A review of the status of some *Delias* Hübner, 1819 (Lepidoptera: Pieridae) in Papua, Indonesia

2. Taxonomic revisions by Yagishita (1993) and Parsons (1999)

Henk van Mastrigt

Kelompok Entomologi Papua, Kotakpos 1078, Jayapura 99010, INDONESIA
Email: hevamas@gmail.com

Suara Serangga Papua: **8** (2): 53-71

Abstract: Over the years, many taxa of *Delias* have been revised, synonymised, given a new status or used in a new combination. Most but not all of these revisions have been formalized by later authors. In this publication the status of about thirty taxa revised by Yagishita (1993) and Parsons (1999) are examined and clarified.

Rangkuman: Bertahun-tahun lamanya banyak takson *Delias* direvisi, menjadi sinonim, diberi status yang baru atau digunakan dalam kombinasi yang baru. Kebanyakan revisi ini –tetapi tidak semuanya– diformalkan oleh pengarang yang kemudian. Dalam publikasi ini kedudukan dari sekitar tiga puluh takson yang direvisi oleh Yagishita (1993) atau/dan Parsons (1999) diperiksa dan diklarifikasi.

Key-words: stat. nov., stat. rev., subspec. nov., **syn. nov.**

Introduction

In March 2013 Van Mastrigt published the first part of this study by reviewing the position of seventeen taxa of *Delias* Hübner, 1819, proposed by D'Abrera (1971, 1977, 1990). In this second part, the author considers various taxa revised by Yagishita (1993) and Parsons (1999).
Yagishita (1993) *et al.* published "An illustrated list of the Genus *Delias* Hübner of the World" in two volumes (text and figures), the first comprehensive review of the genus since Talbot's Monograph of 1928-1937. In 1999 Parsons published "The Butterflies of Papua New Guinea" containing detailed information on *Delias* of the eastern part of the island (p. 296-322, Pl. 32-39: figs. 796-975) and including a number of taxonomic changes. These significant books are indispensable for the study of *Delias* in Papua, Indonesia.

In order to prepare an updated specieslist of *Delias* of Papua, it is necessary to review and evaluate the various revisions proposed by Yagishita and Parsons.

Abbreviations

The following abbreviations have been used throughout the text.

BMNH - Natural History Museum, London, U.K.
ChP - Chimbu Province, PNG
dc - discocellular
f. - form
h.w.v. - hindwing verso, underside of hindwing
KSP - Koleksi Serangga Papua (Collection of Papuan Insects), Jayapura, Indonesia
PNG - Papua New Guinea
RML - see RMNH
RMNH - Naturalis Biodiversity Center(including former ZMA), Leiden, The Netherlands
ssp. - subspecies (plural)
s. str. - *sensu stricto*
TL - type locality.

Revisions

The reasons for these revisions are various. Yagishita (1993) and Parsons (1999) re-assessed the status of a number of species and subspecies on several grounds: not only the very close morphological relationship (as with the three species in the *sagessa* subgroup), but also because of their distribution. When for instance the *catisa* ssp. from the Baliem Valley is synonymized with *catisa* ssp. from the Kobowre Mountains and Paniai in the western part of the Central Cordillera, it is difficult to accept the existence of a separate subspecies in between those two localities, as *catisa* is found all over the central mountain range. Although the present author wishes to restrict himself to *Delias* from Papua only, if species and/or subspecies from Papua are closely related to those from PNG, or share a species name, these may be included in this publication.

Revisions by Yagishita (1993)

Among the *Delias* from Papua, the former Netherlands New Guinea now the combined Indonesian Provinces of Papua and Papua Barat, Yagishita (1993) proposed several new synonyms, some revisions of status and many new subspecies.

All descriptions of new species and subspecies and changes of status (at species level) are brought together on pages 1-19 of the text. Below the species name (each beginning a new page), all subspecies, homonyms, synonyms, infractions, forms and aberrations are listed. To indicate new synonyms, status changes or combinations Yagishita used the following terms in front of the revised name: <Homonym>, <**Homonym nov.**>, <Infraction>, <Synonym>, <**Synonym nov.**>. Homonym is used for names that are invalid because of prior occupation (i.e. the same name is used a second – or third – time within the same genus, as *D. weiskei* (renamed as *D. geraldina*), *D. leucias roepkei* (renamed as *D. nieuwenhuisi nieuwenhuisi*), and also for *D. ibelana roepkei* (= *D. fascelis ibelana*) and *D. ibelana paniaia* (= *D. citrona*).

In the first case Yagishita followed Orr & Sibatani (1985) in accepting *ibelana* as subspecies of *fascelis* and synonymized *ibelana roepkei* with *ibelana*. The fact that *roepkei* is an occupied name (homonym) is not formalized as no new name is given. In the second case *paniaia* is a valid name (not a homonym), as the description by Schmitt (1992) predates Yagishita's publication (1993) in which the form-name *paniaia* is established as a species name. In fact, Yagishita synonymized *ibelana paniaia* with *D. citrona*.

<Infraction> is applied to some infra-subspecific forms such as *D. ladas ladas* <Infraction> f. *sulfurata* Roepke, 1955, and also for synonymization, as in *D. hypomelas lieftincki* <Infraction> *fulgida* Roepke, 1955, and *D. campbelli cambelli* <Infraction> *maria*. It implies that the (form) name is included in the (sub)species name mentioned above and does not have a separate status under the ICZN code. Other form names such as *D. hypoxantha* f. *insula* and *D. mira excelsa* f. *roepkei* are listed without use of the prefix <Infraction>.

Where a subspecies is raised to species level or vice versa, three suffixes are used after the authors name; stat. nov., stat. n. or **stat. nov.** without a clear difference in meaning or application. Van Mastrigt (1996a) reviewed Yagishita's publication in which he also paid attention to synonyms. The slightly earlier publication of Gerrits, F. & H. van Mastrigt [1993] with eight new species was unknown to Yagishita at the time of his publication. Two species described by Gerrits and Van Mastrigt were also described by Yagishita, as a result *D. tessei mastrigti* Yagishita, 1993 is a junior synonym of *D. virgo* Gerrits & van Mastrigt,1993 and *D. clathrata sakumai* Yagishita, 1993 is a junior synonym of *D. neeltje* Gerrits & van Mastrigt, 1993.
In addition, van Mastrigt (1996a) proposed two further synonyms. He stated that *D. iltis majai* Yagishita, 1993 is not a member of *iltis* Ribbe, 1900, but undoubtedly a form of D. *luctuosa* Jordan, 1912 and is therefore treated as a junior synonym of (the variable) *D. luctuosa archboldi* Roepke, 1955, perhaps a local form or aberration.

Furthermore, Yagishita's *D. luteola luteola* is considered to be a synonym of *D. callista callipareia* (f. ♂ *luteola*) Roepke, 1955.

A summary of the revisions and new descriptions are presented below with further comments.

D. dice dice Snellen van Vollenhoven, 1863
<Infraction> .f. *nigroapicalis* Roepke, 1955

D. ladas ladas Grose-Smith, 1894
<Infraction> .f. *sulfurata* Roepke, 1955

D. sagessa anjae Schröder, 1977
<**Synonym nov.**> *dollyae* O. Schmitt, 1992
D. sagessa sinak Mastrigt, 1990, stat. n.
Originally described as *D. sinak*.
For more information see discussions below: *sagessa* Fruhstorfer, 1910, *abrophora* Roepke, 1955 and *sinak* Van Mastrigt, 1990.

D. hypomelas lieftincki Roepke, 1955
<Infraction> *fulgida* Roepke, 1955
Roepke (1955) described two subspecies from more or less the same area, *D. hypomelas lieftincki* and *D. hypomelas fulgida*. Toxopeus (ms.) considered *lieftincki* as closely allied to *argentata* whereas Roepke thought it belongs to *hypomelas rubrostiata*. Recent studies show that *hypolemas, argentata* and *destrigata* are a single species (*Delias hypomelas*), in which four forms are recognized: f. *rubrostriata*, f. *argentata*, f. *clutus* and f. *destrigata* (see van Mastrigt, 2012).

D. fascelis ibelana Roepke, 1955
<**Homonym nov.**> *roepkei* O. Schmitt, 1992
Originally described as *D. cuningputi ibelana*, but Orr & Sibatani (1985) transferred it to *D. fascelis* which was given is specific rank by them. Schmitt (1992) raised *ibelana* to species level and added *roepkei* from Tembagapura (and *paniaia* from Paniai) as new subspecies. As the name *"roepkei"* is occupied by *D. mira roepkei*, it was renamed by van Mastrigt (1996b) as *amungme*, however not as subspecies of *ibelana*, but of *fascelis*.

D. citrona Joicey & Talbot, 1922
<**Homonym nov.**> *paniaia* O. Schmitt, 1992Originally described as *D. cuningputi citrona* but in Talbot (1928) listed as *D. citrona*. Roepke treated it as *D. cuningputi citrona* and Orr & Sibatani (1986) re-instated it to species level. Schmitt (1992)

added *paniaia* as new subspecies of *ibelana*. Van Mastrigt (2002) proposed the combination of *D. fascelis citrona*. Van Mastrigt (1996b) treated *paniaia* as subspecies of *D. fascelis*.

D. approximata Joicey & Talbot, 1922
Originally described as *D. pheres approximata* but Orr & Sibatani (1985) brought it to species level. Funahashi (2012) re-established this taxon as *D. pheres approximata*.

D. balimensis Roepke, 1955
Originally described as *D. aroae balimensis* but Orr & Sibatani (1985) again raised it to species level. They noted that *balimensis* and *approximata* from Balim River have the same label data and are probably sympatric but were not able to decide whether either of these is conspecific with *aroae*. D'Abrera mentioned *D. aroae balimensis* "a doubtfully distinct ssp." Funahashi (2012) synonymized this taxon with *D. aroae*.

D. yabensis Joicey & Talbot, 1922
Originally described as *D. aroae yabensis* but raised by Orr & Sibatani (1985) to species level. Funahashi (2012) re-established this taxon as *D. aroae yabensis*.

D. angiensis Talbot, 1928
Originally described as *D. aroae angiensis* and again raised by Orr & Sibatani (1985) to species level. D'Abrera mentioned *D. aroae angiensis* "a doubtfully distinct ssp." Funahashi (2012) maintained the status level, based on differences in genitalia compared to *aroae aroae* and *aroae yabensis*.

D. eichhorni frater Jordan, [1912]
<Synonym> *soror* Toxopeus, 1944
D. eichhorni antara Roepke, 1955
D. eichhorni far Schröder & Treadaway, 1982
See below: *frater* Jordan [1912] and *antara* Roepke, 1955.

D. germana germana Roepke, 1955
D. germana heliophora Roepke, 1955
D. germana muliensis Morinaka, Mastrigt & Sibatani, 1991 stat. n.
The sympatry of *D. eichhorni germana* and *D. eichhorni antara* in the Baliem Valley (Roepke, 1955) was resolved by Morinaka c.s. (1991) by splitting *eichhorni* into four species: *D. eichhorni, D. antara, D. germana* and *D. heliophora* and adding a newly discovered allied species, *D. muliensis*. Morinaka c.s. (1993) recognized *D. frater, D. hagenensis, D. kerowagi*, as separate species in addition to *D. eichhorni (s. str.)*.

See notes below on *heliophora* Roepke, 1955 & *muliensis* Morinaka, van Mastrigt & Sibatani, 1991 and *germana* Roepke, 1955.

D. carstensziana Rothschild, 1916 [should be 1915]
<Synonym> *alcicornis* Roepke, 1955
Originally described as *D. carstensziana alcicornis*, synonimized by D'Abrera (1971). Van Mastrigt (2013) proposed to use f. *alcicornis* for the form with the yellow underside of forewing and greenish grey underside of hindwing.

D. bornemanni keysseri Rothschild, 1925
Originally described as *D. nais keysseri*. Talbot (1928) mentioned it as *bornemanni keysseri* and Talbot (1929) as *nais keysseri*. Parsons synonymized *keysseri*, while Van Mastrigt & Davenport [2012] re-established *D. nais keysseri* as a valid subspecies.

D. nais maprikensis Yagishita ssp. n.
See revisions by Parsons.

D. denigrata denigrata Joicey & Talbot, 1927 **stat. nov.**
D. denigrata holophaea Roepke, 1955
D. denigrata maruyamai Yagishita ssp. n.
D. zebra takanamii Yagishita ssp. n.
Funahashi (2010) concluded that *zebra* should be regarded as an endemic phenotype of *D. nais*. Van Mastrigt & Davenport [2012] considered *D. nais* to have only five subspecies: *nais nais* (from Kobowre to western PNG); *nais odilae* (Puncak Jaya); *nais beehleri* (Foja Mts), *nais keysseri* (Bismark, Rawlinson, Herzog Mts, northeast PNG), and *nais aegle* (Owen Stanley Mts, E. PNG).

D. iltis majai Yagishita ssp. n.
Proposed as junior synonym of *D. luctuosa archboldi*. See above.

D. luctuosa luctuosa Jordan, 1911
<**Synonym**> *mizukamii* K. Okano, 1989
Parsons (1999) mentioned *mizukamii* is a valid subspecies, widespread in PNG, without referring to Yagishita's synonymization.

D. flavistriga shounan Yagishita ssp. n.
D. awongkor ilagaensis Mastrigt, 1989
See below: *ilagaensis* Van Mastrigt, [1988] and *shounan* Yagishita, 1993.
D. callista porquiaensis Yagishita ssp. n.
Parsons (1999) mentioned *callista porquiaensis* as the valid subspecies of *D. callista* in PNG. The type locality, Porquia, is not listed in the 1974 *PNG Gazetteer* and is

presumed to mean Porgera in Enga Province where the species has later been collected. The range of this species is now known to extend eastwards to Gumine in Simbu Province.
D. luteola luteola Roepke, 1955 stat. n.
D. luteola raymondi Schröder & Treadaway, 1982
D. luteola miyashitai Yagishita ssp. n.
See below: *luteola* Roepke, 1955, *raymondi ogawai* Morita, 1996 and *miyashita* Yagishita, 1993.

D. hapalina kerowagiensis Yagishita ssp. n.
This subspecies is synonymized by Parsons as *D. hapalina hapalina* Jordan, [1912]. See below.

D. tessei tessei Talbot, 1916 stat. nov.
Originally described as *D. tessei*. From 1928 treated as subspecies of *D. hapalina*.
D. tessei conspectirubra Joicey & Talbot, 1922
Originally described as *D. hapalina conspectirubra*. It is Yagishita who transferred *conspectirubra* as subspecies of *tessei*, so comb. nov.
D. tessei mastrigti Yagishita ssp. n.
When Yagishita described this subspecies he was not aware of the description of *D. virgo* Gerrits & van Mastrigt [1993]. See above.

D. campbelli campbelli Joicey & Talbot, 1922
<Infraction> *maria* Talbot, 1937
D. campbelli dentatus Yagishita ssp. n.
Both *maria* and *dentatus* are synonymized by Parsons (1999). See below in Revisions by Parsons.

D. leucias leucias Jordan, 1911
<ab> f. *lutescens* Roepke, 1955
Many *Delias* have a second form in which the white uppersides are creamy or yellowish. Roepke recognized this form within a number of *Delias,* including *leucias* which he named f. *lutescens*. It is a recurrent form, rather than an aberrant, and analogous for example to f. *sulfrata* in *D. ladas*.

D. callima telefominensis Yagishita ssp. n.
Parsons (1999) synonymized *telefominensis* with *callima*. See below: *telefominensis* Yagishita, 1993.
D. kummeri rouffaer Yagishita ssp. n.
D. kummeri highlandensis Yagishita ssp. n.
The individual variety found in *kummeri* and the close relationship with *ligata* do

not support descriptions of new subspecies. Parsons (1999) synonymized *highlandensis*, occurring in PNG, with nomotypical *kummeri*.

D. paniaia paniaia Roepke, 1955 stat. nov.
D. paniaia strix Yagishita ssp. n.
See below: *paniaia* Roepke, 1955.

D. wollastoni wollastoni Rothschild, 1916 [should be 1915]
<Infraction> bryophila Roepke, 1955
Van Mastrigt [2011] maintained *D. wollastoni bryophila* as a valid subspecies without reference to Yagishita whose synonymization was overlooked. Further study has shown that ssp. *bryophila* is in fact a synonym of *D. wollastoni wollastoni*.

D. discus larseni Luck & Gehlen, 1911
<Synonym> *captorima* van Eecke, 1915
D. discus discoides Talbot, 1937
Originally described as *D. albertisi discoides*. When Roepke described *D. discus apodiscus* he mentioned "(*albertisi* (*discus*) *apodisca* Toxopeus ms.)". Van Mastrigt & Davenport (2012) mentioned that the status of *discoides* is uncertain and followed Talbot's classification (*D. albertisi discoides*) until more specimens are available for study.

D. clathrata sakumai Yagishita ssp. n.When Yagishita described this subspecies he was not aware of the description of *D. neeltje* Gerrits & van Mastrigt [1993]. See above.

D. catocausta catocausta Jordan, 1911
<Synonym> *nigerrima* Roepke, 1955
Originally described as *D. catocausta nigerrima*. Since D'Abrera it has been treated as synonym of *catocausta catocausta*.

D. mira excelsa
f. *roepkei* Sanford & Bennett, 1955
Parsons (1999) recognized three subspecies of *mira* in PNG: *mira mira* (including *excelsa* syn. nov.) and *mira reversa* and *mira roepkei*, without mentioning Yagishita's decision to reduce *roepkei* to a form of *mira excelsa*.
Van Mastrigt (2000) treated *roepkei* as a separate species.

D. mariae sigit Mastrigt, 1990
Originally described as *D. sigit*. The morphological relation of *sigit* with *walshae* and *hemianops* Gerrits & van Mastrigt [1993] is more obvious rather than with *mariae*.
D. walshae Roepke, 1955 stat. nov.
D'Abrera suggested synonymization with *menooensis* in his text: *Delias mariae menooensis* (= *walshae* ?).

Van Mastrigt (2013), in reviewing D'Abera, considered *walshae* and its closely related species and retained the taxonomy of van Mastrigt (2000).

D. niepelti niepelti Ribbe, 1900
D. niepelti anamesa Bennett, 1956
D. meeki meeki Rothschild & Jordan, 1904
D. meeki septentrionalis Rothschild, 1925
D. arfakensis Joicey & Talbot, 1922 stat. n.
D. hypoxantha Roepke, 1955 stat. n.
f. *insula* Roepke, 1955
f. *peninsula* Roepke, 1955
D. neagra neagra Jordan, 1911 stat. n.
D. neagra albimarginata Talbot, 1929
D. neagra hypochrysis Roepke, 1955
According to Yagishita's classification the species *niepelti* (including *anamesa*) and *meeki* are endemic in PNG, while *arfakensis*, *hypoxantha* and *neagra* (including ssp. *albimarginata* and *hypochrysis*) are found in Papua. Parsons treated all taxa as subspecies of *niepelti*, except *meeki* which is sympatric with *niepelti* in SE PNG. See below: *meeki* complex.

D. gabia zerate [sic!] Grose-Smith, 1900
<Homonym> *dicefulvoflava* Rothschild, 1916 [should be *dice fulvoflava*].
It is not clear whether the name *(dice) fulvoflava* was previously used for another (sub)species.

D. argenthona insularis Rothschild, 1925
<Infraction> *balli* Hulstaert, 1923
Yagishita erroneously considered the senior name *balli* as an infraction of the junior *insularis*. Parsons mentioned *insularis* Rothschild, 1915 (should be 1925) from Daru Island as synonym based on Talbot, 1937 (p. 578).

Revisions by Parsons (1999)

The taxonomic revisions of *Delias* by Parsons (1999) are listed below

arovana* Fruhstorfer, 1913 ♀ **syn. nov.	for *D. aruna inferna* Butler, 1871
irma Fruhstorfer, 1907 ♂ **syn. nov.**	for *D. aruna inferna* Butler, 1871
Delias cyclosticha Roepke, 1955 **stat. nov.**	
pseudoiltis* Okana, 1989 **syn. nov.	for *D. iltis leucotera* Talbot, 1937
kerowagiensis* Yagishita, 1993 **syn. nov.	for *D. hapalina hapalina* Jordan, [1912]
sayuriae* Okana, 1989 **syn. nov.	for *D. weiskei* Ribbe, 1900

maria Talbot, 1937 **syn. nov.**	for *D. campbelli campbelli* Joicey & Talbot, 1922

Delias niepelti neagra Jordan, [1912] **stat. nov.**
Delias niepelti septentrionalis* Rothschild, 1915 **stat. nov.
Delias niepelti arfakensis Joicey & Talbot, 1922 **stat. nov.**
Delias niepelti albiplaga Talbot, 1929 **stat. nov.**
Delias niepelti hypochrysis Roepke, 1955 **stat. nov.**
Delias niepelti hypoxantha Roepke, 1955 **stat. nov.**
Delias niepelti anamesa* Bennett, 1956 **stat. nov.

excelsa* Jordan, 1930 **syn. nov.	for *D. mira mira* Rothschild, 1904
telefominensis Yagishita, 1993 **syn. nov.**	for *D. callima callima* Rothschild & Jordan, 1905
keysseri* Rothschild, 1925 **syn. nov.	for *D. nais nais* Jordan, [1912]
entima* Jordan, 1930 **syn. nov.	for *D. nais nais* Jordan, [1912]

Note: The taxa prefixed with an asterix (*) do not occur in Papua.

Apart from these formal revisions, Parsons commented on the following species without proposing changes to their recognised classification:

D. sagessa (p. 305): "From a study of various specimens (RML, BMNH) the taxon *abrophora* Roepke, 1955, from the Wissel Lakes (Weyland Mountains, Irian Jaya) it is clear that this represents a race of *sagessa* as Toxopeus (manuscript) had intended to treat it, not a distinct species as Roepke (1955) finally assumed when he published the name...However, the latter 3 taxa (*anjae* Schröder, 1997, *straatmani* Schröder, 1997 and *sinak* Van Mastrigt, 1990 – author) are of doubtful subspecific status in relation to typical *sagessa*, and none of them are presently known to be sympatric."

D. leucias (p. 315): "Only *leucias huonensis* (type from Rawlinson Mts, inland Huon Gulf" is present in PNG... D'Abrera (1978)... incorrectly synonymized ssp. *huonenesis* with nominate *leucias*."

D. nais (p. 321): "The taxon *maprikensis* Yagishita (in Yagishita *et al.*, 1993) was described as a new race of *nais* from a single ♂ collected in 1974, supposedly from Maprik (ESP). Its origin and therefore exact status is unclear. It is likely that the name will eventually have to be treated as a synonym of nominate *nais*." (p. 322): "Ssp. *nais* is extremely variable. Intergrades occur between the distinctive white-striped *nais* from Kundiawa (ChP) and the normal form of *nais*. The HW und white vein character appears to occur sporadically in populations other than in that of '*zebra*'... From a study of the above-mentioned white-striped *nais* form it is likely that the supposed species, *Delias zebra* Roepke, 1955, from the Ibele Valley, Snow Mountains, Irian Jaya, is merely a race of *nais*. This is further endorsed by the fact that Roepke also described f. *reducta* of *zebra* ...; also that neither *zebra or reducta* were found to be sympatric with *nais*..."

Discussion

In the light of these revisions and comments, some taxa or taxa groups deserve further attention, particularly where the opinions of Yagishita (1993) and Parsons (1999) are not in harmony.

sagessa Fruhstorfer, 1910, *abrophora* Roepke, 1955 and *sinak* Van Mastrigt, 1990

The three closely related species and two subspecies - *D. sagessa anjae* from the Arfak Mountains and *D. sagessa straatmani* from Telefomin, published by Schröder in 1977 – have a confused taxonomic history.
D'Abrera (1970, 1977, 1990), who had not seen any material, followed the decision of Roepke (1955) in treating *D. abrophora* as a distinct species and not that of Toxopeus in his manuscript (*D. sagessa abrophora*) in Roepke (1955).
Van Mastrigt (1990) later described *D. sinak* from the central mountain area around Sinak. In appearance this species is closer to *sagessa* than to *abrophora*, which surrounds its range.
Yagishita (1993) treated *abrophora* as distinct species, regarded *anjae* (= *dollyae* Schmitt, 1992 **syn. nov.**) and *straatmani* as subspecies of *D. sagessa* and re-classified *sinak* as *D. sagessa sinak* **stat. nov.**
Van Mastrigt (1996b) added *D. abrophora bugebu* from the Homeyo area (east from Lake Paniai) and *D. abrophora okbibab* from Okbibab in the Star Mountains.
The reduced yellow area on the underside of hindwing with a broad black border with small red spots and the reduced red spot at the bottom of the yellow area are characteristic features of *sagessa* and *sinak*, while *abrophora* has a broader yellow area with a white band between yellow area and reduced black border, bearing larger red spots surrounded with a thin white line and a larger red spot at the bottom of the yellow area. This supports the following division: *D. sagessa sagessa* with *anjae* and *sinak* as subspecies and *D. abrophora abrophora* with *bugebu*, *okbibab* and *straatmani* as subspecies.
On a map of New Guinea, *sagessa* is found in the far west (Arfak Mts), in the east (middle and eastern part of PNG) and around Sinak in the middle of the central mountains in Papua. *D. abrophora* occurs in Paniai around the Wissel lakes, from Weyland Mountains to Homeyo, and as an isolated population in the Star Mountains, both at the western and the eastern side of the border (141° EL).The hypothesis of Toxopeus (ms) and Parsons (1999) that *abrophora* is a subspecies of *sagessa* would resolve the discontinuous distribution problem. However, it is premature to change the published classification of Yagishita until DNA results are available.

***paniaia* Roepke, 1955**

Roepke (1955) described *D. isocharis latiapicalis* var. *paniaia* based on nine males from the Arabu River which differ from *D. isocharis latiapicalis* by the smaller black anal area on the hindwing underside. Yagishita (1993) created *Delias paniaia* Roepke, 1955 **stat. nov.,** raising var. *paniaia* to species level and extending the known range to the Ilaga-Ilu-Mulia area, while adding a new subspecies *Delias paniaia strix* from the Kobowre (Weyland) Mountains and Moanemani. However, in 1992 Schmitt had previously published the taxon *Delias ibelana paniaia* (revised as *D. fascelis paniaia*) from the Paniai Lake area. Since the taxon *paniaia* is preoccupied by Schmitt's use, *strix* (a subspecies of *D. paniaia*) should be used as the new species name and the subspecies *paniaia* requires a new name. However, based on the strong individual and geographic variation found within *isocharis*, the author supports Roepke's opinion of *paniaia* as a variation of *isocharis* which is found from the Kobowre Mountains eastwards to the Star Mountains. So, *D. paniaia paniaia* **syn. nov.** and *D. paniaia strix* **syn. nov.** are considered synonyms of *D. isocharis latiapicalis*.

***fascelis* Jordan, [1912]**

Jordan (1912) described *Delias fascelis* from a series of both sexes collected by A.S. Meek on Mount Goliath. Talbot (1928, 1929, 1930) revised the status as *D. cuningputi fascelis* and Orr & Sibatani (1986) re-established *fascelis* at species level.
In 1922 Joicey & Talbot described *Delias cunningputi* [sic!] *citrona*,later in 1928 Talbot revised *citrona* to full species level. Roepke (1955) listed *citrona* as one of the subspecies of *cuningputi* and Orr & Sibatani followed Talbot and treated it as full species (with some doubts: "As the holotype is the only specimen it is not possible to say whether *citrona* represents a good species or an aberration of *fascelis*."). Van Mastrigt (2002) revised *citrona* as *D. fascelis citrona* with the synonymous taxa *D. citrona sagawaorum* Morita, 1996.
Roepke (1955) described *D. cuningputi ibelana* based on a large series of males and three females from Moss Forest Camp 2600-2700 m and Ibele Camp 2220-2300 m and mentioned in addition *jordani* Kenrick, 1909, *citrona* Joicey & Talbot, 1922 and an undescribed subspecies from the South side of the Carstensz, collected by Meek, as the three subspecies of *cuningputi* in Papua.
Schmitt (1992) described *D. ibelana paniaia* from a single male, recorded from Tuguwai, SE of Paniai Lake, at 2000-2100 m and *D. ibelana roepkei* from the Carstensz Mountains (one ♂), noting that the latter is surely is subspecies mentioned by Roepke (1955).
Van Mastrigt (1996) revised *D. ibelana paniaia* as *D. fascelis paniaia* and renamed *D. ibelana roepkei* as *D. fascelis amungme* as the name *roepkei* was pre-occupied by

D. mira roepkei Sanford & Bennett, 1955. He further described *D. fascelis korupun* from the environment of Korupun, located between the Baliem Valley and Mount Goliath. In 2002 van Mastrigt published an article on the taxonomy of the *Delias fascelis* subgroup in which he described a new, closely related species from the Star Mountains, *D. dortheysi*, recognized *fascelis* in the Star Mountains as *D. fascelis fascelis* and established the central mountain area from Homeyo in the west to the Baliem Valley (TL) as the range of *fascelis ibelana*. *D. citrona (fascelis) sagawaorum* Morita, 1996 from Timepa at the edge of the Weyland Mountains was not mentioned. The holotype and paratype male pictured by Morita show two nearly identical specimens; the only difference is the colour of the upperside of both wings which is cream to yellowish in the holotype and white in the paratype.This difference only underlines that individuals are variable in a given area and is not a reason for naming a second subspecies from a single area. Therefore *sagawaoarum* was proposed as a junior synonym of *citrona* in 2002.

The difference between *paniaia* in the Kamu Valley and around the lakes, and *ibelana* in the Baliem Valley, is most noticeable in three features: the black border on the upperside of hindwing in *paniaia* is reduced while in *ibelana* it is broader and nearly always comma-shaped; *paniaia* has the underside of forewing (nearly) totally black, while in *ibelana* about $^1/_3$ is white, sometimes with some greyish diffusion; on the underside of the hindwing of *paniaia* a large part is filled orange diffusion, which is yellow in *ibelana*.

However, defining boundaries between the various subspecies is not straight forward as the distinguishing features are not always geographically determined, as shown below.

The yellowish or creamy upperside (found in *citrona)* is sometimes present in *paniaia*, absent in *amungme*, but occassionally present in some *ibelana* from Homeyo. The broader and comma-shaped black border on upperside of hindwing (a feature of *ibelana*) is not present in *citrona* and *paniaia* but is always present in *amungme* and often (75%) found in the population from Homeyo; rare in the populations of Ilaga-Ilu-Mulia-Sinak (<10%) and increases again in Kanggime and Tiom ($^2/_3$) towards the Baliem Valley and Pass Valley. Specimens with a dark underside of the forewing are most often found in *amungme* become less frequent in *paniaia* and *citrona* and are absent eastwards to the Baliem Valley. The feature is present again in some *korupun* and common within *fascelis s. str.* The yellow diffusion on underside of hindwing (a feature of *ibelana*) is found in a single *citrona*, in a few specimens of *amungme* and is absent in specimens from Homeyo and the Ilaga-Ilu-Mulia-Sinak area. East of the Baliem and Pass Valley, specimens with a yellow diffusion are unusual an orange diffusion is common in Ilaga-Ilu-Mulia-Sinak specimens.

Varieties are found both in the central area of Ilaga-Ilu-Mulia-Sinak and in the Star Mountains but no boundaries can be firmly established between these possible new subspecies and the existing ones. Even the boundaries between the recognised subspecies are in nearly all cases uncertain.

frater Jordan, [1912] and *antara* Roepke, 1955

The status of *antara* as good species, established by Morinaka *et al.* (1991), is revised by Yagishita (1993) who treated *antara* as subspecies of *eichhorni*, as he also treated *far* Schröder & Treadaway, 1982 and *frater* Jordan, [1912] including *soror* Toxopeus, 1944.

Populations of this species at Korupun (close to Andreae River, TL of *soror*), Langda/Mount Goliath and the Star Mountains are closely related by a very reduced white area on upperside of forewing and the very thin dc bar on underside hindwing. The forewing upperside of the Korupun populations is $^1/_3$ or less white; in some specimens the dc is filled with grey (not black) which makes the dc-bar visible. The forewing upperside of the population of Mount Goliath and Langda is never totally black, but always less than $^1/_3$ filled with grey, sometimes some white. The upperside of the forewing in the Star Mountains population is in general somewhat darker than the Mount Goliath-Langda specimens.

The upperside of the forewing in *hagenensis* (from Mt Hagen in PNG) is black however and based on other features it is better associated with *eichhorni eichhorni* and *eichhorni kerowagi*. The single known specimen of subspecies *far* (from Tuguwai in Paniai district, where it is sympatric with *heliophora*) is problematic. The black forewing upperside, with two subapical spots, the quite thick dc-bar and well-developed terminal spots on underside of forewing, and the large white spots at the end of veins Cu_1 and Cu_2 on the underside of hindwing are more similar to *hagenensis* than to *frater*.

These observations, based on material in the KSP and illustrations and descriptions in literature, lead to the view that the correct classification of the species and subspecies in Papua is as follows:

D. antara antara Roepke, 1955 from the Baliem Valley and upwards;
D. antara solana Morinaka & Nakazawa, 1997 from Pass Valley;
D. frater soror Toxopeus, 1944, **stat. rev.** including the population of Korupun;
D. frater frater Jordan, [1912] from Mt Goliath and Langda to the Star Mts;
D. frater far Schröder & Treadaway, 1982 status retained until more material becomes available.

heliophora Roepke, 1955 & *muliensis* Morinaka, van Mastrigt & Sibatani, 1991 and *germana* Roepke, 1955

According to the historic literature, three closely related species are recognized: *D. heliophora* from montane areas between Lake Yamur and Paniai district, the Kobowre Mountains, Kamu Valley and Paniai district; *D. muliensis* from Mulia-Sinak-Ilu area and Ilaga and *D. germana* from the Baliem Valley. Material has recently become available from Homeyo, between Paniai district and Mulia-Sinak-Ilu area,

and from the vicinity of villages between Mulia-Sinak-Ilu and the Baliem Valley such as Kanggime and Tiom.
The male specimens from Homeyo appear closer to *heliophora* than to *muliensis* although typical features of *muliensis* are also present in some Homeyo specimens. At the western side of the *muliensis*-range the boundary is also not clear. One specimen from Ilu is similar to *germana*, while male specimens from Kanggime and Tiom can be divided into *muliensis* and *germana* with a few intermediates. In the KSP there are only three females (two from the Baliem Valley and one from Tiom) which are variable in appearance.
Based on a study series of 195 ♂♂ and 3 ♀♀, the author supports the classification as proposed by Yagishita (1993):
Delias germana germana Roepke, 1955
Delias germana muliensis Morinaka *et al.*, 1991
Delias germana heliophora Roepke, 1955.

luteola Roepke, 1955, *raymondi ogawai* Morita, 1996 and *miyashitai* Yagishita, 1993

Van Mastrigt (2012) reviewed the *callista-raymondi* complex and proposed the following classification:
D. raymondi **stat. nov.**
D. raymondi shirahatui **comb. nov.**
D. raymondi ogawai **comb. nov.**
D. callista miyashitai **comb. nov.**

D. callista raymondi was described from a single specimen with an unclear label: SW-Irian 2200 m., in April 1980 (R. Straatman leg.). On the same trip he collected *frater far* and *rileyi yofona* at 2200 and 2000 m in May, with labels including Wissel Lake data. After this trip he visited the author in Jayapura and mentioned that he had been in the Arfak Mountains and Paniai district where he visited Tuguwai, a favourite spot for *Ornithoptera* and *Delias*. The author is convinced that *yofona* and *far* were collected in the environment of Tuguwai in the Paniai Lake area and that *D. c. raymondi* originates from somewhere else, as it was collected in April (and not in May like the Tuguwai material) and does fit with the KSP material from Homeyo near the east end of Lake Paniai, the former Wissel Lake, where the appearance of specimens is close to *ogawai* Morita, 1996.
The TL of *ogawai*, 'Mount Waelang, Nabire', is dubious and appears to be a misspelling of Weyland Mts. Nabire is a small town at the coast with a low hilly environment and in the past the regional capital of 'Paniai Regency', a place where commercial dealers are based, and export material from the Kobowe Mts (the former Weylands) and other mountainous areas. The assumption that the holotype of *ogawai* originates from Weyland Mountains is now questionable as Homeyo is not situated in this mountain range, but located east of the Paniai Lake.

In the description, no reference is made to *raymondi*, suggesting that the author was unware of its earlier publication and supporting the view that *ogawai* is a junior synonym of *raymondi*. One of the difficulties in separating *raymondi* from *callista* is found in the females. The female of *D. raymondi s. str.* is similar to typical *callista* including ssp. *callipulchra* from Tembagapura, with broad black borders on the upperside of hindwing. The female from Homeyo have a strongly reduced black border similar to females in the most western areas of *callista*, which also have a red band on the underside of the hindwing. The unique female from Homeyo has a light red to orange band and differs therefore from all females. The yellow ground colour on the hindwing underside of males is very variable, from whitish yellow to yellow with orange scales.

ilagaensis Van Mastrigt, [1988] and *shounan* Yagishita, 1993

Yagishita (1993) made a curious decision in moving ssp. *ilagaensis* from *D. flavistriga* into *D. awongkor* and adding *shounan* as a new subspecies of *D. flavistriga*. The characteristic feature that separates *D. awongkor* from *D. flavistriga* is the the sulphur-yellow streak in cell 2A on the underside of hindwing (cfr. van Mastrigt, 1988), present in *flavistriga* but absent in *awongkor*. The subspecies *ilagaensis* differs from *D. flavistriga flavistriga* in having black lunulate border on the upperside of hindwing and a white basal mark enclosing a proximal yellow spot on the underside of hind wing. The sulphur-yellow streak when present is a specific feature of *D. flavistriga*. Therefore it is proposed to re-instate the previous position of *ilagaensis* as *D. flavistriga ilagaensis* **comb. rev.**
Within the large series of *D. flavistriga* ssp. from Ilaga in the KSP, no specimens are found with a red proximal spot in the white basal mark on the underside of hindwing and only a few with orange ones. From Ilu, the TL of *shounan,* about 60 km east of Ilaga and close to Kanggime and Tiom where *D. flavistriga* is common, a large series of specimens in the KSP show no significant or consistent differences from *flavistriga flavistriga* justifying a separation as a distinct subspecies. Accordingly it is proposed that *D. flavistriga shounan* is a **syn. nov.** of *D. flavistriga flavistriga*.

telefominensis Yagishita, 1993

Rothschild & Jordan, 1905 described, without an illustration, *D. callima* from the Angabunga River, a southern branch of the St. Joseph River, at 6000 ft. and upwards. Fruhstorfer (1910) *in* Seitz, 1927 provided a picture of the underside of a male, with a particularly thin brown-red subterminal line. D'Abrera (1971, 1977, 1990) pictured the underside of a male with a broader subterminal band (quite different from the illustration in Fruhstorfer) and a female, the forewing upperside of which is dark grey with well-developed yellow subapical spots. Jordan (1930) described *D. callima satura* , again without illustrations, based on two males from the west side of the Herzog Mountains,

Eddie Creek and Watut River, stating that the red markings of hindwing are much less bright but larger than in *D. c. callima,* and the discal band is also broader. Yagishita (1993) described *D. callima telefominensis,* based on a single specimen from Telefomin, West Sepik Province in PNG. Van Mastrigt (1996b) revised the status to *D. telefominensis* based on the type specimen, another male specimen from Telefomin, a male and a female from Abmisibil (western part of the Star Mountains) and a large series of males from Pass Valley, including *callima ayaminae* (Sakuma,1996) as syn. nov. Earlier in 1996, Sakuma had described *D. callima ayamiae,* based on two males from River Ameagi, Pass Valley. Parsons (1999) pictured three different undersides of males and the upperside and underside of a female of *D. callima satura,* (which have similarly sized black borders on upperside and underside as *D. callima callima).* Perhaps unaware of the two above mentioned articles of 1996, Parsons synonymized *telefominensis* (described from only one male) with nominotypical *satura,* claiming that its characters fall within the variation of *satura* thoughout western PNG. The author does not agree with Parsons, as the black borders on upperside of both wings are much more reduced than in *satura* and the female is distinguished on the upperside forewing by the presence of only three poorly developed yellow subapical dots in contrast to the very different females of *c. callima* and *c. satura*. For these reasons *telefominensis* is re-established as full species: *D. telefominensis* **stat. rev.**

***neagra* Jordan, [1912], *arfakensis* Joicey & Talbot, 1922, *albiplaga* Talbot, 1929, *hypochrysis* Roepke, 1955, and *hypoxantha* Roepke, 1955**

The revision of this group by Parsons (1999) recognized only two species in NG: *meeki* in SE PNG and *niepelti* ranging from the Arfak Mts to SE PNG, where it is sympatric with *meeki,* which differ in the shade of the upperside white areas – mauve blue in *meeki,* creamy in *niepelti*. Other features used to separate subspecies and species are highly variable and of debatable diagnostic value.
Recent phylogenetic study by Müller *et al.* has confirmed the presence of at least three separate species in this group: *D. meeki, D. niepelti* and *D. anamesa* (without resolving the taxa *arfakensis, hypoxantha, neagra, albimarginata* and *hypochrysis*), a result that is at odds with Parsons arrangement. Further studies are clearly needed to clarify this complex species (see van Mastrigt, 2011).

General discussion

A wide scale DNA-analysis of *Delias* has been started and results are expected in the near future, until this data is available it is unwise to propose major changes to taxonomy. However, it is still possible to clarify and compare previous publications in the light of new material and knowledge.

In a forthcoming third and last part, the author will review some other recent publications on *Delias* in Papua.

References

D'Abrera, B. 1971, 1977, 1990. Butterflies of the Australian Region, 1st, 2nd and 3rd [Revised] Edition: pp. 1416. Hill House, Melbourne & London (126-153).

Funahashi, Katsuyuki. 2010. A revision of *Delias nais* and *D. zebra* (Lepidoptera: Pieridae) on the island of New Guinea – Trans. lepid. Soc. Japan **60** (4) (March 15, 2010): 237-244.

Funahashi, Katsuyuki. 2012. A taxonomic review of *Delias aroae* species complex *s. str.* (Lepidoptera: Pieridae) belonging to New Guinea –Trans. lepid. Soc. Japan) **63** (1) (March 23, 2012): 1-17.

Joicey, J.J. & G. Talbot, [1927]. New Forms of Lepidoptera Rhopalocera – Encycl. ent., Série B III Lep. II (1926-1927, published at 31 Jan. 1927): *Delias*:®34.

Jordan, K. 1930a. Some new butterflies and moths from Eastern New Guinea Nov. Zool. **xxxv** (1930) 277-287 (277-279).

Morita, Sadayuki. 1996b. Five new subspecies of the genus *Delias* from Irian Jaya, INDONESIA (Lepidoptera Piedirae) - Wallace Vol. 2 (14 May 1996): 2-4, Pl. XIII: 2-10.

Morita, Sadayuki. 1996c. Note on the genus *Delias* Hübner from Irian Jaya, INDONESIA - Wallace Vol. 2 (14 May 1996): 7-8, Pl. XIII: 11-14.

Roepke, W. 1955. The Butterflies of the genus *Delias* Hübner (Lepidoptera) in Netherlands New Guinea Nova Guinea, Vol.6 (2): 185-260.

Rothschild, W. 1915b. On lepidoptera from the Islands of Ceram (Seram), Buru, Bali and Misol Nov. Zool. **xxii**:105-144 (*Delias* 109-111).

Rothschild, W. 1915c in: W. Rothschild and J. H. Durrant, Lepidoptera of the British Ornithologists' Union and Wollaston Expeditions in the snow mountains, southern Dutch New Guinea: 1168, pl. III. London, Hazell, Watson & Viney, Ltd.

Sakuma, Satoshi, 1996. A new subspecies of *Delìas callima* (Rothschild & Jordan) from Pass Valley, Wamena, Irian Jaya, Indonesia (Lepidoptera: Pieridae) – Futao No. 23 (Aug. 10, 1996): 4, Pl. 1: 1-2.

Schmitt, O. 1992a. Delias dollyae Nouvelle espece de Papouasie (Lepidoptera Pieridae) - Bull. Sciences Nat., France, 75 & 76 (Octobre 1992): p. 68, Pl. 10: 21-23).

Schmitt, O. 1992b. RÈvision de quelques *Delias* du groupe V: *geraldina* (Lepidoptera Pieridae) - Bull. Sciences Nat., France, 75 & 76 (Octobre 1992): 69-72, Pl. 10: 1-20, 24-25).

Schrˆder, H. 1977. Zwei neue Delias der sagessaGruppe aus Neuguinea (Lep., Pieridae) Ent. Z., Frankf.a.M. 87. Jahrg. (1. Dez. 1977), Nr. 23 (Stuttgart): 265-271.

Schrˆder, H. & C.G. Treadaway. 1982. Neue *Delias*Formen aus WestIrian, Neuguinea (Lep.: Pieridae) Ent. Z., Frankf.a.M. **92** (23), 1 Dec. 1982: 334-338.

Talbot, G. 1928-1937. A monograph of the Pierine Genus *Delias*, 1-6. John Bale, Sons & Danielson, Ltd., London. June 2nd, 1928-January 23rd 1937.

van Mastrigt, H.J.G. [1988]. Taxonomy of the *Delias mesoblema* subgroup from Irian Jaya (Lepidoptera Pieridae) – Ent. Ber., Amst. **49** (1), Jan. 1989: 814.

van Mastrigt, H., 1996a. Review on "An illustrated list of the Genus *Delias* Hübner of the World" (Lepidoptera: Pieridae) – NEN, Marktleuthen 38. Band (April 1996): 9-19.

van Mastrigt, H., 1996b. New species and subspecies of *Delias* Hübner, [1819] from the central mountain range of Irian Jaya, Indonesia (Lepidoptera: Pieridae) – NEN, Marktleuthen 38. Band (April 1996): 21-55.

van Mastrigt, H. 2000. A review of the *Delias clathrata* group from Irian Jaya and Papua New Guinea (Lepidoptera, Pieridae) – NEN, Marktleuthen, 48. Band (May 2000): 3-68; 72-93.

van Mastrigt, Henk, [2011]. The Butterflies of the Genus *Delias* Hübner (Lepidoptera: Pieridae) in the Baliem Valley – SUGAPA **5** (2), Oktober-Desember 2010 (11 Februari 2011): 37-70.

van Mastrigt, Henk, 2011. The Butterflies of the Genus *Delias* Hübner (Lepidoptera: Pieridae) in the Pass Valley – SUGAPA **5** (3), Januari-Maret 2011 (10 Maret 2011): 77-91.

van Mastrigt, Henk, 2012. Review of *Delias hypomelas* group on New Guinea (Lepidoptera: Pieridae) – SUGAPA **6** (3), Januari-Maret 2012 (16 April 2012): 70-98.

van Mastrigt, Henk, 2013. Revision os status of some *Delias* Hübner, 1819 (Lepidoptera: Pieridae) in Papua, Indonesia – SUGAPA **7** (3), Januari-Maret 2013 (20 Maret 2013): 60-71.

van Mastrigt, Henk & Chris Davenport, [2012]. Some notes on *Delias bornemanni-nais* complex on Papua and Papua New Guinea mainland (Lepidoptera: Pieridae) – SUGAPA **6** (2), Oktober-Desember 2011 (15 Februari 2012): 34-60.

Yagishita, A, S. Nakano & S. Morita. [1993a]. An illustratated list of the Genus *Delias* Hübner of the World <text>. i-xiv; 1-384.; <plates>. i-ix; 1-409; i-vi. Ed. Yasusuke Nishiyama; Khepera Publishers Singapore, Tokyo 1993.