A Revision of the Australian Myrmeleontidae (Insecta: Neuroptera)
I. Introduction, Myrmeleontini, Protoplectrini

T. R. New
Department of Zoology, La Trobe University, Bundoora, Vic. 3083.

Abstract
A brief historical outline of studies on the Australian Myrmeleontidae is followed by a review of adult characters useful in systematics and keys to subfamilies and tribes. The Myrmeleontini (23 species) and Protoplectrini (15 species) are revised, and keys and illustrations provided to enable separation of genera and species. The genera Leptoleon Esben-Petersen and Myrmeleonellus Esben-Petersen are synonymized with Myrmeleon L., and 10 new species of Myrmeleon are described. Myrmeleon tigrinum F. has not been confirmed from Australia. Two new genera (Antennoleon, Fenestroleon), each represented by a single new species, and two new species of Protoplectron Gerstaecker, are described.

Introduction
The Myrmeleontidae, commonly known as 'ant-lions', are the most diverse group of Neuroptera in Australia and will probably be found to outnumber all other lacewing families together. Indeed, the fauna reported here constitutes one of the richest ant-lion faunas known — and is perhaps approached only by that of southern Africa. About 2000 species have been described throughout the world. Ant-lions are predominantly found in arid and semiarid regions, and the majority of the 201 species noted below are from such habitats. They are readily attracted to light and, being large and conspicuous insects, they readily attract attention from non-specialist collectors. As a result, they are well represented in museum collections. Virtually nothing is known of their biology in Australia. The term 'ant-lion' is derived from the well known larval habit of constructing pits in loose sand, into which ants and other small arthropods fall, only to be devoured by the waiting larva (see Wheeler (1930) for an account of this habit). Such pits are made by only a minority of Australian species. Larvae of others have been found in loose litter around bases of trees, in caves or under rock overhangs, in loose sand without forming pits and (rarely) under bark, as well as in pits. It appears that in Australia pit-dwelling is confined to Myrmeleon L. and closely related genera.

This revision is based solely on adult characters. Altogether, 201 species are recognized, of which 102 are described as new. Detailed comments on distribution and geographical affinities are premature, but a few general points emerge:

(1) Most species are known only from Australia, and many appear to be severely limited in distribution within the country. Generally, the south-east mainland and Tasmania support far fewer species than warmer dryer areas. Generic endemicity is high, especially in the Dendroleontini (the most substantial myrmeleontoid radiation in Australia).
(2) A few species are known also outside Australia. Several, such as *Distoleon bistrigatus* (Rambur), have a broad distribution in the western Pacific or extend also to the fringe of the Oriental region. Some northern species appear to have close relatives in Papua New Guinea, and more work is needed on the fauna of those regions in order to determine whether species occur in common.

(3) Many species are known from few individuals, often from a single locality. Although it is tempting to allocate these as 'local' or 'rare', considerably more specialist collecting is needed in Australia to determine both distribution and seasonal abundance. In some instances, long series of such species have been taken (usually at light) on the single occasion of capture.

(4) Because of such sporadic occurrence it is likely that many further species remain to be discovered. Likewise, the full range of intraspecific variation in some of the taxa noted here as species complexes is not yet known. In this account I have sometimes ignored small differences in colour pattern and in wing venation (see Stange 1970) if these are not borne out by more substantial structural characters for species separation: these instances are noted in context.

**History**

The first Australian ant-lion to be described, *Myrmeleon tigrinum* Fabricius, was amongst the first Australian insects to be collected on the Endeavour Expedition of 1770: it has been a source of frustration that I have not been able to recognize this species in more modern collections (p. 28). During the nineteenth century, several Australian species were included in more wide-ranging accounts by Leach (1814), Rambur (1842) and Walker (1853), and the first relevant papers dealing solely with Australian taxa are by Gerstaecker (1884, 1885). Many of the species described during that period are recognizable and valid, and several were comparatively appraised by McLachlan (1869, 1875). Substantial collections of Australian Myrmeleontidae were described early this century by Esben-Petersen (1915, 1917, 1918, 1923), Tillyard (1916) and Banks (1910, 1913), and these authors started to arrange the species within keys and to indicate higher groupings between genera, predominantly on features of wing venation. Esben-Petersen (1923) included a catalogue of the ant-lions of Australia and nearby areas, in which 89 Australian species were considered valid and a number of earlier established synonyms listed. Since that catalogue, a number of species have been described by various workers, but no synopsis of the Australian fauna has been made.

Higher classification within the family is discussed on pp. 4–5, but several papers add particularly to knowledge of the Australian fauna. A major contribution to understanding one of our dominant tribes, Dendroleontini, was made by Stange (1976), who considerably augmented data hitherto available on many taxa and included the first available genitalic information for many Australian genera. The Stilbopteryginae were fully reviewed (as the family Stilbopterygidae) by Riek (1968, 1976), who gave species-level keys to this small group.

The present work is therefore the first recent attempt to assess the Myrmeleontidae comprehensively in Australia. It is being published in three parts: this first covers the myrmeleontine tribes Myrmeleontini and Protoplectrini, the second deals with the Dendroleontini, and the third with the Distoleontini and Acanthaclisinae. Figures are numbered in a single sequence through the three parts; appendices and acknowledgments are given at the end of Part III. Abbreviations are used consistently throughout.

**Structural Characters Used in Systematics**

A wide range of morphological features is useful in systematic work on ant-lions. Traditionally, most separations between taxa, at all levels, have relied heavily on features of wing venation, often also utilizing characters of other appendages. Only within the last decade or so has the value of genitalic characters in myrmeleontoid taxonomy become generally apparent. Terminology of body structures in this account is based on the comprehensive appraisal and glossary by Stange (1970), and some important aspects of terminology of wings and genitalia are summarized in Figs 1–8.
Stange's terminology for wing venation incorporates modifications indicated by Adams (1957, 1958) to the basic scheme proposed by Comstock (1918). Part of the rationale for substantial reliance on wing venation in systematics has been the belief that it varies little within a taxon. However, for the American Brachynemurus minisculus Banks, Stange (1970) showed that density of wing venation may vary with climate. Specimens from arid regions had relatively open venation, whereas individuals from humid areas tended to have more crossveins and secondary vein branches. Likewise, the width of the costal cell varied intraspecifically, with consequent differences in incidence of biareolate costal cells, a character frequently used for separation of genera. Such examples are a severe caveat on uncritical use of wing venation alone. Wing shapes, and relative lengths of fore- and hindwings, are usually reliable.

Several specialized features of wings are noted below:

1. The ‘pilula axillaris’ (a.p.) is a small setose knob at the posterior base of the male hindwing in many species. It is used as a dispersive surface for mate-attracting scents (Elofsson and Lofqvist 1974), affords a simple ‘spot’ character for sexual distinction, and has been lost independently in a number of evolutionary lines. Stange (1970) noted that it may be differentially represented in closely related taxa, or even in discrete populations of the same species.

2. The form of the forewing veins 2A and 3A is usable, as an initial separation character at the tribal level (Figs 20, 21). In Dendroleontini these veins are linked by a crossvein, in Myrmeleontini they run parallel (‘fused’) for a variable length. Only rarely is there ambiguity between these states, and this almost always reflects a very short crossvein.

3. The ‘Banksian lines’ (Tillyard 1915) are conspicuous longitudinal lines along the distal parts of wings in some taxa. The ‘anterior Banksian line’ in either wing is formed by bending of the branches of Rs, and the ‘posterior Banksian line’ by similar bending of branches of CuA (forewing) or MP2 (hindwing).

4. The ‘rhegma’, sometimes important in denoting the site of the only wing pigment present, is a preapical area towards the tip of MP1 + 2 (forewing) or MP1 (hindwing).

5. The number of presectoral crossveins in the hindwing is used to separate major groups or (Acanthaclisinae) some genera, and appears to be very consistent for most non-acanthaclisine genera.

The figures later in this account exemplify many features of wing venation: amongst those used for key characters here are relative positions of forks of major veins, points of origin of Rs and incidence of biareolate costal cells.

Useful head characters include extent of raising of the vertex (cf. Figs 22, 32), length and extent of club formation of the antennae (Figs 15–19), incidence of supraorbital bristles (flattened dorsal cranial bristles adpressed to the eye surface), and the size of the labial palp, together with the shape of the sensory area on its apical segment.

Thoracic characters include shape of the pronotum (especially whether it is transverse or elongate), the extent of development of a transverse furrow across it, and general pilosity.

Legs provide important characters ranging from overall shape and relative lengths of the various segments to pilosity, as well as incidence, length and shape of tibial spurs and the form of the tarsal claws (Figs 11–13). Lengths of spurs are given here relative to the length of tarsal segments. Although their length is used as a generic character in some ant-lions, this may also vary at the specific level. Presence of a ‘femoral sense hair’ on the hindleg is, in part, diagnostic for Acanthaclisinae.

Genitalic features (Figs 5–8) are important in both sexes, together with the shape of the ectoprocts and posterior abdominal sclerites. The female genitalic complex is more variable than the male, and appears to be very useful for generic diagnosis. Particularly, the posterior and/or anterior gonapophyses may be present or absent in varying combinations and may be differentially developed, the pregenital plate may or may not be conspicuous, there may or may not be ventral sclerotized ridges and thickened setae or spatulate cavistae. Several female features are extremely useful for species separation, including relative sizes of the gonapophyses lobes, the form of the subgenital plate and the shape and size of the spermatheca.
Male genitalic features (Figs 7, 8) also vary, and all parts differ between taxa. The gonarcus ranges from a simple arch to being deeply hooded, and its central region can become substantially produced to form a mediuncus. Parameres are sometimes large, are often angled anteriorly, and can become considerably elaborated or almost obsolete.

Methods of Study

Wing drawings are made from camera lucida projections of set specimens, or, for alcohol-stored material, of wings clamped flat between glass slides. Head and antennal drawings are also from projections. Genitalia and abdominal apices are figured from macerated terminalia stored in glycerine: they are simplified by omission of the, often dense, non-thickened setae. Wing lengths (FW, HW), total body length (excluding forcipate ectoproct extensions of Acanthaclisinae) (B) and antennal length (A) are given to the nearest half millimetre in descriptions. Genitalic figures are to various scales, but are referred to a scaled (in millimetres) figure of the relevant abdominal apex.

Distribution notes for common species are given only in general terms, with the number of individuals seen: fuller information on particular taxa can be supplied on request. A distributional summary is given as Appendix 2, in Part III. In the text, localities for each political region are listed alphabetically: the regions covered sometimes differ from those listed in the summary. Many older specimens are imprecisely labelled, and sometimes bear only a State name.

Material Examined

Either complete collections, or particular types, from the following institutions have been examined. Abbreviations are those used later in the text.

Museum of Comparative Zoology, Harvard University — MCZ
Museum National d'Histoire Naturelle, Paris — Paris
Zoological Institute, University of Copenhagen — Copenhagen
Rijksmuseum, Stockholm — Stockholm
Naturhistorisches Museum, Vienna — Vienna (photographs only)
Zoological Museum, Greifswald, D.D.R. — Greifswald
Deutsches Entomologisches Institute, Berlin-Dahlem — Berlin
Museo de Zoologica, Barcelona — Barcelona
British Museum (Natural History), London — BMNH
South African National Insect Collection, Pretoria — Pretoria
Australian Museum, Sydney — AM
Australian National Insect Collection, Canberra — ANIC
Department of Agriculture, Rydalmer, N.S.W. — RYD
Museum of Victoria, Melbourne — MVM
Queensland Museum, Brisbane — QM
South Australian Museum, Adelaide — SAM
Tasmanian Museums and Art Gallery, Hobart — TAS
Department of Agriculture, Tasmania — DATAS
University of Queensland, Brisbane — UQ
Western Australian Museum, Perth — WAM

Family Diagnosis

The Myrmeleontidae may be distinguished from other families of Neuroptera in Australia by the following combination of characters: costal area of wings with numerous crossveins and more or less well defined pterostigma; usually 1 subcostal crossvein; $Sc$ and $R1$ fused apically; trichosors absent; ocelli absent; face not markedly lengthened; hindwings not greatly narrowed at base (cf. Nemopteridae); eyes not divided by transverse sulcus (cf. Australian Ascalaphidae); antennae sometimes very short, always less than $\frac{1}{3}$ FW length, sometimes clubbed at or near apex. Medium-sized to very large species.

Higher Classification

Myrmeleontidae is one of four (formerly five) families included in the Myrmeleontoidea in Australia. Of the others, Nymphidae were revised by New (1981), Ascalaphidae by New
(1984), Nemopteridae in part by Mansell (1983), and Stilbopterygidae were reduced to a subfamily of Myrmeleontidae by New (1982). This study therefore completes the basic recent documentation on the superfamily.

Groupings within Myrmeleontidae are rather unsatisfactory, and the key to subfamilies given below reflects the arrangement of Stange (1976), with the addition of Stilbopteryginae. Including the latter, up to six subfamilies have been recognized globally within recent years, the others being Acanthaclisinae, Myrmeleontinae, Dendroleontinae, Palparinae and Echthromyrmicinae. The last two do not occur in Australia. Palparinae are most diverse in Africa and are considered archaic, and Echthromyrmicinae includes only the genus *Echthromyrmex* McLachlan (Hölzel 1972).

The other groups are all represented, but Stange (1976), as did Hölzel (1972), considered the Dendroleontinae to represent a tribe (Dendroleontini) of the most diverse subfamily, Myrmeleontinae. The arrangement below therefore differs from that of Riek (1970) who, on the basis of hindwing venation, separated the ‘Macronemurinae’ from Myrmeleontinae. Macronemurinae *sensa* Riek appears to be largely equivalent to the tribe Formicaleontini Navás, as delimited by Markl (1954). Although they differ in the number of HW presectoral crossveins, Formicaleontini (now, Distoleontini) share with Myrmeleontinae the ‘fusion’ of FW veins 2A and 3A, and are here included in this subfamily.

Although Markl (1954) defined 23 tribes in the family (excluding Stilbopteryginae) without other than general suggestions of relationships between them and relying heavily on venational features, his somewhat unwieldy classification has not been fully accepted. It is useful in suggesting natural groupings of some genera, but other relationships are rather obscure (Hölzel 1970, 1972). Markl’s allocation of the described Australian genera to his tribes is listed in Appendix 1.

Both Tillyard (1916) and Esben-Petersen (1918) suggested some higher groupings of the Australian species. Both recognized Dendroleontinae and Myrmeleontinae as subfamilies, and both included Acanthaclisini within the latter, Tillyard not according it tribal status. Their respective arrangements were:

Tillyard (1916): Dendroleontinae (Protoplectrini, trib. nov.; Dendroleontini, trib. nov.; Distoleontini, trib. nov.), Myrmeleontinae.

Esben-Petersen (1918): Dendroleontinae (Dendroleonini, Creagrini, Formicaleonini), Myrmeleontinae (Acanthaclisini, Myrmeleontini).

‘Creagrini’ *sensa* Esben-Petersen is essentially equivalent to ‘Protoplectrini’ *sensa* Tillyard (Esben-Petersen 1917); Tillyard (1916) considered them to show archaic venational features within the family, and believed that Dendroleontinae are (as a whole) more archaic than the Myrmeleontinae. His main separation character for dendroleontine tribes was the position of origin of the forewing *Rs* in relation to the cubital fork. Although Esben-Petersen (1917) recommended the name ‘Creagrini’ as being the earlier established, ‘Protoplectrini’ has become more generally adopted in recent years.

Stange (1976), discussing the tribe Dendroleontini (equivalent to the above tribe), recognized five subtribes, three of which (Dendroleontina, Acanthoplectrina, Pericylynthia) occur in Australia, the two last being limited to Australia. Tribes of Myrmeleontinae were separated on a combination of venational and genitalic features. A number of dendroleontine genera were not allocated to tribes under his scheme, as genitalic information was not available. A fuller classification of the Myrmeleontinae by Hölzel (1972) recognized 18 of Markl’s (1954) tribes, and raised new groupings to reflect amalgamations of some of these. Hölzel retained Acanthaclisini as a tribe of Myrmeleontinae: it appears preferable to retain them as a distinct subfamily as they are only distantly related to other Myrmeleontinae and differ from them in many characters.

**Key to Subfamilies (Australian representatives only)**

1. Vein *IA* in hindwing with 5 or more branches; antennae short and strongly clubbed (very large species, venation as in Figs 9, 10) ............................................. Stilbopteryginae

Vein *IA* in hindwing with, at most, 3 or 4 branches, usually with fewer; antennae, if short, not as strongly clubbed or species smaller (venation not as Figs 9, 10) .................................. 2
2. Femoral sense hair present on hindleg (generally large, densely hairy species with $>4$ presectoral crossveins in hindwing; FW costal cells partially or completely biareolate; $\sigma$ with scent brushes; legs short and stout; tarsal claws and spurs very strongly arched) .......................................................... Acanthaclisinae (Part III)

Femoral sense hair not present on hindleg, sometimes present on anterior legs (usually not densely hairy; 1-6 presectoral crossveins in hindwing; if $>2$, FW costal cells simple, except [rarely] immediately basal to pterostigma; $\sigma$ without scent brushes; legs usually slender; claws and spurs various) .................................................. Myrmeleontinae (Parts I and II)

Subfamily STILBOPTERYGINAE, sensu New

Allocation of this rather anomalous group to the Myrmeleontidae was discussed by New (1982), who restricted it to contain only Australian taxa. The species have recently been reviewed by Rick (1968, 1976) and thus are not discussed further here.

The two genera may be separated by the following key (based on Riek (1976), who gives additional figures and information). Six species of Stilbopteryx and three of Aeropteryx have been described.

Wings dark at apex, pterostigma white; apical field of both wings broad, with dense network of veins; a.p. well developed ........................................... Stilbopteryx Newman

Wings clear at apex, pterostigma slightly darkened; apical fields relatively narrow, with 3-4 cell rows; a.p. reduced .................................. Aeropteryx Riek

Subfamily MYRMELEONTINAE

As noted above, this is the predominant subfamily of Myrmeleontidae in Australia and 185 species are here recognized. The group is of worldwide distribution, and generic limitations — especially within the Myrmeleonini — are not wholly clear. Four tribes are represented in Australia, and may be separated as follows:

1. FW vein 2A close to 1A at base, then 2A and 3A closely associated over central lengths (Fig. 21) ........................................................................................................... 2
   FW vein 2A clearly separable from 1A at base; 2A and 3A linked by crossvein or meeting at a point .......................................................... Dendroleontini (Part II)

2. HW Rs arising opposite or beyond medial fork; usually 4 or more HW presectoral crossveins
   HW Rs arising well before medial fork; 1 (rarely 2 or more) HW presectoral crossveins . 3

3. FW veins CuA2 and (CuP + 1A) elongate, running parallel to CuA1 and with hind margin of wing for considerable length (FW costal cells sometimes partially biareolate). Protoplectrini
   FW veins CuA2 and (CuP + 1A) not as above, short (FW costal cells simple) ......................
   .................................................................................................................. Distoleontini (Part III)

Tribe MYRMELEONTINI

Key to Genera

1. FW with few costal cells immediately basal to pterostigma biareolate .......... Hagenomyia
   FW with costal cells simple ................................................................. 2

2. FW veins CuA2 and CuP + 1A strongly convergent; CuA2 reaching hind margin of wing before origin of Rs (wings spotted) ........................................... Callistoleon
   FW veins CuA2 and (CuP + 1A) not strongly convergent; CuA2 reaching hind margin of wing beyond origin of Rs (wings not spotted) .................................. Myrmeleon

Genus Hagenomyia Banks

Hagenomyia Banks, 1911, p. 8.
Neleer Navás, 1911, p. 244; Navás, 1912b, p. 404.
Baliga Navás, 1912c, p. 110; Esben-Petersen, 1913, pp. 223, 224.
Balaga Navás, 1912c, p. 111; Esben-Petersen, 1913, pp. 223, 224.
Type-species: *Myrmeleon tristis* Walker.

Medium-sized to large. Vertex moderately raised. Antennae widely spaced. Wings elongate; FW without anterior Banksian line; posterior Banksian line conspicuous in both wings; FW Rs arising almost opposite cubital fork; FW costal crossveins near base of pterostigma divided, so distal costal cells biareolate. Tibial spurs about = t1. Female: posterior gonapophyses long, anterior gonapophyses short and rounded; spermathecal duct long and coiled. Male: gonarcus long, mediuncus scarcely developed; parameres parallel anteriorly.

Banks (1911) recognized the similarity of this genus to *Myrmeleon*, and differentiated it predominantly on wing features. Although he commented that it had 'much broader wings' than *Myrmeleon*, this character is not valid for the Australian species, as *M. pictifrons* (q.v.) is very similar in wing shape and is in some ways annectant between the two genera.

The genus contains about 20 species and is widely distributed. The single Australian species is closely related to a number of Oriental species and appears to be a northern incursive.

*Hagenomyia australis* Banks

(Figs 22–31)

*Hagenomyia australis* Banks, 1939, p. 465.

**Coloration.** Dark grey to black. Eyes grey. Palpi, labrum, clypeus and anterior rim of frons pale yellow. Frons otherwise dark brown to black laterally (Fig. 22). Vertex brown with darker spots: 2 median posterior spots and transverse lateral spot slightly anterior to these. Antennae black. Pronotum dark greyish brown, lateral margins narrowly pale yellow; setae mainly black. Pterothorax dark except for slight paired spots on mesoprescutum. Abdomen dark. Wings: venation mainly dark brown; Sc and R1 paler, dark narrowly at intersections with crossveins; pterostigma white, often scarcely indicated with dark basal spot. Legs tawny yellow; apex of T and of tarsal segments narrowly brown; F and T with sparse black bristles, these segments sometimes greyed externally.

**Morphology.** Slender, abdomen long. Antennae slender, club scarcely developed. Pronotum about as broad as long; anterior angles rounded; transverse furrow well defined. Wing venation as in Figs 23–25. Legs slender; t5 > t1. Spurs slender, extending almost to apex of t1. Claws short, shallowly curved.

**Female.** Abdominal apex as in Fig. 26; ectoproct with c. 6–8 long thickened setae; lateral gonapophyses broad, with 16–18 thickened setae; posterior gonapophyses long, slender, with 6–10 long black setae; anterior gonapophyses small, ventral, each with c. 10 long setae. Spermatheca (Fig. 27) slender, duct long and coiled.

**Male.** Abdominal apex as in Figs 28, 29; ectoproct with slender ventral expansion bearing group of long black hairs. Sternite IX long and tapered, shallow. Genitalia (Figs 30, 31): gonarcus with lateral arms long and shallow; apex transverse; mediuncus small; parameres very slender, apex expanded and heavily sclerotized, parallel.


**Types**

Holotype, ♂, Queensland, Cape York District, Coen. May–June (Darlington) (MCZ No. 22190, now in ANIC) (seen).

**Other Material Examined**


**Comments**

This northern species appears to be the only species of *Hagenomyia* in Australia, and is superficially most similar to *Myrmeleon pictifrons*, from which it is readily distinguished on facial pattern, and on FW costal venation.
Recognition of *australis* in relation to *Hagenomyia* spp from areas near Australia is also facilitated by facial markings. As Banks (1939) noted, *H. papuensis* van der Weele (specimens examined) has the clypeus dark and the wings very broad. This, and other names, have recently been treated as synonyms of *H. sagax* (Walker). The BMNH collection contains a specimen from Melville I., N.T., determined as *sagax* by Banks, but with a later label ‘*australis*, det. D. E. Kimmans’. The type of *sagax*, now somewhat damaged (seen, BMNH) has a frontal pattern very similar to *australis*. A specimen from Kuranda, Qld, (in BMNH), determined as *H. nicobaricus* Brauer (synonymized with *sagax* by Esben-Petersen, 1920), has a similar pattern. Malaysian specimens of ‘nicobaricus’ lack the stem of the pale ‘T’ mark. All Australian specimens I have seen fit the above description of *australis*. *H. sagax* is clearly very similar but, geographically, is likely to represent a different species. Further study of the oriental members of the genus is needed. Some are discussed by van der Weele (1909) (under *Myrmeleon*, p. 32), who considered both *papuensis* (as well as *sumatrensis* v.d. Weele and *celebensis* v.d. Weele) as subspecies of *sagax*.

**Genus Callistoleon** Banks

*Callistoleon* Banks, 1910, p. 42.

Type-species: *Myrmeleon erythrocephalum* Leach.

Large species. Vertex strongly raised. Wings broad. HW strongly tapered; Banksian lines scarcely indicated; often some crossveins linking presectoral veins in one or both wings; Rs arising slightly beyond cubital (FW) or medial (HW) forks; posterior arms of these forks reaching hind margin before origin of Rs; posterior arm of FW cubital fork and vein (*CuP* + 1A) convergent. Tibial spurs = or slightly >1. Female: posterior gonapophyses moderately long; anterior and lateral gonapophyses broad; spermatheca short and curved. Male: gonarcus broad, mediuncus well developed; ectoproct simple.

The most conspicuous feature of this genus, which contains only two species and is known only from Australia, is the marked spotting and marginal shading of both wings (see Figs 33, 42). Although not included in the above formal definition, these markings readily separate *Callistoleon* from all other *Myrmeleontini* in Australia. The predominant venational features separating *Callistoleon* and *Myrmeleon* are the form of the FW cubital fork and the lack of Banksian lines.

**Key to Species**

Vertex wholly orange; wings rather broad (FW usually with some spots across veins Sc and R1) ............................................................................................................ *erythrocephalum*

Vertex dark grey; wings rather slender (FW often without spots across veins Sc and R1). *illustris*

**Callistoleon erythrocephalum** (Leach)

(Figs 32–41)

*Myrmeleon erythrocephalus* Leach, 1814, p. 70.
*Glenurus erythrocephalus* (Leach). Hagen, 1866, p. 405.
*Callistoleon erythrocephalum* (Leach). Banks, 1910, p. 42.

**Coloration.** Eyes dark grey. Head wholly dark tawny orange, unmarked. Antennae: scape and pedicel orange, flagellum black. Pronotum orange, usually somewhat paler than head; setae pale. Pterothorax dorsally predominantly black; mesonotum (especially) with more or less complete median pale stripe; mesoscutellum almost always pale. Abdomen black. Wing venation pale except where shaded and with *C* greyed; markings (very variable) (Figs 33, 34) dark reddish or greyish brown; hind margin of wings slightly fumose; pterostigma white. Thoracic pleura dark grey to black. Legs: FI, II, apex of III orange, otherwise black.
Morphology. Moderately slender. Vertex domed (Fig. 32). Antennae slender, club gradually developed. Pronotum broader than long. Wings broad, venation as Figs 33, 34. Legs short and sturdy; t5>t1. Spurs fairly thick, extending almost to apex of t2. Claws about = spurs.

Female. Abdominal apex as in Figs 35, 36; ectoproct with c. 8–10 long thickened black setae; lateral gonapophyses broad, with c. 10 more slender setae; posterior gonapophyses slender, slightly curved; anterior gonapophyses large and broad, with c. 12 thickened setae. Spermatheca (Figs 40, 41), small, coiled.

Male. Abdominal apex as in Fig. 37: ectoproct broad, sternite IX long, deep. Genitalia (Figs 38, 39): gonarcus broad and shallow; mediuncus broad; parameres with slender sclerotized ventral rim; median setae, and spicules over much of ventral membrane.


Type
Whereabouts unknown. Diagnosis based on specimens determined by Walker, McLachlan, Tillyard, Banks.

Material Examined
96 ex. Queensland (90 ex.): Atherton, Bardon, Blackbutt, Brisbane, Bundaberg, Burleigh Heights, Byfield, Cairns (area), Carnarvon Ra., Chelmer, Dawson, Expedition Ra., Fletcher, Herberton, Highvale, Longman's Gap, Mareeba, Maroochydore, Mt Petrie, Mt Warning, Stradbroke I., Stanthorpe, Sunnybank, Tamborine, Tin Can Bay, Tooloom, Toowoomba, Virginia, Yeppoon. Northern Territory (1 ex.): Darwin. New South Wales: (5 ex.): Barrington Tops, Port Macquarie. (ANIC, SAM, AM, MVM, QM, UQ, BMNH, MCZ.)

Comments
See above species key. As with C. illustris, wing markings are very variable, and the number of spots is sometimes very low. Body coloration and wing shape appear to be reliable features for specific separation.

Callistoleon illustris (Gerstaecker)
(Figs 42–50)

Myrmeleon illustris Gerstaecker, 1885, p. 92.
Callistoleon illustris (Gerstaecker). Esben-Petersen, 1915, p. 62.

Coloration. Predominantly dark. Eyes grey. Palpi, labrum and clypeus tawny: clypeus sometimes slightly darkened posteriorly. Frons dark brown to black. Vertex dark, unmarked. Antennae black, dorsal side of scape partly tawny. Pronotum tawny orange, sometimes darkened medially; most setae black. Pterothorax and abdomen black. Wing venation generally pale except where shaded, but anterior longitudinal veins browned; markings (very variable) greyish brown; apical hind margin fumose. Legs: F1 tawny except apex, FII, III dark; T and t dark, TIII sometimes paler along outer edge; F and T with few black bristles.

Morphology. Moderately sturdy. Antennae slender, club gradually broadened. Vertex domed. Pronotum broader than long. Wings slender and tapered, venation as in Figs 42, 43. Legs moderately sturdy; t5>t1. Spurs somewhat curved, extending almost to apex of t2. Claws slender, about = spurs.

Female. Abdominal apex as in Fig. 44: ectoproct with distinct ventral lobe bearing c. 6–10 long thickened setae; lateral gonapophyses very broad, with dense thickened setae towards apex; posterior gonapophyses long and slender; anterior gonapophyses broad, with black setae. Spermatheca (Fig. 45) small, coiled.

Male. Abdominal apex as in Figs 46, 47: ectoproct broad; sternite IX tapered to narrow apex. Genitalia (Figs 48–50): gonarcus very broad and shallow; mediuncus broad and deep;
parameres parallel, heavily sclerotized along inner edge and at apex, with strong dorsal flange anteriorly.


Type

‘Sydney’ (Greifswald) (not seen). Diagnosis based on specimens determined by Tillyard.

Material Examined

20 ex. Queensland (2 ex.): Carnarvon Ra. New South Wales (18 ex.): Como West, Hornsby, Katoomba, Kenthurst, Kitty’s Creek, National Park, Sydney. (ANIC, AM, QM, BMNH, Pretoria).

Comments

See under last species.

Genus Myrmeleon L.

Myrmeleon L., 1767, p. 913.
Formicaleo Geoffroy, 1762, p. 257; Banks, 1911, p. 16.
Myrmecoleon Burmeister, 1839, p. 989; Hagen, 1866, p. 372.
Morter Navás, 1914b, p. 466.
Grocus Navás, 1925, p. 185. (Syn. of subgen. Morter, Hölzel, 1972, p. 37.)
Myrmeleonellus Esben-Petersen, 1918, p. 17. Syn. nov.
Leptoleon Esben-Petersen, 1918, p. 18. Syn. nov.

Type-species: Myrmeleon formicarius L.

Vertex slightly to moderately raised. Antennae with well defined club. Wings narrow to moderately broad, sometimes tapered. Posterior Banksian line in FW usually strongly developed, anterior Banksian line rarely evident; posterior Banksian line in HW sometimes well developed; costal cells simple; Rs arises slightly beyond cubital (FW) or medial (HW) forks; CuA2 reaching hind margin of FW beyond origin of Rs. Tibial spurs about = t1. Female: posterior gonapophyses usually slender, sometimes very short; anterior gonapophyses rounded; spermatheca slender, with duct usually coiled or convoluted. Male: ectoproct often expanded ventrally, sometimes simple; gonarcus arched, mediuncus usually well developed.

This large genus is cosmopolitan and was formerly used as a ‘holding genus’ for a large and heterogenous assortment of ant-lions. The above synonymy is very conservative: there are likely to be many further synonyms, especially once all the genera raised by Navás (who established about 180 genera in the family) have been competently reappraised. Various attempts have been made to subdivide Myrmeleon by establishment of subgenera. The Australian species are predominantly referable to the subgenus Morter Navás (sensu Hölzel 1972). Kuwayama (1959) separated the subgenera Myrmeleon, s.s., and Morter (as Grocus) largely on the form of the FW CuA2 field. In Myrmeleon the crossveins are bridged by additional veins to some extent; in Morter this is rare and most (often, all) crossveins are not so linked. ‘Grocus’ was raised to contain the Australian species now known as M. croceicollis.

The 20 Australian species are here referred to Myrmeleon, s.1. Three merit comment here.

(1) M. tigrinum F. differs from all others by having an anterior Banksian line in the FW, and in lacking a FW posterior Banksian line. It is thus very distinctive and likely to be removed from Myrmeleon, s.s. Genitalia are at present unknown.

(2) M. regularis is the type (and sole described) species of the monobasic genus Leptoleon Esben-Petersen. This appears to be no more than a rather narrow-winged Myrmeleòn with only a single cell row between the posterior Banksian lines and the anterior ‘fork arm’ of
both wings. No other wing differences from more typical *Myrmeleon* are found. The female genitalia correspond closely to those of other *Myrmeleon* and, although the gonarcus is narrower and more extensively hooded than in other Australian species, I do not believe this is sufficient to accord *regularis* generic status. Some Japanese species of *Myrmeleon*, for example, have male genitalia of similar form (Kuwayama 1959). *Leptoleon* is here synonymized with *Myrmeleon*.

(3) *M. pallidus* also formed the basis of a genus, *Myrmeleonellus* Esben-Petersen, which has not been augmented since its designation. Again, there are only small differences from more typical *Myrmeleon*. The HW posterior Banksian line is not developed, although slightly indicated. Esben-Petersen’s diagnostic character of non-forking of HW vein *Cu2* is shared with some other *Myrmeleon* and may even show individual variation in some Australian species. *Myrmeleonellus* is here synonymized with *Myrmeleon*.

**Key to Species**

1. FW with anterior Banksian line, no posterior Banksian line ........................................... *tigrinum*  
   FW without anterior Banksian line, posterior Banksian line distinct ................................ 2

2(1). Predominantly dark grey or black-bodied ............................................................... 3

   Predominantly yellow-bodied ....................................................................................... 13

3(2). FW cell Sc dark; FW with veins along centre white, venation otherwise black (Fig. 22) (*♂* with eversible abdominal vesicles as in Fig. 226) ................................................................. *albivenosus*  
   FW cell Sc hyaline; FW without contrasted venation as above (*♂* without eversible abdominal vesicles) .......................................................................................................................... 4

4(3). Body largely pruinose grey; pronotum with much of anterior and/or sides pale yellow (Figs 118, 119: these patterns distinctive) ................................................................. *croceicollis*  
   Body black; pronotum not as above .................................................................................. 5

5(4). Pronotum with pronounced median stripe ..................................................................... 6

   Pronotum not with median stripe except (sometimes) where lateral margins very narrowly pale ................................................................. 8

6(5). Vertex wholly black ..................................................................................................... *uptoni*  
   Vertex with pale markings .............................................................................................. 7

7(6). Smaller species (FW c. 20); sides of pronotum mainly pale ........................................... *commoni*  
   Larger species (FW 26); pronotal borders not mainly pale ................................................ *territorius*  

8(5). Face patterned as in Fig. 51: central region of labrum and clypeus black, central region of frons with pale patch (large species, FW 29 or more) ................................................................. *pictifrons*  
   Face not as above (usually smaller, except from Christmas I.) ........................................ 9

9(8). Face with frons mainly yellow, with trace of median stripe and clypeal spots (Figs 186, 188, 190) ................................................................. 10

   Face with frons completely or almost completely black, clypeus pale or with median black mark ................................................................. 11

10(9). FW with single row of cells between *CuAI* and posterior Banksian line; apical segment of labial palp small (*♀*, pregenital plate transverse; *♂*, gonarcus arms strongly divergent anteriorly) ........................................................................................................................................................................... *striatifrons*  
   FW with 2 rows of cells distally between *CuAI* and posterior Banksian line; apical segment of labial palp enlarged (*♀*, pregenital plate small, triangular; *♂*, gonarcus arms slightly divergent anteriorly) ................................................................. *houstonii*  

11(9). Relatively large (FW 28) (known only from Christmas I.) ........................................... *iridescens*  
   Smaller (FW usually 25 or less) (Australian mainland, Tasmania) ...................................... 12

12(11). Area between FW *CuAI* and posterior Banksian line with 1 row of cells; clypeus usually wholly pale ................................................................................................................................. *regularis*  
   Area between FW *CuAI* and posterior Banksian line with 2 rows of cells distally; posterior of clypeus usually black ........................................................................................................ *acer*  

13(2). Pronotum with 3 longitudinal streaks, outer ones as opposed ‘Cs’ ................................. *diminutus*  
   Pronotum not as above, usually with 1 or 2 longitudinal stripes; if 3, then outer ones obsolete on anterior half (Fig. 174) ......................................................................................... 14

14(13). Pronotum with interrupted median stripe, and dorsolateral stripes only on posterior half ................................. *mcfarlandii*  
   Pronotum not as above ..................................................................................................... 15
15(14). Pronotum with 2 elongate stripes ................................................................. 16
Pronotum with median stripe only ........................................................................ 17

16(15). Two pronotal stripes uniform dark red, narrowly separated medially .......... pallidus
Two pronotal stripes scarcely indicated anteriorly, rather broadly separated (Fig. 215) ....

17(15). FW with 3 rows of cells distally between CuAI and posterior Banksian line .......... 18
FW with 2 rows of cells distally between CuAI and posterior Banksian line .......... 19

18(17). HW with 2 rows of cells distally between MPI and posterior Banksian line (large species, pronotal stripe usually interrupted near anterior; costa very dark) ...... nigromarginatus
HW with 1 row of cells distally between MPI and posterior Banksian line (smaller species, pronotal stripe usually complete; costa grey) ......................................................... comptus

19(17). Clypeus with transverse dark spot; anterior of vertex predominantly dark (Fig. 134) 
Clypeus with 2 dark spots; anterior of vertex pale (Fig. 143) .................... maculaclypeus

**Myrmeleon pictifrons** Gerstaecker
(Figs 51–64)

*Myrmeleon pictifrons* Gerstaecker, 1885, p. 96.

**Coloration.** Dark grey to black. Eyes grey. Apical segment of labial palp black. Face yellow laterally: labrum, clypeus and frons with broad black 'Y' (Fig. 51); setae black. Vertex anteriorly black, then row of 2 elongate transverse spots, pair of elongate median streaks, further transverse spots near rear of these, and far posterior median spot. Antennae black. Pronotum mainly pale, with partial median transverse bar and median and lateral posterior darkening; dorsal setae dark, sited on small black dots, some black lateral setae long. Pterothorax dorsally mainly black or pruinescent grey; posterior of scuta somewhat paler. Abdomen black. Wing venation mainly brown, main longitudinal veins rather paler between intersections with crossveins; pterostigma white, scarcely indicated in HW. Legs predominantly yellowish grey, hairs and sparse bristles (F and T) on dark spots; F and T with longitudinal dark streak; apices of T and of tarsal segments dark brown.

**Morphology.** Slender. Antennae slender, club scarcely defined. Pronotum slightly broader than long. Wings as in Figs 52, 53: HW distinctly tapered; FW with 2 distal cell rows between CuAI and posterior Banksian line. Legs long, moderately slender; t5>t1. Spurs straight, extending to apex of t1. Claws shallowly curved, <spurs.

**Female.** Abdominal apex as in Figs 54, 55: ectoproct broad with c. 10 long thickened setae and c. 10 shorter anterior setae; lateral gonapophyses long and tapered, with c. 20 thickened setae; posterior gonapophyses slender, long setae; anterior gonapophyses broad with c. 6 long thickened setae; pregenital plate very small. Spermatheca (Figs 56, 57) small, with long tightly coiled duct.

**Male.** Abdominal apex as in Fig. 58: ectoproct slender dorsally, rather broader ventrally and with distinct posterior angle, with long black setae centrally; sternite IX long and shallow. Genitalia (Figs 59, 60): gonarcus long, sides rather sinuous, rounded posteriorly; mediuncus small; parameres short, deep, no distinct dorsal flange; median posterior setae.


**Type**
Holotype, New South Wales, Sydney (Greifswald) (not seen). Diagnosis based on specimens determined by Esben-Petersen, Banks, and Tillyard.

**Material Examined**
201 ex. **Queensland** (161 ex.): Biggenden, Bowen, Brisbane, Bundaberg (area), Cairns, Capricorn I., Carnarvon Ra., Claudie R., Clermont, Coolangatta, Cunnamulla, Dunk I., Eidsvold, Fraser I., Inglewood, Injune, Kamerunga, Kuranda, Mackay, Mitchell R., Noosa, Palm I., Proserpine, Redlynch, Stradbroke I., Tamborine, Townsville, Tully, Virginia. **Northern Territory** (26 ex.): Cobourg Pen., Daly River Mission, Darwin, Groote Eylandt, Mt Cahill (area). **Western Australia** (1 ex.): Ivanhoe.
**South Australia** (1 ex.): Morialto. **New South Wales** (12 ex.): Bardrell Park, Bondi, Bronte, Coomoo, Earlwood, Sydney, Turramurra, Woodford. (ANIC, WAM, SAM, AM, MVM, QM, UQ, BMNH, MCZ.)

**Comments**

This large species is superficially similar to species of *Hagenomyia* (q.v.), but the Y-shaped frontal mark is distinctive. The body is considerably more slender than that of most other Australian *Myrmeleon*.

One female specimen (New South Wales, Guyra, Jan. 1949, A. Dyce, ANIC) differs from typical *pictifrons* in facial pattern and slightly in genitalic features (Figs 61–64). It may represent a distinct species, but is more likely to be a minor local variant.

**Myrmeleon uptoni**, sp. nov.  
(Figs 65–73)

**Coloration.** Eyes grey. Labrum, genae and anterior of clypeus pale yellow; labrum with c. 6 black setae. Palpi pale, apical segment of labial palp slightly darkened. Whole of rest of head glossy black. Antennae black. Pronotum: margins yellow; broad median greyish brown streak with posterolateral markings very dark (Fig. 65); setae pale, central row and laterals particularly long. Pterothorax dorsally grey with pale hairs; scutella with pale posterior margins. Abdomen black, unmarked except near apex; dense short pale hairs. Wing venation pale, except slight darkening of marginal veins. Legs: F somewhat darkened dorsally and T darkened ventrally, both with sparse black spines; apices of tarsal segments slightly browned.

**Morphology.** A slender, delicate species. Antennae widely spaced, club scarcely expanded. Pronotum broader than long. Wing venation as in Figs 66, 67. Legs fairly short; t5 > t1 > (t2 = t3 = t4). Spurs slender, extending about to apex of t1. Claws simple, slightly thickened, < spurs.

**Female.** Abdominal apex as in Fig. 68: ectoproct with c. 6 cavisetae; lateral gonapophyses broad, with 10–11 long and 8–12 shorter thickened black setae; posterior gonapophyses short; anterior gonapophyses small, but well defined. Spermatheca (Fig. 69) small, broadened at apex.

**Male.** Abdominal apex as in Fig. 70: ectoproct tapered dorsally, with broad posteroventral expansion bearing dense group of long black setae; sternite IX long and somewhat tapered. Genitalia (Figs 71, 72): gonarcus very broad and short; mediuncus deep; parameres short, with slight apical projections and dorsal anterior flange, ventral hairs along median edges.

FW 28, HW 27, A 6, B 32.

**Types**

Holotype, ♂, Northern Territory, 12°06'S., 113°04'E., Cooper Creek, 19 km E. by S. of Mt Borradaile, 31.v.1973, M. S. Upton (ANIC). Paratypes: 1 ♂, same data as holotype; 1 ♂, 1 ♀, Northern Territory, 12°52'S., 132°50'E., 15 km E. Mt Cahill, 6–9.iii.1973, M. S. Upton; 1 ♀, Northern Territory, Mataranka, 1.iii.1967, M. S. Upton (ANIC); 1 ♂, Queensland, 7–14 miles W. Herberton via Watsonville, 1.iii.1967, D. H. Colless (ANIC).

**Other Material Examined**

39 ex. **Queensland** (20 ex.): Bamaga, Charleville, Cooktown, Herberton (area), Lockerbie, Mitchell R., Rollingstone (area). **Northern Territory** (16 ex.): Brocks Creek, Cooper Creek, Howard Springs, Mataranka, Mt Cahill (area). **Western Australia** (3 ex.): Cape Bertholet, West Kimberley. (ANIC.)

**Comments**

This large slender species closely resembles the following one, and is superficially distinct mainly on the difference in vertex coloration. Wings are also extremely similar, but genitalia (especially of the male) provide clear separation characters.
Myrmeleon territorius, sp. nov.
(Figs 74–82)

Coloration. Eyes black. Labrum, anterior of clypeus, genae pale, ivory yellow; labrum and clypeus with black setae. Apical segment of both palpi slightly darkened. Posterior of clypeus and whole of frons black. Vertex partly pale (Fig. 74), but with black areas well defined. Antennae black. Pronotum (Fig. 74) lemon with broad median dark brown stripe, slightly narrowed anteriorly; setae pale, some laterals long. Pterothorax dorsally mainly dark grey, posterior of scutella pale yellow, V-shaped yellow mark around posterior of lateral mesoscutal lobes. Abdomen dark grey, setae pale; some tergites with trace of pale posterior border. Wing venation pale, except grey marginal veins; membrane unmarked. Legs: F slightly darkened along dorsal edge; T darkened ventrally and apically; F and T with few black spines; tarsal segments all slightly darkened apically.

Morphology. Slender. Antennae widely spaced, club slightly developed. Pronotum (Fig. 74) almost square. Wing venation as in Figs 75, 76. Legs moderately long, t5>t1>t2>t3>t4; t5=(t1+t2). Spurs slender, straight, shorter or = t1. Claws thickened, curved apically, simple, < t5, about = spurs.

Female. Abdominal apex as in Figs 77, 78: ectoproct with c. 8 cavisetae; lateral gonapophyses broad, with 10–12 thickened setae; posterior gonapophyses short; anterior gonapophyses well developed, with 6–8 black setae. Spermatheca (Fig. 79) small, broadened apically.

Male. Abdominal apex as in Fig. 80: ectoproct simple; sternite IX long, with black fringe of long hairs. Genitalia (Figs 81, 82): gonarcus broad and strongly arched; mediuncus pronounced; parameres lobed along outer posterior edge and with slender anterior dorsal flange, inner marginal setae; membrane with few gonosetae external to parameres.

FW 28, HW 28, A 51/2, B 29.

Types
Holotype, ♂, Northern Territory, 12°50'S., 132°51'E., 16 km E. by N. of Mt Cahill, 23.v.1973, M. S. Upton (ANIC). Paratypes, 3 ♂, 1 ♀, same data as holotype (ANIC).

Comments
See under last species.

Myrmeleon acer Walker
(Figs 83–95)

Myrmeleon acer Walker, 1853, p. 348; Adams, 1959, p. 18, who gives additional synonymy discussed below.

Myrmeleon inopinus Walker, 1853, p. 368.

Myrmeleon hostilis Walker, 1853, p. 384.


Myrmeleon uniseriatus Gerstaecker, 1884, p. 29. Syn. nov.

Coloration. Black. Eyes dark greyish brown to black. Maxillary palp and apical segment of labial palp black. Base of labial palp, labrum, anterior and sides of clypeus pale yellow; labrum and clypeus with few black setae. Posterior of clypeus black, either as median band or more discrete patch each side of midline. Eye rim narrowly yellow to above antennal socket. Frons and vertex wholly dark: frons glossy, vertex usually matt with closely adpressed small black hairs. Vertex sometimes with indication of posterolateral grey patches. Antennae black except, sometimes, dorsal surface of scape partly yellow. Pronotum black, anterior rim or angles greyish yellow; setae mainly black. Pterothorax and abdomen dark grey to black. Wings pale: longitudinal veins with alternating dark and pale lengths; setae on pale crossveins on minute dark bases; pterostigma white, in FW with small dark spot at base. Legs dark; base of FIII, outer edge of TIII pale yellow; t dark.
**Morphology.** Fairly slender. Antennae sturdy with moderately swollen club, tapered at apex. Pronotum almost square, sides parallel. Wing venation as in Figs 83, 84: 2 cell rows distally between FW CuA, and posterior Banksian line. Legs moderately slender; \( t_5 > t_1 > t_2 > (t_3 = t_4) \). Spurs slender, somewhat shorter than \( t_1 \). Claws basally deep, shorter than spurs.

**Female.** Abdominal apex as in Figs 85, 86: ectoproct with 6-10 fairly short thickened setae; lateral gonapophyses moderately broad with up to 20 short thickened setae; posterior gonapophyses moderately long, setose. Anterior gonapophyses narrowly meeting ventrally, setose with up to 6 setae thicker; pregenital plate small, triangular. Spermatheca simple, duct usually in 2-3 coils.

**Male.** Abdominal apex as in Fig. 87: ectoproct angled dorsally, slightly expanded ventrally, with long black ventral setae; tergite IX broad; sternite IX long and shallow, with black fringe. Genitalia (Figs 88, 89): gonarcus broad and shallow; mediuncus broad and deep; parameres irregularly digitate posteriorly, convergent anteriorly, with groups of short medial and posterior setae.

**FW 23–28, HW 23–27, \( A 5^1_2–6, B 22–27 \).**

**Types**


**Other Material Examined**


**Comments**

The synonymy associated with *M. acer* is complex, and there has been a tendency to allocate any black *Myrmeleon* from Australia and nearby countries to it rather uncritically. Likewise, it has undoubtedly been earlier confused with *M. uniseriatus* (see below). Nevertheless, there appears to be only one predominantly black species with marked clypeus in Australia, and several other taxa named by Walker clearly correspond with this: others, because they now lack the abdomens, are *incertae sedis*. Pronota and forewing base of the type specimens of these are shown in Figs 90–97. The type of *acer* has the anterior pronotal margin wholly pale, unlike many other Australian specimens which have the anterior angles pale (as in Figs 93, 94). The status of some of Walker's species is discussed by van der Weele (1909), who considered that both *hostilis* Walker and *inopinus* Walker could be distinct, although he treated them as subspecies of *acer*. *M. solers* Walker, from China, differs clearly in having more complex medial venation and, as with *celebensis* McLachlan, has the head and pronotum rather broader than other specimens discussed here. The forewing venation...
of celebensis more resembles that of regularis and the female abdomen (type figured on Figs 114, 115) differs from that of acer in the longer posterior gonapophyses and smaller and more delicate anterior gonapophyses; the lateral gonapophyses bear about 30 thickened setae. Banks (1916) commented that celebensis and solers were likely to be the same species. I am, therefore, confident that celebensis should not be considered a synonym of acer, and, although both solers and celebensis were included in synonymy of acer by Adams (1959), at least one further species is there represented. The Japanese form referred to solers by Kuwayama (1959) differs from typical acer. Types of M. malignus Walker and M. exsanguis Walker, both from unknown localities, both now lack abdomens. The latter is probably a distinct species on its more pronounced pronotal pattern and rather more complex venation. The status of malignus is doubtful. However, McLachlan (1875) considered that both names properly applied to acer.

Although van der Weele (1909) included M. iridescens Kirby in synonymy, with acer, it is undoubtedly distinct on, amongst other features, having distinct pale marks on the vertex (see p. 17).

The type of uniseriatus is, although not dissected, clearly identical to acer. Specimens determined as uniseriatus have been recorded from various parts of Australia. A specimen from Sydney (Berlin) determined by Navás as 'Grocus frontalis Burm.' appears to be identical to several individuals concurrently determined by him as 'Grocus uniseriatus'. These, although fragmented, appear to be acer. In addition to other acer, I have seen at least two other species bearing 'uniseriatus' labels (regularis, striatifrons) and different species have been labelled as such by both Esben-Petersen and Tillyard. No author has critically compared uniseriatus and acer. Esben-Petersen (1918) presumably saw the type of uniseriatus, although he made no direct reference to it. Handschin (1936) commented on the similarity of acer and uniseriatus, but differentiated the latter on lacking the enhanced black vertex markings found in acer (and in frontalis). This character is variable. I have seen specimens of acer with a wholly black vertex lacking any enhanced markings, and others with markings enhanced as noted by Handschin and by other authors.

M. acer is one of the most abundant and widely distributed Australian myrmeleontids. The limited synonymy given above reflects the homogeneity of the Australian specimens.

**Myrmeleon regularis** Esben-Petersen, comb. nov.

(FIGS 98–108)

*Leptoleon regularis* Esben-Petersen, 1918, p. 19.

**Coloration.** Dark brown to black. Eyes black. Labrum and clypeus pale, ivory to lemon yellow. Palpi tawny brown, apical segment of labial palp black. Frons dark glossy brown. Vertex very dark matt grey; irregular black glossy posterior and median spots, sometimes as distinct posterior crescents. Antennae: base of scape pale, remainder greyish brown; pale apices to flagellar segments sometimes evident. Pronotum dark grey, anterior angles paler, greyish yellow. Pterothorax very dark brown to black; posterior of mesonotum narrowly pale. Abdomen black, unmarked. Wings: longitudinal veins darkened at intersection with crossveins, especially along Sc, R1, R5; pterostigma (FW) slightly darkened at base, otherwise indistinct; membrane otherwise hyaline. Legs: F dark, a longitudinal dorsal black streak narrowly outlined with yellow; T somewhat paler, I, II distinctly darkened dorsally; t segments darkened at apices.

**Morphology.** Moderately sturdy. Vertex moderately raised. Antennae with distinct club. Pronotum markedly broader than long. Wing venation as in Figs 98, 99: wings rather slender. Legs short and sturdy; t5 = (t1–t4); t1 > t2 > t3 > t4. Spurs slightly curved, extending to (rarely slightly beyond) apex of t1. Claws short.

**Female.** Abdominal apex as in Figs 100, 101: ectoproct broad with c. 9–11 thickened setae; lateral gonapophyses with c. 14 thickened setae, shorter than those on ectoproct; posterior gonapophyses slender, with slender setae; anterior gonapophyses small, rounded; pregenital plate small, triangular. Spermatheca (Fig. 102) slender, curved.
**Male.** Abdominal apex as in Figs 103–105; ectoproct somewhat expanded ventrally, with long black setae near ventral posterior margin and numerous short black setae anterior to these; sternite IX broad and spatulate, with long black setae as posterior fringe. Genitalia (Figs 106–108) long, apex very heavily sclerotized: gonarcus arms almost parallel, apex transverse; parameres long, with strong posterior ventral process and dorsally curved anteriorly.


**Types**

Holotype, ♀, Western Australia, Kimberley District, Mar., Mjoberg. Paratype (teneral), same data as holotype (Stockholm) (seen).

**Other Material Examined**

42 ex. **Queensland** (32 ex.): Blackdown Tableland, Bundaberg, Bunya Mts, Cooktown, Cooloola, Cunnamulla, Fraser I., Roma, Thargomindah, Tully. **Northern Territory** (6 ex.): Coolibah, Daly Waters, Dorisvale HS. (area), Larrimah, Mt Cahill (area). **Western Australia** (3 ex.): Wyndham. **New South Wales** (1 ex.): Woy Woy. (ANIC, QM, UQ, MCZ.)

**Comments**

See under generic diagnosis. Species with similar coloration all have the area between FW Cu1A and the posterior Banksian line at least biareolate over the apical third to half. In *regularis* this is rare: occasionally specimens have a few veins meeting posteriorly to a common stem, so that this wing region contains one or more `Y` veins. Confusion with *M. acer* is avoided in such individuals by their having the clypeus wholly pale.

*Myrmeleon iridescens* Kirby

(Figs 109–113)

*Myrmeleon iridescens* Kirby, 1900, p. 140.

**Coloration.** Dark grey to black. Eyes dark grey. Face yellow. Frons and much of vertex glossy black. Vertex with 2 small rounded yellow spots posteriorly. Pronotum black, anterior angles yellow and yellow marking along lateral border for c. \(\frac{2}{3}\) length. Pterothorax and abdomen wholly dark. Wings unmarked, venation wholly mid- to dark brown; pterostigma pale cream; membrane rather shiny. Legs: F and T pale except base (of F) or base and apex (T); apices of t1–t4, whole of t5 dark.

**Morphology.** Moderately slender. Antennae (missing). Pronotum longer than broad. Wings as in Figs 109, 110: venation dense, cells between FW Cu1A, and posterior Banksian line partly in 2 rows. Legs moderately slender; t5> t1; t5>(t2–t4); t1 = (t2 + t3). Spurs straight, extending to apex of t1. Claws short.

**Female.** Abdominal apex as in Figs 111, 112: ectoproct with c. 4 long and 6–8 shorter thickened setae; lateral gonapophyses broad, with c. 6 posterior thickened setae and shorter anterior setae, posterior gonapophyses long and slender; anterior gonapophyses small, with few thickened setae; pregenital plate small, triangular. Spermatheca (Fig. 113) short and sinuous.

**Male.** Unknown.

FW 29, HW 28, A–, B 25.

**Type**


**Comments**

Kirby (1900) likened this species to the African *M. lethifer* Walker, but with narrower wings. It is clearly rather similar to *M. acer* (q.v.) but differs in denser venation, generally
more extensive vertex and pronotal marking, and in details of female genitalia. It is known only from the type, and critical examination of further material from Christmas I. and other Indian Ocean localities is needed to clarify its relationships.

**Myrmeleon croceicollis** Gerstaecker

(Myrs 116-125)


Grocus *gerstaeckeri* Navás, 1925, p. 7.

**Coloration.** Dark grey to black. Eyes black. Apical segment of palpi black. Labrum and anterior of clypeus tawny or pale yellow. Posterior of clypeus, whole of frons dark brown to black, glossy. Vertex and antennae dark brown to black. Pronotum with large yellow marks anteriorly, either with midline dark grey (Fig. 118) or with pale marks more extensive (Fig. 119); anterior hairs pale, some lateral setae black. Pterothorax dark except posterior rims of scutella. Abdomen dark, posterior margin of central tergites narrowly yellow. Wing venation pale, except grey costa (both wings), and Sc with short brown lengths where intersecting with crossveins; pterostigma pale ivory; some posterior marginal veins slightly greyed. Legs predominantly pale: F with apex (I, II) dark, or (III) with broad dark ventral band; T dark ventrally; apices of t segments narrowly dark; F and T with few black bristles.

**Morphology.** Moderately sturdy. Antennae sturdy, club well defined. Pronotum slightly broader than long, slightly broadened posteriorly. Wing venations as in Figs 116, 117: 2 rows of cells distally in FW between CuA1 and posterior Banksian line, 1 row throughout in HW. Legs moderately long; t5>t1>t2>(t3>or = 4). Spurs slender, extending almost to apex of t1. Claws>spurs, curved.

**Female.** Abdominal apex as in Figs 120, 121: ectoproct broadened ventrally with 12-16 short thickened setae; lateral gonapophyses broad with 12-20 thickened black setae; posterior gonapophyses short and tapered, setose; anterior gonapophyses meeting medially, each with 3-5 long thickened setae. Spermatheca (Fig. 122) simple, duct rather coiled.

**Male.** Abdominal apex as in Fig. 123: ectoproct strongly extended ventrally with 15-20 slightly thickened setae; sternite IX long and shallow. Genitalia (Figs 124, 125): gonarcus broad; mediuncus broad and very deep; parameres strongly inclined dorsally at anterior, lobed at apex, longer median anterior setae and short external spicules posteriorly; membrane with 2 rows of 4-6 thickened short gonosetae between apices of paraprocts.

FW 30-32, HW 27-29, A 4-5, B 30-33.

**Types**

Holotype of *Myrmeleon croceicollis* Gerstaecker, 'Australia' (Greifswald) (not seen). Holotype of *Myrmeleon loweri* Tillyard, New South Wales, Broken Hill, Lower (BMNH) (seen). Tillyard designated only the type in his description but noted it also from Bourke (NSW), and as fairly common. Several Bourke specimens were labelled by Tillyard as 'Paratypes' although such are not specifically noted in the description and therefore have no such status. I have seen several such individuals: 1 ♂, 1 ♀ (ANIC); 1 ex. (BMNH).

**Other Material Examined**

142 ex. **Queensland** (55 ex.): Aramac, Barcaldine, Boulia, Capella, Charleville, Clermont, Cloncurry, Cunnamulla, Durham Downs HS., Injune, Jundah, Longreach, McArthur River, Mornington I., Nockatunga, Noonoo, Normanton, Tambo, Tindra, Winton. **Northern Territory** (20 ex.): Alexandria, Brunette Downs, Emily Gap, Groote Eylandt, Tanami (area). **Western Australia** (33 ex.): Barradale (area), Cane River HS., Fortescue River, Hamersley Ra., Millstream (area), Mt Linden, Mt Tom Price, Nicol Bay (area), Roebourne, Yunimery HS. **South Australia** (3 ex.): Leigh Creek, Mt Charles Gorge. **New South Wales** (31 ex.): Booligal, Bourke, Brewarrina, Broken Hill, Cobar, Coonamble, Lake Menindee, Tibooburra (area), Wentworth Falls. (ANIC, WAM, SAM, MVM, AM, BMNH, MCZ.)
Comments

This species appears to be related to both *M. comptus* and *M. nigromarginatus*, but is considerably darker. Pronotal markings are rather variable in intensity. That figured by Navás for *'G. gerstaeckeri'* clearly falls within this range.

*Mymeleon comptus* Gerstaecker

(Figs 126-133, 142)

Myrmeleon comptus* Gerstaecker, 1885, p. 94.

Myrmeleon croceus* Esben-Petersen, 1918, p. 20; 1923, p. 584.

Coloration. Tawny brown or yellow. Eyes dark grey to black. Labrum and extreme anterior of clypeus pale. Palpi tawny to black. Much of clypeus, whole of frons dark brown to black. Vertex with yellow streak each side of midline, these marks linked by 'crossbar' near posterior; a lateral yellow band outside streaks at c. \( \frac{1}{3} \) length. Antennae dark. Pronotum pale, except for black median streak (Fig. 126); setae pale. Pterothorax with lateral scutal lobes black, medially yellow. Abdomen mainly dark grey; tergites with indistinct central short yellowish band and, sometimes, pale hind border; dense short spicules; sternites paler, mainly tawny. Wings pale except for slightly greying of C and some posterior marginal veins; Sc very slightly darkened (brown) at intersection with crossveins; pterostigma pale cream. Legs predominantly yellow; F darkened dorsally towards apex; T and apices of T segments slightly darkened at apex; F and T with sparse black bristles.

Morphology. Moderately slender. Antennae sturdy, club moderately developed. Pronotum broader than long. Wings fairly broad, venation as in Figs 127, 128: several cell rows distally between FW CuAl and posterior Banksian line, single cell row in HW similar position. Legs short and stout: t5 = (t1 + t2); t1 > t2 > (t3 = t4). Spurs slender, extending to, or almost to, apex of t1. Claws < spurs, curved.

Female. Abdominal apex as in Figs 129, 130: ectoproct with 10-15 thickened black setae; lateral gonapophyses broad, with 4–6 thickened black setae; posterior gonapophyses broad basally, then tapered and setose; anterior gonapophyses broad, meeting in ventral midline, with 3–5 thickened setae; pregenital plate scarcely developed; sternite VII broad. Spermatheca simple, duct sinuous.

Male. Abdominal apex as in Fig. 131: ectoproct elevated dorsally, posterior margin sinuous, basally broad with few long black setae; sternite IX shallow, with black fringe. Genitalia (Figs 132, 133): gonarcus broad and deep; parameres long and strongly angled dorsally at anterior; ventrally heavily sclerotized and with small medial setae.


Types

Holotype of *Myrmeleon comptus*, 'Peak Downs' (Greifswald) (not seen). Holotype, ♀, of *Myrmeleon croceus*, N.W. Australia, Kimberley District, Mjoberg (Stockholm) (seen).

Other Material Examined

113 ex. Queensland (48 ex.): Almaden, Barcaldine, Burketown, Camooweal, Capella, Clermont, Drummond Ra., Hughenden, Mt Isa, Springsure, Yama. Northern Territory (10 ex.): Borroloola (area), Plenty Highway (268 km ENE. Alice Springs), Yuenduni. Western Australia (54 ex.): Cane River HS., Cape Ra., Carnarvon, Comet Vale Siding, Dampier, Halls Creek, Hamersley Ra., Kimberley, Liveringa, Margaret River, Millstream (area), Minilya, White Mts, Wiluna (area). South Australia (1 ex.): Everard Park Stn. (ANIC, WAM, AM, SAM, QM, MVM, BMNH.)

Comments

Venational characters included in Esben-Petersen's (1918) key to this species-group are valid separation features. *M. comptus* is most similar to *M. nigromarginatus* but is considerably less robust in appearance.
**Myrmeleon maculaclypeus**, sp. nov.  
(Figs 134–141)

**Coloration.** Eyes dark greyish brown. Labrum pale yellow. Clypeus with black transverse mark (Fig. 134); anterior of frons pale, otherwise black; anterior of vertex black, posterior with small dark lateral patch and median dark stripe. Antennae very dark brown to black, some flagellar segments with traces of pale apex. Pronotum pale yellow except for black median stripe slightly broadened posteriorly, and 4 small transverse spots along posterior margin (Fig. 135); setae pale, laterals moderately long. Pterothorax dorsally blackened along much of midline (except posterior of mesoscutellum, much of metascutum and posterior of metascutellum) and on lobes above wing bases. Abdomen predominantly black; dorsal midline and posterior border of most tergites narrowly yellow; dense pale hairs. Wing venation pale yellow, except greyed marginal veins; RI (especially FW) with dense black hairs, so appears grey; pterostigma very slightly cream, wings otherwise unmarked. Legs mainly yellow: F brown along apical half of outer edge; T darkened apically and along ventral side; tarsal segments narrowly browned apically; F with few pronounced black bristles, T with moderate similar bristles.

**Morphology.** Slender. Antennae widely spaced, segments beyond t1 broader than long; club gradual, not well defined. Vertex setae short, no supraorbitals. Pronotum (Fig. 135) almost square, anterior angles rounded. Wing venation as in Figs 136, 137. Legs moderately long; t5 > t1 > t2 > (t3 = t4); t5 = (t2–t4). Spurs slender, < t1. Claws short, simple, slender, c. \( \frac{1}{2} \) t5.

**Female.** Unknown.

**Male.** Abdominal apex as in Fig. 138: ectoproct large, angled dorsally; 8–10 slightly thickened long setae on ventral half, not lobed; sternite IX (Fig. 139) abruptly narrowed c. \( \frac{1}{2} \) length, then tapered to narrow rounded apex. Genitalia (Figs 140, 141): gonarcus with long lateral arms, very slightly divergent, apex transverse; mediuncus not well defined as separate structure; parameres long, with ventral digitate process.

FW 18–21, HW 17–20, A 4, B 23.

**Types**

Holotype, \( \sigma \), Queensland, Mt Norman, Norman R., 3.v.1980, D. W. Frith (ANIC). Paratypes, 4 \( \sigma \), same data as holotype (ANIC).

**Comments**

This species resembles both *M. comptus* and the next described, which may form a closely related group. The males are separable on the form of the sternite IX, as well as on details of head and body pigmentation and on genitalia. Although females of *maculaclypeus* are not known, it is likely (by analogy with the other species) that head and body markings will afford straightforward separation from the other species.

**Myrmeleon sagittarius**, sp. nov.  
(Figs 143–153)

**Coloration.** Eyes dark grey. Labrum pale yellow. Clypeus mainly pale, with 2 rounded dark spots narrowly separated medially (Fig. 143). Maxillary palp dark brown, labial palp with apical segment dark brown. Frons darkened centrally towards anterior border; dark band above antennae, not extending to eye margins. Vertex with median dark brown stripe, single small lateral spot; short intermingled black and pale setae. Antennae dark brown, all segments with narrow pale apices; club greyish brown dorsally, pale ventrally. Pronotum pale yellow with dark brown median stripe and slight brown bar extending from this posteriorly (Fig. 144); setae pale. Pterothorax dorsally mainly pale yellow, dark median stripe obsolete on posterior of mesoscutellum and metaprescutum; pronounced dorsolateral brown patches on lateral scutal lobes. Abdomen dark greyish brown, posterior of all tergites.
from III posteriorly with narrow yellow rim; setae dense, pale. Wing venation pale yellow except grey marginal veins, colour most intense on C; wings unmarked except slight white indication of pterostigma. Legs predominantly yellow; outer edge of F, apices of T and of tarsal segments very slightly browned; F and T with few ventral black bristles.

**Morphology.** Slender. Antennal segments broader than long, club slightly expanded. Pronotum slightly broader than long (Fig. 144), transverse furrow well defined. Wing venation as in Figs 145, 146. Legs fairly long: t5 > t1 > t2 > (t3 = t4); t1 = (t2 + t3). Spurs short, as long as or shorter (III) than t1. Claws simple, short.

**Female.** Abdominal apex as in Figs 147, 148: ectoproct with 3 broad and 3–5 narrower caviserata; lateral gonapophyses broad, with c. 16 thickened setae; posterior and anterior gonapophyses short, each with 7–8 long apical setae; pregenital plate transverse, with slight median triangular projection. Spermatheca (Fig. 149) small.

**Male.** Abdominal apex as in Fig. 150: ectoproct with strong dorsal angle; sternite IX (Fig. 151) long, regularly tapered to narrow apex, with fringe of long black hairs. Genitalia (Figs 152, 153): gonarcus, lateral arms long and parallel, apex transverse and deep; mediuncus slender; parameres narrow, with small apical ventral lobe, inclined dorsally at anterior.

**FW 22, HW 21, A 4, B 20.**

**Types**

Holotype, ♂, Western Australia, c. 10 miles E. Wyndham, 15.iv.1966, N. McFarland (SAM). Paratypes: 3 ♂, 2 ♀, same data as holotype (SAM); 1 ♀, Western Australia, 42 miles NW. Halls Creek, 1952 (AM).

**Comments**

See under last species. Intensity of head markings provides useful ‘spot’ features for separation of this species from its closest relatives.

**Myrmeleon nigromarginatus** Esben-Petersen

(Figs 154–163)

**Myrmeleon nigromarginatus** Esben-Petersen, 1917, p. 208.

**Coloration.** Bright yellow, with black markings. Eyes dark grey. Apical segment of labial palp dark brown, palpi otherwise pale. Labrum and clypeus pale, with few black setae. Frons dark brown to black, as anterior of vertex. Posterior of vertex pale except for (sometimes interrupted) median brown stripe; setae pale, minute. Antennae darkened towards apex. Pronotum (flattened in Fig. 154) slightly longer than wide, with narrow dark brown median streak, this sometimes ‘interrupted’, setae pale. Anterior of mesoprescutum black; lateral scutal lobes with large (II) or small (III) black spot above wing base, pterothorax otherwise pale dorsally. Abdomen dark brown to black: lateral margins of anterior tergites, pleural membrane bright yellow. Wing venation pale, yellow except dark grey C (both wings) and darkening of some posterior marginal veins; pterostigma cream. Legs: central region of F, extreme apex of T and tarsal segments dark brown; otherwise pale; F and T with sparse black bristles.

**Morphology.** Sturdy. Antennae sturdy, club moderately developed. Pronotum broader than long. Wings (Figs 155, 156): venation dense: FW with 3 rows of cells distally and 2 rows of cells more basally between CuAl and posterior Banksian line, HW with 2 rows of cells in this position. Legs moderately slender; t5 about = (t1 + t2). Spurs straight, slightly < t1. Claws short, moderately curved.

**Female.** Abdominal apex as in Figs. 157, 158: ectoproct with c. 12 thick blunt black setae; lateral gonapophyses broad, with c. 12 thickened setae and more numerous slender setae; posterior gonapophyses strongly tapered with long black setae; anterior gonapophyses broad, each with 3–5 long thickened marginal setae; pregenital plate crescentic. Spermatheca (Fig. 159) curved, duct convoluted.
Male. Abdominal apex as in Fig. 160: ectoproct broad, not lobed, with group of long black setae on ventral half; sternite IX long and shallow, with black fringe. Genitalia (Figs 161-163): gonarcus broad and short; mediuncus broad, well defined; parameres strongly inclined dorsally at anterior, lobed posteriorly and with anterior median setae and posterior external spicules; membrane between paramere apices with 2 rows of c. 6 short gonosetae.

FW 28-34, HW 24-30, A 5-7, B 26-30.

Type
Holotype, ♂, Western Australia, 20.xii.1902 (ANIC) (seen).

Other Material Examined
20 ex. Northern Territory (4 ex.): Clay Pan Well, N. of Tanami. Western Australia (16 ex.): Dampier, Port Hedland, Roebourne. (ANIC, MVM, WAM, BMNH.)

Comments
This large species appears considerably more robust than other ‘yellow Myrmeleon’ in Australia. The venation of areas immediately anterior to the posterior Banksian lines of both wings is distinctive.

Myrmeleon diminutus Esben-Petersen
(Figs 164–173)

Myrmeleon diminutus Esben-Petersen, 1915, p. 62.

Coloration. Mainly tawny yellow. Eyes dark grey to black. Apical segment of labial palp black. Face tawny, frons scarcely darkened ventral to antennae, darker dorsally (Fig. 164). Vertex with anterior lateral transverse streak and posterior longitudinal mark each side of midline; hairs pale. Antennae yellow, greyed towards apex. Pronotum tawny, with central dark line, sometimes interrupted anteriorly, lateral streaks in form of opposed C markings with posterior arm extending towards posterior angles; often obsolete anterior to transverse furrow, so that pronotum has pattern of 3 longitudinal streaks; setae pale. Pterothorax greyed laterally and (irregularly) medially. Abdomen grey, tergites sometimes with narrow posterior border. Wings pale yellow, margin slightly greyed and anterior longitudinal veins with small dark spots at intersections with crossveins; pterostigma slightly greyed. Legs pale: F dorsally slightly darkened; extreme apex of T and of t segments darkened; F and T with few black bristles.

Morphology. Slender. Antennae sturdy, club well developed. Pronotum broader than long, slightly broadened posteriorly. Wings as in Figs 165, 166: FW with 2 rows of cells distally between CuA and posterior Banksian line. Legs moderately slender; t5 about = (t1 + t2); t1>t2>(t3 = t4). Spurs slender, extending about to apex of t1. Claws short and slender.

Female. Abdominal apex as in Figs 167, 168: ectoproct slightly broadened ventrally, with 5-10 thickened setae; lateral gonapophyses with c. 9-11 thickened setae; posterior gonapophyses short and tapered, with several long preapical setae; anterior gonapophyses deep with c. 6 long spatulate marginal setae; pregenital plate large, triangular. Spermatheca (Fig. 169) small, duct not coiled.

Male. Abdominal apex as in Fig. 170: ectoproct raised and slender dorsally, no ventral lobe but with group of ventral long black setae; sternite IX long and shallow. Genitalia (Figs 171-173): gonarcus rather narrow, apex transverse, deep; mediuncus deep; parameres slender, lobed posteriorly, inclined dorsally at anterior, parallel, with short medial setae.

FW 14-19, HW 12-17, A 4-5, B 16-23.
Australian Myrmeleontidae. I

Types

Holotype, New South Wales, stated to be in Tillyard collection: not found. Diagnosis based on specimens det. by Markl, Banks and Tillyard, and on original (illustrated) description.

Material Examined


Comments

This species appears to be very common in parts of arid Australia, and the pronotal markings are distinctive.

Myrmeleon mcfarlandi, sp. nov.

(Figs 174-179)

Coloration. Pale yellow. Eyes dark grey. Labrum and clypeus pale; labrum with 5 or 6 black setae, clypeus with 3 or 4 black setae. Palpi pale, or very slightly browned on apical segments. Central region of frons narrowly browned anteriorly, marking expanded dorsally into dark brown band narrowly subtending antennal sockets anteriorly, more broadly so posteriorly. Vertex predominantly pale; 2 pairs elongate brown spots near midline; a single pale brown triangular patch external to these; minute black setae. Antennae very dark brown, pale apices to flagellar segments scarcely evident; club somewhat paler ventrally; setae black. Pronotum pale yellow, a median anterior brown streak and 3 brown streaks abutting posterior border (Fig. 174); setae pale, long, dense. Pterothorax dorsally pale except dark anterior border to mesepisternum and partial dark streaks along lateral scutal lobes. Abdomen dark grey, dorsal midline irregularly pale yellow; all tergites with long dense white setae. Wings pale yellow except for grey costal veins and darkening of Sc at junction with costal crossveins. Legs: F and T pale, except for incipient apical browning; tarsal segments browned apically; F and T with few long black ventral spines, more numerous short black setae.

Morphology. Slender. Antennae with flagellar segments beyond f1 broader than long; club not pronounced; widely spaced. Pronotum wider than long, transverse furrow distinct. Wing venation as in Figs 175, 176. Legs moderately stout; t5>t1>t2>(t3 = t4). Spurs slender, almost straight, extending to (or slightly beyond) apex of t1. Claws slender, shallowly curved, <t5. Female. Abdominal apex as in Figs 177, 178: ectoproct with c. 7 cavistetae; lateral gonapophyses short, with 7–8 cavistetae; posterior gonapophyses short, slender, with 7–8 apical black bristles; anterior gonapophytes indicated as small lobes each with 5–7 setae; preganital plate small, transverse. Spermatheca (Fig. 179) convoluted, apex tapered.

Male. Unknown.

FW 25, HW 25, A 4, B 19.
Types


Comments

This is the only pale Myrmeleon, other than diminutus, with traces of three pronotal streaks.

Myrmeleon striatifrons, sp. nov.
(Figs 180–189, 191–193)

Coloration. Buff. Eyes black. Maxillary palp and apical segment of labial palp black. Labrum with 4 black setae. Clypeus with 2 large brown spots, sometimes narrowly linked medially; frons with narrow median dark line towards clypeus (Figs 186, 188), narrowly black below antennae, wholly black above antennae. Vertex with paired median dark brown marks and 2 transverse spots each side; intervening pale area rather indistinct. Antennae black. Pronotum (Fig. 187) with anterior angles pale, otherwise dark brown. Pterothorax black, except pale borders to scutella; pleura brownish grey. Abdomen black. Wings with venation almost all dark grey; Sc and R1 intermittently paler; pterostigma white. Legs: F largely dark brown; T darkened ventrally with few black bristles; apices of T and all tarsal segments darkened.

Morphology. Slender. Antennae fairly stout, segments beyond about f4 broader than long; club moderately developed over last 8 segments. Pronotum almost square. Wing venation as in Figs 180, 181. Legs short and stout, coxa I long; t5>t1>t2>t3>t4. Spurs short, delicate, > half t1. Claws short, thick, about = spurs.

Female. Abdominal apex as in Figs 191, 192: ectoproct with 3 large and c. 6 smaller thickened setae; lateral gonapophyses broad, with c. 5 thickened setae; posterior and anterior gonapophyses small; pregenital plate transverse, ovoid. Spermatheca (Fig. 193) short, curved.

Male. Abdominal apex as in Figs 182, 183: ectoproct broad, not lobed, a group of 5 or 6 long ventral hairs; sternite IX rather short, strongly tapered. Genitalia (Figs 184, 185): gonarcus broad, lateral arms slender, with strong posterior ridge; mediuncus deep, rugose, with slight lateral apical prominences; parameres broad, lobed, with strong anterodorsal flange and other ventral setae; rows of fine setae between parameres.

FW 18, HW 17, A 3½, B 16.

Types

Holotype, ♂, New South Wales, Wingabutta Creek, 23 miles N. Mendooran, 27.iii.1971, D. K. McAlpine (AM). Paratypes: 1 ♂, same data as holotype (AM); 2 ♂, 1 ♀, Western Australia, 7 km NNE. Norseman, 32°09'S., 121°49'E., 23.iii.1971, Upton and Mitchell (ANIC); 2 ♂, 1 ♀, Western Australia, 65 km N. Meekatharra, 8.iv.1971, E. F. Riek (ANIC); 1 ♂, South Australia, 6 miles W. Iron Knob, 16.iii.1968, Common and Upton (ANIC).

Comments

See under next species. A single male from Western Australia (7·5 km SE. Banjiwarn HS., 24.iii.1979, T. F. Houston et al., WAM) is tentatively referred to this species rather than to the next. Genitalia resemble the Wingabutta individuals, but both pronotum (Fig. 189) and face (Fig. 188) differ somewhat in pattern. The labial palp is, however, small, unlike that of houstoni (cf. Figs 186, 190). These small individuals probably constitute a complex of several very similar species.
Myrmeleon houstoni, sp. nov.  
(Figs 190, 194–201)

**Coloration.** Black with pale yellow markings. Eyes grey to black. Face mainly ivory (Fig. 190); labrum with 4–6 black hairs; clypeus with 2 black spots; frons with lateral margins narrowly black, a black spot each side of midline, posteriorly black. Palpi black. Vertex black with yellow transverse band interrupted medially. Antennae black. Pronotum black with anterior angles narrowly tawny yellow, some lateral setae pale, others black. Pterothorax and abdomen black. Wing venation. C pale, other longitudinal veins mainly dark, with intermediate pale lengths; crossveins dark. Pterostigma (FW) brown basally, then white, (HW) white. Legs: F with black band over most of length, on I with pale streaks dorsally and externally; T mainly greyish yellow, black externally; F and T with few black bristles; t black except pale base to 1.

**Morphology.** Slender. Antennae slightly thickened towards apex. Pronotum slightly broader than long. Apex of labial palp (Fig. 190) relatively large. Wing venation as in Figs 194, 195. Legs fairly sturdy; t5>t1> t2 = t3 = t4. Spurs very slender, extending c. 3 t1; claws about = t2, <spurs.

**Female.** Abdominal apex as in Figs 196, 197: ectoproct broad ventrally, with c. 12 long dorsally directed cavisetae; lateral gonapophyses broad, with c. 14 cavisetae; tergite IX very narrow dorsally; posterior gonapophyses short, tapered: they and anterior gonapophyses with long slightly thickened hairs; pregenital plate small, triangular.

**Male.** Abdominal apex as in Figs 198, 199: ectoproct with externally directed ventral lobe bearing 5 or 6 long black setae; sternite IX long, narrow, rounded. Genitalia (Figs 200, 201): gonarcus with lateral arms fairly broad, apex broad and transverse; mediuncus deep, not ornamented; parameres lobed, each with c. 12 external setae; dorsal flange long and tapered; 2 rows of about 15 small setae between parameres.

FW 18–22, HW 17–20, A 4, B (♀) 18–20, (♂) 23–25.

**Types**
Holotype, ♀, Western Australia, c. 9 km SE. Yuinmery HS. (28°34'S., 119°01'E.), 25.iii.1979, T. F. Houston et al. 262 (WAM). Paratypes, all Western Australia: 1 ♀, 1 ♀, same data as holotype (WAM); 1 ♀, 1 ♀, 7.5 km SE. Banjiewarn HS. (27°42'S., 121°37'E.) 24.iii.1979, T. F. Houston et al. 260 (WAM); 1 ♀, nr Mt Gibson, 29°35'S., 117°12'E., 11–12.iii.1982, T. F. Houston and B. Hanich 434-3 (WAM).

**Comments**
This species is separable from the last-named on the rather more swollen labial palp, as well as in numerous genitalic details. As implied earlier, details of facial and pronotal markings may be somewhat variable.

Myrmeleon commoni, sp. nov.  
(Figs 202–207)

**Coloration.** Eyes dark grey. Body predominantly black. Apical segments of palpi black. Labrum and genae pale. Clypeus with broad black mark, this narrowly linked to black frons. Vertex with 2 pairs dark brown median spots, a pair of anterolateral and a pair of posterolateral transverse brown spots. Antennae black. Pronotum with broad median black stripe; anterior angles and lateral margins pale yellow; some lateral setae black. Pterothorax black except for yellow posterior borders to scutella and slight posterior streaks on lateral mesoscutal lobes. Abdomen black, central and posterior tergites sometimes with narrow pale apex. Wing venation (FW) mainly dark brown, (HW) paler; pterostigma slightly creamed. Legs yellow, apex of T and of t segments narrowly black; inner edge of T irregularly dark.
Morphology. Slender. Antennae sturdy, club well defined. Pronotum broader than long, transverse furrow moderately distinct. Wing venation as in Figs 202, 203. Legs slender, t5>t1. Spurs slender, not extending to apex of t1. Claws slender, about = spurs.

Female. Unknown.

Male. Abdominal apex in Figs 204, 205: ectoproct angled dorsally, rounded ventral lobe with c. 10 long simple black hairs; sternite IX shallow, long, slender, with long black fringe. Genitalia (Figs 206, 207): gonarcus with apex transverse; mediuncus deep; parameres with digitate ventral apical lobes, parallel, with anterior dorsal flange.


Types


Comments

This small and slender species is rather darker than other Myrmeleon of the same general shape, and is distinct on both male genitalia and pronotal pattern.

Myrmeleon pallidus (Esben-Petersen), comb. nov.

(Figs 208–214).

Myrmeleonellus pallidus Esben-Petersen, 1918, p. 17.

Coloration. Eyes grey. Body tawny yellow with reddish brown markings. Face and palpi not darkened. Clypeus with few long black hairs. Frons and lower vertex slightly darker brown. Vertex with posterolateral polished brown spot. Antennae beyond scape dark tawny brown, apices of segments rather paler. Pronotum with 2 broad reddish brown stripes, narrowly separated medially, otherwise pale yellow; hairs white. Pterothorax with continuation of pronotal stripes, so that median third irregularly pale, most of dorsolateral areas dark. Abdomen with tergites I, II, rarely III, with narrow pale median stripe, otherwise dark tawny brown. Wing venation predominantly pale; wings unmarked except for slight indication of cream pterostigma. Legs pale, apex of T and of t segments narrowly darkened; F and T with sparse black bristles.

Morphology. Slender. Antennae slender, club moderately developed. Pronotum slightly longer than broad. Wing venation as in Figs 208, 209. Legs slender, not markedly long; t5>t1. Spurs slender, extending beyond apex of t1. Claws about = spurs.

Female. Abdominal apex as in Fig. 210: ectoproct broad, with c. 8 short thickened black setae; lateral gonapophyses with c. 15 thickened setae; posterior gonapophyses short and very slender; membrane with few long setae; anterior gonapophyses small, closely associated, with few thickened setae, below tergite VIII with sclerotized bars. Spermatheca (Fig. 211) slender, duct rather coiled.

Male. Abdominal apex as in Fig. 212: ectoproct slender. Genitalia (Figs 213, 214): gonarcus arms slender, apex rounded; mediuncus a small apical hook; parameres deep, narrow, tapered and convergent posteriorly.


Type

Holotype, ♂, Western Australia, Kimberley District, February, Mjoberg (Stockholm) (seen).

Other Material Examined

8 ex. Western Australia: Barrow I., Broome, Fitzroy River Crossing, Monte Bello I., Narrogin, Sandfire Flat. (WAM, AM, MVM, ANIC.)
Comments

This pale, delicate, species is separable from most other *Myrmeleon* by the two pronotal streaks, a character shared only with the following species.

*Myrmeleon bifasciatus*, sp. nov.

(Figs 215–220)

**Coloration.** Pale yellow. Eyes dark grey. Face pale tawny; apical segment of labial palp slightly browned; clypeus with 4 black setae. Frons pale except narrow median black streak. Vertex with 3 pairs of median reddish brown spots and 2 pairs of larger lateral patches. Antennae: base yellow, flagellum and club dark grey. Pronotum (Fig. 215) with 2 reddish brown streaks, most pronounced posteriorly and almost obsolete centrally; setae pale, some laterals long. Pterothorax pale medially, indication of continuation of pronotal streaks onto lateral scutal lobes; pleura darkened. Abdomen dark brownish grey. Wings pale yellow, except grey costal veins. Legs pale, except darkening of apex of T and of tarsal segments; F and T with few black bristles.

**Morphology.** Antennae slender, club slightly developed. Pronotum longer than wide. Wing venation as in Figs 216, 217. Legs fairly short: t5 about = (t1 + t2); t1> t2>(t3 = t4). Spurs slender, extending almost to apex of t2. Claws slender, about = spurs.

**Female.** Abdominal apex as in Figs 218, 219: ectoproct with c. 9 main cavisetae and few minute inner ventral thickened setae; lateral gonapophyses with c. 11 small posterior cavisetae and 3–4 longer anterior cavisetae; posterior gonapophyses slender, tapered; anterior gonapophyses represented by small rounded lobes; pregenital plate small, transverse. Spermatheca as in Fig. 220.

**Male.** Unknown.

FW 26, HW 25, A 4½, 2 20.

Type


Comments

This, one of several rather similar pale species of *Myrmeleon*, is distinctive on pattern of thorax and genitalic details. The pronotal pattern is rather similar to that of *M. pallidus*, although the stripes are not as pronounced anteriorly, and the single known specimen is larger and more robust than *pallidus*.

*Myrmeleon albivenosus*, sp. nov.

(Figs 221–229)

**Coloration.** Black. Eyes dark grey. Labrum, anterior of clypeus, genae and inner eye margin almost to level of antennal socket tawny yellow. Palpi black, with slight yellow areas at bases of segments. Frons and vertex dull black. Antennae black. Pronotum black, except anterior angles narrowly yellow almost to midline; anterior fringe of short pale hairs; few black and more numerous pale longer hairs laterally. Pterothorax and abdomen black, abdomen with minute pale hairs. Wing venation intense black except in central length of wing (indicated as between lines in Figs 221, 222), where white; pterostigma (FW) basally black, then cream, (HW) cream apical field slightly tinged with greyish cream; cell Se black in FW. Legs: C and F black (F1 paler dorsally); T with longitudinal dorsal yellow streak; t black; F and T with sparse black bristles.

**Morphology.** Sturdy. Vertex moderately raised. Antennae stout, all flagellar segments beyond f2 or f3 broader than long; club scarcely evident, gradually developed over apical quarter of flagellum, then tapered to very narrow apical segment. Pronotum slightly broader
than long. Wing venation as in Figs 221, 222. Legs sturdy; t5>t1>(t2 = t3 = t4). Spurs slightly sinuous, <t1. Claws simple, shallowly curved.

**Female.** Abdominal apex as in Figs 223, 224: ectoproct broadened ventrally, with c. 12 black cavisea; lateral gonapophyses very broad, with c. 8 cavisea; posterior and anterior gonapophyses short, with, respectively, c. 20 and c. 12 thickened black setae; pregenital plate small, triangular. Spermatheca as in Fig. 225.

**Male.** Abdominal apex as in Fig. 226: pair of balloon-like eversible vesicles in membrane between tergites VI-VII and VII-VIII; ectoproct slender, a slight ventral expansion with c. 20 blackened setae; sternite IX (Fig. 227) with apex tapered, fringe of long black hairs. Genitalia (Figs 228, 229): gonarcus very broad, apex transverse; mediuncus deep and broad, with numerous small spicules; parameres short, a narrow dorsal apical process, group of external hairs and few longer, slightly thickened, hairs on inner edge of base of dorsal flange.

FW 28, HW 26, A 5, B 27–30.

**Types**

Holotype, ♂, Western Australia, 8 km SW. by W. of Cane R. HS., 32°07'S., 115°33'E., 31.iii.1971, E. F. Riek (ANIC). Paratypes: 1 ♂, 1 ♀, same data as holotype (ANIC); 1 ♀, Western Australia, Wooramel River, 25°47'S., 115°58'E., 14.iv.1979, M. Petersen (WAM).

**Comments**

This very striking species, in which the contrast between white and black regions of forewing venation gives the appearance of a longitudinal white stripe along the whole of the wing, appears to have no very close relatives in Australia. It is considerably more sturdy than most of the other taxa here included in *Myrmeleon*.

*Myrmeleon tigrinum* F.  
(Fig. 230)

*Myrmeleon tigrinum* Fabricius, 1775, p. 312.

**Coloration.** Face yellow. Frons blackened. Vertex with median anterior black line and paired median elongate posterior spots; pair of lateral spots; posterior corners dark. Palpi black at apex. Pronotum pale, with indication of black median stripe and 2 pairs of black streaks arching around posterior angles. Pterothorax with black anterior to mesonotum, a narrow black median line and black scutal streaks above FW base. Abdomen ?dark grey. Wings hyaline, unmarked. Legs pale, apices of tarsal segments black; T with few black ventral setae.

**Morphology.** Vertex prominently raised to central 'hump'. Pronotum ?broader than long, with deep transverse groove. Forewing: posterior Banksian line absent (Fig. 230); HW with 6 presectoral crossveins. Legs rather short. Spurs to beyond apex of t1. Claws slender, > spur.

FW 27, B 26.

**Type**

Sex ?. ‘Habitat in nova Hollandia’. Banks Collection (BMNH) (seen) (now very dirty, body partially reglued onto pin, antennae missing).

**Comments**

Many of the body markings are very difficult to make out on the sole known specimen of *tigrinum*. This intriguing species, of considerable historical importance, is clearly a myrmeleontine, but differs from all species here recognized in lacking a forewing posterior Banksian line. After examining the specimen in 1980, I believed I might have been in error in noting this, and asked Dr Barnard to reexamine the type. Fig. 230 is a tracing of a sketch
he very kindly prepared after slidemounting a forewing. This wing character should readily enable recognition of *tigrinum* if it is rediscovered in Australia.

**Tribe PROTOPLECTRINI**

A number of Australian ant-lions are difficult to allocate either to this tribe or the Distoleontini, and the groups appear to integrate in several venational features formerly considered to be of sound taxonomic value for tribal separation. Protoplectrini is here artificially restricted not only to taxa in which FW veins *CuA*₂ and (*CuP + MA*) extend along the wing to beyond the separation of *MA* from *Rs* but to such species in which these veins are distally linked by crossveins to form a distinct ‘wall’ before the wing margin (cf. Figs 243, 245). This definition clearly excludes genera such as *Escura* and some *Distoleon* which have traditionally been allied with Distoleontini (Part III): most such species have the female posterior gonapophyses much longer than is usual in Protoplectrini, and their tarsal claws are invariably unornamented. Only in Protoplectrini are the FW costal crossveins frequently doubled, and this character is useful in ambiguous cases. On the above definition, *Pseudoformicaleo*, which may be more properly placed in Distoleontini (especially on male genitalic structure) is retained in Protoplectrini.

Six genera, two of them new, are recognized in Australia. Tribal allocation of *Fenestroleon* is tentative: on some aspects of venation it should be placed in Dendroleontini.

**Key to Genera**

1. Tibial spurs absent ................................................................. *Fenestroleon*
   Tibial spurs present ............................................................ 2

2. FW vein *CuA*₂ angled with *CuA* stem, so that distal part of cell *CuA*₂ narrow and crossveins there simple (tarsal claws simple) .............................................. *Distopletron*
   FW vein *CuA*₂ continued in, or almost in, a straight line from *CuA* stem; distal part of cell *CuA*₂ often broad, with crossveins interconnected (tarsal claws often toothed) ........... 3

3. Antennae extremely long, >½ FW length .................................. *Antennoleon*
   Antennae relatively shorter .................................................................. 4

4. Small slender species; FW costal crossveins simple; claws simple (*♀*, posterior gonapophyses long; *♂*, parameres strongly hooked) ....................................................... *Pseudoformicaleo*
   Sturdy species; FW costal crossveins usually at least partly interlinked; claws toothed ventrally (*♀*, posterior gonapophyses very short; *♂*, parameres broad and platelike) ........... 5

5. Large species with spotted FW (Fig. 290); FW costal cells partially in 2 and 3 rows; HW posterior Banksian line strongly developed .................................................... *Mjobergia*
   FW not spotted as above, although may be irregularly banded in brown, grey and white; FW costal cells usually in 2 rows for part of wing length; HW posterior Banksian line absent or weakly indicated ............................................. *Protoplectron*

**Genus Protoplectron Gerstaecker**

*Protoplectron* Gerstaecker, 1884, p. 15.

*Neoplectron* Navás, 1914a, p. 115. Syn. nov.

Type-species: *Protoplectron venustum* Gerstaecker.

Type-species of *Neoplectron*: *Neoplectron inversum* Navás.

Sturdy. Antennae usually moderately clubbed. Wings rather long and narrow; FW *Rs* arising opposite or slightly beyond cubital fork; HW *Rs* arising basal to medial fork; FW costal cells usually divided for part (sometimes, most) of costal length; FW cubital fork very narrow and long, vein *CuA*₂ forming a straight line (or almost so) with *CuA* stem. Legs rather short and stout; spurs about = t1; claws strong, with 1 or 2 subapical teeth. Female: Anterior gonapophyses absent; posterior gonapophyses short; both ectoproct and lateral gonapophyses with thickened setae; pregenital plate small. Male: gonarcus moderately deep, strongly arched; parameres platelike, angled dorsally and laterally at anterior.
Both Navás (1914a) and Esben-Petersen (1923) recognized the close similarity of *Neoplectron* to *Protoplectron*. The latter retained it as distinct, apparently largely on the character of the region behind HW CuA being biareolate, or largely so, and transferred *longitudinalis* to *Neoplectron* on this feature. This character is in fact rather variable; several specimens of *longitudinalis* I have seen have very little elaboration of this area and, conversely, some biareolation is occasionally found in species conventionally retained in *Protoplectron*—see Fig. 256, of the type of *striatellum*, for example. *Neoplectron* is here synonymized with *Protoplectron*.

Eight species are recognized, several of which form a very intricate complex of variable forms. In particular, small individuals of *venustum* may be difficult to separate from either *striatellum* or *eremiae*: biological studies are needed to consistently separate these species.

**Key to Species**

1. FW with distinct longitudinal streak formed by darkening of cell MP and extended diagonally towards wing apex ................................................................. 2

   FW without such a longitudinal streak .................................................. 3

2(1). FW with longitudinal streak the major wing mark .................................. *longitudinalis*

   FW also with much of R1 cells dark, and a large spot at apex of CuA2 (venation very dense) ................................................................. *umbrotatum*

3(1). Body colour mainly yellow or grey, venation pale, wings not marked .......... *pallidum*

   Body colour mainly dark grey or brown, venation in part darkened, wings usually somewhat suffused with grey or brown ......................................... 4

4(3). FW with conspicuous dark spot at apex of CuA2 .................................... *peterseni*

   FW without such dark spot ..................................................................... 5

5(4). FW with lines of dark pigment between branches of Rs .......................... *striatellum*

   FW without such markings .................................................................... 6

6(5). Paired pronotal stripes indistinctly defined (larger, FW 27 or more; FW often strongly banded; φ, spermatheca hooked at apex) .................. *venustum*

   Paired pronotal stripes distinct (smaller, FW 26 or less; FW not usually banded; φ, spermatheca not hooked) ........................................... 7

7(6). Pronotal stripes usually narrowly separated, by <½ width of a stripe (φ, pregenital plate small, triangular) ......................................................... *eremiae*

   Pronotal stripes separated by >½ width of a stripe (φ, pregenital plate with enlarged base) ................................................................. *inversum*

**Protoplectron venustum** Gerstaecker

(Figs 231–237)

*Protoplectron venustum* Gerstaecker, 1884, p. 16.
*Protoplectron plicatum* Navás, 1914b, p. 465; Esben-Petersen, 1920, p. 191.

**Coloration.** Eyes black. Body dark brown to black. Palpi blackened apically. Labrum, clypeus and genae tawny brown. Clypeus with few long pale hairs. Frons black with sparse white hairs. Vertex mainly dark: a pale, medially interrupted anterior bar and pair of posterior spots; hairs short, black; few longer supraorbitals. Antennae black. Pronotum with trace of narrow pale median stripe and of indistinct greyish yellow dorsolateral streaks; setae mainly black, some long laterals pale. Pterothorax and abdomen black. Wing venation mainly dark, longitudinal veins with alternating pale lengths, setae on crossveins from dark bases; FW patterned with brown or greyish brown bands, pattern very variable in intensity (Fig. 231). Legs predominantly dark brown to black, basal outer part of T partially pale; F and T with long black bristles.

**Morphology.** Sturdy. Antennae sturdy, with well defined club. Pronotum longer than broad. Wing venation as in Figs 231, 232. Legs sturdy, moderately long; t1 about = (t2–t5). Spurs long and slender extending to apex of t1. Claws short, with subapical tooth.

**Female.** Abdominal apex as in Fig. 233: ectoproct broad, with c. 10 blunt–thickened black setae; lateral gonapophyses broad, rounded, with c. 10 thickened setae; posterior
gonapophyses short, bluntly rounded, setose. Spermatheca (Fig. 234) slender, hooked at apex.

**Male.** Abdominal apex as in Fig. 235: ectoproct broad, sternite IX shallow. Genitalia (Figs 236, 237): gonarcus broadly arched, deep posteriorly and incorporating mediuncus; parameres broad, strongly divergent anteriorly and with slender dorsal flange.


**Types**

Holotype of *Protoplectron venustum*, Queensland, Rockhampton (Greifswald) (not seen); holotype, ♂, of *Protoplectron plicatum* Navás (Vienna) (photograph seen). Diagnosis based on specimens determined by Esben-Petersen, Tillyard, Banks.

**Material Examined**


**Comments**

This large dark species is, again, rather variable in intensity of both thoracic and wing pattern. Often, the effect is of a strikingly patterned forewing, with pigment concentrated in the median length of the wing: such specimens generally resemble *D. gerstaeckeri*, from which they are separable on the narrower separation of the branches of the forewing cubital fork. The type of *P. plicatum* is a relatively pale specimen, but still displays some 'banding'. See also comments under *P. eremiae*.

**Protoplectron inversum** (Navás), comb. nov.

(Figs 238–244)

*Neoplectron inversum* Navás, 1914a, p. 116.

**Coloration.** Eyes black. Body dark grey to black. Palpi dark brown. Face tawny yellow. Frons narrowly black below eyes, with sparse short white hairs. Vertex mainly black, an anterior lateral transverse spot, and small pale spot each side of posterior midline; setae black, few short white supraorbitals. Antennae black, flagellar segments with narrow pale apices. Pronotum with irregular yellow midline and dorsolateral stripes; setae mainly black. Pterothorax and abdomen wholly dark. Wings: longitudinal veins with alternating dark brown and pale lengths, many crossveins pale except for dark bases to setae; pterostigma pale, in FW with dark basal spot; markings greyish brown. Legs black, outer edge of T (especially III) partly pale; F with dense white hairs, T with black bristles.

**Morphology.** Moderately slender. Antennae slender, with club long and well defined. Pronotum longer than broad, transverse furrow pronounced. Wing venation as in Figs 238, 239, 243, 244. Legs sturdy, moderately long: t1>t5. Spurs slender, extending to apex of t1. Claws with subapical teeth.

**Female.** Abdominal apex as in Fig. 240: ectoproct broad, with c. 8 blunt thickened setae; lateral gonapophyses with c. 10 thickened setae; posterior gonapophyses short, tapered, setose; pregenital plate (Fig. 241) approximately triangular, with small rounded median keel. Spermatheca (Fig. 242) slender.

**Male.** Unknown.


**Type**

Holotype, ♂, locality uncertain (? Par L’hi) (Vienna) (photograph seen).
Material Examined

7 ex. Queensland (1 ex.): Emerald. Western Australia (5 ex.): Cocklebiddy, Mandurah. South Australia: 1 ex. (ANIC, SAM.)

Comments

Several females listed above tally with Navás’ description, and with the type wings, in all essential respects. As with another Navás species, the type locality is not clear: tracings of the locality labels of these taxa are shown in Figs 247 and 248. They clearly refer to the same locality, and I have shown these figures to a number of experienced insect systematists in the hope of deciding what this may be. To date, no consensus has been derived.

This species is rather like a lightly marked form of P. venustum, and is more slender than that species. It may also be related to P. eremiae, with which it shares well defined pronotal stripes. The pregenital plate is rather different from that of either of those species.

Protoplectron eremiae Tillyard
(Figs 249–255)

Protoplectron eremiae Tillyard, 1916, p. 49.

Coloration. Eyes dark grey to black. Body predominantly black. Palpi brown. Face tawny brown. Frons narrowly black below antennae. Head above antennae grey to black; a broken anterior pale vertex bar; posterior with enhanced row of 3 black spots. Antennae black, narrow pale apices to all segments. Pronotum greyish brown; a narrow pale median stripe flanked by broad black stripes; much of lateral regions, except posterior angles, pale; hairs mainly black, some laterals pale. Pterothorax wholly dark. Abdomen dark, central tergites with narrow pale posterior border. Wings: FW longitudinal veins and HW Sc with alternating dark and pale lengths; rest of HW venation dark; many FW crossveins pale, setae from dark bases; FW marked irregularly, especially along crossveins and irregular streaking, with greyish brown; pterostigma in FW with dark base, in HW mainly pale. Legs dark, with dense white hairs, outer edge of T irregularly pale; T with black bristles.

Morphology. Sturdy. Antennae slender, with club well defined. Pronotum longer than broad. Wing venation as in Figs 249, 250. Legs short and sturdy; t1>t5; t5=(t2+t4). Spurs long and straight, extending to or slightly beyond apex of t1. Claws with short subapical teeth.

Female. Abdominal apex as in Fig. 251: ectroproct broad, with c. 6 thickened black setae; lateral gonapophyses with c. 8 thickened setae; posterior gonapophyses short and tapered; pregenital plate small, triangular. Spermatheca (Fig. 252) slender.

Male. Abdominal apex as in Fig. 253: ectroproct and sternite IX deep. Genitalia (Figs 254, 255): gonarcus broadly rounded; mediuncus small; parameres broad posteriorly, strongly angled anteriorly and with dorsal flange.


Type

Holotype, ♀, New South Wales, Broken Hill, 1.xi.1902, O. Lower (BMNH) (seen).

Other Material Examined

31 ex. Queensland (11 ex.): Alpha (area), Cloverying (area), Cunnamulla, Eromanga, Mitchell (area), Monto (area), Quilpie (area). Northern Territory (4 ex.): Andado HS. (area), Finke. Western Australia (4 ex.): Barradale, Carnarvon, Fitzroy Crossing, Kalbarrie. South Australia (6 ex.): Port Lincoln. New South Wales (6 ex.): Bourke (area), Broken Hill (area), Noccundra, Tibooburra.

Comments

In his diagnosis of eremiae, Tillyard considered it to be closely related to P. venustum, but characterized by lacking the pronounced forewing pattern characteristic of venustum.
The latter is variable (see p. 30) but the wing pattern of *eremiae* often contains partial streaks from the crossveins, as in *P. striatellum*. It is usually separable from *striatellum* by the more distinct pronotal stripes.

**Protoplectron striatellum** Esben-Petersen

(Figs 256-262)

*Protoplectron striatellum* Esben-Petersen, 1917, p. 204.

**Coloration.** Eyes black. Body mainly dark grey, with greyish yellow markings. Palpi dark brown. Face tawny brown. Frons narrowly black, with white hairs below antennae, more extensively black above antennae. Vertex with medially interrupted anterior pale band, otherwise grey; median and lateral posterior spots enhanced, black; short black and white hairs, *c*. 6–10 longer white supraorbitals. Antennae black, apices of all segments pale. Pronotum with traces of narrow pale midline and of posterolateral pale patches, otherwise dark; short black and intermingled white dorsal setae, some laterals longer. Pterothorax dark, lateral scutal lobes with posterior white hairs. Abdomen black, central tergites usually with narrow pale posterior rim. Wings: longitudinal veins mostly with alternating dark and pale lengths; most crossveins pale, but setae on dark bases; pterostigma pale cream; FW with many crossveins shaded and with greyish brown (sometimes yellowish) streaks along most cell rows in apical ⅓ (Fig. 256). Legs mainly dark, outer edge of T with 2 or 3 pale patches; F and T with dense short white hairs and longer bristles: on F III white, elsewhere black.

**Morphology.** Sturdy. Antennae slender, club well defined. Pronotum about as long as wide. Wings slender, venation as in Figs 256, 257. Legs sturdy, fairly short; t1> t5, < (t5 + t4). Spurs long and slender, extending about to apex of t2. Claws with paired subapical teeth.

**Female.** Abdominal apex as in Fig. 258: ectoproct broad, with c. 8 thickened setae; lateral gonapophyses tapered anteriorly, with c. 6 thickened setae; posterior gonapophyses short and tapered; pregenital plate small, triangular. Spermatheca (Fig. 259) slender.

**Male.** Abdominal apex as in Fig. 260: ectoproct deep, sternite IX shallow. Genitalia (Figs 261, 262): gonarcus broadly rounded; mediuncus deep and membranous; parameres broad apically, with slender anterodorsal flange.


**Type**


**Other Material Examined**

90 ex. Queensland (4 ex.): Biggenden, Bundeena, Eromanga, L. Dynevore. Northern Territory (18 ex.): Amadeus Basin: Reedy Rockhole, Andado HS. (area), Mt Borradale, Tanami Borehole, Wauchope. Western Australia (28 ex.): Cane River HS., Carnarvon, Goongarrie, Minderoo (area), Minilya River, Norseman, Widgiemooltha. South Australia (12 ex.): Innamincka, Moomba Gas Field, Oodnadatta, Tingatingana Crossing, Yunta. New South Wales (28 ex.): Bourke (area), Milparinka, Mossgiel, Tibooburra. (ANIC, SAM, AM, MVM, BMNH.)

**Comments**

Esben-Petersen (1917) noted the similarity between *striatellum* and *P. eremiae*, and the two species are sometimes difficult to separate superficially. The forewing of *striatellum* usually has a distinct streaked appearance, as implied above, and the pronotum usually has the dark dorsolateral streaks less distinct than in *eremiae*. Additionally, *striatellum* is usually more 'delicate' in appearance.
**Protoplectron pallidum** Banks

(Figs 263–271)

*Protoplectron pallidum* Banks, 1910, p. 41.

**Coloration.** Eyes dark grey to black. Body predominantly greyish yellow, with localized contrasted markings. Palpi slightly browned. Labrum and clypeus pale: Clypeus with few black hairs. Frons dark brown to black. Vertex with midline black, anterior transverse black spot each side of this; most of posterior black. Antennae: flagellar segments black basally on inner edge. Pronotum with slight anterolateral black spot; posterior angles and much of lateral margins black; hairs white, some laterals long. Pterothorax with nota mainly black anteriorly and laterally; scutella and adjacent areas yellow; sparse white hairs. Abdomen black. Wings unmarked, venation wholly pale yellow. Legs pale, apex of T slightly darkened; F with white hairs; F and T with sparse black bristles, these long on III.

**Morphology.** Sturdy. Antennae long, club moderately developed. Pronotum longer than broad. Wing venation as in Figs 263–265: extent of doubling of FW costal cells very variable, scarcely evident in some specimens. Legs long and slender; \( t > T \); \( t_1 \) very long, about \( = (2–5) \). Spurs long, slightly sinuous, extending almost to apex of \( t_1 \). Claws c. \( 3 \) spurs, straight, abruptly shallowed near apex.

**Female.** Abdominal apex as in Fig. 266: ectoproct with ventral group of c. 10 thickened black setae; lateral gonapophyses with c. 12 thickened setae; posterior gonapophyses short, slender, with long simple setae; pregenital plate (Fig. 267) long and narrow, tapered. Spermatheca (Fig. 268) slender, simple.

**Male.** Abdominal apex as in Fig. 269: ectoproct deep. Genitalia (Figs 270, 271): gonarcus bluntly rounded; mediuncus deep; parameres simple, broad, with slight anterodorsal flange.

FW 28–32, HW 26–30, A 7–9, B 20–27.

**Type**

Holotype, ♀, Northern Territory, Darwin, Dodd (formerly MCZ, now ANIC) (seen).

**Other Material Examined**

89 ex. Queensland (2 ex.): Mutchilba. Northern Territory (34 ex.): Batchelor, Brocks Creek, Darwin (area), Katherine, Kununurra, Mataranka, Roper, Timber Creek. Western Australia (53 ex.): Barradale, Burnside, Dampier, Forrest River Mission, Halls Creek (area), Ivanhoe, Millstream (area), Minilya River, Ord River, Rosebud (area), Wyndham. (ANIC, SAM, WAM, MVM, MCZ.)

**Comments**

This species is both larger and paler than others included in *Protoplectron*, and the extent of doubling of the forewing costal cells varies considerably: in the type (Fig. 263) this is minimal, but some other individuals have nearly the whole length of the costal area biareolate.

**Protoplectron peterseni**, sp. nov.

(Figs 272–277)

**Coloration.** Eyes black, large. Face dark tawny brown, palpi darker. Frons very dark brown to black. Vertex mainly black, with a pale yellow transverse mark each side of the midline anteriorly, and small posterior pale spot each side of midline. Antennal flagellomeres with broad pale apical bands, club darker. Pronotum predominantly dark grey, pale yellowish grey anteriorly (except in midline) and pale mark extending diagonally from anterior angles to c. \( 3/4 \) length of notum; dorsal and posterior setae black, laterals mainly pale, some long. Pterothorax and abdomen black. Wings: most longitudinal veins yellow except for darkening at intersections with many crossveins; \( CuI \) (both wings) more obviously darkened. Pterostigma (FW) dark greyish brown with cream extremities, (HW) pale cream;
other wing markings (Fig. 272) greyish brown. Thoracic pleura with dense white hairs. Legs: F mainly dark brown, T overall paler but darkened apically and near base on outer edge; F with dense white hairs, F and T with black bristles; t dark brown.

**Morphology.** Slender. Antennal interval narrow, antennae sturdy, with club well defined. No supraorbitals. Pronotum almost square, transverse furrow moderately developed. Wing venation as in Figs 272-275: wings slender. Legs short and sturdy: T<F; t>T; t1 very long, at least \((t-2-t5); t5>t2>t3>t4\); spurs long and slender, extending to apex of t1; claws slender, parallel, with slight preapical thickening but no defined subapical tooth.

**Female.** Abdominal apex as in Fig. 276: ectoproct with fringe and well defined group of c. 8 spatulate ventral cavistae; lateral gonapophyses with c. 9 similar or slightly narrower cavistae; posterior gonapophyses short with 4-6 long apical setae; pregenital plate slender and prominent. Spermatheca (Fig. 277) simple.

**Male.** Unknown.

**Types**
Holotype, ♂, Western Australia, Carnarvon, 12.iv.1970, R. Holbeach (MVM). Paratypes, all ♀, Western Australia: 3, Learmonth, 6.vi.1957, A. Snell (MVM); 1, Landor Stn 29.001 (WAM); 1, Minilya, 53-1171 (WAM); 1, Minilya River, 23°49'S., 114°00'E., 29.iii.1971, E. F. Riek (ANIC).

**Comments**
This species is rather variable in the extent of forewing shading, especially the extent of the posterior spot. It appears to be limited to Western Australia and to have no very close relatives in *Protoplectron*. The claw form suggests some affinity with *P. pallidum*, but the two species differ clearly on markings and genitalic features.

**Protoplectron longitudinalis** Tillyard, comb. rev. (Figs 278-284)


**Coloration.** Dark brown to black. Eyes grey to black. Face tawny brown. Frons black. Palpi tawny. Antenna black, segments with narrow yellow apices. Vertex black, with large yellow lateral spot and small posterior lateral spot each side; 2-6 short white supraorbitals, otherwise with minute black dorsal spicules. Pronotum black, with pale greyish midline and sinuous stripe from anterior angles to posterior border, posterior angles dark; setae mostly black, some long white laterals. Pterothorax with narrow yellow streaks or spots on scutella, pleura with long white hairs. Abdomen black. Wings with most longitudinal veins having alternating dark brown and yellow lengths, most crossveins dark, especially when in shading; a dark brown longitudinal streak (Fig. 278) in forewing, and many veins slightly shaded with brown or greyish brown; pterostigma (FW) dark brown basally, (HW) paler, darkened very slightly at base, otherwise white. Legs: F and T dark brown to black, intermittently paler along dorsal edge; t black; F and T with white hairs, T also with black bristles. Spurs and claws dark brown.

**Morphology.** Sturdy. Vertex slightly raised. Antennal club well developed. Pronotum longer than broad, transverse furrow well developed. Wing venation as in Figs 278, 279. Legs sturdy: t>T, t1>t5; t5 c. = (t2-t4). Spurs slender, extending to end of t1. Claws with pronounced subapical tooth.

**Female.** Abdominal apex as in Fig. 280: ectoproct with 10-18 slender cavistae; lateral gonapophyses relatively small, with c. 12 cavistae; posterior gonapophyses short and slender; pregenital plate triangular; sternite VII somewhat tapered. Spermatheca (Fig. 281) slightly expanded at apex.
Male. Abdominal apex (Fig. 282): ectoproct large, sternite IX broadly rounded. Genitalia (Figs 283, 284): gonarcus tapered posteriorly, it and mediuncus relatively shallow; parameres divergent anteriorly with indistinct dorsal flanges, angled on ventral border.


Type

Holotype, Western Australia ‘H22’ (WAM) (right antenna missing, abdomen detached and reglued to body, dirty) (seen).

Other Material Examined


Comments

Within Protoplectron, this species can be confused only with P. umbratum, sp. nov., which is grossly similar in appearance. Tillyard’s quoted dimensions of the type forewing (‘41·4 × 10·5 wide’) are puzzling: the type FW is 26.

Protoplectron umbratum, sp. nov.

(Figs 285–289)

Coloration. Eyes grey. Labrum and anterior of clypeus tawny, clypeus darker brown posteriorly. Labral setae pale, clypeus with 2 black setae. Apical segment of palpi dark brown. Frons dark. Vertex black, with trace of pale posterior band; 5 or 6 short pale supraorbitals. Antennae very dark brown to black, slender, segments beyond Fl broader than long; club incipiently developed over about apical 14 segments. Pronotum with narrow median pale stripe flanked by broad black stripe extending to posterior angle, lateral margins black; setae mainly black, some laterals long and anteriorly directed. Pterothorax dorsally black, pleura obscured by dense white hairs. Abdomen black, with sparse pale hairs. Forewing venation mainly dark brown; MP and posterior branches of Rs pale except where shaded; costal and radial crossveins with numerous short dark lengths; Sc darkened at intersections with crossveins; wing strongly suffused with dark brown as in Fig. 285. Hindwing Sc mainly pale, most crossveins pale; membrane pale except for slight hypostigmal shading, pterostigma pale. Legs: F very dark, T with paler intervals along dorsal edge, t black; C and F with dense white hairs; F and T with sparse black bristles, some about 1·5 × width of segment.

Morphology. Sturdy. Vertex not raised. Antennae widely spaced. Pronotum longer than wide, broadened posteriorly, transverse furrow well developed. Wing venation (Figs 285, 286) very dense; forewing anterior Banksian line indicated in central part of wing. Legs short and stout; t c. = T; t1>t5>(t2 = t3 = t4); (III) t1>(2t-t4); spurs strong, straight, extending to apex of t1; claws strong, <t5, curved, with twin subapical teeth c. § length from apex.

Female. Abdominal apex as in Figs 287, 288: ectoproct with 2–3 long and 4–5 short cavisetae; lateral gonapophyses arched, with 9–11 long setae on dorsal half; posterior gonapophyses small, with few long apical hairs; pregenital plate small, triangular. Spermatheca as in Fig. 289.
Male. Unknown.

FW 27, HW 26, A 5, B 19.

Type

Holotype, ♀, Northern Territory, Roper River, H. E. Warren, n.d. (SAM).

Comments

This specimen appears superficially like a very densely suffused individual of *P. longitudinalis*, and it may prove to be little more than a striking variant of that species. However, the small differences in other body markings and in the form of the female genitalia imply that it may be a distinct species: both the posterior gonapophyses and the pregenital plate are proportionately smaller than in *longitudinalis*.

Genus *Mjobergia* Esben-Petersen

*Mjobergia* Esben-Petersen, 1918, p. 13.

Type-species: *Mjobergia fulviguttata* Esben-Petersen, 1918, p. 13.

General appearance as *Protoplectron*: differs: (1) by greater elaboration of FW costal area, especially in basal half; (2) in overall denser venation; (3) the pronounced HW anterior Banksian line; (4) the generally more pointed wings.

Esben-Petersen regarded *Mjobergia* as a highly specialized genus in this group. It is extremely similar to *Protoplectron* and is only very doubtfully distinct from it: most of the venational differences could result merely from increase in size in relation to most *Protoplectron*. However, *P. pallidum* is large, and the differences may be more fundamental. The single described species is very distinctive in appearance. The conspicuous orange wing spots are not found in any related species.

*Mjobergia fulviguttata* Esben-Petersen

(Figs 290–297)

*Mjobergia fulviguttata* Esben-Petersen, 1918, p. 13.

Coloration. Tawny brown to black. Eyes black. Palpi brown, apical segment of labial palp darkened, sometimes black. Labrum and clypeus tawny brown. Frons black, with few short white hairs. Vertex mainly dark brown, with slightly paler area laterally and each side of posterior midline; short white hairs. Antennae tawny, club rather darkened dorsally, pale ventrally. Pronotum slightly darkened each side of midline and towards posterior angles; setae pale, some laterals long. Pterothorax slightly blackened above wing bases, otherwise tawny; long white setae. Abdomen black, posterior of most tergites narrowly pale. Wing venation very pale except where shaded; forewing (Fig. 290) with conspicuous reddish brown spots; hindwing unmarked except for white-cream pterostigma. Legs tawny; apex of T, whole of t black.

Morphology. Sturdy. Vertex slightly raised. Antennae slender, with well defined club. Pronotum slightly longer than broad, transverse furrow distinct. Wings slender, venation as in Figs 290, 291. Legs moderately stout, t long; t1>t5; t5=(t2-t4). Spurs straight, slender, extending to apex of t1. Claws short, with 2 subapical teeth, sited together c. 1/2 length of claw.

Female. Abdominal apex as in Fig. 292: ectoproct with c. 12 thickened setae; lateral gonapophyses with c. 9–12 thickened setae; posterior gonapophyses short and tapered; pregenital plate small, triangular. Spermatheca (Fig. 293) simple.

Male. Abdominal apex as in Fig. 294: sternite IX deep. Genitalia (Figs 295–297): gonarcus broad, shallow, apex transverse; mediuncus rather membranous; parameres divergent anteriorly, no strong dorsal flange; membrane with median anterior group of setae.

Types
Described from 4 individuals, Western Australia, Kimberley dist., Mjoberg. One labelled as 'TYPE' (Stockholm) (seen).

Other Material Examined
17 ex. Queensland (10 ex.): Capella, Clermont, Emerald, Ingham (area), S. Molle l., Morella, Normanton, Shiptons Flat, Tambo (area). Western Australia (7 ex.): Ivanhoe, Ord R., Wyndham (area). (ANIC, WAM, SAM, AM, UQ.)

Comments
Wing markings of this species immediately differentiate it from all species of *Protoplectron*, which genus it structurally resembles.

Genus *Distoplectron* Banks
*Distoplectron* Banks, 1943, p. 102.
Type-species: *Protoplectron gerstaeckeri* Esben-Petersen.

Very similar to *Protoplectron*; differs in: (1) tarsal claws being simple; (2) FW costal cells doubled consistently over much of basal half of wing; (3) FW *CuA2* strongly angled with stem of *CuA*, so that distal region of cell *CuA2* very narrow.

Differences in claw form and the FW *CuA* fork appear to be consistent generic characters for separation from *Protoplectron*.

Key to Species

1. FW with distinct brown spots, rather than more diffuse shading (Fig. 316) ........ campbelli
2. FW pale, or with diffuse greyish or brownish banding ........................................ 2

2. FW usually with distinct transverse bands (Fig. 298); ♀, pregenital plate small, crescentic; ♂, gonarcus with broad transverse apex ........................................... *gerstaeckeri*
   FW usually pale, sometimes slightly marked but rarely with distinct bands; ♀, pregenital plate transverse; ♂, gonarcus with arms divergent, apex not broad ......................... minor

*Distoplectron gerstaeckeri* (Esben-Petersen) (Figs 298-307)

*Protoplectron gerstaeckeri* Esben-Petersen, 1918, p. 11.

Coloration. Clypeus and anterior border of frons pale yellow. Apical segment of palpi black. Frons mainly dark brown. Vertex dark brown to black, with 2 anterior and 2 posterior yellow spots. Antennae dark, apex of each segment narrowly ringed with yellow. Pronotum dark brown to black, with narrow pale yellow median stripe, a somewhat darker anterior spot each side of this and much of the posterolateral regions similarly pale; dorsal setae mainly dark, some laterals white, anteriorly directed. Pterothorax mainly dark; pale streaks along anterolateral margins of mesoscutum, along centre of lateral lobes of mesoscutum and near midline; metascutum with 2 pale spots. Abdomen dark, paler ventrally, ectoproct pale. Wing venation mainly pale, but longitudinal veins with alternating dark and white lengths; many crossveins pale, others (including apical region) dark and narrowly shaded with greyish brown; incipient greyish brown shading forming traces of 3 brown bands across forewing (Fig. 298); pterostigma (FW) with base and apex slightly shaded, (HW) basally darkened. Legs: F pale brown, sometimes darkened laterally; T darker, blackened at top and in incipient median band; t dark brown to black. Spurs and claws dark brown.

Morphology. Antennae scarcely clubbed. Pronotum broader than long. Wing venation as in Figs 298–301: forewing posterior Banksian line somewhat variable in development.
Legs: \( t_1 > t_5 > t_2 > t_3 \geq t_4 \); \( t_5 = (t_2 + t_3) \), \( t_1 \ c. = (t_1 - t_4) \); spurs slender, extending to just beyond apex of \( t_1 \); claws shallow.

**Female.** Abdominal apex as in Fig. 302: ectoproct broad, with c. 12–16 thick cavisetae; lateral gonapophyses broad, with c. 20 slightly thickened setae; posterior gonapophyses short; pregenital plate small, triangular in profile (Fig. 303). Spermatheca (Fig. 304) angled and fairly large.

**Male.** Abdominal apex as in Fig. 305: ectoproct large, with black fringe; sternite IX rounded. Genitalia (Figs 306, 307): gonarcus broad, posterior margin transverse; mediuncus deep; parameres small, rounded and closely associated, small dorsal flange from anterior inner edge.

FW 26–33, HW 24–31, A 7–9, B 15–19.

**Type**

Holotype, \( \varphi \), Queensland, Cape York, Aug. (in alcohol, Stockholm) (seen).

**Material Examined**

36 ex. Queensland (11 ex.): Cooktown, Cunnamulla, Gilruth Plains, Hamilton. Northern Territory (7 ex.): Clifton Hills HS., Mt Cahill (area). Western Australia (15 ex.): Barradale, Mandurah, Millstream (area), Minilya. South Australia (3 ex.): Levi Creek, Leigh Creek. (ANIC, QM, BMNH.)

**Comments**

This species is distinctive within the genus and is superficially most similar to *Protoplectron venustum*, which it sometimes closely resembles in forewing pattern. Differences in the form of the cubital fork readily separate the two taxa.

**Distoplectron minor** Banks

(Figs 308–315)

*Distoplectron minor* Banks, 1943, p. 102.

**Coloration.** Dark grey. Eyes dark grey. Face yellow. Antennae in broad dark grey to black band, each segment annulated with black and pale greyish white. Vertex mainly dark grey, with narrow transverse yellow band. Pronotum dark grey, with trace of narrow yellow midline (except at borders), an irregular yellow streak posteriorly from anterior angles, a small anterior marginal patch near angles and a larger posterior marginal patch opposite anterior marks. Pterothorax dark grey, with slight yellow markings on lateral scutal lobes. Abdomen wholly dark, unmarked. Thoracic pleura and 1st abdominal sternite with dense white hairs. Forewing: longitudinal veins with alternating dark and white lengths, most crossveins dark, fewer white; pterostigma basally brown, centrally white; slight fumose shading around many vein forks, at fork of \( CuA \) and at apex of \( Cu2 \). Hindwing paler. \( R_1 \) wholly dark brown, other longitudinal veins with alternating dark and pale lengths. Legs dark glossy brown, almost black, unmarked.

**Morphology.** Antennae sturdy. Vertex not raised. Pronotum broader than long. Wing venation as in Figs 308, 309. Legs moderately long; \( t_1 > t_5 > t_2 > (t_3 = t_4) \); spurs long and slender, extending to beyond apex of \( t_1 \); claws simple, moderately curved.

**Female.** Abdominal apex as in Fig. 310: ectoproct somewhat lobed ventrally, with dense black fringe and c. 17 truncate cavisetae on ventral half; lateral gonapophyses short, rounded, with c. 10 thickened cavisetae from individual tubercles and fine dense setae apically; posterior gonapophyses short, rounded with c. 6 fine black apical setae. Spermatheca (Fig. 312) angled. Pregenital plate (Fig. 311) with slight median projection and with strongly posteriorly curved lateral arms.

**Male.** Abdominal apex as in Fig. 313: ectoproct large, with dense black fringe; sternite VIII rounded. Genitalia (Figs 314, 315): gonarcus broad, somewhat sinuous and with deep
mediuncus; parameres broad, closely associated and with small anterior dorsal flanges on inner edge.


**Type**

Holotype, ♂, Queensland, Cunnamulla, Nov., N. Geary (MCZ No. 16,632, now in ANIC) (seen). ‘Paratype ♀’, same data (ANIC) (this not noted in original description and should not, therefore, be regarded as a type).

**Other Material Examined**

20 ex. South Australia (3 ex.): Everard Park. New South Wales (9 ex.): Broken Hill (area), Hay. Victoria: 8 ex.

**Comments**

This species, as Banks (1943) noted, appears to be closely related to *D. gerstaeckeri* but differs in smaller size and less pronounced wing pattern, as well as in details of genitalia of both sexes.

**Distoplectron campbelli** (Handschin) comb. nov.

(Figs 316–321)

*Protoplectron campbelli* Handschin, 1935, p. 691.

**Coloration.** Eyes grey. Labrum pale. Clypeus with darker lateral patches, with c. 6 long outstanding pale hairs. Palpi darkened apically. Frons black, with sparse short white hairs. Vertex mainly black; anterior pale transverse arc linked medially with posterior yellow arc; short white hairs, no supraorbitals. Antennae black, flagellar segments with pale apices. Pronotum dark grey, traces of narrow pale median line and of anterolateral marks; hairs mainly pale, some laterals long. Pterothorax (? and abdomen) dark grey. Pleura with dense white hairs. Venation mainly pale, but with irregular dark intermittent lengths to most longitudinal veins. Forewing with greyish brown shading as in Fig. 316; pterostigma (FW) slightly browned basally, (HW) white. Legs: F and T with dense white hairs, less on TIII; T also with black bristles; F black apically and with 2 black annuli (less marked on III); t black beyond middle of t1.

**Morphology.** Vertex not raised. Antennae rather broad, all flagellar segments broader than long; apex missing but apparently scarcely clubbed. Pronotum almost square. Wing venation as in Figs 316, 317: forewing posterior Banksian line moderately developed, posterior branch of forewing Cu fork divergent from anterior branch. Legs: T < or = F, t c. = T, tI c. = t5> (t2 = t3 = t4); spurs long and slender extending almost to apex of t3; claws slender, curved, c. ⅔ length of spurs.

**Female.** Unknown.

**Male.** Abdominal apex as in Fig. 318: sternite IX (Fig. 319) broad, with slight median prominence. Genitalia (Figs 320, 321): gonarcus broad, rounded, lateral arms narrow, broadest medially with narrow mediuncus; parameres deep, not conspicuously flanged dorsally.

FW 20, HW 18, A 4, B c. 16.

**Type**

Holotype, ♂, Northern Territory (given as ‘N.A.’ on label), Adelaide R., 27.vii.1929, I. M. Mackerras and T. G. Campbell. Also labelled ‘*Protoplectron* n. sp. det Eben-Petersen’. (Basel, seen.)
Comments

Only the type of this species is known. The specimen is slightly damaged: the right forewing and the abdomen had been detached and glued to the card when inspected. It is, however, distinctive and both wing markings and genitalia afford ready separation from other species. I have seen a rather paler specimen (Melville I., SAM) determined by Markl as *Protoplectron campbelli*, which may well be correctly identified. The apex of the abdomen is, unfortunately, missing.

Because of the divergent nature of the branches of the forewing cubital fork, *campbelli* appears to be more similar to species of *Distoplectron* than to true *Protoplectron*; it is accordingly transferred to the former genus, but, as noted on p. 38, the two are clearly closely related.

Genus *Antennoleon*, gen. nov.

Type-species: *Antennoleon carsonensis*, sp. nov.

Sturdy. Antennae relatively very long, bases close together; club slightly developed. Wings long and acutely pointed; FW costal crossveins simple; anterior Banksian lines absent; Rs arising beyond cubital fork (FW) or basal to medial fork (HW); FW CuA2 scarcely divergent from CuA stem, long, parallel to (CuP + 1A). Legs sturdy; spurs to beyond apex of t2, slender; claws simple. Female: ectoproct and lateral gonapophyses with thickened setae; anterior gonapophyses absent; posterior gonapophyses small and rounded; pregenital plate small. Male: sternite IX simple; gonarcus moderately deep, parameres platelike.

Only the type-species of this unusual genus is known. It appears to be rather similar to *Protoplectron* in wing venation, but differs in form of the claws and the antennae.

*Antennoleon carsonensis*, sp. nov. (Figs 322-328)

Coloration. Eyes dark grey to black. Labrum and clypeus pale brown; clypeus with long outstanding pale hairs. Palpi black. Frons black, pattern slightly emarginate anteriorly, with sparse white hairs. Vertex black, with single transverse row of 4 indistinct yellow spots and single posterior spot each side of midline. Antennae black. Pronotum black or pruinescent grey, with indistinct traces of 2 yellow lateral streaks; dorsal setae short black; most long posterior and lateral setae black, some (mainly very long) pale. Pterothorax and abdomen black or dark pruinescent grey; abdominal hairs white. Wing venation mainly dark brown; some longitudinal veins with intermittent pale lengths; pterostigma (HW) cream, (FW) basally brown, then cream. Legs mainly dark brown to black: thoracic pleura, coxae and F with dense long white hairs; F and T also with sparse white bristles; T also with black bristles.

Morphology. Sturdy. Antennal bases large; antennae closely spaced, very long; flagellar segments broader than long; club slightly developed over apical 10–12 segments. Pronotum broader than long, transverse furrow distinct. Wing venation as in Figs 322, 323. Legs short and sturdy; F c. = T; t c. = T; t 5 c. = t 1 > t 2 > t 3 = t 4. Spurs slender, extending to beyond apex of t2. Claws shorter, slender.

Female. Abdominal apex as in Fig. 324: ectoproct with c. 13 thickened setae, very long; lateral gonapophyses broad, with 15–17 thickened black setae; tergite IX with 2 or 3 thickened setae; posterior gonapophyses small and rounded; pregenital plate triangular, with median keel. Spermatheca (Fig. 325) simple.

Male. Abdominal apex as in Fig. 326: sternite IX long and shallow. Genitalia (Figs 327, 328): gonarcus broad, tapered posteriorly; parameres broad; membrane with median and anterior spicules.

FW 27, HW 26, A 10, B 19.
Types

Holotype, ♀, Western Australia, 14°49'S., 125°49'E., Carson escarpment, 9-15.viii.1975, I. F. B. Common and M. S. Upton (ANIC). Paratypes: 1 ♂, 3 ♀, same data as holotype (ANIC); 1 ♀, Western Australia, 15°02'S., 126°55'E., Drysdale River, 3-8.viii.1975, I. F. B. Common and M. S. Upton (ANIC).

Comments

The extremely long and slender antennae of *carsonensis* are both conspicuous and distinctive.

**Genus Fenestroleon, gen. nov.**

Type-species: *Fenestroleon douglasi*, sp. nov.

Sturdy. Vertex very strongly raised, by c. 1/4 depth of face. Antennae sturdy, club not well defined. Wings tapered, posterior margin of FW rather sinuous; FW anterior Banksian line present, HW anterior Banksian line indicated; FW costal crossveins simple; Rs arises slightly beyond cubital fork (FW) and close to medial fork (HW); FW CuA2 not divergent from CuA stem; FW veins 2A and 3A linked by crossvein. Legs short and sturdy; spurs absent; claws slender, straight. Female: anterior gonapophyses absent, posterior gonapophyses short and tapered; pregenital plate with broad base. Male: unknown.

This anomalous species shows venational characters intermediate between Dendroleontini (the well defined crossvein linking FW 2A and 3A) and Protoplectrini (the long FW CuA2 cell). Additionally, both vertex raising and lack of spurs suggest dendroleontine affinities. However, the elongated FW cubital fork is here regarded as the most characteristic feature of Protoplectrini, and *Fenestroleon* is tentatively placed here on this feature, which does not occur in any Australian dendroleontine: it may be separated from spurless genera of Dendroleontini by that feature.

The genus is known from only a single individual.

**Fenestroleon douglasi, sp. nov.**

*(Figs 329-333)*

*Coloration.* Black. Eyes dark grey. Palpi dark. Labrum, clypeus and lower genae tawny yellow. Frons black, few minute pale hairs. Vertex black, with short black hairs; slight traces of median and lateral yellow posterior marks. Antennae mainly black, base of apical segments yellow. Pronotum with very narrow median yellow streak and broader dorsolateral yellow stripe over posterior 2/3, setae black. Pterothorax and abdomen black. Wing venation: FW mainly pale except where shaded (brown) or (Sc) contacting crossveins; HW darker; crossveins with short hairs arising from dark spots, otherwise generally pale; shading dark greyish brown, FW (Fig. 329) distinctly fenestrated in appearance. Thoracic pleura with long white hairs. Legs black except yellow dorsal edge to T (especially III); FI, II with dense white hairs; F and T with black bristles.

*Morphology.* Stout. Vertex strongly raised, by c. 1/2 eye diameter in anterior aspect. Antennae stout, segments beyond f2 broader than long; poorly defined club over last 10-12 segments. Pronotum broader than long; transverse furrow well developed; posterior angles slightly produced; region anterior to furrow distinctly narrower than posterior region. Wing venation as in Figs 329, 330. Legs short and sturdy; t5 c. = t1>(t2 = t3 = t4). Spurs absent. Claws slender, straight.

_Female._ Abdominal apex as in Figs 331, 332: ectoproct slender with c. 6 thickened setae; lateral gonapophyses with c. 6 thickened setae; posterior gonapophyses short; pregenital plate a broad area with minute prominence. Spermatheca (Fig. 333) tapered apically.

_Male._ Unknown.

FW 19, HW 17, A 4½, B 15.
Type

Holotype, ♀, Western Australia, 50 km west of Gascoyne Junction, 16.iv.1979, A. M. and M. J. Douglas (WAM).

Comments

This heavily patterned species has the appearance of having two white anterior ‘windows’ on the forewing. The pattern and venation render it easily recognizable.

Genus *Pseudoformicaleo* van der Weele

*Pseudoformicaleo* van der Weele, 1909, p. 25.
*Tahulus* Navás, 1912b, p. 112; Esben-Petersen, 1915, p. 67.
*Pseudoplectron* Navás, 1914b, p. 467; Esben-Petersen, 1917, p. 204.
*Pseudoformicaleo* van der Weele. Esben-Petersen, 1915, p. 67; 1923, p. 588.
(The above synonymy is further discussed following diagnosis of the next species.)

Type-species: *Pseudoformicaleo jacobsoni* van der Weele.

Type-species of *Tahulus*: *T. caligatus* Navás.

Type-species of *Pseudoplectron*: *Protoplectron costatus* Banks.

Slender. Antennae with well defined club. Wings slender, rather pointed; no anterior Banksian lines; FW costal crossveins simple; Rs arising slightly beyond cubital fork (FW) and well basal to medial fork (HW); FW cubital fork very narrow, cell CuA2 narrow; vein CuA2 scarcely divergent from CuA stem, long. Legs moderately short and sturdy; spurs slender, to about apex of t1; claws short simple. Female: anterior gonapophyses absent; posterior gonapophyses slender; pregenital plate small. Male: parameres fused and strongly hooked; long gonostyli.

As with the last genus, *Pseudoformicaleo* is superficially placed in Protoplectrini on wing features. In genitalia, though, the single Australian species is more closely allied to Distoleontini. It was referred to that tribe by Hölzel (1972). Within Distoleontini, species of *Creoleon* Tillyard also have cell CuA2 long.

*Pseudoformicaleo nubecula* (Gerstaecker)  
(Figs 334–339)

*Creagris nubecula* Gerstaecker, 1885, p. 101.
*Pseudoformicaleo nubecula* (Gerstaecker). Esben-Petersen, 1915, p. 67.
*Pseudoformicaleo jacobsoni* van der Weele, 1909, p. 25; Esben-Petersen, 1915, p. 67.
*Protoplectron costatus* Banks, 1910, p. 41; Esben-Petersen, 1915, p. 67.
*Tahulus caligatus* Navás, 1912a, p. 113; Esben-Petersen, 1915, p. 67.
*Tahulus aesthenicus* Navás, 1914c, p. 140; Esben-Petersen, 1920, p. 191.
*Tahulus ignobilis* Navás, 1914a, p. 115; Esben-Petersen, 1920, p. 191.

**Coloration.** Eyes dark grey. Body dark grey to greyish yellow. Palpi black. Labrum and clypeus tawny brown. Frons with broad black band. Clypeus with few long black hairs. Vertex with anterior row of 3 black spots; posterior row of 5 black spots. Antennae: flagellar segments narrowly black at base, otherwise dark buff. Pronotum broadly suffused with grey, midline generally paler than sides; long black and white hairs intermingled. Pterothorax dark grey; anterior of mesoscutal lobes greyish yellow; lateral groups of 3–5 long white hairs. Abdomen dark grey. Wing venation mainly pale; longitudinal veins darkened at intersections with most crossveins; pterostigma white to pale buff, in FW with small darker basal spot. Legs mainly dark brown, including dark spots at setal bases; T darkened mainly ventrally, in 1 or 2 dorsal bands and at apex; t segments with apices dark; FI11 with long black bristles, T with black bristles; FI, II mainly with white hairs.
Morphology. Slender. Antennae slender, club well defined. Pronotum longer than broad. Wings long and slender, venation as in Figs 334, 335. Legs moderately sturdy; t1>t5>t2>(t3 = t4); t1 c. = (t2-t5). Spurs long and slender, extending about to apex of t1. Claws c. \( \frac{1}{2} \) spurs, shallow, with apex somewhat narrowed.

**Female.** Abdominal apex as in Fig. 336: ectoproct broad, with c. 8 thickened tapered setae; lateral gonapophyses angled, with c. 10 thickened setae; posterior gonapophyses long and slender; pregenital plate small, rounded. Spermatheca slender.

**Male.** Abdominal apex as in Fig. 337: ectoproct deep. Genitalia (Figs 338, 339): gonarcus long, rounded, sides almost parallel; mediuncus membranous; parameres long, fused anteriorly into narrow median stem, long apical hooks; up to c. 6 long ventral setae each side of parameres.


Types

Holotype of *Creagris nubecula*, Queensland, Rockhampton (Greifswald) (not seen). Holotype, ♀, of *Protoplectron costatus* Banks, Northern Territory, Darwin, 10 Apr. (Dodd) (MCZ, now ANIC) (seen).

Other Material Examined

29 ex. **Queensland** (7 ex.): Collinside, Duaringa, Iron Ra., Mitchell R., Rockhampton, Townsville. **Northern Territory** (11 ex.): Alice Springs (area), Burnside, Campbell Spring, Darwin, Magela Creek, Mataranka, Mt Cahill, Victoria River Downs HS. **Western Australia** (10 ex.): Millstream (area). (ANIC, AM, QM, TAS, BMNH).

Comments

This species, although not common in Australia, appears to be one of the few species known to occur also in nearby parts of the Oriental region, such as Japan, China, Formosa, Malaysia, Sri Lanka and Indonesia — assuming the above synonymy, established largely by Esben-Petersen, is correct. Banks (1931) doubted whether his *Protoplectron costatus* was, in fact, a correct synonym of *nubecula*, citing differences in wing markings between the two forms. This opinion was endorsed by Handschin (1935) and Kuwayama (1962). I have not critically examined specimens of *jacobsoni* (Indonesia), but am satisfied that only one species of the genus has been found in Australia. It is somewhat variable in intensity of wing markings.

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Manuscript received 24 August 1983; accepted 1 February 1984
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Figs 1-4. Wings, indicating terminology for venation (1, 3) and major areas (2, 4): 1, 3, forewing; 2, 4, hindwing. Labelling as follows: veins: C, costa; Sc, subcosta; R1, radius; Rs, radial sector; MA, anterior media; MP, posterior media (MP1 and MP2, borders of MP); CuA, anterior cubitus; CuP, posterior cubitus; IA-3A, anal veins.
Figs 5–8. Abdominal apices (5, 6, female; 7, male) and male genitalia (8), to indicate terminology (5, 7, 8 lateral; 6 ventral; segments VII–IX numbered). ect, ectoproct; l.g., lateral gonapophysis; p.g., posterior gonapophysis; a.g., anterior gonapophysis; p.p., pregenital plate; S, spermatheca; gen, genitalia; gon, gonarcus; med, mediuncus; par, parameres.
Figs 9–14. 9, 10, Fore- and hindwings of Stilbopteryginae, to show venation. 11–13, Claw forms (one claw only shown); 11, claw opposable on t5 (e.g. Froggattisca); 12, normal slender simple claw; 13, claw with subapical teeth (e.g. Protoplectron). 14, Hooked tibial spurs of Acanthoplectron.
Fig. 15-21. 15-19, Antennae, to show range of form: 15, Bandidus longigona; 16, Ceratoleon brevicornis; 17, Parvoleon minimus; 18, Escura patriciae; 19, Cosina sp. 20, 21 Base of FW to show relationships between anal veins.
Figs 22-31. *Hagenomyia australis* Banks: 22, facial pattern; 23, forewing; 24, hindwing; 25, forewing of type; 26, female, apex of abdomen; 27, spermatheca; 28, male, apex of abdomen, lateral; 29, sternites VIII and IX, ventral; 30, male genitalia, lateral; 31, same, ventral.
Figs 32–39. *Callistoleon erythrocephalum* (Leach): 32, facial view; 33, forewing; 34, hindwing; 35, female, apex of abdomen, lateral; 36, anterior gonapophyses, ventral; 37, male, apex of abdomen; 38, genitalia, lateral; 39, same, ventral.
Figs 40-50. Callistoleon spp. 40, 41, C. erythrocephalum: 40, spermatheca, lateral; 41, same, ventral. 42-50, C. illustris (Gerstaecker): 42, spermatheca, ventral; 46, male, apex of abdomen; 47, male, posterior sternites, ventral; 48, male genitalia, lateral; 49, same, ventral; 50, same, caudal.
Figs 51–64. Myrmeleon pictifrons Gerstaecker: 51, facial pattern; 52, forewing; 53, hindwing; 54, female, apex of abdomen, lateral; 55, anterior and posterior gonapophyses, ventral; 56, spermatheca, ventral; 57, same, lateral; 58, male, apex of abdomen; 59, male genitalia, lateral; 60, same, ventral; 61–64, unusual female form, Guyra (see text); 61, face; 62, apex of abdomen, lateral; 63, same, ventral; 64, spermatheca.
Fig. 65-73. *Myrmeleon uptoni*, sp. nov.: 65, head and pronotum, dorsal; 66, forewing; 67, hindwing; 68, female, apex of abdomen; 69, spermatheca; 70, male, apex of abdomen; 71, male genitalia, ventral; 72, same, dorsal; 73, same, lateral.
Figs 74–82. *Myrmeleon territorius*, sp. nov.: 74, head and pronotum, dorsal; 75, forewing; 76, hindwing; 77, female, apex of abdomen, lateral; 78, same, ventral; 79, spermatheca; 80, male, apex of abdomen; 81, male genitalia, lateral; 82, same, ventral.
Figs 83-89. *Myrmeleon acer* Walker: 83, forewing; 84, hindwing; 85, female, apex of abdomen, lateral; 86, gonapophyses, ventral; 87, male, apex of abdomen; 88, male genitalia, lateral; 89, same, ventral.
Australian Myrmeleontidae. I

Figs 90-97. Outlines of forewing base and pronota of (90-95) Walker species of *Myrmeleon* and (96, 97) *M. celebensis* McLachlan: 90, type of *M. acer*; 91, type of *M. malignus*; 92, type of *M. exsanguis*; 93, type of *M. inopinus*; 94, type of *M. hostilis*; 95, type of *M. solers*; 96, paratype and (97) type of *M. celebensis*.
Figs 97–108. *Myrmeleon regularis* (Esben-Petersen): 98, forewing; 99, hindwing; 100, female, apex of abdomen; 101, pregenital plate and apex of sternite VII, ventral; 102, spermatheca; 103, male, apex of abdomen, lateral; 104, same, ventral; 105, same, dorsal; 106, male genitalia, lateral; 107, same, ventral; 108, same, dorsal.
Figs 116–125. *Myrmeleon croceicollis* Gerstaecker: 115, forewing; 117, hindwing; 118, 119, range of pronotal pattern; 120, female, apex of abdomen, lateral; 121, same (part), ventral; 122, spermatheca; 123, male, apex of abdomen; 124, male genitalia, lateral; 125, same, ventral.
Fig 126-133. *Myrmeleon comptus* Gerstaecker: 126, pronotum; 127, forewing; 128, hindwing; 129, female, apex of abdomen, lateral; 130, same, ventral; 131, male, apex of abdomen; 132, male genitalia, lateral; 133, same, ventral.
Figs 143–153. *Myrmeleon sagittarius*, sp. nov.: 143, face; 144, pronotum; 145, forewing; 146, hind-wing; 147, female, apex of abdomen, lateral; 148, same (part), ventral; 149, spermatheca; 150, male, apex of abdomen; 151, sternite IX, ventral.
Figs 154-163. Myrmeleon nigromarginatus Esben-Petersen: 154, pronotum; 155, forewing; 156, hindwing; 157, female, apex of abdomen, lateral; 158, same (part), ventral; 159, spermatheca; 160, male, apex of abdomen, lateral; 161, male genitalia, lateral; 162, same, ventral; 163, same, caudal.
Figs 164–173. *Myrmeleon diminutus* Esben-Petersen: 164, face; 165, forewing; 166, hindwing; 167, female, apex of abdomen, lateral; 168, same, ventral; 169, spermatheca; 170, male, apex of abdomen; 171, male genitalia, lateral; 172, same, ventral; 173, same, dorsal.
Figs 174-179. Myrmeleon mcfarlandi, sp. nov.: 174, pronotum; 175, forewing; 176, hindwing; 177, female, apex of abdomen, lateral; 178, same (part), ventral; 179, spermatheca.
Figs 180-190. *Myrmeleon* spp. 180-189, *M. striatofrons*, sp. nov.: 180, forewing; 181, hindwing; 182, male, apex of abdomen, lateral; 183, same (part), ventral; 184, male genitalia, lateral; 185, same, ventral; 186, face and (187) pronotum of Wingabutta specimen; 188, face and (189) pronotum of Banjiwarn specimen. 190, *M. houstoni*, face. (186, 188, 190 with inset to show relative sizes of apical segment of labial palp).
Figs 191–201. *Myrmeleon* spp. 191–193, *M. striatifrons*: 192, female, apex of abdomen, lateral; 192, same (part), ventral; 193, spermatheca. 194–201, *M. houstoni*, sp. nov.: 194, forewing; 195, hindwing; 196, female, apex of abdomen, lateral; 197, same, ventral; 198, male, apex of abdomen, lateral; 199, same (part), ventral; 200, male genitalia, lateral; 201, same, ventral.
Figs 202–207. *Myrmeleon commoni*, sp. nov.: 202, forewing; 203, hindwing; 204, female, apex of abdomen; 205, sternite IX, ventral; 206, male genitalia, lateral; 207, same, ventral.
Figs 208-214. *Myrmeleon pallidus* (Esben-Petersen): 208, forewing; 209, hindwing; 210, female, apex of abdomen; 211, spermatheca; 212, male, apex of abdomen; 213, male genitalia, lateral; 214, same, ventral.
Figs 215-220. *Myrmeleon bifasciatus*, sp. nov.: 215, pronotum; 216, forewing; 217, hindwing; 218, female, apex of abdomen, lateral; 219, same, ventral; 220, spermatheca.
Figs 221–230. *Myrmeleon albivenosus*, sp. nov.: 221, forewing; 222, hindwing (marginal dashes indicate band of white veins); 223, female, apex of abdomen, lateral; 224, same (part), ventral; 225, spermatheca; 226, male, apex of abdomen; 227, sternites VIII and IX, ventral; 228, male genitalia, lateral; 229, same, ventral; 230, forewing of *Myrmeleon tigrinum* F.
Figs 231-237. *Protoplectron venustum* Gerstaecker: 231, forewing; 232, hindwing; 233, female, apex of abdomen; 234, spermatheca; 235, male, apex of abdomen; 236, male genitalia, lateral; 237, same, ventral.
Figs 238–242. *Protoplectron inversum* (Navás): 238, forewing; 239, hindwing; 240, female, apex of abdomen; 241, pregenital plate (upper, ventral; lower, profile); 242, spermatheca.
Figs 243–248. Details of two Navás types. 243, Forewing, (244) hindwing and (247) locality label of *Neoplectron inversum*. 245, Forewing, (246) hindwing and (248) locality label of *Escura divergens* (white circles on data labels are pinholes).
Figs 249–255. *Protoplectron eremiae* Tillyard: 249, forewing; 250, hindwing; 251, female, apex of abdomen; 252, spermatheca; 253, male, apex of abdomen; 254, male genitalia, lateral; 255, same, ventral.
Figs 256-252. *Protoplecton striatellum* Esben-Petersen: 256, forewing; 257, hindwing; 258, female, apex of abdomen; 259, spermatheca; 260, male, apex of abdomen; 261, male genitalia, lateral; 262, same, ventral.
Figs 263–271. *Protothorax pallidum* Banks: 263, forewing and (264) hindwing of type; 265, forewing, showing usual form of costal cells; 266, female, apex of abdomen; 267, pregenital plate (upper, profile; lower, ventral); 268, spermatheca; 269, male, apex of abdomen; 270, male genitalia, lateral; 271, same, ventral.
Figs 272-277. *Protoplectron peterseni*, sp. nov.: 272, forewing; 273, hindwing; 274, 275, variations in forewing cubital spot; 276, female, apex of abdomen; 277, spermatheca.
Figs 278–284. 

*Protoplectron longitudinalis* Tillyard: 278, forewing; 279, hindwing; 280, female, apex of abdomen; 281, spermatheca; 282, male, apex of abdomen; 283, male genitalia, lateral; 284, same, ventral.
Figs 285-289. *Protoplectron umbratum*, sp. nov.: 285, forewing; 286, hindwing; 287, female, apex of abdomen; 288, same, ventral; 289, spermatheca.
Fig. 290-297. *Mjobergia fulviguttata* Esben-Petersen: 290, forewing; 291, hindwing; 292, female, apex of abdomen; 293, spermatheca; 294, male, apex of abdomen; 295, male genitalia, lateral; 296, same, dorsal; 297, same, ventral.
Figs 298–307. Distoplectron gerstaeckeri (Esben-Petersen): 298, forewing and (299) hindwing of type; 300, forewing; 301, hindwing of specimen det. Markl (SAM); 302, female, apex of abdomen; 303, pregenital plate (upper, ventral; lower, profile); 304, spermatheca; 305, male, apex of abdomen; 306, male genitalia, lateral; 307, same, ventral.
Figs 308-315. *Distoplectron minor* Banks: 308, forewing; 309, hindwing; 310, female, apex of abdomen; 311, pregenital plate (left, profile; right, ventral); 312, spermatheca; 313, male, apex of abdomen; 314, male genitalia, lateral; 315, same, ventral.
Figs 316-321. *Distoplectron campbelli* (Handschin): 316, forewing; 317, hindwing; 318, male, apex of abdomen; 319, sternites VIII and IX, ventral; 320, male genitalia, lateral; 321, same, ventral.
Fig. 322-328. *Avenion oamnensis* sp. nov.: 322, Dorsum; 323, Hindwing; 324, Female, apex of abdomen; 325, Semimemec; 326, Male, apex of abdomen; 327, Male genitalia, lateral; 328, Same.

322

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324

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326

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328
Figs 329–333. *Fenestroleon douglasi*, sp. nov.: 329, forewing; 330, hindwing; 331, female, apex of abdomen; 332, same (part), ventral; 333, spermatheca.
Figs 334–339. *Pseudoformicaleon nubecula* (Gerstaecker): 334, forewing; 335, hindwing; 336, female, apex of abdomen; 337, male, apex of abdomen; 338, male genitalia, lateral; 339, same, ventral.
Bibliography of the Neuropterida

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