

First record of the invasive lycaenid species *Chilades pandava* (HORSFIELD, 1829), from Papua New Guinea (Lepidoptera, Lycaenidae)

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Abstract: The invasive lycaenid butterfly *Chilades pandava* (HORSFIELD, 1829) is reported from Papua New Guinea for the first time, from five islands in Central and Milne Bay Provinces. The possible source of the butterfly is briefly discussed.

Erster Nachweis der invasiven Lycaenidenart *Chilades pandava* (HORSFIELD, 1829), von Papua-Neuguinea (Lepidoptera, Lycaenidae)

Zusammenfassung: Die invasive Lycaenidenart *Chilades pandava* (HORSFIELD, 1829) wird erstmalig von Papua-Neuguinea nachgewiesen, und zwar von fünf kleineren Inseln in der Zentralprovinz und der Milne-Bay-Provinz. Die mögliche Herkunft der Art wird kurz diskutiert.

Introduction

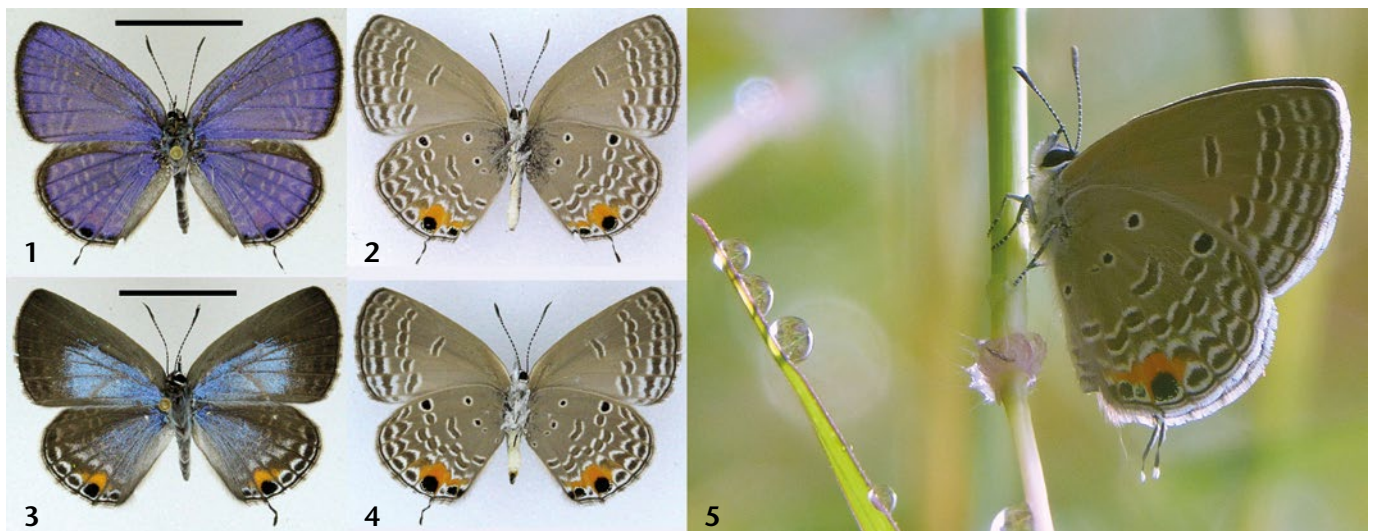
Towards the end of 16 months fieldwork on the islands of Milne Bay Province, Papua New Guinea, in 2010–2012, the author discovered a small – and initially unrecognised – lycaenid butterfly on four different islands. Firstly, on 10. III. 2012, two males in poor condition were taken at the side of a shaded forest coastal path on the island of Delina, southeast of the main island of New Guinea; then, on 16. III., a fresh male was taken in a similar habitat on the nearby island of Gunabalabala, in the western Louisiades.

On that same day the author also visited Kwato, at the western end of the Louisiade chain very close to the mainland and adjacent to the western end of the larger island of Logeia. An open area, with the crumbling remains of several concrete buildings near the centre of the island supported a profusion of rambling vegetation, where there were many hundreds of males of the same

unidentified lycaenid, together with small numbers of *Zizina labradus* GODART, 1824, the occasional *Euchrysops cnejus* FABRICIUS, 1798, and *Lampides boeticus* LINNEAUS, 1758. It was almost an hour before one fresh female (the only female seen) was discovered, in copula with a male (Figs. 1–4).

Finally, on 17. III., a solitary male was collected in coastal vegetation on Logeia itself. At that time, the author was unfamiliar with *Chilades pandava* HORSFIELD, 1829, and it was not until males were dissected on return to the UK that its true identity was confirmed through colleagues (see acknowledgements).

Fieldwork in Milne Bay included preparation for a planned comprehensive treatment of the butterflies of Milne Bay Province islands (TENNENT, in prep.). Following the author's return to the UK, David MITCHELL, Director, Conservation International PNG Field Programme (Asia Pacific Field Division), Alotau, continued to support this project by photographing butterflies in the field, usually in Milne Bay. However, he also photographed a small selection of butterflies from other PNG localities – arbitrarily, in the sense that butterflies were photographed when the opportunity presented itself – and these remain largely uncollated and unidentified. It was serendipitous that photographs taken on 24. IV. 2013 in open forest grassland on the small island of Motupore, Central Province, included one of *Chilades pandava* resting on a grass stem (Fig. 5). Motupore is a research island owned by the University of Papua New Guinea and is also, incidentally, where the PNG written constitution was prepared.



Figs. 1–4: *Chilades pandava*, Kwato. **Figs. 1–2:** ♂; 1: ups., 2: uns. **Figs. 3–4:** ♀; 3: ups., 4: uns (photos author). — Scale bars: 1 cm. — **Fig. 5:** probably ♀, Motupore (photo David MITCHELL).

In the southwest Pacific, *C. pandava* is known from the Northern Marianas (Saipan) (SCHREINER & NAFUS 1997) and from Guam, where it was first reported in 2005 (MOORE et al. 2005, DON BUDEN, pers comm., in TENNENT 2006). Data presented here represent the first records of this butterfly from Papua New Guinea. The fact that it has been observed on five different islands, and in very large numbers on one of them (see map), suggests the species is not only resident in Papua New Guinea, but well established there. Since host-plants are various species of *Cycas*, a plant genus widespread in the southwest Pacific, it is almost certainly already present elsewhere in the region.

Potential source

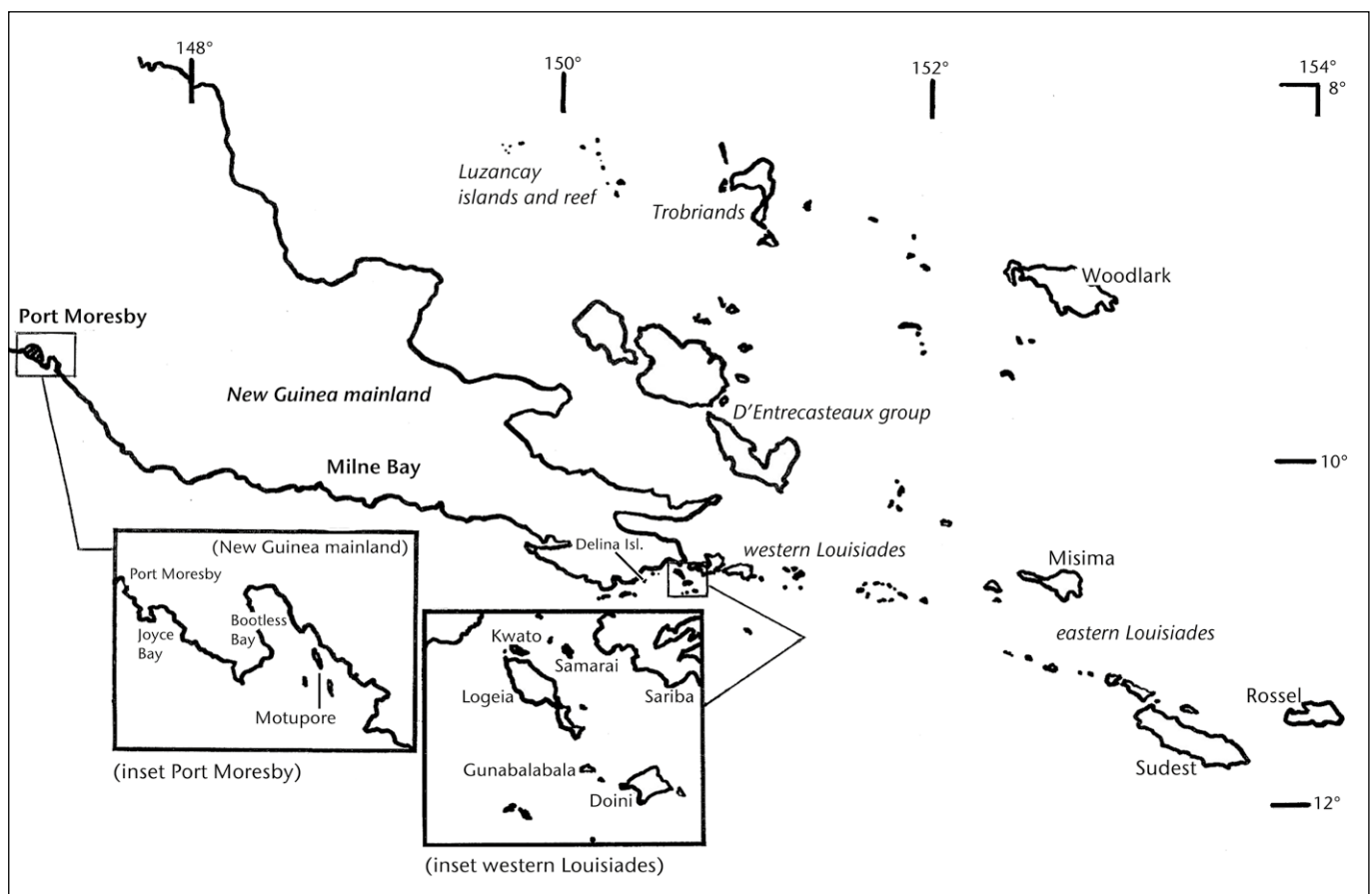
The source of New Guinea *C. pandava* is unknown. The species is clearly now well established on several of the Pacific islands to the north of Papua New Guinea (see above), although it is noted that all records presented here are from islands off the south or southeast coast of the main island of New Guinea – it may well have been overlooked in the north, but was not observed on any of the northern islands of Milne Bay visited by the author (e.g. Luzancay, Trobriands, Woodlark) in 2010–2012.

Dried samples were sent to Yu-Feng Hsu, Life Sciences, National Taiwan Normal University, Taipei, who has been instrumental in researching and tracing the source of outbreaks of *C. pandava* in Taiwan, first reported from there in 1976. Taiwan populations irrupted through-

out the island in 2000 (WU et al. 2010) and molecular analyses identified 29 haplotypes on Taiwan including probable endemic subpopulations in the west of the island. Analysis of PNG material identified only the “O” haplotype – the dominant, most widespread and “primitive” haplotype in southeast Asia (WU et al. 2010) – suggesting a probable source of Sundaland (i.e. Peninsula Malaysia, Borneo, western Java; see WU et al. 2010: fig. 2). Unreported presence of *C. pandava* on Indonesian islands and elsewhere on the New Guinea mainland (i.e. between western Java and eastern New Guinea) seems rather likely.

Discussion

Throughout the wide distribution of the genus *Chilades*, larvae feed on a diverse range of plants, but *C. pandava* seems to be restricted to species of *Cycas*, and the butterfly has the potential to cause significant damage to *Cycas* plants, including the cycad known as the “Sago Palm”, *Cycas revoluta* (Cycadaceae): not to be confused with the “true” Sago Palm, *Metroxylon sagu* (Arecaceae). Occurrence of the butterfly on Guam has been well documented in recent years (e.g. LAROSA 2008, TERRY et al. 2009, MARLER & TERRY 2011, MARLER et al. 2012), where it feeds on *Cycas micronesica*, endemic to the western Carolines and Mariana island groups. It was not reported from Guam by MARLER & MUNIAPPAN (2006) in a study of pests and potential pests of *C. micronesica* carried out on Guam between 2002 and 2005, and it appears to



Map 1: Distribution of *Chilades pandava* in Papua New Guinea (2012).

have been first collected there by MOORE on 13. VII. 2005 (MOORE et al. 2005). In a relatively short time, *C. pandava* was cited, with a scale insect *Aulacaspis yasumatsui*, as a reason for substantial damage to the endemic *Cycas micronesica* (TERRY et al. 2009 etc.) on the island.

At approximately the same time as *C. pandava* was affecting *C. micronesica* on Guam, it was also attracting the attention of entomologists on Taiwan, where it was thought to have been imported with plants of *Cycas revoluta* (WU et al. 2010). The species has also recently been reported from Egypt – and therefore continental Africa – for the first time (FRIC et al., in press).

Several species of ornamental and naturally occurring *Cycas* species occur on the island of New Guinea and on some of the adjoining islands. Of these *Cycas campestris* is currently known from Central and Gulf Provinces of PNG and *C. scratchleyana* from the Moluccas, across southern New Guinea to Milne Bay Province PNG (OSBORNE et al. 2012). These, and other cycad species, are potential hosts for *Chilades* larvae. A *Cycas* sp. (not identified) was present on Motupore Island, near where the adult *C. pandava* (Fig. 5) was photographed.

At one time, the natural range of *C. pandava* was thought to be confined to parts of the Oriental Region, from Sri Lanka and India eastwards to the Philippines. Now the worldwide distribution of *C. pandava*, much of which has been only recently established, includes Sri Lanka, India, eastern China, Hainan, temperate Asia (Korea, Japan), Taiwan (widespread), Thailand, Peninsula Malaysia, Borneo (Sabah, Sarawak), Indonesia (western Java), the Philippines, Guam, Papua New Guinea (Central and Milne Bay Provinces), Egypt, Madagascar, Réunion and Mauritius (MOORE et al. 2005, LAROSA 2008, WU et al. 2010, FRIC et al., in press; this paper). This dramatic range extension illustrates that *C. pandava* clearly has the potential to spread, either naturally or through accidental introduction, to most of the warmer regions of the world where cycads occur either naturally or as commercially cultivated/ornamental plants.

It is clear from the species' behaviour, and rapid population expansion elsewhere, that *C. pandava* has the potential to be a notable pest species on a variety of *Cycas* species. Judging from the very large local population seen on Kwato in March 2012, conditions locally appear highly suitable for this species. A map is provided of the known distribution of this species reported here from Papua New Guinea. It almost certainly occurs there more widely than these few records suggest.

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Milne Bay research would have been significantly more difficult without the local knowledge, helpful advice and interest of David MITCHELL, who also took the photograph of *C. pandava* on Motupore reproduced in Fig. 5, and provided data on cycad distribution in Papua New Guinea. Torben LARSEN first suggested *C. pandava* as a possible identify for the butterfly, and Zdenek FRIC kindly provided proofs of his publication (with others) in press, and permitted its citation here. Frank HSU, Life Sciences, National Taiwan Normal University, Taipei, and Shen Horn YEN, National Sun Yat-Sen University, Taiwan, confirmed *Chilades pandava*, and the former also carried out molecular analysis on dried material supplied by the author, identifying the haplotype.

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