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The Classification and Phylogeny of the Australian Coroebini, Bedel, with a Revision of the Genera *Paracephala*, *Meliboeithon* and *Dinocephalia* (Coleoptera : Buprestidae : Agrilinae)

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Abstract

The definitions of the genera making up the Australian portion of the large tribe Coroebini are briefly discussed. Thirteen genera are considered to have extant species on the continent: *Synechocera*, *Ethon*, *Paracephala*, *Meliboeithon*, *Dinocephalia*, *Alcinous*, *Hypocisseis*, *Cisseis*, *Neospades*, *Pachycisseis*, *Vanroonia*, *Polyonychus* and *Coroebus* (the last three each having one described species from Australia). *Cisseioides* is returned to synonymy under *Hypocisseis*. *Paracephala*, *Meliboeithon* and *Dinocephalia* are revised, with *Pseudosynechocera* proposed as a new junior synonym of *Dinocephalia*. The authorship of *Paracephala* is re-attributed to Saunders. *Paracephala* is defined for seven species and their synonyms: the type-species, *P. pisticina* (= *P. minuta* = *Aphanisticus canaliculatus*), *P. occidentalis*, *P. aenea* (= *P. strandi* = *P. niveiventris*), *P. murina* (= *P. cylindrica*), and three new species, *P. deserta*, *P. hesperia* and *P. borea*. *Meliboeithon* is re-defined for six species and their synonyms, four being transferred from *Paracephala*: the type-species, *M. intermedium* (= *M. fissus*), *M. bicostatum*, *M. crassum*, *M. vitticeps* and two new species, *M. confusum* and *M. cylindricolle*. *Dinocephalia* is re-defined for seven species and their synonyms, with four transferred from *Paracephala*: the type-species, *D. thoracica* (= *D. gigantea*), *D. browni*, *D. cyaneipennis*, *D. transsecta* (= *P. impressicollis*); one species, *D. carteri*, transferred from *Pseudosynechocera*, and two new species, *D. leucogaster* and *D. burnsi*. Keys are presented for the separation of the 13 genera and the species of *Paracephala*, *Meliboeithon* and *Dinocephalia*. Lectotypes are designated for *Paracephala aenea*, *P. browni*, *P. transsecta* and *P. vitticeps*. Key morphological features are illustrated for the genera and for the species of the three revised genera. A preliminary hypothesis of the phylogeny of the 10 strictly Australian coroebine genera is presented in conclusion.

Introduction

The Australian element of the large buprestid tribe Coroebini Bedel (Agrilinae) is in a very confused state, as are the various tribal components for most of the major zoogeographical regions. The work presented herein hopes to partly correct this situation, while presenting comment on groups still needing attention, as this parallels my continuing research on the Afrotropical members of this large tribe.

The often contradictory, and seemingly less than objective, considerations published by Carter, Obenberger and Théry have left many portions of higher buprestid classification in a very confused state. The debates waged between Obenberger and Théry, with Carter acting as Théry's ally with respect to considerations of Australian buprestids, were briefly discussed by Bellamy (1986*b*) and need not be repeated here. Suffice it to say that, because of the polemical nature of many of these works, the classification and taxa proposed by their authors have often been treated too lightly or simply ignored by others, leaving contemporary

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students of the group the initial task of 'taking sides' before approaching revisionary work in an objective manner. One fact that becomes more and more obvious as I consider many of the taxa contentious between these authors is that all were variously guilty of not taking time nor making the effort to examine type material of previously described species, or, especially Obenberger not even offering any comparison between newly proposed taxa and those described previously. I will comment more specifically on this under various taxa below.

Methods and Terminology

The spelling of *Coroebus* was emended from the more traditional spelling, *Coraebus*, by Mequignon (cited by Théry 1942) on the basis of an erroneous transliteration from the original Greek root. The original error was perpetuated by most authors following the description by Gory and Laporte (1839).

The authorship of *Paracephala*, which originated from a manuscript name of Deyrolle, is re-attributed to Saunders (1868), because Saunders was the first to use the name in conjunction with a described species, *Agrilus pistacinus* Hope. Saunders was thus the first to give definition to the concept of *Paracephala*, even though he did not formally describe the genus. Oddly enough, though, he did not use *Paracephala* in his catalogue (1871), but placed *Agrilus pistacinus* in its original combination. Thomson (1878) described *Paracephala* for a new species, *P. murina*, and *P. pistacina* additionally included, with no mention of Saunders' previous use of the name.

The label data is recorded exactly as on the labels for type material and species with scant material, but is reduced to only locality information for all other examined material. A slash mark (/) is used to separate data from different labels. Additional data or remarks are enclosed in parentheses with (h) for handwritten and (p) for printed data. Latitude and longitude, when recorded on labels or subsequently determined, are given in a decimal notation for degrees and minutes. Size ranges given in the descriptions are for maximum length × width.

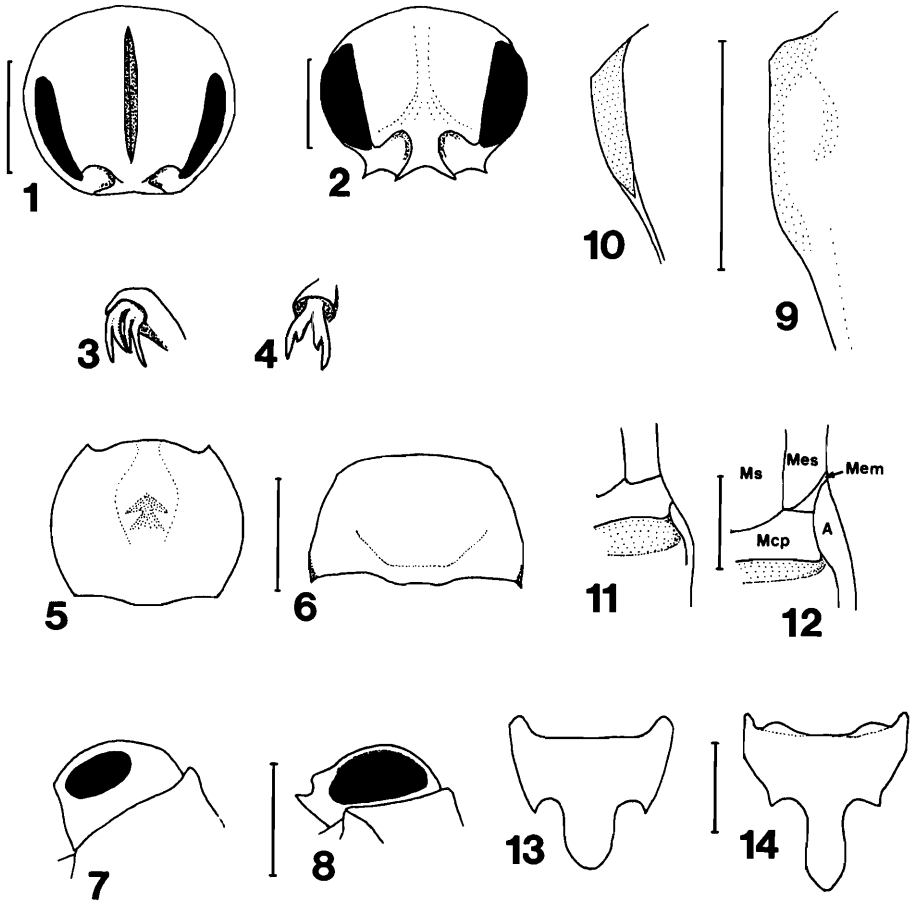
Abbreviations

The acronyms used for the lending collections are based upon the system used by Watt (1979).

AMNH	American Museum of Natural History, New York
AMSA	Australian Museum, Sydney
ANIC	Australian National Insect Collection, Canberra
BMNH	British Museum (Natural History), London
BPBM	B. P. Bishop Museum, Honolulu, Hawaii
CASC	California Academy of Sciences, San Franciso
CLBC	My private research collection
GBVA	G. Burns collection, Mornington, Vic.
GHNC	G. H. Nelson collection, Pomona, California
GWCA	G. A. Williams collection, Lansdowne, N.S.W.
HAHC	H. and A. Howden collection, Ottawa
HCOE	Hope Entomological Collections, Oxford
IRSB	Institute Royal des Sciences Naturelles de Belgique, Bruxelles
JSCA	J. Sedlacek collection, Brookfield, Qld
MMSA	Macleay Museum, University of Sydney, Sydney
MNHN	Museum National d'Histoire Naturelle, Paris
NMBH	Hungarian Natural History Museum, Budapest
NMPC	National Museum, Prague
NMVA	Museum of Victoria, Melbourne
NMWA	Naturhistorisches Museum, Vienna
QMBA	Queensland Museum, South Brisbane
SAMA	South Australian Museum, Adelaide
TMPS	Transvaal Museum, Pretoria, South Africa
WAMA	Western Australian Museum, Perth

Other abbreviations:

desc.	description
non desc.	without description



Figs 1–14. Coroebini, key morphological features: *1*, *2*, frontal view of head: *1*, *Meliboeithon intermedium* (Kerremans); *2*, *Neospades cruciata* (F.). *3*, *4*, tarsal claws: *3*, *N. cruciata*; *4*, *Cisseis leucosticta* (Kirby). *5*, *6*, dorsal outline of pronotum: *5*, *Synechocera tasmanica* Théry; *6*, *M. intermedium*. *7*, *8*, lateral view of head and pronotal margin: *7*, *Paracephala murina* Thomson; *8*, *Alcinous nodosus* Kerremans. *9*, *10*, lateral view of epipleural fold: *9*, *Dinocephalia cyaneipennis* (Blackburn); *10*, *P. murina*. *11*, *12*, ventral view of metathoracic sternites: *11*, *N. cruciata*; *12*, *Polyonychus torridus* (Blackburn). *13*, *14*, ventral view of prosternum: *13*, *Pachycisseis bicolor* (Gory & Laporte); *14*, *C. leucosticta*. *A*, abdominal projection; *Mcp*, metacoxal plate; *Mem*, metepimeron; *Mes*, Metepisternum; *Ms*, Metasternum. Scale bars, 1 mm.

The Classification of the Australian Genera of the Coroebini

Since my comments on the higher classification of Australian Buprestidae (Bellamy 1986*b*) and my revision of *Synechocera* Deyrolle (Bellamy 1987), I have had the opportunity to examine some additional material which I hope will allow further clarification of the Australian generic components of this tribe of Buprestidae.

Based upon my study of the Afrotropical coroebines (Bellamy 1986*a*, 1986*c*, 1988), I find the most fundamental divergence between members of the tribe to be that of two different ovipositor types. The first type I refer to as 'normal', since it is found within the majority of the higher groups of buprestids with the exception of Julodinae, Julodimorphini (Chalcophorinae) and a high percentage of the examined genera of Coroebini. This normal ovipositor is generally dissected as a more or less flattened tube, looking like a deflated balloon, with two pairs of thin, narrow sclerotised support rods, the coxites, held within the membrane. The structure terminates with two very short coxites provided with sensory setae. There is no gross difference between the dorsal and ventral surface in this type of ovipositor. Its length varies within higher groups, and the ratio of coxite lengths has been found to be definitive at the species level in some genera. Any divergence from this 'normal'-type is obviously apomorphic.

The second type of ovipositor I refer to simply as the 'coroebine' type, because I have found it only within genera belonging to the tribe Coroebini. I have illustrated this type of ovipositor for *Paracephala* (Fig. 28), *Meliboeithon* (Fig. 61) and *Dinocephalia* (Fig. 87). The structure is characterised by the opposing 'brushes' of inwardly recurved setae on the ventral surface. The adaptive significance of this modification is unknown to me, because I have not yet observed oviposition by any species, but I can imagine that these setae must play some tactile role which allows the female to find an acceptable site to place her eggs. Within the 50 genera of Afrotropical coroebines I currently define, 46 have this type of ovipositor (1988).

Of the 13 coroebine genera with species in Australia, six have the 'normal' type of ovipositor and seven have the 'coroebine' type. Those genera with the 'normal' type are *Coroebus*, *Alcinous* Deyrolle, *Cisseis* Gory & Laporte, *Pachycisseis* Théry, *Neopades* Blackburn and *Hypocisseis* Thomson. Genera with the 'coroebine' type are *Ethon* Gory & Laporte, *Synechocera*, *Polyonychus* Chevrolat, *Paracephala*, *Meliboeithon*, *Dinocephalia* and *Vanroonia* Obenberger.

Vanroonia

I have examined type material of *Amorphosoma penicillatum* (Klug), the type species, from Brazil along with many of the Old World species of *Amorphosoma* Laporte and all described species of *Vanroonia*. On the basis of these examinations, I find that the Old World species of *Amorphosoma* are not congeneric with *A. penicillatum* and would better be placed in combination with *Vanroonia*, thus restricting the definition of *Amorphosoma* to a strictly New World taxon. The undescribed species of *Amorphosoma* I mentioned earlier (Bellamy 1986*b*) will not be described until further material becomes available, but will be considered as a species of *Vanroonia* herein, for the discussion of generic membership of Australian coroebines.

The type of *Amorphosoma tasmanicum* Germar has remained unavailable for study. A specimen determined as such by Hoscheck, received from IRSB and labelled from Adelaide, the type-locality, is not congeneric with *Amorphosoma* or *Vanroonia*. On the basis of my concept of *Hypocisseis* (see below), this examined specimen from IRSB would best be placed in that genus and is perhaps nothing more than an example of *H. ornata* Carter. Any formal recombination must await the eventual examination of the Germar type.

Polyonychus

Polyonychus belongs to a large complex of genera widely distributed in both the Afrotropical and Indo-Oriental regions and is closest to such Afrotropical genera as *Discoderes* Chevrolat and *Anaphlocteis* Bellamy.

Coroebus

As I commented earlier (Bellamy 1986*b*), *Coroebus pulcherrimus* Obenberger from Queensland is probably a valid combination, because the genus is confirmed as present in New Guinea. I suspect that more detailed study of *Coroebus* will show that this large genus needs to be split into several smaller and more tightly defined taxa. However, for the purposes of this work, I will accept this combination and consider *C. pulcherrimus* as a 'stray', probably relict, species with no close relationship to the Australian coroebine fauna.

Synechocera

Synechocera is widely divergent (see Bellamy 1987) and is probably derived from the same ancient lineage as *Polyonychus*. This suggest a very ancient relationship with the core of the Afrotropical, as well as parts of the Indo-Oriental, fauna.

Ethon

The groove on the frontovertex and gall-forming habits of *Ethon* diagnose a well defined group of species which could probably benefit from a revision. The presence of this cephalic groove in genera from both ovipositor-type groups suggests an atavism of unknown significance. Since all three of the genera which possess this groove, *Ethon*, *Synechocera* and *Meliboeithon*, have species which either are associated with an advanced group of plants (monocots) or have an apomorphic biology (gall-forming), it would seem that this groove must have some advantage.

Cisseis *Generic Group*

I prefer not to use subgeneric rank in my consideration of the *Cisseis* complex, following comments by Matthews (1985) regarding the subgenera of *Stigmodera* Eschscholtz.

Alcinous. This is well defined by the structure of its antennae, mesosterna and male genitalia.

Cisseis. This large genus is badly in need of a thorough revision. From the earlier revision of Carter (1923) and the comments of Carter and Théry (1929), I find that the differences I use to separate the species in the key below are consistent with generic-level differences that follow and that I have observed in the Afrotropical coroebines (Bellamy 1986*a*, 1986*c*, unpublished).

Pachycisseis. The absence of the lobed condition of the anterior prosternal margin and the presence of sexually dimorphic maxillary palpi are themselves sufficient to warrant the elevation of *Pachycisseis* to full generic rank.

Neospades. The species I have examined suggest that it may not be monophyletic, but the bifid tarsal claws, generally uniform sculpture, configuration of the head and number of serrate antennal segments are certainly sufficient to allow this group of species to be considered at the generic level.

Thus, *Cisseis* becomes more tightly defined with *Pachycisseis* and *Neospades* separated, but further revisionary study will be required to more absolutely answer the question of relationship within this group of species.

Hypocisseis

I consider *Cisseioides* to be a junior synonym of *Hypocisseis*. The validity of both *Hypocisseis* and *Cisseioides* has been contentious ever since Carter (1923) first synonymised them. Obenberger (1924*a*) briefly discussed the generic separation, listing four characters that differentiated *H. latipennis* (Macleay) and *C. pilosicollis* (Blackburn). Théry (1927) compared these same two species but concluded that they were not generically distinct. Carter (1928) compared *H. latipennis* and *C. suturalis* (Saunders), without changing his opinion, and Carter and Théry (1929) repeated their opinions jointly. Later, in the last shift of opinion in the literature, Obenberger (1934), as with so many other cases, used his catalogue to validate