



**Diversity, distribution and taxonomy of the Australian agathidine genera
Camptothlipsis Enderlein, *Lytopylus* Foerster and *Therophilus* Wesmael
(Hymenoptera: Braconidae: Agathidinae)**

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Abstract

The braconid subfamily Agathidinae is a large group of koinobiont endoparasitic wasps of lepidopteran larvae. Until recently, three of the 10 agathidine genera that occur in Australia, *Camptothlipsis* Enderlein, *Lytopylus* Foerster and *Therophilus* Wesmael, were treated as synonyms of *Bassus* F. s.l. Of these three genera, *Therophilus* is the most speciose and widely distributed in Australia, and is one of only two agathidine genera whose members are associated with a putative mimicry complex of braconid wasps and other insects comprising species that have a distinctive black, red-orange and white colour pattern. Australian species, previously considered under *Bassus* s.l., have received little attention since their original description nearly 90 years ago and, not surprisingly, this earlier work is insufficient for reliable species identification. The present study updates the taxonomy of the described species, presents a more thorough assessment of intra-specific variation, and provides a key for species of *Therophilus*. Four new species are described that support morphological and molecular phylogenetic studies on the Australian fauna: *Camptothlipsis oliveri* Stevens n. sp., representing the first described species for this genus in Australia, and *Therophilus aalvikorum* Stevens n. sp., *T. mishae* Stevens n. sp., and *T. stephensae* Stevens n. sp., whose descriptions also extend the morphological limits of *Therophilus* in Australia. In addition, the introduced *Lytopylus rufipes* (Nees von Esenbeck) is redescribed, this species representing the only member of the genus known from Australia. Significantly, two species of *Therophilus*, *T. unimaculatus* (Turner) and *T. rugosus* (Turner), are important parasitoids of the native Australian lepidopterans *Etiella behrii* Zeller (Pyrallidae) and *Epiphyas postvittana* (Walker) (Tortricidae) that have become significant pests in southern and eastern Australia, as well as in several other countries.

Key words: Endoparasitoid, lepidopteran hosts, mimicry, *Epiphyas postvittana*, *Etiella behrii*

Introduction

The Agathidinae is a large subfamily of lepidopteran parasitoids with over 1,200 described species in over 50 genera worldwide (Sharkey 1997; Yu *et al.* 2005; Sharkey *et al.* 2006; Achterberg and Long 2010). Agathidine wasps are mostly solitary endoparasitoids of lepidopteran larvae, commonly of larvae that feed within concealed habitats such as curled leaves or silken galleries, although members of some genera parasitise exposed larvae (Shaw and Huddleston 1991; Sharkey 1992; Sarmiento and Sharkey 2004). The Australian fauna comprises ten genera: *Biroia* Szépligeti, *Braunsia* Kriechbaumer, *Camptothlipsis* Enderlein (as *Baeognatha* Kokujev), *Coccygidium* Saussure, *Cremnops* Foerster, *Disophrys* Foerster, *Euagathis* Szépligeti, *Lytopylus* Foerster, *Therophilus* Wesmael and *Zelodia* Achterberg (as *Amputostypos* Sharkey) (Stevens *et al.* 2010). Of these, three genera, *Camptothlipsis* (as *Baeognatha*), *Lytopylus* and *Therophilus*, were recently brought out of synonymy as part of a reclassification of the large polyphyletic genus *Bassus* F. s.l. (Sharkey *et al.* 2006, 2009). While *Camptothlipsis* and *Lytopylus* are represented by few species in Australia, *Therophilus* is highly speciose, comprises more than two-thirds of the Australian agathidine fauna, and is widely distributed across all major continental habitats, as well as in Tasmania. Most Australian species that would have previously been identified as *Bassus* s.l. now belong to *Therophilus*.

The Australian fauna has largely remained unstudied since the original description of most species nearly 90 years ago. The fauna currently comprises 36 species, of which 25 were described by Turner (1918 a, b). Recently, Stevens *et al.* (2010) reviewed the Australian genera, providing generic diagnoses, a key, a reclassification of species, and information on biology, distribution, and putative mimicry-based colour patterns. However, the taxonomy of the Australian species was clearly out-dated and, not surprisingly, the descriptions of most taxa were insufficient for their reliable identification.

There appears to be two putative mimicry complexes in Australia, each likely to be aposematic and part of independent mimicry complexes (Stevens *et al.* 2010). One form comprises contrasting yellow-brown and black that exhibits a variety of patterns on the body and wings in the mostly tropical genera *Braunsia*, *Coccygidium*, *Cremnops* and *Disophrys*. The second pattern comprises distinctive and contrasting black, red-orange and white, and has been referred to as the BROW colour pattern (see plates 3, 5 and 6 in Naumann 1991; Figs 8B and C in Stevens *et al.* 2010). The BROW pattern is widespread across several braconid subfamilies including Helconinae, Braconinae and Doryctinae (Quicke *et al.* 1992; Belokobylskij *et al.* 2004; Iqbal *et al.* 2006), and also occurs in numerous lepidopteran, dipteran, reduviid and mirid species (Naumann 1991; pers. obs.). Within the Australian Agathidinae, the BROW pattern is confined mostly to *Therophilus* species, although it is also known in two species of *Disophrys* (Stevens *et al.* 2010).