

# Inventory of *Delias* Hübner, 1819 (Lepidoptera: Pieridae) from the western Star Mountains, Papua, Indonesia

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*Abstract:* An inventory of species of the genus *Delias* in the western Star Mountains is presented and comparison is made with records from the eastern Star Mountains in PNG. The subspecific classification of seven species is reviewed and changes are proposed to the following taxa; *D. frater soror* **comb. nov.**, *D. frater far* **comb. nov.**, *D. luctuosa versicolor* **syn. nov.**, *D. luctuosa kuning* **syn. nov.**, *D. iltis bultemensis* **syn. nov.**, *D. hemianops felis* **stat. nov.**, *D. roepkei pellos* **syn. nov.** and *D. niepelti henki* **syn. nov.**

*Rangkuman:* Daftar inventarisasi disajikan dari *Delias* di Pegunungan Bintang bagian barat. Perbandingan dibuat dengan hasil dari Pegunungan Bintang bagian timur di PNG. Perhatian khusus diberikan kepada tujuh spesies, yang menghasilkan *D. frater soror* **comb. nov.**, *D. frater far* **comb. nov.**, *D. luctuosa versicolor* **syn. nov.**, *D. luctuosa kuning* **syn. nov.**, *D. iltis bultemensis* **syn. nov.**, *D. hemianops felis* **stat. nov.**, *D. roepkei pellos* **syn. nov.** and *D. niepelti henki* **syn. nov.**

*Key-words:* comb. nov., stat. nov., syn. nov., eastern Star Mts

## Introduction

The Star Mountains was one of the last unexplored parts of Netherlands New Guinea when on 10 April 1959 a Dutch expedition made its bivouac at Mabilabol in the Sibil valley. Fourteen scientists took part: geologists, a soil scientist, a cartographer, botanists, zoologists, a linguist, cultural and physical anthropologists, and undertook a wide range of scientific studies during the expedition. The collections of Lepidoptera were deposited in NCB-RMNH at Leiden but were never published, probably because none of the zoologists specialised in Lepidoptera and because no new species or subspecies were immediately recognized among the collections.

Since 1988, Henk van Mastrigt has published a number of articles, including new species and subspecies from the Star Mountains in Papua, Indonesia. However, none of these has included a complete inventory, with the exception van Mastrigt,

2001 in which a comparison as made between the *Delias* from Borme (lower Star Mountains) and Sumbole, located east of the Pass Valley.

The eastern part of the Star Mountains lies in Papua New Guinea and was largely unexplored for *Delias* before Lachlan, 2000 published the results of his extensive surveys between February 1991 and January 2000 in the upper Ok Tedi region. This included many new geographic records and the description of several new species and subspecies. Lachlan's records are compared to an inventory of *Delias* species from the west side of the Star Mountains and lead to discussion of some taxonomical issues.

## Abbreviations

The abbreviations given below have been used throughout the text.

|          |   |
|----------|---|
| CeP      | - Central Province, PNG   |
| HT       | - Holotype  |
| KSP      | - Koleksi Serangga Papua (Collection of Papuan Insects), Jayapura, Indonesia  |
| NHM      | - Natural History Museum, London, U.K.  |
| NCB-RMNH | - Netherlands Centre for Biodiversity Naturalis, section RMNH (former Rijksmuseum voor Natuurlijke Historie and Nationaal Natuurhistorisch Museum), Leiden, The Netherlands |
| PNG      | - Papua New Guinea  |
| PT       | - Paratype  |
| TL       | - Type locality   |
| WP       | - Western Province  |
| WSP      | - West Sepik Province, PNG  |

## Geography

The Star Mountains - so called because the peaks look like stars from the air - cover the central part of the east-west mountain cordillera that bisects New Guinea, between 140° 30' and 142° E. The western end of the range marked by Mt Goliath (140° E), the eastern end by the headwaters of the Strickland River in PNG.

## Review of Literature

From material collected by Ray Straatman in August 1963 at Telefomin, 1700m altitude in the eastern part of the mountains in PNG, Nieuwenhuis & Howarth, 1969 described *Delias leucias roepkei*, based on two males: HT stored in NHM; PT in NCB-RMNH. This taxon is now known as *D. nieuwenhuisi nieuwenhuisi*.

Orr & Sibatani (1985, 1986) published "A Revision of the *Delias aroae-cuningputi* Complex (Lepidoptera, Pieridae)" in which only *Delias aroae* is mentioned from Telefomin. No other species are associated with the Star Mountains.

In 1989 Henk van Mastrigt published the description of *Delias awongkor* from Oktanglap, Abmisibil, based on a large series of males. The infraction between *D. mira roepkei* Sandford & Bennett, 1955 and *D. leucias roepkei* Nieuwenhuis & Howarth, 1970 is resolved by renaming the latter as *D. nieuwenhuisi* van Mastrigt, 1989.

Morinaka, van Mastrigt & Sibatani (1993), in reviewing the *eichhorni* species-group, elevated *Delias eichhorni frater* Jordan, [1912] (TL Mt Goliath) to species level and considered that examples from Abmisibil and Batimban in the Star mountains belonged to this taxon.

Gerrits & van Mastrigt [1993] published *D. hemianops* from the Star Mountains.

Later in 1993, the monograph on *Delias* by Yagishita et al. included description of *D. callima telefominensis* from Telefomin, PNG. On the range maps *sagessa straatmani* and *nieuwenhuisi nieuwenhuisi* are recorded from Telefomin; *leucias, ornytion, aruna irma, mavroneria mavroneria, gabia zerate* and *mysis lara* from the eastern (PNG) and western side of the Star Mountains; *oktanglap, awongkor* and *wollastoni abmisibilensis* are only recorded from the western part. Erroneously, *catocausta eefi* is shown to occur in the Star Mountains, although the explanation in the text (Tembagapura) is correct.

Arima (1996) published *Delias roepkei cieko* from Waniak (Walmak?), east of Wamena.

Van Mastrigt (1996b) raised *Delias telefominensis* to species level, based on the marked difference in females compared to typical *D. callima*. The publication includes descriptions of new subspecies: *D. iltis sibil*, based on a large series of males, from Okbibab and Okbab (Star Mts), *D. abrophora okbibab*, based on a large series of males and *D. mira reissingeri* from Korupun, Langda and Okbibab and Okbab (Star Mts). It also includes descriptions of three females new to science: *D. nieuwenhuisi poponga, D. catisa catisa* and *D. luctuosa kuning*.

Yagishita (1997) described *Delias nieperti* [sic!] *henki* from Abmisibil and Langda based on a small series on males.

Parsons (1999) listed the following *Delias* species and subspecies from Telefomin (WSP) in the Star Mountains: *sagessa straatmani, aroae, cyclosticha, leucias huonensis, nieuwenhuisi nieuwenhuisi* (referred to as *leucias roepkei*), *callima satura* (referred to as *callima telefominensis* Yagishita, 1993), and *nais*.

Lachlan, 1999 published description of *Delias akrikensis* based on six males and one female collected at 1700m on Mt Akrik, In the Western Province of PNG, near the Ok Tedi mine site.

In 2000 van Mastrigt revised the *Delias clathrata* group. In this work *D. mira reissingeri* is determined to be a junior synonym of *D. roepkei cieko* Arima, 1996, (first described from the Pass Valley), and *D. klossi okse* from R. Okse at southern Star Mts is described as a new subspecies.

Lachlan (2000) published an extensive account of *Delias* from the Ok Tedi and Tari regions in PNG with new descriptions of *D. felis*, *D. inopata*, *D. binnensis*, *D. mira pellos*, *D. carstenziana starenis*, *D. awongkor hindenburgensis*, *D. iltis bultemensis*, *D. fascelis cartieri*, and *D. luctuosa versicolor*.

Van Mastrigt (2002) reviewed the taxonomy of the *fascelis* subgroup, recognizing two species in the Star Mountains: the newly described *Delias dortheysi* and *D. fascelis fascelis* Jordan, [1912].

Van Mastrigt (2003) published descriptions of *Delias inopinata orri* based on 22 males from Okbibab, Star Mts and *Delias subapicalis sibatani* based on an extensive series of males, but only four females, from Pass Valley, Nipsan, Langda, Sumtamon, Bime, Borme, Okbab and Okbibab in the Star Mts.

## Records from the western Star Mountains

The preceding literature records twenty species of *Delias* from higher mountainous areas (over 1,500 m) in the western part of the Star Mountains:

*D. mavroneria mavroneria*, *D. abrophora okbibab*, *D. fascelis fascelis*, *D. dortheysi*, *D. oktanglap*, *D. inopinata orri*, *D. subapicalis sibatani*, *D. frater*, *D. catisa catisa*, *D. awongkor*, *D. luctuosa kuning*, *D. iltis sibil*, *D. leucias*, *D. nieuwenhuisi poponga*, *D. telefominensis*, *D. wollastoni abmisibilensis*, *D. hemianops*, *D. roepkei cieko* (= *D. mira reissingeri*), *D. klossi okse*, and *D. niepelti henki*.

In the KSP collection, seventeen more *Delias* species are recorded in the western part of the Star Mountains, at altitudes over 1,500 m: *geraldina*, *microsticha*, *hypomelas*, *aroea*, *pheres*, *carstenziana*, *leucobalia*, *nais*, *flavistriga*, *callista*, *hapalina*, *campbelli*, *kummeri*, *ligata*, *isocharis*, *alepa*, and *ladas*.

This results in a total of 37 species of *Delias* currently known to occur in the western Star Mountains (Papua, Indonesia) at altitude above 1,500 m:

- |                                       |   |
|---------------------------------------|---|
| 1. <i>D. mavroneria mavroneria</i>    | 20. <i>D. callista callista</i>                             |
| 2. <i>D. abrophora okbibab</i>        | 21. <i>D. luctuosa kuning</i>                               |
| 3. <i>D. geraldina</i>                | 22. <i>D. iltis sibil</i>                                   |
| 4. <i>D. microsticha</i>              | 23. <i>D. hapalina</i>                                      |
| 5. <i>D. hypomelas hypomelas</i>      | 24. <i>D. campbelli</i>                                     |
| 6. <i>D. fascelis fascelis</i>        | 25. <i>D. leucias</i>                                       |
| 7. <i>D. dortheysi</i>                | 26. <i>D. nieuwenhuisi poponga</i>                          |
| 8. <i>D. oktanglap oktanglap</i>      | 27. <i>D. telefominensis</i>                                |
| 9. <i>D. aroae</i>                    | 28. <i>D. kummeri</i>                                       |
| 10. <i>D. pheres</i>                  | 29. <i>D. ligata</i>  |
| 11. <i>D. inopinata orri</i>          | 30. <i>D. isocharis</i>                                     |
| 12. <i>D. subapicalis sibatani</i>    | 31. <i>D. alepa</i>   |
| 13. <i>D. frater</i>                  | 32. <i>D. wollastoni abmisibilensis</i>                     |
| 14. <i>D. carstenziana starensis</i>  | 33. <i>D. hemianops</i>                                     |
| 15. <i>D. leucobalia</i>              | 34. <i>D. roepkei cieko</i> (= <i>D. mira reissingeri</i> ) |
| 16. <i>D. catisa catisa</i>           | 35. <i>D. klossi okse</i>                                   |
| 17. <i>D. nais nais</i>               | 36. <i>D. ladas</i>   |
| 18. <i>D. flavistriga flavistriga</i> | 37. <i>D. niepelti henki</i>                                |
| 19. <i>D. awongkor awongkor</i>       |   |

From the eastern part of the Star Mountains in PNG, four additional species have been recorded: *D. sagessa straatmani*, *D. akrikensis*, *D. felis* and *D. binniensis*

The status and relationships of some species are discussed below.

### ***D. abrophora okbibab*** (Fig. 1)

Three closely related species occur in New Guinea: (1) *D. sagessa* Fruhstorfer, 1910 from central and east PNG (TL-Owen Stanley Mts) , ssp. *anjae* Schröder, 1977 from the Arfak Mts and ssp. *straatmani* Schröder, 1977 from Telefomin in the eastern Star Mts; (2) *D. abrophora* Roepke, 1955 from the Kobowre Mts, Kamu and Paniai with ssp. *bugebu* Van Mastrigt, 1996 from Homeyo and ssp. *okbibab* Van Mastrigt, 1996 from Okbibab and Okbab in the western Star Mts; (3) *D. sinak* Van Mastrigt, 1990 is described from Mulia and Sinak. Although the morphological differences are quite evident, the geographical distribution (none of the species are sympatric) does suggest that they may be one species, as proposed by Parsons, 1999. On the other hand, the widely separated localities between the Star Mts and Sinak populations, and those of the isolated Arfak Mts (home of many other endemics) could lead to an alternative conclusion, that *anjae* should be raised to species level. Further studies of DNA and genitalia will be required to confirm affinities within this group.

***D. frater*** (Figs 2-6)

*D. eichhorni* Rothschild, 1904 was first described from the Owen Stanley Mts in eastern PNG. In 1912 Jordan described ssp. *frater* from Mt Goliath and in 1944 Toxopeus added a further weakly differentiated ssp. *soror*, based on a single male from the headwaters of the Andrae River, collected by A. Dumas. Toxopeus wrote that "Amongst Jordan's material there was one ♂ specimen like the above-described form. It is often the case with an adjoining subspecies that it brings forth the typical form of a neighbour as a rare variety." Roepke (1955) described three subspecies of *D. eichhorni*: *heliophora* from the Kobowre Mts and Paniai, and *germana* and *antara* from the Baliem Valley. Schröder and Treadaway, 1982 described *D. eichhorni far* from Paniai, based on a single male collected by Straatman. In 1991 Morinaka *et al.* raised *heliophora*, *germana* and *antara* to species level and added *D. muliensis* from Mulia-Sinak-Ilu area. In 1993 Morinaka *et al.* described *D. eichhorni kerowagi* from the Chimbu Province and in 1997 Morinaka & Nakazawa, added *D. antara solana* from Pass Valley.

Morphologically, it is evident that ssp. *soror* and ssp. *far* are very closely related to *D. frater*, accordingly the following combinations are proposed: *D. frater soror* **comb. nov.** and *D. frater far* **comb. nov.**

Supported by Lachlan (2000), who recorded the frequent occurrence of *D. frater* in the east, the specimens for the western Star Mts also are recognized as *D. frater frater*. The distribution shows that *D. eichhorni* is restricted to PNG; *D. frater* occurs in the most western part of PNG and in the eastern part of Papua (as far as Korupun), ssp. *solana* in Pass Valley and ssp. *far* in the Paniai Lakes area. *D. antara* and *D. germana* are sympatric in and around the Baliem Valley; *D. muliensis* is known from the central highlands around Ilu and Mulia and *D. heliophora* from Paniai, Kamu and Kobowre Mts.

The large geographical separation between the localities of *frater frater*, *frater soror*, and *frater solana* to the east and *frater far* to the west is curious as is the apparent rarity of ssp *far*.

***D. awongkor*** (Figs 10-11)

*Delias awongkor* Van Mastrigt, [1988] was described from the western Star Mts, based on 42 males from the River Oktanglap at Abmisibil. Specimens have been collected at various localities in the Star Mts and, in recent years, from Pass Valley and Nipsan, where it is, as in some localities in the western Star Mts, sympatric with *D. flavistriga flavistriga* (Figs 7-9). In 2000 Lachlan published *D. awongkor hindenburgensis* from the eastern Star Mts, which differs from the *awongkor awongkor* by its broader black apical markings. Male and female specimens from the western parts of the mountains have consistently narrower black borders compared to the specimens of ssp. *hindenburgensis* figured by Lachlan.

***D. callista*** (Figs 12-17)

Van Mastrigt [2011] paid considerable attention to the *callista* complex. He described a trend in the coloration of the underside of hindwing from west to east, mentioning that in the Star Mountains the ground colour is deep yellow. However, a large variety of phenotypes are found in populations of the western Star Mts, summarized as follows.

- The upperside of both wings is white; sometime quite creamy (*f. luteola*).
- The black border on the upperside forewing bears one to three poor developed white subapical dots.
- Upperside of hindwing has a thin black border, sometimes entering along veins.
- Underside of forewing has black border bearing three yellow to orange subapical spots, followed by three very thin terminal lines.
- On the underside of hindwing are terminal parts of veins black, sometimes extending to triangles at the margins.
- Hindwing basal and terminal spots and central ring varying from pale yellow to orange with scattered red scales.

In one specimen the central area on the underside of hindwing entirely white and the normal yellow ring is absent, a feature that is also found in four specimens from Pass Valley. Nine of the ten females have a white upperside with broad black borders; only one has yellow forewings. In seven females the underside of the forewing is orange yellow; in two it is pale orange yellow and in one deep yellow. These varieties - which are found in all areas where *callista* occurs - make it nearly impossible to define subspecies with consistent distinguishing characteristics. Lachlan (2000) mentioned *D. callista porquiaensis* Yagishita, 1993 as a common species in the eastern Star Mts, where it normally has yellow hindwing marking, although five specimens with orange-yellow markings were also recorded. The only specimen of *ssp. porquiaensis* in KSP, from the Hagen Range, has three well-developed white subapical spots on the upperside forewing border; three yellow subapical spots on underside forewing followed by three terminal spots and is pale yellow on underside hindwing, three features that are absent in the population of the western Star Mts. The *callista* complex remains challenging subject for further studies.

***D. luctuosa*** (Figs 18-33)

*Delias luctuosa kuning* Van Mastrigt, 1990 was described from a series of ten males from the Star Mountains. Forty male specimens from the type-localities are now stored in KSP, showing variety in the yellow coloration on underside of forewing: 30 are deep yellow to yellow orange; 2 are yellow-white; 6 have only some yellow in the base and 1 is pure white. From Korupun (between the Baliem Valley and Mt Goliath) thirteen males were recorded with pale yellow to yellow orange underside

of forewing. The only female from Korupun has a yellow to orange upperside of both wings.

Lachlan (2000) described *D. luctuosa versicolor* from 30 km NNW from Tabubil, 3200 m, WP (5°01'S 141°08'E), in the eastern Star Mts, based on ten males and three females. Besides that he reported two males of *D. luctuosa luctuosa* Jordan, [1912] from 30 km east of Tari, 2100-2400 m, SHP (5°58'S 143°07'E), ca 220 km east of the locality of *versicolor*.

The colour in the central part of the underside of the hindwing distinguishes *D. luctuosa luctuosa* (with a quite pale central part) from *ssp. versicolor*, *ssp. kuning* and *ssp. archboldi* (with a more pinkish colour often with some dark red). The features mentioned by Lachlan to separate *versicolor* from *kuning* (illustrated by a single picture of the holotype) are unreliable because in *kuning* the width of the black borders is notably variable; in some specimens the yellow area on underside of forewing reaches the inner margin and the shape of the black terminal triangles can be more or less rounded.

An overview of all *D. luctuosa* from the Baliem Valley in the west, via Pass Valley, Korupun, Langda, Mt Goliath, the western and eastern Star Mountains shows that the underside of the hindwing is quite constant. Male specimens with a yellow colour on the underside of the forewing are absent in the Baliem Valley, poorly represented in the Pass Valley, and more frequent in Langda, Mt Goliath and Star Mountains. The yellow coloration is generally paler in the western areas and becomes a deeper yellow in the Star Mts. In contrast, female specimens with yellow uppersides are known from the Baliem Valley (f. *butyracea*) and from Korupun, but are not reported from Langda, Mt. Goliath and Star Mts. The yellow coloration in the males represents a clinal graduation and can be classified as a form (f. *kuning*), as it is in the females.

Based on these considerations, I propose to treat all populations of *D. luctuosa* occurring between west of the Baliem Valley to the eastern Star Mts as *D. luctuosa archboldi* Roepke, 1955, including *D. luctuosa kuning* **syn. nov.** and *D. luctuosa versicolor* **syn. nov.**

### ***D. iltis sibil*** (Fig. 67)

*D. iltis sibil* Van Mastrigt, 1996 was described from Okbibab in the western Star Mts. In 2000 Lachlan added *D. iltis bultemensis* from the environment of Tabubil, less than 30 km east of the type locality of *sibil*. In the discussion Lachlan (2000) compared *ssp. bultemensis* with *iltis iltis* and *iltis leucoteria* but did not mention *iltis sibil*, of which he may have been unaware. Comparison of the two taxa reveals no significant differences therefore it is proposed that *D. iltis bultemensis* **syn. nov.** is a junior synonym of *D. iltis sibil*.

***D. wollastoni abmisibilensis*** (Fig. 68)

*Delias wollastoni abmisibilensis* Van Mastrigt, 1990 was described from six males collected at River Oktanglap, Abmisibil in the western Star Mts, and differs from ssp. *bryophila* by the yellow underside of the forewing and a more vivid reddish brown triangulate band on the underside of hind wing. In recent years *abmisibilensis* has also been recorded from other localities in the western Star Mts. Individuals from Pass Valley and Korupun have a more pale yellow coloration on underside of forewing and a less vivid brown band on underside of hindwing. Lachlan (2000) mentioned two males from 16 km NE of Tabubil, 2300 m, 5°10'S 141°20'E.

***D. hemianops*** (Figs 34-38)

In 1993 Gerrits & van Mastrigt published *Delias hemianops* from the Star Mts, based on six males and two females. Specimens collected in the late 1990s exhibit more individual variation, especially on the underside, than the original description. In some specimens the white area on the forewing underside is variable in size and often has a grey diffusion. On the underside of hindwing, the border between black and orange is very irregular in some specimens with orange scaling extending over much of the hindwing cell. Four specimens have a very pale yellow distal half and other specimens have a vestigial yellow sub-basal spot near the costa. In 2000 Lachlan published *Delias felis* from the eastern Star Mts, based on three males and two females and characterized by the presence of a yellow sub-basal spot and a pale yellow discal patch on the hindwing underside. Although there are general differences between typical specimens from west and east localities, the varieties mentioned above justify treatment of both forms as a single species. A new combination is proposed, *Delias hemianops felis* **stat. nov.**

***D. roepkei cieko*** (Figs 39-53)

In 1996 van Mastrigt described *Delias roepkei reissingeri* from a large and variable series of males and seven females from Korupun, Langda and the western Star Mts, unaware of the prior publication of *Delias mira cieko* Arima, 1996 (dated January 16<sup>th</sup>, 1996). Arima's article illustrates the underside of the holotype which resembles some individuals among the large type series of *D. roepkei reissingeri*. Consequently van Mastrigt (2000b) confirmed *D. roepkei cieko* as a new combination and treated *D. roepkei reissingeri* as synonym.

In 2000 Lachlan published *Delias mira pellos* based on sixteen males and a single female from the eastern Star Mts, about 25 km from the localities from where many paratypes of *D. roepkei reissingeri* were collected. The differences between *pellos* and *cieko* c.q. *reissingeri* mentioned by Lachlan are not evident when large series are compared, perhaps because of Lachlan based his discussion only on the pictures of Arima (1996) and van Mastrigt (1996) and was not aware of the publication of van Mastrigt, 2000

nor studied the great variety of *reissingeri* in KSP. Van Mastrigt (2000) included the very variable specimens from Pass Valley in *D. roepkei cieko* and recognized four different forms, of these form D is the only one found in the Star Mts. The frequency of individual variation in the yellow spots on the underside of the forewing, in the basal spot and creamy band on the underside of hindwing and in the width of the black border on the upperside of both wings prevents use of these features to separate subspecies. Based on these observations, *D. roepkei pellos* **syn. nov.** is proposed to be a junior synonym of *D. roepkei cieko*.

### ***D. niepelti neagra*** (Figs 54-66)

According to Parson's (1999) arrangement of the *meeki-niepelti* group, only *niepelti* is present in Papua. Six subspecies, including *D. niepelti henki* Yagishita, 1997 from the Star Mts, have been described with greater or lesser validity; some have even been proposed to be sympatric.

A basic problem is mentioned by Jordan [1912] describing *D. meeki neagra* from the Mt Goliath. "The yellow area on the underside of the forewing has in most specimens the same orange tone found in *D. niepelti*, and its edge is more or less rounded as in that species; but some examples have the same pale yellow tone as in *D. m. meeki*, and in two of these the edge is quite as straight as in that subspecies." Furthermore, Jordan noted the variability of the white costal spot which is vestigial in some specimens.

The same varieties which Jordan described from Mt Goliath are present in specimens from the western Star Mts. So for this reason *Delias niepelti neagra* is considered to be the correct taxon for the Star Mts' population. Accordingly, *D. niepelti henki* **syn. nov.** is proposed as a junior synonym of *Delias niepelti neagra*. Further studies of genitalia and DNA are needed to clarify this complex species.

Finally I would mention again the rare *Delias akrikensis* Lachlan, 1999 (only 4 ♂♂, 1 ♀ are known) and *D. binniensis* Lachlan, 2000 (only 1 ♂, 1 ♀ are known), which were recorded respectively at Mt Akrik, 1700 m, Star Mountains, WP, about 5°10'S 141°09'E, and at Mt. Binnie, 2200 m, next to Ok Tedi mine, WP, 5°13'S 141°08'E. These species may be very rare and restricted to a single locality, however, it is quite possible that further exploration will result in the discovery of populations in the western Star Mts which are only 10-15 km from the type localities.

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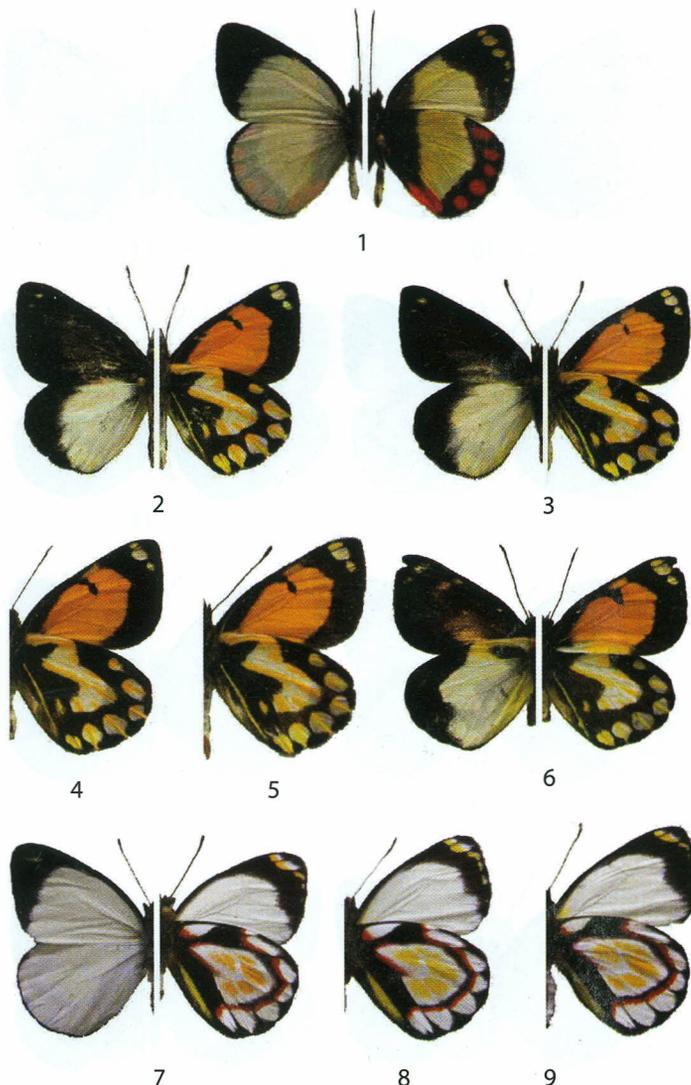
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**Fig. 1.** *Delias abrophora okbibab* ♂ from Batimban (KSP 2942).  
**Figs 2-6.** *D. frater frater*: 2-3: ♂ from Batimban (KSP 6655, 6644); 4: ♂ from Abmisibil (KSP 6636); 5: ♂ from Borne (KSP 6623); 6: ♀ from Batimban (KSP 6656);  
**Figs 7-9.** *D. flavistriga flavistriga* ♂ from Abmisibil (KSP 9154, 9153, 9151) - all from western Star Mts.



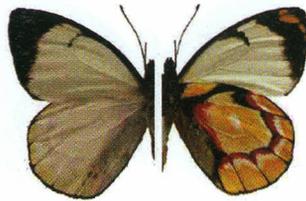
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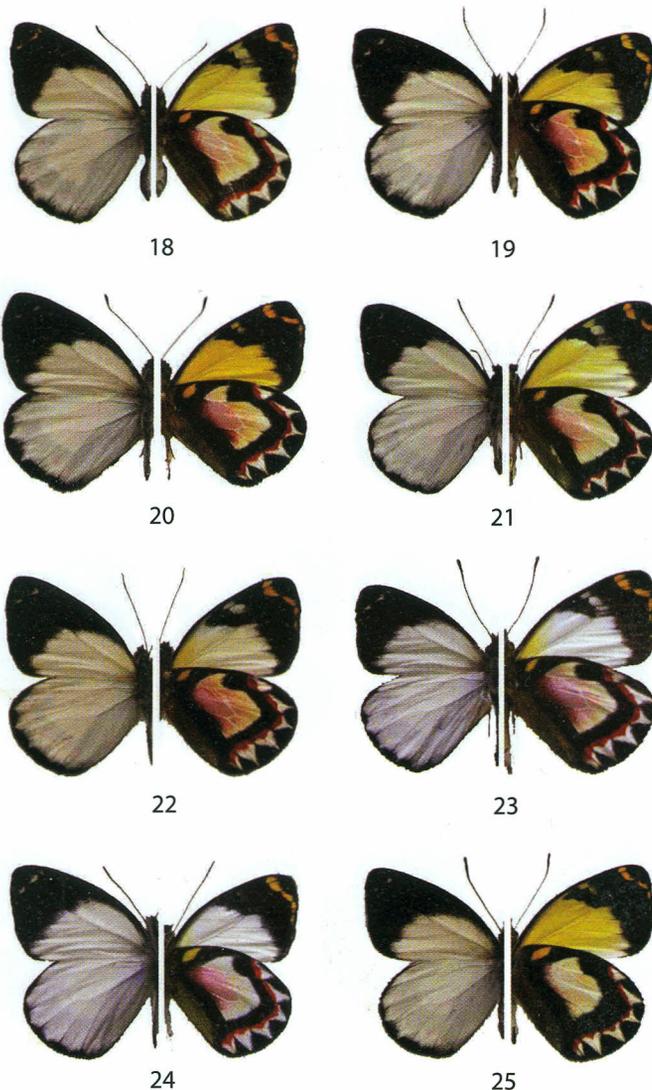


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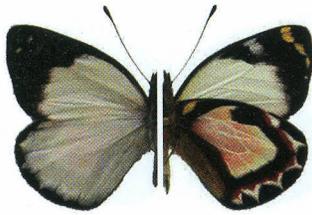


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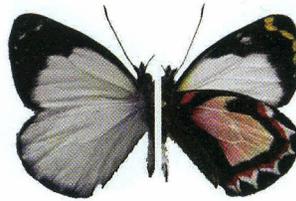
**Figs 10-11.** *Delias awongkor* ♂ from Abmisibil (KSP 8922, 8872);  
**Figs 12-17.** *D. callista*: 12-14. ♂ from Batimban (KSP 8566, 8616, 8640);  
 15. from Abmisibil (KSP 8656); 16. ♀ from Abmisibil (KSP 8679); 17. ♀ from Batimban  
 (KSP 8644) - all from western Star Mts.



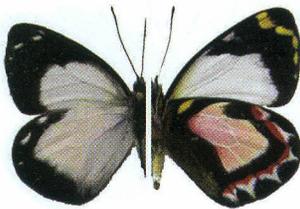
**Figs 18-25.** *Delias luctuosa archboldi* ♂: 18-19. = *D. luctuosa* kuning PT: 18. from Abmisibil (KSP 81580); 19. from Langda (KSP 8156); 20. from Sumtamon (KSP 8167); 21-25. from Abmisibil (KSP 8181, 8182, 26973, 27000, 8180)- all from western Star Mts, except 19.



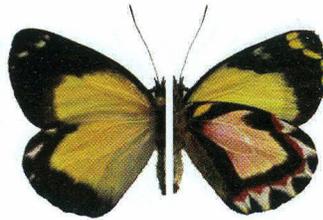
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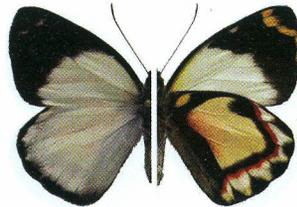
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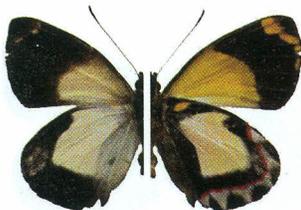
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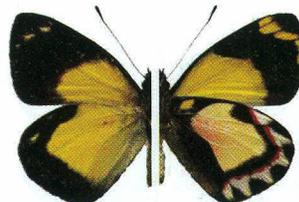
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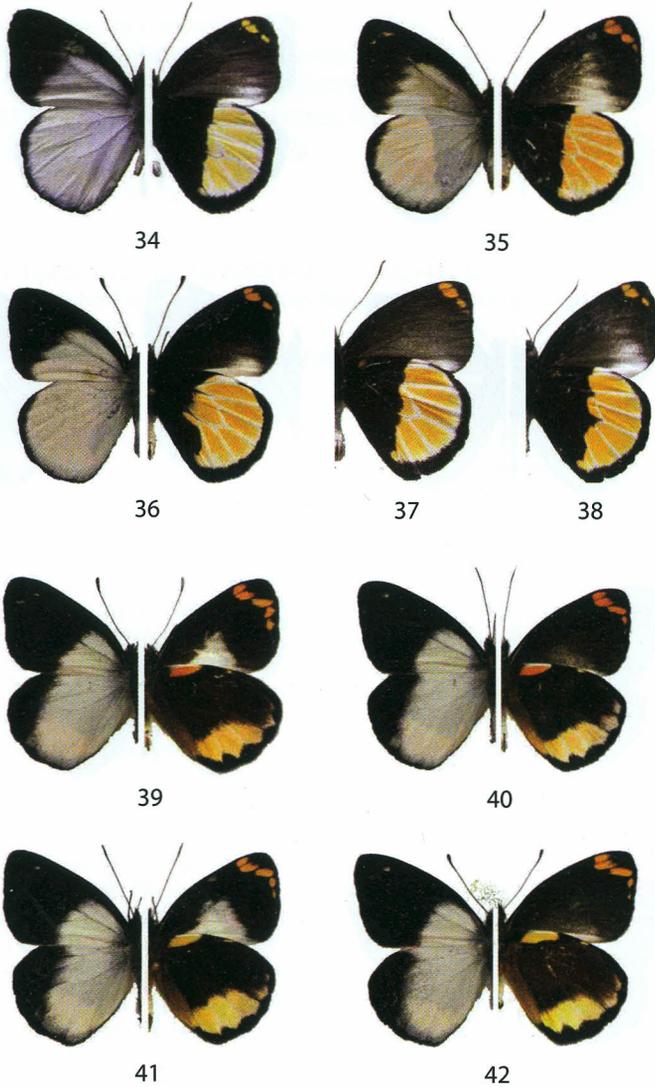


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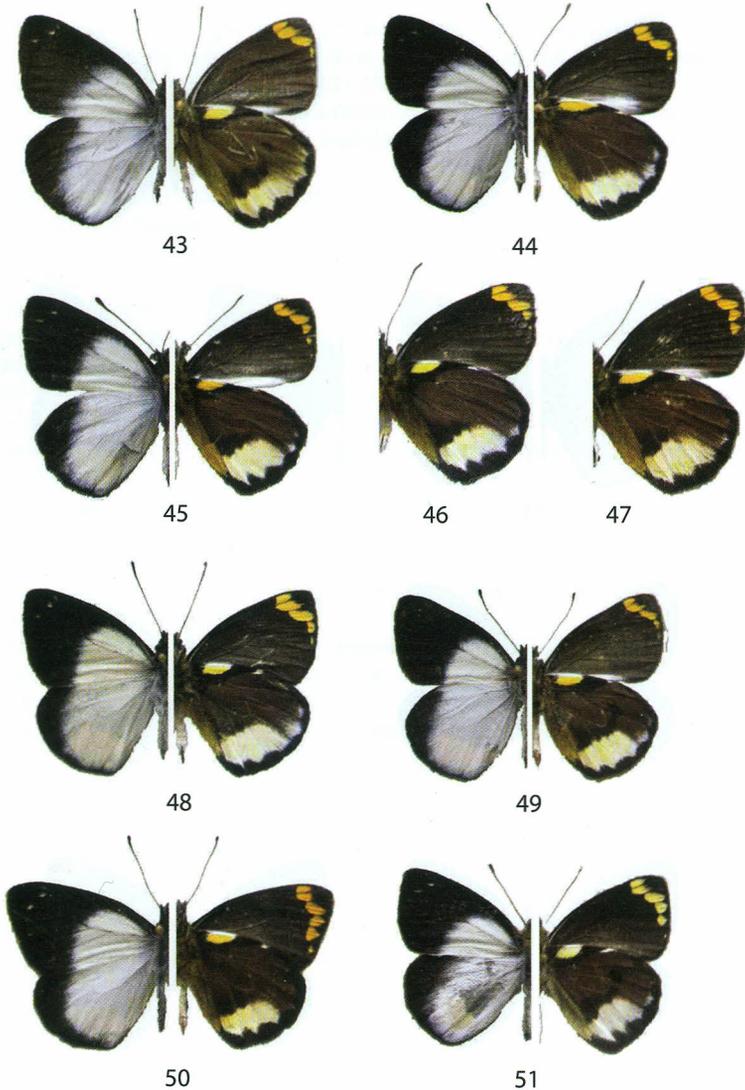


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**Figs 26-29.** *Delias luctuosa archboldi*: 26. ♂ from Ilaga (KSP 8069); 27. ♂ from Baliem Valley = TL (KSP 8088); 28. ♀ from Daela (KSP 8114); f-♀ *butyracea* from Daela (KSP 8118).  
**Figs 30-33.** *D. luctuosa luctuosa* from Chimbu Prov., PNG: 30-31. ♂ (KSP 8191, 8196); 32-33. ♀ (KSP 8224, 8222).



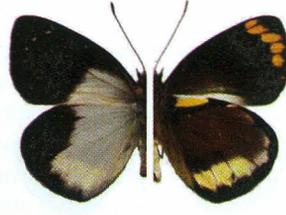
**Figs 34-38.** *Delias hemianops*: 34. PT ♂ (KSP 26992); 35. PT ♀ (KSP 22104); 36-38. ♂ (KSP 22099, 22091, 22081) - all from western Star Mts. **Figs 39-42.** *D. roepkei cieko* from Pass Valley: 39. form A (KSP 22156); 40. form B (KSP 22161); 41. form C (KSP 22164); 42. form D (KSP 22182).



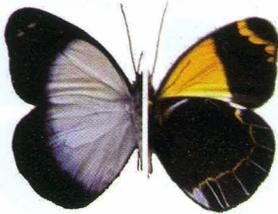
**Figs 43-51.** *Delias roepkei cieko* ♂ form D (= *D. roepkei reissingeri*): 43-44. from Korupun (KSP 22205, 22196)); 45-47. from Abmisibil (KSP 22226, 22253, 22231); 48-50. from Batimban (KSP 22250, 22232, 22227); 51. from Langda (KSP 22222) - 45-50 from western Star Mts.



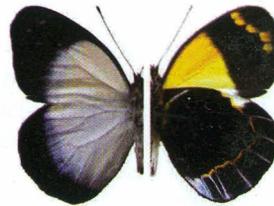
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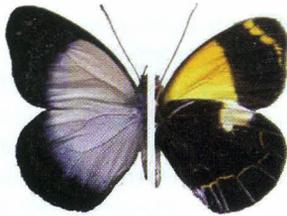
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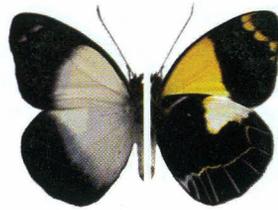
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**Figs 52-53.** *Delias roepkei cieko* form D (= *D. roepkei reissingeri*): 52. ♂ from Langda (KSP 22218); 53. ♀ from Korupun (KSP 22239).

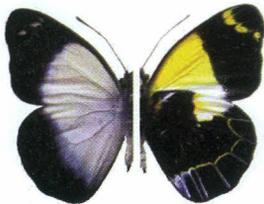
**Figs 54-59.** *D. niepelti neagra* ♂: 54-56. from Abmisibil KSP 21474, 21446, 21486); 57-59. from Batimban (KSP 21439, 21345, 21431) – 54-59 from western Star Mts.



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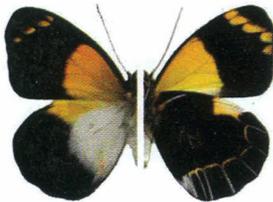
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**Figs 60-66.** *D. niepelti neagra*: 60-64. ♂ from Abmisibil (KSP 21412, 21416, 26943, 26945, 21495); 65. ♀ from Abmisibil (KSP 21474); 66 ♀ from Batimban (KSP 21458).

**Fig. 67.** *D. iltis sibil* ♂ PT from Abmisibil (KSP 7952).

**Fig. 68.** *D. wollastoni abmisibilensis* ♂ from Abmisibil (KSP 21824) - all from western Star Mts.