

A CENTURY OLD MISTAKE SET RIGHT: THE IDENTITIES OF *MYDOSAMA MARGINATA* AND *MYDOSAMA PITANA* PINNED DOWN

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Abstract: Due to an error made whilst producing a major butterfly book more than a century ago, a pair of specimens of the species *Mydosama pitana* (Staudinger, 1897) was used as the basis for the first published illustration of the species *Mydosama marginata* (Moore, 1881). This error is most likely the reason why today the specimen considered as the holotype of *M. marginata* is actually a specimen of *M. pitana*. This in turn appears to have led to another more recent major work on butterflies mixing up the two species. After finding the type series of *M. pitana*, and surveying collections at seven major museums for available specimens, we now have strong evidence for the identity of both these species. We did not find a single case of sympatry, despite this having been reported in recent literature. To clarify the use of the name *M. pitana* a lectotype is designated from the specimens in Staudinger's original type series.

Keywords: *Mydosama marginata*, *Mydosama pitana*, *Mycalesis*, taxonomic revision, mistaken identities

While working on a complete re-curation of all *Mycalesina* specimens kept in the collections of the Museum für Naturkunde, Berlin, we came across a series of six specimens all labelled '*Mycalesis pitana*' in Staudinger's handwriting. All had the small label marked 'Origin.' generally used to tag the specimens in his type series. During initial re-curation work in Berlin, d'Abra (1985) was used as a starting point for specimen identification as it is the only readily available book depicting most known species from the Oriental region. The six Staudinger specimens closely matched the specimen figured by d'Abra (1985) under the name *M. marginata* (Moore, 1881), and d'Abra (1985) further suggested that the illustration of *M. marginata* in Fruhstorfer's (1911) chapter on Asian 'Satyridae' in the Seitz catalogue series was actually *M. pitana*. This apparent confusion led us to an investigation of other material and all the older literature about the two species that we could find. Our research suggests that mistakes have been made about the identity of these two species in major reference works. Furthermore, this case of mistaken identity has even apparently led to a specimen of the wrong species being curated as a type of *M. marginata* in the Natural History Museum, London. Here we attempt to clarify the identity of the two species, and by examining previous works in a chronological order we also try to understand why mistakes were made.

MATERIAL INVESTIGATED

The main collections of the American Museum of Natural History, New York (AMNH), Natural History Museum, London (NHM), Naturhistoriska Riksmuseet, Stockholm (NHRM), and Naturhistorische Museum, Vienna (NHMV) together with the complete collections (as part of ongoing re-curation projects) of the Museum für Naturkunde, Berlin (MNHB), Naturalis Biodiversity Center, Leiden (NMNL) and Oxford University Museum of Natural History (OUMNH) were investigated. All specimens were identified and sexed using wing patterns,

and label locality data recorded. All examined specimens are listed in Table 1. The copyrights of all photographed specimens belong to the respective museums and their Trustees (used with permission).

THE ORIGINAL DESCRIPTIONS

Moore (1881) described a number of new Asian butterflies, among them *Mydosama marginata*. The type specimens, of unspecified number, were collected in Sumatra and kept in the collection of Henley Grose-Smith. In his description Moore pointed out the main differences between this new species and a sympatric, closely related species, which he referred to as '*M. patnia*, that also occurs on Sumatra'. Moore was almost certainly talking about the species *Mycalesis* (*Mydosama*) *anapita* (Moore, 1858), which is also found on Sumatra, while *Mycalesis patnia* (Moore, 1858) is only known from Southern India and Sri Lanka (Ceylon). Rather amusingly, both of these species were originally described by Moore himself a few decades earlier (1858), so this could be taken as a good example of the dangers of using confusingly similar anagrammatic names for related species. Moore presumably had a reasonable understanding of the biogeography of the group, since he made a thorough revision of all Asian *Mycalesis*, introducing no less than twenty new (but no longer used) generic names (Moore, 1880). The main morphological characters mentioned by Moore as distinguishing *M. marginata* from *M. anapita* are the somewhat less rounded wingshape, the broader dark margin on the hindwing, and, as Moore emphasized, the dorsal forewing being broadly dark around all three sides (Fig. 1). Moore did not include any text about the female of the new species and therefore probably knew of no specimens; in the same paper he described both males and females for several other new species.

Staudinger (1896) published the first part of a paper describing a number of 'new exotic butterflies', amongst them *Mycalesis pitana*. The paper was published in volume nine of

the Deutsche Entomologische Zeitschrift. This volume was published in two parts with the first section dated 18 July 1896 (pages 1-224) and the second section 9 January 1897 (pages 225-405). The paper was printed on pages 193-240 with the description of *M. pitana* found on pages 230-231. The first part of the volume finished in the middle of one sentence on page 224, and then continued almost six months later halfway through the same sentence. There is no formal ending of the first part, nor is there any mention that page 225 is a continuation from the previous number suggesting that the full paper was already written and set for print at the time of the publication of the first part. Regardless of the date of publication of the new species being 1897, the descriptive work must have been done in early 1896, possibly explaining some of the confusion that followed (see below). The description is very detailed and begins with a comment that the species is so similar to *M. marginata* that Henley Grose-Smith had suggested they were the same; the text gives the impression that Grose-Smith had personally seen the specimens (or had a detailed correspondence with Staudinger) before stating his opinion. Staudinger clearly pointed out the main differences between the two species, including the lack of a black inner margin on the forewing dorsal surface that easily separates *M. pitana* (Fig. 2) from *M. marginata* (Fig. 1) and other similar species. He wrote in the beginning of the description that he had 'a small number [of specimens] from Kina-Balu, and one female from the Sultanate of Brunei', but following common practice at the time, no single specimen which could

be treated as the holotype was selected to represent the name, from the series of specimens referred to in the description.

TREATMENTS IN GENERAL LEPIDOPTERA PUBLICATIONS

Between 1887-1897, Grose-Smith and Kirby published the first two volumes of the impressive work 'Rhopalocera exotica; being illustrations of new, rare, and unfigured species of butterflies'. The third and last volume was published by Grose-Smith alone between 1897 and 1902. *Mycalesis marginata* was illustrated in a section (Vol. II Satyridae – *Mycalesis* III) published in July 1896, and accompanied by a detailed text regarding the morphology and distribution of the species. The text concerning *M. marginata* appeared, to some degree, to follow Moore's (1881) original text listing Sumatra as the range and stating that *M. marginata* was related to *M. patnia* (thus copying Moore's original error – see above – and therefore demonstrating the use of data from the original description). The descriptive text in Grose-Smith & Kirby (1896) deviates from the original description (Moore, 1881) by fully describing the morphology of the pair of specimens illustrated in beautiful detail under the name *M. marginata*, which were, however, specimens of *M. pitana*; the text clearly pointed out that the forewing is only darkened along two of the three edges. It seems likely that the authors failed to separate the two species in their own source collection when drafting the work and

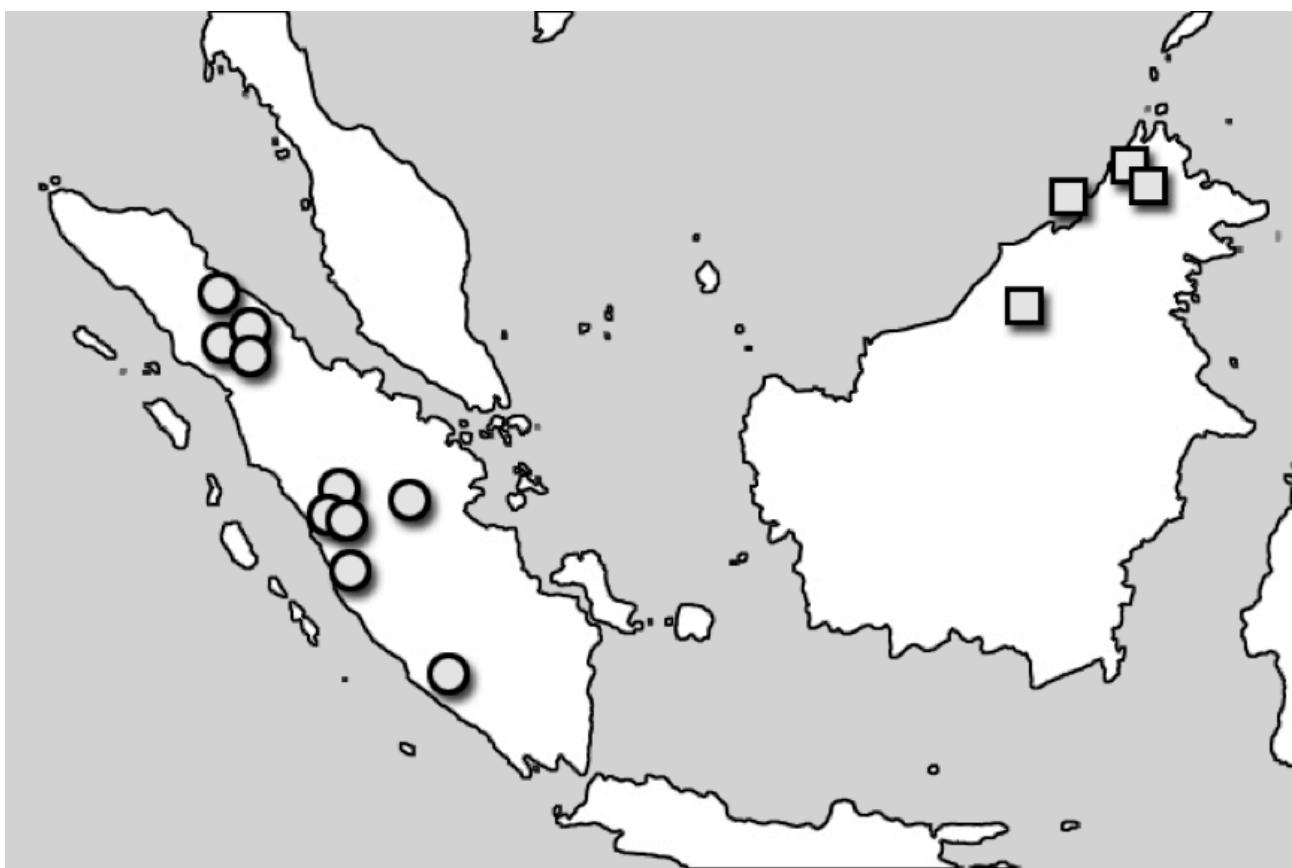


Fig. 3. Capture locations of museum material with detailed label information show that *Mydosama marginata* (circles, all locations on Sumatra) and *M. pitana* (squares, all locations on Borneo) have no geographic overlap. All recorded locations for both species are from upland areas.

then attempted to improve on Moore's rather short original description, but failed to note Moore's point about the three dark margins.

Fruhstorfer (1908) published a revision of all Asian *Mycalesis*, and this was the basis for the abbreviated but illustrated treatment found in Seitz's catalogue of Macrolepidoptera of the World (Fruhstorfer, 1911). Fruhstorfer (1911) recognised both taxa but he considered *M. pitana* as a Borneo race of *M. marginata*. This suggests he knew of no geographic overlap between the two races. Fruhstorfer's work is, in general, very well researched and he had a good knowledge of the material in museums and personal collections, not only because of his academic work, but also because he traded extensively in insect specimens from his many collecting expeditions. In his revision, *M. marginata* was illustrated correctly for the first time, and even though there was no picture of *M. pitana*, the text clearly pointed out the difference regarding the forewing margins following the original descriptions.

The latest illustrated major work to include the two species was d'Abrera (1985)). The NHM formed the basis of this work and in the section about *M. pitana* d'Abrera (1985) stated on page 463 that the 'figure in Seitz (91 d) is very probably that of *pitana*, and not *marginata* as captioned'. The specimens photographed for both species in d'Abrera's (1985) book were therefore switched among the two names in comparison with Frushstorfer's (1911) correct illustration and text, and d'Abrera most likely followed the curation of the NHM (see below), that in turn was likely to be have been influenced by the work of Grose-Smith and Kirby (1896). D'Abrera (1985) suggested for the first time that the two species were sympatric; he listed Sumatra and Borneo as part of the distribution of both species, perhaps leading him to treat as species the taxa that Frushstorfer (1908) had treated as subspecies. It should be noted that d'Abrera was apparently very impressed by Fruhstorfer's work (he even dedicated the whole volume of d'Abrera (1985) to him) and generally followed his treatment of Asian *Mycalesina*. However, it appears that on this occasion the NHM curation misled him into thinking Fruhstorfer had made a mistake. By combining the location data from the mislabelled specimens he had in front of him with those previously reported in the literature, he concluded that the two species were sympatric on both Sumatra and Borneo.

THE BIOGEOGRAPHY

Among the more than 100 specimens we have investigated there was no evidence of sympatry. With the exception of two obvious mistakes (see below), every specimen of *M. marginata* was collected somewhere in Sumatra, while all *M. pitana* came from Borneo (Fig. 3). Many specimens of *M. marginata* were only labelled 'Sumatra' so it is hard to say exactly how localised the species is. However, all more precise localities are at fairly high altitude and early surveys of Sumatran butterflies reported that *M. marginata* (where descriptions were sufficiently detailed to rule out other species) was never found at an altitude below 3000 feet, while the related species *M. anapita* was found solely in low altitude habitats (de Nicéville & Martin, 1896; Martin, 1896; Fruhstorfer, 1907).

The only older record for *M. pitana* we could find is from an early list of Borneo butterflies (Shelford, 1904), where a single specimen was recorded from Kina-Balu in northern Borneo. All specimens of *M. pitana* with precise capture locations are from montane areas, and the two species are most likely ecological replacements for *M. anapita* and *M. patiana* (Eliot, 1969) at higher altitudes. We did find two *M. marginata* from Weymer's collection in MNHB labelled as having been collected in New Guinea, but this must be a labelling mistake given the limited distribution of all other specimens, combined with the general endemism of *Mycalesina* from New Guinea and nearby islands (the exception is the extremely widespread species *Mycalesis perseus* found all over tropical Asia and Australia).

THE PLACEMENT OF THE TWO SPECIES IN THE BROADER PHYLOGENETIC CONTEXT

The moving of individual taxa between genera is understandably frequent in groups of organisms for which there are still many unresolved taxonomic issues. The two species investigated in this paper have both, at one time or another, been assigned to the genera *Mycalesis* or *Mydosama* depending on the view of the authors. A recent molecular phylogeny of the subtribe (Kodandaramaiah *et al.*, 2010) supported a split of all Asian species of what was called *Mycalesis* into two well-defined generic level clades. *Mydosama* (Moore, 1880) seems to be the oldest name for the genus containing both *M. marginata* and *M. pitana*. The closest relatives appear to be *M. fusca* (C. & R. Felder, 1860) (the type species of *Mydosama*), *M. anapita*, *M. patiana* and the Philippine species complex around *M. ita* (C. & R. Felder, 1863) (see Kashiwai (1986) for the most recent treatment of the *ita*-complex). The exact relationship between the species mentioned above is not well known at the moment because the sampling of species in published phylogenies is limited. However, our studies of the androconial structures and the male genitalia suggest that all of the species discussed above are all closely related and belong to the genus *Mydosama* (Brattström *et al.*, unpublished data). Both *M. pitana* and *M. marginata* are unique in this group in having a broad dark margin on the dorsal hindwing in both sexes that at least to some degree obscures the row of marginal eyespots.

Table 1. Number of *Mydosama marginata* and *M. pitana* specimens examined in seven major natural history museums.

Museum	<i>Mydosama marginata</i>		<i>Mydosama pitana</i>	
	Males	Females	Males	Females
AMNH, New York	-	-	1	-
MNHB, Berlin	6	1	2	4
NHM, London	15	6	7	3
NHMW, Vienna	2	5	-	-
NHRS, Stockholm	2	2	-	-
OUMNH, Oxford	5	6	1	-
RMNH, Leiden	35	23	1	1
Total:	65	43	12	8



C

Fig. 1. *Mydosama marginata* Moore, 1881 and *M. anapita* (Moore, 1858). (A) *M. marginata*, male. (B) *M. marginata*, female. (C) *M. anapita*, male.

Both sexes of *M. marginata* are confidently distinguished from all similar species by the presence of a distinct dark margin along the outer edge of the dorsal hindwing combined with a dark margin on all sides of the dorsal forewing. Moore pointed this out in the original description (1881), but due to confusion in two published reference works (Grose-Smith & Kirby, 1896, d'Abrera 1985) this species has often been mixed up with *Mydosama pitana* (Staudinger, 1897) (Fig. 2). *Mydosama anapita* (Moore, 1858) is a related species that was referred to for comparative purposes in the original description of *M. marginata*.

The photographed specimens are from the collections in BMNH (London) and OUMNH (Oxford). The copyrights of the photos belong to the Museums and their Trustees.

Photo references:

Top row

A) ♂ *M. marginata* BMNH(E) 1203292
B) ♀ *M. marginata* OB-OXF-0001

Lower row

C) ♂ *M. anapita* BMNH(E) 120329

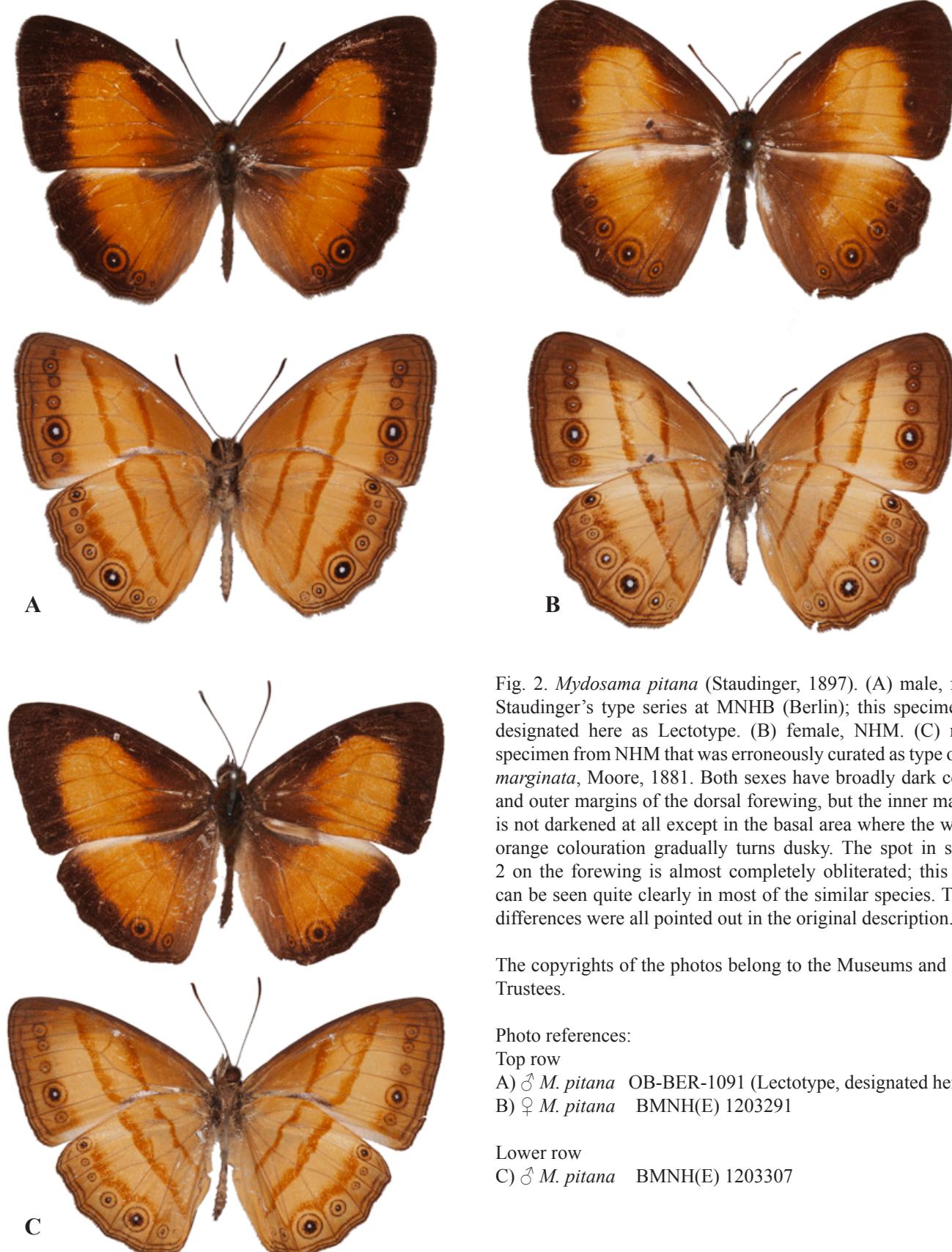


Fig. 2. *Mydosama pitana* (Staudinger, 1897). (A) male, from Staudinger's type series at MNHB (Berlin); this specimen is designated here as Lectotype. (B) female, NHM. (C) male specimen from NHM that was erroneously curated as type of *M. marginata*, Moore, 1881. Both sexes have broadly dark costal and outer margins of the dorsal forewing, but the inner margin is not darkened at all except in the basal area where the whole orange colouration gradually turns dusky. The spot in space 2 on the forewing is almost completely obliterated; this spot can be seen quite clearly in most of the similar species. These differences were all pointed out in the original description.

The copyrights of the photos belong to the Museums and their Trustees.

Photo references:

Top row

A) ♂ *M. pitana* OB-BER-1091 (Lectotype, designated herein)
B) ♀ *M. pitana* BMNH(E) 1203291

Lower row

C) ♂ *M. pitana* BMNH(E) 1203307

THE TYPES

The specimen placed in the type collection of the NHM and labelled *Mycalesis (Mydosama) marginata* (Fig. 2C) is clearly erroneous, because it is a male specimen of *Mydosama pitana* collected at Kina-Balu in Borneo. *Mydosama marginata* was described from a Sumatran specimen and all available data suggest the species is endemic to that island and absent from Borneo. The labels for the supposed ‘type’ show that it came from Joicey’s collection in 1931, which at that time included Grose-Smith’s collection. It is likely that this specimen was picked out from Grose-Smith’s collection when assembling the types, and if his collection was curated following the treatment in Grose-Smith and Kirby’s book (1896), this would explain how a misidentification was later transferred to the rest of the main collection of the NHM. Just prior to publication of this paper we had the opportunity to look through the supplementary collection at NHM. We searched for the true type(s) of *M. marginata* in the Joicey part of the supplementary collection, but we found no specimens of *M. marginata* that match the original description with regard to location and collection date. The specimens investigated during this later visit are not included in Table 1, but no data conflicted with the results presented in this paper. The real type or type series, if it still exists, would have been collected somewhere on Sumatra before early 1881, and given that the original description (Moore, 1881) only described the male morphology, it is very likely that the type(s) were male(s), and this would be the most appropriate sex for a lectotype or neotype if necessary. At this stage we think it unnecessary to designate a neotype, and feel that such an action (or if possible the designation of a lectotype) should wait until the complete *Mydosama* collection at the NHM has been assembled and curated.

To clarify the application of the name *M. pitana*, the male specimen depicted in Fig. 2A, and which is part of Staudinger’s syntype series, is hereby designated as lectotype of *Mycalesis pitana* (Staudinger 1897) (Specimen code: OB-BER-1091). The specimen was collected at Kina Balu by Waterstradt in 1894 and is kept in the collections of MNHB, Berlin.

ACKNOWLEDGEMENTS

We thank the curators/collection managers at the respective museums for their assistance in making their collections available for our work (Blanca Huertas, NHM; Sabine Gaal-Haszler, NHMV; Kjell-Arne Johanson, NHRM and James Hogan, OUMNH). Nick Crumpton took photos of the Mycalesina material in AMNH with the help of Lesley Thayer. Lea van de Graaf assisted with translation of Staudinger’s original German text describing *Mycalesis pitana*. We also thank two reviewers for their helpful comments on the manuscript. This project was funded by an advanced ERC grant no 250325 (EMARES) to Paul M. Brakefield.

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