

On the Miletini (Lepidoptera, Lycaenidae) of the Sulawesi Region

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Abstract Revisional taxonomic information is given for the Miletini (sensu Eliot, 1986) of the Sulawesi region, based largely on evidence from new material obtained during the Royal Entomological Society's 1985 expedition. Two new species, *Miletus rosei*, and *Logania dumoga*, are described.

Keywords Sulawesi, Lycaenidae, Miletini, Project Wallace

Introduction

The information presented here is based largely on material collected during Project Wallace, the Royal Entomological Society's commemorative expedition to the Dumoga Bone National Park in Northern Sulawesi, held in 1985. The opportunity afforded by the expedition has also provided the spur for a review of the current taxonomic knowledge of the Sulawesi region, including the islands of Banggai, Tukangbesi, Selayar, Sangir, Talaud and the Sula archipelago as well as the mainland itself. This paper has been greatly facilitated by the excellent review of the tribe by Eliot, 1986 and by the same author's earlier analysis of the genus *Miletus* Hübner (Eliot, 1961).

The information is presented in the form of an annotated checklist followed by amendments to Eliot's keys. Distributional information is based on material in the BMNH, RNH Leiden and on specimens collected during Project Wallace, together with data from original descriptions where applicable. The limited amount of altitudinal and temporal data available is given as heights in metres and as months of the year (in Roman numerals).

Abbreviations

BMNH	British Museum (Natural History), London
CM	Carnegie Museum, Pittsburgh
MNHU	Museum für Naturkunde der Humboldt Universität, Berlin
RNH	Rijksmuseum van Natuurlijke Historie, Leiden
SM	Senckenberg Museum, Frankfurt am Main
SMT	Staatliches Museum für Tierkunde, Dresden

Genus *Allotinus* C & R Felder

***Allotinus fallax aphacus* Fruhstorfer**

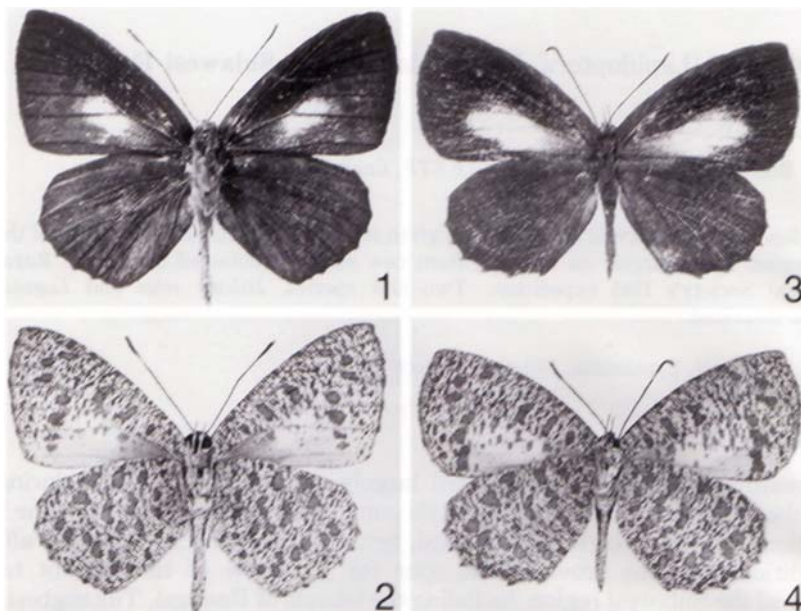
Allotinus fallax aphacus Fruhstorfer, 1913: 343; 1916: 809. Holotype female, Philippines: Camiguin de Mindanao (not located).

Allotinus fallax ancicus Fruhstorfer, 1913: 343; 1916: 809. Lectotype male, Philippines: Mindanao (BMNH).

Allotinus fallax artinus Fruhstorfer, 1916: 809. Lectotype female, Philippines: Panaon (SM).

Eliot (1986) provisionally placed under this taxon a female in the BMNH collection from Talaud.

Locations:[Islands]: Talaud.



Figs 1-4. *Allotinus major* C. & R. Felder. 1. ♂, recto. 2. ♂, verso. 3. ♀, recto. 4. ♀, verso.

Allotinus major C & R Felder (Figs 1-4)

Allotinus major C & R Felder, [1865]: 286, partim male nec female, pl 35, fig 29 male. Lectotype male, Sulawesi (BMNH).

Allotinus fallax depictus Fruhstorfer, 1913: 343; 1916: 809, pl 141h. Lectotype male, Sulawesi (BMNH).

Allotinus kalawarus Ribbe, 1926: 91. Syntypes, Sulawesi (probably in SMT)

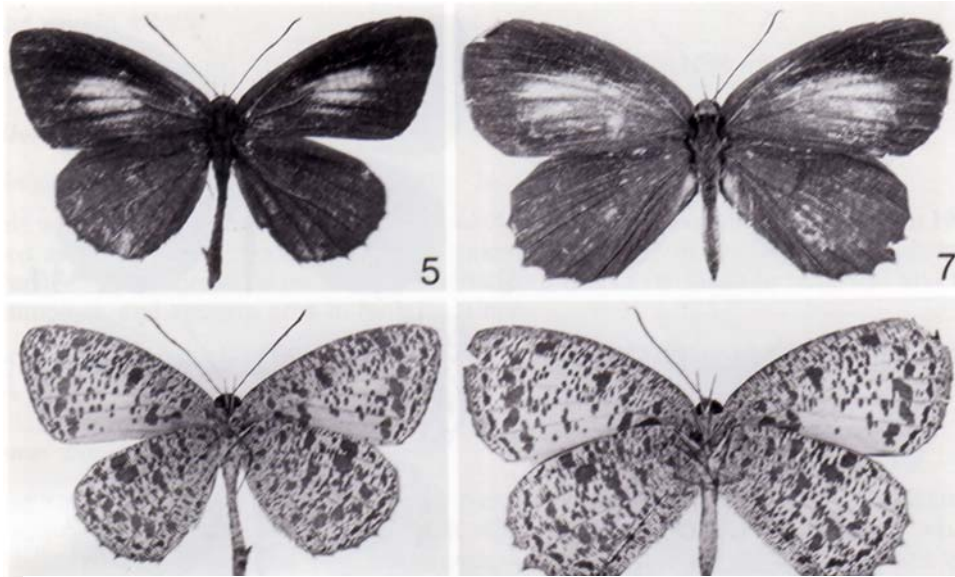
This species was locally common along the forest edge adjacent to the Toraut and Tumpah rivers. The life history was observed and has been fully described by Kitching (1987). The larvae feed on nymphs of a Membracid bug of the genus *Terentius* which itself feeds on *Mallotus mollissimus* (Euphorbiaceae). Both the butterfly and the bug have an association with the brown tree ant *Anoplolepis longipes* Jerdon. The egg is glossy black and is often laid on the prothorax of the adult bug, where it is well camouflaged. The knobby larva is mottled black and brown, whilst the pupa is also glossy black. The only pupa found was attached by the cremaster only to the upper surface of a leaf of the host tree.

Locations: [Mainland]: Minahassa, Tondano, Toli-Toli (xi, xii), Bangkala (ix), Macassar (viii, ix), Maros, Donggala (ix), Tawaya (ix), Tombugu, Palu, Dumoga-Bone NP (200m) (i, ii, iii, iv, vii, viii). [Islands]: Banggai, Sangir, Sula Mangoli (x).

Allotinus maximus Staudinger

*Allotinus albatu*s Felder var *maximus* Staudinger, 1888: 269, pl 94. Holotype male, Sulawesi (coll Staudinger, probably in MNHU).

No new material was collected during Project Wallace. The species would appear, however to be fairly generally distributed throughout the island. The lectotype is labelled "Minahassa", the



Figs 5-8. *Allotinus macassarensis menadensis* Eliot. 5. ♂, recto. 6. ♂, verso. 7. ♀, recto. 8. ♀, verso.

northern area (Takanami, 1989), whilst records also exist for Sampuraga and Puncak in Central Sulawesi and for Bonthain in the South. It is disappointing, however, not to have obtained recent confirmation of the species in the North. Mention should be made here of two females from Central Sulawesi in the Takanami collection. These have the upperside of the hindwing whitish below the radius and vein Rs (7), instead of the more usual all brown hindwing.

Locations: [Mainland]: North Sulawesi, Sampuraga, Puncak, Bonthain (1000-2000m), South Sulawesi (viii, ix).

Allotinus samarensis russelli Eliot

Allotinus samarensis russelli Eliot, 1986: 38, fig 66 female. Holotype female, Sulawesi (BMNH).

This taxon was not recorded from Northern Sulawesi during the expedition. Considering the Philippine distribution of the nominate subspecies, however, and the discovery of *russelli* in East Central Sulawesi, it is probable that the species will eventually be found in the north of the island.

Locations:[Mainland]: Morowali (500m) (iii).

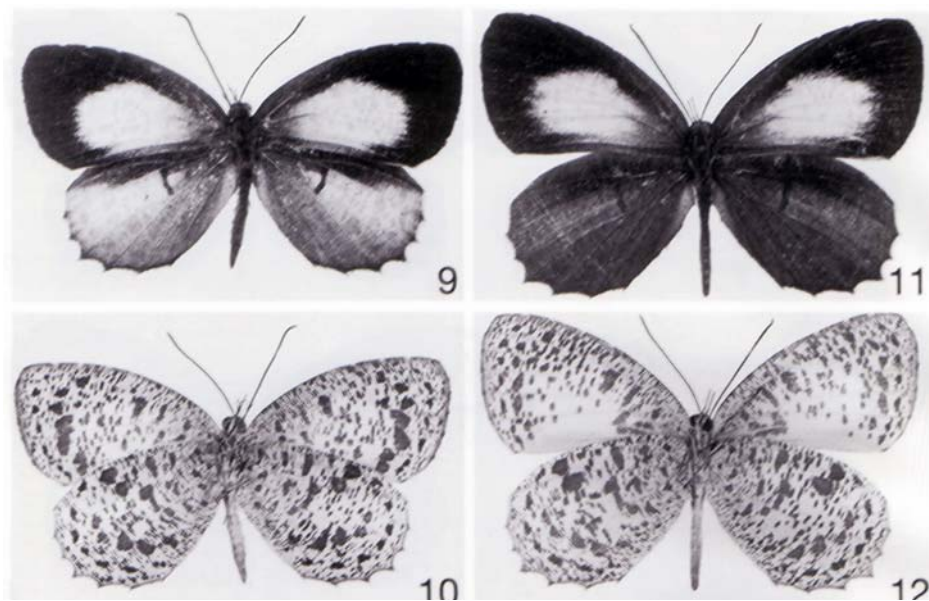
Allotinus macassarensis macassarensis (Holland)

Paragerydus macassarensis Holland, 1891: 70, pl 4 fig 5 female. Holotype female, Sulawesi (not located, probably in CM).

Allotinus unicolor damodar Fruhstorfer, 1913: 369; 1916: 811. Lectotype male, Sulawesi (BMNH).

This subspecies was not observed or captured during the expedition.

Locations: [Mainland]: Maros, Macassar, Lompa-Battau (1000m) (iii), South Sulawesi (viii, ix). [Islands]: Banggai.



Figs 9-12. *Allotinus albatus albatus* C. & R. Felder. 9. ♂, recto. 10. ♂, verso. 11. ♀, recto. 12. ♀, verso.

***Allotinus macassarensis menadensis* Eliot (Figs 5-8)**

Allotinus macassariensis (sic) *menadensis* Eliot, 1967: 68. Holotype male, Sulawesi, north (BMNH).

This subspecies was regularly encountered in lowland forest (below 500m) in the National Park area. In the early part of the year, at least, by far the majority of specimens had considerable forewing discal lightening.

Locations: [Mainland]: Minahassa, Toli-Toli, Tawaya, Dumoga-Bone NP (200m) (i, ii, iv).
[Islands]: Bangka

***Allotinus albatus albatus* C & R Felder (Figs 9-12)**

Allotinus albatus C & R Felder, [1865]: 267. Holotype female, Sulawesi (BMNH).

Several females were captured during the expedition but no males, so the latter sex is still not discovered. These specimens show a range of colouring on the upperside of the hindwing, ranging from the extensive white areas described in the holotype to an almost completely fuscous hindwing. In view of this cline, distinction of the Philippine race *mendax* Eliot can only be made on the latter's reduced size of the forewing white discal patch, not by hindwing colouration. This evidence of strong female polymorphism, as mirrored in *A. maximus*, together with the extreme similarity of the underside of *albatus* to that of *macassarensis* leaves open another possibility. Namely that *albatus* and *macassarensis* are conspecific. This hypothesis has the added advantage of explaining the apparent lack of males to pair with the females of *albatus*. This is an area obviously in need of further study. Meanwhile, I continue to retain the separate identities of these taxa, based only on the white forewing discal patch and the darkened hindwing discocellular vein in *albatus*.

Locations: [Mainland]: Minahassa, Dumoga-Bone NP (600-1200m) (iii, viii).

Allotinus unicolor zitema Fruhstorfer

Allotinus aphocha zitema Fruhstorfer, 1916: 810. Lectotype female, Sulawesi (BMNH).

This was the least common of the species of *Allotinus* in the expedition area during 1985. Two specimens, one of each sex, were taken in January in lowland forest, along a riverside. The species is on the extreme eastern end of its range in Sulawesi and the Philippines, and appears rare in both locations.

Locations: [Mainland]: Tawaya (ix), Dumoga-Bone NP (200m) (i). [Islands]: Banggai, Sula Mangoli (x).

Genus *Logania* Distant

Eliot (1986) included 2 *Logania* species from Sulawesi, both endemic to the island: *paluana* Eliot, which he supposed to be of *regina*-like stock and *obscura* (Röber), which he believed to be descended from *marmorata*-like origins. New material suggests that there are at least 3 different phenotypes in the island, but does not give really adequate information to be certain of their mutual relationships. Thus in this paper, *paluana*, *obscura* and a new taxon *dumoga* are retained at specific rank. However, the 3 are considered to be all descended from *marmorata*-like ancestors, either from successive invasions separated in time or through genetic divergence due to geographic separation. More material may, in due course, shed more light on which, if either, of these hypotheses is correct or whether indeed the 3 taxa may even be considered conspecific, which must remain a possibility. This small group of butterflies should be of real interest to anyone concerned with the biogeography of the Sulawesi region.

Logania paluana Eliot

Logania paluana Eliot, 1986: 63, fig 79 female. Holotype female, Sulawesi, west (BMNH).

No further material was discovered during the expedition, but I have since seen photographs of a male in coll. Takanami which originated from the same area as the two females of the Type series. This male has large white areas on the upperside of both sets of wings, as in the female. The genitalia appear to be similar to those of *obscura*, and are certainly of the basic *marmorata*-like form, not at all like *regina* as Eliot suggested. This taxon is easily separated from *L. obscura* by the white hindwing upperside.

Locations: [Mainland]: Western Sulawesi, Gunung Rangkoenan, Palu (300m) (xi).

Logania obscura (Röber)

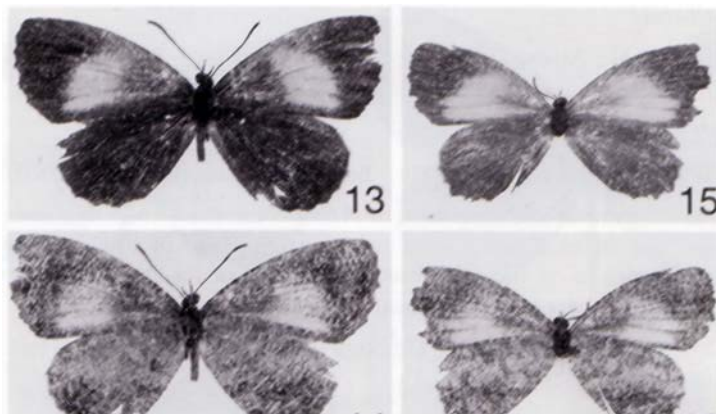
Allotinus obscurus Röber, 1886: 52, pl 4, fig 8 male. Syntypes, Sulawesi (?SMT).

Allotinus martinus Fruhstorfer, 1913: 371; 1916: 814, pl 14lh. Holotype female, Sulawesi: Butung Island (BMNH).

Logania donussa Fruhstorfer, 1914: 24. Lectotype female, South Sulawesi (BMNH).

This taxon was not observed during Project Wallace.

Locations: [Mainland]: Tawaya (ix), Tombugu, Maros, Bonthain (1000-2000m) (ii), South Sulawesi (viii, ix). [Islands]: Banggai, Butung (iv), Tukangbesi.



Figs 13-16. *Logania dumoga* sp. nov. 13. Holotype ♂, recto. 14. Holotype ♂, verso. 15. Paratype ♀, recto. 16. Paratype ♀, verso.

Logania dumoga sp. nov. (Figs 13-16)

A single pair of these butterflies was captured in low fluttering flight on a forest covered ridge at 600m in the Dumoga Bone National Park. On the upperside, both sexes bear a superficial resemblance to the female of *L. marmorata palawana* Fruhstorfer. A white discal band on the forewing is 4mm broad and reaches to vein A (1b) in both sexes. The upperside hindwings plain brown. The underside mottled on a pale whitish ground, with the forewing lightened in an area corresponding with the upperside discal band. On the hindwing, discal and post discal marks in space 7 not darker brown than the other marks, as is the case in *palawana*, but only slightly darker than the ground colour. Forewing costal lengths 14mm for the male and 12mm for the female. The male genitalia (Fig. 17) correspond most closely to those figured for *obscura* in Fig. 44 of Eliot (1986) having both the subapical pointed process on the valva and a fairly stout, downcurved phallus.

It was based on a superficial examination of these two specimens that Eliot based his comment (Eliot 1986: 68) that *marmorata* had recently been found in Northern Sulawesi. Notwithstanding the correction of this remark, I treat *obscura* and *dumoga* as separate from *marmorata* on the grounds of the genitalic differences. However, the distinction is a slight one.

Type material:

Holotype. ♂, North Sulawesi, Dumoga Bone National Park, Blue Zone Ridge, 600m, 5 ii 1985, (J D Holloway). Deposited in BMNH. Paratype. ♀, same data as holotype, also in coll BMNH.

Genus *Miletus* Hübner

Miletus boisduvali boisduvali Moore

Miletus boisduvali Moore, 1857. Holotype female, Java (BMNH).

Gerydus stygianus Butler, 1884 Holotype male, Ternate (BMNH).

Miletus ceramensis Ribbe, 1889. Holotype female, Ceram (not located).

Gerydus vincula H H Druce, 1895. Holotype male, Borneo (BMNH).

Gerydus buruensis Holland, 1900. Holotype male, Buru (not located).

Gerydus boisduvali lombokianus Fruhstorfer, 1913. Holotype male, Lombok (BMNH).

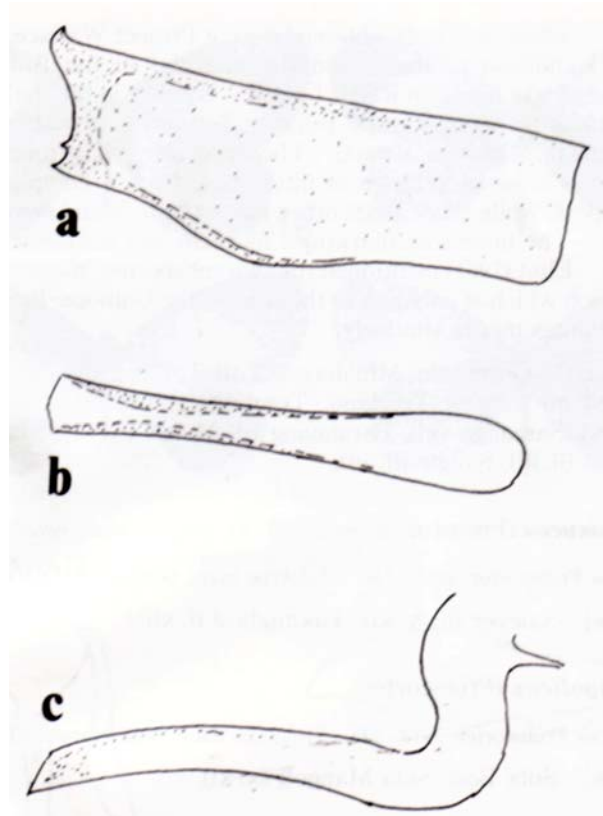


Fig 17. Male genitalia of *Logania dumoga*. **sp. nov.** (a : interior view of left valva. b : dorsal view of aedeagus. c : lateral view of aedeagus)

Gerydus boisduvali dossemus Fruhstorfer, 1913. Holotype male, Obi (BMNH).

Gerydus boisduvali adeus Fruhstorfer, 1913. Holotype male, New Guinea: Fak Fak (not located).

Gerydus courvoisieri courvoisieri Fruhstorfer, 1915. Holotype male, Java (not located).

Gerydus boisduvali oxylus Fruhstorfer, 1915. Holotype male, Bawean (BMNH).

Gerydus boisduvali heraeon Fruhstorfer, 1915b. Holotype male, W Borneo (BMNH).

This subspecies was not encountered during the expedition.

Locations:[Islands]: Sula Mangoli (x), Sula Besi (x).

***Miletus boisduvali diotrophes* (Fruhstorfer)**

Gerydus boisduvali diotrophes Fruhstorfer, 1913. Holotype male, East Sulawesi (BMNH).

No further material was obtained during the expedition.

Locations:[Mainland]: Tombugu.

***Miletus leos maximus* (Holland)**

Gerydus maximus Holland, 1890. Holotype male, South Sulawesi (not located).

Gerydus leos sarus Fruhstorfer, 1913. Holotype male, East Sulawesi (BMNH).

Gerydus symethus vaneeckeii Toxopeus, 1930. Holotype male, North Sulawesi (not located). **syn nov.**

Several specimens of either sex were obtained during Project Wallace, at altitudes from 200 to 1000m. In addition to these, and the material in the BMNH, I have also examined a number of specimens in RNH Leiden. Neither in the males nor females do I believe the markings to be sufficiently reliably distinctive to justify the retention of *vaneeckei* as a separate Minahassan race. The upperside white forewing markings in Minahassan examples exist in a range of intensities, from a complete band to small, widely separated spots, while those from other parts of the island show similar, but less extreme, variation. The underside markings, likewise, are not sufficiently distinct for reliable separation. Eliot (1961) mentioned the two subspecies "meeting and merging" in the Gorontalo district, which is only just to the west of the Dumoga Bone National Park; I suggest the two names merge similarly.

Locations: [Mainland]: Gorontalo, Minahassa, Toli-Toli (xi, xii), Palu (x, xi), Dumoga-Bone NP (200-1200m) (i, ii, v), Tondano, Tombugu, Bonthain (1000-2000m), S. Celebes (iii, viii, ix), Samanga (xi), Patunuang (i), Maros (i). [Islands]: Butung (xii), Moena (xii), Talaud (ii, iii), Sangir (ii, iii),

Miletus leos catoleucos (Fruhstorfer)

Gerydus leos catoleucos Fruhstorfer, 1913. Holotype male, Selayar (BMNH).

Locations: [Islands]: Saleyar (iii, v, xi), Tukangbesi (i, xii).

Miletus leos mangolicus (Fruhstorfer)

Gerydus leos mangolicus Fruhstorfer, 1913. Holotype male, Sula Mangoli (BMNH).

Locations: [Islands]: Sula Besi, Sula Mangoli (x, xi).

Miletus leos tellus (Fruhstorfer)

Gerydus ancon tellus Fruhstorfer, 1913. Holotype male, "E Java", later (1914) corrected to "probably Wetter". (BMNH).

The range and status of this taxon are inadequately determined. The BMNH holds one female from Tanahjampea purporting to be *tellus*. Eliot (1961) suggested that the type location was probably Sumbawa or one of the many small islands lying between Sulawesi and the main chain of the Lesser Sunda Is, rather than Wetter or Java. It is included here for completeness and in the hope that the reference may trigger more information from other collectors with Indonesian experience.

Locations: [Islands]: Tanahjampea ?

Miletus celinus Eliot

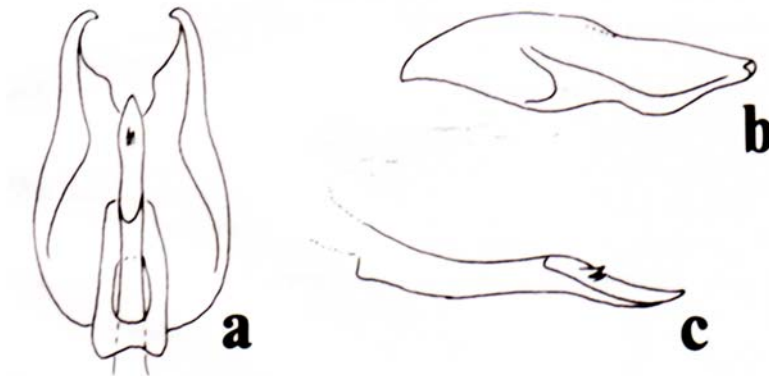
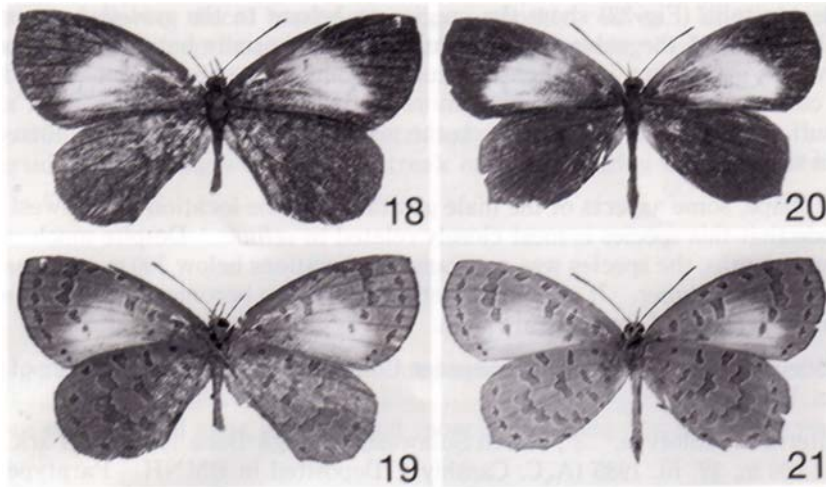
Miletus celinus Eliot, 1961: 175. Eliot, 1986, fig 104 male. Holotype male, South Sulawesi (BMNH).

This species was described from 17 specimens from the southern end of the island and was not discovered in the north during the expedition. RNH Leiden holds a further single male taken at Bantimurung on 29 ix 1965 by R Straatman.

Locations: [Mainland]: South Celebes (viii, ix), Maros, Bantimurung (ix).

***Miletus rosei* sp. nov.** (Figs 18-21)

This species is described from a short series taken in the Dumoga Bone National Park, Northern Sulawesi, during Project Wallace. The size is variable, with forewing length ranging



from 15 to 18mm in the male and 14 to 18mm in the female. Conspecificity of the sexes described here is supported by two pairs having been taken *in cop*. The males have a strongly convex forewing termen and the females a strongly dentate hindwing. In addition, one male and two females exhibit a slight apical hook on the forewing, reminiscent of male *celinus* but less pronounced. Upperside ground colour for both sexes light chocolate brown, and any whitish markings restricted to the forewing. In the males a diffuse whitish discal band covers the outer third of the cell and about an equal distance beyond the cell end. The band reaching neither costa nor dorsum and generally smooth edged distally. The band on the females is more distinct, in one case reaching almost to the forewing base. The distal edge of the band smoothly rounded. The underside ground colour mid greyish brown; the usual markings being present but contrasting only weakly. The postdiscal bars in spaces 4 and 5 on the hindwing almost exactly halfway between the cell end and the termen.

The male genitalia (Fig. 22) show the species to belong to the *symethus* group (*sensu* Eliot). The apex of the valva tapering quite sharply initially but then more produced than in *celinus* and ending in a slightly incurved point. The phallus unusually deep and strongly curved for this group, an even more distinct separator from *celinus*, and with two cornuti. The base of vein 4 on the upperside of the forewing swollen as in all species of the group.

The wing shape, some aspects of the male genitalia and the location in Sulawesi lead me to conclude that this species is most closely related to *celinus*. Despite much searching during four months, the species was not found at elevations below 300m and was usually encountered much higher. It may be therefore that it has become or remained separate from *celinus* because of its vertical range.

The specific name is dedicated to Lieutenant Colonel Hugh Rose, field leader of Phase 1 of Project Wallace.

Type Material. Holotype. ♂, North Sulawesi, Dumoga Bone National Park, Toraut District, 1000m, 19 iii 1985, (A. C. Cassidy). Deposited in BMNH. Paratypes. 4♂, same area, from altitudes 1000m, 600m, 500m & 300m. 4♀, same area, at 1000m (2 ♀), 600m & 400m (A. C. Cassidy and T. W. Harman). One male, one female retained in Cassidy collection, remainder deposited in BMNH.

Amendments to Keys in Eliot 1986

Allotinus sub genus *Paragerydus* Distant

- 13 stet
 - Upperside forewing with large white discal patch, hindwing usually also with some white areas. Discocellular veins blackened..... *albatus* (p. 41)

Miletus Hübner

- 16 Forewing apex without a protruding point (except sometimes in *M. rosei*)17
 - stet
 17 stet
 - stet
 18 stet
 - stet
 19 stet
 - stet
 20 stet
 - stet
 21 Underside of hindwing with markings in cell and spaces 3 and 4 darker than other markings *gallus*
 - Underside of hindwing with all markings of more or less the same intensity25
 22 stet
 - stet
 23 stet
 - stet
 24 stet
 - stet
 25 Upperside forewing discal band outer edge stepped at vein Cu1(3) Underside forewing post discal fasciae fading out below space 4. Larger, forewing 19-23mm *heracleion*

- Upperside forewing discal band outer edge smoothly convex. Underside forewing post discal fasciae continued to space 2. Smaller, forewing 14-18mm *rosei*

Logania Distant

- 6 Underside of hindwing without an unstriated area..... 7
- Underside of hindwing with a white streak or patch bearing few if any striae 10
- 7 stet
- stet
- 8 stet
- stet
- 9 stet
- stet
- 10 Male genitalia with valvae having pointed apical and sub apical processes. Sulawesi ...*dumoga*
- Valvae with pointed apex and rounded sub apical process.*marmorata* (p. 64)

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