

NOTES ON THE TAXONOMY AND DISTRIBUTION OF INDO-AUSTRALIAN PAPILIONIDAE (LEPIDOPTERA)

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Abstract

Notes are presented on: (i) the type locality of *Princeps albinus* (Wallace), (ii) the subspecies and synonymy of *P. pitmani* (Elwes & de Niceville) and *P. hipponous* (C. & R. Felder), (iii) the populations of supposed *P. canopus* (Westwood) in the Solomon Islands and Vanuatu, (iv) the systematic position of *Graphium meeki* (Rothschild & Jordan), (v) the systematic position and synonymy of *G. mendana* (Godman & Salvin), and (vi) the occurrence of *G. macleayanum* (Leach) in Papua New Guinea.

Introduction

Additional information has become available since Hancock (1983a, b) went to press, enabling these papers to be updated and some taxonomic uncertainties relating to Indo-Australian Papilionidae to be resolved.

In a study of the *Papilio fuscus* group, Hancock (1983a) tentatively assigned the type locality of *P. albinus* Wallace to Humboldt Bay, and accorded species status to *P. pitmani* Elwes & de Niceville and *P. hypsicles* Hewitson. Two subspecies each were recognized in *P. pitmani* and *P. hipponous* C. & R. Felder. D'Abrera (1982), following earlier authors, included *P. pitmani* in *P. hipponous* and recognized five subspecies in the latter. Samson (1982) included *P. hypsicles* in *P. canopus* Westwood and described two new subspecies of the latter from the Solomon Islands and Vanuatu. Racheli & Haugum (1983) transferred *P. heringi* Niepelt to the *fuscus* group but Hancock (1983c) suggested that this species was a hybrid between *P. fuscus* Goeze and *P. tydeus* C. & R. Felder.

Hancock (1983b) revised the classification of the Papilionidae, splitting the genus *Papilio* Linnaeus into six genera and assigning all the species in the family into species-groups. Some of these species were assigned tentatively to groups, pending further information, particularly on the male genitalia. Miller & Miller (1981) have provided this information for *Graphium meeki* (Rothschild & Jordan) and *G. mendana* (Godamn & Salvin), and their systematic positions can now be resolved. In Hancock (1983b), *G. meeki* was provisionally included in the *agamemnon* group, whilst *G. mendana* was assigned to a group of its own.

This paper attempts to resolve the taxonomic uncertainties concerning *P. albinus*, *G. meeki* and *G. mendana*, and the disparities between the classifications of D'Abrera (1982) and Samson (1982) on the one hand, and of Hancock (1983a) on the other, for the taxa *P. pitmani*, *P. hipponous*, *P. hypsicles* and *P. canopus*. In addition, the occurrence of *Graphium macleayanum* (Leach) in Papua New Guinea is discussed. The status of *P. heringi* has been discussed by Hancock (1983c) and need not be commented upon further. All the species of *Papilio* mentioned above were transferred to *Princeps* Hübner by Hancock (1983b).

Type locality of *Princeps albinus* (Wallace)

Hancock (1983a) noted that the type locality of *Papilio albinus* Wallace was New Guinea, possibly Humboldt Bay. This was incorrect. Wallace (1865, p. 36), in his discussion of the Papilionidae of this region, referred to 'New Guinea' as a locality on several occasions but the only indications of more precise localities are given as 'Dorey' and 'south-west coast of New Guinea'. Although Dorey appears to have been Wallace's only landing in New Guinea, his collectors spent a month at Amberbaki, a coastal village approximately 160 km west of Dorey (Wallace 1869). *P. albinus* apparently was described from more than one male and, as Dorey was not listed as a specific locality (unlike other instances), it is likely that Wallace had specimens from both Dorey and Amberbaki, but not from Humboldt Bay. Dorey (= Manokwari), West Irian, is therefore selected as the type locality. Rothschild (1895) also recorded *albinus* from Dorey and Amberbaki, and added Sekar (Onin Peninsula, north of Fak Fak) and Humboldt Bay to the distribution.

Subspecies and synonymy in *Princeps pitmani* (Elwes & de Niceville) and *P. hipponous* (C. & R. Felder)

Both Jordan (1908-10) and D'Abrera (1982) included *pitmani* and several other taxa as subspecies of *P. hipponous*. Hancock (1983a) recognized *pitmani* as a distinct species and accepted only two subspecies for each species. The synonymy and distribution of these subspecies are listed below:

Princeps pitmani pitmani (Elwes & de Niceville)

Papilio pitmani Elwes & de Niceville, 1886, *J. Asiat. Soc. Bengal* 54: 434. Type locality Tavoy (Tenasserim, S Burma).

Papilio hipponous pitmani Elwes & de Niceville; Jordan, 1909: 59.

Papilio hipponous siamensis Godfrey, 1916, *J. nat. Hist. Soc. Siam* 2: 110. Type locality Pak Jong, E Siam (= Thailand).

Recorded from S Burma and Thailand. The harpe has been illustrated by Racheli & Haugum (1983), who also recognized this species as distinct from *hipponous*.

Princeps pitmani duboisi (Vitalis de Salvaza)

Papilio hipponous duboisi Vitalis de Salvaza, 1921, *Faune ent. Indo-Chine* fr. 3: 12. Type locality Thado, Annam (= N Vietnam).

Papilio pitmani duboisi Vitalis de Salvaza; Hancock, 1983a: 65. Recorded from Vietnam. The type locality is Thado, Vinh Province, not Tao as previously noted (Hancock 1983a), this being the collector's name.

Princeps hipponous hipponous (C. & R. Felder)

Papilio hipponous C. & R. Felder, 1862, *Wien. ent. Monatsschr.* 6: 283. Type locality Luzon, Philippines.

Papilio hipponous bazilanus Fruhstorfer, 1899, *Berl. ent. Z.* 43: 420. Type locality Bazilan, Philippines; *syn. nov.*

Papilio pitmani leptosephus Fruhstorfer, 1909, *Ent. Z., Stuttgart* 22: 178. Type locality 'Assam', apparently erroneous; *syn. nov.*

Papilio hipponous leptosephus Fruhstorfer; Jordan, 1909: 59.

P. hipponous was described originally from Luzon and Mindanao but Felder & Felder (1865) re-described the species only from Luzon and this should therefore be regarded as the type locality. *P. h. bazilanus* was described from Bazilan I. but Fruhstorfer (1899) suggested that specimens from Palawan and Banguay (Banggi) also belonged with

this taxon. Jordan (1908-10) also included specimens from Mindanao and Bohol, whereas Fruhstorfer (1899) had referred specimens from these islands to typical *hipponous*, following Rothschild (1895). The species appears to be somewhat variable, perhaps clinically, and *bazilanus* does not appear to represent a distinct subspecies. *P. h. leptosephus* was described from Assam but Fruhstorfer (1909) doubted the locality. Jordan (1908-10) noted its similarity to *bazilanus* and the description suggests that it really did come from the Philippines.

Recorded from all the major islands of the Philippines (Luzon, Mindoro, Panay, Negros, Cebu, Bohol, Leyte, Samar, Mindanao, Bazilan, Palawan) and Banggi I.

Princeps hipponous lunifer (Rothschild)

Papilio hipponous lunifer Rothschild, 1894, *Novit. zool.* 1: 687. Type locality Sangir I.

Recorded from Sangir and Talaud Is, NE of Sulawesi, Indonesia.

**Populations of supposed *Princeps canopus* (Westwood)
in the Solomon Islands and Vanuatu**

Samson (1982) described and figured two new subspecies of *P. canopus* from San Cristobal, Solomon Islands and southern Vanuatu (New Hebrides). Hancock (1983a) regarded *P. hypsicles* from Vanuatu as a distinct species; thus the subspecies nomenclature in that species is as follows:

Princeps hypsicles hypsicles (Hewitson)

Papilio hypsicles Hewitson, 1868, *Exot. Butt.* 4: pl. 9, f. 29. Type locality New Hebrides (= Vanuatu).

Papilio canopus hypsicles Hewitson; Rothschild, 1895, *Novit. zool.* 2: 341.

Since two subspecies are now known to occur in Vanuatu, it seems advisable to restrict the type locality of the typical subspecies. Accordingly, Esperitu Santo is selected as the type locality. This subspecies occurs in northern and central Vanuatu (Esperitu Santo, Aoba, Malekula, Paama, Epi, Efate). *Micromelum* (Rutaceae) is an apparent larval foodplant (Samson 1982).

Princeps hypsicles burgessi (Samson); **comb. nov.**

Papilio canopus burgessi Samson, 1982, *Pacif. Ins.* 24: 230. Type locality Fatuna I., Vanuatu.

Recorded from southern Vanuatu (Fatuna, Erromango, Tanna, Aneityum). The larva has been recorded on *Citrus* (Samson 1982). This is a darker subspecies, with narrower pale bands and a blacker ground colour.

The status of the San Cristobal subspecies, *P. canopus cristobalensis* (Samson), is less clear. Described from a single female, it was separated from *P. fuscus xenophilus* (Mathew) on the basis of more clearly demarcated pale bands, that of the fore wing being straighter and yellower, than in the latter. However, since true *canopus* is not known from this region, it is unlikely that a subspecies attributable to it should occur on San Cristobal. *P. c. cristobalensis* does not have the more-or-less vertical fore wing band and narrow hind wing band characteristic of *P. hypsicles*, suggesting that it is not related to that species.

Since San Cristobal *P. fuscus xenophilus* is phenotypically close to *P. canopus* to begin with, it appears most likely that *cristobalensis* is merely a variety of *xenophilus*. In pattern details, the figure of *cristobalensis* (Samson 1982) agrees very closely with those of *xenophilus* illustrated by Racheli (1980). It should be noted that the curvature of the fore wing band is variable

in *P. fuscus capaneus* (Westwood), and presumably in other subspecies as well. It is also possible that the yellowing of the pale areas in *cristobalensis* has occurred post-mortem. This example emphasises that care should always be taken when describing a new taxon from a single specimen, especially when it occurs sympatrically with a closely related species. *P. canopus cristobalensis* is placed here as a new synonym of *P. fuscus xenophilus*, which Racheli (1980) considered to be restricted to Ugi and San Cristobal (type locality Ugi).

Systematic position of *Graphium meeki* (Rothschild & Jordan)

Hancock (1983b) placed *G. meeki* in the *agamemnon* group on pattern characters, no information on the male genitalia being available at the time of writing. Both male and female genitalia were described and figured by Miller & Miller (1981) and these confirm that *meeki* is related to *G. agamemnon* (Linnaeus) and *G. macfarlanei* (Butler). Male and female genitalia of the latter two species were figured by Saigusa, *et al.* (1977) and, especially in the female, show great similarities to *meeki*. Characters of wing shape, number of red spots on the underside of the hind wing, and male genitalia (particularly the aedeagus), show that *meeki* is more closely related to *macfarlanei* than to *agamemnon*, contrary to the arrangement of Saigusa *et al.* (1977). This is supported by zoogeographic evidence where *agamemnon*, *macfarlanei* and *meeki* appear to have originated in Sundaland, New Guinea and the Solomon Islands, respectively.

A distinctive feature of the male genitalia in all three species is the submarginal rows of well developed, inwardly pointing setae towards the posterior margin of the inner surface of the valva.

Two subspecies of *G. meeki* have been described. *G. m. meeki* occurs on Santa Isabel and *G. m. inexpectatus* J. & L. Miller occurs on Bougainville. Records from Choiseul (Racheli 1980) possibly belong to the latter subspecies. There is a female from Bougainville in the Australian National Insect Collection, Canberra.

The *agamemnon* species-group: systematic position and synonymy of *Graphium mendana* (Godman & Salvin)

Hancock (1983b) placed *G. mendana* in a monotypic group close to the *wallacei* group, and noted that available information suggested that the male genitalia were similar to *G. eurypylus* (Linnaeus), since Munroe (1961) had included *mendana* in his *eurypylus* group without any indication of uncertainty. However, the genitalia have been described and figured by Miller & Miller (1981), and it is evident that they are not of the *eurypylus* type. They are close to those of the *agamemnon* group, being reminiscent of *G. agamemnon* in many respects, particularly the curved aedeagus. The apical region of the valva is serrate in *agamemnon*, *macfarlanei*, *meeki* and *mendana*, whereas in the *wallacei* group this part of the valva is obscured by an expansion of the harpe. The *wallacei* group appears to be closely related to the *agamemnon* group and to *mendana* in other characters and the similarities in structure between the harpes of the *wallacei* and *eurypylus* groups thus appear to be superficial.

Despite the great similarity between the aedeagi of *mendana* and *agamemnon*, the lack of the submarginal rows of inwardly directed setae on the valva of *mendana* suggests that it is not as closely related to *agamemnon*, *macfarlanei* and *meeki* as Saigusa *et al.* (1977) suggest. However, the overall similarities of the *agamemnon*, *mendana* and *wallacei* groups are now clear and I agree with Saigusa *et al.* (1977) that all these species should be placed in a single group.

The enlarged *agamemnon* species-group can be divided into three subgroups, viz: *agamemnon* subgroup—*agamemnon*, *macfarlanei*, *meeki*; *mendana* subgroup—*mendana*; *wallacei* subgroup—*wallacei* (Hewitson), *hicetaon* (Mathew), *browni* (Godman & Salvin). The *mendana* and *wallacei* subgroups are closely allied.

Four subspecies of *G. mendana* are recognized (Racheli 1980), viz: *G. m. mendana* from Guadalcanal, *G. m. neyra* (Rothschild) from New Georgia, *G. m. acous* (Ribbe) from Bougainville and *G. m. aureofasciatum* Racheli from Malaita. *G. mendana malaitae* J. & L. Miller, 1981, is a synonym of *G. m. aureofasciatum* Racheli, 1979.

The *agamemnon* species-group is closely related to the *sarpedon* group, which is also divisible into three subgroups, viz: *sarpedon* subgroup—*sarpedon* (Linnaeus), *monticolum* (Fruhstorfer), *cloanthus* (Westwood), *sumatranum* (Hagen), *sandawanum* Yamamoto; *codrus* subgroup—*codrus* (Cramer), *empedovana* (Corbet); *macleayanum* subgroup—*gelon* (Boisduval), *macleayanum* (Leach), *weiskei* (Ribbe), *stresemanni* (Rothschild), *batjanensis* Okano.

The occurrence of *Graphium macleayanum* (Leach) in Papua New Guinea

Sands & Fenner (1978) recorded two specimens of *G. macleayanum* from the Chimbu and West Sepik Provinces of Papua New Guinea. Whilst there is no doubt that these specimens were collected in the areas stated, some doubt does exist as to their origin, suggested by the following: The three mainland Australian—Tasmanian subspecies show a cline in pattern characters, with the northern race *wilsoni* Couchman having the fore wing basal areas mostly white and only suffused with green along the costa, and the postdiscal spots relatively small. The hind wing underside does not have the brown postdiscal band divided by a pale suffusion. In the southern (Tasmanian) race *moggana* Couchman, the fore wing basal areas are almost entirely green and the postdiscal spots are large. The hind wing shows strong pale suffusions in the brown postdiscal band. The typical race, from S Queensland to Victoria, is intermediate in these characters, with specimens from S Queensland and N New South Wales being a little closer to *wilsoni* in pattern than those from further south, especially in the extent of the green suffusion on the fore wing.

The Papua New Guinea specimens closely resemble those from these southern Queensland—northern New South Wales populations, not the northern *wilsoni* populations. They are not separable as a further subspecies, contrary to expectation on geographical grounds. The subspecies occurring

in Papua New Guinea thus appears to be typical *macleayanum* and supports the suggestion by resident lepidopterists (see Haugum & Samson 1980) that the species has been artificially introduced to the region.

G. macleayanum occurs alongside the closely related *G. weiskei* at its known localities in Papua New Guinea (Sands & Fenner 1978) and it will be interesting to see whether these populations of *macleayanum* become established or die out as a result of competition from *weiskei*.

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