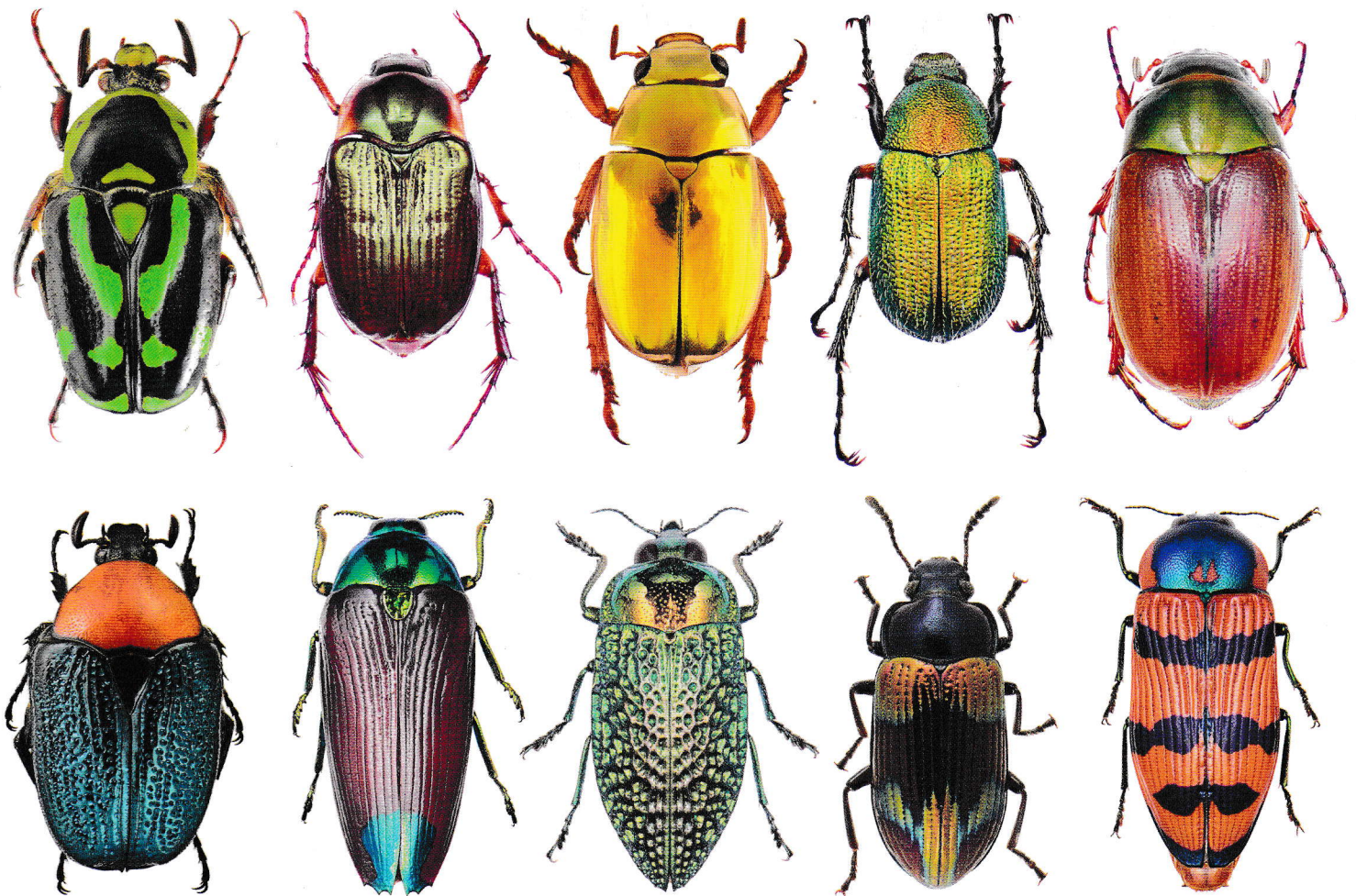


# Australian Beetles

Archostemata, Myxophaga, Adephaga, Polyphaga (part)



Editors: Adam Ślipiński and John F. Lawrence

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## 34. SCARABAEIDAE: CETONIINAE LEACH, 1815

Christian H. Moeseneder, Tom A. Weir, Cate Lemann and Paul M. Hutchinson



Fig. 34.0. *Bisallardiana philippeii* (Allard).

**Common names.** Flower beetles, flower chafers.

**Introduction.** In Australia the cosmopolitan subfamily Cetoniinae currently contains 141 species in 3 tribes and 37 genera. 68% of genera and 90% of species are endemic to this continent. Worldwide there are 4273 described cetoniine species in 485 genera (Krajčič 2012).

The Cetoniinae are a conspicuous group of insects and several species are known to the public in flight and as flower-visitors in suburban backyards, for example the ‘Cowboy Beetle’ (*Chondropyga dorsalis* (Donovan)) and the ‘Fiddler Beetle’ (*Eupoecila australasiae* (Donovan)). Adult beetles range in size from less than 5 mm (*Microvalgus* Kraatz) to 45 mm (*Dilochrosis* Thomson), but the majority are medium-sized beetles. While a few species are well known and reared for education and by hobbyists, little or nothing is understood of the biology of most Australian cetoniines. Some species are so rarely collected that only several specimens have ever been found and the females of six species are unknown. In several large genera, such as *Microvalgus*, few biological or ecological observations of Australian species have been published.

Cetoniines occur in all Australian states, with the tropical north Queensland region especially rich in species and Tasmania particularly poor and represented only by the genus *Microvalgus*. Krikken (1984) suggested the following biogeography for the Australian cetoniines: the Cetoniini and *Charitvalgus* Kolbe (14 species) invaded from the Oriental region, *Microvalgus* (16 species) represent an ancient Gondwanan element (with extant members in Africa)

while the Schizorrhini (111 species) evolved *in situ* and dispersed from there into the Oriental regions, where they are now highly speciose and occur as far as Sri Lanka. Some Australian cetoniines, namely *Dilochrosis atripennis* (Macleay) and *Dilochrosis brownii* (Kirby) have spread over a large part of the continent and are found along the East Coast but also in WA. From the arid centre of Australia few species are known (Moeseneder & Hutchinson 2016) but current collecting effort is yielding new species in such poorly collected regions. No cetoniine species are known to have been introduced by humans to Australia. Within the continent, however, *Protaetia fusca* (Herbst) and *Glycyphana stolata* (Fabricius) were unintentionally transported from their original eastern states range into WA where they have become established.

As an attractive group, cetoniines have received much attention but also turmoil from the beginning of taxonomy. The placement and grouping of species within the Scarabaeoidea and the names of taxa were subject to many changes. Linnaeus (1758) grouped the species which are now in the subfamily Cetoniinae with all other Scarabaeoidea in *Scarabaeus*. The subfamily was named by Fabricius (1775) who created *Cetonia* for all current Cetoniinae. Donovan (1805) described the first species in endemic genera. Leach (1815) placed his family Cetonida under tribe Scarabaeides. The genus *Schizorhina* which held most subsequently described Australian cetoniines was described by Kirby (1825). W. S. Macleay (1838) created an elaborate system with four levels under Cetonidae, which included, for example, *Insulares*, a taxon containing Madagascan and Australasian species; *Valgus* Scriba within the genus *Trichinus* Kirby; and the Australian cetoniine species with a pronotal lobe in *Gymnetinus* Macleay. Burmeister (1842) presented a key to the known species of Schizorrhinidae (it included species from Africa, Madagascar and Australia) and *Cetoniades genuini* (all current Cetoniini). W. J. Macleay (1863), created subsection *Lenosoma* within *Cetonia* F. for *C. fulgens* Macleay and other small species. Van de Poll (1886) recognised the consistency of male genitalia within genera. Gemminger & von Harold (1869) listed all Australian species under genus *Schizorhina* Kirby. Thomson (1878, 1880) described genera in *Schizorhina*. Kraatz (1880) dealt largely with classification, often based on the writing of other authors rather than his own inspection, and created more genera for the 40 diverse species remaining in genus *Schizorhina* Kirby [as *Schizorhina* (sic)]; ten of these are still valid. Schoch’s important papers (Schoch 1894, 1895, 1896) presented keys to genera and a catalogue of cetoniines based mainly on distribution and shape and extent of mesoventral process. In the Schizorrhini he separated those with a lancet-shaped process (*Hemipharidae*) and those without (*Diaphonidae*). In the Cetoniini he created the subtribe *Glycyphanidae* which included *Protaetia* Burmeister and *Glycyphana* Burmeister. Lea (1914) inspected a large amount of material, providing distribution information and in depth morphological work, often based on colour and unusual specimens, but he ignored male genital construction entirely.

This is the only work that dealt with Australian *Microvalgus*, naming 11 of the 17 species. Schenkling presented a catalogue (Schenkling 1921) based on Schoch's divisions and listed Valginae genera without tribes. Bacchus (1974) revised the Australian *Glycyphana*. Krikken (1978) provided morphological diagnosis for the Valgini (as Valginae) and supported Arrow (1910) in his division of the valgines into two groups. Early workers who described the most species (numbers of those still valid in parentheses) were: Lea (28), Janson (15), W. J. Macleay (15), Blackburn (6) and Thomson (6). Taxonomic work after Schenkling is discussed in the classification section.

In recent times, Bacchus (1974) published a review of the Australian species of *Glycyphana*. Since then several authors provided publications and online resources about the Australian cetoniniines, most of general nature, elaborately figured and excluding Valgini: the *Beetles of the World* series by Rigout & Allard (1997) and Allard (1995a, 1995b) on Schizorhinini with monographs on *Lomaptera* Gory and Percheron, *Ischiopsopha* Gestro and *Mycterophallus* van de Poll, (the three books in this series provide a basic overview but are often erroneous, type descriptions are brief and ambiguous and their images have been manipulated); Sakai & Nagai's (1998) cetoniniine volume in the Mushi-Sha series; a history of the research of Australian cetoniniines by Hangay (2001); Reid & Bulbert's (2002) Lucid Key to the flower chafers of NSW, the ABRIS AFD section Cassis *et al.* (2002) and a field guide by Golding (2009) the images of which may be useful. Moeseneder & Hutchinson are current workers of the group. In the last 20 years a dozen new Australian species have been described and at least as many await description.

The most recent work on Australian Cetoniniinae (Krikken 2018) was published too late for its complete incorporation into the present chapter. Two new genera are described in that paper: *Axillonia* Krikken with the type *Clithria bacchusi* Allard, 1995, and *Territonia* Krikken, with the type *T. campbelli* Krikken, 2018. In the key below, *Axillonia bacchusi* keys out at couplet 17 and *T. campbelli* may key out with *Clithria* or related genera.

**Biology.** The majority of Australian Cetoniniinae are anthophagous, a trait which evolved ~62 Ma in the Scarabaeoidea and gave rise to the diversity in the Cetoniniinae (Ahrens *et al.* 2014). In these flower-visiting species, both sexes are volant, sexual dimorphism is not pronounced and mating usually occurs on flowers. Adults are important pollinators of many flowering trees and bushes, especially those in the white-flowering Myrtaceae (*Angophora* Cav., *Leptospermum* J.R.Forst. & G.Forst., *Eucalyptus* L'Her. and *Melaleuca* L.). The cetoniniines consume pollen and nectar when feeding, but some, such as *Dilochrosis balteata* Vollenhoven and *Protaetia fusca* may consume or damage the flower structures. In the wild, a few cetoniniines feed on ripe fruit (not in numbers to be regarded as pests) and captured specimens consume offered honey. Some species have been recorded feeding at sap flows (*Dilochrosis brownii* in W.A.). Adult peak activity times are from October to May and coincide with the flowering of trees which is determined by rainfall. Mating is generally opportunistic and without courtship in the species that are flower-visiting but there are exceptions.

In the ecology section of each genus, records of the host plants on which adult cetoniniines have been recorded were

compiled from Alderson (1976), Armstrong (1979), Bacchus (1974), Froggatt (1894, 1907, 1914), Golding (2009), Hasenpusch & Moeseneder (2010), Hawkeswood (1981, 1982, 2002), Hawkeswood & Turner (2003, 2007), Hiller (1990), Matthews (1984), Moeseneder *et al.* (2014), Moeseneder and Cook (2014), Moeseneder & Hutchinson (2012), Moore (1987), Reid & Bulbert (2002), Simpson (1990), Tepper (1887), Webb (1987), Williams & Adam (1998) and Zietek (2008).

In some genera (*Tapinoschema* Thomson, most *Chondropyga* Kraatz, *Diaphonia* Newman, *Grandaustralis* Hutchinson and Moeseneder, *Navigator* Moeseneder & Hutchinson and some *Pseudoclithria* van de Poll) adults are infrequently or never encountered on flowers. The males have enlarged antennal clubs and are observed flying most likely in search of sedentary females. The females of six species are not known (all are known in the flower-visiting group). Sexual dimorphism is pronounced with females having heavier build and darker coloration. Usually males are found more commonly.

Most Australian cetoniniines can be caught by netting specimens on flowering trees with a net on a long pole. However in the last few decades, flight intercept traps have yielded rare and also undescribed species, especially in the group of the non-flower visiting taxa. Fruit-bait traps have also been successfully used in catching some species. The species in genera *Lomaptera* and *Trichaulax* Kraatz are very strong and fast flyers and can be exceedingly difficult to catch since they often frequent the uppermost flowers on mature trees.

The life history of few Australian cetoniniine species is known. Froggatt (1894), Alderson (1976), Moore (1987), Matthews (1984), Moeseneder & Cook (2014), Moeseneder & Hutchinson (2016) and Tepper (1887) provided observations about several cetoniniine species. A few attractive species such as those in the genera *Dilochrosis*, *Trichaulax* and *Ischiopsopha* have been reared for commercial sale, by zoos and for education. After copulation, females lay between 15 and 40 eggs in suitable substrate. Publications and observations show that in the great majority of species larvae develop in decaying, never living, wood where they are generally beneficial as organic recyclers by breaking down decaying plant material. Often larvae inhabit dead branches and tree trunks on the ground. When larvae have been found in standing living trees, they are encountered within the decaying wood areas in rotten branches, in the core of the tree or openings and splits at the base of the tree, frequently near the boundary layer to living wood (*Trichaulax*, *Lyraphora*, *Chlorobapta*). In some (*Pseudoclithria*, *Navigator*, *Tapinoschema* and one *Dilochrosis* sp.), however, larvae are found freely in soil under leaf litter, unassociated in sand or in decomposing plant litter. The Australian cetoniniines show some particularities which may be associated with the variable and often sparse rainfall in Australia. At least some species are highly tolerant to desiccation, which was shown to cause severe shrinkage and resultant torpor in *Dilochrosis atripennis* and *Tapinoschema digglesii*. Normal growth and activity were rapidly resumed when exposed to a more humid environment and normally developed adults hatched (CHM). Larval development requires 1–3 years in 3 instars. A link to ants or termites during larval stage for several, particularly *Valgini*, has been speculated by some authors but not proven. Cocoons are constructed from humus, soil or decaying wood substrate and incorporate a lesser

or greater amount of the larva's faecal pellets. In many species they remain loose in the substrate, in others they are cemented to the tree's decaying or living wood. Australian cetoniines pupate early and often spend many months in this stage, most likely as a further adaptation to arid conditions.

Predation and parasitism of Australian cetoniine larvae, pupae and adults by insects (usually flies), spiders, birds, mammals and fish has been documented by Alderson (1976), Froggatt (1894), Hawkeswood (2007), Hiller (1990), Moeseneder *et al.* (2014), CHM and PMH pers. obs., Reid & Bulbert (2002) and Simpson (1990).

The Australian cetoniines are not of direct major economic importance to humans and no species is regarded as a pest. Woodruff (2006), however, wrote that *P. fusca* adults are considered commercial pests on mango and other flowering plants in Hawaii since they cause mechanical damage to the flowers while feeding on pollen and nectar.

**Classification.** Recent classification work which is relevant to Australian cetoniines began with Krikken (1984) who provided a suprageneric key to the Cetoniinae based on adult morphology. He raised the Cetoniinae to family rank, as Cetoniidae, with subfamilies Cetoniinae, Trichiinae and Valginae and transferred the genus *Pseudoclitiria* into the Xiphoscelidini – both taxonomic arrangements were generally not accepted by subsequent authors. Krikken also transferred the Australian genera with a developed medial pronotal lobe from the Gymnetini to the Schizorhinini, a decision which found acceptance by all subsequent authors.

Cladistic analysis of the Scarabaeoidea (Browne & Scholtz 1995, 1998, 1999) concluded that Cetoniinae and Valginae are well defined subfamilies and remain in the Scarabaeidae. In a molecular phylogenetic review of the major Scarabaeoidea families and subfamilies of the Scarabaeidae, Smith *et al.* (2006) decided to retain their previous placement and align them with the other phytophagous groups (Melolonthinae, Dynastinae, Rutelinae) despite evidence that Cetoniinae branch off at the base of the Scarabaeidae. The preliminary findings followed those of Browne & Scholtz (1998) but Smith *et al.* (2006) listed Trichiini and Valgini at tribal level.

To date, the most comprehensive molecular phylogenetic study of the subfamily sampled 125 species representing ten of the twelve currently recognized tribes and recovered Cetoniinae as a monophyletic lineage sister to Rutelinae + Dynastinae (Šípek *et al.* 2016). The subfamily was further divided into two clades comprised of i) Valgini, *Microvalgus* (Microvalgini) and Trichiini in part and ii) Cetoniini, Crematoscheilini, Diplognathini, Golathini, Gymnetini, Osmodermatini, Schizorhinini, Stenotarsini, Taenioderini, and Trichiini in part (Šípek *et al.* 2016). Their results highlight the need for taxonomic changes of the tribal classification as only Crematoscheilini was recovered as a monophylum and all other tribes recovered as poly- or paraphyletic (Šípek *et al.* 2016).

Of the 12 tribes currently included within the Cetoniinae (Smith 2006, based on Browne & Scholtz 1995, Ratcliffé & Jameson 2002), only Valgini, Cetoniini and Schizorhinini are represented in the Australian fauna. Sixteen Australian genera representing all three of these tribes were included in the phylogeny of Gunter

*et al.* (2016), however within this study the clade representing Cetoniinae was primarily comprised of Australian taxa (17 of 22 species) so limited extrapolations can be made regarding the overall tribal relationships. The topology was consistent with classification in three distinct lineages, confirming *Glycyphana* and *Protoetia* (Cetoniini) in close relationship to Cetoniini from other continents, and distinct from the monophyletic clades containing thirteen Australian Schizorhinini genera or *Microvalgus* (Valgini) (Gunter *et al.* 2016).

Catalogues at species level are Krajčák (2012) and Cassis *et al.* (2002). The Australian cetoniine fauna is very diverse and, with 3.8 described species per genus (Passalidae 3.9, Rutelinae 5.0, Dynastinae 5.3, and Lucanidae 5.5), Krikken's (1984) advice not to lump genera in the Cetoniinae due to the danger of obscuring complexity seems well placed.

No phylogenetic study or key to the entirety of Australian cetoniines as they are known in recent times has been published, but see Introduction above). The classification of genera presented herein is based on Smith (2006) and Bouchard *et al.* (2011). At this time *Clithria* Burmeister, *Pseudoclitiria* and *Diaphonia* are polyphyletic and in need of revision, hence these genera resolve to several places in the key.

*Schochidia* Berg has been listed from Australia in the past. No specimens have been found in Australian museums by the authors and all specimens recorded in literature were captured in New Guinea. Krikken (1983) also noted Australia to be an incorrect location for this species and *Schochidia* is hence not included.

**Characteristics.** Mandibles and labrum concealed beneath clypeus, not visible from above. Antennal insertion exposed beside clypeus in dorsal view. Antenna 10-segmented; club 3-segmented. Frontoclypeal suture absent. Mesepimeron protrudent at base of elytra (except in Valgini). Elytral subhumeral emargination present (except in Valgini). Propygidium fused with penultimate abdominal ventrite and usually concealed by elytra (except in Valgini). Pygidium exposed. Procoxa conical and ventrally projecting. Mesocoxa usually separated (except in Valgini) and with or without development of an interposed mesoventral process. Mesocoxae aligned transversely. Metacoxa approximate (except in Valgini). Tarsal claws usually simple and subequal length but not independently articulate.

Secondary sexual characteristics. In ~90% of Australian Schizorhinini species, males have longitudinally transversely or broadly impressed tergites, modified legs and/or enlarged antennal clubs. Male genitalia may bear unique ventral structures or pilose patches in some species. Females possess fewer diagnostic characters but are generally wider and stockier. They may be similar to males in general appearance or so morphologically dissimilar they have at times been described as separate species (*Diaphonia dispar* Newman). Females can resemble congeneric species to a degree that they are difficult to determine or indeterminable (*Metallesthes* Kraatz and *Hemichnoodes* Kraatz) without extensive knowledge or when not collected in conjunction with males.

Melanic forms occur in a large number of Australian Schizorhinini. Where possible the generic key provided here does not rely on colour as a primary diagnostic character.

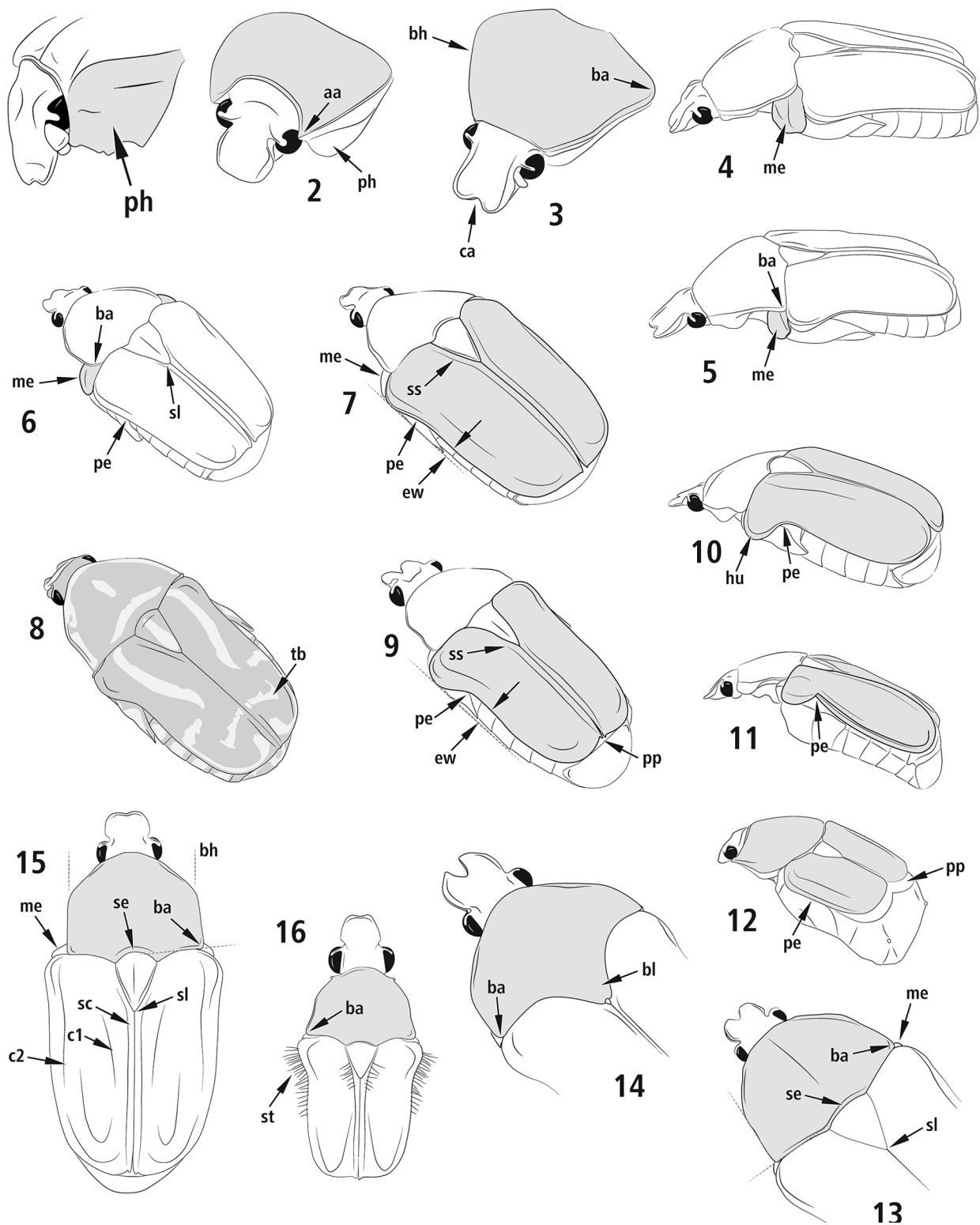


## Key to tribes, subtribes and genera of Australian Cetoniinae

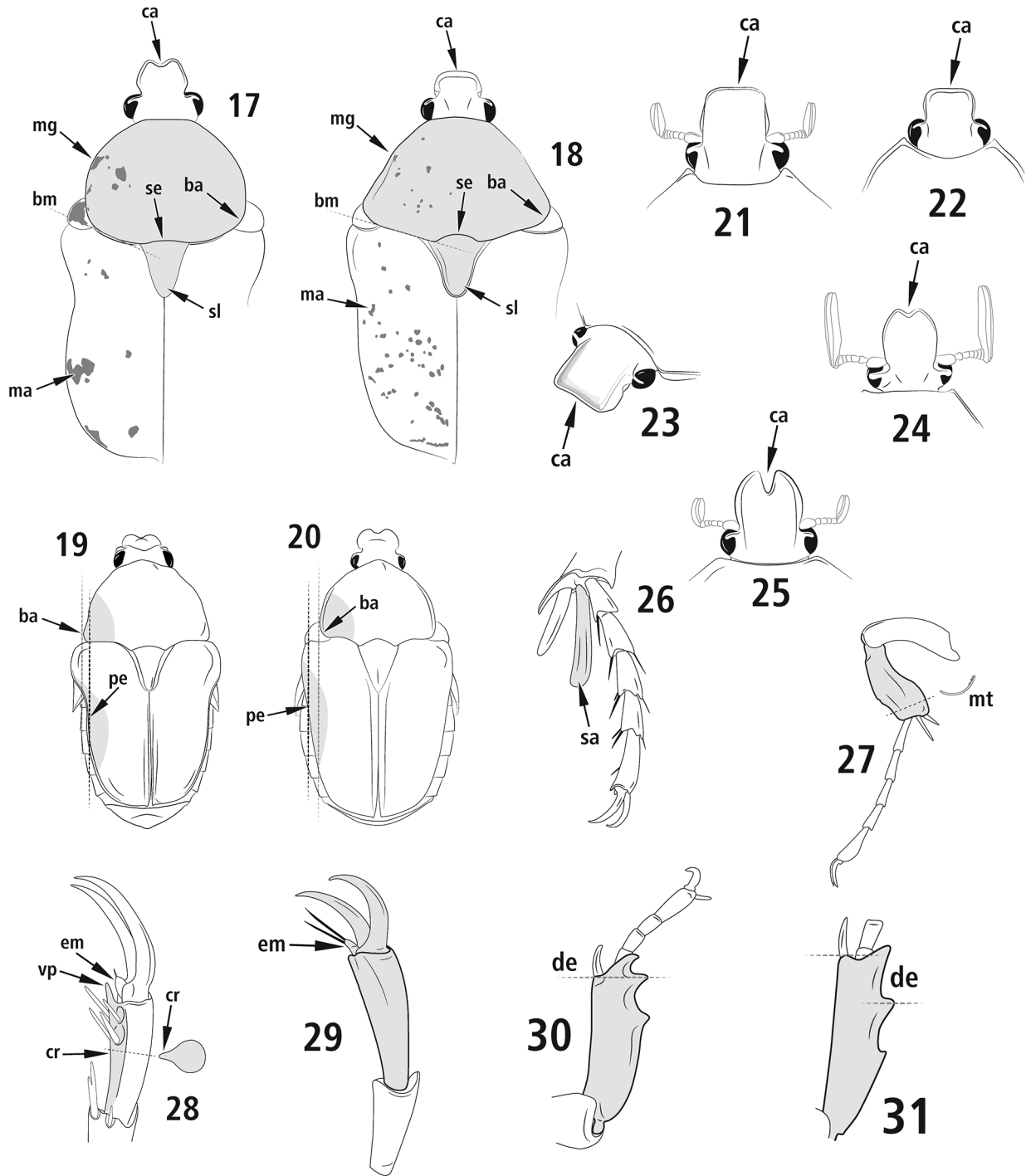
**Notes on key characters.** Specimen lengths were measured from the clypeal apex to pygidial apex. Characters in the key and generic descriptions for taxa which also occur outside the Australian region (*Protaetia*, *Glycyphana*, *Dilochrosis*, *Eupoecila* Burmeister, *Ischiopsopha*, *Mycterophallus*, *Lomaptera*, *Chalcopharis* Heller, *Poecilopharis* Kraatz, *Microvalgus*, *Charitovalgus*) consider only species which occur in Australia and not extralimital species.

Some genera key out more than once, allowing for variation between species and difficulty in interpreting certain characters in the key as well as indicating the need for revision (eg *Pseudoclitiria*, *Diaphonia*, *Aphanesthes*, *Bisallardiana*, *Clithria*). Males usually have longitudinally, transversely or circularly impressed abdominal ventrites or abdomen concave in lateral view, modified legs and/or enlarged antennal clubs. Females are generally wider and stockier with abdomen convex or straight in lateral view, but have fewer diagnostic characters. Costae (Figs 34.15sc–sutural costa, 34.15c1–first costa, 34.15c2–second costa) here are defined as longitudinal raised areas on the elytra which may be broad or narrow, distinct or indistinct or absent. Posthumeral emargination can be arcuate (Fig. 34.20pe) or sinuate (Fig. 34.19pe); if arcuate, the elytra are distinctly constricted in dorsal view at level of posthumeral emargination.. Sculpture, setae, pilosity, colour and other non-diagnostic characters are omitted from all drawings.

1. Elytra with posthumeral emarginations absent (Fig. 34.12pe); elytra together often square, disc almost flat (Fig. 34.12); mesepimera barely or not visible between pronotum and elytra when viewed dorsally; propygidium fully exposed or nearly so (Fig. 34.12pp); metacoxae widely separated; body usually covered with squamose setae or scales (except in *Microvalgus glaber*); 6 mm or less in length (not including female ovipositor, when present).... **Valgini** ..... **2**
- Elytra with post humeral emarginations usually distinct (Figs 34.6pe, 34.7pe, 34.9pe, 34.10pe, 34.11pe); elytra together longer than wide, disc somewhat convex; mesepimera clearly visible when viewed dorsally, protruding between pronotum and elytra to a greater or lesser degree, sometimes concealed under dense setae (Figs 34.4me, 34.5me, 34.6me, 34.7me, 34.15me); propygidium concealed or at most only partially visible in intact specimens (Fig. 34.9pp); metacoxae close together (Fig. 34.32mx); body not covered with squamose setae or scales; greater than 6 mm in length..... **3**
- 2(1). Anterolateral angles of pronotum not obvious; pronotal hypomera somewhat rectangular (Fig. 34.1ph), anterior edge vertical and embracing at least base of eye; pronotum with paramedian ridges and lateral impressions anteriorly and raised above plane of elytra; protibiae with 5 denticles or teeth laterally; females with distinct ovipositor, about as long as pronotum; 5–6 mm in length (not including ovipositor); north QLD ..... **Charitovalgus Kolbe**
- Anterolateral angles of pronotum obvious, acute (Fig. 34.2aa); pronotal hypomera not rectangular (Fig. 34.2ph), anterior edge not vertical, exposing most of eye; pronotum without ridges and in same plane as elytra; protibiae with 5 or fewer denticles or teeth laterally, if with 5, then second and fourth are deflexed; 2–4 mm in length; QLD, NSW, VIC, SA, TAS, WA; ..... **Microvalgus Kraatz**
- 3(1). Pronotum with basolateral angles broadly rounded (Figs 34.17ba, 34.18ba), usually more than 90 degrees, more or less shifted forward relative to base of elytra; mesoscutellum with rounded or broad apex (Figs 34.17sl, 34.18sl); mesoventral process transverse, markedly constricted between mesocoxae (Fig. 34.32m/ba), expanded anteriorly with acute lateral angles (Fig. 34.32m/la), anterior margin more or less straight or broadly rounded, barely extending anterior of mesocoxae (Fig. 34.32m), sometimes with row of punctures or setae adjacent to apex (Fig. 34.32i); body dorsally velutinous (except in *Protaetia andrewsi* from Christmas Island, and some *Protaetia accuminata* from Cocos-Keeling Islands), and with at least a few white or coloured embedded maculae formed by microtrichiae.... **Cetoniini: Cetoniina** ..... **4**
- Pronotum with basolateral angles more or less distinct, usually less than 90 degrees (except *Lyraphora*, *Octocollis*, *Neoclitiria*, *Grandaustralis*, *Phyllopodium*, some *Chlorobapta*, some *Pseudoclitiria* all of which have the mesoventral process other than transverse), more closely applied to base of elytra (Figs 34.3ba, 34.5ba, 34.13ba, 34.14ba, 34.15ba, 34.16ba); mesoscutellum, if visible, with apex usually sharply acute or indistinctly rounded (Figs 34.6sl, 34.13sl, 34.15sl), sometimes rounded (*Bisallardiana* and female *Poecilopharis leai* which have mesoventral process elongate); mesoventral process of various shapes (Figs 34.32a-b, 34.32d-k, 34.32m), sometimes absent (Figs 34.32c, l), sometimes transverse (some *Chondropyga* and some *Diaphonia*) (Fig. 34.32f) but not as above; body rarely velutinous (except some *Lyraphora*) or rarely with maculae formed by microtrichiae (except some *Bisallardiana*) ... **Schizorhinini** ..... **5**
- 4(3). Clypeus distinctly emarginate, not distinctly upturned apically (Fig. 34.17ca); basal emargination of pronotum shallow, smoothly rounded, without distinct lateral angles (Fig. 34.17se); pronotal lateral margins broadly rounded, often parallel basally (Fig. 34.17mg); elytra with posthumeral emargination deep, arcuate; dorsal maculation generally as in Fig. 34.17ma; 10–16 mm in length; widespread – all Australian mainland states ..... **Glycyphana Burmeister**
- Clypeus truncate, distinctly upturned apically (Fig. 34.18ca); basal emargination of pronotum deeper, lateral angles usually distinct (Fig. 34.18se); pronotal lateral margins more linear, not parallel basally (Fig. 34.18mg); elytra with posthumeral emargination shallower, sinuate; dorsal maculation generally as in Fig. 34.18ma; 13–18 mm in length; widespread – all Australian mainland states, Christmas Island, Cocos-Keeling Islands; ..... **Protaetia Burmeister**
- 5(3). Pronotum with basal lobe covering mesoscutellum, entirely or nearly so (Figs 34.14bl, 34.33a, b).... **Lomapterina** ..... **6**
- Pronotum without basal lobe, mesoscutellum fully exposed (Figs 34.6sl, 34.13se/sl, 34.15se/sl).... **Schizorhinina** ..... **8**
- 6(5). Pronotal basal lobe with notched apex; mesoscutellum apex visible (Figs 34.14, 34.33a); abdominal ventrites 2 and 3 with lateral, distinct patches bearing fine diagonal striations (Fig. 34.40); 19–30 mm in length; northern Australia – QLD, NT, WA ..... **Ischiopsopha Gestro**
- Pronotal basal lobe without notched apex (Fig. 34.33b), apex of mesoscutellum not or only barely visible; abdominal ventrites 2 and 3 laterally without such distinct striated patches..... **7**
- 7(6). Elytra with preapical umbone obvious (Fig. 34.37au); metaventrite, metacoxae and abdominal ventrites without or with only a few setae; elytral apex somewhat truncate, not sinuate before suture (Fig. 34.37); 16–25 mm in length; QLD ..... **Lomaptera Gory and Percheron**
- Elytra with preapical umbone not obvious (Fig. 34.36au); metaventrite, metacoxae and abdominal ventrites laterally with abundant pale setae; elytral apex somewhat sinuate before suture (Fig. 34.36); 23–30 mm in length; QLD..... **Mycterophallus van de Poll**
- 8(5). Mesoventral process absent or greatly reduced, not surpassing anterior edge of mesocoxae in lateral view (Figs 34.32c, l) ..... **9**
- Mesoventral process present, variously shaped, surpassing anterior edge of mesocoxae in lateral view (Figs 34.32a-b, d-h, j-k) ..... **14**
- 9(8). Pronotum widest at mid length, appearing somewhat circular AND tarsi of all legs with segments 1 to 5 combined longer than tibiae AND male antennal club greatly enlarged AND body non-metallic dorsally; 16–19 mm in length; north QLD; known from males only..... **Octocollis Moeseneder & Hutchinson**

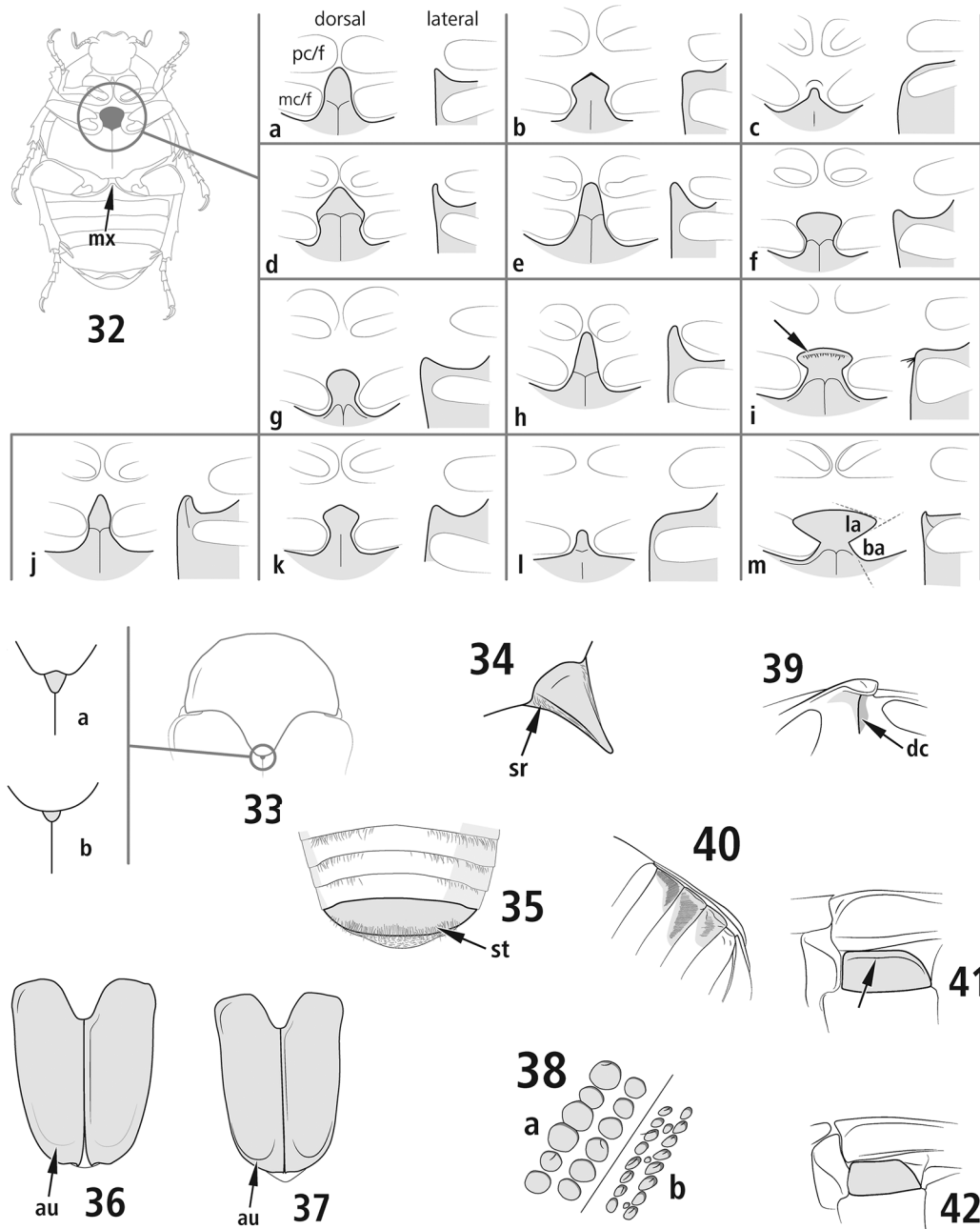


**Figs 34.1–16.** Characters of Australian Cetoniinae genera. Taxa: 1–*Charitovalgus quinquedentatus* (Lea) female, 2–*Microvalgus* sp. male, 3–*Aphanesthes pullata* (Janson) male, 4–*Lyraphora obliquata* (Westwood) male, 5–*Aphanesthes trapezifera* (Thomson) female, 6–*Lyraphora obliquata* male, 7–*Chondropyga dorsalis* (Donovan) male, 8–*Eupoecila australasiae* (Donovan) male, 9–*Clithria eucnemis* (Burmeister) male, 10–*Bisallardiana* sp., 11–*Clithria bacchusi* Allard male, 12–*Microvalgus* sp., 13–*Hemichnoodes mniszehi* (Janson) female, 14–*Ischiopsopha wallacei* (Thomson) male, 15–*Chlorobapta frontalis* (Donovan) male, 16–*Lenosoma fulgens* (Macleay) male,



**Figs 34.17–31.** Characters of Australian Cetoniinae genera. 17–*Glycyphana* (*Glycyphaniola*) *stolata* (**Fabricius**) female, 18–*Protaetia* (*Pseudourbania*) *andrewsi* Gahan male, 19–*Clithria* *albersi* Kraatz female, 20–*Lyraphora* *velutina* (**Macleay**) female, 21–*Stenopisthes* *frenchi* (Blackburn) male, 22–*Poecilopharis* *leai* Schürhoff male, 23–*Chalcopharis* *lansbergei* (**Gestro**) male, 24–*Diaphonia* *antoinei* Allard male, 25–*Dilochrosia* *atripennis* (**Macleay**) female, 26–*Navigator* sp., 27–*Clithria* *eucnemis* male, 28–*Aphanesthes* *pullata*, 29–*Chondropyga* sp., 30–*Poecilopharis* *leai* Schurhoff male, 31–*Macrotina* *satanas* (Schürhoff) male,





**Figs 34.32–42.** Characters of Australian Cetoniinae genera. 32–*Aphanesthes succinea* (Hope) female, 32a–*Evanides bakewellii* (White) female, 32b–*Micropoecila cincta* (Gory & Percheron), 32c–*Grandaustralis boomerang* Hutchinson & Moeseneder male, 32d–*Schizorhina atropunctata* (Kirby) male, 32e–*Dilochrosis brownii* (Kirby) male, 32f–*Diaponia antoinei* Allard male, 32g–*Aphanesthes trapezifera* male, 32h–*Dilochrosis atripennis* (Macleay) female, 32i–*Glycyphana* (*Glycyphaniola*) *stolata* (Fabricius) male, 32j–*Bisallardiana* sp., 32k–*Chlorobapta bestii* (Westwood) female, 32l–*Pseudoclitiria* undescribed sp. male, 32m–*Protaetia fusca* (Herbst) male, 33a–*Ischiopsopha wallacei* (Thomson) female, 33b–*Lomaptera australis* Wallace, 1867 female, 34–*Clithria tibiale* (Macleay) male, 35–*Chondropyga dorsalis* female, 36–*Mycterophallus duboulayi* (Thomson) male, 37–*Lomaptera australis* female, 38a–*Tapinoschema digglesii* (Janson), 38b–*Metallesthes metallescens* (White), 39–*Eupoecila intricata* Lea, 1914, 40–*Ischiopsopha wallacei* male, 41–*Dilochrosis brownii*, 42–*Hemipharis insularis* (Gory & Percheron). Character abbreviations: aa–pronotal anterolateral angle, au–apical umbone, ba–basolateral angle or basal angle, bh–pronotum basal half, bl–pronotal basal lobe, bm–pronotal basolateral margin, c1–first costa, c2–second costa, ca–clypeus apex, dc–dorsal carina, cr–carina, de–dentition, el–elytral lateral margin, em–empodium, hu–humeral umbone, la–lateral angle, ma–macula, mc/f–mesocoxa and mesofemur, me–mesepimeron, mg–margin, mt–metatibia, mx–metacoxae, pc/f–procoxa and profemur, pe– posthumeral emargination, ph–pronotal hypomera, pp–propygidium, sa–spatulate spur, sc–sutural costa, se–scutellar emargination, sl–scutellum, sp–spine, sr–striae, ss–sutural striae, st–setae, tb–transverse band, vp–ventrodistal projection.

- Pronotum widest across posterolateral angles, more tapered anteriorly; tarsi of all legs with segments 1 to 5 combined usually at most as long as tibiae (*Navigator fossor* and *N. pixii* have all legs with segments 1 to 5 combined longer than tibiae); male antennal club variable; body metallic or matt dorsally ..... **10**
- 10(9). Abdominal ventrites with distinctive colour pattern: 1 to 5 yellow and 6 entirely black; 15 mm in length; WA; known from males only (*Diaphonia kerleyi*) ..... **Diaphonia Newman (part)**
- Abdominal ventrites with colour pattern otherwise ..... **11**
- 11(10). Elytra distinctly constricted in dorsal view at level of posthumeral emargination; humeral umbone distinct, protruding; posthumeral emargination deep, arcuate (Fig. 34.10pe); 12–21 mm in length; QLD, NSW, WA, NT ..... **Bisallardiana Antoine (part)**
- Elytra not so constricted in dorsal view at level of posthumeral emargination; humeral umbone distinct or indistinct but not protruding; posthumeral emargination shallow, sinuate (Fig. 34.7pe) ..... **12**
- 12(11). Elytra without distinct raised costae; clypeus with sharp, raised, vertical lateral and anterior margins (less so in female), clypeal apicolateral angles square; mesotibiae with 2 distinct teeth laterally; male antennal club greatly enlarged; sexually dimorphic with regard to colour: male pronotum, elytra and pygidium burnt orange; female all black; non-metallic; 18.5–25.5 mm in length; south-west WA ..... **Grandaustralis Hutchinson & Moeseneder**
- Elytra with 1 or 2 distinct raised costae; clypeus without sharp, raised, vertical lateral and anterior margins, OR lacking raised margins, clypeal apicolateral angles more rounded; mesotibiae usually with 1 tooth externally (2 in the metallic *Navigator fossor*); male antennal club enlarged or not; not dimorphic with regard to colour; metallic or matt dorsally; generally smaller species 10–19 mm in length ..... **13**
- 13(12). Elytra with 2 distinct, narrow costae; colour black or brown, with metallic copper, blue or green reflections (less so in old specimens); pronotum coarsely punctate; male antennal club greatly enlarged; female metatibial inner spur widened apically (Fig. 34.26sa); 10–19 mm in length; QLD, SA, VIC, WA ..... **Navigator Moeseneder & Hutchinson**
- Elytra with 1 or 2 distinct costae, first costa usually wide with somewhat defined margins; colour black, brown or yellow, without metallic reflections; pronotum finely punctate (coarsely in *P. mastersii*); male antennal clubs not greatly enlarged (except *P. adjusta*); female metatibial inner spur parallel sided or tapering apically; 10–19 mm in length; QLD, SA, WA ..... **Pseudoclitiria van de Poll (part)**
- 14(8). Elytra with prominent specialised setae (as well as various other setae): EITHER rows of few erect setae above posthumeral emargination (Fig. 34.16st) and on sutural interval either side of mesoscutellum OR prominent tufts of setae on apical declivity between suture and costa; smaller species 11–18 mm in length ..... **15**
- Elytra without such specialised setae as above (except *Trichaulax* which has elytra with extensive rows of dense setae including on apical declivity) ..... **16**
- 15(14). Elytra with rows of erect setae above posthumeral emargination and on sutural interval either side of mesoscutellum (Fig. 34.16st); body metallic green, red, coppery or blue; 11–16 mm in length; QLD, NSW ..... **Lenosoma Kraatz**
- Elytra with tufts of setae on apical declivity between suture and costa; body not metallic, black or brown, with or without maculae; 11–18 mm in length; QLD ..... **Storeyus Hasenpusch & Moeseneder**
- 16(14). Pygidium with a setose longitudinal groove, broadening apically to a flattened setose depression in female; pronotum with parallel sides in basal half; elytra black with yellow maculae; males with broad, parallel-sided metatibiae and elongate metatarsi; narrow species; 11–14 mm in length; QLD ..... **Neoclitiria van de Poll**
- Pygidium without a setose longitudinal groove, at most with a flattened setose impression; sides of pronotum variable; elytra colour variable; male metatarsi not elongate; body not noticeably narrow ..... **17**
- 17(16). Elytra with posthumeral emargination deep and sharp, angled at 90 degrees (Fig. 34.11pe); males with a tooth on inner claw of protarsi; elytra colour yellow with black maculae; 10–16 mm in length; north QLD ..... (*Clitiria bacchusi*) ..... **Clitiria Burmeister (part)**
- Elytra with posthumeral emargination more evenly rounded, arcuate or sinuate, much greater than 90 degrees (Figs 34.7pe, 34.9pe, 34.10pe); males without a tooth on inner claw of protarsi; elytral colour variable ..... **18**
- 18(17). Mesoventral process large, wide, flat, spade-shaped with angled apex, reaching at least posterior margin of procoxae (Fig. 34.32d, but not as in 34.32b or 34.32k) ..... **19**
- Mesoventral process otherwise shaped (Figs 34.32a–b, e–h, j–k) ..... **20**
- 19(18). Elytra impunctate with 2 wide costae developed, interstices and/or lateral margins grooved and densely setose; elytral margins smooth; dorsally entirely black, dark maroon or green or black elytra with reddish-brown pronotum; 16–39 mm in length; QLD, NSW, VIC, SA, WA ..... **Trichaulax Kraatz**
- Elytra with shallow punctures, coalesced laterally, without costae or dense setae; elytral margins somewhat serrate except near base; yellow to yellow-brown in colour, sometimes with a green hue; 22–28 mm in length; QLD, NSW ..... **Schizorhina Kirby**
- 20(18). Embedded maculae formed by microtrichiae present at least on pygidium (rarely absent) and lateral abdominal ventrites; colour black; elytra distinctly constricted in dorsal view at level of posthumeral emargination (Fig. 34.10); 12–18 mm in length; QLD, NT (*Bisallardiana decorticata* and *B. obscura*) ..... **Bisallardiana Antoine (part)**
- Elytra without embedded maculae formed by microtrichiae, although other coloured maculae not formed by microtrichiae may be present; colour variable; elytral constriction variable ..... **21**
- 21(20). Elytra with dense, deep, large, simple, round punctures arranged in longitudinal rows (Fig. 34.38a); sutural striae deep, and punctate, from apex of mesoscutellum to near apex of elytra; elytra without costae; colour EITHER pronotum burnt orange and elytra burnt orange with black elytral sutural maculae tapering posteriorly OR pronotum burnt orange and metallic blue elytra; 19–29 mm in length; QLD, SA, WA ..... **Tapinoschema Thomson (part)**
- Elytra with punctures of different types but never entirely with dense, deep, large, round, simple punctures (*Metallesthes* has dense punctures on elytra, but these are smaller and elongate (Fig. 34.38b) and the elytra have 2 narrow costae); with or without costae; colour variable ..... **22**
- 22(21). Mesoventral process EITHER tapering from base to apex (Figs 34.32a, e, h) OR parallel sided basally and then tapering to apex (Fig. 34.32j) OR widened medially and then tapering to apex; apex sharply or bluntly pointed; process usually with a distinct dorsal carina or keel (Fig. 34.39dc) (absent in *Neorrhina*, *Evanides*, *Macrotina* and *Stenopisthes*) ..... **23**
- Mesoventral process not as above, either expanded, truncate, rounded or angled, sometimes parallel sided with rounded apex (Figs 34.32f, g, k); process without a distinct dorsal carina or keel (present in *Micropoecila* (Fig. 34.32b) ..... **33**

- 23(22). Elytra distinctly constricted in dorsal view at level of posthumeral emargination; humeral umbone distinct, protruding (Fig. 34.10hu); posthumeral emargination, deep, arcuate (Fig. 34.10pe) ..... **24**  
 – Elytra not so constricted in dorsal view at level of posthumeral emargination; humeral umbone distinct or not distinct, but not protruding; posthumeral emargination shallow, sinuate (Fig. 34.7pe) ..... **27**
- 24(23). Elytra yellow with black maculae generally in the form of spots; legs all yellow; sutural striae present from elytral apices past scutellum usually to pronotal base as a fine but distinct line; 13–18 mm in length; QLD, NSW, VIC, WA, NT ..... **Neorrhina Thomson**  
 – Elytra otherwise coloured; legs brown, black or bicoloured; sutural striae variable, not as above, often shorter, if they extend past scutellum apex then not to pronotal base and only as punctures or dashes ..... **25**
- 25(24). Pronotum, elytra and pygidium with extensive, complex, hieroglyph-like markings composed of bands, lines and spots (as Fig. 34.8); elytra with post-medial sinuous transverse band (Fig. 34.8tb); 14–24 mm in length; QLD, NSW, VIC, SA, WA ..... **Eupoecila Burmeister**  
 – Pronotum, elytra and pygidium without extensive hieroglyph-like markings ..... **26**
- 26(25). Mesoscutellum somewhat rounded apically; mesoventral process with a dorsal carina or keel (sometimes concealed by setae); 12–21 mm in length; QLD, NSW, WA, NT ..... **Bisallardiana Antoine (part)**  
 – Mesoscutellum sharply pointed apically; mesoventral process without a dorsal carina or keel; 19–27 mm in length; QLD, WA ..... **Aphanesthes Kraatz (part)**
- 27(23). Apex of clypeus truncate or slightly emarginate (Figs 34.21ca, 34.22ca, 34.23ca) ..... **28**  
 – Apex of clypeus with a deep notch (Fig. 34.25ca) or distinctly emarginate (Figs 34.3ca, 34.24ca) ..... **31**
- 28(27). Clypeus elongate (Fig. 34.21); base of second protibial tooth posterior to base of apical spur (Fig. 34.31de); (often only one tooth present in male *Stenopisthes*); mesoventral process without a dorsal carina or keel ..... **29**  
 – Clypeus quadrate (Figs 34.22, 34.23) or wider than long; second protibial tooth in line with base of apical spur (Fig. 34.30de); mesoventral process with a dorsal carina or keel (Fig. 34.39dc) ..... **30**
- 29(28). Dorsally entirely metallic green with coppery reflections; clypeus with apex truncate (Fig. 34.21ca); metafemora with a few sparse setae on posterior margin; elytra narrowed apically, sides evenly curved from base to apical umbone; male antennal club not greatly enlarged; 26–33 mm in length; north QLD ..... **Stenopisthes Moser**  
 – Dorsally black or black and pale brown; clypeus with apex slightly emarginate; metafemora with dense fringes of setae on posterior margin; elytra not much narrowed apically, nearly straight from base to apical umbone; male antennal club greatly enlarged; 20–26 mm in length; north QLD ..... **Macrotina Strand**
- 30(28). Clypeus with sharply raised apical and lateral margins; profemora and protibiae with long dense inner fringes of setae; dorsally entirely glossy brass coloured; elytra with sutural striae impressed only apically; 30–37 mm in length; northern WA; extralimital to New Guinea ..... **Chalcopharis Heller**  
 – Clypeus with margins not sharply raised; profemora and protibiae with shorter, sparser setae; dorsally glossy red-brown or coppery with multiple yellow or orange maculae; elytra with sutural striae impressed from base to apex in the one Australian species; 17–20 mm in length; north QLD; extralimital to New Guinea, Fiji ..... **Poecilopharis Kraatz**
- 31(27). Dorsally entirely glossy green or brassy; sides of elytra striate at least in apical half; metanepisternum without a dorsal groove (Fig. 34.42); 19–23 mm in length; QLD, NT, WA ..... **Hemipharis Burmeister**  
 – Dorsally variously coloured but never entirely green; sides of elytra not striate; metanepisternum with a dorsal groove (Fig. 34.41) or short row of chained punctures (male *Evanides rufolatera*) ..... **32**
- 32(31). Clypeus with raised lateral margins, apex with a deep V-shaped notch and pointed apices (Fig. 34.25ca); mesoventral process usually with a dorsal carina or keel; male without long curved setae on apical third of metatibiae; 22–45 mm in length; QLD, NSW, SA, WA ..... **Dilochrosis Thomson**  
 – Clypeus without raised lateral margins, apex with a nearly right-angle shaped notch and rounded apices; mesoventral process without a dorsal carina or keel; male with long curved setae on apical third of metatibiae; 30–40 mm in length; QLD, NSW, VIC ..... **Evanides Thomson**
- 33(22). Pronotum punctate AND all legs with tarsomere 5 having a narrow ventroapical projection (as Fig. 34.28vp) (not to be confused with the empodium which arises between the claws (Fig. 34.28em)) AND elytra setose with irregular, often coalesced punctures (Fig. 34.38b) AND 2 narrow indistinct costae AND post humeral emargination sinuate; dorsally black with or without metallic reflections; 15–25 mm in length; QLD, NSW, VIC, SA, WA ..... **Metallesthes Kraatz**  
 – Without ALL of the above characters in combination. Some *Bisallardiana* have a punctate pronotum but have the elytra distinctly constricted in dorsal view at level of posthumeral emargination and the emargination arcuate. *Hemichnoodes*, *Micropoecila*, some *Aphanesthes* and some *Diaphonia* have the narrow ventroapical projection on tarsomere 5, but without setose elytra. Some *Chondropyga* have a punctate pronotum but lack the narrow ventroapical projection on tarsomere 5 and setose elytra ..... **34**
- 34(33). Width of base of pronotum in relation to width of elytra across posthumeral emarginations wide – a line from basolateral angles of pronotum (Fig. 34.19ba) and parallel to elytral suture passes through or outside of posthumeral emargination (Fig. 34.19pe); mesepimeron usually only slightly visible when viewed dorsally (Fig. 34.13me) ..... **35**  
 – Width of base of pronotum in relation to width of elytra across posthumeral emarginations narrower – a line from basolateral angles of pronotum (Fig. 34.20ba) and parallel to elytral suture passes inward of posthumeral emargination (Fig. 34.20pe); mesepimeron may or may not be clearly visible when viewed dorsally (Figs 34.7me, 34.15me), sometimes obscured by dense setae ..... **40**
- 35(34). Mesoscutellum with distinct lateral grooves that are striate and extending to base (Fig. 34.34sr); head, pronotum and elytra with long setae (longer and denser in males); elytra dorsally distinctly constricted at level of posthumeral emargination; posthumeral emargination deep, arcuate; males with metatibiae expanded, more or less twisted (Fig. 34.27) and with specialised setae on inner side; colour various combinations of black, yellow and orange; smaller species 12–19 mm in length; QLD, NSW, VIC ..... **Clithria Burmeister (part)**  
 – Mesoscutellum without distinct striate lateral grooves; other characters not all present in combination as above. *Bisallardiana* that come out in couplet 38 have elytra dorsally distinctly constricted at the level of post humeral emargination and posthumeral emargination deep, arcuate, but lack the lateral grooves on mesoscutellum ..... **36**
- 36(35). Mesoventral process somewhat expanded laterally and apex truncated or slightly arcuate (Fig. 34.32f) ..... **37**  
 – Mesoventral process usually simple, round, if somewhat expanded then apex rounded (Fig. 34.32g) ..... **38**



- 37(36). Legs bicoloured with femora yellow to orange and tibiae brown-black; dorsally usually uniform yellow-orange on pronotum and elytra; antennal club in both sexes shorter than antennomeres 1 to 7 combined; 18–27 mm in length; WA (*Aphanesthes succinea*).....**Aphanesthes Kraatz (part)**
- Legs not bicoloured (except *Diaphonia lateralis* which is dorsally black with yellow margins to pronotum and elytra); dorsally maybe otherwise coloured on pronotum and elytra; male antennal club as long as or longer than antennomeres 1–7 combined; 17–24 mm in length; QLD, NSW, SA, WA.....**Diaphonia Newman (part)**
- 38(36). Elytra dorsally distinctly constricted at level of post humeral emargination; posthumeral emargination deep, arcuate (Fig. 34.10pe); 12–21 mm in length; QLD, NSW, NT, WA.....**Bisallardiana Antoine (part)**
- Elytra not so constricted in dorsal view at level of post humeral emargination; post humeral emargination shallow, sinuate (Figs 34.7pe, 34.9pe).....**39**
- 39(38). Elytra at most with fine indistinct punctures in rows, inner costae, if present, not reaching base; pronotum with fine punctures, sparse medially; dorsally pronotum and elytra yellow-orange with black central markings on pronotum to all black; 21–24 mm in length; QLD; common (some *Aphanesthes trapezifera* and *A. pullata*).....**Aphanesthes Kraatz (part)**
- Elytra with noticeable large dense punctures often in rows, inner costae reaching base; pronotum with coarser, evenly spaced punctures, less so on midline; in male dorsally pronotum orange brown with black central maculae and elytra orange brown with black sutural stripe widening apically to form an anchor shaped mark, in female dorsally black with some red wash at central base of each elytron; 22–27 mm in length; SA; very rare (*Diaphonia dispar*).....**Diaphonia Newman (part)**
- 40(34). Pygidium uniformly covered with with dense, long pilosity; pronotum and elytra glabrous or with very fine short setae; apex of clypeus with a deep V-shaped notch and somewhat pointed apices (Fig. 34.25); elytra mostly uniform coloured; 23–39 mm in length; NSW, VIC, SA, WA.....**Hemichnoides Kraatz (part)**
- Pygidium not uniformly covered with dense, long pilosity (male of *Phyllopodium palmatum* has pygidium with long setae on either side of a glabrous midline, but also has distinct broad, flat protarsi), but if setae present then pronotum and elytra also with setae different to above; apex of clypeus not as above, either truncate, sinuate or with a shallower notch and rounded apices (Figs 34.20, 34.24); elytral colour variable **41**
- 41(40). Mesoventral process medially with a right angle, a vertical dorsal keel and glabrous ventrally (Fig. 34.32b); elytra without costae; dorsally shiny brown with large central black maculae on pronotum and elytra; 18–23 mm in length; NSW, SA, WA.....**Micropoecila Kraatz**
- Mesoventral process medially without a right angle and vertical dorsal keel, with or without setae; elytra with costae or longitudinal punctures; dorsally colour not as above. QLD, SA, WA, NSW.....**42**
- 42(41). Clypeus subquadrate, apex truncate and raised, anterolateral angles square; pronotum and elytra with setae; male with pronotum black and elytra orange; female all black; 15–20 mm in length; south-west WA (*Diaphonia bacchusi*).....**Diaphonia Newman (part)**
- Clypeus more elongate, apex sinuate or emarginate, if somewhat subquadrate then anterolateral angles rounded; pronotum and elytra with or without setae; colour variable.....**43**
- 43(42). Mesepeimera enlarged and swollen, produced anteriorly (Figs 34.4me, 34.6me); pronotum with basolateral angles broadly rounded (Fig. 34.6ba), sometimes greater than 90 degrees, more or less shifted forwards and overlaying mesepeimera; colour dorsally yellow to orange with black maculae, shiny or velutinous; 15–24 mm in length; QLD, NSW, VIC.....**Lyrphora Kraatz**
- Mesepeimera visible but not enlarged and swollen as above (Figs 34.7me, 34.15me), if larger, then pronotal basolateral angles not broadly rounded; pronotum with basolateral angles variously rounded, usually less than 90 degrees and usually more closely applied to base of elytra (Fig. 34.15ba) (except *Chlorobapta* and some *Chondropyga* e.g. Fig. 34.15ba); colour variable but never velutinous.....**44**
- 44(43). Mesoscutellum with distinct lateral grooves, bearing either striations (Fig. 34.34sr) or stout setae; males with either flattened expanded protarsi OR expanded and more or less twisted metatibiae.....**45**
- Mesoscutellum usually without distinct lateral grooves, if present then neither striate nor setose (a few weak striae in some *Aphanasthes trapezifer*); males with protarsi and metatibiae not as above.....**46**
- 45(44). Lateral grooves of mesoscutellum striate and extending to base (Fig. 34.34sr), sometimes with fine setae as well; head, pronotum and elytra with long setae; elytra dorsally distinctly constricted at level of posthumeral margination; posthumeral emargination deep, arcuate; elytra without distinct costae; males with metatibiae expanded, more or less twisted (Fig. 34.27) and with a tuft of specialised setae on inner side; colour various combinations of black, yellow and orange; smaller species 12–19 mm in length; QLD, NSW, VIC.....**Clithria Burmeister (part)**
- Lateral grooves of mesoscutellum with stout setae, not extending to base; head, pronotum and elytra with only short setae; elytra not so constricted at level of posthumeral emargination; posthumeral emargination shallow, sinuate; elytra with at least one distinct costa; males with expanded, flattened protarsi and curved metatibiae; head, pronotum and basal third of elytra black – rest of elytra orange; larger species 12–26 mm in length; QLD, NSW, VIC, SA.....**Phyllopodium Schoch**
- 46(44). Head both deeply and densely punctate and in male, setose, leaving a raised, glabrous, V-shaped area on vertex of male, a node on female; elytra with 1 distinct raised costa; colour brown and black with yellow maculae on abdominal ventrites or entirely dark brown; 15–18 mm in length; QLD (*Pseudoclitiria hirticeps*).....**Pseudoclitiria van de Poll (part)**
- Head usually not both deeply and densely punctate and setose, if long setae present (some male *Chondropyga* and *Tapinoschema lacunosa*), then without a raised, glabrous, V-shaped area or node on vertex; elytra with or without costae; colour variable; abdominal ventrites with or without yellow maculae.....**47**
- 47(46). Elytra with simple, shallow variously shaped, often coalesced punctures, each with a seta and loosely arranged in longitudinal rows; head, pronotum, scutellum, sutural area of elytra and pygidium with long setae; dense long setae present on ventrites and legs; lateral margins of clypeus sharply raised and expanded; dark brown–black; 18–20 mm in length; WA, SA (*Tapinoschema lacunosa*).....**Tapinoschema Thomson (part)**
- Elytra without punctures and setae as above; scutellum, elytra, and pygidium without long setae, although short setae may be present in some areas; ventrites usually with sparser and shorter setae (most species of *Chondropyga* with longer setae concentrated apically on ventrite 5 (Fig. 34.35st)); lateral margins of clypeus not sharply raised.....**48**

- 48(47). Elytra light brown with 2 longitudinal dark brown lines marking the position of the 2 costae, inner one more raised than outer; pronotum with a distinct narrow impunctate raised longitudinal midline in anterior half; head black, pronotum entirely black in males and black with 4 orange maculae in females; 23–25 mm in length; central QLD (*Chondropyga insignicosta*)..... **Chondropyga Kraatz (part)**
- Elytra otherwise coloured, if light brown then without 2 longitudinal dark brown lines; with or without costae; pronotum without a distinct impunctate raised midline anteriorly; rarely with head and pronotum black (except *Chondropyga frenchi* and WA specimens of *Chlorobapta frontalis*) ..... **49**
- 49(48). Pronotum with basal half parallel or sub parallel (Fig. 34.15bh), especially in female, basolateral angles often greater than 90 degrees; elytral disc somewhat flattened; abdominal ventrites with extensive yellow maculae centrally, interrupted in the middle; colour dorsally black with distinctively shaped complex green, yellow or blue maculae; males with somewhat shortened mesotibiae and asymmetrical mesotarsal claws; 18–25 mm in length; all Australian states except Tasmania..... **Chlorobapta Kraatz**
- Pronotum more evenly curved from basolateral angles to apex (Fig. 34.3bh), basolateral angles less than 90 degrees; elytral disc more convex; abdominal ventrites not with medially interrupted extensive yellow central maculae; colour dorsally not as above; males with mesotibiae not shortened and mesotarsal claws symmetrical..... **50**
- 50(49). Elytra with sutural striae distinct from base to apex, curving around mesoscutellum (Fig. 34.7ss); abdominal ventrite 5 with rows of long setae concentrated apically (Fig. 34.35st); mesotarsomere 5 and metatarsomere 5 ventroapically truncate or slightly concave (Fig. 34.29); empodium of at least metatarsi distinct, with 2 or 3 conspicuous long setae (Fig. 34.29em); metatarsal claws more curved (Fig. 34.29); 17–32 mm in length; QLD, NSW, VIC ..... **Chondropyga Kraatz (part)**
- Elytra with sutural striae not reaching base, present only from apex of mesoscutellum to apex of elytra (Fig. 34.9ss); abdominal ventrite 5 with setae more generally distributed; mesotarsomere 5 and metatarsomere 5 with a pointed ventroapical projection usually arising from a keel-like carina (Fig. 34.28vp, cr); empodium indistinct, with 2 insignificant short setae (Fig. 34.28em); metatarsal claws less curved (Fig. 34.28) ..... **51**
- 51(50). Mesosternal process somewhat expanded and truncated or with a slightly arcuate apex (Fig. 34.32f); males with antennal club elongate, equal to or longer than antennomeres 1–7 combined; 17–24 mm in length; QLD, WA; rare (*Diaphonia antoinei* and *D. vicina*)..... **Diaphonia Newman (part)**
- Mesosternal process with simple rounded apex (Fig. 34.32g); males with antennal club shorter, less than antennomeres 1–7 combined; 17–21 mm in length; QLD; common (*Aphanesthes pullata*, some *A. trapezifera*)..... **Aphanesthes Kraatz (part)**

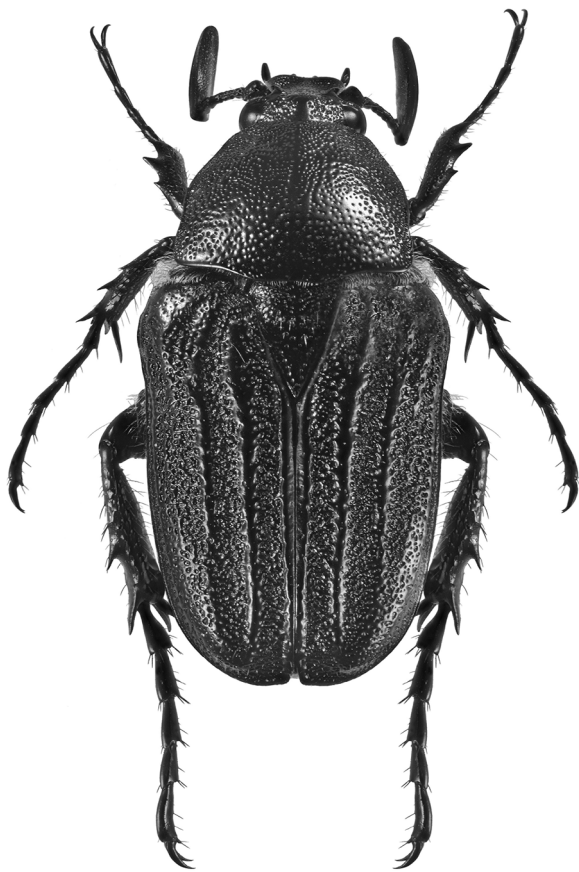


Fig. 34.43. *Navigator fossor* Moeseneder & Hutchinson, male.

## Classification of the Australian genera

### Tribe Cetoniini Leach, 1815

**Characteristics.** Head usually unarmed. Anterolateral angles of clypeus usually rounded. Pronotum with basolateral angles broadly rounded and basolateral margin angled anteriorly. Elytra, subhumeral emargination usually distinct. Mesocoxae separated and mesoventral process transverse.

### Subtribe Cetoniina Leach, 1815

**Characteristics.** Pronotum with distinct posterolateral angles, scutellar emargination usually present. Scutellum with rounded or broad apex.

### *Glycyphana* Burmeister, 1842 (Pls 6C, 73I)

**Type species.** *Cetonia horsfieldii* Hope, 1831.

**Characteristics.** Small, 10–15 mm. Clypeus with emargination sinuate. Pronotal basolateral angles broadly rounded; basolateral margin angled anteriorly. Scutellum with rounded apex. Elytral subhumeral emargination arcuate; humeral umbone protrudent. Mesoventral process transverse. Metacoxae usually separated. Body dorsally dull satin textured and light tomented with many small maculae in most. Not sexually dimorphic.

**Australian species.** Nine in two subgenera, 2 subspecies. Genus total ~104.

**Distribution.** All Australian mainland states. *Glycyphana*

(*Glycyphaniola stolata* (Fabricius) has been introduced in WA and has become established there. Rest of genus: tropical and subtropical Asia and Australasia.

**Biology.** All *Glycyphana* are known to be flower visiting and recorded from many taxa of flowering tree where some species occur in great numbers: *Angophora*, *Leptospermum*, *Terminalia* L., *Melaleuca*, *Eucalyptus*, *Euroschinus* Hook.f., *Kunzea* Rchb., *Tristaniopsis* Brongn. & Gris, *Helichrysum* Mill., *Pittosporum* Banks ex Gaertn., *Viburnum* L., *Alphitonia* Endl., *Aleurites* J.R.Forst. & G.Forst., *Syzygium* Gaertn., *Buckinghamia* F.Muell., *Sannantha* Peter G.Wilson, *Ligustrum* L. A life cycle has not been published for any Australian species but observations show that *Glycyphana* larvae live in rotting, dead or living trees, in sand or in the soil under leaf litter. *G. stolata* has been reared from decaying mulch of *Eucalyptus gomphocephala* DC. and in potting medium of potted palms (PMH).

**Notes.** *Glycyphana* contains two subgenera. Most species are common.

**Key to species.** Mikšić (1970, 1971); Bacchus (1974).

#### Subgenus *Caloglycyphana* Mikšić, 1968

**Characteristics.** Dorsally dull brown or black with multiple white or yellow tomented maculae and red maculation. Male genitalia, parameres gradually tapering to arcuate apex, preapically with arcuate suture giving appearance of secondary apex, dorsal cleft narrow.

**Australian species.** Two.

#### Subgenus *Glycyphaniola* Mikšić, 1968

**Characteristics.** Dorsally dull green to brown with multiple small white tomented maculae. Male genitalia, parameres very broad and short, either broadly arcuate to apex or truncate apex, basally fused, dorsal cleft absent or with apical notch.

**Australian species.** Seven.

#### *Protaetia* Burmeister, 1842 (Pl. 75J)

**Type species.** *Protaetia spectabilis* Schaum, 1841.

**Characteristics.** Small, 13–18 mm. Dorsally brown with greenish reflections and multiple small tomented maculae. Clypeus with apex linear. Pronotal basolateral angles broadly rounded; basolateral margin angled anteriorly. Scutellum with broad and rounded apex. Elytral subhumeral emargination arcuate; humeral umbone indistinctly protrudent. Mesovertral process transverse. Metacoxae usually touching. Body dorsally dull, satin textured and light tomented with many small maculae in most. Not sexually dimorphic. At this time the 4 subgenera of *Protaetia* which occur in Australia can only be differentiated by male genitalia.

**Australian species.** Four. Genus total ~345.

**Distribution.** All Australian mainland states, Christmas Island and Cocos (Keeling) Islands. *Protaetia (Protaetia) fusca* (Herbst) was found only in the eastern states of Australia but has now been introduced to all mainland states. *Protaetia (Pseudourbania) andrewsi* Gahan is found on Christmas Island, *Protaetia (Netociomima) advena* Janson is recorded from Cape York and *Protaetia (Miksicus) acuminata* (Fabricius) from the Cocos (Keeling) Islands, extralimital in Indonesia and South-east Asia. Rest of genus: south-east Florida, Hawaii, Europe, Asia, Indonesia and Solomon Islands.

**Biology.** In Australia adult *Protaetia* can be found on the flowers of most trees, especially *Angophora* and *Eucalyptus*, but also on flowers of citrus, avocados, figs, peaches, roses and *Terminalia* (Simpson 1990) and on tree sap and ripe fruit. Simpson (1990) provided extensive observations on the life cycle of *Protaetia fusca* in captivity. Arrow (1910) wrote that *P. fusca* was observed entering nets of *Trigona* Jurine, 1807 bees in search of honey and the species is known as a pest in Hawaii (Woodruff 2006).

**Notes.** *Protaetia* in Australia contains four species, each in a separate subgenus. The genus *Miksicus* Özdikmen and Turgut, 2009 has generally not been accepted and is listed in Krajčič (2012) as a subgenus of *Protaetia*.

**Key to species.** Mikšić (1987) and Arrow (1910) on Palearctic and Oriental *Protaetia*, which includes *P. (Protaetia) fusca*, *P. (Pseudourbania) andrewsi* and *P. (Miksicus) acuminata*.

#### Tribe Schizorhinini Burmeister, 1842

**Characteristics.** Head without horns. Clypeus apical margin either linear to usual bilobate form. Pronotal base triconcave, often with basomedian lobe extended. Pronotal posterolateral angles usually 90 degrees or less, very distinct. Mesepimera usually concealed under posterolateral corners. Elytra, subhumeral emargination usually sinuate, sometimes arcuate or angulate. Pygidium usually very broad, usually deflexed creating dorsal and ventral zones (ventral zone often invisible in dorsal view); derm usually with conspicuous, subconcentric striolation. Mesocoxae separated, mesovertral process present, in some absent or reduced.

#### Subtribe Lomapterina Burmeister, 1842

**Characteristics.** Pronotum with basomedian lobe extended, covering scutellum.

#### *Ischiopsopha* Gestro, 1874 (Pl. 74I)

**Type species.** *Cetonia bifasciata* Quoy & Gaimard, 1824.

**Characteristics.** Medium to large, 20–27 mm. Dorsally glossy, green. Pronotum with basal lobe extended; apex notched, rendering apex of scutellum visible. Pygidium in dorsal view; arcuate in males and females. Not sexually



dimorphic. Male genitalia, parameres not apically fused, forming incomplete sphere, tongue absent.

**Australian species.** Five. Genus total 81 (Krajčik 2012).

**Distribution.** North-west WA, NT, northern QLD. Outside Australia: New Guinea, Java, Solomon Islands.

**Biology.** Adults on flowers of *Melaleuca*, *Ligustrum* and *Schefflera* J.R.Forst. & G.Forst.

**References.** Allard (1995b).

**Key to species.** Mikšić (1978).

**Notes.** Species-rich genus, often difficult to differentiate. *Ischiopsopha* is divided into 2 subgenera; all Australian species are in *Ischiopsopha* s. str.

*Lomaptera* Gory and Percheron, 1833 (Pl. 74B)

**Type species.** *Cetonia papua* Guérin-Méneville, 1830.

**Characteristics.** Medium to large, 16–24 mm. Dorsally glossy, green or brown. Pronotum with basal lobe extended; apex not notched, covering scutellum. Pygidium in dorsal view; male arcuate, female conical. Sexually dimorphic. Male genitalia, parameres fused apically forming oval shape and with bifurcate tongue.

**Australian species.** Seven in two subgenera, two subspecies. Genus total 112.

**Distribution.** QLD, New Guinea and neighbouring islands.

**Biology.** Adults feed on the flowers of palms. de Baar (1988) reported finding *Lomaptera* larvae in the mulch in trunks of rotten coconut palms throughout the Torres Strait. Adults are very apt and fast flyers.

**References.** Rigout & Allard (1997); Valck Lucassen (1961).

**Key to species.** Valck Lucassen (1961).

*Mycterophallus* van de Poll, 1886 (Pl. 73H)

**Type species.** *Lomaptera validipes* Thomson, 1857.

*Lomapteroides* Schoch, 1898

*Neophonon* Kraatz, 1885

*Mucterophallus* van de Poll, 1886

**Characteristics.** Medium to large, 25–27 mm. Dorsally glossy metallic green with pale margin. Pronotum with basal lobe extended; apex not notched. Pygidium in dorsal view; arcuate in males and females. Not sexually dimorphic. Male genitalia, parameres not fused apically, forming incomplete sphere, tongue present.

**Australian species.** One, *Mycterophallus duboulayi* (Thomson). Genus total five (Krajčik 2012)

**Distribution.** QLD, New Guinea.

**Biology.** Adults on flowers of *Schefflera*, *Ligustrum*, *Sannantha* and *Murraya* J.Koenig ex L.

**References.** Allard (1995b).

Subtribe Schizorhinina Burmeister, 1842

**Characteristics.** Pronotum with basomedian lobe not extended over scutellum.

*Aphanesthes* Kraatz, 1880 (Pl. 73F)

**Type species.** *Eupoecila pullata* Janson, 1873.

*Ablacopous* Thomson, 1880

*Ablacopus* Schoch, 1895

*Anthracopharis* Schoch, 1895

*Poecilcephala* Kraatz, 1880

**Characteristics.** Medium to large, 19–27 mm. Dorsally brown and black, some melanic. Variable genus with several undescribed species. Clypeus elongate, apical emargination arcuate. Pronotal base wide, basolateral angles distinct. Elytra, subhumeral emargination arcuate, costae indistinct. Mesoventral process either transverse, elongate or bud-shaped. Not sexually dimorphic. Male genitalia, parameres attenuate, converging at apices, dorsal cleft wide. *A. pullata* and *A. trapezifera* Thomson occur in Queensland and are highly variable in size, coloration and shape. At least three forms are known in each species. Some differ to such a degree that they are likely the most variable of Australian cetoniines and easily confused with each other or with other cetoniines such as *Bisallardiana* Antoine, 2003.

**Australian species.** Three.

**Distribution.** *A. succinea* Hope in WA, *A. pullata* and *A. trapezifera* in QLD.

**Biology.** Adults have been collected on flowers of *Eucalyptus* and *Melaleuca*. The larval biology is unknown.

**Notes.** The genus is in need of revision and several undescribed species are known.

*Bisallardiana* Antoine, 2003 (Pl. 73C)

**Type species.** *Cetonia gymnopleura* Fischer von Waldheim, 1823.

*Cacochroa* Kraatz, 1880

*Camilla* Thomson, 1880

*Allardiana* Rigout, 1994

**Characteristics.** Small, 12–21 mm. Dorsally brown or black, several with white, yellow or red maculation. Clypeus elongate, apical emargination arcuate. Elytra, subhumeral emargination arcuate, humeral umbone protruding, costae indistinct. Mesoventral process elongate attenuate (length variable). *B. decorticata* (Macleay) and *B. obscura* (Blackburn) with tomentose fovea. Not sexually dimorphic. Males with slightly enlarged antennal clubs. Male genitalia, parameres narrow, converging to often broader apices, dorsal cleft very wide, phallobase ventrally often with setal tufts or sclerotized structures.

**Australian species.** Nine and one subspecies.

**Distribution.** WA, NT, QLD, NSW.

**Biology.** Most *Bisallardiana* are common and found on the flowers of trees and bushes, namely *Angophora*, *Leptospermum*, *Eucalyptus*, *Terminalia*, *Waterhousea* B.Hyland, *Lomatia* R.Br., *Bursaria* Cav. and *Actinotus* Labill. Larvae of the described species have not been

mentioned in literature but larvae of one currently undescribed species in WA were found in sand under *Eucalyptus* leaf litter (PMH).

**Notes.** Rigout (1994) replaced the name *Camilla*, which he wrote to be preoccupied in three instances, with *Allardiana*. *Allardiana*, however, was also a preoccupied name and Antoine (2003) provided its current name. The genus is in need of revision (Moeseneder & Hutchinson pers. comm.) and there are at least six undescribed species. The existence and shape of structures of the ventral phallobase and its pilosity is useful in identification.

*Chalcopharis* Heller, 1903 (Pl. 73L)

**Type species.** *Chalcopharis nigroaenea* Heller, 1903.

**Characteristics.** Large, 30–37 mm. Dorsally glossy brass. Clypeus transverse rectangular, apical emargination sinuate, margins raised. Pronotum with basal lobe slightly extended posteriorly. Elytra humeral and apical umbones indistinct, subhumeral emargination sinuate, non-costate. Mesoventral process elongate. Protibial tridenticles grouped in apical half, second in line with base of apical spur. Metacoxae spinose. Profemur and protibia with dense, long setal brush. Not sexually dimorphic. Male genitalia, parameres on vertical plane, broad equal width to apex, dorsal cleft narrow.

**Australian species.** One, *Chalcopharis lansbergei* Gestro; this and three other species occur in New Guinea.

**Distribution.** North coastal WA. Rest of genus: New Guinea.

**Biology.** Unknown.

**Notes.** No Australian specimens of *C. lansbergei* were seen by the authors.

*Chlorobapta* Kraatz, 1880 (Pls 7G, 73J)

**Type species.** *Schizorhina bestii* Westwood, 1842.

**Characteristics.** Medium-sized, 18–25 mm. Dorsally black with green, yellow or blue maculae. Clypeus subquadrate or elongate, apical emargination sinuate. Pronotum narrow and parallel in basal half. Elytra subhumeral emargination sinuate, costae distinct. Mesoventral process short, strongly divergent fungiform or stout spade shape. Not sexually dimorphic. Males with enlarged antennal clubs and leg modifications – often with stout mesotarsomeres with uneven claws and/or metatibia unusually shaped with or without long setal brushes. Male genitalia, parameres elongate, narrow broadening to apex, dorsal cleft narrow.

**Australian species.** Five.

**Distribution.** All Australian mainland states. *C. goerlingi* Schürhoff occurs in WA, *C. frontalis* is found in Eastern states and NT; other forms, such as in WA, require inspection. All remaining species, *C. bestii*, *C. tibialis* Lea and the rare *C. hirtipes* Lea, in the eastern states.

**Biology.** Adult *Chlorobapta* are found less often on flowers of trees than many other cetoniniines. Records show captures on *Melaleuca* and *Eucalyptus*. Larvae of *C. frontalis* were found in decaying hollow areas, below or above ground, of standing live *Angophora* or *Eucalyptus* trees, often in the matrix of termite nests. Larval stage lasts 1–3 years (CHM and PMH pers. obs. and Tepper 1887). *Chlorobapta hirtipes* larvae were encountered in large, hollow standing *Eucalyptus* together with *E. bakewellii*. *Chlorobapta goerlingi* larvae found in decaying *Eucalyptus* tuber (CHM and PMH).

*Chondropyga* Kraatz, 1880 (Pl. 73D)

**Type species.** *Diaphonia gulosa* Janson, 1873.

**Characteristics.** Medium to large, 17–29 mm. Variable genus.

Group I: Medium, 20–25 mm. Dorsally black and brown with maculated costae. Clypeus elongate, apical emargination sinuate. Pronotum with distinct midline. Elytra humeral umbone protrudent, subhumeral emargination arcuate, bicostae maculated. Mesoventral process slightly divergent to arcuate apex. Not sexually dimorphic. Male genitalia, parameres parallel, gradually widening to two-thirds length, then abruptly narrowing to twisting apical third, at two-thirds length in lateral view bends through 90 degrees, dorsal cleft narrow.

Group II: Medium to large, 17–29 mm. Dorsally yellow or brown with pronotal and elytral macula. Clypeus elongate, apical emargination sinuate. Pronotum wide across base however mesepimeron distinct and slightly anteriorly protrudent. Elytra subhumeral emargination sinuate, costae indistinct. Mesoventral process divergent with truncate apex or fungiform. Abdominal ventrite 6 apically with long setae. Pygidium very transverse. Not sexually dimorphic. Males of 2 of 4 species have enlarged antennal clubs. Male genitalia, parameres parallel elongate attenuate to acute apex, dorsal cleft narrow.

**Australian species.** Six.

**Distribution.** QLD, NSW, VIC.

**Biology.** Some *Chondropyga* species are often seen in flight. Almost all captures of *C. allardi* Rigout and Allard and *C. insignicosta* Hutchinson and Moeseneder have been with flight intercept traps. These two species inhabit a small area of rainforest in east-central Queensland. Adult *Chondropyga* feed on flowers of *Angophora*, *Eucalyptus*, *Euroschinus*, *Waterhousea* and *Ligustrum* but also on the fruits of apricot and peach. Alderson (1976) published the biology of *C. dorsalis* (Donovan) including descriptions of larva and pupa and mentions larvae in soil under logs. Moore (1987) reported that he found *C. dorsalis* larvae in garden compost heaps.

**Notes.** *Chondropyga insignicosta* is known only from approximately ten males and one female (Hutchinson &

Moeseneder 2013a). *Chondropyga suturata* Nonfried is excluded since it was incorrectly placed in this genus by Allard (1995a).

*Clithria* Burmeister, 1842 (Pl. 73A)

**Type species.** *Diaphonia (Clithria) eucnemis* Burmeister, 1842.

**Characteristics.** Small, 12–19 mm. Dorsally light brown or black with black, light or orange macula. Clypeus elongate, apical emargination sinuate or arcuate. Elytra, humeral umbone protrudent, subhumeral emargination arcuate or angulate, costae indistinct. Mesovertral process short, divergent, with arcuate apex. Sexually dimorphic. Males with either flabellate metatibia or basal denticle on claw of proleg. Male genitalia, parameres variable usually uniform width along length, may be divergent, parallel or convergent to apices. Apices with ventral lobes or phallobase with ventral sclerotisation or structure. *Clithria bacchusi* Allard is untypical for the genus.

**Australian species.** Four.

**Distribution.** QLD, NSW, VIC.

**Biology.** As adults, these small yellow-marked beetles feed on the flowers of trees. No other information has been published on the biology of any *Clithria* species.

**Notes.** The genus in need of revision (Hutchinson and Moeseneder pers. comm.).

*Diaphonia* Newman, 1840 (Pl. 73G)

**Type species.** *Diaphonia dispar* Newman, 1840.

*Dysectoda* Kraatz, 1880

*Dysdiatheta* Kraatz, 1880

*Melobastes* Thomson, 1880

**Characteristics.** Group I (near *D. kerleyi* Rigout and Allard, 1997): Small, 17 mm. Dorsally brown, abdominal ventrite 6 black, remainder brown. Clypeus elongate, apical emargination sinuate. Elytra subhumeral emargination sinuate, exposing sternites, costa distinct. Mesovertral process reduced. Pygidium transverse. Protibia with 2 elongate acute denticles, metacoxae non-spinose. Sexual dimorphism unknown as females unknown. Male genitalia, parameres narrow, converging apically, dorsal cleft wide.

Group II: Medium-sized, 17–24 mm. Dorsally brown often with dark maculation, females often black or black with pale margin. Clypeus elongate, apical emargination sinuate or arcuate. Pronotum wide at base. Elytra, humeral umbone protrudent or indistinctly so, subhumeral emargination sinuate or arcuate, costae indistinct. Mesovertral process fungiform or divergent with arcuate apex. Sexually dimorphic. Male antennal clubs enlarged, females stockier and often melanic. Male genitalia, parameres narrowing then converging to apex, dorsal cleft wide.

Group III (near *D. bacchusi* Rigout and Allard): Small, 15–19 mm. Dorsally brown and black, females black. Clypeus subquadrate, apex linear and raised. Elytra humeral umbone not protrudent, subhumeral emargination sinuate, costae indistinct. Mesovertral process short with apex arcuate. Sexually dimorphic. Male antennal club not enlarged, protibia unidentate; females black, stockier and foretibia tridentate. Male genitalia, parameres narrowing then widening to converging apices, dorsal cleft wide.

**Australian species.** 11.

**Distribution.** WA, SA, QLD, NSW.

**Biology.** Adult males generally fly in search of sedentary females and infrequently visit flowers, namely *Eucalyptus*. Larval biology is not known for any *Diaphonia*. Merely Blackburn (1893) writes that Tepper found *D. dispar* Newman pupae at the base of a tree. Detailed observations are needed to understand this unusual group of cetoniines.

**Notes.** *Diaphonia* contains some very untypical species and is in need of extensive revision (CHM and PMH pers. comm.). The number of synonyms at generic level are an indication of the difficulties which authors have had with, and still exist, in the group. Included in the species count is *Chondropyga suturata* (Nonfried) since it was originally described in *Diaphonia*. The genus currently contains two species which are better placed elsewhere: *D. bacchusi* and *D. kerleyi*. The females of some described species are unknown and at least two further undescribed species are awaiting description. At the moment *Diaphonia* are difficult to separate from *Aphanesthes* without utilising primary sexual and ecological characters.

*Dilochrosis* Thomson, 1878 (Pl. 73K)

**Type species.** *Cetonia flammula* Blanchard, 1853.

*Phaeopharis* Kraatz, 1880

*Lethosesthes* Thomson, 1880

**Characteristics.** Large, 22–45 mm. Dorsally yellow to brown with black maculae, or black with or without red maculae. Clypeus elongate, apical emargination deep v-shaped notch with acute apices and lateral margins raised. Elytra subhumeral emargination sinuate, non-costate. Mesovertral process elongate. Not sexually dimorphic. Male genitalia, parameres even width to converging apices, dorsal cleft wide. *Dilochrosis brownii* (Kirby) of the Torres Strait are consistently different morphologically from the nominal form. In WA, *D. brownii* has another localised form which bears a broad, black, basal elytral band.

**Australian species.** Four. Six further species outside Australia.

**Distribution.** WA, SA, NT, QLD, NSW, New Guinea, Moluccas, Solomon Islands. *D. balteata* (Vollenhoven) is found in Australia and in New Guinea. *D. walteri* Lea is rare and found in WA, *D. aripennis* (Macleay), and *D. brownii* are found in eastern states and WA.



**Biology.** Adult beetles have been collected on flowers of *Eucalyptus* and *Terminalia* but some also feed on fruit or sap, specifically sap of *Codonocarpus* Endl. (PMH). The larvae of *D. walteri* were encountered in hollow, standing *Eucalyptus* stems and tubers and in soil beneath leaf litter (CHM and PMH pers. obs.), and *D. brownii* were reared to adult on leaf litter (PMH). de Barr (1988) found *D. brownii* larvae in rotten branches on the ground on several Torres Strait islands. Australian *Dilochrosis* species are available commercially and reared by individuals, schools and zoos.

**Notes.** The species *D. bakewellii* White, and *D. rufolatera* Lea, which have been included in *Dilochrosis* historically, are here listed under genus *Evanides* since they were correctly separated from *Dilochrosis* by Thomson (1880).

*Eupoecila* Burmeister, 1842 (Pl. 73E)

**Type species.** *Cetonia australasiae* Donovan, 1805.

*Neophonia* Thomson, 1878

**Characteristics.** Medium-sized, 16–24 mm. Dorsally black or black and brown with multiple yellow maculae or green with black maculae. Clypeus elongate, widest at midlength, apical emargination deeply arcuate or with v-shaped notch. Pronotal base wide. Elytra subhumeral emargination arcuate, non-costate. Mesoventral process elongate. Abdominal ventrites with centres maculated. Not sexually dimorphic. Male genitalia, parameres narrow converging preapically, then parallel and widening at apex; dorsal cleft very wide, phallobase ventrally with or without setae.

**Australian species.** Four. One species in Indonesia.

**Distribution.** WA, SA, QLD, NSW, VIC, *Eupoecila miskinii* Janson has recently been collected from Aru Islands, Indonesia; other locations are unconfirmed. *Eupoecila australasiae* is well known since it is very common and occurs in backyards in the eastern states.

**Biology.** All *Eupoecila* are flower-visiting. Alderson (1976) published the life cycle of *E. australasiae* and descriptions of its larvae and pupae. The larvae develop in a wide variety of rotten wood, such as felled trees, rotting *Xanthorrhoea* Sol. ex Sm. (Froggatt 1907), but also in other dead wood such as fence posts (Illidge 1917). Adult *Eupoecila* are found on flowers of *Angophora*, *Eucalyptus*, *Alphitonia*, *Melaleuca*, *Waterhousea*, *Xanthorrhoea*, *Bursaria*, *Leptospermum*, *Juniperus* L., *Acmenea* DC., *Tristaniopsis* Brongn. & Gris, *Terminalia*.

*Evanides* Thomson, 1880 (Pl. 76E)

**Type species.** *Schizorhina bakewellii* White, 1859.

**Characteristics.** Large, 30.5–37 mm. Dorsally red-brown with black maculae or black with orange maculae. Clypeus elongate, apical emargination u-shaped with rounded apices, lateral margins not raised. Elytra subhumeral

emargination sinuate, non-costate. Mesoventral process elongate. Not sexually dimorphic. Males with enlarged antennal clubs, metatibia arcuate and with tuft of long setae near apex. Male genitalia, parameres broad, even width and parallel to apex, dorsal cleft narrow.

**Australian species.** Two.

**Distribution.** QLD, NSW, VIC.

**Biology.** *Evanides bakewellii* (White) larvae develop in large, hollow, standing *Eucalyptus* in the rainforests of QLD, NSW and VIC. The adults are rarely found on the flowers of trees. The development of *E. rufolatera* (Lea) is unknown and it occurs only in a small area of northern QLD. Most adults have been found dead in water-carrying structures.

**Notes.** *Evanides*, an endemic genus, was described by Thomson (1880) for *Dilochrosis bakewellii*. The genus was not accepted by subsequent authors, except for Bergé (1884). Inspection of larvae and adults confirmed that they need to be in a separate genus. Both species are large and rare. Few collections have specimens of *E. bakewellii*. Only very few specimens of *E. rufolatera* are known.

*Grandaustralis* Hutchinson and Moeseneder, 2013  
(Pl. 74A)

**Type species.** *Grandaustralis boomerang* Hutchinson & Moeseneder, 2013.

**Characteristics.** Medium-sized, 18.5–25.5 mm. Dorsally, males brown and black, females black. Clypeus elongate trapezoidal, widest apically, apical margin linear. Pronotal basolateral angles greater than 90 degrees, distinct angles, parallel in basal half. Elytra, subhumeral emargination sinuate, elytra distinctly punctate. Mesoventral process absent. Tarsomeres equal to tibial length. Sexually dimorphic. Male with greatly enlarged antennal club, female stockier and black. Male genitalia, parameres equal width along length, dorsal cleft and parameres divergent at midlength.

**Australian species.** One, *Grandaustralis boomerang* Hutchinson & Moeseneder.

**Distribution.** WA, localised.

**Biology.** Adults of both sexes are generally not found on flowers but there is a solitary record of a specimen collected on flowering *Eucalyptus*. Females are sedentary and males are often seen in flight. Hutchinson & Moeseneder (2013b) provided some observations on the adults.

**Notes.** Only two female specimens are known.

*Hemichnoodes* Kraatz, 1880 (Pl. 74F)

**Type species.** *Diaphonia mniszecchii* Janson, 1873.

**Characteristics.** Large, 23–39 mm. Dorsally straw yellow with or without pronotal maculae. Clypeus elongate, apical emargination deep v-shaped notch, apices acute. Elytra

tra humeral umbone protrudent, subhumeral emargination arcuate, costae indistinct. Mesoventral process fungiform or compact spade shape with arcuate apex. Pygidium pilose. Mesotarsomeres and metatarsomeres with long bristles. Sexually dimorphic. Male tibia and tarsomeres elongate, mesotibia in cross-section c-shaped, metatibia compressed and apex sublinear. Female stockier. Male genitalia, parameres very broad and sculptured, abruptly constricted to narrow setose apex, or wide along length to converging widening apices. In both forms apices setose, dorsal cleft narrow and phallobase dorsally with wide deep groove.

**Australian species.** Three.

**Distribution.** WA, SA, NSW, VIC.

**Biology.** Development of *H. mniszecii* has been documented in *Eucalyptus*. Adult *Hemichnoodes* were collected feeding on flowers of *Eucalyptus* (Hawkeswood 1982; PMH). *H. nigriceps* (Blanchard 1850) males frequently flying in *Eucalyptus* close to the ground (PMH; Hawkeswood 1982).

*Hemipharis* Burmeister, 1842 (Pl. 74L)

**Type species.** *Schyzorhina insularis* Gory & Percheron, 1833.

**Characteristics.** Medium-sized, 19–23 mm. Dorsally glossy green with brassy forms. Clypeus subquadrate, apex with wide arcuate emargination with lobes upturned. Pronotum with basal lobe slightly extended posteriorly. Elytra humeral umbone indistinct, subhumeral emargination sinuate, non-costate. Mesoventral process elongate. Not sexually dimorphic. Male genitalia, parameres on vertical plane, converging midlength then diverging with fold (collar) to apex forming figure '8' dorsal cleft.

**Australian species.** One, *Hemipharis insularis* (Gory & Percheron).

**Distribution.** WA, Melville Island, NT, QLD.

**Biology.** Adults on flowers of *Terminalia*. Also observed in large agglomerations on fruiting branches of palms.

*Lenosoma* Kraatz, 1880 (Pl. 74E)

**Type species.** *Schyzorhina (Cetonia) fulgens* Macleay, 1863.

**Characteristics.** Small, 11–14 mm. Dorsally metallic green or copper. Clypeus elongate, apical emargination sinuate. Pronotum with shallow paramedian depressions. Elytra with humeral umbone protrudent, subhumeral emargination arcuate, costae distinct, specialised sparse long setae present aside scutellum and subhumeral emargination. Mesoventral process wide and apically arcuate. Metacoxa distinctly spinose. Not sexually dimorphic. Male genitalia, parameres convergent to broad apices, dorsal cleft narrow.

**Australian species.** One, *Lenosoma fulgens* (Macleay).

**Distribution.** QLD, NSW.

**Biology.** Adults on flowers of *Melicope* J.R.Forst. & G.Forst. and *Barklya* F.Muell., *Bursaria* (Hasenpusch & Moeseneder 2010).

*Lyraphora* Kraatz, 1880 (Pl. 74C)

**Type species.** *Schizorhina obliquata* Westwood, 1842.

*Platedelosis* Kraatz, 1880

**Characteristics.** Medium-sized, 15–24 mm. Dorsally shiny or matt yellow with black maculae. Clypeus elongate, apical emargination sinuate or acute. Pronotum narrow at base, clearly exposing anteriorly protrudent mesepimera. Elytra subhumeral emargination sinuate, costae indistinct. Mesoventral process parallel or divergent with apex arcuate. Metatibia apex with 3 acute spines. Not sexually dimorphic in most. Males with enlarged antennal clubs. Male genitalia, parameres narrow, equal width, parallel to apex, dorsal cleft narrow.

**Australian species.** Four.

**Distribution.** QLD, NSW, VIC.

**Biology.** Larvae of *L. obliquata* were found in hollow of standing *Callitris columellaris* several metres above ground (CHM). Adults on flowers of *Backhousia* Hook. & Harv., *Buckinghamia* F.Muell., *Commersonia* J.R.Forst. & G.Forst., *Barklya* and *Sannantha*.

*Macrotina* Strand, 1934 (Pl. 74H)

**Type species.** *Macrotis satanas* Schürhoff, 1933.

*Macrotis* Schürhoff, 1933

**Characteristics.** Medium-sized, 22–26 mm. Dorsally black or black and pale brown. Clypeus elongate. Elytra subhumeral emargination sinuate, costa indistinct. Mesoventral process elongate, spearhead-shaped. Metacoxa spinose. Sexual dimorphism indistinct. Male antennal clubs enlarged. Male genitalia not examined.

**Australian species.** One, *Macrotina satanas* (Schuroff).

**Distribution.** QLD.

**Biology.** Larvae found in decaying *Xanthorrhoea*.

**Notes.** A rarely collected species, especially females.

*Metallesthes* Kraatz, 1880 (Pls 7H, 74K)

**Type species.** *Diaphonia metallescens* White, 1859.

**Characteristics.** Medium-sized, 15–22 mm. Dorsally black with or without metallic reflections. Clypeus subquadrate to elongate, apical emargination sinuate or arcuate. Pronotum punctate with narrow impunctate midline. Elytra subhumeral emargination sinuate, bicostate distinct or as narrow ridge, deep and large punctation. Mesoventral process either spade-shaped or parallel elongate. Protarsomere 5 with ventrodiscal process. Not sexually dimorphic. Males with metatibia compressed with apical margin lin-

ear. Male genitalia, parameres narrow and even width to apex, dorsal cleft narrow, phallobase dorsally with wide, deep groove. *Metallesthes metallescens* and *M. unicolor* (Macleay) are very similar. Females of these species are difficult to differentiate.

**Australian species.** Three.

**Distribution.** Southern WA, SA, south-eastern QLD, NSW, VIC.

**Biology.** Adults collected on flowers of *Eucalyptus*, *Melaleuca*, *Grevillea* R.Br. ex Knight, *Xylomelum* Sm., *Nuytsia* R.Br. ex G.Don, *Leptospermum*, *Triodia* R. Br., *Xanthorrhoea*, *Styphelia* Sm. and *Angophora*. Larvae in roots and base of *Eucalyptus* (Tepper 1887).

**Notes.** Recent revision and some ecology by Moeseneder *et al.* (2014).

**Key to species.** Moeseneder *et al.* (2014).

*Micropoecila* Kraatz, 1880 (Pls 6B, 74J)

**Type species.** *Schyzorhina cincta* Gory & Percheron, 1833.

**Characteristics.** Medium-sized, 18–23 mm. Dorsally black with brown margin. Clypeus subquadrate, apical emargination sinuate. Pronotum wide at base, semicircular, quite linear across base. Elytral humeral and apical umbones indistinct, subhumeral emargination sinuate, non-costate. Mesoventral process short, diamond-shaped. Not sexually dimorphic. Male genitalia, parameres narrowing, converging apically, dorsal cleft wide.

**Australian species.** One, *Micropoecila cincta* (Gory & Percheron).

**Distribution.** WA, SA, NSW.

**Biology.** Adults infrequently on flowers of *Melaleuca*, *Eucalyptus* and *Angophora*. Froggatt (1896) described the larvae and provided ecological notes such as the larval occurrence in decaying trunks of *Xanthorrhoea*.

*Navigator* Moeseneder & Hutchinson, 2016

**Type species.** *Pseudoclitaria fossor* Lea, 1914.

**Characteristics.** Small to medium, 13–18 mm. Dorsally metallic blue, green, brown or gold. Clypeus subquadrate or elongate, apical emargination linear or sinuate; vertex raised medially. Elytra humeral umbone non-protrudent, subhumeral emargination sinuate; costae distinctly reduced to narrow ridge. Mesosternal process reduced. Prothibia with 2 elongate acute denticles (3 in females); metacoxa non-spinose. Sexual dimorphism distinct, male with enlarged antennal club, females with extended pygidium and very distended abdomen. Male genitalia, parameres narrow, converging to wider apices; dorsal cleft wide.

**Australian species.** Four.

**Distribution.** WA, SA, VIC, QLD.

**Biology.** Adults rarely on flowers of *Eucalyptus* and *Melaleuca*. Males often in flight searching for females which

are mostly sedentary. Larvae found beneath *Acacia* Mill. leaf litter.

**Notes.** The genus separates *Pseudoclitaria fossor* Lea and *P. ruficornis* (Westwood) from *Pseudoclitaria* and contains two newly described species, *N. pixii* (Moeseneder & Hutchinson) and *N. interior* (Moeseneder & Hutchinson).

**Key to species.** Moeseneder & Hutchinson (2016).

*Neoclitaria* van de Poll, 1886 (Pl. 75B)

**Type species.** *Cetonia incana* Macleay, 1863.

**Characteristics.** Small, 13–14 mm. Dorsally black with yellow maculae. Clypeus elongate, apical emargination sinuate. Pronotum parallel in basal half. Elytra, humeral umbone protrudent, subhumeral emargination arcuate, costae indistinct. Mesoventral process short with arcuate apex. Metacoxa non-spinose. Pygidium with shallow longitudinal setose impression. Not sexually dimorphic. Male genitalia, parameres narrowing and converging abruptly to preapex, then linear and parallel, dorsal cleft wide basally, phallobase ventrally with pair of setose structures.

**Australian species.** One, *Neoclitaria eburneoguttata* (Blanchard).

**Distribution.** QLD.

**Biology.** Adults on flowers.

*Neorrhina* Thomson, 1878 (Pls 3D, 75C)

**Type species.** *Eupoecila ochracea* Westwood, 1854.

*Polystigma* Kraatz, 1880

**Characteristics.** Small, 13–18 mm. Dorsally yellow with black maculae. Clypeus elongate, apical emargination sinuate or arcuate. Pronotal basolateral angles produced. Elytra, humeral umbone protrudent, subhumeral emargination arcuate, non-costate. Mesoventral process elongate. Metatibia trispinose. Not sexually dimorphic. Male genitalia, parameres elongate attenuate then abruptly broadening to setose apex. Phallobase ventrally with elongate medial sclerotisation.

**Australian species.** Three.

**Distribution.** WA, NT, QLD, NSW, VIC.

**Biology.** Adults have been collected on flowers of these trees and bushes: *Angophora*, *Acmenea*, *Alphitonia*, *Bursaria*, *Eucalyptus*, *Leptospermum*, *Tristaniopsis*, *Waterhousea*, *Ligustrum*, *Sannantha*, *Murraya*, *Buckinghamia*.

**Notes.** *Neorrhina calopyga* (Lea) is known only from few specimens.

*Octocollis* Moeseneder & Hutchinson, 2012 (Pl. 75G)

**Type species.** *Octocollis setosus* Moeseneder & Hutchinson, 2012.

**Characteristics.** Medium-sized, 16–19 mm. Dorsally brown and black with entirely black forms. Clypeus subquadrate, apical emargination sinuate. Pronotal ba-



solateral angles greater than 90 degrees, rounded, widest medially. Elytra, subhumeral emargination sinuate, elytra distinctly punctate. Mesoventral process absent. Legs slender, tarsomeres longer than tibia. Sexual dimorphism unknown as females unknown. Male antennal clubs very enlarged. Male genitalia, parameres parallel along length with additional apical process, dorsal cleft narrow.

**Australian species.** One, *Octocollis setosus* Moeseneder & Hutchinson.

**Distribution.** QLD, a small area west of the Great Dividing Range and west of Paluma.

**Biology.** Adult males have been found on flowers of *Eucalyptus similis* Maiden growing on rocky ridges. The species occurs very localised and is rare. More frequent in the past (Moeseneder & Hutchinson 2012).

**Notes.** Females are unknown.

*Phyllopodium* Schoch, 1895 (Pl. 75H)

**Type species.** *Schizorrhina (Diaphonia) palmata* Schaum, 1848.

**Characteristics.** Medium-sized, 22–26 mm. Dorsally apically black, posteriorly yellow with black maculae. Clypeus elongate, apical emargination sinuate. Scutellum with lateral setose grooves. Elytral subhumeral emargination sinuate, bicostate. Mesoventral process short, spade-shaped. Sexually dimorphic. Male legs highly modified, protarsomere depressed, mesoclaws unequal, metatibia arcuate. Male genitalia, parameres narrow at base, equal width and parallel to apex, dorsal cleft narrow. Phallobase with unique pair of articulated appendages with long setal brush along length.

**Australian species.** One, *Phyllopodium palmatum* (Schaum).

**Distribution.** SA, QLD, NSW, VIC.

**Biology.** Adults on flowers of *Angophora*. Adults have extensive courtship behaviour. Males bear unique, articulated genital brushes and have unique broad, flattened protarsi. Both sexes of *P. palmatum* stridulate, and are the only Australian cetoniines known to do so. Biology and behaviour by Moeseneder & Cook (2014). *Phyllopodium palmatum* is uncommon but occurs over a wide range.

*Poecilopharis* Kraatz, 1880 (Pl. 75I)

**Type species.** *Schizorrhina bouruensis* Wallace, 1867.

**Characteristics.** Medium-sized, 17–20 mm. Dorsally glossy red-brown with multiple yellow maculae. Clypeus transverse rectangular, apical margin linear, margins not raised. Pronotum with basal lobe slightly extended posteriorly. Elytra humeral and apical umbones indistinct, subhumeral emargination sinuate, non-costate. Mesoventral process elongate. Protibia tridentacles grouped in apical half, second in line with base of apical spur. Metacoxae spinose. Not sexually dimorphic. Male genitalia, param-

eres on vertical plane, broad equal width to folded apex, dorsal cleft narrow.

**Australian species.** One, *Poecilopharis lei* Schürhoff. Genus total 36.

**Distribution.** QLD, New Guinea region, Solomon Islands, Fiji.

**Biology.** Adults are flower feeding.

*Pseudoclitiria* van de Poll, 1886 (Pl. 75D)

**Type species.** *Schizorrhina hirticeps* Macleay, 1871 [= *Clitiria bicostata* Kraatz, 1885].

**Characteristics.** Small, 11–18 mm. The type species differs morphologically from the other species in the genus: 15–18 mm, Dorsally black and brown or melanic. Clypeus subquadrate, apical emargination sinuate; vertex raised medially. Elytra, humeral umbone protrudent, subhumeral emargination sinuate; distinct uncostate. Mesoventral process short, bud-shaped. Abdominal sternite 6 with row of setae. Protibia with 2 acute elongate denticles. Metacoxa distinctly spinose. Sexually dimorphic. Male with enlarged antennal clubs, female with very transverse pygidium. Male genitalia, parameres long, narrow, attenuate; dorsal cleft indistinct.

The remainder of the species are as follows: 10–17 mm.

Dorsally black and brown or black. Clypeus subquadrate or elongate, apical emargination sinuate. Elytra, humeral umbone non-protrudent, subhumeral emargination sinuate, costae distinct but usually reduced to narrow ridge. Mesoventral process reduced. Protibia with 2 or 3 acute elongate denticles. Metacoxa non-spinose. Not sexually dimorphic. Male genitalia, parameres narrow, converging to wider apices; dorsal cleft wide.

**Australian species.** Nine.

**Distribution.** WA, SA.

**Biology.** Larvae of one undescribed species has been found free-living in sand; adults found in coastal sand dune ridges. Some species have recently been captured with flight intercept traps (CHM and PMH pers. obs.)

**Notes.** The genus is poorly represented in collections and in urgent need of revision (CHM and PMH pers. comm.). Polyphyletic group. Keys to several places in the generic key. *Pseudoclitiria* is a catch-all genus which contains several distinct genera and there are a further seven undescribed species.

*Schizorrhina* Kirby, 1825 (Pl. 75E)

**Type species.** *Cetonia atropunctata* Kirby, 1818.

*Schizorrhina* Gory and Percheron, 1833

*Schizorrhina* Burmeister, 1842

**Characteristics.** Large, 25–27 mm. Dorsally light yellow to yellow-brown, sometimes with green hue. Clypeus elongate, apical emargination with deep v-shaped notch. Pronotum basolateral angles produced. Elytra humeral and

apical umbones indistinct, subhumeral explanate covering metacoxae, non-costate. Mesoventral process large, spade-shaped. Tarsomeres elongate. Not sexually dimorphic. Male genitalia, parameres basally abruptly twisting into vertical plane and parallel to expanded setose apex. Dorsal cleft very narrow. Both species are very similar but parameres are diagnostic.

**Australian species.** Two.

**Distribution.** QLD, NSW.

**Biology.** Adults on flowers of *Angophora*. Larvae in forest humus (Moore 1987). Both species frequent woodlands.

*Stenopisthes* Moser, 1913 (Pl. 75L)

**Type species.** *Dilochrosis frenchi* Blackburn, 1894.

**Characteristics.** Large, 26–31 mm. Dorsally metallic green with coppery reflections. Clypeus elongate, apical margin linear. Pronotum subparallel in basal half. Elytra humeral umbone indistinct, subhumeral emargination absent, metacoxae covered in dorsal view, non-costate. Mesoventral process elongate. Not sexually dimorphic. Male genitalia, parameres equal width along length, converging at apex, dorsal cleft wide.

**Australian species.** One, *Stenopisthes frenchi* (Blackburn).

**Distribution.** QLD.

**Biology.** Flower visiting but also on fruit.

*Storeyus* Hasenpusch & Moeseneder, 2010 (Pl. 75F)

**Type species.** *Schizorhina (Cetonia) fasciculata* Macleay, 1863.

**Characteristics.** Small, 12–18 mm. Dorsally brown or black. Clypeus elongate, apical emargination arcuate. Pronotum distinctly setose either side of midline. Elytra, humeral umbone protrudent, subhumeral emargination arcuate. Costae distinct, specialised tufts of setae on apical declivity. Mesoventral process broad, short and apex arcuate. Metacoxa distinctly spinose. Not sexually dimorphic. Male antennal club enlarged, metatibia arcuate with long thick setal brush along length. Male genitalia, parameres very long (subequal to length of phallobase), narrow and parallel, dorsal cleft reduced to base.

**Australian species.** Two.

**Distribution.** QLD, NSW.

**Biology.** Adults found on flowers of *Syzygium*, *Cardwellia* F.Muell., *Symplocos* Jacq., *Angophora*, *Barklya*, *Backhousia* and *Waterhousea* (Hasenpusch & Moeseneder 2010).

**Notes.** *Storeyus* are very poorly represented in collections.

*Tapinoschema* Thomson, 1880 (Pl. 75K)

**Type species.** *Schizorhina impar* Macleay, 1863.

**Characteristics.** Medium to large, 19–28 mm. Dorsally glossy black or orange-red and dark metallic blue. Clypeus subquadrate to elongate, apical emargination sinuate or arcuate. Pronotum punctate, midline indistinct. Elytra, subhumeral emargination sinuate, costa indistinct, deep and large punctation. Mesoventral process either parallel or attenuate elongate. Not sexually dimorphic. Male with elongated antennal clubs. Male genitalia, parameres narrow at base and gradually widening to apex.

**Australian species.** Three.

**Distribution.** WA, SA, QLD.

**Biology.** Larvae of *T. digglesii* (Janson) have been found under composting plant litter and *T. lacunosa* (Janson) larvae in sand under leaf litter. Adults are infrequently seen on flowers of *Melaleuca*. *Tapinoschema digglesii* occur localised, females are sedentary and males have been observed, at times in large numbers, in flight searching for females.

*Trichaulax* Kraatz, 1880 (Pl. 76G)

**Type species.** *Cetonia philipsii* Schreibers, 1802.

**Characteristics.** Large, 21–35 mm. Dorsally black, brown and black or green. Clypeus elongate, apical emargination arcuate or with v-shaped notch. Elytra humeral and apical umbones distinct, subhumeral emargination sinuate, bicostate, costal interstices and/or elytral margins grooved and densely setose. Mesoventral process large, spade-shaped. Tarsomeres elongate. Not sexually dimorphic. Male genitalia, parameres broad, converging to slightly narrowing setose apex. Dorsal cleft narrow or wide.

**Australian species.** Six. Genus total eight.

**Distribution.** WA, SA, QLD, NSW, VIC, extralimital: New Guinea.

**Biology.** Adults on flowers of *Bursaria*, *Eucalyptus*, *Angophora*, *Euodia* J.R.Forst. & G.Forst., *Leptospermum*, *Bursaria* and *Corymbia* K.D.Hill & L.A.S.Johnson. *Trichaulax* are very strong flyers which often prefer the highest flowers on trees. Biology has been published by Hiller (1990), Cantrell (1979), Illidge (1917) and Zietek (2008). Larvae collected in hollows of live or dead *Eucalyptus*, *Angophora* and *Flacourtia* Comm. ex L'Her.

**Key to species.** Hiller (1990).

**Notes.** The status of *T. kirbyi* (Thomson) is unresolved.

Tribe Valgini Mulsant, 1842

**Characteristics.** Pronotal base never with strongly developed basomedian lobe, disc without any strong projections. Mesepimeron only slightly protruding anteriorly. Elytral, subhumeral emargination absent. Elytral disc flat, non-costate. Propygidium broadly exposed. Foretibia with 3–5 denticles. Mesocoxae rarely separated by distinct mesoventral process. Metacoxae widely separated.

**Key to genera.** Krikken (1978).

Subtribe Valgina Mulsant, 1842

**Characteristics.** Pronotum with longitudinal ridges and/or tubercles, occasionally with callosities and impressions. Body usually abundantly squamose and/or setose

*Charitovalgus* Kolbe, 1904 (Pl. 73B)

**Type species.** *Valgus pulcher* Kraatz, 1883.

**Characteristics.** Very small, less than 5 mm. Dorsally brown to black with brown scales. Pronotum with anterolateral angles extended beside head; derm with paramedial longitudinal ridges and lateral impressions. Body with squamose setae present. Protibia with 5 denticles.

**Australian species.** One, *Charitovalgus quinquedentatus* (Lea). Genus total 10.

**Distribution.** *C. quinquedentatus* in QLD, Rest of genus: Andaman Islands, S.E. Asia, Taiwan, Japan, Indonesia and New Guinea.

**Biology.** Biology of the single Australian species is unknown.

Subtribe Microvalgina Kolbe, 1904

**Characteristics.** Pronotum evenly convex. Mesoventrite posteriorly interposed between mesocoxae. Body usually sparsely squamose or setose.

*Microvalgus* Kraatz, 1883 (Pls 3C, 74G)

**Type species.** *Valgus lapeyrouse* Gory and Percheron, 1833.

**Characteristics.** Very small, less than 5 mm. Dorsally dark brown to black with either yellow, red-brown or black elytra and scales white, yellow or grey. Pronotum with anterolateral angles extended beside head; derm without ridges or impressions. Body usually with squamose setae present, rarely absent. Protibia with less than 5 denticles.

**Australian species.** 16 and two subspecies. Genus total ~51.

**Distribution.** WA, QLD, NSW, VIC, TAS. Rest of genus: Africa.

**Biology.** Adults recorded on *Angophora* Cav. and *Leptospermum* J.R.Forst. & G.Forst. Some specimens were collected from bark. Larvae are possibly inhabitants of termite nests (Cassis & Weir 1992; Matthews 1984) but biology has not been described.

**Notes.** Ten *Microvalgus* species were described by Lea (1914). *M. vagans* Lea has 2 subspecies.

**Key to species.** Lea (1914).

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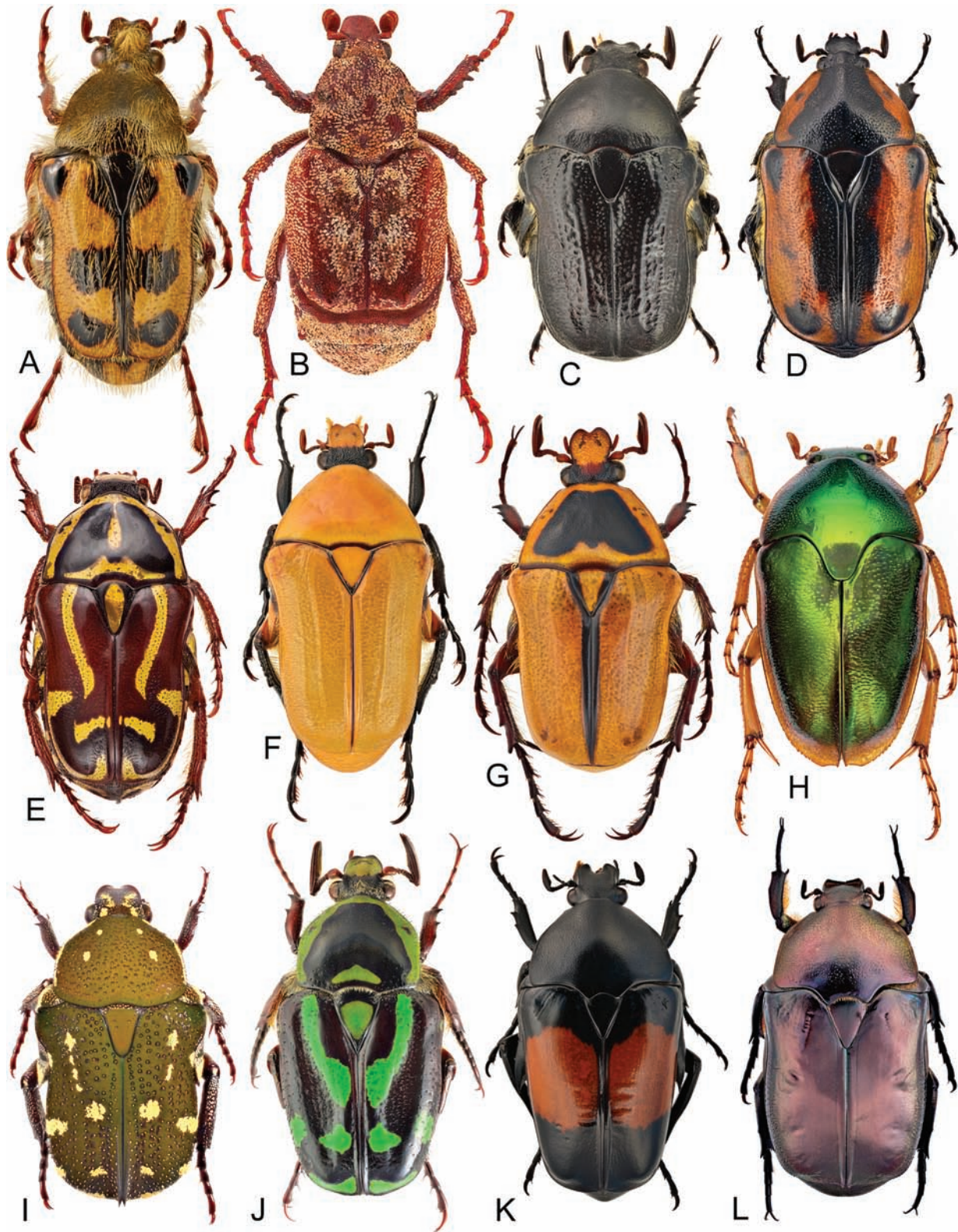


PLATE 73. Scarabaeidae: Cetoniinae. A, *Clithria eucnemis* (Burmeister); B, *Charitovalgus quinquedentatus* (Lea); C, *Bisallardiana philippeii* (Allard); D, *Chondropyga dorsalis* (Donovan); E, *Eupoecila australasiae* (Donovan); F, *Aphanesthes succinea* (Hope); G, *Diaphonia antoinei* Allard; H, *Mycterophallus duboulayi* (Thomson); I, *Glycyphana stolata* (Fabricius); J, *Chlorobapta frontalis* (Donovan); K, *Dilochrosis balteata* (Vollenhoven); L, *Chalcopharis lansbergei* (Gestro).



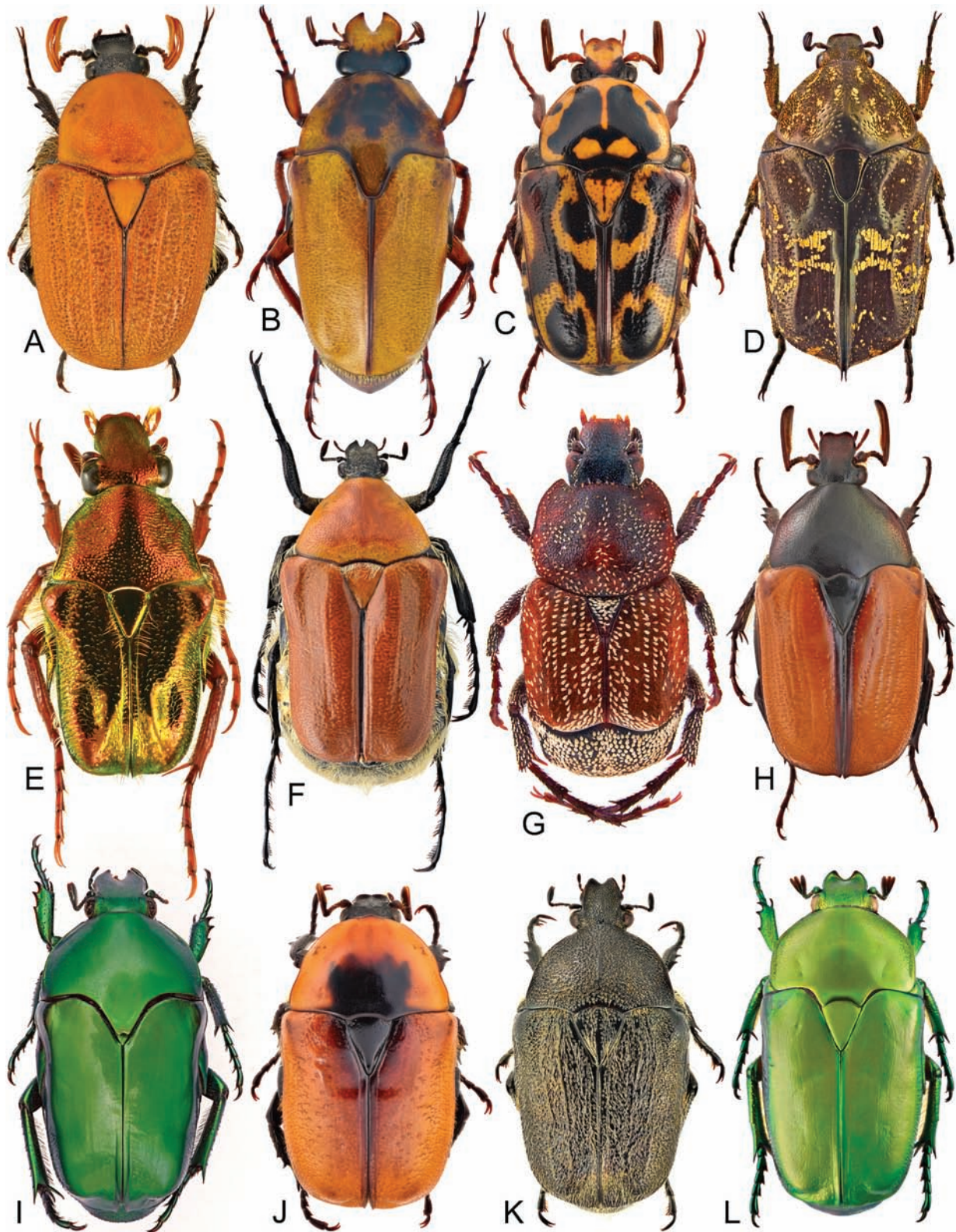


PLATE 74. Scarabaeidae: Cetoniinae. A, *Grandaustralis boomerang* Hutchinson & Moeseneder; B, *Lomaptera cinnamomea* Thomson; C, *Lyraphora obliquata* (Westwood); D, *Miksicus acuminata* (Fabricius); E, *Lenosoma fulgens* (Macleay); F, *Hemichnoodes mniszehi* (Janson); G, *Microvalgus* sp.; H, *Macrotina satanas* Schürhoff; I, *Ischiopsopha wallacei* (Thomson); J, *Micropoecila cincta* (Gory & Percheron); K, *Metallesthes metallescens* (White); L, *Hemipharis insularis* (Gory & Percheron).



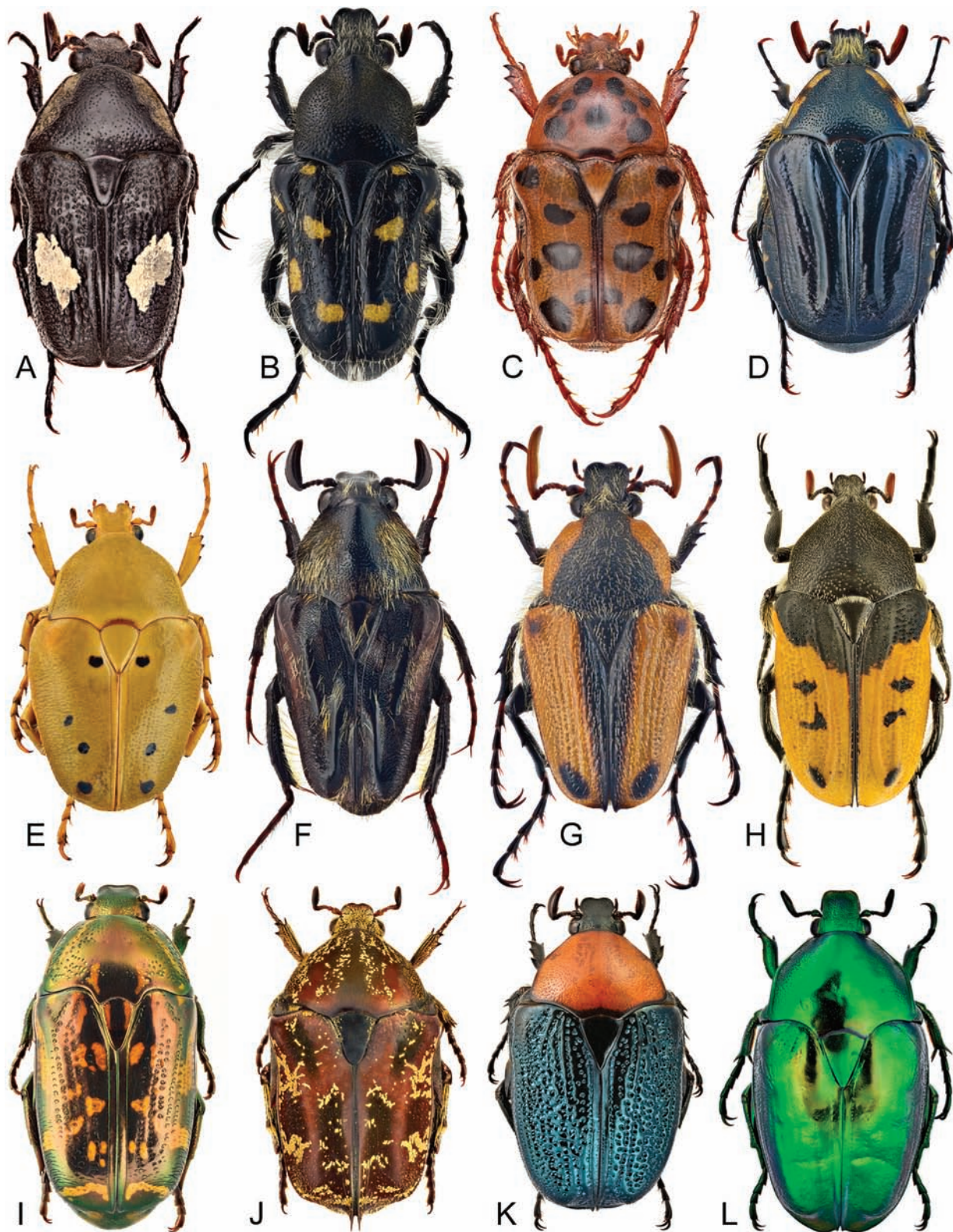


PLATE 75. Scarabaeidae: Cetoniinae. A, *Allardiana decorticata* Macleay

B, *Neoclithria eburneoguttata* (Blanchard); C, *Neorrhina punctatum* (Donovan); D, *Pseudoclithria hirticeps* (Macleay); E, *Schizorhina atropunctata* (Kirby); F, *Storeyus pseudodipterus* Hasenpusch & Moeseneder; G, *Octocollis setosus* Moeseneder & Hutchinson; H, *Phyllopodium palmatum* (Schaum); I, *Poecilopharis leai* Schürhoff; J, *Protaetia fusca* (Herbst); K, *Tapinoschema digglesii* (Janson); L, *Stenopisthes frenchi* (Blackburn).



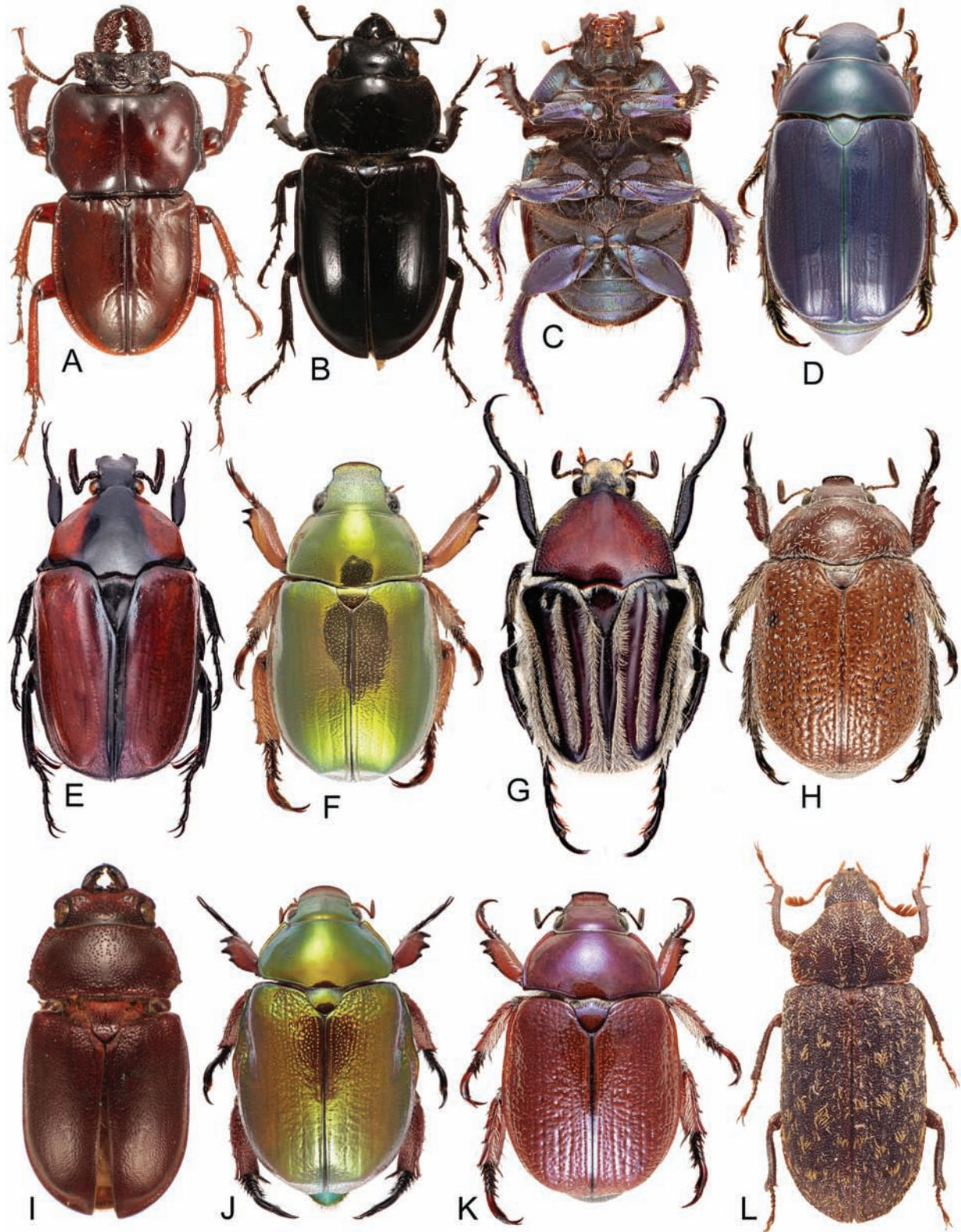


PLATE 76. Lucanidae (A–B, I, L), Geotrupidae (C), Rutelinae (D, F, H, J–K), Cetoniinae (E, G). A, *Safrina polita* (Carter); B, *Pseudodorcus nitidus* Didier; C, *Geotrupes spiniger* Marsham, ventral; D, *Anoplognathus smaragdinus* Ohaus; E, *Evanides bakewellii* (White); F, *Anoplognathus parvulus* Waterhouse; G, *Trichaulax philipsii* (Schreibers); H, *Anoplognathus velutinus* Boisduval; I, *Dorculus* sp.; J, *Anoplognathus viridiaeneus* (Donovan); K, *Anoplognathus rubiginosus* Macleay; L, *Mitophyllus ocularis* (Carter).