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A NEW FAMILY OF DACNONYPHA (LEPIDOPTERA) BASED ON THREE NEW SPECIES FROM SOUTHERN AUSTRALIA, WITH NOTES ON THE AGATHIPHAGIDAE

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Abstract

A new family Lophocoronidae is proposed in the Dacnonypha for the new genus *Lophocorona*, with three new species from southern Australia, *L. pediasia*, *L. astiptica*, and *L. melanora*. Comparative notes are given on the adult morphology of this and other families referred to the Dacnonypha, especially the Agathiphagidae.

INTRODUCTION

The suborder Dacnonypha is of special interest to those studying the phylogeny of the Lepidoptera, for both adult and pupa embrace some of the generalized characters of the Micropterigidae of the suborder Zeugloptera. Our knowledge of the adult morphology and relationship of these groups owes much to the recent comparative studies of Kristensen (1967-1971) and of Mutuura (1972). The Eriocraniidae, one of the four previously known families referred to the Dacnonypha, are represented by a few closely related Palearctic genera, to which has been added the divergent Nearctic genus *Acanthopteroctetes* Braun (Davis 1969). The Neopseustidae include two Indian genera *Neopseustis* Meyrick and *Archepiolus* Mutuura (Mutuura 1971). In the southern hemisphere the suborder was known previously from two small genera referred to the families Mnesarchaeidae and Agathiphagidae. *Mnesarchaea* Meyrick contains seven species from New Zealand, and *Agathiphaga* Dumbleton two species, one from Fiji and one from Queensland. It is of more than usual interest to report the discovery in southern Australia of a new genus and three new species of Dacnonypha, for which a new family is proposed.

Family **LOPHOCORONIDAE** fam. n.

Type genus: Lophocorona gen. n.

Diagnosis

Small homoneurous moths of wingspan 11.0 to 14.5 mm, pale sometimes distinct pattern of non-metallic scales, head with long hair-scales, without sulci and ocelli, mandibles and short haustellum present, maxillary palpi 4-segmented, folded, fore tibia without epiphysis, tibial spurs 0-2-4, wings with Sc forked in forewing, simple in hindwing, R_5 to termen in both wings, forewing with three anal veins, confluent distally, male with paired ventral organs on abdominal segment 5.

Head (Figs. 1, 2) hypognathous, broader than long, cranial sulci vestigial or absent, tentorium with strongly sclerotized anterior arms with tapering sclerotized dorsal arms, corporotentorium a strong transverse bar joining bases of anterior arms, with slender posteromedian process present, no posterior arms; eyes relatively large, ocelli absent; antennae filiform, about one-half length of forewing, clothed with narrow appressed scales; labrum reduced and not differentiated from clypeus, without lateral groups of setae; mandibles a pair of small rounded tapering lobes with rounded apices, without condyles; maxillae (Fig. 4) with galeae modified to form a short haustellum about one-half length of maxillary palpus, slightly coiled in repose, with setose external surface and serrate margin representing linking mechanism; lacinia absent; maxillary palpus four-segmented, folded, segment 2 with constriction indicating fusion of two segments; labium with prementum (Fig. 3) small, bilobed, with very long setae, postmentum membranous, without Eltringham's organ; labial palpus (Fig. 3) three-segmented, apical segment with small rounded distal sensory invagination.

Thorax clothed with imbricate scales; fore tibia (Fig. 5) with scattered fine setae, a small postmedian spine, and five apical spines, epiphysis absent; mid tibia (Fig. 6) with postmedian and apical spines and paired apical spurs; hind tibia (Fig. 7) with postmedian and apical spines and paired postmedian and apical spurs.

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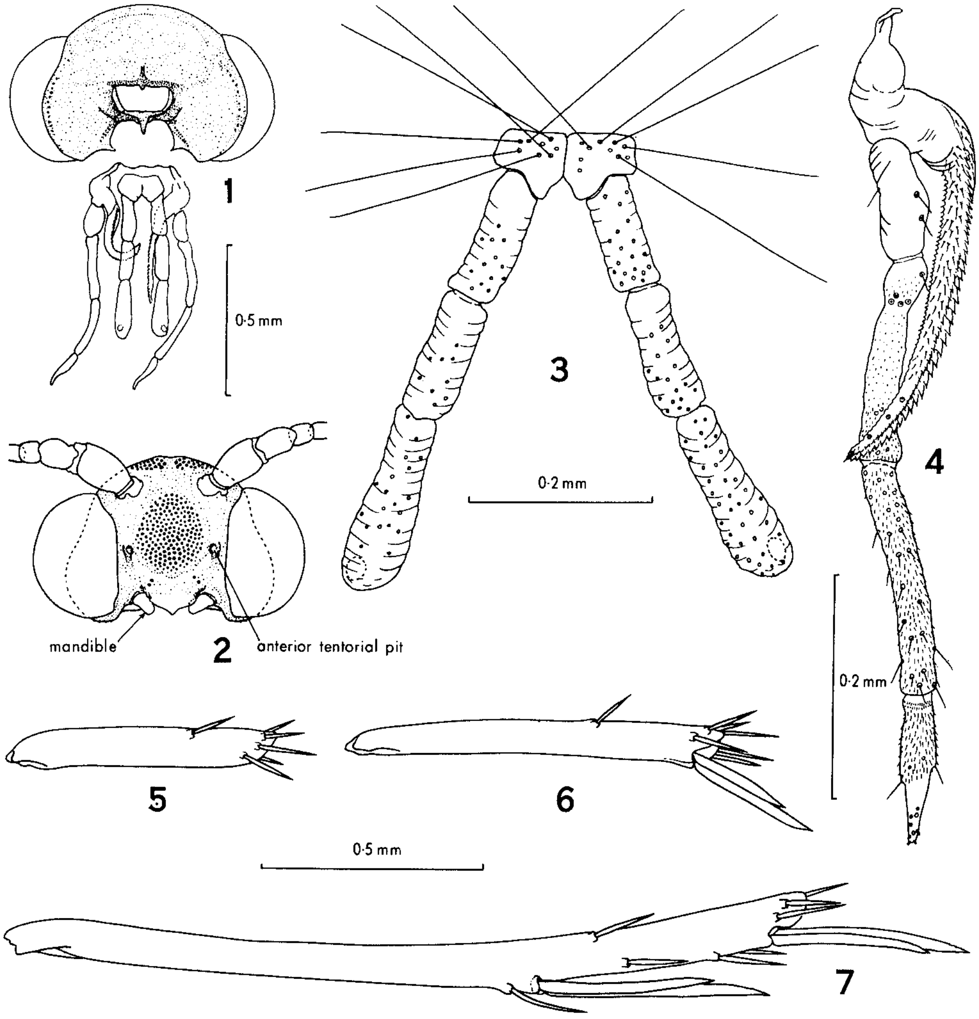


FIGS. **1-7**.—*Lophocorona pediasia* gen. et sp. n.: **(1)** head capsule and mouthparts, posterior view; **(2)** head capsule, anterior view; **(3)** prementum and labial palpi; **(4)** maxilla; **(5-7)** fore, mid and hind tibiae.

Wings (Figs. 8, 9) aculeate, homoneurous; forewing with pigmented scales forming non-metallic pattern, scales (Plate I A-C) variably broad with irregular or scalloped apical margins, prominent striae projecting beyond apical margins, without transverse ribs; forewing with jugum small, humeral vein vestigial, Sc with two branches reaching costa at about one-third and two-thirds, R_1 simple, R_2 and R_3 short- or long-stalked, R_3 sometimes connected to R_{4+5} by a vestigial cross-vein, R_4 and R_5 stalked, R_4 to costa and R_5 to termen, stem of M present in discal cell, M_1 to CuA_2 separate, CuP present, 2A and 3A vestigial but confluent, joining 1A; hindwing with short frenular and postbasal setae, Sc and R_1 simple, R_2 and R_3 short- or long-stalked, R_3 sometimes connected to R_{4+5} by a vestigial cross-vein, R_4 and R_5 stalked, R_4 to costa and R_5 to termen, stem of M present in discal cell, CuP present, 1A + 2A confluent, vestigial.

Abdomen with paired ventral organs on fifth segment.

Male genitalia (Figs. 14-16).—Ninth abdominal segment forming a broad, strongly sclerotized ring, not differentiated into tegumen and vinculum, bilobed posterodorsally, each lobe studded above and beneath with stout short setae; anal tube membranous with fine lateral setae; valva bilobed distally, inner surface of both lobes with stout, strongly sclerotized setae, ventral lobe with a strong apical seta; aedeagus long, more or less cylindrical, vesica with strongly sclerotized cornutus about one-half length of aedeagus, aedeagus supported by membranous diaphragma, with strongly sclerotized plate beneath, and with a row of three long curved setae arising at base of each valva.

Comments

Head.—The head in *Lophocorona* is smaller than in the Palearctic genera of Eriocraniidae and of a different shape, with relatively large eyes and no ocelli. The Nearctic genus *Acanthopteroctetes,* referred to the Eriocraniidae by Davis (1969), also lacks ocelli, and differs in so many other respects from Palearctic Eriocraniidae that its inclusion in that family seems questionable. The shape of the head in *Lophocorona* is more comparable with that of Mnesarchaeidae, in which there are also no ocelli and only a trace of sulci. The head in *Eriocrania* Zeller and related genera is sparsely clothed with woolly hair-scales, whereas in *Lophocorona* the hair-scales of the head are dense, long and nearly straight. The anterior arms of the tentorium in *Lophocorona,* as in Eriocraniidae, Neopseustidae and Mnesarchaeidae, have well-sclerotized dorsal arms, although in more advanced eriocraniid genera (Kristensen 1968c) the anterior arms are greatly reduced posterior to the junction of the dorsal arms. In *Agathiphaga* dorsal arms are absent and the anterior arms are reduced to thin, weak and non-sclerotized strands. As in other Dacnonypha, and in Zeugloptera, a posteromedian process of the corporotentorium is also present in *Lophocorona.*

The well-developed labrum found in Agathiphagidae, Eriocraniidae and Neopseustidae is reduced in Lophocoronidae and Mnesarchaeidae. Except in Agathiphagidae, the mandibles in all adult Dacnonypha, including Lophocoronidae, are reduced to nonfunctional lobes or are lost entirely, and the galeae are modified to form a short haustellum or proboscis. The four-segmented maxillary palpi in Lophocoronidae show some reduction from the primitive five-segmented condition found in Agathiphagidae, Eriocraniidae and Neopseustidae. However, Kristensen (1968a) noted that in *Eriocrania* the maxillary palpi show a slight reduction from the five-segmented condition of the Zeugloptera in that the flexor muscle between segments 2 and 3 has been lost. In *Lophocorona* it is clear that reduction has proceeded even further and these two segments have fused, although the composite segment still shows a constriction at about one-third of its length.

The prementum is bilobed or deeply indented in Lophocoronidae and carries the three-segmented palpi characteristic of Dacnonypha. It is probable, as pointed out by Kristensen (1967), that the basal segment of the so-called four-segmented labial palpi of Agathiphagidae represents the lateral portions of a very deeply indented prementum, and that the palpi have in reality only three segments. The postmentum in Lophocoronidae lacks the Eltringham's organ found in Agathiphagidae, Eriocraniidae and Mnesarchaeidae. However, the invaginated sensory area of the apical palpal segment in Lophocoronidae is similar in size to that of the Eriocraniidae, and much smaller than the very elongate area found in Agathiphagidae. This invaginated sensory area is missing in both Mnesarchaeidae and Neopseustidae (Kristensen 1968b).

Legs.—As in Eriocraniidae and Mnesarchaeidae the epiphysis of the fore tibia is absent in Lophocoronidae, whereas it is present in both Agathiphagidae and Neopseustidae. The Agathiphagidae have, in addition, an apical spur on the fore tibia, known nowhere else in the Lepidoptera. The mid tibia in Lophocoronidae, Mnesarchaeidae and Neopseustidae carries a pair of apical spurs, whereas in Eriocraniidae there is a single apical spur and in Agathiphagidae paired median and apical spurs, as on the hind tibia of all Dacnonypha.

Wings.—In the forewing the jugum is prominent in Agathiphagidae and Eriocraniidae, much smaller in Lophocoronidae and Mnesarchaeidae, and is stated not to project at all in *Neopseustis,* although there is a small projecting jugum in *Archepiolus* (Mutuura 1971).

Kristensen (1970) described the fine structure of the wing scales of *Micropterix* Hübner, *Eriocrania* and *Mnesarchaea.* In *Eriocrania* he showed that the scales varied in width from very broad to narrow, but had a uniform structure. Their structure was similar in most respects to that found in the wing scales of *Micropterix,* each scale having an unindented apical margin, uniformly prominent striae, projecting beyond the apical margin, but no transverse ribs. Both the striae and the intervening lamella showed fine ridges or "crests". The wing scales of *Mnesarchaea* were also very variable in shape, with prominent striae and fine crests, but the apical margins were scalloped and the striae were closely set, some of the latter being more prominent than others. Unlike *Micropterix* and *Eriocrania*, however, some of the scales in *Mnesarchaea* had numerous transverse ribs between the striae.

In *Lophocorona* nearly all the wing scales (Plate I A-C) have variably indented or scalloped apical margins; all are without transverse ribs. The striae are very prominent, of more or less uniform height, and stand about 1·0 to 1·5 μ apart. They project slightly beyond the apical margin of the scale. The lamella carries a

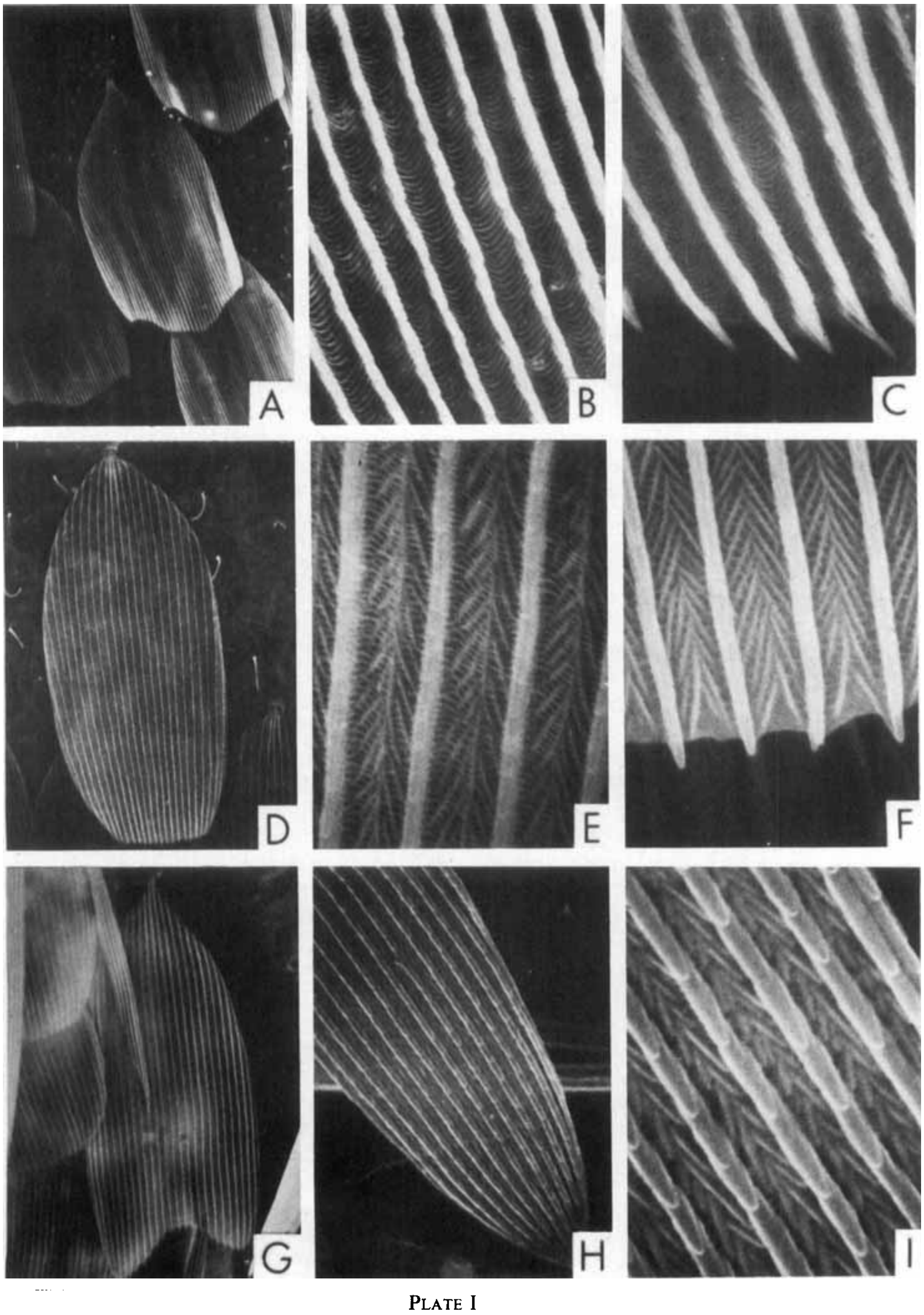
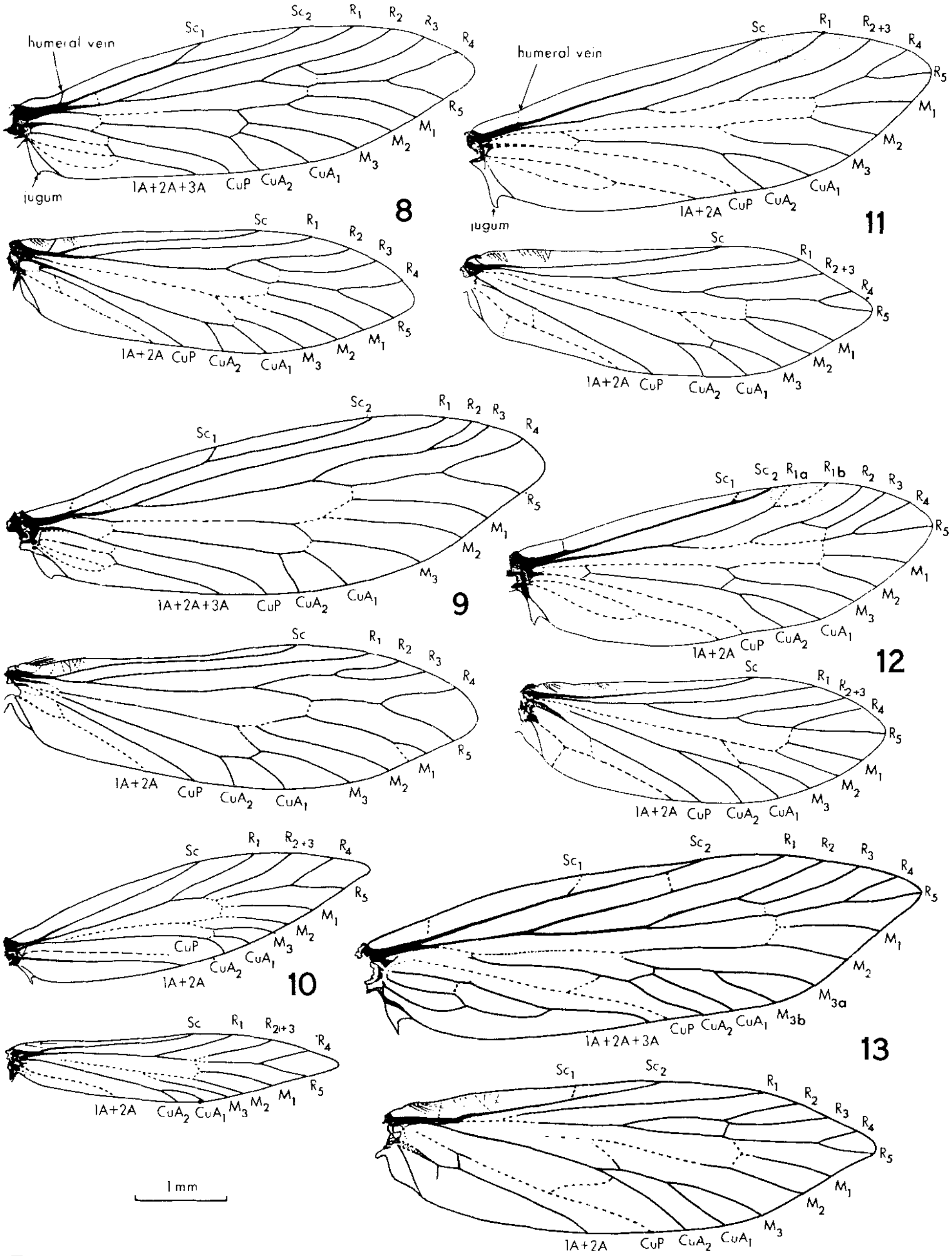


PLATE I
Scanning electron micrographs of wing scales: **A-C.**—*Lophocorona pediasia* gen. et sp. n.; **D-I.**—*Agathiphaga queenslandensis* Dumbleton. (A, D, ×480; G, ×600; H, ×1800; remainder, ×6000).

dense pattern of parallel crests (Plate I B, C), more transversely arranged than those of *Agathiphaga* or in the genera studied by Kristensen, and the striae themselves are more coarsely crested. The scales arise from individually arranged scale sockets.

In *Agathiphaga*, on the other hand, the wing scales (Plate I D-I) are of a very similar structure to that described by Kristensen in *Eriocrania*, with the striae projecting beyond the apical margin and with no transverse ribs. The striae stand 2·0 to 2·5 μ apart. Crests are well developed and, on the lamella, form a distinct oblique herring-bone pattern. Whereas in shape some of the scales in *Agathiphaga* resemble the broad scales of *Eriocrania*, with unindented apical margins (Plate ID), others have strongly notched apical margins (Plate IG). The broad scales with



FIGS. 8-13.—Wing venation: (8) *Lophocorona pediasia* gen. et sp. n.; (9) *L. melanora* sp. n.; (10) *Mnesarchaea paracosma* Meyr.; (11) *Eriocrania semipurpurella* (Stephens); (12) *Heringocrania unimaculella* (Zett.); (13) *Agathiphaga queenslandensis* Dumbleton.

entire apical margins seem to be either unicolorous or even unpigmented, and closely cover the surfaces of both fore- and hindwings. The notched scales, on the other hand, normally overlie the broad scales and, being pigmented, are responsible for the non-metallic wing pattern. They are much more easily denuded than the underlying broad scales. Unlike other genera of Dacnonypha, the wing scale sockets of *Agathiphaga* are scattered either singly, or in twos or even in threes, over the wing surface.

The wing venation of Lophocoronidae shows many features in common with other Dacnonypha, but there are several significant differences. In the forewing the branches of Sc reach the costa much farther apart in *Lophocorona* (Figs. 8, 9) and in *Agathiphaga* (Fig. 13) than in the eriocraniid genera *Heringocrania* Kuznetzov (Fig. 12) and *Dyseriocrania* Spuler. Sc is in fact similar in *Lophocorona* and *Archepiolus*, whereas it is simple in *Neopseustis*, *Eriocrania* (Fig. 11), *Acanthopteroctetes*, and in *Mnesarchaea* (Fig. 10). R_1 is forked near the costa in *Heringocrania* and *Dyseriocrania*, but simple in *Eriocrania*, *Lophocorona*, *Mnesarchaea*, the two genera of Neopseustidae, and in most specimens of *Agathiphaga*, although in one female of *A. queenslandensis* Dumbleton there is a vestigial branch to R_1, and in that genus also there is a vestigial cross-vein between Sc_2 and R_1. In the Palearctic Eriocraniidae a diffuse pterostigma covers the distal one-third of R_1, a feature not noticed in other families of Dacnonypha, but occurring in some of the Monotrysia and Ditrysia. In *Lophocorona* R_2 and R_3 are stalked in both fore- and hindwing, as in *Agathiphaga* and *Archepiolus*. In two of the three species of *Lophocorona*, and in *Agathiphaga* and *Heringocrania*, there is a vestigial cross-vein between R_3 and R_{4+5}. In *Acanthopteroctetes* R_2 is apparently stalked with R_1, but one branch of R is missing from both wings in *Mnesarchaea*, *Neopseustis* and *Eriocrania*, and from the hindwing in all eriocraniid genera. This loss of one vein in *Acanthopteroctetes* was attributed by Davis (1969) to the fusion of R_2 with R_1, but at least in other Eriocraniidae the fusion of R_2 and R_3 seems more probable. In the forewing of *Dyseriocrania* R_2 is simple and R_3 arises from the stalk of R_4 and R_5, and in *Neopseustis* R_{2+3} arises from R_{4+5}.

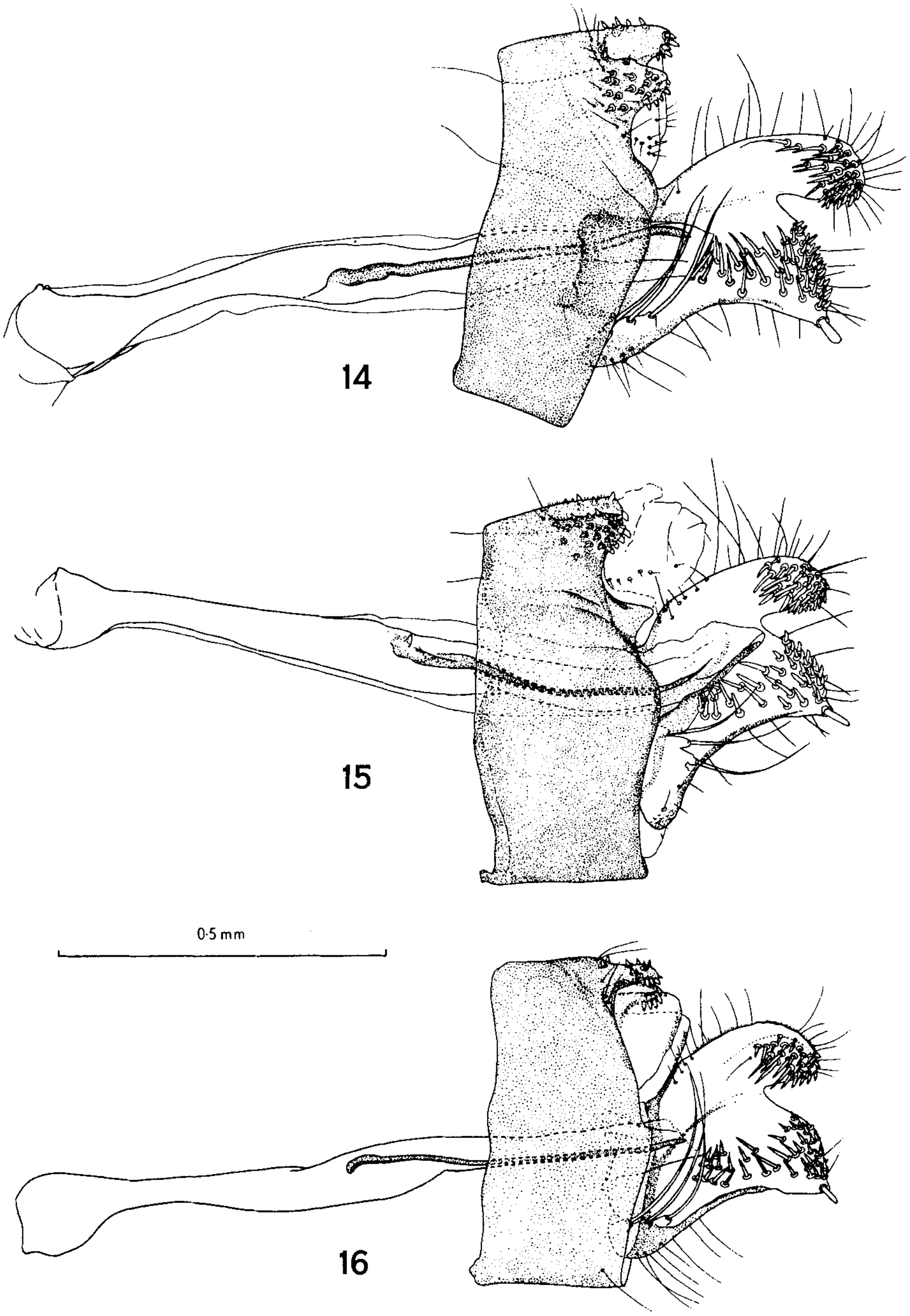
Throughout the Dacnonypha R_4 and R_5 are stalked in both wings; in Eriocraniidae, including *Acanthopteroctetes*, R_5 terminates on the costa near the apex; in Neopseustidae this vein ends at the apex; but in *Lophocorona* and *Mnesarchaea* R_5 ends on the termen remote from the apex. The termination of R_5 in *Agathiphaga queenslandensis* is at the apex, but Dumbleton (1952) stated that in *A. vitiensis* Dumbleton it is on the termen.

In the Palearctic Eriocraniidae and in Neopseustidae CuA_1 and CuA_2 are stalked in the forewing, whereas in other Dacnonypha they are separate. The diversity shown in the three branches of M throughout the suborder may not be of great significance. M_1 arises from R_{4+5} in the forewing of some species of Mnesarchaeidae, and in both wings of *Acanthopteroctetes*, whereas M_1 is stalked with M_2 in both wings of *Neopseustis*. In Agathiphagidae M_3 is stalked with CuA_1 in the hindwing, and in the forewing M appears to have four branches, M_3 being forked. Duplication of the tips of wing veins is not uncommon in some of the more generalized Lepidoptera, such as Hepialidae, and is exemplified by the hindwing of the holotype of *Lophocorona melanora* (Fig. 9) in which the tip of M_1 is duplicated in the right wing but not in the left. However, the additional branch of M in *Agathiphaga* is present consistently in both forewings of the five naturally emerged adults examined. Nevertheless, Dumbleton (1952) reported that in *A. queenslandensis* apical duplication of R_5 and M_3 occurred in some specimens, and he figured only three branches of M in the forewing of both *A. queenslandensis* and *A. vitiensis*.

The arrangement of the anal veins of the forewing in *Lophocorona* and in *Agathiphaga* has not been noticed elsewhere in the Lepidoptera except in the Micropterigidae (Tillyard 1919). All three anal veins are separate at the base, but coalesce before they reach the wing margin. In *Agathiphaga* 3A coalesces with 2A and the combined vein then coalesces with 1A. This is also the situation in *Lophocorona melanora* (Fig. 9), but in the other two species of *Lophocorona* (Fig. 8) 1A and 2A coalesce first and are then joined by 3A.

In the forewing of *Lophocorona* as in *Agathiphaga*, there is a weak or vestigial cross-vein between 3A and CuP, but the oblique vestigial cross-vein between CuA and CuP found in both wings in *Agathiphaga* is lacking in *Lophocorona* and in other Dacnonypha. Dumbleton (1952) pointed out that one of the outstanding features of *Agathiphaga* is the presence in the pupal wings of a cross-vein M-CuA, which forms a small cubito-median cell. This has not been observed in other Dacnonypha, and has usually disappeared in naturally emerged adults of *Agathiphaga*, although a trace of it remains in the forewing of one female.

Genitalia.—Detailed morphological studies on the genitalia of most Dacnonypha are needed before meaningful genitalia comparisons between the taxa will be



FIGS. **14-16.**—Male genitalia of *Lophocorona* gen. n., lateral view with left valva removed: **(14)** *L. pediasia* sp. n.; **(15)** *L. astiptica* sp. n.; **(16)** *L. melanora* sp. n.

possible. Unfortunately, the relative rarity of most species in collections has delayed this work.

The male genitalia of *Lophocorona* (Figs. 14-16) seem to be much more uniform and less complex than in the Mnesarchaeidae. They lack a differentiated uncus, although the posterodorsal lobes of the ninth abdominal segment may be homologous with the dorsal lobes of the tegumen described by Philpott (1927) in *Mnesarchaea hamadelpha* Meyrick and two other species of *Mnesarchaea*. The latter may be comparable with the dorsal lobes found in Eriocraniidae. The bilobed valvae in *Lophocorona* also show some resemblance to those found in the same three species of *Mnesarchaea*. However, here the similarity probably ends. The latter species all lack the broad, strongly sclerotized, cylindrical ninth abdominal segment, the elongate, moderately sclerotized aedeagus, the sclerotized support for the aedeagus, and the stout setal armature of the valvae found in *Lophocorona*. The asymmetrical and more complex male genitalia of the other species of *Mnesarchaea* described by Philpott appear to have little in common with *Lophocorona*, or indeed with the remaining species of *Mnesarchaea*.

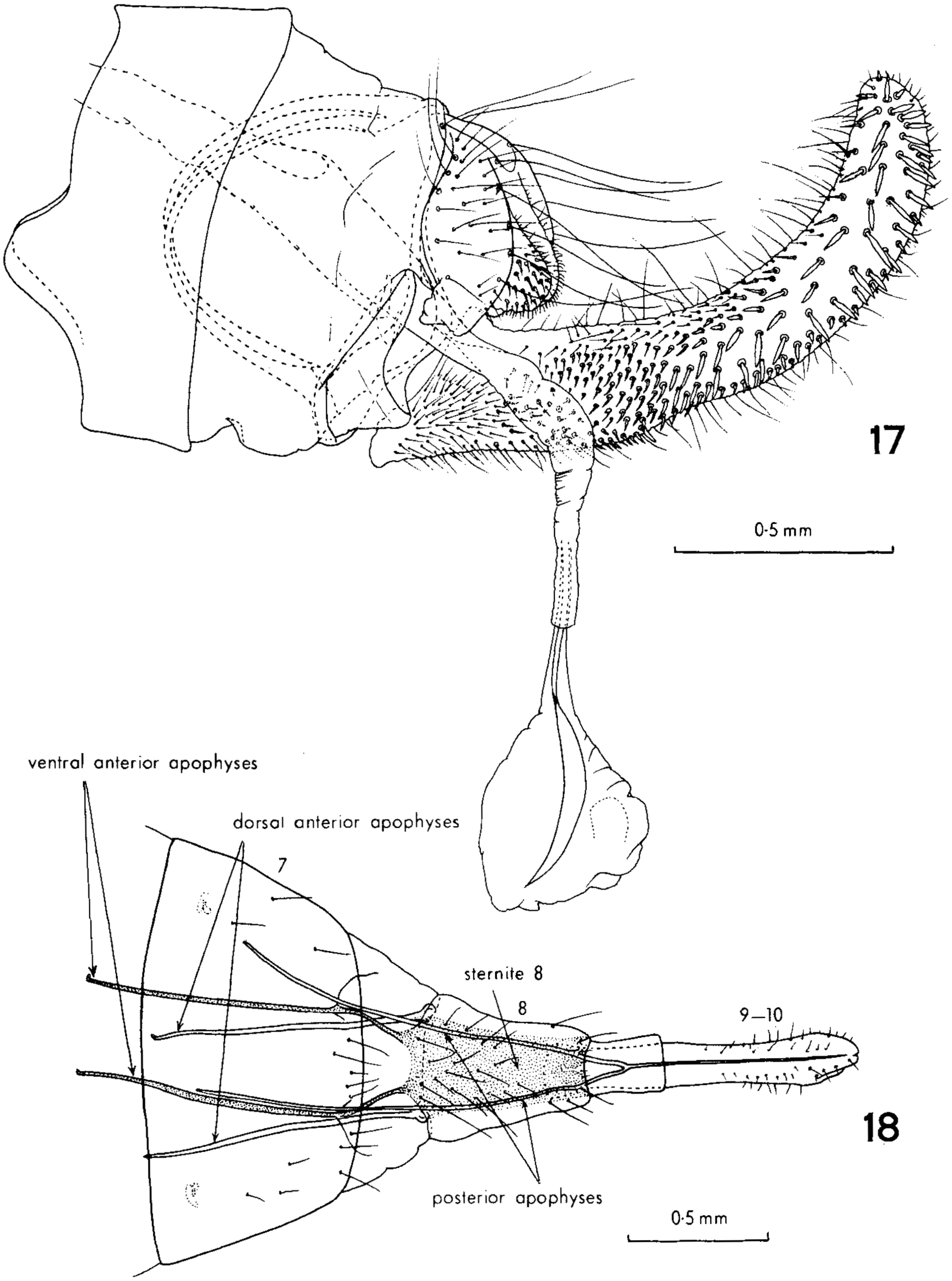
The male genitalia of *Agathiphaga* (Fig. 17) are also very different. In the latter the eighth and ninth abdominal segments each have lateral apodemes protruding into the preceding segments. The ninth segment is narrow and there is a pair of large hairy posterodorsal lobes separated from it by a sulcus; between these lobes the anus protrudes. The aedeagus is itself poorly sclerotized, but the vesica carries a moderately sclerotized, somewhat sickle-shaped thickening. The valvae are very long and upwardly curved, with parallel sides and an array of setae of various forms.

Unfortunately, the female of *Lophocorona* is not known. In a morphological study of the female genitalia in many genera of primitive Lepidoptera, Mutuura (1972) concluded that the Mnesarchaeidae and Neopseustidae may not be closely allied either to the Eriocraniidae or the Agathiphagidae, but to the Prototheoridae. The Agathiphagidae he thought were probably not related to the Eriocraniidae, but might represent the ancestral form of the tineid group of families.

The female genitalia of *Agathiphaga* have not yet been studied adequately. Certainly the posterior segments of the abdomen (Fig. 18) are extensible, as noted by Dumbleton (1952), with the eighth segment telescoping into the seventh, and the ninth-tenth into the eighth. In *A. queenslandensis* the ninth and tenth are fused into one slender weakly sclerotized, nearly cylindrical segment, with sparse short hairs on its posterior half. The posterior end of this segment is slightly expanded and bluntly rounded; above the terminal end is a transverse depression in which a single opening apparently combines the anal and genital openings. The elongate terminal segment is strengthened by a single sclerotized rod formed by the fusion of the two long slender posterior apophyses. Just anterior to their point of fusion the posterior apophyses also appear to have a further point of attachment to the ninth-tenth segment near its anterior margin. In the Eriocraniidae the posterior apophyses are fused to form the terminal piercing organ. The latter is not found in *Agathiphaga*, in which the extensible terminal segments instead serve as a probing ovipositor.

In *A. queenslandensis* there are two pairs of anterior apophyses, a condition not known elsewhere in the Lepidoptera. One pair is attached to the anterior margin of the eighth sternite, while the other is attached to the anterior margin of the eighth tergite. In one specimen examined one of the ventral anterior apophyses is apparently fused with the apex of one posterior apophysis.

Biology.—The early stages of Lophocoronidae, as well as of Mnesarchaeidae and Neopseustidae, are still unknown. The information already available on the leaf-mining habits of Eriocraniidae and on the seed-inhabiting larvae of *Agathiphaga* might suggest that the larvae of *Lophocorona* will prove to be internal feeders. The occurrence of the Lophocoronidae in areas receiving an annual rainfall of 10 to 25 inches (254 to 635 mm) would necessitate adaptations to extreme desiccation, especially in the more arid environments where the rain falls extremely intermittently. Larval diapause is strongly developed even in Eriocraniidae, which are found in temperate deciduous forest environments, and in Agathiphagidae, found in rain forest. Attempts to break the larval diapause in *A. queenslandensis* have so far failed, and mature larvae in seeds of *Agathis robustus* collected in Queensland



FIGS. **17-18.**—*Agathiphaga queenslandensis* Dumbleton: **(17)** male genitalia, lateral view with left valva removed; **(18)** posterior segments of female abdomen, ventral view.

in February 1964, kept at laboratory temperatures, produced very few adults between April 1966 and September 1969. At the end of this time some larvae still survived, but subsequently failed to produce adults. Larvae in samples of infested seed were subjected to low temperatures, and to varied continuous and intermittent moisture regimes, without any evident effect on the diapause.

The resting posture of adult *Lophocorona*, with wings folded in a steeply roofwise position along the back, and antennae extended anteriorly, seems to be similar to that of Eriocraniidae (Plate IIF). The resting posture of *Agathiphaga* (Plate IIE) is even more trichopterous in appearance.

It is probable that the short haustellum in *Lophocorona* is functional and is used for sucking moisture droplets to offset desiccation in a relatively arid environment. Confined adults of the European *Eriocrania semipurpurella* (Stephens) are readily attracted to water-saturated tissue (Plate IIF), extending the maxillary palpi and haustellum and probing the liquid. By offering one of them water stained with mercurochrome, and later tracing the stain throughout the dissected intestinal tract, it was clear that the haustellum was in fact functional. Kristensen (1968c) described the musculature of the sucking pump in the head of Eriocraniidae and also observed individuals sucking from water droplets.

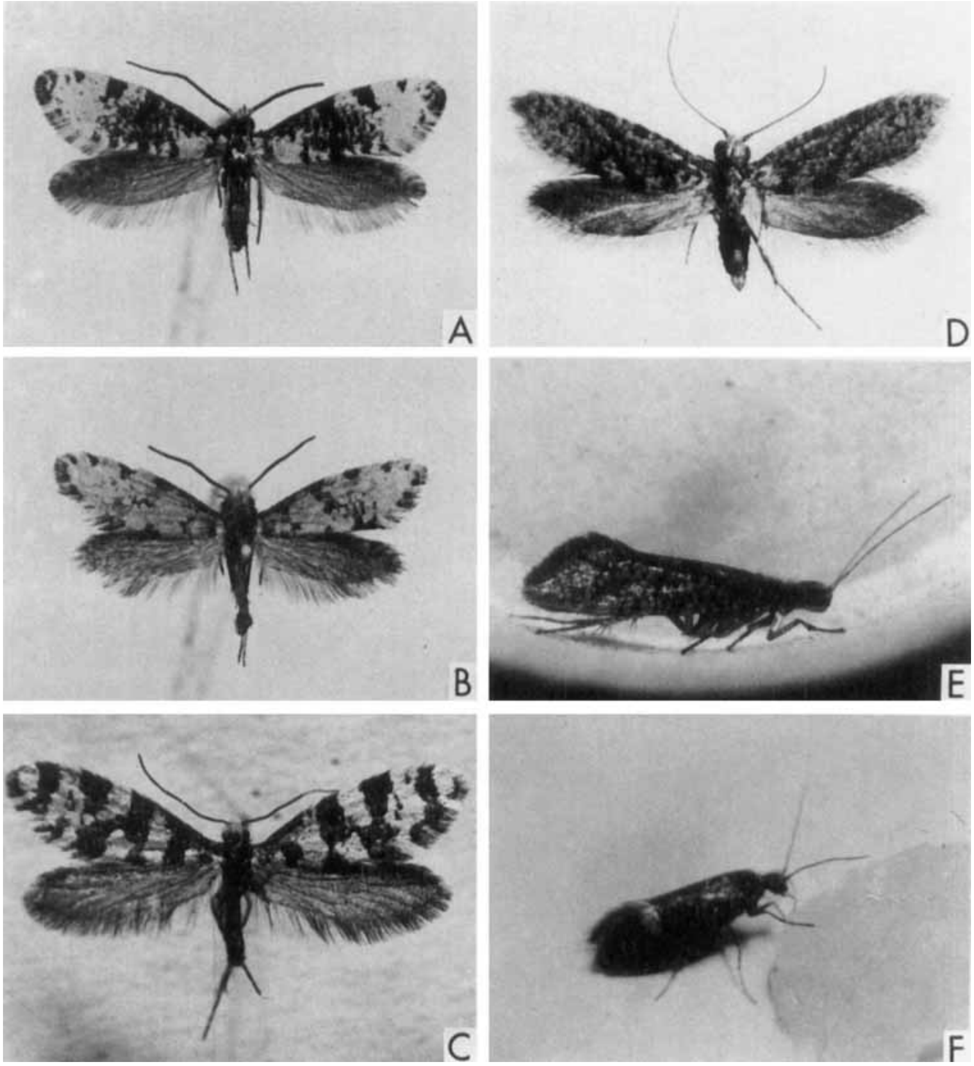


PLATE II

Adults of Lophocoronidae, Agathiphagidae and Eriocraniidae: **A-C.**—Holotype males of *Lophocorona pediasia* gen. et sp. n., *L. astiptica* sp. n., and *L. melanora* sp. n.; **D.**—Male of *Agathiphaga queenslandensis* Dumbleton (expanse 13.0 mm); **E.**—Living adult of *A. queenslandensis* (length 8.0 mm); **F.**—Living adult of *Eriocrania semipurpurella* (Stephens) probing water-saturated tissue with its maxillary palpi preparatory to drinking (length 6.0 mm).

Genus **Lophocorona*** gen. n.

Type species: Lophocorona pediasia sp. n.

Generic characters as for family Lophocoronidae.

Lophocorona pediasia† sp. n.

Types.—WESTERN AUSTRALIA: *Holotype* ♂ (genitalia slide No. H278) and 18 ♂ *paratypes* labelled "28 miles W. of Madura, W.A., 30 April 1968, I. F. B. Common & M. S. Upton"; SOUTH AUSTRALIA: 3 ♂ *paratypes* labelled "25 miles E. of Eucla, W.A., 1 May 1968, I. F. B. Common & M. S. Upton"; 2 ♂ *paratypes* labelled "58 miles E. of Nullarbor, S.A., 2 May 1968, I. F. B. Common & M. S. Upton". *Holotype* and 13 *paratypes* in Australian National Insect Collection, CSIRO, Canberra; 2 *paratypes* each deposited in British Museum (Natural History) and in Zoological Museum, Copenhagen; 1 *paratype* each in National Museum of Natural History, Washington, Queensland Museum, Brisbane, Australian Museum, Sydney, National Museum of Victoria, Melbourne, South Australian Museum, Adelaide, and Western Australian Museum, Perth.

Holotype male (Plate IIA).—Head white, crown and frons orange-brown, antennae with scape white, flagellum dark fuscous, labial and maxillary palpi fuscous. Thorax and tegulae white, anterior margins dark fuscous. Fore- and hindwing with R_2 and R_3 short-stalked, R_3 connected to R_{4+5} by a vestigial cross-vein; forewing white, central one-half suffused or strigulated with fuscous, basal one-third of costa barred with dark fuscous, a blackish bar at about one-sixth extending obliquely outwards to near fold, a broad black fascia from before one-half costa extending obliquely outwards to middle of discal cell, with a narrow outward extension in cell, a dark fuscous spot at one-half inner margin, a fuscous quadrangular spot on costa before two-thirds, with an irregular black extension to end of discal cell, a small fuscous spot on costa beyond four-fifths, a couple of fuscous subapical strigules, and a few dark fuscous and fuscous scales along termen and on tornus, cilia fuscous at apex, white along termen to tornus barred with light fuscous; hindwing grey mottled with light fuscous and whitish near apex, costa near apex white barred with light fuscous. Fore and mid legs dark fuscous, tibiae with white median and apical bars, apices of tarsal segments white, hind leg greyish. Abdomen dull greyish. Expanse 12.3 mm.

Male genitalia (Fig. 14). Dorsal posterior lobes of ninth abdominal segment with numerous short stout setae, valva with very stout apical seta on ventral lobe.

Expanse. Male 11.1—13.0 mm.

Distribution

Known so far only from a narrow low-rainfall belt adjacent to the Great Australian Bight, from 230 km west of the South Australia-Western Australia border to 265 km east of that border.

Comments

The pattern of the forewing is somewhat variable in detail, especially in the extent and intensity of the black markings. The frons is sometimes fuscous rather than orange-brown, but never as yellow as in *L. astiptica.* In the male genitalia the posterior dorsal lobes of the ninth abdominal segment, as in *L. astiptica,* are armed with more numerous short stout setae than in *L. melanora.* In the valva the dorsal lobe is longer than in either *L. astiptica* or *L. melanora,* and the strong apical seta of the ventral lobe is stouter than in these two species.

The type series was taken at mercury vapour light on successive nights at three localities spread over a total distance of some 500 km. The flight period of the adults may well be very restricted, and their time of emergence may have been influenced by heavy rain over this area a few days previously. In the type locality west of Madura there are scattered eucalypts with a saltbush understorey. The locality east of Eucla is mallee and saltbush, and that east of Nullarbor is a eucalypt woodland with saltbush.

**λοφοσ* — a tuft of hair; *κορωνη* — crown; feminine

†*πεδιασια* — of the plain

Lophocorona astiptica* sp. n.

Type.—WESTERN AUSTRALIA: *Holotype* ♂ (genitalia slide No. H279) labelled "20 miles W. of Coolgardie, W.A., 27 April 1968, I. F. B. Common & M. S. Upton", in Australian National Insect Collection, CSIRO, Canberra.

Holotype male (Plate IIB).—Head white, crown ochreous yellow laterally, ventral and lateral margins of frons suffused ochreous yellow, antenna with scape white, flagellum dark fuscous, labial and maxillary palpi fuscous. Thorax fuscous, anterior margin paler, scales of tegulae fuscous tipped with white. Fore- and hindwing with R_2 and R_3 short-stalked, R_3 connected to R_{4+5} by a vestigial cross-vein; forewing white, markings fuscous, an elongate patch on basal one-third of costa, obscurely connected to a spot below fold at one-fifth, a spot on inner margin at about two-fifths, an outwardly oblique fascia from costa beyond one-third to tornus, well-defined near costa but becoming obscure and represented by strigulations towards tornus, a rounded spot on costa beyond one-half, a smaller spot on costa between this and apex, and a small spot on costa just before apex, three small spots on termen, cilia white, fuscous on tornus and opposite terminal spots. Hindwing grey, cilia grey, on costa near apex whitish, spotted with fuscous, on termen white with grey bases. Fore and mid legs dark fuscous, tibiae with obscure whitish median and apical bars, basal segment of tarsus dull whitish apically, hind leg fuscous. Abdomen fuscous. Expanse 11.3 mm.

Male genitalia (Fig. 15). Dorsal posterior lobes of ninth abdominal segment with numerous short stout setae, valva with fairly stout apical seta on ventral lobe.

Distribution

Known only from the type locality, near Coolgardie, Western Australia.

Comments

This species is of about the same size as *L. pediasia*, but with a less prominent wing pattern and with the head ochreous yellowish instead of orange-brown or fuscous. It is much smaller than *L. melanora*, without the bold black transverse fasciae on the forewing of that species. In the male genitalia the posterior dorsal lobes of the ninth abdominal segment are rather similar to those of *L. pediasia*, and with more numerous short stout setae than in *L. melanora*. In the valva the dorsal lobe is shorter than in *L. pediasia* and narrower than in *L. melanora*, and the strong apical seta of the ventral lobe is longer and stouter than in *L. melanora*, but more slender than in *L. pediasia*.

The holotype was taken at mercury vapour light in sclerophyll woodland of Beard's (1969) Coolgardie Vegetation System. Characteristic tree species in the woodland at this locality are *Eucalyptus oleosa* F. Muell., *E. flocktoniae* Maiden, *E. lesouefii* Maiden and *E. torquata* Luehm., with a shrub understorey of *Eremophila, Dodonaea, Cassia, Acacia* and *Atriplex nummularia* Lindl. *Exocarpos aphyllus* A. DC. and *Santalum spicatum* (R. Br.) were also present. The locality is very near the 10 inch (254 mm) isohyet and evaporation is about 92 inches (2337 mm) annually. At Coolgardie the mean maximum temperature for January is 33°C and the mean minimum for July is 5°C.

Lophocorona melanora† sp. n.

Type.—AUSTRALIAN CAPITAL TERRITORY: *Holotype* ♂ (genitalia, wing and head slides Nos. H101, W122, C20) labelled "Black Mt., A.C.T., 20 May 1949, I. F. B. Common", in the Australian National Insect Collection, CSIRO, Canberra.

Holotype male (Plate IIC).—Head orange, antennae greyish ochreous. Thorax and legs dark fuscous. Fore- and hindwing with R_2 and R_3 long-stalked, R_3 and R_{4+5} not connected by cross-vein; forewing white, slightly suffused with pale ochreous along costa, markings dark fuscous: a small basal costal patch reaching half across wing and almost joining a similar patch on base of inner margin, a broad transverse fascia at about one-fifth, much broader on costa, its inner margin joining basal patch along costa, a second broad transverse fascia at about two-fifths, its inner margin slightly waved, its outer

**αστιπτικοσ* — belonging to the desert

†*μελανοσ* — black; *οροσ* — mountain

margin excavated below fold and connected obliquely in middle to third fascia, a third broad transverse fascia at about three-fifths, in left wing almost completely interrupted in middle, and oblique bar joining it to second fascia much broader than in right wing, a fourth broad transverse fascia from about four-fifths costa to middle of termen, joined to a spot near tornus in right wing, spot separate in left, cilia white, black at apex and opposite third and fourth fasciae and terminal spot near tornus. Hindwing and cilia dark fuscous. Expanse 14.3 mm.

Male genitalia (Fig. 16). Dorsal posterior lobes of ninth abdominal segment with few short stout setae, valva with apical strong seta of ventral lobe fairly stout.

Distribution

Known only from the type locality, Black Mountain, Canberra, at an altitude of about 600 metres.

Comments

This is the largest of the three species, with a very distinctive transverse wing pattern. The wing venation differs slightly from that of the type species *L. pediasia* and *L. astiptica,* in the much longer stalk of R_2 and R_3, in the absence of the cross-vein between R_3 and R_{4+5}, and in the slightly different arrangement of the anal veins of the forewing, in which 2A and 3A anastomose before joining 1A. The male genitalia are very similar to those of the other two species, but the posterior dorsal lobes of the ninth abdominal segment have fewer setae, and in the valva the dorsal lobe is broader than in *L. astiptica* and shorter and broader than in *L. pediasia,* and the apical seta of the ventral lobe is shorter and thinner than in the other species.

Despite careful search at the type locality and nearby areas for several years, only the one specimen of *L. melanora* has been taken. It was flying in the late afternoon in dry sclerophyll forest, in which *Eucalyptus macrorhyncha* F. Muell. and *E. rossii* R. T. Bak. are the dominant species. It was collected at the end of May, rather later than the other species, and at a time when heavy frosts were already frequent. The mean annual rainfall at the type locality is about 25 inches (635 mm). The mean maximum temperature for January is 28°C and the mean minimum for July is 1°C.

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