

Review of literature and the biology of the Australian Ceratocanthidae (Insecta: Coleoptera)

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Abstract: The literature pertaining to the Australian Ceratocanthidae (Coleoptera) is reviewed. The information available indicates that very little is known about the three Australian species, all of which occur in Queensland.

Introduction

The family Ceratocanthidae (= Acanthoceridae) is found in the tropics and subtropics of the world and is represented by about 40 genera and 320 species (Ballerio, 2000; Howden & Gill, 2000; Grebennikov *et al.*, 2002) but this number is likely to rise in the coming years as a result of undescribed species being discovered (Grebennikov *et al.*, 2002). The Ceratocanthidae exhibit a pantropical distribution, with few species living in the temperate regions of the Americas, South Africa and south-east Asia (Grebennikov *et al.*, 2002). Taxonomically, it is widely considered as a separate family of the superfamily Scarabaeoidea and appears to be more closely related to the Hybosoridae and Ochodaeidae (Lawrence & Newton, 1982; Browne & Scholtz, 1999; Grebennikov *et al.*, 2002, 2004; Grebennikov & Scholtz, 2004) and the Trogidae (Crowson, 1955). Ceratocanthid beetles are characterised by having a strongly convex body which allows the mouth-parts, abdomen and parts of the legs to be completely concealed when they roll themselves into a pill-shaped form or little compact ball, hence the common name of pill scarab beetle or ball beetle for the group. Their resemblance to little pellets or seeds makes them less conspicuous to predators and may be a reason why they are usually overlooked by insect collectors. The overall appearance of the two species in the genus *Cryptophilharmostes* and several species of *Philharmostes* from Africa have apparently evolved a cryptic appearance to blend in to their habitat on the tropical forest floor (Ballerio, 2000, 2004, 2005) or to an adaptation to life under bark or in dead wood (Grebennikov *et al.*, 2002). But actually, most species are readily found in dead logs (usually those occupied by termites or passalid beetles) or are collected from Berlese samples of leaf litter (Grebennikov *et al.*, 2002). Other species of Ceratocanthidae are known from the rainforest canopy (Grebennikov *et al.*, 2002; Ballerio, 2004; Ballerio & Wagner, 2005). Ceratocanthids are usually small sized beetles, most often less than 5 mm in length (range 2-7 mm in length), dark in colour, while the head, pronotum and scutellum are comparatively large. The larvae can be separated from those of other scarabaeoids by the presence of a 4-segmented antenna and a serrate labrum (Lawrence, 1982; Lawrence & Britton, 1993).

Biology

The biology of this group is poorly known although both the adults and larvae have been collected under bark (Lawrence, 1982) or by beating dead tree limbs. Ceranthocanthids, both adults and larvae, are presumed to feed on soft food, probably fungi (Grebennikov *et al.*, 2002), although rotten wood has also been suspected because Ritcher (1958) stated that the larvae of African species feed on rotting wood. Elsewhere, adults have also been extracted from leaf litter and dung-baited pitfall traps. The adults and larvae of *Cyphopisthes descarpentriresi* Paulian have been taken in the galleries of the termite species, *Mastotermes darwiniensis* Froggatt (Insecta: Isoptera: Termitidae). Termite associations are known in other extralimital ceratocanthid species (e.g. Iwata *et al.*, 1992) but there are indications that they are not highly integrated into termite societies (Kistner, 1982).

Australian species

The Australian fauna currently comprises three species (Cassis & Weir, 1992), all from Queensland, in the genera *Cyphopisthes* Gestro, 1899 (one species) and *Pterorthochaetes* Gestro, 1899 (2 species). Both genera are diverse in Papua New Guinea and the Oriental Region (Paulian, 1977, 1978). Gestro (1899) described two Australian species in a review of the world fauna and Paulian (1977) revised the Australian fauna and redescribed these species and added a third. The Australian species have been poorly collected and are represented by relatively few specimens in museum collections.

1. *Cyphopisthes descarpentriresi* Paulian, 1977

This beetle is 4 mm long, bronze-black covered with sparse, very short, fine, yellow setae. The type locality of this species is Lansdowne Station, Woodstock, Queensland (Paulian, 1977) where on 3 July 1974, J.A.L. Watson recorded them (3) from galleries of *Mastotermes darwiniensis* Froggatt (Insecta: Isoptera: Termitidae) (Paulian, 1977). Other published localities and collection data recorded for this species are: 15, Pallarenda, Townsville, Queensland, 1 August 1974, J.A.L. Watson in galleries of *Mastotermes darwiniensis* Froggatt (Paulian, 1977); 1, Iron Range, Cape York Peninsula, 1-9 September 1971, G.B. Monteith (Paulian, 1977); 1, Mt Coot-tha, Brisbane, Queensland, 13-20 March 1977, G.B. Monteith (Paulian, 1977). The adults and larvae of *Cyphopisthes descarpentriresi* Paulian have been taken in the galleries of the termite species, *Mastotermes darwiniensis* Froggatt (Paulian, 1977; Grebennikov *et al.*, 2002); however, Grebennikov *et al.* (2004), presumably referring to the J.A.L. Watson collection, further noted that adults, pupae, and larvae of this species were collected together in the same galleries of a termite nest which was found situated in a dead *Acacia* tree (Mimosaceae). [Why this information was not provided by Paulian (1977) is strange in the least; maybe the editors of the *Journal of the Australian Entomological Society* edited it out or perhaps Paulian forgot to include these data in his paper]. Lawrence & Britton (1993) stated that this species occurs in northern Queensland along with the other two Australian species of the family but failed to notice that the species was also recorded from

southern Queensland [Brisbane](Paulian, 1977).

2. *Pterorthochaetes cribricollis* Gestro, 1899

This beetle is 4.5 mm in length with a shining black body with short, yellow setae. This species was first recorded from Australia by Paulian (1977). The record was made by the well-known indefatigable over-collector from “hillbilly” Queensland, G. B. Monteith, who collected 17 specimens from Iron Range, Cape York Peninsula during 11-17 May, 1968 (Paulian, 1977). The species was originally described from Papua New Guinea [as New Guinea](Gestro, 1899). It is interesting to note that neither Gestro (1899), Paulian (1977) or Monteith as the collector of the first material recorded from Queensland, provided any ecological information for the species (see also discussion under the following species).

3. *Pterorthochaetes simplex* Gestro, 1899

This beetle is 4.5 mm in length with a shining black body with short, yellow setae. The type locality of this species is Queensland [no specific locality cited](Gestro, 1899). Other localities recorded for the species in Australia are: Iron Range, Cape York Peninsula & Mt. Lewis via Julatten, Queensland (Paulian, 1977). Published collection records for the species are as follows: 4, Iron Range, 28 April - 5 May 1968, G.B. Monteith (Paulian, 1977); 1, Mt Lewis via Julatten, 27 June 1965, G.B. Monteith (Paulian, 1977). It is very interesting to note that G.B. Monteith, as with the other two species listed above, failed to provide any biological data on this species (or perhaps the data were not included on the museum labels?). It is a pity that, as one of the few entomologists to have collected Ceratocanthidae in Australia (and all three known native species at that), that his collecting experiences of the 3 taxa could not have been better documented. Hopefully, the present paper will encourage G.B. Monteith and other entomologists to write more papers about the biology and behaviour of the Ceratocanthidae and other lesser known biological entities.

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