



A new subfamily, genus, and species of Cephidae (Hymenoptera) from Australia

DAVID R. SMITH¹ & STEFAN SCHMIDT²

¹Systematic Entomology Laboratory, PSI, Agricultural Research Service, U. S. Department of Agriculture, c/o National Museum of Natural History, Smithsonian Institution, P.O. Box 37012, MRC 168, Washington, D.C. 20013-7012, U.S.A.

E-mail: dave.smith@ars.usda.gov

²Zoologische Staatssammlung, Münchhausenstr. 21, 81247 Munich, Germany. E-mail: stefan.schmidt@zsm.mwn.de

Abstract

Australcephinae, **n. subf.**, is described from Queensland, Australia, based on *Australcephus storeyi*, **n. gen.**, **n. sp.** This is the only cephid known from Australia and one of the few from the Southern Hemisphere. A key is given for the three recognized subfamilies of Cephidae.

Key words: Cephidae, Australcephinae, *Australcephus*, stem sawfly

Introduction

Cephidae are primarily Holarctic with very few representatives in the tropics or the Southern Hemisphere. Two species in one genus, the only representatives of the subfamily Athetocephinae, occur in Madagascar (Benson 1935, 1946). The Holarctic *Hartigia* Schiødte extends south to Mexico (Chiapas) (Smith 1988) and Guatemala (previously unrecorded) in the Western Hemisphere. In the Indoaustralian Region, only two species are known, *Janus ecarinatus* Smith from Kalimantan, Indonesia (Smith 1994, 1997), and *Sulawesius grandoculus* Smith and Shinohara from Sulawesi, Indonesia (Smith and Shinohara 2002). Goulet (1992) reported that Cephidae occur in Australia but made no further comments. Here we describe a new genus and species from Australia so unique among cephids that we believe a separate subfamily is warranted.

Materials and methods

Acronyms refer to the following institutions: AEIC, American Entomological Institute, Gainesville, FL, USA; USNM, National Museum of Natural History, Smithsonian Institution, Washington, DC, USA; QDPI, Queensland Department of Primary Industries & Fisheries, Brisbane, Australia; ZSM, Zoologische Staatssammlung, Munich, Germany.

The microphotographs were obtained using a digital camera (ProgRes[®] C10plus, Jenoptic Laser.Optik.Systeme GmbH) and processed using the AutoMontage[®] system, version 4.03 (Synoptics Ltd). The digital images were enhanced using Adobe Photoshop[®]. Terminology generally follows Huber and Sharkey (1993).

Systematics

Australcephinae Smith and Schmidt, new subfamily

Type genus: *Australcephus*, **n. gen.**

Description. Head from above about 2X broader than long (Fig. 6). Antenna filiform; flagellum of equal width throughout (Fig. 5). Maxillary palpus 6-segmented, longer than labial palpus; penultimate segment about 0.75 length of apical segment, the latter arising from apex of penultimate segment (cf. fig. 6 in Benson 1946). Labial palpus 4-segmented with sensory pit on apical segment. Left and right mandibles similar, each with long outer and inner tooth, and a smaller middle tooth between the two major teeth (Figs 4, 9). Genal carina absent. Eyes slightly diverging in frontal view, shorter than lower interocular distance (Fig. 4). Head from above narrowing behind eyes (Fig. 6). Distance between antennal toruli about 1.5X distance between antenna and tentorial pit (Fig. 4). Pronotum about 2X broader than long. Forewing (Fig. 1) with cell 2R1 very small; veins 1r and 2r meet stigma near center; stigma broad, oval, somewhat triangular, about 2X longer than broad; vein 3r-m absent, thus with 3 cubital cells; central portion of vein 2A+3A faint. Hind wing (Fig. 2) with 4–5 hamuli; cells Rs and M absent (Rs present in one specimen); veins 1r-m, M, and cu-a interstitial, almost in a straight line; vein 2A of anal cell faint, anal cell open at apex. Tarsal claws simple. Each half of basal plates about as long as broad.

Discussion. Benson's (1946) classification of Cephidae is the most recent and only existing framework in which to place species. Placement in Benson's classification is difficult because of several unique characters not shared with other subfamilies. Significant characters separating the Australcephinae from other Cephidae are the following: Filiform antenna, with all flagellar segments of equal width; forewing with small, rectangular, cell 2R1 with veins 1r and 2r meeting stigma near its center and as wide on the stigma as on posterior margin, oval stigma about 2X longer than broad, absence of vein 3r-m, central portion of vein 2A+3A faint; hind wing lacking closed cells Rs and M, veins 1r-m, M, and cu-a interstitial and in almost a straight line; open anal cell, presence of 4–5 hamuli; and simple tarsal claws.

Other cephid genera have clubbed antennae or the flagellar segments usually widening toward the apex of the flagellum; forewing with much larger cell 2R1 with vein 1r meeting the basal part of the stigma, long narrow stigma 3X or more longer than broad, crossvein 3r-m present thus with 4 cubital cells, closed cells Rs and M, vein 2A+3A distinct; hind wing with crossveins 1r-m, M, and cu-a meeting cells at different points some distance from each other; presence of either both or one of the cells Rs and M, presence of a closed anal cell; 6–15 hamuli in the hind wing; and tarsal claws with a short or long inner tooth.

Two exceptions are the tarsal claws and shape of the stigma and cell 2R1 of the forewing. A simple tarsal claw is shared only by *Calameuta aureus* (Benson, 1935). It was the type species and only species of *Haplocephus* which Benson (1946) later synonymized with *Calameuta* Konow. *Calameuta aureus* is still known only from the holotype male from Algeria, and it is possible this lack of an inner tooth is an anomaly. The more oval stigma and small cell 2R1 of the forewing with veins 1r and 2r meeting the center of the stigma is shared only by *Stigmatijanus* Wei and Nie (2007), a genus otherwise characteristic of *Janus* Stephens, except that the left mandible of the two known species of *Stigmatijanus* have a short middle tooth, which is different from *Janus*. In *Stigmatijanus*, cell 2R1 is much longer, and the distance between veins 1r and 2r on the stigma is much shorter than the posterior width of the cell (Wei and Nie 2007: figs 11, 16).

We did not attempt to conduct a thorough analysis of phylogenetic relationships within the Cephidae. This would require the examination of internal characters and we prefer to wait until adequate specimens are available for study. Based on the external morphology, the following characters can tentatively be regarded as apomorphic for the Australcephinae: tarsal claws simple; forewing with small 2R1 and parallel veins 1r and 2r, vein 3r-m absent; hind wing with cells Rs and M absent, 4–5 hamuli, veins 1r-m, M, and cu-a interstitial, anal cell open at apex.

Benson's (1946) key to subfamilies of Cephidae is modified as follows to include the Australcephinae:

1. Tarsal claws simple; antenna filiform, of equal width throughout (Fig. 5); cell 2R1 of forewing small, as broad on stigma as on posterior side, veins 1r and 2r meeting stigma near center, stigma oval, about 2X longer than broad, vein 3r-m absent (Fig. 1); hind wing with 4–5 hamuli, veins 1r-m, M, and cu-a interstitial, almost in a straight line, cells Rs and M absent, anal cell open at apex (Fig. 2)..... Australcephinae
- Tarsal claws with inner tooth (except *Calameuta aurea* (Benson)); antenna usually clubbed or slightly expanded toward apex; cell 2R1 of forewing large, vein 1r meeting stigma at its base, stigma long and narrow, 3X or more longer than broad (in *Stigmatijanus* Wei and Nie, stigma oval and cell 2R1 small and veins 1r and 2r meeting near center of stigma, but cell 2R1 much narrower on stigma than on posterior side), vein 3r-m present; hind wing with 6–15 hamuli, veins 1r-m, M, and cu-a meeting adjacent cells some distance from each other, cells Rs and M both present or only Rs absent, anal cell complete..... 2
2. Labial palpus 4-segmented and shorter than the 6-segmented maxillary palpus; maxillary palpus with penultimate segment distinctly smaller than apical segment; forewing with intercostal area less transparent than rest of wing membrane; hind wing with 6–9 hamuli or with about 12–13 hamuli in some species of *Megajanus* Wei from China

- (M. Wei, pers. comm.); sawsheath straight or curved down..... Cephinae
- Labial palpus 3-segmented, longer and stouter than the 4-segmented maxillary palpus; maxillary palpus with penultimate segment distinctly longer than apical segment; intercostal area of forewing with same transparency as rest of wing membrane; hind wing with 11–15 hamuli; sawsheath strongly curved up Athetocephinae

Australcephus Smith and Schmidt, new genus

Type species: *Australcephus storeyi*, n. sp.

Description. Characters as for subfamily.

Etymology. Derived from the Latin *austral*, meaning southern, plus *cephus*. The gender is masculine.

Australcephus storeyi Smith and Schmidt, new species

(Figs 1–12)

Description. Female. Length, 5.0–5.5 mm. Black; mandible dark yellow; palpi yellow; scape, pedicel and flagellomeres 1–4(-5) yellowish, gradually darkening toward apex; legs orange yellow, only base of coxae black; wings hyaline, costa and stigma of forewing dark brown, other veins light brown. Head shining with fine punctures on frons through interantennal area; thorax and abdomen shining, without punctures or sculpture.

Antennal length 3.5X head width, scape slightly longer than broad, pedicel slightly longer than broad, 22–25 flagellomeres equal in width throughout; flagellomeres 1 and 2 subequal in length, from 3 to apex gradually decreasing in length (Fig. 5). Postocellar area nearly 2X broader than long. Malar space subequal to diameter of front ocellus. Distances between antennae, between antenna and eye, and between antenna and tentorium as 1.0:0.6:0.6 (Fig. 4). Tibiae without preapical spines; hind basitarsus equal in length to rest of tarsomeres combined. Cerci extending less than half way to apex of sheath; sheath rounded at apex (Fig. 3), from above slender and of uniform width. Valvifers 2 and 3 almost in a straight line, subequal in length. Lancet long, slender, serrulae rounded and distinct only on apical third (Figs 7, 8).

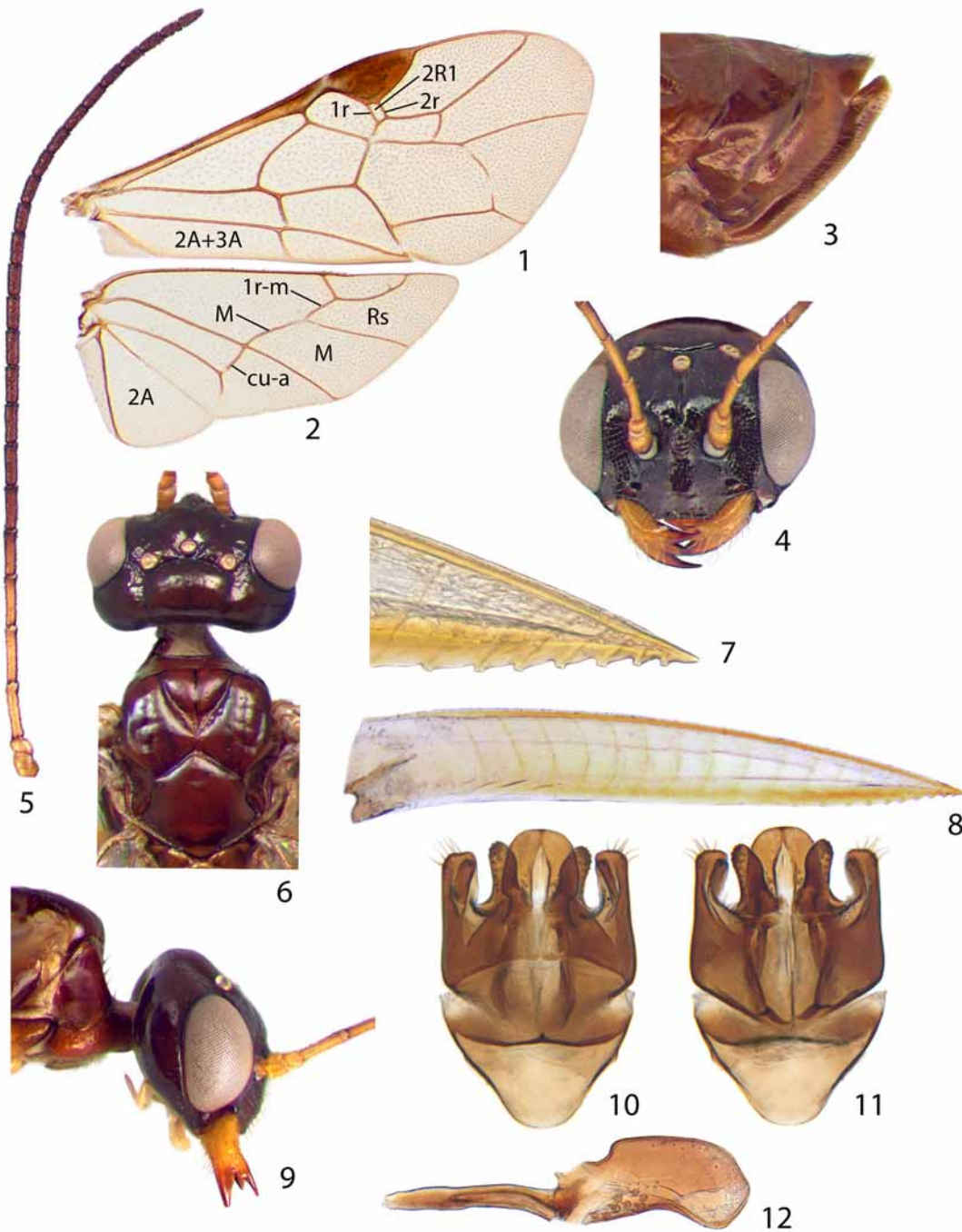
Male. Length, 5.0 mm. Similar in structure to female. Hypopygium rounded at apex. Male genitalia (Figs 10, 11) with sagittae nearly as long as harpes, sagittae with low protuberances at apex, harpes apically with several setae. Gonostipes dorsomedially extended and with deep incision between lateral and medial portion. Penis valve (Fig. 12) with valvicesps oval, turned ventrally at apex, with a patch of about 8 pegs near basal ventral margin.

Types. Holotype: Female, “Australia: QLD, 26 km up Tinaroo Creek Road from Mareeba, 9.VI–19.VII. 1983, 17.097 S, 145.580 E, 1090 m, Storey/Brown, Malaise trap” (deposited in the Queensland Museum, Brisbane (QMB), at the request of QDPI). Paratypes: Same data as holotype (6 ♀, 1 ♂; 4 ♀, 1 ♂ in QMB; 1 ♀ each in the ZSM and USNM); Atherton, Qld., II.13.75, Australia, H. & A. Howden (1 ♂, AEIC); same data except II-17-75 (2 ♂, AEIC).

Etymology. The species is named after the late Ross Storey in honor of his contributions to Australian entomology. In addition, he was one of the collectors of the species.

Host. Unknown. Other species of Cephidae are known to be grass-stem borers or twig borers in various shrubs and trees.

Remarks. One specimen has cell Rs closed in the hind wing; all others lack this cell. The male genitalia are typical of Cephidae in that they are orthandrous, the gonostipes and harpes are fused with no articulation between the two and the volsellae and sagittae are knoblike and provided with minute peglike elevations. This species has two characters that are unlike any other Cephidae we have examined. The sagittae are long, nearly as long as the harpes, and the gonostipes are extended dorsomedially with a deep incision between lateral and medial portions. In other genera we examined (*Janus*, *Hartigia*, *Cephus*, *Calameuta*, and *Syrista*) the sagittae are shorter than the harpes, and the gonostipes are narrow, the apical and basal margins nearly parallel, and the lateral and medial portions are not separated by an incision. These might be considered good subfamily characters, but more information is needed about the male genitalia of other genera.



FIGURES 1–12. *Australcephus storeyi*. 1, Forewing; 2, hind wing; 3, lateral view of apex of abdomen and sawsheath; 4, front view of head; 5, antenna; 6, dorsal view of head and thorax; 7, apex of female lancet; 8, entire female lancet; 9, lateral view of head and anterior thorax; 10, dorsal view of male genitalia; 11, ventral view of male genitalia; 12, lateral view of penis valve.

Acknowledgments

We thank David Wahl, AEIC, Gainesville, Florida, and Shaun Winterton, QDPI, Brisbane, Australia, for their support and permission to access their collections. Henri Goulet (Canadian National Collection of Insects, Ottawa, Canada) and Mei-Cai Wei (Central South University of Forestry and Technology, Changsha, China) made valuable comments to the manuscript.

Literature cited

- Benson, R.B. (1935) On the genera of the Cephidae, and the erection of a new family Syntexidae (Hymenoptera, Symphyta). *Annals and Magazine of Natural History*, (10) 16, 535–553.
- Benson, R.B. (1946) Classification of the Cephidae (Hymenoptera Symphyta). *Transactions of the Royal Entomological Society of London*, 96, 89–108.
- Goulet, H. (1992) *The Genera and Subgenera of the Sawflies of Canada and Alaska, Hymenoptera: Symphyta*. Insects and Arachnids of Canada, Part 20, Research Branch, Agriculture Canada, Publication 1876, 235 pp.
- Huber, J. T. and Sharkey, M. J. (1993) Structure, pp. 13–59. In Goulet, H. and Huber, J.T. (eds.). *Hymenoptera of the World: An Identification Guide to Families*. Research Branch, Agriculture Canada, Ottawa, Publication 1894/E, 668 pp.
- Smith, D.R. (1988) A synopsis of the sawflies (Hymenoptera: Symphyta) of America south of the United States: Introduction, Xyelidae, Pamphiliidae, Cimbicidae, Diprionidae, Xiphydriidae, Siricidae, Orussidae, Cephidae. *Systematic Entomology*, 13, 205–261.
- Smith, D.R. (1994) A new species of *Janus* Stephens (Hymenoptera: Cephidae) from Indonesia. *Treubia*, 31, 59–63.
- Smith, D.R. (1997) A new species of *Janus* (Hymenoptera: Cephidae) from Indonesia. *Entomological News*, 108, 24–28.
- Smith, D.R. and Shinohara, A. (2002) A new genus and new species of Cephidae (Hymenoptera) from Sulawesi Utara, Indonesia. *Proceedings of the Entomological Society of Washington*, 104, 624–628.
- Wei, M.-C. and Nie, H.-Y. (2007) Two new genera of Cephidae (Hymenoptera) from eastern Asia. *Acta Zootaxonomica Sinica*, 32, 109–113.