SYSTEMATIC STUDIES IN AUSTRALIAN PLATYSTOMATIDAE (DIPTERA)

By

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A thesis submitted for the degree of
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October 1969

Abstract

A general survey is made of the Australian flies of the family Platystomatidae on the basis of large collections of preserved material and type specimens in European museums. The development of the study of Australian Platystomatidae is reviewed, together with the present status of knowledge. Some information is provided on the biology and habits of the group. The distribution and abundance of the family in the zoogeographic regions of the world is described and particular attention paid to the distribution of genera occurring in Australia, both within and outside the Australian continent.

The external morphology of the Platystomatidae is described in some detail and the principal trends in morphological diversity are outlined. The apparent relationships of the Platystomatidae to other families of Diptera are given together with their morphological basis. The family is defined and a scheme is presented for the division of the Platystomatidae into four subfamilies.

The problem of defining geographically isolated species is examined and some new criteria are suggested. The desirability of recognizing subspecies is also examined. An attempt is made to analyze the relationship between specific sexual characters and isolating mechanisms and some new definitions of terms are proposed. Special attention is paid to the selective value of male genitalia characters.

The possible role of sexual characters in macroevolution is suggested. Some interesting specific sexual characters exhibited by certain of the Platystomatidae are described.

A key to the Australian genera of Platystomatidae is given and a list of the known Australian species is presented. The genera Mesoctenia, Plagiostenopterina, Lamprogaster, Duomyia, and Euprosopia are defined. Keys to the 126 recognized Australian species of these five genera are provided together with descriptions of the species. Distributional data and, when available, habitat data are recorded for each species.

CONTENTS

I. INTRODUCTION

(A) General Observations

The Platystomatidae are a family of two-winged flies (Diptera) found in most vegetated parts of the world with the notable exception of the temperate zone of South America. The number of known world species is slightly less than 1,000. The form and coloration of the insects are extremely varied. The spectacular form and colours of many of them have attracted collectors and in some areas, e.g. New Guinea, where the dipterous fauna as a whole is not well known, the Platystomatidae are comparatively well documented. On the other hand the numerous small and inconspicuous species of the family have not been collected and studied to the same extent.

Until recently it was usual to regard the group as a subfamily of the family Otitidae (Ortalidae) but specialist opinion has now swung towards giving the Platystomatidae family rank. Though clearly related to other "acalyptrate" families of Diptera, the very large squamae (calyptrae) of certain forms have led some authors to mistake them for calyptrates (e.g. Walker, 1849; Ôuchi, 1939).

Unlike the related family Tephritidae (Trypetidae) the Platystomatidae are of very slight economic importance so far as is known. However a species of Rivellia has been recorded as causing significant damage to a pasture legume in Queensland (Diatloff, 1965). Perhaps species of Duomyia play a role in pollination of some Eucalyptus species.

For the purposes of this work the limits of Australia have been interpreted in the political sense. Thus I include the six Australian states and the Northern Territory, but external territories of Australia are excluded. The Torres Strait Islands are included as part of the state of Queensland and Lord Howe Island is part of the state of New South Wales. Norfolk Island is excluded as an external territory. For practical reasons I do not use political boundaries for defining New Guinea, but apply the term to the main island of New Guinea together with only the most closely adjacent small islands. Thus defined New Guinea includes three zones: West New Guinea (West Irian); North East New Guinea (the Sepik, Highland, Madang, and Morobe Districts of the Trust Territory of New Guinea); and the Australian Territory of Papua. New Guinea material is only treated here when it is desirable to do so for comparative purposes.

(B) Historical and Present State of Knowledge

The first references to Australian species of the family Platystomatidae are by Guérin-Méneville (1831-1838) and Macquart (1835 et seq.). Guérin included three Australian species in the genus Platystoma, but one of these, Platystoma cincta Guérin, was almost certainly collected from outside Australian limits. Macquart (1843, 1847) established the genera Lamprogaster and Euprosopia on the basis of Australian species but his characterisations were superficial

in the extreme. In contrast to those of Guérin, the specific descriptions given by Macquart are very brief with almost no characters other than those of coloration, and illustrations, when provided, are distorted and unclear.

Walker (1849 et seq.) described many platystomatid species, a number of which were from Australia. His descriptions consist very largely of colour characters and there are no accompanying illustrations. Further, as Walker was notoriously inaccurate in his generic placings most subsequent authors have had difficulty in identifying his species. Thomson (1868) described two more Australian species.

Loew (1873) placed most of the platystomatids known to him in the section Platystomina of the family Ortalidae and thus established a taxon roughly equivalent to the modern Platystomatidae. He also attempted a more precise and restricted definition of some of the genera.

Froggatt (1907) and Tillyard (1926) referred to several Australian platystomatid species in their books on Australian insects. In accordance with the classification then widely current they placed the species in the family Ortalidae, though Froggatt also illustrated one species as a diopsid.

Hendel (1914a, 1914b) gave the first comprehensive systematic review of the world Platystomatidae, including keys to genera and species and descriptions. He placed the family as a subfamily of the Muscidae of equal status with Ortalinae, Pyrgotinae, Pterocallinae, Ulidiinae, and Richardiinae. In all subsequent publications he gave the

Platystomatidae family status. Although Hendel's primary sections of the Platystomatidae have not proved acceptable, his work is still to be regarded as authoritative and useful and his generic concepts remain with but little change. Unfortunately he did not designate type specimens for his new species, a fact which has caused difficulty as some of his "species" were composite. Complications in nomenclature have arisen from his publication of a list containing many new names (1914a) before giving formal descriptions of these new species (1914b).

Enderlein (1924) described one new Australian species which was wrongly placed generically. He introduced a number of new generic names for segregates within the genera recognized by Hendel. These genera have almost all proved unacceptable to subsequent workers.

Malloch (1928a et seq.) continued to build on the basis provided by Hendel. He described additional Australian species and began to place the differentiation of species on a more accurate basis. He gave a useful key to the Australian and New Guinean genera (1939a). Like Hendel, he did not examine the types of species described by Guérin, Macquart and Walker. As a result many of these species remain misinterpreted in literature to the present.

Paramonov (1957) described several Australian species under the family name Ortalidae. Steyskal (1961) described

the genitalia of an Australian species for the first time. Munro (1959) gave grounds for altering the name of a long established Australian genus. Diatloff (1965) provided the first information on larval biology of an Australian species.

Up to the present approximately 65 valid species of Platystomatidae have been recorded as occurring in Australia. Possible synonymy among the recorded nominal species of Rivellia might reduce this number slightly.

A review of the present state of knowledge of the Platystomatidae makes it apparent that few aspects of the biology of the family have yet been broached. The taxonomy of the group is much the best covered subject, but apart from the world revision by Hendel, the only detailed studies of any genus are those of Hendel (1913) for Platystoma and Namba (1956) for North American Rivellia, although keys to the species of a number of genera have been published. There is considerable published information on comparative external morphology (mainly in connection with taxonomy) but the important features of the male genitalia have been dealt with by only a few authors. Nothing is published concerning internal anatomy (apart from some cuticular genitalic structures) or chromosome morphology. Hennig (1952) lists published larval descriptions for only two platystomatid species, both of the genus Platystoma. The genetics, population structure, evolution, paleontology, and comparative physiology of the

group remain unstudied. The adult habitat of many species must have been observed, but very few collectors have noted circumstances of capture. The larval habitat of a number of species has been recorded, but these records are perhaps too few to make any generalisations about larval habitats within the family. There is no general ecological study for any species.

(C) Materials and Methods

Before the commencement of this study, field work was carried out in eastern Australia and the Territory of Papua-New Guinea relating to general studies of acalyptrate Diptera. Though this work was not specially orientated towards study of Platystomatidae the collections made included large numbers of this family and many casual field observations were made on platystomatids. These collections, now the property of the Australian Museum, together with large collections made available by other institutions form the basis of the present work. The total number of specimens of Australian Platystomatidae available for this work is well over 5,000.

Most types of previously described species have been examined and reassessed. These include types of species described by Guérin, Macquart, Walker, Hendel, Enderlein, and Malloch.

In the lists of material examined I have abbreviated

the names of museums and collections as follows:-

AM	Australian Museum, Sydney.
BM	British Museum (Natural History), London.
CSIRO	Australian National Insect Collection, Commonwealth Scientific and Industrial Research Organisation, Canberra.
DEI	Deutsches Entomologisches Institut, Eberswalde, East Germany.
GLB	Collection of Dr. G. L. Bush, University of Texas, Austin.
MNM	Természettudományi Múzeum, Hungarian National Museum, Budapest.
NMV	National Museum of Victoria, Melbourne.
NSWDA	New South Wales Department of Agriculture, Rydalmere.
OXN	Hope Entomology Collection, University Museum, Oxford.
PM	Muséum National d'Histoire Naturelle, Paris
QM	Queensland Museum, Brisbane.
SAM	South Australian Museum, Adelaide.
SPHTM	School of Public Health and Tropical Medicine, University of Sydney.
UQ	Entomology Department, University of Queensland, Saint Lucia, Brisbane.
USNM	United States National Museum, Washington, D.C.
WM	Naturhistorisches Museum, Vienna.
ZMB	Zoologisches Museum der Humboldt-Universität, Berlin.

The names of the following collectors are abbreviated to the initials:

T.L. Bancroft, E.B. Britton, A.N. Burns, G.L. Bush, T.G. Campbell, P.B. Carne, C.E. Chadwick, D.H. Colless, I.F. Common, M.F. Day, F.P. Dodd, A.L. Dyce, K. English, F. Evans, W.W. Froggatt, M. Fuller, N. Geary, M. and V. Gregg, H. Hacker, G.H. Hardy, E.J. Harris, D.E. Havenstein, R. Helms, G.A. Holloway, C. M. Kelsall, K.H. Key, A.M. Lea, Z.R. Liepa, R. Lossin, D.K. McAlpine, I.M. Mackerras, G. Monteith, A. Musgrave, A. Neboiss, K.R. Norris, S.J. Paramonov, F.A. Perkins, E.F. Riek, C.N. Smithers, A. Snell, R. Straatman, K.L. Taylor, N.B. Tindale, A.L. Tonnoir, R.E. Turner, M.S. Upton, J.P. Verreaux, A.R. Wallace, M. Wallace, F.E. Wilson, W.W. Wirth, I.C. Yeo.

An attempt has been made to keep nomenclature strictly in accordance with the International Code of Zoological Nomenclature (1961). This, together with examination of older type specimens, has involved a shift in the application of certain names.

Study of most specimens has been with the aid of a stereoscropic binocular microscope at magnifications ranging from x 12.5 to x 100. For study of external features, dry pinned specimens were used. The aedaegus can be examined in such specimens by relaxing over damp sand in a plastic container for 2 or 3 hours, then placing a drop of 5% trisodium phosphate (Na_3PO_4) at the apex of the abdomen under

the microscope and carefully extending the aedeagus. This often involves splitting tergite 5 longitudinally a little to the right of the centre. Specimens should not be relaxed for longer periods or discoloration is likely to result, particularly with species of Euprosopia. For more detailed examination of cuticular genitalic structures the abdomen is removed and immersed in cold lactic acid for several days till the muscle is cleared and the cuticle extended. Lactic acid is also an ideal medium for microscopic examination of the genitalia. Specimens are not left indefinitely in lactic acid as gradual bleaching and deterioration takes place after several months. Genitalia are stored in phials of glycerine with plastic stoppers together with label data and number corresponding to that on the pinned specimen.

Measurements were made with a squared eye-piece (graticule), calibrated by comparison with a millimetre scale on the stage of the microscope. It was not found possible to make direct measurements of the long and ofter coiled terminal filaments of the aedeagus in this way as they could not be straightened. The method used was as follows. The aedeagus was placed in lactic acid in a Petri dish and gently flattened under the weight of a small square of glass cut from a microscope slide. The specimen was placed under the microscope and viewed through a squared eyepiece. An outline drawing of the distal part of the aedeagus with filaments was prepared on squared paper so that the scale was known. Measurements

of the length of the filaments in the drawing were made with an opisometer and expressed as a fraction or multiple of the length of the sclerotized glans.

Illustrations have been prepared from drawings on squared paper made with the aid of a squared eye-piece.

The scanning electron microscope was used for study of some cuticular structures. The technique involves the production of a fine electron probe in a vacuum chamber by focusing a beam of electrons from a heated tungsten filament. The electron probe is used to scan the specimen the surface of which either reflects the electrons or causes other electrons to be emitted which are attracted to a positively charged collector. The pulses of light given out by the collector when struck by the electrons cause a current to be set up by a photo-multiplier which is amplified and conveyed to a cathode ray tube where it contributes to a visible picture. The surfaces of the specimen tilted towards the collector provide the greatest number of electrons to be captured by the latter and the resulting picture at the cathode ray tube is one of sharply contrasted light and shadows depending on the surface relief of the specimen. In order to prevent charging the specimen is first fixed to a metal disc by high conductivity paint (colloidal silver in methyl iso-butyl ketone was used) and coated with a thin film of gold. The coating was produced by exposing the specimen in a vacuum

chamber to vaporised gold produced by heating pure gold wire on a tungsten filament. The image obtained is remarkable for its clarity and depth of focus, the latter being far superior to that obtained with a light microscope.

(D) Acknowledgements

Firstly I would like to thank Mr. R.G. Davies for his help and advice during the preparation of this thesis. Also Mr. B. Cogan, Dr. P. Freeman, Mr. A. Pont, and Mr. K.G.V. Smith of the British Museum (Natural History) for access to the collections and facilities and help offered while working at the Museum. I am indebted to Mr. C.N. Smithers of the Australian Museum, Dr. D.H. Colless of C.S.I.R.O. Division of Entomology, Mr. G. Monteith of the Entomology Department, University of Queensland, Mr. A. Neboiss of the National Museum of Victoria, Mr. G.F. Gross and Mr. N. McFarland of the South Australian Museum for loan of the Australian material of Platystomatidae in the collections under their care. Dr. G.L. Bush also made available material in his collection. I am grateful to Dr. L. Tsacas and Dr. L. Matile of the Muséum National d'Histoire Naturelle, Paris, Dr. A. Kaltenbach of the Naturhistorisches Museum, Vienna, Dr. F. Mihályi and Dr. A. Soós of the Természettudományi Múzeum, Budapest, Mr. G.C. Steyskal and Dr. C.W. Sabrosky of the U.S. National Museum, Washington, D.C., for study

facilities in these museums. Dr. H. Schumann made available types from the Zoologisches Museum der Humboldt-Universität zu Berlin.

Many friends have discussed parts of this thesis or provided various forms of assistance, including Dr. P.M. Barrer, Dr. M.A. Bateman, Dr. G.L Bush, Mr. B. Cogan, Dr. D.H. Colless, Dr. R.W. Crosskey, Dr. W.D. Hamilton, Miss F. Kuberski, Mr. E. Osuna, Dr. M. Speight, Mr. G.C. Steyskal, and Mr. R. Vallins.

Assistance with field work in Australia was given by Mr. R. Lossin and Mr. G.A. Holloway of the Australian Museum, while Mrs. K. Kota carried out much of the laborious processing of material. Mr. Holloway also provided invaluable notes on his field observations of Platystomatidae.

Mr. H.E. Goto gave advice on preparation of material for use with the scanning electron microscope, while Dr. B. Martin of the British Museum (Natural History) helped with the preparation. I would like to thank Mrs. M. Culpan for her skilful operating of the S.E.M. at the Royal School of Mines.

Thanks are due to the Trustees and Director, Dr. F.H. Talbot, of the Australian Museum for financing the trip from Sydney to London. Study at museums in Continental Europe was facilitated by grants from the University of London Grants Council and the Department of Zoology, Imperial College, through Professor T.R.E. Southwood.

II. Geographic Distribution

The family Platystomatidae is best represented in the tropical, subtropical and warm temperate areas of the Old World. In the New World the family is less well represented; in fact it is very poorly represented if the almost cosmopolitan genus Rivellia is excluded from consideration. Steyskal (1965) listed 41 species from America north of Mexico of which 34 are species of Rivellia. In 1968 he recorded 25 species from America south of the United States, of which 11 belong to Rivellia. No species are known from America south of the tropics.

Africa is the continent with the greatest number of known platystomatid species, the approximate number of described species being 240 (calculations based on figure for Otitidae s.l. given by Steyskal, 1960). The Oriental Region (excluding the Papuan Subregion) appears also to have a large representation of Platystomatidae but this is less well known than the Ethiopian fauna.

The Palearctic Region on the other hand has a very restricted platystomatid fauna. Despite the richness of the adjacent Ethiopian and Oriental faunas, these appear to have produced only a few temperate adapted offshoots to the north. Platystoma is the only endemic Palearctic genus and Rivellia is the only other generally distributed genus in the region. The Oriental-Australian genus Euprosopia has several species in the eastern Palearctic.

The approximate number of valid described species recorded from New Guinea (excluding the Moluccas and Bismark Archipelago but including Waigeo, Key, and Aru Islands) is 126, most of which are mentioned by Malloch (1939a). This number is nearly twice as great as the number of valid described species previously recorded from Australia and numbers of undescribed species have been seen from New Guinea. It is therefore evident that New Guinea has a greater concentration of platystomatid species than any other part of the world of similar area. The Papuan Subregion is also interesting for the number of characteristic Papuan genera which at most extend beyond New Guinea only to a few nearby island groups or to North Queensland. Some of these genera are of very bizarre form, e.g. Angitula, Laglaisia, Achiosoma, Asyntona.

There is a relatively small Oceanic element in the Platystomatidae. The closely related genera Giraffomyia and Angituloides form a Melanesian component, probably related to the Papuan Angitula. They are accompanied by the more widespread Scholastes in this part of the Pacific. The genus Pseudorichardia occurs only on oceanic islands and is widely distributed in the Pacific. It appears to have no closely related forms on any major land mass. New Zealand has only two known species of Platystomatidae both belonging to the endemic genus Zealandortalis, which is perhaps related to the widely distributed Rivellia (Harrison, 1959).

In Australia there are 22 known genera and 192 known species (including described and undescribed forms). It is probable that further genera will be found within Australian limits in the more northerly of the Torres Strait Islands, some of which are very close to the New Guinea coast. The genera occurring in Australia may be divided into six groups according to their world distribution patterns.

(1) Almost cosmopolitan genus: Rivellia.

(2) Widely distributed Old World tropical genera: Pterogenia, Naupoda, Elassogaster, Plagiostenopterina.

(3) Oriental-Australian genera: Rhytidortalis, Pogonortalis, Euprosopia.

(4) Papuan-Australian genera: Microepicausta, Lamprogaster.

(5) Papuan genera of restricted Australian occurrence: Lasioxiria, Asyntona, Mesoctenia, Brea, Achias, Achiosoma.

(6) Endemic Australian genera: Lenophila, (?) Scotinosoma, Loxoneuroides, Duomyia, genus A, genus B.

The distribution of the genera within Australia appears to be the product of climate (together with vegetation types produced by the climatic conditions) and mobility of the available faunal elements. Another factor not to be overlooked but always difficult to demonstrate is competition from other forms.

Several of the genera occurring in Australia are restricted to the tropical north-east coast of Queensland.

Most of these genera are to be classed as primarily Papuan, because of their better representation in that subregion. They are all inhabitants of rain forest and riverine forest (see list of Papuan genera above). The genera Plagiostenopterina, Elassogaster, and Pterogenia, though mainly occurring in the wet tropical zone of Queensland have marked extensions outside this zone in Australia, and also have extensive distributions outside Australia. A possibly endemic Australian genus, which I have designated genus B in the generic key, has only been collected in tropical rain forest in Queensland. The endemic genus Loxoneuroides is a tropical and subtropical rain forest form of coastal eastern Australia, and Scotinosoma is perhaps confined to the same areas.

The genus Rivellia is very widely distributed over the Australian continent but occurs mainly in forested areas. It is probably absent from arid parts. Lamprogaster has a similar distribution to Rivellia, occurring mainly in forests and woodlands, but is more restricted within this general habitat. One species occurs in low rainfall areas of western New South Wales, perhaps only in the vicinity of rivers. Duomyia also occupies much the same areas as Rivellia but is known to occur in arid areas as well. It is the only genus of the family known from Central Australia and occurs in all parts of Australia where platystomatids have been collected. Euprosopia is represented mainly in

Eastern Australia but one species extends west to Darwin in the north and another to Adelaide in the south. Together with Lamprogaster, Duomyia, and Rivellia, it is represented at higher altitudes in the Australian Alps. A specimen of Euprosopia alpina n.sp. has been collected at an altitude of 7,300 feet near the summit of Australia's highest mountain. Pogonortalis occurs throughout coastal eastern Australia and also in the south-west. It is the only genus which is common in urban gardens in the eastern states. The Australian species P.doclea (Walker) has been introduced into California (Steyskal, 1961).

A group of species is restricted to the vicinity of coastal sand dunes. Here it would appear to be edaphic conditions rather than climate which determine distribution. Some species of this group are threatened by habitat destruction through rutile mining in eastern Australia. The components are Microepicausta, the cribrata group of Rhytidortalis, and certain species of Duomyia and Rivellia. The pale coloration of some of these forms is perhaps an adaptation to the sandy environment.

The temperate heathlands and zeromorphic scrubs of southern Australia have some characteristic forms. The genus Lenophila is more or less restricted to this habitat, as is possibly the rugifrons group of Rhytidortalis.

The fauna of Lord Howe Island, 350 miles east of the coast of northern New South Wales in the warm temperate zone,

is especially interesting as the island is considered to have been isolated from other land masses since the beginning of the Tertiary. The five genera of Platystomatidae, each represented by a single known species on the island, have almost certainly reached there by dispersal across the ocean. Pogonortalis howei Paramonov and Duomyia howensis n.sp. though endemic to Lord Howe Island are each very closely related to mainland Australian species. Naupoda insularis Paramonov is less closely related to the only other Australian species of its genus. Naupoda is also represented in Fiji and elsewhere in the Pacific. It evidently has considerable powers of dispersal. The genus which I have referred to as genus A in the generic key is known from a single specimen from Lord Howe Island. It seems possible that the genus is endemic to the island and I have seen no forms from elsewhere that appear to be closely related to it. A possible explanation for this isolated occurrence is the extinction of the group elsewhere through increased competition or predation. If a formerly widespread form crossed the sea to become established on a remote island its chances of escaping these pressures would be increased. The status of the Lord Howe Island form of Rivellia has not yet been investigated. As stated above the genus is well represented on the Australian mainland.

With the exception of eight species mentioned below all the Australian species appear to be endemic.

Asyntona tetyroides (Walker), Naupoda regina Hendel, Lamprogaster violacea (Macquart), and Euprosopia ventralis (Walker) extend to New Guinea and a few of the adjacent islands. Elassogaster sepsoides (Walker), Plagiostenopterina aenea (Wiedemann), and P.enderleini Hendel have rather wide distributions, all extending to South-east Asia. Pogonortalis doclea (Walker) is naturally endemic to Australia but has been recently introduced into California as mentioned above.

III. Biology and Habits

Adults

Many species of Platystomatidae have characteristic resting places which may serve as rendezvous points for courtship. Tree trunks are a usual resting place for many species of Euprosopia, Loxoneuroides varipennis, Achias kurandana and Achias australis, and probably for a number of species of Lamprogaster. On the Port Hacking River to the south of Sydney Euprosopia subula may often be seen in numbers on rock surfaces either on the bank or on projecting rocks in mid-stream. Much further north at Finch Hatton Gorge the same species was taken on trunks of palms and trees. Perhaps local conditions determine this difference in habits, as the tree trunks along the Port Hacking River are rather densely shaded. On the other hand rock surfaces at Finch Hatton Gorge may become very hot in the tropical sun. At Kurnell, near Sydney, E. tenuicornis and E. anostigma occur together on the main trunks of various native and introduced trees. E. filicornis shows a distinct preference for settling on the lower branches of Cupaniopsis anacardioides in the same area. At Otford, south of Sydney, Euprosopia megastigma appears to rest mainly on foliage of trees, and despite intensive searching has never been swept from herbage or observed on tree trunks. It has also been taken in numbers on wet stones at the edge of a small stream which

it apparently visits briefly for drinking. Achias australis and Achias kurandana often rest on tree trunks, the latter showing a preference for Ficus trees. When large numbers occur together most of the individuals may be males. On one such occasion females of A. kurandana were eventually found by sweeping foliage of nearby trees. In this genus, as in a number of other platystomatid genera I have observed, there is a strong preference for resting on the lower surface of the leaf. Possibly males of Achias congregate on tree trunks where they wait for receptive females. The females only visit the tree trunks when ready to copulate. As males can presumably copulate effectively at frequent intervals their numbers on the trunks will be much greater than those of females which need only copulate occasionally (perhaps, as in some other Diptera, only once in a lifetime) for maximum reproductive activity. Near Cardstone Lamprogaster viola was seen on tree trunks and was also swept from low foliage. L. violacea (in New Guinea and Queensland), L. tricauda (Mary's Creek), L. indistincta (Mulgrave River), and L. stenoparia (Kuranda and Mulgrave River) rest on lower surfaces of leaves of trees. Lasioxiria sp. at The Crater, Atherton Tableland, rests on the large leaves of Alocasia macrorrhizos (Araceae).

While walking on a surface some platystomatids exhibit a characteristic manner of movement. The wings are extended horizontally and moved backwards and forwards with a rowing

motion. At the same time the proboscis is alternately raised and extended. This behaviour has been especially noted in Pogonortalis and Rivellia but is, I think, common to a number of other genera. Similar wing movements occur in several other acalyptrate families. The mode of carrying the wings at rest differs among different genera and species of Platystomatidae. In Duomyia, Microepicausta, and Rhytidortalis rugifrons the wings are folded roof-wise along the abdomen with their posterior margins uppermost and almost touching above the median line of the abdomen. In the miliaria and ventralis groups of Euprosopia the manner of holding the wings is somewhat similar, but in the tenuicornis and separata groups of the genus the wings are held horizontally slightly spread so that their long axes form a V. In E. filicornis (scatophaga group) the position of the wings is intermediate, their costal margins being held a little lower than the posterior margins which almost meet over the abdomen. In Angitula longicollis the wings are extended horizontally almost at right angles to the body much of the time. Platystomatid species which mimic Hymenoptera may have unusual habits. Xenaspis sp. in New Guinea folds its wings longitudinally, thus increasing its resembalnce to a vespid wasp. Achiosoma nigrifacies in New Guinea and a related species in Queensland greatly increase their resemblance to Vespidae by extending the fore legs in front of the head and waving them rapidly like the antennae of wasps.

This habit is shared by the tephritid fly Phytalmia wallacei which also mimics wasps in New Guinea.

Platystomatid flies are attracted to a number of substances for feeding purposes. I have seen the following species on flowers: Duomyia decora (on Leptospermum), Rhytidortalis rugifrons (on Kunzea and other plants), Rivellia sp. (on unidentified cultivated plant). Specimens of Lenophila caerulea have been taken on flowers of Xanthorrhoea by R. Mulder. Hennig (1945) records Platystoma on decaying fruit and I have observed Plagiostenopterina on broken cucurbitaceous fruit. Hennig also mentions Platystoma as attracted to vinegar. Species of Euprosopia, Rivellia, Plagiostenopterina, and occasionally Duomyia have been taken on fresh mammalian faeces (cow, horse, dog, man) to which they are apparently attracted for feeding. Some other genera, notably Lamprogaster and Achias, seem not to be attracted to faeces when they are plentiful in its vicinity. Rivellia viridulans is known to obtain honey-dew from aphides by stroking them with the fore-legs in the manner of an ant (Hennig, 1945).

Detailed observations of courtship or mating have been made for very few species. Piersol (1907) has made observations on Rivellia boscii and Micholmore (1928) describes copulation in Platystoma seminationis. In the former there appears to be no complex preliminary courtship and the wings of the male are vibrated during copulation (as they probably

would be at other times). In both species mentioned it seems that the male feeds the female by regurgitation while mounted. I have frequently seen Euprosopia anostigma and Euprosopia subula in copula on tree trunks and rock surfaces respectively. The pairs parted promptly when captured. Mr. G.A. Holloway informs me that he has observed courtship and mating in Lenophila dentipes on the trunk of a smooth barked Eucalyptus species. He states: "I noticed several pairs before copulation facing each other for up to five minutes, but I was not able to get too close. They do not wave their wings before copulation."

Larvae.

Hennig (1945, 1952) has listed the recorded habitats of platystomatid larvae. These are very diverse and include fresh, damaged, and rotting vegetable material (including roots and bulbs), human corpses, and humus soil. Steyskal (1965a) has recorded larvae of Poecilotraphera spp. from guava, sugar cane, rice and maize. Diatloff (1965) has recorded larvae of Rivellia sp. in fresh and rotting root nodules of the pasture legume Glycine javanica in Queensland, causing considerable damage. Label data from a few reared specimens provide some information on larval habitat. A specimen of Duomyia (?tomentosa) in poor condition was reared from a mandarin (Citrus) in Queensland. A reared specimen of the closely related D. pallipes from Uriarra, near Canberra, is labelled "pupa in sand." A specimen of

Euprosopia megastigma collected at Roseville near Sydney, Oct. 14, 1957, by Miss K. English bears the following information: "Larva found eating curl grub pupa. Oct. 24 had pupated. Nov. 29 emerged deformed." A series of Scholastes bimaculatus in the Australian Museum is labelled "Ex imported coconuts". I have observed a specimen of Pogonortalis doclea newly emerged on an indoor pot plant, the soil of which had been taken a short time previously from Dee Why near Sydney.

Mr. G.A. Holloway informs me that he has observed apparent oviposition by Euprosopia tenuicornis and Lenophila dentipes at Blue Lagoon Reserve, near The Entrance, New South Wales, in March, 1969. This is mentioned here as probably indicative of larval habitat. On the shaded side of a Eucalyptus tree he found "upwards of forty" females of both these species which appeared to be ovipositing in the sap that was exuding from beetle damage under a piece of dead bark. On investigation he found four dipterous larvae in the sap. As far as I am aware Mr. Holloway has not yet succeeded in rearing adults from these larvae.

IV Morphology

(A) Introductory

The structure of the higher Diptera (Series Schizophora) is in many respects very uniform. For this reason it is not the aim of this chapter to provide a comprehensive description of platystomatid structure. Instead an attempt is made to give a general review of outstanding characters of the Platystomatidae and to provide a basis for the descriptions of morphological diversity presented in the evolutionary and systematic studies. This applies as much to the studies of the cuticle and its processes made with the scanning electron microscope as to the classical methods of study.

(B) The Cuticular Surface

The visual impression of the surface texture of the cuticle has been much used as a taxonomic character in higher Diptera. Unfortunately there has been little attempt to define accurately the surfaces described as "pruinose", "dusted", "pubescent", etc. The present study has convinced the author that it is important to discriminate between kinds of surface texture for taxonomic purposes. The use of the scanning electron microscope (SEM) shows great promise in enabling the often rather vague visual impressions of surface texture to be more accurately defined. This approach has been only touched on here.

The cuticle, which covers the entire surface of the insect, is divisible into two main types - sclerotized and membranous sometimes erroneously referred to as chitinized and non-chitinized. The former type, which is hardened by deposition of scleroproteins, is again divisible into categories, according to the nature of its vestiture. There is also some diversification of the vestiture of membranous cuticle.

The simplest type of surface for sclerotized cuticle is smooth, without processes of any kind. When present in sufficiently large areas smooth cuticle presents a strongly shining appearance (regular reflection). Even where there is a dense vestiture on the cuticle, the spaces between the processes often appear almost smooth, with only slight irregularities under high magnification (fig. 3). That this is a fairly general condition in the higher Diptera is seen from the fact that initially dull cuticle frequently becomes shining when the vestiture is removed by rubbing or abrasion. This may happen under natural conditions when movement against the abdomen causes the posterior surfaces of the hind femur to become shiny, or when parts of the female abdomen are caressed by the male during courtship. It also happens when captured specimens are carelessly handled before mounting.

Cuticle which is devoid of vestiture may have its shining quality reduced or interrupted by fine sculpturing. This sculpturing generally takes the form of irregular pits,

rugosity, or scratching, but may form a very regular grooving reminiscent of the convolutions of the skin on human finger-tips. The latter type of grooving often occurs on the cheek region of the head in Platystomatidae. The dull, lustreless appearance of pruinescent cuticle is sometimes strengthened by sculpturing.

Two broad categories of hair-like cuticular processes are generally recognized, viz. microtrichia and macrotrichia. Microtrichia are superficial extensions of the cuticle, not individually connected with the subcuticular cells of the epidermis. They are immobile, being without a basal socket. Each macrotrichium arises from a specialised hypodermal trichogen cell and is often associated with a nerve cell. It is surrounded at its base by a membranous ring or socket enabling movement. A further difference between microtrichia and macrotrichia is in size. In the Platystomatidae microtrichia are generally less than 30μ in length and macrotrichia are of greater length, but there may be slight overlap in size and this limit varies with the size of the insect. Many of the specialised sensory setae, though structurally allied to macrotrichia, are within the size range for microtrichia.

Microtrichia are of general occurrence on the wing surface where they are widely spaced and may be readily appreciated under the light microscope.

Pruinescence is a general term for vestiture which appears as a close, dust-like or powder-like covering on the cuticle more or less obscuring the surface shine under the

light microscope. As the true structure of pruinescence is not readily discernible under the light microscope it is possible that more than one kind of vestiture is included under the term. Under the SEM pruinescence on the thoracic pleura and abdominal tergites of Euprosopia spp. is seen to consist of very short, curved, hair-like microtrichia (figs. 4, 14). It is possible in other cases that the microtrichia constituting the pruinescence are scale-like, but this is yet to be demonstrated.

Microtrichia which are sufficiently long to be distinguishable at a magnification of X 100 to X 150 under the light microscope are termed pubescence. Pubescence is often seen to intergrade gradually into pruinescence in certain areas. In the genus Euprosopia a specialised kind of vestiture occurs on the fifth abdominal tergite of the female in a number of species. This consists of exceedingly fine microtrichia which, at a magnification of X 50 under the light microscope appear as a translucent covering above the surface of the cuticle. I have termed this velvety pubescence. Under the SEM this appears very similar to pruinescence but the microtrichia are much finer and more erect (figs. 1, 2).

Macrotrichia may occur as a sparser over-storey on cuticle clothed with microtrichia, or they may occur on smooth or sculptured sclerotized cuticle. More rarely they are seen on membranous cuticle. They may occur on certain wing veins or, in a very few instances, on the wing membrane.

The majority of macrotrichia of the body surface, including the legs, may be referred to as either hairs or setulae according to thickness and pigmentation, the setulae being thicker and often darker than the hairs. The division is arbitrary and not much importance is attached to it for taxonomic purposes, though sometimes the colour of the macrotrichia is a useful taxonomic character. Macrotrichia on some areas of the body may be broadened into flat scales of various shapes.

On the surface of the cuticle there is a much smaller number of greatly enlarged macrotrichia called bristles or setae. These are arranged according to a definite pattern so that each bristle or linear series of bristles can be designated by a name. The bristle arrangement or chaetotaxy of the Platystomatidae is dealt with below in the sections on the head, thorax and legs. Modified bristles may occur in certain parts or in a particular sex. Spatulate bristles may occur in the males of a few species, but not in the females. Bristles on the ventral surface of the femur are sometimes thickened into spines. Certain apical bristles of the tibiae are particularly strongly developed and mobile. These are called spurs.

In addition to the microtrichia and macrotrichia there are various kinds of immovable processes or excrescences of the cuticle which have no basal socket, but have a sclerotized covering continuous with that of the surrounding surface.

These are dealt with under appropriate sections of this chapter or, in the case of more restricted types, under the individual species.

(C) The Head

The head capsule is characterised by the loss of most of the boundaries defining the principal head sclerites of more primitive insects. For this reason a modified nomenclature for the regions of the head is necessary, though a few traditional terms are retained with a modified meaning. At the summit of the head there is a transverse ridge, often much rounded off, connecting the eyes. This is termed the vertex. It usually bears two pairs of strong bristles, the inner and outer vertical bristles. Immediately behind the centre of the vertex there is often a pair of much shorter closely placed divergent postvertical bristles. The area between the vertex and the bases of the antennae, bounded laterally by the eyes, is the postfrons (or simply frons of many authors). The anterior marginal region, divided off by the ptilinal fissure, is the frontal lunule. It often forms a more or less horizontal ledge above the bases of the antennae. There are 3 closely grouped ocelli on the posterior median part of the postfrons (absent in the African genus Bromophila). From between the ocelli there often arises a pair of ocellar bristles. The one or two pairs of fronto-orbital bristles when present are situated on the

upper lateral parts of the postfrons, not far from the eyes. The anterior surface of the head below the postfrons is the face or prefrons. The lateral areas, between the downwardly produced lateral arms of the ptilinal fissure and the eye on each side, are called the parafacials. Lying immediately inside the parafacial is usually an antennal groove into which the antenna may be folded. Often, especially in the subfamily Platystomatinae the median area of the face between the antennal grooves forms an elevated ridge or platform, the facial carina. When well developed this may be flat topped with sharp lateral margins, and is narrowed towards the upper extremity where it passes between the bases of the antennae. At its lower extremity the sclerotization of the face ceases abruptly on the transverse epistomal margin. The lower lateral angles of the face may be produced laterally beneath the cheeks from which they are separated by the latero-facial sutures which continue downwards and outwards from the outer margins of the antennal grooves. The shape of these lateral extensions of the face has proved a helpful taxonomic character for separating some species of Euprosopia. The cheek is the lateral area of the head capsule lying below the eye. The height of the cheek, a measurement used in the descriptions, is the vertical distance between a horizontal line passing through the lowest point of the cheek. The cheek has usually a fairly strong, downwardly directed cheek bristle differentiated from the

surrounding hairs. The occiput is the term for the entire posterior surface of the head capsule. In the Platystomatidae, and particularly in many of the Platystomatinae the lower part of the occiput is swollen or convex whereas the upper part, immediately below the vertex is flat or slightly concave.

The ventral surface of the head is the membranous subcranial region supporting the mouthparts. It is sometimes referred to as the subcranial cavity, but when the mouthparts are extended it ceases to be a cavity. Anteriorly the subcranial membrane supports a horseshoe-shaped or lip-like sclerite, the prelabrum. It has been erroneously called labrum, but may be homologous with the clypeus.

The mouthparts are very similar to those of such better known forms as Musca and Calliphora. The maxillae are reduced to the large, unsegmented palpi attached to the membranous basal part of the proboscis. The distal part of the proboscis has on its anterior surface an oral groove leading to the mouth opening near its base. The oral groove and mouth opening are concealed by the elongate labrum which is attached just in front of the mouth. The posterior surface of the distal part of the proboscis is covered by a sclerite, the theca, always broadly developed in the Platystomatidae. At the terminal end of the proboscis there is a pair of broad semicircular labella, armed with numerous pseudotracheae which radiate from the end of the oral groove.

(D) The Thorax (fig.18)

The prothorax in most of the Platystomatidae is of the greatly reduced kind generally met with in the Schizophora. In a very few genera, notably Angitula and Giraffomyia, the prothorax is prolonged forming with the cervical region a prominent neck (Speight, in press). The prosternum, or more correctly the basisternum of the prothorax varies considerably in shape. In the Traphorinae it is very broad, with broadly rounded lateral lobes. In the Scholastinae and Platystomatinae it is generally more or less quadrate and the anterior angles may be connected to the propleura by means of variably sclerotized precoxal bridges. Speight (in press) records the shape of the proternum in many platystomatid genera. The humeral calli, a pair of prominent convexities on the anterolateral angles of the dorsal surface of the thorax, are usually considered to belong to the pronotum. Frequently a humeral bristle is borne on each humeral callus.

The enlarged mesothorax of the higher Diptera is so highly modified that it is almost impossible to apply terms to most of the parts which indicate exact homologies with the sclerites of other insects. The greater part of the dorsal surface of the thorax forms the mesoscutum, often referred to as the mesonotum, but more correctly the latter term includes also the scutellum. Laterally immediately behind the humeral callus and in front of the wing base

is the notopleural area which is not sharply defined in the Platystomatidae. It usually bears an anterior and a posterior notopleural bristle, the latter surmounting a tubercle, the posterior notopleural callus. The pair of notopleural areas is considered to represent the mesothoracic prescutum by Snodgrass (1935). From the posterior end of each notopleural area a transverse suture runs for a short distance in a mesal direction on the mesoscutum. The bristles of the mesoscutum (see fig.18) include the following: supra-alar, postalar, intra-alar, dorsocentral, and prescutellar acrostichal. All these bristles are paired. At its posterior extremity the mesoscutum is separated from the scutellum by a deep secondary scutellar suture. The scutellum forms a posteriorly projecting platform, its dorsal surface almost level with that of mesoscutum. At the free edges it bears a number of scutellar bristles. The scutellar bridges are a pair of strongly raised ridges, one from each upper basal angle of the scutellum running anteriorly to the mesoscutum and bridging the scutellar suture. A longer ridge on each side of the thorax runs from the lower lateral angle of the scutellum to the wing base. This is termed the suprasquamal ridge by Malloch (1929). The presence of hairs on this ridge is sometimes a useful taxonomic character. Below the posterior edge of the scutellum there is usually a transverse convexity, the postscutellum. Below the subscutellum the postnotum drops away almost vertically to

the base of the abdomen. The pleura of the mesothorax are made up of the following sclerites: mesopleuron, pteropleuron, pleurotergite, and sternopleuron. This application of the term mesopleuron to a sclerite which is only part of the true mesopleuron is unfortunate but well established and no very suitable alternative is in use. The mesopleuron, pteropleuron, and sternopleuron may each have a distinct bristle, known as the mesopleural, pteropleural, and sternopleural bristles respectively. In many platystomatids some or all of these bristles are absent. Posteriorly the mesopleuron is limited by a broad membranous cleft, which is a modified suture. Normally this terminates where it meets the upper margin of the sternopleuron, but in Giraffomyia and Angituloides it penetrates deeply into the region of the sternopleuron. The basalare is a small sclerite bordering the posterior side of the upper extremity of the membranous cleft. In many species of Euprosopia, more particularly in the females, it bears a basalar process which projects upwards or forwards. The metathorax, apart from its appendages, is represented only by the pleura and sternum. The pleura tend to become continuous with the meron of the middle coxa to form the hypopleuron. In Angitula, Angituloides, and Giraffomyia the posterior surface of the metathorax between the bases of the hind coxae and the first abdominal sternite is extensively and heavily sclerotized to form a broad postcoxal bridge which is quite continuous with the hypopleuron on each side.

A much less marked development of the postcoxal bridge occurs in some species of Achiosoma. It is present also in some other elongate acalyptrates e.g. in the families Tephritidae (Phytalmia, Diplochorda, Dacus, Soita, Adrama), Micropezidae (Crosa), Megamerinidae, Gobryidae, Diopsidae, etc.

The legs of Platystomatidae vary much in length and thickness, and in the armature of macrotrichia which may or may not include distinct series of bristles. Apart from these superficial differences the structure of the legs is uniform throughout the family and similar to that of other higher Diptera, except for certain specific modifications more or less confined to the male sex. Most of these are mentioned in the specific descriptions or in the section on specific sexual characters. One character worth mentioning here is the presence of the mid-coxal prong in all Platystomatidae, because this prong is absent in many species of the related family Pyrgotidae. The terms anterior, posterior, dorsal, and ventral, as applied to the surfaces of the legs, indicate the position of those surfaces when the leg is completely extended horizontally at right angles to the longitudinal axis of the body. As a further guide, the knee-joint between femur and tibia is taken as moving in a transverse plane dividing anterior from posterior, and the tarsus is considered to be dorsoventrally compressed.

The wing-base includes several structures of taxonomic importance. The tegula is a normally scale-like process,

armed with macrotrichia, which overlaps the anterior surface of the basal extremity of the wing. It is much modified in the females of certain species of Euprosopia. The axillary lobe is a membranous elastic lobe which forms an extension of the wing membrane between the posterior basal part of the wing and the body of the thorax. In most Diptera this extends back along the surface of the thorax to the lower lateral angle of the scutellum as a narrow fringe. In certain groups, notably the Tabanidae and the "calyptrate" families, this fringe is broadened into a conspicuous lobe, the squama or calyptra which may conceal the haltere from above. (Calyptra is the form of the word in both Latin and Greek and is preferable to the forms calypter and calyptron sometimes used.) In many of the subfamily Platystomatinae and perhaps all of the subfamily Scholastinae the squama is a well developed and often conspicuous lobe. This is a most unusual character among the "acalyptrate" families.

The wing venation of the Platystomatidae is of the type characteristic of the Schizophora as a whole. The nomenclature of the veins is that employed by Harrison (1959: fig.437) and Munro (1947: t.fig.13) except for the following points: the anal vein of Harrison is here termed vein 6; the upper crossvein of Munro is here termed anterior crossvein; the posterior crossvein of Harrison, lower crossvein of Munro, is here termed the discal crossvein; the vein separating the second basal and discal cells is here termed

the basal crossvein; the vein closing the distal end of the anal cell is here termed the anal crossvein. The nomenclature of the cells here used is also that of Harrison and Munro except that the cell between the subcosta and vein 1 is here termed the subcostal cell. The costal vein in Platystomatidae is weakened or incised about half way between the humeral crossvein and its basal extremity and again more distinctly a short distance beyond the humeral crossvein. The costa is not incised or broken at the end of the subcosta, a point which distinguishes the Platystomatidae from the Tephritidae. In most families of Tephritoidea the anal cell has a characteristic shape, the anal crossvein being indented and the outer posterior angle of the cell being produced into an acute lobe. In comparatively few of the species of Tephritidae, Otitidae, and Pyrgotidae but in all species of Platystomatidae the anal crossvein is not indented and the anal cell has no acute lobe. In a few platystomatid genera (Asyntona, Clitodoca, Giraffomyia, and Loxoneura) the anal cell is acute, but not lobed. Macrotrichia or setulae occur on the upper surfaces of veins 1 and 3 in all platystomatids that have been studied. In some forms there are also setulae on vein 5, most frequently confined to the basal section of that vein bordering the anal cell. The setulae on vein 1 generally extend from just beyond the level of the humeral crossvein to the distal extremity of the vein. In the genera Euprosopia and Pterogenia there is

a group of setulae on the basal part of vein 1 (radial vein) before the level of the humeral crossvein. Similar variation in the extent of the setulae on vein 1 occurs within the family Tephritidae. In the family Otitidae the setulae on vein 1, when present, are usually more restricted to the distal part of the vein. In order to facilitate description I have introduced a system of nomenclature for the bands of pigmentation on the wing, which is shown in fig. 74. This system was originally devised for Euprosopia species but its use has been extended to the genus Lamprogaster, and it could also be employed for description of Rivellia species.

The metathoracic haltere shows no unusual characters in the Platystomatidae, at least under moderate magnification. For descriptive purposes it is divided into three parts, a swollen basal scabellum, an elongate stalk-like pedicel, and an expanded apical capitellum.

(E) The Abdomen

The term preabdomen is applied to the relatively unmodified anterior segments of the abdomen. In the males of Tephritoidea the preabdomen consists of segments 1 to 5. Usually in females of Tephritoidea the preabdomen may be considered to consist of segments 1 to 6, but in the Platystomatidae segment 6 of the female is always reduced in size and in most genera its tergite is concealed or absent. Hence it is convenient to regard the first five segments as constituting the preabdomen as in the male. The first two

tergites of the abdomen are invariably fused together, though a faint transverse line appears to indicate where fusion has taken place. In the males of some species of Euprosopia, Lamprogaster, Platystoma, and other genera of Platystomatinae tergite 5 is enlarged at the expense of the preceding tergites, apparently in connection with accommodating the genital pouch (see below). By contrast, in the subfamily Scholastinae tergite 5 of the female is always reduced in size or absent and tergite 4 may also be reduced or absent. Thus in the genera Mesoctenia, Naupoda, Neohemigaster, Scholastes, and Trigonosoma the female preabdomen is covered dorsally by two large sclerites only, viz. tergite 1 + 2 and tergite 3. The preabdominal sternites are much narrower than the tergites and are sometimes reduced in size and number. The pleural membrane between the tergites and sternites is well developed and much of its surface faces ventrally because the narrowing of the sternites draws it on to the ventral surface. It may bear hairs or setulae, or, more exceptionally, scales. Normally there is a pair of spiracles for each of the five preabdominal segments, situated in the pleural membrane close to the lateral margins of its segmental tergite. In the females of many species of Scholastinae and Platystomatinae the spiracles of segment 5 and to a lesser extent those of segment 4 are displaced dorsally into the intersegmental membrane behind the tergite of their segment, and in extreme cases those of the fifth pair may be closely approximated on each side of

the median dorsal line (figs. 88, 96). More rarely the spiracles of segment 3 are similarly displaced. The abdominal spiracles vary also in the size and thickness of the sclerotized ring surrounding the opening and in the development of microtrichia on the ring. In many genera of Platystomatinae the microtrichia form a dense conical tuft (fig. 6). In Giraffomyia and Angituloides, unlike Angitula, there are no external microtrichia and the sclerotized ring is very thick in relation to its central aperture. In the Scholastinae the tuft of microtrichia is moderately developed. In Loxoneuroides there are no external microtrichia but on the inner surface of the ring there are numerous radially arranged microtrichia pointing towards the centre of the aperture.

The male postabdomen (figs. 19, 20), consisting of all the segments behind segment 5, may again be divided into the more anterior part, the protandrium (segments 6 to 8) and the posterior part or andrium including the genital and anal segments. The protandrium is without tergits or spiracles. Its sclerotized parts thus consist entirely of sternites which have become highly asymmetrical and spirally displaced in a manner that has only been adequately explained by Crampton (1942). The displacement results from the rotation of the genital segment on its longitudinal axis through 360°, and consequent torsion of the immediately preceding segments. On the right side and on the dorsal surface of the protandrium there is a membranous area which is more or less infolded beneath tergite 5 to form a genital pouch containing the distal part of the aedeagus. In those Platystomatinae in which

the aedeagus has very long terminal filaments (see below) the genital pouch may be very deep and extend into segment 4 on the right side (fig. 19).

The andrium is covered on most of its dorsal and lateral surface by tergite 9, often called the epandrium or, in Drosophilidae, the genital arch. Tergite 9 bears two pairs of rigid processes on its lateral margins, the surstyli (also called paralobes). The inner and outer surstyli of each side are closely united in their basal parts by membranous cuticle, their distal ends projecting freely. It is thus possible to distinguish a fused basal section and a free distal section in each surstylus. At its base the outer surstylus is sclerotically continuous with the surface of tergite 9. The basal end of the inner surstylus either ends freely in the membranous part of segment 9 or is joined to a ventral sclerite of doubtful origin. The distal end of the inner surstylus generally bears two short, strong teeth, the prensisetae of Munro (1947). Ventrally sternite 9 (the hypandrium) extends anteriorly far beyond the anterior limit of tergite 9. It has no external appendages other than the aedeagus but there is usually a gibbosity on each side. Most of its surface is descloritized, but there is a sclerotized arm on each side, the two arms being joined posteriorly to form the genital ring or Gabelplatte of German authors. The intromittent organ or aedeagus emerges from near the posterior end of sternite 9. Its basal section, here termed the stipe (phallotheca of Munro, 1947) is a very long more or less looped tube which, in the Trapherinae (Steyskal, 1965a), constitutes virtually all of

the aedeagus, as is also the case in the Otitidae. In the Platystomatidae, as in the Tephritidae and Pyrgotidae, the stipe is not spirally coiled as it is in the Otitidae, but from its origin passes forwards, downwards and upwards in a loop on the right side beneath tergite 5 to the dorsal surface of the protandrium when not in use (fig. 19). The distal end of the stipe may be differentiated into a usually short but highly variable segment, the preglans. In all Platystomatidae that have been examined, except the Trapherinae, the aedeagus has a variably sclerotized capsule, the glans, distal to the stipe.* It is always very heavily sclerotized in the Platystomatinae except for a membranous window in some forms. In the Plastotephritinae and Scholastinae its structure may be very complex. In repose the glans usually lies on the dorsal surface of the protandrium or in the genital pouch. A membranous bulb is often present at the distal end of the glans and in the genus Duomyia usually has a pair of membranous caeca arising from its base. In the subfamily Platystomatinae only, the aedeagus has a pair of hollow terminal

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* It is unfortunate that Munro (1947) restricts the term aedeagus to the glans. Because his usage is somewhat unusual, I have avoided many of Munro's terms in this work.

filaments (three filaments in the violacea group of Lamprogaster). The filaments may arise from the membranous bulb, or, when the bulb is absent, they arise directly from the glans. The bases of the filaments may be enclosed in a sclerotized tunic. The gonopores are situated at the apices of the filaments. When the filaments are very long they may be coiled like a watch spring inside the genital pouch which is enlarged to receive them. The basal end of the aedeagus connects with the posterior end of the internal rod-like aedeagal apodeme or phallapodeme. The latter has a paid of lateral arms near the middle which fit into the inner surface of the lateral gibbosities of sternite 9, on which the apodeme pivots. The anterior end of the aedeagal apodeme is compressed in a sagittal plane and has muscles attached to it. An aedeagal apodeme of this kind is referred to as fultelliform, and is characteristic of the families Tephritidae, Pyrgotidae, and Platystomatidae, but not, according to Steyskal (1961), of the Otitidae and Richardiidae. The ejaculatory duct connects the base of the aedeagus to the sperm pump which occupies a median position in the posterior part of the abdominal cavity. The sperm pump has been best described by Drew (1969) for the tephritid Dacus (Strumeta) tryoni (Froggatt) in which it appears to be very similar to that of Platystomatidae. The ejaculatory duct connects to the ejaculatory sac of the sperm pump. The posterior wall of the sac is often sclerotized to form an ejaculatory plate which, in the Platystomatinae has generally a pair of sclerotized convexities or tubercles. The anterior

part of the sperm pump is the large ejaculatory apodeme which is strongly compressed in a sagittal plane and is often fan-like in shape. It is generously furnished with muscles. Drew has shown that in Dacus tryoni the ejaculatory apodeme varies greatly with the age of adult flies and recommends care in its use as a taxonomic character. The only sclerotized parts behind the epandrium are the large paired unsegmented cerci which are often partly fused or joined by a membrane. The proctiger, bearing the anus is completely membranous and dorsal to the cerci.

As previously stated segment 6 may be regarded as the first segment of the female postabdomen. In a few forms (Xiria, Apiola, Giraffomyia, Angituloides, and the subfamily Trapherinae) segment 6 could perhaps be better associated with the preabdomen as its tergite is largely exposed and closely associated with tergite 5, though it is much shorter than the latter. In all other forms examined tergite 6 is very small and more or less hidden in a depression behind tergite 5 or it is completely absent. The spiracles of segment 6 appear often to be present in these forms. Segment 7 forms a broadly flattened sclerotized ovipositor sheath. The last pair of abdominal spiracles is situated on this segment. The terminal segments, forming the telescopic ovipositor are capable of being completely withdrawn into segment 7. Segment 8 has no tergite or sternite but has three pairs of longitudinal sclerotized strips. Its whole cuticular surface is highly flexible, as it is capable of being totally invaginated into segment 7. The aculeus is the terminal structure of the ovipositor

complex, and appears to consist of the completely fused sclerites of segment 9, and perhaps segment 10, together with the cerci. In Xiria, Lule, and some other forms the ovipositor is very like that of many frugivorous Tephritidae, being apparently adapted for piercing or cutting. Segment 8 has decussate rows of minute file-like teeth and the aculeus is very broad and blade-like with acute apex. In the Scholastinae and Platystomatinae there are generally no file-like teeth on segment 8 and the aculeus is quite slender with obtuse apex.

V. Species Limits and Specific Characters

(A) The Species Concept

It is necessary to reconsider this area of taxonomic theory despite the voluminous literature on the subject, because (1) it is often difficult to interpret popular stated definitions of the "species" in terms of natural phenomena (2) there is still an unfortunate gap in understanding between many present day systematists and modern systematic method, these systematists continuing to use the intuitive approach, a course which has invoked the derogatory generalization that Systematics is an art, not a science.

Because of the difficulty of deciding in many cases whether different populations represent distinct species or not, the author has had to consider in some detail the question of what constitutes a species, and then to test against these criteria the very incomplete evidence provided by the samples of preserved insects.

According to Mayr, Linsley, and Usinger (1953: 25) "Species are groups of actually (or potentially) interbreeding natural populations which are reproductively isolated from other such groups." The words "or potentially" would seem an essential part of the definition and are not bracketed by Mayr (1963: 19).

Dobzhansky (1951: 262) states: "Species are . . . groups of populations the gene exchange between which is limited or prevented in nature by one, or by a combination of several, reproductive isolating mechanisms. In short, a species is the

most inclusive Mendelian population". This is a double definition, each part of which will have to be considered separately. Mayr (1963: 19) quotes only the latter part of the definition given in amplified form from another publication by Dobzhansky.

The ample discussion of the attributes of species by both Mayr and Dobzhansky indicates that they are writing of much the same thing - the biological species - despite the difference in their definitions. There would appear to be no serious challenge to the continued acceptance of the biological species as the unit of classification for sexually reproducing organisms, though some of its drawbacks have been emphasised by Ehrlich (1961). The problem posed here is the clarification of certain special cases in relation to an acceptable and widely applicable species definition.

Returning to Dobzhansky's definition, the first part demands that there be reproductive isolating mechanisms, as distinct from the mechanism of geographic isolation, which he classes separately when dealing with isolating mechanisms. Some practical difficulties which this raises will be discussed below. The second part of the definition, which describes a species as "the most inclusive Mendelian population" uses only the criterion of discontinuity of population without including the necessity of genetic divergence. Here Dobzhansky seems inadvertently to have classed every insular population as a species.

In considering the definition of Mayr and others quoted above, one must examine the concept of "actually or potentially interbreeding." The significance of this is evident enough where there is no spatial separation of the populations concerned. When

populations are geographically more or less completely isolated from one another, they are not actually capable of interbreeding, but can we judge if they are potentially so? A breakdown of geographic barriers at some future date is the only method of testing the situation, but this has happened very seldom in historic times without interference by man, in which case we may doubt if we are still observing natural populations. As far as I can discern, the only way of testing the potentiality of interbreeding in such populations is an experimental man-made situation. But it is now taken as proved that ability of individuals from populations to form hybrids in captivity, and presumably under other artificially induced conditions, is no indication of their ability to do so under natural conditions. Apart from the disturbance of behaviour patterns, one of the most important deviations from the norm in interbreeding captive populations is likely to be a completely artifical set of selection pressures on the hybrids, affecting their fitness relative to that of the pure strains. The precise ecological conditions under which differentiated populations come in contact may be an important factor in deciding whether they maintain their identity or not. It will generally be impossible to predict under what circumstances populations at present geographically isolated may come together in the future.

Perhaps, if the objection to artificial situations is relaxed for less extreme cases, one might consider the possibility of introducing individuals of one population into a second geographically

separate population in order to ascertain if hybrids can be produced under nearly natural conditions. Even here the production of fertile hybrids does not necessarily indicate conspecificity, as in the end only long term competitive factors may determine how much of the introduced genetic material is able to survive as a permanent part of the gene pool. Measurement of this new genetic material in a natural population of any size is likely to prove difficult, whether or not the situation is considered relevant to species status.

However, quite apart from difficulties of testing, the author takes the view that experiments such as these are based on an erroneous philosophy. He maintains that choice between reproductive isolation versus reproductive non-isolation for totally geographically isolated populations is an impossible concept. There is no answer to the question: Is population A potentially interbreeding with the geographically isolated population B?

With reference to the problem of treating isolated allopatric populations Mayr (1969: 196) says: "....it is just as serious an error to call a population a species when it is really only a subspecies, as vice versa." It is evident that Mayr still adheres to the unsound view that the species criterion of reproductive isolation can exist in nature between geographical isolates.

Mayr's definition of a species has no application to geographically isolated populations and in this respect is deficient.

The "discrimination grid" given by Mayr, Linsley, and

Usinger (1953: 79) seems to assume that allopatric populations can be classified into "not reproductively isolated" and "reproductively isolated" categories. In subsequent admission of the limitations of this system (ibid.: 103-104) these authors advocate that, for deciding the status of geographically isolated populations consideration should be made of the degree of morphological difference separating (1) sympatric species (2) intergrading subspecies (3) hybridizing populations, elsewhere in the same genus. Similar advice is given by Mayr (1969: 196-197) in his recent revision of this work.

In many groups of insects the drawing of such comparisons could scarcely be more difficult. Genera or smaller groups of species often contain sympatric species differentiated at a variety of morphological levels including the sibling species level (almost no morphological differentiation). There is every reason to believe that the only reason for the present limited distribution of recorded sibling species in insect groups is the difficulty of their recognition in preserved material. At least in the order Diptera almost every relatively thorough taxonomic study of a major group of species brings to light some species which are differentiated at or not far from the sibling level. There is some evidence that certain taxonomic characters separating closely related sympatric species (e.g. differences in song, structure of genitalia) only become fully differentiated after acquisition of sympatry and probably as a result of sympatry. The absence of such character differences between geographically isolated

populations is not therefore to be regarded as an indication of the likely future of the populations in the event of a breakdown in the geographic barrier. The morphological differences between intergrading subspecies of hybridizing populations again will vary greatly in extent but will generally have the quality of inconsistency. That is, these populations may differ from one another in the proportion of certain phenotypes present, but not in their absolute phenotype. In the case of intergrading subspecies some morphological differentiation will be present by definition; in the case of hybridizing populations the amount of detectable morphological or other phenotypic differentiation may approach zero.

Having considered the cases of sympatric species, intergrading subspecies, and hybridizing populations in connection with the problem of geographically isolated populations, my generalized conclusions are these: (1) if there are consistent differences of a genetic nature between individuals of geographically isolated populations, then the differences might be considered to correspond in degree to those existing between sympatric species; (2) if no consistent differences of a genetic nature exist between individuals of geographically isolated populations, even though a proportion of the population may differ, the differences might be considered to correspond with those which distinguish intorgrading subspecies or other populations within a species; (3) this line of reasoning gives no indication of any minimum quantity of difference to be expected between allopatric species, but only indicates that such difference should be consistent.

A species definition which takes into consideration the status of geographically isolated populations (1) cannot assume that Mayrian reproductive isolation is always sufficient test for species status (2) must require that individuals of different species exhibit constant difference from one another in the absolute quality of certain genes or gene arrangements, at least in the most closely similar populations of any pair of species.

There still remains to be determined the quantity of the constant genetic difference. As the theoretical methods of determination have been shown to give no clue in this matter, some arbitrary practical minimum level of species difference has to be drawn up. It is clearly best to draw this level where it can be readily detected by methods available to systematists, whatever these methods may be in the group concerned. This is the only lower limit to a significant specific difference which I would care to suggest for purposes of general definition. In practice the systematist should decide on a lower limit of allopatric species difference for the group he is studying and should preferably state his criteria in publications where it has been necessary to treat such forms.

Redefinition of species. A species is the smallest naturally occurring group of genetically similar organisms which maintains a significant degree of genetic distinctness from other groups of organisms with which it is reproductively discontinuous.

Explanatory notes. (1) This definition is limited to sexually reproducing organisms and is perhaps difficult to apply to those

cases where there is excessive inbreeding either by selfing (many multiflowered angiosperms), or by brother-sister mating (possibly in a number of social insects). (2) The definition, having no time dimension, is restricted in its application to a single time transect of little depth, i.e. the present. (3) By "a significant degree of genetic distinctness" is meant, in the case of sympatric and geographically continuous populations, a difference such as will result in reproductive isolation. For the case of geographically isolated populations see the above discussion. (4) By "reproductively discontinuous" is meant reproductively isolated or geographically isolated or temporally isolated (where such isolation is not to be classified as an aspect of reproductive isolation).

Practical considerations. The present work is, by the conditions of its undertaking, restricted to the use of morphological characters (and the distribution and combination of such characters) for (1) evidence of specific limits (2) providing criteria for future sorting of specimens and populations into the species categories here defined. Further, populations are not studied as a whole, but their characteristics have to be inferred from samples which may be quite small. For these reasons the criteria I have used in deciding the status of apparently geographically isolated populations are as follows: (1) a minimum of two constant morphological characters differences exhibited in the available sample is required as sufficient evidence of species status; (2) if the differences approach the minimum allowable, each of the two morphological differences should be visible in a minimum of four

specimens of each form; (3) if the distribution of the forms is extensive and the difference between them approaches the minimum allowable, then a series of specimens from each of the geographic extremes only cannot be taken as evidence of consistent difference, there being a possibility of clinal variation.

(B) The Subspecies

The term subspecies is used for two different concepts in Zoology. Firstly there is the concept of the intergrading subspecies which is not sharply differentiated from geographically adjacent subspecies and in extreme cases is only a level in a clinal gradient. Secondly there is the geographically isolated subspecies which is not sufficiently differentiated to be considered a species in the eyes of the systematist. Most of the "subspecies" of Ornithoptera priamus (Linné) (Lepidoptera Papilionidae) are examples of this latter type (Zeuner, 1943). It is noteworthy that many of these so-called subspecies conform to the definition of species given above.

Wilson and Brown (1953) have criticised the subspecies as subjective and arbitrary in its taxonomic application. Their impressive series of arguments against the continued taxonomic recognition of subspecies include the following: (1) the type-form of a subspecies often merely represents a certain level, chosen by chance, within a cline; (2) different taxonomic characters often show independent geographic variation within a species; (3) subspecific characters may repeat themselves in different parts of

the geographical range of a species; (4) it has not been possible for zoologists to agree upon a lower limit for subspecies differentiation; (5) insular subspecies, the only really distinct entities included in this category, could often just as easily and justifiably be regarded as species; (6) the allowing of subspecific names as nomenclaturally co-ordinate with specific names has tended to clutter literature with a vaste number of names, all of which must be carefully recorded in case any of them should prove to apply to "good" species; (7) the local population of a species is just as easily and more accurately designated by naming the locality after the specific name instead of using a trinomial.

Since the publication of Wilson and Brown's conclusions there have been a number of published studies of geographic variation of continental species, and most of these lend support to the findings of those authors, particularly in respect of points (1) and (2) given above (e.g. Hagmeier, 1958, Christiansen, 1958). Good accounts of insular subspecies using a satisfactory number of characters are hard to find.

It is sometimes argued that the reducing of many less strongly differentiated, geographically isolated forms from the species to the subspecies level has simplified classification because it has reduced the number of species recognized. A counter to this is the argument that the simplification at the species level has been more that compensated for at the subspecies level, as systematists usually feel compelled to catalogue all recognizable named subspecies, either in print or on cards.

There have been few cases of recognition of multiple subspecies in acalyptrate Diptera. An exception is found in the family Micropezidae (= Tylidae) where several polytypic species have been accepted. Two of these are dealt with (one only in part) by Steyskal (1952), viz. Mimegralla albimana (Doleschall) with eight subspecies and M. contingens (Walker) with five subspecies. Both species are distributed over a number of islands of the tropical West Pacific. For some of the subspecies very few specimens are recorded, but it appears from Styskal's key to the subspecies of M. albimana that a number of these conforms to the present author's definition of a species. Elimination of the trinomial system in both Mimegralla and the better known Ornithoptera priamus species-group would result in a larger number of species, but in a reduction in the total number of taxonomic units.

It would seem that a subspecies is often described when an author is in doubt as to whether a sample represents a distinct species or not. However the concept cannot be perpetuated solely for such doubtful cases; the subspecies has never been defined as a provisional species.

I am able to formulate only three kinds of situations in which the establishment of subspecies might be desirable: (1) when well differentiated geographic races having a wide distribution are connected by a short, steep cline; (2) when insular populations are strongly differentiated taxonomically, but the differences between them are not consistent for all individuals; (3) when geographic variation is cyclic and the reproductively isolated

sympatric terminal populations require distinctive names.

It is concluded that in most cases it is difficult to justify the establishment of formally named subspecies. None has been encountered in literature on Australian Platystomatidae and none is recognized in the present account, although it is possible that with further research a few of the forms here treated might be reasonably regarded as subspecies or might be divided into subspecies.

(C) Evolutionary Role of Certain Taxonomic Characters

(1) Introductory

During the present work and earlier work relating to diversity of insect species I have been struck by the consistent reliability of certain kinds of morphological characters for specific separation and the relatively low reliability of others. This has led to an attempt to explain these phenomena in terms of the selective value of specific characters.

Dobzhansky (1937: 419) has stated: "The mechanisms isolating species from each other must be considered the only true specific characters, if the expression 'specific character' is to have any real meaning." This virtual identification of specific characters with isolating mechanisms (in Dobzhansky's broad sense) is a matter that requires further examination. It is possible that many of the characters here used for separating closely related species are the morphological manifestations of complex mechanisms tending to reduce the amount of mating or attempted mating between them.

Such mechanisms are placed together with isolating mechanisms by Dobzhansky (1951) on grounds which will be later shown to be questionable. Other taxonomic characters which have proved reliable for specific separation are those relating to avoidance of inter-specific competition. Competitive pressures between sympatric species may be at times a fundamental cause in divergence of niche which may lead to what Dobzhansky calls "ecological isolation." Though Dobzhansky has probably made too sweeping a generalisation regarding the nature of specific characters, it may be acknowledged that many of the most useful taxonomic characters at the species level are connected with the varied phenomena which he classes as isolating mechanisms (Dobzhansky, 1951: 181).

In order better to understand the relationship between isolating mechanisms and specific characters one must have some understanding of what factors are causative in the breaking up of animal populations into those units which have been defined as species, and what features may result from this speciation process.

It is unfortunate that Dobzhansky, who has been largely responsible for introducing and developing the concept of isolating mechanisms has confused under this name both causes and effects of speciation. This position may be partly excused by the fact that the speciation process may appear to involve a positive feedback where, under conditions of sympatry, the effects of isolation may contribute back to and strengthen the causal elements of the system. Thus from observation it may be difficult to decide which is cause and which effect. This is, however, no reason for

confusing the two aspects in a definition which should be free from unproved assumptions.

Mayr (1963: 91) gives a definition of isolating mechanisms which again fails to establish their role in speciation by including all "biological properties of individuals that prevent interbreeding" of sympatric populations.

I shall therefore attempt to define causal and resultant phenomena of speciation separately, reserving the term "isolating mechanism" for the former.

An isolating mechanism is any device which tends to prevent introgressive gene exchange between sexually reproducing populations or strains.

A specific mating mechanism is any genetically based device which prevents or tends to prevent mating or attempted cross-fertilization between species.

(2) Isolating Mechanisms

There are probably a few kinds of ecological conditions only which enable the genetic divergence of populations leading to speciation to gain any degree of fixity. The three kinds of conditions known to me for the insecta are (1) presence of geographic barriers (2) adaptation to more than one host species (3) accidental origin of phase differences in periodical organisms. Isolation by means of (3) is probably rare or restricted to very few groups of organisms (perhaps only the Cicadidae) so that only (1) and (2) need be considered further.

It is probable that host isolation is an important initiating isolating mechanism in parasites which are closely associated with the one host species throughout their life cycle (e.g. in Mallophaga), and also in insects in which only the larva lives upon the host (animal or plant). The latter case is usually difficult to substantiate because of the problem of proving that allopatry has not been involved during the early stages of speciation, which have taken place too long ago for recording. Cases of apparent speciation by host isolation are recorded by Bush (1969), and because these are among the very few cases of speciation occurring in historic times, it is no longer a safe assumption that this has not happened frequently in the past.

Mayr (1963: chapters 15, 16) takes the greater part of two chapters of his book to demonstrate that geographic speciation "is the almost exclusive mode of speciation among animals," yet he expressly re-defines isolating mechanisms so as to exclude geographic isolation (ibid: 91). The examples which he used to show that geographic barriers are not isolating mechanisms show the weakness of his argument. These are, firstly, that San Francisco Bay, which keeps the prisoners of Alcatraz isolated from other inhabitants of California, is not an isolating mechanism. This barrier is not at all in the nature of a typical geographic isolating mechanism for several reasons: the inmates of the penitentiary do not constitute a permanent reproducing population; there is movement of individuals between Alcatraz and the rest of California; the human species is now too mobile to be

reproductively restricted by terrestial geographic barriers. Mayr's further statement that a mountain or stream, separating two populations otherwise able to interbreed, is not an isolating mechanism, is just as difficult to accept. Such geographic barriers are frequently the major cause of speciation. They are perhaps not an isolating mechanism for those who choose to define the category to exclude them, but they are certainly a major factor in isolation. Geographic barriers and hybrid inviability barriers have similar effects in enabling divergence of the populations concerned and are best covered by a common term.

One may here object ot the usage of the word "mechanism" for a property relating to the environment of the organism rather than a biological property of the organism itself. The author feels such an objection is doubly mistaken. Firstly in modern usage the term "mechanism" is no longer confined in its application to a restricted mechanical (or, by extension, biological) contrivance producing a certain effect. Certainly Dobzhansky, when he first discussed the term "isolating mechanism" used it in a much broader sense, and I can see no adequate reason for a replacement term. Secondly, geographical isolation is not a property of the environment alone but is an interaction of three factors, the nature of the environment, the distribution of populations within the encironment, and the mobility of the individuals. At least one of these elements fits Mayr's requirement of "biological properties of individuals," mentioned above.

Geographic isolation is not only of importance in the early stages of speciation. Often it may remain intact as a barrier long after the attainment of species status by the isolated populations, preventing any other kind of isolating mechanism from coming into operation. The resulting insular species are commonly encountered in many groups of organisms. The isolation of these species is geographic only and there can be no reproductive isolation in the sense in which Mayr employs the term.

Another broad and important category of isolating mechanism is that of lower fitness of hybrids relative to the parent species. At one extreme there is the failure of a hybrid zygote to segment, and there is a range through premature death or sterility of F_1 hybrids to the marginally lower fitness under certain circumstances of hybrid swarms. Saccà (1964) has recorded large hybrid populations between the forms Musca domestica cuthbertsoni Patton and Musca domestica curviforceps Saccà and Rivosecchi. Though these hybrid populations continue to reproduce for a long time, they are, under certain circumstances and in certain areas, not indefinitely viable and may die out, leaving only the pure parental strains. It is apparent that even such a slight inferiority in hybrid fitness may constitute an isolating mechanism, though in the case quoted its efficiency is reduced by geographic variability. It will usually be the first isolating mechanism to operate when grographic barriers are opened during a process of geographic speciation, since it is not dependent on a prior period of sympatry. Also in the case of host speciation

the lower fitness of intermediate forms is probably of primary importance, where individuals having a complex of genes adapting them to one or another host are adaptively superior to those having a mixture of genes, some of which are favourable for development in one host, some for development in another. Under such circumstances extreme combinations of genes are selectively superior to intermediates and gradual divergence of the populations is possible. This would appear to be the mechanism enabling sympatric host speciation in tephritid fruit flies as described by Bush (1966; 1969). A convincing laboratory model showing how isolates may be produced sympatrically by "disruptive selection" is given by Thoday and Gibson (1962).

(3) Specific Mating Mechanisms

When closely related species come to occupy the same geographical territory their fusion is initially prevented, even though mating may occur (occasionally, if there is already a degree of ecological or temporal divergence), by the relatively low fitness of their hybrids. At this stage it may be possible for considerable numbers of hybrids to appear, but if sufficient genetic divergence of the right kind has taken place between the populations the hybrid lines will not continue indefinitely on account of their inferior fitness and will not cause introgression between the parent species. Repeated backcrossing may produce some individuals having virtually the genotype of one or other of the parent species. These may indeed be equal in fitness to the parent species but then they are not hybrids genetically and cannot cause introgression.

A situation like the above appears to exist between forms of Musca in certain parts of Africa as mentioned previously. The rarity of such situations is probably due to rapid evolutionary changes which tend to take place in closely related sympatric species.

Wherever hybrids are of lower fitness than the parent species the ability of an individual to mate with or fertilize an individual of the other species is a selective disadvantage for its genotype as it will tend to eliminate the lineage sooner or later, to the advantage of alternative genotypes which tend to reduce cross-mating in favour of intraspecific mating. In pairs of closely related newly sympatric species pressures to build up genetically some barrier or barriers to attempted crossfertilization must be considerable. This fact has been quite generally recognized by evolutionary geneticists. What they have failed to realize is that these secondary genetic mechanisms are not necessarily or even usually isolating mechanisms for more or less complete isolation already exists before the secondary mechanisms can be selected for, and such complexity or efficiency as they may often exhibit is not to be acquired by accident. These genetic attributes comply with thedefinition of specific mating mechanisms given above.

There are many known cases where the efficiency of specific mating mechanisms approximates to 100%, and appears altogher to prevent gene exchange between closely related sympatric species in the absence of intersterility. This appearance is probably superficial and short term. Mutation will eventually tend to disturb the perfection of any such delicate mechanism and lead

to formation of a few hybrids if these are viable. If the hybrids are not viable the new allele which allows cross-mating will tend to be eliminated from the population. If hybrids are able to develop in such circumstances their absence or extreme rarity in wild populations presumably indicates that they are of inferior fitness to the parent species and they or their descendents are eliminated by natural selection. Hence the mutant allele also tends to be eliminated.

In any population complex where specific mating mechanisms are being developed or maintained by selection, the rate of removal of genes enabling cross-mating will be slower than the rate of selective removal of hybrids except in the highly improbable case of a dominant gene operating at 100% efficiency in favour of hybrid production. Usually there will be a considerable difference in these two rates. As a result one would expect a marked degree of hybrid inferiority in order to produce a specific mating mechanism of the more efficient kind. Clearly, then, isolation of gene pools will take place by means of hybrid inferiority before cross-mating can be wholly prevented by specific mating mechanisms.

A laboratory experiment which illustrates the difference between an artifically imposed isolating mechanism and an artifically induced specific mating mechanism has been described by Koopman (1950), who, however, regarded the latter as an isolating mechanism.

Koopman used for his experiment strains of Drosophila pseudoobscura and Drosophila persimilis, each homozygous for a different recessive gene so that hybrids between them could readily

be detected. Adults of the two species were mixed under optimum temperature conditions for production of hybrids for a number of generations. In each generation all hybrids produced were removed and only the pure species were permitted to contribute to the next generation. After a number of generations there was a very marked decrease in the percentage of hybrids produced in the progeny, largely due to a decrease in cross-mating. It will be seen that the conditions of the experiment impose a 100% effective isolating mechanism - the complete inviability of hybrids. So long as these conditions continue no other isolating mechanism can operate because this mechanism in itself absolutely prevents introgression. Were such conditions to exist in a pair of newly sympatric populations, they would act as two species. The building up of barriers to cross-mating is a secondary effect of this isolation and is an experimentally produced specific mating mechanism. Here it may be seen that the isolating mechanism prevents introgression; the specific mating mechanism tends to prevent hybridism or fruitless attempts at mating or fertilization.

Mayr (1963: 549 et seq.) suggests that the view, that "isolating mechanisms" are only perfected under conditions of sympatry through selection, is unsound. One would tend to agree if he had used the term isolating mechanism only to cover his post-mating mechanisms. His line of argument, however, suggests that at times he is also referring to those premating mechanisms here termed specific mating mechanisms. This ambiguity leads to considerable confusion in his arguments. One statement worthy

of further examination is the following (op.cit.: 549): "Perhaps the most convincing argument against natural selection is supplied by the 'old' hybrid belts....These have existed in many cases for thousands of years, and the narrowness of the belts proves that the hybrids are being selected against. Yet there is no indication that this has led to a strengthening of the isolation in many of the cases." It is necessary to compare some different kinds of of geographic patterns formed by contact between newly diverged species populations in order to understand why, in some cases, no specific mating mechanisms have arisen to eliminate these hybrid belts or narrow zones of intergradation.

Within a stable hybrid belt which contains most possible kinds of intermediates between the pure species (examples given by Mayr, 1963: 369 et seq.), there are not strong selection pressures eliminating hybrids. If this were not so, hybridism would rarely extend beyond perhaps the F_2 or F_3 generations. It even appears possible that selection may favour certain hybrids in the zone of intergradation, perhaps because of some intermediate conditions in the environment. On either side of the hybrid zone there must be a rigorous selection against hybrids, or else noticeable introgression would extend to these areas. Selective pressures to develop specific mating mechanisms cannot operate between the pure species populations because they are not directly in contact, but are only connected through a zone where hybridism is not disadvantageous and specific mating mechanisms not therefore advantageous. This argument is not offered as a full explanation

for the existence of persistent zones of intergradation, but, given this population structure, it appears to be the reason for non-development of specific mating mechanisms.

Let us now contrast a different geographical pattern where two very closely related species have come to occupy a large area in common. If, as appears often to be the case, hybrids are inviable or selectively inferior, there will be a strong tendency towards evolution of specific mating mechanisms as described above. Many pairs of species apparently conforming to this pattern have been encountered by the author among Diptera, e.g. Euprosopia comes and E. separata, Euprosopia anostigma and E. armipes, Euprosopia conjuncta and E. biarmata (in the present work), Austroleria extensa and A. truncata, Diplogeomyza diaphora and Diplogeomyza tridens (McAlpine , 1967).

Zones of hybridization may exist in which the species concerned exhibit specific mating mechanisms. Fisher (1958) cites recurrent hybrids between the butterflies Limenitis arthemis and L. astyanax occurring at low frequency in the narrow zone of overlap of these two species. A strong mating preference (specific mating mechanism) is said to be responsible for this low frequency. Apparently the hybrid lineages are eliminated after a few generations because of inferior fitness. If Fisher's data is accurate, the gene pools of the two species are as effectively isolated as if every hybrid zygote perished. He is therefore mistaken in suggesting the forms to be subspecies rather than species. The author is in agreement with Fisher that the "sexual preference" is favoured by a selective

process, but not that this process "would establish an effective isolation", as effectively complete isolation continues even when the "sexual preference" breaks down.

(4) Kinds of Specific Mating Mechanism.

Common mechanisms of preventing cross-mating in insects include specific differences in time or place of courtship, differences of courtship pattern, visible appearance, chemical secretion, or song, and the necessarily correlated responses to the stimuli imposed by these. Because specific mating mechanisms vary much in their efficiency, their unity as a category has not always been recognized (e.g. by Mayr, 1963). They may approximate to 100% efficiency, virtually eliminating hybridism between interfertile sympatric species, or their efficiency may be so low that their operation often escapes notice, even under laboratory conditions.

(4a) Insect Genitalia

There has been difference of opinion as to the nature of structural differences in the genitalia of insects. Watson (1966) has suggested that in the genus Trapezostigma (Odonata) the specific differences in the genitalia may constitute a "lock and key" isolating mechanism, playing a role in the speciation of the group. Somewhat similar conclusions have been reached by a number of other entomologists regarding genitalia characters in various groups of insects. Robson and Richards (1936) contest this viewpoint. Mayr (1963: 104) while admitting that mechanical isolation (e.g. by means of genitalia differences in insects)

plays "a very minor role" in most groups of animals, suggests a quite different explanation for their interspecific diversity as follows:-

"The genitalic apparatus is a highly complicated structure, the pleiotropic by-product of very many genes of the species. Any change in the genetic constitution of the species may result in an incidental change in the structure of the genitalia. As internal structures they are less subject to the corrective influences of natural selection than are the components of the external phenotype, provided the basic function of gamete transfer is not impaired."

Consideration of genitalic characters in numerous families of Diptera and in other insect groups causes the author to reject this as a satisfactory explanation. It fails to account for the extraordinary stability of genitalia characters within a species as contrasted with the often very great differences between genitalia of species otherwise almost indistinguishable, and with the comparatively haphazard variation of many other characters, including external characters. Yet, according to Mayr's explanation, these latter should be more easily stabilised by selection and the genitalia be readily modified by incidental changes in the genetic constitution of the species. It fails to account for the complexity of genitalia in so many groups of insects, a complexity which would seem likely to evolve through direct selection on the phenotype, rather than as a chance by-product of pleiotropic genes. It carries the necessary but

improbable corollary that similar systems of genes with secondary effects on genitalia exist in perhaps a majority of insect families and most insect orders. Moreover highly specific genitalia characters occur in other groups of animals besides the Insecta. They have been described in monogenetic trematodes (Sproston, 1946), in many Acarina (e.g. Davies, 1968), in Diplopoda (e.g. Johns, 1964), and elsewhere in the animal kingdom, probably always in cases where there is a possibility of the sexual stages of different species mixing with one another.

The only logical explanation that is in accordance with these facts is that structural specific differences in the genitalia of insects generally represent the morphological manifestation of a specific mating mechanism involving a specific stimulus and response.

Frequent records of effective copulation between heterogeneous pairs taken from species with differing genitalia in no way militate against this conclusion. Such experiments and records have not, in general, been placed on a rigorous statistical basis, and merely indicate that genitalia differences are often of low efficiency in their role as specific mating mechanisms. Only a very low degree of efficiency would be necessary for selection and ultimate fixation of the divergent genotypes in newly sympatric sibling species.

Some accounts of "mechanical isolation", e.g. that of Dobzhansky (1951: 189-190), seem to imply that the genitalia of insects show no greater amount of specific distinctness than do

numerous other morphological characters. There are undoubtedly groups where this is the case, but the number of groups in which the reverse is the case is overwhelming. In almost all families of Diptera and a great many in other insect orders the one part which most consistently exhibits morphological differences between sympatric species is the male genital complex. Like many other taxonomists I have illustrated the extraordinary diversity of male genitalia in some groups of Diptera, of which a typical example is the heleomyzid genus Diplogeomyza (McAlpine, 1967). Here each of the five species of what I have called "group 4" has a totally different kind of aedeagus and the less complex clasping or guiding appendages (surstyli and parameres) show a diversity of form that is quite specific. So closely related are these species that, before examining the genitalia, I had tentatively placed three of them together as one, though additional specific characters were subsequently found. In the partially sympatric species Diplogeomyza wirthi McAlpine and D. conformis McAlpine belonging to "group 1" multiple differences exist in the male genitalia, yet no other characters for separating the two species have been found. Many similar cases are known in other groups of insects.

Thomas (1950) has described the intimate association of the male genital appendages with the vaginal opening of the female during copulation in Sarcophaga. In this genus the form of the external genitalia shows a high degree of variability which is quite specific, and the female is known to exercise a very precise

choice on males attempting to copulate. The conclusion seems almost inescapable that the pattern of stimulation caused by the structure and perhaps the movements of the male genitalia assist the female to make this choice.

In the genus Pseudopomyza (= Heluscolia) (Diptera, Pseudopomyzidae) an interesting geographic pattern is seen in specific variation of male genitalia as exemplified by the form of the surstylus (author's unpublished observations). One species occurs in Europe, one species in Australia, and four species in New Zealand, comprising two pairs of sympatric or apparently sympatric species. The form of the genital segment and surstylus in the widely isolated European and Australian species is very similar, whereas in the four New Zealand species these characters are quite diverse. The Australian and European species do not otherwise appear to be closely related within the genus. These observations are in accordance with the theory that genitalia characters diverge under conditions of sympatry because of selection as specific mating mechanisms, but do not do so under conditions of complete allopatry. Watson (1966) presents data on the size of genitalia in the genus Trapezostigma (Odonata) also showing divergence between partially sympatric species which is not necessarily present between completely allopatric species. The structure of male genitalia in the genus Australimyza (Diptera, Carnidae) appears to show a similar pattern (author's observations). This phenomenon is related to but not identical with that designated as character displacement by Wilson and Brown (1956). A parallel may here be drawn with geographical

patterns in calling songs of crickets. Alexander (1962) has pointed out that "acoustical behaviour is always different among species that are sexually active in the same place at the same time," but is not necessarily so between completely allopatric species. It might be expected that different forms of specific mating mechanism would show similar distribution patterns, irrespective of variation in efficiency.

The failure of cross-mating pairs to separate successfully, or the rendering sterile of an individual of a cross-mating pair may possibly be considered as isolating mechanisms if the species occur together in nature. They cannot be regarded as typical examples of specific mating mechanisms, because they can have no positive selective value and because they render ineffective not only cross-mating but also any subsequent attempts at intra-specific mating.

(4b) Secondary Sexual Characters

It is probable that the inclusion of the appendages surrounding the aedeagus (e.g. surstyli, paramores) under the term genitalia is an inexactitude, as they are not part of the primary reproductive system. Strictly speaking they should perhaps be regarded as secondary sexual structures exhibiting secondary sexual characters. However, in view of current usage it is simplest to continue the term genitalia to include the periphallic structures and to regard characters which appear on other parts of the insect in one sex only as secondary sexual characters.

Secondary sexual characters frequently show highly specific

differences, and in some genera are the most reliable or the most obvious specific characters. Sometimes they may offer more useful specific characters than the genitalia for taxonomic use. The modifications may affect many different parts of the body, often with spectacular results. The variety of adornments and coloration in the males of birds of paradise are a well known example. In an undescribed genus of the Dipterous family Tephritidae from Australia the males of the four known (undescribed) species show very conspicuous differences in wing pattern, whereas the females show little difference among themselves but, except in one species, are quite different from the males. Bush (1966) considers that "use of the wings in courtship displays may account for the widespread occurrence of distinctive species specific and occasionally sexually dimorphic wing patterns in many groups of Tephritidae." It would be interesting to know if the quite small but constant differences of wing pattern between closely related species of Euprosopia are distinguishable by the insects themselves. E. tennicornis and E. anostigma inhabit the same tree trunks at Kurnell, as is probably also the case with E. anostigma and E. armipes at Iluka, and especially in the latter pair the difference in wing pattern is quite small.

In the Diptera specific secondary sexual characters of the visual kind are less common than structural ones. The latter frequently take the form of tubercles, modified hairs, spines, or deformities of legs or less frequently of other members, or they may be represented by spatulate hairs or a spatulate

modification of the arista. The function of these structural characters has rarely been investigated but observations on preserved specimens of Euprosopia offered below provide evidence of their use in some cases. These observations suggest that their selective value is not very different from that of genitalia characters and that they are usually the manifestation of specific mating mechanisms. Some characters used in courtship may become grossly exaggerated through intraspecific competition for a mate (intra-sexual selection), but where such characters contrast sharply between related species it is a reasonable assumption that their use also constitutes a specific mating mechanism.

The specialised secondary sexual characters differentiating species are, in the Diptera as in other animals, much more frequently an attribute of the male sex than of the female. This conforms to the general statement by Bateman (1948) that the female is usually the more discriminating member of a courting pair tending to exercise favourable choice on the male most likely to fertilize the ova to best effect. The male, having a surplus of gametes can attain the maximum of offspring by courting often and with less discrimination, according to Bateman's explanation. If such is the case selective forces will favour males with specific characteristics which enable correct discrimination by females.

Sometimes distinctive secondary sexual characters of a structural nature occur in the female. An example is the modified fore tibia in the female of Diplogeomyza signata McAlpine -

a modification not found in any other species of the genus or in the male of this species. From its appearance this modification may be a sense organ, an organ appropriate to a passively discriminating female. In the genus Euprosopia there are several different visible modifications of the thorax or abdomen of the female which are described below. Again these are probably "passive" modifications, and there is some evidence that the specialised part is actively held, rubbed, or touched by the legs of the male, which may themselves show modifications for this purpose.

Some other specific characters which occur in females only are differences in the organs of oviposition. It is possible that these are selected for through ecological displacement effecting choice of oviposition sites in closely related sympatric species.

(5) Specific Sexual Characters in Platystomatidae

Characters of the Male

Coloration. Sexual dimorphism in colour is rather rare in the Platystomatidae. In Achias there are often small differences between the sexes in markings on the face and cheeks, and these markings also show some inter-specific variation. In Duomyia testacea the face of the male is sharply bicoloured, a character which contrasts with the female and with the male of related sympatric species. Observations on courtship to ascertain if the male and female face each other at close quarters as in Lenophila dentipes would be of interest. It seems possible that

these characters could constitute a specific mating mechanism.

Modifications of the head. In males of a number of genera there is a conspicuous widening of the head. In Cleitamia astrolabei the male has a widened head, while in the exceedingly similar sympatric species C. orthocephala the male has a normal head like that of the female (Malloch, 1939a). Varying degrees of head widening occur also in males of the genera Atopognathus, Trigonosoma, Asyntona, Zygaenula, Mesoctenia, and Pterogenia (but not in the known Australian species of the last). In Mesoctenia australis from Queensland and an undescribed species of Mesoctenia from New Guinea the widening is accompanied by production of the epistomal region into a large lobe, giving the head of the males a very characteristic appearance (fig. 23). In the male of M. coalescens from New Britain the head is conspicuously widened but there is no trace of the epistomal lobe. It is not yet known if males of species having differently formed heads occur sympatrically as males of Mesoctenia are poorly represented in collections. It seems probable, however, that these conspicuous modifications play some role in courtship, whether or not they are used for species recognition. Perhaps fighting for the female occurs as in the drosophilid Zygothrica dispar the male of which has a much widened head (Richards, 1927).

In the genera Achias, Achiosoma, and Laglaisia the modification of the head takes the form of protuberant or stalked eyes, through lateral extension of the orbital region of the head capsule of the males. Although within some species there is great variation

in the length of the extensions, there are often characteristic head-forms for different species. This is most apparent in Achiosoma and Laglaisia, where the appearance may enable specific recognition of the males by the females. In males of Achias australis there is much variation in the length of the eye-stalks and the smallest males have the shortest stalks. This species is sympatric with only one other congeneric species, A. kurandana, in Queensland. A. kurandana has much shorter eye-stalks than the great majority of specimens of A. australis but differs from that species in facial markings. Within its range of variation this species shows the same tendency towards reduction of the eye-stalks in smaller specimens, so that the smallest males have heads similar in shape to those of the females. These facts suggest the following theory. Males with longer eye-stalks copulate more often than those with shorter ones, because their appearance stimulates the female to acceptance more quickly. Hence selection favours greater eye length for both species up to the level where greater length begins to have too great a deleterious effect upon survival of the individual, or where greater length no longer improves rate of acceptance by the female, this level being different for the two species. When a larval food supply becomes exhausted, underfed larvae may either perish or survive to become small adults. Survival may depend on economic use of larval materials needed to form the adult body. Selection favours individuals which can make most economic use of available materials when starved, e.g. by reduction of such "luxury items" as eye-stalks. Clearly survival

of the genotype is better ensured by production of adult males with some disadvantage in mating ability, than by failure of males to survive at all because of inability to make the best use of resources. Hence it is only a selective advantage for males to have long eye-stalks when there are adequate food resources and small males with short eye-stalks are a product of the ability of the insects to reduce the proportion of materials used in building eye-stalks when food is seriously limited. I believe that this principle may be applied to other sexual adornments in insects where the relation of the size of the adornment (y) to the size of the individual (x) is given by $y = ax^n$, n being greater than unity and a being an appropriate constant. I do not believe that in this case the length of the eye-stalks is a specific mating mechanism for these two species, though they frequently occur together in the same habitat. If it were so, I believe the eye-stalks of A. kurandana would be altogether eliminated by selection as in the related A. attrahens in New Guinea.

Stalked eyes also occur among species of the following acalyptrate families: Tephritidae, Otitidae, Richardiidae, Micropezidae, Diopsidae, Periscelidae. When they are well developed in both sexes, as in Diopsidae, there is perhaps no reason to assign to them a role in courtship.

Elongate processes of the cheeks occur in males only of one or more species of the genera Clitodoca, Angitula (= Hammatopelma), Giraffomyia, and Apiola (= Xenognathus). Much shorter lamellate extensions of the cheek occur in Neohemigaster, Pterogenia and

Mesoctenia among the Platystomatidae, and Diplochorda of the family Tephritidae. Elongate processes of the cheek also occur in males of certain Tephritidae (Phytalmia, Terastiomyia), and Clusiidae (Labomyia). Enderlein (1936) associated many of these platystomatid and tephritid genera together as the family Phytalmiidae. Hennig (1940a) has shown the true relationships of the "phytalmiid" genera. Of the forms with elongate cheek processes I have only examined living specimens of Phytalmia wallacei, P. cervicornis, and an undescribed specis of Phytalmia near P. biarmata. In these the processes of the males are very conspicuous and differently shaped in each species. They are rather soft and flexible at their bases (especially in the species near P. biarmata) so that it is scarcely conceivable that they are used for combat. In Angitula, Giraffomyia, and Apiola the development or form of the processes also varies specifically but further information on individual variation is needed. At present the most probable explanation for the development and variation of cheek processes is their selective value in courtship display as specific mating mechanisms.

In the male of Pogonortalis doclea the hairs of the cheek region are very elongate and distally crimped. One is tempted to assign to this feature a role in courtship. A study of specific differences in cheek hairs in Pogonortalis is needed, especially as regards sympatric species.

Modification of the antenna. In some playstomatids, notably in certain species of Euprosopia and Duomyia, the third antennal

segment is larger in the male than in the female, and there is sometimes variation between related species in this respect (e.g. in the ventralis group of Euprosopia. The third antennal segment is primarily an olfactory receptor, so that its enlargement in the male suggests, by analogy with the modified male antenna of Saturniidae and some other Lepidoptera, that it may detect a pheromone of the female when specially developed in the male. Experimental evidence is required to confirm this hypotheses. Associated with the enlargement of the third antennal segment in the males there is often an enlargement of the antennal groove to receive it and a consequent narrowing of the facial carina and parafacial relative to those of the female.

The arista of the males of many species of Platystomatidae has a spatulate apex or palette. In these species the palette is almost always absent in the female; the one exception known to me is in Euprosopia maculipennis where the palette is present in the female but smaller than in the male. The presence of the palette appears to be very constant within species but closely related species may contrast sharply in this respect, e.g. in the species Plagiostenopterina aenea and P. onderlcini which are otherwise rather difficult to distinguish. The function of the apical palette is unknown. In an attempt to detect sense organs one surface of the palette of Euprosopia anostigma was examined at magnifications of up to c. x 30,000 with the scanning electron microscope. At these magnifications, the cuticle appears almost completely smooth and featureless. Unfortunately, because of a

faulty preparation, it was not possible to examine both sides.

Modifications of the legs. Spatulate bristles occur on the legs of some male Euprosopia. They also occur on the head in some male tephritids (on the postfrons or proboscis) but are unknown on the head in Platystomatidae. In the two species of the macrotegularia group of Euprosopia the single very elongate spatulate bristle is situated near the middle of the posteroventral surface of the fore femur. In three of the four species of the tenuicornis group of Euprosopia (the exceptional species being E. tenuicornis) there are two curved spatulate bristles on the basal segment of the fore tarsus (fig. 79). The function of the spatulate bristles is unknown but their restriction to the male sex is a remarkable analogy with the spatulate condition of the arista.

In the genus Euprosopia there are two kinds of specialised surfaces of the fore tibia which are, when present, always more developed in the male than in the female, and show different degrees of development in different species. The first kind consists of a flattened or slightly depressed area on the distal half of the posteroventral surface of the tibia which is almost devoid of the larger macrotrichia but has a dense, short, file-like covering probably consisting of sensory setae (fig. 84, se). The cuticle of this area appears to be softer or thinner than that of the rest of the tibia judging from a slight tendency to collapse in dried material. It is most conspicuously developed in E. monodon but is also present to a varying extent in other species of the tenuicornis and separata groups. When well developed it is

very like a specialised area which occurs on the fore tibiae of the heleomyzid Diplogeomyza signata, but in that species it occurs only in the female. The second kind of specialised area is on the anteroventral surface of the fore tibia (fig. 10), often in contact with the area mentioned above, but lying in a different plane. The vestiture is somewhat similar under low power to that of the first kind, but the cuticle is thrown into wave-like folds. At higher magnification under the S.E.M. the pile is seen to consist of setae with socket-like rings at their bases, many of the setae being curved (fig. 11). These appear to be sensory setae and it is highly probable that both kinds of specialised surface are sense organs, though their exact function is unknown.

A group of enlarged setulae is present on the basal part of the ventral surface of the fore tibia in males of the tenuicornis group of Euprosopia. In E. tenuicornis and E. monodon these setulae are relatively short but in the latter species they are rendered conspicuous by their goldish colour. In E. anostigma they are longer but somewhat decumbent and partially concealed by the femur when the knee-joint is flexed. In E. armipes they are especially well developed forming a very conspicuous almost erect brush. In this species some of the setulae are broadened, compressed, and blade-like. Only work with living material is likely to clarify the function of this structure.

In Euprosopia monodon, Duomyia latipilus, and D. irregularis there is a short stout posteroventral tooth on the fore femur of the male. In E. monodon (fig. 84) the tooth is absent in the

female, but in the other two species females have not been seen. In all three cases the tooth is absent in the most closely related species. I suggest that this may be an adaptation for gripping the female in a specific manner which may constitute a specific mating mechanism.

Many kinds of modifications occur in the hind legs of male platystomatids which are absent in the females. The most elaborate of these in any Australian form occurs in Lenophila dentipes. Here the hind trochanter is enlarged and of unusual form; the femur is shortened and curved; the tibia is strongly swollen distally with areas of short or thickened macrotrichia and has a complex group of tubercles with intervening areas of membranous cuticle on the dorsal surface; the basal segment of the tarsus is much depressed. The only other species of the genus, L. caerulea is almost completely without these modifications, there being only a slight ventral depression on the femur, and two small tubercles dorsally near the apex of the tibia. It is sympatric with L. dentipes over a large area of Australia. In Loxoneuroides varipennis there is a comparable but less complex modification of the hind leg. In this genus there is only one species, unless the geographic variants prove to be parapatric species. In the latter event the specific differences in the structure of the hind legs are very slight. In the two closely related species Duomyia tomentosa and Duomyia pallipes there is a conspicuous dorsal gibbosity on the tibia of the male which is of different form in the two species. This is absent in a third

closely related species, D. foliata. The geographic distribution of D. tomentosa overlaps that of both D. pallipes and D. foliata. It seems possible that these modifications of the hind legs are connected with either gripping or stimulating the female but observations on their use are desirable.

Modifications of the hind trochanter occur in species of several genera in the male sex only. In Plagiostenopterina calcarata there is a conspicuous process on the trochanter. In Duomyia decora and D. scintilla there is a marked gibbosity which distinguishes these species from D. montium in the male sex. In the closely related sympatric species Euprosopia separata and E. comes there is a dense brush of setulae on the ventral surface of the trochanter which differs in shape in two species, being set on a tubercle in E. separata (figs. 81, 82). In E. tenuicornis, but not in other species of the tenuicornis group, there is a short stout, basally constricted process on the ventral surface of the trochanter, which bears a dense brush of short setulae on its flattened distal surface (fig. 83). The apparent function of these brushes is discussed below in the section on female characters.

Genitalia. In the Platystomatidae conspicuous differences between the male genitalia of closely related sympatric species are not of quite such general occurrence as in many other dipterous families. However in most such cases differences, which may be relatively small, do exist, and in some cases the divergence has been very great.

The surstyli at times may exhibit very little variation within a species group or subgroup. Those of the closely related Lamprogaster corusca and L. excelsa appear to differ no more from each other than do certain individuals within each species. These species are not known to occur sympatrically though they are possibly parapatric. L. nigrihirta and L. flavihirta show constant but rather small differences in the shape of the surstyli. They are probably closely parapatric or only partially sympatric species, there being an altitudinal displacement. In general morphology the two are exceedingly similar. The sympatric species L. imperialis and L. rugifacies, though closely related to one another have quite distinctive surstyli (figs. 27, 28). Euprosopia reto and E. acula are another pair of closely related sympatric species with conspicuously different surstyli (figs. 99, 100). Differences, apart from those of the male genitalia, are very slight.

Differences in the aedeagus between closely related sympatric species are of very general occurrence in the subfamily Platystomatinae. These consist of differences in the form, armature, relative or absolute length of the different parts, especially the glans and filaments. Many pairs of related species exhibit non-overlap in the absolute length of the glans, so that I have often used this dimension as a taxonomic character. Fig. 17 shows variation in the length of glans for the two sympatric species Euprosopia separata and E. comes. This seems to show that variation in the size of glans is independent of the overall size of the organism, except for the most extreme individuals. In

other cases measurements often suggest that the length of the glans within a species shows less variation relative to the mean than do such measurements as length of thorax or length of wing. Unfortunately material has not yet been gathered to place this assumption on a statistical basis. Nevertheless it appears that forces of some kind are acting to reduce variation in the size of the glans in many species of Platystomatinae. A selective force which might repress variation in this way is the rejection by females of males with the glans of the wrong size. This behaviour might in turn be the result of selection against cross-mating tendencies. I therefore suggest that the specific difference in size of the glans is a component of a specific mating mechanism which occurs widely within the subfamily Platystomatinae.

Specific differences in the length of the terminal filaments are also very common. Here again the species Euprosopia rete and E. acula may be given as examples (figs. 101, 102). The three species Duomyia brevifurca, D. hebes, and D. rudis, all occurring in Queensland, differ greatly from one another in length of filaments. The distributions of these species are not well known, but the first two of these were taken at localities which are not widely separated. It is between these two species that the difference is most marked (compare figs. 62 and 63).

In the compact group of species containing Duomyia pallipes, D. tomentosa, D. foliata, and D. triquetra, the aedeagus is very complex (simplest in the last species) and there is considerable specific difference in structure (figs. 43, 44, 45, 46). Each

of these species occurs sympatrically with at least one other of the group. The two sympatric closely related species Duomyia, lonchacina and D. angustata are worthy of mention as exhibiting great divergence in almost every part of the aedeagus, including preglans, glans, bulb, and filaments. I have illustrated these at approximately the same scale (figs. 57, 58) so that the differences may be fully appreciated.

I feel that there can be little doubt that the great variation in genitalia characters together with their intraspecific consistency in Platystomatidae is due to their selection as specific mating mechanisms.

Characters of the Female

Thoracic modifications. Specific modifications of the female thorax in Platystomatidae affect the region of the wing base and the part of the thorax in front of it as far as the humoral callus. I have seen these modifications only in the genus Euprosopia and the subgenus Stenopterosoma of Plagiostenopterina, though they will probably be found to occur elsewhere in the family.

Enlargement of the tegula occurs in many species of Euprosopia, the exact form and size of the tegula being highly specific in these forms. In E. crassa the tegula is much thickened anteriorly (fig. 78), unlike any other species in the ventralis group of which the female is known. Two of the latter occur sympatrically with E. crassa in southern Queensland. In each of the four species of the tenuicornis group there is a different development of the tegula. In E. armipes it is scarcely modified being similar to

that of the male. In E. anostigma it is slightly enlarged but not much altered in shape. In E. tennicornis and E. monodon it is prolonged forward beyond the membranous cleft, being longer in the latter species than in the former (fig. 18, te). In the separata group the tegula is prolonged forwards in E. conjuncta and E. biarmata (fig. 77) but to a greater extent in the latter. In E. inermis, which is very closely related to the above two species and occurs sympatrically with them, the tegula is unmodified. Males of this species are unknown, and it is just possible that it may prove to be parthenogenetic. The most extraordinary development of the tegula occurs in the macrotegularia group, where it extends forwards to overlap the humeral callus in both the species, E. subula (fig. 75) and E. macrotegularia (fig. 76). Here again there is a difference in form between the two species. It is not yet known if these have parapatric distributions or whether they overlap somewhere in the vicinity of Townsville in Queensland.

Often associated with the modification of the tegula in Euprosopia is the development of the basalar process. Except in some of the ventralis group and E. subacuta of the scatophaga group, this structure is absent in males. It is particularly well developed in E. biarmata (fig. 77 bp) but absent or small in the related species E. conjuncta and E. inermis. Again it is distinctly developed in E. monodon but vestigial or absent in other species of the tenuicornis group.

Many modifications of the vestiture of the humeral callus have been observed. In females of the tenuicornis group the humeral

bristle is always absent or minute. This also applies to the species E. conjuncta and E. biarmata of the separata group but in E. inermis the bristle is normally developed as in the males of all these species. Returning to the tenuicornis group E. anostigma has the humeral callus with a normal covering of fine hairs but the other species of the group have the hairing greatly reduced on the posterior part in the females. In E. monodon the pruinescence is also absent from the posterior part of the callus so that it appears shining, probably through being rubbed.

In E. biarmata the macrotrichia of a large area of the mesopleuron are curiously shortened so that at normal magnifications the sockets are more conspicuous than the setae (fig. 77). Under the S.E.M. (figs. 12, 13) the setae are seen to be developed, but very short.

From my casual observations made on copulating pairs of Euprosopia, it is known that at least in some species (E. anostigma, E. subula) the males place the fore tarsus on the thorax in the general region of the wing base and humeral callus of the female. It is therefore probable that the modifications described above are all connected with providing a surface which either supports the male's fore tarsus or receives or provides a stimulus of some specific kind when in contact with the male tarsus. I believe that the reduction of hairs on certain areas is an adaptation to avoid damage of these parts when rubbed by the male. This view seems to be supported by the fact that the area devoid of hairs in E. monodon is also the area from which the pruinescence is

rubbed, presumably by the male during copulation. If the mating behaviour of these species in any way resembles that of Sarcophaga described by Thomas (1950), these features may play an important role in preventing cross-mating.

Abdominal characters. The female of Euprosopia tenuicornis, but not that of any related species, has an area of dense soft specialised pubescence on a median area of tergite 3 and on the adjacent part of tergite 4 (figs. 7, 8, 9). In all available female specimens this pubescence appears to be combed into stripes on either side of the median line and matted together with liquid. The direction of the combing is always inwards towards the median line and backwards. The areas of pubescence are in such a position that the setulose processes of the hind trochanters of the male (described above) would be likely to contact them during mating. It is concluded that the combing effect is the result of circular movements of the male trochanters when in contact with the pubescence. The liquid is probably a secretion of the female as the matted effect is not restricted to the parts that have been combed. Perhaps it is a lubricating agent reducing damage to the cuticle during vigorous combing. In E. separata and E. comes the brushes of the hind trochanters of the male appear to be used in a different manner. In females of the former species there is generally a shining spot on each side of tergite 4 where the pruinescence has been completely rubbed off, probably from vigorous rubbing by the brushes on the male trochanters. In E. comes, in which the brushes are not mounted on tubercles, the rubbing appears

to be much gentler, for the two disturbed spots are smaller, when they can be detected at all, and very little of the pruinescence has been removed. E. ventralis (ventralis group) shows smooth rubbed areas on tergite 5 of the female. These probably occur throughout the range of the species as I have seen them in specimens from Key Islands, New Guinea, and Queensland. In this species the tergite is probably rubbed with some part of the hind legs of the male which is not noticeably modified for the purpose.

In females of many Euprosopia species tergite 5 is partly or completely clothed with velvety microtrichia which replace the more generally distributed pruinescence. In some species groups the extent of the paired lateral velvety areas is highly specific (figs. 87-98). As microtrichia are not sensory structures, I am unable at present to suggest any function for these areas nor to account for their specific variation.

In the females of many representatives of the subfamilies Scholastinae and Platystomatinae the spiracles of the more posterior preabdominal segments are dorsally displaced as described above in the section on morphology. In the genus Euprosopia the position of the fourth, and more particularly the fifth pair of spiracles varies specifically within several species-groups (see figs. 85-98). It is not known if these variations are adaptations to specific methods of copulation or oviposition.

General conclusions. Specific differences in sexual and secondary sexual structures are often more clear-cut than other kinds of morphological character differences in the Platystomatidae.

It is difficult to attribute any function to some of these features without further observation. On the other hand the function of some structures, e.g. the modifications of the male hind trochanter, is evident from study of dried material and they are probably to be classed as a component of a specific mating mechanism. This is probably also the case in many of the other observed modifications, but further evidence is required concerning their mode of functioning and selective value.

(6) Possible Importance of Specific Mating Mechanisms in Macroevolution

Because specific mating mechanisms have so frequently been a basis of morphological divergence among closely related modern species it is reasonable to assume that this must also have been the case in the very remote past. We may consider then the question as to what kind of long-term contribution specific mating mechanisms could have on the morphology of animal groups, as any present day monophyletic taxon of higher value must have been represented at some time in the past by a single species. Though a demonstrably exact answer to this problem will never be available, consideration may be given to kinds of existing group characters and existing diversity among groups which may have arisen in this way.

Some major groups of arthropods differ greatly from others in the position of the gonopore or of the copulatory organs. These differences have often posed a problem to the evolutionist as some of them seem only explicable as the product of an

evolutionary saltation, when one considers that every intermediate evolutionary stage of their development must have been fully functional. Selection for specific mating mechanisms seems a possible or even probable explanation for rapid divergence in these characters.

The progoneate versus opisthogoneate condition among the myriapod-hexapod group of terrestrial mandibulate arthropods represents a case of extreme evolutionary divergence. It is not necessary to suppose that this divergence took place as the result of a single case of speciation. It is more probable that such change would have been accelerated by a number of cases of speciation each followed by sympatry of the specifically distinct populations. These changes must have taken place so long ago that they had become stabilised in the ancestral species of each of the existing classes of this complex. At the present time three of the classes (Diplopoda, Symphyla, Pauropoda) consist entirely of progoneate species; the remaining classes (Chilopoda and hexapodous forms) are exclusively opisthogoneate. No intermediate condition is known.

Variation of a more limited kind occurs in the position of the external female genital opening in the Order Lepidoptera (see Imms, 1957: 522-523). Again I would suggest evolution of specific mating mechanisms as a possible cause of the divergent types.

Secondary copulatory organs in the males which are distant from the genital opening occur in several groups of animals. Notable examples are the spiders (Araneida) where the terminal

segment of each pedipalp is modified for sperm transference, and the dragonflies (Odonata) where the male copulatory organ is situated on the first abdominal segment. Assuming that in each of these cases the primitive position of the intromittant organ was at the genital opening, a somewhat abrupt step appears to have been involved in evolution of the secondary organ. The step could well have been aided and become fixed through selection as a specific mating mechanism in an ancestral species; in fact it is difficult to conceive of any other selective force which could have brought about this change.

Richards (1927) and others have noted the varying "poses" and "positions" taken up by copulating pairs of insects, especially Diptera. Correlated with these features in males of certain Diptera are (1) the torsion or rotation of the genital segment about the longitudinal axis of the body, a feature also seen in certain Hymenoptera and Coleoptera, and (2) the flexing downwards and forwards of the genital segment. Selection pressure for exclusion of cross mating is again the most probable explanation for the diversity existing in these features. In the whole of the Cyclorrhapha the condition of circumversion, i.e. a torsion of the genital segment through an angle of 360° appears to have become established as a group character. In the genus Bombylius Richards records one species, B. discolor, with inverted genital segment, and another, B. major, with erect genital segment. Here the degree of torsion appears to be a specific mating mechanism of comparatively recent acquisition within the genus Bombylius. Within the

hymenopterous suborder Symphyta the male genital segment is rotated through 180° in the subfamily Zyelinae of the Zyelidae and in all of the superfamily Tenthredinoidea (Benson, 1951). It is perhaps unfortunate that the clumsy terms orthandrous and strophandrous have been used in the Hymenoptera in place of the simpler synonyms erect and inverted used for Diptera.

The ventral flexing of the male genital segment towards the ventral surface of the previous segments is of general occurrence in the division Cyclorrhapha and also in the family Dolichopodidae among the Diptera. It is possibly always correlated with more or less complete circumversion. It is not clear if this correlation indicates a common origin of the Dolichopodidae and Cyclorrhapha separate from that of other Diptera. Aczél (1954) has claimed that this is so, but his conclusions on at least one related matter, regarding the systematic position of the Nothybidae and the morphology of their postabdomen, are untenable (see Hennig, 1958).

VI. Relationships and Classification

(A) Status and Relationships

That the components of the family Platystomatidae are closely related to the Otitid-Tephritid group of families has long been accepted. Several important and consistent characters support this view particularly the following: preapical tibial bristles absent; subcosta always well separated from vein 1, never much reduced; vein 1 setulose dorsally; anal and second basal cells complete; in male the absence of tergite 6 and the elongate, looped aedeagus; in the female the fusion of the terminal abdominal parts into an ovipositor which can be withdrawn into the enlarged, sheath-like segment 7. Hennig (1958) and Steyskal (1961) have done much to clarify the limits of this group of families. Hennig calls the group the superfamily Otitoidea; Steyskal calls it the Tephritoidea giving it the same limits. The name Tephritoidea is here preferred as it is based on an older family-group name.

Steyskal (1961) has better defined the families of Tephritoidea than any previous worker though his views do not appear to differ widely from those of Hennig. Hennig (1940a, 1945) is responsible for setting the currently accepted limits of the Platystomatidae. The families of Tephritoidea accepted by Steyskal are Richardiidae, Otitidae, Platystomatidae, Pyrgotidae, Tachiniscidae, and Tephritidae (= Trypetidae). Two other groups which have often been given family rank are the Pterocallidae and Ulidiidae, but Steyskal has convincingly demonstrated that these should be

included in the Otitidae. It is now proposed to compare the Platystomatidae with each of the other tephritoid families in order to ascertain their relationships within the superfamily.

The Richardiidae are a family of purely American flies which share with the Platystomatidae the absence of an acute lobe to the anal cell. This lobe is present in the greater number of forms belonging to the other tephritoid families. Despite this fact the Richardiidae and Platystomatidae seem to be further apart morphologically and perhaps phylogenetically than any of the other families in the superfamily. In Richardiidae the costa is broken near the end of the subcosta but not broken just beyond humeral crossvein, vein 1 is devoid of setulae, the aedeagal apodeme is reduced or absent, and the aedeagus is not of the usual platystomatid-type. All these characters contrast strongly not only with the Platystomatidae but with other families that appear to have greater claim to relationship with the latter.

The Otitidae (formerly called Ortalidae) are the family with which the Platystomatidae have been most frequently associated. Very often, as in all the writings of Malloch and the earlier writings of Steyskal, the Platystomatidae have been considered to be a subfamily of the Otitidae. Steyskal (1961), however, has shown that the Otitidae differ from the Platystomatidae (and also from the Tephritidae and Pyrgotidae) in some significant characters which suggest that they belong to a phylogenetic branch separate from that which gave rise to these three latter families. In the Otitidae the aedeagal apodeme is simple or Y-shaped, while in the Tephritidae, Pyrgotidae, and Platystomatidae it is, so far

as known, always fultelliform. Again the apex of the aedeagus in the Otitidae lacks the sclerotized apical capsule or glans of the Platystomatidae and most Tephritidae. On this point the Pyrgotidae are too poorly known for comparison. Subsequently Steyskal showed that in the platystomatid subfamily Trapherinae the glans is absent. Despite this fact there appears to be a fairly consistent difference between the aedeagus of the Otitidae and the other families mentioned. In the Otitidae the aedeagus in repose is coiled in a rather tight spiral like a watch spring so that it can be accommodated in the genital pouch. In the other three families the aedeagus (or the stipe of the aedeagus) forms a loose complex loop generally passing forwards and then downwards from its base, backwards and upwards on the right side of the epandrium, then forwards on the dorsal surface of the epandrium into the genital pouch. If, as in some Platystomatinae, the aedeagus has very long terminal filaments these may be spirally coiled within the genital pouch. Steyskal (1961) discarded the use of the setulae on vein 1, as a family character because of its variability within the family Otitidae. My further studies suggest its use as follows. In those otitids which have setulae on vein 1 these are always confined to the distal part of the vein from about the level of maximum forward curvature of the subcosta. In all Tephritidae, Pyrgotidae, and Platystomatidae which I have examined the setulae on vein 1 extend basally almost to level of the humeral crossvein and in some genera of Tephritidae and Platystomatidae they extend considerably further basad. Examination of the genitalia figures of Otitidae provided by Steyskal suggests a further difference

between the two groups. In Platystomatidae and Tephritidae there is a pair of inner surstyli which generally have two (sometimes one) prominent distal teeth (termed prensisetae by Munro, 1947). In most Otitidae only the outer pair of surstyli appears to be present, but if there is an inner lobe or process (as appears to be the case in Diacrita) it is without the specialised teeth. In view of these contrasting characters I am in agreement with Steyskal that the Platystomatidae are well removed from the Otitidae and more closely aligned with the Tephritidae and probably the lesser known Pyrgotidae.

A further tephritoid family that should be mentioned here is the Tachiniscidae. It is possible that this rare and little known Neotropical and Ethiopian family is also a member of the narrow group which includes the Tephritidae, Pyrgotidae and Platystomatidae. If this is the case the family should be readily distinguished from the Platystomatidae by the extraordinary development of the chaetotaxy and the well developed lobe of the anal cell. Mr. B. Cogan of the British Museum (Natural History) is at present investigating the morphology and relationships of this family.

The family Pyrgotidae has been distinguished from other tephritoid families (most recently by Steyskal, 1961) by the absence of ocelli. However ocelli are fully developed in the somewhat aberrant subfamily Teretrurinae. If the view of Malloch (1933) is accepted that this group is not really pyrgotid, then there are still many undoubted pyrgotid species in which the

ocelli are present in various stages of development. In the platystomatid genus Bromophila ocelli are absent, but they are present in all other platystomatids examined. In the Pyrgotidae the anal cell is generally produced into a short acute lobe at its outer posterior corner, though there are a few forms in which this lobe is indistinct. This lobe is always absent in Platystomatidae. A more reliable method of distinguishing the Pyrgotidae from the Platystomatidae is provided by the structure of the female abdomen. In females of Pyrgotidae segment 6 is always well developed with tergite similar to and only slightly shorter than the preceding tergites. In platystomatid females tergite 6 is always much reduced in length, concealed, or altogether absent, except in the aberrant Apiola, the position of which is doubtful. Further the ovipositor sheath of Pyrgotidae (except in the Toretrurinae) is very strongly developed and dorsally convex, more or less conical, cylindrical, or globose; segment 8 is extensively membranous without longitudinal sclerotized bands, appearing amorphous in dried specimens but probably inflatable; and the aculeus is much modified, usually thorn-like or reduced, though sometimes with accessory sclerites. By contrast, in the Platystomatidae the ovipositor sheath is dorsoventrally compressed with keeled lateral margins and is less strongly sclerotized; segment 8 forms a tubular inversion membrane with longitudinal sclerotized bands; the aculeus, though somewhat variable, is always simple, straight, with sensory hairs on each side near apex. To summarize, the Pyrgotidae and Platystomatidae appear to be very closely related families; structurally there are some rather

sharp distinctions so that their separate family status seems assured, but a much more thorough morphological study of the Pyrgotidae is to be desired.

The morphology of the Tephritidae is better known than that of most acalyptrate families and therefore provides a better basis for comparison with the Platystomatidae. Remarkably consistent differences exist between the two families as shown in the following table.

Tephritidae	Platystomatidae
Lower incurved fronto-orbital bristles present.	Lower fronto-orbital bristles absent.
Costa broken near distal end of subcosta.	Costa not broken near distal end of subcosta.
Anal cell produced into an acute lobe (absent in a few forms).	Anal cell not produced into an acute lobe.
Segment 6 of ♀ abdomen well developed, its tergite only slightly shorter than tergite 5.	Segment 6 of ♀ abdomen much shortened, concealed, or absent.

Apart from these differences there is very close agreement between the families so that the Tephritidae appear to be at least as closely related to the Platystomatidae as are the Pyrgotidae. There is very close similarity in the male genitalia between many forms of both families. The inner surstylus of most tephritids and platystomatids has a pair of large distal teeth and it is in the more primitive platystomatids such as Lasioxiria that this structure most resembles

that of Tephritidae. The kind of aedeagus perhaps most common in the Tephritidae, with complex distal glans, is very similar to that of many platystomatids of the subfamilies Plastophritinae and Scholastinae. In the female postabdomen also the resemblance is remarkable. In many, perhaps primitive, genera (including Xiria, Pterogenomyia, Lasioxiria, and the Trapherinae) the aculeus is broad, flattened, often with acute apex, and apparently forms a piercing organ much as in Tephritidae. In some of these platystomatid genera segment 8 has rows of minute cuticular teeth as in many Tephritidae. Again in many tephritid genera (e.g. Dacus, Tephritis) the ovipositor sheath is dorsoventrally compressed in much the same way as in Platystomatidae.

Conclusions. The family Platystomatidae belongs to the superfamily Tephritoidea (or Otitoidea). Within the superfamily it is much less closely related to the Otitidae than has often been supposed, and is very closely related to the Pyrgotidae, Tephritidae, and perhaps Tachiniscidae. It is not closely related to the Richardiidae. There are adequate grounds for considering the Platystomatidae a distinct family from the other families mentioned above.

Definition of Platystomatidae. Tephritoid Diptera having the following combination of characters: ocelli usually present; no lower fronto-orbital bristles; vibrissa absent or rarely a rudimentary vibrissa present; costa broken just beyond humeral crossvein, but not broken near end of subcosta; vein 1 always with continuous dorsal series of setulae from immediately beyond humeral crossvein to its distal

extremity, sometimes also some more basally situated setulae; anal cell not produced into an acute lobe at posterodistal corner, the anal crossvein either straight or convexly curved; ♂ : inner surstylus well developed, generally with one or two distal teeth; stipe of aedeagus not forming a tight spiral coil in repose; ♀ : abdominal segment 6 always more or less reduced, with tergite 6 much shorter than preceding tergites, often concealed or absent altogether; segment 7 forming a flattened ovipositor sheath; segment 8 forming a tube which can be retracted by invagination, supported by several longitudinal sclerotized bands; aculeus always developed, straight, with sensory hairs on each side near apex.

(B) Subfamily Classification.

The first serious attempt at major groupings of genera within the Platystomatidae is that of Hendel (1914a). Enderlein (1922; 1924) added several more groupings. These groupings were called tribes as the authors considered the Platystomatidae as a subfamily of either the Muscidae or Ortalidae (Otitidae). Frey (1932) and Brues, Melander, and Carpenter (1954) recognized a number of these as subfamilies, assigning family rank to the Platystomatidae. Hennig (1945) transferred the subfamily Myrmecomyiinae (Cephaliinae) to the family Otitidae, and more recent authors (Steyskal, 1962, 1965a, 1965c; Frey, 1964) appear only to recognize three subfamilies, viz. Trapherinae, Plastotephritinae, and Platystomatinae. Hennig (1940a) provided

evidence that the subfamily Angitulinae of the obsolete family Phytalmiidae should be transferred to the Platystomatidae.

A thorough examination of most of the world genera would be desirable to produce a satisfactory reclassification, but a study of Australian genera, supplemented by a less complete study of certain other genera, shows that many of these are currently placed in the wrong subfamilies. The characters of the male genitalia and of the female abdomen appear to provide the most reliable characters but these are not always in accord with the characters of general form and chaetotaxy used by Hendel and Enderlein. Unfortunately the male genitalia remain unstudied for many genera. I have examined the aedeagus of a number of non-platystomatine genera but in view of the available time and material I have examined the sperm pump in only a few of these.

At present it appears that the four following subfamilies should be recognized:

(1) Subfamily Trapherinae Hendel, 1914a.

I have not examined the male genitalia of any of this group. Steyskal (1965) has figured and briefly described the genitalia of Poecilotraphera and indicated that in the genera Traphera and Lule the structure of the aedeagus is similar. The stipe of the aedeagus is largely membranous and inflated with a single anterior sclerotized longitudinal strip which is expanded apically. There is no well defined glans. In Lule abdominal tergite 5 is as long as tergite 4, and in the female tergite 6 is well developed and exposed though much shorter than tergite 5; the aculeus of the

ovipositor is very broad and acute. Traphera and Poecilotraphera resemble Lule in these characters as does Phasiamyia which may also belong here. The group is represented in the Ethiopian and Oriental Regions.

(2) Subfamily Plastotephritinae Enderlein, 1922.

Diagnostic characters: squama reduced to a linear fringe; tergite 5 not much shorter than tergite 3; ♂ : aedeagus with at least partly sclerotized glans which is always without terminal filaments; ♀ : abdomen with tergite 6 absent or vestigial and concealed below tergite 5; aculeus variable, often broad and acute.

Of the genera I have examined I would include the following in this subfamily: Atopognathus (= Dasyortalis), Conopariella, Lasioxira, Plastotephritis, Pterogenomyia. It is possible that an undescribed genus from Lord Howe Island belongs here. Frey (1932) also includes the following genera: Acanthoneuropsis, Agrochira, Atopocnema, Federleyella, Rhegmatosaga, Tylopterna. I am unable to comment on the position of these genera, most of which are African.

(3) Subfamily Scholastinae Enderlein, 1924.

This group of stout-bodied flies is somewhat intermediate between Plastotephritinae and Platystomatinae. Enderlein defined the group on the presence of the sternopleural bristle, a character much too unstable for use at the subfamily level. Other authors have not separated the group from the Platystomatinae.

Diagnostic characters: squama always forming a definite

lobe; tergite 5 much shorter than tergite 3, especially in ♀ where it is often absent; ♂ : aedeagus with glans as in Plastotephritinae, but sometimes more complex, without terminal filaments; ♀ : tergite 6 absent; aculeus very slender with rounded apex.

I include the following genera in this subfamily: Asyntona, Lenophila, Mesoctenia, Naupoda, Neohemigaster, Pterogenia, Scholastes, Trigonosoma (= Tropidogastrella), Zygaenula.

(4) Subfamily Platystomatinae Schiner, 1864.

Synonyms: Achiinae Schiner, 1868; Angitulinae Enderlein, 1936; Cleitamiina Hendel, 1914a; Lamprogastrina Hendel, 1914a; Loxoneurinae Enderlein, 1912; Rivelliina Hendel, 1914a; Stenopterinina (correctly Senopterinini) Hendel, 1914a.

Diagnostic characters: squama variable, often forming a well developed lobe; tergite 5 well developed, in sometimes shorter than tergite 3; ♂ : aedeagus with simple oval or cylindrical sclerotized glans and normally 2 hollow terminal filaments, each with apical gonopore; vesicle of sperm pump with heavily sclerotized cap usually with a pair of swellings or tubercles; ♀ : tergite 6 vestigial and concealed below tergite 5, or altogether absent; aculeus slender with rounded apex. In the African species Bromophila caffra (Macquart) the aedeagus has a single terminal filament, but this appears to be the product of fusion of the usual two. In a few species of Lamprogaster there are three instead of two filaments.

I have examined the following genera belonging to this

subfamily: Achias, Achiosoma, Angitula, Bromophila, Cleitamia, Duomyia, Elassogaster, Euprosopia, Laglaisia, Lamprogaster, Loxoneura, Loxoneuroides, Microepicausta, Plagiostenopterina, Platystoma, Pogonortalis, Pseudepicausta, Pseudorichardia, Rhytidortalis, Rivellia, Scotinosoma, Senopterina, Xenaspis.

In addition to the above groupings, the tribe Xiriina Hendel (1914a) should be mentioned. The type genus Xiria agrees with the Trapherinae in the structure of the female abdomen, but does not show close agreement in other characters. As the male genitalia are unknown, I cannot place this genus in the system at present.

(C) List of Australian Species.

SUBFAMILY PLASTOTEPHRITINAE

Lasioxiria Hendel, 1914a

(1 undescribed sp.)

Genus A (unnamed)

(1 undescribed sp.)

SUBFAMILY SCHOLASTINAE

Lenophila Guérin, 1843

dentipes (Macquart, 1843)

caerulea (Macquart, 1846)

Asyntona Osten-Sacken, 1881

tetyroides (Walker 1859)

Pterogenia Bigot, 1859

similis Malloch, 1939a

nubecula Hendel, 1914b

latericia Hendel, 1914b

Naupoda Osten-Sacken, 1881

regina Hendel, 1914b

insularis Paramonov, 1957

Mesoctenia Enderlein, 1924

australis n. sp.

SUBFAMILY PLATYSTOMATINAE

Rhytidortalis Hendel, 1914a.

rugifrons (Thomson, 1868)

solocifemur (Enderlein, 1924) n. comb. (also c. 3 undescribed spp.)

Scotinosoma Loew, 1873

bistrigata Hendel, 1914a.

completa (Malloch, 1931).

attenuata (Malloch, 1931).

erasa Malloch, 1939a.

(also c. 3 undescribed spp.)

Microepicausta Hendel, 1914a.

gracilis Hendel, 1914a.

(also 1 undescribed sp.)

Elassogaster Bigot, 1859

sepsoides (Walker, 1861)

(also 1 undescribed sp.)

Plagiostenopterina Hendel, 1914a

(subgenus Plagiostenopterina)

aenea (Wiedemann, 1819)

enderleini Hendel, 1914b

(subgenus Stenopterosoma Malloch, 1939a)

claudiana n.sp.

crinita n.sp.

macies n.sp.

Pogonortalis Hendel, in de Meijere, 1911.

doclea (Walker, 1849)

commoni Paramonov, 1957.

howei Paramonov, 1957.

Rivellia Robineau-Desvoidy, 1830.

connata (Thomson, 1868)

viridis Hendel, 1914a.

mentissa (Walker, 1849)

virgo Hendel, 1914a.

isolata Malloch, 1930b.

bipars (Walker, 1858)

nigripes (Macquart, 1851) n. comb.

(also c.23 undescribed spp.)

Loxoneurcides Hendel, 1914a.

varipennis Hendel, 1914a.

Brea Walker, 1859.

(1 undescribed sp.)

Genus B (unnamed)

(1 undescribed sp.)

Lamprogaster Macquart, 1843.

(violacea group)

violacea (Macquart, 1843)

tricauda n.sp.

(imperialis group)

indistincta Malloch, 1928a.

flavihirta n.sp.

nigrihirta n.sp.

rugifacies n.sp.

imperialis n.sp.

(stenoparia group)

viola Malloch, 1929.

stenoparia Hendel, 1914a.

corax n.sp.

(flavipennis group)

bicolor Macquart, 1847.

flavipennis Macquart, 1843.

vella (Walker, 1849).

sp. 1.

excelsa n.sp.

nigripes (Macquart, 1851)

corusca n.sp.

laeta (Macquart, 1835)

relucens n.sp.

hilaris (Walker, 1849)

sp. 2.

poecila Hendel, 1914b.

maculipennis Macquart, 1847.

(macrocephala group)

fuscibasis Malloch, 1930a.

Achias Fabricius, 1805.

kurandana Hennig, 1940b.

australis Malloch, 1939a.

Achiosoma Hendel, 1914a.

apictipenne (Hennig, 1940b n.comb.)

(also 1 undescribed sp.)

Duomyia Walker, 1849.

scutellaris (Macquart, 1851)

personata n.sp.

convallis n.sp.

pallipes n.sp.

tomentosa Hendel, 1914b.

foliata n.sp.

triquetra n.sp.

sericea Hendel, 1914b.

botulus n.sp.

argentata n.sp.

eremia n.sp.

smaragdina n.sp.

lacunosa n.sp.

marginalis n.sp.

chaetostigma n.sp.

apicalis (Walker, 1849)

lutea n.sp.

longicauda n.sp.

spinifemorata Malloch, 1929.

irregularis Malloch, 1929.

serra n.sp.

umbrosa n.sp.

octoseta n.sp.

scipio n.sp.

sp. 1

aurantiaca n.sp.

testacea (Macquart, 1855)

ustulata n.sp.

sp. 2

angustata n.sp.

lonchaeina n.sp.

capitalis n.sp.

rasa n.sp.

latipilus n.sp.

parallela n.sp.

adelaidae n.sp.

iris n.sp.

azurea Hendel, 1914b.

ameniina n.sp.

montium n.n

scintilla n.sp.

decora (Macquart, 1846)

obscura Walker, 1849.

thalassina Walker, 1849

howensis n.sp.

maculipennis Hendel, 1914b.

mithrax Hendel, 1914b.

glebosa n.sp.

loxocerina n.sp.

nigricosta Malloch, 1929.

hebes n.sp.

brevifurca n.sp.

rudis n.sp.

Euprosopia Macquart, 1847.

(miliaria group)

rete n.sp.

acula n.sp.

(ventralis group)

ventralis (Walker, 1859)

xanthops n.sp.

punctifacies Malloch, 1928a.

lenticula n.sp.

sericata n.sp.

sp. 1.

crassa n.sp.

sp. 2.

sp. 3.

piperata n.sp.

conferta n.sp.

integra n.sp.

kurandae n.sp.

sp. 4

mica n.sp.

(megastigma group)

sp. 5.

megastigma n.sp.

crispa n.sp.

(maculipennis group)

albipila n.sp.

maculipennis (Guérin, 1831)

sp. 6.

fimbripes n.sp.

vitrea n.sp.

alpina n.sp.

celsa n.sp.

(scatophaga group)

hypostigma n.sp.

subacuta n.sp.

filicornis n.sp.

scatophaga Malloch, 1930a.

ramosa n.sp.

(macrotegularia group)

macrotegularia Malloch, 1928a.

subula n.sp.

(tenuicornis group)

anostigma n.n.

armipes n.sp.

monodon n.sp.

tenuicornis Macquart, 1847.

(separata group)

comes n.sp.

separata Hendel, 1914a.

inermis n.sp.

conjuncta Hendel, 1914b.

biarmata Malloch, 1929.

Notes on Genera and Species.

Lasioxiria. Hendel (1914a; 1914b) based this genus on a single species from New Guinea. An undescribed species occurs in the rain forests of the Atherton Tableland and adjacent areas in North Queensland. I have collected a third species, also undescribed, in New Guinea.

Genus A. This is an apparently new genus based on an undescribed species from Lord Howe Island, 350 miles east of the coast of New South Wales. The distinguishing characters are given in the key to genera, but as only a single damaged specimen is available it seems best to defer formal description for the present.

Lenophila. Munro (1959) has pointed out that this is the correct name for the genus previously known as Celetor Loew.

Rhytidortalis solocifemur (Enderlein) is a new combination for Pseudepicausta solocifemur Enderlein, 1924. This species is

related to R. rugifrons (Thomson) but differs in the smooth postfrons, horizontal grooving on the parafacial and narrower anal cell. I have seen the following material from coastal New South Wales: Sydney, no date (lectotype ♂, here designated, paralectotype ♀, ZMB), Dämel; Nelson's Bay, Port Stephens, viii (or v) 1920 (1 ♀, AM), A.M.

Microepicausta and Elassogaster. I have not listed Elassogaster terraereginae Malloch (1913a) as a separate species because I believe it to be probably a synonym of Microepicausta gracilis Hendel. Elassogaster evitta Malloch (1939a) from New Britain also appears to belong in the genus Microepicausta.

Pogonortalis. Hendel (1914a) gives P. barbifera Hendel (= P. doclea (Walker)) as the type species. I consider that P. uncinata de Meijere is the type species by monotypy. A further study of P. uncinata (from Java) is now needed to decide whether it is congeneric with P. doclea and the other Australian species. As pointed out elsewhere Pogonortalis similis Hendel belongs in the genus Plagiostenopterina.

Rivellia nigripes (Macquart) is a new combination for Urophora nigripes Macquart (1851). I have examined the type (PM).

Loxoneuroides varipennis Hendel. This form has three distinctive geographic variants in northern New South Wales and Queensland. The status of these variants is not clear at present.

Brea. This genus contains several species in New Guinea and adjacent islands. I have collected an undescribed species on the Cape York Peninsula, Queensland.

Genus B. This apparently unnamed genus is represented by a single female specimen which I collected on the Atherton Tableland, Queensland. It may be distinguished by the characters given in the key to genera. Though its appearance is reminiscent of a small dark sepsid, it shares a remarkable number of structural characters with the Oriental genus Loxoneura. It is considered wise to defer description till more material is available.

Achias and Achiosoma. Mystia Walker (1861) is a new synonym of Achias Fabricius (1805). Achias attrahens (Walker) is a new combination for Mystia attrahens Walker (1861). Achias kurandana Hennig is the species erroneously determined by Malloch (1939a) as A. brachyophthalmus Walker. Achias apictipennis Hennig belongs in the genus Achiosoma and is quite closely related to Achiosoma dacoides (Walker).

Scholastes. No species of this genus is known to be established in Australia. S. cinctus (Guerin, 1831-1838) was originally erroneously reported to be from Port Jackson, New South Wales. It is probable that this species occurs within Australian limits on the more northerly of the Torres Strait Islands, as it is common on the adjacent coasts of Papua - New Guinea. S. bimaculatus Hendel has been reared in Sydney from imported cocoa-nuts.

Apiola is a new name for Xenognathus Malloch (1930c, preoccupied by Xenognathus Gilbert, 1915 (Pisces), Case, 1928 (Pisces), Jordan, 1928 (Coleoptera)). This genus, which is only known from Samoa, appears to be a platystomatid, but its subfamily position is doubtful.

(D) Key to Australian Genera of Platystomatidae.

1. Eyes densely hairy; vein 5 setulose above.....Lasioxiria Hendel
   Eyes bare or almost so; vein 5 usually bare.....2

2. Base of vein 1 setulose above.....3
   Vein 1 without setulae before level of humeral crossvein.....4

3. Arista bare, or haired near base only; face with a broad, flat-topped carina between antennae...Euprosopia Macquart
   Arista plumose throughout; facial carina obsolete.....Pterogenia Bigot

4. Middle femur swollen, much thicker than other femora, with 2 rows of stout ventral spines.....5
   Middle femur not noticeably thicker than other femora, either without ventral spines, or with weakly spinescent bristles no more developed than on fore femur.....6

5. Antennae separated by a distance at least equal to width of first segment; head appressed to thorax in repose; ♂ : tergites 4 and 5 together much shorter than tergite 3; ♀ : tergites 4 and 5 absent, i.e. preabdomen with only 2 separate dorsal sclerites.....Mesoctenia Enderlein

Antennae exceedingly close together at their bases; head held away from main body of thorax by the beck-like prothorax; ♂ and ♀ : tergite 5 well developed, not shorter than tergite 3..... Brea Walker

6. Second basal cell longer than discal cell; very stout or subglobose flies.....7

Second basal cell shorter than discal cell; form variable but never subglobose.....8

7. Antennae widely separated at bases; anal cell acutely pointed at posterior distal angle; vein 4 ending in wing apex.....Naupoda Osten-Sacken

8. Sternopleural bristle present but often rather fine.....9

Sternopleural bristle absent.....10

9. Wing with a broad regular blackish band from end of vein 5, across discal and anterior crossveins to submarginal cell, thence bent back, completely transversing again across base of discal cell, also a large separate apical costal mark; scutellum very convex, shining black.....Lenophila Guerin

Wing without such a bent band, irregularly spotted or with broken bands; scutellum somewhat flattened, brown with whitish margin.....Scholastes Loew

10. Eyes protruding or stalked; arista long-plumose for most of its length; mesopleural bristle absent.....11

Eyes not protruding or stalked; arista bare, at least on distal third; mesopleural bristle variable.....12

11. Humeral, intra-alar, and prescutellar acrostichal bristles distinct; squama dilated posteriorly, its outer margin not describing a continuous curve; suprasquamal ridge with some fine erect hairs near middle, which are longer than the pilo-like pubescence on posterior part.....Achias Fabricius

Humeral, intra-alar, and prescutellar acrostichal bristles absent; squama not dilated posteriorly; its outer margin describing a continuous curve; suprasquamal ridge with extremely short pubescence only.....Achiosoma Hendel

12. Mesopleural bristle absent; suprasquamal ridge with a group of rather long, loose hairs or stiff setulae.....Duomyia Walker

Mesopleural bristle present; suprasquamal ridge with short pubescence only.....13

13. Face with a broad, flat, usually sharply
margined carina between antennae; inner
squama very large, always greatly
exceeding the outer squama.....Lamprogaster Macquart

Facial carina little developed or completely
rounded off at lateral margins; inner
squama not much larger than outer squama.....14

14. Lower part of parafacial with numerous short
black setulae; lower margin of cheek
with a series of longer setulae, the fore-
most corresponding in position to a
vibrissa; subcosta angularly bent forward
near distal end; wing black with several
clear marginal markings.....genus A

Lower part of parafacial with at most a few
inconspicuous hairs; lower margin of cheek
without complete series of long setulae;
subcosta not abruptly bent distally, usually
curved forward; wing predominantly clear,
usually with blackish stripes or spots.....15

15. Prelabrum much prolonged downwards and backwards;
metathoracic spiracle with a few fine setulae
on upper margin; middle tibia without strong
apical spur.....genus B

Prelabrum normal, transverse; metathoracic spiracle with soft hairs only; middle tibia with one or two strong spurs.....16

16. Veins 3 and 4 converging towards apex.....17
Veins 3 and 4 sub-parallel or slightly diverging towards apex.....20

17. Face with fine hairs near middle; wing with a longitudinal blackish stripe covering first basal cell.....Plagiostenopterina Hendel
Face without hairs near middle; wing markings variable.....18

18. Fronto-orbital bristles distinct; mesoscutum approximately as wide as long; wing with a longitudinal blackish stripe covering first basal cell..... Pogonortalis Hendel
Fronto-orbital bristles vestigial; mesoscutum longer than wide; wing without stripe covering first basal cell.....19

19. Scutellum not haired or with few hairs at lateral margins in some non-Australian species; vein 4 ending before wing apex.....Elassogaster Bigot
Scutellum with hairs on most of dorsal surface; vein 4 ending slightly behind wing apex..... Microepicausta Hendel

20. Scutellum haired or setulose on central region of dorsal surface; vein 4 nearly always deeply curved down into discal cell before anterior crossvein.....21

Scutellum not haired in central region, but sometimes with very short pubescence or with basal hairs; vein 4 slightly curved or almost straight before anterior crossvein.....22

21. Scutellum with 3 pairs of marginal bristles; prescutellar acrostichals surrounded by long hairs; second basal cell about three quarters as long as discal cell.....Loxoneuroides Hendel

Scutellum with 2 pairs of marginal bristles; usually no hairs between prescutellar acrostichals and scutellar suture; second basal cell not more than about half as long as discal cell .....Rivellia Robineau-Desvoidy

22. Mesoscutum with one or more longitudinal greyish pruinescent stripes; arista with numerous short or minute hairs basally, which extend beyond the slightly swollen basal part.....Scotinosoma Loew

Mesoscutum without longitudinal pruinescent stripes; arista quite bare, or in one species with minute hairs confined to the strongly swollen basal part .....Rhytidortalis Hendel

VII. Genus Mesoctenia Enderlein

Mesoctenia Enderlein, 1924:130; Malloch, 1939a:123.

Head broad, about as wide as thorax in ♀, often wider in ♂, compressed from front to rear; postfrons broad, steeply sloping; facial carina only slightly elevated, flat-topped, at least as wide as antennal segment 1, often wider in ♂, between bases of antennae; epistomal margin of face sometimes produced medially into a prominent, downwardly directed lobe in ♂, which is only very slightly developed in ♀; cheeks wide, somewhat gibbous laterally in ♀, forming a vertical, anteriorly flattened ledge in this region in ♂; outer vertical bristle strong, inner vertical a little weaker; fronto-orbital vestigial or absent; ocellar absent; cheek bristle rather weak or absent. Antenna decumbent, with short oval segment 3, arista long, with pubescence on its entire length. Prelabrum moderately developed, narrowed medially; palpus of moderate width, usually tapered basally and apically.

Thorax very short and broad, shining, devoid of pruinescence; mesoscutum about 1.3 times as wide as long; scutellum broad, rounded in outline, somewhat flattened but with rounded margin, finely setulose on dorsal, lateral and apical surfaces; mesopleuron strongly convex; prosternum without sclerotized procoxal bridges; thorax with the following bristles: a rather weak humeral; 1 + 1 notopleurals; supra-alar; postalar; posterior intra-alar situated rather high up; no dorsocentral; prescutellar acrostichal; 2 or 3 pairs of scutellars;

mesopleural; no sternopleural. Legs, especially the fore one, rather short; fore femur with rather weak pale posteroventral bristles, the dorsal bristles scarcely differentiated from the long dorsal hairs; middle femur strongly swollen and much stouter than other femora, with anteroventral and posteroventral series of strongly thickened black spines.

Wing. Subcosta curved forward at distal extremity; vein 3 ending in wing apex, not converging with vein 4 apically; second basal cell much dilated distally fully as long as discal cell (both cells measured along posterior margins); anal crossvein almost straight forming on its proximal side an obtuse angle with vein 6.

Abdomen. ♂: tergites 4 and 5 distinct but much shorter than tergite 3; ♀ tergite 3 very large; tergites 4, 5, and 6 not distinguishable; spiracles of segments 3, 4 and 5 situated dorsally in membranous area between tergites 3 and 7; aculeus of ovipositor slender. ♂ postabdomen: segment 9 (genital segment) not concealed below tergite 5; aedeagus lying in a shallow dorsal, rather than lateral pouch; distal capsule (glans) divided by a transverse constriction, without terminal filaments.

Type species M. ralumensis Enderlein (= Zygaenula coalescens Hendel).

This genus is very close to Zygaenula Doleschall in which genus Hendel included the species. It differs from Zygaenula in the numerous ventral spines on the middle femur, in the absence of a transverse convexity on the face immediately above

epistomal margin, in having the distal section of vein 4 almost straight, instead of curved forward apically, and in the form of the anal cell which is more expanded distally, with longer more oblique anal crossvein.

I have seen type material of all described species except M. ralumensis Enderlein which seems clearly a synonym of M. coalescens (Hendel). The downwardly directed epistomal lobe of the male has not been previously described, though it may prove to be present in all species except M. coalescens. In an undescribed species from North-east New Guinea (species 1 in the key), there is sexual dimorphism in leg coloration. It may be that all species in which the femora are darkened or partly darkened in the female have them entirely pale in the male. Because of the small numbers of specimens available it is difficult to define some of the previously described species. Males are only known for M. coalescens Hendel and two previously undescribed species. I have seen females of all known species.

The known distribution of Mesoctenia is New Guinea, New Britain, Manus Island, and Queensland as far south as the Cairns district. The two latter localities are new records, the Manus Island record being based on an undescribed species in BM.

Key to species of Mesoctenia

1. Mesopleuron entirely dark brown.....2
   Mesopleuron with conspicuous yellow area just below upper margin.....3

2. Wing with indistinct brown basal suffusion; ♂; head transversely oblong, not wider across cheeks than across eyes, with no trace of epistomal lobe; New Britain.....coalescens Hendel

Wing with well defined dark brown basal zone; ♂: head more nearly pentagonal, wider across cheeks than across eyes, with epistomal margin produced downwards into a prominent subacate lobe; North-east New Guinea.....sp.1

3. Preapical wing band not forming spots on veins 3 and 4, but fading behind vein 2; no spot at apex on vein 3; wing with definite brown basal zone filling anal cell and basal half of second costal cell; femora of ♀ entirely fulvous; Queensland.....australis new sp.

The broken preapical band forming brown spots where it crosses veins 3 and 4; an apical brown spot on vein 3; brown basal zone of wing generally less developed; femora of ♀ variable in colour.....4

4. Femora of ♀ entirely fulvous; Aru Islands....celyphoides (Walker)

Middle and hind femora of ♀ blackened on at least their basal halves; Papua.....hilaris (Hendel)

Mesoctenia australis new sp.

(Figs. 22, 23)

♂♀ . Coloration. Head and its appendages fulvous; antennal arista brown beyond base. Thorax black to dark brown; mesopleuron with a broad pale yellow horizontal stripe a short distance below its upper margin. Legs fulvous; middle and hind coxae brown to blackish; fore and middle tibiae narrowly ringed with black near middle; fore tarsus with 3 distal segments dark brown; middle and hind tarsi with 2 distal segments lighter brown. Wing with large dark brown basal area extending to middle of second costal cell, middle of first basal cell, filling second basal and anal cells, and also extending beyond and behind anal cell; subcostal cell yellowish distally, a yellowish brown transverse band extending backwards from end of subcosta, where it is intensified, almost to vein 4, a similar one extending backwards from end of vein 1, and a shorter one from costa shortly before end of vein 2, all 3 bands becoming diffuse or broken posteriorly; anterior and posterior crossveins clouded with brown. Preabdomenal tergites blackish brown; hypopygium of ♂ fulvous; segment 7 and ovipositor of ♀ yellowish brown.

Head in ♂ with width across cheeks equal to or slightly less than width across eyes, always less than width across eyes in ♀ ; in ♂ epistomal margin of face strongly produced downwards into an obtuse lobe of variable length which is barely indicated in ♀ .

Thorax. Mesoscutum very finely and weakly rugose.

Abdomen. ♂ genitalia as in fig. 22.

Dimensions: Total length, ♂ 4.2-4.6 mm., ♀ 4.3-5.5 mm.; length of thorax, ♂ 2.6-2.9 mm., ♀ 2.4-3.0 mm.; length of wing, ♂ 4.7-5.5 mm., ♀ 4.5-5.6 mm.

Distribution: coastal north-east Queensland.

Material examined: southern side of Thornton Range to Daintree River ferry, i 1967 (holotype ♂, paratypes 2 ♂, 5 ♀, AM, 2 ♀, BM, 2 ♀, CSIRO, 2 ♀, USNM, also shrivelled examples, newly emerged when taken, 6 ♂, 9 ♀, AM), G.A.H. and D.K.M.; Mission Beach, near Cairns, xii 1965 (paratype ♂, UQ), G.M.

Habitat: specimens from near Thornton Range taken on lower surface of palm leaves in stunted forest. Many of these were newly emerged.

Comparative notes. The only other described species with a yellow mark on the mesopleuron are M. hilaris (Hendel) and M. celyphoides (Walker). M. australis differs from both these species in wing markings as indicated in the key.

VIII. Genus Plagiostenopterina Hendel

Plagiostenopterina Hendel, 1914a: 46-50; 1914b: 7, 52-54; Malloch, 1931: 12-14; 1939a: 113-114.

Rather elongate insects of dark coloration, not conspicuously shining.

Wing pattern: transverse banding, when present, restricted to stripe on discal crossvein; a black stripe along costal margin of wing commencing in subcostal cell; a longitudinal black stripe filling first basal cell and extending into base of first posterior cell.

Head, rounded but much higher than long; face with very fine erect hairs near median line; facial carina not distinctly defined; epistomal margin usually prominent; antennal grooves present but rather shallow; parafacial very narrow; cheek moderately so; occiput convex, except sometimes in upper median part; the following bristles present: well developed inner and outer verticals, ocellar and fronto-orbitals rather weak or absent, a strong cheek bristle, an outstanding bristle on occiput near centre of posterior margin of eye. Antenna with third segment elongate; arista filiform with short hairs basally. Prelabrum well developed but not prominent; palpus rather broad.

Thorax. Prothorax produced into a short neck; propleural callus compact, strongly convex; prosternum broadly quadrate with precoxal bridges weakly developed or absent; mesoscutum much longer than broad; posterior notopleural callus not especially prominent; scutellum short; postscutellum not

prominent; suprasquamal ridge with very short pubescence only; the following bristles present: humeral (absent in some species), 2 notopleurals, supra-alar, postalar, intra-alar, dorsocentral, no acrostichal, 2 pairs of scutellars, usually a strong mesopleural. Legs moderately long, without outstanding modifications. Wing moderately elongate, macrotrichia confined to veins 1, 3 and basal section of vein 5, those on vein 1 all beyond level of humeral crossvein, those on vein 5 sometimes absent; anterior crossvein well removed from discal crossvein, veins 3 and 4 converging apically and terminating on either side of apical extremity of wing; anal crossvein curved; second basal cell short; inner squama much reduced, shorter than outer squama.

Abdomen tending towards a cylindrical shape; segment 1 somewhat narrowed; tergites 3-5 well developed and separate.

Type species: Dacus aeneus Wiedemann.

It appears to the author that of the subgenera, recognized by Malloch (1931; 1939a) as belonging here, all except Stenopterosoma are better regarded as separate genera. Otherwise the genus becomes so diverse as to be difficult to define. Thus restricted the genus Plagiostenopterina includes only species with finely haired face, a character absent in the other segregates. In addition the species all have a well developed occipital bristle, and, except where the wing is extensively darkened, there is a prominent dark stripe covering first basal cell. Stenopterosoma agrees with Plagiostenopterina s. str. in these general characters, while deviating in several others,

and is here retained as a subgenus of Plagiostenopterina.

Key to Australian species of Plagiostenopterina

1. Scutellum finely setulose; fronto-orbital bristles absent; some fine setulae on each side of postscutellum (subgenus Plagiostenopterina).....2

Scutellum not setulose; 2 pairs of short fronto-orbital bristles present; postscutellum bare (subgenus Stenopterosoma).....3

2. Ocellar triangle with minute tomentum (as distinct from pruinescence) near margins anteriorly; ♂ : arista apically spatulate; abdominal tergite 4 longer than tergite 5.....aenea (Wiedemann)

Ocellar triangle not tomentose; ♂ : arista filiform; abdominal tergites 4 and 5 of approximately equal length.....enderleini Hendel

3. Face, humeral callus, and most of pleura (except hypopleuron) tawny; glans of aedeagus about 0.43 - 0.48 mm. long.....claudiana new sp.

Lower central part of face dark brown; humeral callus and pleura mostly black or dark brown; glans of aedeagus of different size.....4

4. Grey pruinescence of mesoscutum inconspicuous, becoming obsolete in front of suture; ♂ ; glans

of aedeagus short-oval, about 0.3 mm. long;
filaments more than twice as long as glans;
♀ : hairs on posterior part of humeral callus
strongly crisped apically.....crinita new sp.

Grey pruinescence well developed on median part
of mesoscutum and extending almost to anterior
extremity; ♂ : glans of aedeagus elongate-
cylindrical, about 0.6 mm. long; filaments
not as long as glans; ♀ : hairs on posterior
part of humeral callus not noticeably crisped...macies new sp.

Subgenus Plagiostenopterina Hendel

Fronto-orbitals absent. Humeral bristle well developed in both sexes; no sexual dimorphism in hairing of humeral callus; scutellum setulose dorsally; postscutellum setulose laterally.

This is much the larger of the two subgenera here recognized and is found throughout the known range of the genus. The African species are quite closely related to the Indo-australian ones.

Plagiostenopterina (Plagiostenopterina) enderleini Hendel

Plagiostenopterina Enderleini Hendel, 1914a:49 1914b:56;Malloch, 1931:14; Malloch, 1939a:114.

Senopterina aenea (Wied.): Enderlein, 1912:356. Misidentification.

♂♀. Coloration. Postfrons blackish brown, paler anteriorly; face brown becoming fulvous ventrally; orbital margins of postfrons and parafacial, and antennal groove with greyish white

pruinescence; cheek tawny; occiput black with greyish white pruinescence which is thickest towards posterior orbits. Antenna tawny, becoming brown distally; arista fulvous at base, otherwise black. Prelabrum black; palpus blackish, usually paler apically. Thorax black, not strongly shining but with slight metallic green lustre; mesoscutum with a wide greyish pruinescent median band which becomes wide and diffuse posteriorly; a greyish pruinescent area above and behind each humeral callus; dorsal surface of scutellum also with some greyish pruinescence; pleura greyish pruinescent except for two broad blackish bands, one from humeral callus along anterior margin of mesopleuron to sternopleuron and one, almost vertical, on posterior part of pteropleuron, posterior part of sternopleuron and anterior part of hypopleuron. Legs predominantly black to deep brown; fore femur and distal part of mid femur yellowish brown. Wing markings typical of the genus; discal crossvein without trace of a dark mark. Halteres brown. Abdomen black, with conspicuous areas of white hairs on tergite 2, and basal parts of tergites 3 and 4.

Head. Ocellar triangle without minute tomentum to the front and side of anterior ocellus; inner and outer verticle bristles well developed; ocellars minute, usually pale; postverticals and fronto-orbitals absent; cheek bristle and lateral occipital bristle well developed. Antenna of equal size in both sexes, extending somewhat beyond median epistomal margin of face, third segment subacute apically; arista not spatulate distally in either sex.

Thorax. Scutellum with numerous fine hairs dorsally; postnotum with group of fine hairs and setulae on each side; humeral bristle long and strong. Legs without any distinct bristles apart from the apical spurs on middle tibia. Wing without black setulae among the microtrichia on basal section of vein 5.

Abdomen. ♂ : tergites 4 and 5 of approximately equal length; ♀ : tergite 5 slightly less than half as long as tergite 4.

Dimensions: total length, ♂ 5.1 - 8.9 mm., ♀ 6.4 - 8.7 mm.; length of thorax, ♂ 2.4 - 3.2 mm., ♀ 2.6 - 3.5 mm.; length of wing, ♂ 4.3 - 5.6 mm., ♀ 4.7 - 6.2 mm.

Distribution: Northern Territory - Arnhem Land; Queensland - east coast as far south as Brisbane; Sumatra (types formerly in Stettiner Zoologisches Museum, present location doubtful); Philippines; New Guinea; Papua; Solomon Islands. Not previously recorded from Australia

Material examined (only Australian specimens listed). Northern Territory: Darwin, vi 1964 (2 ♂, CSIRO), K.R.N.; East Point, Darwin, vi 1964 (4 ♂. CSIRO, 2 ♂, AM), K.R.N.; Burnside, near Brock's Creeks; iii 1929 (1 ♀, 1 ex. no abdomen, CSIRO), T.G.C. Queensland: Cooktown, iii vii 1957-1966 (2 ♀, CSIRO), T.G.C., D.E.H.; Bailey's Creek, near Mossman, 1962 (1 ♀, CSIRO), T. Plath; junction of Goldmine and Davies Criiks, Kuranda-Mareeba Road, v 1967 (1 ♀, CSIRO), D.H.C.; Lake Placid, near Cairns, v 1958 (3 ♂, 2 ♀, AM), D.K.M.; Freshwater, near Cairns, viii 1959 (1 ♀, CSIRO), T.G.C.;

Gillies Highway, 2 miles W of Little Mulgrave, Gordonvale district, iv 1957 (1 ♀, CSIRO), D.H.C.; Innisfail, v 1958 (1 ♀, CSIRO) T.G.C.; Flying Fish Point, near Innisfail, iv 1958 (1 ♀, CSIRO), T.G.C.; Palm Island, near Ingham, no date (3 ♀, CSIRO), T.L.B.; Cannonvale, near Proserpine, vi 1958 (2 ♀, CSIRO), T.G.C.; Cannon Valley, near Proserpine, vi 1959 (3 ♂, 1 ♀, CSIRO), T.G.C.; 30 miles WSW of Collinsville, ix 1950 (1 ♀, CSIRO), E.F.R.; Byfield, Yeppoon district, ii 1964 (1 ♂, CSIRO), I.F.C. and M.S.U.; Yeppoon, i xii 1964-1965 (4 ♂, CSIRO), I.F.C.; Heron Island, Capricorn Group, i iv xi xii 1948-1964 (4 ♂, 2 ♀, CSIRO, 1 ♂, 3 ♀, UQ), E. Bernays, A.L.D., I.M.M., E. N. Marks, E. Shipp; Masthead Island, Capricorn Group, i 1948 (1 ♀, CSIRO), E. Shipp; Brisbane, iii ix 1949-1962 (1 ♂, 1 ♀, UQ), G.M., F.A.P. Western Australia: Wyndham to Kimberley Research Station (Ord R), x 1953 (1 ♀, CSIRO), R. Lukins.

Habitat: probably very varied; specimens taken at Lake Placid on shrubs near margin of rain forest remnant.

Plagiostenopterina (Plagiostenopterina) aenea (Wiedemann)

Dacus aeneus Wiedemann, 1819 : 29, 44.

Dacus basalis Walker 1849: 1072, new synonym.

Plagiostenopterina basalis, Hendel, 1914b : 53, 64.

(For further synonymy see Hendel (1914a or 1914b).

Exceedingly similar to P. enderleini described above, but differentiated mainly by the following characters.

Head. Ocellar triangle with minute pale tomentum in front

of and to sides of median ocellus; ocellar bristles black.

♂: arista spatulate apically.

Thorax. Vein 5 of wing with a few black setulae on dorsal surface of basal section (bordering anal cell).

Abdomen. ♂: tergite 4 slightly longer than tergite 5 on mid dorsal line.

Dimensions: total length, ♂ 7.3-10.5 mm., ♀ 7.4-9.7 mm.; length of thorax, ♂ 2.7-4.0 mm., ♀ 2.9-3.7 mm.; length of wing, ♂ 4.8-7.2 mm., ♀ 5.1-6.8 mm.

Distribution: south-east Asia from Formosa to Ceylon; Philippines; Indonesia; New Guinea; New Britain; Queensland - as far south as Proserpine district; Northern Territory - Arnhem Land.

Material examined (only Australian specimens listed). Northern Territory: Port Essington, Cobourg Peninsula, no date (holotype ♀ of Dacus basalis Walker, BM), anon. Queensland: Bamaga, C. 15 miles SW of Cape York, iii 1964 (2 ♀, CSIRO) I.F.C. and M.S.U.; Blue Mountains, Cape York Peninsula, xi 1947 (1 ♂, UQ), J.L. Wassell; Claudie R., Iron Range district v vi 1966 (3 ♂, 4 ♀, AM), D.K.M.; Iron Range, iv 1964 (1 ♂, CSIRO), I.F.C. and M.S.U.; Hutchinson Creek, near Daintree, i 1967 (1 ♀, AM), G.A.H. and D.K.M.; Thornton Range to Daintree R., i 1967 (1 ♂, AM), G.A.H. and D.K.M.; Daintree, xii 1958 (4 ♂, AM), D.K.M.; Ellis Beach, near Cairns, v 1967 (1 ♀, CSIRO), D.H.C.; Lake Placid, near Cairns, v 1958 (6 ♂, 11 ♀, AM), D.K.M.; Freshwater, near Cairns, vi 1960 (1 ♀, CSIRO), T.G.C.; Meringa,

near Gordonvale, xi 1926 (2 ♂, CSIRO), G.M. Goldfinch; Mulgrave R., 4 miles W of Gordonvale, i 1959-1967 (6 ♂, 1 ♀, AM), D.K.M.; Eubenangee, near Innisfail, vi 1950 (1 ♀, NMV), "G.B."; Innisfail, v 1958 (2 ♀, CSIRO), T.G.C.; 9 miles E of El Arish, iii 1964 (1 ♂, CSIRO), I.F.C. and M.S.U.; Clump Point, near El Arish, iii 1964 (5 ♂, 4 ♀, CSIRO), I.F.C. and M.S.U.; Tully, viii 1955 (1 ♂, UQ), A.J. Cowan; Ingham, iii 1961 (1 ♂, CSIRO), R.S.; Palm Island, i xii 1930-1931 (4 ♀, CSIRO), I.M.M.; Shute Harbour, near Proserpine, iii 1964 (1 ♂, CSIRO), I.F.C. and M.S.U.

Subgenus Stenopterosoma Malloch

Stenopterosoma Malloch, 1939a:114, as subgenus of Plagiostenopterina.

Two short but distinct fronto-orbital bristles. Humeral bristle well developed in ♂; in ♀ humeral callus differentiated from that of ♂, either by modified hairing, or reduction of the humeral bristle, or both; scutellum and postscutellum not setulose.

Type species: P. (Stenoptersoma) orbitalis Malloch = Dacus lativentris Walker.

Malloch placed the species P. parva Malloch in the subgenus Plagiostenopterina, but its characters are clearly those of subgenus Stenopterosoma. Unfortunately Malloch (1931:15) described the species from a single female without exact locality (only "Kaiserwilhelmsland" = North-east New Guinea being given), and, as the species are often difficult to distinguish without reference to male genitalia, it may not prove possible to identify it

even when the New Guinea species are better known.

Plagiostenopterina (Stenopterosoma) similis (Hendel) is a new combination for Pogonortalis similis Hendel (1914b : 145-146). It was based on a single female from New Guinea (Friedrich Wilhelmshafen = Madang, holotype, MNM). It is similar to P. macies in most characters, but may be distinguished by having longer hairs on humoral callus and by having only a few black setulae on upper anterior part of mesopleuron.

The only other previously described species of the subgenus is P. lativentris (Walker) which appears to be widely distributed in New Guinea. It is readily distinguished from the three Australian species described below by the heavy dark stripe surrounding discal crossvein of wing and by the specialised basal area of tergite 5 of female. The author has also seen material of three apparently undescribed species of Stenopterosoma from New Guinea.

Plagiostenopterina (Stenopterosoma) claudiana new sp.

(Figs. 24, 25)

♂ ♀ . Coloration. Postfrons blackish posteriorly, elsewhere reddish brown; face tawny, covered with whitish pruinescence on upper half, a little brown colouring in antennal grooves which is almost hidden by pruinescence; orbital margins of postfrons and parafacial whitish-pruinescent; cheek tawny with whitish pruinescence; occiput blackish, with greyish white pruinescence except in area between neck and vertex. Antenna tawny, third segment slightly darkened beyond base; arista tawny at base,

black distally. Prelabrum tawny anteriorly, dark brown at sides; palpus blackish, tawny apically. Mesoscutum black with narrow yellow-brown postsutural dorsocentral stripe, also usually a broader more lateral postsutural stripe which may unite with the dorsocentral stripe near scutellar suture; sometimes also a median pale stripe which fuses with the other stripes posteriorly to form a tawny area immediately in front of scutellum; humeral callus and posterior notopleural callus tawny; most of mesoscutum thinly covered with grey pruinescence except at anterior extremity where pruinescence is restricted to a median zone; scutellum black to reddish brown; postnotum black, sometimes becoming brown laterally; pleura preponderantly tawny; anterior part of mesopleuron sometimes dark brown; hypopleuron dark brown. Legs largely blackish, fore coxa and femur and a variable amount of other femora tawny. Wing markings much as in P. enderleini and P. aenea; costal band extending from distal end of vein 1 to end of vein 4, not much narrowed in marginal cell; a very faint greyish stripe on discal crossvein which is not connected to the heavy blackish stripe filling and extending a little beyond first basal cell. Haltere yellowish brown. Abdomen black; tergite 2 with a yellowish patch on each side more extensive in ♂ which may have variable yellowish areas on tergites 3 and 4; erect hairs on tergite 2 white; silky hairs along median line of tergites 4 and 5 white, more conspicuous in ♀.

Head. Ocellar triangle without distinct tomentum; inner and outer vertical bristles strongly developed; 2 pairs of

fronto-orbitals and ocellar present but short and weak, postverticals very weak; cheek bristle and lateral occipital bristle well developed. Antenna a little shorter than distance from its basal insertion to epistomal margin; third segment rather narrowly rounded apically; arista slender, filiform, with short hairs basally.

Thorax. ♂ : humeral callus and mesopleuron without any black setulae, with fine pale hairs only in addition to the long, strong humeral bristle and mesopleural bristle; ♀ : humeral bristle rather weak, a little longer and stronger than the group of black setulae on posterior part of humeral callus, which are rather long, fine, but not crisped apically, and not very dense; mesopleuron with a group of erect black setulae, of which the posterior ones are generally longer, near upper anterior extremity; also the usual posterior mesopleural bristle as in ♂. Fore femur with well developed series of posterodorsal and longer posteroventral bristles; hind femur with well developed dorsal bristles distally. Wing without setulae on vein 5.

Abdomen. ♂ : tergites 4 and 5 subequal in length; ♀ : tergite 5 about half as long as tergite 4. ♂ postabdomen: outer surstylus rather stout, straight, its free distal section not very much narrowed, with rounded apex and tooth-like preapical lobe on inner side; inner surstylus more slender, its apex reaching to same level as that of outer surstylus; aedeagus with stipe rather short; preglans well sclerotized, elongate; glans elongate cylindrical; filaments rather robust, about

1.4 - 1.7 times as long as glans; cercus almost as long as surstyli.

Dimensions: total length, ♂ 3.6 - 6.5 mm., ♀ 4.7 - 6.0 mm.; length of thorax, ♂ 1.7 - 2.5 mm., ♀ 1.7 - 2.7 mm.; length of wing, ♂ 3.8 - 5.2 mm., ♀ 4.1 - 5.6 mm.; length of glans of aedeagus 0.43 - 0.48 mm.

Distribution: Queensland - Iron Range district, Cape York Peninsula.

Material examined: Claudie R., near Mount Lamond, vi 1966 (holotype ♂ , AM), v vi 1966 (paratypes, 10 ♂, 8 ♀ , AM, 1 ♂, 1 ♀ , USNM, 1 ♂, 1 ♀ , BM), D.K.M.; Iron Range, iv 1964 (paratype ♀ , CSIRO), I.F.C. and M.S.U.

Habitat: rain forest.

Plagiostenopterina (Stenopterosoma) macies new sp.

♂♀. Extremely similar to P. crinita, and apparently differing only in the following characters.

Coloration. Face more broadly fulvous in lateroventral regions than in P. crinita. Central part of mesoscutum more thickly grey-pruinescent, the pruinescence extending almost to anterior extremity; pleura in ♂ (holotype) almost entirely black, in ♀ dark reddish brown to blackish. Fore femur tawny, becoming darker distally; middle femur tawny at distal extremity; legs otherwise blackish brown.

Thorax. ♀ : humeral bristle well developed, black posterior setulae of humeral callus fairly long and numerous, very slightly crisped apically.

Abdomen. ♂ : outer surstylus apparently similar in form to that of P. claudiana (viewed on whole specimen); aedeagus with preglans strongly sclerotized, somewhat elongate; glans elongate-cylindrical, larger and slightly stouter than in P. claudiana; length of filaments about 0.8 of length of glans.

Dimensions: total length, ♂ 5.0 mm., ♀ 4.6 mm.; length of thorax, ♂ 1.9 mm., ♀ 1.8 mm.; length of wing, ♂ 4.2 mm., ♀ 4.1 mm.; length of glans of aedeagus, 0.63 mm.

Distribution: Queensland - Cape York Peninsula.

Material examined: Bamaga, C. 15 miles SW of Cape York iii 1964 (holotype ♂ , paratype ♀ , CSIRO), I.F.C. and M.S.U.

Plagiostenopterina (Stenopterosoma) crinita new sp.

(Fig. 26)

♂♀ . Very similar to P. claudiana in most characters; agreeing with the description given for that species except as indicated below.

Coloration. Postfrons dark brown, black posteriorly; lower part of face dark brown, paler towards lateroventral angles. Prelabrum entirely dark brown. Thorax entirely or almost entirely black; posterior notopleural callus and part of pteropleuron sometimes reddish brown; mesoscutum with thin greyish pruinescence less developed anteriorly than in P. claudiana. Legs blackish; fore femur yellowish brown to deep reddish brown, becoming darker distally. Abdomen with fulvous markings confined to a patch on each side of tergite 2.

Head. Fronto-orbital bristles short, but stronger than those of P. claudiana. Third antennal segment slightly shorter than in P. claudiana.

Thorax. ♂ as described for P. claudiana; ♀ : differing from P. claudiana in having humeral bristle weaker, sometimes only slightly differentiated from the long black setulae below it, which are more numerous than in P. claudiana and with distinctly crisped apices.

Abdomen. ♂: outer surstylus more narrowed distally than in P. claudiana; aedeagus with preglans strongly sclerotized, not much longer than wide; glans comparatively short, ovoid; filaments more than twice as long as glans.

Dimensions: total length, ♂ 4.3 - 5.0 mm., ♀ 4.8 - 5.8 mm.; length of thorax, ♂ 1.7 - 2.3 mm, ♀ 2.2.-2.5 mm.; length of wing, ♂ 3.8 - 4.6 mm., ♀ 4.5 - 5.1 mm.; length of glans of aedeagus, 0.29 - 0.31 mm.

Distribution: north-eastern Queensland - Innisfail district.

Material examined: Mount Bartle Frere, east base, 80 ft., iv 1955 (holotype ♂, CSIRO, paratypes, 1 ♂, 2 ♀, CSIRO, 1 ♂, AM), K.R.N. and I.F.C.; 9 miles E of El Arish, iii 1964 (paratype ♀, CSIRO), I.F.C. and M.S.U.

IX. Genus Lamprogaster Macquart

Lamprogaster Macquart, 1843 : 211. Type species L. flavipennis Macquart.

Cruphiocera Macquart, 1843 : 212. Type species C. violacea Macquart.

Chromatomyia Walker, 1849 : 801. Type species here designated C. formosa Walker (= Lamprogaster laeta (Macquart)).

Ceratopelta Bigot, 1878 : 34. Type species C. tricolor Bigot (= L. patula Walker).

Liolamprogaster Enderlein, 1924 : 128. Type species L. angusta Enderlein.

Head not notably widened, the eyes not prominently bulging; height of cheek not nearly as great as height of eye; antennal grooves distinct, separated by a variable flat-topped carina; inner and outer vertical bristles and cheek bristle well developed; postvertical, ocellar and fronto-orbital bristles weak or not differentiated. Antenna with segment 2 conical, rather short, segment 3 somewhat elongate but not nearly reaching to epistomal margin; arista bare or with very short hairs towards base. Prelabrum well developed; palpus elongate.

Thorax. Mesoscutum about as long as broad or somewhat longer; scutellum usually short and convex, bare or haired, suprasquamal ridge with very short pubescence only; postscutellum variably reduced, sometimes convex; prosternum haired, with distinct precoxal bridges; the following thoracic bristles present: humeral (sometimes absent), 2 notopleurals, anterior supra-alar, postalar, posterior intra-alar, posterior dorsocentral,

prescutellar acrostichal, variable number of scutellars, mesopleural.

Legs of moderate proportions, without special modifications; femora without strong ventral bristles or spines.

Wing of normal proportions or slightly elongate; subcosta gently curved forwards at distal extremity, meeting costa at an acute angle; radial vein setulose only beyond humeral crossvein; second basal cell not enlarged; anal crossvein recurved anteriorly becoming straight posteriorly and forming an angle of 90° or more with vein 6 on its proximal side.

Abdomen broadly ovoid, constricted at junction with metathorax but expanding immediately therefrom; preabdomen with complete compliment of tergites, i.e. 5 tergites visible dorsally of which the first 2 are fused.

Type species: Lamprogaster flavipennis Macquart.

The more typical species of Lamprogaster occur mainly in Australia and New Guinea with extensions into the Moluccas, New Britain, and New Caledonia. Enderlein (1924) has described a species, which is unknown to the author, from the Celebes. Four species have been described from the Philippines (see Frey, 1930, Malloch, 1931). Malloch indicates that the two Philippine species he had seen have no mesopleural bristle in contradistinction to species from other areas. I have examined only one Philippine species, L. placida (Walker) (holotype, BM), which is without the mesopleural bristle and has a dense uniform covering of fine pubescence on the scutellum. If any consistency can be

demonstrated in the distribution of these characters, it is possible that they may be used for generic separation of the Philippine species.

There are about 50 known species of Lamprogaster, of which 24 occur in Australia. An attempt is here made to divide the Australian species into natural groups of closely related species.

1. violacea group. Elongate insects, with abdomen narrowed basally; humeral bristle absent; scutellum extensively haired; aedeagus with 3 terminal filaments (a character unknown in other Platystomatinae). Includes: violacea (Macquart), tricauda new sp. and the extra-limital species basalis Walker, zelotypa Hendel. The genus-group name Cruphiocera Macquart is available for this group.

2. imperialis group. Less elongate than the above; humeral bristle present; hairs on scutellum either confined to its sides or absent (except in L. indistincta); preglans of aedeagus with terminal process; the 2 filaments rather short, less than 3 times as long as glans. Includes: indistincta Malloch, flavihirta new sp., nigrihirta new sp., rugifacies new sp., imperialis new sp., also the extralimital species lepida Walker, and probably rufipes Hendel.

3. stenoparia group. Humeral bristle present; scutellum extensively haired above; preglans without process; the 2 filaments long, many times the length of glans. Includes: viola Malloch, stenoparia Hendel, corax new sp.

4. flavipennis group. Agreeing with stenoparia group,

except that scutellum is devoid of hairs. Includes: bicolor Macquart, flavipennis Macquart, vella (Walker), sp. 1, corusca new sp., nigripes (Macquart), excelsa new sp., laeta (Macquart), relucens new sp., hilaris (Walker), sp. 2, poecila Hendel, maculipennis Macquart.

5. macrocephala group. Humeral bristle present; scutellum devoid of hairs; ♂ genitalia not examined; prelabrum much reduced by comparison with the above groups. Includes: fuscibasis Malloch, and the extralimital macrocephala Hendel.

Key to Australian Species of Lamprogaster

1. Scutellum haired or setulose.....2
   Scutellum bare, except for the marginal bristles.....9
2. Wing with most of costal margin dark brown; entire first and second basal cells dark brown.....3
   Costal margin of wing clear, with at most 3 widely separated dark marks; first and second basal cells clear or yellowish, at least in part.....4
3. Wing with dark field mainly confined to anterior half, a separate dark mark on discal cross-vein; discal and anal cells partly clear; legs almost entirely fulvous.....stenoparia Hendel
   Wing with dark field extending in places to posterior margin and enclosing discal cross-vein; discal and anal cells entirely dark brown; legs entirely blackish brown.....corax new sp.

4. Scutellum broadly glabrous centrally, haired only at sides.....5

Scutellum haired over its entire width.....6

5. Hairs of mesoscutum and scutellum black.....*nigrihirta* new sp.

Hairs of mesoscutum and scutellum yellow, rarely with an admixture of black ones.....*flavihirta* new sp.

6. Wing with heavy dark markings including stigmatal band, discal spot on vein 2, apical mark, a mark on discal crossvein, and one on basal and anal crossveins; humeral bristle present; supra-alar bristle absent.....*viola* Malloch

Wing with markings absent or diffuse and indistinct; if humeral bristle present, then supra-alar bristle also present.....7

7. Humeral and prescutellar acrostichal bristles present; upper part of mesopleuron with dense, pile-like pubescence between the hairs, aedeagus with the usual 2 filaments .....*indistincta* Malloch

Humeral and prescutellar acrostichal bristles absent; upper part of mesopleuron smooth and shining between hairs; aedeagus with 3 filaments.....8

8. All bristles and hairs of head and thorax yellowish; prelabrum rather prominent anteriorly; supra-alar bristle present, sometimes vestigial.....tricauda new sp.

All bristles of head and thorax and hairs of mesoscutum and scutellum black; prelabrum receding; supra-alar bristle absent.....violacea (Macquart)

9. Wing without apical dark mark, but with a dark mark over basal cells and one on anterior crossvein.....10

Wing always with apical dark spot; other markings variable.....11

10. Abdomen light brown with slight metallic lustre; parafacial, in profile, much broader than third antennal segment; arista short-haired on basal half; usually 5 pairs of scutellar bristles.....fuscibasis Malloch

Abdomen black with strong metallic lustre; parafacial, in profile, narrower than third antennal segment; arista bare; usually 3 pairs of scutellar bristles.....maculipennis (Macquart)

11. Arista with some basal hairs which are at least as long as its basal diameter; mesoscutum not pruinescent centrally.....12

Arista with basal hairs absent or much shorter than its basal diameter; mesoscutum with 3 or more greyish pruinescent stripes on central part which may be fused.....13

12. Mesoscutum and abdominal tergites reddish brown with slight metallic lustre; fore tarsus tawny with last 2 segments brown; hind femur with long black dorsal bristles.....rugifacies new sp.

Mesoscutum and abdominal tergites black with conspicuously metallic lustre; fore tarsus dark brown, sometimes with basal segment tawny; hind femur with short weak yellow dorsal bristles only.....imperialis new sp.

13. Thorax fulvous without dark markings; wing broadly yellow anteriorly and with only the apical blackish mark distinct.....bicolor Macquart

Mesoscutum black on median section, at least towards anterior extremity; wing markings various.....14

14. Wing with only the apical spot well marked; stigmatal mark obsolete on costa, only a faint brown cloud in subcostal cell and another on anterior crossvein; black central area of mesoscutum largely obscured by a broad area of yellow-grey pruinescence...flavipennis Macquart

Wing with distinct black stigmatal mark; central area of mesoscutum with more or less separate longitudinal pruinescent stripes.....15

15. Wing without distinct dark mark in first basal cell or along humeral crossvein.....16

Wing with large blackish mark in first basal cell which extends along anal crossvein and along humeral crossvein to costa.....19

16. Fore tarsus cream to yellow; ♂: cercus with anterior basal extension partly visible in lateral aspect in front of lateral lobe of tergite 9; triangular apical expansion of outer surstylus longer than wide.....vella (Walker)

Fore tarsus reddish brown to black; ♂: cercus with anterior basal extension concealed in lateral aspect by lateral lobe of tergite 9; triangular apical expansion of outer surstylus wider than long.....17

17. Fore femur fulvous distally, darkened only on basal half or less.....sp. 1

Fore femur almost entirely dark brown to black.....18

18. Hairs on posterior part of mesopleuron black, except for a few yellow ones near upper margin; ♂: apices of filaments of aedeagus slightly thickened and bell-shaped.....corusca new sp.

Hairs of mesopleuron yellow, except for a few black ones (sometimes absent) near posterior margin; ♂: apices of filaments slender, simple.....19

19. Stigmatal mark nearly oval, quite broad where it crosses vein 2; size large, wing over 9 mm. long; ♂: glans of aedeagus over 0.9 mm. long .....excelsa new sp.

Stigmatal mark forming a relatively narrow bar; size smaller, the wing under 9 mm. long; ♂: glans of aedeagus not over 0.7 mm. long.....nigripes (Macquart)

20. The three distal blackish marks on wing connected or almost touching along costa; legs black with basal segment of each tarsus brown .....poecila (Hendel)

The three more distal blackish marks on wing very widely separated; legs largely fulvous.....21

21. Wing with brown spot in costal cell beyond the heavier mark on or immediately beyond humeral crossvein; mesoscutum with broad postsutural lateral pruinescent stripe outside the dorsocentral stripe.....sp. 2

Costal cell without such spot; postsutural lateral pruinescent stripe of mesoscutum absent or weakly developed.....22

22. Base of submarginal cell with numerous microtrichia; wing membrane, except towards posterior margin, strongly tinged with yellow; black stigmatal mark rather broad, almost triangular.....laeta (Macquart)

Base of submarginal cell without microtrichia, except where darkly pigmented; wing membrane mostly colourless, yellowish only at extreme base; black stigmatal mark narrower, not triangular.....23

23. Dorsocentral and median pruinescent stripes of mesoscutum broadly fused posteriorly; median black area of mesoscutum extending very broadly beyond dorsocentral pruinescent stripes; ventral part of sternopleuron blackish.....hilaris (Walker)

Dorsocentral and median pruinescent stripes separate or joined posteriorly by a narrow transverse stripe; median black area extending narrowly outside dorsocentral pruinescent stripes; sternopleuron entirely fulvous.....relucens new sp.

Lamprogaster violacea (Macquart)

Cruphiocera violacea Macquart, 1843: 212, pl.29, fig.4.

Lamprogaster violacea Hendel, 1914a: 109; 1914b:244.

Lamprogaster elongata van der Wulp, 1885:228; Hendel, 1914a: pl.10, figs. 185, 189; 1914b: 223-224; Malloch 1930a: 432, fig.1; 1939a:144; not L. elongata, Malloch, 1929 (see under L. indistincta)

♂ ♀ . Coloration. Head fulvous to tawny; postfrons largely brown on posterior half and brown in centre posteriorly; face often mottled with brown on lower lateral regions. Antenna and palpus fulvous. Thorax varying from tawny brown to blackish brown, with green or blue reflections, often darker dorsally, without pruinescent markings on mesoscutum; hairs on mesoscutum and scutellum black. Legs fulvous; hind coxa variably brownish. Wing stained with yellow, especially so towards base and anterior margin, sometimes also lightly stained with brown at base, especially in first costal cell and base of second costal cell; often a light yellow-brown mark on anterior crossvein; squama greyish. Haltere dull fulvous. Preabdominal tergites reddish brown to almost black, usually with blue or green reflections.

Head with squarish outline in profile; postfrons usually slightly depressed posteriorly between the dorsally prominent eyes; facial carina broad, flat, prominent; parafacial rather narrow for most of length but much expanded above; height of cheek 0.17-0.21 of height of eye. Antenna extending almost two thirds the distance from its basal insertion to epistomal margin;

arista rather slender, slightly compressed, with short hairs extending for its basal half, the longest of these about as long as basal diameter of arista. Prelabrum rather broad but not prominent, finely but roughly sulcate; palpus rather narrow.

Thorax rather slender; propleuron with a rounded vertical ridge in front of humeral callus reminiscent of the propleural ridge found in Chloropidae but situated higher up; scutellum with numerous rather long black hairs distributed over the entire surface except ventrally; mesopleuron almost devoid of pubescence; with the following bristles: no humeral, 2 notopleurals, no supra-alar, postalar, posterior intra-alar, a weak dorsocentral, no prescutellar acrostichal, a pair of strong apical scutellars, and one to 3 pairs of more laterally placed marginal scutellars; a rather long slender mesopleural. Fore and hind femora with a few weak dorsal bristles distally, but no differentiated ventral bristles. Wing with vein 4 strongly bent forwards at junction with discal crossvein, thereafter curved backward and becoming almost parallel with vein 3 distally, slightly curved forward at extreme apex; posterior distal angle of discal cell acute.

Abdomen narrowed basally; tergites 3 and 5 subequal in length; tergite 4 slightly shorter.

Dimensions: total length, ♂ 7.6-11.3 mm., ♀ 7.0-9.7 mm.; length of thorax, ♂ 3.3-4.9 mm., ♀ 3.4-4.7 mm.; length of wing, ♂ 7.8-11.0 mm., ♀ 8.0-10.9 mm.

Distribution: Molucca Islands; Key Islands; New Guinea; Queensland - Cape York Peninsula only.

Material examined; "Offak, Terre de Papous" = (?) Arfak Mountains, West New Guinea (holotype ♀ of C. violacea, PM), J.S.C.D. d'Urville. North-east New Guinea: Lae, xii 1963 (2 ♀, AM), D.K.M.; Huon Gulf, v-vi 1937 (1 ♂, BM), J.L. Froggatt. Papua: Ongaho, near Popondetta, x 1963 (1 ♂, AM), D.K.M.; vicinity of Mount Lamington, near Popondetta, ii vii x 1927-1929 (3 ♂, 3 ♀, AM), C.T. McNamara; Embala R. to Ajeka, near Kumusi R., xi 1963 (1 ♀, AM), D.K.M.; Brown R., near Port Morsby, x 1963 (1 ♂, AM), D.K.M.; Aroana Estate, Aroa R., xi xii 1963 (7 ♂, 3 ♀, AM), D.K.M. Queensland: Claudie R., Iron Range district, vi 1966 (1 ♂, AM), D.K.M.

Habitat: rain forest, frequently observed resting on lower surface of leaves of trees.

Lamprogaster tricauda new sp.

(Fig. 29)

Lamprogaster zelotypa Hendel, in part, 1914b; 226-227; Malloch, 1928a:350. Misidentifications.

Lamprogaster Zelotypa var. ?: Malloch, 1939a:139, 141-142.

♂♀. Generally similar to L. violacea and also resembling the New Guinea species L. zelotypa; differing from L. violacea principally as indicated below.

Coloration paler than in L. violacea; all bristles and hairs yellowish. Head and its appendages fulvous; face often with blackish dots. Arista brown distally. Thorax shining fulvous

to tawny, often slightly darker dorsally where the reflections may be faintly bluish or greenish, much of surface with fine brown dots, except centre of mesoscutum, pteropleuron, and hypopleuron. Legs fulvous. Wing membrane tinged with yellow anteriorly and basally; veins fulvous; wing markings absent altogether. Haltere pale fulvous. Abdomen shining fulvous to tawny brown, the reflections often faintly bluish, often with scattered dark brown dots on tergites.

Head. Postfrons less depressed posteriorly than in L. violacea; parafacial a little wider than third antennal segment; height of cheek 0.21-0.29 of height of eye. Prelabrum rather prominently projecting forward.

Thorax structurally as described for L. violacea except that supra-alar bristle is present but variable in size. Wing with discal cell relatively broader than in L. violacea; length of preapical section of vein 4/length of discal crossvein = 0.74-0.94; venation otherwise approximately similar to that of L. violacea.

Abdomen somewhat less narrowed basally than in L. violacea. ♂ postabdomen: tergite 9 produced into a short obtuse lobe on each side; outer surstylus of moderate length, its free distal part somewhat dilated, with strongly sinuate distal margin; inner surstylus a little shorter than outer surstylus with two stoutly claw-like black teeth, of which the preterminal has a gibbosity on proximal surface just before point; aedeagus with rather long stipe; preglans little differentiated, but with long slender curved sclerotized process which is longer than glans; glans

rather short, ovoid; filaments 3 in number, of equal length, about 1.7 times as long as glans.

Dimensions: total length, ♂ 4.0-8.1 mm., ♀ 3.4-9.8 mm.; length of thorax, ♂ 1.9-3.8 mm., ♀ 1.8-4.2 mm.; length of wing, ♂ 4.6-8.6 mm, ♀ 4.5-9.0 mm.; length of glans of aedeagus, 0.34-0.44 mm.

Distribution: Queensland - east coast from Cape York Peninsula almost to the southern border.

Material examined: Mary's Creek, near Gympie, ii 1961 (holotype ♂ AM, paratypes, 7 ♂, 1 ♀, AM, 1 ♂, BM), D.K.M.; Iron Range, iv 1964 (1 ♀, CSIRO), I.F.C. and M.S.U.; 10 miles S of Daintree, iv 1955 (1 ♂, CSIRO), K.R.N. and I.F.C.; Barron Falls, near Kuranda, ii 1965 (1 ♀, CSIRO), J.G.B.; 1 mile E of Kuranda, iii iv 1964 (3 ♂, 8 ♀, CSIRO, 1 ♀, AM), I.F.C. and M.S.U.; Cairns, i 1964 (1 ♂, 3 ♀, UQ), I.C.Y.; Cannonvale, near Proserpine, vi 1958 (1 ♀, CSIRO), T.G.C.; Glenella, near Mackay, iv 1960 (2 ♀, CSIRO), T.G.C.; Gladford Creek, Monto-Many Peaks Road, xi 1957 (paratype ♂, UQ), T.E. Woodward; Brisbane, iv 1943 (paratype ♀, UQ), F.A.P.; Flinders Peak, S of Ipswich, iii 1963 (paratype ♂, UQ), G.M.

Habitat; rain forest and gallery forest. Specimens taken at Mary's Creek were resting on lower surfaces of leaves of trees.

Hendel first used the name Lamprogaster zelotypa (1914a:110) without description or figure. Of his two references the first is to the description in his then unpublished paper (Hendel, 1914b) and the other is to the synonym L. ventralis Walker, 1861 (preoccupied

by L. ventralis Walker, 1859, see under Euprosopia). Only the latter reference is a valid indication so that L. zelotypa Hendel has the same type specimen as L. ventralis Walker, 1861 (holotype ♂, New Guinea, BM). I have seen only the holotype of L. zelotypa which is clearly distinct from L. tricauda in having the bristles and some thoracic hairs black; height of cheek/height of eye = 0.14, as compared with 0.21-0.29 in L. tricauda; length of discal crossvein/length of penultimate section of vein 4 = 0.64, compared with 0.74-0.94 in L. tricauda; distal expansion of outer surstylus elongate, quadrate.

Specimens recorded by Hendel and Malloch as L. zelotypa are all either L. tricauda or a closely related undescribed species confined to New Guinea.

Lamprogaster indistincta Malloch

Lamprogaster indistincta Malloch, 1928a:349.

Lamprogaster elongata: Malloch, 1929:515 (misidentification).

Lamprogaster pseudelongata Malloch, 1930a:432-433, fig.2, new synonym.

♂ ♀. Coloration. Head and its appendages fulvous; postfrons and cheek tawny; orbital margins of postfrons and parafacial, and most of occiput with pale yellowish pruinescence; posterior part of postfrons and sides of face with variably developed brown spotting. Arista dark brown. Thorax fulvous; mesoscutum becoming deep tawny or brown on most of dorsal surface; scutellum, sides and posterior part of mesoscutum, mesopleuron, upper part of sternopleuron and usually pteropleuron mottled with brown.

Legs fulvous; fore tarsus tawny or light brown. Wing tinged with yellow anteriorly, the yellowish area becoming a narrow marginal band distally which terminates at vein 4 and, in specimens from Banks Island, is slightly intensified in region of vein 3; posterior part of wing faintly tinged with grey; a very indistinct brownish sub-basal band from near base of vein 3 to anal crossvein; another indistinct brownish mark surrounding anterior crossvein. Haltere fulvous. Abdomen shining tawny-brown.

Head. Postfrons steeply sloping; facial carina moderately broad, flat-topped; parafacial much narrower than third antennal segment; height of cheek 0.24-0.31 of height of eye. Antenna extending slightly more than half the distance from its basal insertion to epistomal margin; arista with numerous basal hairs which are a little longer than its basal diameter. Prelabrum broad, prominently projecting forwards; palpus rather narrow.

Thorax robust; scutellum very rounded except sometimes for a narrow apical depression; mesopleuron densely pubescent on upper part; the following bristles present; 2-4 short scapulars, humeral, 2 notopleurals, supra-alar, postalar, intra-alar, dorsocentral, prescutellar acrostichal, 3-5 pairs of scutellars, well developed mesopleural. Fore and hind femora with some rather weak yellowish dorsal bristles distally. Wing with distal section of vein 4 usually only very slightly curved and making an angle of slightly less than 90° with discal crossvein; posterodistal angle of discal cell acute.

Abdomen broad; tergites 3, 4 and 5 subequal in length

in ♂, tergite 5 slightly shorter in ♀ . ♂ postabdomen: outer surstylus with elongate, almost straight basal section, the very short distal section narrowed with apex flexed posteriorly; distal section of inner surstylus nearly as long as that of outer surstylus, slender, with the two teeth well developed; aedeagus with slender stipe; preglans with small unpigmented process; glans rather small; the 2 filaments of equal length, less than twice as long as glans, slightly thickened apically.

Dimensions: total length, ♂ 6.4-8.3 mm., ♀ 5.5-7.9 mm.; length of thorax, ♂ 3.2-4.1 mm., ♀ 2.9-4.0 mm.; length of wing ♂ 7.3-8.8 mm., ♀ 6.8-9.4 mm.; length of glans of aedeagus, 0.27-0.30 mm.

Distribution: Queensland - north east coast as far south as Gordonvale, and islands of Torres Strait.

Material examined: Banks Island, 1910 (1 ♂, 1 ex., CSIRO), W.W.F.; Iron Range, iv 1964 (1 ♂, CSIRO), I.F.C. and M.S.U.; Cooktown, iii 1966 (2 ♂, CSIRO), D.E.H.; Hutchinson Creek, near Daintree R., i 1967 (3 ♂, 2 ♀, AM), G.A.H. and D.K.M.; Cairns, 1907 (paratype ♀ of L. pseudelongata, AM), anon.; Mulgrave R., 4 miles W of Gordonvale, i 1967 (3 ♂, 10 ♀, AM) G.A.H. and D.K.M.

Habitat: rain forest and gallery forest, resting on trunks and foliage of trees.

Notes on status. Malloch described the two species L. indistincta and L. pseudelongata without making a comparison between them, having initially mistaken the latter concept for L. elongata van der Wulp. In his key to the species (Malloch,

1929, revised in part Malloch, 1930a) he segregates L. pseudelongata with those species having "wings entirely without dark markings, at most with the inner cross-vein very slightly darkened" from L. indistincta and other species having "wings with quite evident dark markings on costa." In specimens from Banks Island (L. indistincta s.str.) I am able to distinguish a light brown spot in the vicinity of the termination of vein 3, which is not defined in specimens from the mainland (L. pseudelongata). In the latter specimens, however, the yellowish tinged area of the anterior part of the wing often becomes narrowed and brownish along the costal part of the wing apex, especially between veins 3 and 4. Thus the difference between the two forms in wing pattern is exceedingly slight. No other clear cut differences have been found. It therefore appears wise to regard these forms as a single species exhibiting slight geographical variation in wing pattern.

Lamprogaster nigrihirta new sp.

(Fig. 37)

♂♀. Coloration. Head tawny brown; postfrons mostly dark brown; face tawny, with brown suffusion or spots on lower part; orbital margins of postfrons and parafacial with dull yellowish pruinescence. Antenna fulvous; arista mostly dark brown to black. Prelabrum and palpus tawny. Mesoscutum and scutellum deep reddish brown with all hairs and bristles black, with three narrow blackish longitudinal stripes, sometimes indistinct; scutellum and sides of mesoscutum with variable brown to blackish

mottling; pleura tawny with variable brown mottling. Legs tawny; tibiae each with a dark brown dorsal stripe and dark brown suffusions at both ends; tarsi reddish brown, becoming dark brown on 2 distal segments. Wing stained with yellow anteriorly, elsewhere greyish hyaline; a brown subbasal mark from second basal cell to anal crossvein; stigmatal band broad and blackish in subcostal cell, narrower and often paler between veins 1 and 3, more intense around anterior crossvein and terminating posteriorly on vein 4; a small dark brown discal spot on vein 2 and a pale brown band along discal crossvein; apical dark brown mark extending from end of vein 2 to end of vein 4; squama tawny. Haltere pale tawny. Abdomen reddish brown with irregular darker suffusions.

Head. Postfrons sloping; carina flat, abruptly but not very sharply margined, not greatly narrowed above, faintly rugose near middle; height of cheek, 0.32-0.42 of height of eye. Antenna extending a little more than half the distance from its basal insertion to epistomal margin; arista compressed, with numerous hairs on basal half, the longer ones somewhat longer than basal diameter of arista. Prelabrum finely and often weakly sulcate; palpus rather narrow.

Thorax stout; outline of scutellum rounded except between apical pair of bristles where it is straight; most of upper half of mesopleuron densely pubescent; the following bristles present: humeral, 2 notopleurals, supra-alar, postalar, intra-alar, dorsocentral, prescutellar acrostichal, 3 or sometimes 4 pairs

of scutellars, a moderately developed mesopleural. Fore femur with well developed black dorsal setulae, but no differentiated dorsal bristles; hind femur with a series of weak black dorsal bristles. Wing with distal section of vein 4 slightly curved, making an angle of about 90° or slightly more with discal crossvein.

Abdomen. Tergites 3 and 4 subequal in length; tergite 5 slightly longer than tergite 4 in ♂, slightly shorter in ♀. ♂ postabdomen: outer surstylus rather short and stout, not nearly attaining to apex of cercus, its free distal section apically thick and rounded, only slightly longer than distal section of inner surstylus; outer terminal tooth of inner surstylus with a posteriorly directed point; aedeagus with rather slender stipe; preglans slightly swollen, with terminal sclerotized tapering process about as long as glans; glans short and stout; filaments fused basally, about twice as long as glans, but length somewhat variable.

Dimensions: total length, ♂ 6.6-8.9 mm., ♀ 6.7-8.5 mm.; length of thorax, ♂ 3.5-4.9 mm., ♀ 3.6-4.6 mm.; length of wing, ♂ 7.4-10.2 mm., ♀ 8.2-10.3 mm.

Distribution: north-eastern Queensland.

Material examined: Mulgrave River, 4 miles W of Gordonvale, i 1967 (hototype ♂, paratype ♂, AM) G.A.H. and D.K.M.; Thornton Range to Daintree River, i 1967 (paratype ♂, AM), G.A.H. and D.K.M., Kuranda, no date (paratypes, 2 ♀, BM), F.P.D.; 9 miles N. of Kuranda, iii 1964 (paratypes, 3 ♀, CSIRO), I.F.C. and M.S.U.; 1 mile E of Kuranda, iii 1964 (paratypes, 2 ♂, 7 ♀,

CSIRO), I.F.C. and M.S.U.; Lake Barrine, Atherton Tableland, xii 1959 (paratype ♂, AM), E.J.H.; Herberton, ii 1910 (paratype ♀, BM), probably F.P.D.

Habitat: rain forest.

Comparative notes: a species of the imperialis group, most resembling L. flavihirta and differing from other species in having numerous hairs on the sides of the scutellum only; differing from L. flavihirta in the black hairs of the mesoscutum and in the form of the surstyli.

Lamprogaster flavihirta new sp.

Lamprogaster laeta Guérin : Malloch, 1929:516, misidentification.

♂ ♀. Very similar in most characters to L. nigrihirta, and agreeing with the description given for that species except as indicated below.

Coloration of head and body slightly paler than in L. nigrihirta. Mesoscutum without dark longitudinal stripes; all hairs on mesoscutum and scutellum and most hairs on pleura yellow. Tibiae with markings indistinct. Wing marked as in L. nigrihirta but the brown band on discal crossvein often less distinct.

♂ postabdomen resembling that of L. nigrihirta; outer surstylus longer, almost attaining to level of apex of cercus, its distal section about twice as long as distal section of inner surstylus, rather broad bear base and tapering to the subacute apex.

Dimensions: total length, ♂ 6.9-9.7 mm., ♀ 7.7-9.6 mm.; length of thorax, ♂ 3.6-5.3 mm., ♀ 3.8-5.1 mm.; length of wing, ♂ 8.6-11.7 mm., ♀ 9.5-11.5 mm.

Distribution: North Queensland - higher part of Atherton Tableland.

Material examined: Herberton (apparently = vicinity of Herberton), 3,000-4,000 feet (altitude not indicated on some specimens including holotype), i 1911 (holotype ♂, BM), i ii xii 1910-1911 (paratypes, 15 ♂, 8 ♀, BM, 2 ♂, AM, the 2 last det. Malloch as L. laeta Guérin), F.P.D.

Lamprogaster rugifacies new sp.

(Figs. 27, 30)

♂♀. Somewhat similar to L. imperialis, and chiefly differing from the description given for that species in the following characters.

Coloration. Head reddish brown; a narrow whitish-pruinescent orbital line on postfrons and parafacial; occiput whitish pruinescent. Antenna, prelabrum and palpus reddish tawny. Thorax rich reddish brown; scutellum brown-black with slightly bluish lustre. Legs tawny, the last two segments of each tarsus dark brown. Wing markings much as in L. imperialis; sub-basal mark indistinct. Abdomen reddish brown with faintly bluish reflections.

Head. Facial carina sharply margined but narrower than in L. imperialis, not wider than antennal groove, near its lower extremity, with transverse sulci extending for its full width, except at upper extremity; height of cheek 0.17-0.25 of height of eye; parafacial less than one third as wide as third antennal segment. Antenna extending about two thirds the distance from its basal insertion to epistomal margin. Prelabrum not distinctly

sulcate, strongly projecting.

Thorax as described for L. imperialis, except that supra-alar bristle is strongly developed. Fore and hind femora with black dorsal bristles on distal halves, those on the former short. Wing with distal section of vein 4 meeting discal crossvein at an angle of about 90° or less; posterior distal angle of discal cell very acute.

Abdomen. ♂ postabdomen: outer surstylus slender basally, broadened towards termination of basal section, contracted at base of distal section which is finely setulose, the apex curved backwards and very obtuse; apical section of inner surstylus shorter than that of outer surstylus; preglans of aedeagus with long slender tapering terminal process, slightly shorter than glans; glans rather elongate; filaments very unequal in length and thickness, the larger one almost as long as glans, the smaller one about two thirds as long as glans.

Dimensions: total length, ♂ 6.9-7.2 mm., ♀ 7.0-8.9 mm.; length of thorax, ♂ 3.5 - 3.9 mm., ♀ 3.6-4.1 mm.; length of wing, ♂ 7.4-8.0 mm., ♀ 7.5-8.2 mm.; length of glans of aedeagus, 0.60-0.62 mm.

Distribution: Queensland - Cape York Peninsula.

Material examined: Iron Range, iv 1964 (holotype ♂, CSIRO, paratypes, 2 ♂, 3 ♀, CSIRO, 1 ♂, AM, 1 ♀, BM, 1 ♀, USNM), I.F.C. and M.S.U.

Comparative notes: a species of the imperialis group, resembling L. imperialis in the absence of hairs on the scutellum

but differing from that species in the more reddish brown thorax and in the male genitalia.

Lamprogaster imperialis new sp.

(Figs. 28, 31, 38)

Lamprogaster lepida Walker; Hendel, 1914b: 235-236; Malloch, 1928a: 349; 1929:516. Misidentifications.

♂♀. Coloration. Head tawny brown; postfrons often darker, sometimes becoming blackish towards vertex; face fulvous; orbital margins of postfrons, upper part of parafacial, and entire occiput, except near vertex, heavily greyish-pruinescent. Antenna fulvous; arista gradually becoming dark brown distally. Prelabrum and palpus fulvous. Mesoscutum, scutellum and postnotum black with metallic green reflections in ♂, purple reflections in ♀, humeral and postalar calli sometimes yellowish brown; propleuron tawny; mesopleuron and sternopleuron shining brown to blackish, with some fine pubescence on upper part of the former; sternopleuron, pleurotergite, and hypopleuron dull brown, with dense, fine pubescence. Legs fulvous, fore tibia brownish, or with brown markings near distal end only; fore tarsus dark brown; other tarsi pale fulvous with two distal segments brown. Wing clear, stained with dull yellow along costal margin, especially towards base; the following brown or blackish markings present: transverse line from base of vein 3 along basal and anal crossveins; stigmatal band filling distal section of subcostal cell and extending back over anterior crossvein; a small discal spot on vein 2; a narrow stripe along discal crossvein; apical mark between ends

of veins 2 and 4; sometimes all these markings except the apical one tending towards light yellow brown and somewhat indistinct; squama pale dull yellowish. Haltere cream to tawny. Abdominal tergites black with purple, blue or green reflections.

Head. Frons sloping; facial carina flat, sharply margined, only slightly narrowed between bases of antennae, transversely grooved across central part; height of cheek 0.40-0.53 of height of eye. Antenna extending about half the distance from its basal insertion to epistomal margin; arista with numerous basal hairs as long as or a little longer than its basal diameter. Prelabrum strongly sulcate; palpus rather narrow.

Thorax rather stout; outline of scutellum rounded but tending to be transverse apically; upper margin of mesopleuron densely pubescent; the following bristles present; humeral, 2 notopleurals, supra-alar rather weak or absent, postalar, intra-alar, dorsocentral, prescutellar acrostichal, 3, 4 or more pairs of scutellars, a moderately developed mesopleural. Fore femur, without distinct dorsal bristles; hind femur with a few short weak yellow dorsal bristles beyond middle. Wing with terminal section of vein 4 slightly curved forward at apex, curved backward through most of its length to its junction with discal crossvein, which it meets at an angle of somewhat more than 90°.

Abdomen. Tergites 3 and 4 subequal in length; tergite 5 about 1.5 times as long as tergite 4 in ♂, subequal to tergite 4 in ♀. ♂ postabdomen: outer surstylus rather stout, not nearly attaining to level of apex of cercus, its distal section short, broad, obtuse to obliquely truncate, with a variably developed

tubercle on inner surface; inner surstylus with free distal section extremely short, but with the usual 2 black teeth, of which the distal one is slightly pointed both anteriorly and posteriorly; aedeagus with rather long stipe; preglans slightly swollen, sclerotized in part, with a slender, tapering, curved or apically hooked terminal process almost as long as glans; glans mederately short; filaments of equal size, swollen basally, about 1.6-1.7 times as long as glans.

Dimensions: total length, ♂ 5.0-7.8 mm., ♀ 5.5-10.7 mm.; length of thorax, ♂ 2.6-4.1 mm., ♀ 3.0-4.4 mm.; length of wing, ♂ 6.3-8.9 mm., ♀ 7.1-9.9 mm.; length of glans of aedeagus, 0.40-0.42 mm.

Distribution: Queensland- throughout eastern districts; New South Wales - coast district as far south as Sydney; Northern Territory.

Material examined. Queensland: Millstream Falls, near Ravenshoe, i 1967 (holotype ♂, AM, paratypes, 28 ♂, 20 ♀ AM, 1 ♂, 1 ♀, MNM, 3 ♂, 2 ♀, USNM), G.A.H. and D.K.M.; Claudie R., Iron Range district, ii 1914 (5 ♂, 17 ♀, NMV, 2 ♂, 2 ♀, AM), W.D.K. Macgillivray; Iron Range, iv 1964 (1 ♂, CSIRO), I.F.C. and M.S.U.; Coen R., no date (1 ♂, SAM), W.D. Dodd; Mossman, iii 1930 (paratype ♂, UQ), D.O. Atherton; Mount Molloy, i 1962 (paratype ♀, CSIRO), P.B.C. and E.B.B.; Kuranda and environs, no date (paratypes, 7 ♂, 3 ♀, BM, 3 ♂, SAM), F.P.D.; xii 1934 (paratype ♀, UQ), F.A.P.; i ii 1950-1952 (paratypes, 1 ♂, 1 ♀, AM, 1 ♂, 5 ♀, NMV), J.G. Brooks; xii 1959 (paratype ♂, AM),

E.J.H.; iii 1964 (paratype ♀, CSIRO), I.F.C. and M.S.U.; Barron Falls, near Kuranda, iii 1961 (paratypes, 3 ♀, CSIRO), R.S.; Cairns, 1920 (paratypes, 1 ♀, AM, 1 ♀, UQ), J. F. Illingworth; iv 1960 (paratypes, 1 ♂, 4 ♀, CSIRO), K.L. Harley; i 1962 (paratypes, 2 ♂, CSIRO), P.B.C. and E.B.B.; Meringa, near Gordonvale, xi 1925 (paratype ♂, CSIRO), anon.; Mareeba, xi 1959 (paratype ♀, UQ), G. Ettershank; Herberton, no date (paratypes, 4 ♂, 5 ♀, BM), F.P.D.; Stannary Hills, near Herberton, c.3,000 ft., no date (paratypes, 4 ♂, 1 ♀, BM), T.L.B.; Almaden, near Chillagoe, iii 1928 (paratype ♀, AM), W.D. Campbell; 13 miles W of Ravenshoe, Mount Garnet Road, v 1967 (paratype ♀, CSIRO), D.H.C.; Palmerston National Park, iii 1961 (paratype ♂, CSIRO), R.S.; Ingham, iii 1961 (paratype ♂, CSIRO), R.S.; Mingela, Burdekin R. district, iv 1955 (paratypes, 4 ♂, 3 ♀, CSIRO), K.R.N.; Bowen, no date (paratype ♂, SAM), A. Simson; 12 miles SE of Bowen, v 1955 (paratypes, 1 ♂, 3 ♀, CSIRO), K.R.N. and I.F.C.; Proserpine, no date (paratype ♂, SAM), H.M. Hale and N.B.T.; Cannonvale, near Proserpine, iv vi 1958-1957 (paratypes, 3 ♂, 4 ♀, CSIRO), T.G.C., M.S.U.; Shute Harbour, near Proserpine, iv 1964 (paratype ♀, CSIRO), I.F.C. and M.S.U.; Mackay, no date (1 ♂, BM, det. Hendel as L. lepida Walker), G. Turner; Yeppoon, i xii 1961-1965 (2 ♂, 3 ♀, CSIRO), I.F.C.; South Keppel Island, no date (1 ♀, SAM), C. Vallis; Rockhampton, no date (1 ♂, BM, 1 ♂, SAM), Pilcher, anon.; Mount Morgan, i 1949 (1 ♀, CSIRO), I.F.C.; Biloela, i ii 1927-1954 (1 ♂, BM, 2 ♀, UQ), G.A. Currie, A. R. Bird, O. R. Byrne; Collosseum Creek, 10 miles S of Miriam

Vale, xii 1966 (1 ♀, UQ), B. Cantrell; Carnarvon Range, Injune district, i ii 1944-1962 (1 ♂, 1 ♀, AM, 1 ♀, UQ), N. G., E. Exley; Fraser Island, ii 1949 (1 ♂, CSIRO), anon.; Maryborough, no date (1 ♂, SAM), E.W. Fischer; Mungar Junction, near Maryborough, no date (1 ♀, SAM), A.M.L.; Nambour, ii 1962 (1 ♀, UQ), H.H. Kong; Bunya Mountains, i xii 1938-1961 (1 ♀, AM, 1 ♂, UQ), N.G., D. Fullerton; Burpengary, no date (8 ♂, 3 ♀, BM, det. Hendel as L. lepida Walker), T.L.B.; Brisbane, i iii iv 1956-1962 (1 ♂, 2 ♀, UQ), J.H. Bryan, Kirkpatrick; Stradbroke Island, iv 1958 (1 ♂, UQ), E.A. Bernays; Belmont, near Brisbane, vi 1952 (1 ♀, UQ), "A.W."; Moggil, near Brisbane, ii xi 1958-1962 (1 ♂, 1 ♀, UQ), H.G. Greening, E.A. Bernays; Canungra, iii xi 1943-1955 (1 ♂, AM, 1 ♀, CSIRO), A. Blombery, anon.; Lamington National Park, xii 1923 (1 ♀, UQ), H.H. New South Wales: Casino, i 1920 (1 ♀, AM), C. Duquet; Deep Creek, Narrabeen, near Sydney, ii 1957 (1 ♀, CSIRO), W.W.W.; Gundamaian, Royal National Park, near Sydney, i ii 1926 (2 ♀, CSIRO), I.M.M. Northern Territory: Grove Hill, i 1922 (1 ♂, SAM), anon.

Comparative notes: previously confused with L. lepida Walker from which it differs in having the stigmatal band broader and less oblique, the stripe on discal crossvein much less marked, and the scutellum more convex and smooth. L. lepida is only reliably reported from the Celebes.

Lamprogaster viola Malloch

(Fig. 36)

Lamprogaster viola Malloch, 1929:515-516.

♂♀ . Coloration. Postfrons, parafacial, and cheek blackish brown to rather dark reddish brown; face reddish brown to tawny; orbital margins of postfrons and parafacial, and antennal grooves with silver-grey pruinescence; posterior orbits and occiput silver-grey pruinescent except for the dark brown to reddish upper part of latter. Antenna tawny with brown suffusions on segment 3; arista black beyond base. Prelabrum tawny; palpus blackish brown, often with paler margins. Thorax tawny brown; mesoscutum with extensive black or deep reddish brown suffusions, with bluish purple lustre and no pruinescence except at lateral margins; scutellum reddish brown with bluish purple lustre above, fulvous below. Legs tawny; coxae, tibiae, and femora with black markings; tarsi blackish brown. Wing dark yellowish basally and anteriorly, light greyish elsewhere; a small brownish grey mark at base of stem vein (stem of veins 2 and 3) and another on basal and anal crossveins; stigmatal band broad, black, extending almost to centre of discal cell, often interrupted along a narrow line in marginal cell; discal band represented by an intense black spot on vein 2 and a short grey stripe enclosing discal crossvein; apical mark distinct, blackish, usually extending from vein 2 to vein 4 but slightly variable; squama yellow-grey. Haltere tawny with greyish brown capitellum. Preabdominal tergites black with purple lustre.

Head. Frons sloping and rather flattened; facial carina well defined, broad below, variably narrowed above; height of cheek 0.23-0.27 of height of eye; the single fronto-orbital bristle rather strong. Antenna rather slender, about 0.6 as long as distance from its basal insertion to epistomal margin; arista slender, not compressed, with rather numerous fine basal hairs, of which the longer are about equal in length to maximum basal diameter of arista. Prelabrum moderately developed, not especially prominent; palpus rather narrow.

Thorax usually rather stout; scutellum slightly convex dorsally, impressed between the widely separated apical bristles with rather numerous black hairs on all of dorsal surface except a narrow median line; mesopleuron almost devoid of pubescence; the following thoracic bristles present: humeral, 2 notopleurals, no supra-alar, postalar, posterior intra-alar, dorsocentral, prescutellar acrostichal, usually 3 pairs of scutellars, a well developed mesopleural. Fore femur with weak dorsal and posteroventral bristles distally; hind femur with rather weak dorsal bristles distally, the anteroventral bristles little developed. Wing with distal section of vein 4 slightly arched, except at apex where it is very slightly curved forwards; posterodistal angle of discal cell acute.

Abdomen. ♂: tergites 3 and 4 very short, the latter slightly longer; tergite 5 about 4 times as long as tergites 3 and 4 togehter. ♀: tergites 3, 4, and 5 subequal in length. ♂ postabdomen: outer surstylus rather long, broadened and

curved near middle, its free distal section short, breadly spatulate, apically rounded; aedeagus with preglans not distinctly sclerotized, without process; glans short; filaments equal, very long and extremely slender beyond bases, at least 25 times as long as glans, i.e. as long as the entire insect.

Dimensions: total length, ♂ 8.3–12.3 mm., ♀ 10.2–11.3 mm.; length of thorax, ♂ 3.3–5.5 mm., ♀ 4.8–5.6 mm.; length of wing, ♂ 8.3–12.9 mm., ♀ 11.2–12.4 mm.; length of glans of aedeagus 0.50 mm. (one specimen measured).

Distribution: north-eastern Queensland – Atherton Tableland and vicinity to Paluma Range.

Material examined: 4 miles W of Babinda, iii 1964 (1 ♂, CSIRO), I.F.C. and M.S.U.; East Base, Mount Bartle Frere, 80 ft., iv 1955 (1 ♂, CSIRO), K.R.N. and I.F.C.; Lake Barrine, xii 1959 (1 ♂, AM), E.J.H.; The Crater (or Mount Hypipamee), near Herberton, 3,100 ft., xii 1961 (1 ♂, AM), R.L. and D.K.M.; near Herberton, 3,700 ft., i 1911 (paratype ♂, AM), F.P.D.; 2 miles N of Tully R. Bridge, E. of Cardstone on Cardstone–Ravenshoe Road, i 1967 (4 ♂, 5 ♀, AM, 1 ♀, BM), G.A.H. and D.K.M.; Mount Spec, near Paluma, 2,600 ft., iii 1964 (1 ♂, CSIRO), I.F.C. and M.S.U.

Habitat: rain forest near streams, resting on tree trunks and low foliage.

Lamprogaster stenoparia Hendel

Lamprogaster stenoparia Hendel, 1914a:109, pl.10, fig.187; 1914b:227-228; Malloch, 1928a:350.

♂♀. Coloration. Postfrons tawny with variable brown markings; remainder of head and its appendages largely fulvous; arista black beyond base. Mesoscutum and scutellum blackish brown to reddish brown, in the latter case often with 3 indistinct darker longitudinal stripes on mesoscutum, which usually has a bluish lustre; humeral callus and propleuron pale fulvous; pleura otherwise predominantly reddish brown to dark brown, paler at sutures. Legs pale fulvous; tarsi a little darker, each with 3 distal segments brownish. Wing with a broad blackish longitudinal band extending for its whole length and in contact with costal margin, except in both costal cells which are predominantly fulvous; discal crossvein surrounded by a broad black stripe, which is not connected to the anterior band; squama yellowish. Haltere pale yellowish. Abdomen with tergite 1 tawny; remainder of preabdomen black to dark brown with strong purple lustre.

Head somewhat similar structurally to that of L. viola; facial carina somewhat narrower above than the average for that species; height of cheek 0.16-0.20 of height of eye; 2 short fronto-orbital bristles. Antenna and mouth-parts as described for L. viola.

Thorax as described for L. viola, except that supra-alar bristle is well developed and prescutellar acrostichal usually absent. Fore femur with bristles almost obsolete.

Abdomen. ♂: tergites 3 and 4 together approximately as long as tergite 5; ♀: tergites 3 and 4 subequal in length, tergite 5 slightly shorter than either. ♂ postabdomen: outer surstylus broadly truncate apically; inner surstylus almost as long, its distal section not spinulose; preglans of aedeagus without process; glans very short, oval; filaments very long, equal, each with a membranous flange extending for most of its length.

Dimensions: total length, ♂ 4.8–8.4 mm., ♀ 5.9–8.8 mm.; length of thorax, ♂ 2.3–3.9 mm., ♀ 2.6–4.3 mm.; length of wing, ♂ 5.6–9.0 mm., ♀ 6.8–9.7 mm.

Distribution: Queensland - north-east coast from Bloomfield R. to Townsville; it is possible that specimens collected by C.M. Kolsall were taken in Cape York Peninsula.

Material examined: Townsville, no date (holotype ♀, i.e. specimen figured by Hendel, BM), F.P.D.; "N.E. Queensland," no date (erroneously labelled as cotypes, 2 ♀, BM), C.M.K.; Gap Creek, 6 miles N of Bloomfield R., xi 1965 (2 ♂, UQ), G.M.; Upper Daintree R., xii 1964 (1 ♂, UQ), G.M.; Thornton Range to Daintree R., i 1967 (1 ♂, 1 ♀, AM), G.A.H. and D.K.M.; 10 miles S of Daintree, iv 1955 (1 ♂, CSIRO), K.R.N. and I.F.C.; Mossman, xii 1963 (1 ♀, UQ), G.M.; Mossman Gorge, xii 1964 (1 ♀, UQ), G.M.; Kuranda, iii xii 1958–1964 (2 ♂, AM, 3 ♂, CSIRO), I.F.C. and M.S.U., D.K.M.; Kamerunga, Barron R., v 1960 (1 ♀, CSIRO), T.G.C.; The Intake (or Crystal Cascades), near Cairns, xi xii 1965–1966 (1 ♂, UQ, 1 ♂, 2 ♀, AM), G.M., G.A.H. and D.K.M.; Lake Placid, near Cairns, i 1959 (1 ♂, AM), D.K.M.; Earl Hill,

N. of Cairns, v 1967 (1 ♀, CSIRO), D.H.C.; Mission Beach, near Cairns, xi 1965 (1 ♂, 1 ♀, UQ), G.M.; Gordonvale, i 1949 (1 ♀, UQ), B. Hitchcock; Mulgrave R., 4 miles W of Gordonvale, i xii 1958-1967 (20 ♂, 23 ♀, AM, 2 ♂, 2 ♀, NMV, 2 ♂, 2 ♀, SAM), G.A.H. and D.K.M.; Upper Mulgrave R., xii 1965 (1 ♀, UQ), G.M.; Cowley, near Innisfail, xi 1951 (1 ♀, UQ), anon; 2 miles N. of Tully R. bridge, E. of Cardstone, Cardstone-Ravenshoe road, i 1967 (1 ♂, 1 ♀, AM), G.A.H. and D.K.M.; 2 miles E of Cardstone, i 1967 (1 ♂, AM), G.A.H. and D.K.M.; Little Crystal Creek, Mount Spec, near Paluma, xii 1954 (1 ♀, UQ), anon.

Habitat: rain forest near streams, most frequently seen resting on lower surface of foliage of trees.

Lamprogaster corax new sp.

(Figs. 32, 33, 39)

♂ ♀. Coloration. Head predominantly dark brown to deep yellowish brown; face fulvous; orbital margins of postfrons and parafacial and all of occiput, except near vertex, with silvery white pruinescence. Antenna fulvous; arista brown distally. Prelabrum and palpus fulvous. Thorax black to dark brown, with conspicuous blue reflections. Legs blackish brown. Wing dark brown; a creamy-hyaline area covering alula, basal and posterior part of anal cell, and base of anal lobe; a creamy-hyaline spot in base of submarginal cell and a creamy hyaline mark in marginal cell immediately beyond end of vein 1, extending from costa, across vein 2 into submarginal cell where it extends a short

distance towards base along vein 3, sometimes the part in submarginal cell separated off from that in marginal cell (as in left wing of holotype); a large hyaline area filling all of second posterior cell, except that part adjacent to discal crossvein, and extending over vein 4 into adjacent part of first posterior cell; third posterior cell with a large hyaline area on margin which does not touch veins 5 and 6; squama creamy. Haltere with yellowish pedicel and brown capitellum. Abdomen black with strong blue lustre.

Head similar structurally to that of L. stenoparia except that facial carina is narrower and more rounded laterally.

Thorax generally as described for L. viola and L. stenoparia; hairs on mesopleuron extremely short and fine, decumbent; chaetotaxy as in L. stenoparia except that mesopleural bristle is extremely short and fine, sometimes distinguishable on one side only.

Abdomen. ♂: tergite 5 approximately 5 times as long as tergites 3 and 4 combined; ♀: tergite 5 somewhat shorter than tergites 3 and 4 combined. ♂ postabdomen: outer surstylus rather stout in basal section, abruptly contracting into distal section, which has the apex curved posteriorly; distal section of inner surstylus with numerous small blunt spines; aedeagus with long stipe; preglans not distinguishable; glans short, oval, complex and lobed at distal end; filaments very long, approximately 30 times as long as glans, each with membranous flange which becomes obsolete distally.

Dimensions: total length, ♂ 7.8 mm., ♀ 6.6-8.4 mm.; length

of thorax, ♂ 3.2 mm., ♀ 3.0-3.2 mm.; length of wing, ♂ 8.2 mm., ♀ 7.6-8.5 mm.; length of glans of aedeagus, excluding lobes, 0.34 mm.

Distribution: Queensland - Cape York Peninsula.

Material examined: Coen R., no date (holotype ♀, SAM, paratypes, 2 ♂, 1 ♀, SAM, 1 ♀, AM), W.D. Dodd; "N.E. Queensland", no date (1 ♀, BM), C.M.K. For information on specimens collected by C. M. Kolsall in "N.E. Queensland" see under Duomyia mithrax Hendel.

Comparative notes: the very distinctive wing pattern readily separates this from all other species of Lamprogaster.

Lamprogaster bicolor Macquart

Lamprogaster bicolor Macquart, 1847:89; not L. bicolor, Hendel, 1914a, 1914b (see under L. relucens); not L. bicolor, Malloch, 1928a (see under L. laeta).

Chromatomyia jucunda Walker, 1849:802, new synonym.

Lamprogaster jucunda, Hendel, 1914b:238.

♂♀. Coloration. Head orange-tawny to fulvous; postfrons and parafacial with whitish pruinescent orbital margins; occiput whitish pruinescent orbital margins; occiput whitish to greyish pruinescent. Antenna orange-tawny; arista blackish beyond base. Prelabrum and palpus orange-fulvous. Thorax orange-tawny without dark markings; mesoscutum with three separate light greyish pruinescent longitudinal stripes which do not reach to scutellar suture; scutellum fulvous-yellow. Legs fulvous; fore coxa and trochanter suffused with brown; tarsi brown distally. Wing

tinged with yellow, strongly so anteriorly and towards base; humeral, sub-basal, and discal bands absent altogether; stigmatal band very faintly indicated as a brownish yellow mark in subcostal and marginal cells and a separate mark surrounding anterior crossvein; apical mark well developed, blackish brown, extending broadly from vein 2 to vein 4 and more narrowly extended basally within marginal cell; squama pale orange-fulvous. Haltere fulvous with a brown mark distally. Abdomen shining black, the reflections without definite colour or sometimes lilac.

Head. Postfrons sloping; facial carina rather broad and sharply margined below, somewhat narrowed between antennae, sometimes weakly rugose; height of cheek 0.34-0.39 of height of eye. Antenna extending distinctly more than half the distance from its basal insertion to epistomal margin; arista slender with a number of minute basal hairs. Prelabrum broad; palpus moderately broad.

Thorax rather robust; scutellum convex dorsally, straight or slightly impressed in outline between apical bristles; mesopleuron almost devoid of pubescence; the following bristles present: humeral, 2 notopleural, no supra-alar, postalar, intra-alar, dorsocentral, prescutellar acrostichal, 3 or rarely 2 pairs of scutellars, a strong mesopleural. Fore and hind femora with short black dorsal bristles distally; posteroventral bristles of fore femur and anteroventral bristles of hind femur obsolete. Wing with microtrichia on almost entire surface except for variable areas in second basal and anal cells; distal section

of vein 4 slightly arched, slightly curved forward apically.

Abdomen. ♂: tergite 4 slightly longer than tergite 3, tergites 3 and 4 together approximately equal to or slightly shorter than tergite 5; ♀: tergites 3, 4, and 5 subequal in length.

Dimensions: total length, ♂ 6.5–9.5 mm., ♀ 8.3–9.6 mm.; length of thorax, ♂ 3.4–4.9 mm., ♀ 4.5–5.3 mm.; length of wing ♂ 7.8–10.8 mm., ♀ 10.4–11.5 mm.

Distribution: South-eastern Queensland; eastern New South Wales; Victoria; ? Tasmania.

Material examined: No locality (but Macquart gives "la; Tasmanie"), no date (lectotype ♂ here designated, paralectotype ♂, OXN), anon. Queensland: Gayndah, i 1935 (1 ♀, BM), anon.; Brisbane, xi 1913 (1 ♀, UQ), H.H.; Crow's Nest, near Brisbane, ii 1948 (1 ♂, UQ), C.S. Andrew. New South Wales: Mosquito or Hunter R., no date (lectotype ♂, lower specimen, paralectotype ♂, upper specimen, here designated of C. jucunda Walker, both on one pin, BM), anon.; Megalong Valley, Blue Mountains, i 1961 (1 ♀, NSWDA), C.E.C.; Sydney, xii 1923 (1 ♂, AM), anon.; 1864 (1 ♀, det. Hendel as L. jucunda, WM), Thorey; no date (1 ♂, AM), L. Gallard. Victoria: Brighton, near Melbourne, no date (1 ♂, NMV), anon.

Despite the fact that this was among the earlier platystomatid species to be described, it is very sparingly represented in modern collections. This is surprising in view of the much more intensive collecting of Diptera carried out in Australia in recent years in areas where the species was collected long ago. It is suggested

that habitat changes in recent decades may have greatly reduced the numbers of this species, even where considerable areas of forest remain. It seems highly probable that the locality Tasmania, given by Macquart, is erroneous (see remarks under Euprosopia tenuicornis).

It is difficult to understand the application of the name L. bicolor Macquart to other species of Lamprogaster by Hendel and Malloch. This is the only Australian species of the genus which can be reconciled with Macquart's description. There are only two specimens, both of the present species, above the label "Lamprogaster bicolor ♀ n.sp. Macq" in the Bigot collection, and though these are both males and not individually labelled I have assumed these to be syntypes.

Lamprogaster flavipennis Macquart

Lamprogaster flavipennis Macquart, 1843:211, pl.28, Fig.7.;

not L. flavipennis, Hendel, 1914b (see under L. vella);

not L. flavipennis, Malloch, 1928a (see under L. excelsa).

Lamprogaster unimacula Hendel, 1914b:239, new synonym.

♂♀ . Similar in most characters, particularly in wing pattern, to L. bicolor; differing from that species principally as indicated below.

Coloration generally a little darker than in L. bicolor. Mesoscutum with broad black median area for its whole length, its lateral limits at the scutellar bridges posteriorly, almost as wide anteriorly; this black area in large part concealed by an area of yellowish grey pruinescence formed from 3 fused pruinescent

stripes which are separated at anterior extremity, not reaching scutellum; scutellum black with bluish reflections. Legs, in the apparently commoner northern form, coloured much as in L. bicolor, in specimens from south of the Hunter R. (Toronto and Monga) basal third to half of all femora dark brown to blackish. Wing with a small brown discal spot of variable intensity on vein 2; apical mark more restricted than in L. bicolor and usually not distinctly extended into marginal cell. Abdomen black with blue reflections.

Head. Height of cheek 0.30–0.39 of height of eye.

Thorax. Mesopleuron very finely pubescent on most of surface.

Abdomen. ♂ : tergites 3 and 4 together a little more than half as long as tergite 5.

Dimensions: total length, ♂ 6.4–10.3 mm., ♀ 8.0–10.6 mm.; length of thorax, ♂ 3.4–4.9 mm., ♀ 4.4–5.2 mm.; length of wing, ♂ 8.1–10.7 mm., ♀ 9.6–11.6 mm.

Distribution: Queensland – south-east; New South Wales – mainly coastal, and of restricted occurrence in the south. Enderlein's record from Fiji is certainly an error and it is improbable that even the Australian specimens he recorded as D. flavipennis were correctly identified.

Material examined. Queensland: "S. Queensland", no date (holotype ♂ of Lamprogaster unimacula Hendel, BM), T.L.B.; Cedar Creek, near Brisbane, iii iv 1966 (2 ♀ , UQ), F. Lo, R. Howler; Highvale, 14 miles NW of Brisbane, i ii xii 1959–1960 (8 ♂, 5 ♀ , CSIRO, 1 ♂, AM), R.S.; Mount Nebo, near Brisbane, i 1962

(1 ♀ , CSIRO), E. Warwick; Brisbane, ii 1962 (1 ♂ , UQ), N. Heather; North Tamborine, i 1961 (1 ♀ , CSIRO), M.S.U.; Tamborine Mountain, ii iii 1954-1962 (2 ♀ , UQ), "R.P.K.", B. Willson; Springbrook, McPherson Range, xi 1949 (2 ♂, 1 ♀ CSIRO), anon. New South Wales: "Nouvelle Hollande" (in register), no date (1 ♀ , deduced to be holotype, PM), anon.; Mount Warning, near Murwillumbah, i 1957 (1 ♂, NSWDA), B.M. Braithwaite; Huonbrook, near Mullumbimby, xii 1961 (1 ♂, 1 ♀ , AM), R.L. and D.K.M.; 7 miles W of Rosebank, Lismore district, 1,700 ft., xi 1961 (1 ♂, CSIRO), I.F.C. and M.S.U.; Richmond R., iii 1866 (1 ♂, 1 ♀ , NMV), Wilcox; Clarence R., no date (2 ♂, NMV), Wilcox; Toronto, Lake Macquarie, no date (1 ♀ , AM), Filmer; Monga, near Braidwood, ii 1966 (1 ♀ , CSIRO), E.F.R.

Some difficulty has been encountered in determining the identity of L. flavipennis Macquart, and in deciding which is the type specimen. Macquart gives "Des iles de la mer du Sud. Museum." In the Paris museum, above the label "L. flavipennis M. Mer du Sud" there are four specimens, all referable to Australian species. One of these bears a red TYPE label and appears to belong either to L. corusca n.sp. or to L. nigripes (Macquart). It is evidently not the type because its coloration cannot be reconciled with Macquart's description, and because the number it bears, $^{2}/_{47}$ indicates that it was added to the Museum collection after Macquart (1843) recorded it as being there. Two further specimens (♂, ♀) appear to belong to the northern form of the present species, though also in poor condition. They both carry the

number $^{2}/47$ indicating that they cannot be type material. The remaining specimen (♀) I regard as almost certainly the holotype. It bears the number $^{229}/35$, which indicates that it is one of the "Insectes de Nouvelle Hollande achetés à M. Gory" in 1835. The label "No.104. Loxoneura flavipennis" probably indicates Macquart's prepublication idea of its generic affinity, before he decided to set up the new genus Lamprogaster for it. It agrees reasonably well with Macquart's description of L. flavipennis and belongs to the southern form of the present species, having the basal halves or somewhat less of all femora darkened.

Lamprogaster vella (Walker)

Chromatomyia Vella Walker, 1849:803.

Lamprogaster amaena Walker, 1849:1162, as correction for C. Vella.

Lamprogaster flavipennis Macquart, Hendel, 1914b: 234-235, misidentification.

♂♀. Similar to L. excelsa in most characters and differing principally as stated below.

Coloration generally as described for L. excelsa. Femora generally with a small amount of tawny suffusion near apices; tibiae tawny with variable brown markings; tarsi pale yellowish, slightly browned on spical segment. Wing with stigmatal band black and well marked but somewhat narrower than in L. excelsa, almost triangular; discal spot on vein 2 well marked, black at least equal in width to width of submarginal cell at same level.

♂ postabdomen: resembling that of L. excelsa but differing as follows; apical triangular expansion of outer surstylus longer than wide; posterior margin of inner surstylus rather convex,

with stout setulae on inner surface (these setulae slightly less developed in L. excelsa); cercus tumid on anterior side of distal surface, with anterior basal extension partly visible in lateral aspect in front of lateral lobe of tergite 9.

Dimenions: total length, ♂ 8.7-10.6 mm., ♀ 7.5-10.1 mm.; length of thorax, ♂ 4.3-4.6 mm., ♀ 3.4-4.7 mm.; length of wing, ♂ 9.6-10.5 mm., ♀ 7.9-11.4 mm.; length of glans of aedeagus, 0.92-1.01 mm.

Distribution: Queensland - south east; New South Wales - coast and tablelands districts; Victoria - near Melbourne.

Material examined. New South Wales: Mosquito or Hunter R., no date (holotype ♀, lower specimen on pin, mounted with a specimen of L. bicolor, BM), anon.; Upper Williams R., near Barrington Tops, x 1926 (1 ♀, SAM), A.M.L. and F.E.W.; Tubrabucca, near Barrington Tops, i 1948-1956 (1 ♂, 1 ♀, NMV), R.T.M.P. and A.N.B., (1 ♀, CSIRO), I.F.C.; Avalon, near Sydney, xii 1966 (1 ♀, AM), M.G. and V.G. Queensland: Bunya Mountains, no date (2 ♂, AM), N.G. Victoria: Melbourne, no date (1 ♂, BM), anon.; Kew, near Melbourne, no date (1 ♀, NMV), anon.

Lamprogaster sp. 1

This category must be considered of doubtful status as the available material is not sufficient to decide how many species are involved or whether all specimens running to this form in the key are distinct from L. excelsa, L. nigripes, and L. corusca. The genitalia of the only available male specimen, from Kew, Victoria, have been examined. This specimen has slender apices

to the filaments as in L. excelsa., and the size of the glans (0.70 mm.) is not very different from that species but the wing pattern agrees better with L. vella. There is much variation in the width of the stigmatal band, even in specimens from the same locality.

All specimens considered under this heading are distinguished from L. nigripes and L. corusca by the lighter coloured femora: fore femur largely tawny on distal half, blackish basally; middle and hind femora tawny or fulvous, often slightly darkened apically.

Distribution: Queensland - south-east; New South Wales; Victoria.

Material examined: Queensland: Mount Coo-tha near Brisbane, v 1953 (1 ♀, UQ), Y.P. Beri. New South Wales: Kendall, near Wauchope, no date (1 ♀, CSIRO), anon.; Goulburn R., no date (1 ♀, BM, det. Hendel as L. flavipennis), Capt. Parry. Victoria: Kew, near Melbourne, no date (1 ♂, 1 ♀, NMV), anon.

Lamprogaster excelsa new sp.

Lamprogaster flavipennis Macquart, Malloch, 1928a:349, misidentification.

♂♀. Coloration. Head orange-tawny, postfrons sometimes a little darker; orbital margins of postfrons and parafacial with band of silvery pruinescence which is widest near level of antenna. Antenna tawny, with segment 3 partly brownish; arista brown basally becoming black distally. Prelabrum and palpus tawny. Thorax orange-tawny; mesoscutum with a broad almost parallel-sided black central area, extending its full length; three longitudinal grey pruinescent stripes on black median area, the

median one broadest, all joined posteriorly and not reaching to scutellum; scutellum glossy black, with bluish green reflections; postnotum dull blackish with pale pubescence; Legs black; two basal segments of each tarsus dark brown to reddish brown. Wing membrane distinctly yellowish anteriorly and towards base, faintly greyish posteriorly; no dark mark in vicinity of humeral and basal crossveins; stigmatal band broad and heavy but scarcely extending behind vein 4, filling end of subcostal cell and broadly developed on vein 2; discal spot on vein 2 very small or indistinct; no mark on discal crossvein; apical mark broadest on vein 3, extending to vein 4; squama pale tawny to buff. Haltere pale yellowish, brown distally. Abdomen black with strong green, greenish blue of bronzy reflections.

Head. Postfrons sloping; facial carina moderately broad, flat, sharply margined, smooth; height of cheek 0.38-0.44 of height of eye. Antenna extending slightly more than half the distance from its basal insertion to epistomal margin; arista filiform, with minute basal hairs not half as long as basal diameter of arista. Prelabrum broad and rather prominent; palpus of moderate width.

Thorax moderately broad; outline of scutellum rounded except at apex where it is transverse; much of upper part of mesopleuron pubescent; the following bristles present: humeral, 2 notopleural, supra-alar absent, postalar, intra-alar, dorso-central, prescutellar acrostichal, 3 or 4 pairs of scutellars (often 3 on one side and 4 on the other), a strong mesopleural.

Fore and hind femora with moderately developed black dorsal bristles on their distal halves; fore femur also with short black posteroventral bristles distally, hind femur with similar series of anteroventral bristles. Wing with microtrichia distributed over entire surface except for 2 narrow streaks in anal cell; distal section of vein 4 arched through most of its length, slightly curved forward at extreme apex; posterior distal angle of discal cell greater than 90°.

Abdomen. ♂: tergites 3 and 4 subequal and together slightly shorter than tergite 5; ♀ : tergite 3, 4, and 5 subequal in length. ♂ postabdomen: outer surstylus with elongate, almost parallel-sided basal section, which reaches to level of apex of cercus where it is abruptly contracted into the much shorter distal section; distal section rather narrow basally where it has a gibbosity on inner surface, distally with a somewhat triangular expansion which is wider than long; free distal section of inner surstylus about half as long as that of outer surstylus, with two teeth of which the distal one is flattened terminally and has a small posteriorly directed point; stipe of aedeagus rather long, containing a pair of pigmented strips which extend its full length, preglans well differentiated from stipe, short sclerotized, without process; glans subcylindrical, somewhat elongate, with membranous terminal lobe; filaments approximately equal, very long, 9-10 times as long as glans, each with a longitudinal pigmented skeletal element which is double near base, apices simple, slender; cercus with anterior basal

extension concealed in lateral aspect by lateral lobe of tergite 9.

Dimensions: total length, ♂ 7.7-12.0 mm., ♀ 9.4-11.0 mm.; length of thorax, ♂ 4.0-5.8 mm., ♀ 4.5-5.5 mm.; length of wing, ♂ 9.6-12.4 mm., ♀ 11.0-12.7 mm.; length of glans of aedeagus 0.93-1.05 mm.; diameter of filament of aedeagus near apex 0.008-0.013 mm.

Distribution: New South Wales - highlands above 3,000 ft.; probably also Victoria (Gisborne, Malloch's record of L. flavipennis, specimen not seen).

Material examined: Mount Kosciusko, ii 1952 (holotype ♂, paratype ♀, AM), K.E.; i 1957 (paratype ♀, NMV), A.N.; The Creel, near Mount Kosciusko, 3,000 ft., i 1931 (paratype ♂, CSIRO), anon.; 1 mile W of Wombeyan Caves, N. of Goulburn, xi 1955 (paratype ♂, CSIRO), T.G.C.; 9 miles NW of Kingstown, W of Armidale, xii 1948 (2 ♂, 1 ♀, CSIRO), K.H.K.; Uralla, xi 1914 (7 ♂, 2 ♀, CSIRO, 1 ♂, NMV, 1 ♂, BM, 1 ♂, USNM), W.W.F.; 3 miles E of Kentucky, near Uralla, xii 1958 (1 ♂, CSIRO), K.L.T.

Comparative notes: one of the group of closely similar species including L. vella (Walker) and L. nigripes (Macquart); distinguished from L. vella by the darker fore tarsus and form of the surstyli; distinguished from L. nigripes by the larger size and form of the stigmatal band.

Lamprogaster nigripes (Macquart) new comb.

(Fig. 35)

Senopterina nigripes Macquart, 1851:283, pl.26, fig.6.

Duomyia nigripes, Hendel, 1914a:58; 1914b:102.

♂. Very similar to L. excelsa and agreeing with the description given for that species except as indicated below.

♀ unknown.

Coloration. Wing with stigmatal band filling end of subcostal cell, but narrow and of almost uniform width behind vein 1; discal spot on vein 2 barely discernible.

Postabdomen. Surstyli as described for L. excelsa except that inner surstylus does not extend to level of apex of cercus, outer surstylus extending a little beyond apex of cercus; glans rather shortly cylindrical; filaments each about 13 times as long as glans, with slender, tapering apices.

Dimensions: total length 7.5-8.2 mm.; length of thorax 3.4-3.7 mm.; length of wing 8.0-8.1 mm.; length of glans of aedeagus 0.62-0.67 mm.

Distribution: Tasmania (confirmation desirable); Victoria.

Material examined: Tasmania: no further data (lectotype ♂, here designated, paralectotypes, 3 ♂, PM), J.P.V. Victoria: Preston, near Melbourne, no date (1 ♂, NMV), anon.

This species is very inadequately known but appears distinct from any other here recognized. No recently collected material is available. Musgrave (1932) records that J.P. Verreaux collected in Tasmania in 1843. The specimen from Preston is doubtfully

referable to this species, as the scutellum is minutely but sharply sculptured and appears to have a patch of grey pruinescence on centre of dorsal surface. In the type material the scutellum is smooth and glossy as in L. excelsa and L. corusca.

Lamprogaster corusca new sp.

(Fig. 41)

Lamprogaster flavipennis var. nigripes Hendel 1914b:235 (subjective synonym of above) not L. nigripes (Macquart, 1851).

♂♀ . Very similar to L. excelsa, and agreeing with the description given for that species except as indicated below.

Coloration. Hairs of mesopleuron black, at least those on posterior marginal section. Legs black; middle and hind femora sometimes with tawny preapical dorsal patch; 2 basal segments of each tarsus sometimes brown. Wing with stigmatal band well marked but narrower than in either L. excelsa or L. vella. Abdomen with blue and purple reflections.

Head. Height of cheek 0.39-0.48 of height of eye.

Thorax with 3 pairs of scutellar bristles. Wing more narrowly elongate than in L. excelsa.

♂ postabdomen: generally similar to that of L. excelsa; aedeagus with glans shorter than in that species; apex of each filament terminating in a bell-shaped expansion.

Dimensions: total length, ♂ 9.1-10.0 mm., ♀ 7.5 m.m. length of thorax, ♂ 4.6-4.9 mm., ♀ 3.2 mm.; length of wing, ♂ 10.3-10.4 mm., ♀ 9.4 mm.; length of glans of aedeagus 0.66-0.72 mm.; diameter of filament near apex 0.05-0.06 mm.

Distribution: Queensland - south east; New South Wales - district not stated.

Material examined. Queensland: Highvale, 14 miles NW of Brisbane, i 1960 (holotype ♂, CSIRO), R.S.; Logan Road, Brisbane, xii 1889 (paratype ♂, CSIRO), H. Tryon; Nerang R., near Springbrook Forest, 13 miles S of Nerang, xii 1966 (paratype ♀, CSIRO), T.G.C. New South Wales: no further data (lectotype ♂, here designated, paralectotype ♀, of L. flavipennis var. nigripes Hendel, MNM), anon.

Lamprogaster laeta (Macquart)

Platystoma laeta Macquart, 1835:445; Guérin-Méneville, 1838:300; 1844:555, pl.104, Fig. 1.

Lamprogaster laeta, Froggatt, 1907:308, pl.28 fig.7.; Tillyard, 1926:371, pl.20, fig.27; not L. laeta, Malloch, 1929 (see under L. flavihirta).

Chromatomyia formosa Walker, 1849:801, new synonym.

Lamprogaster bicolor Macquart, Malloch, 1928a:349, misidentification.

♂♀. Generally similar to L. relucens but average size much larger; differing from that species principally as indicated below.

Coloration. Mesoscutum with dorsocentral pruinescent stripe obsolete behind suture; median pruinescent stripe forked posteriorly, the branches curving outwards; scutellum either entirely shining black or broadly black apically and laterally with reddish brown basal central area. Wing membrane largely yellowish, especially so anteriorly and basally; wing markings much as in L. relucens, but

stigmatal band broader and more triangular. Abdomen black with green or blue reflections.

Head. Postfrons only slightly inclined from the horizontal, somewhat depressed medially; height of cheek 0.45–0.56 of height of eye.

Thorax. Mesopleuron with area of pubescence towards upper margin; scutellum with 3 or 4 pairs of bristles. Wing membrane entirely clothed with microtrichia except for a stripe near centre of anal cell; distal section of vein 4 rather strongly arched.

♂ postabdomen somewhat similar to that of L. relucens; outer surstylus with a slight sigmoid curve, the apical expansion obliquely truncate.

Dimensions: total length, ♂ 11.2–13.3 mm., ♀ 8.4–12.5 mm.; length of thorax, ♂ 5.2–6.4 mm., ♀ 4.3–6.6 mm.; length of wing, ♂ 11.8–14.1 mm., ♀ 10.2–14.4 mm.; length of glans of aedeagus: 1.2–1.4 mm.

Distribution: New South Wales – principally tablelands districts from Barrington Tops southwards; Victoria; Tasmania.

Material examined: New South Wales and Australian Capital Territory: Upper Manning R., near Barrington Tops, 4,200 ft., i 1948 (1 ♀, AM), A.M.; Tubrabucca, near Barrington Tops, 4,300 ft., i 1948 (1 ♀, AM), A.M.; Allyn R., near Barrington Tops, i 1927 (1 ♂, AM), T.G.C.; Avalon Beach, near Sydney, i 1956 (1 ♀, NSWDA), P. Pockley; Sydney, no date (1 ♂, NSWDA), anon.; Port Jackson (i.e. Sydney Harbour), no date (holotype of Macquart and Guérin, much damaged, PM), anon.; Bendora, A.C.T., iii 1949

(1 ♂, 1 ♀, CSIRO), S.J.P.; Mount Franklin, A.C.T., ii 1959 (1 ♀, CSIRO), Z.R.L.; Lee's Springs, A.C.T., ii 1952 (2 ♂, CSIRO), S.J.P.; 3 miles SE of Pilot Hill, Bago Forest, near Batlow, iii 1957 (24 ♂, 3 ♀, CSIRO, 1 ♂, AM, 1 ♂, NMV), T.G.C.; Alpine Creek, near Kiandra, ii 1963 (1 ♀, CSIRO), S.J.P.; 9 miles W of Adaminaby, iii 1962 (1 ♂, 5 ♀, CSIRO), Z.R.L.; Yaouk, near Adaminaby, ii 1959 (1 ♀, CSIRO), M.F.D.; Sawpit Creek, near Mount Kosciusko, i ii 1929-1963 (4 ♂, 5 ♀, AM, 1 ♂, 1 ♀, SAM), A.M., H.O. Fletcher, D.K.M.; Wilson's Valley, near Mount Kosciusko, ii 1963 (1 ♂, AM), D.K.M.; "Kosciusko", ii 1952 (1 ♂, AM), K.E.; Jindabyne, 3,000 ft., iii 1889 (1 ♀, AM), R.H.; Moonbar, S of Jindabyne, 3,000-3,500 ft., iii 1889 (1 ♂, 1 ♀, AM), R.H.; Nimmitabel, i iv 1937-1961 (2 ♀, CSIRO), M.F., D.H.C. Victoria: Strathbogie Range, ii 1962 (1 ♂, 1 ♀, CSIRO), K.L.T.; Tallarook, ii 1951 (1 ♂, CSIRO), K.G. Campbell; Warburton, iii 1929 (1 ♀, UQ), V. Miller; Dandenong Range, near Melbourne, ii 1899 (1 ♀, SAM), anon.; Monbulk, near Melbourne, ii 1899 (10 ♂, 5 ♀, BM), anon. Tasmania: Devonport, no date (1 ♀, SAM), A.M.L.; Lefroy, near George Town, no date (1 ♂, SAM), anon.; Launceston, no date (1 ♀, SAM), anon.; Mangalore, ii 1913 (1 ♀, BM), A. White; Eaglehawk Neck, ii-iii 1913 (1 ♂, BM), R.E.T.; junction of Huon R. and Picton R., ii 1967 (1 ♂, CSIRO), E.F.R.; Cracroft R. crossing, South-West District, ii 1966 (1 ♂, 1 ♀, NMV), A.N.; West Arthur Plains, South-west District, ii 1966 (1 ♀, NMV), A.N. "Australia", no further locality, no date (lectotype ♂, here designated, of Chromatomyia formosa Walker, BM, "one of Walker's series so named"), anon.

Lamprogaster relucens new sp.

(Figs. 34, 40)

Lamprogaster bicolor Macquart: Hendel, 1914a:pl.10, fig.88; 1914b: 237-238; misidentifications.

♂♀. Coloration. Head orange-tawny; postfrons a little darker; orbital margins of postfrons and parafacial with band of silvery pruinescence, which is widest near level of insertion of antenna. Antenna of the same colour as rest of head, except that the distal part of arista is blackish; prelabrum and palpus tawny to fulvous. Thorax orange-tawny; mesoscutum with broad black central area, the lateral limits of which lie approximately along the dorsocentral lines, and including 3 grey-pruinescent longitudinal stripes of which the median one is broadest and sometimes divided by a narrow black median line, the dorsocentral stripes interrupted at suture and entirely separate or joined posteriorly by a narrow transverse stripe and, like the median stripe, discontinued well in front of scutellum; scutellum entirely fulvous or tawny; pleura without any dark markings. Legs tawny; fore coxa, trochanter, and basal half of femur suffused with blackish brown; tibiae suffused with blackish near apices; tarsi brown or tawny basally, becoming black or deeper brown distally. Wing hyaline with a very faint yellow tinge, extreme base and often also costal cell more distinctly yellowish; blackish humeral band extending from costa to vein 4, filling base of first basal cell where it runs distally to join subbasal band which extends from marginal cell to vein 6; stigmatal band black, almost

parallel-sided behind vein 1, extending from costa to just behind vein 4; a distinct black discal spot on vein 2; discal crossvein unmarked; apical mark on end of vein 3 not reaching vein 2, extending narrowly to vein 4; squama tawny-buff. Haltere dull fulvous, brownish distally. Abdomen black with conspicuous green reflections.

Head. Postfrons sloping; facial carina moderately broad, especially below, flat-topped, sharply margined, smooth; height of cheek 0.37-0.43 of height of eye. Antenna extending distinctly more than half distance from its insertion to epistomal margin; arista slender except at base where it usually has a few very minute hairs. Prelabrum broad and rather prominent anteriorly; palpus moderately broad.

Thorax, robust; scutellum rounded in outline, strongly convex; mesopleuron with small areas of pubescence on posterior margin only; the following bristles present: humeral, 2 notopleural, no supra-alar, postalar, intra-alar, dorsocentral, prescutellar acrostichal, 3 pairs of scutellars, a strong mesopleural. Fore and hind femora each with a series of short black dorsal bristles, those of latter extending almost to base; posteroventral bristles of fore femur and anteroventral bristles of hind femur almost obsolete. Wing with microtrichia almost completely absent from those areas of marginal, submarginal and basal cells lying between sub-basal and stigmatal bands; second basal and anal cells also largely devoid of microtrichia in unpigmented areas; distal section of vein 4 slightly arched

through most of its length, not curved forward apically.

Abdomen. ♂: tergite 5 somewhat longer than tergites 3 and 4 together; ♀: tergites 3, 4 and 5 subequal in length. ♂ postabdomen: outer surstylus curved at base, its basal section elongate, reaching to level of apex of cercus; distal section short, with a broadly triangular apical expansion; distal section of inner surstylus a little shorter than that of outer surstylus, with a swollen preapical black region and a flattened terminal tooth with anterior and posterior points; stipe of aedeagus with a pair of variably pigmented skeletal strips; preglans sclerotized on one side only; glans moderately large and elongate, with short membranous terminal lobe; filaments approximately 15 times as long as glans, slender and simple at apices, each with a longitudinal pigmented strip which is duplicated basally; cercus short, rounded.

Dimensions: total length, ♂ 6.5–10.7 mm., ♀ 7.2–9.0 mm.; length of thorax, ♂ 3.4–4.8 mm., ♀ 4.0–4.6 mm.; length of wing, ♂ 7.7–10.3 mm., ♀ 8.5–9.8 mm.; length of glans of aedeagus, 0.90–0.97 mm.

Distribution: New South Wales – widely distributed from Dubbo and Hunter R. southwards and at least as far west as Hay; Victoria; South Australia – near Adelaide.

Material examined: New South Wales: Northmead, near Parramatta, iii 1965 (holotype ♂, AM), M.G. and V.G.; Goulburn R., Hunter R. district, no date (paratype ♀, BM), Captain Parry; Dubbo, vi 1911 (paratypes, 2 ♂, 1 ♀, NSWDA), anon.; Royalla, near Queanbeyan, iii 1961 (paratypes, 3 ♂, 3 ♀, CSIRO, 1 ♂,

AM), S.J.P.; Yanco, iv 1963 (paratypes, 1 ♂, 1 ♀, CSIRO), C.J.R. Johnson; Hay, xi 1915-1916 (paratypes, 4 ♀, NSWDA, 1 ♀, AM, 3 ♂, CSIRO), W.W.F. Victoria: Shepparton, xii 1918 (1 ♂, NMV), P.C. French; Kew, near Melbourne, no date (1 ♂, NMV), anon.; Croydon, near Melbourne, iv 1954 (1 ♀, NMV), anon.; Moozoojona, iv 1925 (1 ♀, NMV), F.E.W. South Australia: Adelaide, no date (1 ♂, BM), "Wilson"; Belair, near Adelaide, iii 1920 (4 ♂, SAM), O.B. Lower; National Park, near Adelaide, iii 1940 (3 ♂, SAM), W.B. Hitchcock.

Comparative notes: most resembling L. laeta and L. hilaris; differing from L. laeta in the smaller size, distribution of microtrichia on the wing membrane, and narrower stigmatal band; most easily distinguished from L. hilaris by the coloration of the thorax as given in the key.

Lamprogaster hilaris (Walker)

Chromatomyia hilaris Walker, 1849:804.

Lamprogaster hilaris Walker, 1849:1162.

♂♀. Similar to L. relucens in most characters and differing principally as indicated below.

Coloration generally somewhat darker than in L. relucens. Mesoscutum with black central area broader than in L. relucens, especially so anteriorly where it extends laterally behind humeral calli, extending well outside dorsocentral lines posteriorly; median greyish pruinescent stripe broadened and divided posteriorly, reaching practically to scutellum; dorsocentral pruinescent stripe interrupted at suture, broadly fused with the ramus of

median stripe posteriorly; scutellum brownish laterally; lower part of sternopleuron and hypopleuron blackish. Tibiae not noticeably darkened distally. Wing markings much as in L. relucens, but dark area in base of first basal cell enclosing a larger hyaline spot or streak.

Head. Facial carina finely transversely rugose, narrower than in L. relucens, at upper end between antennae not as wide as first antennal segment, near middle about as wide as third antennal segment; height of cheek 0.40-0.50 of height of eye. Antenna with arista quite bare beyond the 2 short basal segments.

Thorax. Mesoscutum finely but roughly punctured, especially towards centre; upper part of mesopleuron densely pubescent.

♂ postabdomen rather similar to that of L. relucens; outer surstylus almost straight.

Dimensions: total length, ♂ 6.6-10.4 mm., ♀ 6.6-8.6 mm.; length of thorax, ♂ 3.3-4.3 mm., ♀ 3.4-4.5 mm.; length of wing, ♂ 6.9-8.5 mm., ♀ 7.3-9.0 mm.; length of glans of aedeagus, 0.84-0.89 mm.

Distribution: New South Wales - principally tablelands districts; Victoria - north-west.

Material examined: "New Holland", no date (lectotype ♀, here designated, BM, "Chromatomyia hilaris Walker. One of Walker's series so named. E.A.W."), anon. New South Wales and Australian Capital Territory: 20 miles N of Murrurundi, iv 1952 (1 ♂, CSIRO), I.F.C.; Barrington Tops, iv 1949 (2 ♂, CSIRO), S.J.P.; Jarrawa Creek, near Yass, ii 1966 (1 ♀, CSIRO), Z.R.L.; Hall, A.C.T.,

iii 1952 (18 ♂, 2 ♀, CSIRO, 2 ♂, AM), K.R.N.; Royalla, S of Queanbeyan, iii 1961 (6 ♂, 4 ♀, CSIRO, 1 ♀, AM), D.H.C., Z.R.L., S.J.P.; near Braidwood, ii 1953 (4 ♂, CSIRO), Z.R.L. Victoria: Kewell, Horsham district, no date (1 ♂, NMV), anon.

Lamprogaster sp. 2

♂♀. Similar to L. relucens and L. hilaris in most characters. The available material is inadequate for a detailed description but what appear to be the principal distinctive characters are given below. There is a distinct possibility that the two specimens are not conspecific.

Coloration. Mesoscutum with central blackish area not extending outside dorsocentral lines except posteriorly in ♂, in ♀ only defined towards anterior extremity of mesoscutum; ♂ : pattern of greyish pruinescent stripes much as in L. hilaris except that the lateral postsutural stripe is much better developed and extends broadly almost to intra-alar bristle; ♀ : dorsocentral pruinescent stripe not interrupted at suture and very broadly joined to median stripe immediately in front of suture, lateral stripe joined to dorsocentral stripe at suture and more narrowly joined to it at posterior extremity. Wing markings mostly very heavy and black; a brown blotch just before middle of second costal cell; stigmatal band broader than in L. relucens and L. hilaris, particularly in marginal cell.

Head. ♂ : facial carina similar to that of L. hilaris, similarly rugose and only slightly broader; ♀ : facial carina smooth, somewhat broader and slightly convex.

Abdomen. ♂ : tergite 3 and especially tergite 4 shorter than in L. hilaris; ♀ tergites 3, 4, and 5 subequal in length.

Dimensions: total length, ♂ 7.2 mm., ♀ 8.4 mm.; length of thorax, ♂ 4.0 mm., ♀ 4.4 mm.; length of wing, ♂ 8.6 mm., ♀ 9.5 mm.

Distribution: Western Australia (probably South-western Division).

Material examined: "W. Australia", no date (1 ♂, 1 ♀, SAM), anon. Messrs. N. McFarland and G.F. Gross of the South Australian Museum inform me that the labels appear to those of A.M. Lea and are therefore likely to be correct, despite their inadequacy.

Lamprogaster poecila Hendel

Lamprogaster poecila Hendel, 1914b:239-240.

♂♀ . Resembling L. relucens but more slender; otherwise differing from that species principally as indicated below.

Coloration. Lower part of sternopleuron extensively suffused with deep brown; scutellum black with greenish lustre. Legs black to dark brown; basal segment of each tarsus tawny brown. Wing with humeral and sub-basal marks well developed and joined in first basal cell; stigmatal stripe much wider than in L. relucens, extending broadly to centre of discal cell and extending along costal margin to unite with or touch discal mark; discal mark forming a large blotch on costa and vein 2, extending along costa to fill or almost fill distal end of marginal cell and touch the well developed apical mark which extends from

vein 2 to vein 4.

Abdomen. ♂ : tergites 3 and 4 subequal in length and together slightly longer than tergite 5; ♀ : tergites 3, 4 and 5 subequal in length, tergite 4 appearing strongly gibbous in the available dried material.

Dimensions: total length, ♂ 8.2-9.6 mm., ♀ 7.4-8.7 mm.; length of thorax, ♂ 3.5-3.7 mm., ♀ 3.1-3.8 mm.; length of wing, ♂ 8.5-8.7 mm., ♀ 7.5-8.6 mm.

Distribution: Queensland - from Mackay district to southern border district.

Material examined: "Austral. sept." = northern Australia, probably Queensland, 1864 (holotype ♂, WM), Thorey; Marwood, near Mackay, i 1924 (1 ♂, AM), W.G. Harvey; Kilcoy, xii 1947 (1 ♂, 1 ♀, CSIRO), K.R.N.; Surprise Rock, Binna Burra, Lamington National Park, xi 1952 (1 ♀, CSIRO), anon.

Lamprogaster maculipennis Macquart

(Fig. 42)

Lamprogaster maculipennis Macquart, 1847:89, pl.6, fig.5.

♂ ♀. Similar to L. relucens in most characters, and differing principally as indicated below.

Coloration of head and thorax, including markings of mesoscutum as described for L. relucens, except that there is a reddish brown area on lower part of sternopleuron. Black subbasal mark of wing strongly developed and filling base of first basal cell but only feebly extended towards costa immediately beyond humeral crossvein; a pale brown blotch near centre of

second costal cell; stigmatal band broader and heavier than in L. relucens, extending to middle of discal cell; discal spot on vein 2 and apical mark absent altogether. Abdomen coloured as in L. relucens.

Head. Facial carina slightly narrower than in L. relucens, not rugose. Arista bare. Prelabrum very prominently projecting forwards.

Abdomen. ♂ : tergite 5 slightly longer than tergites 3 and 4 together; ♀ : tergites 3, 4, and 5 subequal in length.

Dimensions: total length, ♂ 7.3 mm., ♀ 6.9-7.3 mm.; length of thorax, ♂ 4.2 mm., ♀ 3.7-4.3 mm.; length of wing, ♂ -, , ♀ 8.4-9.4 mm.

Distribution: Australian Capital Territory.

Material examined: no locality on label but given as "Nouvelle Hollande" by Macquart, no date (lectotype ♀ , here designated, left wing missing, paralectotype ♂, right wing missing, left wing damaged, OXN), L. Fairmaire; Blundell's near Canberra, iii 1948 (1 ♀ , CSIRO), S.J.P.

In the Bigot collection, now at Oxford, there is a large number of specimens now placed above the label "Lamprogaster maculipennis ♂ Macq Coll Fairmaire D. Ex.", all of which are without individual labels. Only two of these agree with Macquart's description and I have regarded these two as syntypes, the others probably having been added by Bigot or others. In the Paris museum there is a specimen of L. laeta (Macquart) erroneously labelled as type of this species.

Lamprogaster fuscibasis Malloch

Lamprogaster fuscibasis Malloch, 1930a:433-434.

The following brief notes were made on the holotype some years ago, but it has not been possible to re-examine material of the species in connection with the present work. Identification should be possible from Malloch's description together with the additional characters given below and in the key. However the species is very similar to type material of L. macrocephala Hendel (MNM, WM) from Papua-New Guinea and a careful comparison will need to be made in order to decide the validity of Malloch's species.

♂. Coloration of wing: anterior margin stained with yellowish; distal part of subcostal cell deeper yellow; basally a large complex dark mark, much as in L. laeta; a brown mark surrounding anterior crossvein; no other markings.

Head. Parafacial much broader than third antennal segment; cheek very nearly half as high as eye.

Thorax. Scutellum bare, with 5 pairs of marginal bristles and slight apical sulcus.

Dimensions: total length 13 mm. (Malloch).

Distribution: north-eastern Queensland.

Material examined: Kuranda, no date (holotype ♂, SPHTM), F.P.D.

X. Genus Duomyia Walker

Duomyia Walker, 1849:800. Type species D. obscura Walker (Hendel, 1914a).

Campigaster Macquart, 1855:122. New synonym. Type species C. testacea Macquart.

Euchalcota Loew, 1873:40. Type species Senopterina decora Macquart.

Helocnemia Enderlein, 1924:128. New synonym. Type species Chromatomyia apicalis Walker.

Duomyza Malloch, 1929:507 (as subgenus of Duomyia). Type species Duomyia tomentosa Hendel.

Head rather large for the size of the body, its outline, viewed anteriorly, subcircular; posterior surface broadly flattened and usually fitting closely to anterior surface of thorax; antennal grooves usually deep and well defined and separated by a distinctly margined, flat-topped carina, in a few species the carina obsolescent and the antennal grooves shallower; cheek with or without an oblique carina near middle; prelabrum normally developed; antenna with segment 2 short and compact, segment 3 usually elongate but very variable; arista usually bare or with very short hairs near base only, in very few species plumose, but the distal third always bare; 2 short fronto-orbital bristles sometimes present; ocellar bristles variably developed, often absent; inner and outer verticals well developed; postverticals absent or poorly differentiated; posterior cheek bristle present or absent.

Thorax. Mesoscutum usually much longer than wide but the proportions variable, usually with the following bristles: 1 humeral, 1 + 1 notopleural, anterior supra-alar, postalar, posterior intra-alar, 1 posterior dorsocentral, prescutellar acrostichal; scutellum bare or haired, with 2-4 pairs of marginal bristles; pleura extensively haired, without differentiated bristles; supra-squamal ridge with a group of fine erect hairs.

Legs of normal proportions, or, in some species, rather short for the length of the body.

Wings of normal size or rather short; radial vein without setulae before level of humeral crossvein; veins 3 and 4 converging apically, often very strongly so; second basal cell not enlarged; posterior distal angle of anal cell obtuse; squama usually large and rounded, sometimes reduced in size but always larger than antisquama.

Abdomen usually subcylindrical or ovoid-cylindrical with segment 1 only slightly narrowed, rarely more broadly ovate, preabdominal tergites 1-5 well developed, the first two fused; spiracles of segments 1-5 situated below lateral margins of tergites.

Coloration. Thorax and abdomen usually black, often with greenish metallic sheen, or sometimes much of surface obscured by greyish pruinescence; in some species the thoracic pleura, or the entire thorax and abdomen yellowish brown. Wings never with elaborate pattern; sometimes wing apex or distal costal region with dark cloud or spot, or the subcostal cell and region of the principal crossveins darkened, or the greater part of wing surface

suffused with brown.

Type species, Duomyia obscura Walker.

Duomyia, the platystomatid genus containing the largest number of Australian species, has proved difficult to divide into discrete species-groups. A group of species having a haired scutellum with two pairs of scutellar bristles forms a relatively well defined group for which the subgeneric name Duomyza Malloch is available. The remaining species show very diverse character combinations and, though there are some obvious small groups of related species, there are also marginal forms which make these difficult to define morphologically. On the other hand species I have grouped together in the key for practical reasons are not always more closely related to each other than they are to species appearing in other parts of the key. The character of posteroventral spines on the fore femur, on which Enderlein based the genus Helocnemia, is shared by species of several unrelated groups. For these reasons I have refrained from presenting any subdivision of the genus into species-groups, despite its somewhat unwieldy size.

Key to Australian species of Duomyia

1. Scutellum with numerous hairs on dorsal surface.....2
   Scutellum bare, except for the marginal bristles.....20
2. 3 pairs of scutellar bristles.....3
   2 pairs of scutellar bristles.....4

3. Scutellum predominantly reddish brown, sometimes with metallic dark green area in centre; mesoscutum rather densely grey-pruinescent, finely and separately pitted at base of each hair; wing with slight brown stain but not noticeably darker on costal margin.....scutellaris (Macquart)

Scutellum entirely black with slight green lustre; mesoscutum not grey-pruinescent except at lateral margins, very densely and roughly pitted; apex of wing with diffuse grey cloud on costal margin .....personata new sp.

4. Fore femur with short, thick, black posteroventral spines.....5

Fore femur without such spines.....6

5. Scutellum tawny with yellowish pruinescence; mesoscutum with greyish pruinescence on most of surface; femora fulvous; costal region of wing not darkened.....pallipes new sp.

Scutellum brown at sides, black in centre with metallic green lustre; mesoscutum and scutellum not pruinescent except near margins; femora extensively suffused with dark brown; costal region of wing with dark cloud distally.....convallis new sp.

6. Scutellum light brown; palpus not entirely blackish, usually fulvous.....7

Scutellum predominantly black, often with metallic lustre; palpus not entirely fulvous, usually blackish.....12

7. oo.....8

oo.....10

8. Hind tibia with very prominent dorsal tubercle; preglans of aedeagus elongate with pair of broad membranous wings .....tomentosa Hendel

Hind tibia without dorsal tubercle; preglans not as above.....9

9. Facial carina between antennal bases no wider than first antennal segment; palpus brown with tawny apex; preglans very short with a broad membranous lobe; glans without lobe.....triquetra new sp.

Facial carina between antennal bases distinctly wider than first antennal segment; palpus tawny or yellowish; preglans slender, elongate, with vestigial lobe; glans with long leaf-like lobe near base.....foliata new sp.

10. Antenna reaching to epistomal margin; palpus brown with tawny apex.....triquetra new sp.

Antenna extending not more than three quarters of distance from its basal insertion to epistomal margin; palpus fulvous.....11

11. Hind femur entirely fulvous; hind tibia with one brown mark beyond middle only.....*tomentosa* Hendel

Hind femur with diffuse variable brown dorsal patch; hind tibia with brown mark just beyond base, another just beyond middle, and another at apex.....*foliata* new sp.

12. Abdominal tergites 3-5 with pale pruinescence at least on area near lateral margins.....13

Abdominal tergites 3-5 without pruinescence or almost so.....14

13. Palpus with tawny apex; pruinescence on tergites 3-5 diffuse, extending faintly to dorsal surface.....*triquetra* new sp.

Palpus entirely blackish; tergites 3-5 with pruinescence confined to the conspicuous whitish, triangular lateral areas.....*sericea* Hendel

14. Parafacial without setiferous pits on upper half below the dark mark at its junction with postfrons.....15

Parafacial with several setiferous pits on upper half.....17

15. Hind femur with numerous short black anteroventral bristles; pruinescence on mesopleuron confined to its upper and posterior margins.....*botulus* new sp.

Hind femur without black anteroventral bristles; pruinescence on mesopleuron extending broadly across upper posterior angle.....16

16. Fore femur with black dorsal bristles; third antennal segment rounded at apex; parafacial with conspicuous band of silvery pruinescence, expanded above to cover the dark mark at its summit.....*argentata* new sp.

Fore femur with all dorsal bristles white; third antennal segment mucronate at apex; silvery band on parafacial narrow and inconspicuous.....*eremia* new sp.

17. Mesopleuron with whitish pubescence or pruinescence confined to small patches on upper and posterior margins.....18

Mesopleuron with the whole of upper part pruinescent-pubescent almost to centre.....19

18. Parafacial smooth at junction with cheek; ♂ : outer surstylus not much narrowed before apex, but strongly curved forward and truncated.....*smaragdina* new sp.

Parafacial strongly rugose at junction with cheek; ♂ : outer surstylus almost straight, narrowed before the somewhat expanded apex.....*lacunosa* new sp.

19. Costal margin of wing with brown stripe from subcostal cell to apex; surface of facial carina with weak irregular rugosity.....*marginalis* new sp.

Costal margin not strongly browned beyond subcostal cell; facial carina with strong vertical plications.....*chaetostigma* new sp.

20. Fore femur with one or more of the postoventral bristles thickened into black spines.....21

Fore femur without posteroventral black spines or spinescent bristles.....25

21. Arista with some rather long hairs on basal half; humeral bristle absent.....22

Arista almost bare, with minute pubescence near base only; humeral bristle well developed.....23

22. Scutellum covered with greyish white pruinescence; postfrons with a blackish spot between ocelli only; fore femur with prominent ventral tooth (at least in ♂).....*irregularis* Malloch

Scutellum without pruinescence; postfrons with a large blackish mark covering ocellar triangle and a similar blackish mark on each side covering upper orbits; fore femur without ventral tooth .....*spinifemorata* Malloch

23. No strong pteropleural bristle, scutellum black.....*serra* new sp.

A strong black pteropleural bristle among the whitish hairs; scutellum largely yellow-brown.....24

24. Abdomen fulvous; thorax fulvous with a large black central area on mesoscutum; scutellum unmarked; facial carina at widest part only slightly wider than antennal groove.....*lutea* new sp.

Abdomen with tergites 1 to 4 black; thorax with most of mesoscutum, centre of scutellum, and lower part of sternopleuron black; facial carina at widest part about twice as wide as antennal groove.....*apicalis* (Walker)

25. Frons deeply pitted on greater part of surface.....26

Frons almost smooth except, in some species, for the median and lateral humps.....36

26. Arista plumose on basal half or more, the hairs about as long as width of third antennal segment.....*ameniina* new sp.

Arista with very short basal hairs only.....27

27. Anterior and discal crossveins clouded with brown.....28

Crossveins not clouded with brown, or the anterior one very faintly so.....30

28. Basal crossvein not clouded with brown; hind femur browned on distal half or more; ♂ : hind trochanter without posterior prominence.....*montium* nom. n.

Basal crossvein clouded with brown; hind femur variably marked; ♂ : hind trochanter with posterior tubercle or gibbosity.....29

29. Hind femur darkened at extreme apex only; ♂ : filaments of aedeagus less than twice as long as glans.....*decora* (Macquart)

Hind femur dark brown on basal half; ♂ : filaments of aedeagus more than twice as long as glans.....*scintilla* new sp.

30. Wing without conspicuous dark markings; vertex not raised into a sharp ridge; postfrons without median hump in front of ocelli.....31

Wing with blackish costal mark from subcostal cell to apex; vertex raised into a sharp, somewhat backwardly directed ridge; postfrons usually with median hump in front of ocelli.....34

31. Palpus bright fulvous; wing strongly stained with yellow except at apex and posterior margin .....*azurea* Hendel

Palpus brown or black; wing at most stained with yellow only at extreme base and in subcostal cell.....32

32. All tarsi black or brown-black; facial carina sharply margined only on upper part; parafacial with horizontal grooves on upper part.....adelaidae new sp.

Tarsi tawny or the fore ones slightly browned; facial carina distinctly margined throughout; parafacial at most rugose only at lower end.....33

33. Distal section of vein 4 parallel with vein 3 except at apical end where it is slightly curved forwards to end approximately at wing apex; thorax with slightly bluish reflections, abdomen shining but without coloured reflections.....parallela new sp.

Distal section of vein 4 curving forwards through most of its length and thus strongly converging with vein 3 distally, ending distinctly in front of wing apex; thorax and abdomen with blue-green to yellow-green reflections.....iris new sp.

34. Fore femur and tibia black, fore tarsus dark brown; aedeagus with filament and bulb together much shorter than glans.....brevifurca new sp.

Fore legs with at least the tibia and tarsus fulvous to yellowish brown; filament and bulb together almost as long as or longer than glans.....35

35. Facial carina completely rounded off and undefined; filament of aedeagus very much longer than glans.....hebes new sp.

Facial carina sharply defined near upper end, obsolete below; aedeagus with filament and bulb together about as long as glans.....rudis new sp.

36. Postfrons with median hump or elevation in front of ocelli and sometimes another near anterior margin (if thorax is almost entirely tawny, without blackish areas see couplet 45).....37

Surface of postfrons even, without median elevations.....44

37. Wing with conspicuous dark apical mark, often confined to costal region.....38

Wing not darkened apically, sometimes the greater part of wing suffused with brown.....42

38. Arista with numerous hairs on basal half, the longer ones with length equal to about half the width of third antennal segment.....mithrax Hendel

Arista bare or with very minute basal pubescence.....39

39. Facial carina broad, flat, sharply margined; palpus black.....*maculipennis* Hendel

Facial carina variable but not flattened and sharply margined except sometimes towards upper extremity; palpus usually yellowish, at least at apex.....40

40. Third antennal segment attenuated, about 7 times as long as maximum width; antennal groove shining black at upper end; pleura (except lower part of sternopleuron) and sides of scutellum reddish brown.....*loxocerina* new sp.

Third antennal segment less than 5 times as long as wide; upper end of antennal groove with dense silvery pruinescence; pleura and scutellum black.....41

41. Wing with apical dark mark and that in subcostal cell broadly confluent along costal margin; femora entirely blackish.....*nigricosta* Malloch

Wing with apical dark mark separate from that in subcostal cell; femora brownish yellow with darker brown markings.....*glebosa* new sp.

42. Mesoscutum broadly margined with reddish brown; scutellum also reddish brown.....*howensis* new sp.

Mesoscutum black, at most slightly brown at extreme margins; scutellum black, sometimes brown at sides.....43

43. A large blackish mark at summit of each parafacial between antenna and eye; fore tarsus entirely blackish.....*obscura* Walker complex

No such mark at summit of parafacial; first segment of fore tarsus tawny except at apex.....*thalassina* Walker

44. Mesoscutum tawny.....45

Mesoscutum predominantly or wholly black.....50

45. Wing not darkened distally, usually extensively tinged with yellow.....46

Wing shaded with brown in distal part.....48

46. Antenna not more than $^{2}/_{3}$ as long as distance from its basal insertion to middle of epistomal margin; ♂ : face sharply bicoloured, creamy above, reddish tawny below; distal section of outer surstylus very short and broad; aedeagus with preglans much shorter than glans.....*testacea* (Macquart)

Antenna more than $^{2}/_{3}$ as long as distance from its basal insertion to middle of epistomal margin; ♂ (where known): face not sharply bicoloured, generally slightly darker below; distal section of outer surstylus rather narrowly prolonged beyond apex of inner surstylus; aedeagus with preglans longer than glans.....47

47. Parafacial much narrower than third antennal segment; height of cheek less than 0.25 of height of eye; ♂ with characters as indicated above.....*aurantiaca* new sp.

Parafacial about as wide as third antennal segment; height of cheek greater than 0.25 of height of eye; ♂ unknown.....sp. 1.

48. 3 pairs of scutellar bristles; wing with distal brown area forming a more intense band on costa which runs basally to subcostal cell and to bases of marginal and submarginal cells.....*umbrosa* new sp.

4 pairs of scutellar bristles; wing with distal brown area not continued basally as far as anterior crossvein.....49

49. Ocellar and 2 pairs of fronto-orbital bristles well developed but slender; facial carina flat-topped; arista with very short hairs just beyond base; fore tarsus with 3 distal segments brown.....*octoseta* new sp.

Ocellar bristles absent; fronto-orbitals vestigial; facial carina strongly convex; arista bare; fore tarsus entirely light tawny.....*scipio* new sp.

50. Scutellum entirely fulvous; facial carina strongly raised, very sharply margined, with strong vertical corrugations.....*longicauda* new sp.

Scutellum black or dark brown; facial carina variable, but not strongly corrugated.....51

51. Facial carina absent; palpus fulvous; wing heavily marked or shaded distally.....52

Facial carina well defined, either with sharp edges, or at least dropping away abruptly at lateral margins; palpus black or dark brown, at least on distal part; wing markings variable.....53

52. Arista with rather numerous short hairs towards base; hairs on postfrons fine, normal.....*rasa* new sp.

Arista bare; hairs on postfrons conspicuously thickened.....*latipilus* new sp.

53. Antenna unusually short, extending only half way from its basal insertion to centre of epistomal margin in ♀; facial carina broad, flat, little raised, its lateral margins distinct but not very sharp.....sp.2

Antenna longer; facial carina of different conformation.....54

54. Postfrons forming an acute angle with face in profile; narrowest part of facial carina (between bases of antennae) about as wide as second antennal segment or wider, the lower part almost flat.....55

Head not angular in profile; narrowest part of facial carina much narrower than second antennal segment, the lower or central part convex.....56

55. Postfrons fulvous; legs fulvous with brown markings; wing with apical grey suffusion.....ustulata new sp.

Postfrons dark brown; legs almost entirely black to dark brown; wing without apical suffusion .....capitalis new sp.

56. Tarsi black or dark brown; hairs of mesoscutum rather short, pale, decumbent, except those immediately in front of scutellum; scutellum smooth, glossy; aedeagus with filaments about half as long as glans.....lonchaeina new sp.

Tarsi, except distal segments of fore tarsus, tawny; hairs of mesoscutum longer, almost erect, most of the longer ones black; scutellum finely sculptured dorsally; aedeagus with filaments many times as long as glans.....angustata new sp.

Duomyia scutellaris (Macquart)

(Fig. 47)

Senopterina scutellaris Macquart, 1851:282-283, pl.26, fig.5.

Senopterina grandis Schiner, 1868:289, new synonym.

Duomyia grandis: Hendel, 1914b:101-102; Steyskal, 1968:55.4.

Duomyia scutellaris: Hendel, 1914a:58; 1914b:102.

♂ ♀ . Coloration. Head pale yellowish to fulvous; postfrons and upper part of parafacial brown, with whitish pruinescence on orbital margins; occiput with a dark brown area on each side largely obscured by whitish pruinescence. Antenna tawny, with arista black beyond base. Palpus brown-black. Thorax with thin covering of grey pruinescence on most of surface; mesoscutum black, with lateral margins broadly reddish brown behind suture; hairs of mesopleuron mostly short and pale, with an admixture of black ones, some longer black ones immediately in front of suture; humeral callus and notopleuron reddish brown, the former shining, without pruinescence; scutellum reddish brown with thin greyish pruinescence; pleura reddish brown, lower part of sternopleuron and most of hypopleuron dark brown. Legs tawny; femora with variable brown suffusions. Wing with faint yellowish tinge which is intensified in distal part of subcostal cell, without dark markings; squama whitish. Haltere yellowish or tawny, sometimes with brownish capitellum. Abdomen with greyish or yellowish pruinescence confined to lateral parts of tergites 1 and 2; ♂ : abdominal tergites tawny; ♀ : abdomen black with distal part of tergite 5 tawny.

Head. Postfrons sloping, its width anteriorly 0.40-0.47 of width of head, posteriorly a little narrower, surface smooth, with fine pale hairs; facial carina rather strongly elevated, much narrowed between antennal sockets where it varies from about one quarter the width of third antennal segment (in smallest ♂) to almost as wide as that segment (in largest ♀), the lateral margins well defined but not very sharp above, completely rounded off below, surface with variable vertical ridges; parafacial somewhat rugose at lower extremity, otherwise smooth, its narrowest part always narrower than antennal groove; height of cheek 0.31-0.39 of height of eye; ocellar and one fronto-orbital bristle each represented by a weak black hair; cheek bristle well developed, black. Antenna extending almost to level of epistomal margin in ♂ , about three quarters as long in ♀ ; segment 3 rounded apically; arista almost bare in ♂ , with few very short basal hairs in ♀ . Palpus of moderate width.

Thorax. Scutellum with rather sparse mostly pale hairs, longer than those on central part of mesoscutum, and 3 pairs of long bristle; pteropleuron with 1 to 3 black bristles among the long pale hairs. Fore femur with black dorsal bristles, often in 2 rows, and more numerous long white ventral bristles; middle femur with mostly black posterior bristles on distal part; hind femur with series of dorsal bristles, white basally, black distally, but not reaching apex. Wing with anterior crossvein slightly longer than or subequal to fourth section of costa (between veins 3 and 4); distal section of vein 4 curving

forward apically to end slightly in front of wing apex.

Abdomen. Tergite 5 about twice as long as tergite 4 in ♂, about 1.5 times as long in ♀. ♂ postabdomen: outer surstylus with distal section narrowing from just beyond its origin, then abruptly widened into a sub-triangular apical expansion; stipe of aedeagus with only extremely minute pubescence on a line which runs on to terminal process; preglans well differentiated and sclerotized, with a broad, rounded, sclerotized basal lobe which runs on to stipe and partially encloses a cavity, distally with a short membranous lobe; glans elongate-cylindrical, curved, without lobes; bulb with pair of membranous caeca arising from near base which are narrowed distally; filaments equal, slender, slightly less than 3 times as long as glans, each with a very narrow membranous margin.

Dimensions: total length, ♂ 6.4-7.2 mm., ♀ 6.5-11.0 mm.; length of thorax, ♂ 2.7-3.4 mm., ♀ 2.4-4.6 mm.; length of wing, ♂ 6.2-7.3 mm., ♀ 5.5-9.1 mm.; length of glans of aedeagus 0.70 mm. (2 specimens).

Distribution: New South Wales and southern Queensland - coastal districts; Tasmania (doubtful record).

Material examined. "Tasmanie", no date (holotype ♀ of S. scutellaris Macquart, PM), J.P.V. "Chili" (error), no date (apparent holotype ♂ of grandis Schiner, WM), "Novara-Reise". Queensland: Noosa National Park, Nambour district, xii 1966 (1 ♀, UQ), B. Cantrell. New South Wales: Royal National Park, near Sydney, xi 1966 (1 ♂, AM), J. Walsh, G.A.H., and D.K.M.; 3 miles S of Crescent Road, Kempsey district, iii 1965 (1 ♂, CSIRO),

I.F.C. and M.S.U.; 4 miles SW of Gosford, iii 1965 (1 ♀, CSIRO), I.F.C. and M.S.U.

Habitat: specimen from Royal National Park taken in dry sclerophyll forest with mercury vapour lamp.

Duomyia personata new sp.

(Fig. 48)

♂ ♀. Resembling D. scutellaris and agreeing with the description given for that species except as indicated below.

Coloration. Postfrons reddish brown, becoming tawny posteriorly, darker brown anteriorly; ptilinum, summit of facial carina, and, in ♂, most of parafacial dark brown, in ♀ parafacial usually less extensively darkened. Antenna with segment 2 tawny; segment 3 dark brown, sometimes more tawny towards base. Thorax black with broken greenish reflections; mesoscutum and scutellum devoid of pale pruinescence except towards lateral margins, with hairs mostly white; pleura with grey pruinescence or pubescence except on sternopleuron and lower anterior part of mesopleuron, with hairs white except for some black ones on mesopleuron and pteropleuron. Femora black with fulvous apices; tibiae tawny-brown with darker markings; tarsi tawny or fulvous. Wing with slight brown tinge which is intensified as an apical cloud in vicinity of apices of veins 2 to 4. Haltere with brown capitellum. Abdominal tergites black with green reflections; hairs on tergites 1 and 2 mainly white, those on other tergites black except for some white ones on lateral margins.

Head. Postfrons weakly pitted, facial carina broad below,

less strongly narrowed above than in D. scutellaris, with variable corrugations or rugosity, sharply margined on entire lateral margins in ♂, margins becoming indistinct below in ♀; height of cheek 0.29–0.36 of height of eye. Arista bare or almost so.

Thorax. Hairs on scutellum more numerous than in D. scutellaris. Fore femur often with a few black posteroventral bristles among the fine hair-like white ones.

Abdomen. Tergite 5 about one and a half times to twice as long as tergite 4. ♂ postabdomen: outer surstylus broad, not much contracted before the apical expansion, with a strong black tubercle at base of distal section on inner surface; stipe of aedeagus with narrow stripe of short inconspicuous pubescence extending on to the slight terminal process; preglans short, sclerotized, simple basally, with short membranous lobe distally; glans rather similar to that of D. scutellaris; caeca of bulb not narrowed distally; filaments slightly more than 5 times as long as glans, with membranous margins better developed than in D. scutellaris.

Dimensions: total length, ♂ 8.6–8.7 mm., ♀ 6.8–9.7 mm.; length of thorax, ♂ 3.4–3.8 mm., ♀ 3.0–4.3 mm.; length of wing, ♂ 7.2–7.4 mm., ♀ 6.7–8.5 mm.; length of glans of aedeagus 0.73–0.80 mm.

Distribution: New South Wales – tablelands; Australian Capital Territory.

Material examined: Black Mountain, Canberra, iii 1964

(holotype ♂, CSIRO), i.ii 1959-1964 (paratypes, 2 ♀, CSIRO, 1 ♂, AM), I.F.C.; river crossing, 1 mile W of Uralla, Armidale district, i 1967 (1 ♂, 1 ♀, UQ, 1 ♀, AM), B. Cantrell.

Comparative notes. This species differs from all others except D. scutellaris in having a haired scutellum with 3 pairs of bristles. It is readily distinguished from D. scutellaris by the details of coloration and structure of the aedeagus as indicated above.

Duomyia convallis new sp.

♀. Somewhat similar to D. pallipes and agreeing with the description for that species, except as indicated below. ♂ unknown.

Coloration. Palpus black. Thorax darker than in D. pallipes with more conspicuous metallic green reflections dorsally, because of the thinner and somewhat less extensive pruinescence; humeral callus shining metallic black without pruinescence; mesoscutum often with 3 indistinct brown longitudinal stripes; scutellum reddish brown with metallic blackish central patch. Femora dark brown to blackish, often with a very variable tawny region near middle, apices of fore and middle femora pale yellowish; tibiae brown or black with tawny or yellowish base and tawny band just beyond middle; fore tarsus with basal segment yellowish with black apex, the other segments black; middle and hind tarsi with basal segment yellowish with brown apex, the other segments preponderantly brown. Wing with most of membrane faintly stained with brown; apical part of costal margin from end of vein 1 to end of vein 4 covered by a dark brownish cloud; anterior crossvein

with a brown mark. Abdomen black with dull metallic green lustre, with grey pruinescence only near lateral margins of tergites 2 to 5.

Head. Postfrons and facial carina slightly narrower than in D. pallipes; height of cheek 0.38-0.39 of height of eye.

Thorax. Fore femur with series of strong dorsal bristles, the basal ones whitish, the distal ones black, finer white posteroventral bristles, and 4 to 8 thick black posteroventral spines; middle femur with strong black posterior bristles distally. Wing with discal crossvein less oblique than in D. pallipes, slightly curved outwards.

Abdomen. Tergite 5 about one and a half times as long as tergite 4 or slightly more.

Dimensions: total length 6.9-9.1 mm.; length of thorax 3.0-4.0 mm.; length of wing 5.3-6.9 mm.

Distribution: Queensland - western side of Great Dividing Range.

Material examined: Carnarvon Gorge, Injune district, i 1962 (holotype ♀, QM, paratypes, 3 ♀, UQ, 1 ♀, AM), E. Exley; Stannary Hills, W of Atherton, c. 3,000 ft. (1 ♀, BM), T.L.B.

Comparative notes. Agrees with D. pallipes in the haired scutellum and posteroventral spines on fore femur. Readily distinguished from that species by characters of coloration and other characters given above.

Duomyia pallipes new sp.

(Fig. 43)

♂♀. Coloration. Head fulvous; ocellar spot black;

face pale yellowish; posterior part of cheek and occiput whitish-pruinescent. Antenna fulvous; arista black beyond base. Prelabrum tawny; palpus fulvous. Thorax with predominantly black ground colour, appearing grey from the extensive covering of white pruinescence and hairs; humeral callus and posterior notopleural callus sometimes tawny (as in holotype); scutellum tawny with white hairs and thin whitish pruinescence. Legs fulvous with mostly pale hairs; apices of tibiae slightly browned. Wing clear, without markings; veins fulvous; squama whitish. Haltere pale yellowish. Abdominal tergites 1 - 4 with entirely black ground colour or with a small fulvous area on median line (in holotype only), covered with grey pruinescence except towards median line and sometimes towards their posterior margins; tergite 5 almost entirely fulvous in ♂ or with anterior part brown, with light grey pruinescence except on anterior part, in ♀ black, sometimes fulvous distally, with an anterolateral area of grey pruinescence and an anterior median area of thinner grey pruinescence.

Head. Postfrons very wide, minutely pitted, especially towards lateral margins, with minute pale recurved hairs; facial carina very broad, at narrowest part (between antennae) broader than antennal groove, each lateral margin raised into a sharp flange, surface with well developed vertical corrugations, becoming fine and irregular on lower median section; parafacial broader than antennal groove, almost smooth; cheek with oblique carina, its height 0.36-0.41 of height of eye; ocellar, fronto-orbital, and cheek bristles absent. Antenna reaching almost to level of

epistomal margin in ♂, about three quarters as long in ♀; third segment slender, slightly angular at apex; arista bare, curved near base. Prelabrum feebly developed. Palpus moderately narrow.

Thorax. Mesoscutum with numerous fine white recurved hairs, which become longer just in front of scutellum; scutellum with numerous pale, more or less recurved hairs and 2 pairs of bristles; pleura with longer hairs. Legs short and thick; fore femur with numerous strong yellow dorsal bristles, 4-7 strong posteroventral black spines beyond middle and some longer yellowish bristles between these and base; fore tibia with some black dorsal setulae distally among the paler hairs; middle femur with a few strong posterior bristles towards apex, all yellow in ♂, apical ones black in ♀; hind trochanter loosely haired on ventral surface; hind femur somewhat swollen, with a dorsal series of numerous yellow bristles, its apex dilated in ♂; ♂: hind tibia with strong gibbosity on dorsal surface a short distance before apex surmounted by a weak oblique ridge but not forming such a prominent tubercle as in D. tomentosa, at outer side of apex of tibia a few black setulae, at least one of which is thickened into a short spur; basal segment of hind tarsus with strong apical gibbosity on posterior side; ♀: hind tibia without dorsal gibbosity but with apical setulae and spurs as in ♂; basal segment of hind tarsus without apical gibbosity. Wing with anterior crossvein longer than fourth section of costa (between veins 3 and 4); vein 4 strongly curved down into discal cell before anterior crossvein, distal section of vein 4 forming a

sigmoid curve, strongly converging with vein 3 distally and ending well in front of wing apex; discal crossvein forming a sigmoid curve or its posterior part straight.

Abdomen. Tergite 5 as long as tergites 3 and 4 together; tergites 3, 4, and 5 with median strip furnished with longer hairs, which, on tergite 5 of ♀, is broadened posteriorly to form a triangular area. ♂ postabdomen: basal section of outer surstylus rather broad basally, distally gradually narrowing into the distal section which has an obtusely subtriangular apical expansion; inner surstylus somewhat shorter with blunt terminal tooth; aedeagus with heavily sclerotized stipe having a line of well developed pubescence distally; preglans strongly differentiated and sclerotized, slender, curved with a pair of membranous wing-like lobes on posterior surface, one of which runs on to glans; glans narrowed and curved basally with a prominent spine at extreme base and a longer membranous lobe near middle of posterior surface; bulb elongate and lightly sclerotized, with 2 very long soft, thin-walled caeca, the smaller arising from junction of bulb with glans; filaments of approximately equal length, almost 4 times as long as glans, membranous margins obsolete except towards apices.

Dimensions: total length, ♂ 6.8-10.0 mm., ♀ 8.9-9.7 mm.; length of thorax, ♂ 2.9-4.0 mm., ♀ 3.8-4.6 mm.; length of wing, ♂ 6.3-8.4 mm., ♀ 8.1-8.3 mm.; length of glans of aedeagus 0.93 mm. (holotype).

Distribution: Queensland - south-east; New South Wales - coast to Western Slopes district.

Material examined. New South Wales and Australian Capital Territory: Childowlah (or Chidowla), near Burrinjuck Dam, Murrumbidgee R., xii 1956 (holotype ♂, paratype ♂, CSIRO), E.F.R.; Uriarra, near Canberra, x 1960 (paratype ♂, CSIRO), K.R.N.; Sydney, xii 1931 (paratype ♀, AM), K.K. Spence; "Bondi Sandhills", near Sydney, i 1934 (paratype ♂, AM), K.K. Spence; river crossing 1 mile W of Uralla, i 1967 (paratypes, 2 ♀, UQ), B. Cantrell. Queensland: Sunnybank, near Brisbane, iv 1951 (1 ♀, UQ), B. Champ.

Habitat: sandy situations are indicated by some label data. The specimen from Uriarra is reared and is labelled "Pupa in sand". The Bondi sandhills no longer exist as the area is now a residential suburb of Sydney.

Comparative notes. Closely related to D. tomentosa but distinguished from that species by the strong posteroventral spines of the fore femur. Distinguished from D. convallis, which also has such spines, as indicated under that species.

Duomyia tomentosa Hendel

(Fig. 44)

Duomyia tomentosa Hendel, 1914a:58 (nomen nudum); 1914b:100-101; Malloch, 1929:507.

♂ ♀ . Very closely related to D. pallipes and D. foliata and differing from description of former principally as indicated below.

Coloration very similar to that of D. pallipes. Wing often with an indistinct grey apical cloud. Ground colour of abdominal

tergites 1 - 4 almost wholly black, that of tergite 5 black anteriorly, fulvous posteriorly; the proportion of each colour very variable, the whole of tergites with dense yellow-grey pruinescence, except when rubbed, in which case there is a small area devoid of pruinescence and hairs on each side of tergite 5, well clear of its margins.

Thorax. Legs as in D. pallipes except as follows: fore femur without black spines, all bristles yellow; middle femur with all posterior bristles yellow; ♂ : hind tibia with dorsal gibbosity forming a strongly elevated tubercle with rather narrowly rounded summit; hind tarsus with basal segment slightly convex on posterodorsal surface but without distinct gibbosity.

Abdomen. Tergite 5 a little shorter than tergites 3 and 4 together. ♂ postabdomen: outer surstylus with small apical expansion; stipe and preglans of aedeagus rather similar to those of D. pallipes; glans basally less narrowed and curved than D. pallipes, and the spine less developed, membranous lobe forming a longitudinal flange; filaments each about 5 times as long as glans, with distinct membranous margin which is widened towards the curved apex.

Dimensions: total length, ♂ 9.4-10.8 mm., ♀ 7.0-11.0 mm.; length of thorax, ♂ 3.9-4.6 mm., ♀ 3.5-4.9 mm.; length of wing, ♂ 7.1-8.4 mm., ♀ 7.6-8.1 mm.; length of glans of aedeagus 0.67-0.77 mm.

Distribution: Queensland - east coast as far north as Cairns district; New South Wales - far north; Northern Territory.

Material examined. Queensland: Townsville, no date (holotype ♀, BM), F.P.D.; Kuranda, ix 1910 (2 ♀, BM), F.P.D.; Waugh's Pocket, near Innisfail, i 1962 (1 ♂, CSIRO), P.B.C. and E.B.B.; Forrest Beach, near Ingham, iii 1963 (1 ♀, CSIRO), K.L. Harley; 10 miles S of Bowen, ix 1950 (1 ♀, CSIRO), E.F.R.; Caloundra, i 1961 (1 ♂, UQ), E.C. Dahms; Bribie Island, i 1914 (1 ♀, UQ), anon.; Stradbroke Island, xii 1913 (1 ♀, BM, 1 ♀, UQ), H.H.

In BM there is a reared specimen with the label data "Bred from mandarin, Sunnybank, x 1917, H. Laughton". As it is a female specimen without fore legs, killed when newly emerged, it is difficult to decide if it belongs to this species, D. pallipes, or D. foliata.

Duomyia foliata new sp.

(Fig. 45)

♂ ♀ . very similar to D. tomentosa and D. pallipes; agreeing with the description given for the latter species except as indicated below.

Coloration of head and thorax as in D. pallipes. Legs fulvous; middle femur with ventral brownish patch beyond middle; hind femur with dorsal brownish patch beyond middle which may be very diffuse; fore and middle tibiae with apical brown mark, often also with brown marks just beyond base and just beyond middle; hind tibia with all 3 of these brown marks present; fore tarsus often with the 3 or 4 distal segments somewhat browned. Wing often faintly clouded with grey apically. Preabdominal tergites entirely

covered with greyish pruinescence (partly yellowish on tergite 5 of ♂), except for a shining posterolateral patch on either side of tergites 3, 4 and 5 in some ♀♀, perhaps caused by rubbing behaviour of ♂♂.

Head. Facial carina of ♂ narrower than in D. pallipes, that of ♀ less noticeably so; parafacial, at narrowest part, usually narrower than antennal groove but somewhat variable; height of cheek 0.26-0.32 of height of eye. Antenna and mouthparts as described for E. pallipes.

Thorax. Fore femur with well developed dorsal and posteroventral pale yellowish bristles, without any thickened black bristles or spines; middle femur with posterior bristles distally of which the terminal one is often black, the others pale yellowish; hind femur with well developed yellowish dorsal bristles; hind tibia without trace of dorsal gibbosity or tubercle; apical gibbosity on basal segment of hind tarsus of ♂ barely distinguishable. Wing with discal crossvein less oblique than in D. pallipes and tomentosa, curved anteriorly.

Abdomen. ♂ postabdomen: surstyli somewhat similar in form to those of D. pallipes; aedeagus with stipe much as in D. pallipes; preglans elongate and slender, curved, with pair of very narrow longitudinal membranous flanges on posterior surface; glans curved, somewhat narrowed basally without spinous process at base, but with long membranous foliaceous lobe before middle; bulb elongate, soft, strap-shaped, with a pair of long delicate caeca; filaments long, slender of equal length and nearly 7 times as long

as glans, each with a membranous flange extending for most of its length except towards base; cercus elongate and slender.

Dimensions: total length, ♂ 6.2-8.2 mm., ♀ 5.3-9.8 mm.; length of thorax, ♂ 2.4-3.6 mm., ♀ 2.3-4.8 mm.; length of wing, ♂ 4.5-6.5 mm., ♀ 5.1-8.3 mm.; length of glans of aedeagus, 0.42-0.47 mm.

Distribution: Queensland - widely distributed in tropical zone; Northern Territory; North-western Australia.

Material examined. Queensland: Cannonvale, NE of Proserpine, iv 1967 (holotype ♂, paratype ♂, CSIRO), M.S.U.; Red Island Point, near Cape York, iii 1964 (paratypes, 1 ♂, CSIRO, 1 ♂, AM), I.F.C. and M.S.U.; Claudie R., Iron Range district, v 1966 (paratype ♀, AM), D.K.M.; Upper Daintree R., xii 1964 (paratype ♀, UQ), G.M.; Yorkeys Knob, near Cairns, viii 1963 (paratype ♂, UQ), B.V. Timms; Mount Garnet Road, 13 miles W of Ravenshoe, v 1967 (paratype ♀, CSIRO), D.H.C.; Yeppoon, xii 1964 (paratype ♂, CSIRO), I.F.C. Northern Territory: 15 miles N of Tennant Creek, ii 1967 (1 ♂, CSIRO), M.S.U. Western Australia, Peewah R., 14 miles NNE of Whim Creek, between Roebourne and Port Hedland, vi 1953 (1 ♀, damaged, CSIRO), J.H. Calaby.

Habitat: specimen from Claudie R. on shrubs at river bank, sandy area near rain forest.

Comparative notes. Males may be distinguished from those of D. tomentosa by the simple hind tibia and structure of aedeagus, and from other species by structure of aedeagus. Females are less easy to distinguish from D. tomentosa and D. triquetra but

coloration of palpus and legs, as given in key, appear to be useful characters.

Duomyia triquetra new sp.

(Fig. 46)

♂ ♀ . Similar to D. foliata and D. pallipes in a majority of characters, but differing from the description given for the latter species in the characters given below.

Coloration of pale form agreeing rather closely with that of D. pallipes, except that: (1) palpus coloured as in type form of present species; (2) each tibia with a black or brown mark beyond middle, best developed on hind tibia, in addition to the apical mark; (3) wing marked as in type form of present species; (4) abdomen entirely light tawny in ground colour.

Coloration of type form. Head coloured much as in D. pallipes. Antennal segment 3 tawny-brown. Palpus blackish with apex broadly tawny. Thorax black with rather thin grey pruinescence; scutellum yellowish brown to black. Femora fulvous with variable brown suffusion or largely blackish with fulvous apices; tibiae marked much as in D. foliata but slightly variable. Wing, except in immature specimens, with an apical grey cloud covering ends of veins 2, 3 and 4. Abdomen black with thin grey pruinescence on lateral parts of tergites 2 to 4.

Head. Facial carina rather similar to that of D. foliata, lateral margins almost straight making the outline almost triangular in ♂ , less nearly triangular in ♀ on account of the broader summit; parafacial about as wide as antennal groove, rugose at

lower end; height of cheek 0.28–0.35 of height of eye. Antenna with segment 3 extending to level of epistomal margin in both sexes, slightly longer and more acutely pointed in ♂ than in ♀ .

Thorax generally as described for D. pallipes. Legs as described for D. foliata.

Abdomen. ♂ postabdomen: outer surstylus with rather broad apical expansion; stipe of aedeagus with only a small pubescent patch near distal end extending on to preglans; preglans short and compact, less than twice as wide as long, with a short membranous lobe commencing in groove between stipe and preglans and running longitudinally; glans elongate curved, without lobe; bulb much as in D. pallipes, with pair of caeca arising from near base; filaments of equal length, long and slender, compressed, nearly 7 times as long as glans.

Dimensions: total length, ♂ 6.2–8.4 mm., ♀ 5.4–7.0 mm.; length of thorax, ♂ 2.5–3.6 mm., ♀ 2.4–2.9 mm.; length of wing, ♂ 5.3–.6.3 mm., ♀ 4.9–5.7 mm.; length of glans of aedeagus 0.50–0.57 mm.

Distribution: Queensland - north-east coast.

Material examined: 13 miles W of Ravenshoe, Mount Garnet Road, v 1967 (holotype ♂, paratype ♀, CSIRO), D.H.C.; Gap Creek, 6 miles N of Bloomfield R., xi 1965 (paratype ♂, UQ), G.M.; 15 miles NW of Bowen, ix 1950 (paratype ♀, CSIRO), E.F.R.

Comparative notes. The bicoloured palpus and structure of aedeagus appear to be the most reliable character for distinguishing this from related forms with pruinescent abdomen.

Duomyia sericea Hendel

Duomyia sericea Hendel, 1914a:58 (nomen nudum); 1914b:99-100.

♂ ♀ . Somewhat resembling D. lacunosa and agreeing with the description given for that species except as indicated below.

Coloration. Postfrons largely reddish brown; a brown mark towards each side of facial carina with a pale cream blotch immediately above it. Thorax black, the reflections not distinctly greenish; mesopleuron with whitish pruinescence or very short pubescence on upper posterior part, not quite extending to centre. Legs coloured much as in D. lacunosa. Wing with distal part of subcostal cell yellow. Abdomen black, often with bronzy reflections; lateral parts of tergites with white pruinescence which on tergites 2 to 5 forms conspicuous triangular areas; tergites with coarse curved white hairs along median line, and fine straight white hairs on lateral pruinescent areas.

Head. Facial carina broad in both sexes, its surface weakly corrugated only on lateral parts, its lateral margins sharply raised, somewhat curved outwards; height of cheek 0.30-0.33 of height of eye.

Thorax. The short, curved hairs on scutellum not becoming noticeably longer towards posterior margin.

Abdomen. ♂ postabdomen: stipe of aedeagus slender, without evident pubescence or terminal process; preglans very short, but well differentiated and sclerotized, with a small rounded basal lobe; glans rather short and stout, almost ovoid; bulb large, longer than glans, the 2 caeca at its base exceedingly short and

thick; filaments slender, without distinct membranous margins, each a little more than 3 times as long as glans.

Dimensions: total length, ♂ 6.2 mm., ♀ 5.9–8.6 mm.; length of thorax, ♂ 2.5 mm., ♀ 2.6–3.3 mm.; length of wing, ♂ 4.6 mm., ♀ 4.6–5.7 mm.; length of glans of aedeagus 0.35 mm.

Distribution: Queensland - south-east.

Material examined: Burpengary, 26 miles N of Brisbane, no date (lectotype ♀ here designated, upper specimen on pin, paralectotype ♀ , lower specimen on same pin, BM), T.L.B.; Belmont, near Brisbane, iv 1959 (1 ♂ , 1 ♀ , UQ), I.C.Y.

Duomyia botulus new sp.

(Fig. 49)

♂ . Closely related to D. lacunosa and agreeing with that species except as indicated below; ♀ unknown.

Coloration. Thorax with purplish blue reflections. Black rings on fore and hind tibiae tending to coalesce, making these parts predominantly blackish. Abdomen with purplish blue to greenish blue reflections.

Head. Parafacial narrower than antennal groove, without any setiferous pits on upper part below the black mark, lower part strongly rugose; cheek 0.34 of height of eye. Antenna with segment 3 rounded apically. Legs as described for D. lacunosa except that hind femur has numerous rather short black anteroventral bristles on distal half. Wing with vein 6 a little better developed than in D. lacunosa.

Abdomen. Tergite 5 fully twice as long as tergite 4. ♂ postabdomen: outer surstylus almost straight narrowing gradually for most of length, without well defined apical expansion, with preapical tubercle on posterior margin; stipe of aedeagus with extensive longitudinal pubescent strip; preglans with terminal rounded membranous lobe overlapping base of glans; glans more elongate and curved than in D. lacunosa, without lobes; filaments more slender than in D. lacunosa or D.smaragdina, as long as glans, without membranous margins.

Dimensions: total length 8.6 mm.; length of thorax 3.7 mm.; length of wing 6.4 mm.; length of glans of aedeagus 0.88 mm.

Distribution: Victoria - north-west of state.

Material examined: Wyperfield National Park, Hopetoun district, xi 1966 (holotype ♂, CSIRO), I.F.C. and M.S.U.

Comparative notes. This species should also be compared with D. argentata and D. eremia to which it is closely related. It can be distinguished from both these species by the presence of numerous anteroventral bristles on the hind femur and the more restricted pruinescence of the mesopleuron.

Duomyia argentata new sp.

♀ . Resembling D. eremia and D. lacunosa; agreeing with description of the latter except as indicated below. ♂ unknown.

Coloration. Head predominantly tawny; postfrons brown except posteriorly and along orbital margins; face whitish to creamy; orbital margins of postfrons and parafacial with broad silvery pruinescent stripe which is expanded to cover the brownish

mark at junction of postfrons and parafacial. Antenna with segments 1 and 2 tawny. Palpus dark brown. Entire upper part of mesopleuron with whitish pruinescence or pubescence, extending almost to centre. Wing with yellowish pterostigma in subcostal cell. Abdomen with white hairs less developed than in D. lacunosa.

Head. Postfrons rather weakly pitted; facial carina less narrowed between antennae than in ♀ of D. lacunosa; parafacial without setiferous pits; height of cheek approximately 0.34 of height of eye. Antenna as long as distance from its basal insertion to epistomal margin, apex of segment 3 rounded; arista apparently bare.

Thorax. Fore femur with short but strong black dorsal bristles, and slightly elevated posteroventral gibbosity; middle femur with some posterior bristles black.

Abdomen. Tergite 5 about 1.6 times as long as tergite 4.

Dimensions: total length 6.6-7.7 mm.; length of thorax 2.5-3.1 mm.; length of wing 5.6-6.2 mm.

Distribution: New South Wales - tablelands districts; Australian Capital Territory.

Material examined: Blundell's, near Canberra, i 1931 (holotype ♀, CSIRO), A.L.T.; river crossing, 1 mile W of Uralla, i 1967 (paratype ♀, UQ), B. Cantrell.

Comparative notes. Distinguished from D. botulus and D. eremia by the presence of short strong black dorsal bristles on the fore femur, and from D. lacunosa, D. marginalis and D. chaetostigma by the absence of setiferous pits on the parafacial.

Duomyia eremia new sp.

(Fig. 50)

♂ . Somewhat similar to D. lacunosa and agreeing with the description given for that species except as indicated below; ♀ unknown.

Coloration. Postfrons fulvous except for the black ocellar spot. Thorax black with broken green reflections; upper posterior part of mesopleuron with whitish pruinescence or very short pubescence which does not quite extend to centre. Tibiae blackish, the fore and middle ones becoming tawny at each end; fore tarsus brown, becoming paler on basal part of first segment, other tarsi tawny. Abdomen without pale pruinescence on tergites.

Head. Postfrons somewhat pitted but with rather fine hairs; facial carina broad, its lateral margins sharply raised, curved outwards, surface with fine, irregularly reticulate rugosity; parafacial at narrowest point slightly narrower than antennal groove, not pitted, finely indistinctly rugose above, coarsely rugose at junction with cheek, a rather sharp ridge on upper part running just outside ptilinal suture; height of cheek 0.28-0.36 of height of eye. Antenna with segment 3 strongly pointed anteriorly at apex.

Thorax. Middle femur with posterior bristles on distal part, those nearest apex black. Wing with discal crossvein having distinct sigmoid curvature.

Abdomen. Tergite 5 fully twice as long as tergite 4. ♂ postabdomen: outer surstylus with elongate subcylindrical distal section, terminal surface truncated; inner surstylus very

much shorter than outer surstylus; stipe of aedeagus without pubescence, with lateral ridges which run on to base of preglans; preglans short and stout, without lobe; glans very stout, slightly curved, without lobe; bulb with vestigial caeca; filaments rather stout, only slightly longer than glans, with a stout process on their conjoined bases.

Dimensions: total length 7.9-8.8 mm.; length of thorax 3.3-3.6 mm.; length of wing 6.4-6.5 mm.; length of glans of aedeagus 0.50-0.53 mm.

Distribution: Central Australia.

Material examined: 48 miles WSW of Alice Springs, ii 1966 (holotype ♂, CSIRO, paratype ♂, AM), E.B.B., M.S.U. and McInnes.

Comparative notes. In addition to the characters given in the key the aedeagus of this species is very distinctive.

Duomyia smaragdina new sp.

(Figs. 51, 54)

♂ ♀ . Very similar to D. lacunosa and agreeing with the description given for that species except as indicated below.

Coloration. Thorax black with conspicuous metallic green reflections. Abdomen with golden-green reflections.

Head. Parafacial not as wide as antennal groove, upper part with a number of slight setiferous pits, the rest of surface quite smooth; height of cheek 0.22-0.28 of height of eye. Antenna with segment 3 rounded apically.

Thorax. Surface of scutellum and mesopleuron almost smooth.

Abdomen. Tergite 5 about twice as long as tergite 4. ♂ postabdomen; outer surstylus with distal section not much narrowed basally, curved backwards, the apex obliquely truncated; inner surstylus with the two points of preapical tooth quite prominent; aedeagus much as in D. lacunosa; glans stouter than in West Australian specimens of that species, filaments with wider membranous margins.

Dimensions: total length, ♂ 5.6 mm., ♀ 5.3-6.8 mm.; length of thorax, ♂ 2.3 mm., ♀ 2.2-2.7 mm.; length of wing, ♂ 4.4 mm., ♀ 4.1-5.0 mm.; length of glans of aedeagus 0.66 mm.

Distribution: Western Australia - Monte Bello Islands.

Material examined: Cocoa Beach, Trimouille Island, xi 1953 (holotype ♂, CSIRO , paratypes, 2 ♀ , CSIRO, 1 ♀ , AM), T.G.C.

Comparative notes. This species is most reliably distinguished from the very closely related D. lacunosa by the absence of grooving on the parafacial and by the genalia characters of the male.

Duomyia lacunosa new sp.

(Figs. 52, 53)

♂ ♀ . Coloration. Head predominantly pale fulvous; ocellar spot black; postfrons tawny, with white pruinescence along orbital margins; a blackish spot at summit of each parafacial against eye; occiput with large blackish area on each side. Antenna brown; arista black with tawny base. Prelabrum reddish brown. Palpus black. Thorax black, often with metallic blue-green reflections, with pale grey pruinescence on lateral margins of mesoscutum and scutellum, on propleuron, upper margin and a

small part of posterior margin of mesopleuron, posterior extremities of pteropleuron and sternopleuron, pleurotergite, and much of hypopleuron; almost all thoracic hairs white. Femora black, with tawny apices except sometimes that of hind femur; tibiae tawny, each with 3 blackish rings, the broadest just before middle, one just beyond middle, and one apical; tarsi fulvous, the fore tarsus suffused with brown except at base of first segment. Wing clear; distal part of subcostal cell with brown pterostigma; squama white. Haltere light brown. Abdomen black, often with metallic reflections as for thorax, without areas of pale pruinescence; lateral parts of tergites 2 to 4 with fine white hairs, median part of tergites 2 to 5 with coarse, curved white hairs, most numerous on tergite 5, the remaining parts of tergites with black hairs.

Head. Postfrons pitted on much of surface, especially so anteriorly, with numerous coarse white curved hairs; frontal lunule separated from face by a sharp transverse ridge; facial carina irregularly corrugated, its lateral margins strongly raised, in ♂ broadly subtriangular in shape, narrowed above to less than twice width of first antennal segment, in ♀ slightly less narrowed above and with slightly convex lateral outlines; parafacial about as wide as antennal groove (♂) or slightly wider (most ♀♀), with longitudinal row of setiferous pits, and often additional ones at upper end, lower part irregularly rugose; height of cheek 0.30-0.37 of height of eye; fronto-orbital bristles absent; ocellar bristle scarcely differentiated from

surrounding hairs; cheek bristle vestigial. Antenna as long as distance from its basal insertion to epistomal margin in ♂, very slightly shorter in ♀; segment 3 narrow and parallel-sided, rounded or indistinctly angular at apex; arista with a little pruinescence or exceedingly minute pubescence on base only. Palpus of moderate width.

Thorax. Mesoscutum and scutellum with numerous short curved hairs, becoming longer towards posterior margin of mesoscutum; scutellum and greater part of mesopleuron finely irregularly rugose; 2 pairs of scutellar bristles. Legs short and thick; femora without ventral spines; fore femur with well developed white posterodorsal and posteroventral bristles; middle femur with white posterior bristles near apex; hind femur with well developed series of dorsal bristles; tibiae unmodified. Wing without setulae on pterostigma; vein 4 somewhat curved down into discal cell before anterior crossvein, its distal section converging with vein 3 throughout and curved forward apically to end well in front of apex; discal crossvein slightly curved; vein 6 represented by an unpigmented fold distally.

Abdomen. Tergite 5 about one and a half times to almost twice as long as tergite 4. ♂ postabdomen: outer surstylus narrowed gradually from commencement of free distal section, with obtusely subtriangular apical expansion, a rounded tubercle on inner surface just before narrowest part; inner surstylus rather slender distally, the preapical tooth on its inner surface elongate, with two points; stipe of aedeagus with pubescence

reduced to a small terminal tuft, usually well developed in Victorian specimens, vestigial in West Australian specimens; preglans short and stout, less than twice as long as wide, with a short membranous lobe; glans elongate, curved, a little stouter in Victorian spcimens, without lobes; bulb elongate, compressed, soft and membranous, with two moderately long membranous caeca; filaments about $3^1/3$ times as long as glans, each with a membranous margin for its whole length.

Dimensions: total length, ♂ 5.4-9.9 mm., ♀ 5.3-9.9 mm.; length of thorax, ♂ 2.2-4.1 mm., ♀ 2.1-4.1 mm.; length of wing, ♂ 4.3-7.9 mm., ♀ 4.4-7.8 mm.; length of glans of aedeagus 0.67-0.72 mm.

Distribution: South-western Australia; Victoria - north-western districts.

Material examined. Western Australia: Nedlands, near Perth, i ii iii (x-xi) xii 1960-1961 (holotype ♂, CSIRO, paratypes, 6 ♂, 3 ♀, CSIRO, 2 ♂, 1 ♀ AM, 1 ♂, USNM), M.W.; Perth, iii 1936 (paratypes, 2 ♀, BM), R.E.T.; Crawley, near Perth, ii iii xi xii 1934-1953 (paratypes, 2 ♂, 3 ♀, CSIRO), K.R.N., O.K. Lee; Guildford, near Perth, xii (paratype ♂, BM), H. Brown; Cottesloe, near Perth, xii 1952 (paratype ♀, CSIRO), H. Lee; Fremantle, iii 1950 (paratypes, 2 ♀, CSIRO), J.A. Mahon; Yanchep, 32 miles N of Perth, xii 1935-ii 1936 (paratypes, 2 ♀, BM), R.E.T.; 13 miles ENE of Kojonup, xi 1952 (paratype ♂, CSIRO), McIntosh and J.A. Calaby; Pingrup, xi 1958 (paratype ♂, CSIRO), E.F.R. Victoria: Wyperfield National Park, Hopetown district, xi 1966 (2 ♂, 1 ♀, CSIRO, 1 ♂, AM), I.F.C. and M.S.U.; Little Desert, 5 miles S of Kiata, ii 1956 (4 ♂, 1 ♀, CSIRO), I.F.C.

Comparative notes. This species is most clearly distinguished from other species with pitted parafacial by the structure of the aedeagus; the sculpturing of the lower end of the parafacial and reduced pruinescence of the mesopleuron are further distinctive features.

Duomyia marginalis new sp.

(Fig. 55)

♂ ♀ . Resembling D. lacunosa and agreeing with the description given for that species except as indicated below.

Coloration. Head approximately as in D. lacunosa but sometimes darker, in holotype relatively pale with dark mark at summit of parafacial obsolete. Mesopleuron with grey pruinescence on upper posterior part extending almost to middle; pteropleuron with some pruinescence extending to anterior margin. Wing with blackish pterostigma and dark brown costal margin from pterostigma to end of vein 4.

Head. Surface of facial carina with rather fine, dense, irregular rugosity; height of cheek 0.25-0.29 of height of eye. Antenna as long as distance from basal insertion to epistomal margin in both sexes.

Abdomen. ♂ postabdomen: surstyli not observed; stipe with very minute pubescence scattered over a broad stripe, distally with a slight ridge which runs on to preglans where it bears a linear brush of longer pubescence; preglans with very large membranous lobe extending beyond each of its extremities; glans

curved, shorter and stouter than in D. lacunosa; filaments very slender, without membranous margins, almost 7 times as long as glans.

Dimensions: total length, ♂ 7.8 mm., ♀ 6.6-7.5 mm.; length of thorax, ♂ 3.1 mm., ♀ 2.7-2.9 mm.; length of wing, ♂ 6.3 mm., ♀ 5.4-6.8 mm.; length of glans of aedeagus 0.50 mm.

Distribution: Queensland - tablelands in south east; New South Wales - north coast district.

Material examined. Queensland: Stanthorpe, ii 1930 (holotype ♂, QM), anon, but possibly F.A.P.; Amiens, 11 miles NW of Stanthorpe, xii 1966 (paratype ♀, CSIRO), T.G.C. New South Wales: Bannyabba, c.40 miles N of Grafton, xi 1965 (paratype ♀, AM), G.L.B.

Comparative notes. The very attenuated terminal filaments of the aedeagus, together with the strongly darkened costal margin of the wing, serve to differentiate this from other closely related species.

Duomyia chaetostigma new sp.

(Fig. 56)

♂. Resembling D. lacunosa and D. marginalis; agreeing with description of former except as indicated below.

Coloration. Facial carina whitish. Mesopleuron with pale pruinescence on most of upper part, more extensive posteriorly, extending almost to centre. Wing faintly brownish at apex between veins 2 and 4.

Head. Facial carina a little less broadened below and less narrowed above than in ♂ of D. lacunosa; parafacial narrower

than antennal groove, with single series of setiferous pits; height of cheek 0.27 of height of eye.

Thorax. Wing with three short setulae on upper surface of pterostigma, similar to those situated on vein 1.

Abdomen. Tergite 5 about twice as long as tergite 4. Outer surstylus with short distal section narrowed basally, with small apical expansion; aedeagus much as in D. marginalis but differing in detail; membranous lobe of preglans undeveloped basally; the 2 caeca of bulb much longer than in D. marginalis; filaments comparatively stout, each with membranous margin which is expanded distally, almost 4 times as long as glans.

Dimensions: total length 6.7 mm.; length of thorax 2.6 mm.; length of wing 5.5 mm.; length of glans of aedeagus 0.53 mm.

Distribution: New South Wales - North-west Slopes district.

Material examined: "Wheogo", 12 miles NE of Dunedoo, xi 1931 (holotype ♂, AM), A.M.

Comparative notes. If the presence of macrotrichia in the subcostal cell should prove to be an unreliable character, this species will still be distinguishable from D. marginalis by the strong plications on the facial carina and the characters of the aedeagus.

Duomyia apicalis (Walker) new comb.

Chromatomyia apicalis Walker, 1849:804-805.

Lamprogaster apicalis Walker, 1849:1162; Hendel, 1914b:227.

Duomyia annulipes Hendel, 1914a:57 (nomen nudum); 1914b: 98-99 (described). New synonym.

Helocnemia apicalis Walker: Enderlein, 1924:128.

♂ ♀ . Coloration. Head yellow; postfrons with a diffuse light brown mark on each side of posterior half; hairs on postfrons black; upper occiput brown with white pruinescence, tawny towards vertex. Antenna fulvous, third segment brownish tawny; arista tawny at base, dark brown beyond. Palpus fulvous. Mesoscutum black, tawny at sides behind suture, also on humoral callus and posterior notopleural callus; scutellum fulvous with large black central blotch; pleura tawny to reddish brown; lower part of sternopleuron extensively blackened. Legs tawny; femora conspicuously browned or blackened near middle, the fore one especially so; tibiae each with three blackish marks, one before middle, one beyond middle, and one at distal extremity; tarsi tawny. Wing clear; distal part of subcostal cell yellowish; faint brown marks surrounding anterior, basal, and anal crossveins; squama whitish. Haltere creamy. Abdomen black to dark brown; distal part of tergite 5 tawny.

Head. Postfrons almost smooth; parafacial rugose at lower end, facial carina well developed, flat-topped, smooth, sharply margined, usually rather broad but narrower in very small specimens; a weak black frontorbital and smaller ocellar bristle; cheek bristle well developed. Antenna as long as distance from its basal insertion to centre of epistomal margin in ♂ , somewhat shorter in ♀ ; arista bare. Prelabrum much reduced; palpus of moderate width.

Thorax. Humeral and prescutellar acrostichal bristles

present; scutellum with 3 pairs of bristles and no hairs; pteropleuron with a strong black bristle in addition to long pale hairs. Femora rather stout; fore femur with black dorsal bristles, a series of yellow posteroventral bristles and 2-4 shorter spinescent black posteroventral bristles; middle femur with black posterior bristles distally; hind femur with yellow and a few black anterodorsal bristles. Wing with distal section of vein 4 slightly bent forward from junction with discal crossvein, then almost parallel with vein 3 for much of its length, curving forward apically; anal crossvein almost straight; squama moderately large.

Abdomen. Tergite 5 about twice as long as tergite 4, with some strong black posterolateral bristles; often also some posterolateral black bristles on tergite 4; in ♀ only, pleural membrane in region of segments 3 and 4 with strong black bristles. ♂ postabdomen: stipe of aedeagus long and slender, slightly expanded basally, where it has a fringe of short hairs on each side; preglans sclerotized, simple, slightly shorter than glans; glans short, ovoid; membranous bulb very short; filaments long and slender, about 5 times as long as glans.

Dimensions: total length, ♂ 4.9-8.6 mm., ♀ 4.8-9.3 mm.; length of thorax, ♂ 1.9-4.3 mm., ♀ 1.8-4.1 mm.; length of wing, ♂ 4.4-8.5 mm., ♀ 4.5-9.3 mm.

Distribution: South-western Australia.

Material examined: "W. Australia", no date (lectotype ♀, here designated, and paralectotype ♀ of Chromatomyia apicalis Walker, BM), anon.; Swan R., no date (holotype ♂ of D. annulipes

Hendel, WM), anon.; Perth, xi 1935 (3 ♂, BM, 1 ♂, AM), R.E.T.; King's Park, Perth, xi 1936 (2 ♂, 1 ♀, CSIRO, 1 ♀, AM), K.R.N.; Nedlands, near Perth, x-xi 1960 (1 ♂, CSIRO), M.W.; Crawley, near Perth, x xi 1934 (2 ♀, CSIRO), K.R.N.; Yallingup ix-x xi 1913-1958 (3 ♂, BM, 1 ♀, CSIRO), R.E.T., E.F.R.; Margaret R., xi 1958 (2 ♂, CSIRO, 1 ♂, AM), E.F.R.

Duomyia lutea new sp.

♂. Similar to D. apicalis in most characters; agreeing with description given for that species except as indicated below. ♀ unknown.

Coloration. Hairs on postfrons pale, short and inconspicuous. Third antennal segment light fulvous; arista yellow-brown. Mesoscutum black dorsally, broadly margined with tawny-orange all round; scutellum and the entire pleura tawny-orange, the latter with white pruinescence on much of surface. Legs fulvous; fore femur suffused with tawny-brown near middle of posterior surface; other femora with a small brown ventral mark near middle. Abdomen tawny-orange.

Head. Postfrons almost horizontal, forming a right angle with face in profile; parafacial wider than third antennal segment; height of cheek 0.35 of height of eye. Palpus rather narrow.

Thorax. Fore femur with one spinescent black posteroventral bristle. Wing with anal crossvein quite straight.

♂ postabdomen. Aedeagus with base of stipe not visible in types; preglans long and slender, slightly longer than glans;

glans elongate-cylindrical; filaments very short, stout basally, rapidly tapering, each slightly more than half as long as glans.

Dimensions: total length 7.9–8.0 mm.; length of thorax 3.0–3.3 mm.; length of wing 7.9 mm.; length of glans of aedeagus 0.60–0.65 mm.

Distribution: South-western Australia.

Material examined: Nannup, xi 1958 (holotype ♂, CSIRO), I.F.C.; Yallingup, ix-x 1913 (paratype ♂, BM), R.E.T.

Comparative notes. This species is distinguished from others with spinescent posteroventral bristles on the fore femur by the more general fulvous yellow coloration of the thorax and abdomen; it is further distinguished from the related species D. apicalis and D. longicauda by the much shorter filaments of the aedeagus.

Duomyia longicauda new sp.

♂ . Somewhat similar to D. apicalis and D. lutea; agreeing with the description given for the former species except as indicated below. ♀ unknown.

Coloration. Head very pale fulvous; postfrons brown except towards margins; a dark brown mark in lower part of each antennal groove on inner wall. Palpus tawny, with broadly dark brown apex. Scutellum without dark dorsal blotch. Femora tawny, each with a dark brown preapical blotch; tibiae tawny, each narrowly dark brown at apex and with dark brown spot on anterior surface beyond middle; fore tarsus brown, except for basal half of first segment. Wing with very diffuse brown apical cloud from just beyond level of discal crossvein; anterior and discal crossveins

narrowly clouded with brown. Abdomen tawny; segments 2 to 4 broadly brown on median line, on posterior border, and on lateral part.

Head. Parafacial a little narrower than third antennal segment, not rugose; facial carina with sharply raised margins and strong, parallel, vertical corrugations; height of cheek 0.35 of height of eye; no distinguishable fronto-orbital. Antenna longer than distance from its basal insertion to epistomal margin; arista with a few minute basal hairs.

Thorax. Pteropleuron without an outstanding bristle, but with about 2 black setulae among the paler hairs. Fore femur with yellowish dorsal and posteroventral bristles, and no posteroventral spines; middle femur with yellowish posterior bristles; hind femur with yellowish dorsal bristles. Wing with anal crossvein curved.

Abdomen. Tergites 4 and 5 without strong bristles. ♂ postabdomen: outer surstylus moderately broad, its distal section at first narrowed, then expanded with a prominence on posterior side just beyond apex of inner surstylus; stipe of aedeagus broad and compressed distally; preglans very short, not much longer than wide, but well defined and sclerotized; glans short, ovoid; bulb very short; filaments very long, about 13 times as long as glans.

Dimensions: total length 6.5 mm.; length of thorax 2.4 mm.; length of wing 5.6 mm.; length of glans of aedeagus 0.37 mm.

Distribution: south-western Australia.

Material examined: Deep Dene, near Karridale, iii 1964 (holotype ♂, CSIRO), L. M. O'Halloran.

Comparative notes. This species appears to be most closely related to D. apicalis and D. lutea, from which it may be distinguished by the absence of spinescent posteroventral bristles and by the exceedingly long filaments of the aedeagus.

Duomyia spinifemorata Malloch

Duomyia spinifemorata Malloch, 1929:508-509, figs 1a, 2a.

♂. Coloration. Head tawny; postfrons with a blackish mark on each side near vertex, in addition to a black ocellar spot; orbital margins of postfrons and parafacial with line of silvery pruinescence; lunule light brown or blackish; occiput blackish with whitish pruinescence, except on upper third. Antenna, including arista, tawny, some brown suffusions on segments 1 and 2. Prelabrum brown; palpus brown, paler apically. Thorax shining black, with greenish reflections on mesoscutum; greyish pubescence or pruinescence covering notopleural region, propleuron, upper posterior part of mesopleuron, upper posterior extremity of pteropleuron, pleurotergite, and most of hypopleuron, none on humeral callus or scutellum. Femora black to dark brown, narrowly fulvous at apices; tibiae dark brown; tarsi fulvous, 4 distal segments of fore tarsus and two distal segments of other tarsi brown. Wing clear; distal part of subcostal cell yellowish brown; a diffuse pale brown apical cloud on costal margin and a very indistinct brown mark on anterior crossvein; squama white, Haltere yellowish. Abdomen black or brown-black with purplish

reflections.

Head. Vertex rounded off, not carinate; postfrons almost smooth, nearly horizontal posteriorly, steeply sloping anteriorly; parafacial as wide as third antennal segment or almost so, with exceedingly minute, regular rugosity; facial carina broad and flat, sharply margined, almost smooth; height of cheek 0.41-0.45 of height of eye; ocellar bristle very minute; fronto-orbital indistinguishable; cheek bristle black and quite distinct or pale and less conspicuous. Antenna extending about $^{2}/_{3}$ the distance from its basal insertion to epistomal margin; arista with well developed hairs on basal half, of which the longer are slightly over half as long as width of third antennal segment. Prolabrum rather small; palpus of moderate width.

Thorax. Scutellum minutely roughened, without hairs; humeral bristle absent; prescutellar acrostichal present; 3 pairs of scutellars; pteropleural bristle not clearly differentiated. Fore femur with two series of rather short strong black dorsal bristles, and a series of 7 to 10 short black posteroventral spines, no posteroventral tooth; middle femur with a few black posterior bristles near apex; hind femur with series of black anterodorsal bristles. Wing with distal section of vein 4 almost straight and subparallel with vein 3 on basal half, on distal half strongly curved forward, ending very slightly in front of wing apex; anal crossvein curved; squama of moderate size.

Abdomen. Tergite 5 about 3 times as long as tergite 4.

Dimensions: total length 5.3-5.9 mm.; length of thorax 2.2-2.3 mm.; length of wing 3.8-4.1 mm.

Distribution: Northern Territory - vicinity of Darwin (= Palmerston).

Material examined: Darwin, ii 1909 (2 ♂, BM), anon. but probably collected by F.P. Dodd who was at Darwin at that time and sent material to Brunetti and Lichtowardt.

Duomyia irregularis Malloch

Duomyia irregularis Malloch, 1929:509-510, fig. 1b.

♂. Very similar to D. spinifemorata in most characters, differing principally as indicated below. ♀ unknown.

Coloration. Dark marks on each side of upper part of postfrons indistinct or absent; median area of postfrons suffused with tawny-brown. Antenna reddish brown with tawny arista. Palpus greyish brown. Humeral callus, posterior margin of mesoscutum, and dorsal surface of scutellum covered with light grey pruinescence; pruinescence on mesopleuron extending broadly to posteroventral corner; centre of upper margin of sternopleuron and anterior margin of pteropleuron also pruinescent. Fore tarsus entirely brown. Wing without apical cloud or mark on anterior crossvein. Abdomen with grey pruinescence covering segment 1.

Head. Parafacial wider than third antennal segment; height of cheek 0.50-0.60 of height of eye.

Thorax. Fore femur with a broad, rounded compressed posteroventral tooth at about one third of length from distal end, and immediately beyond it 2 or 3 rather small black posteroventral spines.

Dimensions: total length 5.6-5.9 mm.; length of thorax

2.3 mm.; length of wing 3.7-4.0 mm.

Distribution: Northern Territory - vicinity of Darwin (= Palmerston).

Material examined: Darwin, ii iii 1909 (2 ♂, BM), anon. As with D. spinifemorata it is probable that all known material was collected by F.P. Dodd.

Duomyia serra new sp.

♂ . Somewhat resembling D. apicalis and D. lutea; agreeing with description given for the former species except as indicated below. ♀ unknown.

Coloration. Postfrons with brown mark extending before and behind ocelli but without lateral brown marks. Third antennal segment fulvous. Thorax black with green reflections and all hairs whitish. Femora tawny, the fore and middle ones slightly, the hind one strongly suffused with brown on distal half; tibiae tawny-brown, slightly darker distally; all tarsi dark brown. Wing with distal part of subcostal cell tawny, otherwise unmarked. Abdomen black with greenish and coppery reflections.

Head. Parafacial broader than third antennal segment, smooth; facial carina with margins very sharply raised, surface with a few rather strong plications; height of cheek 0.43 of height of eye. Antenna slightly shorter than distance from its basal insertion to epistomal margin.

Thorax. Ptoropleural bristle absent. Fore femur with about 6 rather short strong black posteroventral spines. Wing with distal section of vein 4 converging with vein 3 throughout, almost

straight just beyond discal crossvein, rather strongly curved forward on distal half to end well in front of wing apex.

Abdomen. Tergite 4 without strong bristles; tergite 5 with moderately developed black bristles on posterior margin. ♂ postabdomen: stipe of aedeagus sclerotized and compressed (basal part not visible); preglans very long and slender, curved, slightly thickened distally, with membranous flange for most of its length; glans slender cylindrical, almost straight; filaments very short, about 2/3 as long as glans, fused for slightly more than half their length.

Dimensions: total length 9.5 mm.; length of thorax 3.7 mm.; length of wing 7.4 mm.; length of glans of aedeagus 1.03 mm.

Distribution: Queensland - Cape York Peninsula.

Material examined: Chester R., Silver Plains, Coen district, xii 1961 (holotype ♂, CSIRO), J.L. Wassell.

Comparative notes. This may be distinguished from other species with bare scutellum and ventrally spinose fore femur by the bare arista and absence of a pteropleural bristle. The aedeagus, with long, attenuated preglans and very short filaments is also characteristic.

Duomyia umbrosa new sp.

♂ ♀ . Similar to D. octoseta in most characters; agreeing with description given for that species except as indicated below.

Coloration. Postfrons light tawny; no brown blotch on upper end of parafacial. Third antennal segment light tawny. Femora entirely tawny; tibiae brownish apically; fore tarsus

with only the apical segment brown. Wing with brown distal areas as in D. octoseta which is intensified in costal region and, in addition, extended basally to fill marginal and submarginal cells, and extended over vein 3 to form a blotch surrounding anterior crossvein; base and anterior margin of first basal cell also with light yellow-brown suffusion. Abdomen tawny.

Head. Parafacial about as wide as third antennal segment; facial carina well defined but its margins not very sharp; height of cheek 0.30-0.37 of height of eye; fronto-orbitals even more developed than in D. octoseta. Antenna about $^{2}/_{3}$ to $^{3}/_{4}$ as long as distance from its basal insertion to epistomal margin; arista with a few very minute hairs near base.

Thorax. 3 pairs of scutellar bristles only. Wing with distal section of vein 4 curved backwards immediately beyond discal crossvein, then becoming almost straight, curved forwards apically, ending very slightly behind wing apex.

Abdomen. Tergite 5 about twice as long as tergite 4 in ♂, about 1½ times as long in ♀. ♂ postabdomen: aedeagus with slender stipe; preglans elongate but not as long as glans, without membranous flange; glans elongate cylindrical, slightly curved; bulb very short; filaments short, united for about half their length, abruptly bent near apices, each approximately 0.57 of length of glans.

Dimensions: total length, ♂ 8.9 mm.; ♀ 8.6-9.0 mm.; length of thorax, ♂ 3.5 mm., ♀ 3.6-3.8 mm.; length of wing, ♂ 7.9 mm., ♀ 8.2-8.8 mm.; length of glans of aedeagus 0.93 mm.

Distribution: southern Queensland - Stradbroke Island.

Material examined: Dunwich, North Stradbroke Island, v 1966 (holotype ♀, QM), R. Chamberlin; Stradbroke Island, v xii 1911-1912 (paratypes, 1 ♂, 1 ♀, in copula, UQ, 1 ♀, CSIRO), H.H., anon.

Comparative notes. The wing markings distinguish this species from related forms with pale mesoscutum.

Duomyia octoseta new sp.

♂ ♀ . Coloration. Head fulvous; postfrons largely rust-coloured; a brownish blotch at upper end of parafacial; occiput scarcely darkened. Antenna tawny; third segment somewhat darker; arista dark brown or blackish beyond base. Prelabrum and palpus tawny. Thorax tawny; mesoscutum more rusty brown, especially towards centre; pleural hairs mostly yellowish, a few black ones on mesopleuron and some black hairs or setulae on pteropleuron. Legs tawny; femora usually slightly suffused with brown distally; fore and hind tibiae variably darkened apically; fore tarsus with 3 distal segments brown. Wing membrane strongly tinged with yellow, distal third including distal extremity of discal cell brown, intensely so near costal margin, becoming much paler behind vein 3; squama creamy. Haltere creamy with light brown capitellum. Abdomen tawny brown to brown black; distal half of tergite 5 yellow.

Head. Postfrons almost smooth; parafacial narrower than third antennal segment, nearly smooth, slightly pitted at junction with postfrons; facial carina well developed, rather

sharply margined above, flat-topped, surface finely rugose, without major corrugations; height of cheek 0.22-0.28 of height of eye; ocellar and two pairs of fronto-orbital bristles well developed but slender; cheek bristle strong. Antenna as long as distance from its basal insertion to epistomal margin; segment 3 elongate but not attenuated, obtusely rounded at apex; arista with a number of minute hairs just beyond base, each shorter than basal diameter of arista. Prelabrum rather small; palpus of moderate width.

Thorax. Scutellum bare; humeral and prescutellar acrostichal bristles present; 4 pairs of well developed scutellars; no well developed pteropleural bristle. Femora moderately stout; fore femur with double series of black dorsal bristles and a series of long fine yellowish posteroventral bristles; middle femur with strong black posterior bristles distally; hind femur with series of black dorsal bristles. Wing with distal section of vein 4 gradually curving forward from a short distance beyond junction with discal crossvein, ending in wing apex; anal crossvein almost straight; squama moderately large.

Abdomen. Tergite 5 about twice as long as tergite 4. ♂ postabdomen: aedeagus with stipe well sclerotized, somewhat broadened and compressed; preglans elongate and slender with a broad membranous flange extending its entire length; glans much stouter, strongly curved; bulb well developed, with one long and one short membranous caecum; filaments slightly longer than glans.

Dimensions: total length, ♂ 5.7-9.9 mm., ♀ 6.3 mm.; length of thorax, ♂ 2.4-3.9 mm., ♀ 2.5 mm.; length of wing, ♂ 5.9-8.4 mm., ♀ 6.2 mm.; length of glans of aedeagus 0.67-0.87 mm.

Distribution: Queensland - south coast; New South Wales - north coast.

Material examined. New South Wales: Iluka, Clarence R., ii 1965 (holotype ♂, AM), R.L. and D.K.M.; Brunswick Heads, i 1961 (paratype ♀, CSIRO), K.R.N. Queensland: Dunwich, North Stradbroke Island, v 1964 (paratype ♂, UQ), T. Weir.

Habitat: holotype taken in rain forest near sea.

Comparative notes. This is distinguished from other species with tawny mesoscutum, except D. scipio, by the distinct distal cloud on the wing which does not extend to anterior crossvein. From the latter species it is distinguished by the distinct ocellar bristles, short-haired arista, and less elongate third antennal segment.

Duomyia scipio new sp.

♀ . Very similar to D. octoseta but apparently a distinct species in view of the differences noted below. ♂ unknown.

Coloration. Fore tarsus entirely light fulvous. Discal crossvein outlined in light brown, instead of standing in a light brown field as in D. octoseta.

Head. Postfrons with slight median hump in front of ocelli; parafacial much wider than antenna; facial carina strongly convex in centre; height of cheek 0.32 of height of eye; ocellar bristle

indistinguishable; fronto-orbital weak and not much differentiated from the surrounding hairs. Antenna slightly longer than distance from its basal insertion to epistomal margin; third segment very attenuated, length 7.7 times width near middle; arista quite bare.

Dimensions: total length 12.5 mm.; length of thorax 4.7 mm.; length of wing 9.8 mm.

Distribution: Queensland - south coast.

Material examined: Noosa, ii 1960 (holotype ♀, QM), "H.G.G."

Habitat: in "woods".

Comparative notes. This species has the third antennal segment more elongate than in any other species with entirely pale mesoscutum.

Duomyia sp.1

Some ♀ specimens resembling D. testacea and D. aurantiaca are of doubtful status, and may represent variants of either of these species or one or two additional species. The two specimens do not agree very well with one another in detail but may be run to sp.1 in the key.

Distribution: New South Wales - coast districts.

Material examined: Taree, x 1929 (1 ♀, CSIRO), J.L. Wassell; Broulee, 7 miles NE of Moruya, iv 1966 (1 ♀, CSIRO), M.S.U.

Duomyia aurantiaca new sp.

♂ ♀ . Very similar to D. testacea in most characters and agreeing with the description given for that species except as indicated below.

Coloration. Face creamy-fulvous on carina, gradually becoming light tawny towards epistomal margin, but not distinctly bicoloured. Antenna with third segment brownish tawny. Prelabrum and palpus light tawny. Sternopleuron not darkened, with all hairs yellowish. Legs tawny; each femur with a small brown ventral mark; tibiae each with preapical brown mark; tarsi with apical segment brown. Wing with very indistinct brownish apical cloud; squama creamy.

Head. Parafacial much less than half as wide as third antennal segment; facial carina extending below middle of face; antennal grooves broad and deep, extending below level of centre of epistomal margin; height of cheek 0.18 of height of eye; ocellar and 2 pairs of fronto-orbital bristles well developed but slender. Antenna in ♂ distinctly longer than distance from its basal insertion to epistomal margin, in ♀ almost as long as that distance; arista with very minute hairs near base.

Thorax. No additional black bristles near the prescutellar acrostichals and dorsocentrals; 3 or 4 pairs of scutellars. Wing with distal section of vein 4 slightly bent forward from discal crossvein, then running subparallel to vein 3 to near apex where it is curved forwards, ending distinctly behind wing apex; anal crossvein straight.

Abdomen. Tergite 5 about 1½ times as long as tergite 4 in ♂. ♂ postabdomen: outer surstylus more elongate than in D. testacea, with a prominent tubercle on posterior side near level of apex of inner surstylus, beyond which it is gradually

narrowed and curved forwards; preglans elongate, somewhat curved, especially so near base, longer than glans, with a membranous flange extending for most of its length; glans rather stout; bulb short; length of filaments 0.85 of length of glans.

Dimensions: total length, ♂ 5.5 mm., ♀ 7.6 mm.; length of thorax, ♂ 2.4 mm., ♀ 3.2 mm.; length of wing, ♂ 5.0 mm., ♀ ------- ; length of glans of aedeagus 0.43 mm.

Distribution: New South Wales - far north coast.

Material examined: Brunswick Heads, ii 1962 (holotype ♂ , paratype ♀ , CSIRO), D.E.H.

Comparative notes. This is nearest to D. testacea from which it may be distinguished by the larger antenna, narrower cheek, and coloration of the face in the male.

Duomyia testacea (Macquart) new comb.

Campigaster testacea Macquart, 1855:122-123; Hendel, 1914a:169.

♂ ♀ . Coloration. Head orange-fulvous; a narrow line of pale pruinescence along orbital margins of postfrons and parafacial; no brown blotch at upper end of parafacial; face of ♂ sharply bicoloured, upper part pale fulvous, somewhat shining, lower part reddish tawny, dull, thickly pruinescent; face of ♀ similar but the upper and lower sections not sharply differentiated and the colours less contrasted. Antenna tawny, third segment sometimes predominantly dark brown. Prelabrum and palpus tawny. Thorax orange-tawny; bristles black; hairs and setulae both black and yellowish, or almost entirely black; sternopleuron sometimes largely blackish. Legs almost entirely tawny, or variably darkened; femora and tibiae often brown or black; 2 or 3 distal segments of each tarsus usually brown. Wing strongly tinged with yellow, especially towards base, without darker markings; squama yellowish. Haltere fulvous. Abdomen fulvous or with tergites 2 and 3 variably browned.

Head. Postfrons almost smooth; parafacial narrower than third antennal segment in ♂, about as wide as that segment in ♀ ; facial carina well defined only

on upper half where it is flat, rather sharply margined, with fine vertical grooves, much narrowed between antennal bases; ocellar bristle small; fronto-orbitals very weak and variable; cheek bristle rather strong. Antenna slightly more than half as long as distance from its basal insertion to middle of epistomal margin, standing out a little more from face than usual because first segment is less deeply sunken; arista quite bare. Prelabrum moderately developed; palpus rather narrow.

Thorax. Scutellum without hairs; humeral and prescutellar acrostichal bristles present; several additional bristles in vicinity of dorsocentrals and acrostichals; scutellum with 3 or 4 pairs of bristles, in the latter case the basal pair often shorter than the others. Fore femur with 2 rows of black dorsal bristles, posteroventral bristles reduced to long fine pale hairs; middle femur with some black posterior bristles distally; hind femur with series of black dorsal bristles. Wing with distal section of vein 4 slightly converging with vein 3, slightly curving forward, principally on distal half, ending at wing apex; anal crossvein curved; squama rather large.

Abdomen. Tergite 5 twice as long as tergite 4 in ♂, somewhat less than twice as long in ♀. ♂ postabdomen: outer surstylus stout, its distal section short and broad, sheathing apex of inner surstylus; preglans weakly sclerotized, without membranous flange, slightly more than half as long as glans; glans cylindrical, rather short, almost straight; bulb membranous, rather short; filaments about 1.3 times as long as glans.

Dimensions: total length, ♂ 3.9-7.9 mm., ♀ 6.4-8.8 mm.; length of thorax, ♂ 1.6-3.8 mm., ♀ 2.9-4.4 mm.; length of wing, ♂ 4.0-7.7 mm., ♀ 6.9-9.1 mm.; length of glans of aedeagus 0.55 mm.

Distribution: southern New South Wales and Victoria - sea coast.

Material examined. "De la nouvelle Hollande" (Macquart), "Austral." on label (not original), no date (holotype ♂, OXN), anon. New South Wales: Durras, near Bateman's Bay, xi 1953 (1 ♀, CSIRO), S.J.P.; Bateman's Bay, i 1963 (1 ♀, CSIRO), I.F.C. and M.S.U.; Broulee, S of Bateman's Bay, i xii 1935-1962 (1 ♂, 1 ♀, CSIRO), I.M.M., M.S.U.; Narooma, xi 1930 (1 ♂, CSIRO), A.L.T. Victoria: 17 miles NW of Orbost, xii 1956 (1 ♂, CSIRO), E.F.R.; Seaford, Port Phillip Bay, v 1921 (?) (2 ♀, NMV, 1 ♀, AM), W.F. Hill.

This species shows greater colour variation than is usual in the genus, and the limits of variation will only be understood when much more material is studied. A ♀ from North Beach, Bellinger R., N.S.W., resembles this species in colour and structure of face, but has longer antennae, minute hairs on arista, and very narrow parafacial, characters which are more suggestive of D. aurantiaca.

Duomyia ustulata new sp.

♀ . Coloration. Head fulvous; upper part of occiput with a blackish area on each side which is somewhat obscured by grey pruinescence. Antenna with segments 1 and 2 tawny, segment 3

grey-brown; arista tawny at base, brown beyond. Palpus tawny with dark brown apex. Mesoscutum black with finely broken green reflections, becoming reddish brown towards lateral margins, with short whitish hairs; scutellum black on dorsal surface, reddish brown on margins; pleura reddish brown, mesopleuron with large central greenish black suffusion; lower part of sternopleuron extensively blackened; all pleural hairs white. Legs tawny with hairs and most bristles whitish; femora with preapical brown suffusions; tibiae with some irregular brown markings; fore tarsus brown, fulvous at base of first segment. Wing almost clear; distal part of subcostal cell yellowish brown; a diffuse brown apical cloud extending into marginal cell anteriorly; anterior crossvein surrounded by a brown cloud; discal crossvein very faintly clouded; squama white, with a brown marginal mark near inner posterior angle. Haltere tawny with brown capitellum. Abdomen black with broken greenish reflections; segment 1 and part of segment 2 reddish brown; grey pruinescence confined to lateral parts of segments 1 and 2.

Head. Postfrons gradually and evenly descending anterior to form approximately a right angle with face in profile, almost smooth; parafacial very broad, fully twice as wide as antennal groove; facial carina moderately broad, flat, well defined, but not very elevated, and not very sharply margined, slightly corrugated in centre; height of cheek 0.41 of height of eye; fronto-orbital and cheek bristles absent; ocellar very minute. Antenna as long as distance from its basal insertion to centre

of epistomal margin; third segment rather slender, obtuse at apex; arista bare. Prelabrum much reduced; palpus rather short and narrow.

Thorax. Scutellum minutely sculptured, without hairs; humeral bristle present; prescutellar acrostichal absent; scutellars 4 on one side, 3 on other in holotype. Femora rather stout, especially the fore one; fore femur with 2 series of pale yellowish dorsal bristles and a single series of longer pale posteroventral bristles; middle femur with series of posterior bristles on distal half, of which 2 or 3 distal ones are black; hind femur with series of pale anterodorsal bristles which do not extend to apex. Wing with distal section of vein 4 very slightly converging with vein 3 for most of length, curved forward apically to end at wing apex; anal crossvein somewhat curved; squama rather broad.

Abdomen. Tergite 5 slightly longer than tergite 4.

Dimensions: total length 9.8 mm.; length of thorax 4.4 mm.; length of wing 8.4 mm.

Distribution: South-western Australia.

Material examined: Crawley, near Perth, iv 1935 (holotype ♀, CSIRO), K.R.N.

Comparative notes. The smooth, entirely pale postfrons, apical wing cloud, and fine close sculpturing of the mesoscutum and scutellum, which gives a silky appearance, serve to distinguish this from related species.

Duomyia sp. 2

♀ . Somewhat similar to D. ustulata and agreeing with description given for that species except as indicated below.

Coloration. Postfrons dark brown anteriorly, becoming reddish brown posteriorly. Scutellum mostly black, tawny at apex; almost all of sternopleuron black; some fine black hairs on posterior part of mesopleuron and some black hairs and setulae on pteropleuron. Fore femur dark brown, tawny at apex; other femora reddish brown with tawny apices; tibiae tawny with small brown preapical marking, fore tibiae with brown mark before middle also; tarsi tawny, slightly brownish apically. Wing with distal part of subcostal cell yellow; anterior crossvein with faint yellow suffusion; discal crossvein not clouded.

Head. Postfrons forming an obtuse angle with face in profile; parafacial about as wide as third antennal segment and no wider than antennal groove; facial carina similar to that of D. ustulata but a little less strongly margined, almost smooth; height of cheek 0.35 of height of eye; ocellar bristle short but distinct; 2 distinct but small fronto-orbitals, posterior one curved backwards, anterior one curved inwards; cheek bristle present. Antenna approximately half as long as distance from its basal insertion to epistomal margin; third segment not slender; arista with minute basal hairs; palpus larger than in D. ustulata.

Thorax. Prescutellar acrostichal bristle present; 3 pairs of scutellars. Fore femur with some black dorsal bristles; the pale ventral bristles longer and finer than in D. ustulata;

middle femur with well developed black posterior bristles distally; hind femur with finer pale anterodorsal bristles. Wing with anal crossvein only curved at anterior end.

Abdomen. Tergite 5 slightly more than twice as long as tergite 4.

Dimensions: total length 10.4 mm.; length of thorax 4.0 mm.; length of wing 8.5 mm.

Distribution: New South Wales - Sydney district.

Material examined: Gundamaian, Royal National Park, i 1926 (1 ♀, CSIRO), A.J. Nicholson.

Unfortunately the thorax of the only available specimen has been damaged by corrosion of the pin.

Duomyia angustata new sp.

(Fig. 58)

♂. Coloration. Postfrons brown with tawny markings posteriorly, with long black hairs posteriorly and finer white ones anteriorly; parafacial and cheek fulvous; face cream, upper half of occiput black with silvery pruinescence, tawny towards centre of vertex. Antenna tawny, with third segment mostly brownish; arista dark brown. Prolabrum dark brown to fulvous; palpus black. Thorax black with reflections green or slightly coppery; pleural hairs nearly all pale, a few black setulae on posterior margin of mesopleuron and on pteropleuron. Femora black; tibiae tawny; fore tibia with variable brown suffusion on posterior surface; tarsi tawny, becoming brownish distally. Wing almost clear; distal part of subcostal cell yellowish;

anterior crossvein faintly suffused with brown; squama white. Haltere brown. Abdomen black with green or slightly coppery reflections; tergites 1 and 2 and sides of tergites 3 and 4 with numerous long white hairs, hairs elsewhere black.

Head. Postfrons almost smooth, indistinctly pitted anterolaterally; parafacial about as wide as third antennal segment; facial carina strongly elevated, with sharp, raised margins throughout, very broad below, narrowing above to become almost linear from a short distance below antennal sockets, surface irregularly rugose, convex in centre; epistomal margin of face deeply sinuate in centre; height of cheek 0.40-0.44 of height of eye; ocellar bristle well developed; 1 or 2 reclinate frontoorbitals and an anterior incurved one; cheek bristle well developed. Antenna longer than distance from basal insertion to centre of epistomal margin; third segment rounded at apex; arista slightly stouter than usual, compressed beyond base, with numerous very minute hairs on swollen basal region. Prelabrum much reduced; palpus broad.

Thorax. Mesoscutum with rather long hairs and setulae; scutellum bare, its surface minutely roughened; humeral bristle present; several long prescutellar bristles or setulae in addition to dorsocentral and acrostichal; 3 pairs of scutellars. Fore femur with irregularly arranged black dorsal bristles and longer, finer posteroventral black bristles mixed with equally long pale hairs; middle femur with black posterior bristles distally and white posterior hairs; hind femur with black anterodorsal

bristles and long white hairs on anterior and ventral surfaces. Wing with distal section of vein 4 bent forwards from discal crossvein, then slightly converging with vein 3, curved forward apically to end a little in front of wing apex; anal crossvein curved for a short distance anteriorly, then almost straight; squama somewhat narrowed beyond base.

Abdomen. Tergite 5 about $3\frac{1}{2}$ to 4 times as long as tergite 4. ♂ postabdomen: aedeagus with stipe rather broad and compressed; preglans very short, scarcely longer than wide, well defined and sclerotized, without flange; glans rather short, cylindrical, very slightly curved; bulb exceptionally long, tightly spirally coiled in about 5 whorls, fully as long as glans without uncoiling; filaments exceedingly long, about 18 times the length of glans, coiled like a watch spring.

Dimensions: total length 6.6-7.0 mm.; length of thorax 2.8-3.0 mm.; length of wing 5.4-5.7 mm.; length of glans of aedeagus 0.55-0.56 mm.

Distribution: Western Australia - Geraldton district to Perth district.

Material examined: Fremantle, vii 1934 (holotype ♂, CSIRO), K.R.N.; Dongara, S of Geraldton, viii 1935 (paratype ♂, BM), R.E.T.

Comparative notes. In addition to the characters given in the key, the elongate, spirally twisted bulb of the aedeagus is highly distinctive and unlike that of any other species of the genus which I have examined.

Duomyia lonchaeina new sp.

(Fig. 57)

♂ . Somewhat similar to D. angustata in many characters; agreeing with description given for that species except as indicated below.

Coloration. Face bright fulvous yellow. Third antennal segment orange, brownish on anterior margin and at apex. Prelabrum tawny; palpus dark brown. Thoracic pleura with all hairs white, no black hairs or setulae. Tibiae and tarsi black to dark brown. Wing strongly stained with yellow, especially on basal half; squama cream.

Head. Parafacial slightly narrower than third antennal segment; facial carina less broad below than in D. angustata, with margins less strongly raised, surface almost smooth, convex; height of cheek 0.33-0.38 of height of eye.

Thorax. Hairs on mesoscutum and pleura shorter than in D. angustata; scutellum smooth and shining; 3 or 4 pairs of scutellars. Fore femur with all posteroventral bristles pale; all femora with pale hairs shorter and less conspicuous than in D. angustata. Wing with distal section of vein 4 in its mid-region subparallel with vein 3, ending at or slightly behind wing apex.

Abdomen. Tergite 5 slightly more than twice as long as tergite 4. ♂ postabdomen: preglans elongate but shorter than glans, with a short membranous lobe near distal end; glans somewhat elongate and curved; bulb very short; filaments very short, with small basal swelling, narrowed on distal third, each half as long as glans.

Dimensions: total length 7.4-7.6 mm.; length of thorax 3.3 mm.; length of wing 7.0-7.2 mm.; length of glans of aedeagus 0.88-0.90 mm.

Distribution: south-western Australia.

Material examined: Cannington, near Perth, x 1934 (holotype ♂, CSIRO), K.R.N.; Walpole, Frankland R. district, xi 1958 (paratype ♂, CSIRO), I.F.C.

Comparative notes. In the smooth scutellum and strong yellow tinge of the wing this species resembles D. azurea, but differs in the smooth postfrons. Otherwise it closely resembles D. angustata but differs in the smooth scutellum and very different aedeagus.

Duomyia capitalis new sp.

♂♀. Coloration. Head dull fulvous; postfrons dark brown to blackish, with white pruinescence along orbital margin; parafacial brownish along anterior margin; upper part of occiput blackish with grey pruinescence. Antenna brown; segment 3 blackish brown beyond insertion of arista; arista black beyond base. Prelabrum brown; palpus black, brown at base. Thorax black, with all hairs pale, major bristles black; sides of mesoscutum, propleuron, upper part of mesopleuron, pteropleuron, pleurotergite, most of hypopleuron with grey pubescence or pruinescence. Legs black, knees and extreme bases of middle and hind tarsi narrowly yellowish brown. Wings clear; distal part of subcostal cell brown; squama cream. Haltere light brown basally with dark brown capitellum. Abdomen black.

Head. Postfrons descending slightly immediately in front of ocellar triangle, then becoming almost horizontal as far as antennal bases, not pitted; parafacial as broad as third antennal segment in ♂, broader in ♀; antennal groove broad and deep, especially in ♂ where it reaches almost to epistomal margin; face in profile forming an acute angle with outline of postfrons, receding below; facial carina strongly elevated, flat-topped, smooth, very sharply margined at sides; height of cheek 0.57–0.69 of height of eye; cheek carina not prominent, rounded off. Antenna of ♂ about as long as distance from its basal insertion to lowest extremity of cheek, with segment 3 much enlarged, with rounded apex; antenna of ♀ reaching only to middle of epistomal margin of face, with segment 3 shorter and narrower; arista bare. Prelabrum vestigial; palpus moderately short.

Thorax with rather long fine hairs on much of surface, those on mesoscutum shorter in ♀; scutellum bare; bristles rather fine; humeral absent; 3 to 5 pairs of scutellars. Fore femur with a few weak black dorsal bristles distally; femora ventrally with rather long hairs but no bristles. Wing with vein 4 slightly dipped into discal cell before anterior crossvein; distal section of vein 4 curved basally, then subparallel with vein 3 for most of its length; squama moderately developed; suprasquamal ridge with a few fine hairs.

Abdomen. Tergite 5 about 1½ times as long as tergite 4.

Dimensions: total length, ♂ 4.2–7.3 mm., ♀ 4.4–7.6 mm.; length of thorax, ♂ 1.6–2.7 mm., ♀ 1.7–2.7 mm.; length of wing, ♂ 3.9–5.8 mm., ♀ 4.5–6.5 mm.

Distribution: Australian Capital Territory.

Material examined: Black Mountain, Canberra, iii 1966 (holotype ♂, CSIRO), I.F.C.; ii iii iv 1955-1967 (paratypes, 33 ♂, 15 ♀, CSIRO, 2 ♂, 1 ♀, BM, 2 ♂, 1 ♀, AM, 2 ♂, 1 ♀, USNM), I,F.C., D.H.C.

Comparative notes. The angular outline of the head and very dark antenna, which is enlarged in the male, help to distinguish this from the most closely related species.

Duomyia rasa new sp.

♀. Coloration. Head brownish tawny; postfrons darker brown; a stripe of silvery pruinescence along orbital margins of postfrons and parafacial; occiput brown to black on upper part, with whitish pruinescence except for a broad upper marginal area. Antenna tawny; arista black beyond base. Prelabrum and palpus tawny. Mesoscutum almost entirely black including humeral callus (holotype), or black with broad reddish brown margins including humeral callus (paratype); scutellum reddish brown with variable black central area; pleura reddish brown, propleuron and adjacent parts of mesopleuron and sternopleuron blackish in holotype, entirely reddish brown in paratype. Legs fulvous; fore femur variably suffused with brown; fore tarsus variably browned distally, apical segment relatively pale in holotype, dark brown in paratype. Wing membrane faintly tinged with yellow-brown; distal part of subcostal cell brown; a broad brown apical cloud, darkest on but not confined to costal margin; slight brown suffusions on fork of veins 2 and 3, and basal and anal crossveins; broader

brown marks on anterior and discal crossveins, that on the latter more or less separate from apical cloud in holotype, confluent with it in paratype; squama creamy white. Haltere tawny. Abdomen black or reddish brown.

Head. Vertex not sharply carinate; postfrons steeply sloping, smooth, with moderately fine pale hairs; parafacial narrower than third antennal segment; face concave in profile, with epistomal margin prominent, not sinuate in centre; facial carina almost completely obsolete but defined by the moderately developed antennal grooves; height of cheek 0.25-0.37 of height of eye; ocellar bristle present, rather small; fronto-orbitals not well differentiated from surrounding hairs; cheek bristle present. Antenna as long as distance from its basal insertion to epistomal margin or almost so; third segment moderately elongate; arista with numerous hairs on basal third, many of which are a little longer than basal diameter of arista. Prelabrum rather well developed; palpus moderately elongate.

Thorax. Scutellum short and broad, with posterior margin more transverse than usual, dorsal surface finely sculptured, without hairs; pleura with pale hairs only, no black setulae or bristles; humeral and prescutellar acrostichal bristles present; 3 pairs of scutellars, the basal pair shorter. Fore femur with rather fine black dorsal bristles and longer yellow posteroventral bristles; middle femur with a few long fine black posterior bristles distally; hind femur with black anterodorsal bristles also finer than usual. Wing with distal section of vein 4 only

slightly converging with vein 3 through most of its length, slightly more curved forward apically, ending at wing apex; anal crossvein slightly curved at anterior end, otherwise almost straight; squama a little smaller than usual for genus.

Abdomen. Tergite 5 about twice as long as tergite 4.

Dimensions: total length 6.4-7.6 mm.; length of thorax 2.4-3.0 mm.; length of wing 5.0-7.1 mm.

Distribution: Queensland - Atherton Tableland.

Material examined: Kuranda, i 1967 (holotype ♀, AM), G.A.H. and D.K.M.; Millaa Millaa Falls, near Millaa Millaa, xii 1966 (paratype ♀, UQ), B. Cantrell.

Comparative notes. The broad apical wing cloud and normal, fine postfrontal hairs distinguish this from other forms with smooth postfrons and obsolete facial carina.

Duomyia latipilus new sp.

♂. Similar to D. rasa in most characters; agreeing with description given for that species except as indicated below. ♀ unknown.

Coloration. Postfrons brown-black, becoming reddish brown near vertex; parafacial, face, and cheeks pale ochraceous; antennal grooves and upper half of face with glistening cream pruinescence; upper part of occiput black on each side, tawny in centre. Third antennal segment slightly suffused with brown. Thorax black; posterior part of mesopleuron, pteropleuron, and pleurotergite reddish brown. Fore femur black with tawny apex, other femora blackish brown with tawny apices and more broadly

tawny bases; tibia tawny with brown preapical marks, best developed on hind tibia; tarsi tawny, fore tarsus with 3 distal segments dark brown. Wing with dark brown costal band from end of subcosta to apex, expanding distally to fill apical fifth of wing, becoming much paler behind vein 4; basal and anal crossveins not clouded; anterior and discal crossveins indistinctly brown-clouded. Abdomen dark brown; tergite 1 paler brown.

Head. Postfrons rather flat, less steeply sloping than in D. rasa, with conspicuously broadened and compressed, curved white hairs; face as in D. rasa but flatter, less concave in profile, with epistomal margin not prominent and antennal grooves very shallow; height of cheek 0.35 of height of eye; ocellar bristle very small and pale; fronto-orbitals small and weak. Antenna about as long as distance from its basal insertion to centre of epistomal margin; arista bare. Prelabrum reduced.

Thorax. Scutellum a little narrower and more rounded in outline than in D. rasa, more finely sculptured; a black pteropleural bristle visible on one side of thorax only. Fore femur with broad low rounded postoventral tooth just beyond middle, dorsal bristles shorter than in D. rasa; middle femur with white posterior bristles only; hind femur with only a few black dorsal (or anterodorsal) bristles distally.

Abdomen. Tergite 5 slightly more than twice as long as tergite 4.

Dimensions: total length 7.0 mm.; length of thorax 2.7 mm.; length of wing 5.9 mm.

Distribution: New South Wales - south coast.

Material examined: Depot Beach, 10 miles NE of Bateman's Bay, xii 1967 (holotype ♂, CSIRO), I.F.C.

Comparative notes. This species differs from D. rasa in the conspicuously thickened hairs of the postfrons, and from D. nigricosta, D. hebes, and allied forms, in the smooth flat postfrons.

Duomyia parallela new sp.

♂ ♀ . Very similar to D. iris in most characters; agreeing with description given for that species except as indicated below.

Coloration. Postfrons light reddish brown, with moderately fine white hairs; upper occiput with white pruinescence restricted to 4 spots, a pair above occipital foramen and one on each side near eye margin. Prelabrum tawny; palpus dark brown. Thorax with green reflections less brilliant than in D. iris; mesoscutum with hairs almost all white. Fore tarsus brownish tawny; other tarsi somewhat paler. Wing with distal part of subcostal cell only faintly yellowish. Abdomen shining but reflections not coloured.

Head. Face rather strongly convex in both sexes; height of cheek 0.31-0.35 of height of eye; ocellar and fronto-orbital bristles weaker than in D. iris, but still quite distinct. Prelabrum reduced; palpus short.

Thorax. Scutellum roughened on upper surface; prescutellar acrostichal bristle weak or not readily distinguishable from the surrounding long white hairs; 3 to 5 pairs of scutellar bristles. Fore femur with dorsal bristles mixed black and white, sometimes

mostly white; middle and hind femora with all bristles white. Wing with distal section of vein 4 slightly bent forward from discal crossvein, subparallel with vein 3 for most of its length, slightly curved forwards apically, ending slightly in front of apex; anal crossvein curved only at anterior end.

Abdomen. Tergite 5 slightly more than twice as long as tergite 4.

Dimensions: total length, ♂ 5.3-6.3 mm., ♀ 5.7 mm.; length of thorax, ♂ 2.1-2.5 mm., ♀ 2.2 mm.; length of wing, ♂ 3.9-4.3 mm., ♀ 4.2 mm.

Distribution: south-western Australia - further north than D. iris.

Material examined: Dongara, ix x 1935 (holotype ♂, BM, paratypes, 2 ♂, 1 ♀, BM, 1 ♂, AM), R.E.T.

Comparative notes. This species may be distinguished from D. azurea by the dark brown palpus, from D. adelaidae by the paler tarsi, and from D. iris by the almost parallel-sided first posterior cell of the wing.

Duomyia adelaidae new sp.

♂ ♀ . Similar to D. iris in most characters; agreeing with description given for that species, except as indicated below.

Coloration. Postfrons with tawny markings posteriorly; face light fulvous. Antenna with third segment dark greyish brown in ♂, in ♀ brown with tawny base; arista reddish brown. Palpus dark brown. Thorax without coloured reflections. Legs entirely black, with all hairs and bristles pale. Abdomen without coloured

reflections; some pale hairs on all tergites.

Head. Parafacial broad, slightly wider than third antennal segment in ♂, about twice as wide as that segment in ♀, with a variable number of spaced horizontal grooves; facial carina strongly convex, with variable irregular rugosity, margined at most on upper half, often less; height of cheek 0.40–0.55 of height of eye. Third antennal segment especially large and broadened in ♂, narrower and almost cylindrical in ♀. Prelabrum much reduced; palpus short, extending for only about half the distance from its basal attachment to anterior extremity of prelabrum.

Thorax. Fore femur with rather fine white dorsal bristles. Wing with distal section of vein 4 subparallel with vein 3 for most of its length, very slightly curved forwards apically, ending distinctly behind wing apex; anal crossvein curved only at anterior end or slightly dipped into anal cell.

Abdomen. Tergite 5 about 1½ times to twice as long as tergite 4. ♂ postabdomen: Aedeagus with preglans short, simple; glans fusiform-cylindrical; bulb well developed, with caeca reduced to a pair of tubercles; filaments very roughly 5 times as long as glans.

Dimensions: total length, ♂ 5.1–6.4 mm., ♀ 5.2–7.9 mm.; length of thorax, ♂ 2.4–2.8 mm., ♀ 1.8–3.1 mm.; length of wing, ♂ 5.0–5.5 mm., ♀ 4.3–6.3 mm.; length of glans of aedeagus 0.61–0.67 mm.

Distribution: South Australia - Adelaide district.

Material examined: National Park, x 1951 (holotype ♂, CSIRO, paratypes, 1 ♂, 1 ♀, CSIRO, 1 ♂, AM), E.F.R.; Mount Lofty, no date (paratypes, 2 ♂, SAM, 1 ♀, BM), J.G.O. Tepper; Tanunda, xi 1901 (paratype ♀, SAM), J.G.O. Tepper.

Comparative notes. This species is nearest D. parallela from which it differs in the darker tarsi. It differs from D. azurea in the much darker palpus and antenna and almost colourless wing membrane.

Duomyia iris new sp.

♂♀. Coloration. Head fulvous; postfrons reddish brown posteriorly, darker brown anteriorly, with coarse mostly white hairs; face cream; occiput black on upper part, tawny near vertex, with whitish pruinescence except on a broad upper marginal area. Antenna tawny; arista dark brown beyond base. Prelabrum fulvous in front, darker at sides; palpus black. Thorax black with strong green reflections; mesoscutum with mixed black and whitish hairs; pleura and humeral callus with long white hairs only. Legs black, the femora with green or coppery reflections; tarsi tawny, becoming brown distally. Wing with distal part of subcostal cell yellowish, otherwise clear; squama whitish. Haltere brown. Abdomen black with green or coppery reflections; tergites 1 and 2 with white hairs except on central part of posterior margin of tergite 2; white hairs also on lateral margins of tergites 3 and 4; elsewhere on tergites all hairs black.

Head. Postfrons steeply sloping anteriorly, not forming an angle with face in profile, its surface pitted, without median

hump; parafacial about as wide as third antennal segment in ♂, much wider in ♀; facial carina elevated, rather broad below, with rather sharp margins, surface slightly rugose, slightly convex in ♂, strongly convex in ♀; height of cheek 0.33-0.41 of height of eye; ocellar, 2 pairs of fronto-orbitals and cheek bristle all quite strongly developed. Antenna longer than distance from basal insertion to centre of epistomal margin in ♂, about as long as that distance in ♀; arista with very minute basal hairs. Prelabrum moderately small; palpus rather large but not much broadened.

Thorax. Scutellum almost smooth; humeral and prescutellar acrostichal bristles present, also some additional bristles or long setulae near the latter; 3 or 4 pairs of scutellars, in the latter case the basal pair somewhat shorter; pteropleural bristle absent. Fore femur with strong black dorsal bristles, posteroventral bristles whitish, long, almost hair-like; middle femur with some white posterior bristles on distal half, becoming stronger and black near apex; hind femur with white anterodorsal bristles near middle, and black more dorsally placed bristles distally. Wing with distal section of vein 4 slightly converging with vein 3 from junction with discal crossvein, strongly curved forwards apically to end slightly in front of wing apex; anal crossvein curved; squama rather long and narrow.

Abdomen. Tergite 5 almost twice as long as tergite 4.

Dimensions: total length, ♂ 5.3-7.1 mm., ♀ 5.2-8.7 mm.; length of thorax, ♂ 2.1-3.0 mm., ♀ 2.2-3.4 mm.; length of wing, ♂ 3.9-5.1 mm., ♀ 5.0-6.4 mm.

Distribution: south-western Australia.

Material examined: Bunbury, i 1957 (holotype ♂, AM), i xii 1957-1958 (paratypes, 2 ♀, AM), A. Snell; Capel district, 18 miles S of Bunbury, i 1957 (paratypes, 2 ♀, AM), A. Snell; Yanchep, 32 miles N of Perth, xi xii 1935 (paratypes, 3 ♂, 2 ♀, BM), R.E.T.

Comparative notes. Most closely related to D. adelaidae and D. parallela, this species differs from both in its pronounced metallic colouring and strong forward curvature of the distal section of vein 4.

Duomyia azurea Hendel

Duomyia azurea Hendel, 1914a:57 (nomen nudum); 1914b:97-98 (described).

♂ ♀. Rather similar to D. iris but more robust and distinguished mainly as indicated below.

Coloration. Postfrons reddish brown with some fulvous markings posteriorly, with black hairs posteriorly, fine whitish hairs anteriorly; face, parafacial and cheek bright orange-fulvous. Prelabrum tawny, palpus orange-fulvous. Thorax with blue to blue-green reflections; mesoscutum with short black and yellowish hairs; humeral callus and pleura with yellowish hairs. Tarsi dark brown, paler at joints. Wing strongly stained with yellow, the colour fading towards apex and posterior margin. Haltere with yellowish pedicel and light brown scabellum. Abdomen black with greenish blue reflections.

Head. Parafacial very narrow in ♂, about as wide as third antennal segment in ♀; facial carina strongly elevated and well defined, smooth, convex in centre, without sharp lateral margins, much narrowed above in ♂; height of cheek 0.28–0.39 of height of eye; ocellar bristle well developed; fronto-orbitals very short and weak. Third antennal segment of ♂ enlarged, with basal swelling, that of ♀ much shorter and narrower without basal swelling. Prelabrum well developed; palpus broad.

Thorax. Scutellum smooth, dorsally convex; 3 or 4 pairs of scutellars. Wing with distal section of vein 4 very slightly converging with vein 3 on most of its length, except near apex where it is strongly curved forward to end at or near wing apex.

Abdomen. Tergite 5 slightly more than twice as long as tergite 4 in ♂, twice as long as tergite 4 in ♀.

Dimensions: total length, ♂ 5.9–8.1 mm., ♀ 8.0–8.3 mm.; length of thorax, ♂ 2.7–3.6 mm., ♀ 3.7–3.8 mm.; length of wing, ♂ 6.1–7.5 mm., ♀ 7.6–7.9 mm.

Distribution: south-western Australia.

Material examined: Swan R., no date (lectotype ♀ here designated, paralectotype, ? ♂, abdomen damaged, WM), Winthem; Nedlands, near Perth, ix x xi 1959-1960 (5 ♂, CSIRO, 1 ♂, BM), M.W.; Crawley, near Perth, x 1934 (1 ♀, CSIRO), K.R.N.; Fremantle, ix x 1934 (1 ♂, 1 ♀, CSIRO), K.R.N.; Pinjarra, x 1964 (1 ♂, AM), G.L.B. An additional specimen in WM without locality data and labelled "Paratype" is evidently not a type.

Duomyia ameniina new sp.

♂ ♀ . Resembling D. iris and agreeing with the description given for that species except as indicated below.

Coloration. Postfrons bright fulvous. Palpus dark brown. Thorax with bright green or greenish blue reflections; a broad stripe of whitish pubescence from lower anterior part of notopleural area to upper posterior part of mesopleuron; the very short hairs on mesoscutum and long ones on pleura almost all white. Fore tarsus dark brown with basal segment tawny, at least towards its base; other tarsi fulvous with 2 distal segments brown. Wing with distal part of subcostal cell yellowish brown. Haltere with yellowish pedicel and brown capitellum. Abdomen with hairs on central region of tergite 2 bluish-green iridescent.

Head. Parafacial wider than third antennal segment in both sexes, especially so in ♀ ; facial carina sharply margined, slightly convex in centre in both sexes, with weak horizontal rugae below centre; height of cheek 0.34-0.46 of height of eye; ocellar bristle weak; fronto-orbital bristles weak or indistinguishable. Antenna short, length equal to about $^{2}/_{3}$ the distance from its basal insertion to epistomal margin; third segment rather narrow; arista plumose, i.e. with long hairs forming a dorsal and a ventral series on basal half or more, the longest of which are about equal in length to the width of third antennal segment.

Thorax. Scutellum smooth and dorsally convex. Hind femur with black anterodorsal bristles. Wing with distal section of

vein 4 very strongly curved forwards apically to end well in front of wing apex.

Abdomen. Tergite 5 about 3 times as long as tergite 4.

Dimensions: total length, ♂ 6.0-8.7 mm., ♀ 6.6-8.0 mm.; length of thorax, ♂ 2.4-3.5 mm., ♀ 2.5-3.9 mm.; length of wing, ♂ 4.4-6.1 mm., ♀ 5.0-7.0 mm.

Distribution: Queensland, including inland areas; north-western Australia.

Material examined. Queensland: Morven, i 1963 (holotype ♂, paratype ♂, CSIRO), D.E.H.; Brisbane, ii 1918 (paratypes, 1 ♂, 1 ♀, UQ), H.H. Western Australia: Kimberley Research Station, near Kununurra, Ord R., ii 1952 (1 ♀, CSIRO), R. Lukins.

Comparative notes. Readily distinguished from D. iris, D. azurea and other related species by the long hairing of the arista.

Duomyia montium nom.n.

Duomyia (Duomyia) punctifrons Malloch, 1929:510, secondary junior homonym of Ortalis punctifrons Macquart, 1848 (see under D. decora).

♂ ♀ . Coloration. Postfrons dark brown; parafacial and cheek fulvous, the former slightly browned on anterior margin; face creamy, with a brown mark on inner wall of antennal groove; upper part of occiput black, tawny towards vertex, with some whitish pruinescence, thickest in centre above neck and along posterior margins of eyes. Antenna tawny; third segment becoming reddish brown beyond base; arista reddish brown at base, blackish beyond. Prelabrum and palpus tawny. Thorax black with broken

greenish reflections. Fore legs almost entirely black to dark brown; base of fore tibia tawny-brown; other legs tawny; middle femur with some brown suffusion on distal half; hind femur with distal half almost entirely dark brown; middle tibia variably browned distally; hind tibia broadly dark brown at distal end, with a brown dorsal longitudinal line; middle and hind tarsi with 2 apical segments brown. Wing clear; distal part of subcostal cell tawny; distal parts of marginal, submarginal, and first posterior cells faintly clouded with brown; anterior and discal crossveins distinctly clouded with brown; basal crossvein not clouded; short section of vein 5 between basal and anal crossveins slightly clouded; squama white. Haltere with brown capitellum and tawny pedicel. Abdomen black with reflections slightly greenish.

Head. Postfrons steeply sloping, strongly pitted anteriorly, less so posteriorly; parafacial slightly wider than third antennal segment in ♂, much wider than that segment in ♀; facial carina rather broad flat, sharply margined above, finely rugose; height of cheek 0.33-0.39 of height of eye; ocellar and 2 pairs of fronto-orbital bristles well developed; cheek bristle usually distinct but pale. Antenna somewhat shorter than distance from its basal insertion to epistomal margin; third segment rather slender and not much smaller in ♀ than in ♂; arista with very minute basal hairs. Prelabrum moderately developed, slightly prominent anteriorly; palpus elongate.

Thorax. Scutellum finely but strongly roughened and rugose; humeral and prescutellar acrostichal bristles present; no

secondary bristles near the latter; usually 3, sometimes 4 pairs of scutellars; pteropleural bristle absent. Fore femur with very slight posteroventral pubescent gibbosity just beyond middle, with black dorsal bristles and long pale hair-like posteroventral bristles; middle femur with white posterior bristles and sometimes a few black ones near apex; hind femur almost straight basally, with series of white anterodorsal bristles which tend to become more dorsally placed on distal half, where a few black ones may be present; hind trochanter normal in both sexes, without any trace of tubercle on posterior surface. Wing with distal section of vein 4 gradually converging with vein 3 on most of its length, curving forwards apically to end a little in front of wing apex; anal crossvein curved on anterior part; squama moderately large.

Abdomen. Tergite 5 about 4 times as long as tergite 4 in ♂, usually slightly longer in ♀.

Dimensions: total length, ♂ 6.1-8.4 mm., ♀ 5.8-8.9 mm.; length of thorax, ♂ 2.4-3.5 mm., ♀ 2.5-4.1 mm.; length of wing, ♂ 5.2-7.5 mm., ♀ 5.6-8.4 mm.

Distribution: New South Wales - tablelands districts from the Blue Mountains to the Snowy Mountains; Australian Capital Territory - Canberra district.

Material examined: Wilson's Valley, Snowy Mountains, ii 1963 (5 ♂, 6 ♀, AM, 1 ♂, 1 ♀, BM), D.K.M.; Sawpit Creek and vicinity, Snowy Mountains, ii 1963 (2 ♂, 8 ♀, AM, 1 ♂, 1 ♀, GLB), D.K.M.; Diggers Creek, near Mount Kosciusko, Snowy Mountains, i 1933 (1 ♂, 1 ♀, CSIRO), I.M.M.; Alpine Creek, near Kiandra, xi 1938 (1 ♀, CSIRO), A.L.T.; Kiandra, ii 1961

(1 ♂, CSIRO), E.F.R.; Pilot Hill, Bago Forest, near Batlow, iii 1957 (1 ♂, 1 ♀, CSIRO, 1 ♂, 1 ♀, USNM), T.G.C.; 4 miles E of Nimmitabel, iii 1963 (1 ♂, 1 ♀, CSIRO), D.H.C.; Brown Mountain, E of Nimmitabel, iii 1963 (3 ♀, CSIRO), D.H.C.; Tuross, E of Cooma, iii 1937 (2 ♂, 1 ♀, AM), K.C. McKeown; Mount Franklin, W of Canberra, ii 1965 (1 ♀, GLB), G.L.B.; Uriarra State Forest, W of Canberra, ii 1965 (1 ♀, CSIRO), Z.R.L.; Mount Gingera, near Canberra, i ii 1955-1964 (2 ♂, 1 ♀, CSIRO), I.F.C., Z.R.L., D.F. Waterhouse; Blundell's near Canberra, ii iii 1930-1952 (4 ♀, CSIRO), A.L.T., S.J.P.; Wee Jasper, near Burrinjuck Dam, i 1933 (1 ♀, CSIRO), M.F.; Woodford, Blue Mountains, i 1926 (1 ♀, CSIRO), I.M.M.; Leura, Blue Mountains, i 1932 (1 ♂, 1 ♀, AM), K.K. Spence; Katoomba, i ii 1912-1962 (holotype ♂, DEI, 2 ♀ AM), F.P.D., G.H.H.; Mount Victoria, Blue Mountains, i 1967 (2 ♂, UQ), J.C. Cardale.

Duomyia scintilla new sp.

♂ ♀ . Very similar to D. montium and D. decora in most characters; agreeing with description of the former except as indicated below.

Coloration. Postfrons reddish brown with tawny areas anteriorly and posteriorly; parafacial not browned anteriorly; brown mark on inner wall of antennal groove very indistinct. Thorax with bright green reflections dorsally. Fore tibia tawny becoming dark brown apically; middle and hind femora dark brown on approximately their basal halves, tawny distally; middle tibia not browned distally; hind tibia slightly browned distally. Wing

with small but distinct brown suffusion on basal crossvein.

Head. Facial carina a little narrower than in D. montium, its lateral margins less sharp, almost straight; height of cheek 0.35–0.43 of height of eye; cheek bristle strong, black. Antenna slightly longer than distance from its basal insertion to epistomal margin.

Thorax. Three pairs of scutellar bristles. Middle femur with the stronger distal posterior bristles black; hind femur somewhat curved basally, with most dorsal and anterodorsal bristles black or brown; hind trochanter with rounded tubercle on posterior surface in ♂ only.

Abdomen. Tergite 5 approximately twice as long as tergite 4 in ♂, 3 times as long in ♀. ♂ postabdomen: aedeagus with preglans simple, moderately short, not very strongly sclerotized; glans elongate cylindrical, very slightly curved; bulb short with 2 short caeca; filaments slender, slightly more than twice as long as glans.

Dimensions: total length, ♂ 7.0–7.5 mm., ♀ 7.2–7.4 mm.; length of thorax, ♂ 2.6–2.9 mm., ♀ 2.7 mm.; length of wing, ♂ 5.2–5.4 mm., ♀ 5.3 mm.; length of glans of aedeagus, 0.50–0.55 mm.

Distribution: New South Wales – central coast district.

Material examined: Gundamaian, Royal National Park, S of Sydney, i 1926 (holotype ♂, CSIRO, paratypes, 1 ♂, 2 ♀, CSIRO, 1 ♂, BM), A.J. Nicholson, Benham, I.M.M.

Comparative notes. Very similar to D. decora and most easily distinguished by the colour of the hind femur.

Duomyia decora (Macquart)

Senopterina decora Macquart, 1846:208, pl.18, fig.10.

Ortalis punctifrons Macquart, 1848:61, pl.7, fig.4.

Chromatomyia laeta Walker, 1849:805. New synonym.

Lamprogaster laeta Walker, 1849:1162.

Euchalcota decora: Loew, 1873:40.

Duomyia decora: Hendel, 1914b:95-96.

♂ ♀ . Similar to D. montium and D. scintilla in most characters; agreeing with description given for D. montium except as indicated below.

Coloration. Postfrons reddish brown, with tawny markings posteriorly; inner wall of antennal groove with variable brown mark. Fore tibia tawny with dark brown apex; middle femur and tibia almost entirely tawny; hind femur and tibia tawny with brown apical marks. Wing with marks on anterior and discal crossveins broader and darker than in D. montium; basal and anal crossvein also with brown suffusion.

Head. Facial carina with lateral margins rounded off on most of their extent, usually forming a slightly curved outline, surface with rather strong, regular, mostly horizontal grooves. Antenna slightly longer than distance from its basal insertion to centre of epistomal margin in ♂, about equal to that distance or slightly shorter in ♀.

Thorax. 3 pairs of scutellar bristles. Femora with chaetotaxy as described for D. montium; hind trochanter of ♂ with posterior tubercle much as in D. scintilla.

Abdomen. ♂ : tergite 5 slightly more than twice as long as tergite 4; ♀ : tergite 5 about 2½ to 3 times as long as tergite 4. ♂ postabdomen: aedeagus somewhat similar to that of D. scintilla; filaments less than twice as long as glans.

Dimensions: total length, ♂ 5.4-7.8 mm., ♀ 4.4-7.3 mm.; length of thorax, ♂ 1.9-2.9 mm., ♀ 1.5-3.0 mm.; length of wing, ♂ 3.7-5.8 mm., ♀ 2.5-6.6 mm.

Distribution: Tasmania; Victoria; New South Wales - as far north as Sydney district.

Material examined. No state given: no locality, no date (holotype ♀ of Ortalis punctifrons Macquart, OXN), anon.; "New Holland", no date (lectotype ♂, here designated, of Chromatomyia laeta Walker, BM, "One of Walker's series so named"), anon. Tasmania: "Tasmanie," no date (lectotype ♂, here designated, of Senopterina decora Macquart, OXN, paralectotypes, 1 ♂, 2 ♀, OXN) anon.; Waterhouse estate, 25 miles NE of Scottsdale, i 1948 (2 ♂, CSIRO), K.H.K., P.B.C., and Kerr; 8 miles E of Scottsdale, i 1948 (1 ♀, CSIRO), E.F.R.; near Saint Helens, i 1948 (1 ♂, 1 ♀, CSIRO), K.H.K., P.B.C., and Kerr; 8 miles NNW of Bicheno, i 1948 (1 ♀, CSIRO), K.H.K., P.B.C., and Kerr; Orford, i 1948 (1 ♀, CSIRO), E.F.R.; Eaglehawk Neck, i 1949 (1 ♂, CSIRO), E.F.R.; Snug, ii 1966 (4 ♀, CSIRO), M.J. Whitten; Lake Saint Clair, i 1949-1960 (1 ♀, UQ, 1 ♀, CSIRO, 1 ♀, AM), F.J. McDonald, E.F.R., D.K.M. Victoria: Berwick, near Melbourne, no date (1 ♀, NMV), anon. New South Wales: Jamberoo, near Kiama, i 1949 (1 ♂, AM), N.W. Rodd; McCarr's Creek, Kuringai

Chase, near Sydney, i 1963 (1 ♂, 2 ♀, CSIRO), D.H.C.; Wentworth Falls, Blue Mountains, i 1963 (2 ♂, AM), D.K.M.; Mount Boyce, Blue Mountains, ii 1964 (2 ♂, AM), D.K.M.

Duomyia obscura Walker

(Fig. 21)

Duomyia obscura Walker, 1849:800; Hendel, 1914a:58, pl.5, figs.106, 107, pl.6, fig.105; 1914b:90-92; Malloch, 1928a:351; 1929:510-511.

Senopterina gigas Macquart, 1851:282, pl.26, fig.4.

The form which has been referred to as D. obscura Walker is a complex consisting of an unknown number of species. At present there is not enough material available to enable characterisation of these species, which will probably depend mainly on male genitalia characters. The synonymy given above, which is according to Hendel, may not therefore be correct.

The species of this complex may be distinguished as a group from the most closely related species, D. howensis and D. thalassina, by the almost entirely blackish fore tarsi. They may further be distinguished from D. howensis by the more extensively blackened mesoscutum and scutellum and from D. thalassina by the large black spot at junction of each parafacial with postfrons.

Distribution: specimens of this complex have been seen from localities in Queensland (as far north as Banks Island, Torres Straits), New South Wales, and Victoria. Macquart's record for Tasmania is probably erroneous.

Types (examined by author): "New Holland", no date (lectotype ♀, here designated, of D. obscura Walker, "One of Walker's series so named", BM), anon., pres. J. Hunter; "Tasmanie", (possible error), no date (holotype ♀ of Senopterina gigas Macquart, PM), J.P.V.

Duomyia thalassina Walker

(Fig. 61)

Duomyia thalassina Walker, 1849:801; Hendel, 1914b:92.

♂ ♀ . Very similar to D. howensis in most characters, differing principally as indicated below.

Coloration. No dark blotch at junction of parafacial and postfrons. Mesoscutum almost entirely black with greenish reflections; humeral callus black; scutellum black, variably suffused with reddish brown at sides; pleura largely black; propleuron, lower parts of mesopleuron and pteropleuron, and upper anterior part of sternopleuron usually reddish brown. Femora black on basal half or more; tibiae reddish brown with darker suffusions towards centre of fore and hind ones, sometimes the former preponderantly black. Wing with distal part of subcostal cell (stigma) yellow or brownish yellow; apex with faint greyish suffusion; wing otherwise almost clear.

♂ postabdomen: aedeagus with glans somewhat longer than in D. howensis; filaments slightly more than twice as long as glans.

Dimensions: total length, ♂ 9.3-12.6 mm., ♀ 9.8-12.4 mm.; length of thorax, ♂ 3.9-5.4 mm., ♀ 4.4-5.1 mm.; length of wing, ♂ 7.9-10.4 mm., ♀ 8.8-9.6 mm.; length of glans of aedeagus 1.50-1.80 mm.

Distribution: coastal eastern Australia, from Cape York (Hendel) to Victoria.

Material examined. Queensland: Currumbin, near Coolangatta, xii 1965 (1 ♀, UQ), C. Speed. New South Wales and Australian Capital Territory: Port Macquarie, i 1935 (1 ♀, CSIRO), M.F.D.; Barrington House, via Salisbury, Barrington Tops district, xii 1965 (1 ♂, UQ), B. Cantrell; Roseville, near Sydney, i 1958 (1 ♂, AM), K.E.; Heathcote, near Sydney, i 1963 (1 ♂, AM), R. Witchard; Nowra, i 1929 (1 ♀, BM), F.A. Rodway; Bateman's Bay, i 1963 (1 ♂, 2 ♀, CSIRO), I.F.C. and M.S.U.; Black Mountain, Canberra, iii 1968 (1 ♂, CSIRO), I.F.C. Victoria: 13 miles WSW of Bairnsdale, i 1958 (2 ♂, 1 ♀, CSIRO, 1 ♂, AM), P.B.C., Helman, and T. Greaves; Berwick, near Dandenong, no date (1 ♂, NMV), anon.; Dandenong, ? date (1 ♀, NMV), collector's name illegible; Oakleigh, near Melbourne, no date (2 ♂, NMV), anon.

Duomyia howensis new sp.

(Figs.59, 60)

♂ ♀ . Coloration. Head pale buff; postfrons reddish brown; a large blackish blotch at summit of each parafacial; upper part of occiput with a large brown-black area on each side. Antenna, including arista, predominantly dark brown. Palpus brown-black. Thorax tawny to reddish brown, mainly shining; central part of mesoscutum broadly black for its whole length, leaving lateral areas reddish brown, more broadly so behind suture; lower part of sternopleuron black; posterior parts of hypopleuron

and pleurotergite dull black. Legs tawny to reddish brown; fore femur with variable black dorsal stripe or patch, sometimes also darkened ventrally towards base; hind femur darkened ventrally towards base; fore tibia darkened apically; fore tarsus with basal segment tawny to reddish, more distal segments deep reddish brown to dark brown; other tarsi tawny. Wing with distal part of subcostal cell brown; marginal and submarginal cells with light yellowish brown suffusion, which sometimes extends over greater part of wing; squama light grey. Haltere fulvous with brown capitellum. Abdomen black with greenish reflections, sometimes partly reddish brown.

Head wider than thorax, its width about 1.3 of height; postfrons broad, especially so anteriorly, slightly pitted anterolaterally, with median hump or convexity in front of ocelli and a slight depression in front of this; vertex somewhat raised in centre, carinate but not very sharply so; parafacial broad, smooth; facial carina broad flat, its convexly curved lateral margins very sharp, narrowest part, between antennal bases, almost as wide as antennal groove, surface with well developed corrugations; height of cheek 0.44-0.54 of height of eye; fronto-orbital and ocellar bristles indistinguishable or almost so; cheek bristle distinct. Antenna slightly shorter than distance from its basal insertion to centre of epistomal margin in ♂, slightly shorter in ♀; segment 3 moderately slender; arista bare, slightly compressed. Prelabrum weak; palpus of moderate width.

Thorax. Scutellum with 4 or 5 pairs of marginal bristles,

of which at least the basal pair is hair-like, the surface otherwise without hairs, almost smooth. Femora not especially thick; fore femur with black dorsal bristles near apex, and numerous dorsal and ventral rather long pale hairs; middle femur with a few black posterior bristles near apex; hind femur without black bristles but with some bristle-like pale hairs in a dorsal series not reaching apex. Wing with anterior crossvein much longer than fourth section of costa (between veins 3 and 4); vein 4 dipping into discal cell before anterior crossvein, converging with vein 3 on its entire distal section, curved forwards at apex; anal crossvein slightly curved.

Abdomen. Tergite 5 about as long as tergites 3 and 4 together in ♂, slightly shorter in ♀. ♂ postabdomen: aedeagus with stipe broadened, compressed, and strongly sclerotized; preglans well defined and sclerotized, rather short, cylindrical, with a membranous flange extending its full length; glans much longer, cylindrical, curved; bulb with pair of long membranous caeca; terminal filaments nearly twice as long as glans, not much tapered distally, slightly expanded at apices.

Dimensions: total length, ♂ 10.8–11.0 mm., ♀ 9.8–14.4 mm.; length of thorax, ♂ 4.2–4.5 mm., ♀ 4.6–5.3 mm.; length of wing, ♂ 8.9–9.3 mm., ♀ 9.7–10.5 mm.; length of glans of aedeagus 1.37–1.40 mm.

Distribution: Lord Howe Island.

Material examined: "Lord Howe Island", xi 1955 (holotype ♂, CSIRO), S.J.P. and Z.R.L.; i 1922, no date (paratypes, 2 ♀,

AM), A.M., anon.; Blinky Beach, xii 1966 (paratype ♂, CSIRO), E.B.B.; near Johnson's Beach, xii 1966 (paratype ♀, CSIRO), E.B.B.; North Bay, ii 1957 (paratypes, 1 ♀, CSIRO, 1 ♀, BM), Z.R.L.

Comparative notes. Differs from the closely related species D. obscura and D. thalassina in the much broader reddish brown lateral areas of the mesoscutum.

Duomyia maculipennis Hendel

Duomyia maculipennis Hendel, 1914a:58 (nomen nudum); 1914b: 93-95 (described); Malloch, 1929:511, fig.2C.

Duomyia fidschiensis Enderlein, 1924:112. New synonym.

♂ ♀. Coloration. Postfrons deep reddish brown to brown-black; parafacial reddish brown, becoming darker on anterior margin and upper extremity; face and cheeks reddish brown; upper part of facial carina often dark brown; orbital margins of postfrons and parafacial with dense silvery pruinescence; upper part of occiput mainly black with thin grey pruinescence on most of surface. Antenna reddish brown, third segment often darker; arista black beyond base. Prelabrum reddish brown to black; palpus dark brown to black. Mesoscutum black with reddish brown lateral margins, or, in specimens from northern Queensland, more extensively reddish brown, sometimes almost entirely so; scutellum reddish brown on margins, usually blackish or dark brown centrally; pleura, in southern specimens (e.g. from near Sydney), light reddish brown with lower part of sternopleuron extensively blackened, in specimens from southern Queensland pleura darker with

extensive dark brown or blackish suffusions, in specimens from northern Queensland pleura entirely reddish brown. Femora reddish brown to black; tibiae reddish brown, often darker distally; fore tarsus reddish brown to dark brown, other tarsi tawny, variably darkened apically. Wing tinged with yellow and grey, always with a blackish cloud from just beyond end of vein 1 to apex; squama whitish. Haltere tawny with brown capitellum. Abdomen reddish brown to black.

Head. Vertex weakly and not sharply carinate; postfrons not pitted, with a rounded hump between its centre and anterior ocellus, a pair of less prominent antolateral humps and a slight hump at middle of anterior margin; parafacial smooth, rather variable in width; facial carina elevated, moderately broad, with lateral margins narrowly raised but not very sharp, surface minutely rugose, but without vertical corrugations, slightly convex below middle; fronto-orbital and ocellar bristles absent; a black cheek bristle present. Antenna somewhat longer than distance from its basal insertion to centre of epistomal margin; third segment rather slender, obtuse; arista bare or with very minute hairs near base only. Prelabrum moderately developed, well sclerotized and slightly prominent; palpus rather narrow.

Thorax. Scutellum without hairs; humeral and prescutellar acrostichal bristles present. Femora rather stout; fore femur with series of black dorsal bristles and weak pale, often hairlike posteroventral bristles; middle femur with some black posterior bristles distally; hind femur with some black dorsal bristles near

middle. Wing with distal section of vein 4 strongly converging with vein 3 for its whole length, slightly curved forward apically to end a little in front of wing apex; anal crossvein almost straight; squama moderately large.

Abdomen. ♂ : tergite 5 1½ times to twice as long as tergite 4, the former relatively longer in smaller specimens; ♀ : tergite 5 about 1½ times as long as tergite 4. ♂ postabdomen: aedeagus with stipe well sclerotized, not broadened or noticeably compressed; preglans short but well sclerotized, with broad membranous flange; glans simple, cylindrical, slightly curved; bulb membranous, somewhat elongate, with pair of elongate caeca from near base; filaments rigid, strongly sclerotized, short, curved, diverging from their common base, each about half as long as glans but length somewhat variable.

Dimensions: total length, ♂ 7.1-12.0 mm., ♀ 7.0-14.4 mm.; length of thorax, ♂ 3.1-5.0 mm., ♀ 2.6-5.6 mm.; length of wing, ♂ 6.9-9.8 mm., ♀ 6.6-10.8 mm.; length of glans of aedeagus 0.80-1.03 mm.

Distribution: coastal eastern Australia from north Queensland to southern New South Wales; erroneously recorded from Fiji.

Material examined. Queensland: Gap Creek, 6 miles N of Bloomfield R., xi 1965 (2 ♀, UQ), G.M.; Kuranda Range State Forest, near Kuranda, i 1967 (1 ♂, 1 ♀, AM), G.A.H. and D.K.M.; The Boulders, near Babinda, xii 1966 (1 ♂, 1 ♀, UQ), B. Cantrell; 2 miles E of Cardstone, Tully R. district, i 1967 (3 ♂, AM),

G.A.H. and D.K.M.; Burpengary, no date (1 ♀, BM), T.L.B.; Woombye, near Nambour, x 1965 (1 ♂, 5 ♀, CSIRO), D.H.C.; Brisbane, iv x xi 1913-1957 (1 ♂, BM, 2 ♂, 2 ♀, UQ), various collectors; Sunnybank, near Brisbane, ix 1925 (1 ♂, 1 ♀, NMV), L. Pottenger; Stanthorpe, ii xii 1925-1930 (1 ♂, 2 ♀, UQ), anon.; Amiens, 11 miles NW of Stanthorpe, xii 1966 (5 ♂, 3 ♀, CSIRO), T.G.C.; Wyberba, near Stanthorpe, iii 1957 (1 ♀, CSIRO), E.F.R.; "Austra. sept." (northern Australia), 1864 (1 ♂, 1 ♀, WM), Thorey. New South Wales: Boonoo Boonoo Falls, near Tenterfield, i 1966 (2 ♂, 2 ♀, UQ), B. Cantrell and T. Weir; 1 mile W of Uralla, i 1967 (1 ♂, UQ), B. Cantrell; 50 miles S of Singleton, i 1956 (1 ♂, CSIRO), I.F.C.; Woodford, Blue Mountains, i 1928 (1 ♂, 1 ♀, AM), G.A.W.; Northmead, near Sydney, xii 1964 (1 ♂, AM), M. and V.G.; Sydney, 1900 (lectotype ♂, here designated, of D. maculipennis Hendel, WM), L. Biro, 1864 (1 ♂, labelled "paratype" but perhaps not a type, WM), Thorey; Como, near Sydney, xi 1922 (3 ♂, 1 ♀, AM), T.G.C.; Royal National Park, near Sydney, ii xi 1926-1966 (2 ♂, 1 ♀, CSIRO, 2 ♂, 1 ♀, AM), G.M. Goldfinch, J. Walsh, G.A.H., D.K.M.; Falls Creek, near Nowra, xii 1926 (1 ♂, AM), B. Bertram; Jervis Bay, xi 1956 (1 ♂, 1 ♀, CSIRO), E.F.R.; Clyde Mountain, near Braidwood, i 1960 (1 ♀, CSIRO), I.F.C. and M.S.U.; "Feejee Isl" or "Fidji Inseln" (in error), no date (lectotype ♀ here designated, paralectotype ♀, of D. fidschiensis Enderlein, ZMB), Dämel.

Habitat: taken in dry sclerophyll forest in the vicinity of Sydney; specimens from near Cardstone on tree trunks in rain forest.

The locality Fiji given on the labels of the type series of D. fidschiensis Enderlein is clearly erroneous. Dämel also collected at Sydney and this is the probable locality of origin of these specimens.

Duomyia mithrax Hendel

Duomyia mithrax Hendel 1914a:58 (nomen nudum); 1914b:92-93 (description).

♂ ♀ . Somewhat resembling D. maculipennis and differentiated principally as indicated below.

Coloration. Head much as in D. maculipennis but face, prelabrum and palpus bright fulvous. Thorax largely black with conspicuous blue-green reflections. Legs black to dark brown; middle and hind tarsi tawny, with two distal segments brown. Wing with distal dark cloud extending posteriorly over discal crossvein; squama creamy. Abdomen black with blue-green reflections.

Head. Vertex distinctly carinate, but not sharply produced as in D. hebes; postfrons with humps as in D. maculipennis but these less elevated and relatively inconspicuous; facial carina slightly concave in profile, with strong longitudinal corrugations towards sides; epistomal margin deeply sinuate, slightly prominent in profile. Antenna: arista subplumose on basal half, the longer hairs about 3 times as long as basal diameter of arista. Prelabrum well developed, not prominent.

Thorax. 3 pairs of almost equally strong scutellars. Fore femur without distinct posteroventral bristles. Wing with distal section of vein 4 gradually curving forwards through most of its

length, more strongly curved apically.

Abdomen. ♂ : tergite 5 about 1½ times as long as tergite 4; ♀ tergites 4 and 5 approximately equal in length.

Dimensions: total length, ♂ 9.2 mm., ♀ 9.5-10.7 mm.; length of thorax, ♂ 4.0 mm., ♀ 4.1 mm.; length of wing, ♂ 8.4 mm., ♀ 8.9 mm.

Distribution: Queensland - Cape York Peninsula.

Material examined: "N.E. Queensland", no date (holotype ♀ , erroneously determined as ♂ , BM), C.M.K.; Claudie R., Iron Range district, ii 1914 (1 ♀ , NMV), W.D.K. Macgillivray; Coen R., no date (1 ♂ , SAM), W.D. Dodd.

Duomyia glebosa new sp.

♂ . Somewhat similar to D. maculipennis and agreeing with description given for that species except as indicated below. ♀ unknown.

Coloration. Postfrons dark brown; face, parafacial and cheek brownish tawny; orbital margins of postfrons and parafacial with silvery pruinescence; facial carina with a conspicuous silvery pruinescent mark on each side. Antenna tawny, third segment brown on dorsal side. Prelabrum and palpus tawny. Thorax black; upper margin of mesopleuron, propleuron, anterior part of upper margin of sternopleuron, posterior part of notopleuron, pleurotergite, and hypopleuron with greyish pubescence or pruinescence; pleural hairs all pale. Legs tawny; all femora with preapical brown blotch; fore and hind tibiae brown apically; tarsi with only the apical segment darkened. Wing with broad apical cloud which

is less concentrated towards anterior margin than in D. maculipennis, not reaching discal crossvein. Haltere cream; base of capitellum brown. Abdomen shining black.

Head. Vertex a little more raised than in D. maculipennis but not very sharply carinate; postfrons with well developed humps as in D. maculipennis; parafacial narrower than third antennal segment, almost smooth; facial carina completely rounded off at sides, slightly concave in profile but without definite central depression, surface finely rugose; ocellar bristles very small but distinct, black. Third antennal segment less slender than in D. maculipennis. Prelabrum moderately developed, not prominent; palpus short and broad.

Thorax. Pleural hairs short. Femora not thickened; middle femur with posterior bristles reduced to weak pale hairs; hind femur with some weak bristles beyond middle. Wing: distal section of vein 4 bent forward from discal crossvein and converging with vein 3, thence curving to become subparallel with vein 3, towards apex gradually converging with vein 3 again, but without distinct apical curvature; anal crossvein with slight sigmoid curvature.

Abdomen. Tergite 5 about $2\frac{1}{2}$ times as long as tergite 4 and encroaching further on to pleural area at sides than preceding tergites; sternites 3 and 4 much reduced in size.

Dimensions: total length 9.0 mm.; length of thorax 3.4 mm.; length of wing 7.6 mm.

Distribution: New South Wales - north coast.

Material examined: 7 miles W of Rosebank, Lismore district, 1700 ft., xi 1961 (holotype ♂, CSIRO), I.F.C. and M.S.U.

Comparative notes. The absence of macrotrichia on the horizontal ridge which separates the posterior part of the pteropleuron from the subalar region distinguishes this species from all others having a non-pitted postfrons with median hump.

Duomyia loxocerina new sp.

♂ ♀ . Somewhat resembling D. maculipennis and D. globosa; agreeing with description of former species except as indicated below.

Coloration. Frons reddish brown; parafacial, face, cheek, and lower half of occiput fulvous; a large black blotch within upper end of each antennal groove; orbital margin of parafacial with very narrow silvery pruinescent stripe. Antenna tawny; third segment brown beyond base, becoming blackish apically; arista pale fulvous for most of length, brown only at extreme apex. Prelabrum tawny; palpus brown with tawny apex, or, in specimen from Kurrajong Heights, entirely tawny. Mesoscutum and humeral callus black, the latter with tawny lateral margins behind suture; scutellum blackish dorsally, its margins broadly tawny; pleura tawny; lower part of sternopleuron black. Legs fulvous; all femora with dark brown ventral blotch near base; fore and hind tibia with variable brown blotch beyond middle; fore tarsus with 3 distal segments brown. Wing marked as in D. globosa, but more strongly tinged with yellow. Haltere fulvous. Abdomen shining black; segments 1 and 2 tawny or reddish brown on lateral margins.

Head. Postfrons almost horizontal; median hump well marked, anterior lateral humps somewhat less so; surface of postfrons

slightly depressed between humps; parafacial as wide as antennal groove, smooth; facial carina narrow strongly elevated above where the margins are rather sharply raised, rounded off below, its surface finely rugose or almost smooth; height of cheek 0.32 of height of eye. Antenna longer than distance from its basal insertion to centre of epistomal margin; third segment very attenuated, 8.2-8.7 times as long as width near middle, rounded at apex; arista with few very minute hairs towards base. Prelabrum moderately developed, not very prominent; palpus of moderate width.

Thorax. Scutellum minutely rugose; pleural hairs longer than in D. glebosa. Fore and hind femora with dorsal bristles weaker than in D. maculipennis, sometimes mostly yellow; fore tarsus of ♂ widened, especially segments 2-4. Wing with distal section of vein 4 gradually curved and converging with vein through most of its length, ending in wing apex; anal crossvein curved but less strongly so that in D. glebosa.

Abdomen. Tergite 5 1½ times to twice as long as tergite 4. ♂ : all preabdominal sternites well developed, with long fine apically crimped hairs; ♀ : sternites without especially long hairs, sternites 3 and 4 much reduced.

Dimensions: total length, ♂ 11.2 mm., ♀ 8.1-9.4 mm.; length of thorax, ♂ 4.1 mm., ♀ 3.1-3.5 mm.; length of wing, ♂ 9.5 mm., ♀ 7.4-8.3 mm.

Distribution: New South Wales - eastern edge of tablelands.

Material examined: Boonoo Boonoo Falls, Tenterfield district, i 1966 (holotype ♂, QM, paratype ♀, UQ), T. Weir and B. Cantrell;

Kurrajong Heights, near Richmond, i 1935 (1 ♀, CSIRO), D.F. Waterhouse.

Comparative notes. The very elongate parallel-sided third antennal segment, reminiscent of that of the psilid genus Loxocera, is a distinctive character separating this species from allied forms.

Duomyia nigricosta Malloch

Duomyia (Duomyia) nigricosta Malloch, 1929:511.

♂ ♀ . Somewhat resembling D. maculipennis; differing principally as indicated below.

Coloration. Postfrons dark brown; face and cheeks tawny. Prelabrum and palpus light tawny. Thorax black with blue or bluish green reflections. Fore femur black, other femora dark brown to black; fore tibiae black in specimens from southern Queensland and New South Wales, tawny with variable brown suffusions in specimens from North Queensland; other tibiae tawny with brown suffusions; fore tarsus black in southern specimens, tawny, becoming brownish distally, in specimens from north Queensland; other tarsi tawny. Wing with broad blackish costal band from distal part of subcosta to apex, scarcely extending behind vein 4. Abdomen shining black.

Head. Vertex sharply carinate; postfrons with 2 prominent median humps; face short and broad with epistomal margin sinuate; facial carina weakly margined immediately below antennae, otherwise ill-defined, with slight transverse depression in middle.

Thorax. 3 pairs of scutellar bristles.

Abdomen. Tergite 5 about 1½ times as long as tergite 4. ♂ postabdomen: not examined in detail.

Dimensions: total length, ♂ 7.2-8.1 mm., ♀ 6.5-8.3 mm.; length of thorax, ♂ 2.6-3.0 mm., ♀ 2.5-3.3 mm.; length of wing, ♂ 5.0-6.1 mm., ♀ 4.9-6.2 mm.

Distribution: coastal eastern Queensland and New South Wales.

Material examined. Queensland: Iron Range, iv 1964 (1 ♂, 2 ♀, CSIRO), I.F.C. and M.S.U.; Rocky R., near Coen, xii 1964 (1 ♀, UQ), G.M.; Ewan Road, 3-14 miles W of Paluma, i 1966 (1 ♀, CSIRO), J.G. Brooks; Camp Mountain, near Brisbane, xi 1951 (1 ♀, UQ), anon.; Highvale, 14 miles NW of Brisbane, xii 1959 (2 ♂, 2 ♀, CSIRO), R.S.; Brookfield, near Brisbane, xii 1962 (1 ♂, UQ), G.M. New South Wales: Ourimbah State Forest, near Gosford, xi 1955 (1 ♀, CSIRO), T.G.C.; Galston Gorge, near Sydney i xii 1963-1964 (2 ♀, AM), J.H. Ardley; Kuringgai Chase, near Sydney, i 1964 (1 ♀, AM), J.H. Ardley; Bulli, xii 1925 (1 ♂, CSIRO), I.M.M.

Duomyia hobes new sp.

(Fig. 63)

♂ ♀. Coloration. Postfrons brown-black; parafacial brown; face, cheek, and lower occiput brownish tawny; orbital margins of face and frons with silvery pruinescence; a band of similar pruinescence within antennal groove which is much widened at upper end; upper part of occiput black. Antenna tawny basally; third segment brown beyond insertion of arista; arista reddish

brown basally, otherwise blackish. Prelabrum tawny with brown margin; palpus black. Thorax black; mesoscutum and scutellum with greenish reflections. Femora tawny with extensive brown suffusions to almost entirely black; tibiae tawny; tarsi fulvous, the 3 distal segments of fore tarsus slightly browned. Wing membrane with faint greyish yellow tinge; a broad blackish costal band from distal end of subcosta to apex, broader and more diffuse distally but not extending behind vein 4; squama white. Haltere brown. Abdomen shining black.

Head. Vertex strongly raised and compressed into a sharp carina; a small hump between ocelli and centre of postfrons; postfrons roughly pitted on most of surface except in vicinity of median hump and vertex; parafacial narrower than third antennal segment, smooth; face much shorter than postfrons; facial carina ill-defined and completely rounded off at sides, usually with transverse depression in centre and another just above the slightly prominent epistomal margin; ocellar and 1 or 2 pairs of fronto-orbital bristles small but distinct, black. Antenna about $1\frac{1}{3}$ times as long as distance from its basal insertion to epistomal margin; third segment not attenuated, rounded apically; arista with numerous short hairs near base, which are not longer than basal diameter of arista. Prelabrum rather small but well sclerotized; palpus of moderate width.

Thorax. Scutellum without hairs, its surface minutely rugose; humeral and prescutellar acrostichal bristles present; 3 pairs of scutellars; pteropleuron with some black setulae. Fore femur

moderately stout, other femora less so; fore femur with 2 rows of black dorsal bristles, posteroventral bristles reduced to fine hairs; middle femur with posterior bristles strong and black apically, becoming pale and hair-like towards middle; hind femur with well developed black dorsal bristles. Wing with distal section of vein 4 gradually converging with vein 3, very slightly and evenly curved throughout; anal crossvein almost straight; squama rather long.

Abdomen. Tergite 5 2 to nearly 3 times as long as tergite 4. ♂ postabdomen: outer surstylus with basal section moderately long but rather stout; free distal section much shorter, narrowing to the obtuse apex, with a tubercle near middle of posterior side; distal section of inner surstylus shorter and much narrower with transversely flattened terminal tooth; aedeagus with stipe heavily sclerotized, broadened and compressed distally; preglans well differentiated, elongate, curved, with a membranous flange along its entire length, slightly longer than glans and separated from it by a broad membranous section; glans only slightly curved; membranous bulb short but distinct, with pair of very short membranous caeca, one of which is unequally bifid; filaments fused at extreme bases, rather slender beyond the thickened basal part, slightly expanded at apices, each about 4.7 times as long as glans.

Dimensions: total length, ♂ 8.2-10.3 mm., ♀ 9.0-10.1 mm.; length of thorax, ♂ 3.7-4.0 mm., ♀ 3.6-4.3 mm.; length of wing, ♂ 7.1-7.7 mm., ♀ 7.1-7.6 mm.; length of glans of aedeagus 1.35-1.50 mm.

Distribution: Queensland - north-central coast.

Material examined: Shute Harbour, near Proserpine, iii 1964 (holotype ♂, CSIRO), iii iv 1964 (paratypes, 3 ♂, 4 ♀, CSIRO, 1 ♂, 1 ♀, AM, 1 ♂, 1 ♀, BM), I.F.C. and M.S.U.; Cannonvale, near Proserpine, vi 1958 (paratype ♀, CSIRO), T.G.C.

Comparative notes. Apart from the small differences in colour and in the development of the facial carina mentioned in the key, differentiation of this and the next two species rests principally in the structure of the aedeagus (see figs. 62, 63, 64).

Duomyia brevifurca new sp.

(Fig. 62)

♂ ♀ . Very similar to D. hebes in most characters; agreeing with description given for that species except as indicated below.

Coloration. Face brownish above, fulvous below. Prelabrum brown. Femora black, narrowly tawny at each extremity; fore tibia black; other tibiae tawny to blackish brown; fore tarsus dark brown; other tarsi fulvous.

Head. Postfrons with whitish hairs much coarser and more conspicuous than in D. hebes; median hump rather weakly developed; parafacial as wide as third antennal segment or almost so, usually with weak horizontal grooves; face short in relation to antenna and postfrons than in D. hebes, concave in profile but otherwise without transverse depressions; ocellar bristle weak and pale; fronto-orbital absent.

♂ postabdomen: outer surstylus with posterior tubercle situated before middle of distal section; aedeagus with stipe

not noticeably broadened and compressed distally; glans strongly curved; filaments very short, each 0.81 of length of glans.

Dimensions: total length, ♂ 8.2 mm., ♀ 7.0-7.9 mm.; length of thorax, ♂ 3.3 mm., ♀ 3.0-3.2 mm.; length of wing, ♂ 6.6-6.7 mm., ♀ 6.0-6.5 mm.; length of glans of aedeagus 1.19-1.27 mm.

Distribution: Queensland - north-central.

Material examined: Mingela, Charters Towers district, iv 1955 (holotype ♂, CSIRO, paratypes, 2 ♀, CSIRO, 1 ♂, AM, 1 ♀, BM), K.R.N.

Duomyia rudis new sp.

(Fig. 64)

♂. Very similar to D. hebes in most characters; agreeing with the description given for that species except as indicated below. ♀ unknown.

Coloration. Fore femur almost entirely black.

Head. Postfrons with whitish hairs coarser than in D. hebes, more as in D. brevifurca; median hump in front of ocelli rather well developed; face concave in profile but without transverse depressions; facial carina margined laterally immediately below antennae, but not very strongly so, rounded off and ill-defined below; ocellar bristle weak and pale; fronto-orbitals indistinguishable.

♂ postabdomen. Stipe not much dilated distally; preglans almost straight; glans strongly curved; filaments each 1.4 times as long as glans.

Dimensions: total length 9.7-9.8 mm.; length of thorax, 4.0 mm.; length of wing 8.1-8.2 mm.; length of glans of aedeagus 0.96-0.98 mm.

Distribution: Queensland - south-central.

Material examined: 25 miles N of Gin Gin, W of Bundaberg, iii 1958 (holotype ♂, paratype ♂, CSIRO), I.F.C.

XI. Genus Euprosopia Macquart

Euprosopia Macquart, 1847:89-90. Type species E. tenuicornis Macquart.

Pachycephala Doleschall, 1858:115-116 (pp.43-44 in reprint), not Vigors, 1825 (Aves).

Type species P. Mohnikei Doleschall (Enderlein, 1924).

Notospila Osten Sacken, 1882:209 (for Pachycephala Dol.).

Oncoscelia Enderlein, 1924:136 (for Pachycephala Dol.).

Lepidocompsia Enderlein, 1924:137. Type-species Platystoma impingens Walker.

Tetrachaetina Enderlein, 1924:138. Type-species T. Bürgersiana Enderlein.

Neoestromyia Ôuchi, 1939:249 (given as Neogastrophyllus on pl.20). Type species N. kienyangensis Ôuchi.

Head of approximately normal proportions or vertically elongate; antennal grooves deep and well defined, separated by a broad, flat-topped, sharply defined facial carina; an almost vertical carina on cheek which is crossed by an impressed line on its lower extremity; prelabrum well developed; segment 2 of antenna very short and compact; segment 3 variably elongate; arista bare or haired only on basal half in Australian species; fronto-orbital bristles absent; inner vertical bristles present or absent; postvertical bristles minute or absent; a strongly developed posterior cheek bristle.

Thorax. Mesoscutum a little longer than wide, with the following bristles: usually 1 humeral (absent in females of some

species), usually 1 + 1 notopleural, anterior supra-alar, postalar, posterior intra-alar, 1 posterior dorsocentral, pre-scutellar acrostichal; scutellum haired or setulose, with a variable number of marginal bristles; pleura without any normally developed strong bristles; supra-squamal ridge with rather long, fine erect pale hairs or with shorter black setulae, sometimes with both.

Legs of normal proportions; femora without ventral spinose bristles, though normal bristles or other processes may be present.

Wings of normal proportions; radial vein with a number of setulae dorsally before level of humeral crossvein; second basal cell not enlarged; posterior distal angle of anal cell obtuse; squama large, rounded.

Abdomen ovoid, often broadly so, usually broadest across segment 2. ♂ postabdomen typical of the subfamily; inner and outer surstyli usually connected for more than half their length; filaments of aedeagus without connecting membrane.

Coloration. Thorax and abdomen usually dull brown, the surface almost entirely obscured by dense pruinescence; mesoscutum usually with irregular markings. Wings extensively spotted or heavily banded.

Type species E. tenuicornis Macquart.

Malloch (1931) is the only author to attempt a division of Euprosopia into species-groups. He was, at the time, mainly concerned with species from the Philippines, China, and some other Asiatic countries. Later (Malloch, 1939a, 1940), when dealing

with the species from New Guinea and the Solomon Islands he did not use or extend this system. Of Malloch's eight species-groups, only the tenuicornis and separata groups occur in Australia, the other six groups containing only Oriental species. Malloch included E. tenuicornis and E. scatophaga in the tenuicornis group but I find it necessary to remove the latter species from the group, as E. tenuicornis and its allies are more closely related to the separata group than to E. scatophaga and its allies. I recognize eight species groups as occurring in Australia.

Miliaria group. Small or very small species; scutellum with 2 pairs of bristles; distal half of wing usually with reticulate pattern, consisting of clear spots on a dark ground; inner vertical bristle usually present; arista with distinct hairs, at least on basal part; posterior notopleural bristle often duplicated or with strong adjacent setulae; abdomen without scales. Includes: rete n. sp., acula n. sp. (Australia), miliaria Hendel (Moluccas), minuta Malloch, setinervis Malloch, dubitalis Malloch (New Guinea), minor Malloch (Solomon Islands).

Ventralis group. Size variable; scutellum with at least 3 pairs of bristles; wing pattern not reticulate, consisting of dark spots which often tend of coalesce into transverse stripes; head not distinctly higher than wide; inner vertical bristles well developed; arista always with distinct basal hairs; abdomen without scales. Includes: ventralis (Walker), xanthops n.sp. (both Australia and New Guinea), punctifacies Malloch, lenticula n.sp., sericata n.sp., sp.1, crassa n.sp., sp.2, sp.3, piperata

n.sp., conferta n.sp., integra, n.sp., kurandae n.sp., sp.4, mica n.sp. (Australia), potens (Walker) (Moluccas).

Megastigma group. Head slightly higher than wide; inner vertical bristles absent; arista bare; face without pair of blackish marks joining inner margin of antennal groove to epistomal margin; scutellum pruinescent, rounded, without apical sulcus, wing with discal band complete but sometimes complex; abdominal tergites with scales in both sexes. Restricted to eastern Australia. Includes: sp.5, megastigma n.sp., crispa n.sp.

Maculipennis group. Very similar to the megastigma group except as follows: face with pair of distinct dark marks joining inner margin of antennal groove to epistomal margin; wing pattern almost completely broken up into dark spots. Temperate parts of Australia only. Includes: albipila n.sp., maculipennis (Guérin), sp.6, fimbripes n.sp., vitrea n.sp., alpina n.sp., celsa n.sp.

Scatophaga group. Similar to the megastigma group except as follows: face with pair of distinct dark marks connecting inner margin of antennal groove to epistomal margin; wing with discal band complete and joined to the sometimes slightly broken preapical band in the vicinity of vein 4 to form a V-shaped mark; apical mark enclosing a pale dot; scutellum entirely pruinescent, with a slight apical depression, the bristles of the apical pair more widely separated than usual. Restricted to eastern Australia. Includes: hypostigma n.sp., subacuta n.sp., filicornis n.sp., scatophaga Malloch, ramosa n.sp.

Macrotegularia group. Head much higher than wide; inner

vertical bristles absent; arista with distinct short hairs near base; face with pair of conspicuous black marks; tegula of ♀ very elongate, reaching to humeral callus; humeral bristle absent in both sexes; tarsi entirely black; normally 2 pairs of scutellar bristles, the apical ones widely separated; abdominal tergites with scales in both sexes; inner and outer surstyli of ♂ elongate and united only at extreme bases. Restricted to eastern Australia. Includes: macrotegularia Malloch, subula n.sp.

Tenuicornis group. Head distinctly higher than wide; inner vertical bristles absent; arista bare or almost so; face with pair of conspicuous black marks; tegula of ♀ , if enlarged, not reaching to humeral callus; humeral bristle well developed in ♂ , absent or minute in ♀ ; wing with stigmatal, discal, and preapical bands well developed; apical mark not enclosing a pale dot; scutellum entirely pruinescent, apically rounded, with apical bristles rather close together; abdominal tergites of ♂ with surface scales, scaling in ♀ more or less reduced to fringes on posterior margins of tergites; ♂ with inner and outer surstylus joined for more than half their length. Apparently restricted to eastern Australia. Includes: anostigma n.n., armipes n.sp., monodon n.sp., tenuicornis Macquart.

Separata group. Very similar to the tenuicornis group except as follows: humeral bristle of ♀ well developed in one species only; scutellum with margins dark and shining, more or less devoid of pruinescence, with apical depression or sulcus between the well separated apical bristles. Includes, comes n.sp.,

separata Hendel, inermis n.sp., conjuncta Hendel, biarmata Malloch (Australia), connexa Malloch (Solomon Islands).

Key to Australian Species of Euprosopia

1. Inner vertical bristles well developed; abdominal tergites scaleless; arista distinctly haired basally.....2
Inner vertical bristles absent or minute; abdominal tergites scaled, at least in ♂; arista most frequently bare or almost so.....25

2. Wings dark brown with numerous clear spots; 2 pairs of scutellar bristles; 2 or more unequal posterior notopleurals (miliaria group).....3
Wings clear, with dark spots or bands; 3 pairs of scutellar bristles: 1 posterior notopleural (ventralis group).....4

3. Apex of first posterior cell pale, almost clear; clear spots in discal cell mostly separate from one another; ♂ : outer surstylus dilated distally, without spine; filaments of aedeagus each more than 10 times as long as glans.....rete new sp.
Apex of first posterior cell dark brown; clear spots in discal cell tending to merge together; ♂ : outer surstylus with long, slender recurved distal spine; filaments of aedeagus not more than 4 times as long as glans .....acula new sp.

4. Scutellum without whitish apical hairs, but with numerous coarse mostly black ones on lateral margins; lower part of face with irregular brown reticulation or isolated streaks.....ventralis (Walker)

Scutellum with whitish apical hairs, its lateral margins without hairs or setulae; facial markings, when present, variable.....5

5. Face unmarked; hind femur with some black setulae or hairs on ventral surface near base; basalar process usually undeveloped in ♂, forming a broadly rounded lobe in ♀; ♀: tergite 5 about half as long as tergite 4.....xanthops new sp.

Face normally with numerous brown spots, reduced to a few irregular streaks in small specimens; hind femur without black ventral setulae or hairs near base; basalar process variable in both sexes, when well developed always narrowly pointed; ♀: tergite 5 almost as long as tergite 4.....6

6. Palpus broadened, about as wide as or wider than lateral part of prelabrum; lower lateral extremity of face somewhat broadened and rounded ventrally.....7

Palpus not broadened, generally distinctly narrower than lateral part of prelabrum, in ♂ narrower than third antennal segment; lower lateral extremity of face tapering to a narrow angle (except in E. kurandae).....15

7. ♂ ♂ (unknown in sp. 3)..... 8

♀ ♀ (unknown in E. punctifacies, spp. 1 and 2)..... 13

8. Middle and hind femora greyish brown, often darker distally; aedeagus with filaments about 1.5 times as long as glans, bent near bases.....crassa new sp.

Middle femur, and usually also hind femur, fulvous with dark distal marks; aedeagus variable..... 9

9. Basalar process well developed, finely pointed; stipe of aedeagus slender.....sp. 2

Basalar process very short or almost obsolete; stipe of aedeagus usually broad..... 10

10. Aedeagus with filaments not more than 1.5 times as long as glans; outer surstylus notably longer than inner..... 11

Aedeagus with filaments about twice as long as glans; outer surstylus variable..... 12

11. Hind femur fulvous with grey-brown distal marks; section of stigmatal band in marginal cell entire or almost so, but a separate rounded dark spot in this cell opposite end of vein 1; apex of outer surstylus somewhat narrowed and curved posteriorly; ejaculatory apodeme without strong dorsal prominence on posterior end of main piece.....lenticula new sp.

Hind femur entirely dark brown; section of stigmatal band in marginal cell broken by hyaline spots; apex of outer surstylus not much narrowed and curved; ejaculatory apodeme with strong dorsal prominence on posterior end of main piece .....punctifacies Malloch

12. Outer surstylus about as long as inner surstylus, its apex narrow and more or less curved backwards; glans longer, 0.31-0.35 mm in length; preglans well sclerotized, at least as long as wide.....sericata new sp.

Outer surstylus distinctly longer than inner surstylus, its apex not much narrowed, slightly incurved; glans shorter, about 0.23 mm long; preglans distinguishable as a narrowly sclerotized ring only..... sp. 1

13. Spiracles of segment 5 very close together near median dorsal line, each separated from the other by scarcely more than its width; spiracles of segment 4 somewhat closer to median dorsal line than to posterolateral angle of tergite 4; velvety areas on tergite 5 extending broadly to its posterior margin.....sp. 3

Spiracles of segment 5 more widely separated; spiracles of segment 4 much closer to posterolateral angles of tergite 4; velvety areas of tergite 5 not reaching posterior margin of tergite.....14

14. Middle and hind femora greyish brown, often darker distally; tegula elevated and thickened anteriorly, with a depression on anterior surface which extends inwards .....crassa new sp.

Middle and hind femora fulvous with dark distal marks; tegula not thickened anteriorly.....15

15. Spiracles of segment 5 each situated midway between median dorsal line and lateral margin of tergite 5; abdominal pleural membrane with short inconspicuous whitish hairs in region of segment 4.....lenticula new sp.

Spiracles of segment 5 each much closer to median line than to lateral margin of tergite 5; pleural membrane with rather long silky yellow hairs in region of segment 4 .....sericata new sp.

16. ♂ ♂ (unknown in E. mica and sp. 3).....17

♀ ♀ 20

17. Outer surstylus reaching approximately to level of apex of cercus, slender, straight, and parallel-sided in profile; glans of aedeagus short, straight; discal and preapical bands of wing usually complete.....18

Outer surstylus not nearly attaining to apex of cercus; aedeagus variable; discal and preapical bands of wing usually more irregular and dissected.....19

18. Sternopleuron blackish brown, at least on lower half; wing with discal band entire on costal margin; section of preapical band in first posterior cell without spot divided off from inner posterior corner; filaments nearly as long as stipe and about 4 times as long as glans.....integra new sp.

Sternopleuron tawny, at most faintly suffused with brown; wing with discal band strongly incised on costal margin; section of preapical band contained in first posterior cell with spot more or less separated from its inner posterior corner; filaments much shorter than stipe, about 3 times as long as glans.....kurandae new sp.

19. Filaments nearly as long as stipe; terminal tooth of inner surstylus conspicuously hooked forwards..conferta new sp.

Filaments not nearly as long as stipe; terminal tooth of inner surstylus less strongly flexed forward.....piperata new sp.

20. Tergite 5 with paired velvety areas small and situated near lateral margins.....21

Tergite 5 with very large velvety areas which occupy the greater part of its surface.....22

21. Middle and hind femora fulvous with grey pruinescence, slightly browned distally; apical mark of wing not enclosing a hyaline spot; velvety areas moderately developed, each extending for most of length of lateral part of tergite 5; spiracles of segment 4 situated behind and slightly above posterior angle of tergite 4; spiracles of tergite 5 situated close to median dorsal line; size medium, wing usually over 6.0 mm. long .....sp. 4

Middle and hind femora rather dark brown with grey pruinescence and narrowly fulvous apices; apical mark enclosing a hyaline spot; velvety areas of tergite 5 minute; spiracles of tergite 4 situated below and slightly in front of posterior angle of tergite; spiracles of segment 5 separated by almost full width of tergite 5; size small, wing usually under 5.0 mm. long.....mica new sp.

22. Pleural membrane of abdomen with numerous coarse blackish setulae in vicinity of segment 3; spiracles of segment 5 situated closer to lateral margins of tergite 5 than to median dorsal line.....23

Pleural membrane without or with very few blackish setulae; spiracles of segment 5 situated closer to median dorsal line than to lateral margins of tergite.....24

23. Sternopleuron heavily suffused with blackish brown, at least on lower half; wing with discal band entire on costal margin; section of preapical band in first posterior cell without spot divided off from its inner posterior corner; abdomen with a conspicuous transverse brush of golden setulae behind sternite 3 .....integra new sp.

Sternopleuron tawny, at most faintly suffused with deeper brown; wing with discal band strongly incised on costal margin; section of preapical band contained in first posterior cell with spot more or less separated from its proximal posterior corner; no such brush of golden setulae behind sternite 3 .....kurandae new sp.

24. Spiracles of segment 5, very close together, each separated from median dorsal line by not more than its own diameter; spiracles of segment 4 situated just above posterolateral corners of tergite 4.....conferta new sp.

Spiracles of segment 5 approximately equidistant from each other and from lateral margins of tergite 5; spiracles of segment 4 situated just below posterolateral corners of tergite 4.....piperata new sp.

25. Scutellum with median groove at apex separating a pair of blackish shining swellings (*separata* group).....26

Scutellum not shining at apex, with median groove indistinct or absent.....30

26. Wing with apical mark separate from preapical stripe; a small transverse black streak between stigmatal band and discal band; ♂: hind trochanter with a ventral brush of dense, short black setulae.....27

Apical mark connected to preapical band along costa; no streak between stigmatal and discal bands; ♂ (unknown in *E. inermis*): hind trochanter normally haired.....28

27. Dorsal surface of hind femur with some black setulae near base and numerous black setulae on distal part, the intermediate region with whitish hairs or setulae and usually only a few scattered black setulae, which form at most an irregular double row transversing this region; ♂: hind femur not narrowed or strongly curved towards base; ♀: spiracles of segment 5 approximately dorsally behind tergite 5, each situated closer to median dorsal line than to lateral margin of tergite.....*comes* new sp.

Dorsal surface of hind femur usually with numerous black setulae for its entire length; ♂ : hind femur narrowed and strongly curved towards base; ♀ : spiracles of segment 5 usually more widely separated, each situated closer to lateral margin of tergite 5 than to median line.....*separata* Hendel

28. Scutellum polished only at extreme margin, the dorsal surface with fine rugosity extending almost to the apical bristles, the apical groove very shallow; dark area in first basal cell usually with one transverse hyaline mark and 2 hyaline dots; ♀ : tegula reaching forward to level of anterior notopleural bristle; basalar process lanceolate, about one third the length of tegula.....*biarmata* Malloch

Scutellum more extensively polished on distal part, the apical groove usually broader and deeper; dark area in first basal cell usually divided by 2 or 3 transverse hyaline bands, and with 2 hyaline dots; ♀ : tegula not reaching to level of anterior notopleural bristle; basalar process very short or absent.....29

29. Fore femur with posteroventral bristles almost obsolete; ♀ : tegula short, normal; basalar process absent.....*inermis* new sp.

Fore femur with posteroventral bristles well developed distally; ♀ : tegula produced anteriorly; basalar process present, very short, acute.....*conjuncta* Hendel

30. Fore and middle tarsi entirely black; normally 4 scutellar bristles; humeral bristle absent or minute in both sexes; ♀ : tegula very long, reaching to humeral callus (*macrotegularia* group).....31

Middle tarsus, and usually other tarsi, pale basally; normally 6 or more scutellar bristles in all species; humeral bristle present, at least in ♂; ♀ : tegula not reaching to humeral callus.....32

31. Mesoscutum with pair of non-pruinescent spots immediately in front of dorsocentrals black and included within the broad black central area (partly obscured by pale pruinescence) which extends laterally as far as extremities of dorsal scutellar bridges; ♂ : outer and inner surstyli subequal in length; ♀ : tegula tapering beyond base, slender and subcylindrical anteriorly; spiracles of segment 5 close to lateral margins of tergite 5 and well in front of posterior extremity of latter.....*subula* new sp.

Non-pruinescent spots in front of dorsocentrals reddish brown, or if black, then they are situated at lateral limits of the comparatively narrow central black area of mesoscutum; ♂ : outer surstylus notably longer than inner; ♀ : tegula somewhat broadened anteriorly and strongly depressed on that surface which is uppermost when the wings are raised; spiracles of segment 5 removed from margins of tergite 5 and placed in a transverse line with its posterior extremity....*macrotegularia* Malloch

32. Face without pair of blackish marks connecting inner margins of antennal grooves with epistomal margin, sometimes the extreme sides of epistomal margin with small brown marks (*negastigma* group).....33

Face with pair of blackish marks connecting (or almost connecting) inner margin of each antennal groove with epistomal margin.....35

33. Wing markings consisting primarily of 2 very large irregular blotches which are joined posteriorly and produced into a number of irregular streaks on their margins, also a small apical spot and some basal markings.....sp.5

Wing markings not as above, including a complete transverse discal band, an incomplete stigmatal band, and other smaller markings.....34

34. Wing with discal band straight, widened and somewhat dissected anteriorly; palpus narrow, almost parallel-sided; ♀ : basalar process rudimentary, not curved forwards; abdominal segment 5 with numerous elongate scales on pleural membrane.....*negastigma* new sp.

Wing with discal band curved inwards anteriorly and not much widened; palpus dilated distally, ♀ : basalar process small, slender, erect basally, much curved dorwards distally, pleural membrane of abdomen without scales.....*crispa* new sp.

35. Wing pattern broken into spots, without any complete transverse bands (except in some specimens of *E. maculipennis*, which has a ventral tubercle at base of hind femur) (*maculipennis* group).....36

Wing with at least the discal band well developed; hind femur without basal ventral tubercle.....42

36. Hind femur with rounded ventral tubercle near base; arista minutely spatulate in both sexes; ♀ : tergite 5 reduced in size, largely concealed by the much larger tergite 4 .....*maculipennis* (Guérin)

Hind femur without ventral tubercle; arista variable in ♂, filiform in ♀; ♀ : tergite 5 more than half as long as tergite 4.....37

37. Wing with irregular stigmatal band from costa, to vein 4; central region of mesopleuron with predominantly white hairs .....albipila new sp.

Stigmatal band represented only by a black blotch in subcostal and marginal cells; hairs on central region of mesopleuron black.....38

38. Anterior carina of cheek transversely grooved at lower end; basal segment of fore tarsus reddish brown to black; ♂: arista with palette entirely grey or blackish, rather narrow.....39

Anterior carina of cheek without transverse grooves, basal segment of fore tarsus pale fulvous, except at blackish distal end; arista variable.....40

39. Fore tarsus entirely black (or dark brown in old preserved specimens); ♂: preglans strongly developed, about twice as long as its maximum diameter; filaments unequal, the shorter one not more than 2.5 times as long as glans.....celsa new sp.

Fore tarsus blackish with tawny or reddish, brown patch on anterior surface which does not extend to distal end; ♂: preglans smaller, less than twice as long as its maximum diameter; filaments slightly unequal, about 4 times as long as glans.....alpina new sp.

40. Fore femur with short weak hairs on posteroventral surface, or a few longer ones distally only; fore tibia usually with a light brownish area near middle which extends towards base dorsally; ♂: arista with apical palette broad, usually rounded, transparent in middle; filaments of aedeagus unequal, the shorter one at least 3 times as long as glans; ♀ : abdominal spiracle 5 situated near posterior margin of tergite 5 above its posterior angle .....vitrea new sp.

Fore femur with posteroventral series of long white bristles for most of its length; fore tibia entirely black; ♂ : arista of different conformation; filaments equal or subequal, up to about twice as long as glans; ♀ (unknown in sp.6): abdominal spiracle 5 situated below lateral margin of tergite 5.....41

41. ♂ : arista with lanceolate terminal palette at apex.....fimbripes new sp.

♂ : arista finely filiform at apex.....sp.6

42. Wing with apical mark enclosing a hyaline dot; preapical band connected posteriorly with discal band, though the former may be partly broken into spots; ♀ : surface of tergites 3 - 5 scaly (scatophaga group).....43

Wing with apical mark not enclosing a pale dot; preapical band separate from discal band; ♀: tergites 3 and 5 without surface scales, but tergite 3 with marginal fringe of narrow scales (*tenuicornis* group).....47

43. Frons dark brown; lower lateral angles of face entirely blackish: 2 posterior notopleurals....*ramosa* new sp.

Frons light yellow-brown, often with darker median patch; face with comparatively small blackish mark only on each side; one posterior notopleural.....44

44. Base of marginal cell with a single compact dark spot before stigmatal band; ♂ (unknown in *E. hypostigma*): tergite 5 much longer than tergites 3 and 4 together; ♀: tergite 5 not sinuate or emarginate on posterior margin; abdominal spiracles 4 and 5 variably located.....45

Base of marginal cell with 2 or more separate dark spots before stigmatal band; ♂: tergite 5 shorter than tergites 3 and 4 together; ♀: posterior margin of tergite 5 deeply sinuate or emarginate medially; spiracles of segment 4 situated dorsally between tergites 4 and 5, those of segment 5 situated close to median dorsal line behind tergite 5.....46

45. Basalare anteriorly rounded off, with minute tuft of pubescence only; ♀ : abdominal spiracles 4 and 5 situated in pleural membrane near posterior corners of tergites.....hypostigma new sp.

Basalare process developed as a small subacute projection; ♀ : spiracle 4 situated dorsally between tergites 4 and 5; spiracle 5 situated behind tergite 5, rather close to median dorsal line.....subacuta new sp.

46. Vein 6 developed for much more than half the distance from anal cell to wing margin; fore femur black, other femora dark brown to black; wing with preapical stripe entire; ♂ : arista spatulate near apex.....scatophaga Malloch

Vein 6 becoming unpigmented and desclerotized approximately half way between anal cell and wing margin, thereafter represented by a fold in wing membrane only; femora light brown on basal halves; wing with preapical stripe deeply incised; ♂ : arista filiform.....filicornis new sp.

47. Wing with apical mark broadly connected anteriorly to preapical band; ♀ : tegula short, normal.....48

Apical mark separate from preapical band; ♀ : tegula produced forward beyond mesopleural suture.....49

48. Discal cell without transverse stripe between stigmatal and discal bands, sometimes 1 or 2 dark dots in this area; ♂: fore tibia with the dense black ventral bristles of basal part short, decumbent, and inconspicuous; ♀: abdomen with hairs of pleural membrane numerous, long, and silky in vicinity of segments 4 - 5; spiracles of segment 4 situated high up behind tergite 4, as far apart as are those of segment 5.....anostigma new sp.

Discal cell with narrow transverse stripe between stigmatal and discal bands; ♂: fore tibia with the dense black ventral bristles long, very conspicuous, semi-erect; ♀: abdomen with hairs of pleural membrane short and inconspicuous; spiracles of segment 4 situated just behind and above posterior angles of tergite 4, much further apart across dorsal surface than those of segment 5.....armipes new sp.

49. Sternopleuron with extensive dark brown to blackish ventral area (its entire surface with overlying greyish pruinescence); basal section of first basal cell (up to base of discal cell) with 3 or 4 well separated blackish spots; ♂: fore femur not toothed; hind trochanter with stout truncate ventral process; ♀: abdominal tergite 3 with median area of dense matted pubescence but devoid of setulae

or longer hairs in this area; tergite 4
not noticeably longer than either tergite 3
or tergite 5, with few narrow marginal scales
only.....*tenuicornis* Macquart

Sternopleuron entirely tawny below the greyish
covering of pruinescence; basal section of first
basal cell with a large blackish area which is
only incompletely divided by hyaline spots; ♂:
fore femur with strong posteroventral tooth;
hind trochanter without process; ♀ : tergite 3
with rather long dense hairs in median area;
tergite 4 longer than tergite 3 and about twice
as long as the reduced tergite 5 on median line,
with numerous scattered scales.....*monodon* new sp.

Euprosopia rete new sp.

(Figs.65, 99, 101)

Euprosopia miliaris Hendel: Malloch, 1929:512, misidentification.

♂ ♀ . *Coloration.* Head dull ochraceous, with or without the following dark markings: a brown spot in front of each fronto-orbital plate, a dark brown spot in lower extremity of each antennal groove, a pair of regular spots on face touching epistomal margin, a few irregular brown marks on face; fronto-orbital plates broadly creamy-pruinescent; orbital margins of postfrons and parafacial with creamy pruinescence; occiput dark brown on upper part with dense greyish pruinescence.

Antenna fulvous with segment 3 often somewhat brownish; arista black beyond the tawny base. Prelabrum and palpus fulvous to tawny. Mesoscutum and scutellum blackish with dense yellow-grey pruinescence and dark brown pruinescent markings; humeral callus tawny with yellowish pruinescence; pleura brown with grey pruinescence; propleuron paler; upper margin of mesopleuron with goldish pruinescnee; a goldish pruinescent stripe running from anterior spiracle, across centre of mesopleuron on to sternopleuron; a goldish pruinescent mark on upper part of sternopleuron. Femora fulvous with very variable brown suffusion, sometimes fore femur largely grey-brown, sometimes all femora almost entirely fulvous; tibiae fulvous, broadly brown apically, often also a less conspicuous subbasal brown mark; tarsi tawny brown, with basal segment of each creamy white except at its apex. Wing with brown spots of distal half merging to form a network enclosing compact clear spots, in basal part the brown spots mostly separate; apex pale, subhyaline in first posterior cell; squama pale brown. Haltere yellowish. Abdomen grey-brown with a pair of darker brown patches on each of tergites 2 to 5.

Head very slightly wider than high; height of cheek 0.15-0.21 of height of eye; inner vertical bristle well developed but a little shorter than outer vertical; ocellar and fronto-orbital absent; cheek bristle well developed. Antenna extending two thirds to three quarters of distance from its basal insertion to epistomal margin of face in ♂, a little shorter in ♀; arista with very short inconspicuous basal hairs only, that of ♂ with a

short, broadly lanceolate preapical expansion, and with a shorter filiform apical section; arista of ♀ simple, filiform. Prelabrum moderately well developed; palpus of moderate width.

Thorax. Humeral callus with moderately fine pale hairs; scutellum rounded in outline, with a few hairs extending on to sides; basalare with short, blunt pubescent process; tegula not enalrged or modified; humeral bristle moderately developed; posterior notopleural callus with well developed notopleural bristle in addition to 2 or more somewhat shorter black bristles or strong setulae; prescutellar acrostichal present; 2 pairs of scutellars. Fore femur with well developed dorsal and posteroventral black bristles; hind femur with a few black dorsal bristles distally; tibiae and tarsi without special armature. Wing without setulae on vein 5.

Abdomen scaleless in both sexes; ♂ : tergite 3 shorter than tergite 4; tergite 5 longer than tergite 4; sternite 5 with a group of black setulae on each side and shorter pale hairs medially; ♀ : tergites 3 and 4 both shorter than tergite 5; sternite 5 without black setulae. ♂ postabdomen: outer surstylus rather elongate, the free distal section at first narrowed, then broadly dilated on outer side, without distal spine; inner surstylus shorter, with distal section bent outwards, with two small terminal teeth; aedeagus with preglans sclerotized but not very sharply differentiated; glans subcylindrical, slightly curved; filaments each nearly 12 times as long as glans, slender distally, with a fine, bristle-like terminal process.

Dimensions: total length, ♂ 4.3-6.2 mm., ♀ 4.1-5.0 mm.; length of thorax, ♂ 2.0-2.9 mm., ♀ 2.0-2.6 mm.; length of wing, ♂ 4.1-5.4 mm., ♀ 4.2-5.0 mm.; length of glans of aedeagus 0.47-0.57 mm.

Distribution: Queensland - north-east coast.

Material examined: Kuranda, i 1967 (holotype ♂, AM), G.A.H. and D.K.M.; Claudie R., Iron Range district, v vi 1966 (3 ♂, 16 ♀, AM, 2 ♀, BM), D.K.M.; Mulgrave R., 4 miles W of Gordonvale, i v xii 1961-1967 (paratypes, 2 ♂, 2 ♀, AM, 1 ♂, BM), R.L., G.A.H. and D.K.M.; 2 miles N of Tully R. bridge, E of Cardstone, old Cardstone-Ravenshoe road, i 1967 (1 ♀, no head, AM), G.A.H. and D.K.M.; Clump Point, near Tully, iii 1964 (paratype, ♀, CSIRO), I.F.C. and M.S.U.; 10 miles N of Ingham, iv 1955 (paratype ♀, CSIRO), K.R.N.

Notes. This appears to be the species recorded by Malloch (1929) from Queensland under the name E. miliaria Hendel, but the author is satisfied that the name applies to a different species only known from the Moluccas. Hendel's name was first introduced (Hendel 1914a (April): 149-150, 167) without description or figure, but with three references. The first reference is an incomplete one to Hendel's later work (1914b, not published till June 1914); the other references are to the descriptions of Platystoma pectoralis Walker (1862) and Euprosopia diminutiva Walker, of de Meijere (1913). Hendel's second publication of E. miliaria, given as a new species in June of the same year (Hendel, 1914b: 353-354, pl.2, fig. 41), includes the same references to the descriptions of Walker and

de Meijere, but also includes a description based on two females from Deslacs Island near New Britain, without any type designation. Hendel (1914a: 167) indicates that Platystoma pectoralis Walker (1862) is a primary homonym of P. pectorale Loew (1852).

At the time of first publication of the name E. miliaria Hendel (1914a) it became available only by virtue of the references to the already published descriptions of Walker and de Meijere, and the material described by these authors therefore constitutes the type series (International Code, arts. 12, 72(b)). The reference to the then unpublished description in Hendel (1914b) does not constitute an "indication" as defined in art.16 of the International Code. As E. miliaria is not expressly a replacement name, the type specimen cannot be fixed under art.72(d) of the Code. I therefore designate the holotype of P. pectoralis Walker as the lectotype of E. miliaria Hendel. This specimen (♂, Gilolo = Halmahera, Moluccas, A.R.W., BM) belongs to a distinct species from any other available material. It is possible that E. miliaria is confined to the Moluccas.

The specimens described by Hendel (2 ♀, Deslacs Island, Vitu or French Islands, New Britain District, 1901, L. Biro, MNM) are more like the Australian E. rete than any other named form, but their identity will only be clarified when better material, including males, is available from the locality. Despite the fact that they bear Hendel's determination labels as the types of E. miliaria, they are not true types.

E. miliaria is distinguished from E. rete by having segments

3 and 4 of fore tarsus much broadened in ♂; clear spots in marginal and submarginal cells large, complex and merging in places, instead of separate and in a single simple series in each of these cells as in E. rete, spots elsewhere on wing more numerous and complex; posterior notopleural callus with rather numerous short additional bristles; no groups of strong black setulae on sternite 5 of ♂; size larger than in E. rete.

Euprosopia diminutiva (Walker) (holotype ♀, BM) differs from E. rete as follows: posterior notopleural callus with short, weak black hairs only in addition to the single strong bristle; arista loosely plumose; markings on apical part of wing different, there being a brown field divided into broad discal, preapical, and apical bands by means of 2 narrow clear broken stripes.

Euprosopia acula new sp.

Fig.

♂ ♀ . Very similar to E. rete in most characters and agreeing with the description given for that species except as indicated below.

Coloration. Head golden-ochraceous with pruinescent markings as in E. rete; postfrons tawny-brown posteriorly; face with an ill-defined brown mark on each side connecting inner side of each antennal groove to epistomal margin. Femora grey-brown with fulvous apices. Wing with extreme apical part of first posterior cell brown; discal cell with clear spots tending to fuse into irregular clear areas.

Head. Height of cheek 0.19-0.24 of height of eye; inner vertical bristle as long as outer.

Abdomen. ♂: sternite 5 with some of the black setulae on each side longer and stronger than in E. rete, the pale median hairs almost absent. ♀: abdomen too shrivelled for description. ♂ postabdomen: outer surstylus with distal expansion narrower and more angular than in E. rete and with a long slender recurved spine; inner surstylus with a single compressed terminal tooth; aedeagus with glans more slender than in E. rete; filaments each about 3½ times as long as glans, not much tapered distally, with terminal process stouter than in E. rete.

Dimensions: total length, ♂ 5.8–7.4 mm., ♀ 4.4mm.; length of thorax, ♂ 2.5–3.3 mm., ♀ 2.3 mm.; length of wing, ♂ 5.6–6.9 mm., ♀ 5.0 mm.; length of glans of aedeagus 0.57 mm. (holotype).

Distribution: North Queensland – mountainous areas.

Material examined: Barron R., at the Crater (or Mount Hypipamee), near Herberton, 3,100 ft., xii 1961 (holotype ♂, paratype ♂, AM), R.L.; Mount Lewis, near Julatten, Mossman district, xii 1966 (paratype ♀, UQ), B. Cantrell.

Habitat: rain forest.

Comparative notes: The most useful character for distinguishing both sexes of this species from E. rete is the absence of the apical wing spot in the first posterior cell.

Euprosopia ventralis (Walker)

Lamprogaster ventralis Walker, 1859:131.

Euprosopia ventralis: Hendel, 1914b:343; not E. ventralis: Malloch, 1939a:150–151, pl.5, fig.39, misidentification of undetermined species.

♂ ♀ . Somewhat similar to E. xanthops and differing from the description given for that species mainly as indicated below.

Coloration. Face with very variable brown markings which may take the form of a few inconspicuous dots (specimens from Key Islands) or extensive irregular reticulation (most Australian specimens), also a large brown blotch of varying intensity on upper part of facial carina in Australian specimens. Thorax darker than in E. xanthops with heavy deep greyish pruinescence, the dark markings rather indistinct except for 2 pairs of small black spots on posterior part of mesoscutum. Femora deep reddish brown to tawny, often darker apically; tibiae tawny, at least the hind one darkened apically; tarsi dark brown, the basal segment yellowish basally, becoming light to rather dark brown distally. Wing with rather sparse spots basally, where it is variably stained with yellow (strongly so in specimens from Key). Abdomen pruinescent, grey with irregular blackish clouding on tergites.

Head. Palpus rather broad.

Thorax. Basalar process minute or absent in both sexes; tegula not enlarged or modified; scutellum with coarse predominantly black setulae on lateral surfaces and no whitish apical hairs. Fore tibia without thickened ventral setulae.

Abdomen. ♂ : tergites 3 and 4 together almost as long as tergite 5; posterior margin of tergite 5 polished and devoid of pruinescence; sternite 5 with very long fine hairs; ♀ : tergites 3-5 subequal in length or tergite 5 very slightly longer; tergite 5 with an area on each side near lateral margin which is shining

and devoid of pruinescence, probably through abrasion. ♂ postabdomen: outer surstylus with basal section somewhat elongate, nearly as long as cercus; distal section narrowly elongate beyond base, almost straight, with numerous low setiferous tubercles; inner surstylus with some weak setiferous tubercles on anterior surface, free distal section very short with only a single, subacute terminal tooth with no fine point; aedeagus with glans rather short, more so in Queensland specimens than in lectotype (Key Islands); filaments very long, approximately equal in length, about 8 times as long as glans in paralectotype, about 18 times as long as glans in Queensland specimens.

Dimensions: (Type material, Key Islands) total length, ♂ 10.9 mm., ♀ 10.7 mm.; length of thorax, ♂ 5.8 mm., ♀ 5.9 mm.; length of wing, ♂ 10.1 mm., ♀ 9.9 mm.; length of glans of aedeagus 0.53 mm.; (material from Queensland) total length, ♂ 7.3-9.5 mm., ♀ 5.4-9.2 mm.; length of thorax, ♂ 3.8-4.9 mm., ♀ 3.1-5.1 mm.; length of wing, ♂ 7.1-8.4 mm., ♀ 6.1-8.9 mm.; length of glans of aedeagus (2 ♂ of different size, wing length 7.4 and 8.4 mm. respectively), 0.37 mm.; (material from Papua) total length, ♂ 7.6 mm., ♀ 8.3 mm.; length of thorax, ♂ 3.8 mm., ♀ 4.0 mm.; length of wing, ♂ 6.8 mm., ♀ 7.4 mm.; length of glans of aedeagus, 0.37 mm.

Distribution: Key Islands (type series); North-east New Guinea; Papua; Queensland, as far south as Palm Island.

Material examined: Key Islands: "Ké I," no date (lectotype ♀, here designated, paralectotype ♂, BM), A.R.W. North-east

New Guinea: Seleo, Berlinhafen (= (?) Selo Island, c.10 miles E of Aitape, near the former settlement of Berlinhafen, Sepik District), 1896 (1 ♂, 2 ♀, MNM), L. Biró. Papua: Gaile Forest, 28 miles SE of Port Moresby, v 1965 (1 ♂, 1 ♀, BM), R.W. Crosskey. Queensland: Claudie R., near Mount Lamond, Iron Range district, v vi 1966 (3 ♂, 2 ♀, AM), D.K.M.; Mulgrave R., 4 miles W of Gordonvale, i 1959-1967 (1 ♂, 1 ♀, AM), G.A.H. and D.K.M.; Babinda, i 1949 (1 ♂, UQ), B. Hitchcock; Palm Island, no date (1 ♀, CSIRO), T.L.B.

Habitat (in Queensland): lowland rain forest and gallery forest.

The specimen herebesignated as lectotype has been figured previously as "Euprosopia ventralis (Walker) type" (Malloch, 1939a: pl.5, fig.38). This is not considered to be a valid type designation for the following reasons. Malloch, working in America, did not see any of Walker's type material in the British Museum (Natural History) but acknowledges (p.97) receiving photographs of the wings of types in that institution. The determination of this specimen as type is therefore not due to Malloch but to the supplier of the photograph who probably assumed the specimen conspicuously labelled "type" to be Walker's type. It is possible that liaison with the British Museum was through F.H. Taylor who communicated Malloch's paper to the Linnean Society of New South Wales for publication and made the photographs of those specimens lodged in Australian collections. In this case the authorship of the captions to the illustrations may be due to Taylor instead of Malloch. Malloch does not refer to a type specimen in his text.

Malloch's specimen (1939a: fig.39, Cyclops Mountains, L.E. Cheesman, BM) is not referable to E. ventralis but to an undetermined species, perhaps undescribed.

Euprosopia xanthops new sp.

(Figs. 103, 107)

Euprosopia potens Walker: Hendel, 1914b:341-343 (part); Malloch, 1939a:150, pl.5, fig.37. Misidentifications.

♂ ♀ . Coloration. Head light fulvous; postfrons tawny; fronto-orbital plates yellowish-pruinescent, the pruinescence extending in a narrow line along orbit to parafacial; a diffuse brown spot in front of each fronto-orbital plate; face with a small brown mark on each side near lower lateral angle but with no other markings; occiput tawny-brown above, covered with greyish white pruinescence; antenna light yellowish brown, arista black beyond base; prelabrum and palpus fulvous. Mesoscutum with blackish ground colour becoming brown at lateral margins, covered with yellowish grey pruinescence and dark grey pruinescent markings; scutellum tawny brown, with yellowish and brown pruinescence, the hairs on its dorsal surface brown or blackish, those at apex whitish; pleura reddish brown with light grey pruinescence; mesopleuron with black, brown and yellowish hairs. Femora dull fulvous, the fore one a little darker, middle and hind femora often slightly darkened apically; fore tibia brownish fulvous, broadly blackish at apex, the blackish area extending towards base on anteroventral surface; middle and hind tibiae dull fulvous, narrowly dark brown at apices; tarsi black to dark brown, basal

segment of each pale fulvous with brown apex. Wing with pattern of basal half consisting of more or less separate dark brown spots, there being no stigmatal band; discal band more or less complete but irregular, with a tendency to break into spots anteriorly; preapical band usually complete; apical spot not enclosing a distinct pale area, except in immature specimens; squama grey, creamy on posterior margin. Haltere creamy; distal part of pedicel dark brown. Abdomen tawny, with greyish brown suffusions on tergites.

Head slightly wider than high; height of cheek 0.31-0.36 of height of eye; eye 1.6-1.8 times as high as long; only the following cephalic bristles well developed: inner and outer verticals, which are subequal, and cheek bristle. Antenna extending slightly more than half the distance from its basal insertion to epistomal margin in ♂, extending half or slightly less than half that distance in ♀; segment 3 elongate; arista filiform in both sexes, with conspicuous hairs on basal half, the longer ones a little more than half as long as width of segment 3 of antenna. Prelabrum moderately developed, finely sulcate; palpi rather narrow.

Thorax. Humeral callus with long yellowish hairs on most of surface, often also a smaller number of short blackish hairs on upper part; scutellum rounded, without hairs of setulae on lateral surfaces; basalar process in ♂ little developed, obtuse, in ♀ short, compressed, broadly rounded at apex; tegula unmodified; the following bristles present: prescutellar acrostichal;

dorsocentral; humeral; 1 + 1 notopleurals; supra-alar; postalar; posterior intra-alar; 3 pairs of scutellars. Fore femur with series of black posteroventral bristles which is only well differentiated on distal half of femur in ♂ but extends to near base in ♀ ; fore tibia with numerous thickened black setulae on ventral to anteroventral surface which are largest on distal quarter of tibia and better developed in ♂ than in ♀ ; hind trochanter with some black hairs among the paler ones which are more numerous in ♂ than in ♀ ; hind femur with some black setulae on ventral surface, especially towards base, which are more numerous and stronger in ♂ than in ♀ ; hind tibia rather strongly curved in ♂ so as to leave a gap when folded against the femur, less strongly curved in ♀ and enclosing no such gap.

Abdomen. Tergites scaleless in both sexes; ♂ : tergites 3 and 4 subequal in length and each only slightly shorter than tergite 5; ♀ : tergite 4 somewhat longer than tergite 3; tergite 5 not more than half as long as tergite 4; spiracles of segments 4 and 5 situated in pleural membrane below lateral margins of tergites. ♂ postabdomen: base of outer surstylus swollen, distal section rather short, straight, compressed apically; inner surstylus slightly shorter, its terminal tooth only slightly projecting posteriorly; aedeagus with long stipe; glans sub-cylindrical with very slight curvature; filaments equal, moderately slender, each about $1\frac{1}{2}$ to $1\frac{3}{4}$ times as long as glans.

Dimensions: total length, ♂ 8.2-8.7 mm., ♀ 7.6-10.4 mm.; length of thorax, ♂ 4.1-4.4 mm., ♀ 4.2-4.9 mm.; length of

wing, ♂ 7.7-7.9 mm., ♀ 8.2-9.0 mm.; length of glans of aedeagus 0.58-0.61 mm.

Distribution: Queensland - north-east coast; New Guinea.

Material examined. Queensland: 2 miles E of Cardstone, Tully River, i 1967 (holotype ♂, AM), G.A.H. and D.K.M.; Mulgrave R., 4 miles W of Gordonvale, i 1967 (paratype ♂, AM), G.A.H. and D.K.M.; 2 miles N of Tully R. bridge, E of Cardstone, old Cardstone-Ravenshoe road, i 1967 (paratypes, 5 ♀, AM, 1 ♀, USNM), G.A.H. and D.K.M.; 9 miles E of El Arish, Tully district, iii 1964 (paratype ♀, CSIRO), I.F.C. and M.S.U. West New Guinea: Cyclops Mountains, Sabron, 930 ft., vi 1936 (2 ♂, 2 ♀, BM), L.E. Cheesman. North-east New Guinea: Wewak, no date (1 ♂, SPHTM, 1 ♂, 1 ♀, AM), F.H. Taylor; Friedrich Wilhelm Hafen (= Madang), 1896 (1 ♂, MNM), L. Biró; Stephansort, Astrolabe Bay, 1898-1900 (1 ♂, 1 ♀), L. Biro. Papua: Aroana Estate, Aroa R., xi xii 1963 (3 ♀, AM), D.K.M.; Kanosia Estate, Aroa R., xii 1963 (1 ♀, AM), L. Delange; Brown R., near Port Moresby, x 1963 (1 ♂, 1 ♀, AM), D.K.M.; Paga Hill, Port Moresby, i 1966 (1 ♂, UQ), E. Mann.

Notes. This species has been confused with E. potens (Walker) but that species differs from E. xanthops in having a median brown stripe on face; apical half of wing with more definite transverse bands; lateral surfaces of scutellum with pale setulae; ♀ with small, slender, acute basalar process. E. potens is possibly confined to the Moluccas.

Euprosopia punctifacies Malloch

Euprosopia punctifacies Malloch, 1928a:346-347, fig.2; 1929: 512, latter probably misidentification of other species.

This species has not been examined by the author but Mr. G.C. Steyskal has sent much detailed information on the holotype. From this, and from Malloch's description it seems highly probable that the species is distinct from any other dealt with here.

♂. Apparently rather similar to E. lenticula and E. sericata, but differing as indicated below and in key. ♀ unknown.

Coloration. Middle femur dark brown only on apex and adjacent distoventral part; hind femur entirely dark brown. Wing pattern (Malloch, 1928a: fig.2): stigmatal band enclosing 2 clear spots in marginal cell; preapical band completely crossing first posterior cell, though very irregular; apical mark enclosing a small clear spot.

Postabdomen: outer surstylus rounded and not narrowed at apex, which is not posteriorly flexed; aedeagus with glans and filaments of somewhat similar dimensions to those of E. lenticula; ejaculatory apodeme of sperm pump with a strong dorsal prominence just before posterior end of main piece, projecting from beneath sclerotized cap.

Dimensions: total length 8 mm. (Malloch); length of glans of aedeagus 0.27 mm. (Steyskal).

Distribution: North Queensland - Magnetic Island, near Townsville (holotype ♂, USNM).

Euprosopia lenticula new sp.

(Figs. 104, 105)

♂ ♀ . Very similar to E. sericata, and agreeing with the description given for that species except as indicated below.

Coloration as described for E. sericata.

Head. Height of cheek 0.23–0.26 of height of eye; eye 1.9–2.1 times as high as long. Antenna extending about two thirds the distance from its basal insertion to epistomal margin in ♂, slightly shorter in ♀ .

Thorax as described for E. sericata.

Abdomen. ♀ : spiracles of segment 5 a little closer to lateral margin of tergite 5 than to median dorsal line; pleural membrane with some short fine whitish hairs, best developed in region of segment 3. ♂ postabdomen: free distal section of outer surstylus not, as in E. sericata, abruptly contracted, but more gradually narrowed, a little longer than inner surstylus, its apex strongly curved posteriorly beyond apex of inner surstylus; aedeagus with glans a little shorter than in E. sericata, filaments rather robust, strongly curved near bases, not more than 1.5 times as long as glans.

Dimensions: total length, ♂ 6.5–7.6 mm., ♀ 6.6–8.3 mm.; length of thorax, ♂ 3.4–3.8 mm., ♀ 3.5–4.1 mm.; length of wing, ♂ 6.4–6.8 mm., ♀ 6.7–7.6 mm.; length of glans of aedeagus, 0.27–0.29 mm.

Distribution: north Queensland – high islands near coast.

Material examined: Palm Island, near Ingham, i xii 1930–1931, one without date (holotype ♂, CSIRO, paratypes, 2 ♂, 2 ♀, CSIRO,

1 ♂, AM), I.M.M., T.L.B.

Comparative notes. This species is similar to E. punctifacies in many features including its island habitat. It apparently differs in the features noted under that species.

Euprosopia sericata new sp.

(Fig. 90)

♂ ♀ . Coloration. Head fulvous; postfrons with a tawny-brown blotch on each side immediately in front of the whitish pruinescent fronto-orbital plates, and another such blotch surrounding ocelli; face with rather numerous brown spots of variable shape (tending to disappear in specimens which have not been dried immediately after death); upper part of occiput blackish, covered with thick light grey pruinescence; antenna tawny, arista black beyond base; prelabrum fulvous; palpus fulvous often with slight darker suffusion. Mesoscutum with dark brown ground colour and overlying grey pruinescence with comparatively few and not very heavy dark markings; scutellum yellowish grey pruinescent with three brown dorsal blotches, its apical hairs whitish; pleura brown, lower part of propleuron, posterior part of mesopleuron, and upper part of sternopleuron tawny, the whole with overlying grey pruinescence. Femora fulvous, marked with brown distally, the fore one also suffused with grey dorsally; tibiae fulvous, broadly brown distally; tarsi blackish, each with basal segment cream except at apex. Wing with all transverse bands either broken into spots or with a distinct tendency to become so, sometimes either discal or preapical band more or less

complete; apical mark enclosing an irregular hyaline spot; squama very pale brownish. Haltere cream. Preabdominal tergites grey with a pair of transversely elongate brown blotches on tergites 2-4.

Head a little wider than high; height of cheek 0.24-0.27 of height of eye; eye 1.7-2.0 times as high as long; lower lateral extremity of face distinctly expanded and rounded on ventral margins; only the following cephalic bristles well developed; inner and outer verticals of approximately equal size; cheek bristle. Antenna extending a little more than half the distance from its basal insertion to epistomal margin in both sexes; arista filiform, with short basal hairs the longest of which are nearly 3 times as long as basal diameter of arista; prelabrum broad; palpus strongly broadened.

Thorax. Humeral callus with rather long pale hairs; scutellum rounded, convex dorsally, without hairs on lateral surface; basalar process of ♂ almost obsolete or represented by a broadly angular prominence on basalare, that of ♀ well developed, elongate, erect, the apex slightly curved forward; tegula not enlarged or modified in either sex; the following bristles present: prescutellar acrostichal; dorsocentral; humeral; 1 + 1 noto-pleurals; supra-alar; postalar; posterior intra-alar; 3 pairs of scutellars. Fore femur with well developed black posteroventral bristles, absent on approximately basal quarter or third of femur; fore tibia without enlarged ventral setulae or zones devoid of setulae; hind trochanter with pale hairs only; hind femur without any black central setulae, very slightly curved upward

so that when tibia is fully flexed its apex does not nearly touch base of femur (contrast E. conferta). Wing with distal section of vein 4 with slight sigmoid curve, the forward curvature of its apical part being often more noticeable than the basal curvature.

Abdomen without scales on tergites. ♂ : tergites 3 and 4 subequal in length, tergite 5 a little longer; ♀ : tergites 3 and 4 subequal in length, tergite 5 slightly shorter and much narrower, with a pair of large velvety areas separated from posterior margin of tergite by a pruinescent marginal strip; spiracle of segment 4 situated between tergites 4 and 5, a little above posterior angle of former; spiracles of segment 5 situated close to posterior margin of tergite 5 and closer to each other than to lateral margin of tergite; pleural membrane with long silky yellow hairs in region of segment 4 and much shorter ones in regions of segments 3 and 5. ♂ postabdomen: outer surstylus not nearly attaining to apex of cercus, quite broad as far as the extremity of its basal section, the free distal section abruptly contracted, rather short, its slender apex curved backwards; free distal section of inner surstylus almost as long as that of outer surstylus, its terminal tooth flexed backwards; stipe of aedeagus broad, slightly tapered distally, without hairs or pubescence; preglans short and rather slender, sclerotized; glans large, curved, sausage-shaped; filaments about twice as long as glans or a little less, slender distally, nearly straight towards bases.

Dimensions: total length, ♂ 6.2–8.1 mm., ♀ 5.8–7.8 mm.; length of thorax, ♂ 2.9–3.8 mm., ♀ 3.4–4.1 mm.; length of wing, ♂ 6.3–7.4 mm., ♀ 7.0–8.1 mm.; length of glans of aedeagus, 0.31–0.35 mm.

Distribution: eastern Queensland, as far north as the Mackay-Eungella district; New South Wales, north-eastern border district only.

Material examined. Queensland: Broken River, Eungella, xii 1961 (holotype ♀, paratypes, 2 ♂, AM), R.L. and D.K.M.; Finch Hatton Gorge, xii 1961 (paratypes, 1 ♀, AM, 1 ♀, BM), R.L. and D.K.M.; Mary's Creek, near Gympie, ii 1961 (1 ♂, AM), D.K.M.; Maleny, v 1936 (1 ♀, UQ), anon.; Harlin, upper Brisbane River, ii 1936 (1 ♀, UQ), F.A.P.; Highvale, 14 miles NW of Brisbane, i xii 1959–1960 (1 ♀, AM, 1 ♂, 1 ♀, CSIRO), R.S.; Moggill, near Brisbane, i 1960 (1 ♀, UQ), K. Korboot; Tamborine Mountain, ii xii 1925–1960 (1 ♂, AM, 1 ♂, UQ), A.M. and G.P. Whitley, F.A.P.; Lamington National Park, ii 1961 (1 ♀, UQ), I.C.Y.; Nerang River, near Springbrook Forest, 13 miles from Nerang, xii 1966 (1 ♂, 2 ♀, CSIRO, 1 ♂, 1 ♀, USNM), T.G.C. New South Wales: Legume, near Woodenbong, iv 1925 (1 ♀, UQ), anon.

Habitat: rain forest and forest remnants near streams. Taken on foliage of trees and on faeces of cow.

Comparative notes. The genitalia characters given in the key serve to distinguish the male, while the silky yellow hairs on the abdominal pleural membrane and the position of the fifth pair of spiracles will help to distinguish the female from related species with broad palpus.

Euprosopia sp.1

♂ . The available specimens agree generally with the description given for E. sericata except in genitalia. ♀ unknown.

Postabdomen. Outer surstylus with free distal section gradually narrowing from its origin to about middle, its apex broadly rounded and slightly incurved; inner surstylus distinctly shorter, its terminal tooth posteriorly flexed; stipe of aedeagus moderately slender, with line of short pubescence along anterior surface; preglans sclerotized only at distal extremity; glans slightly curved, shorter than in E. sericata; filaments nearly straight near bases, twice as long or slightly more than twice as long as glans.

Dimensions: total length 6.9–7.5 mm.; length of thorax 3.4 mm., length of wing 6.5–6.6 mm.; length of glans of aedeagus 0.23 mm.

Distribution: New South Wales - north coast; Queensland - south-east.

Material examined. Queensland: Mount Beerwah, via Glasshouse, 1,800 ft., xii 1965 (1 ♂, UQ), B. Cantrell. New South Wales: Iluka, Clarence R., xi 1964 (1 ♂, AM), D.K.M.

Habitat: specimen from Iluka taken in rain forest not far from sea.

Euprosopia crassa new sp.

(Figs.78, 91)

♂ ♀ . Generally similar to E. sericata and E. lenticula; agreeing with the description given for the former species except

as indicated below.

Coloration as given for E. sericata except that of legs. Femora deep greyish brown, heavily pruinescent, the fore femur with some tawny patches; fore tibia brown, blackish distally, fulvous at extreme base; middle and hind tibiae tawny, broadly blackish distally and often brownish basally; tarsi as in E. sericata.

Head. Height of cheek 0.23-0.28 of height of eye; eye 1.7-2.0 times as high as long.

Thorax. Basalar process developed as a slight angular prominence in ♂, in ♀ similar to that of E. sericata except that the apex is usually slightly curved forward or almost straight; tegula of ♂ almost normal, with slight groove towards inner edge, that of ♀ thickened and elevated anteriorly, with a depression on anterior surface which runs inwards as a groove.

Abdomen. ♀ : tergite 5 with velvety areas slightly larger than in E. sericata, more nearly approximated medially and only narrowly separated from posterior margin of tergite; spiracles of segment 5 widely separated, much closer to lateral margins of tergite 5 than to median dorsal line. ♂ postabdomen: outer surstylus curved in basal section, with a darkly pigmented anterior basal area, its free distal section gradually narrowing and curving forwards to the narrowly obtuse apex; inner surstylus shorter with posteriorly directed terminal tooth; stipe of aedeagus rather broad, with line of minute pubescence on anterior surface; preglans about as long as broad, not swollen; glans stout, slightly curved, shorter than in E. sericata; filaments

robust, curved for a short distance just beyond bases, about 1.5–1.7 times as long as glans.

Dimensions: total length, ♂ 5.6–7.8 mm., ♀ 5.6–7.2 mm.; length of thorax, ♂ 2.7–3.8 mm., ♀ 2.8–3.5 mm.; length of wing, ♂ 5.4–7.2 mm., ♀ 5.6–6.9 mm.; length of glans of aedeagus, 0.20–0.22 mm.

Distribution: south-eastern Queensland, from the Burnett River district to the southern border district.

Material examined: Nerang River, near Springbrook Forest, 13 miles S of Nerang, xii 1966 (holotype ♀, CSIRO, paratypes, 2 ♂, CSIRO, 1 ♂, 1 ♀, AM), T.G.C.; Eidsvold, no date (except one, x 1929–iv 1930) (6 ♂, 2 ♀, CSIRO), T.L.B.; Gayndah, i 1935 (1 ♀, BM), anon; Gatton, iv 1955 (paratype ♂, UQ), D. Nunn; Highvale, 14 miles NW of Brisbane, xii 1959 (paratype ♀, CSIRO), R.S.; Brisbane, i 1931 (paratype ♂, UQ), F.A.P.; Tamborine Mountain, ii 1960 (paratype ♂, UQ), F.A.P.; Cunningham's Gap, near Maryvale, iv 1961 (paratype ♂, UQ), M.A. Tesch.

Comparative notes. The general greyish brown colour of the femora, together with the short glans of the male and the thickened tegula of the female are useful recognition points.

Euprosopia sp.2

♂. The only available specimen agrees generally with the description given for E. sericata except as indicated below.

♀ unknown.

Coloration. Thoracic pleura tawny-brown, with pale grey and yellowish pruinescence. Fore tibia predominantly brown,

blackish distally. Wing with discal band more or less complete, divided by a hyaline streak in submarginal and first posterior cells; apical mark not enclosing a hyaline spot.

Head. Height of cheek 0.24 of height of eye; eye 1.9 times as high as long. Prelabrum moderately developed; palpus moderately broadened.

Thorax. Basalar process rather well developed, somewhat elongate, acute, the tegula reaching almost to its base. Hind femur almost straight.

♂ postabdomen. Stipe of aedeagus long and slender; preglans sclerotized, slightly swollen; glans slender, straight, shorter than in E. sericata; filaments about 1.4 times as long as glans, not strongly curved near bases.

Dimensions: total length 9.0 mm.; length of thorax, 4.5 mm.; length of wing, 8.1 mm.; length of glans of aedeagus, 0.24 mm.

Distribution: north Queensland - Daintree River district.

Material examined: Hutchinson Creek, E of Thornton Range, mercury vapour lamp, i 1967 (1 ♂, AM), G.A.H. and D.K.M.

Habitat: rain forest.

It seems probable that this form is specifically distinct from the others dealt with here. However I prefer to wait till more specimens, particularly females, become available before naming it.

Euprosopia sp. 3

♀ . Agreeing with description given for E. sericata except as indicated below. ♂ known.

Coloration. Fore femur greyish brown, darker distally, tawny centrally on ventral surface; middle and hind femora tawny with rather dense grey pruinescence.

Head. Height of cheek 0.24 of height of eye; eye 1.9 times as high as long; palpus moderately broad.

Thorax. Basalar process rather elongate and slender, its apex slightly curved forwards and outwards; tegula very slightly enlarged, not quite reaching basalar process. Fore femur with well developed black posteroventral bristles confined to distal half, those near middle weaker and whitish.

Abdomen. Tergite 5 with pair of very extensive velvety areas, narrowly separated posteriorly and reaching to posterior margin of tergite on their full width; spiracles of segment 4 situated high up between tergites 4 and 5, closer to median dorsal line than to lateral margins of tergite 5; spiracles of segment 5 situated very close together near median dorsal line, each separated from the other by a distance equal to its own width; pleural membrane with short, scattered whitish hairs, numerous black setulae mixed with paler hairs in region of segment 3.

Dimensions: total length, 5.6 mm.; length of thorax, 2.8 mm.; length of wing, 5.7 mm.

Distribution: north Queensland.

Material examined: Kuranda, no date (1 ♀, BM), F.P.D.

Though probably a distinct species, I prefer to wait till more material is available before naming this form.

Euprosopia piperata new sp.

(Fig. 89)

♂ ♀ . Agreeing with the description given for E. conferta in most characters but differing as indicated below.

Coloration. Facial spots well developed, variable in shape and number. Mesoscutum usually with dark markings less heavy than in E. conferta. Fore femur tawny-brown, darker distally, with grey pruinescence, especially on dorsal surface; middle and hind femora dull fulvous, becoming brown distally; tibiae dull fulvous, darkened distally, the fore one also somewhat darkened basally; tarsi as in E. conferta.

Head. Height of cheek 0.24-0.31 of height of eye; eye 1.7-1.9 times as high as long. Palpus usually slightly spatulate distally but not as wide as in E. sericata and crassa, narrower than lateral part of prelabrum.

Thorax. Basalar process very short but acute in both sexes.

Abdomen. ♀: spiracles of segment 4 situated immediately below posterior angle of tergite 4; spiracles of segment 5 approximately equidistant from one another and from lateral margins of tergite 5; pleural membrane with short scattered mostly whitish hairs, best developed in region of segment 3. ♂ postabdomen: outer surstylus rather short, gibbous at base posteriorly, broadened near middle and commencing to narrow well before separating from inner surstylus, its free distal section short with apex very obtuse and curved inwards and backwards; free distal section of inner surstylus very short, the terminal tooth flattened on end and not strongly

flexed posteriorly; aedeagus with stipe of moderate length and thickness; preglans little differentiated from stipe; glans elongate, curved; filaments about 1.8-1.9 times as long as glans, and much shorter than stipe, rather slender.

Dimensions: total length, ♂ 3.5-6.5 mm., ♀ 3.5-6.5 mm.; length of thorax, ♂ 1.8-3.0 mm., ♀ 1.7-3.3 mm.; length of wing, ♂ 3.8-6.0 mm., ♀ 3.9-6.4 mm.; length of glans of aedeagus, 0.21-0.30 mm.

Distribution: Queensland - as far north as Mackay-Eungella district; New South Wales, as far south as Hunter River district.

Material examined: Queensland: Broken River, Eungella, xii 1961 (holotype ♀, AM, paratypes, 2 ♂, 1 ♀, AM), R.L. and D.K.M.; Finch Hatton Gorge, xii 1961 (paratypes, 5 ♀, AM, 1 ♀, BM, 1 ♀, CSIRO), R.L. and D.K.M.; Mary's Creek, near Gympie, ii 1961 (1 ♀, AM), D.K.M.; Inbil, f 1936 (1 ♂, UQ), F.A.P.; Upper Cedar Creek, via Samford, xii 1962 (1 ♂, UQ), G.M.; Brisbane, i 1931 (1 ♀, UQ), F.A.P.; Tamborine Mountain, ii 1960 (1 ♀, UQ), P.R.W. New South Wales: Tooloom, near Kyogle, i 1926 (1 ♂, UQ), anon.; Huonbrook, near Mullumbimby, iii 1965 (1 ♀, AM), R.L. and D.K.M.; Upper Allyn, near Eccleston, ii 1967 (1 ♂, AM), D.K.M.

Geographical variation. The size of the glans of the aedeagus appears to increase from north to south, being smallest in the two males from Broken River and greatest in that from Upper Allyn. However the males from Broken River are exceptionally small, by comparison with females from the same locality, and with most

specimens from other localities. On the basis of the available material it is difficult to interpret the significance of this variation.

Comparative notes. The male may be distinguished from E. conferta by the genitalia characters given in the key and the female by the position of the fifth pair of abdominal spiracles.

Euprosopia conferta new sp.

(Figs. 1-6, 19, 88)

♂ ♀ . Coloration. Head dull fulvous; postfrons tawny, darker posteriorly, the short fronto-orbital plates with greyish yellow pruinescence; face with rather numerous scattered brown spots of very irregular shape and size, often a few of the lower ones coalescing to form complex marks, in one preserved specimen the spots obsolete, evidently from imperfect drying; occiput with a large blackish area on each side of upper half which is almost completely obscured by thick pale grey pruinescence; antenna tawny, segment 3 suffused with brown, arista black beyond base; prelabrum and palpus fulvous or tawny. Mesoscutum with blackish brown ground colour, covered with yellow-grey pruinescence and heavy blackish brown markings; scutellum brown with yellowish pruinescence and three darker pruinescent patches of varying intensity, most of hairs on dorsal surface black, the apical hairs whitish; pleura brown with greyish pruinescence. Fore femur blackish brown with grey pruinescence; middle and hind femora brown or tawny, with grey pruinescence, the latter often darker distally; fore tibia black distally, gradually becoming tawny or

yellowish brown towards base; middle and hind tibiae fulvous with dark brown apices; tarsi black, basal segment of each pale cream with black apex. Wing spotted on basal half, the spots with slight tendency to coalesce into a very incomplete stigmatal band; discal band complete but irregular and incised; preapical band usually complete or with a short break in first posterior cell, one or two spots or a narrow stripe between it and discal band; apical mark enclosing a distinct hyaline dot; squama pale brownish. Haltere cream. Abdomen dark brown with grey markings on tergites.

Head slightly wider than high; height of cheek 0.30-0.40 of height of eye; eye 1.4-1.7 times as high as long; lower lateral extremity of face scarcely expanded ventrally, forming a narrow angle; only the following cephalic bristles well developed: inner and outer verticals, the former slightly smaller; cheek bristle. Antenna extending about half the distance from its basal insertion to epistomal margin in ♀, slightly longer in ♂; segment 3 of variable width; arista filiform in both sexes, with short basal hairs the longest of which are about twice as long as basal diameter of arista. Prelabrum rather broadly developed, especially at sides; palpus elongate and rather narrow, distinctly narrower than third antennal segment in ♂, narrower than prelabrum in ♀.

Thorax. Humeral callus with rather long mostly pale hairs; scutellum rounded, without hairs or setulae on lateral surface; basalar process very short, obtuse in ♂, slightly longer and erect in ♀; tegula normal in ♂, slightly enlarged and extending

as far forward as basalar process in ♀ ; the following bristles present; prescutellar acrostichal; dorsocentral; humeral; 1 + 1 notopleurals; supra-alar; postalar; posterior intra-alar; 3 pairs of scutellars. Fore femur with well developed series of black posteroventral bristles usually extending for about the distal two thirds of femur; fore tibia without enlarged setulae on ventral surface nor with differentiated zones except that setulae on an anteroventral strip are especially fine and crowded; hind trochanter with fine pale hairs only; hind femur without black setulae on ventral surface, almost straight, so that apex of hind tibia touches or almost touches its base when fully flexed. Wing with distal section of vein 4 slightly converging with vein 3 for most of its length, gradually curving forwards apically.

Abdomen. Tergites scaleless in both sexes; ♂ : tergites 3 and 4 subequal in length; tergite 5 slightly longer than tergite 4; ♀ : tergites 3 and 4 subequal, tergite 5 almost as long as tergite 4, with 2 very large velvety areas occupying all of surface except a median strip which is widened anteriorly; spiracle of segment 4 situated behind and just above posterior angle of tergite 4; spiracles of segment 5 approximated dorsally; pleural membrane with rather conspicuous yellowish hairs on upper part in region of segment 3, and shorter but more numerous and widely distributed hairs in region of segment 4. ♂ postabdomen: outer surstylus of moderate length, not nearly attaining to apex of cercus, slightly gibbous anteriorly near base, free distal part short, at first rather broad but narrowed towards the obtuse slightly incurved apex,

with an external subapical gibbosity; free distal section of inner surstylus a little shorter than that of outer surstylus with terminal tooth strongly flexed backwards; stipe of aedeagus rather slender, without hairs or pubescence; preglans not widened, slightly longer than wide, sclerotized but not very sharply distinguished from rest of stipe; glans rather slender, of moderate length; filaments equal, about as long as stipe and 4 times as long as glans, each bent where it enters the very short tunic.

Dimensions: total length, ♂ 6.1-8.9 mm., ♀ 6.0-8.5 mm.; length of thorax, ♂ 3.0-4.1 mm., ♀ 2.9-4.4 mm.; length of wing, ♂ 6.5-8.6 mm., ♀ 6.5-8.6 mm.

Distribution: North Queensland - Paluma Range (north-west of Townsville) and higher parts of Atherton Tableland.

Material examined: Birthday Creek Falls, near Paluma, i 1967 (holotype ♀, AM, paratypes 5 ♂, 10 ♀, AM, 1 ♂, 1 ♀, BM, 2 ♀, UQ, 1 ♂, 1 ♀, USNM), G.A.H. and D.K.M.; Birthday Creek (near bridge), i 1967 (paratypes, 2 ♀, AM), G.A.H. and D.K.M.; Mount Spec, near Paluma, 2,600-2,900 ft., iii iv 1955-1964 (paratypes, 1 ♂, 2 ♀, CSIRO), K.R.N., I.F.C. and M.S.U.; The Crater, near Herberton, i 1967 (1 ♂, 1 ♀, AM), G.A.H. and D.K.M.

Habitat: rain forest, resting on tree trunks.

Comparative notes. From other species with narrow palpus, the male is most readily distinguished on the genitalia characters given in the key; the female is distinguishable by the approximated spiracles of the fifth pair.

Euprosopia integra new sp.

(Figs. 66, 92)

♂ ♀ . Agreeing with the description given for E. conferta in most characters, but differing as indicated below.

Coloration. Facial spots distinct but rather small, especially in ♂ . Thoracic pleura blackish brown, reddish brown on lower part of propleuron, lower posterior corner of mesopleuron, and on central upper part of sternopleuron. Wing with narrow irregular stigmatal band extending from costa to vein 4; discal band rather broad, almost regular, not or only slightly incised on costal margin; preapical band usually complete, without any partially separated spots on proximal side; apical mark usually with an enclosed hyaline spot.

Head. Height of cheek 0.32-0.35 of height of eye; eye 1.7-1.8 times as high as long. Antenna almost two thirds as long as the distance from its basal insertion to epistomal margin in ♂ , scarcely more than half that distance in ♀.

Thorax. Basalar process of ♂ almost obsolete, that of ♀ rather short acute; tegula of ♀ very slightly enlarged, not reaching to basalar process. Fore femur with usually 4 or more long black posteroventral bristles on distal half to two thirds of femur; hind femur very slightly curved upwards; apex of hind tibia not quite touching base of femur when tibia is fully flexed.

Abdomen. ♀ : spiracles of segment 5 distinctly closer to lateral margins of tergite 5 than to median dorsal line; pleural membrane coarsely setulose in region of segment 3, those setulae near centre being black, the more dorsal and more ventral ones

predominantly yellow, a brush of yellow hairs or setulae behind sternite 3. ♂ postabdomen generally similar to that of E. kurandae; outer surstylus with free distal section short, strongly swollen before apex; stipe of moderate length, the filaments almost as long and approximately 4 times as long as glans.

Dimensions: total length, ♂ 6.1-7.7 mm., ♀ 7.1-7.3 mm.; length of thorax, ♂ 3.4-4.0 mm., ♀ 3.9-4.0 mm.; length of wing, ♂ 7.3-8.2 mm., ♀ 8.0-8.4 mm.; length of glans of aedeagus 0.17-0.19 mm.

Distribution: north Queensland - Atherton Tableland.

Material examined: The Crater (or Mount Hypipamee), near Herberton, 3,100 ft., i 1967 (holotype ♀, paratypes, 3 ♂, AM, 1 ♂, BM), G.A.H. and D.K.M.; Millaa Millaa Falls, xii 1966 (paratype ♀, UQ), B. Cantrell; Atherton, i 1959 (paratype ♂, AM), D.K.M.; Mount Edith, 18 miles NE of Atherton, 3,400 ft., iii 1964 (paratype ♂, CSIRO), I.F.C. and M.S.U.

Habitat: rain forest.

Comparative notes. This species is nearest to E. kurandae from which it may be distinguished by the darkened ventral part of the sternopleuron and details of wing markings.

Euprosopia kurandae new sp.

(Fig. 67)

♂ ♀ . Agreeing with the description given for E. conferta in most characters but differing as indicated below.

Coloration. Postfrons fulvous, brownish posteriorly just in front of each fronto-orbital plate and around ocelli; facial

spots distinct but often sparse, of irregular shape, sometimes fading after prolonged preservation; antenna fulvous, segment 3 sometimes partly brownish. Mesoscutum with dark brown ground colour, and a variable amount of tawny coloration on the humeral, posterior notopleural, and postalar calli; pleura tawny with light yellowish grey pruinescence. Fore femur tawny-brown to dark brown with grey pruinescence; middle and hind femora fulvous or tawny, variably darkened distally; fore tibia tawny with distal third blackish brown; legs otherwise coloured as in E. conferta. Wing with discal band strongly incised on costal margin; preapical band with a spot more or less divided off from its proximal side in posterior part of first posterior cell; apical mark not enclosing a distinct hyaline spot. Abdomen tawny to yellowish brown with grey markings.

Head. Height of cheek 0.20-0.24 of height of eye; eye 1.7-2.0 times as high as long; lower lateral angle of face slightly expanded and ventrally rounded. Antenna extending about three quarters of distance from its basal insertion to epistomal margin in ♂, about two thirds that distance in ♀.

Thorax. Basalar process short or very short and angular, sometimes reduced to a slight prominence in ♂, variable in both sexes. Fore femur usually with only two long, strong well spaced posteroventral bristles, both in distal half, and a number of much shorter ones, occasionally one other bristle rivalling these two in length; hind femur very slightly curved upwards so that when tibia is flexed against femur the apex of tibia does not meet base of femur.

Abdomen. ♀ : spiracles of segment 4 situated close behind posteroventral angles of tergite 4; spiracles of segment 5 situated somewhat closer to lateral margins of tergite 5 than to median dorsal line; pleural membrane with numberous coarse dark brown to black setulae on lower part of region of segment 3, some shorter ones extending on to region of segment 4, some finer pale setulae on upper part of region of segment 3. ♂ postabdomen: outer surstylus long, almost attaining to apex of cercus, its basal section elongate, almost straight, slightly gibbous at base, free distal section slightly gibbous, its chisel-like apex slightly bent inwards; face distal section of inner surstylus shorter than that of outer surstylus, its terminal tooth horizontally flexed; stipe of aedeagus slender, apparently bare, rather long; preglans lightly sclerotized; glans rather small almost straight; filaments about 3 times as long as glans, not much curved basally.

Dimensions: total length, ♂ 4.8-7.1 mm., ♀ 5.8-6.8 mm.; length of thorax, ♂ 2.7-4.0 mm., ♀ 2.9-3.6 mm.; length of wing, ♂ 5.2-7.6 mm., ♀ 5.9-7.4 mm.; length of glans of aedeagus 0.16-0.17 mm.

Distribution: north Queensland - only known from the immediate vicinity of Kuranda (Cairns district).

Material examined: Kuranda, i 1967 (holotypo ♀ , paratypes, 3 ♂, AM), G.A.H. and D.K.M.; xii 1959 (paratype ♂, AM), E.J.H.; iii 1964 (paratype ♂, CSIRO), I.F.C. and M.S.U.; 1910 (paratypes, 2 ♂, 8 ♀ , BM) anon. but probably F.P.D., ex coll. E.A. Brunetti.

Comparative notes. See under E. integra for comparison with that species. The wing markings are similar to those of "sp.4" but the female is readily distinguished from that species by the much larger velvety areas on tergite 5 and the more laterally placed spiracles of the fifth pair.

Euprosopia sp.4

♀ . Most resembling E. kurandae and E. mica but much larger than the latter species. ♂ unknown.

Coloration. Middle and hind femora fulvous, slightly browned apically. Wing pattern much as in E. kurandae, but stigmatal section of subcostal cell more extensively darkened, stigmatal band not divided by clear spots in marginal cell, except for the separation of a dark spot opposite apex of subcostal cell.

Head. Height of cheek 0.23-0.26 of height of eye.

Thorax. Basalar process distinct but short, acute. Fore femur with usually 5 moderately long black posteroventral bristles distributed on approximately the distal two fifths of femur, and sometimes other shorter bristles.

Abdomen. Paired velvety areas of tergite 5 reduced in size and confined to lateral parts of tergite, separated from one another by a distance equal to about twice the width of each; spiracles of segment 4 situated behind and slightly above posterior angle of tergite 4; spiracles of segment 5 situated rather close to median dorsal line, separated from one another by about twice the width of each.

Dimensions: total length 6.3 mm.; length of thorax

3.2-3.3 mm.; length of wing 6.6-6.8 mm.

Distribution: Queensland - exact locality not stated. If, as seems probable, the specimens were collected by F.P. Dodd, they probably came from the tropical zone of Queensland where he did most of his collecting. From the notes offered by Musgrave (1932: 69) it would appear that Dodd resided at Townsville in the year 1901. However, he may well have visited other localities for collecting.

Material examined: "Queensland", vii 1901 (2 ♀ , BM), ? F.P.D.

Although the status of this form and the specific characters of the female are reasonably clear, it would be undesirable to provide a name for it without having exact locality data.

Euprosopia mica new sp.

(Fig. 87)

♀ . Similar to E. conferta and agreeing with the description given for that species except as indicated below.

Coloration. Face with very few brown spots of very irregular and variable shape and distribution. Dark markings on mesoscutum not as broad and heavy as in E. conferta; scutellum with most hairs pale, except for a variable number of black ones near centre of dorsal surface. Fore femur dark brown with greyish pruinescence; middle and hind femora greyish brown, darker distally; tibiae dull fulvous, blackish distally; tarsi brown, the basal segment of each, except at distal extremity, cream.

Head. Lower lateral angle of face little developed and narrowed by comparison with E. conferta and other related species;

height of cheek 0.35-0.40 of height of eye; eye 1.5-1.7 times as high as long. Antenna extending 0.60-0.63 of the distance from its basal insertion to epistomal margin. Palpus narrow throughout.

Thorax. Basalar process vestigial; tegula not enlarged. Hind femur almost straight.

Abdomen. Tergite 5 with paired velvety areas distinct but greatly reduced in size, and situated close to lateral margins of tergite; spiracles of segment 5 separated from one another by most of width of tergite 5 and situated near its posterior angles; pleura with few very weak scattered pale setulae.

Dimensions: total length 3.5-4.4 mm.; length of thorax 1.8-2.0 mm.; length of wing 4.2-4.4 mm.

Distribution: north Queensland - Atherton Tableland.

Material examined: The Crater (or Mount Hypipamee), near Herberton, 3,100 ft., i 1967 (holotype ♀ , paratype ♀ , AM, paratype ♀ , BM), G.A.H. and D.K.M.

It is just possible that the male of this species is represented by a shrivelled specimen from Mount Lewis, via Julatten, Mossman district, 3,500 ft., xii 1966 (UQ), B. Cantrell. This specimen has very large antenna, extending 0.81 of distance from its basal insertion to epistomal margin; palpus slightly spatulate; aedeagus with very short glans, 0.11 mm long; filaments long and fine, about 5 times as long as glans, bent near bases. It will be necessary for the sexes to be taken together in order to associate them with certainty.

Comparative notes. The female is distinguished from related species, except "sp.4", by the very small velvety areas of tergite 5,

and from that species by the more laterally placed spiracles of the fifth pair. The small size and greyish brown coloration of the femora are also distinctive.

Euprosopia sp.5

♂ ♀ . Somewhat resembling E. megastigma except in wing pattern; agreeing with the description given for that species except as indicated below.

Coloration. Palpus tawny. Hairs of mesopleuron mostly whitish. Femora tawny or light brown, becoming darker distally. Wing with stigmatal band not filling apex of subcostal cell, broadly extending from vein 1 to vein 5, dilated and somewhat dissected behind vein 5; discal and preapical bands quite broad on costal margin, joining immediately behind vein 3 to form a very broad dark field in distomedian part of wing, extending to posterior margin around end of vein 5 and connecting with stigmatal band behind vein 5, an additional dark stripe from end of vein 1 to dark discal field; apical mark contained mainly within first posterior cell, not enclosing a pale spot.

Head distinctly higher than wide. Antenna extending not more than half distance from its basal insertion to epistomal margin.

Thorax. Basalare and tegula much as in E. megastigma.

Abdomen. ♂ : tergite 5 approximately as long as tergites 3 and 4 together; ♀ : tergite 5 much as in E. megastigma; spiracles not visible; pleural membrane apparently without scales.

♂ postabdomen: not examined.

Dimensions: total length, ♂ 4.4 mm., ♀ 5.5 mm.; length of thorax, ♂ 2.2 mm., ♀ 3.0 mm.; length of wing, ♂ 4.6 mm., ♀ 6.1 mm.

Distribution: Queensland - south-east; New South Wales - North coast.

Material examined. Queensland: Imbil State Forest, S of Gympie, xi 1957 (1 ♂, UQ), T.E. Woodward. New South Wales: Grafton, 1926 (1 ♀, CSIRO), W.W.F.

As the two available specimens are in poor condition, it is considered desirable to defer naming this species until better material is obtained.

Euprosopia megastigma new sp.

(Figs. 69, 93)

♂ ♀ . Coloration. Head buff; postfrons yellowish brown centrally; face without dark markings except for a small brown mark near each lower lateral angle; occiput blackish on much of upper half, with overlying pale grey pruinescence except near vertex; antenna tawny to light brown; arista tawny at base, blackish beyond; prelabrum fulvous, brown or blackish at sides above; palpus brown with grey pruinescence, fulvous basally. Ground colour of mesoscutum broadly blackish medially, reddish brown laterally, the whole with extensive yellowish grey markings; scutellum yellowish grey or tawny, with brown markings; pleura reddish brown, an extensive dark brown area on lower part of sternopleuron and smaller ones on pteropleuron, pleurotergite, and hypopleuron; hairs of mesopleuron, except near its margins, mostly

black. Fore femur blackish brown with grey pruinescence; other femora tawny-brown with grey pruinescence; tibiae tawny, darker at distal extremities, the fore one with additional brown basal and ventral markings; tarsi blackish, each with basal segment, except at distal extremity, creamy. Wing with stigmatal band broad, terminating posteriorly on vein 5, enclosing a few hyaline spots in submarginal and first posterior cells; discal band broad, especially towards anterior end, straight, with some pale incisions on costal margin, often enclosing a few hyaline spots or streaks; preapical band usually broken into spots behind vein 3; apical mark enclosing a pale or distinctly hyaline spot; squama light brown with paler margins. Haltere creamy. Preabdominal tergites brown to greyish brown; basal part of tergite 2 and median or submedian marks towards anterior margins of tergites 3 and 4 grey.

Head approximately as high as wide; height of cheek 0.34-0.43 of height of eye; anterior ridge of cheek prominent, smooth; eye 1.5-1.8 times as high as long; outer vertical and cheek bristles well developed, sometimes one or two rudimentary, hair-like fronto-orbitals. Antenna extending more than half the distance from its basal insertion to epistomal margin, but variable in length; arista of moderate length, filiform in both sexes, with minute basal hairs, their length up to about half maximum diameter of arista. Prelabrum moderately developed, densely sulcate; palpus moderately narrow.

Thorax. Humeral callus with moderately long fine hairs on most of surface; scutellum convex, rounded, but with apical part

of margin almost straight and transverse; basalar process rudimentary, barely discernible in both sexes; tegula unmodified, slightly larger in ♀ than in ♂ ; the following bristles present: prescutellar acrostichal, dorsocentral, humeral, 1 + 1 notopleurals, supra-alar, postalar, posterior intra-alar, 3 pairs of scutellars. Fore femur with well developed series of postero-ventral bristles, those on basal half rather short and weak, those on distal half mostly longer and stronger, those at apical extremity black, the remainder whitish; fore tibia and tarsus without obvious modifications; middle coxa with fringe on ventral margin including rather numerous coarse black setulae which are particularly congested towards its inner angle; hind trochanter with rather long pale hairs on ventral surface. Wing with distal section of vein 4 subparallel to or slightly converging with vein 3, very slightly curved forward at apex.

Abdomen. Tergite 2 with posterior marginal fringe of narrow scales only; tergites 3-5 with scattered surface scales; ♂ preabdomen with tergite 4 slightly longer than tergite 3, tergite 5 slightly longer than tergite 4; spiracle of segment 5 conspicuously enlarged, that of segment 4 somewhat less so; ♀ preabdomen: tergite 5 well developed, but shorter than tergite 4: spiracles of segments 4 and 5 somewhat enlarged but the latter less so than in ♂, each situated immediately behind the lower posterior angle of its respective tergite; pleural membrane in vicinity of segments 4 and 5 with rather numerous narrow scales. ♂ postabdomen: inner and outer surstyli united for most of the length of inner one;

outer surstylus slightly sigmoidally curved, free distal part incurved, apex broadly rounded; inner surstylus considerably shorter, with the terminal and subterminal black teeth well separated, a slight angular projection between them on posterior surface; stipe of aedeagus of moderate thickness; preglans well developed, longer than maximum diameter; glans rather large and elongate; filaments fairly stout, equal in length, slightly over twice as long as glans.

Dimensions: total length, ♂ 4.8–8.4 mm., ♀ 5.8–8.6 mm.; length of thorax, ♂ 2.6–4.0 mm., ♀ 2.9–4.5 mm.; length of wing, ♂ 5.8–8.0 mm., ♀ 6.4–8.8 mm.

Distribution: New South Wales - coast districts to eastern scarp of tablelands; Queensland - extreme south-east.

Material examined. New South Wales: Otford, Illawarra District, ii 1964 (holotype ♂, AM), i ii 1958–1964 (paratypes, 19 ♂, 7 ♀, AM, 2 ♂, 1 ♀, BM, 2 ♂, USNM), D.K.M.; Barrington House, via Salisbury, Barrington Tops district, xii 1963–1965 (paratypes, 2 ♂, 1 ♀, UQ), D.F. O'Sullivan, T. Weir; Upper Allyn, via Eccleston, ii 1967 (paratype ♂, AM), D.K.M.; Deep Creek, Narrabeen, near Sydney, i 1964 (paratype ♀, CSIRO), D.H.C.; Killara, near Sydney, N.S.W., i 1936 (paratype ♀, CSIRO), M.F.D.; Roseville, near Sydney, emerged 29 xi 1957 (paratype ♂, reared, AM), K.E.; Royal National Park, S of Sydney, ii 1957 (paratype ♂, CSIRO), W.W.W.; Palm Creek, Royal National Park, xii 1960 (paratype ♀, CSIRO), D.H.C.; Colo Vale, near Mittagong, i iii iv 1954–1957 (paratypes, 2 ♂, 5 ♀, CSIRO, 1 ♀, USNM), A.L.D., W.W.W.; Cabbage Tree Creek, Clyde Mountain, near Nelligen,

ii 1965 (paratypes, 2 ♂, 1 ♀, CSIRO), Z.R.L.; Durras Lake, near Bateman's Bay, ii 1965 (paratypes, 1 ♂, 2 ♀, CSIRO), D.H.C.; Merimbula, i 1965 (2 ♀, CSIRO), K.R.N. Queensland: Ladybrook, ii 1932 (1 ♀, UQ), "D.J.T."; Tamborine Mountain, xii 1925 (1 ♀, AM), A.M.

Habitat: rain forest and wet sclerophyll forest.

Comparative notes. The absence of well defined facial markings, and the complete, broad discal band of the wing are distinctive characters. For comparison with E. crispa see under that species.

Euprosopia crispa new sp.

(Fig. 80)

♂ ♀ . Generally resembling E. megastigma and agreeing with the description given for that species except as indicated below.

Coloration. Prelabrum fulvous centrally, black at sides. Ground colour of mesoscutum almost entirely blackish, only a variable part of lateral margins reddish-brown; pleura usually darker than E. megastigma, often largely dark brown. Fore femur blackish brown; middle and hind femora deep reddish brown to blackish brown with sparse grey pruinescence; fore tibia dark brown; middle and hind tibiae tawny centrally, dark brown at each extremity. Wing with stigmatal band not extending behind vein 2, except as more or less separate spots; discal band less widened anteriorly than in E. megastigma, and curved towards base at anterior end; preapical band very irregular and broken; apical mark with or without a pale spot in centre.

Head. Height of cheek 0.32-0.40 of height of eye; eye

1.5-1.8 times as high as long. Arista of ♂ very narrowly spatulate, that of ♀ filiform. Palpus broadened distally.

Thorax. Scutellum almost uniformly rounded; ♀ : basalar process well developed, slender erect basally, strongly curved forwards distally. Fore femur with posteroventral bristles obsolete on basal third, the remaining ones nearly all black; middlecoxa with black setulae on ventral margin not particularly numerous or dense. Wing with distal section of vein 4 somewhat converging with vein 3 distally, very slightly curved forward at apex.

Abdomen. ♂ : tergites 3 and 4 subequal in length; tergite 5 nearly as long as tergites 3 and 4 together; spiracles not visible in only available ♂; ♀ : spiracles of segments 4 and 5 not enlarged, that of segment 4 situated in pleural membrane near middle of lateral margin of tergite 4, that of segment 5 situated as in E. megastigma; pleural membrane without scales. ♂ postabdomen not examined.

Dimensions: total length, ♂ 6.1 mm., ♀ 5.3-7.4 mm.; length of thorax, ♂ 3.1 mm., ♀ 2.7-3.4 mm.; length of wing, ♂ 6.5 mm., ♀ 5.8-7.2 mm.

Distribution: New South Wales - coast and tablelands districts.

Material examined: Broken Bay, near Sydney, xii 1923 (holotype ♀, CSIRO, paratypes, 2 ♀, CSIRO, 1 ♀, AM), I.M.M.; Katoomba, xii 1960 (paratype ♂, AM), G.H.H.; river crossing, 1 mile W of Uralla, i 1967 (paratype ♀, UQ), B. Cantrell; Metz Gorge, near Armidale, xii 1965 (paratype ♀, UQ), B. Cantrell.

Habitat: not recorded. The locality data suggest open sclerophyll forest or woodland habitats.

Comparative notes. Closest to E. megastigma in most characters, this species is distinguished by the colour and extent of the posteroventral bristles of the fore femur, the shape of the discal wing band, and by a number of secondary sexual characters of the female as described above.

Euprosopia albipila new sp.

(Fig. 68)

♂ ♀ . Somewhat similar to E. maculipennis and E. vitrea, and differing from the description of the latter species mainly as indicated below.

Coloration. Mesopleuron with white hairs on anterior and central parts and some black hairs towards posterior margin, the longer bristle-like hairs at posterior margin all white. Femora rather variable in colour, in specimens from the vicinity of Canberra and northwards predominantly tawny, brown on distal parts, in specimens from Victoria and Tasmania fore femur predominantly blackish, tawny on ventral surface and at extreme base, other femora brown, becoming darker brown or blackish distally; fore tibia blackish brown becoming lighter brown at base in specimens from the north, entirely black in specimens from Victoria and Tasmania; middle and hind tibiae pale tawny, slighty browned distally, in northern specimens, much darker in southern specimens. Wing with an irregular blackish stigmatal band extending posteriorly to vein 4 or a little beyond, often narrowed or fenestrated in submarginal cell; pattern otherwise consisting of more or less separate spots.

Head. Height of cheek 0.35–0.40 of height of eye; eye 1.6–1.9 times as high as long. Antenna extending at least three quarters the distance from its basal insertion to epistomal margin in ♂, slightly over half that distance in ♀; arista a little shorter than distance from its basal insertion to lowest extremity of cheek, filiform apically in both sexes.

Thorax. Fore femur with numerous moderately developed posteroventral bristles which are nearly all white; hind trochanter with normal loose hairing in both sexes; hind tibia with apical dorsal excavated area almost obsolete.

Abdomen. ♀: spiracles of segments 4 and 5 situated very close to posterolateral angles of their respective tergites. ♂ postabdomen: free distal section of outer surstylus rather slender, rounded apically; inner surstylus with terminal tooth small, not much projecting backwards; aedeagus with stipe of moderate length; preglans well sclerotized, nearly as long as broad; glans short and compact; filaments equal in length and 2.2–2.5 times as long as glans, slightly dilated apically.

Dimensions: total length, ♂ 5.6–8.2 mm., ♀ 6.1–7.5 mm.; length of thorax, ♂ 2.7–3.9 mm., ♀ 3.0–3.6 mm.; length of wing, ♂ 6.4–8.4 mm., ♀ 7.1–8.4 mm.; length of glans of aedeagus 0.43–0.53 mm.

Distribution: New South Wales – tablelands districts; Victoria – mountainous areas; Tasmania.

Material examined: New South Wales and Australian Capital Territory: Katoomba, xii 1960 (holotype ♂, AM), i xii 1950–1960

(paratypes, 4 ♂, 2 ♀, AM, 1 ♂, BM), G.H.H.; New England National Park, near Ebor, i 1966 (1 ♂, UQ), T. Weir; Barrington Tops, ii 1965 (paratype ♀, UQ), G.M.; Mount Gingera, near Canberra, iii 1962 (paratype ♂, CSIRO), H.M. Cane; Batlow, iii 1957 (paratype ♂, CSIRO), F.J. Gay; 3 miles E of Pilot Hill, Bago Forest, near Batlow, iii 1957 (paratypes 2 ♀, CSIRO, 1 ♀, USNM), T.G.C.; Brown Mountain, near Nimmitabel, iii 1963 (paratype ♂, CSIRO), Z.R.L.; Rennix Gap, Snowy Mountains, 5,200 ft., iii 1962 (paratype ♂, AM), F.E.; Perisher Valley, Snowy Mountains, iii 1962 (paratype ♀, AM), F.E.; Kosciusco, 5,000 fit., iii 1965 (paratype ♂, CSIRO), D.E.H. Victoria: Mount Stirling, near Mount Buller, Mansfield District, iii 1963 (1 ♀, NMV), A.N. Tasmania: Lake Leake, 2,000 ft., ii 1963 (1 ♀, CSIRO), I.F.C. and M.S.U.; Hobart, ii 1949 (1 ♂, NMV), C. Oke; Mount Wellington, ii 1963 (1 ♀, CSIRO), D.H.C.; Penstock Lagoon, near Waddamana, ii 1967 (1 ♂, NMV), A.N.

Comparative notes. The better developed stigmatal band, preponderance of white hairs on the mesopleuron, and absence of a basal tubercle on the hind femur distinguish this from other species of the maculipennis group.

Euprosopia maculipennis (Guérin)

Platistoma maculipennis (sic) Guérin-Méneville, 1831: pl.21, fig.8.

Platystoma maculipennis, Macquart, 1835:444; Guérin-Méneville, 1838:299.

Platystoma australis Macquart, 1846:205, pl.18, fig.5.

Euprosopia maculipennis, Hendel, 1914a:149; 1914b:358-359, pl.2, fig.42.

♂ ♀ . Somewhat similar to E. vitrea and differing from that species principally as stated below.

Coloration. Agreeing in most details with E. vitrea. Palette of arista black. Hairs of mesopleuron white and black, the white ones principally on anterior part except for the long thickened white ones on posterior margin. Femora almost entirely blackish with grey pruinescence; fore tibia black with reddish brown dorsal area; other tibiae tawny, marked with brown distally. Wing markings usually much as in E. vitrea, except that spot on anterior crossvein is darker and more conspicuous; sometimes spots merging to form an indistinct, broken discal band.

Head. Height of cheek 0.42-0.50 of height of eye. Arista somewhat shorter than in E. vitrea, with apical palette opaque, small, especially so in ♀ .

Thorax. Scutellum with 3, 4, or sometimes 5 pairs of bristles. Hind trochanter without dense pilosity; hind femur with rounded tubercle at base on ventral surface, which has a small patch of fine dense pilosity; hind tibia with very weak excavation only at apex on dorsal side.

Abdomen. Tergites 2 and 3 with posterior marginal scales only; tergites 4 and 5 with scattered surface scales; ♂ : tergites 3, 4 and 5 subequal in length; ♀ : tergite 5 not more than half as long as tergite 4 and partly concealed by it; spiracle of segment 4 situated immediately behind posterior angle

of tergite; spiracle of segment 5 close to posterior margin of tergite, a short distance inwards from its posterior angle.

♂ postabdomen: outer surstylus not strongly gibbous basally; stipe of aedeagus rather slender; glans elongate ovoid; filaments equal in length, less than twice as long as glans.

Dimensions: total length, ♂ 5.7-10.2 mm., ♀ 5.4-10.4 mm.; length of thorax, ♂ 2.7-5.0 mm., ♀ 2.6-5.8 mm.; length of wing, ♂ 6.3-10.2 mm., ♀ 6.3-11.6 mm.; length of glans of aedeagus 0.60-0.62 mm.

Distribution: Queensland - highlands of far south-east only; New South Wales - principally tablelands above 2,000 ft.; Victoria; Tasmania.

Material examined: Queensland: Toowoomba, i 1964 (1 ♀, UQ), J.C. Cardale; Tamborine Mountain, xii 1961 (1 ♂, UQ), B.F. Stone; Lamington National Park, McPherson Range, ii xii 1923-1961 (4 ♂, 1 ♀, UQ), H.H., F.A.P., I.C.Y. New South Wales and Australian Capital Territory; Brooklana, East Dorrigo district, 1929 (1 ♀, AM), W. Heron; Armidale, ii 1955 (3 ♂, 18 ♀, CSIRO) E.J. Waterhouse; Barrington Tops, iv 1964 (2 ♂, CSIRO), S.J.P.; Broken Bay, xii 1923 (4 ♂, 2 ♀, CSIRO), I.M.M.; Mount Wilson, Blue Mountains, ii 1936 (3 ♂, CSIRO), M.F.D., D.F. Waterhouse; Hampton, near Blue Mountains, ii 1964 (1 ♂, 1 ♀, AM), C.E.C.; Port Jackson (= Sydney), no date (holotype ♀ of Platystoma maculipennis Guérin, PM), anon.; Casula, near Liverpool, xi 1958 (1 ♂, NMV), M.R. Nikitin; Colo Vale, near Mittagong, ii iii 1957-1958 (2 ♂, 1 ♀, CSIRO), A.L.D., R. Lewis; near Braidwood,

ii iii iv 1953-1959 (9 ♂, 4 ♀, CSIRO, 1 ♂, 1 ♀, AM), Z.R.L., S.J.P.; Monga, near Braidwood, ii 1966 (1 ♀, CSIRO), E.F.R.; Blundell's, near Canberra, i ii iii iv 1934-1954 (20 ♂, 10 ♀, CSIRO), M.F., S.J.P., T.G.C.; Black Mountain, near Canberra, i 1934 (4 ♂, CSIRO), W.L. Rait; Bendora, near Canberra, ii 1959 (1 ♂, 1 ♀, CSIRO), S.J.P.; Royalla, S of Queanbeyan, iii 1961 (3 ♂, 3 ♀, CSIRO), S.J.P., D.H.C.; 9 miles W of Adaminaby, iii 1962 (1 ♂, 3 ♀), Z.R.L.; Cooma, ii 1963 (1 ♂, 2 ♀, CSIRO), D.H.C.; Nimmitabel, i 1961 (3 ♂, 2 ♀, CSIRO), D.H.C.; 4 miles E of Nimmitabel, iii 1963 (1 ♂, 2 ♀, CSIRO), D.H.C.; Brown Mountain, near Nimmitabel, ii iii 1963-1965 (3 ♂, CSIRO), S.J.P., Z.R.L.; Sawpit Creek, Snowy Mountains, iii 1962 (1 ♀, AM), F.E.; Moonbah, near Jindabyne, 3,000-3,500 ft., iii 1889 (1 ♂, AM), R.H. Victoria: Timbertop, near Mount Buller, Mansfield district, ii 1958 (3 ♂, 1 ♀, NMV), anon.; Warragul, i 1960 (1 ♂, NMV), F.E.W.; Narracan, near Moe, ii iii 1897-1920 (1 ♂, 4 ♀, NMV), J. Hill; Gunyah, near Foster, iii 1962 (1 ♀, CSIRO), G. Bornemissza; Lower Tarwin, iii 1925 (1 ♂, NMV, 3 ♂, 2 ♀, SAM), G.F. Hill; Nar-nar-goon, iii 1963 (1 ♀, NMV), F.E.W.; Launching Place, Yarra River, i 1913 (3 ♂, 1 ♀, NMV), F.P. Spry; Melbourne, no date (1 ♂, BM), C. French; Blackburn, near Melbourne, iii 1958 (1 ♂, NMV), McEvey; Frankston, near Melbourne, no date (1 ♀, NMV), anon; Woodend, i 1896 (1 ♀, NMV), anon.; Colac, i 1927 (1 ♂, CSIRO), F.E.W. Tasmania: "Tasmanie", probably 1843 (lectotype ♀, here designated, paralectotypes, 2 ♂, of Platystoma australis Macquart, PM), J.P. Verreaux; Wynyard, i 1916 (1 ♀, AM), G.H.H.; Launceston, iv 1916 (1 ♀, SAM), F.M. Littler; Mangalore, no date

(1 ♂, BM), A. White; Hobart, no date (1 ♂, SAM), A.M. Lea.

Euprosopia sp. 6

♂. Two specimens agree very closely with E. fimbripes, except that the arista is finely filiform to the apex. This kind of character has proved to be of specific value elsewhere in the genus and family, but in this case it will be necessary to examine a larger number of specimens before the status of the form can be decided. The aedeagus is very similar to that of E. fimbripes.

Dimensions: total length 7.3 mm.; length of thorax 3.0-3.1 mm.; length of wing 6.6-6.7 mm.; length of glans of aedeagus 0.66-0.70 mm.

Distribution: southern New South Wales; Victoria.

Material examined. New South Wales: Queanbeyan R., near Jerangle, i 1938 (1 ♂, CSIRO), I.M.M. Victoria: Tooronga Falls, 6½ miles E of Noojee, iii 1965 (1 ♂, AM), G.L.B.

Euprosopia fimbripes new sp.

♂ ♀. Very similar to E. vitrea in most characters and agreeing with description given for that species except as indicated below.

Coloration. Palette of ♂ arista blackish, paler apically. Fore tibia almost entirely blackish brown.

Head. Height of cheek 0.36-0.45 of height of eye. ♂: arista not as long as in E. vitrea, with apical palette narrowly lanceolate, acute.

Thorax. Fore femur with series of well developed whitish posteroventral bristles extending for most of its length, the

longer bristles longer than half diameter of femur.

Abdomen. ♂ : tergite 4 a little longer than tergite 3; tergite 5 approximately equal in length to tergites 3 and 4 together. ♀ : tergite 5 at least as long as tergite 4, appearing slightly longer in some specimens; spiracle of segment 4 situated below middle of lateral margin of tergite 4; spiracle of segment 5 situated in pleural membrane, below and somewhat in front of posterior angle of tergite. ♂ postabdomen: surstyli not examined in detail; aedeagus with glans larger and more elongate than in E. vitrea; filaments with rounded, slightly dilated apices, slightly unequal in length, the longer approximately twice as long as glans.

Dimensions: total length, ♂ 4.9-7.3 mm., ♀ 5.8-7.1 mm.; length of thorax, ♂ 2.4-3.4 mm., ♀ 3.0-3.5 mm.; length of wing, ♂ 5.5-6.7 mm., ♀ 6.3-7.1 mm.; length of glans of aedeagus 0.62-0.66 mm.

Distribution: Australian Capital Territory - Canberra district; Victoria - near Melbourne.

Material examined: Victoria: Seaford, near Melbourne, v 1921 (holotype ♂, paratypes, 2 ♀, NMV), W.F. Hill. Australian Capital Territory: Paddy's River, near Canberra, i 1959 (1 ♂, 2 ♀, CSIRO), K.R.N.

Comparative notes. The combination of mainly black hairs on the centre of the mesopleuron, well developed pale posteroventral bristles on the fore femur, and absence of a tubercle at the base of the hind femur distinguish this from other species of the maculipennis group.

Euprosopia vitrea new sp.

(Figs. 70, 106, 108)

♂ ♀ . Coloration. Head tawny; postfrons darker than face; postfrons, parafacial, and cheek with whitish orbital margins; face with pair of blackish marks from inner edge of each antennal groove almost to epistomal margin; occiput blackish on each side of upper half, covered with whitish pruinescence except in upper median part; antenna yellowish brown, segment 3 darker except at base; arista tawny at base, black beyond, palette of ♂ transparent in centre, often blackish at margins, occasionally entirely black; prelabrum fulvous, blackish at sides; palpus tawny brown basally, blackish brown distally with grey pruinescence. Mesoscutum blackish, narrowly reddish brown on lateral margins, the whole patterned with yellow-grey pruinescent markings; scutellum tawny, deeper reddish brown in centre, with greyish pruinescent markings, pleura reddish brown, lower part of sternopleuron blackish, the whole covered with grey and brown pruinescence; hairs of mesopleuron almost all black, except at extreme margins. Fore femur blackish with thin grey pruinescence, the extreme base and apex narrowly yellowish brown; middle and hind femora reddish brown, darker distally, with grey pruinescence; tibiae tawny with blackish distal extremities, fore tibia somewhat darker with blackish colouring often extending to base on ventral surface; tarsi blackish brown, basal three quarters of basal segment of each creamy yellow. Wing markings almost completely broken into separate small spots, there being no transverse bands; a prominent dark stigmatal blotch confined to subcostal and marginal cells; spot on anterior crossvein

not especially prominent, not situated directly behind stigmatal blotch but slightly beyond it; apical mark rather diffuse, enclosing, or almost enclosing, a hyaline spot; squama light brown or yellowish with whitish margin. Haltere creamy to fulvous. Preabdominal tergites greyish brown, a large part of tergite 2 grey.

Head approximately as high as wide; height of cheek 0.40-0.50 of height of eye; anterior ridge of cheek without transverse grooves; eye 1.5-1.8 times as high as long; outer vertical and cheek bristles well developed; other bristles undeveloped. Antenna extending to epistomal margin or slightly more; arista longer than distance from its basal insertion to lowest extremity of cheek, bare, in ♂ with rather large broadly rounded apical palette, transparent at least in centre, and usually blackish on margins, in ♀ arista quite filiform apically. Prelabrum moderately well developed, densely sulcate; palpus rather narrow.

Thorax. Humeral callus with long hairs on entire surface; scutellum rounded, dorsally convex; basalar process undeveloped; tegula not enlarged or modified in either sex; the following bristles present; prescutellar acrostichal, dorsocentral, humeral strongly developed in both sexes, 1 + 1 notopleurals, supra-alar, postalar, posterior intra-alar, 3 pairs of scutellars. Fore femur with series of well developed black dorsal bristles and series of short, weak posteroventral bristles on distal third, the more distal ones black, the others whitish; hind trochanter densely pilose on posteroventral prominence in ♂, more loosely haired in ♀; hind femur without basal ventral tubercle; hind tibia with distinct excavated shining area dorsally at apex, having the shape of a

segment of a circle equal to or greater than a semicircle. Wing with veins 3 and 4 slightly converging distally, the latter very slightly curved forwards at apex.

Abdomen. Tergite 2 with posterior marginal fringe of scales; tergite 3 with sparse surface scales and posterior marginal fringe; tergites 4 and 5 with numerous scales; spiracles of segments 4 and 5 not greatly enlarged in either sex; ♂ : tergites 3 and 4 subequal in length and each somewhat shorter than tergite 5; ♀ : tergites 3 and 5 each a little shorter than tergite 4; spiracle of segment 4 situated in pleural membrane very close to posterior angle of tergite 4, that of segment 5 situated close behind tergite 5, closer to posterior lateral angle of tergite than to median line. ♂ postabdomen: outer surstylus strongly gibbous at base anteriorly, its free apical part exceeding inner surstylus by quite a short distance, slightly curved inwards and backwards; inner surstylus slender apically, the terminal tooth flattened, projecting backwards; stipe of aedeagus rather broad, glabrous; preglans very short; glans rather short, ovoid; filaments unequal, the shorter one approximately 4 times as long as glans.

Dimensions: total length, ♂ 7.0-9.6 mm., ♀ 5.7-8.1 mm.; length of thorax, ♂ 3.0-4.3 mm., ♀ 2.7-4.5 mm.; length of wing, ♂ 6.6-8.5 mm., ♀ 6.0-9.0 mm.; length of glans of aedeagus 0.40-0.43 mm.

Distribution: New South Wales - principally tablelands districts; Queensland - south-eastern border district; Victoria.

Material examined. New South Wales and Australian Capital Territory: Mount Boyce, near Blackheath, Blue Mountains, ii 1964 (holotype ♂, AM), ii iv 1964 (paratypes, 5 ♂, 20 ♀, AM, 2 ♂, 2 ♀, BM, 1 ♂, 2 ♀, DEI, 1 ♂, 1 ♀, MNM), D.K.M.; 2 miles NW of Katoomba, iii 1963 (paratypes, 6 ♂, 3 ♀, AM), D.K.M.; Katoomba, i xii 1957-1960 (paratypes, 2 ♂, 1 ♀, AM), G.H.H.; Jenolan, ii 1932 (paratype ♀, AM), J.C. Wiburd; Boyd R. crossing, Kanangra Road, Oberon district, 4,100 ft., ii 1956 (paratypes, 1 ♂, 1 ♀, AM), L.S. Willan; Colo Vale, near Mittagong, iii 1957 (paratype ♀, CSIRO), A.L.D., 10 miles SE of Braidwood, xii 1951 (paratype ♂, CSIRO), T.G.C.; Clyde Mountain, near Braidwood, 2,400 ft., iii 1961 (paratype ♂, CSIRO), I.F.C. and M.S.U.; Batemans Bay, xi 1949 (paratype ♂, CSIRO), Wylie; Bendora, A.C.T., ii iv 1952-1953 (paratypes, 3 ♂, 5 ♀, CSIRO), I.F.C., S.J.P.; Blundells, A.C.T., i ii iii 1934-1951 (paratypes, 3 ♂, 1 ♀, CSIRO), W. Rafferty, M.F., S.J.P., H.M. Cane; Mount Gingera, A.C.T., ii 1959 (paratype ♀, CSIRO), S.J.P.; Lee's Springs, A.C.T., i ii iii 1938-1952 (paratypes, 25 ♂, 3 ♀, CSIRO), T.G.C., Z.R.L., K.R.N., S.J.P.; 2 miles E of Mount Tidbinbilla, A.C.T., c.3,580 ft., iii 1951 (paratypes, 2 ♀, CSIRO), K.H.K.; Five Fords (or Condor Creek), near Canberra, iii 1934 (paratypes, 1 ♂, 1 ♀, CSIRO), M.F.; Woo Jasper, near Burrinjuck Reservoir (paratype ♀, CSIRO), M.F.; Pilot Hill, Bago Forest, near Batlow, iii 1957 (paratypes, 2 ♂, 2 ♀, CSIRO), T.G.C.; Alpine Creek, near Kiandra, xi 1938 (1 ♂, 2 ♀, CSIRO), A.L.T.; 9 miles W of Adaminaby, iii 1962 (9 ♂, 11 ♀, CSIRO), Z.R.L.; Eucumbene, near Adaminaby, ii 1959

(1 ♀ , CSIRO), E.F.R.; Wee Jasper, i 1933 (1 ♀ , CSIRO), M.F.; Sawpit Creek, Snowy Mountains, ii 1963 (1 ♀ , AM), D.K.M.; Mount Kosciusko, 1893 (1 ♀ , USNM), anon.; Mount Kosciusko, 4,000 ft. and 4,500 ft., iii 1965 (1 ♂ , 3 ♀ , CSIRO), D.E. Havenstein; Mount Kosciusko Hotel, ii 1946 (1 ♀ , CSIRO), E.F.R.; 4 miles E of Nimmitabel, iii 1963 (1 ♀ , CSIRO), Z.R.L.; Brown Mountain, Bega district, ii iii 1961-1965 (17 ♂ , 21 ♀ , CSIRO), Z.R.L., S.J.P.; Moonbar near Jindabyne, iii 1889 (1 ♂ , AM), R.H.; Ebor, i 1932 (3 ♀ , CSIRO), M.F.; Merimbula, i 1965 (1 ♀ , CSIRO), K.R.N.; New England National Park, near Ebor, i 1966 (1 ♀ , CSIRO), B. Cantrell; Upper Manning R., near Barrington Tops, 4,100 ft:, i 1948 (paratype ♂ , AM), A.M.; Tubrabucca, near Barrington Tops, 4,300 ft., i 1948 (paratype ♂ , AM), A.M.; Berowra, near Sydney, xii 1956 (paratype ♀ , AM), D.K.M. Queensland: Lamington National Park, xi 1961 (1 ♂ , UQ), I.C.Y. Victoria: Mount Pinnibar, Mitta Mitta R. district, 3,500-4,000 ft., iii 1967 (3 ♀ , CSIRO), K.R.N.; Snowy R. Valley, 5 miles S of Tulloch Ard, no date (1 ♀ , NMV), anon.; Tawonga Gap, near Mount Bogong, i 1957 (3 ♂ , NMV), A.N.; Timbertop, near Mount Buller, Mansfield district, ii 1958 (1 ♂ , NMV), "I.E."; Millgrove, near Warburton, ii 1929 (1 ♀ , UQ), F.E.W.; Tallarook, near Seymour, i 1950 (1 ♀ , CSIRO), A. Floyd; Mount Buangor, near Beaufort, 1,400 ft., ii 1956 (1 ♂ , CSIRO), I.F.C.

Habitat: Principally sclerophyll forest. The specimen from Millgrove is labelled "on wombat dung".

Comparative notes. This species is distinguished from other members of the maculiponnis group having black hairs on the centre

of the mesopleuron and no strong posteroventral bristles on the fore femur, by the absence of grooving on the anterior ridge of the cheek and the predominantly cream-coloured basal segment of the fore tarsus.

Euprosopia alpina new sp.

♂ ♀ . Generally resembling E. vitrea, and agreeing with the description given for that species except as indicated below.

Coloration. Head as in E. vitrea but somewhat darker; antenna rather dark brown; palette of ♂ arista brownish grey. Fore femur black, other femora dark reddish brown to blackish brown; fore tibia black; fore tarsus blackish, with basal two thirds of basal segment reddish brown on posterior surface; other tarsi with basal segment yellowish brown to fulvous basally. Preabdominal tergites dark brown, often tinged with grey; basal part of tergite 2 grey.

Head. Height of cheek 0.37-0.47 of height of eye; anterior ridge of cheek with one or more (usually 2 or 3) transverse grooves near lower end; eye 1.6-1.9 times as high as long. Arista long, especially so in ♂ which has a minute rounded terminal palette, narrower than thickened base of arista.

Thorax. Posteroventral bristles of fore femur rather short and weak, those on distal third usually mixed black and white, those on basal half not differentiated from hairs; in ♀ ratio length of fore tibia/length of fore tarsus = 0.90 - 0.98, mean 0.95 (10 specimens measured); hind trochanter with numerous short hairs, not forming a dense pile.

Abdomen. ♂ preabdomen: spiracles of segments 4 and 5 much enlarged, especially the latter which has a diameter approximately twice that of spiracle of segment 3; ♀ preabdomen: spiracles enlarged to a lesser extent than in ♂, each situated in pleural membrane near posterior angle of its tergite. ♂ postabdomen: surstyli similar to those of E. vitrea but more slender; aedeagus with stipe long, slender, glabrous; preglans rather short, less than twice as long as wide; glans rather short; filaments very slender, slightly unequal, at least 4 times as long as glans.

Dimensions: total length, ♂ 7.6-9.0 mm., ♀ 6.3-8.6 mm.; length of thorax, ♂ 3.7-3.9 mm., ♀ 3.5-3.7 mm.; length of wing, ♂ 7.6-8.3 mm., ♀ 7.5-8.4 mm.

Distribution: New South Wales - Southern Tablelands District (including Australian Capital Territory), principally above 3,000 ft. and extending to the highest altitudes; Victoria.

Material examined. New South Wales and Australian Capital Territory: Lee's Springs, A.C.T. i 1952 (holotype ♂, CSIRO), K.R.N., ii iii 1950-1952 (paratypes, 3 ♂, 2 ♀, CSIRO, 1 ♂, AM), Z.R.L., S.J.P.; Mount Gingera, A.C.T., i ii iii xi 1950-1955 (paratypes, 3 ♂, 4 ♀, CSIRO, 1 ♀, BM), I.F.C., M.F.D., Z.R.L., K.R.N., S.J.P.; Bendora, A.C.T., ii 1952 (paratype ♀, CSIRO), Z.R.L.; Hall, A.C.T., iii 1952 (paratype ♀, CSIRO), K.R.N.; Alpine Creek, near Kiandra, i 1938 (paratype ♂, CSIRO), I.M.M.; Moonbar, near Jindabyne, 3,000-3,500 ft., iii 1889 (paratypes, 5 ♀, AM), R.H.; Kosciusko district, 4,000 ft., iii 1920 (paratype ♂, CSIRO), anon.; Mount Kosciusko, 7,300 ft., i 1951 (paratype ♂, damaged, CSIRO),

H.M. Cane; Mount Kosciusko, 1893 (paratypes, 2 ♀, USNM), anon.; Wilson's Valley, near Mount Kosciusko, iii 1962 (paratype ♀, AM), F.E. Victoria: Woodend, i 1896 (1 ♂, 1 ♀, BM), anon.

Habitat: not recorded, but the label data "Mount Kosciusko, 7,300 ft." indicate that the species can occur in alpine vegetation well above the tree line.

Comparative notes. Differs from E. vitrea in the darker fore tarsus and grooving of the anterior cheek ridge, and from E. celsa in the somewhat paler fore tarsus, length of the filaments of the aedeagus, and length of the fore tarsus of the female.

Euprosopia celsa new sp.

♂ ♀. Very similar to E. alpina and apparently distinguishable only by the characters given below.

Coloration. Palette of ♂ arista black. Posteroventral bristles on distal part of fore femur all or nearly all black; fore tarsus entirely or almost entirely black (dark brown in old preserved specimens).

Head. Height of cheek 0.33-0.42 of height of eye; eye 1.6-1.9 times as high as long. Arista of ♂ with rounded terminal palette which is slightly wider than thickened base of arista.

Thorax. ♀: ratio length of fore tibia/length of fore tarsus = 0.82-0.85, mean 0.84 (4 specimens measured).

Abdomen. ♂ postabdomen: preglans strongly developed, fully twice as long as its maximum diameter; glans rather large, elongate; filaments not attenuated, unequal in length, the shorter one not more than 2.5 times as long as glans.

Dimensions: total length, ♂ 9.3 mm., ♀ 7.3-9.1 mm.; length of thorax, ♂ 4.0-4.3 mm., ♀ 3.7-4.1 mm.; length of wing, ♂ 8.3-8.5 mm., ♀ 8.1-8.7 mm.

Distribution: New South Wales - Northern Tablelands District at higher altitudes.

Material examined: Point Lookout, New England National Park, near Ebor, 5,250 ft., i 1966 (holotype ♂, paratypes, 1 ♂, 2 ♀, AM), C.N.S.; Barrington Tops, i 1925 (paratypes, 2 ♀, UQ), Sydney University Zoology Expedition.

Euprosopia hypostigma new sp.

(Figs. 71, 98)

Very similar in most characters to *E. filicornis*, and agreeing with the description of that species except as indicated below. ♂ unknown.

♀ Coloration. Face with a rather broad blackish mark between each antennal groove and epistomal margin; second antennal segment dark brown except for the paler distal margins; palpus brown, slightly paler apically, pale fulvous at base. Ground colour of an extensive area on lower part of sternopleuron and of much of meropleurite dark brown. Femora brown, the fore femur darkest, all somewhat darker distally. Wing with basal part of marginal cell containing a single large blackish spot situated at fork of veins 2 and 3; preapical band broken in first posterior cell, its posterior part connected to discal band and to the large blotch in middle of second posterior cell. Abdomen with tergite 1 tawny-grey, dark brown medially; tergite 2 grey, becoming tawny

at lateral extremities, broadly margined with dark brown posteriorly; tergites 3-5 predominantly deep brown, with median grey pruinescent central marks on tergites 4 and 5.

Head. Height of cheek 0.40 of height of eye; eye 1.6 times as high as long.

Thorax. Hairs on humeral callus long and numerous, not notably shortened posteriorly; tegula not, as in ♀ of E. filicornis, extending over anterior corner of basalare. Wing with vein 6 well developed to within a short distance of margin.

Abdomen. Tergite 5 almost ¾ as long as tergite 4, its posterior margin entire; spiracles of segments 4 and 5 situated laterally in pleural membrane behind posterior corners of their respective tergites.

Dimensions: total length 7.3 mm.; length of thorax 4.1 mm.; length of wing 8.7 mm.

Distribution: New South Wales - Hunter River district.

Material examined: Upper Allyn, near Eccleston, ii 1967 (holotype ♀ , AM), D.K.M.

Habitat: rain forest.

Comparative notes: ♀ readily distinguished from other species of the scatophaga species group by the position of the fourth and fifth abdominal spiracles. Further differentiating characters may be found in ♂ when discovered.

Euprosopia subacuta new sp.

(Fig. 95)

♂ ♀ . Very similar in most characters to E. filicornis and E. hypostigma, and agreeing with the description of the former

except as indicated below.

Coloration. Head fulvous; postfrons with tawny suffusions. Lower parts of sternopleuron and meropleurite dark brown, their upper parts tawny to reddish brown like the greater part of thoracic pleura. Fore femur dark brown; leg coloration otherwise as given for E. filicornis. Wing pattern as described for E. hypostigma. Abdominal coloration as described for E. hypostigma.

Head. Height of cheek 0.37-0.39 of height of eye; eye 1.6-1.7 times as high as long.

Thorax. Hairs on humeral callus of ♀ only slightly shortened anteriorly; scutellum with slight but distinct apical depression; basalare with short broadly angular process fringed with pubescence in both sexes; tegula of ♀ only very slightly larger than that of ♂, not modified. Wing with vein 6 normal, pigmented and sclerotized to within a short distance of margin.

Abdomen. ♂: tergites 3 and 4 short, tergite 5 large, about half as long as the whole preabdomen; ♀ : tergite 5 with posterior margin straight, entire; spiracles of segments 4 and 5 dorsal, but not quite as close to median line as in E. filicornis. ♂ postabdomen not examined.

Dimensions: total length, ♂ 8.1 mm., ♀ 7.5-7.8 mm.; length of thorax, ♂ 3.6 mm., ♀ 3.7-3.8 mm.; length of wing, ♂ 8.0 mm., ♀ 8.1-8.6 mm.

Distribution: Queensland - McPherson Range.

Material examined: Lamington National Park, ii 1963 (holotype ♀ , QM, paratype ♂ , UQ), A. Macqueen, G.M.; Picnic

Rock, West Canungra Creek, Lamington National Park, ii 1958 (paratype ♀, AM), H.G. Greening.

Habitat: probably rain forest, as this is the predominant vegetation in the given localities.

Comparative notes: most readily distinguished from other species of the scatophaga species group by the very short but distinct, subacute basalar process of both sexes.

Eupsosopia filicornis new sp.

(Figs. 96)

♂ ♀ . Coloration. Head buff; postfrons with yellow-brown central area which tends to become broken into blotches in some specimens; postfrons and parafacial with narrow whitish pruinescent orbital margins; face with a rather narrow dark brown mark between each antennal groove and epistomal margin, also a small brown mark near lower lateral angle of face; occiput with some dark markings in upper part, densely whitish-pruinescent except near vertex; antenna yellow-brown; arista yellow-brown at base, blackish beyond; prelabrum yellowish, blackish brown on upper lateral part; palpus brown in centre, fulvous at base, apex and ventral margin. Mesonotum with reddish brown ground colour, the scutum with extensive blackish grey markings, the whole with markings of light grey to yellowish pruinescence; pleura with reddish brown ground colour, largely covered with pale greyish yellow pruinescence. Femora tawny with approximately their distal thirds brown, fore femur darkest and with additional basal anterior dark brown blotch; fore tibia brown; middle and hind tibiae fulvous, broadly browned

distally and the latter slightly browned basally; tarsi dark brown to black, basal segment, except at apex, creamy white. Wing: base of marginal cell with 2 or 3 separate blackish spots before stigmatal band; narrow broken stripe on anterior part of wing between stigmatal and discal bands separate from stigmatal band except sometimes for a linear connection along vein 3; preapical band interrupted in first posterior cell, fusing with discal band in region of posterior crossvein; apical mark large, enclosing a distinct hyaline dot; squama very pale brown with creamy margin. Haltere yellowish. Abdominal tergites 1 and 2 tawny with brown markings; tergites 3-5 brown with few grey or yellowish pruinescent markings.

Head, slightly higher than wide; facial carina irregularly rugose; height of cheek 0.31-0.36 of height of eye, its anterior ridge well developed, smooth; eye 1.7-2.0 times as high as long; outer vertical and cheek bristles present, sometimes a minute upper fronto-orbital; other head bristles absent. Antenna extending about half way from its basal insertion to epistomal margin; arista simple, filiform, with a few minute hairs near base. Prelabrum well developed, densely sulcate; palpus narrow.

Thorax. Hairs on posterior part of humeral callus shortened in ♀, scarcely so in ♂; scutellum with outline at apex transverse, almost straight or very slightly sinuate medially; basalare with minute process anteriorly, consisting of little more than a raised tuft of pubescence; tegula not obviously modified in either sex but extending slightly further over basalare in ♀ than in ♂;

the following thoracic bristles present: prescutellar acrostichal, dorsocentral, humeral (in both sexes), 1 + 1 notopleurals, supra-alar, postalar, intra-alar, usually 3 pairs of scutellars, the apical ones rather widely separated from each other. Fore femur with complete series of posteroventral bristles, basal ones weak, hair-like, those on distal quarter black, the remainder white. Wing with distal section of vein 4 subparallel with vein 3 for most of its length; vein 6 abbreviated, extending approximately half way from anal cell to wing margin, thereafter connected to margin by an unpigmented fold.

Abdomen with numerous scales on tergites 3-5, tergite 2 with fringe of scales on posterior margin; ♂ : tergite 5 much longer than tergite 4, but not as long as tergites 3 and 4 combined; ♀ : tergite 5 nearly as broad as but little more than half as long as tergite 4, deeply incised on posterior margin; tergite 6 much reduced and generally concealed in dried specimens; spiracles of segment 4 situated dorsally between tergites 4 and 5; spiracles of segment 5 situated very close together within a median dorsal incision of tergite 5. ♂ postabdomen: outer and inner surstyli united for the greater part of their length; free part of outer surstylus only slightly narrowed, apically thickened, rounded and slightly incurved; free part of inner surstylus short with the usual 2 black teeth, of which the apical one has a posteriorly directed point; aedeagus very slender; stipe moderately long, preglans and glans slender; filaments exceptionally long, slightly shorter than stipe; cercus with rather long hairs and with a single longer and thicker bristle.

Dimensions: total length, ♂ 6.6-7.5 mm., ♀ 6.1-8.2 mm.; length of thorax, ♂ 3.2-3.6 mm., ♀ 2.8-3.8 mm.; length of wing, ♂ 6.6-7.0 mm., ♀ 6.2-7.4 mm.

Distribution: New South Wales - sea coast.

Material examined: Kurnell, near Sydney, ii 1964 (holotype ♂, AM), i ii 1963-1964 (paratypes, 8 ♂, 5 ♀, AM, 1 ♂, 1 ♀, BM, 1 ♂, 1 ♀, USNM), D.K.M.; Coogee, near Sydney, xii 1922 (paratypes, 2 ♂, 2 ♀, AM), F.A. McNeill; Bronte, near Sydney, i 1966 (paratype ♀, AM), D.K.M.; Shoal Bay, near Port Stevens, x 1962 (paratype ♀, AM), K.E.

Habitat: sandy areas, series from Kurnell taken on lower branches of Cupaniopsis anacardioides (artificially planted and not native to area).

Comparative notes: most readily distinguished from other species of the scatophaga group by the abbreviated vein 6, which does not extend more than about half way from the anal cell to margin.

Euprosopia scatophaga Malloch

(Fig. 97)

Euprosopia scatophaga Malloch, 1930a:431-432.

♂ ♀ . Generally similar to E. filicornis and agreeing with the description of that species except as indicated below.

Coloration. Face with strong blackish brown mark between each antennal groove and epistomal margin. Fore femur dark brown to blackish brown; other femora deep reddish brown to dark brown usually darker distally. Wing with preapical band not interrupted, forming, with discal band a conspicuous V-shaped mark.

Head. Antenna extending slightly over half way from its basal insertion to epistomal margin; arista with well developed preapical lanceolate expansion in ♂, faintly thickened beyond middle in ♀.

Thorax. Wing with distal section of vein 4 sub-parallel to or slightly converging distally with vein 3, curved forwards at extreme apex; vein 6 not much abbreviated, pigmented and somewhat sclerotized for considerably more than half way from anal cell to margin.

Abdomen. ♀ : spiracles of segments 4 and 5 situated dorsally, but not quite so close to median line as in E. filicornis. ♂ postabdomen generally as described for E. filicornis; filaments of aedeagus unequal, one being considerably more slender distally than the other.

Dimensions: total length, ♂ 4.9-6.8 mm., ♀ 6.0-8.9 mm.; length of thorax, ♂ 2.6-3.3 mm., ♀ 3.1-4.6 mm.; length of wing, ♂ 5.1-6.9 mm., ♀ 6.4-8.7 mm.

Distribution: Queensland - north-central districts; New South Wales - Hunter R. district.

Material examined: Queensland: Eungella and vicinity, iii 1929 (holotype ♀, paratypes, 4 ♀, SPHTM; also 2 paratypes USNM according to Lee, Crust, and Sabrosky, 1956), F.H. Taylor, xii 1961 (1 ♂, 1 ♀, AM), D.K.M.; xii 1965 (1 ♂, 1 ♀, UQ), G.M.; Finch Hatton Gorge, Mackay district, xii 1961 (1 ♂, 1 ♀, AM), D.K.M.; Little Crystal Creek, Mount Spec, near Paluma, xii 1954 (3 ♀, UQ), anon. New South Wales: Upper Allyn, near Eccleston, ii 1968 (1 ♀, CSIRO), D.H.C.

Habitat: forest and partly cleared areas; some specimens on faeces of horse and cow.

Comparative notes: distinguished from other species of the scatophaga species group by the complete, regular preapical band which forms a V-shaped mark with the discal band; the preapical expansion of the arista in ♂ is quite distinctive. The specimen listed above from Upper Allyn may prove to belong to a distinct species. It differs in having the spiracles of segment 5 exceedingly close together and the preapical band of wing irregularly incised. It is not, however, referable to E. filicornis.

Euprosopia ramosa new sp.

(Fig. 72, 94)

♀ . Coloration. Postfrons dark brown, reddish brown from centre to vicinity of ocelli; postfrons and parafacial with whitish pruinescent orbital margins, widest at the junction of the two; parafacial dark brown; facial carina, lower median part of face, and upper part of ocellar groove pale buff; entire lower lateral angle of face to inner margin of antennal groove and almost to centre of epistomal margin dark brown to black; cheek brown anteriorly, paler posteriorly, where it is densely whitish-pruinescent; occiput yellowish buff below, brown above, entirely whitish-pruinescent; antenna reddish brown, segment 2 dark brown; arista deep reddish brown at base, black beyond; prelabrum black, dark brown in centre; palpus dark brown, slightly paler basally. Mesoscutum with blackish ground colour becoming reddish brown laterally, with yellowish grey pruinescent markings; scutellum dark brown, paler laterally, with

thin grey pruinescence; pleura reddish brown with yellowish and greyish pruinescence, lower part of sternopleuron suffused with dark brown. Fore leg black, extreme apices of trochanter, femur, and tibia yellow-brown; all tarsi black with basal segment creamy except at apex; middle and hind femora dark brown; middle and hind tibiae reddish brown, broadly blackened distally. Wing pattern as in fig.72; stigmatal band complex, divided into two in front of vein 3 through the incorporation of an additional stripe corresponding to the broken stripe between stigmatal and discal bands of E. filicornis; discal and preapical bands broad, not incised, fused into a Y-shaped band and separate only in front of vein 3, separate from the large blotch in centre of second posterior cell; apical mark large, diffuse posteriorly, enclosing a diffuse pale spot in first posterior cell; squama, including margins, brown. Haltere tawny. Preabdominal tergites dark brown, with some light brown suffusions on tergite 1 and sides of tergite 2.

Head approximately as high as wide; upper part of postfrons slightly depressed; facial carina very weakly rugose; height of cheek 0.32 of height of eye; anterior cheek ridge well developed, smooth; eye 1.6 times as high as long; chaetotaxy of head as given for E. filicornis. Antenna extending half way from its basal insertion to epistomal margin; arista filiform almost bare, with a few basal hairs whose length is not more than $\frac{1}{4}$ of maximum diameter of arista. Prelabrum strongly developed, almost smooth; palpus moderately narrow.

Thorax. Humeral callus with long pale hairs anteriorly,

those near posterior extremity somewhat shorter and black; scutellum with outline between the apical bristles transverse and slightly concave; basalar process elongate, finely pointed at apex, almost erect at base, thence curving forwards and slightly downwards; tegula only very slightly enlarged and not otherwise modified; the following thoracic bristles present: prescutellar acrostichal, dorsocentral, a long but rather weak humeral, 1 + 2 notopleurals, supra-alar, postalar, posterior intra-alar; 3 pairs of scutellars, the apical ones rather widely separated from each other. Fore femur with moderately developed series of black posteroventral bristles which are almost obsolete basally. Wing with distal section of vein 4 almost parallel with vein 3, only slightly curved; vein 6 well developed, reduced to a fold near margin.

Abdomen. Tergites 2 and 3 with sparse fringe of narrow scales on posterior margins; tergites 4 and 5 with mucronate surface scales; tergite 4 somewhat longer than either tergite 3 or tergite 5; pleural membrane with some fine, pale, silky hairs in vicinity of segment 5; spiracles of segment 4 not visible in type, presumably concealed between tergites 4 and 5; spiracles of segment 5 situated dorsally but well separated from one another and situated in shallow separate impressions in posterior margin of tergite 5.

Dimensions: total length 9.4 mm.; length of thorax 5.2 mm.; length of wing 10.2 mm.

Distribution: Queensland - Atherton Tableland.

Material examined: The Crater (or Mount Hypipamee), near Herberton, 3,100 ft., i 1967 (holotype ♀, AM), D.K.M.

Habitat: rain forest.

Comparative notes. The unique type clearly represents a very distinct species of the scatophaga species group. Even if the duplicated posterior notopleural bristle proves to be inconsistent, the dark colouring of the head, the wing pattern, and the curiously developed basalar process of the female, somewhat similar to that of E. crispa, will serve to distinguish it.

Euprosopia macrotegularia Malloch

(Figs. 76, 86)

Euprosopia macrotegularia Malloch, 1928a:345-346, fig.1; 1929:512; 1930a:430.

♂ ♀ . Similar to E. subula in most characters, and differing in the characters given below.

Coloration. Mesoscutum with median black band (partly obscured by pruinescence) narrowed or discontinuous near scutellum, so that the pair of non-pruinescent prescutellar spots are entirely brown, not black. Fore femur often rather extensively reddish brown basally. Wing with preapical band usually complete, or only narrowly broken in first posterior cell. Abdominal tergite 2 usually with extensive yellowish or tawny areas.

Thorax. ♀ : tegula as long as in E. subula, somewhat broadened anteriorly, depressed on that surface which is uppermost when the wings are raised; supra-alar bristle well differentiated from the bristles in front of it, which are usually much shorter.

Abdomen. Preabdomen of ♀ : tergite 5 broader than in E. subula; spiracles of segment 5 somewhat removed from margin of tergite 5 and situated approximately level with its posterior extremity. ♂ postabdomen: generally very similar to that of E. subula; outer surstylus distinctly longer than inner.

Dimensions: total length, ♂ 4.0-10.9 mm., ♀ 6.4-10.4 mm.; length of thorax, ♂ 2.2-4.9 mm., ♀ 2.9-5.0 mm.; length of wing, ♂ 4.9-9.4 mm., ♀ 6.6-10.0 mm.

Distribution: north-eastern Queensland, as far south as Tully River.

Material examined: Coen, xi 1947 (1 ♀ , UQ), H. Pottenger; Daintree R., 6 miles NW of Daintree, xii 1958 (1 ♂, AM), D.K.M.; Daintree, xii 1958 (1 ♂, 4 ♀ , AM), D.K.M.; Kuranda, v 1958 (3 ♂, 2 ♀ , AM), D.K.M., x 1910 (3 ♀ , BM), F.P.D.; Mulgrave R., 4 miles W of Gordonvale, i xii 1958-1967 (13 ♂, 20 ♀ , AM, 1 ♂, 1 ♀ , CSIRO), R.L., G.A.H., and D.K.M.; Little Mulgrave R., Gordonvale district, xii 1961 (1 ♂, 6 ♀ , AM), D.K.M.; 2 miles N of Tully R. bridge, E of Cardstone, Cardstone-Ravenshoe road, i 1967 (1 ♀ , AM), G.A.H. and D.K.M.

Habitat: gallery forest and rain forest near streams, usually seen resting on tree trunks.

Euprosopia subula new sp.

(Figs. 20, 75, 85)

♂ ♀ . Coloration. Head buff; frons with a large brown central area, which is expanded posteriorly to reach eyes; face with a blackish brown stripe on each side which extends from inner

side of lower extremity of antennal groove almost to epistomal margin; cheek with a large brown area in front of middle; occiput largely brown with whitish pruinescence; antenna yellowish brown, arista, beyond the basal part, blackish; prelabrum shining black, yellow in centre; palpus blackish with grey pruinescence, yellowish at base; proboscis dark brown. Thoracic colouring generally typical of the genus; mesoscutum with central area of black ground colour, broad, reaching to outer ends of scutellar bridges posteriorly and of almost uniform width in postsutural section, largely obscured by greyish yellow pruinescence but showing through as a pattern of symmetrical blackish markings. Fore legs black, the femur usually with a very small amount of reddish brown colouring at base; middle and hind femora varying shades of brown, darker distally; middle and hind tibiae dull fulvous, blackish on distal third, often variably brownish basally; middle tarsus black; hind tarsus with two basal segments deep brown, the three distal segments black. Wing with blackish markings, those on distal part of wing slightly variable; preapical band usually broken into spots; squama buff with light brown central area. Haltere pale yellowish. Preabdominal tergites dark brown with variable creamy median markings and grey lateral markings.

Head slightly elongate in a vertical direction, about 1.2 times as high as wide; postfrons almost horizontal for most of its length, gibbous anteriorly and dropping away abruptly to ptilinal suture; facial carina with numerous closely placed horizontal grooves, impressed on each side below where the facial marks

encroach on its margins; height of cheek 0.40-0.50 of height of eye, the anterior ridge weakly developed; eye 1.6-1.9 times as high as long; outer vertical bristles present; no inner vertical, postvertical, fronto-orbitals or ocellar; cheek bristle weak or not differentiated. Antenna short, extending for not more than half the distance from basal insertion to epistomal margin; arista filiform in both sexes, with some basal hairs which are not or only slightly longer than its basal diameter. Prelabrum broad; palpus slightly broadened in ♂.

Thorax. Humeral callus haired, the hairs shorter in ♀ than in ♂; scutellum somewhat truncate at apex, with short decumbent hairs on dorsal surface but none on sides; basalare without process; tegula normal in ♂, in ♀ very long, extending to humeral callus, its free section slender, cylindrical, slightly tapering; the following thoracic bristles present; prescutellar acrostichal, posterior dorsocentral, no humeral, a weak anterior notopleural, sometimes absent in ♀, a posterior notopleural present in ♂ only, supra-alar often short in ♂, in ♀ well developed with a group of bristles in front, some of which may rival the supra-alar in size; a group of rather long setulae just in front of transverse suture on either side, postalar, intra-alar, 2 pairs of scutellars, the apical ones widely separated. Fore femur with numerous short posteroventral bristles distally, and a very long fine spatulate one just beyond middle in ♂, which is normally absent or little developed and not spatulate in ♀; fore tibia with a strong dorsal longitudinal ridge and thickened setulae,

especially on dorsal surface. Wing with veins 3 and 4 subparallel distally.

Abdomen with tergites 2-5 scaly, more profusely so in ♂; tergite 5 of ♀ rounded-ovate with spiracles situated a little behind middle of lateral margin; sternite 3 obsolete, sternite 4 reduced; sternite 5 broad and well developed in ♂, much reduced in ♀. ♂ postabdomen: outer and inner surstyli elongate, slender, almost straight, free for most of their length, united only at their broadened bases, subequal in length, the outer exceeding the inner one by only a minute distance; outer surstylus nearly smooth, with few minute setulae; inner surstylus more slender, with roughened surface, especially on distal part, a rounded black tooth on inner surface near base and a terminal somewhat black tooth; aedeagus with rather slender, bare stipe; proglans sclerotized, not as long as wide; glans short and stout; filaments about one and a half times as long as glans.

Dimensions: total length, ♂ 5.8-8.5 mm., ♀ 5.7-8.7 mm.; length of thorax, ♂ 2.7-4.4 mm., ♀ 2.4-4.7 mm.; length of wing, ♂ 5.6-8.5 mm., ♀ 4.9-9.0 mm.

Distribution: New South Wales and Queensland - coast districts as far north as Mackay; also vicinity of Canberra, Australian Capital Territory.

Material examined. New South Wales and Australian Capital Territory: vicinity of Waterfall Creek to Frew's Creek, Port Hacking R., Royal National Park, near Sydney, iii 1965 (holotype ♀, AM), i iii 1958-1965 (paratypes, 5 ♂, 9 ♀, AM, 1 ♂, 2 ♀, BM), D.K.M.; Ourimbah, near Gosford, iii 1959 (paratype ♂, AM),

K.E.; Nepean R. (southern tributary of Hawkesbury R.), iii 1933 (paratype ♀, AM), A.M.; Otford, Illawarra District, xii 1957-1962 (paratypes, 4 ♂, 6 ♀, AM, 1 ♂, 1 ♀, USNM), K.E., D.K.M.; Cabbage Tree Creek, foot of Clyde Mountain, near Nelligen, i ii 1955-1956 (paratypes, 1 ♂, 5 ♀, CSIRO), E.B.B., D.H.C., Z.R.L.; Paddy's R., Canberra, i iv 1952-1959 (paratypes, 2 ♂, CSIRO), D.L. McIntosh, K.R.N. Queensland: Finch Hatton Gorge, Mackay district, xii 1961 (1 ♂, 3 ♀, AM), R.L. and D.K.M.; Mackay, vi 1960 (1 ♀, UQ), R. Jones; D'Aguilar, 47 miles N of Brisbane, i 1961 (1 ♂, UQ), M. Ludlow; Highvale, 14 miles NW of Brisbane, i 1960 (4 ♂, 2 ♀, CSIRO), R.S., 1960 (1 ♀, UQ), J. Bryan; Brisbane, xii 1913 (1 ♂, BM), H.H.; Lawes, near Gatton, xii 1950 (1 ♀, UQ), J.B. Ritson; Nindoocinbah, near Boaudesert, ii v 1954 (2 ♀, CSIRO), K.R.N.; Boonah, x 1958 (1 ♀, UQ), Haseler.

Habitat: stream margins in forested country. Specimens taken along the Port Hacking River at Otford and Royal National Park were resting on rocks on the bank and in mid stream. Those from Finch Hatton Gorge were taken on tree trunks.

Comparative notes. The only closely related species is E. macrotegularia. In addition to the characters given in the key, this species may usually be distinguished from E. macrotegularia by the almost entirely dark brown ground colour of abdominal tergite 2 (which has generally extensive yellowish areas in E. macrotegularia), and the break in the preapical wing band where it crosses the first posterior cell (this band usually entire in E. macrotegularia).

Euprosopia anostigma n. name

(Figs. 10, 11, 15, 16, 79)

Platystoma australis Walker, 1849:1061, primary and secondary junior homonym of P. australis Macquart, 1846 (see under E. maculipennis (Guérin)).

Euprosopia australis: Hendel, 1914a:149; 1914b:363.

Euprosopia tenuicornis Macquart: Hendel, 1914a: Pl.13, fig.253, pl.14, fig.252; 1914b:336-337, pl.2, fig.40; Malloch, 1928b:612. Misidentifications.

♂ ♀ . Coloration. Head buff; postfrons largely suffused with brown; postfrons and parafacial with whitish-pruinescent orbital margins; face with the usual blackish mark between each antennal groove and epistomal margin, the lower lateral angle of face tawny brown; cheek with inconspicuous brownish suffusion below eye; occiput darkened above, but its entire surface obscured by whitish pruinescence; antenna light yellow-brown, arista fulvous basally, otherwise black including palette of ♂; prelabrum broadly yellowish in centre, brown or blackish at sides; palpus deep brown, yellowish at base and apex, with greyish pruinescence. Thorax varying shades of brown with grey-pruinescent and blackish markings. Femora and fore tibia tawny brown to dark brown; middle and hind tibiae orange-tawny; fore and middle tarsi with basal segment whitish, brown at apex, the other segments dark brown; hind tarsus with basal segment creamy, yellow-brown at apex, second segment reddish brown, other segments darker brown. Wing with narrow stripe between stigmatal and discal bands not represented in discal cell, except sometimes for one or two isolated dots;

apical mark continued broadly along costa to unite with preapical band; squama buff with pale brown central area. Haltere creamy white, the scabellum tawny or fulvous. Preabdominal tergites dark brown with grey markings.

Head very slightly higher than wide; postfrons slightly depressed in middle; frontal lunule with a median tubercle and forming a raised rim above antennal socket on each side; facial carina finely irregularly granulose and rugose; height of cheek 0.40-0.42 times as high as eye, the anterior ridge distinct, smooth; eye about twice as high as long; outer vertical and cheek bristles present but no other distinct bristles on head. Antenna usually extending slightly more than half way from its basal insertion to epistomal margin; arista simple in ♀, strongly spatulate at apex in ♂, the basal part with very minute pubescence. Prelabrum moderately developed; palpus not broadened.

Thorax. Humeral callus in ♂ with long hairs on entire surface, in ♀ with long hairs on anterior part but with hairs somewhat shortened posteriorly; scutellum evenly rounded; basalare without process; tegula not obviously enlarged or produced in either sex but extending slightly further over anterior margin of basalare in ♀ than in ♂; thorax with the following bristles: prescutellar acrostichal, dorsocentral, humeral present in ♂ only, 2 well developed notopleurals, supra-alar, postalar, intra-alar, 3 pairs of scutellars, the apical ones not much further from each other than from the intermediate ones. Fore femur flattened on ventral surface, without posteroventral bristles; fore tibia normal in ♀, with the following modifications in ♂: ventral surface except

towards base broadly desclerotized, thrown into transverse folds, and devoid of setulae, a dense group of short black more or less decumbent bristles situated on basal part of ventral and postero-ventral surfaces; basal segment of fore tarsus in ♂ only with 2 curved bristles at apex posteriorly, which are flattened and slightly expanded distally, second segment sometimes with one or two bristles which are similar but short and straight. Wing with veins 3 and 4 subparallel distally, the latter curved forwards at extreme apex; discal cell rather strongly expanded at distal end through the backward curvature of vein 5.

Abdomen with tergite 2 and parts of tergite 1 long-haired; ♂ : tergites 2-5 scaly, scales on tergites 2 and 3 forming a fringe on posterior margin, those on tergites 4 and 5 scattered over surface; tergite 5 slightly shorter than length of tergites 3 and 4 combines; ♀ : narrow scales on posterior margins of tergites 2 and 3 only; tergite 5 squarish, about one third as wide as tergite 4; tergite 6 distinct but small and divided into 2 plates; spiracles of segment 5 situated at the rounded posterior angles of tergite 5, those of segment 4 situated dorsally, close behind posterior margin of tergite 4 and not or very slightly further apart than those of segment 5; spiracles of segment 6 enclosed within the tergal plates; pleural membrane with long white silky hairs in the region of segments 4-5; in both sexes sternites 1-4 well developed, sternite 5 much reduced in ♀ . ♂ postabdomen with outer surstylus abruptly narrowed well beyond middle into a subcylindrical strongly backwardly curved distal

section with a tubercle on inner surface just beyond the constriction and minute setulae at apex; inner surstylus slightly shorter, with a subterminal black tooth on inner surface and a terminal backwardly curved one; aedeagus with rather long stipe which has a line of dense pubescence on basal half; preglans well defined and sclerotized; filaments long, equal, slightly thickened apically, about 3.5 times as long as glans; cerci rather broad.

Dimensions: total length, ♂ 8.0-11.2 mm., ♀ 8.7-9.8 mm.; length of thorax, ♂ 5.0-5.6 mm., ♀ 4.9-5.2 mm.; length of wing, ♂ 9.7-10.8 mm., ♀ 9.2-10.4 mm.

Distribution: New South Wales - coastal areas: Queensland - southern coast; Victoria - far east coast.

Material examined. New South Wales: Sydney, no date (holotype ♀ of Platystoma australis Walker, BM), anon.; Kurnell, near Sydney i ii xii 1925-1967 (35 ♂, 40 ♀, AM, 2 ♂, 2 ♀, BM, 2 ♂, 2 ♀, USNM), B. Bertram, D.K.M.; Lake Narrabeen, near Sydney, xii 1938 (1 ♀, AM), anon.; Broken Bay, xii 1923 (1 ♀, CSIRO), I.M.M.; Catherine Hill Bay, near Lake Macquarie, iv 1949 (1 ♂, CSIRO), S.J.P.; Iluka, Clarence R., xi 1964 (1 ♂, AM), D.K.M. Queensland: Bribie Island, i 1915 (1 ♀, UQ), anon.; Stradbroke Island, xii 1913 (1 ♀, UQ, 1 ♂, 1 ♀, USNM), H.H. Victoria: Wingan, S of Genoa, iii 1946 (1 ♀, NMV), anon.

Habitat: forested areas within a short distance of sea, usually taken on tree trunks.

E. anostigma is a replacement name for Platystoma australis Walker, having the same type.

Euprosopia armipes new sp.

(Fig. 73)

♂ ♀ . Very similar to E. anostigma, and agreeing with the description given for that species except as indicated below.

Coloration. Paired facial marks brown rather than blackish; palette of ♂ arista colourless, transparent. Hind tarsus coloured as fore and middle tarsus. Wing (Fig.73) with a narrow transverse stripe in discal cell between stigmatal and discal bands.

Head. Height of cheek 0.30-0.41 times height of eye; eye 1.7-1.8 times as high as long. Antenna extending for about half or slightly more of distance from its basal insertion to epistomal margin. Palpus very slightly broadened distally.

Thorax. ♂ : humeral callus haired as in E. anostigma; ♀ : humeral callus with some rather long hairs anteriorly but all hairs on posterior half much reduced, those towards posterior extremity obsolete. ♂ : fore femur with a slight depression on posteroventral surface at about one quarter of its length from apex; fore tibia with dense group of black bristles long, semi-erect, brush-like, very conspicuous: basal segment of fore tarsus with the pair of apical posterior bristles not as long as in E. anostigma but much more strongly clavate.

Abdomen. ♀ : spiracles of segment 4 much further apart than those of segment 5, situated slightly above posterior angles of tergite 4 and well removed from anterior angles of tergite 5; pleural membrane with comparatively few, short, inconspicuous

hairs in region of segments 4-5. ♂ postabdomen: outer surstylus, beyond the constriction, expanded into a large, straight, leaf-like, round-tipped lamina; aedeagus with glans rather large but few other details apparent in the single damaged specimen.

Dimensions: total length, ♂ 10.6 mm., ♀ 6.0-10.1 mm.; length of thorax, ♂ 5.0 mm., ♀ 3.2-5.4 mm.; length of wing, ♂ 9.3 mm., ♀ 6.9-10.4 mm.

Distribution: New South Wales - north coast; Queensland - south coast.

Material examined. New South Wales: Iluka, Clarence R., xi 1964 (holotype ♀ , paratype ♀ , AM), D.K.M. Queensland: Mullet Creek, near Bundaberg, iv 1959 (paratype ♀ , CSIRO), T.G.C.; Nambour, xii 1957 (paratype ♀ , UQ), Kirkpatrich; Brisbane, i 1929 (paratype ♂, AM), G.H.H.

Habitat: specimens from Iluka taken in rain forest near sea.

Comparative notes: the presence of an additional transverse stripe between the stigmatal and discal bands in the discal cell distinguishes this species from others of the tenuicornis species group.

Euprosopia monodon new sp.

(Figs. 74, 84)

♂ ♀ . Coloration. Head yellow-buff; postfrons brown centrally, darkest anteriorly; postfrons and parafacial with broad whitish pruinescent orbital margins; face with dark brown mark between each antennal groove and epistomal margin, which extends as a suffusion to lowerlateral angle; cheek with slight

brownish suffusion below eye; occiput with some dark markings above, its surface, except near vertex, covered with whitish pruinescence; antenna yellowish brown, arista fulvous basally, otherwise dark brown except for the colourless apical palette in ♂: prelabrum yellowish in centre, brown at sides; palpus dark brown, yellowish at base and also at apex where it is covered with pale grey pruinescence. Mesoscutum deep reddish brown with extensive yellow-grey pruinescent markings; scutellum similarly marked but with darker ground colour; thoracic pleura entirely tawny but with irregular covering of yellow to grey pruinescence. Femora reddish brown, the fore one often partly tawny; tibiae tawny, the hind one darkened distally; tarsi black except the basal segment of each which is creamy white, darkened apically and on ventral surface. Wing pattern as in fig.74; basal section of first basal cell with a large blackish area containing 3 hyaline spots, of which only the basal one may extend most of the distance across the cell; preapical band somewhat irregular, not approaching the discal band posteriorly and separate anteriorly from the apical mark which is not hyaline in centre; squama pale buff with large pale brown central area. Haltere creamy; scabellum pale yellowish to fulvous. Preabdominal tergites reddish brown with greyish markings, darker brown in ♀ .

Head very slightly higher than wide; frontal lunule with narrow median tubercle; facial carina almost smooth; height of cheek 0.32-0.37 of height of eye, the anterior ridge moderately developed; eye 1.6-1.9 times as high as long; outer vertical

and cheek bristles well developed; no other cephalic bristles. Antenna extending for slightly more than half the distance from basal insertion to epistomal margin; arista simple in ♀, spatulate in ♂, apparently bare. Prelabrum somewhat shortened (i.e. transversely narrowed) anteriorly; palpus slightly broadened distally and somewhat shortened, not nearly attaining level of anterior extremity of prelabrum.

Thorax. Humeral callus in ♂ with long hairs on entire surface, in ♀ with all hairs confined to anterior part, the posterior part devoid of pruinescence also, smooth, shining; scutellum with rounded outline; basalare of ♀ with well-developed but rather short, tapering, thorn-like process; tegula almost normal in ♂, in ♀ produced into a stout process which extends forward a little beyond posterior notopleural bristle; thoracic chaetotaxy as described for E. anostigma. Fore leg of ♂ : femur with a broad, compressed, distally directed posteroventral tooth just beyond middle, distal posteroventral bristles weakly developed, posteroventral ridge absent beyond the tooth; tibia with soft, folded ventral area present but less developed than in E. anostigma, contiguous with a broad conspicuously flattened or slightly concave posteroventral membranous area which is sparsely setulose and occupies slightly more than the distal half of tibia, some short thick fulvous posteroventral bristles towards base of tibia; tarsus with pair of hooked clavate bristles at apex of basal segment posteriorly; fore leg of ♀ : femur without posteroventral tooth, a slight rounded prominence in this position;

tibia without modifications noted for ♂, except that there is a narrow, slightly depressed posteroventral strip which is nearly devoid of setulae; tarsus of ♀ without clavate bristles on basal segment; hind trochanter of ♂ without ventral process. Wing with veins 3 and 4 subparallel distally, the latter slightly curved forwards at apex; discal cell somewhat expanded distally.

Abdomen with tergite 2 haired on most of surface, except for a pair of sublateral areas on posterior margin which are shortly setulose like the succeeding tergites, with fringe of narrow scales on posterior margin; ♂ : tergites 3-5 almost uniformly setulose, with scales which are sparse on tergite 3 except along its posterior margin, numerous on tergites 4 and 5; tergite 4 a little longer than tergite 3, shorter than tergite 5; ♀ : tergite 3 with numerous rather long hairs medially and a fringe of narrow scales on posterior margin; tergite 4 somewhat longer than tergite 3, with numerous scattered scales and some rather long hairs medially towards anterior margin; tergite 5 reduced, wider than long, not more than half as long as tergite 4, with pubescence and fine setulae but without longer hairs or scales; tergite 6 undivided; spiracles of segment 4 situated dorsally between tergites 4 and 5, those of segment 5 situated behind posterior margin of tergite 5. ♂ postabdomen not examined.

Dimensions: total length, ♂ 9.5-10.1 mm., ♀ 9.1-9.6 mm.; length of thorax, ♂ 5.5 mm., ♀ 5.1-5.2 mm.; length of wing, ♂ 10.1-10.6 mm., ♀ 10.0-10.4 mm.

Distribution: north-eastern Queensland.

Material examined: Tully R., 2 miles E of Cardstone, i 1967 (holotype ♂, paratypes, 1 ♂, 1 ♀, AM, paratype ♀, BM), G.A.H. and D.K.M.; Forestry Road, 22 miles SW of Ingham, 2,400 ft., iv 1961 (paratype ♀, CSIRO), R.S.

Habitat: specimens from near Cardstone taken on tree trunks in rain forest near stream margin.

Comparative notes. This is distinguished from other species of the tenuicornis species group by the uniform coloration of the sternopleuron and the separate preapical band and apical mark; in addition the male may be distinguished by the toothed fore femur and the female by the vestiture of tergite 3.

Euprosopia tenuicornis Macquart

(Figs. 7, 8, 9, 18, 83)

Euprosopia tenuicornis Macquart, 1847:90, pl.6, figs 4, 4a; Schiner, 1868:284; Tillyard, 1926:371, pl.25, fig.25; Malloch, 1930: 430-431. (Not E. tenuicornis: Hendel, 1914a, 1914b; Malloch, 1928b - misidentifications of E. anostigma, q.v.)

♂ ♀ . Generally similar to E. monodon, and agreeing with the description given for that species except as indicated below.

Coloration. Apical palette of ♂ arista blackish; palpus brownish, fulvous at base and along margins and more broadly so at apex where it has a thin covering of silvery pruinescence. Mesoscutum with extensive blackish grey markings; ground colouring of sternopleuron and meropleurite largely blackish except in their upper parts, their whole surface with rather thick greyish pruinescence. Wing with basal section of first basal cell with

3 or 4 quite separate blackish spots or transverse streaks. Preabdominal tergites dark brown with greyish markings.

Head. Prelabrum better developed and more strongly projecting anteriorly than in E. monodon; palpus extending forward approximately to level of upper margin of centre of prelabrum, but not as far as the more prominent lower margin.

Thorax. ♀ : humeral callus as described for E. armipes; basalar process present but very small; tegula extending forward approximately to level of posterior notopleural bristle but not beyond. Fore leg of ♂ : femur without posteroventral tooth but with a strong posteroventral ridge extending from near middle to distal extremity where it becomes weaker, the posteroventral bristles very weakly developed distally; tibia with folded ventral area on distal half, but with depressed posteroventral area little developed or almost indistinguishable; basal segment of tarsus without clavate bristles; fore leg of ♀ : femur with posteroventral ridge less developed than in ♂; tibia without differentiated ventral or posteroventral areas; hind trochanter of ♂ only with a short stout truncate ventral process, which is densely setulose on distal surface (fig. 83).

Abdomen. ♀ : tergite 3 with large median area of fine dense pubescence, which is devoid of setulae, hairs, or marginal scales; a small but otherwise similar area of fine pubescence medially on anterior margin of tergite 4; tergites 3-5 subequal in length or tergite 5 a little longer; spiracles of segment 4 situated dorsolaterally behind posterior margin of tergite 4 and lateral to anterior angles of tergite 5. ♂ postabdomen with surstyli

rather short and united for most of their length; outer surstylus stout, the free distal part incurved so that its apex lies closely over that of inner surstylus, with a preapical gibbosity; inner surstylus slightly shorter, the free distal section with a subterminal black anterior tooth and a black terminal tooth with posteriorly directed point; stipe of aedeagus long with some minute inconspicuous pubescence on anterior median line of basal half; preglans sclerotized and separated from sclerotized distal end of stipe by a constriction; glans of moderate size; filaments slightly longer than glans, their bases contained in a short, sclerotized tunic; cercus with a single strong setula in addition to the finer hairs.

Dimensions: total length, ♂ 5.9-9.4 mm., ♀ 7.1-9.8 mm.; length of thorax, ♂ 3.4-5.0 mm., ♀ 3.7-5.4 mm.; length of wing, ♂ 6.2-9.2 mm., ♀ 7.3-9.8 mm.

Distribution: Queensland - southern to north-central districts; New South Wales - coast district; Tasmania - doubtful record.

Material examined. Queensland: Townsville, no date (1 o , det. Hendel, BM), F.P.D.; Clermont, no date (1 ♂ , AM), K.K. Spence; Gatton, ii 1955 (1 ♀ , UQ), D. Nunn; Miami, Gold Coast, ii 1958 (1 ♂ , UQ) J. Martin. New South Wales: Toukley, near Wyong, i 1963 (1 ♂ , 5 ♀ , CSIRO), Z.R.L.; Broken Bay, xii 1923 (1 ♂ , 1 ♀ , CSIRO), J.M.M.; Deep Creek, near Narrabeen, i 1964 (1 ♂ , CSIRO), D.H.C.; Narrabeen, iii 1922 (1 ♂ , AM), A.M.; Sydney and suburbs, i ii xi xii 1909-1965 (16 ♂ , 10 ♀ , AM, 3 ♂ , 3 ♀ , CSIRO) various collectors; Kurnell, near Sydney, i ii iii v 1910-1967

(7 ♂, 41 ♀, AM, 1 ♂, 2 ♀, BM, 1 ♀, CSIRO, 1 ♂, 2 ♀, USNM) various collectors; Cronulla, no date (1 ♀, CSIRO), Purser; Como, near Sydney, ii 1922 (1 ♀, AM), A.M.; Sutherland, i 1951 (1 ♂, CSIRO), no collectors name; Heathcote, i ii iv 1961-1963 (1 ♂, 3 ♀, AM), R. Witchard; Otford, Illawarra District, ii 1964 (1 ♂, 1 ♀, AM), D.K.M.; Tahmoor, near Picton, i 1961 (8 ♂, 3 ♀, CSIRO), Z.R.L.; Durras Lake, near Bateman's Bay, ii 1965 (1 ♂, 1 ♀, CSIRO), D.H.C.; Bateman's Bay, i 1963 (1 ♀, CSIRO), I.F.C. and M.S.U. Tasmania: "Van Diemen" (Van Diemen's Land = Tasmania), no date (lectotype ♂ here designated, paralectotype ♂, OXN), anon.

Note on type locality. This species is not known to have been collected in Tasmania since its original description. The fact that, in New South Wales, the species is restricted to the warmer coastal lowlands, renders it improbable that the species would exist also in Tasmania. It is not known to occur in Victoria. G.H. Hardy (1929) considers that, of the species recorded by Macquart (1850) in the fourth supplement to his Diptères Exotiques as coming from Tasmania, "the majority if not all, were from Sydney." He further states: "In no way does this affect Tasmania as a locality in other parts of the Diptères Exotiques, but it does raise the question as to whether further mistakes have been made in location." As E. tenuicornis is very common in the vicinity of Sydney, it seems probable that Macquart's type came from that locality. On the other hand the Diptera of Tasmania are still far from adequately known and very few specimens

of Euprosopia are at present available from that state. A final decision on the type locality cannot therefore be made.

Note on type material. When looking for the type material of Macquart in the Bigot collection, now at Oxford, I found above the label "Euprosopia tenuicornis ♂ n.g. n.sp. Macq Van Diemen," the following material: 2 ♂ of the present species; 1 ♂, 1 ♀ of E. anostigma; 1 ♀ of E. megastigma. None of these specimens was individually labelled. Only the two males of the present species agree with Macquart's description and figure of wing and there is scarcely room for doubt that they represent the species he intended. I have therefore regarded these two specimens as syntypes for purposes of lectotype designation.

Habitat: most frequently in dry sclerophyll forest or isolated groups of trees, usually seen on tree trunks, also on human faeces.

Euprosopia comes new sp.

(Fig. 81)

♂ ♀ . Generally similar to E. conjuncta, E. inermis, and especially E. separata, and agreeing with the description of the first, except as indicated below.

Coloration of head and body somewhat paler than in E. conjuncta, more like that of E. inermis. Femora reddish brown, fore femur darker distally; dorsal surface of hind femur with group of black setulae near base and numerous black setulae on distal part, the intermediate region with whitish hairs or setulae and usually only a few scattered black setulae, at most forming two irregular

rows. Wing with 4 or more, sometimes quite numerous, hyaline marks in dark field in basal part of first basal cell; marginal cell with a transverse streak half way between stigmatal and discal bands, without yellowish suffusion between discal and preapical bands; preapical band well separated from the compact apical mark; squama whitish, sometimes slightly brownish in centre. Preabdomen: ♂ with tergites 1, 2 and basal part of 3 tawny with overlying greyish pruinescence; rest of tergites dark brown except for a grey median anterior patch on tergite 4; preabdominal tergites of ♀ grey, tawny ground colour showing through the grey pruinescence on tergites 1 and 2, tergites 2-4 brown on their posterior margins, or with brown area slightly removed from their posterior margins, tergite 5 largely brown.

Head. Height of cheek 0.27-0.35 of height of eye; eye 1.8-2.1 times as high as long. Arista of ♂ weakly spatulate apically.

Thorax. Humeral callus with long pale hairs on most of surface in both sexes; scutellum with distinct median apical depression, the swollen areas on either side strongly shining; basalar process vestigial in ♂, varying from vestigial to distinct but small and pointed in ♀; tegula unmodified in both sexes; mesopleuron with rather long predominantly pale hairs on most of surface in both sexes; humeral bristle well developed in both sexes. Fore femur with weak black posteroventral bristles distally; ♂: distal half of fore tibia with depressed, finely pubescent posteroventral strip almost devoid of setulae, and with folded coarsely pilose ventral area as in E. anostigma and E. monodon;

hind trochanter with a very dense ventral brush of short, even black setulae covering a small elongate oval area and not situated on a distinct prominence; hind femur with at most very slight basal curvature, not narrowed basally except for the constriction at its articulation with trochanter; hind tibia slightly expanded and compressed at distal end in a vertical plane; ♀ : fore tibia with the modified areas described for ♂ not distinctly differentiated; hind trochanter without brush of setulae; hind femur as described for ♂ ; hind tibia with distal expansion less marked than in ♂.

Abdomen. ♂ : tergites 3-5 with numerous broadly obovate scales on surface; ♀ : tergite 3 with well developed fringe of narrow marginal scales; tergite 4 sometimes with much smaller marginal scales and sparse surface scales; tergite 5 considerably shorter and narrower than tergite 4; spiracles of segment 4 situated on dorsal surface between tergites 4 and 5, closer to median line than to lateral margins of tergite 4; spiracles of segment 5 approximated dorsally in slight incisions in posterior margin of tergite 5, each situated closer to median line than to lateral margins of tergite 5. ♂ postabdomen: outer and inner surstyli united for almost their entire length, the former very slightly longer than the latter, together forming a straight, elongate, parallel-sided structure; outer surstylus terminating in a short pigmented section with a slight, blunt, posteriorly directed tooth; inner surstylus with 2 closely placed black teeth, the terminal one without posteriorly directed point;

aedeagus with rather slender stipe, pubescent on median line in basal half; preglans well developed, about twice as long as maximum diameter; glans subcylindrical, somewhat elongate; filaments equal in length, about one and a half times as long as glans but somewhat variable.

Dimensions: total length, ♂ 4.8–8.5 mm., ♀ 5.2–8.0 mm.; length of thorax, ♂ 2.4–4.4 mm., ♀ 3.0–4.1 mm.; length of wing, ♂ 4.9–8.4 mm., ♀ 5.8–7.7 mm.; length of glans of aedeagus, 0.33 mm–0.42 mm.

Distribution: Queensland - tropical section of east coast. The single record from Dunwich, in southern Queensland, requires confirmation.

Material examined: Mulgrave R., 4 miles W of Gordonvale, i 1959 (holotype ♂, AM), xii 1966 (paratype ♂, AM), G.A.H. and D.K.M.; Claudie R., near Mount Lamond, Iron Range district, v 1966 (1 ♀, AM), D.K.M.; Mowbray R., near Mossman, v 1960 (paratypes, 1 ♂, 1 ♀, CSIRO), T.G.C.; Bramston Beach, near Innisfail, iv 1967 (paratype ♂, CSIRO), D.H.C.; Ingham, vii 1958 (paratype ♀, CSIRO), K.L. Harley; Palm Island, near Ingham, no date (paratypes, 1 ♂, 3 ♀, CSIRO), T.L.B., i xii 1930–1931 (paratypes, 1 ♂, 8 ♀, CSIRO, 1 ♂, 1 ♀, BM), I.M.M.; Townsville, no date (paratypes, 1 ♂, SAM, 1 ♂, AM), G.F. Hill; Magnetic Island, near Townsville, no date (paratype ♂, SAM), anon.; Dunwich, North Stradbroke Island, iv 1958 (1 ♂, UQ), E.A. Bernays.

Habitat: specimens from Mulgrave R. and Claudie R. taken in rain forest near river bank.

Comparative notes. This species is exceedingly similar to E. separata but a useful character for distinguishing both sexes

is the reduction or absence of black setulae on the central part of the dorsal region of the hind femur. The male may also be distinguished from that of E. separata by the form of the hind trochanter and femur (fig. 81) and by the size of the glans of the aedeagus.

Euprosopia separata Hendel

(Fig. 82)

Euprosopia separata Hendel, 1914a:150, pl.14, fig.259; 1914b: 338-339, pl.2, fig.37; Malloch, 1928a:344-345; 1929:512.

♂ ♀ . Exceedingly similar to E. comes in most characters and deviating from the description of that species only in the following characters.

Coloration. Hind femur with black setulae on a broad dorsal area extending its full length.

Thorax. ♂ : brush of black setulae more compact than in E. comes, covering a rounded area and situated on a distinct prominence, the central setulae longer than the outer ones, thus giving the brush a narrowly rounded outline distally; hind femur strongly curved and narrowed basally, its maximum vertical diameter about 1.5 times that a short distance beyond base; hind tibia more strongly expanded distally than in E. comes.

Abdomen. ♀ : spiracles of segment 5 and closer to its lateral margin than to median line. ♂ postabdomen: glans of aedeagus larger than in E. comes.

Dimensions: total length, ♂ 7.2-9.1 mm., ♀ 6.7-9.2 mm.;

length of thorax, ♂ 3.2-4.6 mm., ♀ 3.5-4.8 mm.; length of wing, ♂ 7.0-9.1 mm., ♀ 7.4-9.4 mm.; length of glans of aedeagus 0.47-0.52 mm.

Distribution: North Queensland.

Material examined: Townsville, no date (1 ♀, det. Hendel, probably holotype but without type label, WM, 1 ♂, 3 ♀, BM), F.P.D.; Kuranda, ii vi xi 1910 (2 ♂, 3 ♀, AM, 10 ♂, 42 ♀, BM), F.P.D.; Thornton Range to Hutchinson Creek, Daintree R. district, i 1967 (1 ♀, AM), D.K.M.

Habitat: specimen from near Thornton Range taken in rain forest.

Notes. As the name E. separata Hendel (1914a) first became available through publication of a figure without description, the figure must be taken as representing the holotype. It is certain that the original figure and the photographic one subsequently published by Hendel (1914b: fig. 37) are taken from the same specimen, a right wing which was probably mounted on a slide. Though this mounted wing cannot now be found, I believe that the specimen preserved in WM and lacking the right wing is the rest of the holotype. Further specimens labelled "Cotype" (N.E. Queensland, no date, 2 ♀, BM, C.M.K.) have no type status.

Euprosopia inermis new sp.

Similar to E. conjuncta in most characters, and agreeing with the description given for that species except as indicated below. ♂ unknown.

♀. Coloration. Postfrons yellow, with brown suffusion

much lighter than in E. conjuncta; lower lateral angle of face yellowish; occiput usually not much darkened above; palpus brown, fulvous at base and apex, the latter with greyish white pruinescence. Sternopleuron usually extensively stained with dark brown, less so in holotype. Fore femur tawny; other femora tawny to reddish brown with variable darker brown suffusions. Wing without yellowish suffusion in marginal cell between discal and preapical bands.

Head. Height of cheek 0.23-0.30 of height of eye; eye 1.7-1.8 times as high as long; prelabrum with fine parallel grooves on entire surface.

Thorax. Humeral callus with numerous hairs, slightly shortened but still quite well developed posteriorly, and a strong humeral bristle; scutellum with marked median apical depression; basalar process reduced to a minute tuft of pubescence on a very slight prominence; tegula slightly enlarged, reaching almost to anterior edge of basalare, but not produced anteriorly; mesopleuron with hairs mostly fine, but those near centre not much shortened. Fore femur without well differentiated posteroventral bristles.

Abdomen. Spiracles of segment 5 situated dorsally, very close to posterior margin of tergite 5 but not within deep incisions of its posterior margin.

Dimensions: total length 6.1-8.8 mm.; length of thorax 3.6-5.0 mm.; length of wing 7.0-9.2 mm.

Distribution: north-eastern Queensland; Northern Territory.

Material examined. Queensland: Daintree R., 6 miles NW of Daintree, xii 1958 (holotype ♀, AM), D.K.M.; Dungeness, near

Ingham, xii 1962 (paratype ♀, CSIRO), K.R.N. Northern Territory: Darwin, no date (1 ♀, paralectotype of E. conjuncta Hendel), R.G.S. Buckland; Howard Springs, 15 miles E of Darwin, vi 1964 (5 ♀, CSIRO, 1 ♀, AM, 1 ♀, USNM), K.R.N.; Groote Eylandt, no date (1 ♀, SAM), N.B. Tindale.

Habitat: holotype on tree trunk in small group of trees near stream in semi-open country.

Comparative notes. This species is separated from its nearest allies in Australia (E. conjuncta and E. biarmata) by the reduction of the posteroventral bristles of the fore femur, and, in the female sex, by the normally developed humeral bristle and scarcely enlarged tegula. It is also very similar to E. connexa Malloch (1940) from the Solomon Islands, which has a similar tegula in the female, but E. connexa has the humeral bristle and the hairs on the posterior part of the humeral callus of the female much reduced and the yellowish hairs on the scutellum much longer than in E. inermis.

The absence of males in the available material of this species suggests either that the males have different habits from the females, or that it is a parthenogenetic male-less form. Perhaps some support is given to the latter alternative by the fact that the female differs from that of the three most closely related species in the complete absence of those modifications of the thorax which I assume to play a role in mating.

Euprosopia conjuncta Hendel

Euprosopia conjuncta Hendel, 1914a:149 (nomen nudum); 1914b: 339-340, pl.2, fig.35 (described); Malloch, 1929:512; 1930:329.

♂ ♀ . Coloration. Head buff; postfrons yellow with brown suffusion; postfrons and parafacial with whitish-pruinescent orbital margins; face with large blackish brown mark on each side from antennal groove to epistomal margin; lower lateral angles of face tawny; cheek with a tawny suffusion near middle; occiput darkened above but its entire surface covered with whitish pruinescence which is thinnest near vertex; antenna yellowish brown, arista fulvous at base, blackish beyond, palette of ♂ dark grey; prelabrum blackish laterally, yellow in centre; palpus brown with greyish pruinescence. Mesoscutum reddish brown laterally, usually becoming dark brown or blackish medially, the whole with yellowish grey pruinescent markings; scutellum dark brown, becoming blackish and shining laterally and towards apex, with a large triangular median greyish yellow pruinescent area, the vertex of which is prolonged over apex; pleura tawny-brown with extensive whitish to yellowish pruinescence. Femora reddish brown, darkened distally, the fore one sometimes darker brown; fore tibia brown; middle and hind tibiae tawny, dark brown distally; tarsi blackish, basal segment creamy, darkened at extreme apex. Wing with blackish area in basal half of first basal cell usually enclosing at least 4 hyaline marks which may partly divide it transversely; stigmatal and discal bands complete, without any intermediate

markings, usually with some yellow incisions on their anterior edges; marginal cell often with a yellowish suffusion between discal and preapical bands which may enclose a dark spot; preapical band broadly joined to apical mark anteriorly; squama buff, usually pale brown in centre. Haltere creamy to fulvous. Pre-abdominal tergites very variable in colour, usually combining tawny, reddish brown, dark brown, and grey.

Head approximately as high as wide; height of cheek 0.22-0.35 of height of eye; anterior ridge of cheek well developed; eye 1.6-1.9 times as high as long; outer vertical and cheek bristles present but no other cephalic bristles present. Antenna extending at least $^{2}/_{3}$ of distance from its base to epistomal margin in ♂, extending distinctly more than half the distance in ♀; arista with very minute basal hairs, spatulate apically in ♂, simple in ♀. Prelabrum moderately developed, rugose in centre, almost smooth at sides; palpus moderately broad.

Thorax. Humeral callus with hairs all or nearly all pale, long in ♂, in ♀ the hairs moderately developed anteriorly, very short posteriorly; setulae on and near notopleural area not shortened; scutellum always with a distinct apical groove or depression of variable width and depth, which separates a pair of convexities on which are situated the apical bristles; ♂: basalar process represented by a slight prominence only; tegula moderately developed, not produced forwards; ♀: basalar process distinct but very small, acuminate; tegula strongly produced forwards at least as far as base of posterior notopleural but not as far as base of anterior notopleural, not thickened distally;

mesopleuron without specially developed hairs towards ventral margin in either sex, with most hairs, except the enlarged posterior marginal ones, rather short, more so in ♀, but not as short as in ♀ of E. biarmata; the following thoracic bristles present: prescutellar acrostichal, dorsocentral, humeral strongly developed in ♂, very weak or absent in ♀, 1 + 1 notopleurals, supra-alar, postalar, posterior intra-alar, 2 pairs of scutellars. Fore femur with series of moderately strong black posteroventral bristles on distal third or more; fore tibia and tarsus unmodified. Wing with veins 3 and 4 gradually converging distally; vein 4 with barely noticeable forward curvature at apex.

Abdomen. ♂ : tergite 2 with posterior marginal fringe of scales; tergites 3-5 subequal in length, with scattered scales, sparser on tergite 3 where they may be reduced to the marginal fringe; ♀ : tergite 2 with posterior marginal fringe of scales, other tergites devoid of scales; tergite 5 narrower but not much shorter than preceding tergites; spiracles of segment 5 situated in deep incisions in posterior margin of tergite 5, those of segment 4 situated between tergites 4 and 5, usually a little more widely separated from one another than are those of segment 5. ♂ postabdomen: inner and outer surstyli united for most of their length; free distal part of outer surstylus with a short anterior lobe, beyond which it is narrower, the rounded apex slightly curved inwards and backwards; inner surstylus with comparatively narrow head bearing two compact black teeth; aedeagus with stipe of moderate length, almost bare; preglans well differentiated, sclerotized; glans somewhat elongate; bulb short,

sclerotized; filaments equal, very short, only slightly longer than glans.

Dimensions: total length, ♂ 5.8–8.3 mm., ♀ 5.9–9.8 mm.; length of thorax, ♂ 3.2–4.9 mm., ♀ 3.1–5.0 mm.; length of wing, ♂ 6.5–9.6 mm., ♀ 7.0–10.2 mm.

Distribution: Queensland – east coast from Cape York Peninsula almost to southern border. Hendel's record from Port Darwin is erroneous, as it refers to the species here described as E. inermis.

Material examined: Townsville, no date (lectotype ♀ here designated, also 1 ♀, possibly a paralectotype but without determination label, BM), F.P.D.; Claudie R., near Mount Lamond, Iron Range district, vi 1966 (1 ♀, AM), D.K.M.; Claudie R., ii 1914 (1 ♂, 3 ♀, NMV), J.A. Kershaw; Thornton Range to Hutchinson Creek, Daintree R. district, i 1967 (1 ♀, AM), G.A.H. and D.K.M.; Kuranda, 1910 (2 ♂, 8 ♀, BM), F.P.D.; Meringa, near Gordonvale, xi 1925–1926 (2 ♀, CSIRO), G.M. Goldfinch; Mulgrave R., 4 miles W of Gordonvale, i xii 1959–1966 (2 ♂, 1 ♀, AM), D.K.M.; 2 miles N of Tully R. bridge, E of Cardstone, Cardstone–Ravenshoe Road, i 1967 (2 ♂, 3 ♀, AM), G.A.H. and D.K.M.; 2 miles E of Cardstone, Tully R. district, i 1967 (1 ♂, 7 ♀, AM), G.A.H. and D.K.M.; Little Crystal Creek, Mount Spec, near Paluma, xii 1954 (2 ♀, UQ), anon.; Broken R., Eungella, xii 1961 (9 ♂, 8 ♀, AM), R.L. and D.K.M.; Finch Hatton Gorge, xii 1961 (1 ♀, AM), R.L. and D.K.M.; Upper Finch Hatton Creek, near Finch Hatton, i 1965 (1 ♀, UQ), G.M.; Saint Helen's Creek, xii 1961 (2 ♂, AM), R.L. and D.K.M.; Mackay, no date (1 ♀, BM), G. Turner; Mary's Creek, near Gympie,

ii 1961 (2 ♂, 3 ♀, AM), D.K.M.; Maroochydore, xii 1948 (1 ♀, UQ), J.A. Beck; Caloundra, iii 1960 (1 ♀, UQ), R. Shephard; Highvale, 14 miles NW of Brisbane, i ii 1960 (1 ♂, 2 ♀, CSIRO), R.S.; Tamborine Mountain, ii iii iv 1952-1960 (2 ♀, UQ), F.A.P., anon. (1 ♀, CSIRO), K.R.N.; Canungra, ii 1955 (2 ♀, CSIRO), Sharp, anon.

Habitat: rain forest or small groups of trees near streams, most frequently taken on tree trunks or mammalian faeces.

Euprosopia biarmata Malloch

(Figs. 12, 13, 14, 77)

Euprosopia biarmata Malloch, 1929:512-513; 1930a:431.

♂ ♀ . Very similar to E. conjuncta in most characters, so that only the differentiating characters are here given.

Coloration. Wing with blackish area in basal half of first basal cell containing 3 hyaline spots, 2 at same level just before fork of veins 2 and 3, and one more basally situated.

Head. Prelabrum with numerous fine subparallel grooves, weaker laterally.

Thorax. Scutellum almost semicircular in outline, but with a slight median apical depression, and slight convexity on either side which are less marked than in E. conjuncta, margin devoid of pruinescence, except on median line, and somewhat shining but not highly glossy on account of the fine sculpturing of the entire dorsal surface, which extends to the apical bristles and slightly below the lateral bristles, extreme margins and ventral surface smooth and glossy; ♂ : mesopleuron haired as in ♂ of

E. conjuncta but with some much coarser predominantly pale hairs along its ventral margin; other secondary sexual characters of thorax as described for E. conjuncta; ♀ : hairs on posterior half of humeral callus reduced to extremely short black setulae; hairs in vicinity of anterior notopleural bristle similarly reduced; basalar process well developed, lanceolate, extending for about half the distance from its base to anterior extremity of tegula; tegula produced forwards slightly beyond level of base of anterior notopleural bristle, slightly thickened anteriorly; mesopleuron with hairs on most of surface much shortened, many of those near centre almost indistinguishable though their sockets are visible, a group along ventral margin much enlarged into coarse, black setulae. Fore femur with posteroventral bristles as in E. conjuncta, or somewhat weaker.

Abdomen. ♂ : tergite 3 with posterior marginal fringe of scales only. ♂ postabdomen very similar to that of E. conjuncta except for following characters: surstyli shorter and broader, head of inner surstylus broad, with the 2 black teeth transversely dilated and closely appressed.

Dimensions: total length, ♂ 4.9-7.9 mm., ♀ 4.9-8.0 mm.; length of thorax, ♂ 2.7-4.3 mm., ♀ 2.4-4.5 mm.; length of wing, ♂ 5.7-8.0 mm., ♀ 6.0-9.3 mm.

Distribution: north-eastern Queensland - Cairns, Atherton, and Tully districts.

Material examined: 9 miles N of Kuranda, iii 1964 (1 ♂, CSIRO), I.F.C. and M.S.U.; Mulgrave R., 4 miles W of Gordonvale,

i 1967 (1 ♂, 1 ♀, AM), G.A.H. and D.K.M.; The Boulders, near Babinda, v 1967 (1 ♀, CSIRO), D.H.C.; Tolga, near Athertoh, iv 1955 (1 ♀, CSIRO), K.R.N. and I.F.C.; Wongabel State Forest, near Atherton, v 1967 (1 ♀, CSIRO), D.H.C.; Malanda, x 1962 (1 ♀, CSIRO), K. Harley; The Crater (or Mount Hypipamee), near Herberton, i 1967 (1 ♀, AM), G.A.H. and D.K.M.; Herberton, i ii 1911 (holotype ♀, DEI, 1 ♀, BM), F.P.D.; 2 miles N of Tully R. bridge, E. of Cardstone, Cardstone-Ravenshoe road, i 1967 (1 ♂, 1 ♀, AM), G.A.H. and D.K.M.; 2 miles E of Cardstone, i 1967 (2 ♂, 3 ♀, AM, 1 ♀, BM, 1 ♀, USNM), G.A.H. and D.K.M.; 5 miles W of Tully, iv 1955 (1 ♂, 1 ♀, CSIRO), K.R.N. and I.F.C.

Habitat: rain forest near streams.

Malloch's statement that the basalar process of the female is about as long as the tegular process is misleading. Though longer than in other species of the separata group, it is about half as long as the distance from its base to the anterior extremity of the tegula in all female specimens examined, including the holotype.

XII. Summary

(I) The present study is the result of two years' work at the Department of Zoology and Applied Entomology, Imperial College of Science and Technology, and at the Entomology Department, British Museum (Natural History). The observations and conclusions are the original work of the author except where expressly attributed to others.

The family Platystomatidae includes between 900 and 1,000 known world species and about 65 valid species have previously been recorded from Australia. During the preparation of this work approximately 192 Australian species have been seen, but not all of these are described here.

Material examined includes well over 5,000 Australian specimens and type material of nearly all the previously described Australian species. Special studies have been made of the male genitalia and the structure of the cuticular surface has been studied with the aid of the scanning electron microscope.

(II) The family Platystomatidae is almost world wide but is not known to occur in the temperate zone of South America. The greatest concentration of species is found in the Old World tropics, the Americas having relatively few genera and species. In Australia there occur both widely distributed and endemic genera. Certain genera are characteristic of particular parts of the Australian continent or of particular vegetation types. All the Australian species except eight are apparently endemic. The long-isolated Lord Howe Island has a small number of species which are of

exceptional interest because of the problem of their origin. The following genera are recorded from Australia for the first time: Lasioxiria, Mesoctenia, Brea, Achiosoma. The following species occur in Australia though not previously recorded: Plagiostenopterina enderleini, Lamprogaster violacea, Euprosopia ventralis.

(III) A few notes and observations can be added to the little already known of the biology and habits of the Platystomatidae.

(IV) The general morphology of the adults of Platystomatidae is much like that of other higher Diptera (Schizophora). Some parts exhibit a close structural resemblance to those of the family Tephritidae, notably the genitalia of the male and the ovipositor of the female. The nature of the vestiture of the cuticle, which has been examined with the scanning electron microscope, is of interest as a taxonomic character.

(V) Current definitions and explanations of the species concept are difficult to apply to insular populations, as the criterion of reproductive isolation cannot be applied to them. For this reason it is necessary to use arbitrary morphological criteria for deciding the status of these populations.

The discrimination of subspecies has probably added little to our understanding of genetic variation in animal populations and of genetic discontinuities. The naming of subspecies can probably be justified only in exceptional circumstances.

Many of the attributes of animal species which have been classed as isolating mechanisms play little or no part in producing or maintaining the separation of specific gene pools. Those which

I designate as specific mating mechanisms evolve and are largely maintained as a result of isolation between closely related sympatric species. Inferior fitness of hybrids is probably a more important isolating mechanism than has been generally recognized.

Specific differences in the male genitalia and in many secondary sexual characters in the Platystomatidae are probably components of specific mating mechanisms involving a specific stimulus and response.

Evolution of specific mating mechanisms in the distant past may account for some of the remarkable differences in the reproductive systems now existing between groups of arthropods at various taxonomic levels.

(VI) The family Platystomatidae belongs in the superfamily Tephritoidea (Otitoidea) of the series Schizophora, its members having often been included in the family Otitidae (Ortalidae). However morphological evidence indicates that, within the superfamily Tephritoidea, the Platystomatidae are more closely related to Pyrgotidae and Tephritidae than to Otitidae. It seems best to regard the Platystomatidae as a separate family of the Tephritoidea though the morphological gap between it and the Tephritidae is not great.

It is at present possible to recognize and define four subfamilies of the Platystomatidae, viz. Trapherinae, Plastotephritinae, Scholastinae, and Platystomatinae.

A listing of the known Australian genera and species (including undescribed forms) includes 22 genera and 192 species. The Australian genera may be identified with the aid of the key provided.

(VII-XI) The Australian species of five genera are considered in detail, viz Mesoctenia, Plagiostenopterina, Lamprogaster, Duomyia and Euprosopia. Descriptions and keys are provided for identification of the species of these genera. 84 of these species appear to be previously undescribed.

Nomenclature

New generic name: Apiola (replacement name for Xenognathus Malloch, not Gilbert)

New specific names: Mesoctenia australis, Plagiostenopterina (Stenopterosoma) claudiana, P.(S) crinita, P.(S.) macies, Lamprogaster tricauda, L. nigrihirta, L. flavihirta, L. rugifacies, L. imperialis, L. corax, L. excelsa, L. corusca, L. relucens, Duomyia personata, D. convallis, D. pallipes, D. foliata, D. triquetra, D. botulus, D. argentata, D. eremia, D. smaragdina, D. lacunosa, D. marginalis, D. chaetostigma, D. lutea, D. longicauda, D. serra, D. umbrosa, D. octoseta, D. scipio, D. aurantiaca, D. ustulata, D. angustata, D. lonchaeina, D. capitalis, D. rasa, D. latipilus, D. parallela, D. adelaidae, D. iris, D. ameniina, D. montium (replacement name), D. scintilla, D. howensis, D. glebosa, D. loxocerina, D. hebes, D. brevifurca, D. rudis, Euprosopia rete, E. acula, E. xanthops, E. lenticula, E. sericata, E. crassa, E. piperata, E. conferta, E. integra, E. kurandae, E. mica, E. megastigma, E. crispa, E. albipila, E. fimbripes, E. vitrea, E. alpina, E. celsa, E. hypostigma, E. subacuta, E. filicornis, E. ramosa, E. subula, E. anostigma (replacement name), E. armipes, E. monodon, E. comes, E. inermis.

New synonymy - generic (the invalid junior synonym placed first): Mystia Walker = Achias Fabricius: Campigaster Macquart = Duomyia Walker; Helocnemia Enderlein = Duomyia Walker.

New synonymy - specific: Elassogaster terraereginae Malloch = (?) Microepicausta gracilis Hendel; Dacus basalis Walker = Plagiostenopterina aenea (Wiedemann); Lamprogaster elongata Van der Wulp = L. violacea (Macquart); Lamprogaster pseudelongata Malloch = L. indistincta Malloch; Chromatomyia jucunda Walker = Lamprogaster bicolor Macquart; Lamprogaster unimacula Hendel = L. flavipennis Macquart; Chromatomyia formosa Walker = Lamprogaster laeta (Macquart); Senopterina grandis Schiner = Duomyia scutellaris (Macquart); Duomyia annulipes Hendel = D. apicalis (Walker); Duomyia fidschiensis Enderlein = D. maculipennis Hendel.

New combinations: Rhytidortalis solocifemur (Enderlein) (Pseudepicausta); Plagiostenopterina (Stenopterosoma) similis (Hendel) (Pogonortalis); Microepicausta evitta (Malloch)(Elassogaster); Rivellia nigripes (Macquart)(Urophora); Lamprogaster nigripes (Macquart)(Senopterina); Achias attrahens (Walker)(Mystia); Achiosoma apictipenne (Hennig) (Achias); Duomyia apicalis (Walker) (Chromatomyia); Duomyia testacea (Macquart)(Campigaster).

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XIV. Index to Taxa

Explanation of Figures

The scale given on genitalia figures represents one millimetre in all cases.

Figures 1-16 are scanning electron micrographs.

Fig. 1. Euprosopia conferta, paratype ♀. Microtrichia of velvety area of tergite 5, x 12,000.

Fig. 2. The same, x 6,000.

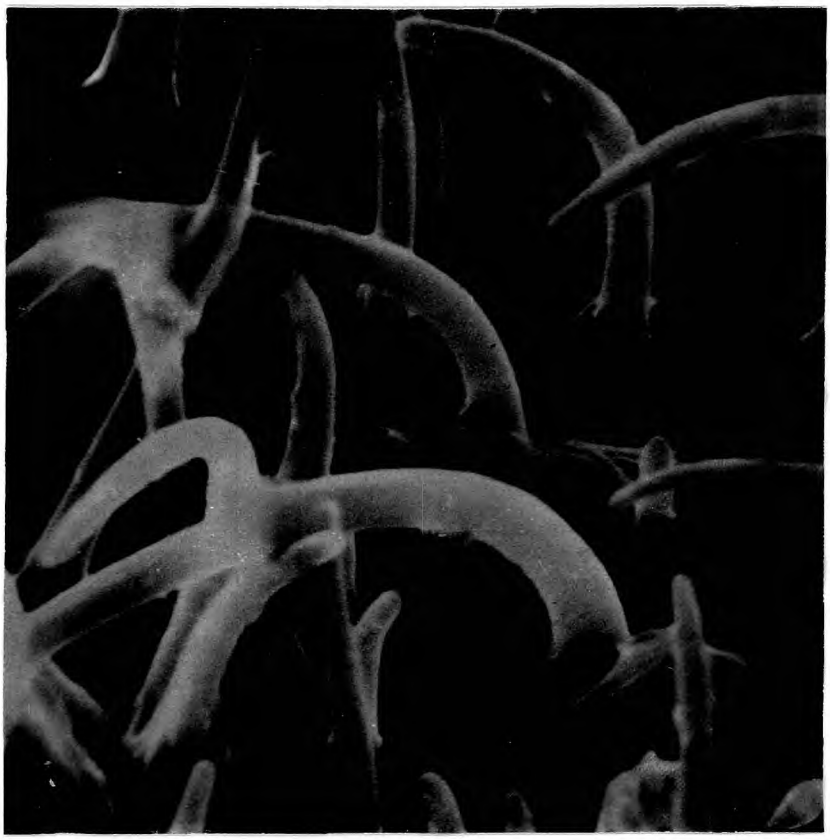

Fig. 1

Fig. 2

Fig. 3. Euprosopia conferta, paratype ♀. Cuticle and microtrichia of pruinescent area of tergite 5, x 23,000, showing groove in cuticle.

Fig. 4. The same, x 11,600.

Fig. 3

Fig. 4

Fig. 5. Euprosopia conferta, paratype ♀. Microtrichia of pruinescent area of tergite 5, x 5,800, part of a macrotrichium at right.

Fig. 6. The same specimen. Segments 5-7, posterior aspect, x 170, showing spiracles of segment 5.

Fig. 5

Fig. 6

Fig. 7. Euprosopia tenuicornis, ♀. Tergite 3 and base of tergite 4, x 120, showing combed pubescence. Anterior towards upper right.

Fig. 8. The same specimen. Combed pubescence on tergite 3, x 1,180.

Fig. 7

Fig. 8

Fig. 9. Euprosopia tenuicornis, ♀. Combed pubescence on tergite 4, x 590.

Fig. 10. Euprosopia anostigma, ♂. Apical part of fore tibia, ventral aspect, x 225, showing undulated sensory area.

Fig. 9

Fig. 10

Fig. 11. Euprosopia anostigma, ♂. Sensory setae from crest of ridge on sensory area of fore tibia, x 5,600. Note deep basal sockets.

Fig. 12. Euprosopia biarmata, ♀. Pruinescence and stumpy macrotrichia on mesopleuron, x 1,080.

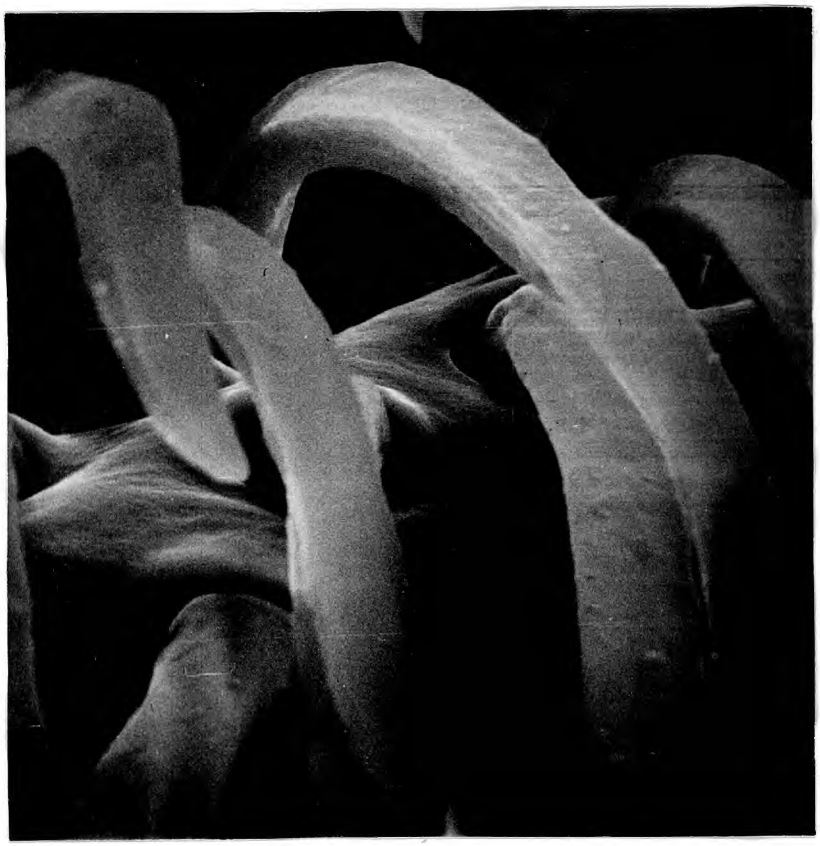

Fig. 11

Fig. 12

Fig. 13. Euprosopia biarmata, ♀. Base of a stumpy macrotrichium and surrounding microtrichia on mesopleuron, x 4,280.

Fig. 14. The same specimen. Pruinescence (microtrichia) from lower anterior margin of mesopleuron, x 5,300. Note absence of basal sockets.

Fig. 13

Fig. 14

Fig. 15. Euprosopia anostigma, ♂. Sensory setae from outer surface of third antennal segment, x 2,130.

Fig. 16. The same specimen. Sensory pit of third antennal segment, x 2,120.

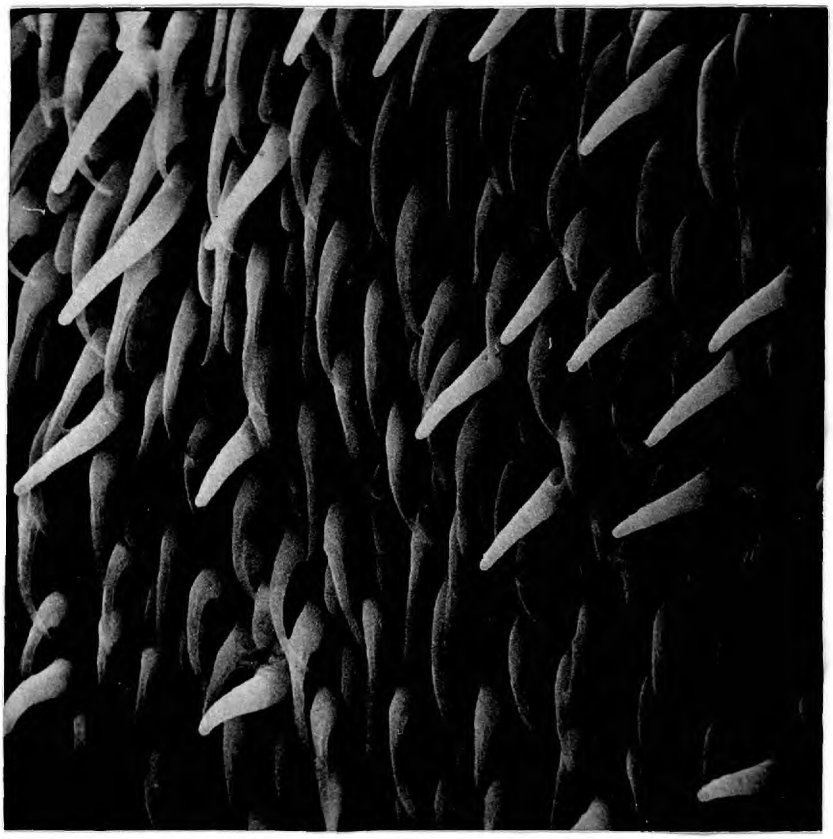

Fig. 15

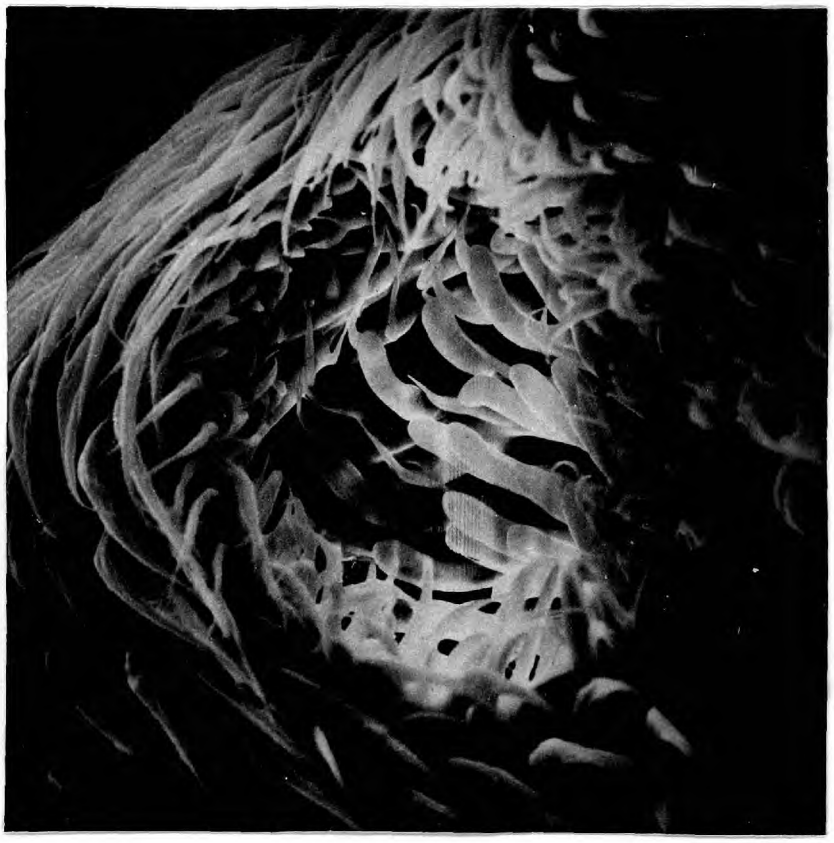

Fig. 16

Fig. 17. Graph showing relationship between width of postfrons (horizontal axis) and length of glans of aedeagus (vertical axis) for the two species Euprosopia separata and E. comes. Measurements given in graticule units (1 unit = 0.033 mm.).

Fig. 18. Euprosopia tenuicornis, ♀. Left lateral aspect of thorax to illustrate terminology. Wing and legs removed.

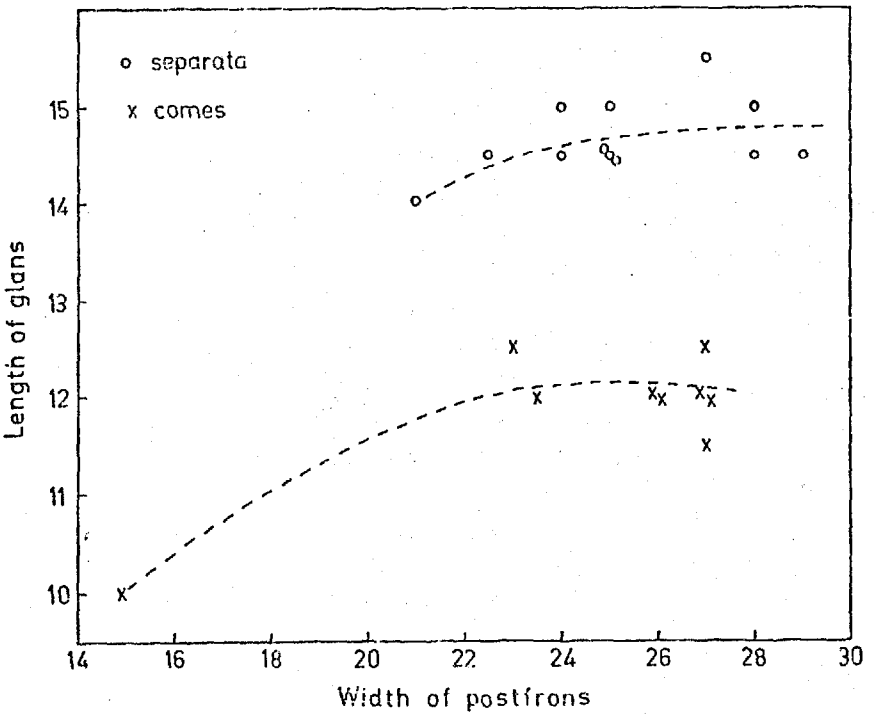
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Fig.17

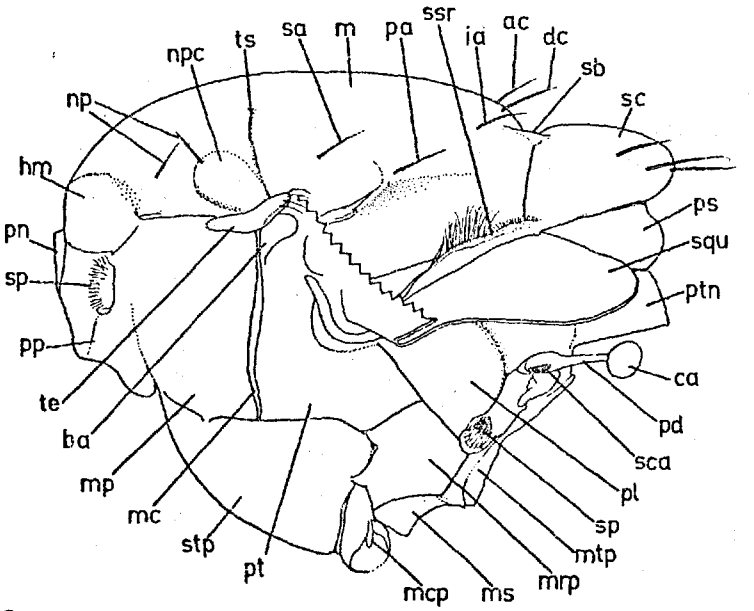
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fig.18

Fig. 19. Euprosopia conferta, paratype ♂. Distal part of abdomen from right, cut away to show genital pouch and postabdomen.

Fig. 20. Euprosopia subula, paratype ♂. Distal part of abdomen from left, postabdomen fully extended.

Fig. 21. Duomyia sp. (? obscura), Kellyville, N.S.W. Aedeagus to illustrate terminology. Only one of two terminal filaments shown complete.

Fig. 22. Mesoctenia australis, paratype, Thornton Range. ♂ genitalia from left.

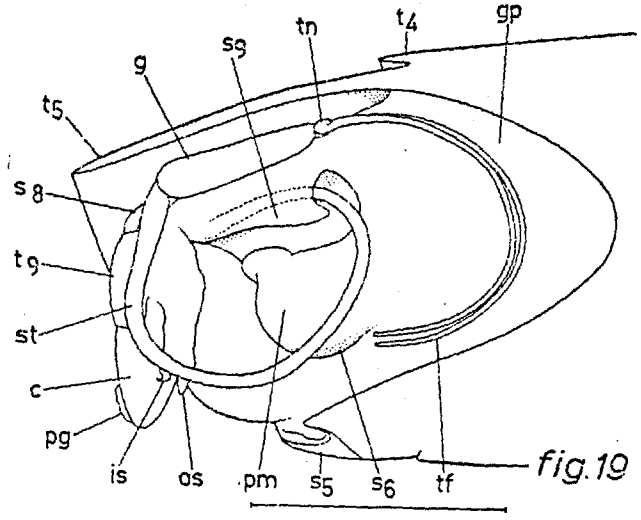

fig. 19

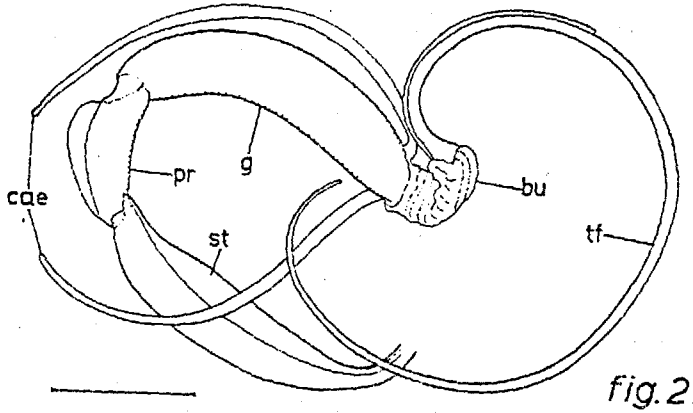

fig. 21

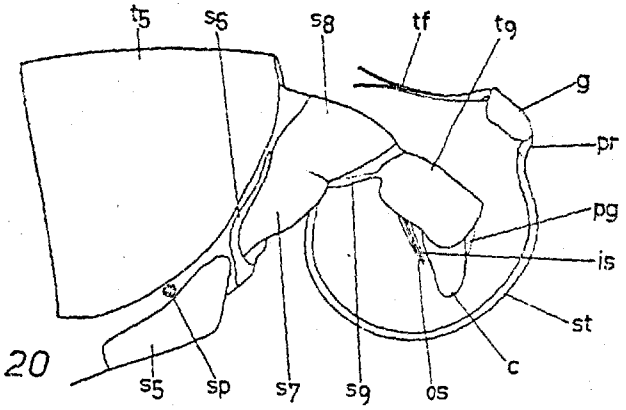

fig. 20

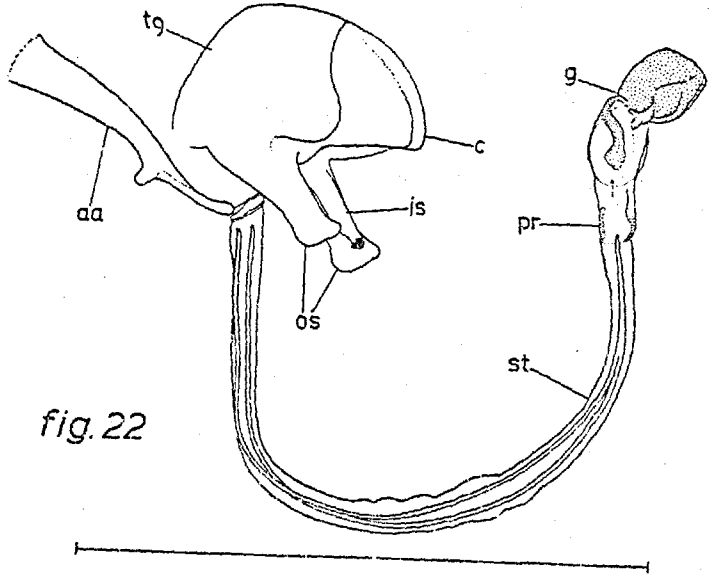

fig. 22

Fig. 23. Mesoctenia australis, holotype. Head, anterior aspect.

Fig. 24. Plagiostenopterina claudiana, paratype. Epandrium from left.

Fig. 25. P. claudiana, paratype. Aedeagus.

Fig. 26. P. crinita, paratype. Aedeagus.

Fig. 27. Lamprogaster rugifacies, paratype. Epandrium from left.

Fig. 28. L. imperialis, paratype, Millstream Falls. Epandrium from left.

Fig. 29. L. tricauda, holotype. Wing.

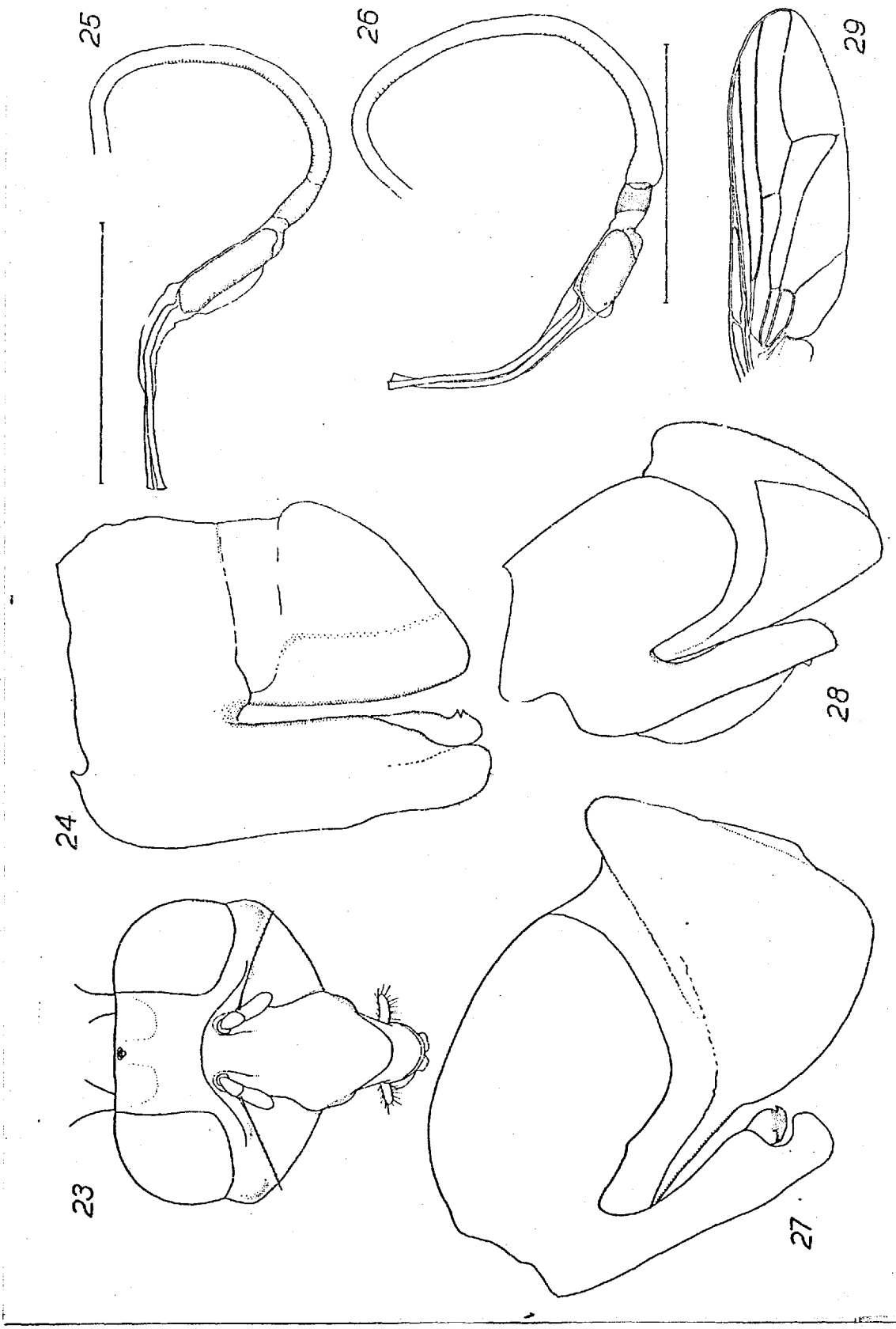
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Fig. 30. L. rugifacies, paratype. Distal part of aedeagus.

Fig. 31. L. imperialis, paratype, Millstream Falls. Distal part of aedeagus.

Fig. 32. L. corax, paratype. Epandrium from left.

Fig. 33. L. corax, paratype. Aedeagus.

Fig. 34. L. relucens, paratype, Royalla. Distal part of aedeagus.

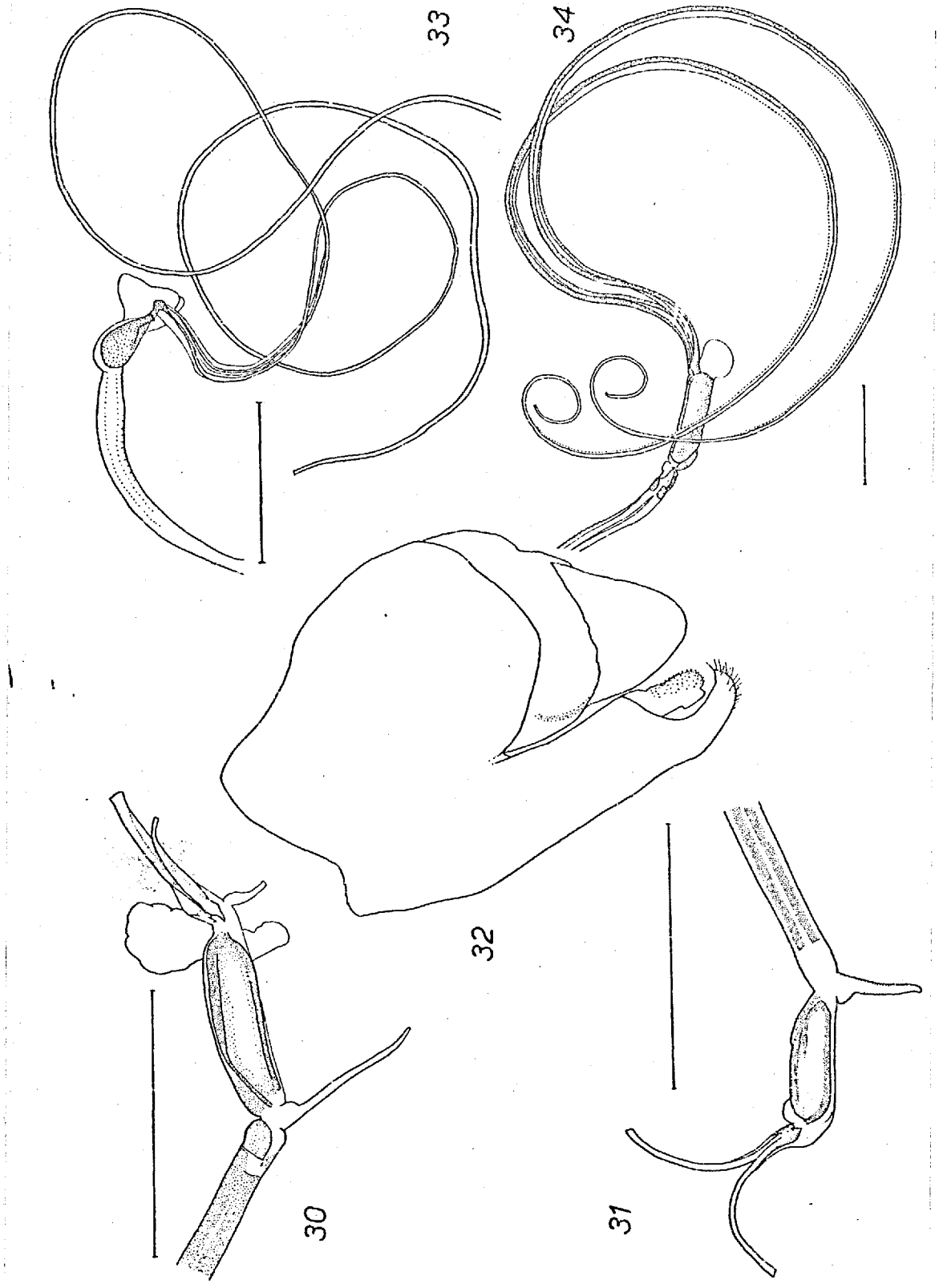
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Fig. 35. L. nigripes, paralectotype. Aedeagus.

Fig. 36. L. viola, near Tully River. Wing.

Fig. 37. L. nigrihirta, holotype. Wing.

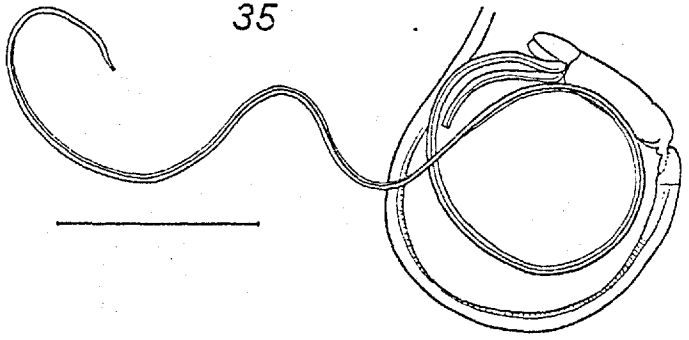
Fig. 38. L. imperialis, holotype. Wing.

Fig. 39. L. corax, holotype. Wing.

Fig. 40. L. relucens, holotype. Wing.

Fig. 41. L. corusca, holotype. Wing.

Fig. 42. L. maculipennis, Blundell's. Wing.



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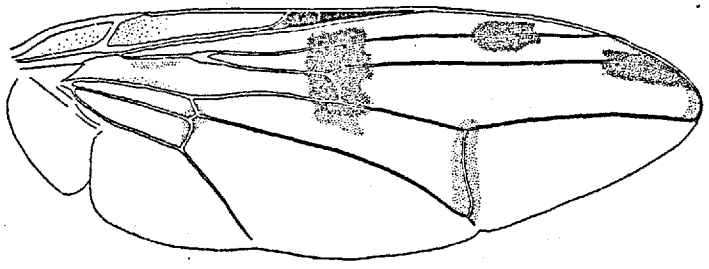

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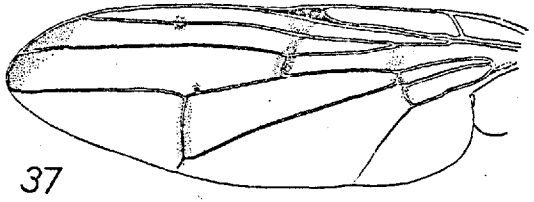

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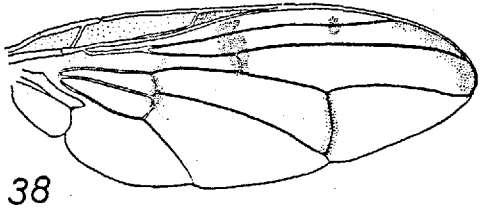

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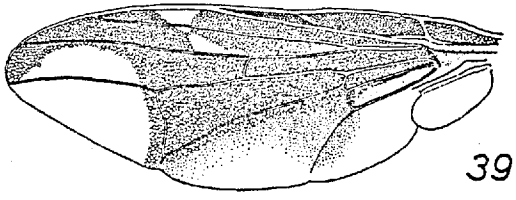

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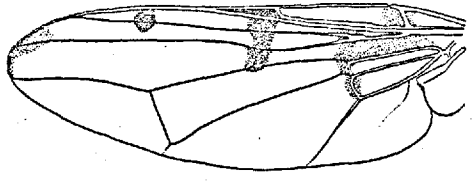

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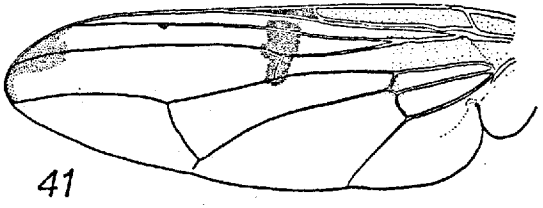

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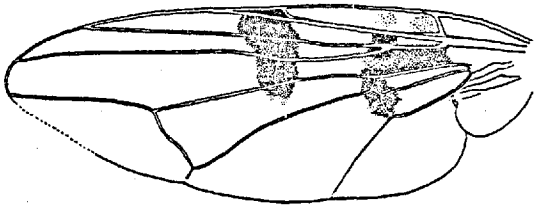

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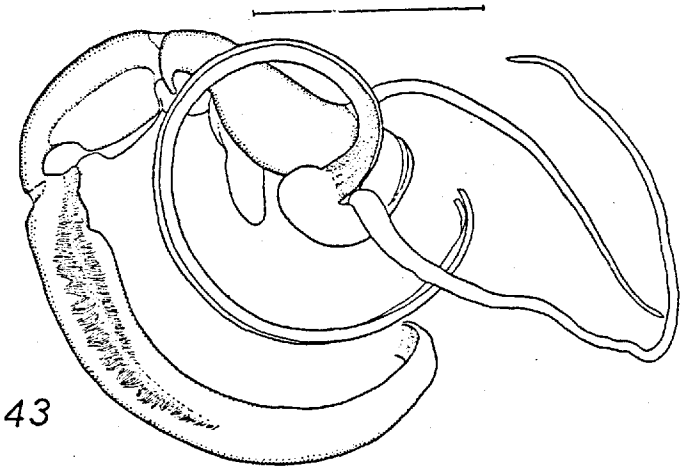
Fig. 43. Duomyia pallipes, holotype. Aedeagus.

Fig. 44. D. tomentosa, Caloundra. Aedeagus.

Fig. 45. D. foliata, holotype. Aedeagus.

Fig. 46. D. triquetra, paratype, Gap Creek. Aedeagus.



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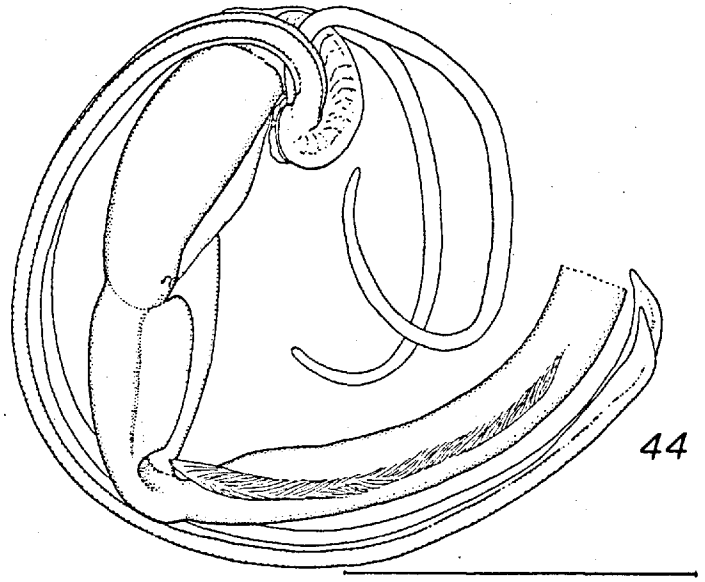

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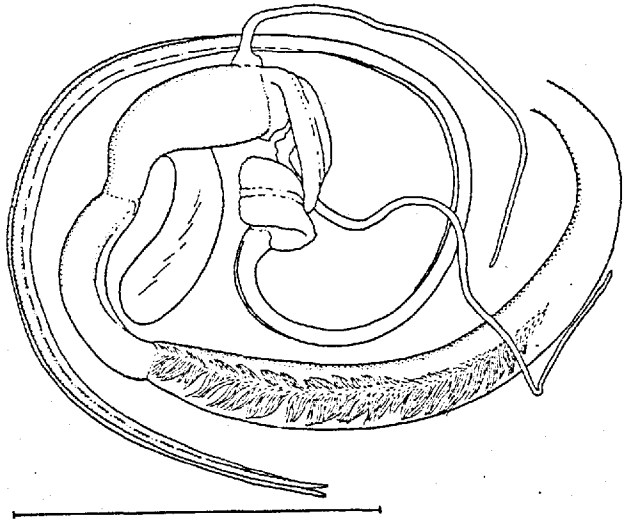

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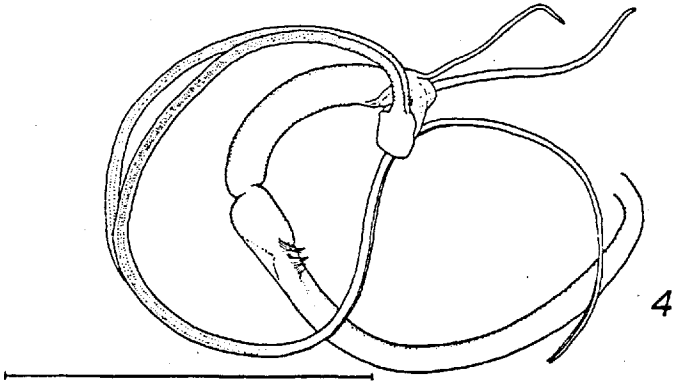

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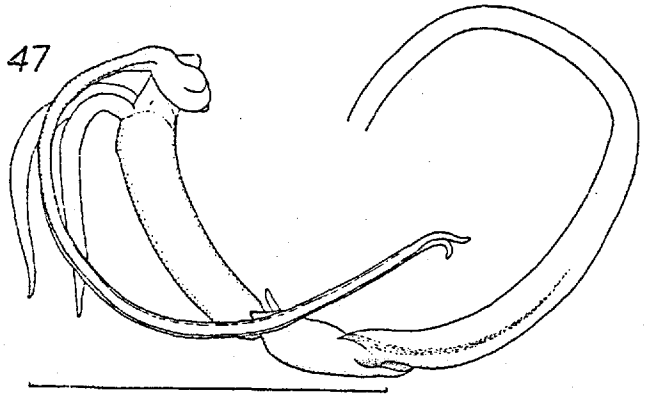
Fig. 47. D. scutellaris, Royal National Park. Aedeagus.

Fig. 48. D. personata, holotype. Aedeagus.

Fig. 49. D. botulus, holotype. Aedeagus.

Fig. 50. D. eremia, holotype. Aedeagus.



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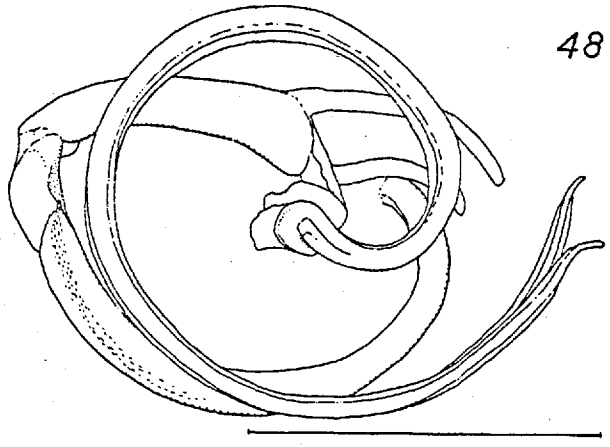

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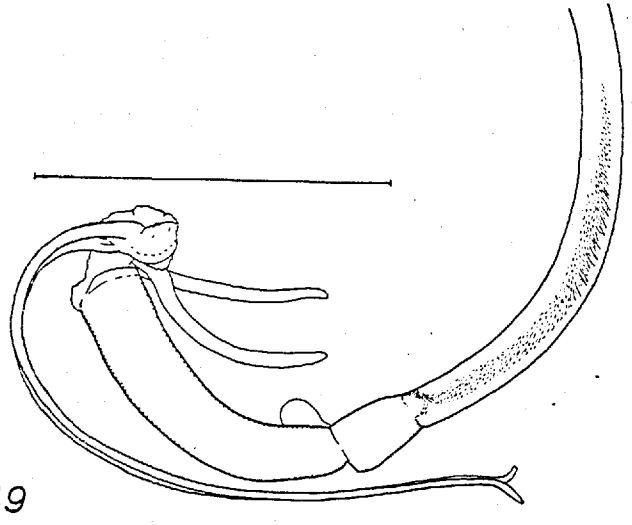

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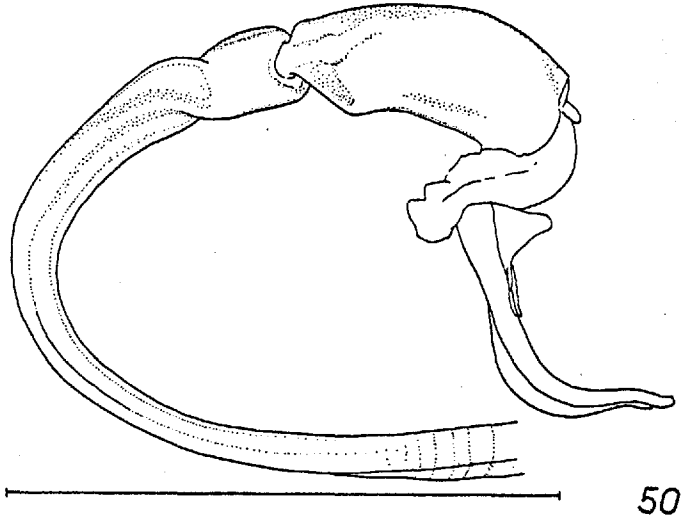

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Fig. 51. D. smaragdina, holotype. Epandrium from left.

Fig. 52. D. lacunosa, paratype, Nedlands. Epandrium from left.

Fig. 53. D. lacunosa, paratype, Nedlands. Aedeagus.

Fig. 54. D. smaragdina, holotype. Aedeagus.

Fig. 55. D. marginalis, holotype. Aedeagus.

Fig. 56. D. chaetostigma, holotype. Aedeagus.

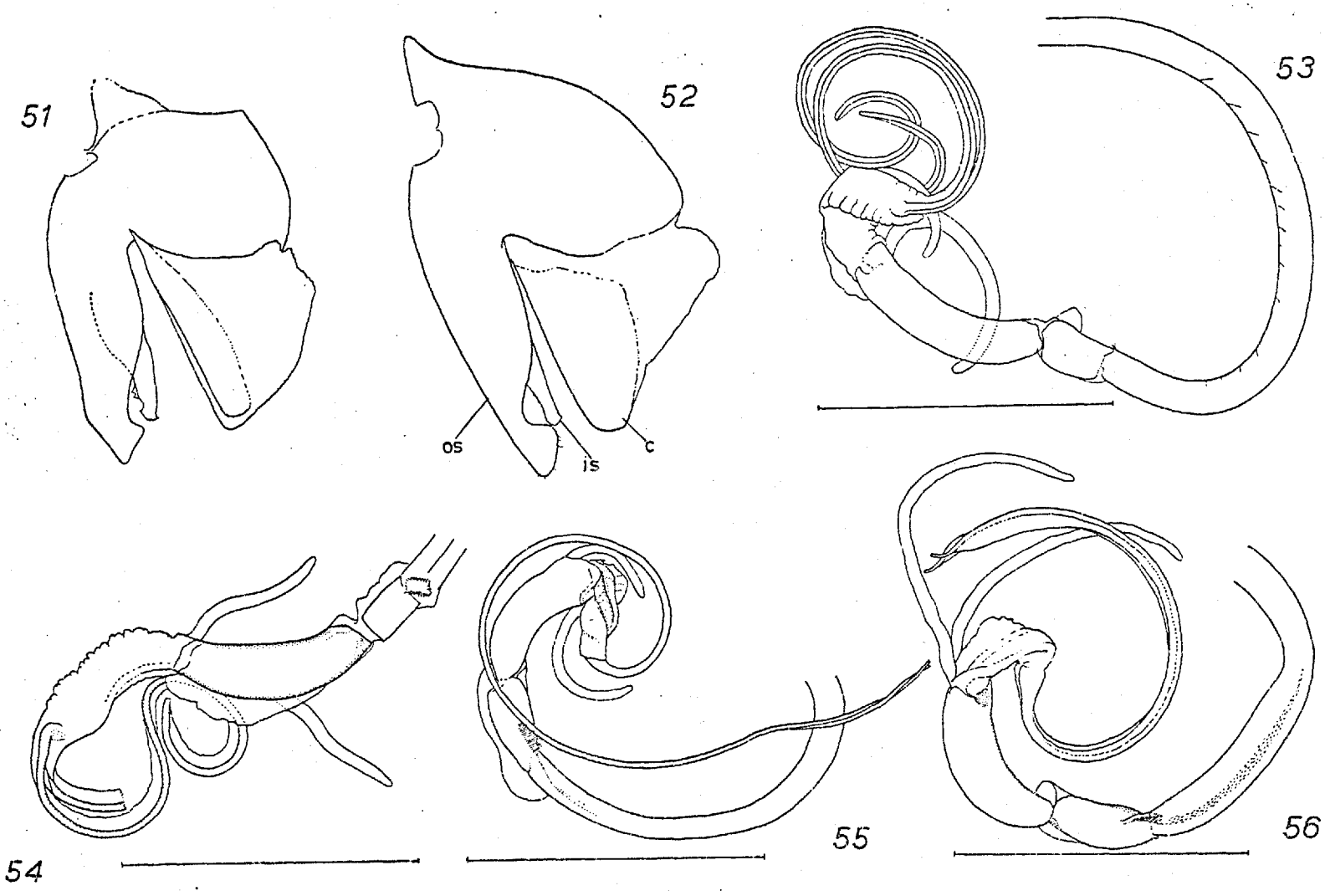
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Fig. 57. D. lonchaeina, holotype. Distal part of aedeagus.

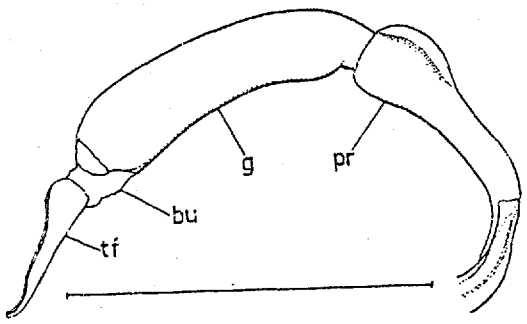
Fig. 58. D. angustata, holotype. Distal part of aedeagus.

Fig. 59. D. howensis, holotype. Wing.

Fig. 60. D. howensis, holotype. Distal part of aedeagus.

Fig. 61. D. thalassina, Roseville. Aedeagus.

Fig. 62. D. brevifurca, paratype. Aedeagus.



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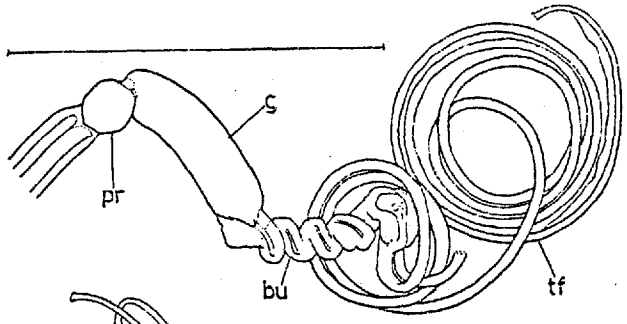

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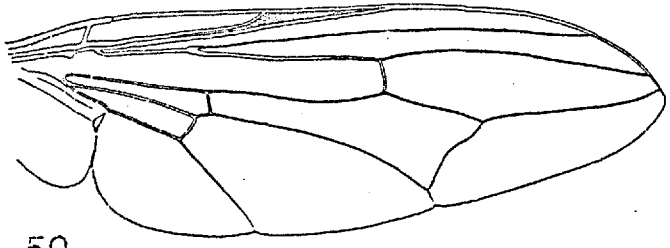

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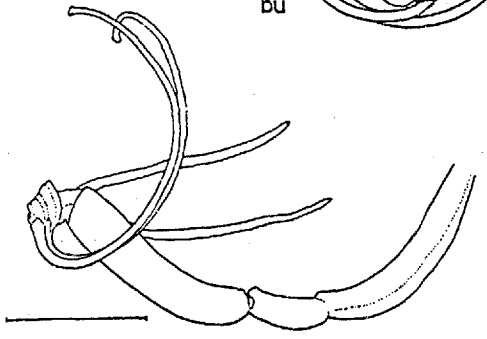

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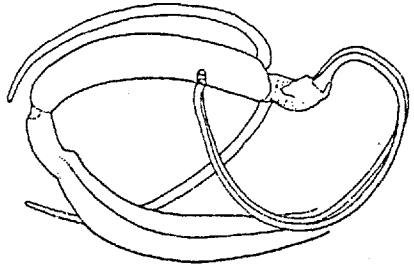

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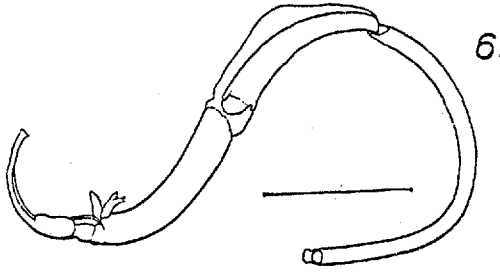


62

Fig. 63. D. hebes, paratype, Shute Harbour. Aedeagus.

Fig. 64. D. rudis, paratype. Aedeagus.

Fig. 65. Euprosopia rete, holotype. Wing.

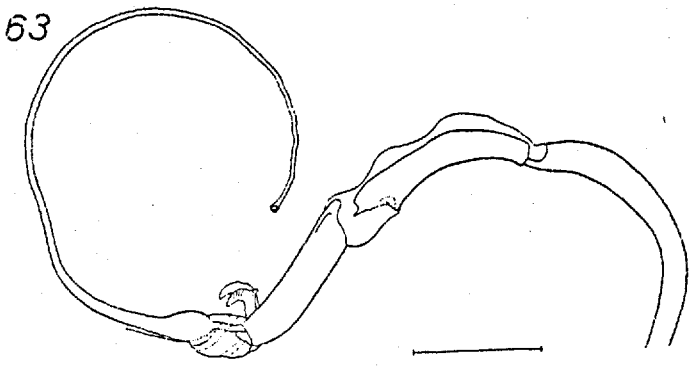
Fig. 66. E. integra, holotype. Wing.

Fig. 67. E. kurandae, holotype. Wing.

Fig. 68. E. albipila. holotype. Wing.

Fig. 69. E. megastigma, holotype. Wing.

Fig. 70. E. vitrea, holotype. Wing.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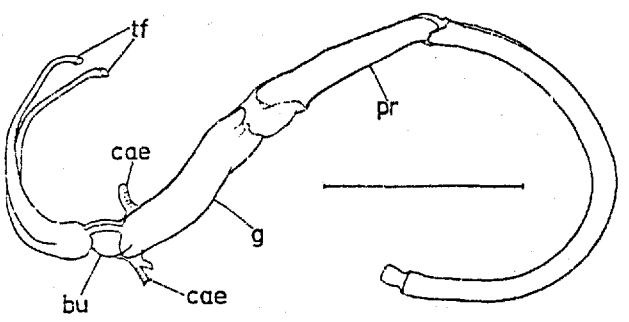
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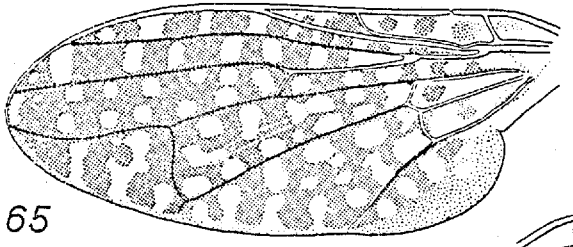
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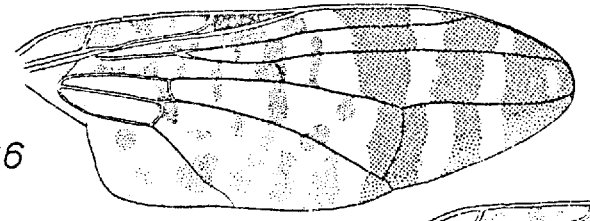
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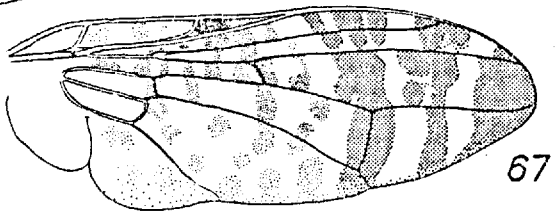
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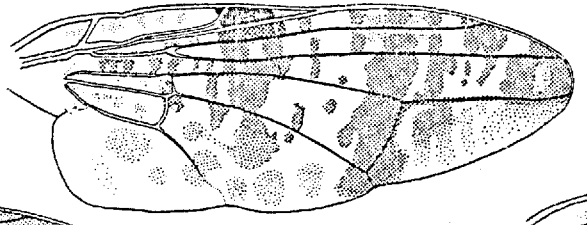
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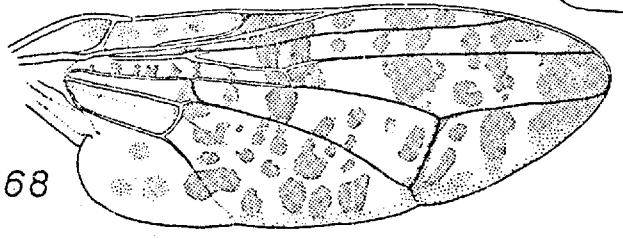
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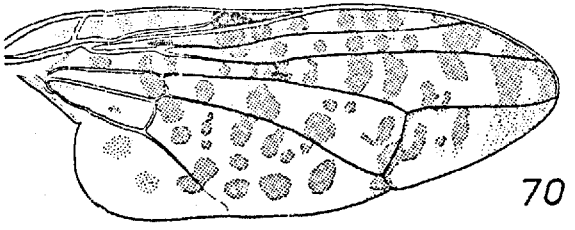
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Fig. 71. E. hypostigma, holotype. Wing.

Fig. 72. E. ramosa, holotype. Wing.

Fig. 73. E. armipes, holotype. Wing.

Fig. 74. E. monodon, holotype. Wing.

Fig. 75. E. subula, holotype ♀. Anterodorsal part of thorax, left lateral aspect.

Fig. 76. E. macrotegularia ♀, Mulgrave R. Same as above.

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Fig. 77. E. biarmata, near Cardstone. Same as above.

Fig. 78. E. crassa, paratype ♀, Nerang R. Region of left wing base.

Fig. 79. E. anostigma, ♂, Kurnell. Apex of basal segment of fore tarsus.

Fig. 80. E. crispa, paratype ♀, Broken Bay. Region of left wing base.

Fig. 81. E. comes, holotype ♂. Hind trochanter and femur, anterior aspect.

Fig. 82. E. separata, ♂, Townsville. Same as above.

Fig. 83. E. tenuicornis, ♂, Northmead. Hind trochanter.

Fig. 84. E. monodon, holotype ♂. Fore femur and tibia, posterior aspect.

Fig. 85. E. subula, holotype ♀. Abdominal tergite 5, showing border of tergite 4 and adjacent spiracles, semi-diagrammatic.

Fig. 86. E. macrotegularia, ♀, Mulgrave R. Same as above.

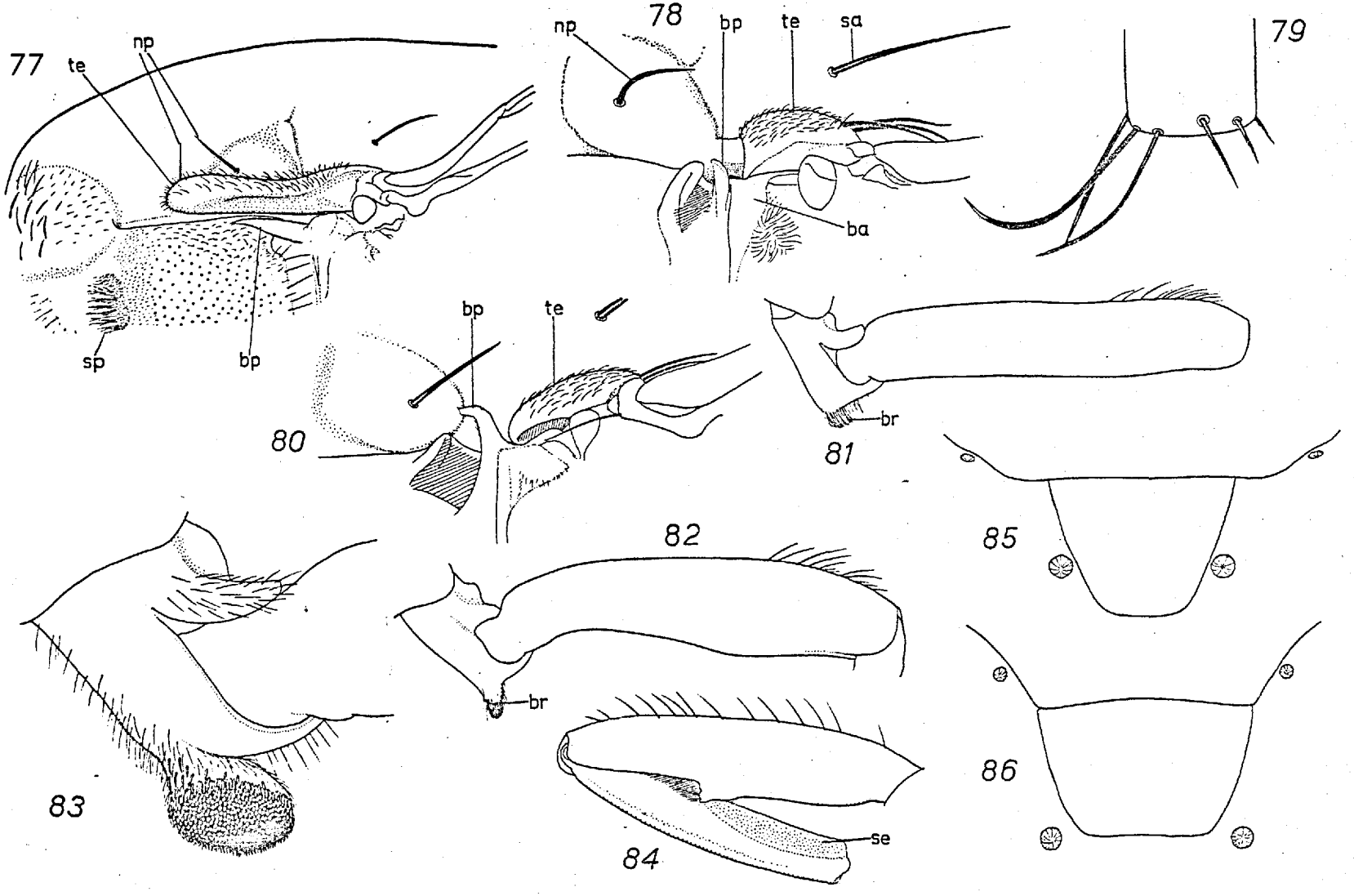
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Fig. 87. E. mica, ♀ (composite). Same as above, velvety areas stippled.

Fig. 88. E. conferta, holotype ♀. Same as above.

Fig. 89. E. piperata, holotype ♀. Same as above.

Fig. 90. E. sericata, o (composite). Same as above

Fig. 91. E. crassa, holotype ♀. Same as above.

Fig. 92. E. integra, holotype ♀. Same as above.

Fig. 93. E. megastigma, paratype ♀, Otford. Same as above, scales omitted.

Fig. 94. E. ramosa, holotype ♀. Same as above, scales and fourth pair of spiracles omitted.

Fig. 95. E. subacuta, holotype ♀. Same as above, scales omitted.

Fig. 96. E. filicornis, paratype ♀, Kurnell. Same as above, scales omitted.

Fig. 97. E. scatophaga, ♀, Little Crystal Creek. Same as above, scales omitted.

Fig. 98. E. hypostigma, holotype ♀. Same as above, scales omitted.

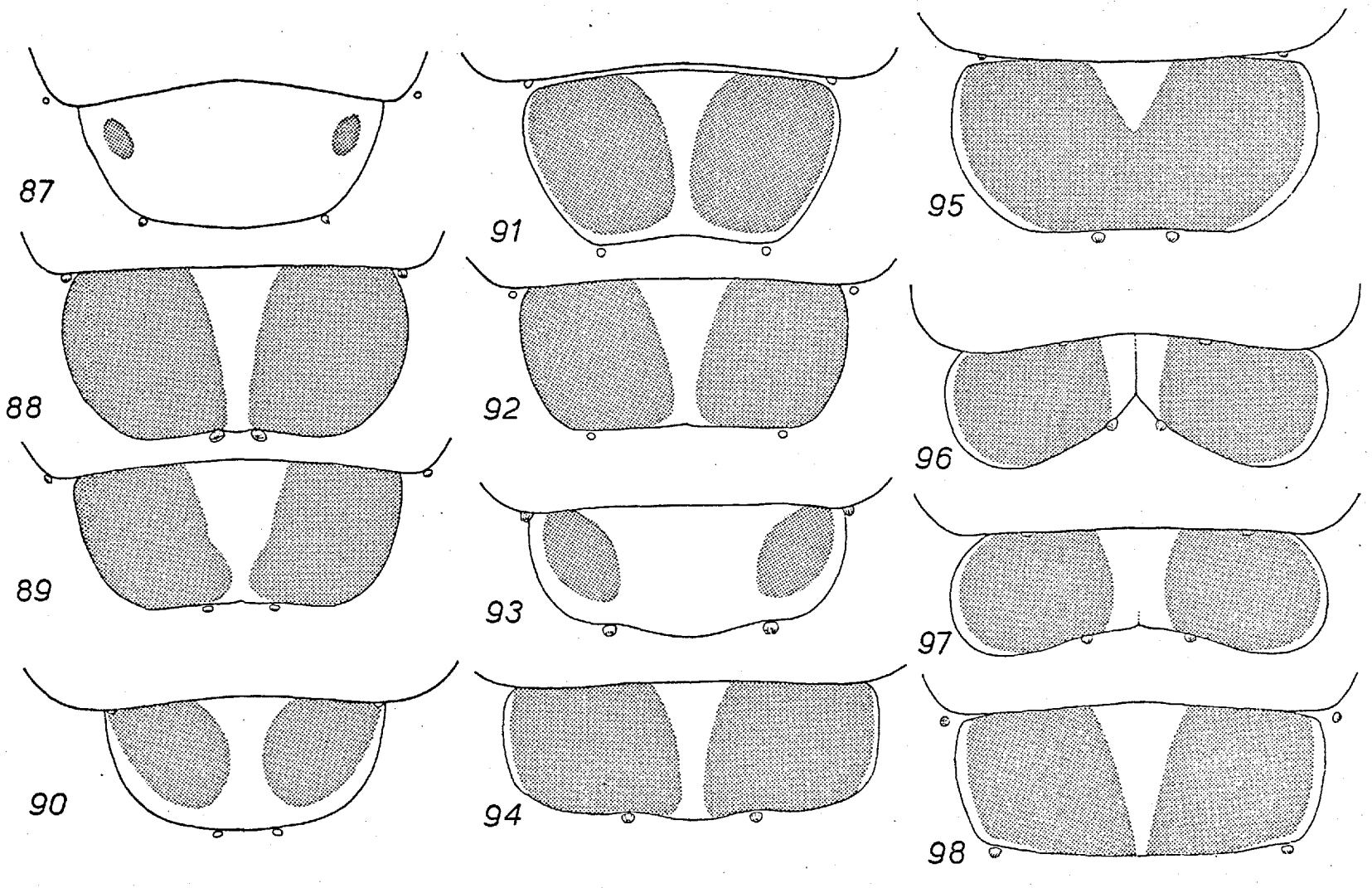
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Fig. 99. E. rete, paratype, Mulgrave R. Left surstyli, anterior aspect.

Fig. 100. E. acula, paratype, The Crater. Same as above.

Fig. 101. E. rete, paratype, Mulgrave R. Distal part of aedeagus.

Fig. 102. E. acula, paratype, The Crater. Same as above.

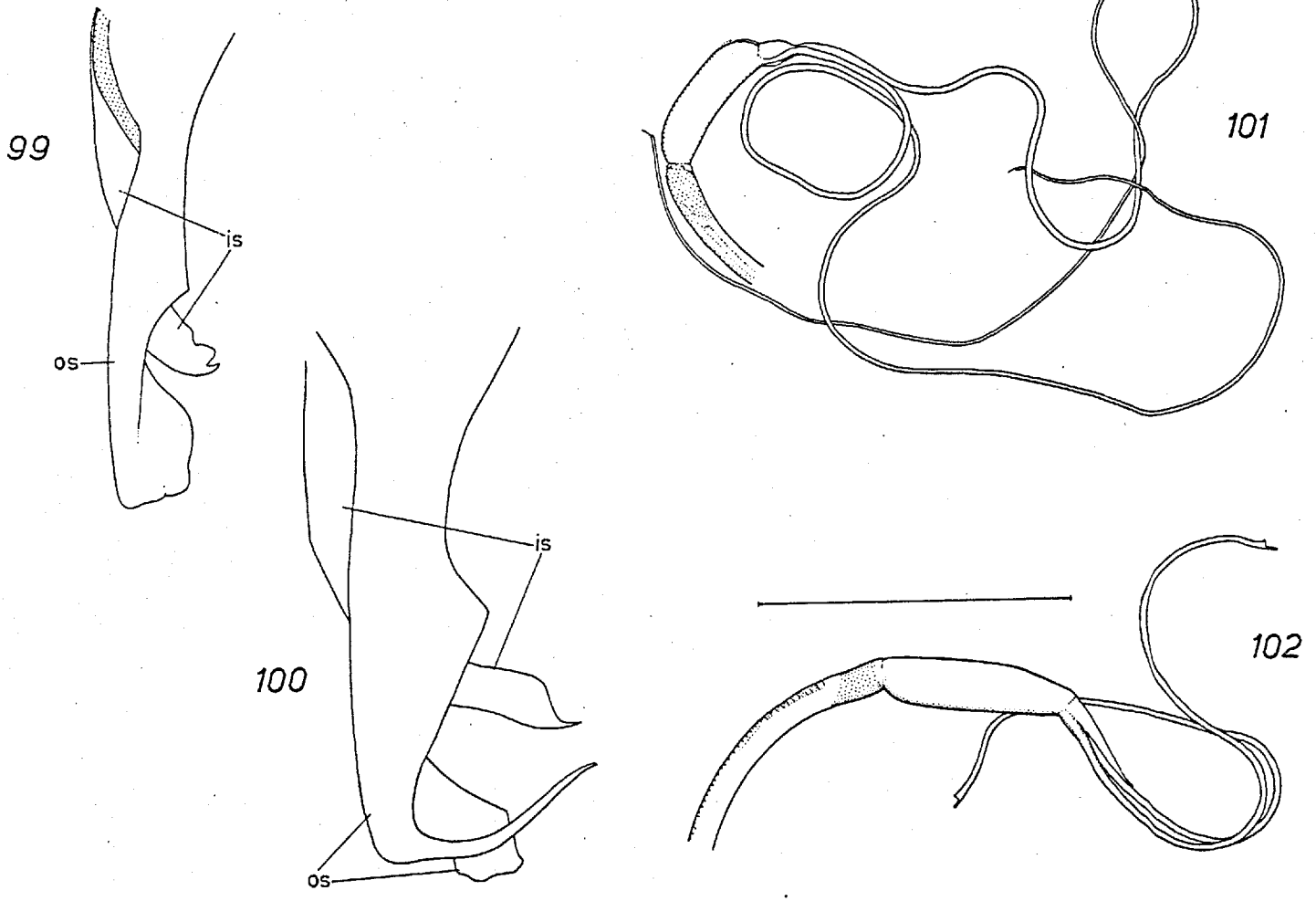
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Fig. 103. E. xanthops, holotype. Epandrium from left.

Fig. 104. E. lenticula, paratype. Same as above.

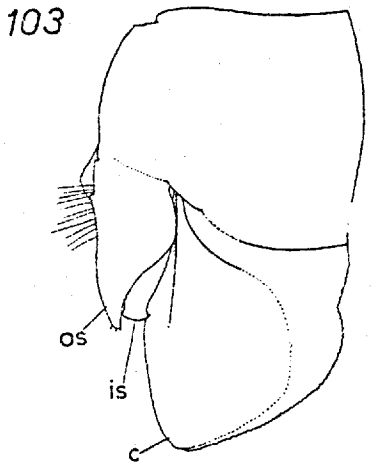
Fig. 105. E. vitrea, paratype, Mount Boyce. Same as above.

Fig. 106. E. lenticula, paratype. Aedeagus.

Fig. 107. E. xanthops, holotype. Distal part of aedeagus.

Fig. 108. E. vitrea, paratype, Mount Boyce. Same as above.

Abbreviations used on figures. aa, aedeagal apodeme. ac, prescutellar acrostichal bristle. ba, basalare. bp, basalar process. br, brush of setulae on trochanter. bu, membranous bulb of aedeagus. c, cercus. ca, capitellum of haltere. cae, membranous caeca of aedeagus. dc, dorsocentral bristle. g, glans of aedeagus. gp, genital pouch. hm, humeral callus. ia, intra-alar bristle. is, inner surstylus. m, mesoscutum. mc, membranous cleft. mcp, midcoxal prong. mp, mesopleuron. mrp, meropleuron. ms, metasternum. mtp, metapleuron. np, notopleural bristles. npc, posterior notopleural callus. os, outer surstylus. pa, postalar bristle. pd, pedicel of haltere. pg, proctiger. pl, pleurotergite. pm, protandrium (membranous part). pp, propleuron. pr, preglans of aedeagus. ps, postscutellum. pt, pteropleuron. ptn, postnotum. sa, supra-alar bristle. sb, scutellar bridge. sc, scutellum. sca, scabellum of haltere. se, sensory area of tibia. sp, spiracle. squ, squama. ssr, supra-squamal ridge. st, stipe of aedeagus. stp, sternopleuron. s_{4-9}, sternites 4-9. te, tegula. tf, terminal filaments of aedeagus. tn, tunic of aedeagus. ts, transverse suture. t_{4-9}, tergites 4-9.



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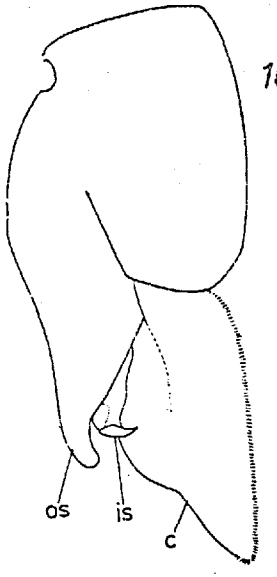

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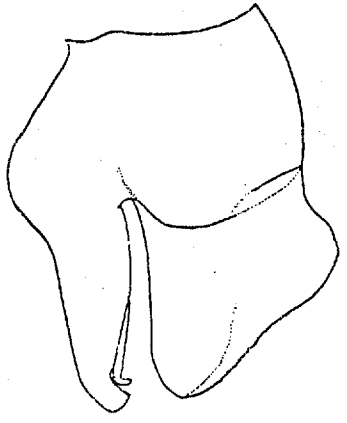

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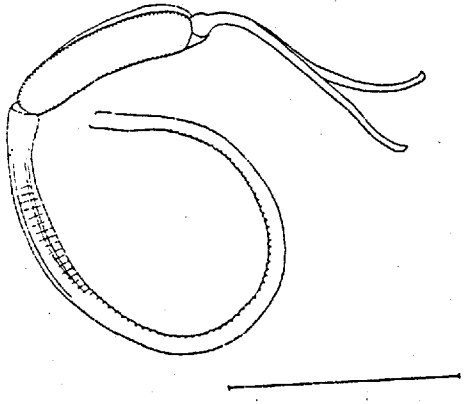

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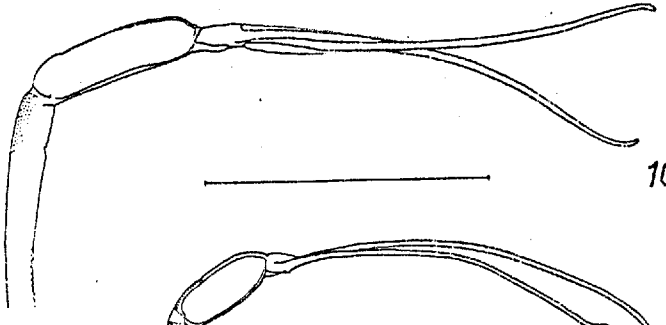

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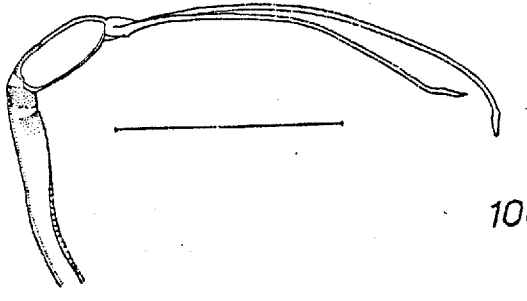

108