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A Revision of the Australian Coccinellidae (Coleoptera) Part 1. Subfamily Coccinellinae

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Abstract

The first part of a revision of Australian Coccinellidae (Epilachninae excepted) deals with the subfamily Coccinellinae, which now includes 14 genera and 32 species. The Australian coccinellid fauna is examined in relation to that of the world as a whole and the history of its role in the field of biological control briefly reviewed. Keys to subfamilies, genera and species are given. The Coccinellinae and its included Australian genera and species are defined and available data concerning distribution and biology presented. Two new species, *Illeis (Leptothea) flava* and *Micraspis confusa* are described. Two new specific synonymies, [*Orcus mollipes* Olliff = *Menochilus sexmaculatus* (Fabricius) and *Archegleis crotchi* Iablokoff-Khnzorian = *A. delta* (Weise)], are proposed. *Lemnia* Mulsant [Australian species *mulsanti* (Montrouzier) and *jansoni* (Crotch)] is re-synonymised with *Coelophora* Mulsant and *Synia* Mulsant (renamed *Synona*, nom. nov.) is restored to full generic status. *Micraspis frenata* (Erichson) is resurrected as a good species, *Coelophora astrolabiana* Weise transferred to *Phrynocaria* Timberlake, and *Harmonia duplicata* (Crotch) is transferred to *Archegleis* Iablokoff-Khnzorian. *Phrynocaria astrolabiana* (Weise) and *Coccinella undecimpunctata* Linnaeus are recorded as new to Australia.

Introduction

This is the first of an intended series of papers constituting a revision of all Australian Coccinellidae except for the Epilachninae. It deals solely with the Coccinellinae (Coccinellini + Psylloborini of some authors), the 'ladybirds' of the family; usually recognisable by their convex, shiny appearance and distinctive colour pattern, and by their insect-eating habits.

The group is defined and a key provided to separate it from the other subfamilies. Keys to genera and species occurring in Australia are given. Each genus is described, its

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distribution summarised and the currently included species total recorded. Each Australian species is described and illustrated; its known distribution is summarised, with the Australian component set out in more detail. Where possible, biological information is given for each species.

As far as has proved practicable, the original material of all species treated, synonyms included, has been examined and, where necessary, lectotypes have been designated. Previous lectotype designations are acknowledged by author and date. All those without a following reference are 'by present designation'.

The bibliography for genera and species is selective. The original citation is always given, but subsequent references are generally limited to those involving some taxonomic or nomenclatural change, those directly concerned with the Australian fauna, and those with some biological content.

Historical Résumé

The first Coccinellidae to be described from Australia were among material brought back from Cook's voyage (1770–1771) by Sir Joseph Banks and named by Fabricius (1775). During the next 100 years, relatively few new species were discovered and several so considered were later found to be synonyms. Masters's Catalogue (1888) was almost complete, but included only 47 valid names. Then Blackburn, between 1889 and 1895, added 135 new species to the list, keying out certain groups, but paying very little attention to the species already known. Lea (1897–1929) following in Blackburn's footsteps, adopted much the same stance, adding 41 species to the known fauna, but never giving more than an occasional comparative comment. Overlapping these two, Weise (1885–1927), working from Europe and mostly on material from various collecting expeditions, described 30 species as new and gave fresh localities for many others. From 1930 to the late 1970s, almost the only taxonomists to concern themselves with the Australian coccinellid fauna were Korschefsky (one species described as new in 1934) and Bielawski (no new species, but various groups treated as parts of wider studies: see bibliography).

The Australian Fauna

Including those described here as new, 265 species of Coccinellidae are known to occur in Australia. They fall into about 46 genera distributed among the six recognised subfamilies as: Epilachninae, 10; Coccidulinae, 82; Sticholotidinae, 14; Scymninae, 99; Chilocorinae, 28; Coccinellinae, 32.

Table 1. Australian Coccinellidae as part of the world fauna

Family and Subfamily	Known from Australia (%)	Endemic to Australia (%)
Coccinellidae	8·4	7·9
Epilachninae	1·8	0·18
Coccidulinae	26·0	25·0
Sticholotidinae	7·7	7·7
Scymninae	8·3	8·2
Chilocorinae	7·0	6·0
Coccinellinae	4·8	2·6

Compared with the world fauna (Table 1), the Epilachninae are the least well-represented, with less than 2% of the described species, and the Coccidulinae the best with more than 25%. The Coccinellinae are second from bottom in the league with 4·8%.

Looked at from another angle, that of endemicity (Table 1), the variation between subfamilies becomes even more extreme. Among the 10 Epilachninae, only one seems to be confined to Australia and even that assumption may be disproved as the faunas of New

Guinea and Indonesia become better known. Almost all the Australian Coccidulinae, Sticholotidinae and Scymninae seem to be endemic to the region, occurrences outside the continent being the result of deliberate or accidental introductions. For the Chilocorinae, the picture is less clear. Several species of *Orcus* Mulsant, the principal chilocorine genus in Australia, occur in New Guinea and Indonesia. At least one has travelled across the Torres Straits to reach Australia and further study may well show that others living in the Northern Territory or Cape York have a similar origin. Finally, among the 32 Coccinellinae dealt with in the present paper, 17 are known only from Australia, nine occur also in New Guinea, New Caledonia or the Solomon Islands, four are widespread in the eastern hemisphere and two originate from Europe.

Imports, Exports and Transports

Early American successes in the biological control of insect pests using Australian coccinellids inspired the Bureau of Agriculture for Western Australia, in 1895, to propose an exchange of 'useful insects with other colonies or foreign countries' (Wilson 1960, p. 1). A. M. Lea and George Compere were prime movers in this traffic, Lea sending *Harmonia conformis* (Boisduval) from Tasmania to Western Australia and Compere sending there a number of species from eastern Australia, China, Europe and the Middle East, India, 'Ceylon' and America (Jenkins 1948). These early translocations and introductions were not well-documented. Many failed, but it is possible that *Coccinella undecimpunctata* Linnaeus and *Adalia bipunctata* (Linnaeus) were among those that did not.

In more recent times (Wilson 1960; Rimes 1962; Sproul 1981) a further three series of exotic species were introduced. The first, six against scale insects in 1927, came from California. The second, three against *'Chermes'* in the 1930s came from England, and the third was four Asiatic species of *Chilocorus* Leach by the CIBC in 1960–62 for the campaign against red citrus scale in the south-west of Western Australia. All six from California failed to become established (Wilson 1960, pp. 7–8). Of the three imported for *'Chermes'* control, only one, *Exochomus quadripustulatus* (Linnaeus), was liberated, apparently in the Australian Capital Territory and New South Wales during 1934–35 and 1937–39 (Wilson 1960, p. 38). Nothing is known of the species in those parts today, but it has been common around Perth, W.A., since 1935 and has recently been taken (1981) on non-native conifers not far from Melbourne, in Victoria. The fate of the 1960s *Chilocorus* is unknown, but it seems likely that, as with the 1927 importations, none survived.

On the other side of the coin, a much larger number of indigenous Australian species have been exported, particularly to the United States, in the hope that they would be effective in controlling orchard and other pests. Of 46 species so recorded (Gordon 1985, pp. 14–28), only six would be the concern of the present paper and, of these, none achieved even temporary establishment.

Data Presentation

Because this part of the revision was based on more than 15 000 specimens, about 12 600 being from Australia, immense quantities of data accumulated. For all type series, full label data is quoted verbatim, but for other specimens, a progressive summarising of information has been attempted, directly proportional to the abundance and geographic spread of the species. Localities in each state are listed from north to south. The states are ordered clockwise round the continent, beginning with Queensland; Norfolk I. and Lord Howe I. are listed separately after New South Wales.

Abbreviations

AM	Australian Museum, Sydney
AMR	Dr Aola M. Richards, University of New South Wales, Kensington, Sydney
ANIC	Australian National Insect Collection, CSIRO, Canberra
BCRI	Biological and Chemical Research Institute, Rydalmere, N.S.W
BM	British Museum (Natural History), London
BZA	Dr G. Bornemizzsa, Hobart, private collector

DAH	Department of Agriculture of Tasmania, Hobart
DASA	Department of Agriculture of South Australia, Northfields, Adelaide
DAV	Department of Agriculture of Victoria, Melbourne
DLN	Dallas Doolan, Sydney, private collector
DPIM	Department of Primary Industries, Mareeba, Qld
DPPD	Department of Primary Production, Berrimah Experimental Farm, Darwin
DSIR	Entomology Division, Department of Scientific and Industrial Research, Auckland
FCN	Forestry Commission, Sydney
FCV	Commission of Forests, Melbourne
HNH	Brian Hanich, Perth, private collector
HDN	Professor H. Howden, Carleton University, Ottawa
HM	Hope Department of Entomology, Oxford University Museum, Oxford
LRC	Loxton Research Centre, Loxton, S.A.
LSL	Linnean Society of London, London
LU	La Trobe University, Bundoora, Melbourne
MGL	Muséum Guimet, Lyon
MHN	Muséum d'Histoire Naturelle, Geneva
MM	MacLeay Museum, University of Sydney
MNHN	Muséum Nationale d'Histoire Naturelle, Paris
MNHU	Museum für Naturkunde der Humboldt-Universität, Berlin
MVM	Museum of Victoria, Melbourne
NMB	Naturhistorisches Museum, Basel
NR	Naturhistoriska Riksmuseet, Stockholm
NTM	Northern Territory Museum of Arts and Sciences, Darwin
PKY	Rex Pitkethley, DPPD, private collector
QDPI	Department of Primary Industries, Indooroopilly, Qld
QM	Queensland Museum, Brisbane
SAM	South Australian Museum, Adelaide
TM	Tasmanian Museum and Art Gallery, Hobart
TMB	Természettudományi Muzeum, Budapest
UQ	Department of Entomology, University of Queensland, Brisbane
USNM	Smithsonian Institution, United States National Museum, Washington, D.C.
UWA	Department of Zoology, University of Western Australia, Perth
WADA	Western Australian Department of Agriculture, Perth
WAIT	Western Australian Institute of Technology, Perth
WAM	Western Australian Museum, Perth
WARI	Waite Agricultural Research Institute, University of South Australia, Adelaide
W-H	A. Walford-Huggins, Mt Molloy, Qld, private collector
ZIU	Zoological Institute, University of Uppsala, Uppsala
ZM	Zoological Museum, Department of Zoology, University of Cambridge
ZMC	Zoologisk Museum, Copenhagen

Key to Subfamilies of Coccinellidae

1. 3·5–11·0 mm long and glabrous dorsally; head with genae never expanded beneath eyes (Fig. 48); (eyes finely faceted, emarginate at antennal insertions (Fig. 53), not as Fig. 47) ..... Coccinellinae

   If >3 mm long, then either with genae expanded beneath eyes (Fig. 47), or with upper surfaces obviously pubescent, or with both these characteristics 2

2(1). More than 6 mm long; obviously pubescent dorsally; head (Fig. 50) with minimum interocular distance *c.* 4× width of an eye, antennae inserted at some distance from finely faceted eyes; mandibles (Fig. 90) without a basal tooth, multidentate apically .... Epilachninae

   If >6 mm long and obviously pubescent dorsally, then interocular distance at most 3 eye widths, eyes coarsely faceted (Fig. 49) and mandibles bifid or simple apically 3

3(2). Apical segment of maxillary palpi either pointed apically (Fig. 63) or as Fig. 64; eyes coarsely faceted (Fig. 51); species <2·5 mm long ..... Sticholotidinae

   Apical segment of maxillary palpi either more or less securiform (typically as Fig. 62) or, if barrel-shaped with apex obliquely truncated, then 2nd segment much shorter than apical segment, not as in Fig. 64; length variable; eye facets coarse (Fig. 49) or fine (as Fig. 53); length variable 4

4(3). Head expanded beneath eyes, covering antennal insertions when viewed from in front (Fig. 47) ..... Chilocorinae
Head not expanded beneath eyes, antennal insertions exposed when viewed from in front (Fig. 49) ..... Coccidulinae*; Scymninae*

* These two subfamilies, as currently constituted, appear not to form monophyletic groups and a reliable key couplet has not proved possible. In general, coarsely faceted eyes (Fig. 49) and antennae 1·5–2 times as long as minimum frontal width will separate the Australian Coccidulini from the rest, but neither character is apomorphic for the tribe.

A comprehensive revision, including all old world genera, is necessary, but preliminary studies, using species from all Australian and most Asiatic genera, suggest a single subfamily divided into five tribes.

Subfamily **COCCINELLINAE** Leach

Definition

Length 3–11 mm. Convex to very strongly convex, hemispherical to somewhat elongate (Figs 1–45); usually shining, pronotum and elytra always glabrous. Head (Figs 48, 52–57) with genae never expanded beneath eyes, eyes finely faceted, almost always emarginate at antennal insertions, antennae (Figs 58–60) almost always 11-segmented, varying from as long as to >2× as long as minimum frontal width between eyes, apical segment of maxillary palpi securiform (Fig. 62), sometimes very broadly so (Fig. 61), mandible simple or bifid apically, never multidentate (Fig. 90). Pronotum with anterior border always emarginate between anterior angles, frequently arcuate medially (Fig. 72). Elytra with external margins usually more or less explanate and almost always with a thickened external border (Fig. 66). Prosternal process between anterior coxae usually with longitudinal carinae of varying length and clarity (Figs 76–78). Abdomen with postcoxal plates of 1st sternite almost always a quadrant (Figs 79–84), sometimes with an oblique dividing line (Fig. 79, *R*), occasionally with hind border obliterated toward lateral borders of sternite (Fig. 83); usually with 6 visible sternites, a 7th occasionally visible through apical emargination of 6th sternite. Tibiae never expanded or toothed externally; tarsi cryptotetramerous; claws appendiculate (Fig. 69), except in *Micraspis furcifera* (Guérin-Méneville), where they are simple (Fig. 70).

Key to the Genera of Coccinellinae

1. Pronotum with anterior border evenly emarginate between anterior angles, hind border finely grooved in front of scutellum; maxillary palpi with apical segment exceptionally broad (Fig. 61); head unusually narrowed in front of antennal insertions (Fig. 52); elytra yellow or yellow and black (Figs 36, 37) ..... *Illeis* Mulsant
Pronotum with anterior border always much more strongly curved laterally, usually arcuate medially (Figs 71–73), hind border without a groove in front of scutellum; maxillary palpi with last segment of normal shape (e.g. Fig. 62); head rarely (*Antineda*, *Harmonia*, *Cleobora*) narrowed in front of antennal insertions, more usually as Fig. 53; elytral colour pattern variable 2

2(1). Middle and hind tibiae with 2 small apical spurs in addition to apical fringe of setae (Fig. 67) 3
Apices of middle and hind tibiae without a pair of spurs among fringing setae (Fig. 68) 11

3(2). Large species (8–12 mm long); external elytral margins moderately to very broadly explanate, black in contrast to elytral disc and either without a thickened external border (Fig. 65) or with border confined to apical $\frac{1}{2}$ and around shoulders 4
If as much as 8 mm long, then lateral eytral margins not black in contrast to discal coloration and with an entire, thickened border (e.g. Fig. 66) 5

4(3). Elytra with very broadly explanate external margins, without a thickened external border (as Fig. 65); colour pattern of brown-red, yellow and black (Fig. 1); elytral disc secondarily

raised at *c.* $\frac{1}{3}$ from base to form a blunt-topped cone rather than an evenly rounded dome; antennae $>2\times$ as long as minimum width of head between eyes; deeply notched anterior mesosternal margin without a raised border along emargination; pronotal hypomera without foveae; intercoxal prosternal process without longitudinal carinae (Australian species only) ..... *Australoneda* Iablokoff-Khnzorian

Explanate external elytral margins narrower and with a thickened external border round shoulders and along apical half; dorsal colour pattern (Fig. 2) black, yellow and orange-red; elytral disc evenly domed; antennae $<2\times$ as long as minimum width of head between eyes; deeply notched anterior edge of mesosternum with an entire raised border; pronotal hypomera each with a shallow fovea (Fig. 76); prosternal intercoxal process with distinct longitudinal carinae (Fig. 76) ..... *Antineda* Iablokoff-Khnzorian

5(3). Explanate external elytral margins either upturned to form a shallow gutter, or with a thickened external border (Fig. 66), or with both; anterior clypeal border almost always (except for *Synona*) straight between lateral projections (Fig. 56) 6

Explanate external elytral margins neither turned up to form a shallow gutter nor with a thickened external border; anterior clypeal border broadly emarginate between lateral projections (Fig. 57); (antennae about as long as minimum width of head between eyes, pronotal hypomera without foveae; size small to moderate, 3·5–6·0 mm long; dorsal colour patterns typically as in Figs 23 and 24) ..... *Menochilus* Timberlake

6(5). Anterior mesosternal border almost or quite straight (Fig. 75); pronotal hypomera without foveae; elytral epipleura without foveae; postcoxal plates of 1st abdominal sternite as in Figs 79 or 80 7

Anterior mesosternal border deeply (Fig. 78), or moderately (Fig. 77) emarginate medially; pronotal hypomera and elytral epipleura with or without foveae; postcoxal plates of 1st abdominal sternite either as in Fig. 79, or without the oblique dividing line (*R*) 8

7(6). Prosternal intercoxal process without longitudinal carinae; postcoxal plates of 1st abdominal sternite as in Fig. 80 ..... *Adalia* Mulsant

Prosternal intercoxal process longitudinally carinate; postcoxal plates of 1st abdominal sternite as in Fig. 79 ..... *Coccinella* Linnaeus

8(6). Intercoxal prosternal process without longitudinal carinae; outline and colour pattern of yellow and black as in Fig. 3; pronotal hypomera without foveae; (usually >7 mm long) ..... *Cleobora* Mulsant

Intercoxal prosternal process longitudinally carinate; outline much less elongate (e.g. Figs 26–31); pronotal hypomera almost always with shallow foveae (Fig. 74) 9

9(8). Small species (*c.* 3·5 mm long); hind pronotal angles no more broadly rounded than anterior angles; colour pattern (Fig. 25) constant, yellow elytral patches not reaching external borders ..... *Oenopia* Mulsant

Larger species (usually much more than 4mm long but, if not, then colour pattern not as in Fig. 25); hind pronotal angles always more broadly rounded than anterior angles ... 10

10(9). Anterior clypeal border emarginate between lateral projections (Fig. 48); elytral epipleura with well-marked foveae; postcoxal plates of 1st abdominal sternite with a well-marked, though incomplete, oblique dividing line (Fig. 82); elytra black ..... *Synona*, nom. nov.

Anterior clypeal border straight between lateral projections (Fig. 53); elytral epipleura with at most very shallowly impressed foveae; postcoxal plates of 1st abdominal sternite without an oblique dividing line; elytra variably coloured, sometimes totally black .... *Coelophora* Mulsant

11(2). Pronotal hypomera foveate (as in Fig. 74); elytral epipleura foveate at level of middle and hind coxae; head (Fig. 54) very narrow between unusually large eyes .... *Phrynocaria* Timberlake

Pronotal hypomera and elytral epipleura without foveae; head much broader between relatively small eyes (Fig. 56) 12

12(11). Scutellum unusually small, *c.* $\frac{1}{15}$ as broad at base as elytra at shoulders (Fig. 72) .... *Micraspis* Dejean

Scutellum almost always at least $\frac{1}{10}$ as broad at base as elytra at shoulders (Fig. 71) ... 13

13(12). Pronotum evenly convex across disc and margins almost to narrowly thickened external borders (Fig. 71); antennae shorter, club segments transverse, compactly arranged (Fig. 60); mid-trochanters asymmetrically expanded (Fig. 85) ..... *Harmonia* Mulsant

Pronotum with a concave area of varying width and shape inside lateral borders (Fig. 73); antennae distinctly longer, with a less compact, elongate segmented club (Fig. 59); mid-trochanters not expanded (Fig. 86) ..... *Archegleis* Iablokoff-Khnzorian

Genus **Illeis** Mulsant

Psyllobora (Illeis) Mulsant, 1850, pp. 166, 1026; 1853, p. 153; 1866, p. 127. Type-species *Coccinella cincta* Fabricius, by subsequent designation, Korschefsky, 1932, p. 558.

Illeis Mulsant; Crotch, 1871, p. 4; Korschefsky, 1932, p. 558; Timberlake, 1943, p. 42; Iablokoff-Khnzorian, 1979, p. 63; 1982, p. 282.

Leptothea Weise, 1898, p. 227; Korschefsky, 1932, p. 570; Bielawski, 1961*a*, p. 354. Type-species *Psyllobora galbula* Mulsant, by original designation. Synonymised by Timberlake, 1943, p. 42.

Illeis (Leptothea) Weise; Iablokoff-Khnzorian, 1979, p. 63; 1982, p. 282.

Description

Small to medium-sized (3·8–5·2 mm long). Outlines and dorsal colour patterns yellow and black as in Figs 36, 37. Head (Fig. 52) narrowed in front of antennal insertions, minimum interocular width of frons at most $1\frac{1}{2}\times$ that of an eye; antennae at least 2× as long as minimum frontal width, club segments loosely articulated, segment 8 much smaller and narrower than segment 9; apical segment of maxillary palpi extremely broad (Fig. 61). Pronotum *c.* 2× as broad as long; much narrower at base than elytra at shoulders; anterior border evenly and shallowly emarginate; posterior margin usually with a feebly raised hind border in front of scutellum; lateral margins narrowly upturned, but without a thickened external border. Scutellum *c.* $\frac{1}{8}$ as broad at base as basal pronotal border. Elytra subacuminately rounded apically; with explanate external margins almost horizontal and entire from shoulders nearly to apicosutural angles, each with a very narrow, thickened or upturned external border. Pronotal hypomera without a fovea on each side near anterior angles; prosternum with longitudinal carinae of intercoxal process convergent anteriorly, extending to, or almost to anterior prosternal border. Mesosternum with hind border straight, distinctly narrower than median length, raised anterior border shallowly emarginate medially to receive arcuate apex of prosternal intercoxal process. Elytral epipleura at most *c.* $\frac{1}{4}$ as broad as metathorax. Abdomen with postcoxal plates of 1st sternite with boundaries more or less obliterated for external half; males with apices of 5th and 6th abdominal sternites shallowly emarginate medially; females with apex of 5th sternite not emarginate, of 6th with a deep, V-shaped median notch.

Included species. 14.

Distribution. India, China, Japan, South-east Asia, Philippines, New Guinea, Australia.

Comments

Mulsant's subgenus, raised to full generic status by Crotch in 1871, but apparently forgotten by him in 1874 and synonymised with *Halyzia* in the Gemminger and Harold catalogue of 1876, was resurrected by Korschefsky (1932). The most recent publications on *Illeis* (Iablokoff-Khnzorian 1979, 1982), continue to recognise it as a full genus, but with *Leptothea* as an included subgenus rather than a synonym. Acording to Iablokoff-Khnzorian, *Leptothea* may be distinguished from the nominate subgenus by the relatively wide frons, smaller and more finely faceted eyes and by genitalic differences. The head characters, known to Iablokoff-Khnzorian from *I. (L.) galbula* alone, are also possessed by the new species described in the present paper. This extra evidence, coupled with the geographical isolation of the two species, lends support to Khnzorian's contention and his rankings are adopted here.

Key to Species of *Illeis (Leptothea)*

1. Elytra plain yellow; dark colour of pronotum reaching anterior border (Fig. 37); genitalia as in Figs 94–96 ..... *flava*, sp. nov.
   Elytra patterned with yellow and black (Fig. 36); dark colour of pronotum not reaching anterior border; genitalia as in Figs 91–93 ..... *galbula* (Mulsant)

Illeis (Leptothea) flava, sp. nov.

(Figs 37, 94–96)

Types

Holotype ♂, New South Wales/ Cascade Jan. 1934 F. E. Wilson/ F. E. Wilson Collection, MVM. Paratypes 5 ♂, 6 ♀. Queensland: 1 ♂, Mt Spec Paluma 16.i.[19]64 A. & M. Walford-Huggins, W-H; 1 ♂, Paluma Q (18.59 S. 146.09 E.) 2 km. SE. 17.i.[19]70, at light, rain-forest Britton & Misko, BM; 1 ♀, Paluma Dam N. Qld, 27.xii.1963 G. Monteith, UQ. New South Wales: 2 ♂, 1 ♀, Dorrigo, N. S. Wales, ANIC; 1 ♂, Dorrigo W. Heron, SAM; 2 ♀, same data as holotype, MVM, BM; 1 ♀, 10 ml [16 km] from Dorrigo on Rd to Ebor 30.viii.1961 C. N. & A. S. Smithers, AM; 1 ♀, Ulong, East Dorrigo N.S.W. W. Heron/ K43584, AM.

Total number of specimens examined: 12.

Size

Length 3·9–5·0 mm. Breadth 3·0–3·9 mm.

Male

Outline and dorsal colour pattern of yellow, black and cream as in Fig. 37. Head and sides of pronotum cream, elytra yellow; underside, except for pronotal hypomera and elytral epipleura brownish-black; legs brownish-black. Head with frontal punctures smaller than eye facets and usually separated by several diameters except toward eyes where they are larger and separated by about their own diameter; intervals reticulately microsculptured, more faintly so toward anterior clypeal border. Pronotum slightly $<2\times$ as broad as long; anterior angles almost as narrowly rounded as posterior angles; flattening or concavity of surface toward lateral borders much less obvious and narrower than in *galbula*; surface of disc and margins usually smooth, sometimes with traces of reticulate microsculpture mediobasally; punctures near scutellum about as large as eye facets and mostly separated by from $1\frac{1}{2}$–2 diameters, punctures often smaller and separated by 3 diameters or more anteriorly and laterally. Scutellum as in *galbula*. Elytra slightly elongate (70 : 62); surface of disc smooth; punctures as in *galbula*. Prosternal intercoxal process with longitudinal carinae convergent anteriorly, variable in length and distinctness. Apical border of 5th abdominal sternite often very feebly bisinuate, of 6th with a distinct median emargination, sometimes notch-like. Genitalia as in Figs 94–96.

Female

Extremely similar to male because the abdominal characters are very difficult to see; apical border of 5th abdominal sternite feebly and broadly emarginate, that of 6th no more than briefly truncate medially.

Comments and Biology

The extremely slight external sexual differences are, apparently, somewhat variable, much less easy to discern than those of *galbula*. Perhaps, as in the latter species, pheromones play a very large part in sexual recognition (Richards 1980), and adult males are able to identify females before they emerge from the pupal skin.

Nothing is known concerning the food of *flava*, but it is reasonable to assume that it is plant mildews, as in the other species of *Illeis*. It may well be in unsuccessful competition with the widespread *galbula*, managing to survive only in areas somehow less attractive to the latter.

Illeis (Leptothea) galbula (Mulsant)

(Figs. 36, 52, 61, 91–93)

Psyllobora (Illeis) galbula Mulsant, 1850, pp. 166, 1026; 1866, p. 127.
Illeis galbula (Mulsant); Crotch, 1871, p. 4; Timberlake, 1943, p. 43.

Thea galbula (Mulsant); Crotch, 1874, p. 135; Froggatt, 1902, p. 903; 1907, p. 209; 1910, p. 337.
Halyzia galbula (Mulsant); Gemminger and Harold, 1876, p. 3576; Masters, 1888, p. 89; Lea, 1902, p. 490.
Leptothea galbula (Mulsant); Weise, 1898, p. 227; 1923, p. 132; Korschefsky, 1932, p. 570; Bielawski, 1961*a*, p. 354; 1961*b*, p.411; Richards, 1980, p. 26; Anderson, 1981, pp. 1–15; 1982, pp. 59–70.
Leptothea csikii Weise, 1902, p. 497; Korschefsky, 1932, p. 570; Bielawski, 1961b, p. 407. Synonymised by Iablokoff-Khnzorian, 1979, p. 63.
Leptothea moseri Weise, 1902, p. 497; Korschefsky, 1932, p. 570; Bielawski, 1961*b*, p. 412. Synonymised by Iablokoff-Khnzorian, 1979, p. 63.
Illeis (Leptothea) galbula (Mulsant); Iablokoff-Khnzorian, 1979, p. 63; 1982, p. 287.

Size

Length 3·9–5·2 mm. Breadth 2·8–3·9 mm.

Male

Outline and colour pattern as in Fig. 36, with dark area of pronotum variable in extent, but pale patches of elytra more or less constant. Head, antennae and mouthparts yellow; pronotal hypomera yellow, prosternum broadly yellow laterally with intercoxal process and area in front of process brownish-black; mesosternum, metasternum and abdominal segments brownish-black or black; elytral epipleura yellow except for small black areas at shoulders, apices and at about middle of length; legs, including coxae brown or black. Head between eyes with fine, reticulate microsculpture and minute punctures separated by >1 diameter. Pronotum slightly <2× as broad as long (15 : 8); anterior angles much more strongly rounded than posterior angles; more or less flat longitudinally, transversely convex medially and broadly concave within posterior and anterior angles; surface smooth, minutely and sparsely punctured, a small number of larger, more obvious punctures usually present in front of scutellum. Scutellum sparsely and finely punctured. Elytra slightly elongate (68 : 63); surfaces of disc and margins almost completely smooth, punctures much larger than those of pronotum, separation variable, but often by >1 diameter. Prosternal intercoxal carinae convergent anteriorly, but usually neither meeting together nor quite reaching anterior prosternal border. Abdomen with apical border of 5th sternite feebly and broadly emarginate, of 6th narrowly and deeply emarginate medially. Genitalia as in Figs 91–93.

Female

Apical border of 5th abdominal sternite not emarginate and 6th with a median V-shaped notch in apical border.

Types

Holotype of *galbula*, Museum Paris Australie Verreaux 2-47/ 825/ 60 [yellow label]/ 2·47 [circular label, handwritten, pink on reverse side and a typical MNHN, Paris accession label]/ Psyllobora galbula Muls. auct. det., MNHN. Holotype ♂ of *csikii*, Nova-Guinea: Sattelberg, [from Weise, 1902, p. 497, not examined] TMB. Lectotype ♂ of *moseri*, Leptothea moseri m. Key-ins, [designated by Iablokoff-Khnzorian, 1982, p. 288], MNHU [not examined].

Other Specimens Examined

Non-Australian: New Guinea (Bubia, Orrori); New Zealand (Auckland).

Queensland: 31 km WNW. of Cooktown; Mt Molloy; Koah Rd via Kuranda; Kuranda; Barron Falls, Kuranda; Redlynch; Cairns; Elizabeth Gorge; Kairi; Stannary Hills *c.* 30 km W. of Atherton; 6·3 km S. of Atherton; Almaden, Chillagoe district; 9 km W. of Herberton; Ravenshoe; Millaa-Millaa; Cardstone; 55 km SW. of Mt Garnet; Townsville; Ayr; Mackay; Broken R., Eungella; Lotus Ck; Clermont; Byfield; Yeppoon; 9 km E. of Yeppoon; 10 km SSE of Yeppoon; Rockhampton–Yeppoon; Emerald; Bundaberg; 10 km S. of Bundaberg; Gorge at Burnet R. 19 km S. of Bundaberg; Pine Ck nr Bundaberg; Eidsvold; Bluff Range nr Biggenden; Blackall Ranges; Kenilworth State Forest; 10 km E. of Queen Mary's Falls nr Killarney; Maleny; Bunya Mts; Mt Beerwah; Deception Bay 40 km N.

of Brisbane; Dayboro; Ravensbourne; Mt Glorious; Brisbane; Moreton Bay; Ormiston; Gatton; Mt Tamborine; Canungra; Warwick; Bald Mtn area via Emu Vale; Macpherson Range Natl Park. **New South Wales:** Tweed R.; Whian Whian State Forest nr Lismore; Booyong; Eltham; Lismore; Richmond R.; Brooklana, E. of Dorrigo; Dorrigo; Boambee; Valery; Port Macquarie; Comboyne; Tubrabucca, Upper Hunter district; Wingham; Maitland; Abernethy; Huntley; Ourimbah; Narara; Gosford; Erina; Richmond; Woodford; Glenbrook Ck, Nepean R.; Sydney; Jenolan; Menai district; Picton; Helensburgh; Otford; Mt Keira; Wollongong; 'Illawarra'; Jamberoo Mtn; Minnamurra Falls; Kangaroo Valley; Gerroa. **Victoria:** nr Chiltern; Kewell district; 1 km S. of Wandong; Millgrove; Melbourne; Warburton district; Warragul; 'Gippsland'. **South Australia:** 'S.A.', 1 SAM. **Northern Territory:** Roper River; 22 km WSW. of Borroloola; Surprise Ck, 45 km SSW. of Borroloola.

Specimen depositories: AM, AMR, ANIC, BCRI, BM, DAH, DAV, DLN, DPIM, DSIR, FCN, HDN, MM, MVM, QDPI, QM, SAM, UQ, WADA, WARI, W-H.

Total number of specimens examined (Australian) 586.

Comments

The relatively narrow pronotum with its evenly emarginate anterior border, together with the more or less constant dorsal colour pattern, readily serve to distinguish *galbula* from other Australian coccinellines. The new species, *flava*, is clearly very closely related, but may be recognised by the key characters and the few more minor differences referred to in its description.

The record from South Australia must be regarded as doubtful.

Biology

Early observers, e.g. Koebele (1893, p. 23), recognised the fungivorous habit of *galbula*, but Froggatt (1902, p. 903), described the species as in association with aphids and scale insects. In two recent papers, Anderson (1981, 1982), has shown *galbula* to be quite strictly mycophagous, both adults and larvae feeding exclusively on spores and hyphae produced by species of *Oidium* (Erysiphaceae) infecting various plants including cucurbits, crepe myrtle (*Lagerstromia* sp.) and *Lonicera fragrantissima*.

Genus **Australoneda** Iablokoff-Khnzorian

Australoneda Iablokoff-Khnzorian, 1984*a*, p. 204; 1984*b*, p. 107. Type-species *Neda bourgeoisi* Kerville, by original designation.

Neda Mulsant, 1850, p. 274 (partim); Bielawski, 1963, pp. 457–70.

Description

Medium to large (8–11 mm long) species with elytra very broadly explanate laterally and often with striking colour patterns. Head strongly narrowed from truncate anterior clypeal border to between large eyes; antennae at least 3 × as long as narrowest part of frons between eyes. Pronotum broadly convex across disc, concave within very narrowly raised and thickened lateral borders; anterior border slightly arcuate medially, anterior angles distinctly produced, though rounded; hind margin without a raised posterior border, truncate or emarginate in front of scutellum. Scutellum transversely triangular. Elytra without thickened or raised external borders; disc domed and, sometimes, additionally raised medially, more or less to a point at *c.* $\frac{1}{3}$ of length from scutellum; elytral punctures of uniform size or varied, intervals smooth or reticulately microsculptured. Pronotal hypomera without foveae; prosternum more or less compressed medially, intercoxal process rounded apically, with or without faintly indicated longitudinal carinae. Mesosternum strongly excavate to receive apex of prosternal intercoxal process. Abdomen usually with 6, clearly visible sternites, but 6th occasionally almost or quite hidden by 5th; postcoxal plates of 1st sternite entire to lateral border of sternite, almost reaching posterior, without a clearly defined oblique dividing line. Legs unusually long, slender.

Included species. Six.

Distribution. New Guinea, Australia.

Comments

As here defined, *Australoneda* includes the five New Guinean species of '*Neda* Mulsant' treated by Bielawski in 1963, as well as the single Australian representative.

Superficially, *Neda* and *Australoneda* have a number of characters in common, but the genitalia (*A. bourgeoisi*: Figs 97–99) as well as such external characters as the shape of the head, the presence or absence of a raised external elytral border and the clearly marked oblique dividing line within the postcoxal plates of *Neda*, show the two groups to be quite distinct. Among old world genera, that with genitalia most similar to those of *Australoneda* would appear to be *Docimocaria* Crotch, 1874, with four included species, two from the Philippines and two from New Guinea. However, the head in *Docimocaria* is not distinctly narrowed between the eyes, the antennae are hardly longer than the width of the frons, the pronotal hypomera have more or less distinct foveae, the scutellum is not transverse and the external elytral margins are much less broadly explanate.

Australoneda bourgeoisi (Kerville)

(Figs 1, 97–99)

Neda bourgeoisi Kerville, 1884, p. 70; Masters, 1888, p. 90; Korschefsky, 1932, p. 279; Bielawski, 1963, p. 469; 1965, p. 229.

Australoneda bourgeoisi (Kerville); Iablokoff-Khnzorian, 1984*a*, p.204; 1984*b*, p. 109.

Size

Length 8·2–10·3 mm. Breadth 7·9–9·5 mm.

Male

Outline and dorsal colour pattern as in Fig. 1. Head yellow, pronotum yellow and black, scutellum black, elytra with explanate external margins black, disc reddish-brown, separated from margins by a yellow band of varying width; pronotal hypomera mostly yellow, narrowly black along lateral margins and more broadly so along hind margins, prosternum mostly black, but with a yellow area laterally in front of each coxa; mesosternum black; metasternum and abdomen black; elytral epipleura broadly black along external margins, internal margins with a very narrow black border, widening at level of metasternum and toward apex; hind legs almost or entirely black, front and middle legs pale-coloured, at least in part. Head with frontal punctures small, separated by 1 diameter or more, intervals with reticulate microsculpture; antennal segments 3–9 elongate. Pronotum with punctures of disc and margins similar in size to those of head, separated by from 1 to several diameters, more usually by the greater distance, intervals reticulately microsculptured. Scutellum acutely pointed apically. Elytra almost as broad as long (15 : 19), very broadly explanate laterally, disc more or less pointed in profile at *c.* $\frac{1}{3}$ length back from scutellum; punctures small, usually of 2 sizes, mostly separated by >1 diameter; punctures along explanate lateral margins smaller and sparser than those elsewhere, intervals smooth. Intercoxal process of prosternum with carinate lateral borders, but without longitudinal carinae extending in front of coxae. Mesosternum sharply excavate to accommodate arcuate apex of prosternal intercoxal process, punctures relatively coarse, often separated by <1 diameter, somewhat obscured by white, semierect setae. Metasternum with punctures progressively smaller and more sparsely arranged from anterior to posterior border, sparsely pubescent throughout, including postcoxal plates. Abdomen with apical border of 6th sternite slightly emarginate medially. Genitalia as in Figs 97–99.

Female

Anterior and middle legs predominantly dark-coloured; apical border of 6th abdominal sternite, though somewhat impressed, evenly arcuate, rather than emarginate medially.

Type

Lectotype ♀, Australie, MNHN (see comments).

Other Specimens Examined

Queensland: Maryborough; nr Gympie; Blackall Ranges; Montville; Cairncross nr Maleny; Killarney Plateau; Bunya Mts; Bunya Mts 3 km from summit; d'Aguilar Range nr Lacey's Ck; Ravensbourne; Upper North Pine; Mt Glorious; Brisbane; Mt Tamborine; Lamington Natl Park; Levers Plateau via Rathdowney; 'Queensland'. **New South Wales:** Boluny, Tweed R.; Tooloom; Richmond R.; Gibraltar Range Natl Park, 950 m; Nymboida R., N. of Dorrigo; Eve Ck 34·5 km W. of Coramba; Dorrigo; Dorrigo Natl Park, 800 m; Comboyne; 'New South Wales'.

Specimen depositories: AM, ANIC, BM, DAH, DSIR, HDN, MM, MNHN, MVM, QDPI, QM, SAM, UQ, W-H.

Total number of specimens examined: 81.

Comments

Kerville described *bourgeoisi* from an unspecified number of examples in his own collection, giving 'Australie' as their origin. His collection was subsequently acquired by Sicard, who combined it with his own, not infrequently removing identification labels as he did so. Sicard's collection is now in the MNHN, Paris. It contains 11 specimens over the name *bourgeoisi*, all conforming to Kerville's coloured illustration. However, only one has the dark head markings referred to by Kerville in his description. It is this individual, bearing only the single, handwritten label 'Australie', that is here designated lectotype.

Biology

Practically nothing has been recorded. It has been found at the edges of rainforest areas, has once been taken at light (Bunya Mts, Queensland) and has been bred and reared (November–December) on *Hyperomyzus* aphids on *Sonchus* sp. by K. J. Houston at Brisbane from parents taken at Mt Tamborine.

Genus **Antineda** Iablokoff-Khnzorian

Antineda Iablokoff-Khnzorian, 1982, p. 141. Type-species *Neda princeps* Mulsant, by original designation.

Archaioneda Crotch, 1874, p. 169 (partim).

Description

Size moderate to large (7–11 mm long), almost hemispherical. Head with anterior clypeal border almost straight between strongly produced anterior angles; antennae *c.* $1\frac{1}{2}\times$ as long as minimum frontal width between eyes, segments 3 and 4 more or less equal, club segments compactly arranged and all asymmetrical; eyes large, together making up $>\frac{1}{2}$ of total head width. Pronotum with disc transversely convex, very feebly convex longitudinally; lateral margins rather narrowly impressed just within finely raised external borders; anterior border strongly arcuate medially, sinuate laterally to well-marked anterior angles. Scutellum with lateral borders sinuate, incurved to base and outwardly curved to acute-angled apex. Elytra with explanate external margins having thickened external borders obliterated or partly obliterated behind shoulders. Pronotal hypomera each with a shallow fovea near anterior angles; prosternum with intercoxal process longitudinally carinate. Anterior border of mesosternum deeply emarginate medially (as Fig. 76). Elytral epipleura shallowly foveate to receive apices of middle and hind femora. Post-coxal plates of 1st abdominal sternite without an oblique dividing line (Fig. 84); 6th sternite almost or quite concealed by 5th. Legs shorter and relatively more robust than those of *Australoneda*.

Included species. Three (Iablokoff-Khnzorian 1982).

Distribution. Australia, Philippines, Indonesia (Aru Is.).

Comments

Clearly related to *Australoneda*, but differing as indicated in the key to genera and by the genitalia (Figs 100–102). *Archaioneda* Crotch, type-species *Coccinella tricolor* Fabricius, is separable from both, by genitalic and external characters.

Antineda princeps (Mulsant)

(Figs 2, 76, 100–102)

Neda princeps Mulsant, 1850, p. 278; Masters, 1888, p. 90.
Callineda princeps (Mulsant); Crotch, 1871, p. 6.
Archaioneda princeps (Mulsant); Crotch, 1874, p. 169; Korschefsky, 1932, p. 271.
Antineda princeps (Mulsant); Iablokoff-Khnzorian, 1982, p. 142.

Size

Length 7·1–9·0 mm. Breadth 6·6–8·0 mm.

Male

Outline and dorsal colour pattern of orange-yellow and black as in Fig. 2. Antennae and head yellow to orange-yellow; pronotum with black of lateral margins sometimes confined to posterior half, colour of disc sometimes darker medially; scutellum usualiy pale with dark borders; underside pale except for external margins of pronotal hypomera, metasternum and, in some specimens, lateral margins of mesosternum and its raised anterior border and anteromedian part of abdomen; elytral eipipleura with black external margins, otherwise pale; anterior and middle legs pale, hind legs usually dark except for tarsi, occasionally entirely pale. Head with obvious punctures separated by 1 diameter or less, intervals reticulately microsculptured. Pronotum almost 2× as broad as long; punctures of disc and margins slightly smaller than those of head, usually separated by >1 diameter, sometimes by almost 2 diameters, generally closer in front of scutellum; intervals with less strongly impressed microsculpture than those of head. Scutellum smooth, shining, irregularly punctured. Elytra scarcely longer than their greatest combined breadth; punctures of disc similar to those of pronotum, often separated by >1 diameter, intervals smooth, shining; punctures along explanate external margins mostly similar to those of disc but, occasionally, larger and irregularly spaced. Prosternal intercoxal process with longitudinal carinae slightly convergent anteriorly, stopping at *c.* $\frac{1}{3}$ from anterior border of prosternum (Fig. 76). Apex of 5th abdominal sternite feebly arcuate medially, more strongly so laterally; apically emarginate 6th sternite hidden by apically almost truncate 5th. Genitalia as in Figs 100–102.

Female

With apex of 5th abdominal sternite evenly arcuate.

Type

Lectotype ♀, Holotype O.U.M./ 32/ P. Ess [Hope's handwriting]/ Neda Princeps Mulsant 1850 / Ann. Soc. Agric. Lyon (2)2: 278/ T/ Type COL: 1291 Neda princeps Mulsant HOPE DEPT. OXFORD, HM.

Other Specimens Examined

Queensland: Iron Range; Coen area; Marina Plains via Musgrave; Endeavour R.; Cooktown; Kuranda; Cairns; Cairns district; Mareeba; Forty Mile Scrub via Mareeba; Little Mulgrave R.; Gillies Hwy nr Mulgrave R. **Western Australia:** Wyndham; Kimberley Res. Stn. **Northern Territory:** Port Essington; Bathurst I.; Coopers Ck 19 km SE. of Mt Borradaile; King River; Yirrkala; Darwin; Port Darwin; Koolpinyah; Holmes Jungle 10 km S. of Darwin; Groote Eylandt; Angurugu, Groote Eylandt; Katherine Gorge 24 km NE. of Katherine; Katherine; 26 km E. of Katherine; 11 km SW. of Katherine; Mataranka HS Roper R.; Elsey Ck 15 km SSE. of Mataranka; 17 km S. of Mataranka; Goose Lagoon 11 km SSW. of Borroloola; Carrambirini WH. 33 km SW. of Borroloola; Cattle Ck 54 km SW. of Borroloola; Surprise Ck 45 km SSW. of Borroloola; Macarthur R., 48 km SSW. of Borroloola; 8 km ESE. of Cape Crawford; 'Twenty Mile Station NT Railway'.

Specimen depositories: AM, ANIC, BM, DAH, DAV, DPIM, MM, MVM, NTM, QDPI, SAM, UQ, WADA, W-H.

Total number of specimens examined: 129.

Biology

Nothing seems to have been published concerning the biology of *princeps*. Information from data labels is limited to 'On *Eucalyptus*' and 'at light', but it has been reared on *Hyperomyzus* aphids on *Sonchus* by K. J. Houston at Brisbane.

Genus **Menochilus** Timberlake

Cheilomenes sensu Mulsant, 1850, p. 443 (not Dejean, 1837).

Menochilus Timberlake, 1943, p. 40; Iablokoff-Khnzorian, 1979, p. 58; 1982, p. 144. Type-species *Coccinella sexmaculata* Fabricius, by original designation.

Description

Small to medium-sized (3·5–6·2 mm long), strongly convex, only slightly elongate. Head with anterior clypeal border evenly emarginate between lateral projections (Fig. 57); antennae shorter than minimum width of head between eyes, this equal to *c.* $\frac{3}{5}$ total head width including eyes. Pronotum more or less evenly convex transversely; anterior border weakly arcuate between produced but well rounded anterior angles; hind angles more strongly rounded than anterior angles; lateral borders very narrowly upturned, the resulting ridge continuing forward round anterior angles. Scutellum equilaterally triangular. Elytra in outline as Fig. 23; explanate external margins rather narrow, but complete and without a thickened external border (Fig. 65). Pronotal hypomera without foveae inside anterior angles; prosternum with carinae of intercoxal process abbreviated, not usually extending onto anterior $\frac{1}{3}$ of prosternal length. Mesosternum with anterior border entire and only moderately emarginate medially. Elytral epipleura with barely perceptible foveae at level of middle and hind legs. Postcoxal plates of 1st abdominal sternite with an oblique dividing line (Fig. 79).

Included species. One.

Distribution. Asia west to Baluchistan, east to China and Japan, south to India, Malaysia and Indonesia. Philippines, Micronesia, New Guinea, Polynesia and Australia.

Menochilus sexmaculatus (Fabricius)

(Figs 23, 24, 57, 58, 65, 89, 103–105)

Coccinella sexmaculata Fabricius, 1781, p. 96.

Coccinella quadriplagiata Schoenherr, 1808, p. 195. Synonymised by Nakane and Araki, 1959, p. 50.

Cheilomenes sexmaculata (Fabricius); Dejean, 1837, p. 435; Mulsant, 1850, p. 444; Crotch, 1871, p. 8; 1874, p. 180 (as *Chilomenes*).

Cheilomenes quadriplagiata (Schoenherr); Dejean, 1837, p. 435; Mulsant, 1850, p. 447; Crotch, 1871, p. 8; 1874, p. 181 (as *Chilomenes*).

Cheilomenes sexmaculata var. *flavofasciata* Mulsant, 1850, p. 446; Mader, 1935, p. 352.

Orcus mollipes Olliff, 1895, p. 30. Syn. nov.

Cheilomenes sexmaculata var. *australis* Weise, 1908, p. 12 (as *Chilomenes*); Mader, 1935, p. 352.

Menochilus sexmaculatus (Fabricius); Timberlake, 1943, p. 40; Nakane and Araki, 1959, p. 50; Sasaji and Akamatsu, 1979, p. 2; Iablokoff-Khnzorian, 1979, p. 58; 1982, p. 146.

Menochilus quadriplagiatus (Schoenherr); Timberlake, 1943, p. 41.

Size

Length 3·5–6·2 mm. Breadth 3·0–5·3 mm.

Male

Outline and dorsal colour pattern of yellow or orange-yellow and black as in Fig. 23 or Fig. 24. Head yellow, underside of body variably coloured, but usually with thorax and abdominal disc dark, abdominal margins, pronotal hypomera and inner margins of elytral epipleura pale, legs dark; examples with dorsal colour pattern as in Fig. 23 often entirely pale beneath, including legs. Head between eyes with punctures of similar size to eye facets,

often separated on disc by >1 diameter, intervals with very fine, reticulate microsculpture; antennae with basal segment expanded asymmetrically into a lobe on upper side (Fig. 58). Pronotum at most *c.* 2× as broad as median length; punctures of disc and margins similar in size to those of head, but more widely separated, intervals as finely but less obviously microreticulate than those of head. Scutellum with basal width $>1/10$ of maximum pronotal breadth; punctures variable, intervals smooth. Elytra about as long as broad; punctures of disc slightly larger than those of pronotum, usually separated by >1 diameter, intervals smooth; punctures toward and along external margins sometimes more deeply impressed than those of disc and so appearing larger. Elytral epipleura broad, moderately descending externally (Fig. 89). Abdomen with apical border of 5th sternite straight or very slightly emarginate, apex of 6th somewhat flattened medially, more arcuate laterally. Genitalia as in Figs 103–105.

Female

Head usually bearing a dark mark of varying size and shape; apical border of 5th abdominal sternite sometimes faintly arcuate, apex of 6th more strongly arcuate, median flattening very brief or non-existent.

Types

Lectotype ♀, of *sexmaculata*, [Ind.Orient.] /Coccinella 6.maculata Fab. Sp. Ins. n. 20 [handwritten, black-bordered, Banks collection label], BM. Lectotype ♀, of *quadriplagiata*, Ind: Or: Kymella, NR. Four other specimens standing over the name *quadriplagiata* in the Schoenherr collection, Stockholm are labelled examples of the originally designated segregates 'alpha', 'beta', 'gamma' and 'delta' and therefore not acceptable as paralectotypes. Type material of *mollipes* not examined (lost).

Other Specimens Examined

Non-Australian: Oman, Seychelles Is, India, Sri Lanka, Christmas I., Andaman Is, Burma, West Malaysia (Malaya), East Malaysia (Sarawak), Indonesia (Sumatra, Java, Sulawesi, Ternate), Philippine Is, Vietnam, China, Japan.

Victoria: 1, Melbourne, DAV. **Western Australia:** Kununurra; Geraldton; Perth; Rottnest I., 1936; Fremantle, 2, 1891; Manoogalup 27 km S. of Perth; Peel Estate 12 km W. of Byford; Rockingham Park 39 km S. of Perth; Yalgorup Natl Park nr Mandurah; Bunbury; King George Sound, Albany; 'Swan River' pre-1843, BM; 'Western Australia'. **Northern Territory:** Darwin; Berrimah Exp. Farm nr Darwin; 86 km S. of Katherine; Victoria River Downs Irrigation Farm.

Specimen depositories: AM, ANIC, BM, DAH, DAV, DPPD, HNH, MM, MVM, QM, SAM, UWA, WADA, WAM.

Total number of specimens examined (Australian): 174.

Comments

The synonymy of *sexmaculatus* and *quadriplagiatus* was first published by Nakane and Araki in 1959, but subsequently ignored by most authors until after the appearance of a detailed account of carefully organised breeding experiments by Sasaji and Akamatsu (1979). The synonymy of *sexmaculatus* and *Orcus mollipes* is based on the original author's published description and a single specimen in the SAM. The description of *O. mollipes* is fairly detailed as to size, shape, puncturation and colour pattern but, curiously, makes no reference to its having the very characteristic head shape of the genus *Orcus*. The overall size and shape fall within the limits of *M. sexmaculatus* and the colour pattern clearly corresponds to that of Fig. 24, a distinctive appearance, unlike that of any known Australian *Orcus*, let alone one 'found in large numbers around Perth' (Olliff 1895). Olliff also stated that the species fed 'on various aphides . . . which affect trees of the citrus family'. Aphidophagy is the rule among Coccinellinae, but not usual in most Chilocorinae and, apparently, unrecorded for any species of *Orcus* (Schilder and Schilder 1928, p. 266). All this casts doubt on the correctness of Olliff's generic assignment for *mollipes*, a scepticism reinforced by the action of A. M. Lea for, in the SAM, among a series of

sexmaculatus, there is a specimen agreeing very well with Olliff's description and labelled by Lea as '*Orcus mollipes* Oll. Agr. Gaz. N.S.W. Jan. 1895, Swan R. Lea'.

The Australian Component of M. sexmaculatus

Looked at over its entire distributional range, *sexmaculatus* shows considerable variation in dorsal colour pattern. However, a number of distinct forms recur quite regularly and some of these have been given distinguishing trinomina (Mader 1935, pp. 349–352). All specimens so far seen from the Northern Territory (48) and the single example from Kununurra, W.A., have the pattern of Fig. 23, which corresponds very closely to that of the lectotype of *sexmaculatus*. All other specimens, predominantly from south-western Australia, have a colour pattern resembling Fig. 24. Individuals vary somewhat one from another, but none agree precisely, either with any of the patterns illustrated by Sasaji and Akamatsu (1979) for Japanese material or with those of 'typical' *quadriplagiatus* and its original varieties (Schoenherr 1808). They seem to represent a distinct race, now peculiar to Western Australia, described by Weise as *Chilomenes sexmaculata* var. *australis* and said by Mader (1935) to be the same as *C. sexmaculata* var. *flavofasciata* Mulsant.

The northern Australian specimens were collected from a limited area over a few years in the mid-1970s. The south-western population appears more widespread, has been in the region for more than 100 years, and flourishes today. The evidence points to both populations being the result of introductions, probably accidental, and supports the suggestion that each originated from a small sample, including only a tiny fraction of the total gene pool.

The possible origins of both populations are of interest. 'Typical' *sexmaculatus* occur many parts of Asia, ranging south and east into Indonesia as far as Timor, some 600 km from Darwin. This relatively short distance, coupled with the prevailing south-westerly surface winds during January, could well account for the species' sudden, if temporary, appearance in the sorghum plots at Berrimah in the 1970s.

The *quadriplagiatus* form found in south-western Australia is, by contrast, unique to the area as far as is known. A few specimens collected many years ago in China and Hong Kong show the closest approach to its colour pattern but, even there, the differences are obvious and constant. The south-western population may well have been established for far longer than the 140 recorded years, either representing the survivors of a colour form otherwise now extinct, or a relatively new variety, developed in isolation. Whatever the answer, no evidence remains as to its source.

Biology

Lefroy (1909, p. 307) described and illustrated all stages in the life history of *sexmaculatus*, basing his studies on Indian material. He recorded it as multivoltine and as feeding on *Aphis gossypii* Glover and *A. cardui* Linnaeus. Schilder and Schilder (1928, p. 251) gave a more diverse food range, including isopods, psyllids, aleurodids and coccids, as well as aphids, but list no records for Australia. Timberlake (1943, p. 41) quoted from Koebele's field notes which recorded the species as feeding (in China) on coccids infesting *Acacia* and *Ficus*, and on aphids on *Hemerocallus*, eggplant and various weeds. The only food records for Australia are those of Olliff (see *Comments*) and that of the present author who found it feeding on aphids on *Asclepias* near Perth in 1981.

Genus **Adalia** Mulsant

Idalia Mulsant, 1846, p. 44 (n. preocc. Huebner, 1819 [Lepidoptera]). Type-species *Coccinella bipunctata* Linnaeus, by subsequent designation, Crotch, 1874, p. 99.

Adalia Mulsant, 1846, 'Addenda et errata' [2] (replacement name for *Idalia* Mulsant).

Description

Small to medium-sized (4·0–6·5 mm long), moderately convex and shortly elongate-oval (Fig. 13), broadest behind middle. Head with anterior clypeal border straight between lateral

projections; minimum width of frons between eyes >2× that of an eye; antennae *c.* $\frac{1}{2}$ as long again as minimum frontal width. Pronotum *c.* 2× as broad as median length, evenly convex transversely, lateral margins very narrowly upturned externally throughout their length, upturning continuing inward for a short distance along anterior margin. Scutellum *c.* $^{1}/_{15}$ as wide at base as elytra at shoulders. Elytra slightly elongate; disc convex; explanate external margins very narrow, their raised outer border also very narrow, but entire. Pronotal hypomera without foveae, intercoxal process of prosternum without longitudinal carinae. Mesosternum with scarcely emarginate anterior edge having an uninterrupted raised border. Elytral epipleura at most $\frac{1}{7}$ of metathoracic width, not descending externally (Fig. 88). Postcoxal plates of 1st abdominal sternite as in Fig. 80.

Included species. Six (Iablokoff-Khnzorian, 1982).

Distribution. Holarctic, South America (probably introduced), Australia (introduced).

Adalia bipunctata (Linnaeus)
(Figs 13, 80, 88, 106–108)

Coccinella bipunctata Linnaeus, 1758, p. 364.
Adalia bipunctata (Linnaeus); Mulsant, 1846, p. 51 (as *Idalia*); Iablokoff-Khnzorian, 1979, p. 70; 1982, p. 438.

Size

Length 3·6–5·2 mm. Breadth 2·8–4·2 mm.

Male

Outline and dorsal colour pattern as in Fig. 13. Head black medially with a more or less semicircular cream-yellow area on either side adjacent to inner borders of eyes; pronotal colours cream-yellow and black; elytra red with a black spot on each; underside black except for pale pronotal hypomera, elytral epipleura and, sometimes, lateral and apical margins of abdominal sternites; legs black. Head with clypeal and frontal punctures barely as large as eye facets, variably separated by from 1 to 2 or more diameters, intervals with reticulate microsculpture. Pronotum with punctures similar in size to frontal punctures, but more sparsely set, especially toward lateral margins; intervals on disc microreticulate, progressively more faintly so toward lateral margins. Scutellum an equilateral triangle, black. Elytra with punctures larger and more deeply impressed than those of pronotum, somewhat variable in size and usually separated by from 1 to 2 diameters, intervals smooth. Abdomen with apical border of 5th sternite straight or very faintly emarginate, of 6th more or less distinctly flattened medially, occasionally slightly emarginate. Genitalia as in Figs 106–108.

Female

With apical border of 5th abdominal sternite usually slightly arcuate medially and apical border of 6th evenly arcuate.

Type

Lectotype ♀, 'In Europae' [no locality or other data attached to specimen], LSL.

Other Specimens Examined

Non-Australian: Europe, Asiatic Russia, China, North America (Canada and U.S.A.), South America (Argentina and Chile).

Tasmania: 30, Mt Stewart, DAH; 9, Hobart, 2 BM, 4 DAH, 3 QDPI. **Western Australia:** 1, Dongara, BM.

Total number of specimens examined (Australian): 40.

Comments

Neither the single example from Western Australia (collected in December 1935, but

without bionomic data) nor the recent appearance (1972) of the species in Tasmania seem to be the result of deliberate, publicised introductions. The former may well have been a casual, boat-borne immigrant whose companions, if any, failed to establish themselves, but the population around Hobart is clearly flourishing, at least in cultivated areas. A few specimens have been collected in most years since 1972 and many were seen by the author in 1981.

A. bipunctata is, as far as the European fauna goes, one of the most variable of coccinellids. More than 100 colour variants have been separately named and, in recent years, considerable effort has been devoted to the study of the genetic mechanisms underlying them and to the way in which external influences may determine their incidence in the field. Iablokoff-Khnzorian (1982, p. 438–41) lists many references to these and other topics, but their relevance to the present Australian component of the species seems minimal. All examples seen to date correspond to Fig. 13, suggesting that, as with *Menochilus sexmaculatus* in Western Australia, the present population arose from a single, very small invasion or introduction.

Biology

A polyphagous species preying mainly on aphids, but also recorded (Schilder and Schilder 1928, pp. 257–8) as feeding on Coccidae, Thysanoptera, Psyllidae, Hymenoptera and other coccinellids (e.g. *Epilachna* spp.). Blackman (1965, 1967*a*, 1967*b*) dealt in some detail with the feeding habits and prey preferences of the species, comparing rates of larval development, mortality and fecundity between individuals fed on different species of aphid.

Clausen (1916) gave details of the life history and feeding records of *bipunctata* in the U.S.A., and Hawkes (1920) based her account on British material.

Genus **Coccinella** Linnaeus

Coccinella Linnaeus, 1758, p. 364; Iablokoff-Khnzorian, 1979, p. 66; 1982, p. 341. Type-species *Coccinella septempunctata* Linnaeus, by subsequent designation, Latreille, 1810, p. 432.

Description

Small to large species (4·0–8·4 mm long), slightly to moderately elongate. Head with anterior clypeal border straight between lateral projections; minimum frontal width almost 3× that of an eye; antennae about as long as minimum interocular distance. Pronotum usually rather <2× as wide as median length; evenly convex transversely to very narrowly upturned and finely bordered lateral margins, borders continuing along anterior margins behind eyes; anterior angles usually slightly less strongly rounded than posterior angles. Scutellum *c.* $^1/_{15}$ as broad at base as elytra at shoulders. Elytra strongly convex to narrowly explanate lateral margins, margins with an entire, narrow, thickened external border. Pronotal hypomera without foveae. Intercoxal process of prosternum with longitudinal carinae extending forward for slightly $>\frac{1}{2}$ of prosternal length. Mesosternum more or less completely straight anteriorly, with an entire raised anterior border. Elytral epipleura at most *c.* $\frac{1}{6}$–$\frac{1}{5}$ as broad as metathorax, not descending externally (as Fig. 88). Postcoxal plates of first abdominal sternite with an oblique dividing line (Fig. 79, *R*).

Included species. Over 70. The actual number is difficult to assess in view of disagreements over subjective synonymies.

Distribution. Cosmopolitan.

Comments

Iablokoff-Khnzorian (1982, p. 357) places *C. undecimpunctata*, along with *C. alpigrada* Iablokoff-Khnzorian and *C. miranda* Wollaston, in the subgenus *Neococcinella* Savoiskaya, 1969, a group set apart by him on genitalic characters alone.

Key to Species of *Coccinella*

1. Outline and colour pattern as in Fig. 12; elytra smooth between punctures ..... *undecimpunctata* Linnaeus
   Outline and colour pattern generally as in Fig. 11; elytral intervals with well-marked reticulate microsculpture ..... *transversalis* Fabricius

Coccinella undecimpunctata Linnaeus

(Figs 12, 112–114)

Coccinella undecimpunctata Linnaeus, 1758, p. 366; Iablokoff-Khnzorian, 1979, p. 66; 1982, p. 351.

Coccinella novaezealandiae Colenso, 1888, p. 40; Koebele, 1890, p. 25. Synonymised by Sharp in Riley, 1891, p. 352.

Size

Length 4·3–5·3 mm. Breadth 3·0–3·7 mm.

Male

Outline and dorsal colour pattern as in Fig. 12. Pale anterolateral pronotal areas yellow or yellowish-cream; ground colour of elytra red or orange-red, small light patches on either side of scutellum yellowish-cream, black elytral patches sometimes joined transversely or, occasionally, partly absent; prosternum and posterior part of hypomera black, anterior part of hypomera yellowish-cream; mesosternum, metasternum and abdominal segments black; elytral epipleura matching elytral ground colour; legs black. Head with punctures of clypeus and frons a little larger than eye facets, separated by from <1 to almost 2 diameters; intervals reticulately microsculptured. Pronotum with punctures similar in size to those of head, evenly spaced by from *c.* $1\frac{1}{2}$–2 diameters; intervals usually reticulately microsculptured. Scutellum black. Elytra slightly longer than broad (70 : 58), broadest at about middle, slightly acuminately narrowed to apices; punctures more deeply impressed than those of pronotum and appearing larger, mostly separated by 1 diameter or less; intervals smooth. Prosternum with intercoxal carinae indistinctly marked, convergent anteriorly. 6th abdominal sternite closely punctured and pubescent in front of broadly transverse apical fovea. Genitalia as in Figs 112–114.

Female

Sixth abdominal sternite not foveate, apical border of 5th sometimes slightly arcuate.

Type

Lectotype of *undecimpunctata*, 'Europa' [no data attached to specimen], LSL. Type material of *novaezealandiae* not examined.

Other Specimens Examined

Non-Australian: Europe, Mediterranean region, Iran, Iraq, North-west India, New Zealand, Falkland Is.

Tasmania: 6, Cranbrook, DAH; 9, Hamilton, DAH; 50, Bagdad, DAH; 1, Glenora, DAH; 1, Bushy Park, DAH; 3, Brighton, DAH; 65, Hobart, 4 BZA, 55 BM, 3 DAH, 1 QDPI, 2 TM; 1, Mt Wellington 1000 m, DAH; 2, Cremorne, QDPI; 1, 1 km NE. of Kingston, ANIC; 2, Grove, DAH; 1, Huonville, TM. **Western Australia:** 2, Perth, 1 WADA, 1 WAM; 4, Rockingham Park 39 km S. of Perth, HNH; 2, Lake Clifton, WADA; 2, L. Preston, WADA.

Total number of specimens examined (Australian): 152.

Comments

C. novaezealandiae, described by Colenso, but illustrated by Koebele (1890), was considered by Sharp (quoted in Riley 1891) to be a synonym of *undecimpunctata*. This opinion was regarded with reserve by subsequent authors outside New Zealand, up to and including

Iablokoff-Khnzorian (1982). However, having examined the available evidence and personally collected *undecimpunctata* in the South Island during 1981, I have no hesitation in accepting Sharp's conclusion.

As with *Adalia bipunctata*, all Tasmanian records of *undecimpunctata* are recent, the earliest, from Hobart, being a single specimen brought to the TM in February 1970. A few specimens were collected in each succeeding year until 1980 but, in 1981, a total of 109 specimens were found at four separate sites. The Western Australian records, beginning with a single specimen taken at South Perth in April 1959, also continued up to the time when the present work was begun in 1981.

Biology

Data labels on most of the Tasmanian specimens show that they were collected in cultivated areas and were feeding, both as larvae and adults, on various aphid species.

The records given by Schilder and Schilder (1928, p. 261), restricted to Great Britain and Egypt, suggest that *undecimpunctata* eats only aphids. Iablokoff-Khnzorian (1982, p. 357) gave selected references to the ecology of the species and (p. 359) listed the various aphids recorded as its prey. Most are from European studies, but two papers (Miller *et al.* 1936; Read 1965) considered the species in New Zealand, the former recording it as introduced for biological control in 1874, but being of little value because of a parasite introduced along with it, the latter listing 11 species of aphid as its prey.

Many accounts of the life history of *undecimpunctata* have been published, but the fullest and most copiously illustrated is that by Ibrahim (1948), based on the subspecies *aegyptiaca* Reiche. As with *Adalia bipunctata*, many colour varieties of *undecimpunctata* have been named (Mader 1932 lists 33), but again they seem of little relevance to the Australian populations.

Coccinella transversalis Fabricius

(Figs 11, 66, 69, 75, 79, 109–111)

Coccinella transversalis Fabricius, 1781, p. 97; Mulsant, 1850, p. 1022; Masters, 1888, p. 89; Lea, 1902, p. 489; Timberlake, 1943, p. 14; Iablokoff-Khnzorian, 1979, p. 68; 1982, p. 391.

Coccinella repanda Thunberg, 1781, p. 18; Mulsant, 1850, p. 124; Crotch, 1871, p. 3; 1874, p. 117; Froggatt, 1902, p. 899; 1907, p. 209; Weise, 1902, p. 489; 1908, p. 11; 1923, p. 132; Korschefsky, 1932, p. 483. Synonymised by Mulsant, 1850, p. 1022.

Coccinella contempta Boisduval, 1835, p. 592. Synonymised by Mulsant, 1850, p. 126.

Size

Length 3·8–6·7 mm. Breadth 3·3–5·45 mm.

Description

The outline and colour pattern of this widespread and common species (Fig. 11) are so nearly constant in all Australian examples so far seen that a formal description is not given. The slight possibility that some colour variant of *Coelophora inaequalis* (Fabricius) or *Menochilus sexmaculatus* (Fabricius) might be mistaken for *transversalis*, or that the reverse might happen, should be eliminated by examination of the generic characters.

The external sexual differences in *transversalis* are very slight, but apparently constant. In the male the last visible abdominal sternite is slightly emarginate apically and the penultimate broadly but shallowly so. In the female the last sternite is arcuate apically and the penultimate either straight or shallowly arcuate across the apical border. Genitalia as in Figs 109–111.

Types

Lectotype ♀ of *transversalis*, Coccinella transversalis Fabr. spec. ins n. 24 [black-bordered, handwritten label in Banks collection], BM. Lectotype ♀ of *repanda*, repanda Mus. Thunb [Thunberg's handwriting], ZIU. Type of *contempta* not found. Boisduval gave as data

'collection de M. Dejean'. Mulsant (1850) refers to the 'type' in Dejean's collection. No specimen or label bearing the name exists there today. The synonymy is retained on the assumption that Mulsant actually saw the original specimen(s).

Other Specimens Examined

Non-Australian: India and Sri Lanka, Chagos Archipelago, China, Vietnam, Burma, Andaman Is, Cocos Keeling Is, Malaysia (Malaya), Indonesia (Sumatra, Java, Borneo, Sulawesi), Philippines, Solomon Is, New Caledonia, Loyalty Is, New Hebrides, Fiji, Samoa, Cook Is, Tubai Is, Society Is, Tuamotu, Marquesas Is.

Queensland: Hann R., Kennedy Rd; Butchers Hill; Station Ck 17 km N. of Mt Molloy; Cairns; Kuranda; Redlynch; 18 km SW. of Kuranda; junction of Goldmine and Davies Cks Kuranda–Mareeba Rd; Mareeba; Edmonton; L. Barrine; Atherton; Alamden, Chillagoe district; 11–22 km W. of Herberton nr Watsonville; Evelyn; Millaa Millaa; Maalan Ck 13 km E. of Ravenshoe; 21 km W. of Ravenshoe, Mt Garnet Rd; E. Palmerston Natl Park; South Johnstone; Utchee Ck; Normanton; Forty Mile Scrub via Mt Garnet; Silkwood; Cardstone; Doomadgee Mission; Rudd Ck Minnamoolka Rd; Ingham; Mt Spec, Paluma; Townsville; Ayr; Lake Mondarra 20 km from Mt Isa; Bucasia nr Mackay; Blacks Beach nr Mackay; Finch Hatton Gorge W. of Mackay; Broken R., Eungella; Wokingham Ck 64 km NW. of Winton; Winton, Longreach; Palm Ck 5·6 km ESE. of Byfield; Byfield; Clermont; Diamantina R.; Yeppoon; Rockhampton; 62 km S. of Boulia; Emu Park NE. of Rockhampton; Lady Musgrave I.; Emerald; Mourangee Stn nr Edungalba 80 km SW. of Rockhampton; nr Dawson R., 5 km SW. of Mourangee Station; Awoonga Dam, Boyne R., SW. of Gladstone; Lady Elliott I.; 25 km S. of Bedourie; Meteor Downs, Springsure; Rosedale; Moore Park, Gooburrumshire 22 km N. of Bundaberg; Bundaberg; Burnett R., N. of Eidsvold; Pine Ck 19 km S. of Bundaberg; 11 km NE. of Cordalba; 80 km N. of Birdsville; Eidsvold; Crater Lakes Natl Park, SW. of Biggenden; Gayndah; 48 km WSW. of Birdsville; Noosa Heads; Peregian; Caloundra; Brisbane R., 4 km N. of Harlin; Elimbah; Bribie I.; Deception Bay; 3·2 km W. of Oakey, Redcliffe; Mt Glorious; 10 km SE. of Oakey; Brisbane; Ormiston; Purrawunda; Malu 2 km NW. of Jondaryn; Mt Russell; Lawes; Toowoomba; Gatton; L. Dyer nr Laidley; Wyreema; Charlwood; Mermaid Beach; Broadbeach; Currumbin Ck; Eulo; Palen Ck 11 km SW. of Rathdowney; Amiens; Stanthorpe; Kelso. **New South Wales:** 6·4 km from Woodenbong; 10 km SE. of Murwillumbah; Upper Richmond R., 13 km from Woodenbong; Mt Warning; Blakebrook; Whian Whian State Forest nr Lismore; Bogo State Forest; Eltham; Middle Pocket nr Billinudgel; Broken Head Nature Reserve, 8 km S. of Byron Bay; Wollongbar; 6·4 km S. of Woodburn, SW. of Ballina; Lightning Ridge; Graman; 42 km NE. of Grafton; Mt Gibraltar Natl Park; Grafton Exp. Farm; 15 km SE of Grafton; Terewah [=Narram] Lake; Mt Topper State Forest; Walgett; Barwon Overflow; Llangothlin; Wee Waa; Bruxner Park; Dorrigo; Dorrigo Natl Park; Narrabri; Boambee; Pilliga; Raleigh; Warwick Farm; Point Lookout via Ebor (1700 m); Mundowey; Wagga; Conamble; St Helens Ck, Macleay district; Gunnedah; Apsley Falls; 32 km from Coolabah; Gnalta Stn nr Broken Hill; Stony Ck Falls, 37 km SW. of Walcha; Dungal Ck; Garrawilla, Mulalley; Curlewis; Kuring-Gai; Walcha–Wauchope Rd; 6·4 km N. of Telegraph Point nr Port Macquarie; SE. of Coonabarabran; Wambelong Ck, Warrumbungle Natl Park; Winburndale Natl Park, Reserve 21 km E. of Coonabarabran; 8 km E. of Warrumbungle Forest; 10 km NW. of Port Macquarie; Nundle; Eungai Ck nr Port Macquarie; Wauchope; Quirindi; Nyngan district; Warra; Mendooran; Wingham; 21 km NE. of Trangie; Whecogo 19 km NE. of Dunedoo; Tubrabucca; Broken Hill; Barrington Tops; Berrico via Gloucester Tops; Upper Williams R.; Upper Colo R.; Mr Cutter's Pass, Williams R.; Quondong, 52 km SE. of Broken Hill; Lister Park, Upper Allyn; Chichester State Forest via Dungog; Tuglo Reserve nr Singleton; Dubbo; L. Menindee; Denman; Menindee; Dungog State Forest; Singleton; Branxton; Hawks Nest; Lochinvar; Putty Road; 13 km NE. of Raymond Terrace; Raworth; Newcastle; Condobolin; Molong; Round Hill nr Euabalong; Freeman's Waterholes, 27 km SE. of Cessnock; 23 km E. of Parkes; Orange; Forbes; Narara; Mooney Mooney Ck nr Gosford; Bathurst; Gosford; 2·4 km NE. of Eugowra; Murray R. 80 km W. of Wentworth; Millthorpe; Terrigal; Milsan I.; Broken Bay; Kurrajong Heights; Pitt Town; Mt Piddington, Mt Victoria, Blue Mts; Arcadia; Windsor; Blackheath, Blue Mts; Kenthurst; Lawson; Ooma Ck, Nags Head, NW. of Grenfell; Wentworth Falls; Cowra; Sydney; Nampoo Billabong 90 km from Mildura; Engadine; Curlwaa; Menangle Hill; Helensburgh; Trentham Cliffs; Bulli Pass; Loddon Falls nr Bulli; Mt Keira (300 m); Taralga; Wongawilli via Wollongong; 19 km NE. of Moss Vale; Mittagong; Wyvern, Bringagee; Roslyn; 'Illawarra'; Sturt Hwy 19 km WSW. of Hay; Leeton; Darlington; Yanco; 11 km SE. of Harden; Fitzroy Falls; 22 km NE. of Goulburn; Mt Jamberoo; Minnamurra Falls; Kiama; Junee Reefs; Goulburn; Eurolie–Narrandera Rd; Gerroa; Nowra; Beecroft Head N. of Jervis Bay; Burrinjuck Dam; Jervis Bay; Gundagai; Goodrabigbee R.; 30 km NE. of Canberra via Gundaroo; Purrorumba, L. George; Limekiln; Conargo; Queanbeyan; 11 km N. of Braidwood; Cooleman Plain; Deniliquin; 11 km N. of Finley; Lobbs Hole;

Clyde Mtn; Caldwell; Durras North; Batemans Bay; 16 km N. of Holbrook; Cabbage Tree Ck nr Monga; Sherlock Ck 17 km S. of Captains Flat; Kiora nr Moruya; Congo Point, 8 km ESE. of Moruya; Tuross Head; Bringenbrong; Cooma; Kosciusko; Mt Kosciusko (2250 m); Brown Mtn; Eden. **Lord Howe Island. Australian Capital Territory:** L. George; Uriarra; Kowen Forest; Canberra; Molonglo Gorge; 9 km E. of Brindabella; Najor Orchard nr Narrabundah; 2 km S. of Picccadilly Circus; Bull's Head (1400 m); Tidbinbilla; Kangaroo Ck; Mt Gingera (1800 m); Honeysuckle Ck 8 km SW. of Tharwa. **Victoria:** Robinvale; L. Hattah; Wyperfeld Natl Park, 51 km NW. of Hopetoun; Birchip; Ovens R. 22 km E. of Yarrawonga; Katamatite; Ardmona; Everton; Dimboola; Mitta Mitta R.; Little Desert Natl Park, 21 km S. of Kiata; Inglewood; Eight Mile Ck; Eustace Gap Ck, Dartmouth Dam area; Mt Buffalo Natl Park; Bright; Bogong; Hotham Heights (1600 m on snow); Mt Hotham (1900 m); Wartook; Halls Gap, Grampian Ranges; Mt Rosea, Grampian Ranges; Murrindindi R.; Silver Ck, 8 km S. of Flowerdale; 4 km N. of Kalkallo; Dolodrook R., Brady Pinch mine; Mt Robertson–Yan Yean via Arthurs Ck; Fernshaw; Jordan R. at Jericho; Healesville; Bacchus Marsh; Diamond Ck; Mt Donna Buang via Healesville; Launching Place; Melbourne; Kalorama; Powelltown; Lakes Entrance; Jordanville; Glenelg R., Dartmoor; Emerald; Beaconsfield; Fitzroy R.; L. Corangamite via Colac; Tyabb; Blairgowrie, Mornington Peninsula; Gibsons Beach, Port Campbell; Beech Forest via Colac; Mt Sabine Otway Ranges; Moonlight Head; Cape Otway; Mt Ramsay. **Tasmania:** King I.; Stanley; Elliot; Herrick; Pipers R.; Winnaleah; Penguin; Scottsdale; Wilson North Down; Forthside; Tewkesbury; Melrose; Georges Bay; Barrington; St Patricks R.; Freshwater Point; Launceston; Mathinna; Cressy; Conara Junction nr Campbelltown; Great Lake; Cranbrook; L. St Clair; Freycinet Peninsula; Parattah; Ouse; Kempton; Hamilton; Bagdad; Bushy Park Peninsula; Tyenna; New Norfolk; Sorell; Cambridge; Hobart; Tarooma; 1 km NE. of Kingston; Ranelagh; Cape Contrariety. **South Australia:** Simpson Desert; 30 km E. of Poeppels Corner Bench Peg 6878, Simpson Desert Natl Park; Eyre Ck, Terachi Waterhole, Simpson Desert; Andrewilla Waterhole, 80 km N. of Birdsville; Alton Downs old HS. 48 km WSW. of Birdsville; 170 km E. of Purni Bore in Trachoemenu, Simpson Desert; Ajax Mine nr Copley; Creek nr Victory Well, Everard Park Stn; 6 km S. of Maynards Bore, Everard Ranges; Blods Ck, Oodnadatta; Cowarie; New Kalamurina HS., Warburton R.; Coopers Ck Ferry Crossing; L. Eyre; Etadunna HS., Birdsville Track; L. Palankarinna; 23 km SSW. of Etadunna HS.; 4·8 km NE. of Marree; Callabonna; Arkaroola HS.; Boll and Bolland WH, Arkaroola Station; Gammon Plateau; Arcoona Ck, Gammon Ranges; 1·6 km ESE. of Ooldea; Owieandana, Flinders Ranges; Leigh Ck; Arooma Ck; L. Frome; Kingoonya; Chambers Gorge; Eringunda Valley Flinders Ranges; 3 km N. of Blinman; Angorichina Hostel; Parachilna Gorge; Koonalda Cave area; 14·4 km S. of Nullarbor HS.; Wilpena Pound; Arkaba; Mernmerna, 33 km N. of Hawker; 54 km SW. of Nullarbor HS.; Wilson Bluff, 1·6 km E. of cairn, Eucla Basin; Elders Ranges; Hawker; Binberrie Hill, Boolcoomata Station; Ceduna; 5 km W. of Mudamuckla; Bosanquet Bay; Quorn; Paralana Hot Springs, 24 km N. of Yunta; Franklin I.; 96 km SE. of Nonning HS.; Orroroo; Melrose; Port Germein; Whyalla; Hambridge Natl Park; Spalding; Booborowie; Rudall; Verran Hill Track, Hincks Natl Park; Hincks Natl Park; Sevenhill; Mortlock Research Institute, 5 km N. of Auburn; Cadell; 14 km NW. of Ungarra; Port Arthur; Renmark; Paringa; Waikerie; Port Clinton, St Vincent Gulf; Sinclair Flat, Murray R.; Lyrup; South Kilkerran, Yorke Peninsula; Greenly I.; River Flat 2 km N. of Portee Station; Loxton; Nuriootpa; Reevesby I.; Turretfield; 6·4 km E. of Two Wells; Virginia; Minlaton; Corny Point, Yorke Peninsula; Adelaide; Woodside; Mt Lofty Ranges; Yorketown; Mt Barker; south of Halletts Cove, north of Curlew Point; Port Stanvac; Port Noarlunga; 11 km S. of Lameroo; coastal sand-dunes between Sellicks Hill and Mt Terrible Ck; Yankalilla; Goolwa; Goolwa–Middleton; Murray R.; Tapanappa, Cape Jervis; Culburra; Kangaroo I. (inc. Rocky River, Castle Hill); the Coorong 36 km S. of Meningie; Hindmarsh Park Stn; Kingston; Mt William, Gambier Ranges (1170 m); Mt Gambier; 12 km S. of Mt Gambier. **Western Australia:** Queen I.; Kununurra; 8 km S. of Cape Bertholet, W. Kimberley; Derby; Ord R.; Langey Crossing, Fitzroy R.; Cocoa Beach, Trimouille I., Monte Bello Is; Hermite I., Monte Bello Is; Cossack Peninsula; Yandeearra Stn; Millstream; Fortescue R., Hamersley Range; Yardie Ck, Station Cape Range; Rudall R.; Chabjuwardoo Bay; Wongon Hills; Newman; 7 km SE. of Newman; 10 km SE. of Newman; Killagurra Spring, Durba Hills, Canning Stock Route; Carnarvon; Towrana; 6·4 km SSE. of Minilya; Warburton Ranges; 28 km WSW. of Warburton; Wiluna; 18 km S. of Nerren Nerren; Murchison House Stn; Kalbarri; 60 km N. of Ajana; 280 km N. of Neale Junction; 17 km W. of Binnu; Yuna; Emu Fields 480 km NW. of Woomera; 17 km N. of Geraldton; Rat I., Easter Group, Houtman Abrolhos; 5 km NE. of Geraldton; Geraldton; Walkaway; Morawa; River Cave, Arrowsmith R. nr Dongara; Dongara; Yundamindra HS.; 2·5 km N. of Mt Linden; 8 km S. of Paynes Find; 9·8 km SSW. of Mt Linden; 61 km NE. of Wubin; 48 km NE. of Wubin; Buntine Res. Stn; 1·5 km S. of Mt Jackson; 12 km NW. of Watheroo; Dalwallinu; Bishops Hole; 12 km NNE. of Bungalbin Hill; 5–20 km N. of Moora; Ballidu; Moora; Dandaragan; 2 km N. of Cataby via Dandaragan; Lakewood; Koorda; Waddouring;

Cowalla Pool, Moore R.; 21 km SE. of Karonie; Wannamal; Yelben; Wyalkatchem; Mullamullang Cave (Doline), Eucla Basin; SE. edge of Harris Lake 23 km S. of Zanthus; Moorine Rock; Goomalling; 13 km NW. of Widgiemootha; Toodyay; Meckering; Tammin; Weebobby Cave, Eucla; Waylunga Natl Park; Eucla; Wooloroo; 1·6 km NE. of Mundrabilla HS.; L. Leschenault; Split Rock, 29 km N. of Mt Holland; Perth; Rottnest I.; Fremantle; Maddington; North Lake; Spearwood; Jandakot Res. Stn; 70–75 km ENE. of Norseman; Churchman Brook; Norseman; Coolongup, 38 km S. of Perth; Rockingham Park 39 km S. of Perth; Penguin I.; Jarrahdale; Wamenusking; East Brookton; 0·6 km W. of L. Cronin; Serpentine Dam; Serpentine River, Albany Hwy; nr Emu Rock, 53 km E. of Hyden; John Forrest Natl Park, Darling Ranges; Bannister; Harvey; Dryandra Forest, Cuballing; Mandurah nr Yalgorup Natl Park; Narrogin; Salmon Gums; Williams; 16 km E. of Newdegate; Myalup; L. Grace; Binningup; Bunbury; L. Bryde; Collie; 37 km W. of Mt Ragged; 11 km SW. of Mt Ragged; Capel; Donnybrook; 13 km N. of Busselton; 27 km N. of Kojonup; 60 km W. of Israelite Bay; Yallingup; Busselton; 4 km W. of Fitzgerald; Katanning (Keast arboretum); Wilga; Thomas R.; Point Malcolm; Kojonup; Esperance Bay; Red Gum Spring, Stirling Ranges; 23 km WNW. of Mt Arid; Fitzgerald R. nr Ravensthorpe; 3 km N. of Hopetoun; Ongerup; Augusta; Pemberton; Stirling Natl Park; Mt Barker; Denmark; North Walpole; Albany; Balkuling; Ravensthorpe. **Northern Territory:** Darwin; Vesteys Beach, Darwin; Berrimah nr Darwin; Middle Point nr Holmes' Jungle; Fogg Dam; Coomalie Ck 88 km S. of Darwin; Batchelor; Stapleton; Arnhem Hwy on Pine Ck Rd; Kakadu Natl Park; Tipperary Stn; Daly R.; Groote Eylandt; Fergusson R.; Roper R.; Delamere; 8 km ENE. of Victoria River Downs; West Baines R.; 4 km S. of Brunette Downs; Alexandria; Tennant Ck; Soudan Stn 100 km W. of Camooweal; Chilla Well; Illungnarra WH., 90 km SSW. of Urandong; Limestone bore, Anburla HS.; Milton Park HS.; 30 km NNW. of Alice Springs; Simpsons Gap, 17 km WNW. of Alice Springs; 39 km E. of Alice Springs; Alice Springs area; Ellery Gorge, 85 km W. of Alice Springs; Palm Valley, Finke Gorge Natl Park; Hermannsberg; 43 km SW. of Alice Springs; Ewaninga, 31 km ESE. of Alice Springs; Finke R.; Andado Stn; 9 km N. of Kulgera.

Specimen depositories: AM, AMR, ANIC, BCRI, BM, DAH, DASA, DAV, DLN, DPIM, DPPD, DSIR, FCN, FCQ, FCV, HDN, HNH, LRS, LU, MM, MVM, NTM, QDPI, QM, SAM, TM, UQ, UWA, WADA, WAIT, WAM, WARI, W-H, ZIU.

Total number of specimens examined (Australian): 2845.

Comments

Although the name *repanda* has been used quite frequently as the valid name for this species, there is no doubt, as Mulsant (1850, p. 1022) pointed out, that Fabricius's description of *transversalis* appeared in print several months before Thunberg's publication.

Biology

Schilder and Schilder (1928, p. 261) gave a few references to the aphid-feeding habits of the species. Koebele (1893, p. 23) recorded it as widespread in Australia and feeding on various species of aphid, including 'woolly aphis'. Label data also suggests that *transversalis* is an obligate aphid feeder.

Genus **Cleobora** Mulsant

Cleodora Mulsant 1850, p. 160 (n. preocc. Peron & Lesueur, 1810 [Mollusca]). Type-species *Cleodora mellyi* Mulsant, by monotypy.

Cleobora Mulsant, 1850, p. 1025 (replacement name for *Cleodora*); 1866, p. 122; Iablokoff-Khnzorian, 1982, p. 301.

Description

Medium to large (5–8 mm long), not very convex, somewhat elongate (Fig. 3). Head with anterior clypeal border almost or quite straight between lateral projections; frons not greatly narrowed between moderate-sized eyes; antennae *c.* 2× as long as minimum frontal width. Pronotum convex across disc, concave on either side within lateral borders, concavity often more marked over basal half; anterior angles rather narrowly rounded, hind angles more broadly so; anterior border arcuate medially; hind border more or less truncate in front of scutellum, apparently very shallowly emarginate on either side. Scutellum acutely pointed behind, slightly transverse. Elytra slightly elongate (*c.* 17 : 15), subacuminate apically;

convex on disc, humeral callosities prominent, explanate external margins moderately broad from shoulders to *c.* $\frac{1}{3}$ from apices, narrowed thence to apicosutural angles. Pronotal hypomera without foveae. Prosternum compressed medially, intercoxal process broadly rounded apically, without longitudinal carinae. Mesosternum broadly excavate anteriorly to receive apex of prosternal process. Abdomen with 5 clearly visible sternites, 6th almost obscured by 5th in female, more obvious in male; postcoxal plates of 1st sternite without the oblique dividing line of Fig. 79, intercoxal process of 1st sternite unusually narrow and strongly rounded at junction with metasternum.

Included species. One.

Distribution. Australia.

Cleobora mellyi (Mulsant)

(Figs 3, 118–120)

Cleodora mellyi Mulsant, 1850, p. 160.
Cleobora mellyi (Mulsant), 1866, p. 123; Crotch, 1874, p. 133; Iablokoff-Khnzorian, 1982, p. 301.
Halyzia mellyi (Mulsant); Masters, 1888, p. 90; Lea, 1902, p. 490.

Size

Length 5–8 mm. Breadth 4·5–6·5 mm.

Male

Outline and dorsal colour pattern almost always as in Fig. 3, although dark transverse elytral bands may vary in thickness and, occasionally, coalesce; dark areas black, pale areas yellow. Underside of pronotum yellow except for posterior third of lateral margins, hind margins and postcoxal extensions; prosternum black; mesosternum black, epimera pale yellow; metasternum black; abdominal segments mostly black, but usually with a sublateral pale area on each side of first 4 visible sternites; elytral epipleura pale except where black pattern of upper surfaces reaches edges of elytra; legs with femora usually black on rearward surfaces, particoloured on forward-facing surfaces, tibiae and tarsi generally pale-coloured. Head with frontal and clypeal punctures small, separated by 1–2 diameters, intervals with reticulate microsculpture; antennae with segments 3–11 elongate, segment 10 only slightly so. Pronotum with punctures slightly smaller than those of head, usually separated by >1 diameter, but more closely set anteriorly and anterolaterally, more sparsely arranged toward posterior angles, intervals usually with rather faintly impressed reticulate microsculpture; lateral margins usually with an ill-defined, narrowly raised outer border, sometimes confined to anterior half; anterior and posterior margins unbordered. Scutellum with sparsely arranged punctures smaller than those of pronotum, intervals usually smooth. Elytra with external margins having a narrowly thickened outer border; punctures of disc and margins of 2 sizes, variably separated, but usually by >1 diameter, smaller punctures similar in size to those of pronotum, larger punctures deeper than smaller punctures, their borders ill-defined; intervals between punctures smooth, shining. Prosternum with intercoxal process transversely convex, sometimes with traces of longitudinal carinae near apex. Mesosternum convex, transversely ridged on either side of anteromedian excavation. Metasternum frequently transversely rugulose laterally. Abdominal sternites with intervals between punctures reticulately microsculptured, more obviously so toward lateral borders; apical border of 5th sternite broadly truncate, 6th truncate apically. Genitalia as in Figs 118–120.

Female

With apical border of 5th abdominal sternite broadly arcuate.

Types

Lectotype ♀, Museum Paris Australie Verreaux 1 – 46/ 1·46 [circular accession label, pink on reverse]/ 58 [printed label]/ Cleobora mellyi Muls. auct. det., MNHN. Paralectotypes 5; 1 ♂, 1 ♀, Museum Paris, Tasmanie, J. Verreaux 1844/ 3·44 [circular accession label, pink on reverse], MNHN; 2 ♂, 1039 Cleobora mellyi Muls. nov. holl., MNHN; 1 ♀, Type mellyi Guerin, ZM.

Other Specimens Examined

Queensland: Rockhampton, (pre-1960), BM; Lamington Natl Park, 1928, SAM. **New South Wales:** Pilot Hill Park, Bogo State Forest; Deer Vale; Barrington Tops; Tubrabucca; Mt Irvine; Blackheath; nr Jenolan Caves; Sydney; Alpine Way; Gerroa; Braidwood; Blowering Dam; Clyde Mtn; Old Adaminaby; Tuross; Mt Kosciusko. **Australian Capital Territory:** Uriarra; Canberra; Blundells. **Victoria:** Redcliffs; Warracknabeal; Upper Kiewa; Tallandoon; Eustace Gap Creek, Dartmouth Dam area; Harrietville; Bogong High Plains; Mt Buller; Toorurong Reservoir; Humevale; Kinglake; Yan Yean area; Healesville; Melton; Warburton; Don R., 4 km NW. of Launching Place; Melbourne; Singleton Reserve, Mt Dandenong; Dandenong Ranges; Powelltown; Ferntree Gully; Monbulk; Emerald; Lysterfield; Warragul; Geelong; Otway Ranges; Moonlight Head; Wilsons Promontory; 'Gippsland'. **Tasmania:** King I.; 5 km SW. of Smithson; Table Cape; Burnie; Flowerdale R., Muenna; Arthur R.; Elliot; Winnaleah; Ridgley; Ulverstone; Devonport; Hellyer Gorge, 24 km N. of Waratah; Mt Dismal; Ringarooma; Binalong Bay; Underwood; St Patricks R., 31 km E. of Launceston; Forth Falls via Sheffield; Hill W. of Roland; Launceston; Interview R. area N. of Pieman R.; Pieman R.; Great Lake; L. St Clair; Dolphin Sands; Queenstown; Strahan; Meredith R. 19 km from Corinna; Freycinet Peninsula; Gordon R. Valley nr Smith R.; National Park 64 km NW. of Hobart; Florentine Valley; Bagdad; Ellendale; Mt Field Natl Park; Olga Camp; Tyenna; nr Maydena; Cambridge; Collinsvale; Hobart; Mt Wellington; L. Pedder; Huon R.; Tahune Forest, Arve Road; Southport. **South Australia:** Adelaide; Mt Lofty; Mylor; nr Kangarilla; Myponga; Tapanappa nr Cape Jervis; American River, Kangaroo I.; Mt Gambier. **Western Australia:** Croydon, 1.xi.1914, ANIC; Cunderdin; Spencers Brook; York; Mundaring; Perth; Bibra Lake; Beverley; Narrogin; Bunbury; Picton Junction; Ludlow; Yallingup; Busselton; Katanning; Thomas R. 23 km WNW. of Mt Arid; Margaret River; Hopetoun; 3 km SE. of Margaret River; Boranup; Karridale; Boranna; Deepdene; 8 km W. of Manjimup; Flinders Bay, Augusta; Takenup 30 km NNE. of Albany; Mt Barker; nr Porongorup; Porongorup; Nornalup; King George Sound, Albany.

Specimen depositories: AM, AMR, ANIC, BCRI, BM, DAH, DAV, DSIR, FCV, HDN, MVM, QDPI, QM, SAM, TM, UQ, UWA, WADA, WAIT, WAM, WARI, W-H.

Total number of specimens examined: 507.

Comments

The more northerly Queensland record, based on two specimens said to have come from 'coll. Pitcher', is regarded as suspect, especially as both have broad, black elytral markings typical of Tasmanian and other southern populations of *mellyi*. The ANIC example labelled 'Croydon, W.A.' is also accepted with reserve, the locality being so remote from all other Western Australian records.

Biology

An early record by Thompson (1893) associated *mellyi* with *Eriococcus* species on 'small eucalypts', but label data on specimens collected recently in Tasmania suggest that the species, at least as an adult, can feed on blackbean aphis. In contrast, Elliott and de Little (1980) have shown that *mellyi* can develop and reproduce, if rather slowly, when fed exclusively on the larvae of *Chrysophtharta bimaculata* (Olivier) (Coleoptera : Chrysomelidae), a species sometimes causing widespread defoliation of eucalypts in Tasmania. In passing, the authors refer to experiments being undertaken in New Zealand using *mellyi* as a possible control for another eucalypt-defoliating chrysomelid, *Paropsis charybdis* Stål. Preliminary studies in relation to this project were published in the 1977 and 1979 Reports of the New Zealand Forest Research Institute (pp. 51–3 and 48–9 respectively). Early difficulties in bulk rearing, thought at first to be caused either by low humidity or inadequate diet, were later overcome by the provision of psyllid-infested *Acacia*

baileyana. Mated adults commenced egg-laying and the resulting larvae fed on psyllids until after their second moult. Then they were offered *P. charybdis* eggs as well as psyllids. Survival was greatly improved and it is clear that, even more than is the case with *Harmonia conformis* (Boisduval), psyllids play an essential role in the survival of the species. Finally, in a recent paper (Bain *et al.* 1984) they announced their success in rearing the species on artificial diets as a prelude to release for biological control. To date, there appears to be no published account illustrating the early stages of *mellyi*.

Genus **Oenopia** Mulsant

Oenopia Mulsant, 1850, p. 420; 1866, p. 279; Crotch, 1874, p. 158; Korschefsky, 1932, p. 287; Timberlake, 1943, p. 56; Iablokoff-Khnzorian, 1979, p. 69; 1982, p. 398. Type-species *Oenopia cinctella* Mulsant, by subsequent designation, Sicard, 1907, p. 134.

Gyrocaria Timberlake, 1943, p. 39; Bielawski, 1964*b*, p. 83. Type-species *Coelophora guttata* Blackburn, by monotypy. Synonymised by Iablokoff-Khnzorian, 1979, p. 69.

Description

Small to medium-sized (3–6 mm long), strongly convex, often almost as broad as long, but sometimes distinctly elongate (non-Australian species). Head with anterior clypeal border apparently somewhat variable, usually straight but sometimes slightly emarginate between lateral projections; minimum width of head between eyes 2× the width of an eye, sometimes more; antennae scarcely longer than minimum interocular distance. Pronotum with anterior border strongly arcuate medially; raised lateral borders continuing along anterior border on each side behind eyes. Scutellum relatively large, $>\frac{1}{8}$ as broad at base as elytra at shoulders, usually a little broader than long. Elytra with explanate external margins narrow or moderately narrow; thickened external borders distinct and entire. Pronotal hypomera with or without a small, shallow fovea on each side, close to junction with prosternum; prosternal intercoxal process with longitudinal carinae of varying length. Anterior emargination of mesosternum not deep, but distinct (Fig. 77). Elytral epipleura with maximum width *c.* $\frac{1}{6}$ that of abdomen, strongly descending externally (as Fig. 87), without or with barely perceptible foveae at levels of middle and and legs. Postcoxal plates of 1st abdominal sternite with oblique dividing line or ridge (as Fig. 79), sometimes very faintly indicated.

Included species. 19 (Iablokoff-Khnzorian 1982).

Distribution. Europe, Asiatic Russia, Africa, India, Sri Lanka China, Japan, Philippines, New Guinea, Australia.

Comments

Timberlake erected *Gyrocaria* for the single species, *Coelophora guttata* Blackburn, allying it to *Oenopia*, but separating the two by differences in the male genitalia. Bielawski (1964*b*) accepted Timberlake's genus, adding to it *Coelophora parvula* Sicard from Borneo and a new species, *Gyrocaria minuta*, from New Britain. Iablokoff-Khnzorian (1979, 1982), again relying on genitalic characters but with, perhaps, a broader knowledge of the old-world fauna than Timberlake, synonymised *Gyrocaria* with *Oenopia*, suggesting that the presence of hypomeral foveae, cited by Timberlake in his description of *Gyrocaria*, was the only real distinction between the two genera and was not constant. The resulting assemblage has a rather wide range, both geographic and in external morphology, but, in the majority of cases, there is no doubt as to the genitalic similarity.

Oenopia, as it was originally described, included two new subgenera, *Aza* and *Pania*, as well as the nominate subgenus. Crotch (1874), incorrectly, designated *O. (Pania) addicta* Mulsant as the type-species of *Oenopia*. Later, Sicard (1907) noticed Crotch's error and, correctly, designated *O. cinctella*, one of the two species originally included in the nominate

subgenus. Korschefsky (1932) ignored both designations, incorrectly giving *O. (Aza) kirbyi* Mulsant as type-species. Timberlake (1943) rejected Crotch's designation, ignored Korschefsky's and, apparently unaware of Sicard's statement, designated *O. (s. str.) cinctella* as type-species for the second time.

Oenopia guttata (Blackburn)

(Figs 25, 77, 121–123)

Coelophora guttata Blackburn, 1892, p. 239; Lea, 1902, p. 490; Weise, 1923, p. 132.
Gyrocaria guttata (Blackburn); Timberlake, 1943, p. 39; Bielawski, 1964*b*, p. 83.
Oenopia guttata (Blackburn); Iablokoff-Khnzorian, 1979, p. 69; 1982, p. 400.

Size

Length 3·4–3·7 mm. Breadth 2·9–3·3 mm.

Male

Outline and dorsal colour pattern of yellow and black as in Fig. 25. Head yellow, yellow elytral patches never reaching external borders or suture; pronotal hypomera yellow, mesepimera usually yellow, remainder of underside black; anterior and middle legs usually entirely pale-coloured, hind legs dark-coloured, at least in part. Head with anterior clypeal border straight between lateral projections; surface of frons with punctures about as large as eye facets and separated by 1 or more diameters, intervals reticulately microsculptured, minimum frontal width between eyes a little $>2\times$ width of an eye; antennae slightly shorter than minimum frontal width, club compact, last segment obliquely truncated apically, segments 3–6 subequal. Pronotum transverse, almost $2\times$ as broad between unusually sharply formed hind angles as between anterior angles; anterior border arcuate medially, hind border evenly arcuate; disc and margins convex, not concave within narrowly raised lateral borders; punctures of disc and margins similar in size to those of head, becoming larger toward lateral borders, almost always separated by >1 diameter, sometimes by >2, intervals strongly micro-reticulate laterally, distinctly less obviously so toward middle of disc. Scutellum irregularly set with punctures smaller than those of pronotum, intervals smooth. Elytra with greatest combined width slightly more than median length (31 : 27), equally strongly convex longitudinally and transversely; explanate external margins narrow, broadest *c.* $\frac{2}{3}$ from shoulders; punctures of disc distinctly larger than those of pronotum, separation varying from by *c.* 1– 2 diameters, often difficult to assess as puncture rims curve gradually; punctures along explanate external margins more deeply impressed and larger than those of disc, variably spaced; intervals between elytral punctures shining, with very faintly indicated microsculpture. Prosternum with intercoxal carinae more or less parallel (Fig. 77), stopping anteriorly at *c.* $\frac{1}{4}$ from anterior prosternal border. Postcoxal plates of 1st abdominal sternite with a faint oblique dividing line, apical border of 5th broadly emarginate, of 6th briefly and shallowly emarginate. Genitalia as in Figs 121–123.

Female

Head black; anterior and middle legs and mesepimera frequently partly black also. Apical border of 5th abdominal sternite broadly impressed, not as a rule emarginate, 6th arcuate apically.

Types

Lectotype ♂, T [on mounting card]/ Type [circular, red-bordered, BM Type label]/ 4427/ Coelophora guttata Blackb. [Blackburn's handwriting], BM. Paralectotypes 2; N. Queensland Blackb's Coll./ Coelophora guttata, Blackb, co-type [Blackburn's handwriting], SAM.

Other Specimens Examined

Non-Australian: New Guinea (West Highlands, Sepik district, Goroka, Arona).

Queensland: 2, Julatten, 1 BM, 1DPIM; 5, Kuranda, 1 ANIC, 3 BM, 1 SAM; 4, Redlynch, 1 ANIC, 3 BM; 28, Cairns and Cairns district, 1 AM, 2 ANIC, 1 DAH, 2 MM, 2 MVM, 1 QDPI, 2 QM, 14 SAM, 1 UQ, 2 W-H; 1, Davies Ck via Mareeba, QDPI; 1, Bellenden Ker Mts, BM; 1, Millaa Millaa, AMR; 1, Kalbo Junction, QDPI; 1, East Palmerston, ANIC; 1, South Johnstone, ANIC; 1, Mission Beach, QDPI; 1, 'Queensland', AM.

Total number of specimens examined (Australian): 47.

Comments

From the distribution of close relatives (Bielawski 1964*b*) and the apparent range of *guttata* itself, this species would appear to be, like *Cryptolaemus affinis* Crotch, a New Guinea taxon in process of extending its southern limits, probably with the help of human traffic and trade.

Biology

Timberlake (1943, p. 39), quoting Koebele's collecting records, gave orange and *Hibiscus* as host plants and psyllids as prey. This is supported by the data attached to the specimen from Mission Beach and added to by those from South Johnstone, said to be 'feeding on mealybug on Peuro'.

Genus **Synona**, nom. nov.

Synia Mulsant, 1850, p. 375 (n. preocc. Duponchel, 1845 [Lepidoptera]); 1866, p. 248; Crotch, 1874, p. 177; Korschefsky, 1932, p. 276; Timberlake, 1943, p. 56; Bielawski, 1964*c*, p. 23; Iablokoff-Khnzorian, 1979, p. 74. Type-species *Synia melanaria* Mulsant, by subsequent designation, Crotch, 1874, p. 177.

Lemnia (Synia) Mulsant; Iablokoff-Khnzorian, 1982, p. 232.

Description

Medium to large (5·3–6·9 mm long); strongly convex, barely longer than broad. Elytra black, pronotum orange-brown or black with varying amounts of yellow laterally; head black or pale-coloured. Head (Fig. 48) with anterior clypeal border clearly emarginate between lateral projections; minimum frontal width *c.* 2× that of an eye; antennae slightly longer than minimum frontal width (*c.* 17 : 15), last segment of club obliquely truncate apically. Pronotum *c.* 2× as broad as median length; anterior border arcuate medially behind head; lateral borders not sinuate behind anterior angles; hind border evenly arcuate; disc evenly convex transversely; lateral margins very narrowly reflexed, somewhat more strongly so toward anterior angles, upturning continuing along anterior border as far as exterior margin of eye on each side. Scutellum at base *c.* $\frac{1}{8}$ as broad as elytra at shoulders, equilaterally triangular or slightly transverse. Elytra very slightly elongate; not at all subacuminately rounded to apicosutural angles; humeral callosities feebly to moderately well-marked; disc strongly convex longitudinally and transversely; lateral margins little explanate; thickened lateral borders entire, shallow, broad for the most part but narrowed apically to apicosutural angles. Pronotal hypomera with subanterior foveae small, but distinct; intercoxal process of prosternum with longitudinal carinae often not extending much beyond halfway to anterior border of prosternum. Mesosternum with anterior emargination distinct and abruptly limited on each side, posterior border backwardly angled medially, matching backwardly angled emargination of metasternum between midcoxae. Elytral epipleura at most *c.* $\frac{1}{6}$ as broad as metathorax, foveae at level of middle and hind legs distinct, usually with sharply defined borders. Postcoxal plates of 1st abdominal sternite (Fig. 82) with an oblique dividing line extending from posterior border forward to about halfway from anterior border of sternite; 6th clearly visible in both sexes.

Included species. Two.

Distribution. India, Sri Lanka, Vietnam, Taiwan, Central China, Philippines, New Guinea, Australia.

Comments

Although Iablokoff-Khnzorian (1982) chose to regard *Synona* (as *Synia*) as no more than a subgenus of his expanded *Lemnia*, it is considered here that the genitalic differences and external characters, especially the emarginate anterior clypeal border, combine to justify its resurrection to full generic status.

Synona seminigra (Weise), comb. nov.

(Figs 4, 48, 115–117)

Coelophora seminigra Weise, 1902, p. 501; Korschefsky, 1932, p. 296.
Synia seminigra (Weise); Bielawski, 1964*c*, p. 24.
Lemnia (Synia) seminigra (Weise); Iablokoff-Khnzorian, 1982, p. 232.

Size

Length 5·4–6·7 mm. Breadth 3·9–5·9 mm.

Male

Outline and dorsal colour pattern of yellow and black as in Fig. 4. Head orange-ellow; underside and legs unicolorous testaceous except for black or mostly black elytral epipleura. Head with punctures on disc about as large as eye facets, usually separated by *c.* $1\frac{1}{2}$ diameters, intervals strongly micro-reticulate. Pronotum with punctures mostly *c.* $\frac{1}{2}$ as large again as those of head, but a few micropunctures also present, separation of larger punctures somewhat variable, but usually by from a little <1–*c.* 2 diameters, intervals between punctures with reticulate microsculpture similar to that of head, but much less deeply marked in some examples. Scutellum slightly broader than long, variably set with punctures much smaller than larger pronotal punctures. Elytra with humeral callosities moderately well-marked; discal punctures variable in size, distinctly smaller than larger pronotal punctures, separated as a rule by at least 2 diameters; some punctures along explanate external margins much larger than those elsewhere and more deeply impressed; intervals between punctures smooth, without microsculpture. Apical border of 5th abdominal sternite shallowly, but entirely emarginate, of 6th briefly and shallowly emarginate medially. Genitalia as in Figs 115–117.

Female

Disc of head black, pale parts of pronotum reduced to narrow areas along anterior and lateral margins from anterior angles, generally limited to anterior $\frac{1}{2}$ of each lateral margin and outermost $\frac{1}{4}$ of anterior margin on each side; prosternum often darker than rest of underside; apical border of 5th abdominal sternite truncate, that of 6th evenly arcuate.

Type

Lectotype ♀, (designated by Bielawski, 1964*c*, p. 25 [as 'Typus']), N. Guinea, Fenichel/ TYPUS/ Coelophora seminigra Ws., TMB [not examined].

Other Specimens Examined

Non-Australian: New Guinea (Gulf District, Central District, Kokoda, North District, Madang District).

Queensland: 1 ♀, Banks [Moa] I., MVM; 1 ♂, 1 ♀, Iron Range, BM; 1 ♀, Coen district, MVM; 1 ♂, Southedge via Mareeba, DPIM; 1 ♂, 20·4 km W. of Ravenshoe Mts, Mt Garnet Rd, ANIC; 1 ♂, Bowen, QDPI; 1 ♀, Cooloola, DSIR. **Northern Territory:** 1 ♂, Darwin, NTM; 6 ♂, 6 ♀, East Point Reserve, Darwin, 8 NTM, 4 BM.

Total number of specimens examined (Australian): 21.

Comments

The type species of *Synona, melanaria*, described from 'the East Indies', is, according to Iablokoff-Khnzorian (1982), distributed from India east to Taiwan and south to the Philippines. It is very similar in size and general appearance to *seminigra*, but may usually be distinguished externally by the fact that, in the males, the pronotum is entirely yellowish-orange, while in the females a large median black area extends from the base almost to the anterior border.

Biology

Nothing is known of the food and habits of *seminigra* except that those found in the Northern Territory during 1980 were seen to attack nymphs of *Coptosoma* spp. (Hemiptera : Plataspidae) (M. Malipatil, personal communication). This observation parallels the account given by Subramanyan (1925), who recorded *Coptosoma ostensum* Distant as the essential prey of *S. melanaria* in India.

Genus **Coelophora** Mulsant

Coelophora Mulsant, 1850, p. 390; 1866, p, 257; Crotch, 1871, p. 7; 1874, p. 148; Chapuis, 1876, p, 195; Korschefsky, 1932, p. 290; Timberlake, 1943, p. 31; Chazeau, 1978, p. 59; Iablokoff-Khnzorian, 1979, p. 61; 1982, p. 265. Type-species *Coccinella inaequalis* Fabricius, by subsequent designation, Crotch, 1874, p. 148.

Lemnia Mulsant, 1850, p. 376; 1866, p. 249; Crotch, 1871, p. 7; Timberlake, 1943, p. 30; Iablokoff-Khnzorian, 1979, p. 62; 1982, p. 218. Type-species *Lemnia fraudulenta* Mulsant (= *Coccinella biplagiata* Schoenherr), by subsequent designation, Korschefsky, 1932, p. 290. Synonymised by Crotch, 1874, p. 148.

Microcaria Crotch, 1871, p. 7; Timberlake, 1943, p. 33. Type-species *Coccinella (Daulis) mulsanti* Montrouzier, by subsequent designation, Rye, 1873, p. 329. Synonymised by Crotch, 1874, p. 148.

Coelophora (Lemnia) Mulsant; Chapuis, 1876, p. 197; Korschefsky, 1932, p. 290.

Description

Small to medium-sized (4·3–7·1 mm long); strongly convex, only slightly elongate (*c.* 11 : 10). Head with anterior border straight between lateral projections; eyes (Fig. 53) relatively large and with well-rounded inner borders; minimum width of frons between eyes *c.* $1\frac{1}{2}\times$ maximum eye width; antennae almost $2\times$ as long as minimum frontal width, apical segment as long as broad, rounded or truncate apically, but not obliquely so. Pronotum *c.* $2\times$ as broad as median length or slightly more (*inaequalis*); evenly convex across disc to very narrowly upturned lateral borders, the upturning or thickening continuing along anterior border to above inner margins of eyes; lateral borders almost always faintly sinuate behind anterior angles. Scutellum *c.* $^1/_{10}$–$^1/_{11}$ as broad at base as elytra at shoulders. Elytra as long as broad, very slightly subacuminately rounded to apicosutural angles; disc strongly convex; explanate external margins steeply inclined, narrow; thickened external borders more or less flat-topped, steadily narrowed over posterior half to apicosutural angles. Pronotal hypomera (Fig. 78) with foveae distinct, more or less sharply bordered externally, about as long as precoxal part of prosternum; intercoxal prosternal process (Fig. 78) with longitudinal carinae ending at *c.* $\frac{1}{3}$ or $\frac{1}{4}$ from anterior border. Mesosternum (Fig. 78) with deep emargination of anterior border with an entire raised anterior edge, hind border sometimes angulately produced posteriorly. Elytral epipleura moderately descending externally (as Fig. 89), at most $\frac{1}{6}$–$\frac{1}{4}$ as wide as metathorax, foveae at level of middle and hind legs shallow, but discernible. Postcoxal plates of 1st abdominal sternite without an oblique dividing line or ridge; males with apical border of 6th abdominal sternite very shallowly emarginate, of 5th sometimes very shallowly emarginate, sometimes not; females with apical border of 6th sternite arcuate, of 5th truncate or very slightly arcuate.

Included species. As defined here *Coelophora* probably contains about 30.

Distribution. Asia north to China and Japan, south and east to Malaysia, Indonesia and widespread in the south Pacific region, including Hawaii, the Philippines, Micronesia, New Guinea, Australia and New Zealand.

Comments

When first erected, *Coelophora* included 21 nominal species. Crotch's (1874) synonymy of *Lemnia* and *Artemis* Mulsant with *Coelophora* and the addition of newly described species raised the total to 49. Opinion as to the composition of the genus has varied substantially since then. Korschefsky (1932) listed 75 included species. Timberlake (1943) removed several of these to distinct new genera and accepted *Lemnia* as separate also, but Iablokoff-Khnzorian (1979, 1982) reduced *Coelophora* to a single included species (*inaequalis*), referring most of the outcasts, along with others not previously in *Coelophora*, to a broadly defined *Lemnia* containing four subgenera. He admitted that there seemed to be no reason for isolating *Coelophora* in this way, other than the possession of a somewhat unusually-shaped spermatheca. With this in mind, the present author follows the example of Chazeau (1978), allowing a broader definition of *Coelophora*, accepting *inaequalis*, the type-species or, as no more than an aberrant member of the genus and so including *jansoni* Crotch along with *mulsanti* (Montrouzier) as the other Australian representatives of *Coelophora*.

The appearance, disappearance, reappearance and current status of *Microcaria* requires a comment. Listed in 1871 as a new genus including two species, *Daulis mulsanti* (Montrouzier) and *Calvia albolineata* 'Muls.', it was ignored by the same author in his later (1874) work, for *mulsanti* was included in *Coelophora*, and *albolineata*, this time correctly attributed to Schoenherr, was designated as the type-species of a new genus *Bothrocalvia*. As *mulsanti* was designated type species of *Microcaria* by Rye in 1873, Crotch's 1874 action effectively synonymised *Coelophora* and *Microcaria*. The latter genus was overlooked by Korschefsky (1932), but resurrected by Timberlake (1943), although he thought it might turn out to be a synonym of *Anisolemnia* Crotch (1874). The genitalic characters used by Timberlake to distinguish *Microcaria* are such that, if *Coelophora* and *Lemnia* are united, all three must be regarded as a single genus.

Key to species of *Coelophora*

1. Elytra black with an apical red patch on each; pronotum red, sometimes with anterior angles paler; elytral punctures apparently of more than one size, a consequence of varying depth of impression ..... *jansoni* Crotch

   If elytra black with pale apices, then pronotum with a mediobasal dark area of varying extent, elsewhere dark yellow; elytral punctures mostly of one size, although larger than elsewhere immediately within external borders 2

2(1). Elytra with fine, reticulate microsculpture between punctures, punctures small, separated on disc by several diameters; colour pattern (Figs 26–29) very variable .... *inaequalis* (Fabricius)

   Elytra quite smooth between punctures, punctures larger, deeper, separated by up to *c.* 2 diameters; dorsal colour pattern of brownish-yellow and black as either Fig. 44 or Fig. 45, or both types combined ..... *mulsanti* (Montrouzier)

Coelophora jansoni Crotch, comb. rev.

(Figs 46, 127–130)

Coelophora jansoni Crotch, 1874, p. 155; Lea, 1902, p. 490; Weise, 1923, p. 132; Korschefsky, 1932, p. 293.

Microcaria jansoni (Crotch); Timberlake, 1943, p. 33.

Lemnia jansoni (Crotch); Iablokoff-Khnzorian, 1982, p. 247.

Size

Length 5·2–6·5 mm. Breadth 4·3–5·4 mm.

Male

Outline and dorsal colour pattern of black and orange-brown as in Fig. 46; head, pronotum, underside and legs concolorous reddish-testaceous. Head with minimum frontal width *c.* $1\frac{1}{2}\times$ that of an eye; frontal punctures smaller than eye facets, usually separated by >1 diameter, sometimes by >2, punctures toward eyes and anterior angles bearing distinct setae; intervals between punctures with obvious reticulate microsculpture; antennae *c.* $2\times$ as long as minimum frontal width. Pronotum $2\times$ as broad as median length; anterior border arcuate behind head; lateral borders much more strongly convergent over anterior $\frac{1}{4}$ than elsewhere, shallowly sinuate behind anterior angles; disc and margins more or less evenly convex transversely to narrowly thickened lateral borders, borders continuing along anterior edge to above inner margins of eyes; disc and margins with punctures about as large as eye facets, usually separated by 1–2 diameters; intervals reticulately microsculptured. Scutellum often pale-coloured, slightly broader than long, lateral borders sinuate. Elytra about as broad as median length, extremely slightly subacuminately rounded to apicosutural angles; humeral callosities moderately well-developed; disc very strongly convex, external margins very little explanated, thickened external borders less broad than in *Synona*, more or less flat-topped, evenly narrowed over posterior $\frac{1}{2}$ to apicosutural angles; punctures of disc of 2 distinct sizes, some about as large as pronotal punctures, others almost $2\times$ as large, the 2 sizes apparently randomly arranged; punctures separated by from <1 large diameter to >2 small diameters, intervals with faint traces of microreticulation, sometimes giving the appearance of micropunctures; some punctures along explanate external margins even larger and more deeply impressed than large discal punctures. Prosternal intercoxal process with longitudinal carinae convergent anteriorly, but not meeting, extending to *c.* $\frac{1}{3}$ from anterior prosternal border (as Fig. 78). Mesosternum with hind border triangularly produced into correspondingly emarginate anterior border of metasternum (as Fig. 78). Elytral epipleura at most *c.* $\frac{1}{6}$ as broad as metathorax, foveae for reception of hind femoral apices shallow, but distinct, for mid-femora very difficult to see. Abdomen with apical borders of both 5th and 6th sternites broadly, but shallowly emarginate. Genitalia as in Figs 127–130.

Female

With apical border of 5th abdominal sternite not emarginate, of 6th shallowly arcuate.

Types

Lectotype ♀, c. york [pink, handwritten]/ TYPE Jansoni C. york/ TYPE [blue, printed], ZM. Paralectotypes 5; 1 ♀, c./ c. york [pink, handwritten], ZM; 1 ♀, Type [red-bordered, circular, BM Type-label]/TYPE/Nova Holland/Jansoni n sp Crotch [Crotch's handwriting]; 1 ♂, 1 ♀, Co-type [yellow-bordered, circular, BM co-type label]/TYPE/Nova Holland; 1 ♂, Nova Holland; last 4 all BM from Fry Bequest.

Other Specimens Examined

Non-Australian: Solomon Is (Honiara, Guadalcanal).

Queensland: 3, Darnley I., SAM; 1, Yorke I., SAM; 21, Yam I., 1 AM, 6 QM, 14 SAM; 2, Moa I., SAM; 1, Sue Islet, ANIC; 1, Somerset, ANIC; 2, Dividing Range 15 km W. of Captain Billy Ck (11°40′S.,142°45′E.), QM; 5, Iron Range, 3 W-H, 2 QM; 1, Coen, ANIC; 1, Stewart R. 5 km NW. of Port Stewart, QM; 1, Kalpower Crossing 75 km NW. of Laura, DPIM; 2, Endeavour R., 1 ANIC, 1 MVM; 5, Mt Webb Natl Park 5 km N. of Cooktown, QM; 2, Cooktown, MVM; 1, Mossman, QDPI; 1, Julatten, QDPI; 5, Kuranda, 2 ANIC, 1 DSIR, 1 SAM, 1 DPIM; 1, Mantaka, W-H; 1, Cairns, W-H; 10, Cairns and Cairns district, 2 ANIC, 1 QDPI, 2 MM, 2 QM, 3 SAM; 9, Mission Beach, QDPI; 1, Dunk I., MVM; 2, Leichardt Ck DPIM; 1, Palm I., SAM; 2, Magnetic I., ANIC; 5, Townsville, 3 MVM, 2 SAM; 1, Bowen, SAM; 1, Yeppoon, QM; 1, 'Cape York', ANIC; 2, 'North Queensland', SAM.

Total number of specimens examined (Australian): 98.

Comments

C. jansoni appears to be constant in its general colour pattern and may be separated from other species by the entirely orange-red pronotum with lateral sinuations just behind the anterior angles and by the black elytra, each with a subapical orange-red patch. Should an example of *inaequalis* have such elytral colouring, the pronotum will, almost certainly, have a dark discal area and the same applies to *Synona seminigra* with its distinctive clypeus. However, separation from varieties of *Phrynocaria astrolabiana* depends upon the latter's extremely narrow frons (Fig. 54), almost smooth pronotal surface between punctures, partly pale-coloured elytral epipleura and relatively much narrower, thickened external elytral borders.

Biology

Timberlake (1943, p. 33) quoted from Koebele's field notes where it was recorded that *jansoni* was taken 'at Geraldon, Queensland on a hibiscus tree badly infested with a psyllid'. No other published records appear to exist, but the 9 specimens from Mission Beach were found on *Grevillea banksii* in association with psyllids.

Coelophora inaequalis (Fabricius)

(Figs 26–29, 53, 67, 74, 78, 124–126)

Coccinella inaequalis Fabricius, 1775, p. 80.

Coccinella novempunctata Fabricius, 1775, p. 81 (n. preocc. Linnaeus, 1758). Synonymised by Crotch, 1874, p. 153 (as *novemmaculata*).

Coccinella novemmaculata Fabricius, 1781, p. 97 (replacement name for *novempunctata* Fabricius).

Lemnia desolata Mulsant, 1850, p. 387; 1866, p. 254; Crotch, 1871, p. 7. Synonymised by Houston, 1979, p. 49.

Coelophora novemmaculata (Fabricius); Mulsant, 1850, p. 398; 1866, p. 264.

Coelophora inaequalis (Fabricius); Mulsant, 1850, p. 405; 1866, p. 266; Crotch, 1874, p. 153; Timberlake, 1922, p. 121; Korschefsky, 1932, p. 292; Timberlake, 1943, p. 31; Hales, 1976, p. 273; 1977, p. 55; Houston, 1979, p. 45; Iablokoff-Khnzorian, 1979, p. 61; 1982, p. 266; Houston and Hales, 1980, p. 669.

Coelophora desolata (Mulsant); Crotch, 1874, p. 150; Korschefsky, 1932, p. 292.

Coelophora ripponi Crotch, 1874, p. 156; Korschefsky, 1932, p. 296. Synonymised by Hales, 1977, p. 55; synonymy confirmed, Houston, 1979, p. 49

Coelophora mastersi Blackburn, 1892, p. 238; Lea, 1902, p. 490; Korschefsky, 1932, p. 293. Synonymised by Timberlake, 1943, p. 31.

Coelophora veranioides Blackburn, 1894, p. 239; Lea, 1902, p. 490; Korschefsky, 1932, p. 297; Timberlake, 1943, p. 33. Synonymised by Hales, 1977, p. 55; synonymy confirmed, Houston, 1979, p. 49.

Coccinella religiosa Lea, 1902, p. 488; Korschefsky, 1932, p. 509. Synonymised by Hales, 1977, p. 55; synonymy confirmed, Houston, 1979, p. 49.

Size

Length 4·1–6·0 mm. Breadth 3·6–5·2 mm.

Male

Outline and dorsal colour patterns of yellowish-orange and black as in Figs 26–29; underside colouring also variable, but generally with at least meso- and metathorax and abdominal disc dark and at least part of elytral epipleura and legs pale. Head pale-coloured; frons with minimum interocular width *c.* $1\frac{3}{4}$ eye diameters (Fig. 53); punctures slightly smaller than eye facets, separated by *c.* 1 diameter, intervals finely microreticulate; antennae *c.* 2× as long as minimum frontal width, last segment slightly longer than broad, obtusely rounded apically. Pronotum *c.* 2× wide as median length; anterior border arcuate medially; lateral borders very slightly sinuate just behind anterior angles—sometimes scarcely visibly so—with a very narrowly raised outer edge continuing along anterior border on each side to inner margins of eyes and along hind border to inner limit of rounded hind angles; disc

evenly convex, lateral margins often slightly dished over part of their length; punctures of disc and margins as large as eye facets, separated by from slightly <1 to *c.* 2 diameters; intervals with reticulate microsculpture. Scutellum *c.* $1\frac{1}{2}\times$ as broad as median length, slightly acuminately produced apically. Elytra at most slightly broader than median length, not acuminately rounded apically; humeral callosities not well-marked; explanate external margins narrow, thickened external borders flat-topped, little narrowed posteriorly except almost at apicosutural angles; discal punctures smaller than those of pronotum, more or less regularly spaced, usually separated by several diameters; intervals with faint microsculpture giving the appearance of micropunctures; punctures near and along explanate external margins much larger and deeper (up to $3\times$) than those of disc, irregularly spaced, sometimes by less than their diameter. Prosternum with intercoxal longitudinal carinae variable both in extent and anterior convergence, but generally visible for posterior half of process and not meeting anteriorly. Mesosternum with hind border between midcoxae somewhat variable, usually shallowly but distinctly angled medially (Fig. 78). Elytral epipleura slightly $>\frac{1}{5}$ as broad as metathorax. Abdomen with apical borders of both 5th and 6th sternites shallowly but distinctly emarginate. Genitalia as in Figs 124–126.

Female

Apical border of 5th abdominal sternite truncate or very slightly arcuate, of 6th arcuate.

Types

Lectotype ♀ of *inaequalis*, Cocc. inaequalis—Fab. Entom. p. 80 n. 8 [black-bordered, Banks collection label], BM. Lectotype ♀ of *novempunctata*, Coccinella 9-maculata Fabr. Spec. 97.n.26 [black-bordered, Banks collection label], BM. Holotype ♂ of *desolata*, HOLOTYPE O.U.M. [printed, circular, red-bordered]/ 48. [printed on yellow]/ P. Ess. [Hope's handwriting]/ 48 Lemnia desolata Mulst. Type Mus Hope [handwritten]/ Lemnia desolata Mulsant 1850 Ann. Soc. Agric. Lyon (2) 2: 387 [handwritten and printed]/ Type Col. 1917 Lemnia desolata Mulsant HOPE DEPT. OXFORD [handwritten on printed proforma label], HM. Lectotype ♀ of *ripponi*, Austral. [pink, handwritten label]/ TYPE [blue, printed]/ TYPE Ripponi Cr. [typical Crotch collection label]/ Coelophora inaequalis F. Khnzorian det., ZM. Paralectotype ♂, Type [circular, red-bordered BM type label]/ 36769 [Fry collection register number]/ TYPE [white, printed]/ Ripponi n. sp. [Crotch's handwriting], BM. Lectotype ♀ of *mastersi*, Type [circular, red-bordered, BM Type label]/ 4426 N.Qu. [in red] T [Blackburn's handwriting]/ Coelophora Mastersi, Blackb. [Blackburn's handwriting], BM. Paralectotypes 3; 1, N.Qu [in red on mounting card]/ N Queensland Blackb's Coll./ Coelophora Mastersi, Blackb. Cotype [Blackburn's handwriting], SAM; 2, Qu [in red on mounting card]/ Queensland Blackb's Coll/ Coelophora Mastersi, Blackb. Cotype [Blackburn's handwriting], SAM. Lectotype ♀ of *veranioides*, Type [circular, red-bordered, BM Type label]/ 5219 N.S.W. [in red] T [Blackburn's handwriting]/ Coelophora veranioides, Blackb. [Blackburn's handwriting], BM. Paralectotypes: none found, either in BM or SAM, despite the fact that Blackburn clearly had a series of specimens. Lectotype ♀ of *religiosa*, religiosa Lea TYPE Behn R/ Coccinella religiosa Lea N.W. Australia TYPE 10375 [typical Lea collection label], SAM. Paralectotype ♀, religiosa Lea TYPE Wyndham, SAM.

Other Specimens Examined

Non-Australian: China, Andaman Is, Philippines, Malaysia (Malaya), Indonesia (Nias, Sumatra, Java, Sulawesi), Molukkas (Batjan), Solomon Is, New Hebrides, Loyalty Is, Samoa, Austral Is, Cook Is, Mariana Is, Fiji, Hawaiian Is, New Zealand.

Queensland: Boigu I.; Stephens I.; Dalrymple Islet; Yam I.; Murray I.; Mabuiag I.; Rennel I.; Moa I.; Sue Islet; Hammond I.; Thursday I.; Prince of Wales I.; Somerset; Bamaga; Hibberd Point, Weipa; Lankelly Ck, Coen; Coen; Dividing Range 15 km W. of Captain Billy's Ck; Endeavour R.; Cooktown; Butchers Hill; Mossman Gorge; Mossman; Port Douglas; Michaelmas Cay off Cairns; Pebbly Beach, N. of Cairns; Julatten; Palm Beach; Black Mountain Rd 6 km NW. of Kuranda; Kuranda–Koah Rd; Kuranda; Southedge via Mareeba; nr Redlynch; Cairns; Davies Ck nr Mareeba;

Mareeba; Emerald Ck via Mareeba; Gordonvale; Tinaroo; Walkamin; Kairi; Turnoff Lagoons; Tolga Scrub; Atherton; Peeramon; Babinda; 11–22 km W. of Herberton; Waugh's Pocket; Eubenangee; Millaa Millaa; Innisfail; Herberton; Kalbo junction; Millaa Millaa–Ravenshoe Rd; Mourilyan; 21 km W. of Ravenshoe; South Johnstone; 1·6 km E. of Crawford's Lookout, Palmerston Natl Park; Millstream Falls; Normanton; Mt Garnet Rd; Forty Mile Scrub via Mt Garnet; Burketown; Cardstone; Mission Beach; Doomadgee Mission; Dunk I.; Kennedy; Cardwell; Ingham; Lone Pine; Mt Spec, Paluma; Crystal Ck 43 km SSW. of Ingham; Alligator Creek, Townsville; Magnetic I.; Townsville; East Barratta Ck; Home Hill; Clare Exp. Stn; 3·2 km SW. of Inkerman; Charters Towers; 20 km W. of Mt Maria; Burleigh; Penrith I.; Blacks Beach nr Mackay; Mackay; Broken R., Eungella; Collaroy; Coppermine Ck, 67·5 km N. of Marlborough; 5 km N. of Byfield; Clermont; Palm Park, 5·6 km ESE. of Byfield; Bowenia; The Caves; Tryon and Wreck Is; Emu Park; 90 km NW. of Gladstone; Rockhampton; 5km SW. of Mourangee Station nr Dawson R., Edungalba; Awoonga Dam, Boyne R., SW. of Gladstone; Biloela Res. Stn; Fletchers Gully, 18 km E. of Dawson R., SW. of Rockhampton; Dawson R. nr Duaringa; Granite Ck 34 km S. of Miriam Vale; Bundaberg; Gorge at Burnett R., 19 km S. of Bundaberg; Eidsvold; Bin Bin Range nr Bundaberg; W. slope of Bluff Range, Biggenden; Biggenden; Maryborough; Mundubbera; Ipswich; Gayndah; Rainbow Beach, E. Gympie; Pomona; Palmwoods nr Nambour; Blackall Ranges; Mapleton; Maroochydore; Buderim; Montville; Caloundra; Bunya Mts; Harlin; Elimbah; Dalby; Ravensbourne; Redcliffe; Upper Cedar Ck nr Samford; Brisbane R., Northbrook, 10 km N.of Fernvale; Samford; Mt Nebo; Upper Kedron Brook; Brisbane; Dunwich; Stradbrooke I.; Mt Crosby; Gatton; Lawes; Moggill; Mt Russell; Pittsworth; Greenbank; Rosevale area; Southport; Mt Tamborine; Nerang; Tarome area; Canungra; Broadbeach; St George; Goomburra; Black Shoot Ck, Nerang–Springbrook Rd; second Palen Ck Crossing from Rathdowney; Palen Ck; Stanthorpe; Nundubbermere 20 km SW. of Stanthorpe. **New South Wales:** Dungay; Tweed R.; Murwillumbah; Middle Pocket nr Billinudgel; Brunswick Heads; Kyogle; Tooloom Scrub via Urbenville; Dunoon; Blakebrook; Wollongbar; Spring Grove; Richmond R.; Wallangra; Clarence R.; Greystones; Narrabri; Dorrigo; Boambee; Uralia; Spring Ridge; Yarras; Hastings R.; Port Macquarie; Crowdy Bay, 40 km NE. of Taree; Wingham Brush, 13 km W. of Taree; Berrico on rd to Gloucester Tops; 11 km N. of Stroud; 6·4 km. N. of Buladelah; Abernethy; Budgewoi; Kulnura; Mangrove Ck; Narara; Gosford; Milson I.; Brooklyn; Kurrajong; Richmond; Windsor; Lawson; Toongabbie; Prospect; Sydney; Cobbity; Bate Bay; Otford Falls; Stanwell Park; Goodmans R., Wollondilly R.; Unanderra; 'Illawarra'; Greenwich Park; Minnamurra Falls; Shoalhaven Heads. **Norfolk I.:** Pine Valley; Anson Bay; Mt Pitt; Mt Bates. **Lord Howe I.:** Blinky Beach; Mt Lidgbird. **Western Australia:** Kimberley Res. Stn; Behn R.; Martins Well, West Kimberley; Kimberley; 'Upper Murchison'; Perth; Rockingham Park, 39 km S. of Perth. **Northern Territory:** Black Point Wildlife Reserve, Cobourg Peninsula; Eldo, Gove Peninsula; Darwin; Koolpinyah; Howard Springs, 32 km E. of Darwin; Holmes Jungle, E. of Darwin; Manton Dam, 52 km SSE. of Darwin; Adelaide R.; Adelaide R. crossing, Daly R. Rd; Groote Eylandt; Katherine Exp. Farm; Fergusson R.; Flood Plain Block, Scott Ck Stn via Katherine; Roper R.; East Jasper Gorge, 54 km NW. of Victoria River Downs; Macarthur R., 48 km SSW. of Borroloola.

Specimen Depositories: AM, AMR, ANIC, BCRI, BM, DAH, DAV, DPIM, DPPD, DLN, DSIR, HNH, HDN, MVM, NTM, QDPI, QM, SAM, TM,UWA, UQ, WADA, WAM, W-H.

Total number of specimens examined (Australian): 1464.

Comments

The variation in colour pattern and wide distribution of *inaequalis* led to its being redescribed as new on a large number of occasions. As far as the Australian fauna is concerned, early observations by Crotch (1874) and subsequent work by Timberlake (1922, 1943), Hales (1976, 1977) and Houston (1979), have demonstrated the ways in which the colour patterns are produced and have firmly established all the relevant synonymies. Iablokoff-Khnzorian (1982, pp. 268–70) provided a key to separate 18 named varieties, including those known to occur in Australia.

Biology

Although the species recognised as a fairly generalised aphid predator and imported into Hawaii in 1894 and New Zealand (date unknown) as a biocontrol agent, no detailed account of the life-history of *inaequalis* seems to have been published, apart from the illustrated summary (as *Coccinella repanda*) by Swezey (1905). Many of the prey records in Hawaii were listed by Leeper (1976). For Australia, label data from specimens examined has yielded

many records of aphid predation, but only four including identifications; *Toxoptera citricidis* (Kirkaldy), *Pentalonia nigronervosa* Coquerel, *Rhopalosiphum padi* (Linnaeus) and '*Chermes*' sp. In the laboratory, *inaequalis* has been reared on a number of aphid species by Hales (1976), Houston (1979) and Houston and Hales (1980).

Coelophora mulsanti (Montrouzier), comb. rev.

(Figs 44, 45, 131–133)

Coccinella (Daulis) mulsanti Montrouzier, 1861, p. 304.
Daulis mulsanti (Montrouzier); Mulsant, 1866, p. 211.
Coelophora mulsanti (Montrouzier); Crotch, 1874, p. 152; Fauvel, 1903, p. 327; Korschefsky, 1932, p. 294; Chazeau, 1978, p. 63.
Lemnia mulsanti (Montrouzier); Iablokoff-Khnzorian, 1982, p. 256.
Coelophora ochracea Mulsant, 1866, p. 262. Synonymised by Crotch, 1874, p. 152.
Coelophora mulsanti var. *ochracea* Mulsant; Korschefsky, 1932, p. 294; Chazeau, 1978, p. 65.

Size

Length 4·9–6·7 mm. Breadth 4·5–5·6 mm.

Male

Outline and dorsal colour pattern of dark yellow-testaceous and black as in Figs 44, 45. Head yellow-testaceous; underside and leg coloration similar to upper surface ground colour in examples with black-spotted elytra; underside of specimens without elytral spots generally having part of prosternum, metasternum, outer margins of elytral epipleura and abdominal disc dark-coloured; legs variable, but often dark-coloured, at least in part. Head with minimum frontal width between eye *c.* $\frac{1}{3}$ as broad again as an eye; punctures of frons and clypeus variable in size and spacing, not usually larger than eye facets, sometimes separated by <1 diameter; intervals between punctures microreticulate; antennae nearly $2\times$ as long as mimimum frontal width, last segment about as long as broad, rounded apically. Pronotum slightly $>2\times$ as broad as median length; anterior border strongly arcuate medially; lateral borders sinuately emarginate just behind anterior angles; disc evenly convex transversely to very narrowly upturned lateral borders that continue along anterior edge to above inner margins of eyes; punctures of disc and margins about as large as eye facets, separated on disc by a little <1 diameter in most examples, occasionally by more, separation toward lateral margins less regular and sometimes greater than on disc; intervals with reticulate microsculpture, usually clearly marked, but sometimes very difficult to discern toward lateral margins. Scutellum transverse (*c.* 3 : 2). Elytra almost as long as broad; extremely slightly subacuminately rounded to apicosutural angles; humeral callosities moderately pronounced; explanate external margins and thickened external borders as in *jansoni*; discal punctures of more or less uniform size, similar to those of pronotum, separated by *c.* 1 diameter, intervals smooth, shining; some punctures along anterior half of explanate external margins up to *c.* $2\times$ as large as discal punctures. Prosternal process with longitudinal carinae convergent anteriorly, occasionally conjoined, extending to within *c.* $\frac{1}{3}$ from anterior border. Meso–metasternal junction very shallowly angled between mid-coxae, much less strongly than in *jansoni*. Elytral epipleura at most $\frac{1}{6}$ as broad as metathorax, foveae for mid- and hind femoral apices shallow, sometimes difficult to see. Abdomen with apical border of 5th sternite truncate, of 6th shallowly emarginate. Genitalia as in Figs 131–133.

Female

With apex of 6th abdominal sternite arcuate.

Types

Lectotype ♂ of *mulsanti* (designated by Chazeau, 1978, p. 63), 1207 *Daulis mulsanti* Montrouzier Art Nov. Caledonia, MNHN. Lectotype ♀ of *ochracea*, 28003/ Nov. Holl.

Cuming [blue, handwritten label]/ Mulsanti Montr. var. (Crotch*) [white label, Gerstaecker's handwriting]/ Coelophora ochracea [Mulsant's handwriting], MNHU.

Other Specimens Examined

Non-Australian: New Caledonia (inc. Mt Mou, Mt Dore, Carovin).

Queensland: 1, Coen, W-H; 1, Stewart R. 5 km W. of Port Stewart via Coen, QM; 1, Lizard I., W-H; 1, Mt Misery, W. of Mt Carbine, W-H; 4, Magdalena Bay, Coral Sea, AM; 1, Cairns, W-H; 4, Herald Cays, Coral Sea, AM; 1, Arriga Res. Stn via Mareeba, DPIM; 1, Walkamin, DPIM; 1, Magnetic I., SAM; 3, 65 km SW. of Mt Garnet, W-H; 2, Bowen, SAM; 1, Gayndah, AM; 1, Gatton, QDPI; 1, 'Queensland', MVM. **New South Wales:** 1, Upper Williams R,, MVM; 2, 'Illawarra', 1 MM, 1 MVM; 2, Kiama, AM. **Western Australia:** 2, Baudin I., BM; 3, Prince Regent Reserve 2, 15°07′S., 125°33′E., 1, 15°17′S.,125°04′E., WADA; 1,Wyndham, BM; 1, 8 km S. of Cape Bertholet, W. Kimberley, ANIC. **Northern Territory:** 1, Elcho I., W-H; 2, Cooper Ck, 19 km SE. of Borradaile, DPPD; 3, Cooper Ck, 11 km SW. of Nimbuwah Rock, ANIC; 1, Birraduk Ck, 18 km NE. of Oenpelli, DPPD; 5, Darwin, 2 BM, 2 SAM, 1 ANIC; 1, Koolpinyah, SAM; 1, 1 km N. of Cahills Crossing, E. Alligator R., ANIC; 2, 9 km NE. of Mudginberri HS., DPPD; 1, Magela Ck, NNW. of Mudginberri HS., DPPD; 1, 10 km N. of Mt Cahill, SAM; 1, Nourlangie Ck, 8 km NNE. of Mt Cahill, DPPD; 1, 8 km NE. of Mt Cahill, DPPD; 1, Koongarra 15 km E. of Mt Cahill, DPPD; 2, Adelaide R., SAM; 1, UPD Falls Reserve, 341 km SE. of Darwin, NTM; 1, Moline Rockhole, 6 km ENE. of Mt Daniels, DPPD; 3, Groote Eylandt, SAM; 1, Katherine, ANIC; 2, 11 km SW. of Katherine, UQ; 2, Batten Point, 30 km ENE. of Borroloola, ANIC; 3, Horn Islet, Sir Edward Pellew Group, UQ; 1, 22 km WSW. of Borroloola, ANIC; 1, Goose Lagoon, 11 km SSW. of Borroloola, ANIC; 2, 80 km S. of Larrimah, W-H; 1, Surprise Ck, 45 km SSW. of Borroloola, ANIC; 1, Cattle Ck, 54 km SW. of Borroloola, ANIC.

Total number of specimens examined: 76.

Comments

There seems to be no doubt that Crotch's synonymy of *mulsanti* with *ochracea* was correct, although he saw no type material of Montrouzier's species. The apparently consistent colour differences between the range of specimens from Australia and the uniform material from New Caledonia are not supplemented by any observable genitalic distinctions.

In Australia, the southern distribution of *mulsanti*, from the evidence sofar available, seems to be a thing of the past. The example from Gatton was taken in 1962, that from Upper Williams River in 1926 and those from 'Illawarra' before 1922 in one case and during the 19th century in the other. It is also curious that the southern specimens have no black elytral spots, whereas all those taken north of Mt Garnet agree with Fig. 44.

Biology

No information, published or otherwise, has been found for Australian examples of *mulsanti*. Chazeau (1978, p. 65) reported the species as common in New Caledonia and predaceous on both aphids and cicadellid nymphs. Iablokoff-Khnzorian (1982, p. 256) recorded the species as having been taken on maize and cotton, but did not remark on its prey.

Genus **Phrynocaria** Timberlake, stat. rev.

Phrynocaria Timberlake, 1943, p. 34; Iablokoff-Khnzorian, 1979, p. 62; (not 1982, p. 270). Type-species *Coccinella congener* Billberg *in* Schoenherr, by original designation.

Lemnia (Phrynocaria) Timberlake; Iablokoff-Khnzorian, 1984*a*, pp. 205, 210–14 (in part).

Lemnia (Microlemnia) Iablokoff-Khnzorian, 1982, p. 261. Type-species *Coelophora vidua* Mulsant, by original designation. Synonymised by Iablokoff-Khnzorian, 1984*a*, p. 205.

Description

Medium-sized (*c.* 4–6 mm long), strongly convex, very little elongate. Colour pattern of upper surfaces highly variable. Head (Fig. 54) with frons very narrow between eyes, markedly broadened anteriorly toward antennal insertions; anterior clypeal border straight

between lateral projections; eyes relatively very large; antennae shorter than total width of head with eyes, segments 3 and 4 subequal, last segment of club slightly longer than broad, more or less rounded apically. Pronotum with anterior angles much less widely separated than more strongly rounded posterior angles; anterior border arcuate medially between lateral projections; lateral borders narrowly thickened, often slightly sinuate just behind anterior angles. Scutellum c. $\frac{1}{8}$ as broad at base as elytra at shoulders, usually slightly transverse. Elytra strongly convex, usually very slightly transverse; lateral margins not strongly explanate, thickened external borders narrow, but entire; intervals between punctures of disc and margins usually smooth, shining. Pronotal hypomera with distinct foveae, much as in *Coelophora*; prosternum with or without longitudinal carinae on intercoxal process. Mesosternum with anterior border moderately deeply and triangularly excavate to receive apex of prosternal intercoxal process. Elytral epipleura strongly descending externally (as Fig. 87), weakly foveate at level of hind coxae, barely discernibly so, if at all, at level of mid-coxae. Abdomen with postcoxal plates of 1st sternite without an oblique dividing line or ridge; female with 6 visible abdominal sternites, male frequently with a 7th visible through emargination of apical border of 6th sternite.

Included species. Nine.

Distribution. India, China, New Guinea, Australia.

Comments

Iablokoff-Khnzorian's 1984 interpretation of *Phrynocaria* Timberlake seems, from his key, to be composite, probably including species related to *Lemnia (Artemis) circumusta* (Mulsant). Fortunately, there is no doubt concerning the identities of the two Australian species, or of their generic placement.

Key to Species of *Phrynocaria*

1. Intercoxal process of prosternum with convergent longitudinal carinae, usually flat between coxae; prosternum and legs largely black; abdomen with first 3 sternites broadly black medially ..... *gratiosa* (Mulsant)

   Intercoxal prosternal process without longitudinal carinae, transversely convex between coxae; prosternum and legs almost or completely pale-coloured; abdomen either entirely pale or with intercoxal process of 1st sternite dark ..... *astrolabiana* (Weise)

Phrynocaria gratiosa (Mulsant), stat. rev.

(Figs 19–22, 54, 137–139)

Coelophora gratiosa Mulsant, 1853, p. 187; 1866, p. 276; Crotch, 1874, p. 155; Blackburn, 1894, p. 238.

Coelophora elegans Crotch, 1874, p. 156. Synonymised by Houston, 1983, p. 19.

Coelophora nigrovittata Blackburn, 1895, p. 237. Synonymised by Iablokoff-Khnzorian 1979, p. 62.

Autotela elegans (Crotch); Korschefsky, 1932, p. 299.

Phrynocaria gratiosa (Mulsant); Timberlake, 1943, p. 35; Iablokoff-Khnzorian, 1979, p. 62; 1982, p. 271; Houston, 1983, p. 19.

Phrynocaria gratiosa var. *flavoguttata* Timberlake, 1943, p. 35; Houston, 1983, p. 19. Synonymised by Iablokoff-Khnzorian 1979, p. 62.

Phrynocaria gratiosa var. *koebelei* Timberlake, 1943, p. 35; Houston, 1983, p. 19. Synonymised by Iablokoff-Khnzorian, 1979, p. 62.

Phrynocaria gratiosa var. *nigrocincta* Timberlake, 1943, p. 36; Houston, 1983, p. 19. Synonymised by Iablokoff-Khnzorian 1979, p. 62.

Phrynocaria gratiosa var. *nigrovittata* (Blackburn); Timberlake, 1943, p. 37; Houston, 1983, p. 19. Synonymised by Iablokoff-Khnzorian, 1979, p. 62.

Phrynocaria gratiosa var. *palens* Timberlake, 1943, p. 36; Houston, 1983, p. 19. Synonymised by Iablokoff-Khnzorian, 1979, p. 62

Lemnia (Phrynocaria) gratiosa (Timberlake); Iablokoff-Khnzorian, 1984*a*, p. 211.

Size

Length 4·3–5·2 mm. Breadth 4·0–4·75 mm.

Male

Outlines and dorsal colour patterns as in Figs 19–22. Colour of underside also variable, but with thorax and middle of abdominal segments usually darker than elsewhere; colour of legs also variable. Head with minimum interocular width about equal to that of an eye (Fig. 54); frontal and clypeal punctures similar in size to eye facets, often separated by <1 diameter, intervals with faintly indicated reticulate microsculpture. Pronotum slightly $>2\times$ as broad as median length; lateral margins usually each with a shallow fovea, its centre *c.* $\frac{2}{5}$ of lateral pronotal length away from hind angles; punctures of varying size and separation, usually a little larger than those of head, separated by *c.* 1 diameter near anterior angles and in front of scutellum, sometimes by as much as 2 diameters mediolaterally; intervals for the most part smooth and shining, faint reticulate microsculpture usually present mediobasally. Scutellum acutely pointed behind, a few, minute, scattered punctures on otherwise smooth, shining surface. Elytra with discal punctures similar to those of pronotum, separation varying from by slightly <1 to almost 2 diameters, most often by *c.* 1 diameter; punctures along explanate external margins usually more deeply impressed than those elsewhere and so appearing larger and more closely set, intervals everywhere smooth, shining. Pronotal hypomera with foveae distinctly bordered externally and anteriorly, extending inward to lateral borders of prosternum; prosternum almost always black, with convergent carinae of intercoxal process ending separately little more than halfway along median prosternal length. Meso- and metasterna almost always black. Elytral epipleura black externally, often with a pale area of varying length extending rearward from shoulders along internal half of each epipleuron. Abdomen with apical border of 6th sternite briefly and extremely shallowly emarginate medially, often exposing tip of 7th. Legs usually with at least some parts dark-coloured, especially femora and especially hind legs. Genitalia as in Figs 137–139.

Female

With apical border of 6th abdominal sternite evenly arcuate, not exposing 7th segment.

Types

Lectotype of *gratiosa*, TYPE [blue, printed]/ N. Holl. [small, pink, handwritten]/ A/ Type gratiosa Deyr [Crotch's handwriting], ZM. Lectotype ♀ of *elegans*, Type [circular, red-bordered, BM Type-label]/ 57·71[blue, circular, handwritten]/ Coelophora elegans Crotch (Type) [Waterhouse's handwriting]/ Elegans Gehin Gabon [handwritten, ? by Gehin]/ Elegans Crotch TYPE [unknown handwriting, perhaps Jekel's], BM. Lectotype ♀ of *nigrovittata*, Type [circular, red-bordered, BM Type-label]/ 5898 T N. Qu. [handwritten, number in red]/ Coelophora nigrovittata, Blackb. [Blackburn's handwriting], BM. Paralectotype, 5898 [handwritten in red]/ Cairns/ Coelophora nigrovittata, Blackb. cotype [Blackburn's handwritng]/ Arrow wrote '=elegans Crotch (an African sp.)'/ Coelophora nigrovittata Blackb Queensland cotype 9696 [Lea's label], SAM. The type series of the varieties described by Timberlake should be in the Bishop Museum, Honolulu, Hawaii. They have not been examined.

Other Specimens Examined

Queensland: 1, Black Mtn Rd 9·6 km N. of Kuranda, W-H; 2, Cairns district, SAM; 1, Woodstock, W-H; 1, Burleigh, QDPI; 1, Glenella nr Mackay, BM; 1, Yeppoon, BM; 1, Rockhampton, UQ; 6, Bundaberg Rd, BM; 2, Blackall Ranges, MVM; 1, Bunya Mts (26°50′S.,151°33′E.), 2 km NW. of Mt Mowbullan, BM; 1, nr Glasshouse Mts, QDPI; 2, Deception Bay, QDPI; 1, N. Pine R., QM; 47, Brisbane, 42 QDPI, 4 QM, 1 UQ; 2, Toowoomba, QDPI; 2, Southport, QM; 1, Broadbeach, MVM; 2, 'Nat. Park', UQ, QM. **New South Wales:** 6, Richmond R., 5 BCRI, 1 BM; 3, Port Macquarie, BM; 1, Moorland, BCRI; 1, Tubrabucca, MVM; 1, Wallis Lake, MVM; 2, Sydney, 1 DLN, 1, AMR.

Total number of specimens examined: 92.

Comments

P. gratiosa occurs in a number of distinct, genetically controlled colour forms as noted by Blackburn (1894) and Timberlake (1943), and as studied by Houston (1983). Blackburn (1895) apparently forgot his earlier comments when he described *nigrovittata* as a good species. Timberlake (1943, pp. 35–7), recalling Blackburn's earlier observations on the variability of *gratiosa* and having before him the Koebele material from which Blackburn drew his conclusions, reduced *nigrovittata* to the status of a variety and described four others as new. *Coelophora elegans* Crotch was described from a single, incorrectly localised specimen acquired by the BM in 1857. It is without doubt a synonym of *gratiosa*, for the specimen is an example of *'nigrovittata'*.

Biology

Timberlake, quoting from Koebele's field notebooks, recorded *gratiosa* as predaceous on a black scale *'Lecanium depressum'* [=*Parasaissetia nigra* (Nietner)] on various trees. This observation is curiously in conflict with label data on specimens recently examined and with successful breeding experiments by K. J. Houston (1983) using a number of aphid species. Adults have been found in association with unidentified psyllids on *Hymenosporum flavum*.

Phrynocaria astrolabiana (Weise), comb. nov.

(Figs 14–18, 134–136)

Coelophora astrolabiana Weise, 1902, p. 498; Korschefsky, 1932, p. 290; Iablokoff-Khnzorian, 1982, p. 220.

Size

Length 3·8–6·0 mm. Breadth 3·5–5·0 mm.

Male

Outlines and dorsal colour patterns typically as in Figs 14–18. Underside colour patterns variable except for constant features referred to in key to species; mesosternum usually pale-coloured; metasternum, abdominal segments and elytral epipleura all variably coloured, but legs almost or entirely pale and black areas of abdomen, if present, more limited in extent than is the case with *gratiosa*. Head conformation, puncturation and surface texture very similar to *gratiosa*, antennae of similar construction and length. Pronotum of similar shape and proportions to that of *gratiosa*, but with punctures slightly more sparsely arranged. Scutellum as in *gratiosa*. Elytra, colour patterns excepted, very similar to those of *gratiosa*, but with explanate external margins relatively broader. Prosternum without longitudinal carinaeon transversely convex intercoxal process. Genitalia as in Figs 134–136.

Female

With apex of 6th abdominal sternite evenly arcuate, not exposing 7th segment.

Types

Lectotype ♀ of *astrolabiana*, N. Guinea, Biro, 1900/ Stephansort, Astrolabe Bay/ Holotypus 1902 Coelophora astrolabiana Weise [red-bordered, printed and handwritten]/ Typus Coelophora astrolabiana Weise Term. Fuz. 25. 1902. 498/ Coelophora astrolabiana Weise, TMB. Paralectotypes 2; 1 ♂, N. Guinea, Stephansort/ astrolabiana m. [Weise's handwriting]/ Paratypus [red, printed label], NR; 1 ♀, N. Guin. Stephans/ astrolabiana m. [Weise's handwriting], MNHU.

Other Specimens Examined

Non-Australian: New Guinea (types only).

Queensland: 2, Iron Range, ANIC, BM; 1, Kalpower Crossing, 75 km NE. of Laura, DPIM; 1,

Tin Ck, Cook Hwy, ANIC; 1, Newell 6·4 km NE. of Mossman, ANIC; 20, Cairns and Cairns district, 2 ANIC, 1 DAH, 3 QM, 2 QDPI, 10 SAM, 2 W-H; 1, Mareeba, QDPI; 1, Gordonvale, ANIC; 1, Innisfail, SAM; 6, Kennedy, 5 DPIM, 1 QDPI; 1, Ingham, QM; 1, Magnetic I., MVM; 10, Home Hill, QDPI; 3, Mackay, 1 QDPI, 2 MVM; 39, 'bred at Brisbane', QDPI. **Northern Territory:** 1, Smith Point, Cobourg Peninsula, ANIC; 4, Black Point, Cobourg Pensinsula, 1 BM, 3 ANIC; 1, Mungenella Ck, DPPD; 1, 1 km N. of Cahills Crossing, E. Alligator R., ANIC; 1, Eldo, Gove Peninsula, DPPD; 1, UPD Falls Reserve, 431 km SE. of Darwin, NTM.

Total number of specimens examined (Australian): 96.

Comments

Although the pronotal and elytral patterns of the type material and of the var. *mutata* (Weise) (1902, p. 498) are not duplicated in any of the Australian specimens so far examined, there is no observable genitalic difference between members of the various populations available. Considering the paucity of the New Guinea records, the known variability of *P. gratiosa*, that observed throughout the distributional range of *Coelophora inaequalis*, that already encountered in *astrolabiana* and the pattern peculiarities discussed under *Menochilus sexmaculatus*, there seems no reason to suspect that the Australian specimens represent a distinct species. Without controlled experiments to investigate the inheritance of colour pattern or the influence upon it of external factors, little can be said at this point. However, it is of interest that all but one of the Northern Territory specimens and one from Iron Range are patterned as Fig. 18, an appearance not so far repeated in specimens from elsewhere. A second Iron Range example is similar, but has black external margins to the elytra. Specimens from further south in Queensland divide into four distinct colour forms (Figs 14, 15, 16, 17), all of which have been taken in the vicinity of Cairns and one of them, the darkest (Fig. 17), additionally at Smith Point, Cobourg Peninsula NT, as well as at Newell, Mareeba, Kennedy and Home Hill.

Biology

So far, information is largely restricted to that from label data, but most of the evidence points to *astrolabiana* being an aphid predator. The specimens from Brisbane were reared (August–September 1976) on *Hyperomyzus* aphids on *Sonchus* by K. J. Houston, although originating from parents taken at Home Hill on *Ficus* infested by *Pulvinaria* sp. (Coccidae). Five of the examples collected at Kennedy came from a citrus orchard and are recorded as 'feeding on aphids'.

Genus **Micraspis** Dejean

Micraspis Dejean 1837, p. 435; Crotch, 1874, p. 173; Fürsch, 1964, p. 70; Iablokoff-Khnzorian, 1979, p. 72; 1982, p. 497. (Not Mulsant, 1846, p. 162; 1850, p. 213; 1866, p. 152; Crotch, 1871, p. 5). Type-species *Coccinella striata* Fabricius, by subsequent designation, Hope, 1840, p. 157.

Alesia Mulsant, 1850, p. 343; 1866, p. 232; Masters, 1888, p. 90; Korschefsky, 1932, p. 304. Type-species *Coccinella striata* Fabricius, by subsequent designation, Korschefsky, 1932, p. 304. Synonymised by Korschefsky, 1932, p. 304.

Verania Mulsant, 1850, p. 358; 1866, p. 240; Crotch, 1874, p. 175; Froggatt, 1902, p. 901; Korschefsky, 1932, p. 307; Timberlake, 1943, p. 27. Type-species *Coccinella comma* Thunberg, by subsequent designation, Crotch, 1874, p. 175. Synonymised by Fürsch, 1964, p. 71.

Cisseis Mulsant, 1850, p. 129 (n. preocc. Laporte & Gory, 1839 [Buprestidae]); 1866, p. 101. Type-species *Coccinella furcifera* Guérin-Méneville, by monotypy. Synonymised by Iablokoff-Khnzorian, 1979, p. 72.

Cissella Weise, 1895, p. 153 (replacement name for *Cisseis* Mulsant); Korschefsky, 1932, p. 376; Timberlake, 1943, p. 16.

Menevillidea Brèthes, 1923, p. 229 (unnecessary replacement name for *Cisseis* Mulsant).

Description

Small to medium-sized (3·90–5·95 mm long); slightly to moderately elongate (Figs 30–35). Head with anterior clypeal border more or less straight between lateral projections (Figs 55,

56); frons between eyes at least 2× the width of an eye; antennae as long as or slightly longer (12 : 10) than minimum frontal width, usually 11-segmented, but sometimes with segments 10 and 11 at least partly fused and, occasionally, with funicle reduced to 5 segments instead of 6. Pronotum *c.* 2× as broad as median length; reflexed lateral margins narrow; anterior border arcuate medially. Scutellum (Fig. 72) usually $<1/15$ as broad at base as elytra at shoulders, slightly elongate, sides more or less straight. Elytra (Figs 30–35) broadest at about middle; explanate external margins narrow, thickened external border sometimes indistinct or absent. Pronotal hypomera without foveae; prosternum with intercoxal process usually carinate, carinae sometimes indistinct or absent. Mesosternum with raised anterior border not or only shallowly emarginate medially. Elytral epipleura not or only slightly descending externally (as Fig. 88), at most *c.* $\frac{1}{4}$ as broad as metasternum. Postcoxal plates of 1st abdominal sternite without an oblique dividing line; both sexes with 6 visible sternites. Legs with tarsal claws appendiculate or simple (Figs 69, 70).

Included species. Difficult to assess without a world revision but about 30.

Distribution. Asia north to China and Japan, west to India, south and east to Indonesia; Africa; Melanesia; Australia.

Comments

Mulsant (1846, p. 162) restricted Dejean's *Micraspis* to the single European species *M. duodecimpunctata* (Gebler),apparently unaware that Hope (1840) had already, quite correctly, designated *striata* as its type-species. In 1850 and 1866 Mulsant continued to use *Micraspis* in the same sense, adding *M. phalerata* (Costa), but dividing the remaining originally included species between two newly erected genera *Alesia* and *Verania*. Korschefsky's (1932) designation of striata as the type-species of *Alesia* made it a junior objective synonym of *Micraspis*. Fürsch (1964) re-examined the situation, studying the type material of *striata*. Considering *striata* and *comma* to be congeneric, he synonymised *Verania* with *Micraspis*.

Iablokoff-Khnzorian (1979, 1982), adding *Cisseis* (as *Cissella*) to the synonymy of *Micraspis*, listed a total of 15 species in the Palaearctic and Indo-Australian regions, referring in passing to the existence of the genus in Africa as well. In the present work, six Australian species are recognised, only two being positively recorded from outside the continent and one being described as new. Each is readily identifiable by its superficial appearance (Figs 30–35). Two are easily distinguished, both from each other and from the rest, by reliable external morphological characters as well, but for the remaining four, colour patterns excepted, the similarities, both external and genitalic, are so great as to cast doubt on their accepted ranking (see key). However, as constant differences do exist, distributions overlap and there is, so far, no evidence of interbreeding, they are regarded as separate species until proved otherwise.

Key to Species of *Micraspis*

1. Tarsal claws appendiculate (Fig. 69); head (Fig. 56) broader between eyes; antennae clearly 11-segmented; dorsal colour pattern not as Fig. 35 2
   Tarsal claws simple (Fig. 70); head (Fig. 55) relatively elongate between eyes; antennal segments 10 and 11 at least partly fused, funicle sometimes reduced to 5 segments .... *furcifera* (Guérin-Méneville)

2(1). Surface of pronotum and elytra with well-marked reticulate microsculpture, dull; outline and dorsal colour pattern as in Fig. 30 ..... *aphidectoides* (Korschefsky)
   Surface of pronotum and elytra smooth between punctures, shining; outlines and dorsal colour patterns different (Figs 31–34) 3

3(2). Dark elytral pattern including a single stripe on each, sometimes sigmoid, in addition to common sutural stripe and marginal band (Figs 31, 32) 4
   Discal stripe of elytral pattern bifid from shoulders (Figs 33, 34) 5

4(3). Discal stripe of elytral pattern simple, linear, sometimes interrupted medially (Fig. 31) .... *lineola* (Fabricius)
Discal stripe of elytral pattern sigmoid or Z-shaped (Fig. 32) ..... *frenata* (Erichson)
5(3). Bifid dark stripe on elytra never reaching basal border (Fig. 33) ..... *flavovittata* (Crotch)
Bifid dark stripe on elytra always reaching basal border (Fig. 34) ..... *confusa*, sp. nov.

Micraspis furcifera (Guérin-Méneville)
(Figs 35, 55, 70, 143–146)

Coccinella furcifera Guérin-Méneville, 1835, pl 51, fig. 1; Boisduval, 1835, p. 602; Guérin-Méneville, 1844, p. 318.
Cisseis furcifera (Guérin-Méneville); Mulsant, 1850, p. 130.
Sospita flavolineata Mulsant, 1866, p. 113. Synonymised by Crotch, 1871, p. 8 (as *Verania*).
Verania gauthardi Mulsant, 1866, p. 241. Synonymised by Crotch, 1871, p. 8.
Verania furcifera (Guérin-Méneville); Crotch, 1871, p. 8; 1874, p. 175.
Alesia furcifera (Guérin-Méneville); Masters, 1888, p. 90.
Cissella furcifera (Guérin-Méneville); Weise, 1895, p. 153; Korschefsky, 1932, p. 377; Timberlake, 1943, p. 16.
Menevillidia furcifera (Guérin-Méneville); Brèthes, 1923, p. 229.
Micraspis furcifera (Guérin-Méneville); Iablokoff-Khnzorian, 1979, p. 73; 1982, p. 515.

Size

Length 4·50–5·75 mm. Breadth 3·5–4·5 mm.

Male

Outline and dorsal colour pattern of pale yellow and black (Fig. 35) (dark areas reduced in some examples from arid localities); head yellow, with a narrow, longitudinal median brown stripe from just behind labrum to halfway from vertex, occiput with 2, triangular, forwardly pointing black areas, one on either side of middle; underside black except for anterior half of pronotal hypomera, prosternum in front of and between anterior coxae, mes- and metepimera and elytral epipleura; legs black. Head (Fig. 55) with oblique ridges over antennal insertions much less convergent than other species of *Micraspis* (Fig. 56), punctures similar in size to eye facets, separated by *c.* 1 diameter on disc, much sparser elsewhere, especially anterolaterally, intervals with weakly-marked, reticulate microsculpture; last and penultimate antennal segments wholly or partly fused, funicle sometimes reduced to 5 segments, segments 4–7 subequal in length. Pronotum with hind border very slightly sinuate laterally close to strongly rounded posterior angles; punctures of discand margins similar in size to those of head, almost always separated by >1 diameter, mostly by 2 or more; intervals smooth (except for one specimen from Queensland). Elytra almost as broad as long (20 : 19), subacuminately narrowed over posterior third to apicosutural angles; explanate external margins very narrow, upturned at external border to form a narrow, gutter-like trough; punctures of disc and margins similar in size to those of pronotum, also separated by several diameters; intervals smooth (except for Queensland specimen). Intercoxal process of prosternum transversely convex, without longitudinal carinae. Elytral epipleura at most *c.* $\frac{1}{6}$ as broad as metathorax. Abdomen with apical border of 5th sternite very shallowly emarginate, of 6th flattened medially, not quite truncate. Tarsal claws simple (Fig. 70). Genitalia as in Figs 143–146.

Female

Head with dark anterior patch very distinct, covering entire width at clypeal border, triangularly narrowed behind, sometimes joined to dark areas of vertex. Apical border of 5th abdominal sternite slightly arcuate, of 6th arcuate, frequently with a small, tubercle-like prominence.

Types

Lectotype ♀ of *furcifera*, Type [blue, printed]/ TYPE furcifera N. Holl. Guer., ZM. Lectotype ♀ of *flavolineata*, Type [blue, printed]/ Australia [pink, handwritten]/ TYPE flavolineata Deyr., ZM. Lectotype ♂ of *gauthardi*, Type [blue, printed]/ S. Austral [pink, handwritten]/ TYPE Gauthardi Bakewell, ZM. Paralectotype ♂, S. Austr [pink, handwritten]/ A [small, square, printed], ZM.

Other Specimens Examined

Queensland: 2, 'Queensland', 1 BM, 1 MVM. **New South Wales:** 1, Richmond R., SAM; 5, Bogan R., 4 DAV, 1 SAM; 6, Merriwagga, ANIC; 2, Carrathool, BCRI; 15, Hay, ANIC. **Victoria:** 1, Sea Lake, MVM; 1, Kerang, AM; 1, Melbourne, SAM; 4, Mud I., Port Phillip Bay, MVM. **South Australia:** 2, Simpson Desert, SAM; 1, 50 km N. of Mungeranie HS., ANIC; 6, Heyott to Killalpaninna, SAM; 87, survey site on bore drain, Etadunna Stn, WAM; 5, Stirton's old campsite nr Cannuwaukaninna Bore, WAM; 1, Stirton's old campsite, E. side of Canny or 9-mile Dune, Tirari Desert, WAM; 1, nr Lake Eyre South, ANIC; 2, Angus Bore, 7 km SE. of Beresford, SAM; 1, Bullinina Dam, NE. of Marree, SAM; 1, Nantowarpunna WH., 28 km N. of Marree, SAM; 6, Yerilla Ck, SAM; 25, Millers Ck, 23 SAM, 2 UQ; 2, Farina, SAM; 1, Quorn, MVM; 25, nr Wilmington, SAM; 1, Melrose, DASA; 3, 48 km SW. of Yunta, UQ; 1, Port Pirie, SAM; 17, Flinders I., SAM; 59, Port Arthur, SAM; 2, Renmark, SAM; 1, Salter Springs, WARI; 3, Port Wakefield, SAM; 1, St Kilda, AM; 2, Loxton, LRC; 1, 16 km S. of Blanchetown, WAM; 13, Eyre Peninsula, SAM; 1, Port Victoria, SAM; 1, Port Prime, DASA; 8, Reevesby I., MVM; 3, Port Lincoln, MVM; 47, Port Noarlunga, 44 SAM, 3 ANIC; 1, Tailem Bend, UQ; 20, 16 km S. of Tailem Bend, BM; 1, Goolwa, MVM; 1, Myponga Swamp, 80 km S. of Adelaide, BM; 1, Meningie, AM; 2, Kangaroo I., SAM; 4, Kingscote, Kangaroo I., SAM; 3, Kingston SE., AM; 5, the Coorong, SAM.

Total number of specimens examined: 405.

Comments

M. furcifera is a problem species in two ways, nomenclaturally and taxonomically. The first concerns the authorship of the name and the whereabouts of the type material. Fortunately, Cowan (1971) published a detailed study of Guérin-Méneville's 'Iconographie du Règne Animal de Cuvier', demonstrating with reasonable certainty that his name and illustration of *furcifera* appeared in print before Boisduval's description of the species. The original material is therefore accepted as having been in Guérin-Méneville's possession and so to be the specimen in the Crotch collection here designated as lectotype.

The second involves the status of Mulsant's genus *Cisseis* (= *Cissella*). Superficially, *furcifera* differs from the other species of *Micraspis* by so many characters that it would appear impossible to accept it as a member of the same genus. However, the genitalia (Figs 143–146) are so similar to those of the *frenata–lineola* group (Figs 147–156) and relatively so distinct from those of *M. aphidectoides* (Figs 140–142), acceptable without reserve as a *Micraspis*, that *furcifera* must be regarded as no more than a very aberrant species of the genus.

As Iablokoff-Khnzorian (1982, p. 58) remarked, abnormal tarsal claws maybe a special adaptation to life on a particular substrate. The simple claws of *furcifera*, unique among all the Australian Coccinellinae and rare among the world fauna of the subfamily, could well relate to some past or present ecological peculiarity. However, nothing is known of the life-style of the species, other than it aggregates during cold weather (Smithers and Holloway, 1982) and appears to have a very unusual distribution centred on the Eyrean subregion of South Australia. The undated Queensland specimens are old and of doubtful reliability.

Micraspis aphidectoides (Korschefsky)

(Figs 30, 140–142)

Verania aphidectoides Korschefsky, 1934, p. 108.
?*Micraspis aphidectoides* (Korschefsky); Iablokoff-Khnzorian, 1979, p. 73.
Micraspis aphidectoides (Korschefsky); Iablokoff-Khnzorian, 1982, p. 498.

Size

Length 5·0–5·8 mm. Breadth 3·9–4·4 mm.

Male

Outline and dorsal colour pattern of yellow and dark brown (Fig. 30). Underside with prosternum, elytral epipleura except for outer margins, mes- and metepimera and lateral areas of abdominal segments usually very pale in contrast to testaceous colouring elsewhere; legs pale testaceous. Head pale, minimum frontal width *c.* $2\frac{1}{2}\times$ that of an eye, surface with reticulate microsculpture, punctures of variable size and separation, some similar in size to eye facets, others distinctly larger; antennae 11-segmented with segments 3, 4 and 5 subequal. Pronotum with posterior border slightly but distinctly sinuate on either side close to hind angles; anterior border strongly arcuate medially; punctures of disc and margins usually smaller than eye facets, mostly separated by >2 diameters, intervals with reticulate microsculpture clearly marked on disc, more faintly so along lateral margins. Elytral outline as in Fig. 30; explanate external margins continuing posteriorly to apicosutural angles, frequently with a vaguely indicated, thickened external border, especially near shoulders; punctures of disc and margins shallow, sometimes obscured among surface microsculpture, about as large as pronotal punctures, but separated by up to *c.* 4 diameters. Intercoxal prosternal process with close-set, parallel, often faintly marked longitudinal carinae. Maximum width of elytral epipleura $<\frac{1}{4}$ that of metathorax (3 : 13). Abdomen with apical border of 5th sternite shallowly emarginate, of 6th briefly so medially. Tarsal claws appendiculate. Genitalia as in Figs 140–142.

Female

With apex of 5th abdominal sternite not emarginate, that of 6th more or less evenly arcuate.

Types

Lectotype ♀ (designated by Iablokoff-Khnzorian, 1982 [as 'Holotypus']), Holo: Typus [red label]/ Ferguson R. [ca 300 km südlich von Darwin N.T.] May 1931, HANDSCHIN/ Verania aphidectoides m., Holotypus det. Korschefsky [Korschefsky's handwriting], TMB. Paralectotypes 3 ♀; 2, PARATYPUS [red label]/Ferguson R. N.T. May 1931 HANDSCHIN; 1, Katherine May 1931. HANDSCHIN, all TMB.

Other Specimens Examined

Queensland: 1, Bentinck I., SAM; 2, Chillagoe, DPIM; 8, Knob Lagoon, 48 km NW. of Doomadgee Mission, 7 UQ, 1 QDPI; 6, Normanton, QDPI. **Western Australia:** 4, Forrest R., 2 MVM, 2 SAM; 16, Kimberley Res. Stn, 15 WADA, 1 ANIC; 2, Kununurra, WADA; 2, King Sound, ANIC; 11, Oobagooma, WADA. **Northern Territory:** 11, Darwin, 1, MVM, 6 DPPD, 3 SAM, 1, ANIC; 1, Holmes Jungle nr Darwin, NTM; 2, 16 km NE. of Mt Cahill, DPPD; 1, S. Alligator R., 46 km WSW. of Mt Cahill, SAM; 4, Batchelor, SAM; 3, Stapleton, SAM; 4, Blain Block, Tipperary Stn, DPPD; 15, Daly R., SAM; 15, Katherine Exp. Farm, 19 km N. of Katherine, 12 DPPD, 3 ANIC; 1, 56 km W. of Katherine, ANIC; 3, Katherine, ANIC; 1, Yann Ck nr Katherine, W-H; 1, Scott Ck Stn, 50 km SW. of Katherine, DPPD; 1, Flood Plain Block, Scott Ck Stn via Katherine, DPPD; 7, Mataranka, W-H; 2, Elsey Stn, DPPD; 2, Elsey Ck, 16 km E. of Mataranka on Roper R. Rd, DPPD; 6, Jasper River Gorge 54 km N. of Victoria River Downs, DPPD; 3, Daly Waters, DPPD; 3, Irrigiation Farm, Victoria River Downs, DPPD; 1, Macarthur R. 80 km SW. of Borroloola, ANIC; 1, West Baines R. Crossing, ANIC; 1, Alice Springs, BCRI; 6, Finke R., SAM; 1, Sixty Mile [rice project], ANIC; 6, 'Northern Territory', 2 MVM, 4 SAM.

Total number of specimens examined: 153.

Comments

M. aphidectoides is most easily distinguished from other Australian members of the genus by the strong microsculpture of the elytra. The male genitalia (Figs 140–142) are also quite different, although conforming to the ground plan for *Micraspis* as a whole.

The Australian distribution suggests that *aphidectoides* might be, like the northern population of *Menochilus sexmaculatus*, an immigrant species, but no specimens are known from elsewhere and the species is as different from Asian *Micraspis* as it is from its Australian relatives.

Biology

Nothing has been published, but, from data on specimens examined, *aphidectoides* appears likely to be an aphid feeder. It has been taken on various kinds of low-growing vegetation, including crops such as millet, groundnuts and sorghum.

Micraspis lineola (Fabricius)

(Figs 31, 152–153)

Coccinella lineola Fabricius, 1775, p. 79.
Verania lineola (Fabricius); Crotch, 1871, p. 8; 1874, p. 176; Koebele, 1893, p. 24; Froggatt, 1902, p. 901; Korschefsky, 1932, p. 309; Timberlake, 1943, p. 27.
Alesia lineola (Fabricius); Masters, 1888, p. 91.
Coccinella strigula Boisduval, 1832, pl. 8, f. 27; 1835, p. 601. Synonymised by Crotch, 1874, p. 176.
Verania strigula (Boisduval); Mulsant, 1850, p. 366; Crotch, 1871, p. 8.
Alesia lineola var. *strigula* (Boisduval); Masters, 1888, p. 91.
Alesia strigula (Boisduval); Lea, 1902, p. 489.
Micraspis lineola (Fabricius); Iablokoff-Khnzorian, 1979, p. 73; 1982, p. 506.

Size

Length 4·0–4·6 mm. Breadth 3·25–3·70 mm.

Male

Outline and dorsal colour pattern of dark yellow and black as in Fig. 31. Head usually entirely pale; elytral epipleura, prosternum, mes- and metepimera, sides of abdomen, anterior and middle legs pale; hind legs with at least part of femora dark coloured. Head with minimum frontal width *c.* $2\frac{2}{5}\times$ that of an eye; punctures about as large as eye facets, separated by from *c.* 1 to >2 diameters; intervals with faint, reticulate microsculpture. Pronotum with hind border not sinuate laterally; disc and margins with punctures about as large as eye facets, separated on disc by from 1 to 3 or 4 diameters, usually by the greater distance, separation in front of scutellum *c.* 1 diameter, 2 or more toward lateral borders. Elytra usually slightly elongate (13 : 12); explanate external margins obliterated posteriorly shortly before reaching apicosutural angles, thickened external border often not clearly defined, being more of a slightly reflexed outer edge; punctures of disc and margins slightly larger than those of pronotum, more deeply impressed, separated by from *c.* 1 to $1\frac{1}{2}$ diameters; intervals smooth. Intercoxal prosternal process with short, anteriorly convergent, longitudinal carinae confined to posterior half, sometimes difficult to see. Maximum width of elytral epipleura slightly $>\frac{1}{4}$ that of metathorax (3 : 11). Abdomen with apical border of 5th sternite broadly and shallowly emarginate, of 6th more narrowly and very shallowly emarginate, flat. Genitalia as in Figs 152, 153.

Female

Head usually with a dark anteromedian patch; anterior and mid-femora dark, at least in part; apical border of 5th abdominal sternite not emarginate, of 6th very briefly notched medially, surface with a tubercle-like median prominence.

Types

Lectotype of *lineola*, [no abdomen and evidence of head and legs inclonclusive], Cocc. Lineola Fab. Entom. p 79 n. 5 [black-bordered, Banks collection label], BM. Type material of *strigula* not examined [see 'Comments'].

Other Specimens Examined

Non-Australian: Fiji, Tonga.

Queensland: 1, Lockerbie, UQ; 8, Mapoon, 80 km N. of Weipa, 6 AM, 2 MVM; 1, Weipa, W-H; 1, Archer R., QDPI; 1, Stewart R., SAM; 4, Stewart R. 5 km W. of Port Stewart via Coen, QM; 2, Hann River N. of Laura, QDPI; 1, Sandstone outcrops 30 km W. of Fairview via Laura, QM; 1, Bloomfield, SAM; 1, Redlynch, BM; 2, Cairns, W-H; 2, Russell R., MM; 1, South Johnstone, DPIM; 10, Ayr, 2 DPIM, 8 QDPI; 1, Home Hill, DPIM; 3, Mackay, QDPI; 1, Bundaberg, SAM; 1, Pialba, SAM; 4, Maryborough, SAM; 25, Brisbane, 2 QM, 1 W-H, 20 QDPI, 1 SAM, 1 ANIC; 1, Mt Tamborine, MVM; 3, 'Queensland', BM. **New South Wales:** 16, Tweed R., 9 BCRI, 7 SAM; 2, Tygalgah, BCRI; 1, Middle Pocket nr Billinudgel, AM; 1, Clarence R., MVM; 16, Richmond R., 1 AM, 1 ANIC, 10 BCRI, 1 BM, 1 DAH, 2 SAM; 1, Maclean, DAH; 1, Lawrence, DAH; 6, Grafton, DAH; 1, Narara, BCRI; 12, Sydney, 2 ANIC, 10 BM; 6 'New South Wales', 1 MVM, 5 SAM. **Northern Territory:** 1, Elcho I., ANIC; 2, 18 km NE. of Oenpelli, ANIC; 10, E. Alligator R., Oenpelli, AM; 7, Darwin, 5 DPPD, 1 ANIC, 1 PKY; 2, Cannon Hill via Jim Jim, DPPD; 1, Holmes Jungle nr Darwin, NTM; 1, 7 km NNW. of Cahills Crossing, E. Alligator R., DPPD; 1, Fogg Dam, NTM; 4, Humpty Doo, ANIC; 2, Roper R., SAM; 1, Sixty Mile [rice project], ANIC.

Total number of specimens examined (Australian): 172.

Comments

Mulsant based his interpretation of *strigula* on material that included what he believed to be Boisduval's 'type' in the MNHN, Paris. This specimen could not be found during a search made in 1980, but Boisduval's illustration agrees well with the Fabrician type of *lineola* and Crotch's synonymy is accepted.

Biology

Nothing seems to have been published since the observations of Koebele (1893) and Froggatt (1902). The first recorded *lineola* as always feeding on aphids, both as larva and adult,and at one time 'numerous in a cornfield [maize] on the Richmond River'. The second stated that the species could be taken 'feeding on aphis on low shrubs along the northern rivers [of N.S.W.] and in south Queensland'. Label data examined adds little except 'on *Sorghum bicolor*' (Darwin), 'ex maize' (Mona Park, Ayr), 'off *Digitaria decumbens* pasture' (South Johnstone), 'Cotton' (Ayr), 'sweeping grass' (Brisbane) and 'ex grass and reeds, edge of marsh' (Brisbane). In addition, it has recently been reared on *Hyperomyzus* aphids on *Sonchus* by K.J. Houston (QDPI).

Micraspis frenata (Erichson), stat. rev.

(Figs 32, 56, 147–149)

Coccinella frenata Erichson, 1842, p. 239.

Verania frenata (Erichson); Mulsant, 1850, p. 362; Crotch, 1871, p. 8; 1874, p. 175; Koebele, 1893, p. 24; Froggatt, 1902, p. 901; 1907, p. 209; 1910, p. 337; Korschefsky, 1932, p. 309; Bielawski, 1962, p. 202.

Alesia frenata (Erichson); Masters, 1888, p. 90.

Micraspis lineata (Thunberg); Iablokoff-Khnzorian, 1982, p. 514; Anderson and Hales, 1983, p. 47.

Size

Length 3·8–4·9 mm. Breadth 2·8–3·8 mm.

Male

Outline and dorsal colour pattern as in Fig. 32. Head yellow, sometimes with a faintly marked, anteromedian dark patch, occiput black, anterior border of black area bilobed; underside dark-coloured except for pronotal hypomera, mes- and metepimera and elytral epipleura within dark external margins; anterior legs usually pale, middle legs sometimes with femora dark-coloured, hind legs with femora dark, at least in part. Head (Fig. 56) with minimum frontal width $>2\frac{1}{2}\times$ that of an eye; punctures of disc and margins about as large as or slightly larger than eye facets, separated by 1 diameter or less toward eyes, a little

less closely set on disc, intervals reticulately microsculptured. Pronotum with hind border almost evenly curved; anterior border weakly arcuate medially; punctures of disc and margins smaller than those of head, usually separated by 2 or 3 diameters on disc, often by more toward lateral margins, sometimes by less in front of scutellum; intervals smooth or with very faint, reticulate microsculpture on disc and mediobasally. Elytral outline as in Fig. 32; explanate external margins entire from shoulders almost to apicosutural angles, with at most traces of a thickened external border; punctures of disc and margins a little larger than those of pronotum and more deeply impressed, separated by from 1 to 2 or 3 diameters; intervals smooth. Intercoxal process of prosternum with parallel longitudinal carinae usually extending anteriorly a little beyond base of process; shallow anteromedian emargination of mesosternum scarcely as broad as hind border between coxae. Elytral epipleura at most *c.* $\frac{1}{4}$ as broad as metathorax. Abdomen with apical border of 5th sternite broadly but shallowly emarginate, of 6th truncate or very shallowly emarginate, surface flat. Genitalia as in Figs 147–149.

Female

With a clearly-marked, anteromedian dark patch on head, usually with at least femora of all legs dark, with apical border of 5th abdominal sternite not regularly emarginate, usually slightly produced medially; 6th arcuate apically, surface with a longitudinal median, tubercle-like ridge.

Types

Lectotype ♀, 27964/ Typus [red, printed]/ frenata Er. Van Diem. Schayer [mauve, hand-written, probably by Gerstaecker], MNHU. Paralectotypes 3; 1 ♀, 1208 [red, on white label]/ Terra v. Diem Schayer Nr. 27964/ Typus [red, printed]; 1 ♀, same data but '1209', 1 ♀, same data but '1210', all MNHU.

Other Specimens Examined

Non-Australian: New Caledonia.

Queensland: Southedge via Mareeba; Cairns; Chillagoe; Rocky Ck Atherton Tableland; Tolga Scrub; Timberlea, Atherton; 17 km from Herberton; Bakerville; The Crater Natl Park, 25 km S. of Atherton; Walker Ck, N. of Normanton; Doomadgee Mission; Alligator Ck; Ewan Rd; Townsville; Ayr; 4 Mile Ck, Woodstock; Charters Towers; Burleigh; Corrella Ck 40 km W. of Cloncurry; Mackay; Coppermine Ck 67·5 km N. of Marlborough; Barmount; Peak Downs; Capella; Grove Gully 20 km N. of Rockhampton; Rockhampton; Thomson River nr Longreach; Emerald; Barcaldine; Bluff; Edungalba, 80 km W. of Rockhampton; Biloela; Dawson R. nr Duaringa; Fletchers Gully, 16 km E. of Dawson R.; 50 km W. of Moura; Granite Ck Rd 34 km S. of Miriam Vale; 27 km N. of Tambo; More Park, *c.* 22 km N. of Bundaberg; Barcoo R. nr Blackall; Bundaberg; Nive River; 11 km E. of Cordalba; Eidsvold; Bin Bin Range via Discot; Biggenden; Bluff Range nr Biggenden; Mt Walsh Natl Park, Biggenden; 16 km S. of Birdsville; 15 km SW. of Charleville; Mungallala; Mitchell; Kingaroy; Roma; Yuleba; Maleny; Caloundra; Glasshouse Mts; Elimbah; Bum Bum Ck 4·8 km S. of Cooyar; Condamine R., Macalister; Surat; Dalby; North Pine; Mt Glorious; Brisbane R., Northbrook, 10 km N. of Fernvale; Samford; Brisbane; Ormiston; Moreton Bay; Malu; Gatton; Lawes; Toowoomba; Millmerran; Mt Tamborine; Broadbeach; Mermaid Beach; Goomburra; Cunnamulla; Eulo; Emu Vale area; Springbrook; Palen Ck 11 km S. of Rathdowney; Applethorpe; Stanthorpe; Binna Burra (1000 m); Wallangarra. **New South Wales:** Middle Pocket nr Billinudgel; Clarence R.; 16 km SE. of Nimbin; Eltham; Wollongbar; Richmond R.; 3·2 km W. of Evans Head; Kialoa; Wallangra; Moree; Graman; The Dunes, Angourie nr Yamba; Warialda; Greystones; Glen Innes; Inverell; Carrington; Hawkers Gate House; Terewah Lake; 11 km N. of Coffs Harbour; Guyra; Narrabri; Pilliga; 5 km N. of Repton; Barrington House via Salisbury; Marooma; Hollywood; North Head; 13 km S. of Uralla; nr Cobar; Gunnedah; Cawai–Kempsey; Girilambone; 8 km N. of Telegraph Point; 13 km W. of Coonabarabran; Warrumbungles Natl Park; Gulargambone; Kindee; Hastings R.; Nundle; Port Macquarie; Cobar; Quirindi; Byabarra; Nyngan district; Mt Bulls, Comboyne Plateau; Warren; 10 km N. of Coolah; Moorland; Dingo Ck nr Wingham; Wingham; Dunedoo; 11 km SW. of Broken Hill; Dubbo; 6·4 km S. of Coolongolook nr Nabiac; Wallingat State Forest; Scotters Ck nr Dungog; Menindee Lakes, Burkes Camp; Menindee; Putty Rd 91 km from Singleton; Williamtown; Abernethy; Cumnock; Willandra Natl Park; Ourimbah; Somersby; Lisarow; Wisemans Ferry; Narara;

Narara Forest Research Station; Colo Reserve; Gosford; 2·4 km NE. of Eugowra; Winburndale Reserve, 20 km E. of Bathurst; Upper Colo; Terrigal; Roberts Ck, Kurrajong; Bensville, S. of Gosford; Kurmond; Broken Bay; Richmond; Grose Wold; Cowan; Windsor; Berowra; Kenthurst; Mt Colah; Lawson; Mungo Brush; Jenolan Caves; Mt Edwards; Boyd Plateau nr Jenolan; Sydney; Moorna Stn, 25 km W. of Wentworth; Royal Natl Park; Otford; Stanwell Park; Mt Keira; Wollongong; Unanderra; Dapto; 'Illawarra'; Knights Hill; Kiama; Minnamurra Falls; Kangaroo Valley; Gerroa; Nowra; Brooks R.; 16 km E. of Bungendore; Tarcutta; Deniliquin; 8 km W. of Moruya; Batehaven; Cabbage Tree Ck, nr Monga; 9 km SE. of Batemans Bay; Mogo; 16 km S. of Batemans Bay; Tuross; NE. of Bodalla; Wallaga Lake; Tathra. **Australian Capital Territory:** Canberra. **Victoria:** 'Mallee'; Lake Albacutya; Woolonga; Echuca; Tambo Crossing; Whittlesea; Healesville; Olinda Ck; Coranderrk Reserve, Healesville; Macalister R. 9 km NNE. of Heyfield; Millgrove; Lilydale district; 2 km E. of Seville; Launching Place; Warburton; Melbourne; Yarra Junction; Nar-Nar-Goon; Koo-wee-rup; 'Gippsland'. **Tasmania:** Burnie; Denison Gorge; Guns Plains; Underwood; Frankford; Sheffield; Kimberley; Launceston; Hobart. **South Australia:** Coopers Ck Ferry Crossing; Lake Eyre N. opp. Prescott Peninsula; Angus Bore, 7 km SE. of Beresford; Bullinina Dam, 45 km NE. of Marree; Nantowapunna WH., 28 km NE. of Marree; 35 km N. of Hawker, Flinders Ranges; Mortlock Res. Stn, 5 km N. of Auburn; Renmark; Lyrup; Adelaide; Langhorne Ck; Mt Compass; Myponga; Normanville; Hindmarsh Falls; Goolwa; Myponga Swamp, 80 km S. of Adelaide; Tapanappa nr Cape Jervis. **Northern Territory:** Simpsons Gap 17 km WNW. of Alice Springs.

Specimen depositories: AM, AMR, ANIC, BCRI, BM, DAH, DASA, DAV, DLN, DPIM, DSIR, FCN, HDN, LRC, MM, MVM, QDPI, QM, SAM, UQ, WADA, WARI, W-H.

Total number of specimens examined (Australian): 2005.

Comments

Iablokoff-Khnzorian (1982) treated *frenata* as a synonym of *lineata*, illustrating it as a distinct 'form' in Fig. 95c. However, careful comparison of a series of Australian specimens with undoubted *lineata* from Java, Sumatra and New Guinea, showed constant genitalic differences between the two, especially in the male sipho (Fig. 147). These, and minor genitalic differences elsewhere, together with the distinctive colour pattern of *frenata* and its known distribution suggest that, if *lineata* and *lineola* are to be regarded as separate species, then so must *frenata*.

Biology

Early observers such as Thompson (1893), Koebele (1893), Froggatt (1902) and Swezey (1905), (who described and illustrated the immature stages), all referred to *frenata* as an aphid feeder, particularly on grasses and sugar cane. Swezey also recorded the species as feeding on young leaf-hoppers in the insectary and suggested that it might do so in the field, if aphids became scarce.

Label data associates the species with many other plants, including citrus, cotton, sorghum, lucerne, peach trees, maize, potatoes and paw-paw. It has been reared on *Hyperomyzus* aphids on *Sonchus oleracea* by K. J. Houston (QDPI), and bred on *Pineus pini* (Linnaeus) on *Pinus radiata* at Somersby, N.S.W. (FCN).

Recent studies in both field and laboratory (Anderson and Hales 1983) have shown the multivoltine *frenata* (as *lineata*) to be polyphagous, capable of completing larval development and reproducing in the field on either aphids or pollen and, in the laboratory, additionally on powdered, freeze-dried, honeybee brood. The authors suggested that it is this versatility that enables the species to remain reproductively active from early spring to early autumn. In contrast, *Illeis (Leptothea) galbula*, the only other Australian species recorded as feeding on pollen (Anderson, 1982), does so during post-dormancy and pre-breeding periods and has a midsummer reproductive diapause.

Micraspis flavovittata (Crotch)

(Figs 33, 154–156)

Verania flavovittata Crotch, 1874, p. 176; Korschefsky, 1932, p. 309. (Not Timberlake, 1943, p. 27.)

Alesia flavovittata (Crotch); Masters, 1888, p. 90.

Micraspis flavovittata (Crotch); Iablokoff-Khnzorian, 1979, p. 73. (Not Iablokoff-Khnzorian, 1982, p. 518.)

Size

Length 4·5–4·9 mm. Breadth 3·40–3·65 mm.

Male

Outline and dorsal colour pattern of yellow and black as in Fig. 33. Head yellow, sometimes with a faint, anteromedian dark patch, occiput black, anterior border of black area bilobed; underside except for yellow pronotal hypomera, mes- and metepimera and all but external margins of elytral epipleura dark-coloured; all legs, especially femora, dark-coloured. Head with minimum frontal width *c.* $2^{3}/_{10}\times$ that of an eye, punctures about as large as eye facets, frequently separated by <1 diameter, intervals reticulately microsculptured. Pronotum with hind border evenly arcuate; anterior border slightly arcuate medially; punctures of disc and margins slightly smaller than those of head, separated in front of scutellum by *c.* 1 diameter, a little more sparsely arranged on disc, punctures toward lateral margins apparently smaller than those of disc and less deeply impressed; intervals sometimes smooth, sometimes with faint traces of reticulate microsculpture. Elytral outline as in Fig. 33; explanate external margins not quite reaching apicosutural angles, conspicuously narrowed for apical $\frac{1}{5}$, thickened outer border at most faint and incomplete, sometimes absent; punctures of disc and margins slightly larger than those of pronotum, more deeply impressed, usually separated by from 1 to *c.* $1\frac{1}{2}$ diameters; intervals smooth. Intercoxal process of prosternum with longitudinal carinae faint, parallel, extending anteriorly a little in front of base of process; anterior border of mesosternum very shallowly emarginate, but emargination broader than hind mesosternal border between coxae. Elytral epipleura at most almost $\frac{1}{4}$ as broad as metathorax. Apical border of 5th abdominal sternite broadly, but very shallowly emarginate, of 6th briefly truncated or very shallowly emarginate medially. Genitalia as in Figs 154–156.

Female

With a clearly marked, anteromedian dark patch on head; with apical border of 5th abdominal sternite not emarginate, that of 6th evenly arcuate, surface with a small, median, tubercle-like prominence.

Types

Lectotype ♂, Type [circular, BM Type label]/ Austral, 53·55 [circular, blue, hand-written]/ Verania flavovittata, (Type) [handwritten by C. O. Waterhouse]/ flavovittata TYPE [Crotch's hand]), BM.

Other Specimens Examined

Victoria: 1 ♂, Narbethong, MVM; 1 ♀, Narbethong, 7.viii.1949, MVM; 1 ♂, Kallista, 29.xii.1944, MVM.

Total number of specimens examined: 4.

Comments

The type specimen, registered in the BM in 1853, is recorded as having been taken in Melbourne. *M. flavovittata* appears to be an extremely rare, perhaps even extinct species of very restricted distribution in southern central Victoria.

The records, description and illustrations given for *flavovittata* by Timberlake (1943) and Iablokoff-Khnzorian (1982) refer to another species, described as new below.

Micraspis confusa, sp. nov.

(Figs 34, 150, 151)

[*Verania flavovittata* Crotch; Timberlake, 1943, p. 27; Iablokoff-Khnzorian, 1892, p. 518. Misidentifications.]

Verania sp., Swezey, 1905, p. 232, pl. xv, fig. 12.

Types

Holotype ♂, Bundaberg, Australia RI. xiii.'05/ Koebele and Perkins Colls./ R. C. L. Perkins B.M. 1942–95, BM. Paratypes 21; 6 ♂, 3 ♀, same data as holotype; 6 ♂, 6 ♀, Australia: Qld., Bundaberg R. C. L. Perkins Coll. B.M. 1942–95, BM.

Total number of specimens examined: 22.

Size

Length 4–5 mm. Breadth 3·1–3·8 mm.

Male

Outline and dorsal colour pattern of yellow and black as in Fig. 34. Head yellow, occiput black with anterior border of black area bilobed; underside, except for pale hypomera, mes- and metepimera, elytral epipleura other than external margins, and, sometimes, sides of abdominal sternites, black or dark brown; anterior and middle legs pale-coloured, femora of hind legs black. Head with minimum frontal width *c.* $2^3/_{10}\times$ as wide as an eye; punctures variable in size, but averaging about diameter of eye facets, separated by *c.* 1 diameter, intervals with faint, reticulate microsculpture. Pronotum with hind border slightly sinuate on either side near rounded hind angles; anterior border extremely shallowly arcuate medially; punctures of disc and margins smaller than those of head, usually separated by 2 or more diameters, even in front of scutellum; intervals smooth. Elytral outline as in Fig. 34; explanate external margins broader than in other Australian species of *Micraspis*, not quite reaching apicosutural angles but not narrrowed for apical $\frac{1}{5}$ of length, thickened external borders either absent or very faintly marked and incomplete; most punctures of disc and margins distinctly larger than those of pronotum and head, a few much smaller, separation by from *c.* 1 to, sometimes, *c.* 2 diameters; intervals smooth. Intercoxal prosternal process with longitudinal carinae variable, if well marked, then usually extending more than halfway to anterior border of prosternum, process transversely convex. Shallow emargination of anterior mesosternal border not as broad as hind border between coxae. Elytral epipleura at most *c.* $\frac{1}{4}$ as broad as metathorax. Apical border of 5th abdominal sternite broadly emarginate, of 6th very briefly truncated. Genitalia as in Figs 150, 151.

Female

With an anteromedian dark patch on head; with femora of all legs for the most part dark-coloured; with apical border of 5th abdominal sternite arcuate; 6th with apical border arcuate and surface with a small, tubercle-like prominence.

Comments

In addition to the distinctive elytral colour pattern, the unusually broadly explanate external elytral margins set *confusa* apart from all other Australian species of *Micraspis*. Otherwise, genitalia included, the relationship with other members of the *frenata–lineola* group is clearly very close.

The species is known only from the type series and a further eight specimens in the Bishop Museum, Honolulu, Hawaii (Timberlake 1943), for the two specimens referred to by Iablokoff-Khnzorian (1982) were most probably part of the latter. All were collected by Perkins and Koebele at Bundaberg during their trip to Queensland in 1904 in search of leafhopper enemies. Apart from the comment by Swezey (1905) that a few specimens (described and illustrated by him as *Verania* sp.) were collected from canefields at Condong, N.S.W., in December, 1904, no records of its habitat or habits exist. As in the case of *flavovittata*, this species could now be extinct.

Genus **Harmonia** Mulsant

Harmonia Mulsant, 1846, p. 108; 1850, p. 75; 1866, p. 55; Crotch, 1871, p. 3; Mader, 1926, p. 19; Timberlake, 1943, p, 17; Iablokoff-Khnzorian, 1979, p. 71; 1982, p. 456. Type-species *Coccinella marginepunctata* Schaller [= *Coccinella quadripunctata* Pontoppidan] by subsequent designation, Timberlake, 1943, p. 17.

Leis Mulsant, 1850, p. 241; Froggatt, 1902, p. 902. Type-species *Coccinella dimidiata* Fabricius by subsequent designation, Crotch, 1874, p. 119. Synonymised by Iablokoff-Khnzorian, 1979, p. 71.

Ballia Mulsant, 1853, p. 159. Type-species *Ballia christophori* Mulsant by subsequent designation, Crotch, 1874, p. 126. Synonymised by Iablokoff-Khnzorian, 1979, p. 71.

Callineda Crotch, 1871, p. 6; Timberlake, 1943, p. 17. (Not Crotch, 1874, p. 122.) Type-species *Coccinella sedecimnotata* Fabricius by subsequent designation, Rye, 1873, p. 329. Synonymised by Timberlake, 1943, p. 17.

Stictoleis Crotch, 1874, p. 118; Korschefsky, 1932, p. 275. Type-species *Coccinella corypha* Guérin-Méneville by original designation. Synonymised by Iablokoff-Khnzorian, 1979, p. 71.

Ptychanatis Crotch, 1874, p. 122. Type-species *Coccinella axyridis* Pallas by original designation. Synonymised by Korschefsky, 1932, p. 440.

Coccinella (Harmonia) Mulsant; Chapuis, 1876, p. 179; Korschefsky, 1932, p. 439.

Rhopaloneda Timberlake, 1943, p. 17 (replacement name for *Callineda sensu* Crotch, 1874, not 1871). Type-species *Callineda decussata* Crotch by original designation. Synonymised by Iablokoff-Khnzorian, 1982, p. 458.

Description

Medium to large (4·8–7·6 mm long); very convex and scarcely elongate (*bicolor* Fig. 6) to much less convex and distinctly elongate (*octomaculata* Fig. 8). Head with anterior clypeal border straight between lateral projections; minimum interocular frontal width usually *c.* 2× that of an eye; antennae *c.* $1^{3}/_{10}\times$ as long as minimum frontal width, last segment obliquely truncate apically, asymmetrically transverse. Pronotum *c.* 2× as broad as median length, or slightly less; evenly convex transversely to very narrowly upturned lateral borders, upturning, or thickening, continuing along anterior border, occasionally traversing it entirely. Scutellum transverse, basal width from $^{1}/_{12}$–$^{1}/_{10}$ that of elytra at shoulders. Elytra either almost as broad as long (Fig. 6) or distinctly elongate (Fig. 8); disc strongly to moderately convex; explanate external margins with an entire, thickened outer border. Pronotal hypomera without foveae; intercoxal process of prosternum with longitudinal carinae usually clearly defined. Mesosternum with anterior edge very slightly emarginate medially, with an entire, raised anterior border. Anterior border of metasternum truncate between midcoxae. Elytral epipleura slightly (as Fig. 88) to moderately (as Fig. 89) descending externally, without foveae at levels of mid- and hind coxae. Postcoxal plates of 1st abdominal sternite always with an oblique dividing line (as Fig. 79); males with apical border of 5th abdominal sternite distinctly emarginate, or truncate (*octomaculata*), 6th emarginate apically; females with apical border of 5th sternite straight or arcuate, sometimes with a small, shallow, median notch, 6th with a median tubercle or tubercle-like ridge, apical border arcuate, sometimes very briefly notched medially.

Included species. 20 (Khnzorian, 1982).

Distribution. Old world.

Comments

The composition and status of *Harmonia* Mulsant has varied substantially over the years, hence the large number of synonymic and other references given above. However, since the work of Timberlake (1943), it has become more stable and is now accepted as a group confined to the eastern hemisphere.

Key to Species of *Harmonia*

1. Relatively elongate with dorsal colour pattern approximating to Fig. 8; a distinct, concave 'gutter' present within shoulder region of narrow, rounded, thickened external elytral borders; males with apical border of 5th abdominal sternite truncate ..... *octomaculata* (Fabricius)

   Outlines and dorsal colour patterns typically as Figs 5–7, 9, 10; thickened external borders of elytra relatively broad, more or less flat-topped and without a concave 'gutter' between them and elytral disc; males with apical border of 5th abdominal sternite distinctly emarginate 2

2(1). Elytral pattern of a partial or complete black network on a pale ground (Figs 9, 10) ..... *testudinaria* (Mulsant)

   Elytra either deep yellow with black spots (Fig. 5), plain black, or black with a large, reddish patch just behind and external to to each humeral callosity (Fig. 6) 3

3(2). Elytra black or black with a reddish subhumeral patch (Fig. 6); underside and legs pale-coloured ..... *bicolor* (Blackburn)

   Elytra dark yellow with black spots (Fig. 5); meso- and metathorax and abdominal segments almost always dark-coloured, legs usually particoloured ..... *conformis* (Boisduval)

Harmonia octomaculata (Fabricius)

(Figs 8, 167–170)

Coccinella octomaculata Fabricius, 1781, p. 97 [not Thunberg, 1781, p. 13].

Coccinella arcuata Fabricius, 1787, p. 55; Boisduval, 1835, p. 591; Crotch, 1874, p. 110; Froggatt, 1902, p. 900; Lea, 1902, p. 488; Korschefsky, 1932, p. 440.

Harmonia arcuata (Fabricius); Mulsant, 1850, p. 77; 1866, p. 59; Crotch, 1871, p. 3; Timberlake, 1943, p. 18; Miyatake, 1965, p. 60.

Harmonia arcuata (Fabricius) var. *octomaculata* (Fabricius); Mulsant, 1850, p. 80.

Harmonia octomaculata (Fabricius); Mader, 1932, p. 215; Bielawski, 1957, p. 93; 1961*c*, p. 6; 1962, p. 204; 1964*a*, p. 5; Nakane and Araki, 1959, p. 51; Bielawski and Chûjô, 1961, p. 334; 1966, p. 48; Nakane, 1963, p. 210; Sasaji, 1971, p. 280; Iablokoff-Khnzorian, 1979, p. 71; 1982, p. 475.

Harmonia octomaculata (Fabricius) var. *arcuata* (Fabricius); Mader, 1932, p. 217.

Coccinella arcuata (Fabricius) var. *octomaculata* (Fabricius); Korschefsky, 1932, p. 441.

Ptychanatis octomaculata (Fabricius); Kamiya, 1965, p. 59.

Size

Length 4·6–7·5 mm. Breadth 3·4–5·4 mm.

Male

Outline as Fig. 8. Dorsal colour pattern of reddish-yellow and black frequently as in Fig. 8, but dark markings may be much smaller, or even absent. Colours of underside variable, but prosternum, elytral epipleura, and external margins of abdomen pale, mesosternum, metasternum and abdominal disc dark; legs variably coloured, but femora of hind legs almost always dark. Head pale coloured with dark patch on vertex; frons and clypeus with punctures usually smaller than eye facets, sometimes separated by several diameters; intervals with reticulate microsculpture sometimes faintly impressed. Pronotum $<2\times$ as broad as median length (9 : 5); punctures of disc and margins very similar in size to those of head, usually separated by >1 diameter on disc, by even more toward lateral margins; intervals usually clearly microreticulate mediobasally, often smooth elsewhere. Scutellum at base *c.* $^1/_{12}$ as broad as elytra at shoulders. Elytra (Fig. 8) usually slightly longer than broad (18 : 17) and subacuminately rounded apically; thickened external borders very narrow and bead-like, sometimes bounding a concave, 'gutter'-like margin, especially toward shoulders; discal punctures similar in size to those of pronotum, usually separated by 3–4 diameters, intervals with microsculpture of varying clarity and depth of impression, sometimes giving the effect of micro-reticulation, but more often appearing to be irregularly shaped micro-punctures; punctures along and close to explanate external margins usually much larger and more closely set than those of disc, intervals smooth or almost so. Longitudinal carinae of

prosternal intercoxal process more or less parallel, extending from apex of process to slightly over $\frac{1}{2}$ from anterior prosternal border. Mesosternum with anterior border at most very lightly notched medially. Elytral epipleura hardly descending externally (as Fig. 88), at most *c.* $\frac{1}{6}$ as broad as metathorax. Postcoxal plates of 1st abdominal sternite with hind borders partially obliterated externally to dividing line, similar to those of *Adalia* (Fig. 80); apex of 5th sternite truncate, of 6th shallowly but distinctly emarginate. Genitalia as in Figs 167–170.

Female

Frequently smaller than male; apical border of 5th abdominal sternite arcuate medially, 6th with a median tubercle and an arcuate apical border.

Types

Lectotype ♀ of *octomaculata*, Coccinella 8 maculata Fabr. Sp. Ins. n. 25 [black-bordered, handwritten, Banks collection label], BM. Syntypes 3 of *arcuata*, (China) Dom. de Sehestedt, ZMC (not examined).

Other Specimens Examined

Non-Australian: India, China, Loo Choo Is, North Vietnam, Laos, Malaysia (Malaya), Sumatra, Tonga, Fiji, Philippines, Gilbert Is, Solomon Is, New Hebrides, New Caledonia.

Queensland: Saibai I.; Darnley I.; Sue Islet; Hammond I.; Thursday I.; Lockerbie; Bamaga; Bird I.; Wenlock R.; Hibbert Point Weipa; W. Claudie R.; Iron Range; Claudie R.; Archer R.; Coen; Silver Plains HS.; Stewart R., 5 km W. of Point Stewart via Coen; 38 km S. of Musgrave; 21 km NW. of Cooktown; W. Normanby R. 64 km W. of Cooktown; McIvor R. 64 km S. of Cooktown; Endeavour R.; 25 km N. of Laura; Kowanyama; 30 km W. of Fairview via Laura; Lakeland Downs; Butchers Hill; Palmer R.; Cooper Ck; Mornington I.; Station Ck 17 km N. of Mt Molloy; Kuranda; Redlynch; Cairns; Arriga Res. Stn via Mareeba; Chilcott Cay; Mareeba; Emerald Ck via Mareeba; Walkamin; Chillagoe; Danbulla Forestry Reserve; Tolga; Atherton; 27–32 km W. of Atherton; The Boulders, Babinda; 6·4 km S. of Atherton; Bakerville; West Cay, Diamond Islets; Karumba; South Johnstone; Archers Ck; Utchee Ck; Normanton; 66 km W. of Mt Garnet; Forty Mile Scrub via Mareeba; Silkwood; 8 km E. of Cardstone; Cardstone; 32 km S. of Ravenshoe; Doomadgee Mission; Kirrama; Ingham Rd; Forrest Beach; Lone Pine; Waterfall Ck 32 km N. of Rollingstone; Crystal Ck 41 km SSE. of Ingham; Townsville; Cyprus Ck; Ayr; Lansdowne Stn, 7 km S. of Woodstock; Home Hill; Clare; 3·2 km SW. of Inkerman; Pandanus Ck 120 km from Cathu State Forest; Port Denison; Millaroo; Mt Maria; Corella Ck 40 km W. of Cloncurry; Blacks Beach nr Mackay; Mackay; Gannet Cay; Funnel Ck; Connors River; Bowenia; Yeppoon; Darr R. 31 km NNW. of Longreach; Rockhampton; 5·6 km S. of Marmor; Calliope R. 23 km SE. of Gladstone; Awoonga Dam, Boyne R., SW. of Gladstone; Nagoorin; Biloela; Dawson R. nr Duaringa; Moura; Bundaberg; Burnett R. N. of Eidsvold; Point Vernon via Maryborough; Biggenden; Crater Lakes Natl Park, SW. of Biggenden; Gayndah; Cooloola; Kingaroy; Mapleton; Braemar State Forest via Kogan; Sandgate; Aitkinson's Dam nr Lowood; Brisbane; Moreton Bay; Purrawunda; Cecil Plains; Norwin; Mt Russell; Gatton; Lawes; L. Dyer, Laidley; Beaudesert; St George; Currumbin Ck; Palen Ck 11 km SW. of Rathdowney; Levers Plateau via Rathdowney; Applethorpe. **New South Wales:** Tweed R.; Tygalgah; Middle Pocket nr Billinudgel; Mullumbimby; Clarence R.; Eltham; Spring Grove; Lismore; Richmond R.; Grafton; Dubbo; Narara; Forest Reef district; 8 km N. of Batlow. **South Australia:** 'L. Pinpa' (on lake surface) 40 km E. of Frome Downs Stn 1, SAM. **Western Australia:** Prince Regent Reserve; Carson Escarpment; Kimberley Res. Stn via Wyndham; Wyndham; Kununurra; Martin's Well, West Kimberley; Beverley Springs Stn; 8 km S. of Cape Betholet; Derby; 3 km S. of Coulomb Point, West Kimberley; 6 km NNW. of Broome; South Perth, 2 WADA. **Northern Territory:** Coopers Ck 19 km E. of Mt Borradaile; 15 km SW. of Nimbuwah Rock; Koolpinyah; Coastal Plains Res. Stn, nr Darwin; Cannon Hill via Jim Jim Ck; 7 km NNW. of Cahills Crossing, E. Alligator R.; 1 km N. of Cahills Crossing; Thorak Reserve via Berrimah; Darwin; Darwin R. 16 km SW. of Noonamah; Elizabeth R. 40 km from Darwin; 9 km NE. of Mudginberri HS.; Humpty Doo; Magela Ck 1 km NNW. of Mudginberri HS.; Southport R. 17 km SW. of Noonamah; Mt Cahill area; Batchelor; Coomalie Ck 88 km S. of Darwin; Stapleton; Adelaide R.; UDP Falls Reserve, 341 km SE. of Darwin; Daly R. Mission; Beeboom Crossing, Daly R., Tipperary Stn; Port Keats; Edith R.; Katherine; Scott Ck Stn via Katherine; Roper R.; Mataranka; Elsey Stn; Elsey Ck 19 km SSE. of Mataranka; Brock Ck, Brunswick; Willeroo Stn; Auvergne HS.; Delamere; W. Baines R.; 14 km NNE. of Borroloola; Batten

Point, 30 km ENE. of Borroloola; Horn Islet, Sir Edward Pellew Group; Jasper Gorge 54 km NW. of Victoria River Downs; Macarthur R. at Borroloola; 22 km WSW. of Borroloola; Goose Lagoon, 11 km SSW. of Borroloola; Batten Ck 31 km WSW. of Borroloola; Daly Waters; Victoria River Downs; 1 km N. of Boko Hill, SW. of Borroloola; Macarthur R. 48 km SSW. of Borroloola; Bessie Spring, 8 km ESE. of Cape Crawford; Finke R.

Specimen depositories: AM, ANIC, BCRI, BM, DAH, DAV, DPIM, DPPD, DSIR, HDN, MM, MVM, NTM, PKY, QDPI, QM, TM, UQ, WADA, WAM, WARI, W-H.

Total number of specimens examined (Australian): 1545.

Comments

The troubled nomenclatural history of this common and very widespread species has been given in some detail to show that, although Mulsant (1850, p. 80) was the first to synonymise *arcuata* and *octomaculata* (the latter as 'var. F.' of *arcuata*), Mader (1932) was the first to use the current combination.

As with many well-known coccinellid species, a large number of varietal names are associated with *octomaculata*. However, as none appear to have been used in connection with the Australian fauna, no reference is made to them here.

The records for Perth, South Australia and southern New South Wales do not seem to be part of the normal distribution pattern of *octomaculata* in Australia, where it appears to be essentially tropical and subtropical.

Biology

Koebele, in his field notebooks (Timberlake 1943), recorded *octomaculata* in association with scale insects on ferns in New South Wales, with aphids on orange trees in south Queensland, with Cicadinae on various plants in north Queensland, with aleurodids on Taro in Fiji and with various scale insects in China. It is not clear whether these comments were the result of misidentifications, or optimistic observations (Koebele was, after all, in search of scale insect predators), but more recent accounts (e.g. Puttarudriah and Channa Bassavanna 1953) and data from specimens examined, all point to *octomaculata* as being an aphid predator.

Harmonia testudinaria (Mulsant)

(Figs 9, 10, 85, 157–160)

Daulis testudinaria Mulsant, 1850, p. 300.

Callineda testudinaria (Mulsant); Crotch, 1871, p. 6 [as *testudinata*]; 1874, p. 161; Froggatt, 1902, p. 900; Korschefsky, 1932, p. 282.

Neda testudinaria (Mulsant); Masters, 1888, p. 90; Lea, 1902, p.489.

Harmonia testudinaria (Mulsant); Timberlake, 1943, p. 18; Bielawski, 1964*a*, p. 7; Iablokoff-Khnzorian, 1979, p. 72; 1982, p. 494.

Size

Length 5·10–6·85 mm. Breadth 4·35–5·65 mm.

Male

Outline and dorsal colour pattern of yellow and black as in Figs 9, 10, dark areas often much reduced. Head yellow, underside variably coloured, sometimes all pale, but usually with pro-, meso- and metasterna, outer margins of elytral epipleura and 1st abdominal segment dark; legs either pale or partly dark. Head with punctures of 2 sizes, many much smaller than eye facets but some, more noticeable laterally and anterolaterally, about as large as eye facets; intervals reticulately microsculptured. Pronotum with punctures slightly smaller than eye facets, separated on disc by from 1 to *c.* 3 diameters, even smaller and generally more sparsely set toward lateral borders; intervals almost always smooth toward lateral borders, sometimes with faint reticulate microsculpture on disc. Scutellum at base $^1/_{10}$ as broad as elytra at shoulders. Elytra as long as greatest breadth, extremely slightly

subacuminately rounded apically; external margins very slightly explanate, thickened external borders broad, more or less flat-topped; discal punctures similar to those of pronotal disc, usually separated by *c.* 3 diameters, intervals smooth; punctures along external margins, especially toward shoulders, much larger and deeper than those of disc, often separated by <1 diameter. Longitudinal carinae of intercoxal prosternal process extending forward more than halfway to anterior prosternal border, strongly convergent anteriorly. Elytral epipleura moderately descending externally (as Fig. 89), at most *c.* $\frac{1}{6}$ as broad as metathorax. Apical border of 5th abdominal sternite broadly and triangularly emarginate medially, of 6th more briefly, but still distinctly emarginate. Genitalia as in Figs 157–160.

Female

With apical border of 5th abdominal sternite faintly arcuate laterally, sometimes briefly and very feebly emarginate medially, apex of 6th arcuate, sometimes subangulately so.

Types

Lectotype [card-mounted], Museum Paris Nov. Hollande Gory 229-35/91 [yellow, printed]/ Daulis testudinaria Muls. auct. det. [handwritten], MNHN. Paralectotypes 2; 1 ♀, ? Mulsant 19. Adelaide N. Holle. MHN; 1 ♀, ? Mulsant 20. Melbourne N. Holle, MHN.

Other Specimens Examined

Non-Australian: New Guinea.

Queensland: Mossman; Kuranda area; Koah; Cairns; Whitfield Range 22 km from Cairns; Kairi Ck, Tinaroo Dam; Walkamin; Kairi; Tolga; Upper Mulgrave R.; Atherton; Peeramon; Luscombes Camp; East Barron; Herberton; Crater Natl Park, Atherton Tableland; Evelyn; Millaa Millaa–Ravenshoe Rd; Millaa Millaa; Nerada; South Johnstone; Ravenshoe area; 22 km N. of Paluma; Mt Spec via Paluma; Paluma; Burleigh; Eungella; Broken R. Rd 4 km S. of Eungella; Kianga; Bundaberg; Camp Milo, Cooloola; Gympie; Pomona; Coolum; Blackall Ranges; Mapleton; Nanango district; Montville; Caloundra; Bunya Mts; Mt Beerwah; Deception Bay; N. Pine R.; Mt Glorious; Upper Cedar Ck; Brisbane; Moreton Bay; North Stradbroke I.; Toowoomba; Gatton; Redland Bay; Mt Tamborine; Canungra; Cunningham's Gap Natl Park; Currumbin Ck; Lamington Natl Park. **New South Wales:** Bald Mtn area via Emu Vale; Tweed R.; Murwillumbah; Tygalgah; Huonbrook nr Mullumbimby; Tooloom Scrub via Urbenville; Minyon Falls, 6 km N. of Rosebank; Clarence R.; Dunoon, Richmond R.; Wollongbar; Alstonville; Iluka; Grafton; Coffs Harbour; Dorrigo; Dorrigo Natl Park; Boambee; Bonville; Barren Ground Forest Reserve; Barrington House via Salisbury; Tuckers Knob via Repton; Kempsey; Bril Bril State Forest; Yarras; Port Macquarie; Comboyne; Acacia Ck; Wingham Scrub; Duffers Ck 9 km WSW. of Barrington; Upper Williams R.; Faulkland; Tuglo Reserve nr Singleton; Saddleback Peak; Narara; Gosford; Blue Mts; Kenthurst; Cabramatta, Georges River Valley; Sydney; Helensburgh; Mt Keira; 'Illawarra'; Jamberoo; Minnamurra Falls, 16 km W. of Kiama; Kiama; Gerroa; Durras North; Hastings. **Norfolk I. Lord Howe I:** Mt Lidgbird.

Specimen depositories. AM, AMR, ANIC, BCRI, BM, DAH, DAV, DLN, DPIM, DSIR, HDN, MM, MVM, QDPI, QM, SAM, UQ, WARI, W-H.

Total number of specimens examined (Australian): 527.

Comments

The labels bearing the words 'Adelaide' and 'Melbourne' on the paralectotypes of *testudinaria* were clearly added after Mulsant had examined the specimens during 1847 and are considered to be erroneous.

Iablokoff-Khnzorian (1982, p. 494) suggested that *testudinaria* occurred in Indonesia as well as New Guinea, but gave no details. It is possible that this belief stemmmed from a misidentification of *H. decussata* (Crotch), incorrectly synonymised with *H. manillana* (Mulsant) by Iablokoff-Khnzorian (1979, p. 71).

Biology

Swezey (1905, pp. 224–8) gave a detailed account of all stages in the life history of *testudinaria*, based on material collected in Queensland and reared in Hawaii. He asserted that, in captivity, the species would feed avidly, both as larva and adult, on either aphids

or leafhoppers. He hoped, quite clearly, that it would prove useful against leafhoppers on sugar cane, but this was evidently not to be, for *testudinaria* is not listed by him in his later work (Swezey 1923), neither is it mentioned by Leeper (1976).

Iablokoff-Khnzorian (1982), relying on Timberlake (1943), recorded the species as common on peach trees, orange trees and *Ficus* sp., associated with aphids. K. J. Houston has bred it using *Hyperomyzus* aphids on *Sonchus oleraceus*. Larval records September and November.

Harmonia conformis (Boisduval)

(Figs 5, 59, 68, 164–166)

Coccinella conformis Boisduval, 1835, p. 604; Crotch, 1874, p. 118; Masters, 1888, p. 89; Koebele, 1893, p. 22.

Leis conformis (Boisduval); Mulsant, 1850, p. 261; 1866, p. 182; Crotch, 1871, p. 5; Froggatt, 1902, p. 902; 1907, p. 209; Korschefsky, 1932, p. 273.

Harmonia conformis (Boisduval); Timberlake, 1943, p. 17; Iablokoff-Khnzorian, 1979, p. 71; 1982, p. 471.

Leis conformis (Boisduval) var. *occidentalis* Lea, 1902, p. 489; Korschefsky, 1932, p. 273.

Size

Length 5·0–7·9 mm. Breadth 4–5 mm.

Male

Outline and dorsal colour pattern of deep yellow and black as in Fig. 59 ('var. *occidentalis*' tends to have larger black markings, some of which coalesce). Head with clypeus and most of frons yellow, vertex and lateral margins usually black; underside, except for pronotal hypomera, mes- and metepimera, extreme external margins of elytral epipleura and lateral abdominal margins, usually black; legs variably coloured, but usually with at least some parts of all femora black. Head with most punctures smaller than eye facets and separated by 1–2 diameters, a few larger, setiferous punctures present, particularly anterolaterally; intervals usually reticulately microsculptured. Pronotum with punctures of disc and margins similar in size to smaller head punctures, separation variable, but mostly equal to several diameters; intervals almost or quite smooth. Scutellum at base *c.* $^1/_{10}$ as broad as elytra at shoulders. Elytra as long as broad, extremely slightly subacuminately rounded to apicosutural angles; lateral margins only slightly explanate, except sometimes near shoulders, thickened external borders rounded on top; punctures of disc often larger and deeper than those of pronotum, generally separated by a little >1 diameter; intervals usually smooth; punctures along lateral margins often much deeper, larger and more closely set than those on disc. Prosternal intercoxal process with longitudinal carinae confined to posterior half of prosternal length. Elytral epipleura at most $\frac{1}{6}$ as wide as metathorax, moderately descending externally (as Fig. 89). Apical border of 5th abdominal sternite broadly and deeply emarginate, of 6th briefly and shallowly so. Genitalia as in Figs 164–166.

Female

With apical border of 5th abdominal sternite often membranous, very shallowly arcuate with a brief, shallow, notch-like median emargination; apical border of 6th arcuate, surface with a shallow, longitudinal median, ridge-like tubercle.

Types

Lectotype of *conformis*, Coccinella conformis Mihih. in Nova Hollandia [handwritten, pink label in Dejean collection], MGL. Paralectotype, same data as lectotype, MGL. Lectotype of *occidentalis*, Mt Barker W.A.: Helms/ Leis conformis Boi var. occidentalis Lea W. Australia 10349. Types of var, SAM. Paralectotype, Mt Barker McSorley, SAM.

Other Specimens Examined

Non-Australian: New Zealand.

Queensland: Southedge via Mareeba; Mareeba; Mt Fisher State Forest, Millaa Millaa; Magnetic I.; Blacks Beach nr Mackay; Gargett, 50 km W. of Mackay; Beaconsfield; Lotus Downs nr Marlborough; Clermont; Rockhampton; Emerald; Marmor, 43 km SSW. of Rockhampton; Calliope R. 22 km SE. of Gladstone; Biloela Res. Stn; Burnett R.; Bundaberg; 40 km S. of Bundaberg; 3·3 km W. of Childers; Eidsvold; Mundubbera; Cooloola Natl Park; Buderim; Bunya Mts; 5 km W. of Mt Mowbullan, Bunya Mts; Mt Beerwah; Ravensbourne; Tara; Upper Cedar Ck; Brisbane; Gatton; Stradbroke I.; Mt Tamborine; Warwick; Palen Ck 11 km S. of Rathdowney; Lamington Natl Park; Stanthorpe. **New South Wales:** Tweed R. Boat Harbour; Brunswick Heads; 4 km NNE. of Whian Whian; Ruby Ck 1·5 km W. of Amosfield; Clarence R.; Blakebrook; Boonoo Boonoo Falls; Wollongbar; Lismore; Casino; 5 km W. of Woodburn; 3 km W. of Evans Head; Wallangra; Harwood; Graman; Bondi State Forest; Grafton; Cobbs Gully; Terewah Lake [=Narram Lake]; Mt Topper State Forest; Ben Lomond; Walgett; Bogan R.; Hilton; Boambee State Forest; Namoi R., Narrabri; Dorrigo; Narrabri; Pilliga; Bonville; Barrington House via Salisbury; Barrington Tops (1600 m); Barren Ground Forest Reserve; Point Lookout nr Armidale; Chiswick Exp. Stn nr Armidale; Wollomombi Falls nr Armidale; Styx R. State Forest SE. of Armidale; Apsley Falls; Hat Head; MacArthurs Clearing nr Kempsey; Kuring-Gai; 8 km N. of Telegraph Point; Warrambungle; Coonabarabran; Bellangry State Forest; Wauchope; Quirindi; Byabarra; 3·3 km N. of Herons Ck; Siding Spring, Mt Warrambungle Range; 10 km N. of Coolah Rd to Binnaway; Moorland; Wingham Scrub; 21 km NE. of Trangie; Tubrabucca (1390 m); 8 km NW. of Trangie; Careys Peak; Upper Williams R.; Mt Royal nr Singleton; Dubbo; Dungog State Forest; Cardia nr Belubula; Wellington; 20 km SW. of Bulga nr Muswellbrook; 5 km SE. of Maitland; nr Paxton; Molong; Freemans Waterholes, 27 km E. of Cessnock; Orange; Tuggerah; Somersby; Lisarow; Forbes; Narara; Bathurst; Gosford; Upper Colo R.; Vittoria nr Bathurst; Cattai; Kurrajong; Grose Vale; Mt Piddington, Mt Victoria, Blue Mts; Pittwater; Berowra; Kenthurst; 60 km from Oberon; Springwood; Lawson; Kellyville; Katoomba district; Collaroy Plateau; Wentworth; Penrith; Jenolan Caves Natl Park; Sublime Point; Sydney; Liverpool; Camden; Casula; Waterfall; Abercrombie R., 8 km N. of Goulburn; Helensburgh; Bulli Pass; Loddon R. nr Bulli; Mt Keira; Alpine Way; Mittagong; Mt Kembla; Roslyn; Dapto; 'Illawarra'; Wollondilly R.; 6·4 km NE. of Paddys R.; Upper Kangaroo R.; Morton Natl Park 3 km N. of Yarrunga; 11 km NE. of Kangaroo Valley; Junee Reefs; 2 km S. of Tallong; 9 km E. of Goulburn; 2 km S. of Goulburn; Gerroa; Burrier nr Nowra; Murrumbateman; Goodradbigbee R.; Charleyong nr Braidwood; 2–6 km NW. of Bungendore; Uriarra; Tumut; 9 km NE. of Queanbeyan; 19 km NW. of Milton; Pigeon House Mtn nr Ulladulla; Queanbeyan; 11 km N. of Braidwood; Blowering Dam; 119 km S. of Nowra on Nerriga–Nowra Road; Batlow; NW. of Captains Flat; Clyde Mtn; Caldwell; Cabbage Tree Ck nr Monga; Mogo; Boyd R. Crossing Kanangra Rd; Congo, 8 km ESE. of Moruya; Khancoban; Cooma; Jindabyne; Mt Kosciusko; L. Cootapatamba, Snowy Mountains; Spencers Ck, Snowy Mountains; Wilsons Valley, Snowy Mts; Bibbenluke; Eden. **Australian Capital Territory:** Mt Ainslie; Canberra; Mt Stromlo Observatory; Blundells; 9 km NE. of Brindabella; Bulls Head; Weston Ck; 2 km S. of Piccadilly Circus; 3 km N. of Mt Aggie; Gibraltar Falls; 6 km SW. of Naas. **Victoria:** Merbein CSIRO Exp. Farm; old Mildura; Red Cliffs; 'Mallee' (NW. Vic.); Yarrawonga; Mitta Mitta R. 4 km NW. of Eskdale; Glenrowan district, central Vic.; Inglewood; 6 km W. of Violet Town; Eustace Gap Ck, Dartmouth Dam area; Bendigo; Avenel; Heathcote; Abbeyard, Buffalo R. valley; Six Mile Ck; Mt Buller; Mt Macedon; Noorimbee North, nr Camp River; 4 km N. of Kalkallo; Humevale; Wellington R. 17 km N. of Licola; Lal Lal, 16 km ESE. of Ballarat; 3 km NE. of Glen Thompson; Bruthen; Macalister R. 9 km NNE. of Heyfield; Melbourne; Emerald; Dandenong; Beaconsfield; Carrum; Elaine; Sale; Tyers; Warragul; Tyabb; Main Ridge. **Tasmania:** King I. (inc. Ravine des Casoars); Babel and Great Dog Is, Furneaux Group; Fisher I. nr Lady Barron; Flinders I.; Wynyard; Bridport; 6·4 km ESE. of Wynyard; Burnie; Herrick; George Town; Elliott; Ulverstone; Branxholm; Devonport; Forthside; Hellyer Gorge N. of Waratah; 3·2 km SSW. of Oonah, Wynyard–Waratah Road; Mt Dismal; St Helens; Binalong Bay; George Bay; Forth Falls via Sheffield; Hill W. of Mt Roland; Launceston; Que R.; Pieman R.; Dolphin Sands; Queenstown; Meredith R. 19 km from Coriana; Wayatinah; Lower Gordon R.; Mt Spode nr Hamilton; Florentine valley; Bagdad; Mt Field Natl Park; Plenty; Richmond; Tyenna; New Norfolk; Windermere, Claremont; Cambridge; Hobart; Mt Wellington; Cremorne; Mt Nelson; Taroona; Grove; Clifton Beach; Ranelagh; Cape Contrareity; Margate; Tasman Peninsula; Cradoc; Tahune Forest Park; Strathblane nr Dover; New Harbour. **South Australia:** Wilpena Ck; St Mary's Peak, Wilpena Park; Wilpena; Flinders I.; Auburn; Moorook; Lyrup; Tarlee; Reevesby I.; Barossa Valley; Mt Lofty; Brown Hill Ck; Adelaide; Langhorne Ck; Myponga; Tapanappa nr Cape Jervis; Kangaroo I. (inc. Muston, Middle R., 16 km W. of Vivonne Bay); Avenue Range; Mt Gambier. **Western Australia:** Marloo

Station, Wurarga; Moora; Perth; Fremantle; East Rockingham; Bedfordale; Jarrahdale; Harvey; Bunbury; Donnybrook; Busselton; Wilga; 'Scotts' nr Capel; Kojonup; Pemberton; Mt Barker.

Specimen depositories: AM, AMR, ANIC, BCRI, BM, DAH, DASA, DAV, DLN, DPIM, DSIR, FCN, HNH, HDN, LRC, LU, MM, MVM, QDPI, QM, SAM, TM, UQ, UWA, WADA, WAM, WARI, W-H.

Total number of specimens examined (Australian): 1937.

Comments

When describing var. *occidentalis*, Lea commented, in a footnote, that a text-figure of the variety had already been published (Lea, 1897). Though this is true, the illustration bears no scientific name and so var. *occidentalis* still dates from 1902.

Biology

Label data from specimens examined record *conformis* as feeding on many aphids (including *Toxoptera citricidis* Kirkaldy, *Aphis fabae* Scopoli, *Macrosiphum rosae* (L.), *Chermes* sp., *Adelges* sp. and *Cinara fresai* Blanchard), 'psyllid nymphs on *Eucalyptus baileyi*' and 'psyllids on *Acacia* sp.'.

Koebele (1893, pp. 22–3) recorded the species as feeding on various aphids, but as being especially effective against 'woolly aphis, *Schizoneura lanigera*'. He also noted one instance (Mt Victoria, N.S.W.) of its breeding on *Eriococcus leptospermi* Maskell.

Leeper (1976, p. 293) made the interesting observation that, in Hawaii at least, and then under laboratory conditions, *conformis* could not survive for more than three generations on aphids alone. Psyllidae seemed to be an essential part of its diet at some point and he suggested this as the reason why the species did not become established in Hawaii until after the introduction of *Psylla uncatoides* (Ferris & Klyver).

More recent studies in the Sydney area (Hales 1979) discovered that psyllids are the usual food of *conformis*, aphids and other groups taking their place only if the primary prey is in short supply.

Harmonia bicolor (Blackburn)

(Figs 6, 7, 161–163)

Neda bicolor Blackburn, 1892, p. 238; 1895, p. 239.
Archaioneda bicolor (Blackburn); Korschefsky, 1932, p. 271.
Harmonia bicolor (Blackburn); Timberlake, 1943, p. 18; Iablokoff-Khnzorian, 1979, p. 72; 1982, p. 496.
Neda bicolor var. *picturata* Blackburn, 1895, p. 239.
Archaioneda bicolor var. *picturata* (Blackburn); Korschefsky, 1932, p. 271.
Harmonia bicolor var. *picturata* (Blackburn); Iablokoff-Khnzorian, 1982, p. 496.

Size

Length 5·65–7·4 mm. Breadth 5·2–6·6 mm.

Male

Outline and dorsal colour pattern of red and black as in Fig. 7, or Fig. 6 (var. *picturata*). Underside and legs pale testaceous except for darker elytral epipleura and, sometimes, midline of prosternum. Head with punctures smaller than eye facets and separated by *c.* 2 diameters, sometimes smaller and more sparsely set toward anterior clypeal border; intervals faintly microreticulate. Pronotum with discal punctures similar to or slightly larger than those of head, separation by *c.* 1–3 diameters; intervals with a mixture of scattered micropunctures and reticulate microsculpture, microsculpture often present only in patches or very faintly marked; punctures toward lateral margins generally smaller than those of disc, distinctly more widely separated and with intervals smooth, or almost so. Scutellum *c.* $^1/_{10}$ as broad at base as elytra at shoulders, usually set with small punctures on either side of an impunctate, longitudinal median strip. Elytra as long as greatest breadth; external margins

very little explanate, except near shoulders, thickened external borders relatively broad, more or less flat-topped; discal punctures usually smaller than those of pronotal disc, often separated by 3 diameters or more; intervals apparently smooth but, in certain lights, extremely fine micropunctures can be seen, each bearing a minute, curved seta; punctures along explanate external margins variable in both size and separation, but generally much larger than those of disc. Longitudinal carinae of prosternal intercoxal process reaching to within *c.* $\frac{1}{3}$ from anterior prosternal border. Elytral epipleura moderately descending externally (as Fig. 89), at most *c.* $\frac{1}{5}$ as broad as metathorax. Apical border of 5th abdominal sternite distinctly and subtriangularly emarginate over median third, more or less truncate on either side; apical border of 6th similarly emarginate medially, but arcuate laterally. Genitalia as in Figs 161–163.

Female

With apical border of 5th abdominal sternite arcuate laterally, broadly truncate medially, of 6th arcuate.

Types

Lectotype ♂ of *bicolor*, Type [circular, red-bordered BM Type label]/ 4428 N. Qu. T [handwritten in red, apart from 'T']/ Neda bicolor, Blackb. [Blackburn's handwriting], BM. Lectotype ♀ of *picturata*, var. ? picturata, type [Blackburn's handwriting]/ N. bicolor var. picturata Bl Queensland Cotype 9706 [Lea's handwriting], SAM.

Other Specimens Examined

Queensland: 2, Leo Ck Rd 30 km NE. of Coen, QM; 1, Mt Carbine, DPIM; 2, Endeavour R., MM; 1, Upper Daintree, ANIC; 1, Julatten, BM; 1, Mt Lewis Road via Julatten, W-H; 8, Little Mitchell R. nr Yalkula, QDPI; 6, Cairns, 2 W-H, 1 SAM, 3 QM; 1, Cardstone, ANIC; 1, Port Denison [Bowen], ANIC; 39, 'bred at Brisbane', QDPI.

Total number of specimens examined: 65.

Comments

The genitalia of *bicolor* seem negligibly different from those of the widespread and variably-coloured *testudinaria* (Figs 157–160). However, the distributional overlap and the colour constancy throughout 39 examples reared from a single source support the conclusion that two species are involved.

Biology

The specimens bred at Brisbane were reared on *Hyperomyzus* aphids on *Sonchus* by K. J. Houston and originated from parents collected at Little Mitchell River near Yalkula.

Genus **Archegleis** Iablokoff-Khnzorian

Archegleis Iablokoff-Khnzorian, 1984b, p. 113. Type-species *Coccinella kingi* MacLeay, by original designation.

Egleis Mulsant, 1850, p. 151 (partim).

Description

Small to medium-sized (4·50–6·75 mm long), varying from apparently almost as broad as long (*barronensis*: Fig. 42) to slightly but distinctly elongate (*edwardsi*: Fig. 39); strongly convex; dorsal colour patterns usually of yellow or pale testaceous and black, but sometimes with additional pinkish-orange areas; underside and legs variably coloured, but usually with most of abdomen pale. Head with anterior clypeal border straight between lateral projections, minimum frontal width between eyes from *c.* $1\frac{1}{2}$–$2\times$ as broad as an eye; antennae (as Fig. 60) at least $1\frac{1}{2}\times$ as long as minimum frontal width, segments 3–8 and last segment of club elongate. Pronotum *c.* $2\times$ as broad as median length, anterior border variably arcuate between produced anterior angles; arcuate lateral borders sometimes more

convergent over anterior third than elsewhere, each with a very narrowly thickened, bead-like rim; hind border arcuate medially, straight or very slightly sinuate toward rounded hind angles; disc evenly convex transversely; lateral margins concave within lateral borders, concavity sometimes deepened medially (as Fig. 73). Scutellum from $^1/_{12}$–$^1/_{10}$ as broad at base as elytra at shoulders, broader than long (*c.* 7 : 5). Elytra about as broad as median length, evenly rounded or slightly acuminate to apicosutural angles; explanate external margins well marked, frequently upturned near shoulders, thickened external borders variable in width, but usually entire; discal and marginal punctures deeply impressed, their outer rims curved, enlarging apparent size of punctures, intervals almost or quite smooth. Prosternal process with longitudinal carinae clearly marked to within *c.* $\frac{1}{4}$ or less from anterior border, often more or less parallel-sided. Mesosternum with entire raised anterior border, weakly emarginate medially; meso- metasternal junction between mid-coxae often very slightly curved. Postcoxal plates of 1st abdominal sternite usually more or less obliterated over external half, visible borders sometimes briefly recurved at outer ends; male with apical border of 6th abdominal sternite emarginate, of 5th straight or slightly emarginate medially; female with apical border of 5th sternite arcuate, sometimes almost concealing apically arcuate 6th.

Included species. Six.

Distribution. Australia.

Comments

Originally erected to include five species, three from America and two from Australia, *Egleis* was catalogued by Korschefsky (1932, p. 576) as containing eight species, four American and four Australian. Timberlake (1943, p. 26) transferred *Callineda barronensis* Blackburn to *Egleis* and noted that the Australian members of the group seemed likely to represent a distinct genus. However, being unfamiliar with any of the American species, he was unable to provide distinguishing characters. Iablokoff-Khnzorian (1984b, p. 114) agreed with Timberlake's conclusions and segregated the Australian species into his new genus *Archegleis*. Examination of a male example of *E. adjuncta*, the type-species of *Egleis*, named by Mulsant himself, shows that there is certainly some superficial resemblance between it and the Australian '*Egleis*', but the antennae are relatively shorter, the head between the eyes relatively broader, the pronotum far less broadly concave laterally, the scutellum only about one-fifteenth as broad at base as elytra at shoulders, and the elytral epipleura strongly descending externally. More importantly, the male genitalia are different from those of any of the Australian species. The sipho is short and of a one-piece construction with a simple apical opening, and the median lobe resembles that of a species of *Harmonia* (e.g. Fig. 169).

Though the species of *Archegleis* seem to be fairly constant as to colour pattern and easily distinguished thereby, supporting external morphological characters are very difficult to set down in words. For this reason, the key to species relies more heavily on colour than might seem desirable. However, should long series show wider variation than has been observed so far, examination of the genitalia will always confirm the identity of the species.

Archegleis is, externally, very similar in general appearance to *Harmonia*, a fact apparent from the key to genera. However, when the genitalia are examined, despite there being two distinct types of sipho in *Archegleis* (Figs 171, 174), the justification for regarding the latter as a distinct genus becomes clear. Neither type is appropriate for a species of *Harmonia* and the spermatheca (*A. barronensis*: Fig. 190) is also of a different construction, lacking an infundibulum, but having a distinct ramus and a swollen nodulus.

Key to Species of *Archegleis*

1. Discal elytral pattern of round black spots on a pale ground (Figs 41, 43); metepisterna pale-coloured, contrasting with metasternum; mesosternum usually pale-coloured 2
   Discal elytral pattern as Fig. 42, or of black stripes on a pale ground (Figs 38–40); metepisterna dark, concolorous with metasternum; mesosternum variably coloured 3

2(1). Thickened external borders of elytra entire and clearly visible from shoulders almost to apicosutural angles; pronotal and elytral pattern as Fig. 43; outer end of postcoxal line recurved (Fig. 83) ..... *kingi* (MacLeay)

Thickened external borders of elytra obliterated from just behind shoulders to about level of hind coxae; pronotal and elytral colour pattern as Fig. 41; outer end of postcoxal line not recurved ..... *duplicata* (Crotch)

3(1). Dorsal colour patterns as Figs 38, 42; intervals between pronotal punctures usually quite smooth, occasional traces of reticulate microsculpture present medio-basally 4

Dorsal colour patterns as Figs 39, 40; pronotal intervals with fine, but distinct reticulate microsculpture over most of disc 5

4(3). Dorsal colour pattern as Fig. 42; posterior half of elytral epipleura usually entirely black ..... *barronensis* (Blackburn)

Dorsal colour pattern as Fig. 38; posterior half of elytral epipleura usually with a longitudinal median pale stripe ..... *delta* (Weise)

5(3). Dorsal colour pattern as Fig. 40; generally smaller species (5–5·5 mm long) .... *interrupta* (Weise)

Dorsal colour pattern as Fig. 39; generally larger species (6·4–7 mm long); (postcoxal plates of 1st abdominal sternite often with a faintly marked, oblique dividing line as in Fig. 79) ..... *edwardsi* (Mulsant)

Archegleis kingi (MacLeay)

(Figs 43, 83, 174–176)

Coccinella kingi MacLeay, 1826, p. 454; Mulsant, 1850, p. 1049; Crotch, 1874, p. 310; Masters, 1888, p. 89; Blackburn, 1892, p. 238; Lea, 1902, p. 488.

Egleis varicolor Mulsant, 1850, p. 154; 1866, p. 120; Crotch, 1874, p. 131. Synonymised by Blackburn, 1892, p. 238.

Halyzia varicolor (Mulsant); Masters, 1888, p. 90.

Egleis kingi (MacLeay); Blackburn, 1892, p. 238; Korschefsky, 1932, p. 576; Timberlake, 1943, p. 27.

Archegleis kingi (MacLeay); Iablokoff-Khnzorian, 1984b, p. 115.

Size

Length 5·5–6·5 mm. Breadth 4·5–5·2 mm.

Male

Outline and dorsal colour pattern of cream-yellow (head and pronotum), orange-yellow with a darker sublateral stripe (elytra) and black as in Fig. 43. Prosternum, mesothorax, abdominal sternites and elytral epipleura, except internal and external margins and apices, pale-coloured; metasternum black or dark brown, metepimera and metepisterna concolorous with mesepimera; legs mostly pale, apices of femora and parts of tibiae sometimes dark. Head with frontal punctures as large as or larger than eye facets, separated by 1–2 diameters; intervals reticulately microsculptured. Pronotum slightly $>2\times$ as broad as median length; anterior border distinctly arcuate medially; lateral borders slightly more strongly convergent over anterior third than elsewhere; discal punctures similar in size to eye facets, separated by *c.* 2 diameters, smaller and a little more sparsely set toward lateral borders; intervals with faintly indicated reticulate microsculpture on disc, almost or quite smooth near lateral borders. Scutellum *c.* $^1/_{10}$ as broad at base as elytra at shoulders, transverse (3 : 4), variably coloured and punctured, smooth. Elytra very slightly longer than broad, subacuminately rounded to apiocosutural angles (Fig. 43); disc strongly convex, highest point in profile *c.* $\frac{3}{5}$ from apices; explanate external margins very narrow except between shoulders and middle of length, entire, thickened external borders slightly broadened where external margins are broadened; discal punctures somewhat variable in size, but deeply impressed, mostly larger than pronotal punctures and separated by 1 diameter or slightly less; intervals smooth; punctures toward and along anterior halves of explanate external borders more variable in size and spacing than those of disc, some as large, others very much smaller and

more widely spaced. Longitudinal carinae of prosternal intercoxal process variable in length, when clearly marked in front of coxae, distinctly less widely separated there than between coxae. Postcoxal plates of 1st abdominal sternite with borders somewhat recurved externally before becoming very indistinct (Fig. 83); apical border of 5th sternite straight or very slightly emarginate, of 6th distinctly though narrowly emarginate medially. Genitalia as in Figs 174–176.

Female

With apical border of 5th abdominal sternite arcuate, almost obscuring apically arcuate 6th.

Types

Lectotype of *kingi*, Coccinella Kingii McL. Capt. King Australia, ANIC. Holotype ♂ of *varicolor*, TYPE [blue, printed]/Type varicolor Reich. [Crotch's handwriting], ZM.

Other Specimens Examined

Queensland: 1, Atherton, UQ; 2, Port Denison [Bowen], ANIC; 2, Emerald, 1 QDPI, 1 QM; 1, Mourangee, nr Eungella, 80 km SW. of Rockhampton, ANIC; 2, 4 km S. of Marmor, 48 km SSW. of Rockhampton, ANIC; 1, Gorge at Burnett R. 19 km S. of Bundaberg, ANIC; 3, Pine Ck nr Bundaberg, ANIC; 1, Point Vernon via Maryborough, ANIC; 1, Maryborough, SAM; 2, Gayndah, AM; 1, Tyrone HS., 5 km E. of Langlo Crossing, MVM; 1, Gympie, SAM; 1, Bunya Mts, SAM; 4, North Pine R., QM; 2, Pine R., QDPI; 23, Brisbane, 1 ANIC, 18 QDPI, 3 QM, 1 UQ; 1, Moreton Bay, AM; 3, Toowoomba, 1 HDN, 1 SAM, 1 UQ; 2, Millmerran, W-H; 2, Mt Tamborine, 1 QDPI, 1 QM; 1, Lamington Natl Park, QM; 2, 'Queensland', 1 MVM, 1 BM. **New South Wales:** 1, Yarras, FCN; 1, Kurrajong, AM; 1, Grose Vale, AM; 15, Sydney, 1 BM, 1 SAM, 13 USNM; 5, Menangle, 3 ANIC, 2 MM; 3, 'New South Wales', MVM. **Northern Territory:** 3, Hamilton Downs Stn, 60 km NW. of Alice Springs, ANIC.

Total number of specimens examined: 90.

Comments

The dorsal colour pattern of this species has proved more or less constant through all of the specimens so far seen, especially the very characteristic pronotal design, so that there is little difficulty in distinguishing it from, say, *Coelophora mulsanti*, even if the underside and legs are not examined.

The Northern Territory record, three specimens on a single occasion in June 1976, must be regarded as evidence of a temporary inland extension to the normal range of *kingi* and to have been one of many such excursions by various species following unusual rainfall.

Biology

Nothing has been written about the habits of *kingi*. Label data associated with specimens examined include 'bred ex larvae ex *Acacia* on aphids on *Sonchus*'; 'bred ex adult on spittle bug nymphs on *Acacia* and on aphids on *Sonchus*' and 'feeding on young spittle bugs on *Acacia* and aphids on *Sonchus*'. All three comments refer to material collected at Brisbane by K. J. Houston and housed in the QDPI.

Archegleis duplicata (Crotch), comb. nov.

(Figs 41, 177–180)

Callineda duplicata Crotch, 1874, p. 161; Korschefsky, 1932, p. 282.
Harmonia duplicata (Crotch); Iablokoff-Khnzorian, 1982, p. 461.

Size

Length 6 mm. Breadth 5·2 mm.

Male

Outline and dorsal colour pattern of pale testaceous and black as in Fig. 41. Head pale testaceous; underside, except for dark metasternum and external margins of elytral epipleura, also pale-coloured; legs pale-coloured except for a vaguely indicated darker patch near apices of hind femora. Head with minimum frontal width *c.* 2× that of an eye; punctures about as large as eye facets, separated by from 1 to about, occasionally, 2 diameters; intervals reticulately microsculptured. Pronotum with concavity of lateral margins slightly deepened medially, continuing along anterior margins to above eyes; upturned lateral borders with bead-like rim barely noticeable; punctures of disc about as large as eye facets, separated by from <1 to >2 diameters, most commonly by $1-1\frac{1}{2}$ diameters; a shallow, sub-basal, sublateral fovea set with punctures much larger than those of disc present on either side of pronotum; intervals between discal punctures faintly microreticulate. Scutellum *c.* $^{1}/_{12}$ as broad at base as elytra at shoulders, *c.* $1\frac{1}{2}\times$ as broad as long. Elytra slightly elongate (18 : 17), subacuminately rounded to apicosutural angles, highest point in profile slightly in front of middle (5 : 12); explanate external margins with thickened external borders more or less obliterated from shortly behind shoulders to about middle of elytra, margins markedly wider over this region; most discal punctures larger and deeper than those of pronotum, often separated by <1 diameter; intervals smooth; some punctures along external margins much larger than those of disc, others smaller, separation very variable. Longitudinal carinae of intercoxal prosternal process almost reaching anterior border of prosternum. Elytral epipleura at most *c.* $\frac{1}{5}$ as broad as metathorax. Postcoxal plates of 1st abdominal sternite with borders obliterated for more than outer half; apical border of 5th sternite with a shallow, median, V-shaped notch occupying *c.* $\frac{1}{4}$ of total width, apical border of 6th similarly, but more deeply notched. Genitalia as in Figs 177–180; very similar to those of *kingi*.

Female

With apical border of 5th abdominal sternite arcuate and concealing 6th.

Type

Lectotype ♂ [head and prothorax missing], Type [circular, red-bordered, BM Type label]/ Callineda duplicata, (Type) Crotch [C. O. Waterhouse's handwriting]/ duplicata [Crotch's handwriting], BM.

Other Specimen Examined

Western Australia: 1 ♀, Prince Regent Reserve (15°26′S.,129°36′E.), Roe River, WADA.
Total number of specimens examined: 2.

Comments

Timberlake (1943, p. 17, footnote) distinguished generically between *Callineda* Crotch, 1871 and 1874, using *Rhopaloneda* as a replacement for the junior homonym and adding the senior to the synonymy of *Harmonia*. He did not list the included species in either case but, by implication, *duplicata* belonged to *Rhopaloneda*. Iablokoff-Khnzorian (1982, p. 458) regarded both *Callineda* and *Rhopaloneda* as synonyms of *Harmonia* and therefore included *duplicata*, sight unseen, in *Harmonia*.

Examination of the defective male lectotype leaves no doubt as to the true position of *duplicata*, but there is always the chance that the two examples represent either a single phenotype of a variable species or, perhaps, a subspecies of *kingi*. However, the partly obliterated, thickened external borders to the elytra, known otherwise only in *Antineda princeps*, together with the partly obliterated postcoxal plates on the first abdominal segment, should help to confirm any future discovery of the species.

In passing, it may be said that a search through material collected in New Guinea, New Caledonia and the New Hebrides has so far failed to confirm an idea that *duplicata* might

originate from there and be only a casual immigrant to Australia, known only from the north-west (Crotch, after his description of *duplicata*, refers to 'N. Australia').

Biology

Unknown, but, as with other species of *Archegleis*, *duplicata* is likely to be an aphid predator.

Archegleis barronensis (Blackburn)

(Figs 42, 171–173, 190, 191)

Cycloneda barronensis Blackburn, 1895, p. 238; Lea, 1902, p. 489.
Callineda barronensis (Blackburn); Weise, 1923, p. 133; Korschefsky, 1932, p. 282.
Egleis barronensis (Blackburn); Timberlake, 1943, p. 27.
Harmonia barronensis (Blackburn); Iablokoff-Khnzorian, 1982, p. 461.
Lemnia barronensis (Blackburn); Iablokoff-Khnzorian, 1984*a*, p. 206.
Archegleis barronensis (Blackburn); Iablokoff-Khnzorian, 1984*b*, p. 118.

Size

Length 4·3–4·7 mm. Breadth 3·5–4·1 mm.

Male

Outline and dorsal colour pattern of yellow and black as in Fig. 42. Yellow areas sometimes larger than shown; head yellow except for 2 black areas on vertex; pronotal hypomera yellow except for extremely narrow black region over posterior halves of lateral margins; prosternum mostly yellow, black between anterior coxae; mesepimera yellow or dark, metasternum black, abdomen with 1st segment broadly dark across disc, other segments pale; elytral epipleura broadly pale over anterior half with margins black, posterior half black; anterior legs almost entirely pale, middle legs with tibiae pale, femora in some part black, hind legs mostly dark-coloured. Head with minimum interocular distance *c.* $1\frac{1}{2}\times$ width of an eye; punctures of head variable, but often larger than eye facets and separated by 1 diameter or less; intervals reticulately microsculptured. Pronotum with anterior border more or less straight between lateral projections; lateral borders slightly more strongly convergent over anterior third than elsewhere; disc with punctures similar in size to eye facets, or smaller, separated by from *c.* $1\frac{1}{2}$ to up to 3 diameters, greatest separation and smaller punctures predominating toward anterior margin and, even more markedly, toward and on dished lateral margins; intervals smooth. Scutellum *c.* $^1/_{10}$ as broad at base as elytra at shoulders, equilateral. Elytra slightly broader than long (11 : 12); evenly rounded to apicosutural angles; highest point in profile at about middle; well-marked explanate external margins distinctly narrowed over posterior half to apicosutural angles, thickened external borders narrow, but entire; discal punctures of 2 sizes, mostly larger than those of pronotum and separated by *c.* 1 diameter, smaller punctures *c.* $\frac{1}{2}$–$\frac{2}{3}$ as large as larger punctures and scattered amongst them; intervals between punctures smooth; punctures along explanate margins sometimes much larger than any on disc and irregularly spaced. Intercoxal prosternal process with longitudinal carinae more or less parallel. Elytral epipleura at most *c.* $\frac{1}{5}$ as wide as metathorax. 1st abdominal sternite with hind borders of postcoxal plates less easy to see over external half of plate, but still present; apical border of 5th sternite truncate or very feebly arcuate, of 6th very slightly emarginate medially. Genitalia as in Figs 171–173.

Female

Lateral margins of head between eyes generally black, or at least dark-coloured; apical border of 5th abdominal sternite slightly arcuate, almost obsuring apically arcuate 6th. Genitalia as in Figs 190, 191.

Type

Lectotype ♀, Type [circular, red-bordered BM Type label]/ 7544 N.Qu.T [handwritten in red, apart from 'T']/ Neda barronensis, Blackb. [Blackburn's handwriting], BM.

Other Specimens Examined

Queensland: 2, Mossman, QDPI; 2, Julatten, BM; 27, Kuranda, 3 ANIC, 9 BM, 4 DSIR, 5 MVM, 6 SAM; 8, Cairns, 2 ANIC, 1 BM, 3 MM, 2 W-H; 10, Cairns district, SAM; 2, Mareeba, QDPI; 1, Danbulla Forestry Reserve, DPIM; 1, Kairi, QDPI; 3, Atherton, QDPI; 2, Babinda, BM; 1, The Boulders nr Babinda, QDPI; 11, Innisfail, 1 AM, 1 ANIC, 3 DPIM, 6, QDPI; 6, South Johnstone, 1 BCRI, 2 DPIM, 3 QDPI; 2, Kennedy, 1 DPIM, 1 QDPI; 1, Mackay, QDPI.

Total number of specimens examined: 80.

Comments

Although he did not say so, it seems likely that Blackburn received a single example of *barronensis* (from Koebele) for description. No paralectotype candidates exist in the SAM.

The dorsal colour pattern of *barronensis* has been fairly constant throughout the specimens so far examined, making identification straightforward and dissection unnecessary. The ease with which *barronensis* and *delta* may be separated externally makes the similarity between the genitalia of the two species all the more remarkable. However, if the currently recorded distributions reflect the true situation, they are separated by a minimum of some 450 km, and may have arisen by allopatric speciation.

Biology

No published account exists, but label data and Koebele's notebooks (Timberlake, 1943, p. 27) show an association with aphids on citrus and the species has been reared at Brisbane by K. J. Houston, using *Hyperomyzus* aphids on *Sonchus*.

Archegleis delta (Weise)

(Figs 38, 81, 186–189)

Egleis delta Weise, 1898, p. 225; Korschefsky, 1932, p. 576; Timberlake, 1943, p. 26.

[*Egleis edwardsi* Mulsant; Mulsant, 1866, p. 122; Crotch, 1874, p. 131. (Not Mulsant, 1850, p. 158.) Misidentifications.]

[*Halyzia edwardsi* (Mulsant); Masters, 1888, p. 89; Lea, 1902, p. 490. Misidentifications.]

Archegleis crotchi Iablokoff-Khnzorian, 1984b, p. 116. Syn. nov.

Size

Length 4·6–5·3 mm. Breadth 4·0–4·8 mm.

Male

Outline and dorsal colour pattern of greenish yellow and black as in Fig. 38. Head yellow except for a small black patch on either side of vertex; pronotal hypomera pale except where black areas of pronotal pattern reach external borders; prosternum mostly black except laterally in front of coxae; mesosternum black, sometimes with disc pale, epimera and episterna pale; metasternum, epimera and episterna black; elytral epipleura pale with black internal and external margins; 1st abdominal sternite broadly black medially, elsewhere testaceous, remaining sternites pale testaceous; anterior and middle legs largely pale, hind legs largely black. Head with minimum frontal width at most $1\frac{1}{2}\times$ that of an eye; most frontal punctures larger than eye facets and often separated by <1 diameter, intervals reticulately microsculptured, sometimes less obviously so anteromedially; antennae almost

2× as long as minimum frontal width. Pronotum with anterior border almost straight between lateral projections to anterior angles; lateral borders almost evenly arcuate, slightly more strongly convergent for anterior $\frac{1}{4}$; discal punctures smaller than those of head, usually separated by >2 diameters, much closer mediobasally; concave lateral areas deep, but variable, sometimes more heavily impressed medially and extending inwards along hind and anterior margins; intervals between punctures smooth. Scutellum transverse, (3 : 4). Elytra very slightly broader than long, highest point in profile very slightly in front of middle; explanate external margins very little upturned near shoulders, clearly defined and relatively broad (unlike *edwardsi*) almost to apicosutural angles; thickened external borders entire, but less pronounced than in *edwardsi* or *interrupta*; discal punctures mostly of 1 size, distinctly larger than those of pronotal disc and often separated by 1 diameter or less, intervals smooth. Prosternum with longitudinal carinae of intercoxal process extending to within *c.* $\frac{1}{5}$ from anterior border of prosternum. Elytral epipleura at most $\frac{1}{4}$ as wide as metathorax. Borders of postcoxal plates on 1st abdominal sternite extending almost to lateral borders of sternite, without an oblique dividing line (Fig. 81); apical border of 5th sternite almost truncate, of 6th very slightly emarginate medially. Genitalia as in Figs 186–189.

Female

Head narrowly black anteriorly and laterally above the antennal insertions; pro-, meso- and metathoraces usually entirely dark-coloured and all femora wholly or largely black; apical border of 5th abdominal sternite shallowly but perceptibly arcuate or lobed medially, of 6th arcuate throughout.

Types

Lectotype ♂ of *delta*, N. S. Wales Stauding [handwritten] /Egleis delta m. [Weise's handwriting]/ Holotypus Khnz 76 Egleis delta Ws [handwritten by Iablokoff-Khnzorian on red label], MNHU. Holotype ♂ of *crotchi*, TYPE [blue, printed]/Type Edwardsi Reich, ZM.

Other Specimens Examined

Queensland: 2, Pine Ck 19 km S. of Bundaberg, 1 ANIC, 1 BM; 1, nr Kenilworth, QDPI; 4, Kenilworth State Forest, QDPI; 2, Cairncross Park nr Maleny, QDPI; 1, Mt Glorious, UQ; 3, Moreton Bay, 2 AM, 1 BM; 4, Mt Tamborine, 2 ANIC, 1 BM, 1 SAM; 6, Lamington Natl Park, 2 QM, 4 UQ; 2, 'Nat. Pk' [? Lamington], MVM. **New South Wales:** 1, Tweed R., SAM; 1, Tooloom, ANIC; 2, Cootes Crossing, Orara R., AM; 1, 'New South Wales', MVM.

Total number of specimens examined: 32.

Comments

After giving a clear diagnosis of *delta*, Weise compared it with *edwardsi* Mulsant (1850), stressing the difference in elytral patterns. He went on to comment that Crotch's description of *edwardsi* did not agree with Mulsant's of 1850 and appeared to be of *delta*, that Crotch's *pascoei* appeared to be *edwardsi* 1850 and that Mulsant's second (1866) version of *edwardsi* differed from his earlier description and seemed also to be *delta*. Korschefsky (1932) accepted the synonymies thus proposed by Weise and Timberlake (1943) correctly interpreted both *delta* and *edwardsi* 1850.

It is unfortunate that Iablokoff-Khnzorian (1984*b*) seems to have misremembered the Weise material that he examined in 1976 (see '*Types*'), incorrectly synonymising '*delta*' with *edwardsi* 1850 and describing the true *delta* as a new species, *crotchi*, using Crotch's misidentified specimen of '*edwardsi*' as holotype.

Biology

A couple of larvae taken near Kenilworth by K. J. Houston were reared through to adults on *Hyperomyzus* aphids on *Sonchus*. Koebele's specimen (Timberlake, 1943, p. 27) was collected from an orange tree infested with aphids and several data labels refer to 'rainforest' as habitat, but give no information about prey.

Archegleis interrupta (Weise)

(Figs 40, 184, 185)

Egleis interrupta Weise, 1927, p. 12; Korschefsky, 1932, p. 576; Bielawski, 1965, p. 233.
[*Egleis delta* Weise; Weise, 1923, p. 132. (Not Weise, 1898, p. 225.) Misidentification.]
Archegleis interrupta (Weise); Iablokoff-Khnzorian, 1984*b*, p. 115.

Size

Length 4·6–5·5 mm. Breadth 4·0–4·5 mm.

Male

Outline and dorsal colour pattern of greenish-yellow (fading to yellow in long-dead specimens) and black as in Fig. 40. Head pale yellow with 2 small black marks across vertex; pronotal hypomera pale except where dark parts of pronotal pattern reach external borders; prosternum usually pale; mesosternum, mesepimera and mesepisterna pale; metasternum, metepimera and metepisterna dark-coloured; elytral epipleura yellow except for narrow, black internal and external margins; abdomen with 1st sternite broadly black across disc and between coxae, elsewhere pale testaceous; anterior and middle legs with some dark areas, but mostly pale, hind legs mostly dark-coloured. Head with minimum frontal width little $>1\frac{1}{2}$ eye widths; punctures about equal in size to eye facets, separated by 1–2 diameters, intervals with distinct, reticulate microsculpture; antennae $1\frac{2}{3}\times$ as long as minimum frontal width. Pronotum with anterior border very shallowly arcuate between produced anterior angles, lateral borders evenly convergent from broadest point almost to rounded anterior angles; concavities internal to lateral borders greatly widened anteriorly and posteriorly, somewhat C-shaped; punctures of disc similar in size to those of head, usually separated by 1–2 diameters, intervals with faint microsculpture. Scutellum transverse (7 : 10), sides straight. Elytra as broad as long, barely noticeably subacuminately rounded to apicosutural angles; highest point in profile very little in front of middle; explanate external margins upturned near shoulders, narrowed posteriorly, but entire almost to apicosutural angles, thickened external borders entire; discal punctures of 2 sizes and depths of impression, separation variable, intervals smooth. Prosternum with longitudinal carinae of intercoxal process nearly parallel, stopping *c.* $\frac{1}{5}$ from anterior prosternal border. Elytral epipleura at most about $\frac{1}{5}$ as wide as metathorax. Postcoxal plates of 1st abdominal sternite with external borders more or less obliterated for outer half, not recurved before ending; apical border of 5th sternite truncate or very feebly emarginate medially, of 6th very briefly emarginate medially. Genitalia as in Figs 184, 185.

Female

Apex of 5th abdominal sternite feebly arcuate, that of 6th also arcuate.

Types

Lectotype ♀, Cedar Creek/ Queensl. Mjoberg/ mars/ Egleis interrupta m. [Weise's handwriting], NR. Paralectotypes 4 ♂, 3 ♀; 1 ♂, 1 ♀, same data as lectotype, but no identification labels; 1 ♀, same data as lectotype, but 'april' instead of 'mars' and no identification labels; 1 ♂, same data as lectotype, but neither date nor identification labels; 2 ♂, Evelyne/ Queensl. Mjoberg/ aug.; 1 ♀, Atherton/ Queensl. Mjoberg; all NR.

Other Specimens Examined

Queensland: 3, Cairns district, 1 QM, 2 SAM; 1, Yungaburra State Forest, ANIC; 1, Atherton, SAM; 5, 6·4 km S. of Atherton, BM; 1, Wongabel, QDPI; 1, Millaa Millaa Lookout Rd, QDPI; 1, Maalan Ck, DPIM; 3, Ravenshoe, QM; 4, 'North Queensland', UQ.

Total number of specimens examined: 28.

Comments

Though distinct, the dorsal colour patterns and genitalia of *interrupta* and *edwardsi* are

more closely related to one another than either is to *delta*. These similarities coupled with the geographic separation of the two species suggest the possibility that each may be a relatively recently-derived taxon from a once more widespread ancestral form.

Iablokoff-Khnzorian's remark (1984*b*, p. 116) that the species was described from New South Wales is erroneous.

Archegleis edwardsi (Mulsant)

(Figs 39, 181–183)

Egleis edwardsi Mulsant, 1850, p. 158; Weise, 1898, p. 226; Korschefsky, 1932, p. 576; Timberlake, 1943, p. 27.

Egleis pascoei Crotch, 1874, p. 131. Synonymised by Weise, 1898, p. 226.

Halyzia pascoei (Crotch); Masters, 1888, p. 90; Lea, 1902, p. 490.

[*Archegleis delta* (Weise); Iablokoff-Khnzorian, 1984*b*, p. 117. (Not Weise, 1898, p. 225.) Misidentification.]

Size

Length 5·7–6·7 mm. Breadth 4·8–5·2 mm.

Male

Outline and dorsal colour pattern of slightly greenish-yellow and black as in Fig. 39. Head pale yellow with 2 transverse black marks across extreme vertex; pronotal hypomera yellow, mesepimera and mesepisterna yellow, metasternum, metepimera and metepisterna black; abdomen black across disc of 1st sternite, pale testaceous elsewhere; elytral epipleura bordered on both sides with black, otherwise yellow; anterior and middle legs mostly pale with some dark areas, hind legs mostly dark, but with coxae and proximal parts of femora pale. Head with frontal punctures very slightly smaller than eye facets, mostly separated by at least 2 diameters, intervals reticulately microsculptured. Pronotum with anterior border distinctly arcuate between lateral projections to anterior angles; lateral borders slightly more convergent over anterior third than from widest point to posterior angles; discal punctures slightly larger than eye facets, separated by from <1 to *c.* 2 diameters; punctures toward lateral borders similar to those of disc, only slightly more sparsely set; concave lateral areas of pronotum usually without the obvious, C-shaped form seen in *interrupta*; intervals between punctures of both disc and margins with faintly impressed but clearly visible microsculpture. Scutellum transverse (*c.* 9 : 13), sides straight. Elytra as broad as long, highest point in profile slightly before middle; explanate external margins sometimes slightly upturned near shoulders, distinctly narrowed over posterior half, but present almost to apicosutural angles, thickened external borders entire; discal punctures of 2 sizes and depths of impression, separation variable, intervals smooth. Prosternum with longitudinal carinae of intercoxal process only slightly convergent anteriorly, reaching to within *c.* $\frac{1}{5}$ from anterior prosternal border. Elytral epipleura at most *c.* $\frac{1}{5}$ as broad as metathorax. Postcoxal plates of 1st abdominal sternite often showing signs of an oblique dividing line where hind border begins to be obliterated; apical border of 5th sternite truncate, of 6th very shallowly and broadly emarginate. Genitalia as in Figs 181–183.

Female

Usually with a small, transverse, anteromedian dark patch on head, with middle and hind legs similarly dark-coloured and with pro- and mesosterna black; apical border of 5th abdominal sternite feebly arcuate, of 6th with a brief, shallow, median notch.

Types

Lectotype of *edwardsi* [abdomen broken and empty], Museum Paris, Australie 2–47/ 670/ 57/ 2·47 [Paris Museum register entry reads 'acheté a Verreaux']/ Egleis edwardsi Muls. auct. det. [handwritten], MNHN. Lectotype ♂ of *Egleis pascoei*, Type Pascoei/ TYPE [blue, printed], ZM.

Other Specimens Examined

Queensland: 9, Blackall Ranges, 1 DAV, 3 MVM, 5 QM; 2, Maleny, QDPI; 1, Bunya Mts, UQ; 1, Moreton Bay, BM; 7, Mt Tamborine, 3 QM, 4 SAM; 1, Teviot Falls (600 m), DPIM; 3, Cunninghams Gap Natl Park, ANIC; 13, Lamington Natl Park, 3 ANIC, 6, QDPI, 4 UQ; 13, 'Nat. Pk' [? Lamington], 9 QM, 4 SAM. **New South Wales:** 1, Tweed R., ANIC; 6, Tooloom, 4 QM, 2 UQ; 2, Clarence R., MVM; 4, Richmond R., 1 ANIC, 1 SAM, 2 BM; 1, Dorrigo, BM; 4, Hastings R., 2 MVM, 2 AM; 1, Port Macquarie, ANIC; 3, Wauchope, ANIC; 1, Tuglo Reserve nr Singleton, BM; 4, Mooney Mooney Ck nr Gosford, AM; 3, Gosford, 2 AM, 1 SAM; 1, Sydney, SAM; 1, Minna Murra Falls, 16 km S. of Kiama, HDN; 1, Gerroa, HDN; 1, Nowra, MM; 2, Eden, ANIC; 5, 'National Park', 2 AM, 3, MVM; 5, 'New South Wales', 3 MVM, 2 MNHU. **Victoria:** 1, Club Terrace, UQ; 2, 'Vict.', MVM.

Total number of specimens examined: 100.

Comments

Crotch's misinterpretation of *edwardsi* has already been commented on elsewhere (p. 699). The single specimen in his collection under this name bears the labels listed in the type data for *crotchi* (p. 699) and is undoubtedly conspecific with the lectotype of *delta*. *A. pascoei* is represented by the lectotype and a single male from Queensland (Moreton Bay) clearly added to the collection after the description was written.

The Victorian records listed above, especially 'Vict.' are regarded as of doubtful validity.

Biology

Timberlake (1943, p. 27) quoted Koebele as reporting the species on orange trees, probably feeding on aphis.

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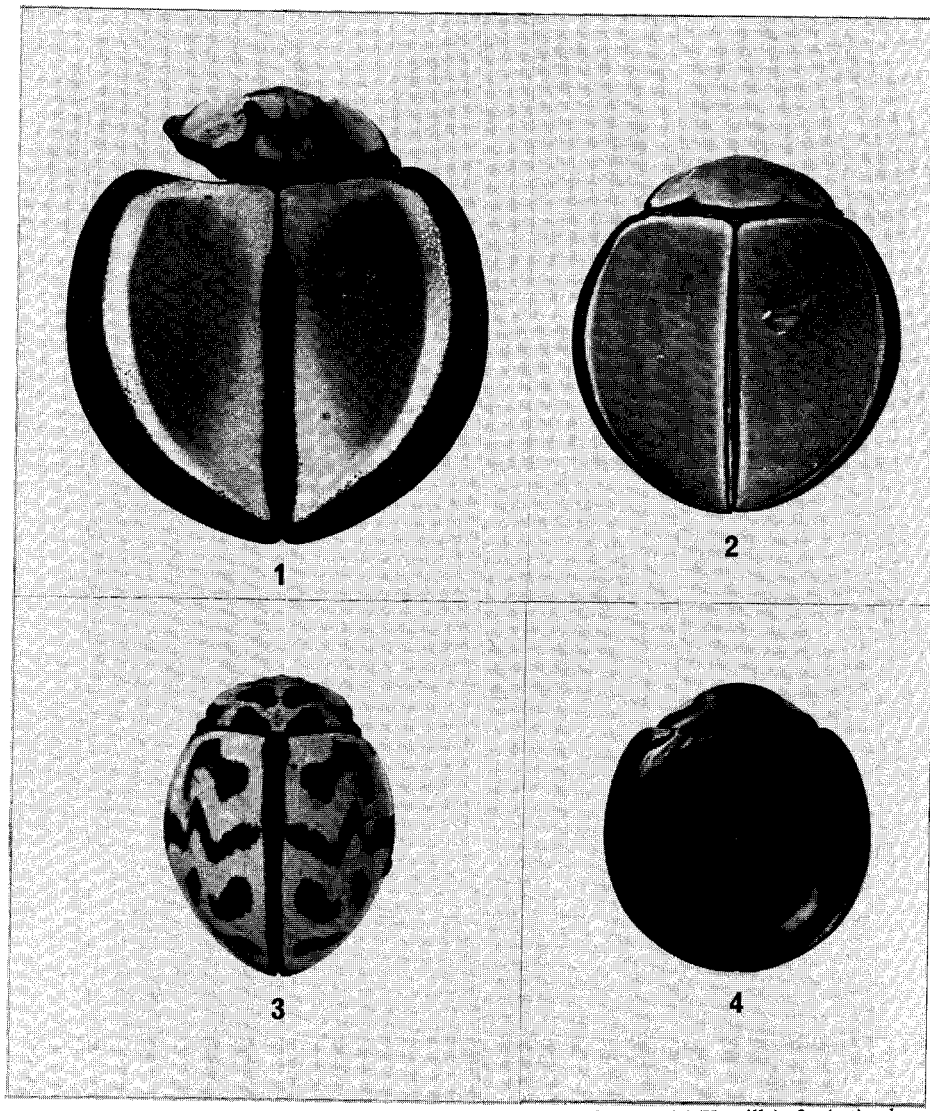
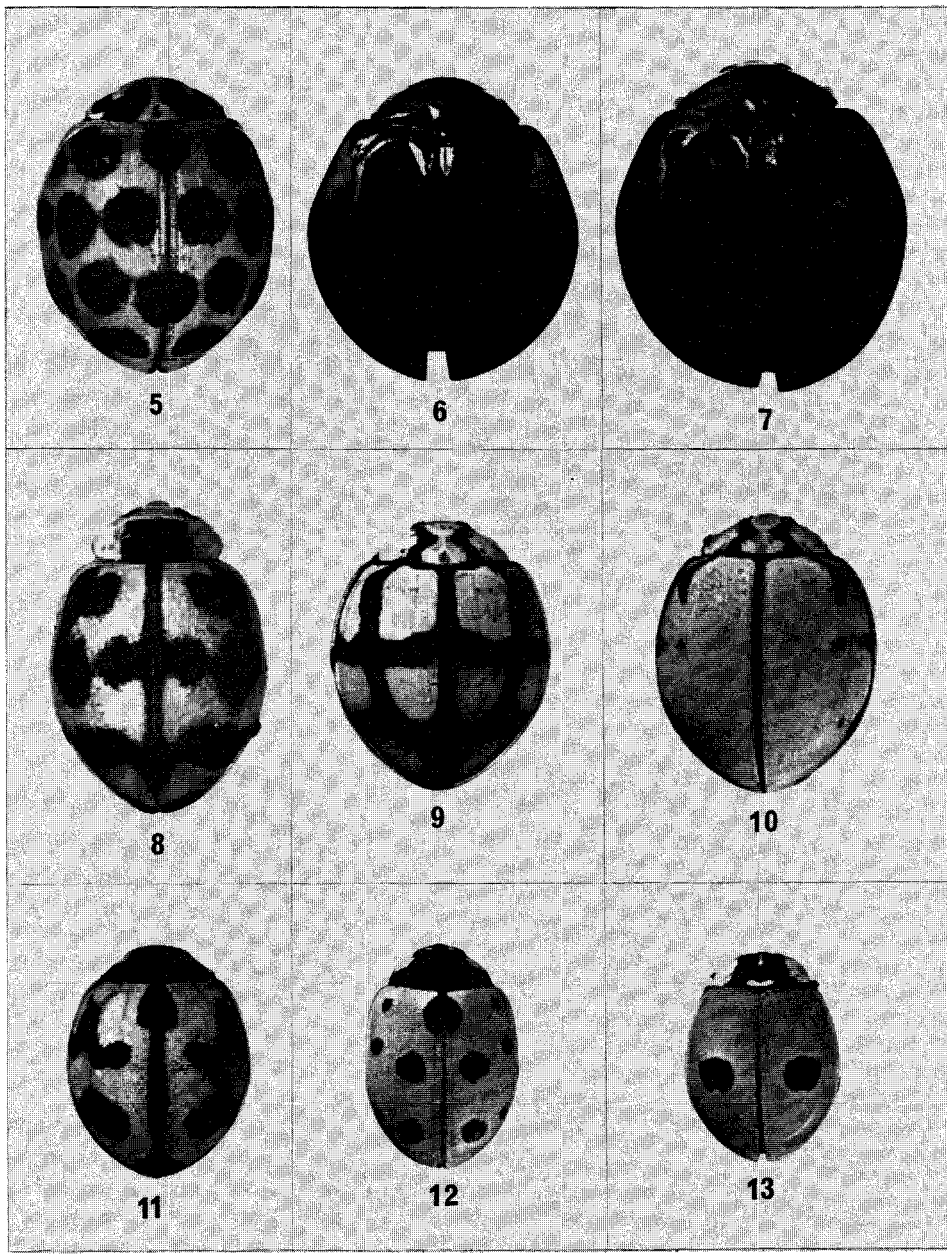


Figs 1–4. Outline and colour pattern: *1*, *Australoneda bourgeoisi* (Kerville); *2*, *Antineda princeps* (Mulsant); *3*, *Cleobora mellyi* (Mulsant); *4*, *Synona seminigra* (Weise). All ×6.



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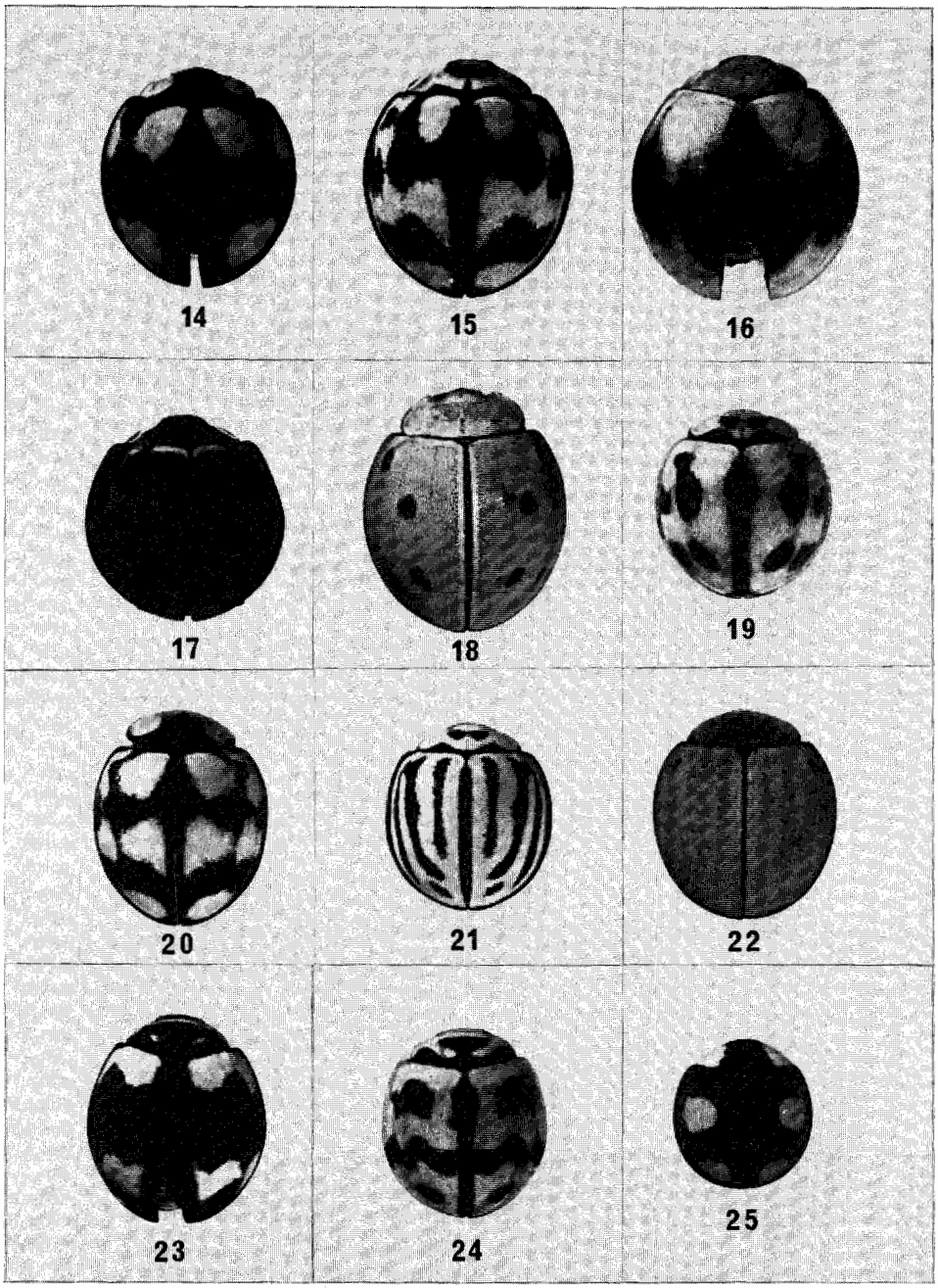

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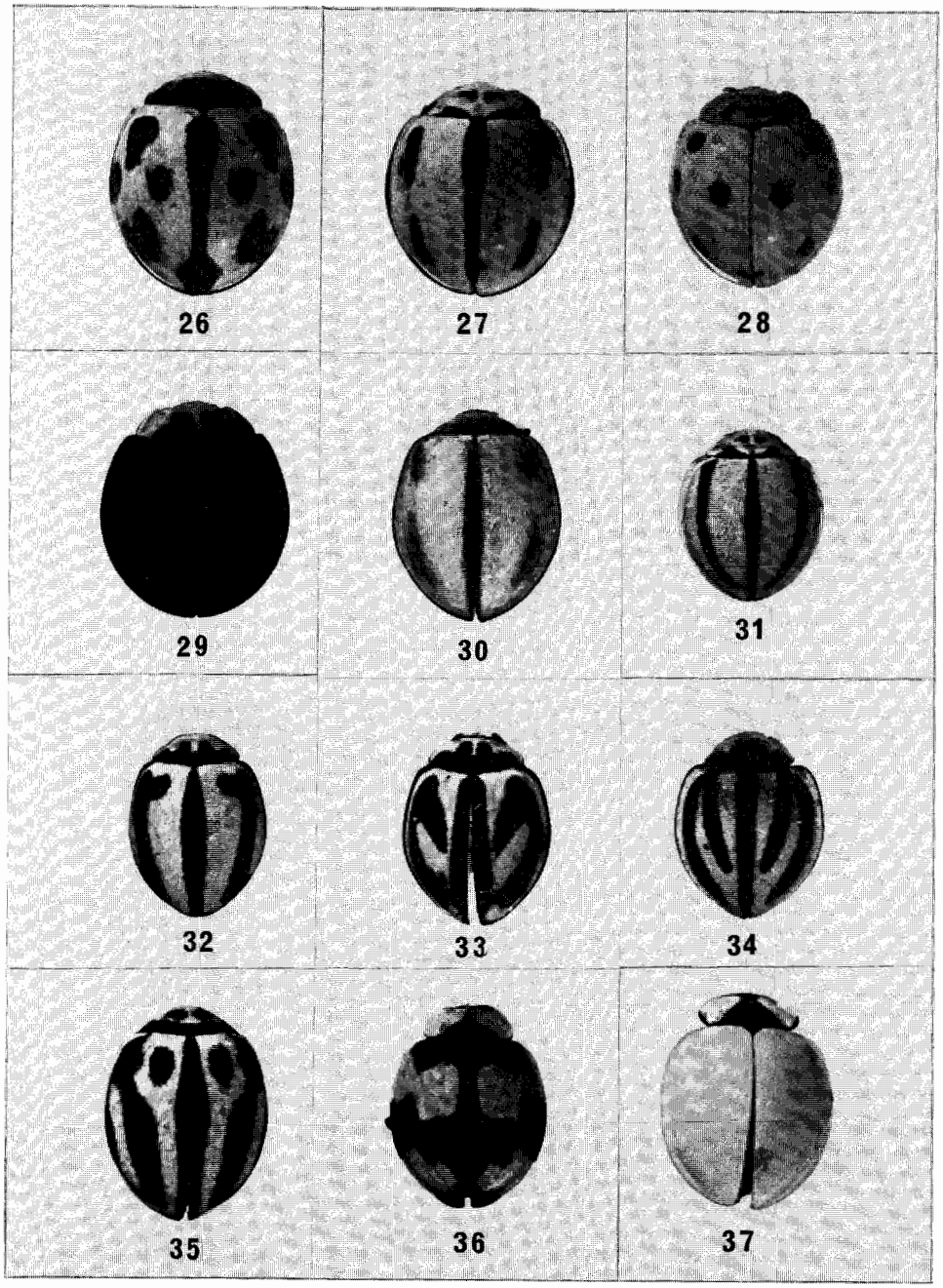

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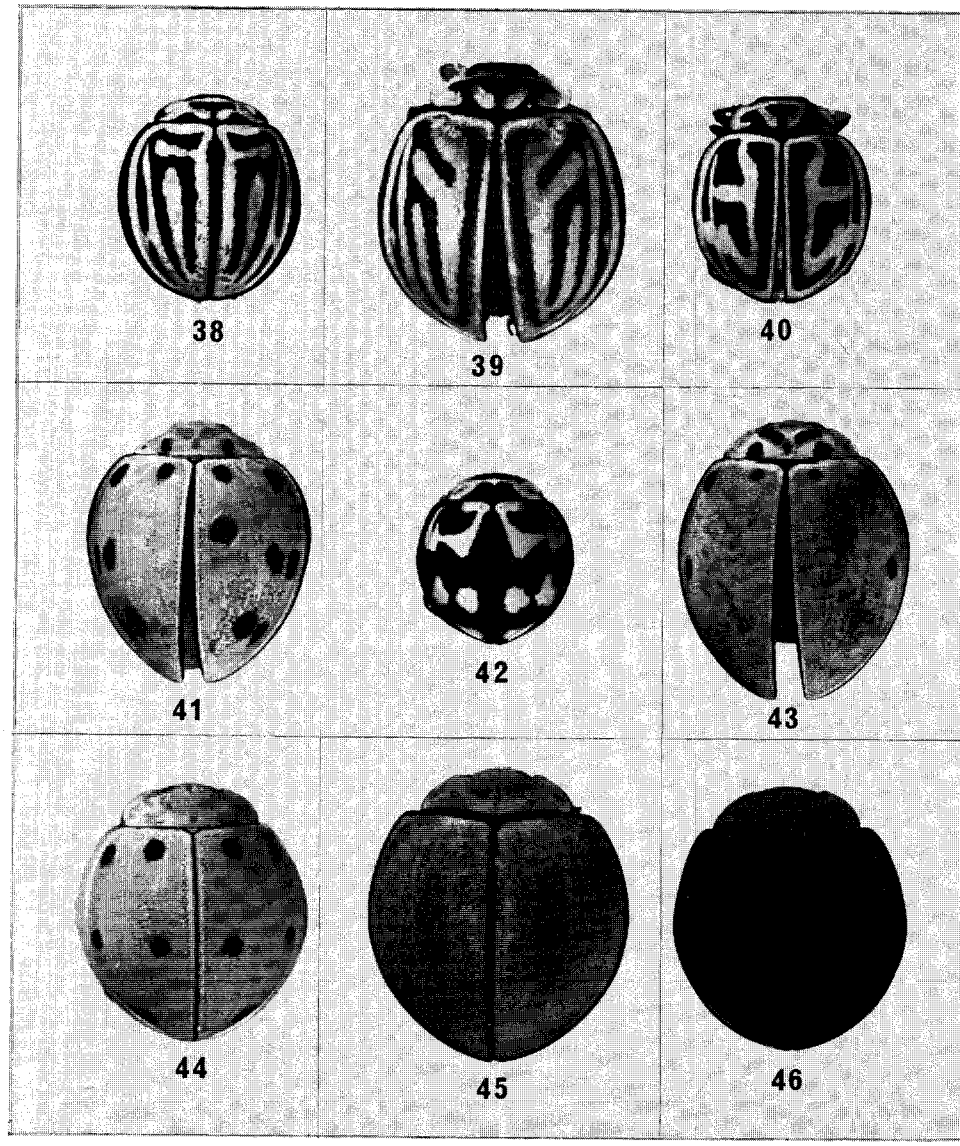

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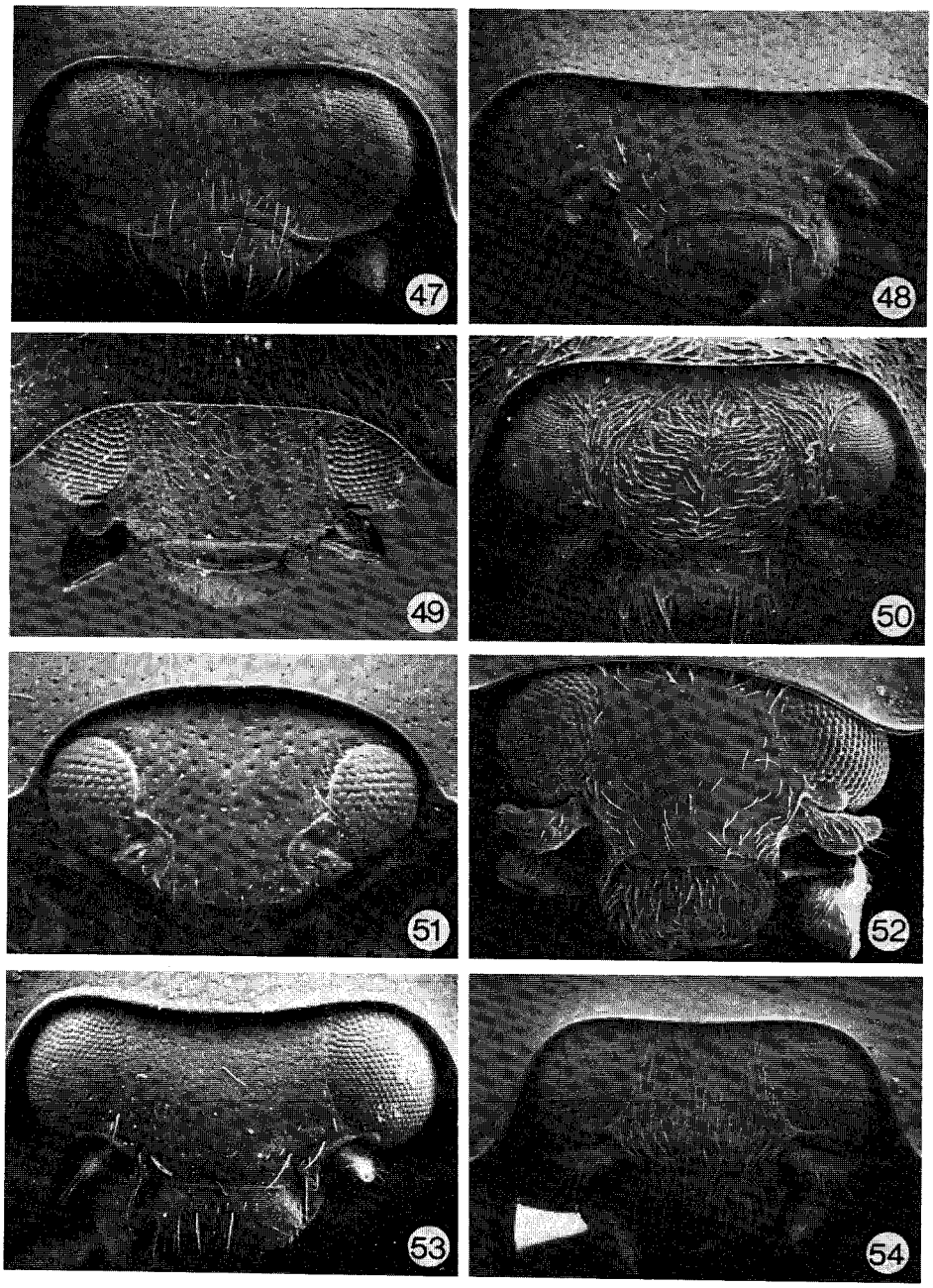

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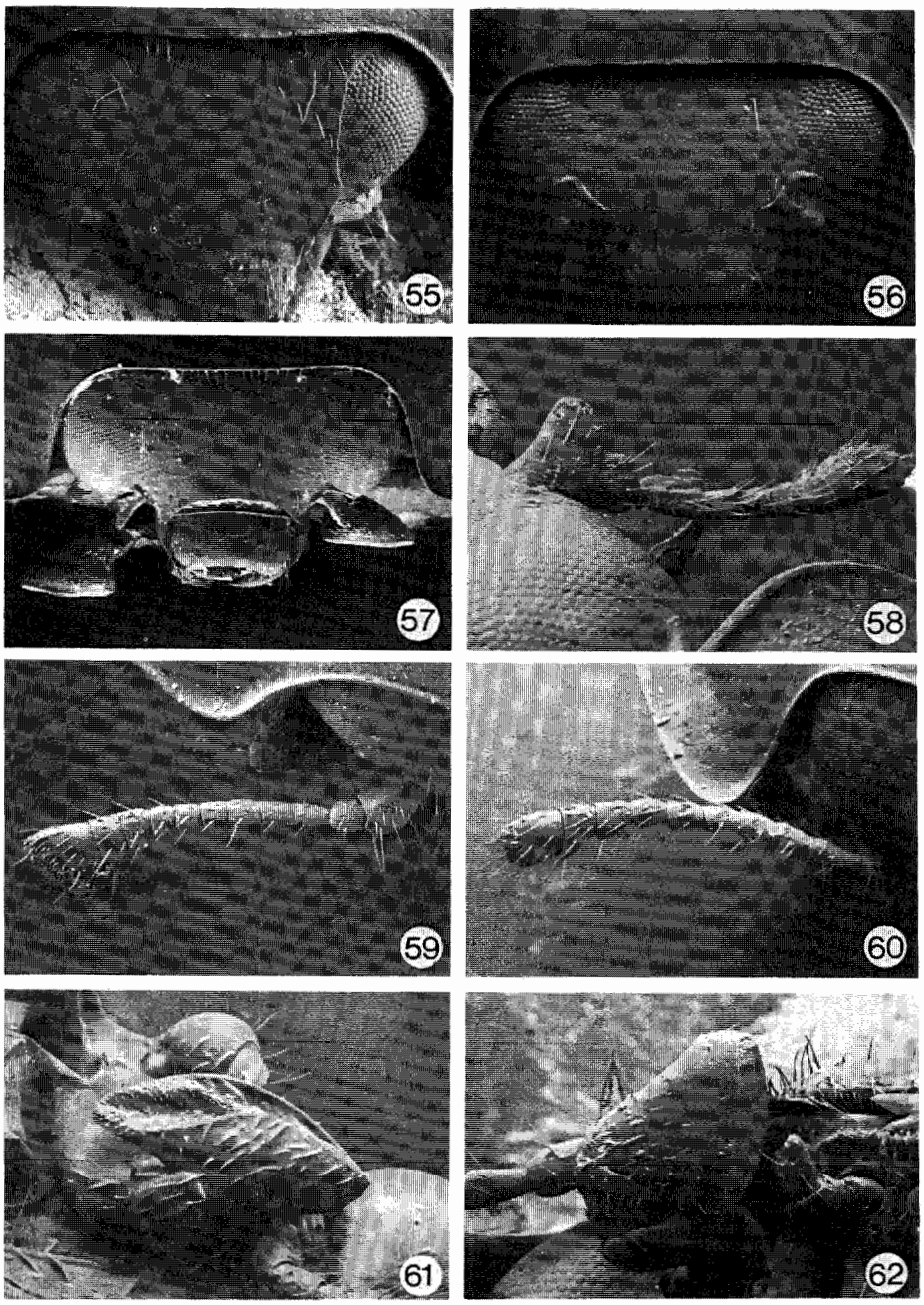

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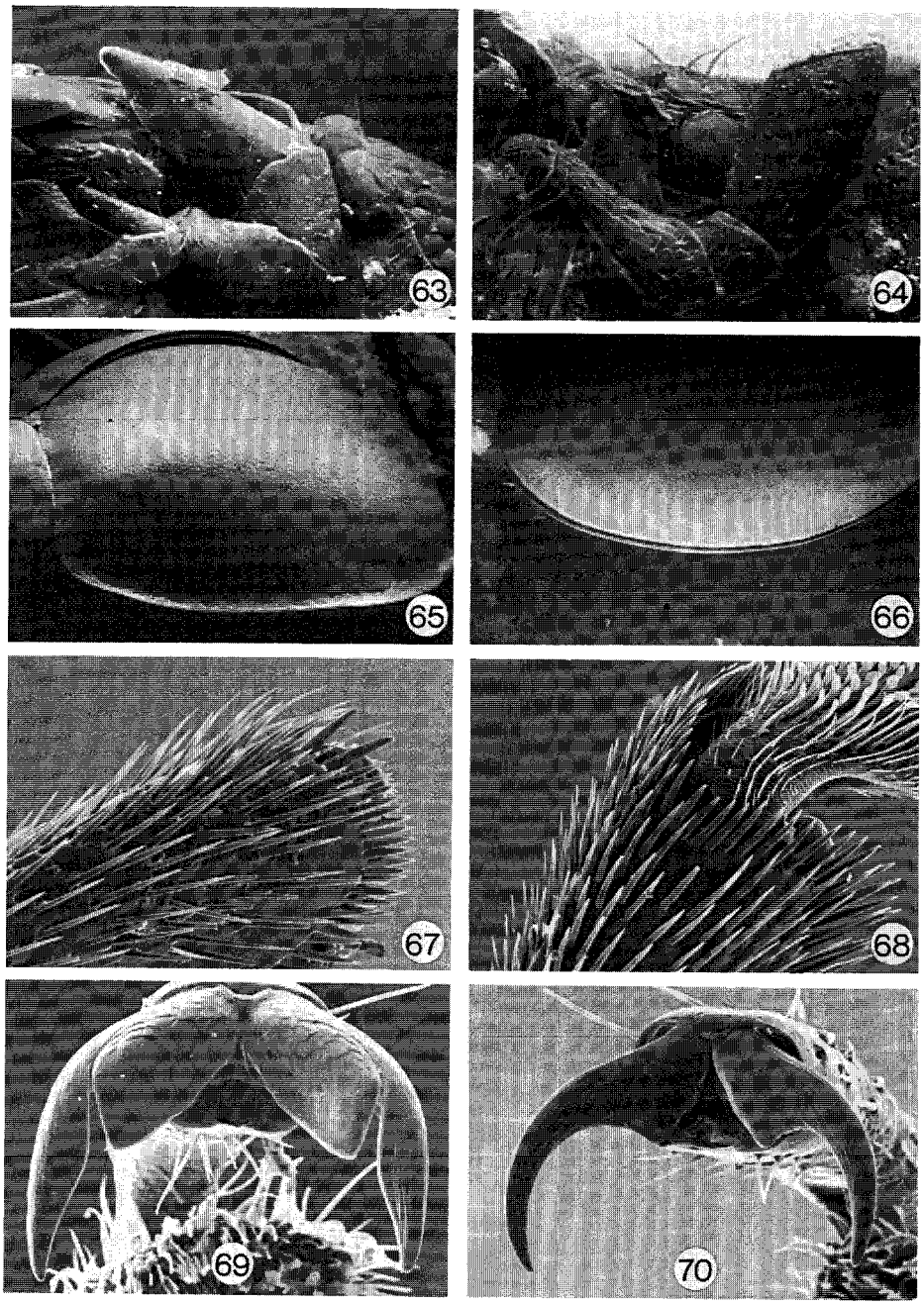

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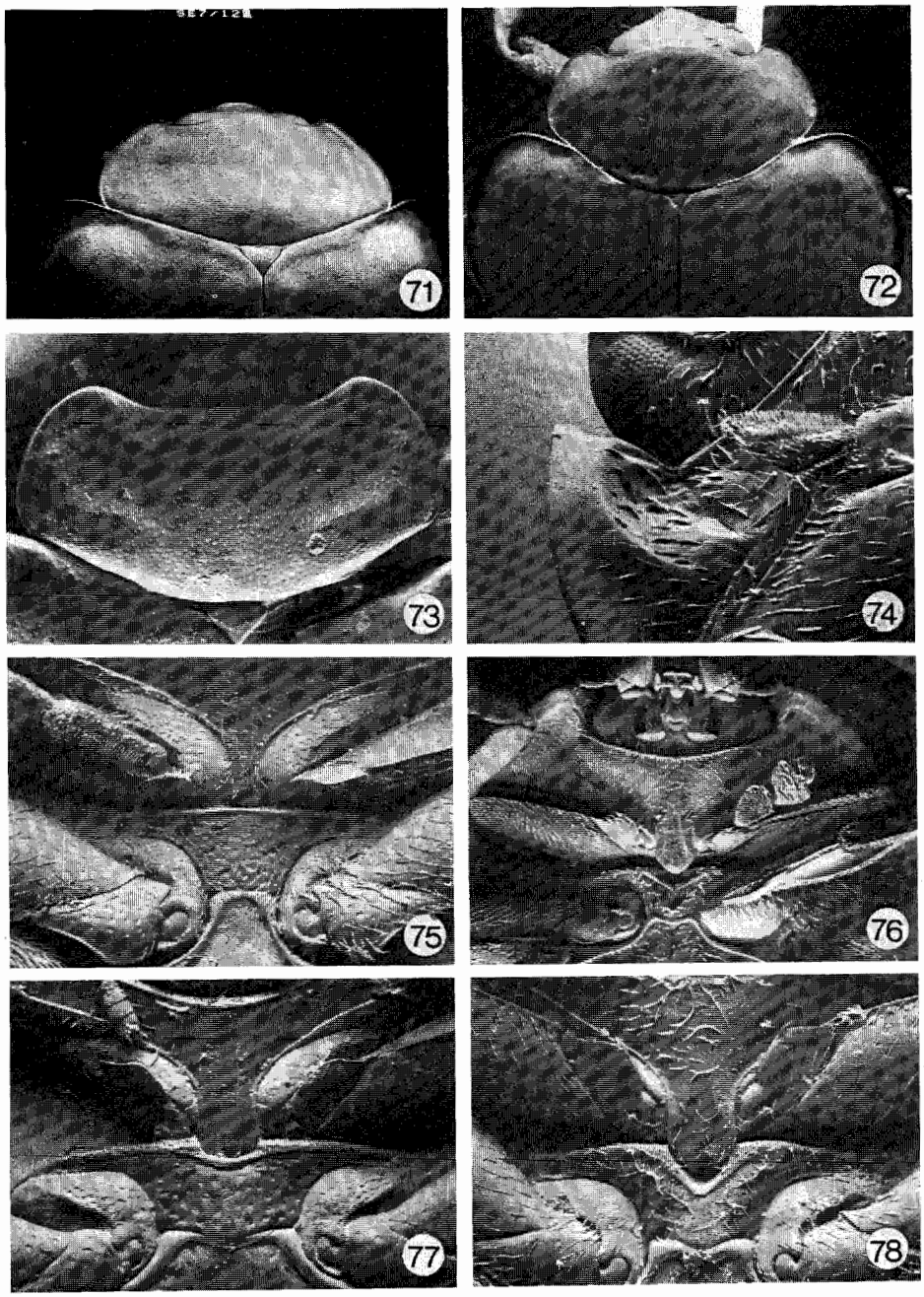

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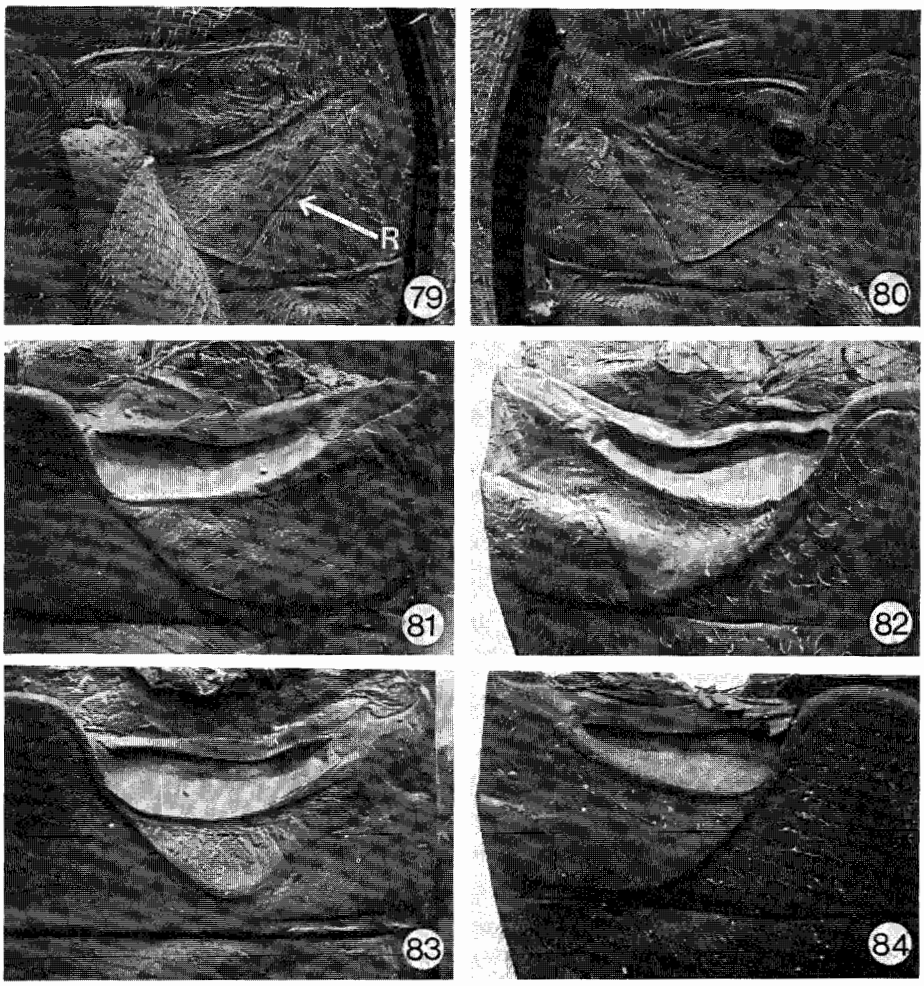

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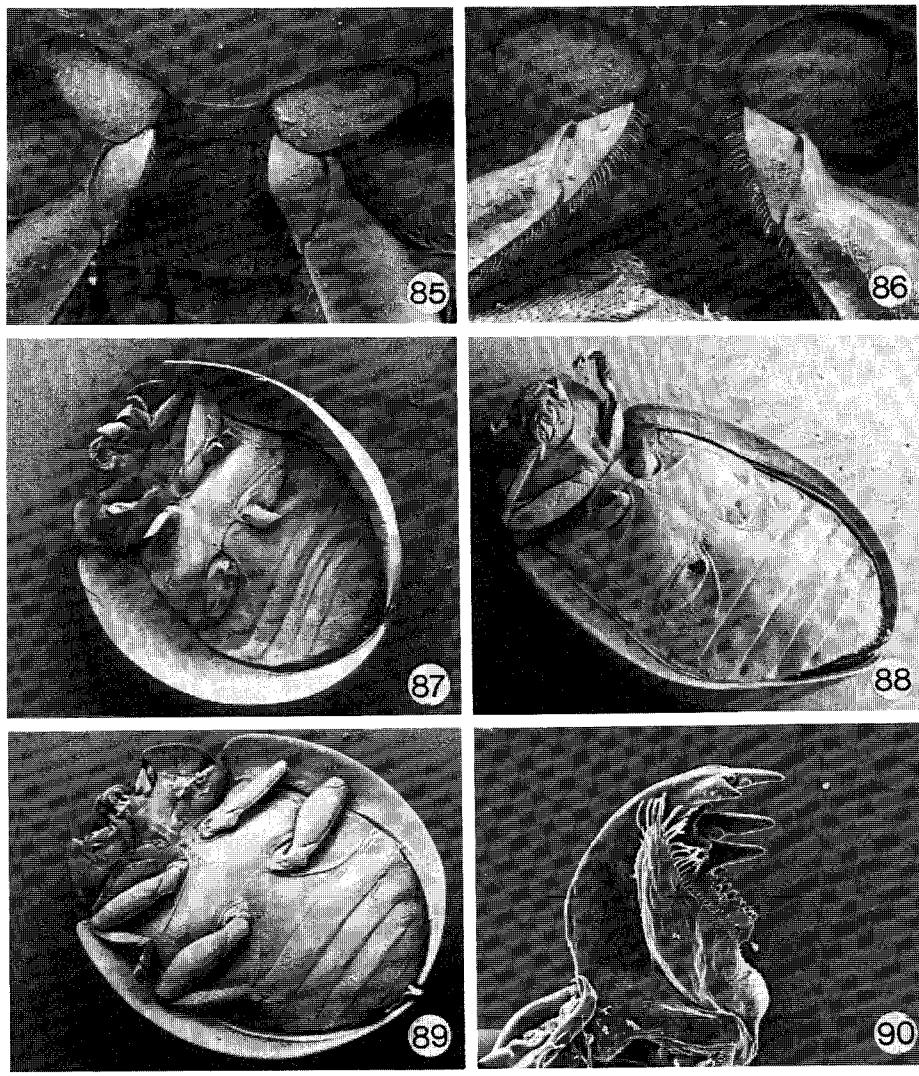

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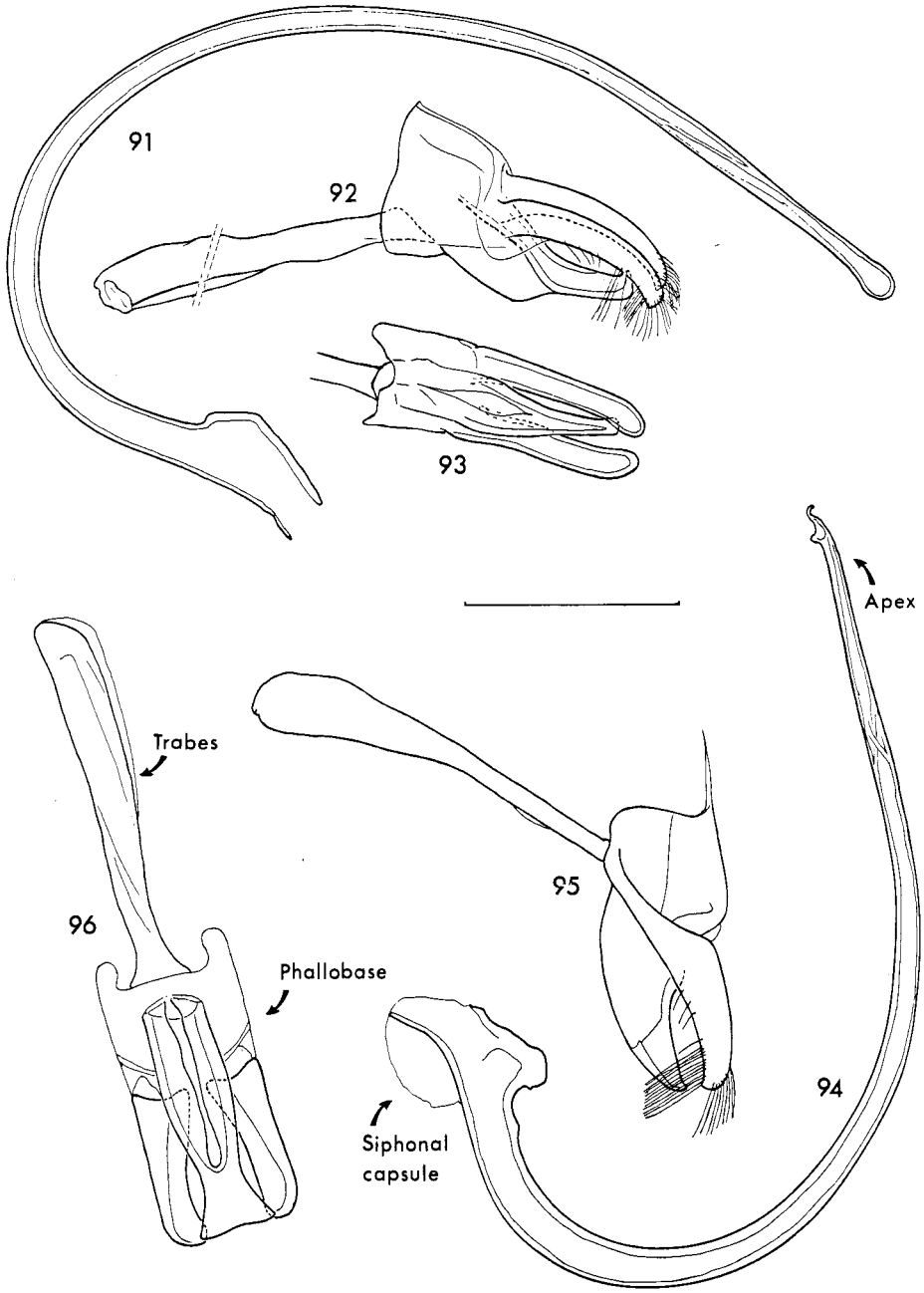

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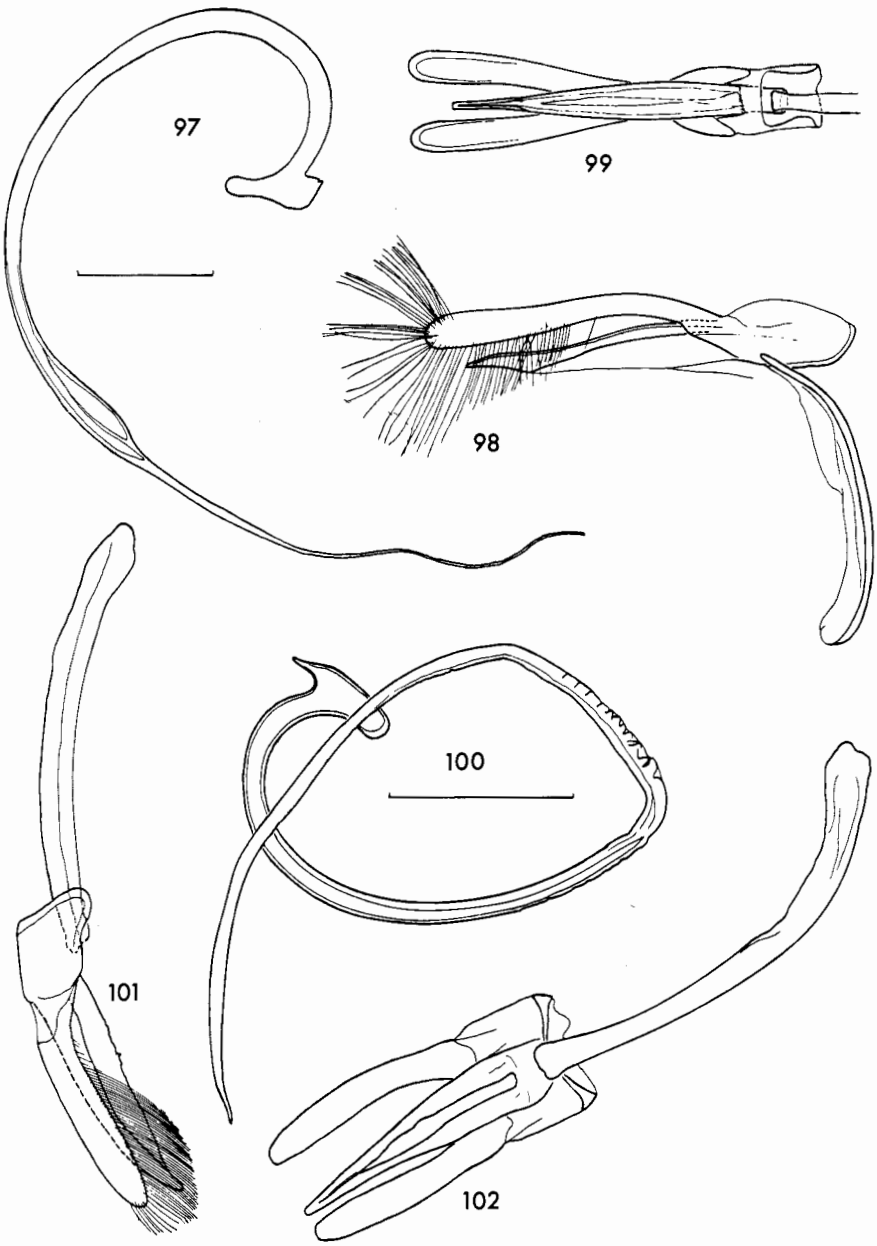

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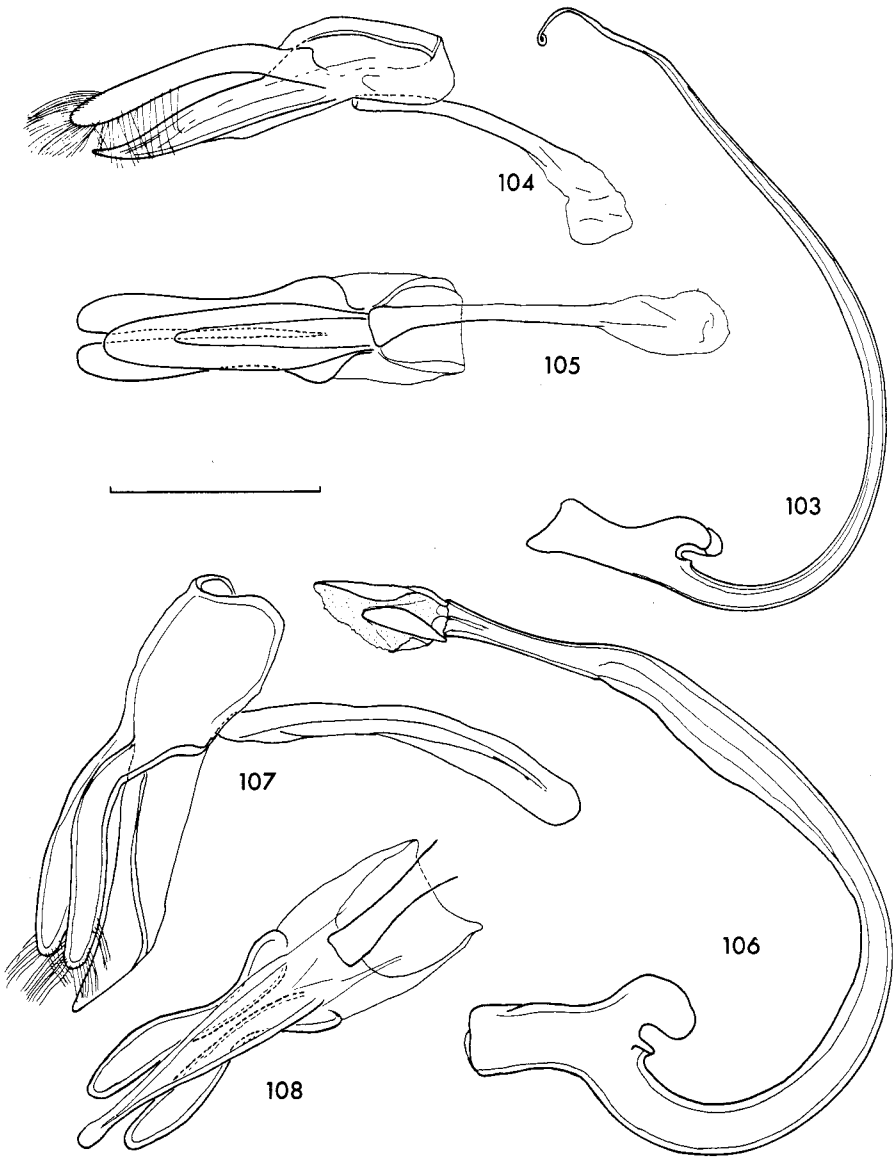

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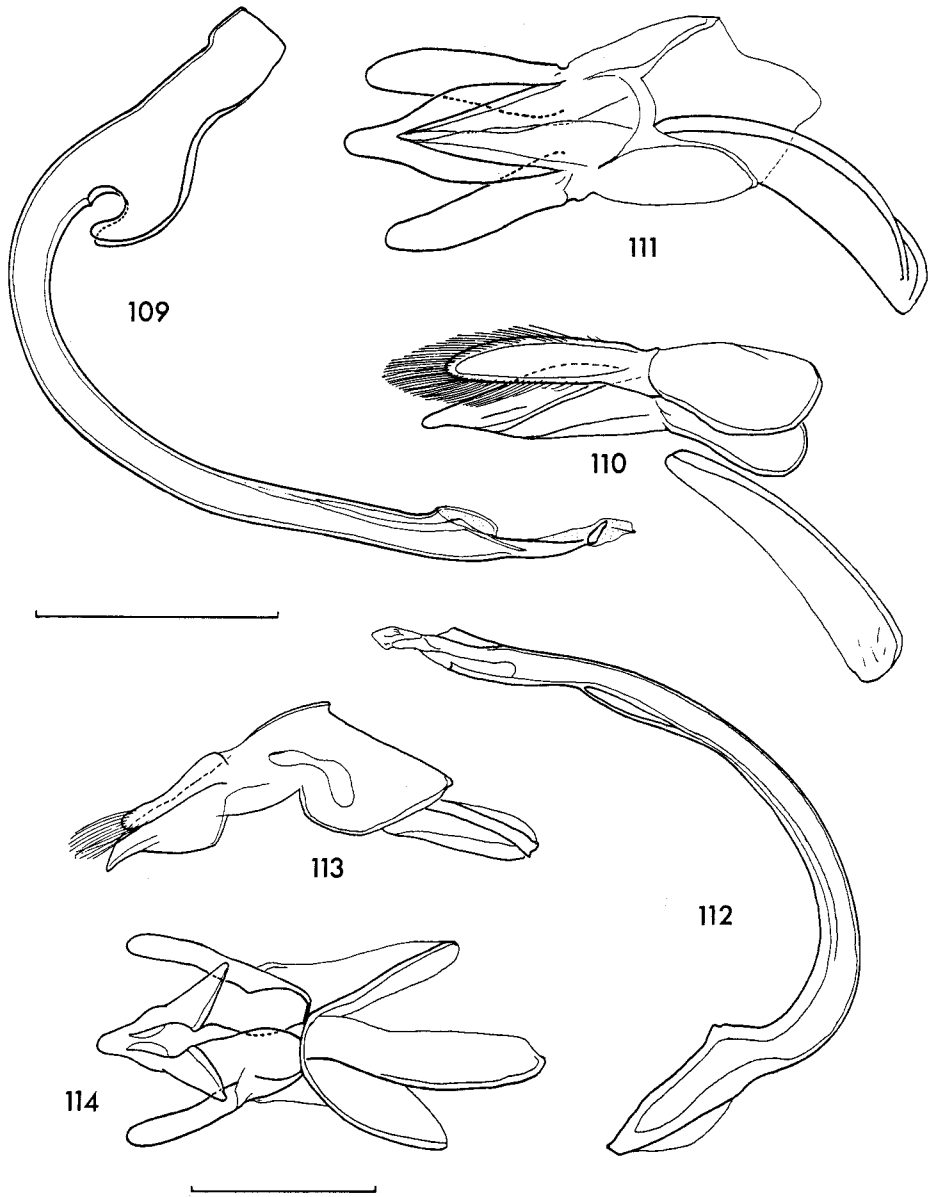
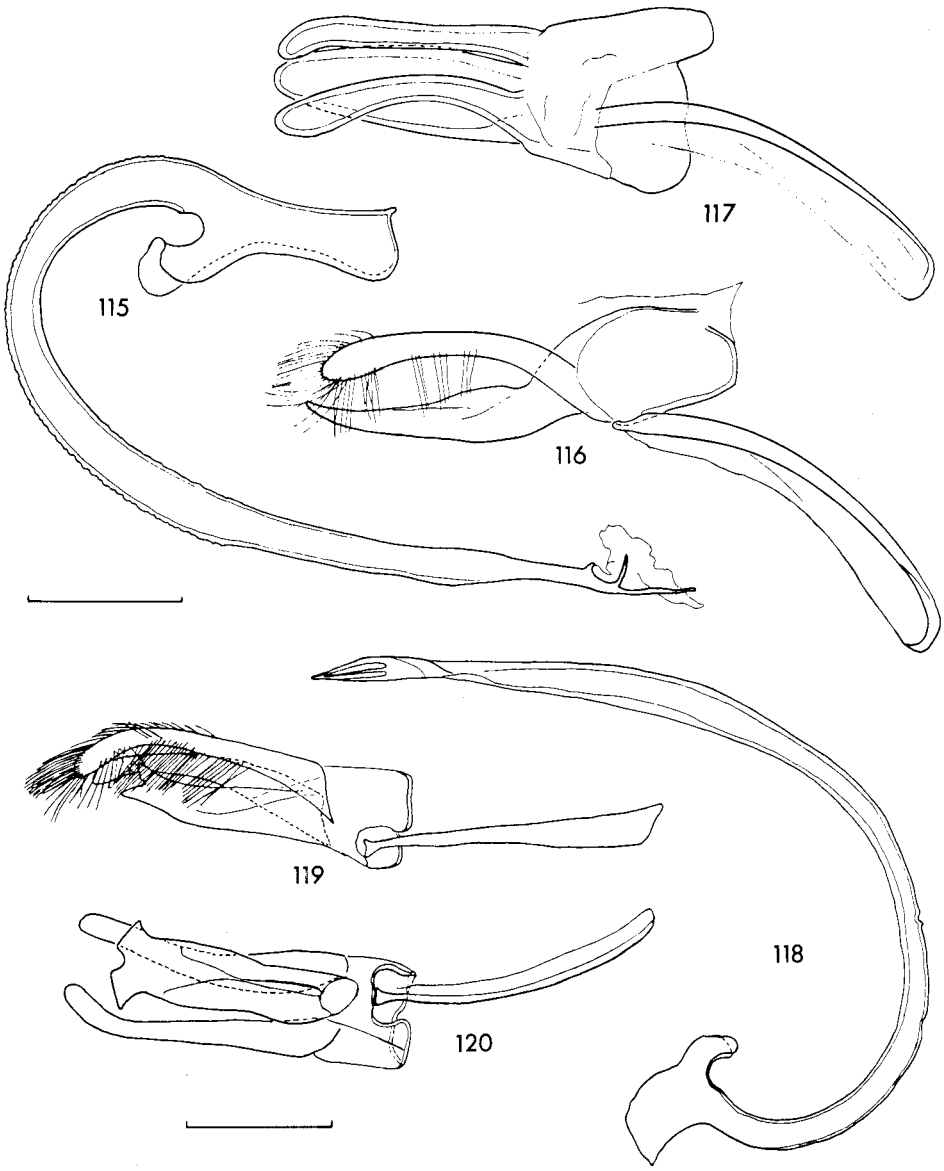
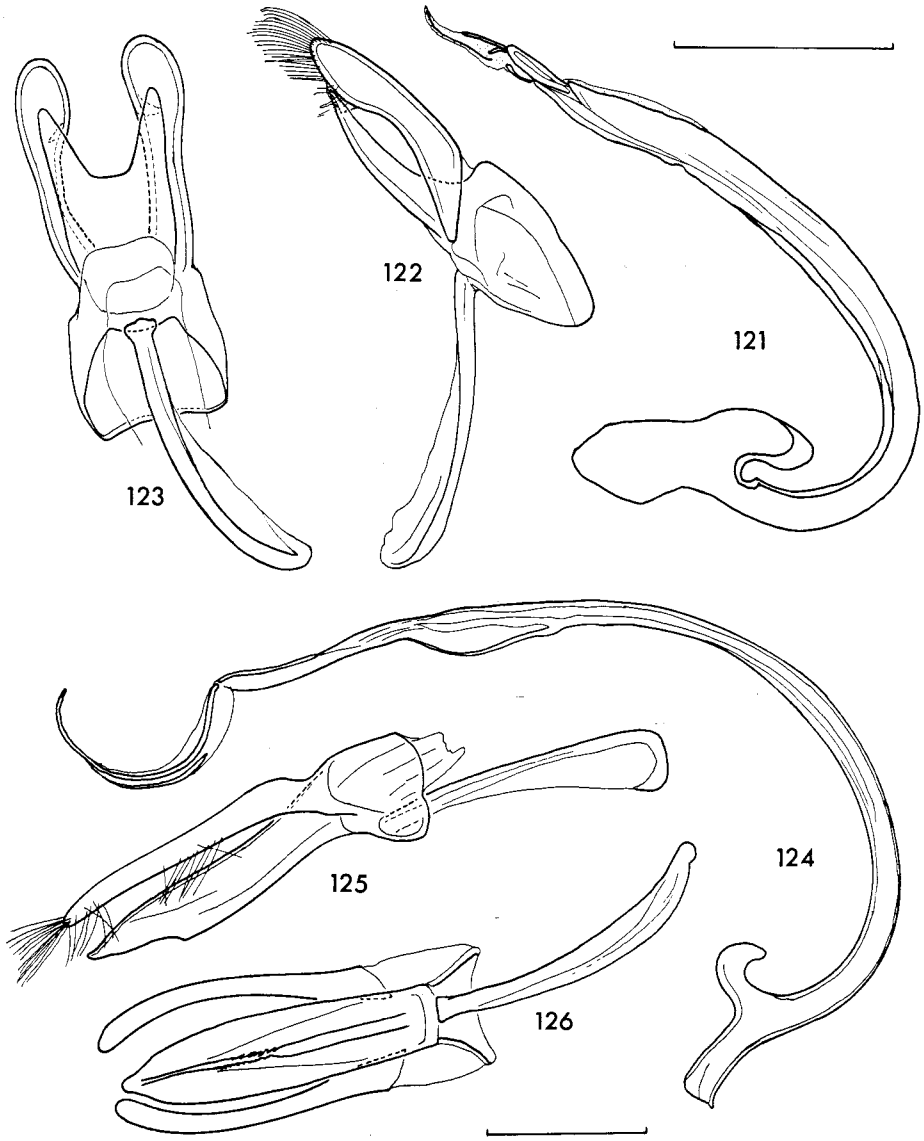


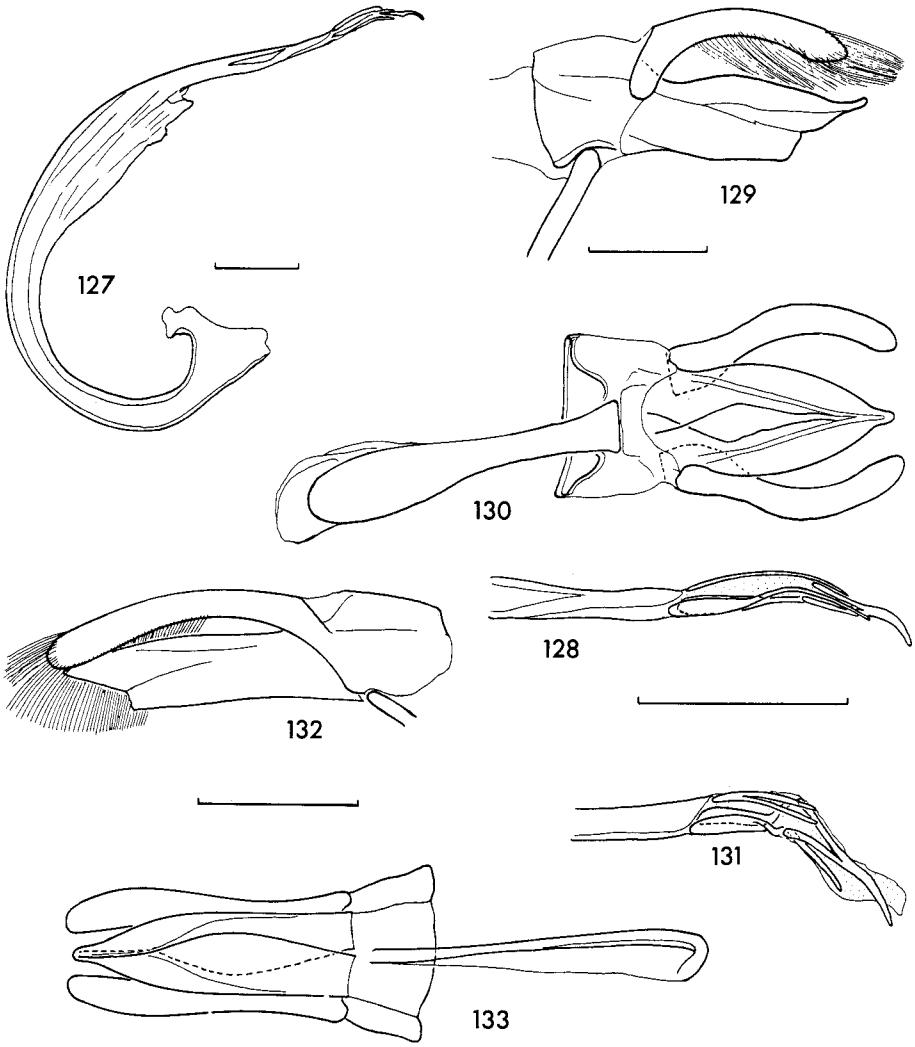
Figs 109–111. *Coccinella transversalis* F.: *109*, sipho; *110*, *111*, phallobase and trabes: *110*, lateral; *111*, ventral.
Figs 112–114. *Coccinella undecimpunctata* L.: *112*, sipho; *113*, *114*, phallobase and trabes: *113*, lateral; *114*, ventral. Scale lines, 0·5 mm.



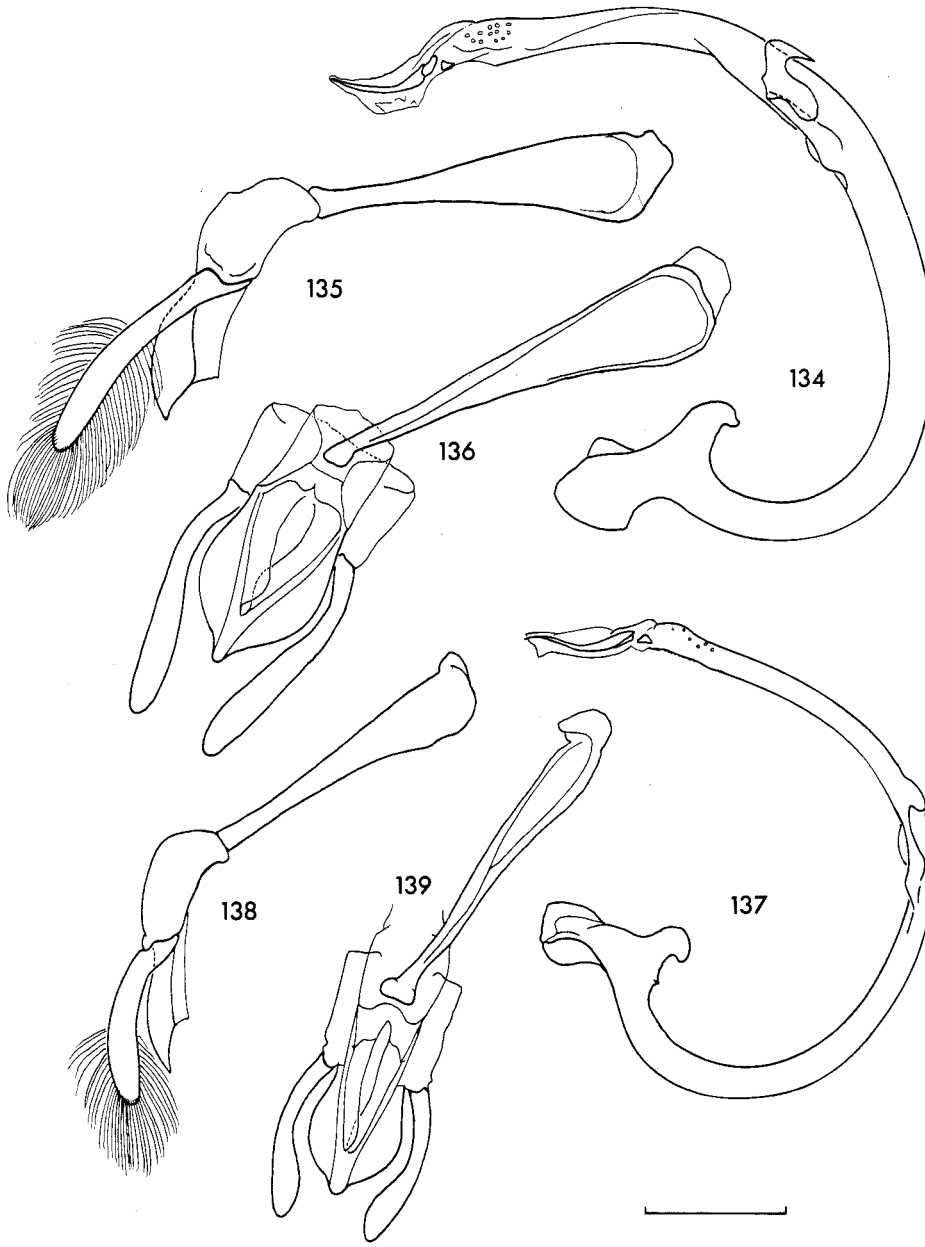
Figs 115–117. *Synona seminigra* (Weise): *115*, sipho; *116*, *117*, phallobase and trabes: *116*, lateral; *117*, ventral.
Figs 118–120. *Cleobora mellyi* (Mulsant): *118*, sipho; *119*, *120*, phallobase and trabes: *119*, lateral; *120*, ventral. Scale lines, 0·5 mm.



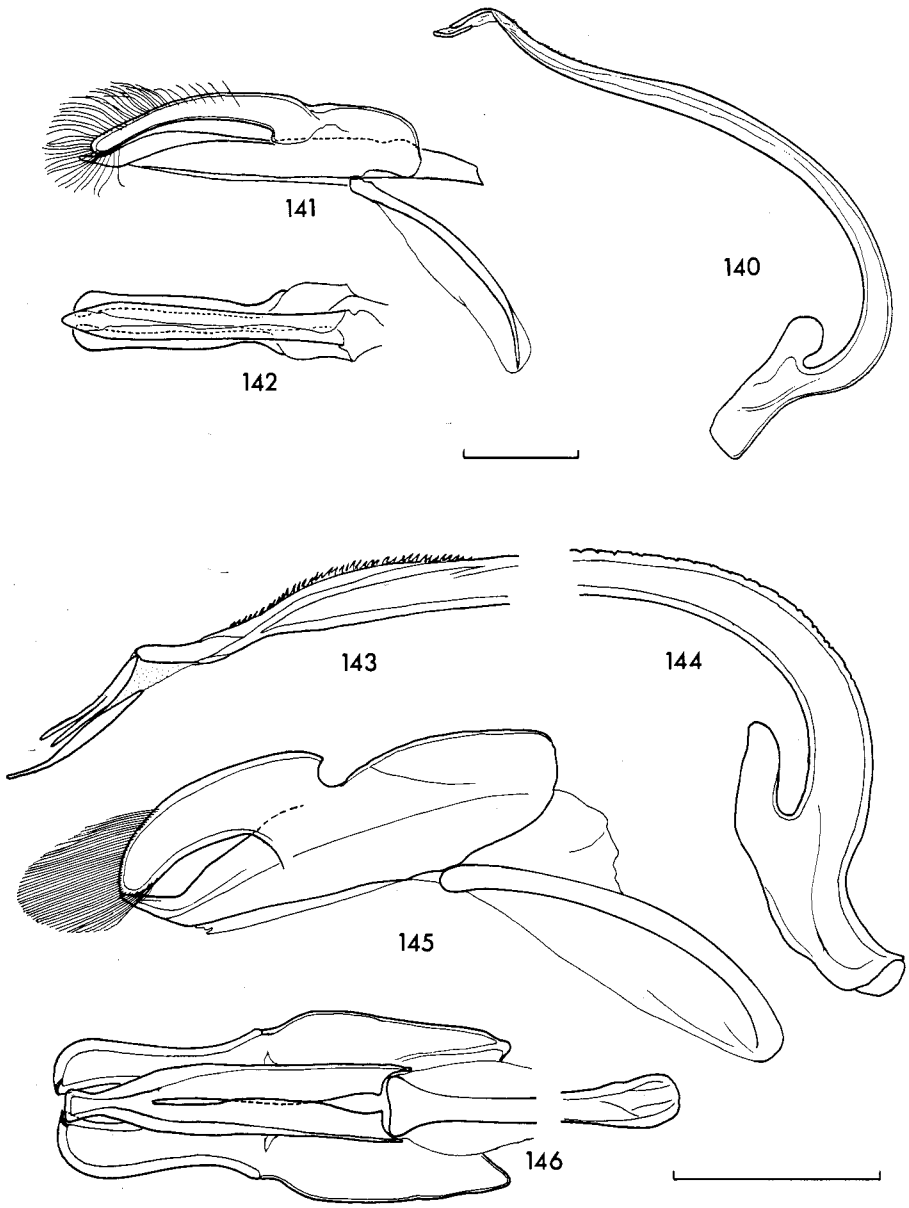
Figs 121–123. *Oenopia guttata* (Blackburn): *121*, sipho; *122*, *123*, phallobase and trabes: *122*, lateral; *123*, ventral.
Figs 124–126. *Coelophora inaequalis (F.): 124*, sipho; *125*, *126*, phallobase and trabes: *125*, lateral; *126*, ventral. Scale lines, 0·5 mm.



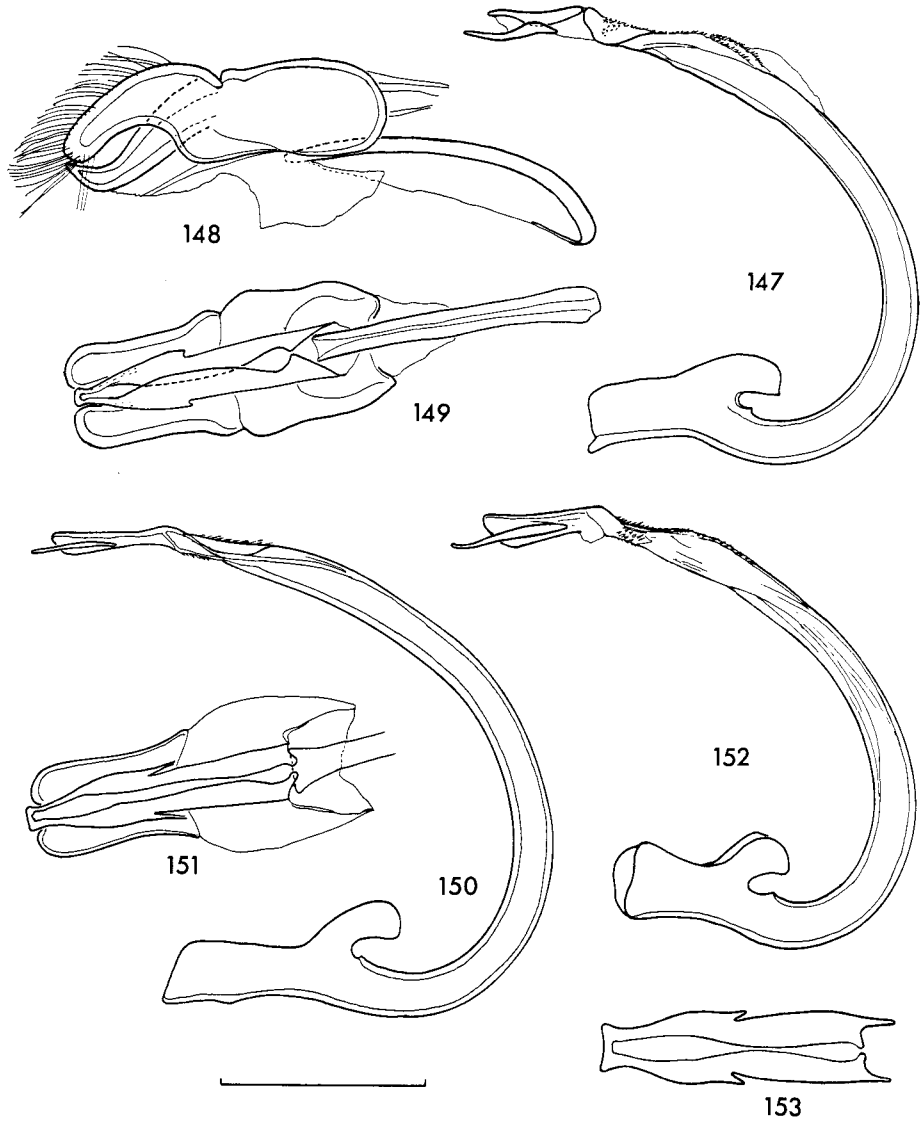
Figs 127–130. *Coelophora jansoni* Crotch: *127*, sipho; *128*, apex; *129*, *130*, phallobase and trabes: *129*, lateral; *130*, ventral.
Figs 131–133. *Coelophora mulsanti* (Montrouzier): *131*, siphonal apex (sipho otherwise as *jansoni*); *132*, *133*, phallobase and trabes: *132*, lateral; *133*, ventral. Scale lines, 0·5 mm.



Figs 134–136. *Phrynocaria astrolabiana* (Weise): *134*, sipho; *135*, *136*, phallobase and trabes: *135*, lateral; *136*, ventral.
Figs 137–139. *Phrynocaria gratiosa* (Mulsant): *137*, sipho; *138*, *139*, phallobase and trabes: *138*, lateral; *139*, ventral. Scale line, 0·5 mm.



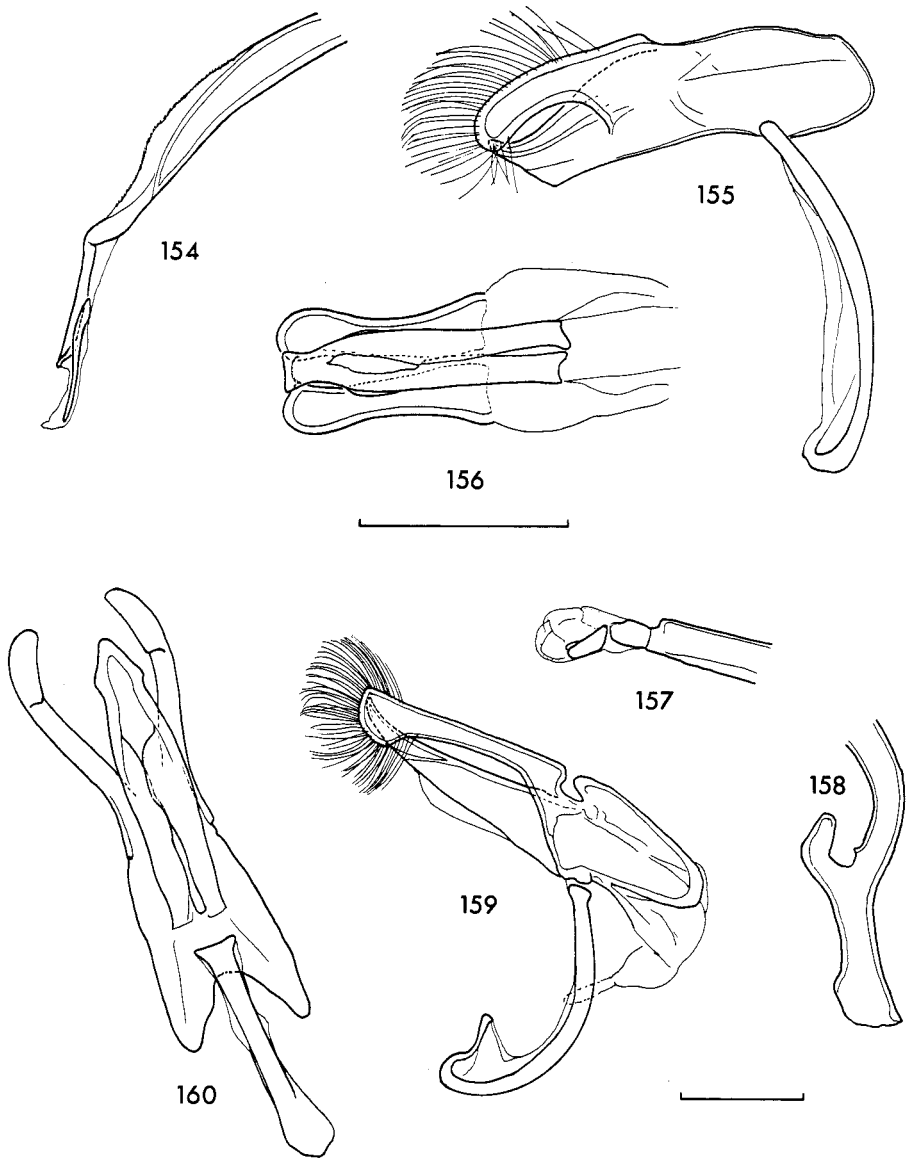
Figs 140–142. *Micraspis aphidectoides* (Korschefsky): *140*, sipho; *141*, *142*, phallobase and trabes: *141*, lateral; *142*, ventral.
Figs 143–146. *Micraspis furcifera* (Guérin-Méneville): *143*, *144*, sipho: *143*, apex; *144*, base; *145*, *146*, phallobase and trabes: *145*, lateral; *146*, ventral. Scale lines, 0·5 mm.



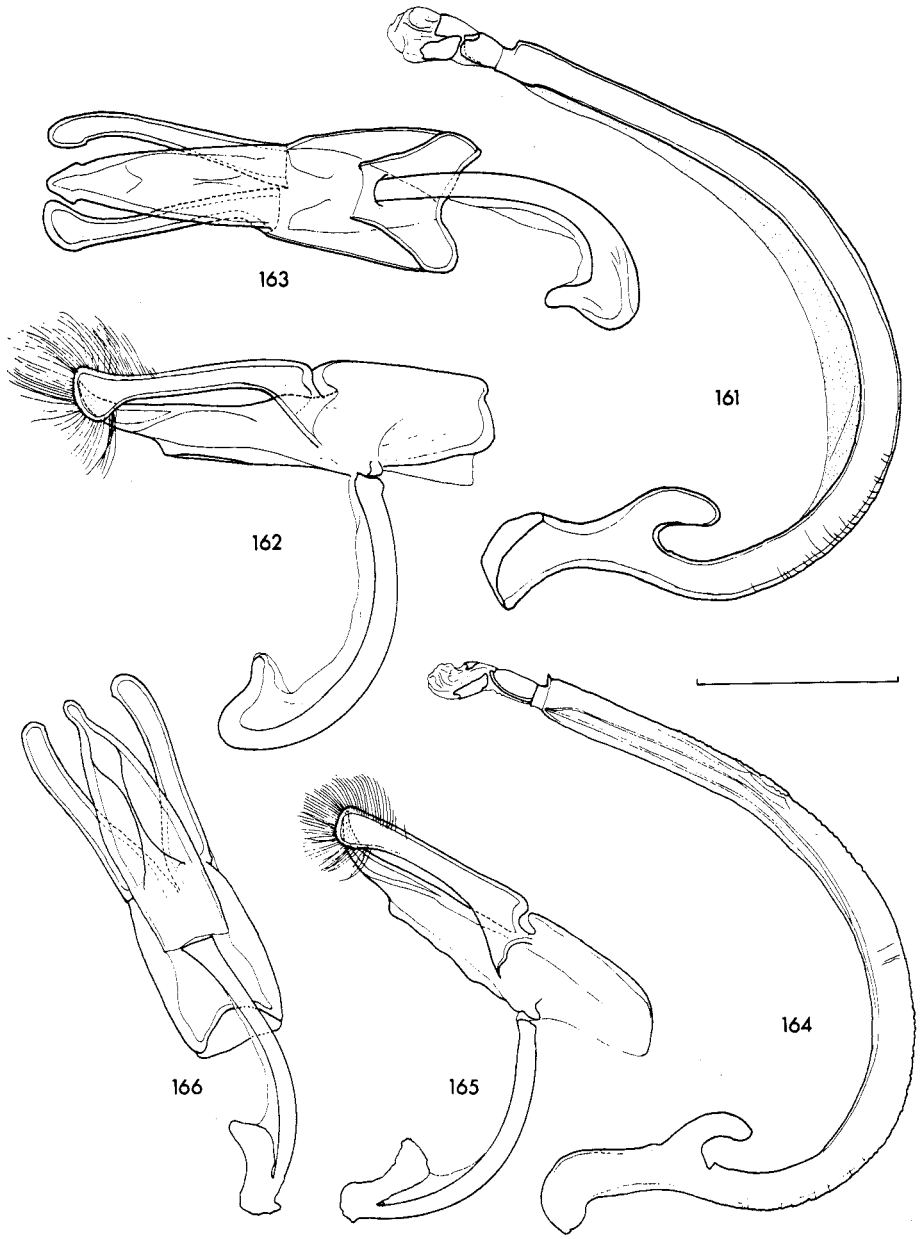
Figs 147–149. *Micraspis frenata* (Erichson): *147*, sipho; *148*, *149*, phallobase and trabes: *148*, lateral; *149*, ventral.

Figs 150, 151. *Micraspis confusa*, sp. nov.: *150*, sipho; *151*, phallobase and trabes, ventral (lateral view as *frenata*).

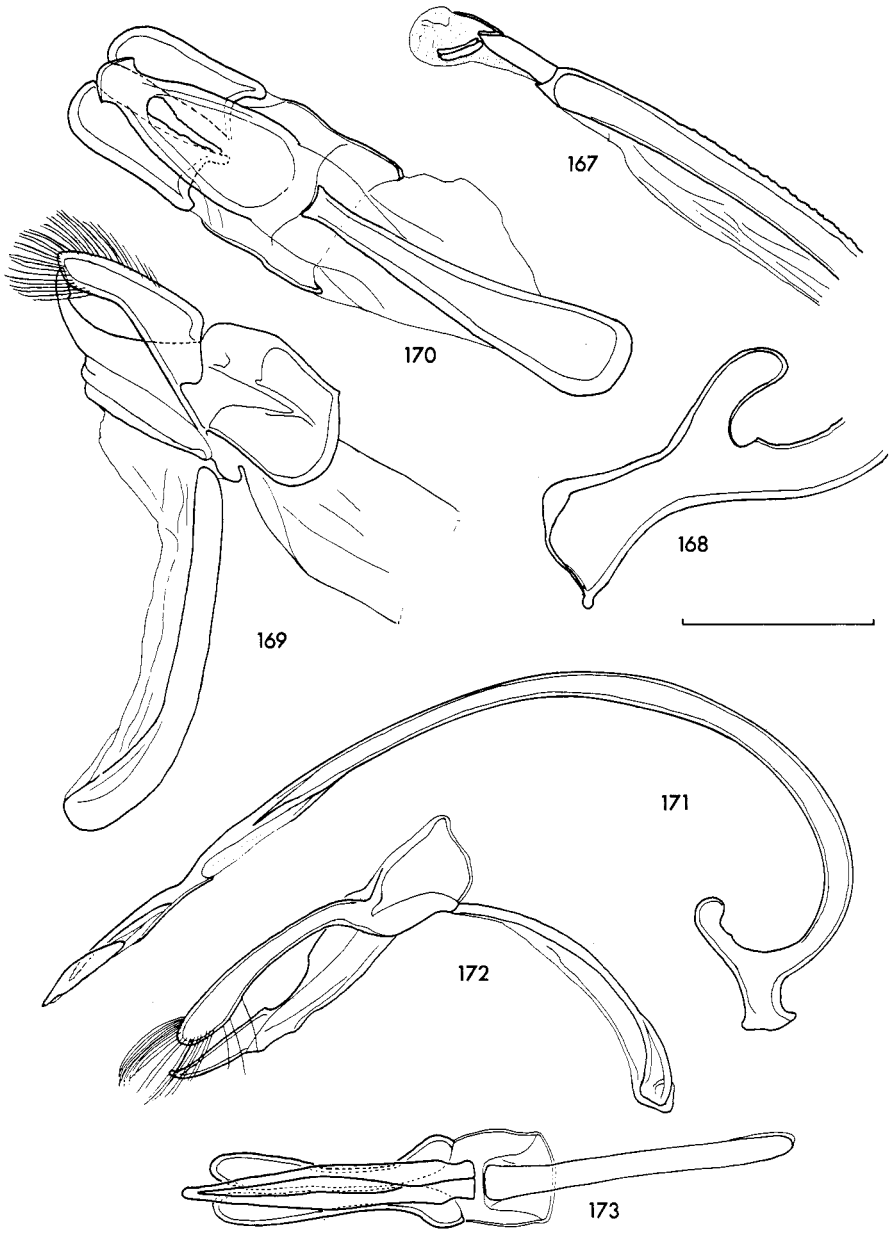
Figs 152, 153. *Micraspis lineola* (F.): *152*, sipho; *153*, median lobe of phallobase, ventral (phallobase and trabes otherwise very like *frenata*). Scale line, 0·5 mm.



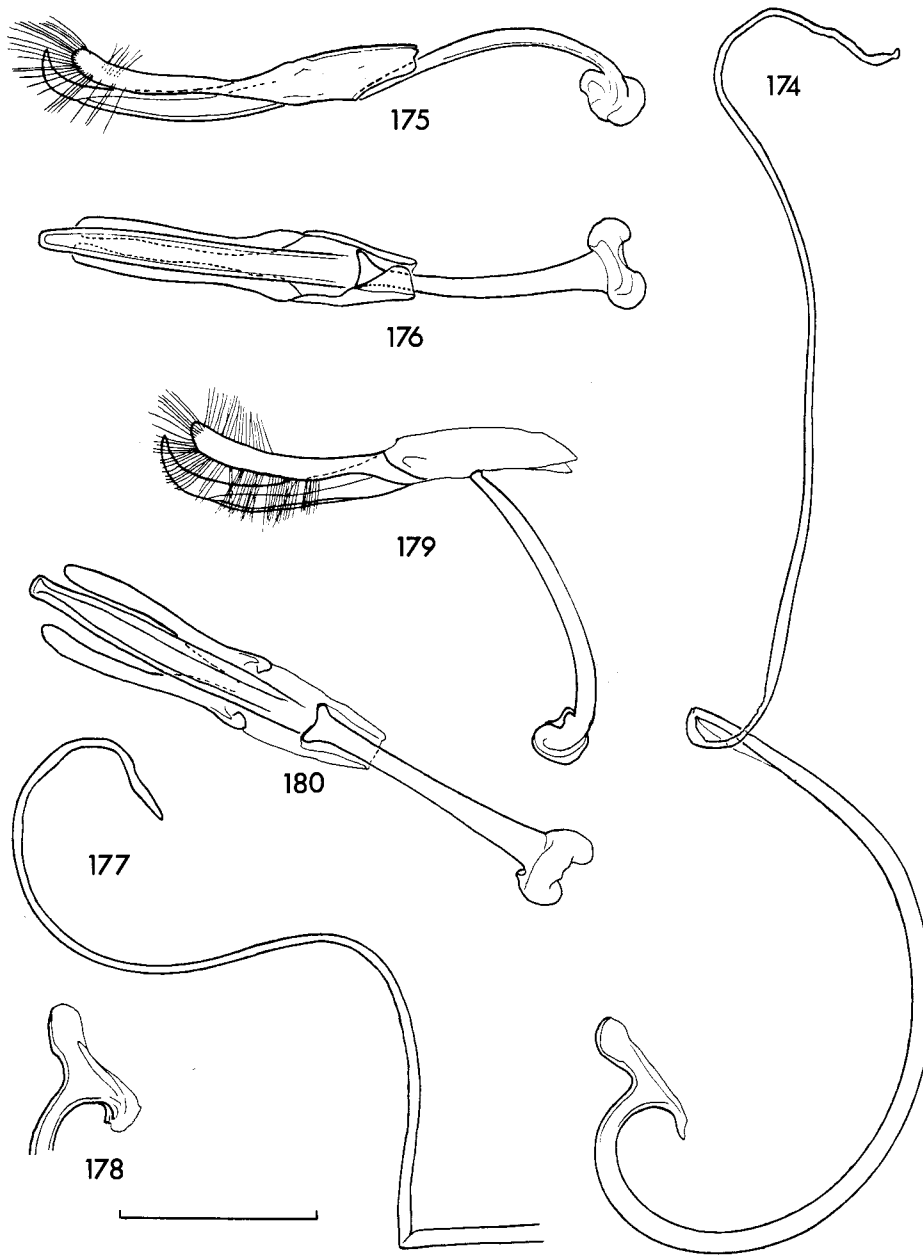
Figs 154–156. *Micraspis flavovittata* (Crotch): *154*, siphonal apex (rest of sipho as *frenata*); *155*, *156*, phallobase and trabes: *155*, lateral; *156*, ventral.
Figs 157–160. *Harmonia testudinaria* (Mulsant): *157*, *158*, sipho: *157*, apex; *158*, base; *159*, *160*, phallobase and trabes: *159*, lateral; *160*, ventral. Scale lines, 0·5 mm.



Figs 161–163. *Harmonia bicolor* (Blackburn): *161*, sipho; *162*, *163*, phallobase and trabes: *162*, lateral; *163*, ventral.
Figs 164–166. *Harmonia conformis* (Boisduval): *164*, sipho; *165*, *166*, phallobase and trabes: *165*, lateral; *166*, ventral. Scale line, 0·5 mm.

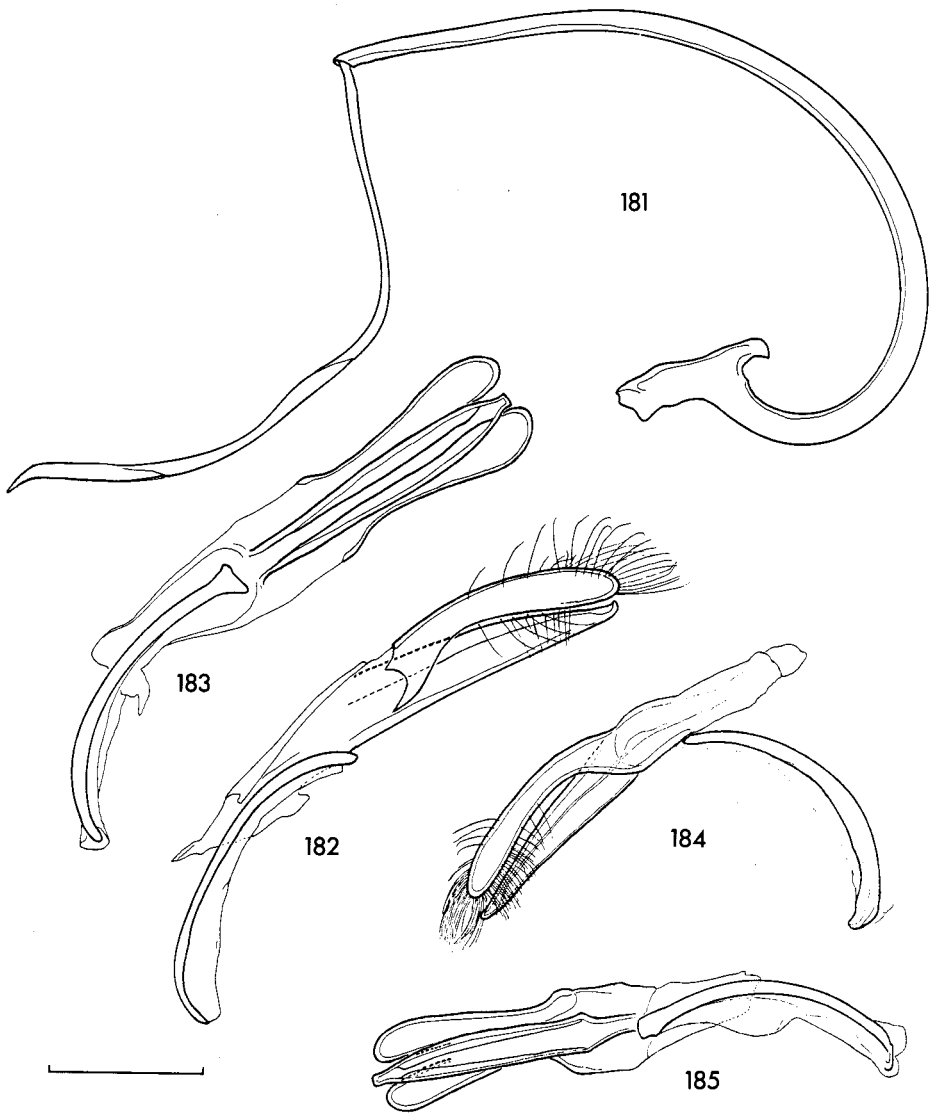


Figs 167–170. *Harmonia octomaculata (F.). 167, 168*, sipho: *167*, apex; *168*, base; *169, 170*, phallobase and trabes: *169*, lateral; *170*, ventral.
Figs 171–173. *Archegleis barronensis* (Blackburn): *171*, sipho; *172, 173*, phallobase and trabes: *172*, lateral; *173*, ventral. Scale line, 0·5 mm.

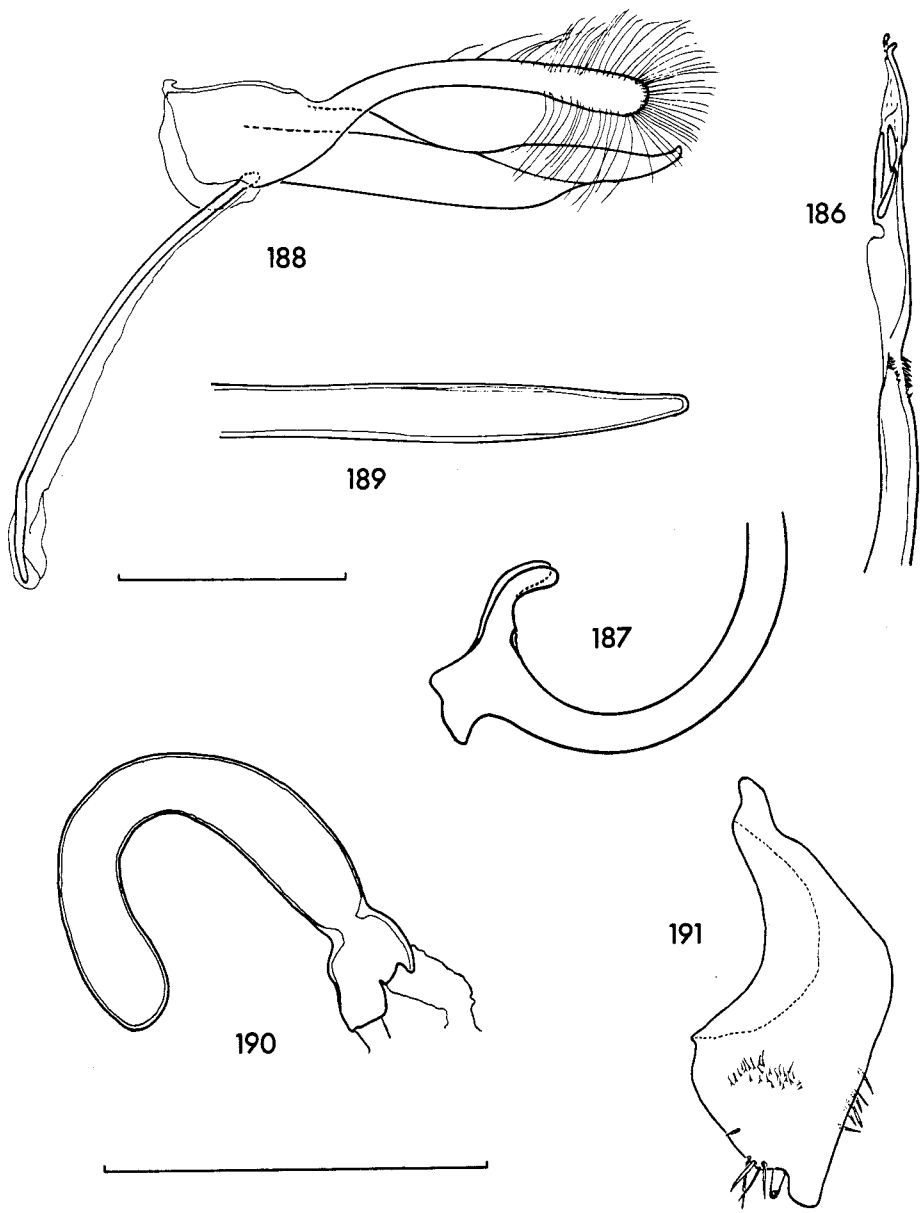


Figs 174–176. *Archegleis kingi* (MacLeay): *174*, sipho; *175*, *176*, phallobase and trabes: *175*, lateral; *176*, ventral.

Figs. 177–180. *Archegleis duplicata* (Crotch): *177*, *178*, sipho: *177*, apex; *178*, base; *179*, *180*, phallobase and trabes: *179*, lateral; *180*, ventral. Scale line, 0·5 mm.



Figs 181–183. *Archegleis edwardsi* (Mulsant): *181*, sipho; *182*, *183*, phallobase and trabes: *182*, lateral; *183*, ventral.
Figs 184–185. *Archegleis interrupta* (Weise) (sipho as *edwardsi*): *184*, *185*, phallobase and trabes: *184*, lateral; *185*, ventral. Scale line, 0·5 mm.



Figs 186–189. *Archegleis delta* (Weise), male genitalia: *186*, *187*, sipho: *186*, apex; *187*, base; *188*, phallobase and trabes, lateral; *189*, median lobe of phallobase, ventral.
Figs 190–191. *Archegleis barronensis* (Blackburn), female genitalia: *190*, spermatheca; *191*, genital plate. Scale lines, 0·5 mm.