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Systematics, distribution and biology of the Australian 'micro-flea' wasps, *Baeus* spp. (Hymenoptera: Scelionidae): parasitoids of spider eggs

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Abstract

Baeus represents one of the most unusual genera of parasitic wasps in that females are apparently wingless, highly compact and flea-like in appearance. They are endoparasitoids of spider eggs of host families associated with above-ground vegetation and crytobiotic niches such as leaf-litter. The genus has remained poorly studied, with only 25 species described world-wide, with three from Australia; *B. dux* Girault, *B. leai* Dodd and *B. saliens* (Hickman). This study revises the Australian fauna, and describes 17 new species: *Baeus arthuri* Stevens **sp. nov**., *B. glenysae* Stevens **sp. nov**., *B. hallarakeri* Stevens **sp. nov**., *B. iqbali* Stevens **sp. nov**., *B. jenningsi* Stevens **sp. nov**., *B.maryae* Stevens **sp. nov**., *B. matthewi* Stevens **sp. nov**., *B. moorei* Stevens **sp. nov**., *B. murphyi* Stevens **sp. nov**., *B. mymyae* Stevens **sp. nov**., *B. ocellatus* Stevens **sp. nov**., *B. prolatusspissus* Stevens **sp. nov**., *B. scrobiculus* Stevens **sp. nov**., *B. spirolimbus* Stevens **sp. nov**., *B. tropaeumusbrevis* Stevens **sp. nov**., *B. tropaeumusdensus* Stevens **sp. nov**. and *B. vulcanus* Stevens **sp. nov**. In addition, information is presented on the distribution of species which generally show the greatest diversity along the eastern seaboard of the Australian continent, including Tasmania. The biology of *Baeus*, its monophyly and relationships within the Baeini are also discussed. The African genera *Angolobaeus* Kozlov **syn. nov.** (type species *Parabaeus machadoi* Risbec, from Angola) and *Paraneurobaeus* Risbec **syn. nov.** (type species *Paraneurobaeus arachnevora* Risbec, from Cameroon) are placed in synonymy with *Baeus*, and a lectotype is designated for *P. arachnevora* Risbec.

Key words: Baeini, *Ceratobaeus*, *Idris*, egg parasitoid, spider host

Introduction

The Scelionidae are small wasps, 0.5–12 mm in length, that are endoparasitic on the eggs of insects and spiders. They have a hypodermic-like ovipositor that is used to pierce the chorion of a host egg, in which they lay their own egg. The scelionid larva then consumes the contents of the host egg, pupates within it, and emerges as a fully developed adult (Austin 1983, 1985; Austin *et al.* 2005). Although the tribal classification of the family is somewhat problematic in that numerous groups are probably not monophyletic (see Murphy *et al.* in press) they, none-the-less, are mostly easy to recognise morphologically and appear to have relatively fixed host relationships. For example, members of the Scelionini *sensu str.* parasitize the eggs of acridid grasshoppers, the Gryononi parasitise heteropteran eggs, the Embidobiini attack embiid eggs, and the Teleasini and Xenomerini (Teleasinae) parasitise eggs of carabid beetles (e.g. Masner 1976; Austin *et al.* 2005).

The Baeini (*sensu* Austin and Field 1997) is the only scelionid tribe that utilises the eggs of spiders as a host food source for their larvae. As a group they have radiated into numerous araneid families (Austin 1985: Iqbal & Austin 2000b) and, because of their relatively high degree of host specificity, have speciated along with the diverse fauna of spiders that are found in three key habitats; soil and leaf-litter, under the bark of trees, and the foliage of shrubs and bushes. Even though members of the tribe are often the most diverse scelionid groups in some habitats, the vast majority of species remain undescribed for all regions of the world. In Australia, where at least some taxonomic work has been undertaken on the group (e.g. Austin 1986, 1988; Iqbal & Austin 2000b), at least 80% of species have not yet been described, with the fauna probably exceeding 1,000 species.

Members of the Baeini can be recognized by three synapomorphies other than their host biology, however none are unequivocal for the group. These are the female antenna comprised of four compact clavomeres that are usually completely fused to each other; the antennal scape not reaching above the level of the anterior ocellus; and tridentate mandibles with a convex outer surface (Austin & Field 1997). A recent molecular study has shown that most Baeini (*Idris* Foerster, *Ceratobaeus* Ashmead, *Baeus* Haliday and *Odontacolus* Priesner) form a monophyletic group, but that the Australasian genera *Mirobaeiodes* Dodd and *Neobaeus* Austin are more closely related to other genera of scelionids associated with non-spiders hosts (Carey *et al.* 2006; Murphy *et al.* in press).