A new species of *Altiapa* Parsons, 1986 from Papua New Guinea (Lepidoptera: Nymphalidae: Satyrinae)

[1]C. J. Müller & [2]W. J. Tennent

[1]Honorary Associate, Australian Museum, 6 College Street, Sydney, NSW 2010, Australia
[2] Scientific Associate, Department of Life Sciences, Terrestrial Vertebrates Division, the Natural History Museum, London SW7 5BD, England

Abstract: *Altiapa blancae* **n. sp.** is described from the Upper Sepik and Eastern Highlands Province, Papua New Guinea. Both sexes and the male genitalia are figured and compared with *Altiapa pandora* (Joicey & Talbot, 1916), with which the new species has previously been confused, and *A. decolor* (Rothschild & Jordan, 1905). *Altiapa pedaloidina* (Joicey, Noakes & Talbot, 1916) **rev. stat.** is reinstated as a distinct species.

INTRODUCTION

Altiapa was described by Parsons (1986) for a small number of species that were previously recognised within Rothschild & Jordan's (1905) Group C of *Platypthima* Rothschild & Jordan, 1905. Parsons (1986) designated *Platypthima decolor* Rothschild & Jordan, 1905 as the type species for his new genus *Altiapa*, which he implied exhibited a morphological relationship to *Hypocysta* Westwood & Hewitson, 1850. He considered *Altiapa* to be closely related to *Platypthima* and assigned it to the Hypocystini of Miller (1968). Parsons (1986) separated *Altiapa* from *Platypthima* based on differences in the antennal length, labial palpi, wing shape and venation, as well as male and female genitalia. Kodandaramaiah *et al*. (2010) showed that *Altiapa* was most closely related to *Hypocysta*, being recovered in a different subclade to that of *Platypthima*.

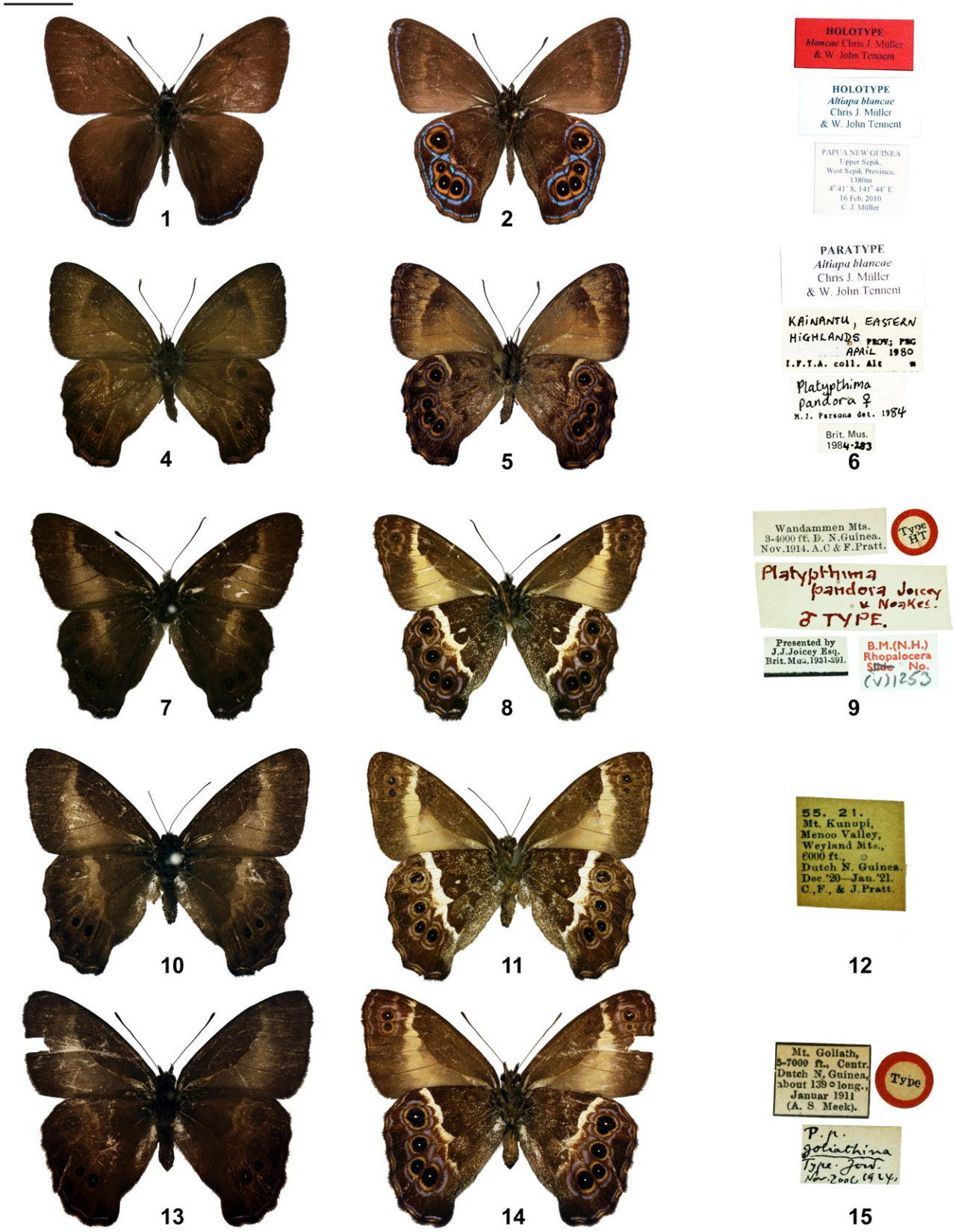
Parsons assigned the following taxa of *Platypthima* to *Altiapa*: *decolor*, *klossi* Rothschild & Durrant, 1915, *pandora* Joicey & Talbot, 1916, *goliathina* Jordan, 1924, *pedaloidina* Joicey, Noakes & Talbot, 1916, and *colorata* Nishizawa & Sibatani, 1984. All of these taxa are restricted in distribution to the main central cordillera on mainland New Guinea, with the last two endemic to the Arfak Mountains in Papua, Indonesia. Additionally, Tuzov (1997) described two species of *Altiapa*, *A. andreasi* Tuzov, 1997, and *A. aborigena* Tuzov, 1997, from the Bayliem River Valley, Papua, Indonesia. One of these, *A. aborigena*, appears to be very closely related to *A. klossi*. *Altiapa andreasi*, a very distinctive species, is represented by a long series of specimens without data in the Museum Zoologi Bogor (MZB), Indonesian Institute of Sciences (LIPI), Indonesia, collected by Toxopeus during the 1930s in what was formerly Irian Jaya.

Male *Altiapa* specimens were collected by the first author during an expedition to the Upper Sepik early in 2010. Based on comparison with the single, halved image of the underside of *A. pandora* figured by Parsons (1998: Plate 92, Fig. 2645), these males were initially identified as *Altiapa pandora*. However, subsequent examination of the type series of *A. pandora* in the Natural History Museum, London (BMNH), and other specimens in MZB, suggested that *A. pandora* is a completely different insect to the newly collected specimens from the Sepik and from that figured by Parsons and mistakenly identified as *A. pandora* (also in the BMNH). We regard the male specimens from the Sepik and the female figured by Parsons as representing the same, undescribed species, which is described here. The external facies and male genitalia of the new species are compared in detail with those of *A. pandora* and also *A. decolor*, both of which appear to be closely related to the new taxon.

MATERIALS AND METHODS

Type and other specimens were examined and/or deposited in the following institutions: Australian Museum, Sydney, Australia (AM), Australian National Insect Collection, Canberra, Australia (ANIC), the Natural History Museum, London, England (BMNH), McGuire Center for Lepidoptera and Biodiversity, Gainesville, Florida, USA (MGCL) and Museum Zoologi Bogor, Indonesia (MZB).

Adult specimens were photographed using a Nikon D300s Digital SLR Camera with a Nikon AF-S VR Micro-Nikkor 105 mm f/2.8G IFED Macro lens and Nikon R1C1 Close-up Kit Flashes Speedlights. RAW images were edited using Adobe Photoshop CS6. Editing included alignment, auto-contrasting and removal of background. A standardised procedure was followed with photography and image editing to ensure consistency of image output. Single genitalia for each taxon assessed were extracted following maceration of abdomens in 10% KOH at room temperature for 36 hours. Genitalia were photographed in glycerol using the same camera with a Meiji Techno EMZ-5TR-P-FOI Trinocular Stereozoom Microscope, with OPTEK FL95E Fibreoptic Illuminator and twin arm optical fibre. Individual sliced genitalia images were concatenated using the software Helicon Focus 6.0 and edited in Adobe Photoshop CS6. Plates were designed in Adobe InDesign CS6. Wing notation follows the numerical vein system (Corbet and Pendlebury, 1993).



Figs. 1–15. Adults of *Altiapa*. **Fig. 1**, *Altiapa blancae* n. sp., ♂ (Holotype), dorsal view; **Fig. 2**, *A. blancae* n. sp. ♂ (Holotype), ventral view; **Fig. 3**, *Altiapa blancae* n. sp. (Holotype), label data; **Fig. 4**, *A. blancae*; n. sp. ♀ (Paratype), dorsal view; **Fig. 5**, *A. blancae*; n. sp. ♀ (Paratype), ventral view; **Fig. 6**, *A. blancae*; n. sp. (Paratype), label data; **Fig. 7**, *A. p. pandora* (Holotype), dorsal view; **Fig. 8**, *A. p. pandora* (Holotype), ventral view; **Fig. 9**, *A. p. pandora* ♂ (Holotype), label data; **Fig. 10**, *A. p. pandora* ♀, dorsal view; **Fig. 11**, *A. p. pandora* ♀, ventral view; **Fig. 12**, *A. p. pandora* ♀ label data; **Fig. 13**, *A. p. goliathina* ♀ (Holotype), dorsal view; **Fig. 14**, *A. p. goliathina* ♀ (Holotype), ventral view; **Fig. 15**, *A. p. goliathina* (Holotype), label data. Scale bar = 10 mm.

RESULTS

Altiapa blancae Müller & Tennent, **new species** (Figs. 1 - 6, 31)

Altiapa pandora Parsons, 1998, Butterflies of Papua New Guinea. Their systematics and biology, p. 561 (partim), plate 92, fig. 2645 (misidentification)

Adult Description. *Male* (Figs. 1, 2). Forewing length 21.5 mm, antenna 10.5 mm (holotype). Head, labial palpus, antenna, thorax and legs dark brown.

Forewing apex rounded, inner margin bowed slightly near base. Dorsal forewing uniformly dark brown, without markings; cilia dark brown. Ventral forewing dark brown, with a scattering of light brown scales in postmedian area; an obscure wavy light brown postmedian band oblique to termen; termen bordered pale orange-brown; a narrow iridescent deep blue subterminal band, wider at apex (approximately 1.0 mm wide).

Hindwing elongated, inner margin bowed about two-thirds from base. Dorsal hindwing dark brown, a narrow iridescent deep blue subterminal band, widest at tornus (approximately 0.5 mm wide). Ventral hindwing dark brown, a scattering of light brown scales in median area and along inner margin; a series of three large spots in spaces 2, 3 and 4 and another large spot displaced towards base occupying space 6, each of these spots black with white centres and each series of spots connected by broad orange halo, rimmed with dark brown, both series of spots connected by a broad halo of iridescent blue, with obscure rim basally of light brown-cream scales; termen bordered light orange-brown; a narrow iridescent deep blue subterminal band (approximately 0.7 mm wide).

Male Genitalia (Fig. 31). Tegumen narrow, pronounced dorso-laterally, approximately 0.85 length of uncus, lateral margin concave. Uncus long and slightly arched, thicker near base and tapering to apically, apex rounded; brachia of gnathos long and nearly straight, with slight bump at one-third of length, slightly splayed outwards in dorsal view; valva long and narrow, ventro-laterally without indentations, apex with small upward facing point; aedeagus long and narrow, with triangular, pointed tip.

Female (Figs. 4, 5). Forewing length 20.0 mm, antenna 10.0 mm. Similar to male but with termen of wings more convex, inner margin nearly straight; iridescent deep blue markings on both wing surfaces less brilliant; postmedian band on ventral forewing more contrasting with ground colour; vestigial light cream narrow band (approximately 1 mm wide) basal of postmedian ocelli in space 6.

Types: HOLOTYPE ♂: **PAPUA NEW GUINEA**: labelled "Papua New Guinea, Upper Sepik, West Sepik Province, 1380m, 4°41'S, 141°44'E, 16 Feb, 2010, C. J. Müller"; deposited in BMNH.
PARATYPES (1♂, 1♀): **PAPUA NEW GUINEA**: 1♂ same data as holotype (MGCL). 1 ♀: labelled "Kainantu, Eastern Highlands Prov; PNG, April 1980, I.F.T.A. coll, Platypthima pandora ♀, M.J. Parsons det. 1984; Brit. Mus. 1984-283" (BMNH).

Type locality. Papua New Guinea: Upper Sepik, West Sepik Province (4°41'S, 141°44'E, 1380 m).

Etymology. The species is named for Blanca Huertas, Collections Manager at the BMNH, who maintains a particular interest in the systematics of Neotropical Satyrinae.

Distribution and phenology. The new species is known only from the northern part of the central cordillera, Papua New Guinea, from both the West Sepik and Eastern Highlands Provinces, at elevations from 1380 m to approximately 1600 m. It is noted that the average elevation of Kainantu, Eastern Highlands Province, is *ca.* 1575 m, although no elevation data accompany the paratype female specimen.

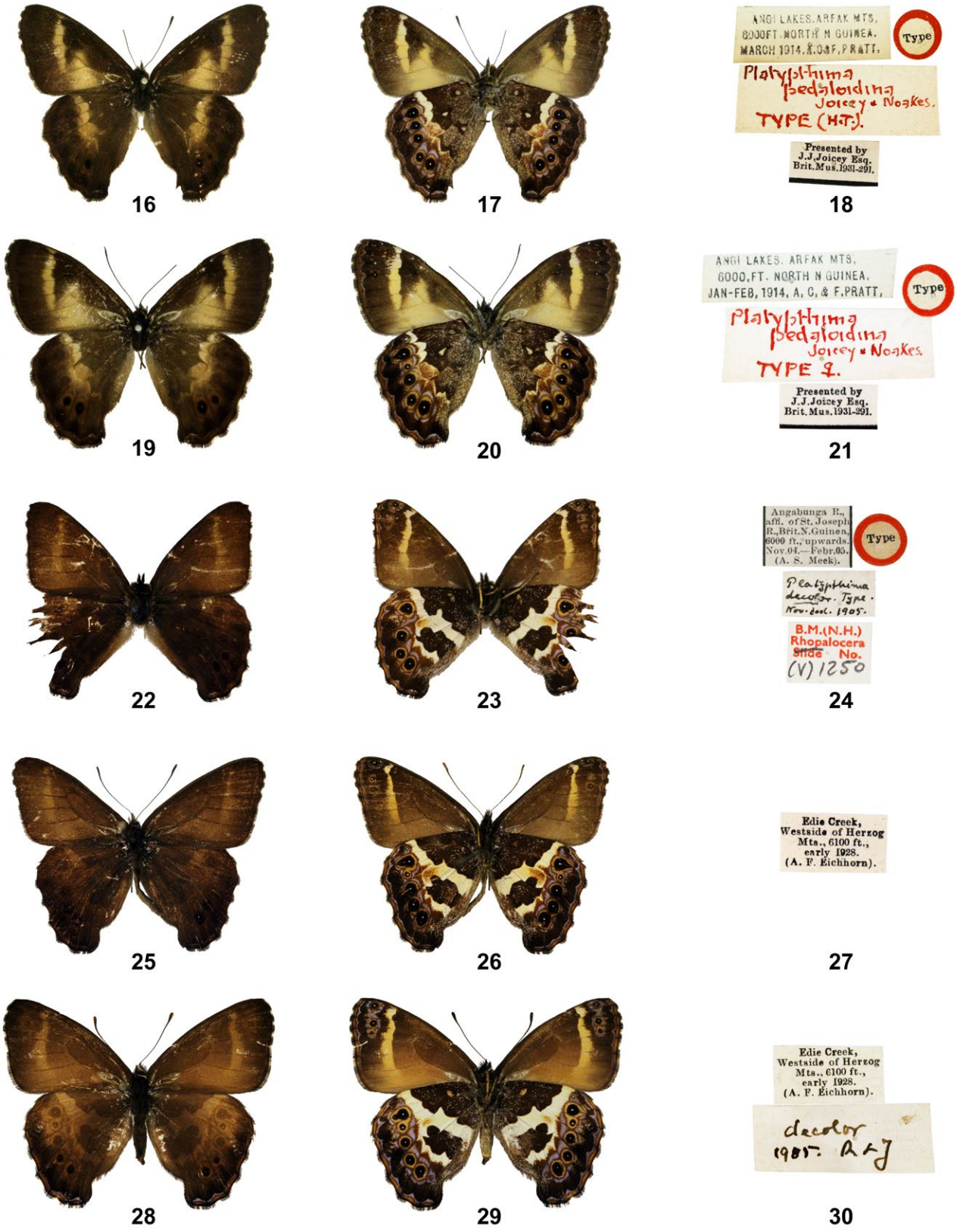
Diagnosis. The new species is considered to belong to the genus *Altiapa* based on the morphology of the male genitalia, in which the valvae bear pointed apical protrusions (Figs. 31a, b, c), and the shape of the aedeagus, which is triangular at its apex (Fig. 31d). The wing venation and configuration of ocelli on the hindwing underside in both sexes (Figs. 2, 5) also confirm association with *Altiapa*. However, *A. blancae* is unusual in that the forewing apex and termen lack the apparent serrations (created by darkened cilia at the extremity of the veins) of other *Altiapa* species, particularly in the male. The subterminal blue line on the forewing underside in *A. blancae* is prominent and linear (Figs. 2, 5), not sinuous as in other species. On the underside, the hindwing ocelli in spaces 2, 3 and 4 are fully encapsulated by a single orange bordering line, whereas in other *Altiapa* taxa the individual spots are enclosed with orange.

The male genitalia of *A. blancae* are distinctive, with a rounded tip to the uncus (Fig 31a), and very subdued points to the valvae. In both *A. pandora* and *A. decolor*, the uncus tip is sharply pointed downwards and the valvae bear prominent apical spikes. This is evidenced also in the line drawings of Parsons, who illustrated the genitalia of the holotype of *A. pandora* and a specimen of *A. decolor* from Nondugl, PNG, held in the ANIC (Parsons, 1986: p. 169, figs. 51, 52).

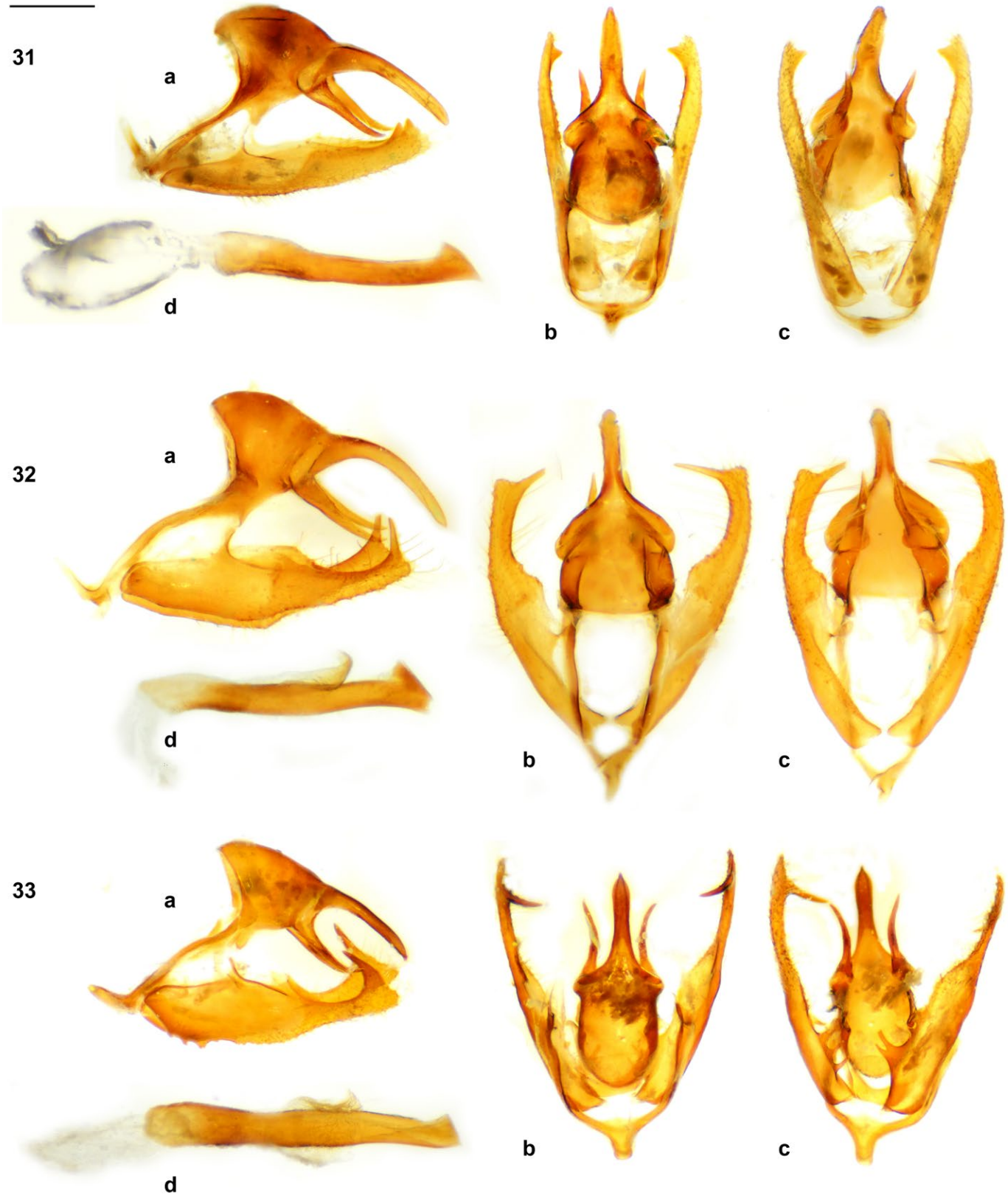
DISCUSSION

Altiapa blancae **n. sp.** is a distinctive species but was previously confused with *A. pandora* by Parsons (1998), who had only seen the paratype female which he wrongly identified as *A. pandora*. Comparison of the type series of *A. pandora* and the holotype female of subspecies *A. p. goliathensis* (Jordan, 1924) (Figs. 13 – 15) indicates that the female *A. 'pandora'* figured by Parsons (1998: plate 92, fig. 2645) is not that species. *Altiapa pandora goliathina* is very similar to *A. p. pandora* (Figs. 7 – 12), differing only in having a slightly narrower white median band in the area of the cell on the hindwing underside. The known localities for *A. pandora* are thus the Wandammen Mountains (type locality), Weyland Mountains and Mount Goliath, all in Papua, Indonesia. The taxon *A. pedaloidina* **rev. stat.** (Figs. 16 – 21) was described as a distinct species but was treated as a subspecies of *A. pandora* by d'Abrera (1971, 1977, 1990: 270). Although apparently allopatric with *A. pandora*, this Arfak Mountains endemic is restored to species status here, based on the differing configuration of ventral hindwing ocelli and the presence of cell markings on both surfaces of the forewing in the former taxon. We note that *A. pedaloidina* was described before *A. pandora;* both names were raised in 1916, but Joicey & Talbot compared *A. pandora* with the already published *A. pedaloidina*. Thus, if the two taxa were to be treated as conspecific, then *A. pandora* should be treated as a subspecies of *A. pedaloidina*. However, since in our view the two taxa are clearly not conspecific, this potentially confusing issue does not arise.

There are a number of obvious and significant morphological differences between *A. blancae* and *A. pandora* (and *A. decolor*), which warrant their treatment as distinct, possibly allopatric species. *Altiapa blancae* is a smaller insect than *A. pandora*, being approximately the size of *A. decolor* (Figs. 22 – 30), and the forewings are not as pointed as they are in *A. pandora*. The upperside is unmarked in *A. blancae*, whereas in *A. pandora* (and to some degree *A. decolor*) the pattern of the underside is obscurely visible on the upperside.



Figs. 16–30. Adults of *Altiapa*. **Fig. 16**, *Altiapa pedaloidina* ♂ (Holotype), dorsal view; **Fig. 17**, *Altiapa pedaloidina* ♂ (Holotype), ventral view; **Fig. 18**, *Altiapa pedaloidina* (Holotype), label data; **Fig. 19**, *Altiapa pedaloidina* ♀ (paratype), dorsal view; **Fig. 20**, *Altiapa pedaloidina* ♀ (paratype), ventral view; **Fig. 21**, *Altiapa pedaloidina* (paratype), label data; **Fig. 22**, *Altiapa decolor* ♂ (Holotype), dorsal view; **Fig. 23**, *Altiapa decolor* ♂ (Holotype), ventral view; **Fig. 24**, *Altiapa decolor* (Holotype), label data; **Fig. 25**, *Altiapa decolor* ♂, dorsal view; **Fig. 26**, *Altiapa decolor* ♂, ventral view; **Fig. 27**, *Altiapa decolor* ♂, label data; **Fig. 28**, *Altiapa decolor* ♀, dorsal view; **Fig. 29**, *Altiapa decolor* ♀, ventral view; **Fig. 30**, *Altiapa decolor* ♀, label data. Scale bar = 10 mm.



Figs. 31-33. Male genitalia of *Altiapa*, depicting a) lateral view, b) dorsal view, c) ventral view, d) aedeagus in lateral view. **Fig. 31**, *Altiapa blancae* n. sp., ♂ (Holotype); **Fig. 32**, *A. p. pandora* (Wandammen Mountains, West Papua, Indonesia); **Fig. 33**, *A. decolor* (Koinambe, Western Highlands Province, Papua New Guinea). Scale bar = 0.5 mm.

The pale median/postmedian band on the forewing underside is broad and adjacent to the cell in *A. pandora* and, where it tapers to meet the costa, it is approximately parallel to the termen. In *A. blancae*, this band occupies only the postmedian area and is very narrow and oblique to the termen. The subterminal line on the underside of both wings is straight and iridescent blue in *A. blancae* yet is sinuous and lead-coloured in *A. pandora* and *A. decolor*, and there are prominent ocelli on the forewing underside in the subapical area in spaces 4 and 5 of *A. pandora* and *A. decolor* that are absent in *A. blancae*. The pale postmedian band on the hindwing underside is vestigial/absent in *A. blancae*, yet well developed in both *A. pandora* and *A. decolor*. The three postmedian spots on the hindwing underside between veins 2 and 5 are connected in *A. blancae*, whereas the spot in space 4 is disjunct and displaced basally in *A. pandora*. This row of spots are completely enclosed by orange in *A. blancae*, whereas in *A. pandora* and *A. decolor* these spots are enclosed more or less separately with orange.

Parsons (1986) stated that the male genitalia of all *Altiapa* species were very similar. However, he figured only those of *A. pandora* and *A. decolor*, referring also to the figures of *A. colorata* by Nishizawa & Sibatani (1984), which he believed to be very similar to those of *A. pandora*. The male genitalia of *A. blancae* (Fig. 31) are highly distinctive when compared with *A. pandora* (Fig. 32) and *A. decolor* (Fig. 33). Indeed, genitalia of all three taxa exhibit significant differences in morphology. In *A. blancae* the uncus is broad when viewed dorsally (Fig. 31b) and tapered towards a rounded tip (Fig. 31a), whereas in *A. pandora* (Fig. 32b) and *A. decolor* (Fig. 33b) the uncus is narrow, particular in the centre, and terminates in a distinctly sharp point. In lateral view, the unci of *A. blancae*, and *A. decolor* are relatively straight, but strongly bowed downwards in *A. pandora*. The brachia of the gnathos are splayed in *A. blancae* and *A. decolor* in dorsal and ventral views whereas they are straight in *A. pandora*. The valvae of *A. blancae* are relatively simple, when compared with those of *A. pandora* and *A. decolor* which have long spikes at the apex and, in the case of *A. decolor*, also on the inner ventral margin. The aedeagus of *A. blancae* is much more pointed apically than in the other two species.

Male specimens of *A. blancae* observed by the first author in the field appeared to be defending territories at the peak of a large mountain crowned with montane heath-type vegetation, where they flew about 1.5 m above the ground, in the company of another satyrine, *Erycinidia gracilis* Rothschild & Jordan, 1905. *Altiapa blancae* is known to occur in the Upper Sepik as well as in the Eastern Highlands. It therefore probably occurs throughout much of the northern cordillera between the West Sepik and Eastern Highlands Provinces.

ACKNOWLEDGEMENTS

The authors are grateful to the Department of Environment and Conservation, Papua New Guinea Government, for approving export of specimens. Prof. Niklas Wahlberg, University of Turku, gave valuable insights into the molecular systematics of Mycalesini. Blanca Huertas and Geoff Martin (BMNH), Ted Edwards (ANIC), David Britton (AM) and Djunijanti Peggie (MZB) kindly allowed examination of specimens in their care. The authors also thank Keith Willmott (MGCL) and Oskar Brattström (University of Cambridge, UK) for their reviews of the manuscript.

LITERATURE CITED

Corbet, A. S., Pendlebury, H. M. 1993. *The Butterflies of the Malay Peninsula*. Kuala Lumpur, Malayan Nature Society. 4th edition, revised by J.N. Eliot. 597 pp.

D'Abrera, B. 1971. *Butterflies of the Australian Region*. Melbourne, Lansdowne. 415 pp.

D'Abrera, B. 1977. *Butterflies of the Australian Region*. Second Edition. Melbourne, Lansdowne Editions. 415 pp.

D'Abrera, B. L. 1990. *Butterflies of the Australian Region*. 3rd (Revised) Edition. Melbourne, Hill House. 416pp.

Kodandaramaiah, U., Peña, C., Braby, M. F., Grund, R., Müller, C. J., Nylin, S., Wahlberg, N. 2010. Phylogenetics of Coenonymphina (Nymphalidae: Satyrinae) and the problem of rooting rapid radiations. *Molecular Phylogenetics and Evolution* 54: 386–394.

Miller, L. D. 1968. The higher classification, phylogeny and zoogeography of the Satyridae (Lepidoptera). *Memoirs of the American Entomological Society* 24: 1–174.

Nishizawa, T., Sibatani, A. 1984. A new species of Hypocystini (Lepidoptera: Satyridae) from the Arfak Mountains, Irian Jaya. *Tyô to Ga* 35: 33-36.

Parsons, M. J. 1986. A new genus and twenty-six new species of butterflies (Lepidoptera, Hesperiidae, Lycaenidae, Nymphalidae) from Papua New Guinea and Irian Jaya. *Tyô to Ga* 37(3): 103-177.

Parsons, M. J. 1998. *The Butterflies of Papua New Guinea. Their systematics and biology*. London, Academic Press. xvi + 736 pp., 136 pls.

Rothschild, W., Jordan, K. 1905. On some new Lepidoptera discovered by A. S. Meek in British New Guinea. *Novitates Zoologicae* 12: 448-478.

Tuzov, V. K. 1997. New species of the genus *Altiapa* Parsons, 1986 (Lepidoptera: Nymphalidae, Satyrinae) from Irian Jaya (Indonesia). *Nachrichten des Entomologischen Vereins Apollo N.F.* 18 (2/3): 217–222.