly flattened, without distinct declivity,

propodeal spiracles elongate but narrow, with raised margin; propodeal surface transversely rugulose. **Wings:** Macropterous, forewing light orange, with small, irregular infuscation along cu-a and anterior (vertical) portion of M, and with band-like infuscation covering proximal half of marginal cell, most of SM2 and SM3 and parts of discal 2 and discal (3). Apical margin of forewing slightly darkened. SMC3 longer and higher than SMC2. Terminal abscissa of vein M reaches wing margin as hardly visible, relict spectral vein. **Legs:** Tarsal claws pectinate, elongate, not strongly curved, with short ventral tooth that is shorter than claw. Tarsal plantulae present. Foretibia without distinct apical spine. Hind tibia with weakly developed toothed scales. **Metasoma:** T1 anteriorly petiolate, with dense, but short and indistinct white setation. Same setation present on remaining mesomal terga and sterna. S2 with shallow transverse groove. Apex of metasoma with long setae.

Male, unknown.

Comments: This large and distinct species is only known from the type specimen collected in the Dorrigo National Park (Fig. 8A). This park is part of the Gondwana rainforests of Australia and is a UNESCO World Heritage Site.

5.4 *Sphictostethus gadali* n. sp. (Figs. 1M, N; 3F; 5D; 6C; 7C)

Holotype ♀: Australia, Australian Capital Territory, Canberra, 30.III.1985, E. McCALLAN (ANIC).

Paratypes: 1 ♀, 1 ♂, Australia, Australian Capital Territory, National Botanic Gardens, 13.II.1981, TIDEMANN (ANIC); 1 ♀, Australia, Australian Capital Territory, Weston, 7.I.1974, T. BELLAS (SMNS); 1 ♂, Australia, Australian Capital Territory, Black Mountain, Malaise Site 2, 4.–17.II.1980, D. H. COLLESS (SMNS); 1 ♀, Australia, New South Wales, Dorrigo National Park, 12.II.1968, D. H. COLLESS (ANIC); 1 ♀, Australia, Victoria, Cann Valley Highway, 7 km Southwest of New South Wales border, ex alcohol collection, 25.II.1980, I. D. NAUMANN & J. C. CARDALE (WINC); 1 ♀, Australia, South East Queensland, Cunningham's Gap, rainforest pitfall 31B, 762 m, 1974–1975, G. B. & S. R. MONTEITH (ANIC); 1 ♀, Australia, Queensland, Sandgate, 27.VIII.1931 (ANIC); 1 ♂, Australia, Queensland, Brisbane, 4.XII.1935, A. MAY (QDPIF).

Etymology: The word 'gadali' means 'to hunt' in the Ngunnawal language, which was traditionally spoken in the region where the type was collected. The species epithet is to be treated as a noun in apposition.

Diagnosis: Foretibia in female with distinctly elongate apical spine; ventral clypeal margin slightly incised medially (Fig. 1M). Forewing in both sexes hyaline, with two brown bands of infuscation and greyish apical wing margin. Male genitalia with lamina volsellaris having one large and blunt distal hook, proximal hook absent (Fig. 7C).

Description, female (Fig. 3F): **Body length:** 4.90–6.83 mm, head plus mesosoma: 2.70–4.08 mm. **Colour:** Head and metasoma dark brown, mesosoma and legs red-brown, some specimens with pronotum and/or mesoscutum dark brown; antennae brown, darkened along distal segments; clypeus with narrow light brown rim along ventral margin. **Head** (Fig. 1M): Head sculpture finely punctuate, with dense short, white setation. One row of elongate setae present along upper inner eye margin. Inner eye margin slightly incised medially, eye 1.7–1.8 times as long as wide. Malar space very short. Clypeus 3.12–3.35 times as wide as high, with dense white setation and regular row of elongate setae near ventral margin; ventral clypeal margin slightly incised medially. First flagellomere 4.64–5.07 times as long as wide and 1.11–1.20 times as long as second flagellomere. **Mesosoma:** Pronotum very short, posterior margin deeply incised, surface finely punctuate. Mesonotum finely punctuate, mesoscutum with parapsidal sulcus, parascutal carina slightly raised. Mesoscutellum with medially distinct scutoscuteellar sulcus. Mesopleuron ventrolaterally not distinctly produced. Metanotum with distinct, reticulate metascutellum. Metapostnotum well developed, median length 0.93–1.00 times as long as metascutellum, dorsal surface with distinct transverse striae, median sulcus present and broad. Propodeum with distinct declivity, propodeal spiracles elongate but narrow, without raised margin; propodeal surface finely reticulate without transverse rugae. **Wings:** Macropterous, forewing hyaline, with two brown bands of infuscation and greyish apical wing margin, second brown band covers SMC2 and SMC3 completely. SMC3 narrow on marginal cell, about as wide as SMC2; SMC3 broad on M, broader than SMC2; 3rs-m curved, higher than 2rs-m. Terminal abscissa of vein M reaches wing margin as spectral vein. **Legs:** Tarsal claws pectinate, elongate, not strongly curved, with ventral tooth that is about as high as claw. Tarsal plantulae present. Foretibia with distinctly elongate apical spine. Hind tibia without toothed scales. **Metasoma:** Metasoma shiny, T1 petiolate anteriorly, metasomal terga with fine reticulation and dense short setation. S2 with deep transverse groove. Apex of metasoma with long setae.

Description, male (Fig. 5D): **Body length:** 4.22–5.61 mm, head plus mesosoma: 2.42–2.99 mm. **Colour:** Legs orange-brown, head, mesosoma and metasoma varying from uniformly red-brown to dark brown, antennae uniformly orange-brown or darkened along apical flagellomeres; clypeus completely orange-brown or with narrow orange-brown rim along ventral margin. **Head** (Fig. 1N): Eye 1.67–1.79 times as long as wide. Clypeus 2.73–2.86 times as wide as high, without row of elongate setae near ventral margin. First flagellomere 2.75–3.00 times as long as wide and 0.97–1.00 times as long as second flagellomere. **Mesosoma:** Mesoscutellum with

medially distinct scutoscuteellar sulcus. Mesopleuron ventrolaterally not distinctly produced. Metanotum with distinct, reticulate metascutellum. Metapostnotum 0.92–1.21 times as long as metascutellum. Propodeum flattened, without distinct declivity. *Legs*: Foretibia without distinctly elongate apical spine. *Metasoma*: T1 elongate and distinctly petiolate anteriorly. S2 without transverse groove. Subgenital plate (Fig. 6C) elongate, with scattered, long setation, tip narrowly rounded. Male genitalia (Fig. 7C) with aedeagus much shorter than parapenial lobe and digitus volsellaris. Digitus volsellaris straight, longer than parapenial lobe. Lamina volsellaris with one large and blunt distal hook, proximal hook absent. Paramere long and slender, uniformly setose.

Comments: This species shows a wide distribution from south east Queensland, eastern New South Wales to eastern Victoria (Fig. 8B).

5.5 *Sphictostethus geevestoni* n. sp. (Figs. 2A, B; 3B; 5B; 6A; 7A)

Holotype ♀: Australia, Tasmania, 13 km West of Geeveston I.1983, I. D. GAULD (ANIC).

Paratypes: 2 ♂♂, Australia, Tasmania, Barrow Creek, 8 km Northeast of Nunamara, 41°21'S 147°22'E, Malaise/ethanol, 12.I.–6.II.1983, I. D. NAUMANN & J. C. CARDALE (ANIC, WINC); 2 ♂♂, Australia, Tasmania, West side Lake St. Clair, ca. 750 m, 25.–29.I.1980, Eucalypt-Acacia forest, A. NEWTON, M. THAYER, window-pane gutter trap (ANIC, SMNS); 1 ♂, Australia, Tasmania, Mount Field National Park, I.–II.1983, I. GAULD (BMNH).

Etymology: Named after the type locality.

Diagnosis: Body uniformly dark brown to black; antennae orange; wings hyaline with two brown bands of infuscation and greyish apical wing margin. Female with ventral clypeal margin straight (Fig. 2A) and foretibia without elongate apical spine. Parameres in male medially with reduced setation; aedeagus much shorter than parapenial lobe (Fig. 7A).

Description, female (Fig. 3B): *Body length*: 8.23 mm, head plus mesosoma: 4.36 mm. *Colour*: Head, mesosoma, metasoma, coxae, trochanters and tibiae dark brown to black, antennae, ventral margin of clypeus and rest of legs orange. *Head* (Fig. 2A): Head sculpture finely punctuate, with dense white setation, that is more conspicuous on lower face. One row of elongate setae present along upper inner eye margin. Inner eye margin slightly incised medially, eye 1.8 times as long as wide. Malar space absent. Clypeus 2.52 times as wide as high, with dense white setation and irregular row of elongate setae near ventral margin, setae arising from distinct punctures; ventral clypeal margin straight. First flagellomere 3.8 times as long as wide and 1.06 times as long as second flagellomere.

Mesosoma: Pronotum very short, posterior margin deeply incised, surface finely reticulate. Mesoscutum finely reticulate, with parapsidal sulcus, parascutal carina not distinctly raised. Mesoscutellum finely punctuate, medially with distinct scutoscuteellar sulcus. Mesopleuron ventrolaterally not distinctly produced. Metascutellum distinctly marked by lateral depressions. Metapostnotum well developed, posteromedially slightly invaginated, median length 0.74 times as long as metascutellum, dorsal surface with distinct transverse striae, median sulcus present. Propodeum with distinct declivity, propodeal spiracles elongate but narrow, without raised margin; propodeal surface finely reticulate without transverse rugae. *Wings*: Macropterous, forewing hyaline, with two brown bands of infuscation and greyish apical wing margin. SMC3 very narrow on marginal cell, narrower than SMC2, 3rs-m straight, longer than 2rs-m. Terminal abscissa of vein M reaches wing margin as distinct vein. *Legs*: Tarsal claws pectinate, elongate, not strongly curved, with ventral tooth that is slightly shorter than claw. Tarsal plantulae present. Foretibia without elongate apical spine. Hind tibia with inconspicuous toothed scales. *Metasoma*: T1 petiolate anteriorly, metasomal terga with fine reticulation and dense short setation. S2 with shallow transverse groove. Apex of metasoma with long setae.

Description, male (Fig. 5B): *Body length*: 4.73–6.47 mm, head plus mesosoma: 2.78–3.36 mm. *Colour* as in female. *Head* (Fig. 2B): Row of elongate setae along upper inner eye margin absent. Eye 1.73–1.80 times as long as wide. Clypeus 2.47–2.67 times as wide as high. Malar space very short. First flagellomere 2.37–2.44 times as long as wide and 0.88–0.91 times as long as second flagellomere. *Mesosoma*: Mesopleuron ventrolaterally slightly produced. Metascutellum distinctly marked by lateral depressions, surface transversely striate, with short white setation. Metapostnotum well developed, posteromedially not invaginated, 0.70–0.95 times as long as metascutellum. Propodeum dorsally flattened, without distinct declivity. *Wings*: SMC3 not distinctly narrowed on marginal cell, about as wide as SMC2, 3rs-m curved. *Legs*: Tarsal claws pectinate, elongate, not strongly curved, with ventral tooth that is slightly shorter than claw. Tarsal plantulae present. Foretibia without elongate apical spine. Hind tibia with inconspicuous toothed scales. *Metasoma*: S2 without shallow transverse groove. Subgenital plate (Fig. 6A) moderately elongate, with dense short setation, tip broadly rounded. Male genitalia (Fig. 7A) with aedeagus much shorter than parapenial lobe and digitus volsellaris. Digitus volsellaris straight, slightly longer than parapenial lobe. Lamina volsellaris with two hooks, of which the distal one is larger. Paramere long and slender, medially with reduced setation.

Comments: This species is only known from Tasmania, where it is widely distributed (Fig. 8L).

5.6 *Sphictostethus haoae* n. sp.
(Figs. 1G; 2C, D; 4A; 5E; 6B; 7B)

Holotype ♀: Australia, New South Wales, Toonumbar National Park, 5 km South of Hanrahans, Murray Scrub Road, 28°28'S 152°43'E, yellow pans, wet sclerophyll forest, 350 m, 17.–18.XII.1998, D. BICKEL (AM Reg. no. K240863).

Paratypes: 1 ♀, Australia, New South Wales, Tooloom Plateau, 14 km West of Urbenville, ex pantraps, 15.–21.II.1984, I. D. NAUMANN (SMNS); 1 ♀, Australia, New South Wales, Ewingar State Forest, Elkhorn Road, 29°06'42"S 152°26'56"E, pitfall 12AR, 710 m, 4.II.–9.IV.1993, M. GRAY & G. CASSIS, ne NSW NPWS Survey (AM Reg. no. K240901); 1 ♀, 1 ♂, Australia, New South Wales, Wiangaree State Forest, Isakson Ridge, 1050 m, 29.II.–3.III.1980, *Nothofagus moorei* rainforest, A. NEWTON & M. THAYER, flight intercept window/trough trap (ANIC); 1 ♀, Australia, North East Queensland, Windsor Tableland, III.1981, R. STOREY (QDPIF); 1 ♀, Australia, North Queensland, Mossman Bluff Track, 5–10 km West of Mossman, 17.–31.XII.1988, Site 8, 1180 m, flight intercept, MONTEITH, THOMPSON & ANZSES (QM); 1 ♀, Australia, Queensland, Mount Glorious, II.–VI.1977, A. HILLER (ANIC); 1 ♂, Australia, Queensland, Mount Glorious, near Brisbane, X.1976–I.1977, Z. BOUČEK (BMNH).

Ety m o l o g y: Named in honour of Ms. BIN HAO (Harbin, China), the mother-in-law of the first author.

Diagnosis: Fore wing in female yellowish, with two dark brown bands of infuscation and without greyish apical wing margin; female foretibia with distinctly elongate apical spine; female clypeus with ventral margin deeply but narrowly incised medially and lateral corner with distinct edges (Fig. 2C). Parameres in male medially with reduced setation; aedeagus about the same height as parapenial lobe (Fig. 7B).

Description, female (Fig. 4A): **Body length**: 6.76–7.99 mm, head plus mesosoma: 3.33–4.15 mm. **Colour**: Head dark brown, clypeus light orange-brown to brown, antennae uniformly orange-brown, mesosoma red-brown to brown, legs uniformly orange-brown, metasoma dark brown. **Head** (Fig. 2C): Head sculpture finely punctuate, with dense short, white setation. One row of elongate setae present along upper inner eye margin. Inner eye margin slightly incised medially, eye 1.83–2.18 times as long as wide. Malar space very short. Clypeus 2.91–3.17 times as wide as high, with dense white setation and irregular row of elongate setae near ventral margin; ventral clypeal margin deeply but very narrowly incised medially, lateral corners of clypeal margin with distinct edges. First flagellomere 4.67–5.50 times as long as wide and 1.06–1.12 times as long as second flagellomere. **Mesosoma**: Pronotum very short, posterior margin deeply incised, surface finely punctuate. Mesonotum finely punctuate, mesoscutum with parapsidal sulcus, parascutal carina slightly raised. Mesoscutellum with medially distinct scutototellar sulcus. Mesopleuron ventrolaterally slightly

produced. Metanotum with distinct reticulate and slightly raised metascutellum. Metapostnotum well developed, median length 0.84–0.89 times as long as metascutellum, dorsal surface with distinct transverse striae, median sulcus present, posterior margin of metapostnotum slightly incised medially. Propodeum with distinct declivity, propodeal spiracles elongate but narrow, without raised margin; propodeal surface with fine transverse rugae. **Wings**: Macropterous, forewing yellowish, with two dark brown bands of infuscation and without greyish apical wing margin, second brown band covers SMC2 and SMC3 completely. SMC3 relatively narrow on marginal cell, about as wide as SMC2. SMC3 wide on M, much wider than SMC2. 3rs-m curved, higher than 2rs-m. Terminal abscissa of vein M reaches wing margin as hardly visible spectral vein. **Legs**: Tarsal claws pectinate, elongate, not strongly curved, with ventral tooth that is slightly higher than claw. Tarsal plantulae present. Foretibia with distinctly elongate apical spine. Hind tibia with toothed scales completely absent. **Metasoma**: Metasoma shiny, T1 petiolate anteriorly, metasomal terga with fine reticulation and dense short setation. S2 with deep transverse groove. Apex of metasoma with long setae.

Description, male (Fig. 5E): **Body length**: 5.09–6.66 mm, head plus mesosoma: 2.56–3.63 mm. **Colour**: Head (without clypeus) and metasoma dark brown, antennae, clypeus, mesosoma, legs light brown, apical flagellomere darkened. **Head** (Fig. 2D): Eye 1.64–1.76 times as long as wide. Clypeus 2.45–2.47 times as wide as high, ventral clypeal margin straight. First flagellomere 2.71–2.88 times as long as wide and 0.86–0.88 times as long as second flagellomere. **Mesosoma**: Metapostnotum 1.00–1.05 times as long as metascutellum. Propodeum flattened, without distinct declivity. **Wings**: Forewing with SMC3 narrow on marginal cell, narrower than SMC2. SMC3 broad on M, about as broad as SMC2. **Legs**: Foretibia without apical spine. Hind tibia without toothed scales. **Metasoma**: T1 distinctly petiolate. S2 without deep transverse groove. Apex of metasoma without long setae. Male genitalia with aedeagus about the same height as parapenial lobe. Digitus volsellaris distinctly longer than aedeagus and parapenial lobe. Lamina volsellaris with two hooks, of which the distal one is large and the proximal one hardly traceable. Paramere long and slender, with long setae apically, medially bare. Subgenital plate elongate, with dense, long setation, tip rounded.

Comments: This species has been collected in various localities in north east Queensland, south east Queensland and the north eastern regions of New South Wales (Fig. 8C). Together with *S. yidiam* this species shows the northern-most distribution of the Australian *Sphictostethus* species.

5.7 *Sphictostethus infandus* (Smith, 1868) n. comb.
(Figs. 2E, F; 3G; 5G; 6H; 7H)

Pompilus infandus Smith, 1868: 244. FROGGATT 1892: 213 [cat.];
DALLA TORRE 1897: 295 [cat., dist.]; ELLIOTT 2007 [cat.].

Holotype ♂, Australia (BMNH Reg. no. 19.158). – Other specimens examined: 1 ♀, Australia, New South Wales, Mount Tomah, Blue Mountains, 26.III.1987, N. W. RODD (AM Reg. no. K240910); 1 ♂, Australia, New South Wales, Clarence, Blue Mountains, 10.I.1989, N. W. RODD (AM Reg. no. K240911); 1 ♀, Australia, South Australia, Stirling, ‘Woorabinda’, Stirling Linear Park, Mt Lofty Ranges, Malaise trap, 3.–14.I.2001, N. STEVENS (WINC).

Diagnosis: Forewing orange without dark infuscations; body bicoloured with distinct black/orange colouration (Figs. 3G; 5G); head with dense fine punctuation and scattered large punctures. Male with lateral tubercles on subgenital plate slightly extended and distinctly pointed (Fig. 6H).

Description, female (Fig. 3G): Body length: 25.03 mm, head plus mesosoma: 13.74 mm. Colour: Head and body black apart from orange propodeum, and the first and second metasomal segment which are mainly orange; T1 orange but anteriorly black, T2 and S2 posteriorly black; antennae and legs orange. Head (Fig. 2E): Head with dense fine punctuation and scattered large punctures. Long setae arising from the large punctures and very short setae from the fine punctures. Inner eye margin apically white, medially incised, eye 1.97 times as long as wide. Malar space present and distinct. Clypeus 2.32 times as wide as high and densely covered with setae, setation absent ventromedially; row of elongate setae present near ventral margin; ventral clypeal margin straight. Labrum with dense orange setation and ventrally with stout bristles. First flagellomere 6.31 times as long as wide and 1.19 times as long as second flagellomere. Mesosoma: Pronotum short, posterior margin deeply incised. Mesoscutum with parapsidal sulcus, parascutal carina not distinctly raised. Mesoscutellum flattened, scutoscuteellar sulcus deep medially. Mesopleuron tuberculately produced ventrolaterally. Metanotum laterally broadened, with distinct metascutellum. Metapostnotum 0.73 times as long as metascutellum, dorsal surface with distinct transverse striae, medially with smooth depression. Propodeum with distinct declivity, propodeal spiracles elongate but narrow, with raised margin; propodeal surface transversely rugulose; with distinct pair of lateral tubercles posterior to spiracles. Wings: Macropterous, forewing orange, slightly darkened along apical margin. SMC3 greatly enlarged, about twice as long and 1.5 times as high as SMC2. Hind wing orange, slightly darkened along apical margin. Legs: Tarsal claws pectinate, with distinct ventral tooth that is shorter than claw. Tarsal plantulae present. Foretibia without distinct apical spine. Hind tibia with distinct toothed scales. Metasoma: T1 anteriorly petiolate,

metasomal segments with dense, but short and indistinct setation. Apex of metasoma with longer setae. S2 with deep transverse groove.

Description, male (Fig. 5G): Body length: 17.68 mm, head plus mesosoma: 10.20 mm. Colour, sculpture and setation as in female. Head (Fig. 2F): Eye 1.89 times as long as wide. Clypeus 2.47 times as wide as high. First flagellomere 3.55 times as long as wide and 0.99 times as long as second flagellomere. Mesosoma: Median length of metapostnotum 0.76 times as long as metascutellum. Metasoma: Subgenital plate (Fig. 6H) with distinctly pointed lateral tubercles for insertion with S6; surface with scattered setae, tip narrowly rounded. Male genitalia (Fig. 7H) with aedeagus shorter than parapenial lobe and digitus volsellaris. Digitus volsellaris slightly shorter than parapenial lobe. Digiti volsellares medially slightly extended, apical portions bent inwards. Lamina volsellaris with two hooks, of which the proximal one is slightly larger. Paramere long and slender, with long setation.

Comments: Despite its large size and distinctive morphology this species has remained largely unnoticed by taxonomists since SMITH (1868) described it in the genus *Pompilus* Fabricius (Pompilinae). We here transfer it to *Sphictostethus* as it is a member of Pepsinae and shows the diagnostic features of the genus. This species is only known from three localities, Melbourne (label data from BMNH specimens, communicated by GAVIN BROAD), the Blue Mountains in New South Wales, and the Mount Lofty Ranges in South Australia (Fig. 8D). As far as is known, this species has the western-most distribution of all *Sphictostethus* and is the only one that has been recorded from South Australia.

5.8 *Sphictostethus insularis* n. sp.
(Figs. 2G, H; 4E; 5C; 6G; 7G)

Holotype ♀: Australia, New South Wales, Lord Howe Island, Ned's Beach, XII.1972, Z. LIEPA (ANIC).

Paratypes: 2 ♀♀, Australia, New South Wales, Lord Howe Island, 30.XI.1955, S. J. PARAMONOV & Z. LIEPA (ANIC, BMNH); 1 ♀, Australia, New South Wales, Lord Howe Island, Mount Gower, walking trail, 31°35'8"S 159°4'45"E, 28.XI.–5.XII.2000, CBCR, Australian Museum, LHI049/03, pit trap (SMNS); 1 ♀, Australia, New South Wales, Lord Howe Island, Western face of Mount Lidgberg, at base of summit tabletop, 31°34'22"S 159°4'46"E, 2.–12.XII.2000, CBCR, Australian Museum, LHI038/01, pit trap (AM Reg. no. K281473); 1 ♀, same collection data as before, but LHI038/05 (WINC); 1 ♀, Australia, New South Wales, Lord Howe Island, Southeastern face of Mount Lidgberg, at base of summit tabletop, 31°34'26"S 159°4'54"E, 25.XI.–2.XII.2000, CBCR, Australian Museum, LHI031/05, pit trap (AM Reg. no. K281470); 1 ♂, Australia, New South Wales, Lord Howe Island, Ned's Beach, Muttonbird burrow, XII.1972, Z. LIEPA (ANIC); 1 ♂, Australia, New South Wales, Lord Howe Island, near Ned's Beach, Malaise trap, 20.–25.II.1971, D. K. McALPINE (AM).



Fig. 1. *Spichtostethus* spp., diagnostic characters (A–G), head, frontal view (I–N). – A. *S. yidyam* n. sp., ♂ paratype, wings. B. *S. aliciae*, ♀, hind tibia. C. *S. picadillycircus* n. sp., ♀ paratype, hind tibia. D. *S. walteri* n. sp., ♂ paratype, mesosoma, dorsal view. E. *S. yidyam* n. sp., ♀ paratype, mesosoma, lateral view. F. *S. montanus* n. sp., ♀ holotype, foretibia, lateral view. G. *S. haoae* n. sp., ♀ paratype, foretibia, lateral view. H. *S. walteri* n. sp., ♀ paratype, head and mesosoma, dorsal view. I. *S. aliciae*, ♀ holotype. J. *S. aliciae*, ♂. K. *S. connectens*, ♀. L. *S. dorrigoensis* n. sp., ♀ holotype. M. *S. gadali* n. sp., ♀ holotype. N. *S. gadali* n. sp., ♂ paratype. – Abbreviations: mpn = metapostnotum, no1 = pronotum, no3 = metanotum, pd = propodeum, sc = mesoscutum, scl = mesoscutellum, SMC = submarginal cell. – Scale: 0.5 mm.



Fig. 2. *Sphictostethus* spp., head, frontal view. – **A.** *S. geevestoni* n. sp., ♀ holotype. **B.** *S. geevestoni* n. sp., ♂ paratype. **C.** *S. haoae* n. sp., ♀ holotype. **D.** *S. haoae* n. sp., ♂ paratype. **E.** *S. infandus*, ♀. **F.** *S. infandus*, ♂. **G.** *S. insularis* n. sp., ♀ holotype. **H.** *S. insularis* n. sp., ♂ paratype. **I.** *S. montanus* n. sp., ♀ holotype. **J.** *S. montanus* n. sp., ♂ paratype. **K.** *S. picadillycircus*, ♀ holotype. **L.** *S. walteri* n. sp., ♀ holotype. **M.** *S. walteri* n. sp., ♂ paratype. **N.** *S. xanthochrous* ♀. **O.** *S. yidyam* n. sp., ♀ holotype. **P.** *S. yidyam* n. sp., ♂ paratype. – Scale: 0.5 mm.

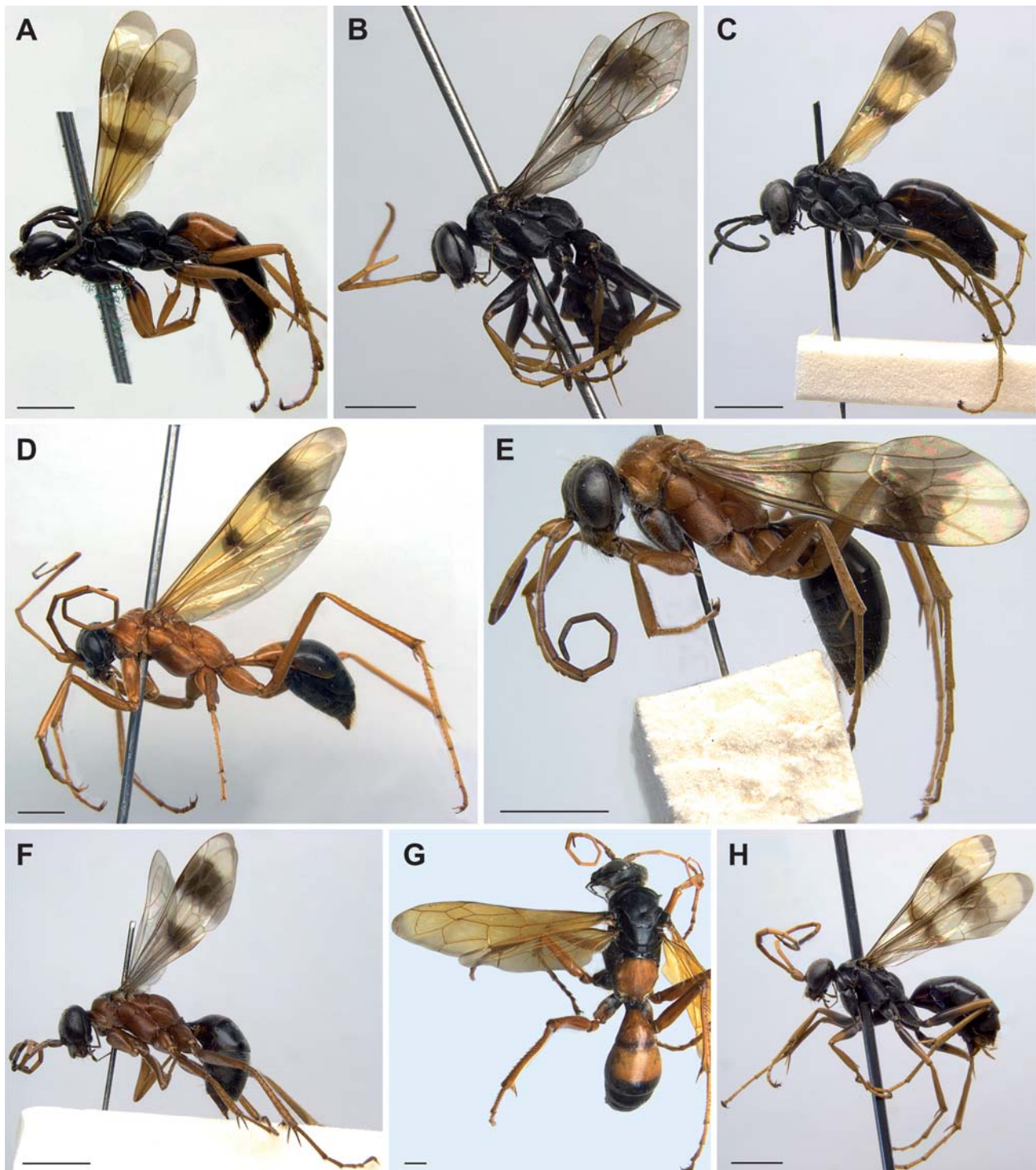


Fig. 3. *Sphictostethus* spp., females, habitus. – A. *S. aliciae*. B. *S. geevestoni* n. sp., holotype. C. *S. xanthochrous*. D. *S. dorrigoensis* n. sp., holotype. E. *S. montanus* n. sp., holotype. F. *S. gadali* n. sp., holotype. G. *S. infandus*. H. *S. connectens*. – Scale: 2 mm.

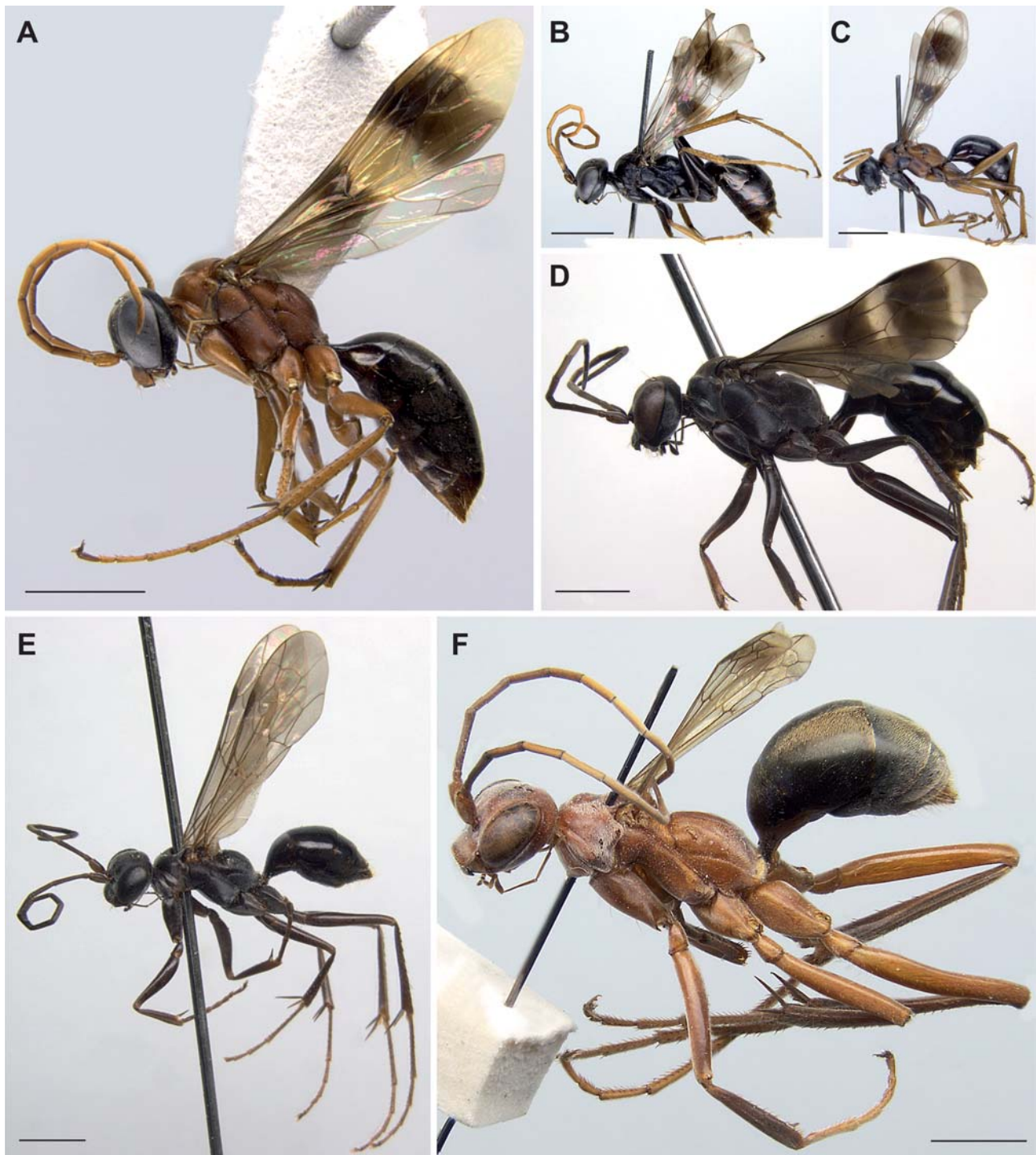


Fig. 4. *Sphictostethus* spp., females, habitus. – **A.** *S. haoae* n. sp., holotype. **B.** *S. picadillycircus* n. sp., holotype. **C.** *S. picadillycircus* n. sp., paratype. **D.** *S. yidyam* n. sp., holotype. **E.** *S. insularis* n. sp., holotype. **F.** *S. walteri* n. sp., holotype. – Scale: 2 mm.

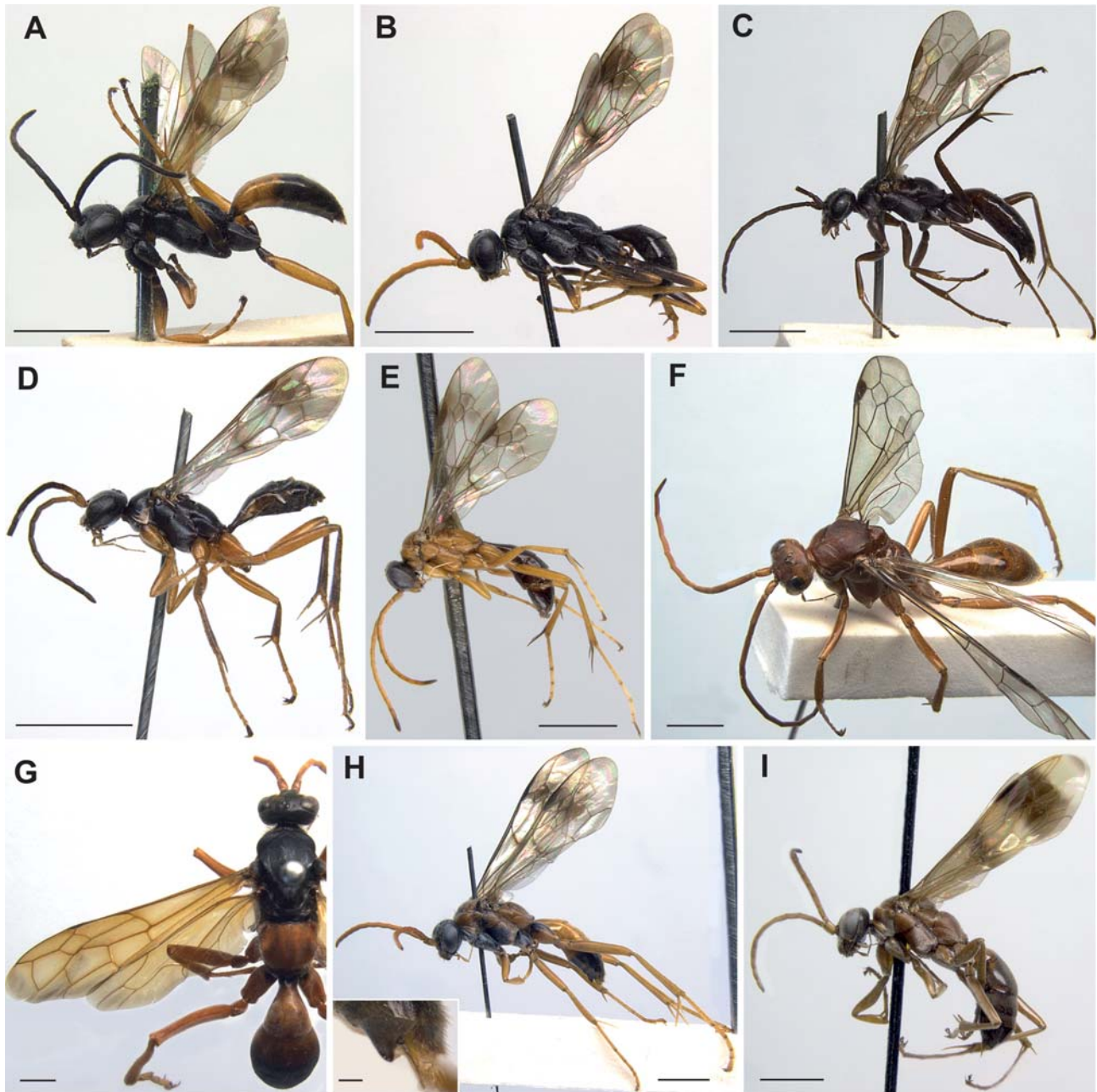


Fig. 5. *Spichtostethus* spp., males, habitus. – **A.** *S. aliciae*. **B.** *S. geevestoni* n. sp., paratype. **C.** *S. insularis* n. sp., paratype. **D.** *S. galdi* n. sp., paratype. **E.** *S. haoae* n. sp., paratype. **F.** *S. walteri* n. sp., paratype. **G.** *S. infandus*. **H.** *S. montanus* n. sp., paratype, habitus and apex of metasoma. **I.** *S. yidyam* n. sp, 'southern' specimen. – Scale: 2 mm (inlay of H: 0.2 mm).

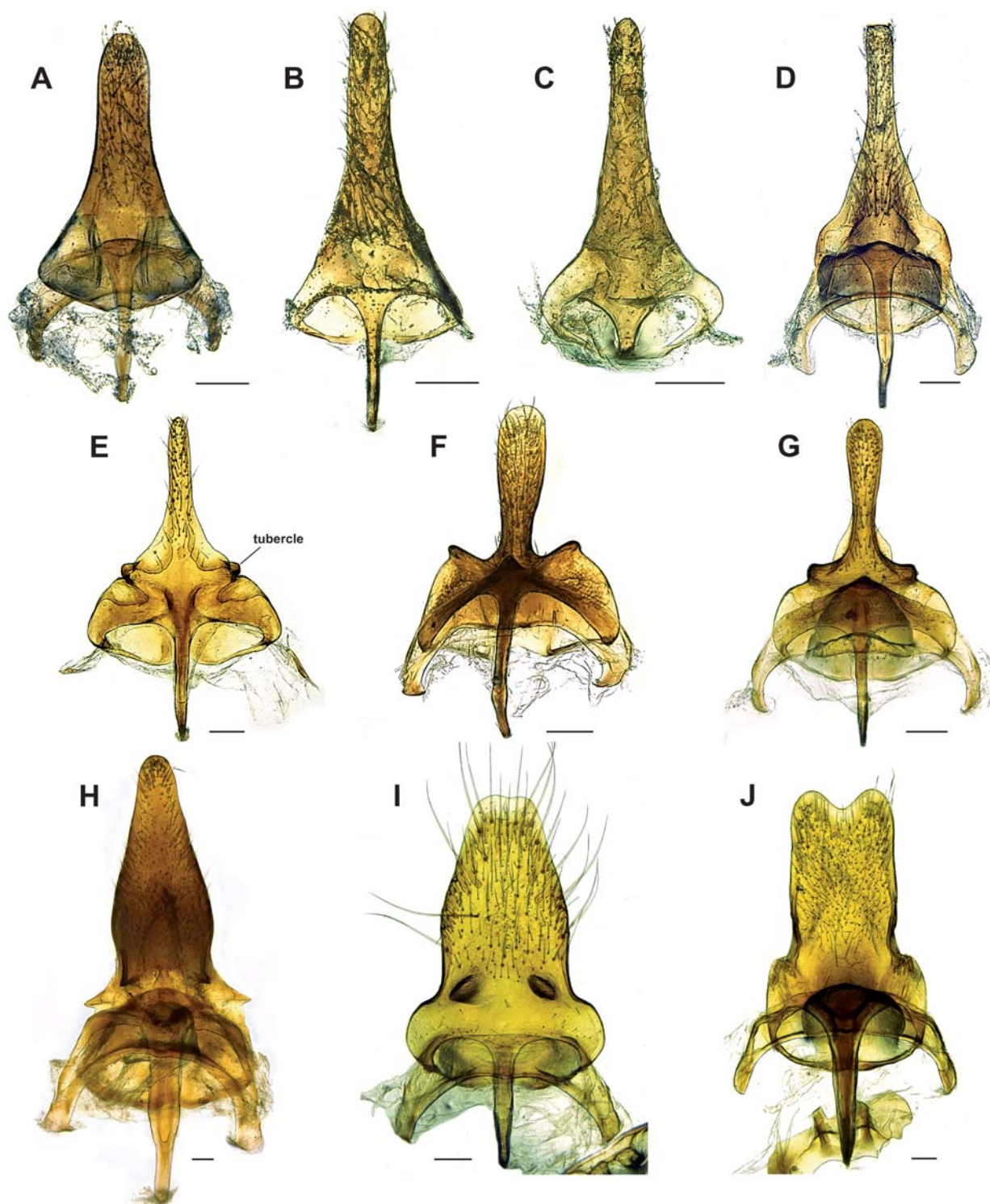


Fig. 6. *Sphictostethus* spp., subgenital plates, ventral view. – **A.** *S. geevestoni* n. sp. **B.** *S. haoae* n. sp. **C.** *S. gadali* n. sp. **D.** *S. yidyam* n. sp., ‘southern’ specimen. **E.** *S. montanus* n. sp. **F.** *S. aliciae*. **G.** *S. insularis* n. sp. **H.** *S. infandus*. **I.** *S. walteri* n. sp. **J.** *S. gravesii*. – Scale: 0.1 mm.

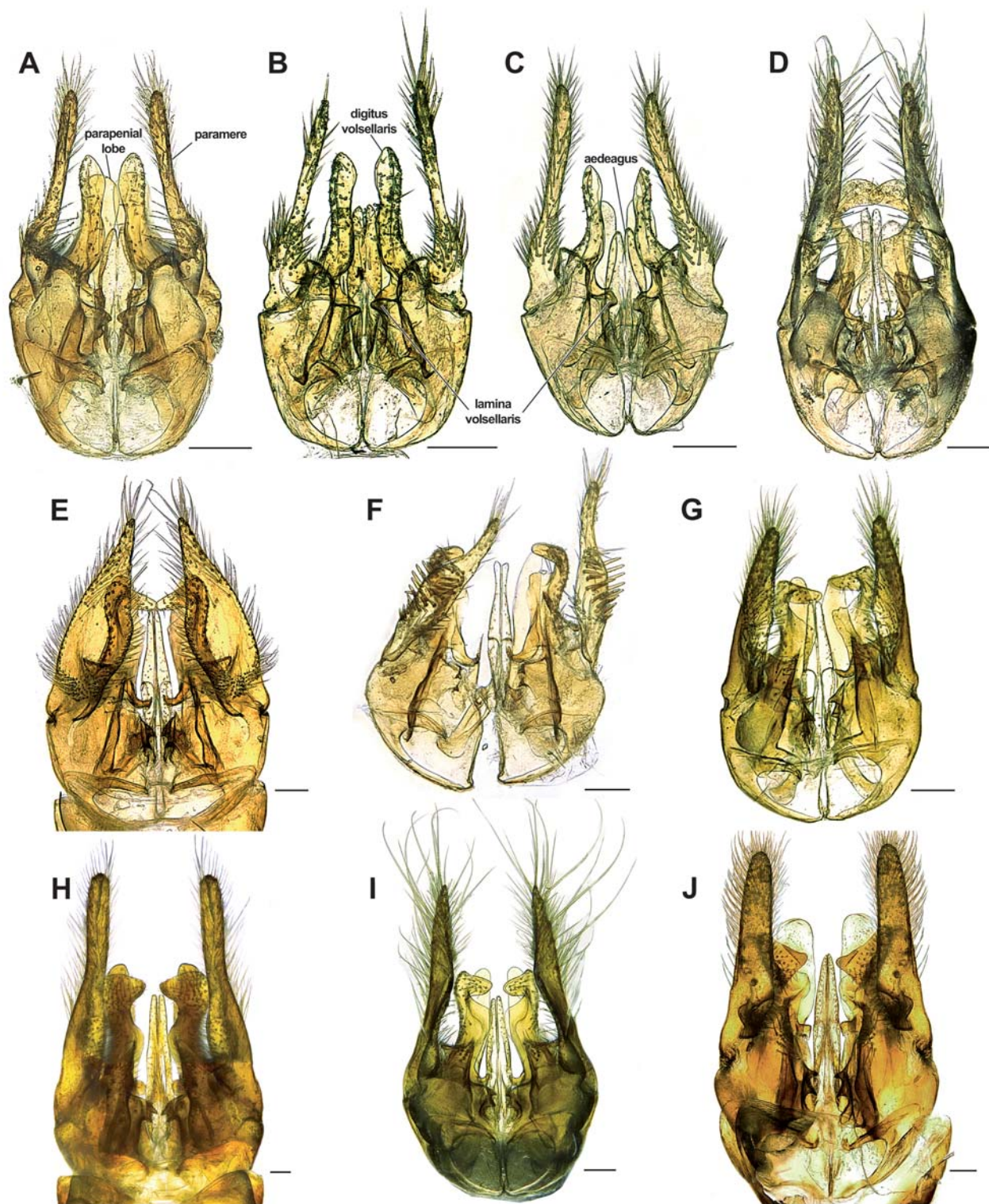


Fig. 7. *Sphictostethus* spp., male genitalia, ventral view. – **A.** *S. geevestoni* n. sp. **B.** *S. haoae* n. sp. **C.** *S. gadali* n. sp. **D.** *S. yidyam* n. sp., 'southern' specimen. **E.** *S. montanus* n. sp. **F.** *S. aliciae*. **G.** *S. insularis* n. sp. **H.** *S. infandus*. **I.** *S. walteri* n. sp. **J.** *S. gravesii*. – Scale: 0.1 mm.

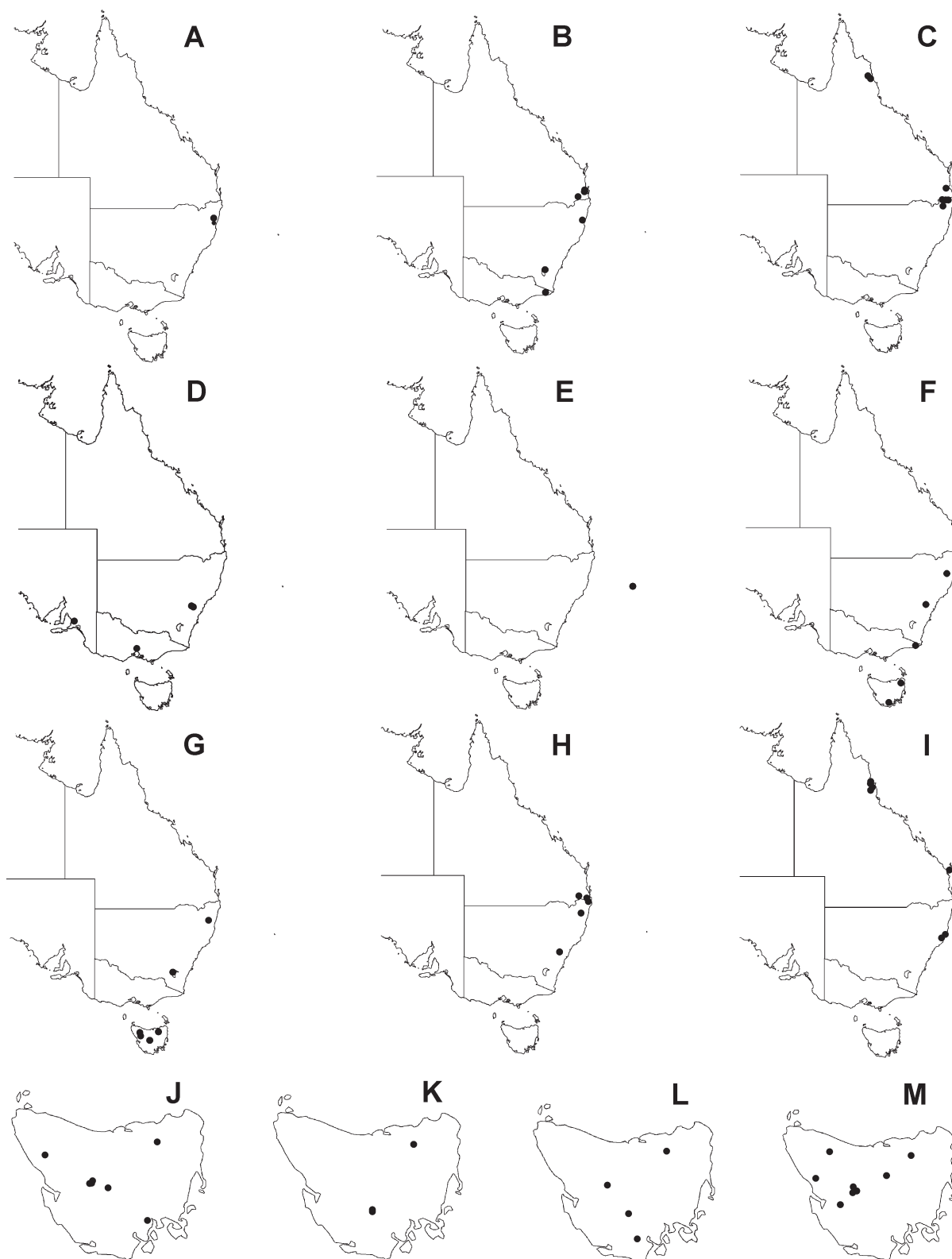


Fig. 8. Distribution of Australian *Sphictostethus*. – **A.** *S. dorrigoensis* n. sp. **B.** *S. gadali* n. sp. **C.** *S. haoae* n. sp. **D.** *S. infandus*. **E.** *S. insularis* n. sp. **F.** *S. montanus* n. sp. **G.** *S. picadillycircus*, n. sp. **H.** *S. walteri* n. sp. **I.** *S. yidyam* n. sp. **J.** *S. aliciae*. **K.** *S. connectens*. **L.** *S. geevestoni* n. sp. **M.** *S. xanthochrous*.

E t y m o l o g y : Named with reference to the insular type locality.

D i a g n o s i s : Body and appendages uniformly dark brown; wings hyaline, without infuscation (Figs. 4E, 5C). Female foretibia without distinctly elongate apical spine. Male subgenital plate with compressed lateral tubercles and parameres slightly broadened throughout whole length, parameres with long and normal setation (Fig. 7G).

D e s c r i p t i o n , female (Fig. 4E): **B o d y l e n g t h :** 8.36–10.05 mm, head plus mesosoma: 4.82–5.65 mm. **C o l o u r :** Head, antennae, legs and body dark brown. **H e a d** (Fig. 2G): Head sculpture finely punctuate, with short white setation, that is most conspicuous on lower face. One row of elongate setae present near inner eye margin at level of ocelli. Inner eye margin slightly incised medially, eye 1.71–2.06 times as long as wide. Malar space absent. Clypeus 2.61–2.77 times as wide as high and densely covered with short white setae, setation absent ventromedially; row of elongate setae present near ventral margin, setae arising from distinct punctures; ventral clypeal margin slightly emarginate medially. First flagellomere 6.33–6.62 times as long as wide and 1.15–1.19 times as long as second flagellomere. **M e s o s o m a :** Pronotum short, posterior margin deeply incised. Mesoscutum with parapsidal sulcus, parascutal carina not raised. Mesoscutellum flattened, not distinctly raised medially. Mesopleuron tuberculately produced ventrolaterally. Metanotum with flattened, indistinct metascutellum. Metanotum short, with raised metascutellum. Metapostnotum 1.11–1.28 times as long as metascutellum, dorsal surface with distinct transverse striae and median sulcus. Propodeum with distinct declivity, propodeal spiracles elongate but narrow, without raised margin; propodeal surface transversely rugulose. **W i n g s :** Macropterous, forewing without infuscation. SMC3 slightly longer and distinctly higher than SMC2. **L e g s :** Tarsal claws pectinate, with distinct ventral tooth that is about as high as claw. Tarsal plantulae present. Foretibia without distinct apical spine. Hind tibia with weakly developed toothed scales. **M e t a s o m a :** T1 anteriorly petiolate, with dense, but short and indistinct white setation. Same setation present on remaining metasomal terga and sterna. S2 with shallow transverse groove. Apex of metasoma with long setae.

D e s c r i p t i o n , male (Fig. 5C): **B o d y l e n g t h :** 6.32–7.45 mm, head plus mesosoma: 3.33–3.87 mm. **C o l o u r ,** sculpturation and setation as in female. **H e a d** (Fig. 2H): Eye 1.73–1.88 times as long as wide. Malar space very short. Clypeus 2.74–2.80 times as wide as high. First flagellomere 3.50–3.59 times as long as wide and 0.91–0.95 times as long as second flagellomere. **M e s o s o m a :** Metapostnotum 1.20–1.24 times as long as metascutellum. **M e t a s o m a :** T1 elongate and petiolate, spiracles situated in anterior half. Apex of metasoma without elongate setae. Subgenital plate (Fig. 6G) with broad base and

compressed lateral tubercle for insertion with S6; apically with short setation, tip rounded. Male genitalia (Fig. 7G) with aedeagus slightly shorter than parapenial lobe and digitus volsellaris. Digitus volsellaris about as long as parapenial lobe. Digiti volsellares medially extended and adjacent to each other, apical portions bent inwards. Lamina volsellaris with two hooks, of which the proximal one is larger. Paramere relatively short and slightly broadened, with long setation.

C o m m e n t s : This species is only known from Lord Howe Island, where it is apparently endemic and may represent one of the geographically most isolated pompilid species known (Fig. 8E). The only other species that has been described from Lord Howe Island is *Ctenostegus murrumbidgee* Evans, which is not endemic to the island but very widely distributed throughout Australia and Tasmania (EVANS 1976).

5.9 *Sphictostethus montanus* n. sp. (Figs. 1F; 2I, J; 3E; 5H; 6E; 7E)

H o l o t y p e ♀: Australia, New South Wales, Wright's Lookout, New England National Park, 4100–4000 ft, 29.X.1965, G. L. BUSH, 6560 (ANIC).

P a r a t y p e s : 1 ♂, Australia, New South Wales, Blue Mountains, Mount Wilson, 30.III.1976, D. K. McALPINE, M. A. SCHNEIDER (AM Reg. no. K240912); 1 ♂, Australia, New South Wales, Blue Mountains, Mount Wilson, 17.III.1972, D. K. McALPINE (AM); 1 ♂, Australia, New South Wales, Blue Mountains, Mount Wilson, 15.XII.1981, I. GAULD (BMNH); 1 ♂, Australia, Victoria, Mount Drummer, 4.XII.1956, E. F. RIEK (ANIC); 4 ♂♂, Australia, Tasmania, 4 km Southeast of Weldborough, 41°14'S 147°56'E, Malaise/ethanol, 13.I.–7.II.1983, I. D. NAUMANN & J. C. CARDALE (ANIC, SMNS, WINC); 2 ♂♂, Australia, Tasmania, 13 km West of Geeveston, I.1983, I. D. GAULD (BMNH).

E t y m o l o g y : Named after the mountainous type locality.

D i a g n o s i s : Female foretibia without elongate apical spine; female mesosoma orange (Fig. 3E); female forewing light orange, with two brown bands of infuscation and slightly indicated greyish apical wing margin, second brown band covers SMC2 and proximal two-thirds of SMC3. Male subgenital plate with compressed lateral tubercles (Fig. 6E); male paramere broad and flap-like, setation restricted to outer margin (Fig. 7E).

D e s c r i p t i o n , female (Fig. 3E): **B o d y l e n g t h :** 7.54 mm, head plus mesosoma: 3.93 mm. **C o l o u r :** head and metasoma dark brown, first metasomal segment with some irregular orange markings; antennae, clypeus, mesosoma and legs orange to orange-brown, coxae partly darkened. **H e a d** (Fig. 2I): Head sculpture finely punctuate, with dense short, white setation, that is more conspicuous on lower face. One row of elongate setae present along upper inner eye margin. Inner eye margin slightly incised

medially, eye 1.7 times as long as wide. Malar space very short. Clypeus 2.65 times as wide as high, with dense white setation and regular row of very elongate setae near ventral margin, setae arising from distinct punctures; ventral clypeal margin slightly incised medially. First flagellomere 6.09 times as long as wide and 1.2 times as long as second flagellomere. *Mesosoma*: Pronotum very short, posterior margin deeply incised, surface finely punctuate. Mesonotum finely punctuate, mesoscutum with parapsidal sulcus, parascutal carina not distinctly raised. Mesoscutellum with medially distinct scutoscuteellar sulcus. Mesopleuron ventrolaterally produced. Metanotum with distinct metascutellum. Metapostnotum well developed, median length 0.94 times as long as metascutellum, dorsal surface with distinct transverse striae, median sulcus posteriorly indicated. Propodeum with distinct declivity, propodeal spiracles elongate but narrow, without raised margin; propodeal surface finely reticulate without transverse rugae. *Wings*: Macropterous, forewing light orange, with two brown bands of infuscation and slightly indicated greyish apical wing margin, second brown band covers SMC2 and proximal two-thirds of SMC3. SMC3 distinctly longer and higher than SMC2. Terminal abscissa of vein M reaches wing margin as distinct vein. *Legs*: Tarsal claws pectinate, elongate, not strongly curved, with ventral tooth that is about as high as claw. Tarsal plantulae present. Foretibia without elongate apical spine. Hind tibia with inconspicuous toothed scales. *Metasoma*: T1 petiolate anteriorly, metasomal terga with fine punctuation and dense short setation. S2 with deep transverse groove. Apex of metasoma with long setae.

Description, male (Fig. 5H): Body length: 6.53–8.17 mm, head plus mesosoma: 3.32–4.27 mm. **Colour:** Head dark brown with orange clypeus, antennae orange, mesosoma orange-brown with varying degree of melanism, ranging from: mesosoma entirely orange-brown; mesosoma darkened on propleuron, ventral and lateral mesopleuron and along propodeal spiracles; mesosoma almost entirely dark brown with orange markings restricted to pronotum, mesoscutellum, metascutellum, metapostnotum and propodeum; legs varying from entirely orange, to darkened along coxae; metasoma with first three metasomal segments orange (sometimes T3 and S3 posteriorly darkened) and rest of metasoma dark brown. **Head (Fig. 2J):** Eye 1.72–1.80 times as long as wide. Clypeus 2.52–2.60 times as wide as high. First flagellomere 2.10–2.52 times as long as wide and 0.93–0.98 times as long as second flagellomere. *Mesosoma*: Median length of metapostnotum 0.73–0.88 times as long as metascutellum, median sulcus complete. Propodeum dorsally flattened, without distinct declivity. *Wings*: Macropterous, forewing light orange, almost hyaline, with two brown bands of infuscation and slightly greyish apical wing margin. Terminal abscissa of vein M reaches wing

margin as spectral vein. *Legs*: Hind tibia without toothed scales. *Metasoma*: S6 posteromedially with distinct posteriorly directed spine. Subgenital plate (Fig. 6E) with broad base and compressed lateral tubercle for insertion with S6; apically with short setation, tip narrowly rounded. Male genitalia (Fig. 7E) with aedeagus slightly shorter than parapenial lobe. Digitus volsellaris slightly longer than parapenial lobe. Apical portions of digiti volsellares bent inwards. Lamina volsellaris with two hooks, of which the distal one is slightly larger. Paramere broad and flap-like, with setation restricted to outer margins.

Comments: This species is widely distributed throughout eastern New South Wales, eastern Victoria and Tasmania (Fig. 8F).

5.10 *Sphictostethus picadillycirus* n. sp. (Figs. 1C; 2K; 4B, C)

Holotype ♀: Australia, Australian Capital Territory, Blundells Creek, 3 km East of Picadilly Circus, 850 m, 35°22'S 148°50'E, II.1984, WEIR, LAWRENCE & JOHNSON, flight intercept window/through trap (ANIC).

Paratypes: 1 ♀, same data as holotype (SMNS); 1 ♀, Australia, Australian Capital Territory, Blundells Creek Road, 850 m, 3.5 km East of Picadilly Circus, 27.I.1982, J. LAWRENCE, Berlese ANIC 864, leaf & log litter (ANIC); 1 ♀, Australia, Australian Capital Territory, Blundells Creek, 35°22'S 148°50'E, I.1988, D. H. COLLESS (BMNH); 1 ♀, Australia, New South Wales, 24BR, 0.4 km East-Northeast of junction of Hardens & Chaelundi Roads, 30°08'S 152°25'E, Marengo SF 6/23, 1290 m (NPWS Survey), 4.II.–9.IV.1993, M. GRAY, G. CASSIS (AM Reg. no. K240860); 1 ♀, Australia, Tasmania, Barrow Creek, 8 km Northeast of Nunamara, 41°21'S 147°22'E, Malaise/ethanol, 12.I.–6.II.1983, I. D. NAUMANN & J. C. CARDALE (ANIC); 1 ♀, Australia, Tasmania, 9 km South of Bronte Park, 42°12'S 146°30'E, ex pantrap, 15.I.–3.II.1983, I. D. NAUMANN & J. C. CARDALE (ANIC); 1 ♀, Australia, Tasmania, 14 km South of Bronte Park, 42°15'S 146°29'E, Malaise/ethanol, 15.I.–3.II.1983, I. D. NAUMANN & J. C. CARDALE (WINC); 1 ♀, Australia, Tasmania, 4 km East of Roseberry, 41°47'S 145°35'E, Malaise/ethanol, 16.I.–1.II.1983, I. D. NAUMANN & J. C. CARDALE (ANIC); 1 ♀, Australia, Tasmania, Waratah, 31.I.1949, E. F. RIEK (ANIC).

Etymology: Named after the type locality. The species epithet is to be treated as a noun in apposition.

Diagnosis: Female foretibia with distinctly elongate apical spine; ventral clypeal margin deeply and broadly incised medially (Fig. 2K).

Description, female (Fig. 4B, C): Body length: 6.13–8.24 mm, head plus mesosoma: 3.14–4.21 mm. **Colour:** head, mesosoma and metasoma dark brown to black, antenna orange-brown apart from darker brown scape and pedicel, all legs with coxa, trochanter and femur dark brown, and tibia and tarsus orange-brown; some specimens with metasoma partly or completely red-brown (Fig. 4C) and femora either light brown in posterior half

or with all legs completely light brown. **Head** (Fig. 2K): Head sculpture finely punctate, with dense short, white setation. One row of elongate setae present along upper inner eye margin. Inner eye margin slightly incised medially, eye 1.88–1.97 times as long as wide. Malar space very short. Clypeus 3.13–3.33 times as wide as high, with dense white setation and irregular row of seven elongate setae near ventral margin; ventral clypeal margin deeply and broadly incised medially. First flagellomere 4.06–5.00 times as long as wide and 0.98–1.02 times as long as second flagellomere. **Mesosoma**: Pronotum very short, posterior margin deeply incised, surface finely punctate. Mesonotum finely punctate, mesoscutum with parapsidal sulcus, parascutal carina slightly raised. Mesoscutellum with medially distinct scutoscuteellar sulcus. Mesopleuron ventrolaterally not distinctly produced. Metanotum with distinctly raised, reticulate metascutellum. Metapostnotum well developed, median length 0.88–1.21 times as long as metascutellum, dorsal surface with distinct transverse striae, median sulcus present and broad, posterior margin of metapostnotum slightly incised medially. Propodeum with distinct declivity, propodeal spiracles elongate but narrow, without raised margin; propodeal surface with fine transverse rugae. **Wings**: Macropterous, forewing hyaline, with two brown bands of infuscation and greyish apical wing margin, second brown band covers SMC2 and SMC3 completely. SMC3 narrow on marginal cell but slightly wider than SMC2. SMC3 broad on M, broader than SMC2. 3rs-m curved, higher than 2rs-m. Terminal abscissa of vein M reaches wing margin as spectral vein. **Legs**: Tarsal claws pectinate, elongate, not strongly curved, with ventral tooth that is slightly higher than claw. Tarsal plantulae present. Foretibia with distinctly elongate apical spine. Hind tibia with toothed scales slightly indicated in proximal half. **Metasoma**: Metasoma shiny, T1 petiolate anteriorly, metasomal terga with fine reticulation and dense short setation. S2 with deep transverse groove. Apex of metasoma with long setae.

Male, unknown.

Comments: This species shows a very similar distribution to *S. montanus*, covering Tasmania and south eastern Australia (Fig. 8G).

5.11 *Sphictostethus walteri* n. sp.
(Figs. 1D, H; 2L, M; 4F; 5F; 6I; 7I)

Holotype ♀: Australia, South East Queensland, Cunningham's Gap, rainforest pitfall 31B, 762 m, 1974–1975, G. B. & S. R. MONTEITH (QM).

Paratypes: 1 ♀, Australia, New South Wales, Mount Nardi, via Nimbin, rainforest pitfall 43A, 762 m, 1974–1975, G. B. & S. R. MONTEITH (QM); 2 ♀♀, Australia, Queensland, Lamington National Park, 28°13'S 153°07'E, 13.XI/3.XII.1995, IRWIN (ANIC, SMNS); 1 ♀, Australia, New South Wales, Ramornie S.F. Track off T-Ridge Road, pitfall 20AG, 29°43'00"S

152°33'23"E, 4.II.–9.IV.1993, M. GRAY & G. CASSIS, ne NSW NPWS Survey (AM Reg. no. K240926); 1 ♂, Australia, New South Wales, Mount Tomah, Blue Mountains, 10.IV.1978, N. W. RODD (AM Reg. no. K240943); 2 ♂♂, Australia, New South Wales, Mount Tomah, Blue Mountains, 20.IV.1978, N. W. RODD (AM Reg. nos. K240944, K240945); 1 ♂, Australia, New South Wales, Mount Tomah, Blue Mountains, 22.IV.1977, N. W. RODD (AM Reg. no. K240946); 1 ♂, Australia, New South Wales, Mount Tomah, Blue Mountains, 26.V.1977, G. A. HOLLOWAY (WINC); 1 ♂, Australia, New South Wales, Mount Tomah, 22.IV.1977 (SMNS).

Etymology: Named in honour of Mr WALTER KROGMANN (Norderstedt, Germany), the father of the first author.

Diagnosis: Female brachypterous (Fig. 4F); metapostnotum greatly enlarged, median length 3.5–3.6 times as long as metascutellum (Fig. 1H). Male subgenital plate broad, with distinctly elongate setae and submedian tubercles (Fig. 6I).

Description, female (Fig. 4F): **Body length**: 9.52–11.46 mm, head plus mesosoma: 4.90–6.59 mm. **Colour**: Head, antennae and metasoma light orange-brown, metasoma dark brown apart from apex, which is light brown. **Head** (Fig. 2L): Head sculpture finely punctate, with short white setation, row of three elongate setae present near inner eye margin approximately at level of ocelli. Inner eye margin only very slightly incised, eye 1.76–1.96 times as long as wide. Malar space absent. Clypeus 2.46–2.77 times as wide as high and densely covered with short white setae, two irregular rows of elongate setae present near ventral margin, ventral clypeal margin nearly straight, only slightly emarginate medially. First flagellomere 6.85–8.64 times as long as wide and 1.29–1.32 times as long as second flagellomere. **Mesosoma**: Pronotum distinctly developed, laterally rounded. Mesonotum narrower than pronotum, parapsidal sulcus absent, mesoscutum with distinct and raised parascutal carina, mesoscutellum distinctly raised medially. Mesopleuron anteromedially constricted at level of median mesepisternal groove, in posterior half tuberculately produced ventrolaterally. Metanotum short, with raised metascutellum. Metapostnotum large, median length 3.5–3.6 times as long as metascutellum, dorsal surface with distinct transverse striae. Propodeum elongate, without distinct declivity, propodeal spiracles elongate but narrow, with slightly raised margin; propodeal sculpture finely punctate and additionally with fine striae. **Wings**: Brachypterous, forewing very narrow with dark infuscation around SMC2. Wing venation complete, SMC3 shorter than SMC2. **Legs**: Tarsal claws pectinate, with distinct ventral tooth that is about as high as claw. Tarsal plantulae present. Foretibia without distinct apical spine. Hind tibia with weakly developed toothed scales. **Metasoma**: T1 anteriorly petiolate, without distinct setation, remaining tergites sparsely setose dorsally.

Description, male (Fig. 5F): Body length: 9.52–11.46 mm, head plus mesosoma: 4.90–6.59 mm. **Colour:** Head, antennae, and body light orange-brown to red brown, metasoma partly darkened dorsally. **Head (Fig. 2M):** Head sculpture as in female, with distinct golden setation on lower face lateral to toruli. Inner eye margin only very slightly incised, eye 1.79–2.05 times as long as wide. Malar space very short. Clypeus high, 2.26–2.38 times as wide as high and densely covered with long golden setae. First flagellomere 3.95–4.93 times as long as wide and 1.00–1.11 times as long as second flagellomere. **Mesosoma:** Pronotum relatively short, posterior margin deeply incised medially. Mesoscutum large, parapsidal sulcus present, mesoscutum with distinct and raised parascutal carina. Mesoscutellum distinctly raised medially. Mesopleuron tuberculately produced ventrolaterally, tubercles cone-like and more distinct than in female. Metanotum normally developed, with raised metascutellum. Metapostnotum large, median length 1.57–1.81 times as long as metascutellum, dorsal surface with distinct transverse striae. Propodeum elongate, without distinct declivity; propodeal surface reticulate in anterior third, rest of surface with distinct transverse striae. Setation of metapostnotum and propodeum restricted to lateral margin. **Wings:** Macropterous, forewing without infuscation, SMC3 longer and higher than SMC2. **Metasoma:** T1 elongate and distinctly petiolate, spiracles situated in anterior half, T1 with sparse setation dorsally and few long setae laterally, remaining tergites densely pilose. S2 with deep transverse groove. Subgenital plate (Fig. 6I) broad, with distinctly elongate setae, tubercles present submedially, tip blunt, slightly incised medially. Male genitalia (Fig. 7I) with aedeagus much shorter than parapenial lobe and digitus volsellaris. Digitus volsellaris slightly shorter than parapenial lobe. Digiti volsellares medially extended and adjacent to each other, apical portions bent inwards. Lamina volsellaris with two hooks, of which the proximal one is slightly larger. Paramere long and slender, apically with greatly elongate setae.

Comments: *Sphictostethus walteri* is distributed from south east Queensland to eastern New South Wales (Fig. 8H). This species is a rare example of a wing-reduced pompilid. From Australia there is only one other species known with brachypterous females and macropterous males, i. e. *Eremocurgus linnaei* (Pepsinae) from Western Australia (KROGMANN et al. 2008).

5.12 *Sphictostethus xanthochrous* (Turner, 1915) (Figs. 2N; 3C)

Calopompilus xanthochrous Turner, 1915: TURNER 1915a: 65–66.
Priocnemis xanthochrous: TURNER 1915b: 334 [generic transfer].
Sphictostethus xanthochrous: HARRIS 1987: 64 [generic transfer]; ELLIOTT 2007 [cat.].

Holotype ♀, Australia, South Tasmania, Mount Wellington, 1300–2300 ft, January to March, R. E. TURNER (BMNH). – **Other specimens examined:** 1 ♀, Australia, Tasmania, West side Lake St. Clair, ca. 750 m, 25.–29.I.1980, Eucalypt-Acacia forest, window-pane, gutter trap, A. NEWTON, M. THAYER (SMNS); 1 ♀, Australia, Tasmania, Derwent Bridge, 29.I.1960, F. J. D. McDONALD (UQIC Reg. no. 91592); 1 ♀, Australia, Tasmania, Zeehan, 3.II.1925 (QM); 1 ♀, Australia, Tasmania, 9 km West by South Poatina, 41°48'S 146°52'E, 20.I.1983, I. D. NAUMANN & J. C. CARDALE (WINC); 1 ♀, Australia, Tasmania, 10 km East-Northeast of Nunamara, 41°22'S 147°24'E, Malaise/ethanol, 12.I.–6.II.1983, I. D. NAUMANN & J. C. CARDALE (ANIC); 1 ♀, Australia, Tasmania, 9 km West-Southwest of Derwent Bridge, 42°10'S 146°08'E, ex yellow tray, 21.I.1983, I. D. NAUMANN & J. C. CARDALE (ANIC); 1 ♀, Australia, Tasmania, Franklin Road, 55 km East-Southeast of Queenstown, 400 m, 19.–20.II.1980, open eucalypt forest, window trap, A. NEWTON, M. THAYER (ANIC); 1 ♀, Australia, Tasmania, Helyer Gorge, 2.II.1967, E. F. RIEK (ANIC).

Diagnosis: Female foretibia without distinctly elongate apical spine; clypeus uniformly dark brown; metapostnotum without median sulcus; antenna dark brown; fore wing yellowish, with two brown bands of infuscation and greyish apical wing margin.

Description, female (Fig. 3C): Body length: 7.20–10.55 mm, head plus mesosoma: 3.58–5.73 mm. **Colour:** Head, antennae, mesosoma, coxae, trochanters, and metasoma dark brown to black, rest of legs orange apart from forefemur which is dark brown in proximal half and mid femur which has brown markings proximally. **Head (Fig. 2N):** Head sculpture finely punctuate, with dense short, white setation, that is more conspicuous on lower face. One row of elongate setae present along upper inner eye margin. Inner eye margin slightly incised medially, eye 1.83–1.97 times as long as wide. Malar space absent. Clypeus 2.78–3.22 times as wide as high, with dense white setation and irregular row of elongate setae near ventral margin, setae arising from distinct punctures; ventral clypeal margin incised medially. First flagellomere 4.67–5.17 times as long as wide and 1.03–1.24 times as long as second flagellomere. **Mesosoma:** Pronotum very short, posterior margin deeply incised, surface finely punctuate. Mesonotum finely punctuate, mesoscutum with parapsidal sulcus, parascutal carina not raised. Mesoscutellum with medially distinct scutoscuteellar sulcus. Mesopleuron ventrolaterally not distinctly produced. Metanotum relatively long, with distinct, slightly raised metascutellum. Metapostnotum medially slightly constricted, median length 0.67–0.81 times as long as metascutellum, dorsal surface without distinct transverse striae, median sulcus absent. Propodeum high, apically rounded, with distinct declivity, propodeal spiracles elongate but narrow, without raised margin; propodeal surface finely reticulate without transverse rugae. **Wings:** Macropterous, forewing yellowish, with two brown bands of infuscation and greyish apical wing margin, SMC2 completely covered by brown band,

SMC3 incompletely covered. SMC3 slightly longer and distinctly higher than SMC2. Terminal abscissa of vein M reaches wing margin as hardly visible, relict spectral vein. **Legs**: Tarsal claws pectinate, elongate, not strongly curved, with ventral tooth that is about as high as claw. Tarsal plantulae present. Foretibia without elongate apical spine. Hind tibia with toothed scales. **Metasoma**: T1 not distinctly petiolate anteriorly, metasomal terga with fine reticulation and dense short setation. S2 with shallow transverse groove. Apex of metasoma with long setae.

Male, unknown.

Comments: This species is only known from Tasmania, where it is widely distributed (Fig. 8M).

5.13 *Sphictostethus yidyam* n. sp.
(Figs. 1A, E; 2O, P; 4D; 5I; 6D; 7D)

Holotype ♀: Australia, North East Queensland, Millstream Conservation Park, 17°32'S 145°29'E, 1040 m, O/For. Intercept. 2116, 6.XII.1998–4.II.1999, MONTEITH & COOK (QM).

Paratypes: 1 ♀, Australia, North Queensland, Lake Eacham, ANIC 1091, flight intercept trap, with trough closed forest on metamorphic soil, 17°17'S 145°37'E, 29.III.–31.V.1988. D. C. F. RENTZ (ANIC); 1 ♀, 1 ♂, Australia, Queensland, Wet Tropics, Mossman Gorge, 16°47'18"S 145°32'38"E, 100 m a. s. l., 15.–20.VI.2006, rainforest Malaise, ANIC Bulk Sample 2918, R. WILSON (ANIC, SMNS); 5 ♂♂, Australia, Queensland, Wet Tropics, Mossman Gorge, 16°47'15"S 145°32'17"E, 100 m a. s. l., 20.–26.VI.2006, rainforest Malaise, ANIC Bulk Sample 2936, R. WILSON (ANIC, SMNS, WINC); 1 ♂, Australia, Queensland, Wet Tropics, Mossman Gorge, 16°45'94"S 145°32'61"E, 100 m a. s. l., 20.–26.VI.2006, rainforest Malaise, ANIC Bulk Sample 2934, R. WILSON (ANIC); 1 ♂, Australia, Queensland, Wet Tropics, Mossman Gorge, 16°47'18"S 145°32'38"E, 100 m a. s. l., 17.–22.V.2005, rainforest Malaise, ANIC Bulk Sample 2864, R. WILSON (ANIC).

Specimens excluded from the type series: 1 ♂, Australia, Queensland, Coolool National Park, rainforest, Malaise trap, IX.–X.1979, E. DAHMS & G. GORDH (QM); 7 ♂♂, Australia, New South Wales, Dooragan National Park, North Brother Mountain, 450 m, subtropical rainforest, Malaise trap, 14.–28.I.1999, G. WILLIAMS (AM Reg. nos. K240864, K246242, WINC, SMNS); 1 ♂, Australia, New South Wales, vic. Breakneck Lookout, approx. 11 km South-Southwest of Taree, ex dry rainforest, 26.XII.1992–14.I.1993, G. & T. WILLIAMS (AM Reg. no. K240893); 3 ♂♂, Australia, New South Wales, Kiwarrah State Forest, near Taree Breakneck Lookout, dry rainforest, Malaise trap, 26.XII.1992–14.I.1993, G. WILLIAMS (ANIC).

Etymology: The species is named after the aboriginal name of Lake Eacham, where one of the female paratypes was collected. The species epithet is to be treated as a noun in apposition.

Diagnosis: Forewing whitish with three dark bands of infuscation (Fig. 1A); mesopleuron ventrolaterally distinctly produced (Fig. 1E); propodeum with distinct posterolateral tubercles (Fig. 1E). Female clypeus with irregular ventral clypeal margin (Fig. 2O); female foretibia without

distinctly elongate apical spine. Male genitalia with digiti volsellares medially extended and adjacent to each other, apical portions bent inwards (Fig. 7D).

Description, female (Fig. 4D): **Body length**: 8.72–9.82 mm, head plus mesosoma: 4.64–5.55 mm. **Colour**: Head, antennae, mesosoma and legs dark purple, metasoma black. **Head** (Fig. 2O): Head sculpture finely punctuate, with very short white setation. One row of elongate setae present along upper inner eye margin. Inner eye margin slightly incised medially, eye 1.82–2.18 times as long as wide. Malar space absent. Clypeus 2.57–2.68 times as wide as high, reticulate, laterally with longer white setae, medially with short inconspicuous setation, row of elongate setae present near ventral margin, setae arising from distinct punctures; ventral clypeal margin irregular, i. e. slightly incised submedially and medially. First flagellomere 4.47–4.79 times as long as wide and 1.12–1.20 times as long as second flagellomere. **Mesosoma**: Pronotum very short, posterior margin deeply incised. Mesoscutum with parapsidal sulcus, parascutal carina slightly raised. Mesoscutellum with medially distinct scutoscuteellar sulcus. Mesopleuron ventrolaterally distinctly produced (Fig. 1E). Metanotum long, with distinct but not raised metascutellum. Metapostnotum short, median length 0.54–0.68 times as long as metascutellum, dorsal surface with indistinct transverse striae, median sulcus absent but median area polished. Propodeum with distinct declivity, propodeal spiracles elongate but narrow, without raised margin. Propodeal surface finely transversely rugulose, propodeum posterolaterally with distinct pair of tubercles (Fig. 1E). **Wings**: Macropterous, forewing whitish, with three dark bands of infuscation (Fig. 4D). SMC3 about as long as, but distinctly higher than SMC2. Terminal abscissa of vein M reaches wing margin as hardly visible, relict spectral vein. **Legs**: Tarsal claws pectinate, elongate, not strongly curved, with distinct ventral tooth that is higher than claw. Tarsal plantulae present. Foretibia without distinct apical spine. Hind tibia with toothed scales in proximal half. **Metasoma**: T1 anteriorly petiolate, metasomal terga not reticulate, surface shiny with tiny punctures and few tiny setae. S2 with deep transverse groove. Apex of metasoma with long setae.

Description, male (Fig. 1A): **Body length**: 6.57–7.74 mm, head plus mesosoma: 3.43–4.46 mm. **Colour**: Head dark brown; clypeus with ventrolateral margin light brown (Fig. 2P); antennae dark brown; mesosoma red-brown, with varying degrees of melanism in the areas of pronotum, mesoscutum, lateral mesopleuron, mesoscutellum and metascutellum; legs dark red-brown; anterior three-quarters of first metasomal segment red-brown, rest of metasoma dark brown. **Head** (Fig. 2P): Eye 1.78–1.95 times as long as wide; face with conspicuous white setation. Malar space absent. Clypeus 0.22–0.25 times as wide as high, with conspicuous white

setation; ventral clypeal margin slightly concave medially. First flagellomere 2.60–2.88 times as long as wide and 0.79–0.85 times as long as second flagellomere. **Mesosoma:** Mesoscutellum distinctly raised; mesopleuron distinctly expanded laterally. Median length of metapostnotum 0.79–0.85 times as long as metascutellum. Propodeum only slightly flattened, with distinct lateral tubercles. **Wings:** Macropterous, forewing colouration as in female. **Metasoma:** Metasomal terga with punctures more distinct than in females; surface shiny, with dense short setation. S2 without deep transverse groove. Apex of metasoma without long setae. Subgenital plate (Fig. 6D) elongate, with dense long setation, tip narrowly rounded. Male genitalia (Fig. 7D) with aedeagus slightly longer than parapenial lobe. Digitus volsellaris longer than aedeagus and parapenial lobe. Digiti volsellares medially extended and adjacent to each other, apical portions bent inwards. Lamina volsellaris with two hooks, of which the distal one is larger. Paramere long and slender with long setation.

Comments: Together with *S. haoae* this species shows the northern-most distribution of the Australian *Sphictostethus* species (Fig. 8I). Specimens of both sexes are known from north east Queensland, but males from south east Queensland and New South Wales differ from the ‘northern’ males in head, body and wing colouration (clypeus light orange-brown, body uniformly orange-brown to light brown, wings yellowish with proximal brown band of infuscation much narrower), and in having the mesopleural extensions and propodeal tubercles less pronounced. They share a number of characters, including the conspicuous white setation on the face, the punctuation of the metasoma, same wing venation and nearly identical male genitalia (parameres just slightly shorter in the ‘southern’ specimens). We found the shared features more significant and decided to associate these males with *S. yidyam*, mainly to make them available in the published record. However, we decided not to include them in the type series in case future studies show them to belong to a different species.

6 Discussion

In the original description of *Sphictostethus*, KOHL (1884) used a number of morphological characters that are now not diagnostic for the genus, but rather are a result of the wing-reduction in the female of *Sphictostethus* (*Pompilus*) *gravesii*, on which the genus was based. The most useful diagnostic features given by KOHL (1884) are the cone-like expanded lateral mesopleuron (“Mesothorax vor den Mittelhüften kegelförmig ausgezogen”) and the presence of toothed scales (“Hinterschienen sägezählig”) on the female hind tibia. As these characters are absent

in a few Australian species, we have added a number of new features that separate Australian *Sphictostethus* from other closely related genera. Most important is vein M, which reaches the outer wing margin at least as a spectral vein (Fig. 1A). This spectral vein sometimes can be hardly traceable but is complete in *S. gravesii* (specimens in ZMHB). A complete diagnosis of the other putatively closely related genera, including *Trichocurgus* Haupt, 1937 and *Dipogon* Fox, 1897 will be published as part of a comprehensive synopsis of the Australian pompilid genera (KROGMANN et al. in prep.). HARRIS (1987: figs. 4, 13–17) used the length and position of the premental bristles to discriminate *Sphictostethus* from *Trichocurgus* (which he treats as a subgenus of *Priocnemis*). We did not include this character into the generic diagnosis mainly for practical reasons. We could not check this character in most specimens and, to fully interpret it, manipulation of the mandibles and sometimes even removal of the head would have been necessary. A detailed study of this character system would be desirable in the future as it may be useful to define *Sphictostethus* as a whole or subgroups therein.

Sphictostethus is a rare example of a pompilid genus that shows a restricted southern hemisphere distribution that may be explained by a Gondwanan origin. This is further supported by the restriction of *Sphictostethus* to eastern Australia and Tasmania, where it largely occurs in wet sclerophyll- and rainforests that contain floral elements that are believed to be Gondwanan relics (see e.g. HILL 2004). A comprehensive dated molecular phylogenetic analysis of pompilids is required to test whether the distribution of *Sphictostethus* can best be explained by vicariance and this would require the inclusion of material from South America and New Zealand. The only other pompilid genus that shows a similar, putatively Gondwanan distribution is *Epipompilus* Kohl, which occurs in South America, Australia and New Zealand. However, the distribution of this genus differs to that of *Sphictostethus* in that it is not restricted to eastern Australia and Tasmania but occurs throughout the Australian continent. Additionally, phylogenetic studies (PITTS, pers. comm.) question whether New World and Australasian species are congeneric, which would rebut their Gondwanan origin.

TOWNES (1957) placed *Priocnemis montrouzieri* Williams in the subgenus *Sphictostethus* and HARRIS (1987) consequently considered it to be a member of the genus *Sphictostethus*. We examined the holotype of *P. montrouzieri*, as well as *P. umbrosicola* Williams, and *P. auraucae* Williams (all specimens in BPBM) to verify their placement in *Sphictostethus*. In contrast to most species of *Sphictostethus*, the New Caledonian species lack the extension of the lateral mesopleuron. Additionally, vein M clearly terminates before the wing margin, and as we regard this feature crucial for the diagnosis of *Sphictostethus*, we follow WILLIAMS’ (1945) original classification

and suggest that these species be retained in *Priocnemis* Schiödt. HARRIS (1987) also cites *Sphictostethus* as occurring in New Guinea but gives no reference or refers to material that supports this. TOWNES (1957) placed *Priocnemis pretiosa* in the subgenus *Sphictostethus*, making it the only known Nearctic species, but HARRIS (1987) transferred it to *Priocnemis* after raising *Sphictostethus* to generic rank. Based on the published record *Sphictostethus* remains restricted to the Neotropics, Australia, and New Zealand.

The male genitalia of *Sphictostethus* provide a number of characters of potential phylogenetic value. HARRIS (1987) found lateral tubercles on the subgenital plates of the males for insertion with S6 of all New Zealand *Sphictostethus* species. We found similar structures on the subgenital plates of *S. aliciae*, *S. montanus*, *S. insularis* and *S. walteri* from Australia (Fig. 6E–G, I). In *S. infandus* the tubercles are distinctly pointed (Fig. 6H), while they are slightly developed and bear small setae in the Chilean *S. gravesii*, the type species of *Sphictostethus* (Fig. 6J). In the remaining Australian species the tubercles are absent, but the subgenital plates are laterally rounded or angular (Fig. 6A–D). We found significant interspecific variation in the male genitalic morphology (Fig. 7A–J) but hardly any intraspecific variation. Therefore male genitalic characters are useful to discriminate between pompilid species and are likely to provide a number of potentially phylogenetically relevant characters.

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Authors' addresses:

Dr. LARS KROGMANN, Staatliches Museum für Naturkunde, Rosenstein 1, 70191 Stuttgart, Germany;
e-mail: lars.krogmann@smns-bw.de

Prof. Dr. ANDREW D. AUSTIN, Australian Centre for Evolutionary Biology and Biodiversity, School of Earth & Environmental Sciences, The University of Adelaide, South Australia 5005, Australia;
e-mail: andy.austin@adelaide.edu.au

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