

A new member of the *Ideopsis gaura* superspecies (Lepidoptera: Danainae) from the Foja Mountains, Papua, Indonesia

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Suara Serangga Papua 3(4): 1 – 19

Abstract: A new member of the *Ideopsis gaura* superspecies, *Ideopsis (Ideopsis) fojana* **sp. nov.**, from the Foja Mountains, Papua, Indonesia, is described. This new species is the most easterly representative of the superspecies yet discovered. Reasons for according this taxon status as a semispecies (rather than subspecies) within this taxonomically challenging group are discussed.

Ikhtisar: Satu anggota baru dari superspesies *Ideopsis gaura*, *Ideopsis (Ideopsis) fojana* **sp. nov.**, dari Pegunungan Foja, Papua, Indonesia, dipertelakan. Spesies baru ini merupakan perwakilan yang dijumpai paling timur di antara anggota superspesies yang telah dikenal sebelumnya. Alasan pemberian status semispecies dan bukan subspecies kepada takson ini diuraikan dalam makalah ini.

Keywords: Nymphalidae, milkweed butterflies, taxonomy, distribution, *Ideopsis fojana* new species, *Ideopsis vitrea*, subspecies.

Depositories

- BMNH - The Natural History Museum, London, U.K.
KSP - Koleksi Serangga Papua (Collection Papuan Insects) at Jayapura, Indonesia
MZB - Museum Zoologicum Bogoriense, Cibinong, Java, Indonesia
ZMAN - Zoologisch Museum Amsterdam, Netherlands

Introduction

The milkweed butterfly genus *Ideopsis* Horsfield, 1857 (type species: *Idea*? [sic] *gaura* Horsfield, 1829; generic synonyms are *Radena* Moore, 1880, *Gamana* Moore, 1883, and *Aianthis* Fruhstorfer, 1910), occurs from Sri Lanka to the Pacific, including southern China, the whole of Indonesia, New Guinea and the Solomon Islands--although it does not occur in Australia, New Caledonia or Vanuatu. Currently the genus is divided into two subgenera: *Radena* and *Ideopsis* sensu stricto. Subgenus *Radena* includes the *similis*-complex of three species and *I. oberthurii*. Subgenus *Ideopsis* (the *gaura* superspecies) includes four semispecies.

Subgenus *Radena* is represented in Papua by a single species, *I. juvena* (Cramer, 1777), which occurs all over the lowland areas. Talbot (1943) recognized the following subspecies for this taxon in Papua: *I. j. purpurata* (Butler, 1866) (Raja Ampat: Salawati, Waigeo, Misool), *I. j. bosnika* (Talbot, 1943) (Biak), *I. j. tanaïs* (Fruhstorfer, 1904) (Teluk Cenderawasih), *I. j. sobrina* (Boisduval, 1832) (distribution uncertain), *I. j. hollandia* (Talbot, 1943) (Jayapura area) and *I. j. kollerii* (Hulstaert, 1923) (Merauke). Subgenus *Ideopsis* (Map 1) is represented in Papua by three species: *I. vitrea* (Blanchard, 1853) in the Bird's Head region, with *I. v. uninuncta* Butler, 1865 (Gebe, Waigeo, Batanta), *I. v. onina* Talbot, 1940 (Fakfak area), *I. v. arfakensis* Fruhstorfer, 1898 (Arfak Mountains) and *I. v. serena* Joicey & Talbot, 1916 (Wondama Mountains) as subspecies; *I. hewitsonii* Kirsch, 1877, on the islands Supiori, Biak and Mioswar; and the new species described here, from the Foja Mountains.

As discussed by Forbes (1939), division of the *gaura* superspecies is problematic. The current separation into four semispecies is based on Talbot (1940) but--as pointed out by Ackery & Vane-Wright (1984: 37)--this arrangement has no particular claim to authority, and differs from Forbes (1939) division into four species, Hulstaert's (1931) system of five species, and Fruhstorfer's (1910) arrangement of seven species.

In this paper we describe a striking new member of the *gaura* superspecies (Fig. 1) from the isolated and until recently almost unknown 'lost world' (Beehler, 2006) of the Foja Mountains of Papua, Indonesia. As such, it represents the most eastern

element of the superspecies yet discovered. Given the difficulties of deciding species-rank in this group, our decision to accord this taxon species-level status is necessarily provisional. However, we believe there are good reasons for doing so, and present these in the concluding Discussion.

Characters of *Ideopsis sensu stricto*

Amongst the milkweed butterflies (Nymphalidae: Danaini; Ackery *et al.*, 1999), *Ideopsis (Ideopsis)* is recognised by the combination of adult characters listed below (the ciphers correspond to the system of Ackery & Vane-Wright, 1984). All of these characters can be confirmed for the new species, with the exception of 14 (female unknown) and, with respect to 20, it is uncertain if Sc + R₁ separate again beyond their confluence (no wing preparation made).

- 1 Paronychia and pulvilli of the pretarsus very small;
- 2 Tarsal claws straight;
- 6 Posterior margin of the male 8th sternite armed with spines;
- 14 Corpus bursae of female genitalia double;
- 18 Internal face of male genital valve folded and produced into a downwardly directed, pointed process;
- 19 Male hindwing vein 1A + 2A bordered with androconia along its entire length, no section of the vein being swollen;
- 20 Forewing with veins R₁ and Sc anastomosed for a short distance;
- 97 Vesica of penis smooth, lacking dorsal cornuti;
- 98 Uncus fused to socii;
- 99 Antennae clubbed.

In addition to these characters, Ackery & Vane-Wright (1984: 36) noted that the pale areas of the hindwing discal cell on the upperside are covered in broad, translucent scales in both sexes. Fruhstorfer (1910: 216) stated that, unlike subgenus *Radena*, *Ideopsis* s.s. has the upper hindwing discocellular vein (i.e., r-m) "longer than the others". He also noted sexual dimorphism in the antennae, with the male antennae more abruptly clubbed than the female, there being 8-9 expanded segments in males, but 10-11 in females. Fruhstorfer (loc. cit.) also pointed to differences within the group. The more eastern taxa (which he placed in *Aianthis* Fruhstorfer) have oval, compressed antennal clubs (instead of elongate and more

rounded in cross section), and the second forewing subcostal vein (i.e., R₂) arises before the apex of the discal cell, "so that there is a distinct upper discocellular" (as opposed to upper discocellular being absent). Talbot (1940), however, cast doubt on many of these additional distinctions claimed by Fruhstorfer--although there is undoubtedly some geographical variation in a number of characters in addition to the wing pattern differences (see Forbes, 1939).

The species of *Ideopsis* (*Ideopsis*) currently recognised

Ideopsis gaura (Horsfield, 1829) occurs from Malaya eastwards to the Philippines and Java, but it is not represented in the Lesser Sunda Islands, including Bali (Ackery & Vane-Wright, 1984). This butterfly has a notably *Idea*-like facies, with post-discal dark spots prominent on the hindwing. It is divisible into numerous subspecies. Fruhstorfer (1910) separated this group into two separate species: *I. gaura* on Java only, and *I. daos* Boisduval, from the Malay Peninsula, Sumatra, Java and the Philippines. Both Forbes (1939) and Talbot (1940) argued against this arrangement.

Ideopsis vitrea (Blanchard, 1853) replaces *I. gaura* (or *I. daos*, according to Fruhstorfer's scheme) eastwards from Borneo, including Sulawesi, but, like *I. gaura*, it does not occur in the Lesser Sunda Islands. Forewing cell M₃ is pale at the base, yellow markings are usually apparent, and the hindwing lacks discrete post-discal dark spots. Currently this species is divided into more than a dozen subspecies, including four from western New Guinea (Map 1).

Ideopsis klassika Martin, 1909, is considered to replace *I. vitrea* on Seram, where this monotypic taxon appears to be montane. Forewing cell M₃ is mostly dark at the base, and the antennal clubs of the males are particularly well-developed.

Ideopsis hewitsonii Kirsch, 1877, apparently described from Mioswar (Kirsch, 1877), not Biak as suggested by Ackery and Vane-Wright (1984: 189), is only known from the geologically very interesting islands of Biak, Supiori and Mioswar, in Cenderawasih Bay (Map 1). It has a unique pattern of broadly darkened veins on an otherwise purely white/translucent background. Even so, Fruhstorfer (1910: 218) regarded it as a subspecies of *I. inuncta*, otherwise known only from Waigeo and Batanta (Raja Ampat) and Gebe (N Maluku). This latter taxon is currently regarded as a subspecies of *I. vitrea*, a view accepted here.

Given the present classification, the only species to which this new taxon can usefully be compared are *I. vitrea* and *I. klassika*, of either of which it could possibly be a subspecies. Although the races of *I. vitrea*, as conceived by Talbot (1940), seem fairly well delineated, the more eastern subspecies have rarely been dealt with or illustrated in modern works. We therefore include a brief account of all races of

I. vitrea (sensu Talbot), and illustrate the four most easterly of them (Figs 2–8), together with *I. klassika* from Seram (Figs 9, 10) and *I. hewitsonii* from Biak (Figs 11, 12), to demonstrate how different the overall phenotype of the new species is compared with all hitherto known eastern populations of *Ideopsis* s.s. To make this assessment, access to the collections of the Natural History Museum, London (BMNH), has been essential.

The subspecies of *Ideopsis (Ideopsis) vitrea*

I. vitrea vitrea (Blanchard, 1853) (= *oenopia* Felder & Felder, 1859). N., C. and E. Sulawesi (over 150 individuals examined, of which *ca* 100 in BMNH, *ca* 50 in MZB). Hindwing strongly marked with clear yellow in both sexes. Illustrated by Morishita (1981: pl. 112, figs 1, 2, as *oenopia*). Note: the nominal taxon *Danais vitrea* was described in Blanchard's (1853) text as from the coast of New Guinea, although Java is given on the plate. Fruhstorfer (1910), however, considered that this butterfly came from Sulawesi, and re-examination of the original Blanchard image confirms that this must have been the case. This has caused confusion in the past, and as a result even Talbot (1940: 201) cited *vitrea* as a senior synonym of *arfakensis*—which it clearly is not. The name *vitrea* is correctly applied to a Sulawesi butterfly by Fruhstorfer (1910), in the Walter Rothschild Collection (BMNH), and in Ackery & Vane-Wright (1984), D'Abrera (1990) and Vane-Wright & de Jong (2003), but incorrectly applied to a New Guinea butterfly by Hulstaert (1931), in the "main collection" at the BMNH, and in Talbot (1940), D'Abrera (1971) and Morishita (1981). On Markku Savela's well-known website (<http://www.funet.fi/pub/sci/bio/life/intro.html>) the application of this name, perhaps understandably, is confused.

Danais vitrea Blanchard, 1853: 385, pl. 2, fig. 2. Described from at least two specimens (syntypes). Type locality: "[Collected by] Hombron et Jacquinot sur la côte de la Nouvelle-Guinée." [N. Sulawesi, following Fruhstorfer, 1910; see also above]. Type depository: probably MNHN Paris.

Danais oenopia Felder & Felder, 1859: 182, pl. 4 fig. 2. Described from at least one male specimen. Type locality: "Celebes." Type depository: supposedly in the Rothschild Collection (BMNH), but not definitely located there.

I. vitrea arachosia Fruhstorfer, 1910. S. Sulawesi (over 80 individuals examined, of which over 70 in BMNH, 10 in MZB). Very similar to *I. vitrea vitrea*, but the dark pattern of the hindwing is slightly more heavily marked, notably in cell CuA₁. However, this separation across Sulawesi as a whole is not totally convincing, and the variation may be clinal. Illustrated by Morishita (1981: pl. 111, fig. 17; pl. 112, figs 3, 4).

Ideopsis (Aianthis) vitrea arachosia Fruhstorfer, 1910: 217. Described from an unstated number of specimens collected (by implication) by H. Fruhstorfer. Type locality: "South Celebes ... waterfall of Maros." Type depository: BMNH.

I. vitrea ribbei Röber, 1887. Banggai (6 individuals examined in BMNH). Entirely pale-translucent and black, with a faint yellowish tinge, but without the bright yellow hindwing pattern elements seen in *v. vitrea* and *v. arachosia*. This race, which is very similar to but distinct from the next subspecies, is considerably smaller than *I. vitrea* from Sulawesi. This taxon, together with the next, was regarded by Fruhstorfer (1910: 218) as a separate species.

Ideopsis ribbei Röber, 1887: 186, pl. 8 fig. 4. Described from more than one male and more than one female specimens (syntypes), collected by H. Kühn. Type locality: "Bangkei". Original type depository: Karl Ribbe Collection. Several specimens labelled "Bangkei Kühn" in BMNH could be syntypes.

I. vitrea iza Fruhstorfer, 1898. Sula (42 individuals examined, of which 39 in BMNH, 3 in MZB). Similar to *I. v. ribbei*, but with marginal dark elements slightly more extensive. Illustrated by Morishita (1981: pl. 111, figs 18–21). Placed by Fruhstorfer (1910: 218) as a subspecies of *I. ribbei*.

Ideopsis inuncta iza Fruhstorfer, 1898: 258. Described from at least one male and one female specimens collected by W. Doherty in October and November 1897 (syntypes). Type locality: "Sula Mangoli". Type depository: BMNH.

I. vitrea chloris Felder & Felder, 1860 (= *salvini* Butler, 1866; *neleus* Fruhstorfer, 1904; and *morotaica* Fruhstorfer, 1913). Halmahera, Ternate, Morotai, Bachan, Buru (very doubtful: all supposed Buru material is probably from Morotai, including the single known syntype of *neleus*), Saparua (Rothschild Collection, BMNH, one specimen, which could represent an unnamed race, having the greenish-yellow areas slightly more extensive), Ambon (one plausible specimen in Zoological Museum Amsterdam, ex *Wertheim*, examined by RIVW). In total, over 80 individuals examined, of which over 75 in BMNH, 7 in MZB. All pale areas of both wings greenish-yellow. Illustrated by D'Abbrera (1990: 167). Fruhstorfer (1910: 217) considered that *neleus* and *obiana* represent separate subspecies (which they clearly do), and described *morotaica* as a separate race three years later. However, *neleus* was undoubtedly based on material from Morotai that was misinterpreted--we have seen no material of *I. vitrea* that has been unequivocally obtained from Buru, and it seems certain that the source of error is the same as that reported by Tennent & Rawlins (2008)--see note under *neleus* below. If *I. vitrea* occurs on Ambon and Saparua, it must be very rare there, possibly extinct, and may have occurred as a race weakly differentiated from *chloris*, being unlike *I. v. obiana* from Obi, or *I. klassika* from Seram.

Danais chloris Felder & Felder, 1860: 231. Described from one male and one female (syntypes), collected by A.R. Wallace. Type locality: "Batschian." Type depository: BMNH.

Danais salvini Butler, 1866: 172–173, fig. 2. Described from at least one male and one female specimens (syntypes). Type locality: "Gilolo and Batchian." Type depository: BMNH.

Ideopsis vitrea neleus Fruhstorfer, 1904: 300. Described from at least one female specimen (syntype). Type locality: "Insel Buru." [Morotai]. Listed by Talbot (1923: 22) as *I. vitrea "nebis"* from Buru, and by Talbot (1923: 111) as *I. vitrea "nebus"*. The only known type specimen bears the data "Neu-Guinea, Miro Nov. 98, ex coll. Fruhstorfer", and it is now well documented that Fruhstorfer's "Miro" does not relate to Buru, but to Mira, a locality on Morotai (Tennent & Rawlins, 2008: 77). Type depository: BMNH.

Ideopsis vitrea morotaica Fruhstorfer, 1913: 91–92. Described from an unstated number of specimens, collected by von Plassen, with the "Type in Kollektion Fruhstorfer" (female holotype). Type locality: "Morotai". Type depository: BMNH.

I. vitrea obiana Fruhstorfer, 1903. Obi (over 75 individuals examined, of which over 60 in BMNH, 15 in MZB). Very similar to *I. v. chloris*, but greenish-yellow coloration distinctly brighter.

Ideopsis chloris obiana Fruhstorfer, 1903: 340. Described from unstated number of specimens of both sexes (syntypes). Type locality: "Insel Obi." Type depository: uncertain (material most probably among BMNH series but, as noted by Talbot, 1940: 201, no type material labelled by Fruhstorfer has been found, and it was not listed among Fruhstorfer's type material by Talbot, 1923).

I. vitrea inuncta Butler, 1865. Gebe, Waigeo, Batanta (= *phaestis* Felder & Felder, 1865). Over 50 individuals examined, of which over 50 in BMNH, 3 in MZB, 1 in KSP (from Batanta). Regarded by Fruhstorfer (1910: 218) as a separate species. Extensively pale-translucent, with yellowish tinge only at the base of the forewing. Illustrated by D'Abrera (1990: 167); Figs 7, 8.

Danais inuncta Butler, 1865: 481. Described from an unstated number of specimens. Type locality: "Waigiou." Type depository: BMNH.

Ideopsis phaestis Felder & Felder, 1865: 351, pl. 43, fig. 5. Described from at least one female, collected by A.R. Wallace (syntype), in Felder Collection. Type loc: "Ins. Waigiou." Type depository: BMNH.

I. vitrea arfakensis Fruhstorfer, 1898. Arfak (= *vitrea* according to various authors, but not Blanchard). Over 100 individuals examined, of which over 85 are in BMNH, 1 in MZB, 7 in ZMA, and 14 in KSP. Regarded by Fruhstorfer (1910: 217) as a race of *I. vitrea*, despite placing *inuncta* as a separate species. Pale areas of the hindwing almost entirely yellowish (unlike true *vitrea*, in which the hindwing discal cell is

pale-translucent); forewing variably yellowish to pale, translucent. Illustrated by D'Abbrera (1990: 167); Figs 5, 6.

Ideopsis vitrea arfakensis Fruhstorfer, 1898: 257. Described from a single male (holotype) collected by Vraz. Type loc: "Hattam, Arfak, Holl. Neu-Guinea." Type depository: BMNH.

I. vitrea onina Talbot, 1940. Onin Peninsula (9 individuals examined in BMNH, 2 in KSP). Described by Talbot (1940: 201) as "Somewhat intermediate between *ribbei* and *inuncta*." Figs 3, 4.

Ideopsis vitrea onina Talbot, 1940: 201. Described from at least two specimens, representing both sexes, without designation of a holotype (syntypes). Type locality: "Dutch New Guinea, Onin Peninsula, two days north of Fak Fak, 1700 feet, i.-ii.1908 (A.E. Pratt), 1 male, id., xii.1907, 1 female (ex Coll. Adams)." Type depository: BMNH.

I. vitrea serena Joicey & Talbot, 1916. Wondama Mts. Talbot (1940) noted that he had only seen four females, including the "type"--to which we can only add knowledge of one additional female in KSP (from Wondiboy). Similar to *I. v. arfakensis*, but brighter, the hindwing discal cell pure yellow, without any indication of dark scales running along the obsolete median veins normally visible in *arfakensis*. It can also be compared with *I. v. inuncta*, to which it is also very similar except the yellow hindwing. Illustrated in Fig. 2.

Ideopsis vitrea serena Joicey & Talbot, 1916: 73. Described from four females, without designation of a holotype (syntypes), collected by A.C. & F. Pratt in November 1914. Type locality: "Wandammen Mts." Type depository: BMNH.

Ideopsis (Ideopsis) fojana Peggie, Vane-Wright & van Mastrigt **sp. nov.**

Map 1, Figs 1, 13–18

Based on a single male specimen from the Foja Mountains, Papua Province, Indonesian New Guinea.

Brief diagnosis: *I. fojana* has the following combination of characters (as listed in Ackery & Vane-Wright, 1984; see above): 1, 2, 6, 18, 19, 20, 97, 98, 99. This taxon (which may prove to be small: forewing length of unique specimen 36.5 mm) differs from all other known members of *Ideopsis* in having the post-discal area of the forewing upperside cells anterior to vein M3 entirely black, the whole wing apex being dark except for a series of five small and indistinct submarginal pale spots, one in each of the five cells from R4 to M3 (Fig. 1). Both wings lack paired marginal pale spots on the upperside. Antennae almost half length of forewing, and thus long relative to other *Ideopsis* species (forewing length/antennal length

ratio 2.1; other species fall in range 2.2–2.9), with very pronounced, compressed club, comparable to condition seen in *I. klassika* (character 99).

Type material and depository: Holotype male, Indonesia, Papua Province, Pegunungan Foja, Bog Camp, 1650 m, 02°34.5'S, 138°42.9'E, 6–27.xi.2008, CI/LIPI Survey, *H. v. Mastrigt*. KSP 58300. Condition of specimen: antennae, one foreleg, and one midleg on slide; one hindleg removed for subsequent DNA sequencing; male genitalia and abdomen in vial; right forewing damaged during examination. Holotype to be deposited in MZB: Entomology Laboratory, Zoological Division, Museum Zoologicum Bogoriense, Indonesian Institute of Sciences (LIPI), Cibinong, Indonesia.

Description

Head: coloration black, with two pairs of highly contrasting spots composed of white scales in the occipital area—one pair near the vertex, with the spots adjacent to the eyes, the second pair posterior to the rather indistinct chaetosemata. In addition there is a small median tuft of white hairs between the antennal bases, and a few white hairs and scales medially behind and adjacent to the eyes. Antennae 17.5 mm in length (forewing/antenna length ratio 2.1), black, naked (except for a few, short verticils per segment), tricarinate, flagellum with at least 47 segments, of which the terminal 10–11 are widened to form a very broad, flattened and conspicuous club (Fig. 13). In a macerated preparation, at its widest point in one plane, the club is at least twice as wide as the club is thick when viewed in the orthogonal plane; the maximum width of the club is *ca* 0.75 mm, approximately four times the width of the shaft (Fig. 13). In the dry state, however, the maximum width of the club appears to be up to eight or more times the width of the antennal shaft. Palpi black with scattered white hairs, curved around the eye and subequal in length to the eye height; third segment apparently short, approximately 0.8 mm in length (no preparation made). Eyes smooth with no evidence of interfacetal hairs (at x 20). Proboscis coiled in unique specimen, with one of the palpi passing through the coils in the state of rigor mortis (not dissected).

Thorax. Black, laterally with nine conspicuous white scale spots: one below each wing base, two above the metathoracic leg, three above the mesothoracic leg, and two smaller spots medially below the white forewing base spot; in addition, a large tuft of white hairs medially on the prothorax. Dorsum of prothorax with one or two small white scale-spots, but dorsum of meso and metathorax black, uniform with the dorsum of the abdomen.

Legs. Legs black, with a fine line of white scaling running along the femora. Foreleg (Fig. 14) *ca* 4.5 mm in length (femora 1.8 mm, tibia 1.9 mm, fused tarsi 0.9 mm).

Midleg (Fig. 15) *ca* 14.5 mm in total length (femora 5.0 mm, tibia 4.9 mm, first tarsus 1.8 mm, tarsi 2–5 subequal, combined length 2.9 mm; paired tibial spurs short, *ca* 0.3 mm; tarsal claws slightly curved, *ca* 0.65 mm. Hindleg similar, but not examined in detail.

Wings. Dorsal pattern as in Fig. 1. Major pattern differences from other taxa are indicated in the diagnosis (above). The principal forewing pale fasciae occur in cells M₃, CuA₁ and CuA₂, and on the hindwing in cells R₁, discal, M₃, CuA₁ and CuA₂. The ventral pattern is very similar to the upperside, with all the pale fasciae almost identical. However, there are a few small, additional submarginal and marginal pale spots, as follows: forewing M₂ has a very small, indistinct posterior marginal spot; forewing M₃ has an anterior and a posterior marginal spot, the anterior one being very small and indistinct; forewing CuA₁ has a very small submarginal and an equally small anterior marginal spot; hindwing R₅ has a distinct, round submarginal spot; hindwing M₁ has a pair of small pale marginal spots, and the submarginal spot is triangular, and larger than on the upperside; hindwing M₂ has a small posterior marginal spot, and the submarginal spot is large and ovoid; and hindwing M₃ has a very small posterior marginal spot. In addition, the hindwing underside has a conspicuous irregular-shaped patch of white scales in the basal, precostal cell. Forewing venation is essentially normal for the genus; R₁ diverges from R at an angle of 45° about 5 mm before the extreme end of discal cell, and anastomoses with Sc—but we cannot confirm whether or not the two veins separate again distally before running to the wing margin (Fig. 16). Hindwing venation also typical for the genus; a sketch of the discal cell (maximum length 14.5 mm, widest breadth 4.2 mm) is given in Fig. 17.

Abdomen. Total length 18 mm. Tergites and pleurae black. Entire venter grey, the sternites being clothed with a mixture of white and black scales. Paired hairpencils present, each some 4 mm in length, the hairs pale brown (in cleared preparation). Male genitalia relatively small, typical of genus, but the outline of the valve (Fig. 18), which is *ca* 1.95 mm in maximum height, and 1.75 mm from the vertex to the tip of the ventrally-directed process, differs somewhat from *I. klassika* (as illustrated by Ackery & Vane-Wright, 1984: 295, fig. 55) in that the process is relatively larger, arguably more similar to *I. vitrea* as illustrated by Morishita (1981: 514). However, insufficient dissections of *Ideopsis* have been made to interpret the small differences noted and illustrated, much of which may be due to individual variation.

In the key to *Ideopsis* given by Ackery & Vane-Wright (1984: 163), *I. fojana* will run to couplet 7 (separation of *I. vitrea* and *I. hewitsonii*), which section can be replaced with the following:

- 7(6) Forewing upperside cells M₁ and M₂ entirely black.....
**fojana** Peggie, Vane-Wright & van Mastrigt
- Forewing upperside cells M₁ and M₂ extensively pale.....8
- 8(7) Wing markings usually partially yellow, if completely white then hindwing
 veins only narrowly bordered with black**vitrea** (Blanchard)
- Wing markings white, hindwing veins broadly bordered with black.....
**hewitsonii** Kirsch

Discussion

As one might expect from its geography, *Ideopsis fojana* has characters in common with *I. vitrea*, *I. hewitsonii* and *I. klassika* and is thus, phenotypically at least, linked to this eastern group of three semispecies rather than the western *I. gaura*. Like *I. vitrea* and *I. hewitsonii*, it has the base of forewing cell M₃ almost entirely pale and, in this respect, it is unlike *I. klassika* from Seram, which has forewing cell M₃ extensively darkened at the base. Like *I. klassika*, however, the male has an especially pronounced club at the tip of the antenna which, until now, was considered to be an autapomorphic feature of *I. klassika*. Like *I. klassika* also, *I. fojana* has relatively very long antennae (forewing/antenna ratio 2.1 in the unique holotype; *ca* 2.3 in *I. klassika*; *ca* 2.45 in various races of *I. vitrea* including *arfakensis*; *ca* 2.5 in *I. gaura*; and *ca* 2.8 in *I. hewitsonii*), and on the upperside it similarly lacks paired marginal spots on both wings. These spots are conspicuous in all races of *I. vitrea*, and in *I. hewitsonii*. Unlike *I. klassika* however, *I. fojana* lacks all traces of the prominent anterior post-discal fascia of five pale spots that occupy forewing cells R₁, R₂, R₅, M₁ and M₂. In contrast, the hindwing of *I. fojana* is more extensively pale than that of *I. klassika*, notably in that the pale area of the discal cell broadly extends across the whole of the base of cells M₃, CuA₁ and CuA₂, fusing with the potentially discrete post-discal pale spots found in M₃ and CuA₁, to form a major pale fascia. Unlike *I. vitrea* and *I. hewitsonii*, cell CuA₂ in *I. fojana* is not pale from its base virtually to the wing margin, but is entirely dark over its outer third. Finally, it is notable that the entirely pale base to hindwing cell M₃ is comparable to the condition seen in *I. hewitsonii* and *I. vitrea arfakensis*, but this does not correspond to *I. klassika*, in which the base of this cell is entirely darkened.

Taking into account this mixture of features seen in *I. vitrea*, *I. hewitsonii* and *I. klassika*, coupled with the unique characters of its wing pattern, we consider that, in the present state of *Ideopsis* taxonomy, it is best to regard *fojana* as a fifth semispecies of the *gaura* superspecies--and thereby, for the purposes of formal nomenclature, it is proposed with species rather than subspecies rank. We consider

this justified on the basis that, were we to accord the new taxon subspecies rank, we would either have to regard it as a second but highly disjunct race of *I. klassika* (linked by the relatively long antennae, large antennal clubs, and montane habitat, but separated by some 800 km distance and several races of *I. vitrea*), or regard it as a race of *I. vitrea* (but then have to explain away the convergent characters with *I. klassika*, and its divergent characters from all other *I. vitrea* races). It could also be supposed that *fojana* might be a second race of *I. hewitsonii*, being separated by about only 200 km, even less than the nearest known *I. vitrea* populations in the Bird's Head region--but then the marked character discordance between *fojana* and *I. hewitsonii* would have to be explained away instead (notably, *fojana* having relatively the longest antennae, and *I. hewitsonii* the shortest). For all these reasons, we propose *I. fojana* with specific rank, tentatively suggesting that it is the sister species of *I. klassika*.

Acknowledgements

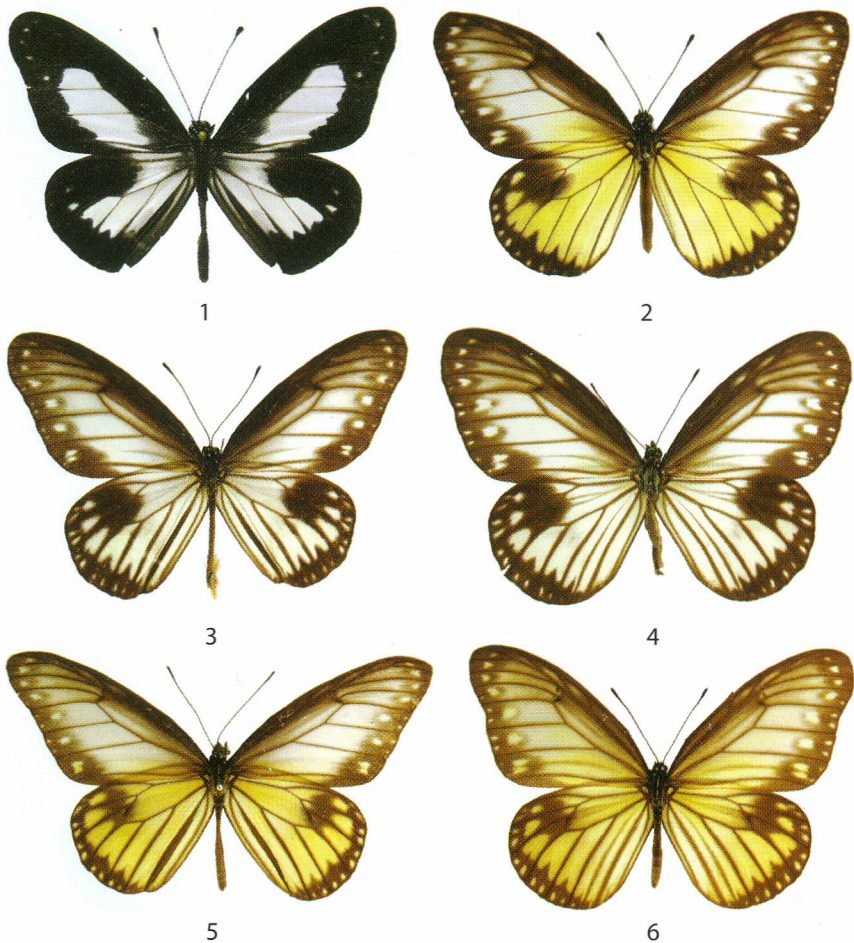
We thank Blanca Huertas for access to the collections of the Natural History Museum (BMNH), London. Michael Boppré very kindly originated Figs 2-12. Henk is very thankful to Conservation International for the opportunity given to join the second CI-LIPI expedition to the Foja Mts. Also thanks to the members of the team and the local people, especially Mr. Wimpie who assisted in the field. Carla Penz reviewed the MS and provided useful suggestions. John Tennent and Ian Kitching kindly read the MS. We are grateful to Goulven Keineg of the NHM Entomology Library for his help with checking the publication date of Fruhstorfer 1898.

Literature

- Ackery, P.R. and Vane-Wright, R.I. 1984. *Milkweed Butterflies: Their Cladistics and Biology*. Cornell University Press, New York; 425 pp.
- Ackery, P.R., de Jong, R. and Vane-Wright, R.I. 1999. The butterflies: Hedyloidea, Hesperioidea and Papilionoidea. In: Kristensen, N.P. (ed.), *Lepidoptera, Moths and Butterflies, Handbook of Zoology*, **4**(35), pp. 263–300. Walter de Gruyter, Berlin.
- Beehler, B.M. 2006. The lost world. *Living Bird* **25**(3): 14–24.
- Blanchard, É. 1853. Description des insectes. In: Hombron, J.B. & Jacquinot, H. (eds.), *Voyage au Pole Sud et dans l'Océanie sur les corvettes l'Astrolabe et la Zélée* (Zoologie) **4**(1): iv + 422 pp. Gide & Baudry, Paris.
- Butler, A.G. 1865. Descriptions of the characters of six new species of rhopalocerous Lepidoptera in the collection of the British Museum, with notes on the allied species. *Proceedings of the Zoological Society of London* **1865**: 481–486.

- Butler, A.G. 1866. Supplement to a monograph of the genus *Danais*, founded on specimens in the collection of Mr. Osbert Salvin. *Proceedings of the Zoological Society of London* **1866**: 171–175.
- D'Abrera, B. 1971. *Butterflies of the Australian Region*. Lansdowne, Melbourne; 415 pp.
- D'Abrera, B. 1990. *Butterflies of the Australian Region* (3rd edn). Hill House, Melbourne and London; 416 pp.
- Felder, C. & Felder, R. 1859. Lepidopterologische Fragmente. *Wiener Entomologische Monatschrift* **3**: 178–186.
- Felder, C. & Felder, R. 1860. Lepidopterologische Fragmente (VI.). *Wiener Entomologische Monatschrift* **4**: 225–251.
- Felder, C. & Felder, R. 1865. Lepidoptera Rhopalocera, Heft 2. *Reise der Österreichischen Fregatte Novara*, Zoologischer Theil, Band 2, Abtheilung 2: Lepidoptera. Rhopalocera (Heft 2): 137–378, pls. 22–47. Kaiserlich-Königlichen Hof- und Staatsdruckerei, & Carl Gerold's Sohn, Wien.
- Forbes, W.T.M. 1939. Revisional notes on the Danainae (Lepidoptera). *Entomologica Americana*, Lancaster, Pa. (N.S.) **19**(2): 101–140.
- Fruhstorfer, H. 1898. Uebersicht der bekannten *Ideopsis* und Beschreibung neuer Localracen. *Stettiner Entomologische Zeitung* **59**: 257–263.
- Fruhstorfer, H. 1903. Neue Falter von der Insel Obi. *Insekten-Börse*, Leipzig **20**(44): 340.
- Fruhstorfer, H. 1904. Neue Rhopaloceren aus dem Malayischen Archipel. *Entomologische Meddelelser*, Kjøbenhavn (2) **2**: 291–332.
- Fruhstorfer, H. 1910–1911. Danaidae. In Seitz, A. (ed.), *Gross-Schmetterlinge der Erde*, Stuttgart (2) **9**, pp. 191–284, 13 pls. Fritz Lehmann, Stuttgart.
- Fruhstorfer, H. 1913. Neue indo-australische Rhopaloceren. *Entomologische Rundschau*, Stuttgart **30**: 91–92.
- Hulstaert, R.P.G. 1931. Lepidoptera Rhopalocera: Fam. Danaididae: Subfam. Danaidinae and Tellervinae. In: Wytzman, P. (ed.), *Genera Insectorum* (193): 215 pp., 6 pls. Louis Desmet-Verteneuil, Bruxelles.
- Joicey, J.J. & Talbot, G. 1916. New Lepidoptera from Dutch New Guinea. *Annals and Magazine of Natural History* (8) **17**: 68–90, 4 pls.
- Kirsch, T. 1877. Beitrag zur Kenntniss der Lepidopteren Fauna von New Guinea. *Mitteilungen aus dem K. Zoologischen Museum, Dresden* **1**: 103–134, 3 pls.
- Morishita, K. 1981. Danaidae. In: Tsukada, E. (ed.), *Butterflies of the South-East Asian Islands* **2**: 439–628, pls 85–162. Plapac, Tokyo.
- Röber, J. 1887. Neue Schmetterlinge aus Indien. *Correspondenz-blatt des Entomologischen Vereins "Iris"*, Dresden **1**(4): 185–202, 3 pls.

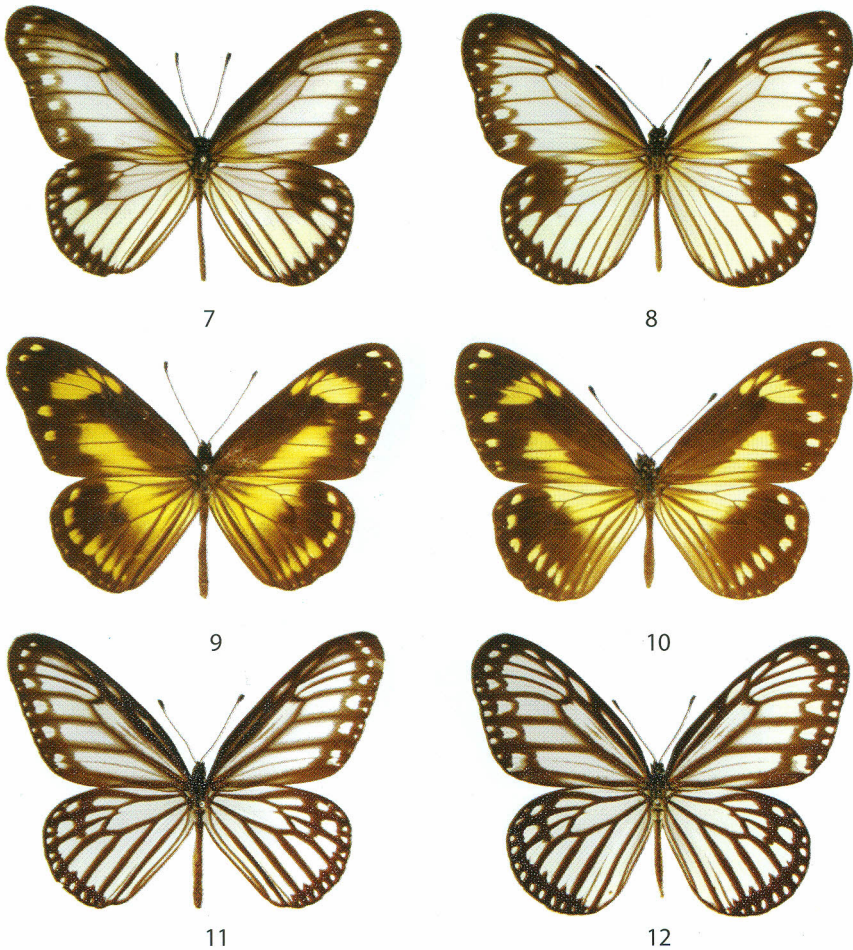
- Talbot, G. [1923] *The Fruhstorfer Collection of Butterflies. Catalogue of types with general account and list of the more interesting forms*. J. Gastaud, Nice, 8 + 135 + ix pp. [Note: see Tennent (2008) concerning the authorship of this sale catalogue.]
- Talbot, G. 1940. Revisional notes on the genus *Ideopsis* Moore (Lep. Rhop. Danaidae). *Proceedings of the Royal Entomological Society of London* (B) **9**(11): 197-202.
- Talbot, G. 1943. Revisional notes on the genus *Danaus* Kluk (Lep. Rhop. Danaidae). *Transactions of the Royal Entomological Society of London* **93**(1): 115-148.
- Tennent, J. 2008. Citation of the contents of The Fruhstorfer Collection of Butterflies: Catalogue of types with general account and list of the more interesting forms published in the 1920s. *Entomologist's Gazette* **59**(1): 41-53.
- Tennent, W.J. & Rawlins, A. 2008. A review of *Cethosia cydippe* (Linnaeus, 1767) (Lepidoptera: Nymphalidae) in the Moluccan islands. *Butterflies* (Teinopalpus) (49): 67-81.
- Vane-Wright, R.I. and de Jong, R. 2003. The butterflies of Sulawesi: annotated checklist for a critical island fauna. *Zoologische Verhandelingen* (343): 1-267.



Figs 1-6. Uppersides of *Ideopsis gaura* superspecies from eastern Indonesia.

All specimens, except *Ideopsis fojana* **sp. nov.**, in BMNH. All images brought to ca same size to facilitate comparison (rfw = right forewing length):

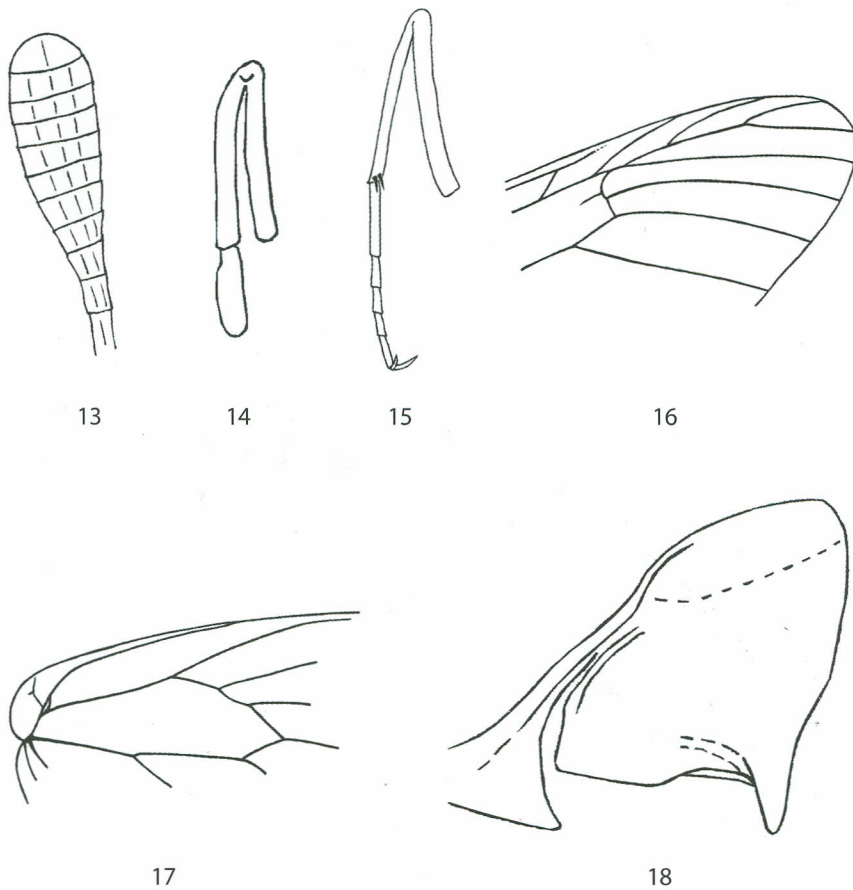
1. *I. fojana* **sp. nov.** HT ♂ (Pegunungan Foja, 1650 m, 6-27.ix.2008; rfw : 36.5 mm; KSP 58300);
2. *I. vitrea serena* ♀ (Wandammen Mts, 3-4000 ft, xi.1914, A.C. & F. Pratt; rfw 42.5 mm);
3. *I. vitrea onina* ♂ (Kapaur, low country, xi.1897, Doherty; rfw 40.0 mm);
4. *I. v. onina* ♀ (Kapaur, low country, i.1897, Doherty; rfw 43.8 mm);
5. *I. vitrea arfakensis* ♂ (Momi River, iii.1914, A.C. & F. Pratt; rfw 43.7 mm);
6. *I. v. arfakensis* ♀ (Momi River, iii.1914, A.C. & F. Pratt; rfw 45.9 mm).



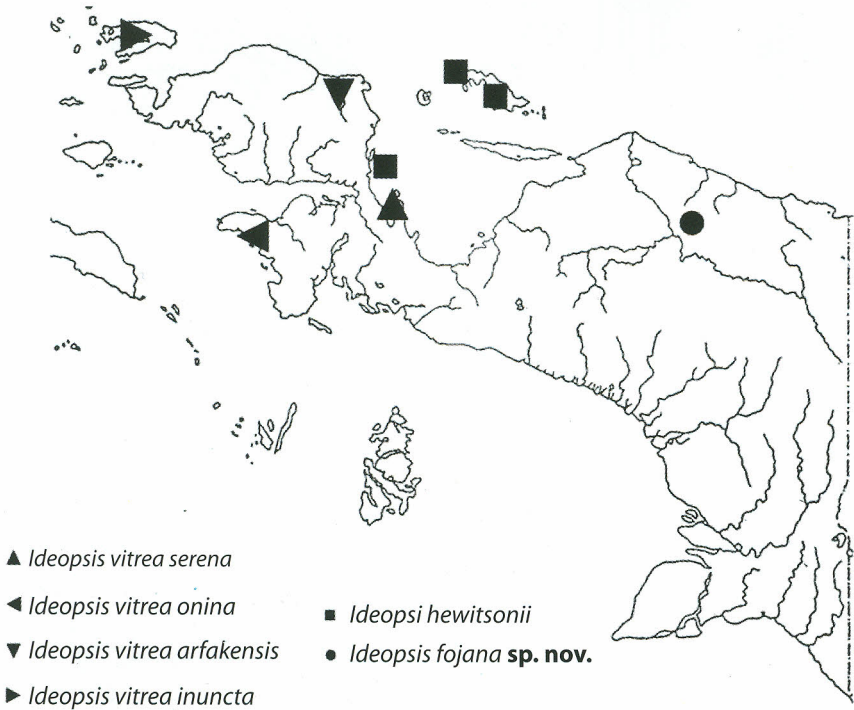
Figs 7-12. Uppersides of *Ideopsis gaura* superspecies from eastern Indonesia (continued).

All specimens in BMNH. All images brought to *ca* same size to facilitate comparison:

- 7. *I. vitrea inuncta* ♂ (Waigeu, iv.-v.1915, A.C. & F. Pratt; rfw 41.3 mm);
- 8. *I. v. inuncta* ♀ (Waigeou, 1904, ex J. Waterstradt; rfw 45.2 mm);
- 9. *I. klassika* ♂ (Mansuela, 3000 ft, x-xi.1919, C.F. & J. Pratt; rfw 44.0 mm);
- 10. *I. klassika* ♀ (Mansela, 650 m, 1912, E. Stresemann; rfw 49.5 mm);
- 11. *I. hewitsonii* ♂ (Biak, vi.1914, ex Joicey Bequest; rfw 48.3 mm);
- 12. *I. hewitsonii* ♀ (Bosnik, v-vi.1914, A.C. & F. Pratt; rfw 49.0 mm).



Figs 13-18. *I. fojana* sp. nov. HT ♂. Outline diagrams of various adult structures (not to scale): 13. Antennal club; 14. Foreleg; 15. Midleg; 16. Forewing radial venation; 17. Hindwing discal cell; 18. Outline sketch of male genital valve.



Map 1. Distribution of *Ideopsis (Ideopsis) gaura* superspecies in New Guinea. Members of this superspecies are not known from Papua New Guinea. The new species from the Foja Mts. is the most easterly representative of the superspecies yet discovered.