

Some notes on *Delias* (Hübner, 1819) from the Foja Mountains, Papua, Indonesia (Lepidoptera: Pieridae)

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Abstract: The second survey to the Foja Mts (at 1,650 m) increased the number of *Delias* species recorded in that area from eight to twelve, including a new species described below. On 1,250 m three species were collected, including one not recorded at 1,650 m. Further information about the Foja *Delias*, including descriptions of the female of *D. durai* and the male of *D. microsticha weja* is provided.

Ikhtisar: Survei kedua ke Pegunungan Foja meningkatkan jumlah spesies *Delias* di daerah itu (1.650 m) dari delapan menjadi dua belas, termasuk satu spesies baru yang diletakkan di bawah ini. Pada ketinggian 1.250 m tiga spesies ditangkap, termasuk satu yang tidak diobservasi pada ketinggian 1.650 m. Catatan-catatan tambahan diberikan tentang *Delias* dari Peg. Foja, termasuk deskripsi betina *D. durai* dan jantan *D. microsticha weja*.

Keywords: new species.

Introduction

After the first successful survey of the Foja Mountains in the northern part of Papua, close to the Mamberamo River, (25 November – 7 December 2005) many of the participants hoped to return to the isolated mountains range once more. In November 2008 this became possible. Conservation International in collaboration with the Zoological Division of the Research Center for Biology of the Indonesian Institute of Science (LIPI) organized a survey to Kwerba and from there by helicopter to the Foja Mountains. From the 6th to 27th November 2008 ten scientists, including three from National Geographic Magazine and eleven local people camped at the same place as in 2005 (at 1,650 m, on 2°34.5' S, 138°42.9' E). Due to much rain during the wet season, daytime collecting results were very poor although night time collection of moths by lights was more productive.

This article includes records of all *Delias* species recorded from the Foja Mts, including description of a new species collected during the 2008 expedition.

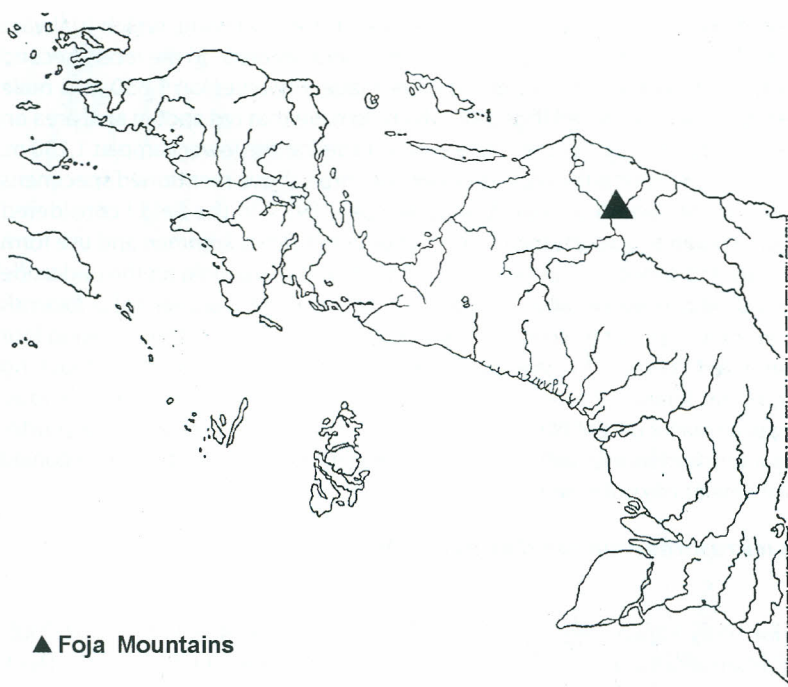
Depositories

Av.	- Average
CI-RAP	- Conservation International-Rapid Assessment Program
fig(s).	- figure(s)
Fwl	- Length of fowering
HT	- Holotype
KSP	- Koleksi Serangga Papua (Papuan Insects Collection), Jayapura, Indonesia
Mts	- Mountains
MZB	- Museum Zoologicum Bogoriense, Cibinong, Indonesia
Prov.	- Provinsi (= Province)
Peg.	- Pegunungan (= Mountain)
PT	- Paratype
RAP	- Rapid Assessment Program
und.	- underside
upp.	- upperside

Results

In the publication on *Delias* collected during the first survey of the Foja Mts (van Mastrigt, 2006), I mentioned the recording of eight different species: *D. approximata* ssp., *D. nais* ssp., *D. fojaensis*, *D. durai*, *D. cumanau*, *D. ormoensis*, *D. kristianiae* and *D. microsticha weja*. In the survey of November 2008, the same species were recorded as in 2005, except *D. fojaensis*. In addition a female of *D. cumanau* was recorded (in 2005 only males) and two males of *D. microsticha weja* (in 2005 only a single female). Apart from the species mentioned above, *D. kummeri fumosa* (a male and a female), and single male specimens of *D. campbelli*, *D. lecerfi* and of a new species, here described as *D. papuana* **spec. nov.** were collected during the 2008 expedition.

On 20-21 November 2008 a local assistant descended the north side of the range to an altitude of 1,250 m (on 2°35.46' S; 138°43.198' E), where he collected, besides *D. campbelli* and *D. kummeri fumosa*, one other species: *D. ladas*. These three are not unusual species at that altitude; the first and second one were also recorded at 1,650 m, *D. ladas* is a new record for the Foja Mountains.



Map 1. Location of Foja Mountains in Papua, Indonesia

***Delias fojaensis* van Mastrigt, 2006**

Fig. 1

Material: "Prov. Papua, Peg. Foja 1,650 m, 2° 34.5'S and 138° 42.9'E, 23.XI-7.XII.2005, CI-RAP Mamberamo-Foja", HT ♂, MZB; idem, 4 PT ♂♂, KSP. (Fwl. 24-26 mm)

***Delias kummeri* Roepke, 1955**

Figs 2-4

Material: *Delias kummeri*: "Prov. Papua, Peg. Foja 1,650 m, 2° 34.5'S and 138° 42.9'E, 6-27.XI.2008, CI-LIPI Survey – Henk van Mastrigt", 1 ♂, 1 ♀, KSP; idem, but Lower Camp, 2°35.46' S; 13843,198' E, 1,250 m, 21-22.XI.2008, 1 ♂, KSP. (Fwl. 24-26 mm)

Comment. The specimens (5 ♂♂) recorded in 2005, were published as a new species "closely related to *Delias kummeri*, but can easily be recognized by the absence of

a red spot on the anal area on the underside of the hind wing, which is always present in *kummeri* and its related species *ligata* and *isocharis*". In the recent second survey no new records of *D. fojaensis* were made. However, on 1,650 m. a male and a female were recorded (figs 3-6), which do have that red spot in anal area on underside of hindwing. Another male was recorded at the lower camp at 1,250 m. There is no significant difference between the three above mentioned specimens and material of *Delias kummeri fumosa* Roepke, 1955. In the field I considered whether I should propose *fojaensis* as a synonym of *Delias kummeri* and use form *fojaensis* for the specimens without the red spot on the anal area on the underside of the hind wing. However, after a comparison between the specimens of *D. fojaensis* and *D. kummeri* I prefer to keep two separate species, based on the following four features in *D. fojaensis*. On upperside of fore wing black apical border is touching dc-bar; on underside of forewing the yellow subapical spots are more obvious, cutting of a smaller part of black apical border; on underside of hind wing a shorter red basal spot and shorter and broader red line in the black area, often accompanied by white line at the outer side.

***Delias microsticha weja* van Mastrigt, 2006**

Figs 5-6

Material: "Prov. Papua, Peg. Foja 1,650 m, 2°34.5'S and 138° 42.9'E, 23.XI-7.XII.2005, CI-RAP Mamberamo-Foja", HT ♀, MZB; idem, 6-27.XI.2008, CI-LIPI Survey – Henk van Mastrigt, 3 ♂♂, KSP.

Delias microsticha weja was described in 2006, based on a single female, which is more closely related to *Delias (microsticha) flavopicta* Jordan, [1912] from the Arfak Mountains, than to any other *microsticha* ssp., because of its broad black border on upperside forewing and hindwing and the absence of subapical spots. This close relationship is affirmed by the males, having also a broad black border on upperside of both wings.

Description of male. Forewing upperside greyish white with a black costa and broad black border which inner edge is straight from 1 mm outside discal cell to tornus. No subapical spots. Hind wing upperside white with black border from Rs to anal area is widest in cell M₂ (2.5 mm) and is reducing to both sides. Fore wing underside is golden brown-grey with a some greyish brown diffusion in cell 1A+2A and CuA₂ (partly), and with a large yellow streak in discal cell, two yellow spots just outside top of discal cell, followed by two very small ones; two small yellow subapical spots, one touching costa, the second one at vein M₁, followed by two larger and one small terminal spots. Hindwing underside is of same colour as forewing underside, with a red spot in the base. Six yellow terminal spots from Rs

to 1A+2A, from which the second and third one are very small; a larger yellow spot at middle of costa and in the discal cell; and a row of five very small yellow dots from Rs to middle of anal area.

Length of fore wing: 22-24 (23) mm.

***Delias papuana* spec. nov.**

Figs 7-8

Material: Holotype ♂: "Prov. Papua, Pegunungan Foja, Bog Camp 1,650 m, S: 2°34.5' E: 13842.9', 6-27.XI.2008, CI/LIPI-survey - Henk v Mastrigt, KSP.

Diagnosis: This species is related to *hypomelas* which it closely resembles on the upperside. However, the underside of fore wing is not black but white, a feature only known in *hypomelas* females from the Pass Valley. Besides that no concentration of black scales is found in the centre of hindwing underside as common in all *hypomelas*. It is quite different from the sympatric *D. ormoensis*, in which species the upperside does not resemble *hypomelas*, the forewing underside is black and there is no row of white terminal spots on hindwing underside.

Description: Forewing upperside white with black costa and black border, which is slightly entering in M₁ and M₂ absorbing the dc-bar. Hindwing upperside is white with thin black border, slightly entering at vein-ends. Underside forewing is white, with black costa and black border, bearing two short, thin, red subapical lines. Black border of same size as on upperside, however, more reduced from M₃ to tornus. Hindwing underside is black with rounded yellow basal spot and six white terminal spots of different size close to the vein-ends M₁ to 1A+2A.

Length of forewing: 23 mm.

Female: unknown

Etymology: '*papuana*' is an adjective in apposition, derived from Papua, the name of the province, including the Foja Mts and where the Governor, Mr. Barnabas Suebu, is planning a sustainable development to protect the biodiversity of its rich tropical forests.

***Delias durai* van Mastrigt, 2006**

Figs 9-11

Material: "Prov. Papua, Peg. Foja 1,650 m, 2° 34.5' S and 138° 42.9' E, 23.XI-7.XII.2005, CI-RAP Mamberamo-Foja", HT ♂, MZB; idem, 6 PT ♂♂, KSP; 2 PT ♂♂, MZB; idem, 6-27.XI.2008, CI/LIPI Survey – Henk van Mastrigt, 8 ♂♂, 1 ♀, KSP. (Fwl. 24-26 mm)

Delias durai was described in 2006 (fig 9), based on nine males. During the second survey – besides a number of 'normal' males – a single male was collected in which the curved grey line from M2 to apex is poorly developed and partly absent (fig. 11). A damaged female was also recorded (fig. 10), and is described below.

Description of female: Forewing upperside white with black costa and broad black border, slightly entering discal cell, bearing three small to very small white subapical spots; with irregular inner edge from discal cell to termen at CuA₂, curving to tornus. Hind wing upperside translucent white, with broad (> 5 mm) black border from M₁ to tornus, cutting off a white spot in M₁. Forewing underside with slightly reduced black border than on upperside, especially in CuA₁ and CuA₂, bearing three yellow subapical spots, following by a yellow dot. Hind wing underside mainly black, with a yellow elongate spot in the basal area, and a oval, white and yellow discal spot consisting of parts of discal cell, M₁, M₂ and M₃, which is less wide than in male; a red curved line from middle of costa to tornus, not reaching the border, which is wider in Rs and M₁, cutting of two small white parts of cells, separate by black vein part. Red line at outer side accompanied by greyish white line, which is narrowed than in male, and sometimes even interrupted. Length of fore wing: 26 mm.

***Delias cumanau* van Mastrigt, 2006**

Figs 12-13

Material: Prov. Papua, Pegunungan Foja 1,650 m, 2°34.5'S and 138°42.9'E, 23.XI-7.XII.2005, CI-LIPI Survey – Henk van Mastrigt, 1 ♂ HT, MZB; 5 ♂♂ PT, KSP; idem, 6-27.XI.2008, 10 ♂♂, KSP. (Fwl. 23-25 mm)

Comment. Although eight specimens were added in 2008, in addition to the six specimens collected in 2005, the female is still unknown.

***Delias kristianiae* van Mastrigt, 2006**

Fig. 14

Material: Prov. Papua, Pegunungan Foja 1,650 m, 2°34.5'S and 138°42.9'E, 23.XI-7.XII.2005, CI-LIPI Survey – Henk van Mastrigt, 1 ♂ HT, MZB; 2 ♂♂ PT, KSP; idem, 6-27.XI.2008, 1 ♂, KSP. (Fwl. 24-26 mm)

Comment. The record of only a single specimen in 2008, in addition to the three specimens collected three years ago, implies that this is the rarest of the species described from the Foja Mts in 2006 (result of 2005 CI-LIPI Survey).

***Delias campbelli* Joicey & Talbot, 1922**

Figs 15-17

Material: Prov. Papua, Pegunungan Foja 1,650 m, 2° 34.5' S; 138° 42.9' E, 6-27.XI.2008, CI-LIPI Survey – Henk van Mastrigt, 1 ♂, KSP; idem, but Lower Camp, 2°35.46' S; 13843,198' E, 1250 m, 21-22.XI.2008, 2 ♂♂, KSP. (Fwl. 24-25 mm)

Diagnosis: Comparison of the single specimen from the bog camp and the two specimens from the lower camp leads to the conclusion that the specimens from the lower camp are more or less similar with other specimens from the middle and eastern part of the central mountain range in Papua. However, the one from the bog camp is characterized by the absence of a white (to greyish) spot or line at Rs. However, having only a single specimen, this is a too weak feature to describe a new subspecies.

***Delias lecerfi* Roepke, 1955**

Figs 18-19

Material: Prov. Papua, Pegunungan Foja 1,650 m, 2° 34.5' S and 138° 42.9' E, 6-27.XI.2008, CI-LIPI Survey – Henk van Mastrigt, 1 ♂, KSP. (Fwl. 24 mm)

Diagnosis: Comparison of the new record from the Foja Mts and specimens of *Delias lecerfi* Roepke, 1955 (13 ♂♂; 2 ♀♀) from the Kobowre (former Weyland) Mts. in KSP, shows a small difference: the subapical row of yellow spots on underside of fore wing is better developed in the Foja specimen than in those from the Kobowre Mts. Particularly, the third and fourth spot are larger and more rounded. Once again, a single specimen is insufficient to justify description a new subspecies.

***Delias ormoensis* van Mastrigt, 2006**

Fig. 20

Material: Prov. Papua, Pegunungan Foja 1,650 m, 2° 34.5' S and 138° 42.9' E, 23.XI-7.XII.2005, CI-LIPI Survey – Henk van Mastrigt, 1 ♂ HT, MZB; 6 ♂♂ PT, KSP; idem, 6-27.XI.2008, 4 ♂♂, KSP. (Fwl. 22-26 mm)

Comment. Four records in 2008, in addition to the seven specimens collected three years ago, were not sufficient to get the first female.

***Delias ladas* Grose-Smith, 1894**

Fig. 21

Material: Prov. Papua, Pegunungan Foja, Lower Camp, 2°35.46' S; 13843,198' E, 1,250 m, 21-22.XI.2008, CI-LIPI Survey – Henk van Mastrigt, 1 ♂, KSP. (Fwl. 28 mm)

Diagnosis: The single example of this species has reduced black borders on the fore wing upperside, which are more hooked than rounded on the inner margin. It fits within the range of variation known from the central mountain range in Papua.

***Delias approximata* Joicey & Talbot, 1922**

Figs 22-23

Material: Prov. Papua, Pegunungan Foja 1,650 m, 2° 34.5' S and 138° 42.9' E, 23.XI-7.XII.2005, CI-LIPI Survey - Henk van Mastrigt, 15 ♂♂, 1 ♀, KSP; idem, 6-27.XI.2008, 11 ♂♂, KSP. (Fwl. 21-24 mm)

Comment. The complexity of the *aroae* group as defined by Orr & Sibatani, 1985, within the *aroae-cuningputi* species group, restrains me from a detailed study. It is expected that DNA analysis will be required to establish the relationships within this difficult and complex group.

***Delias nais* Jordan, [1912]**

Figs 24-25

Material: Prov. Papua, Pegunungan Foja 1,650 m, 2°34.5' S and 138° 42.9' E, 23.XI-7.XII.2005, CI-LIPI Survey - Henk van Mastrigt, 12 ♂♂, 4 ♀♀, KSP; idem, 6-27.XI.2008, 2 ♀♀, KSP. (Fwl. 24-27 mm)

Comment. *Delias nais* (including *D. denigrata*) has a large variety all over New Guinea, where it occurs from the Kobowre Mts in the most western part of the central mountain range of Papua, to the Herzog Mts (Biagi) and Rawlingson Mts in the eastern part of P. N. G. Seven subspecies are recognized, most of which are weakly distinguished and contain much individual variation. See D'Abrera (1971, 1977, 1990), Parsons (1999) and Gotts & Ginn (2004), Yagishita (1993a, 1993b). A planned review of the complex will include comparison of the Foja Mts population.

Acknowledgements

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Finally I would like to thank Mr. Lesley Day, who gave comments on the publication of the results of 2005, at the website delias-butterflies.co.uk and Mr. Chris Davenport and Mr. Fred Gerrits for their advices and comments on the draft of this publication.

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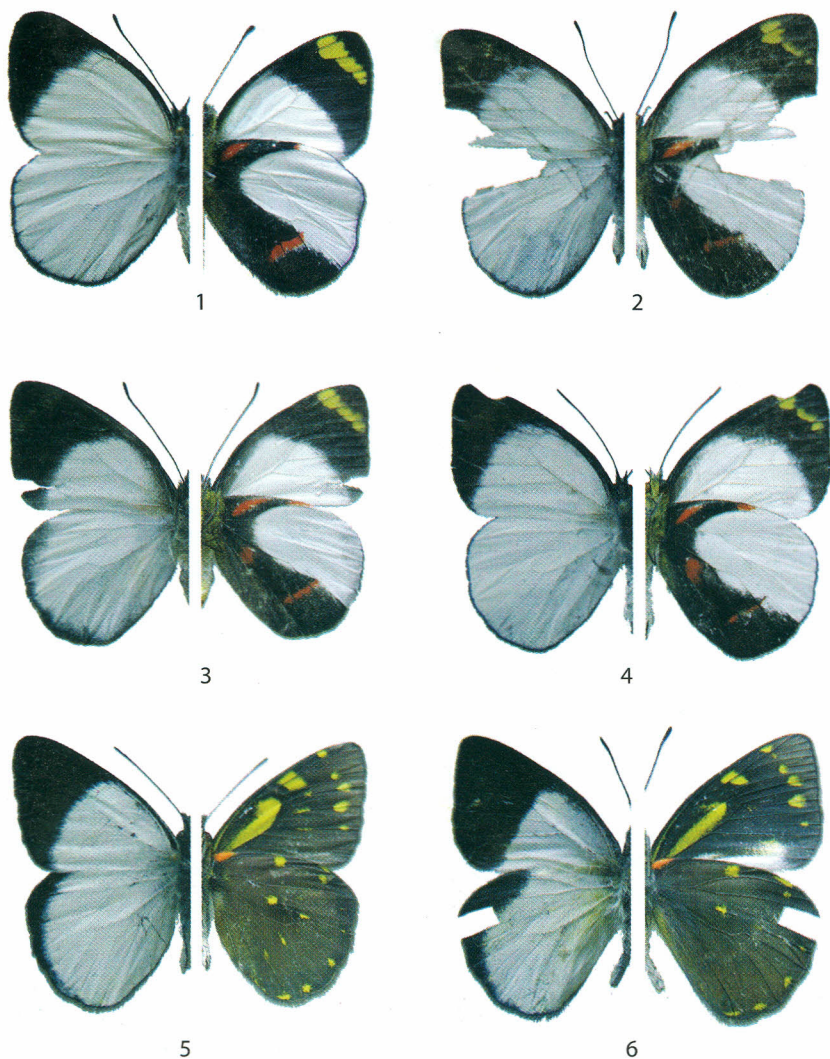
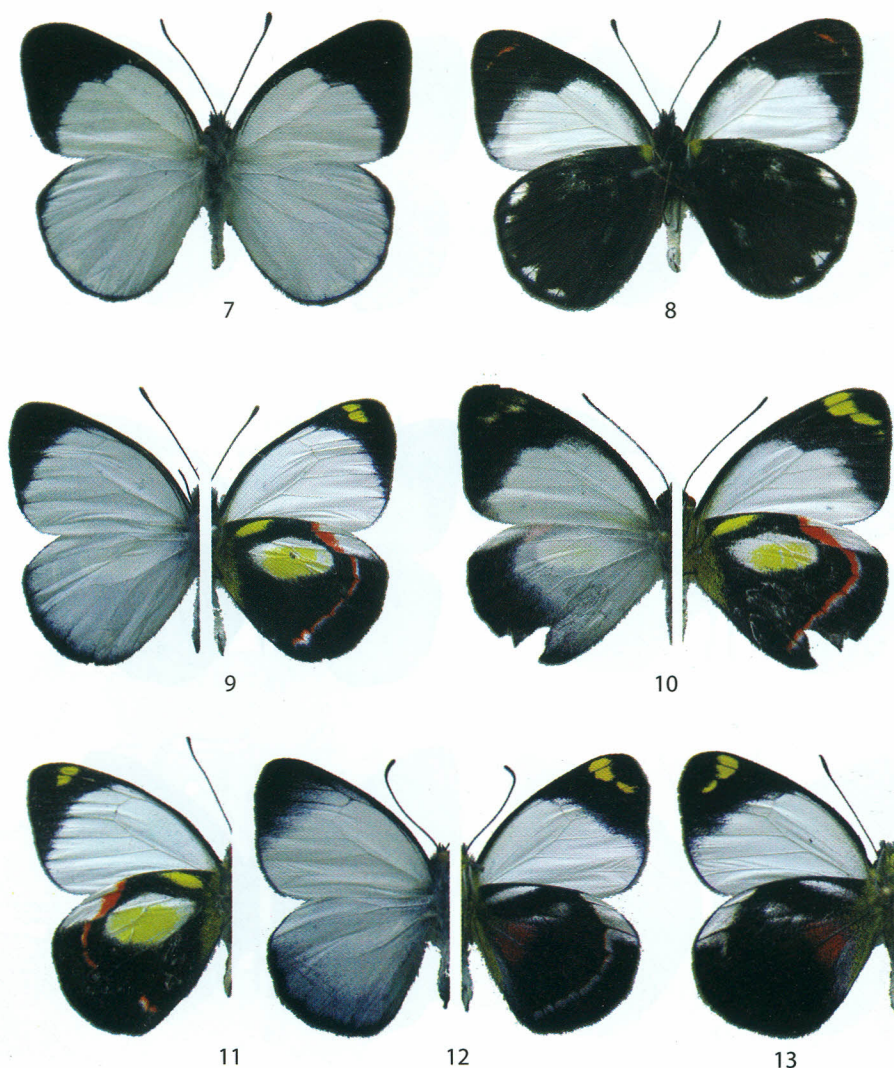


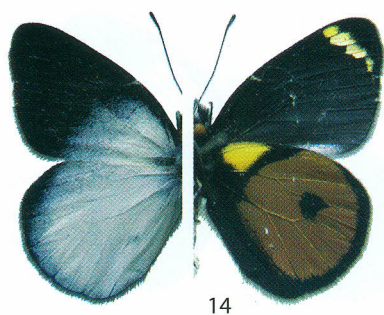
Fig. 1. *Delias fojaensis* HT ♂, upp./und.

Figs 2-4. *Delias kummeri*. 2. ♂ (Foja Mts, 1,650 m), upp./und.; 3. ♀ (Foja Mts, 1,650 m), upp./und.; 4. ♂ (Foja Mts, 1,250 m), upp./und.

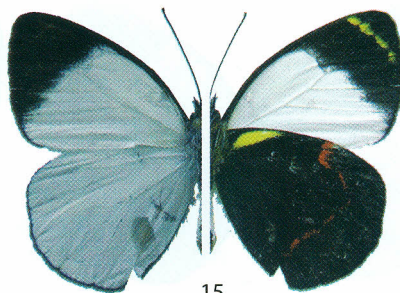
Figs 5-6. *Delias microsticha weja*. 5. ♂ (Foja Mts, 1,650 m), upp./und.
6. HT ♀ (Foja Mts, 1,650 m), upp./und.



Figs 7-8. *Delias papuana* **spec.nov.** HT ♂ 7. upperside; 8. underside.
Figs 9-11. *Delias durai*. 9. HT ♂, upp./und.; 10. ♀, upp./und.; 11. ♂, variety, und.
Figs 12-13. *Delias cumanaui*. 12. HT ♂, upp./und. 13. f. *kwerbae*, und.



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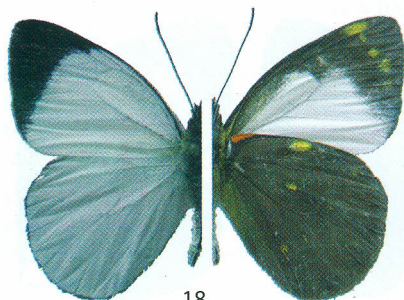
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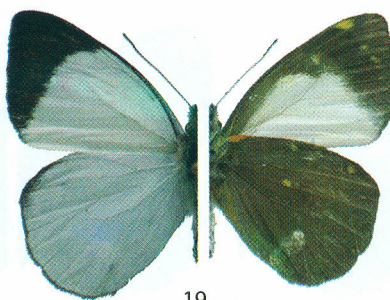
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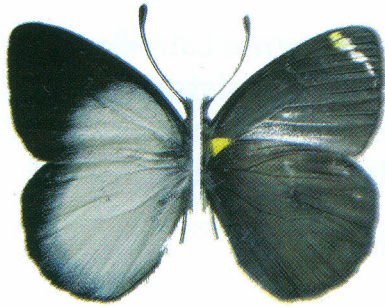
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Fig. 14. *Delias kristianiae* HT ♂, upp./und.

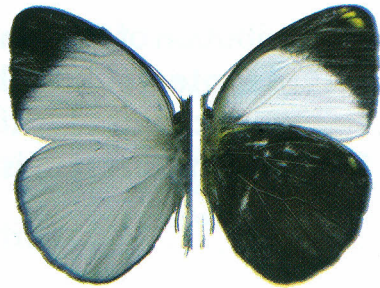
Figs 15-17. *Delias campbelli*. 15. ♂ (Foja Mts, 1,650 m), upp./und.;
16. ♀ (Foja Mts, 1,650 m), upp./und.; 17. ♂ (Foja Mts, 1,250 m), upp./und.

Figs 18-19. *Delias lecerfi*. 18. ♂ (Foja Mts, 1,650 m), upp./und.

19. ♂ (Kombowre Mts, 1,400 m), upp./und.



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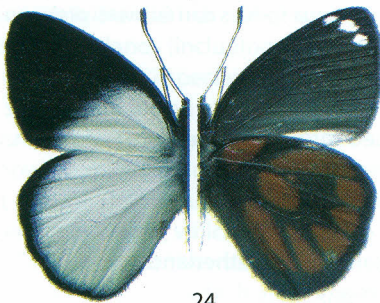
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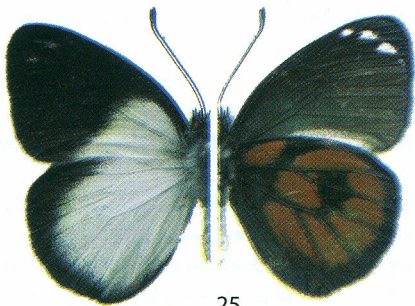
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Fig. 20. *Delias ormoensis* HT ♂, upp./und.

Fig. 21. *Delias ladas* ♂ (Foja Mts, 1,250 m), upp./und.

Figs 22-23. *Delias approximata*. 22. ♂ (Foja Mts, 1,650 m), upp./und.;

23. ♀ (Foja Mts, 1,650 m), upp./und.

Figs 24-25. *Delias nais*. 24. ♂ (Foja Mts, 1,650 m), upp./und.;

25. ♂ (Foja Mts, 1,650 m), upp./und.