

Notes on some *Antheraea* of Sundaland, with description of a new species (Lepidoptera: Saturniidae)

Stefan NAUMANN

Dr. Stefan NAUMANN, Potsdamer Strasse 71, D-10785 Berlin, Germany; E-Mail: snb@saturniidae.com

Abstract: A new species of the genus *Antheraea* HÜBNER, 1819 (“1816”) in the subgenus *Antheraea* from Sundaland is described: *A. (A.) broschii* spec. nov. The new species is known so far from Brunei and Sabah, East Malaysia, both on Borneo Island, further from Sumatra, Indonesia, and from mainland Asia in West Malaysia; for type material only the Bornean specimens are selected. The male holotype from Sabah in the author’s collection will be deposited in the collection of the Zoologisches Museum der Humboldt-Universität in Berlin, Germany, the female allotype is stored in the Natural History Museum, London, Great Britain. Specimens so far were figured several times already, e.g. in LAMPE (1984, 1985) or in HOLLOWAY (1987), in these publications under the name *A. (A.) celebensis* nec WATSON, 1915. Different, but closely related *Antheraea* taxa from Sundaland are discussed, and critical comments on taxonomy of these are given: *A. (A.) ulrichbroshii* U. & L. H. PAUKSTADT, 1999 syn. nov. is cited as a new synonym of *A. (A.) steinkeorum* U. PAUKSTADT et al., 1999, *A. (A.) myanmarensis* U. PAUKSTADT et al., 1998 syn. nov. is interpreted as a junior synonym of *A. (A.) gschwandneri* NIEPELT, 1918; *A. (A.) zwicki* NÄSSIG & TREADAWAY, 1998 stat. nov. is elevated to species rank as there is no close relationship of this taxon to *A. (A.) gschwandneri* at all; a first record of *A. (A.) zwicki* from Borneo is recorded as well. The holotype of *A. (A.) gschwandneri* from the collection of Naturhistorisches Museum Wien (Vienna), which was supposed to be lost, is figured for the first time in colour to clarify the taxonomical situation.

Key words: Sundaland, Borneo, Saturniidae, *Antheraea*, new species, new synonymy.

Anmerkungen zur Gattung *Antheraea* von Sundaland, mit Beschreibung einer neuen Art (Lepidoptera: Saturniidae)

Zusammenfassung: Eine neue Art der Gattung *Antheraea* HÜBNER, 1819 („1816“) aus dem Subgenus *Antheraea* von Sundaland wird beschrieben: *A. (A.) broschii* spec. nov. Nachweise existieren bisher aus Brunei und Sabah, Ost-Malaysia, beide auf der Insel Borneo, sowie von Sumatra und vom asiatischen Festland aus Westmalaysia. Der männliche Holotypus von Sabah aus der Sammlung des Autors wird in die Sammlung des Zoologischen Museums der Humboldt-Universität zu Berlin gelangen, der weibliche Allotypus befindet sich im BMNH, London. Tiere dieser Art sind seit langem bekannt und wurden bisher mehrfach farbig abgebildet, unter anderem bei LAMPE (1984, 1985) und bei HOLLOWAY (1987), dort jeweils als *A. (A.) celebensis* nec WATSON, 1915. Weiter werden verschiedene *Antheraea*-Arten, die in Sundaland vorkommen, besprochen und einige kritische taxonomische Anmerkungen hierzu gemacht: *A. (A.) ulrichbroshii* U. & L. H. PAUKSTADT, 1999 syn. nov. wird als neues Synonym zu *A. (A.) steinkeorum* U. PAUKSTADT et al., 1999 gestellt, *A. (A.) myanmarensis* U. PAUKSTADT et al., 1998 syn. nov. als jüngeres Synonym zu *A. (A.) gschwandneri* NIEPELT, 1918; *A. (A.) zwicki* NÄSSIG & TREADAWAY, 1998 stat. nov. wird auf Artrang angehoben, diese Art ist nicht näher verwandt mit *A. gschwandneri* und wird erstmals auch von Borneo nachgewiesen. Der bisher als vermisst geltende Holoty-

pus von *A. (A.) gschwandneri* aus dem Naturhistorischen Museum Wien wird erstmalig farbig abgebildet.

Introduction

Within the genus *Antheraea* HÜBNER, 1819 (“1816”), three subgenera are known (NÄSSIG 1991): *Telea* HÜBNER, 1819 (“1816”), *Antheraeopsis* WOOD-MASON, 1886 and *Antheraea* HÜBNER, 1819 (“1816”) of which the second and the third have members in the Sundaland area. NÄSSIG (1991) gave an application of group names within the subgenus *Antheraea*, and in the present publication I deal only with the so-called *paphia/frithi*-group – a term which later on was changed to *mylitta/frithi*-group by different authors. All of them stated that these collective-group names never were used in the sense of valid taxa (ICZN 1999) but just were established tentatively “for certain assemblages of taxonomic convenience only” (U. PAUKSTADT et al. 2000: 6). During the studies for a monograph of the genus, U. PAUKSTADT et al. (2000) published a preliminary checklist of the names of the genus *Antheraea* to make taxonomic ideas available for further discussion with other entomologists; several shorter publications on the genus so far were presented by at least two of the authors of this list, some of them with descriptions of new species from Sundaland (e.g., PAUKSTADT, U., & PAUKSTADT, L. H. 1999, PAUKSTADT, U., et al. 1998, 1999).

During my studies on SE Asian Saturniidae I found that sometimes there was some uncertainty in the identity of older taxa, mostly because the type material was not found or museum collections were not checked prior to the publication of faunistic works or of new taxa. Also in recent literature (e.g. ALLEN 1981, HOLLOWAY 1981, 1987, LAMPE 1984, 1985) the identity of some *Antheraea* taxa remained tentative, which already some years ago let arise the idea to write a paper on a new *Antheraea* from Borneo and West Malaysia; further recent publications by U. & L. H. PAUKSTADT and U. PAUKSTADT et al. now make some taxonomical comments necessary.

Those taxa which are accepted in this work to have full species rank were elaborated and delimited due to a morphospecies concept, usually based on external morphology (wingpattern, details of pattern elements, antennal morphology, etc.) only; as shown by several authors before (e.g. NÄSSIG et al. 1996, NÄSSIG & TREADAWAY 1998), there are no evident or only minor differences in male genitalia structures in the *mylitta/frithi*-group in general, so that, according to present knowledge, most often only differences in wing shape, wing and eyespot pattern or size of the specimens in total, of eyespots or antennae or the proportions between these features give significant

characters to separate different species. A definitive solution about what are real species and what are synonyms of these can most likely only be found after the breeding of many (or all) of these populations, combined with chemical (e.g., DNA) analyses of them and combining all these results with the knowledge we have so far.

Results of the study

During visits in several natural history museums during the last years old type material was located, examined and photographed for comparative studies. This was done mainly for the preparation of a revisional work on the genus *Samia* HÜBNER, 1819 (“1816”), but thereby also other genera of the family Saturniidae were examined. So the following results dealing with *Antheraea* can be presented here.

In Naturhistorisches Museum Wien (Vienna) the holotype of *Antheraea (Antheraea) gschwandneri* NIEPELT, 1918 was found which only once was figured as black and white figure in NIEPELT (1918); this ♂ is figured here for the first time in colour (Figs. 3, 4). That taxon can clearly be identified by its small size, wing pattern and colour combination of yellow and violet brown plus the strongly curved forewing apex and details in antenna proportions. The lack of earlier type studies produced some confusion, e.g., in HOLLOWAY (1987), NÄSSIG et al. (1996), NÄSSIG & TREADAWAY (1998), and U. PAUKSTADT et al. (1998):

- HOLLOWAY (1987: 103) erroneously combined *gschwandneri* with *A. (A.) celebensis* WATSON, 1915, a taxon which, according to present knowledge, is confined to Sulawesi (Celebes) and probably smaller adjacent islands (compare NAUMANN 1995, HOLLOWAY et al. 1996 and NÄSSIG & TREADAWAY 1998). He obviously never had seen either the type or the original description of *A. (A.) gschwandneri* as he stated that the Sundanian material had less falcate forewings in comparison to typical *A. (A.) celebensis*. During the time of preparation of his book also the identity of *A. (A.) celebensis* had remained unclear as the single type is a ♀ which is even harder to separate from other taxa in the *mylitta/frithi*-group. than the ♂♂ Also, it was believed at that time that *celebensis* also occurs far away from Sulawesi, e.g. on Borneo or in West Malaysia, and it was confused with other species.
- NÄSSIG et al. (1996), also without knowing the type material of *A. (A.) gschwandneri*, combined different taxa under this name due to the fact that they could not find any major genitalia differences within this group. But as figured out by several authors (e.g. NÄSSIG & TREADAWAY 1998, U. PAUKSTADT et al. 1998), these are minor in this genus in general, and other features like, e.g., antenna proportions or wing ocellus pattern can be found to separate the species more or less safely. A true *A. (A.) gschwandneri* ♂ in the sense of NIEPELT (1918) is figured in NÄSSIG et al. (1996) on plate 2, fig. 7; all other specimens figured there as *A. (A.) gschwandneri* belong either to *A. (A.) sumatrana* NIEPELT, 1926 or to other taxa.
- NÄSSIG & TREADAWAY (1998: 385) described the new taxon *zwicki* from Palawan, Philippines, as a subspecies of *A. (A.) gschwandneri*. This combination was, as already stated by the authors themselves, somewhat tentative, and mainly was based on the concept published earlier by NÄSSIG et al. (1996) for Sumatra. So, indeed, some of the “forms” found in Sumatra resemble somewhat that taxon *zwicki*, but in fact *zwicki* has nothing to do with true *A. (A.) gschwandneri*. That Palawan species also is not identical with *A. (A.) moultoni* WATSON, 1927 from Borneo (due to its wing shape, ocellus pattern, wingspan and details in genitalia morphology), of which longer series in the author’s collection, in SMFL (in CCGT, CWAN) and in CUBH were examined during the preparation of the present publication; this series is conspecific to the pair of syntypes of *moultoni* in BMNH which was also examined for this purpose. Therefore, and because I am unable to combine the Palawan species with any other taxon, I herewith give *A. (A.) zwicki* **stat. nov.** full species rank. It can be separated from *A. (A.) semperi* C. & R. FELDER, 1861 by the characters given in NÄSSIG & TREADAWAY (1998). Furthermore, *A. (A.) zwicki* is also recorded from Borneo now: Most recently a single ♂ from Brunei was found in CUBH with data “Brunei, Labi, 23. i. 1997, leg. G. R. PING”. That specimen and its genitalia structures are also figured here as first record of *A. (A.) zwicki* from Borneo (Figs. 7, 20).
- Also in 1998, U. PAUKSTADT et al. described the new species *A. (A.) myanmarensis* U. PAUKSTADT, L. H. PAUKSTADT & BROSCHE from southern Myanmar and southern Thailand. The taxon is figured in the original description in colour and with detailed photographs of ♀ antenna and ♂ genitalia. Unfortunately, the authors only compared their specimens with mainland material of other species from Myanmar and Thailand, and evidently only with the misleading figures of the then so-called “*A. (A.) gschwandneri*” in NÄSSIG et al. (1996) (although this book was not cited in their bibliography); during that time they also did not know the true status of *A. (A.) gschwandneri*. In all known morphological details *A. (A.) myanmarensis* **syn. nov.** is absolutely identical with *A. (A.) gschwandneri* so that I herewith change the status of that taxon into synonymy. The only problem for understanding is that the type material of *A. (A.) myanmarensis* originates from the area around Isthmus of Kra in Thailand, and *A. (A.) gschwandneri* from Sumatra, while from the area in between, i.e., West Malaysia and the southern lowland tip of Thailand, no similar material is known so far. This situation can probably be interpreted as a gap either due to intensive agriculture and deforesting, due to the few systematic collecting at night in that area, or (most probably not) due to zoogeographical reasons.

A second taxon from the same Sundaland area and probably further north caused similar irritations during the last years. That species was figured first by NÄSSIG et al. (1996) e.g. on their plate 2, figure 8 and plate 6, figure 24, again under the name *A. (A.) gschwandneri*. Later U. PAUKSTADT et al. (1999) and again U. PAUKSTADT & L. H. PAUKSTADT (1999) presented, in the same volume of the journal, two papers with descriptions of obviously the same species, one from southern Thailand and Myanmar, the other from West Malaysia. I herewith interpret the one published on a later page, *A. (A.) ulrichbroschi* U. & L. H. PAUKSTADT **syn. nov.**, to be a junior synonym of the first one, *A. (A.) steinkeorum* U. PAUKSTADT, L. H. PAUKSTADT & BROSCHE; this rank of synonymy was chosen in concordance with the ICZN (1999), article 24.2.1. (determination by the first reviser). For both species no genitalia structures are figured in the original descriptions, and it is mentioned that no or only minor differences could be found. When describing, *A. (A.) steinkeorum* was compared with *A. (A.) frithi* MOORE, 1859 and with *A. (A.) ulrichbroschi*, for which only differences in the lighter colour could be found; *A. (A.) ulrichbroschi* was compared with some further Sundaland species. In this paper for the first time *A. (A.) gschwandneri* and *A. (A.) sumatrana* were mentioned to be two separate species, after the photograph of the holotype of *A. (A.) gschwandneri* from the Vienna museum was handed over to the authors. From the in part quite small sizes of material of *A. (A.) sumatrana* compared, it appears possible that for some part conspecific specimens were used for comparison; unfortunately again the publication by NÄSSIG et al. (1996) for the Sumatran fauna was not seen (or just not cited); within this publication, clearly the same species is figured twice, see above. Unfortunately, for *A. (A.) ulrichbroschi* the paratype series was not examined carefully by the authors: in CWAN in SMFL I found a mixed series of 4 paratypes of which one with data: "West Malaysia, Taiping vic., c/o SCHINTLMEISTER 1982, Händler-Tier" (Fig. 6) in fact does not belong to *ulrichbroschi*. This species most probably belongs to another West Malaysian taxon for which a description is in preparation by NAUMANN et al., in which also a more complete survey on the mainland species of the *mylitta/frithi*-group will be given.

A. (A.) steinkeorum therefore is a much more widespread species than mentioned by the authors for the two synonymized taxa: In their original description of *A. (A.) steinkeorum* the authors cite a single ♂ in CUBH from Laos which was figured in BROSCHE et al. (1999) and does not correspond in all pattern elements to the original description; therefore it was not included in the type series. In the description of *A. (A.) ulrichbroschi* a typical specimen from Borneo, Sabah, is mentioned ex CSNB (Fig. 15), but is also not included into the type series, although the authors had a photograph of this specimen in their hands during preparation of the manuscript; also this record outside West Malaysia is not discussed in the text at all. A second Bornean specimen from Brunei,

Lamunin, is in CCGT in SMFL. Therefore we now know a wide distribution of *A. (A.) steinkeorum* from the southern tips of Myanmar and Thailand (Isthmus of Kra), in West Malaysia, down to Borneo and Sumatra; further records could perhaps also be expected for Java. The record from Laos should be studied when further material is available; from the single specimen an exact determination of the identity does not appear to be possible.

Similar confusion arose with a third species which is recorded from West Malaysia, Sumatra and Borneo so far. This was figured already by ALLEN (1981 [partim: the ♀ on plate 11a is the allotype of the species described here, the worn ♂ on plate 11b belongs to the taxon *moultoni*, compare wing ocelli]) and HOLLOWAY (1987 [partim: the figured ♂ specimen on pl. 11, fig. 3 is the same specimen as figured by ALLEN 1981: plate 11b]) for Borneo and by LAMPE (1984, 1985 [partim: the ♂ specimen figured on plate 5, fig. 1 should belong to the species described here]) for West Malaysia under the name *A. (A.) celebensis*, by NÄSSIG et al. (1996) [partim: ♂ specimens on col. plate 1, fig. 4 and col. plate 3, fig. 12 should belong to the species described here] as *A. (A.) gschwandneri* for Sumatra, and caused discussions in this work and also e.g. in HOLLOWAY (1976, 1981), HOLLOWAY & HALL (1998), and U. PAUKSTADT et al. (2000). In U. PAUKSTADT & L. H. PAUKSTADT (1999) it was mentioned in part as *A. (A.) ulrichbroschi*; this name was only applied to a singleton figured in LAMPE (1984, 1985, pl. 4, fig. 3). I herewith describe this species as new. In the following it will be compared with other related taxa like *A. (A.) gschwandneri*, *A. (A.) sumatrana*, *A. (A.) moultoni*, *A. (A.) alleni* HOLLOWAY, 1987, and *A. (A.) zwicki*, all aside of *A. (A.) celebensis* from Sulawesi, Indonesia.

Abbreviations used:

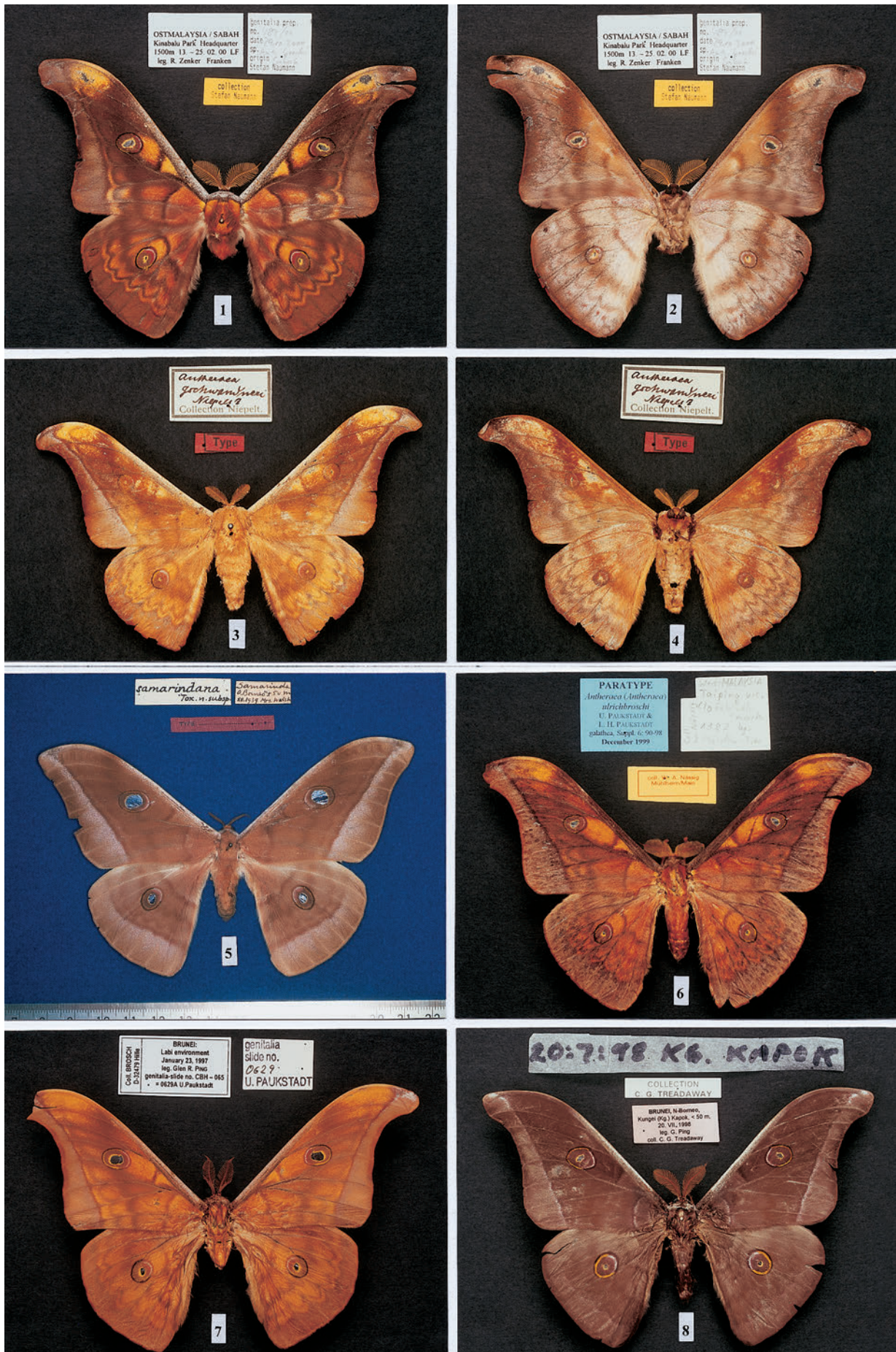
BMNH	The Natural History Museum [formerly: British Museum (Natural History)], London, Great Britain.
CCGT	collection Colin G. TREADAWAY, now in SMFL.
CMBH	collection Martin BEEKE, Hille, Germany.
CSLL	collection Swen LÖFFLER, Lichtenstein, Germany.
CSNB	collection Stefan NAUMANN, Berlin, Germany.
CRLN	collection Rudolf E. J. LAMPE, Nürnberg, Germany.
CWAN	collection Wolfgang A. NÄSSIG, now in SMFL.
SMFL	Lepidoptera collection of the Senckenberg-Museum, Frankfurt am Main, Germany.
ZMA	Instituut voor Systematiek en Populatiebiologie (Zoölogisch Museum), Afdeling Entomologie, Amsterdam, The Netherlands.

Antheraea (Antheraea) broschii n. sp.

Holotype (Figs. 1, 2): ♂, Ostmalaysia, Sabah, Kinabalu Park Headquarters, 1500 m, 13.–25. II. 2000, LF, leg. R. ZENKER, Franken, GP 489/00 SNB (CSNB). A red holotype label will be fixed accordingly. The holotype will be deposited in the collection of Museum für Naturkunde der Humboldt-Universität zu Berlin, Germany.

Paratypes (in total 37 ♂♂, 3 ♀♀):

East Malaysia, Sabah: allotype ♀, [Borneo, Sabah, Kinabalu N.P.], C.E.M.K., Power Station, 15. VIII. [19]65 (BMNH); specimen figured in ALLEN 1981, p. 107, pl. 11a, and HOLLOWAY 1987, plate 11, fig. 4. A red allotype label will be fixed accord-



Colour plate 1: Sundanian *Antheraea*. Fig. 1: *Antheraea broschii* spec. nov. ♂, holotype, dorsal. Fig. 2: *A. broschii* spec. nov. ♂, holotype, ventral. Fig. 3: *A. gschwandneri* ♂, holotype, dorsal, Sumatra. Fig. 4: *A. gschwandneri* ♂, holotype, ventral. Fig. 5: *Antheraea* sp. ♀, dorsal, Kalimantan, Borneo (labelled as "*A. samarindana* spec. nov. TOXOPEUS", nomen nudum). Fig. 6: *Antheraea* sp. ♂, dorsal, paratype of *A. ulrichbroshii*, West Malaysia. Fig. 7: *A. zwicki* ♂, dorsal, Brunei, Borneo. Fig. 8: *A. moultoni*, dark brown variation ♂, dorsal, Brunei, Borneo. — Photograph 5 by S. NAUMANN, all others by U. BOSCH.



Colour plate 2: Further Sundanian *Antheraea*, figured from dorsal side. **Figs. 9–12:** *A. broschii* spec. nov., ♂♂, paratypes, Sabah, Borneo. **Figs. 13 & 14:** *A. broschii* spec. nov. ♂♂ paratypes, Brunei, Borneo. **Fig. 15:** *A. steineorum* ♂, Sabah, Borneo. **Fig. 16:** *A. broschii* spec. nov. ♂, West Malaysia. — All figs. at the same scale. Photograph U. BROSCH.

ingly. The other paratypes with blue paratype labels: 2 ♂♂, same data as holotype (CSNB); 12 ♂♂, 1 ♀, same data as holotype (CSLL); 1 ♂, Kinabalu, Kian [Kiau?] Gap, 4. iv. 1986, via L. RACHELI, GP 487/00 SNB (CSNB); 1 ♂, Mt. Marapok, iv. 1993, leg. Marc DE RIDDER (CSNB); 1 ♂, Crocker Range, 1200 m, iii. 1994, leg. MARTINI (CSNB); 1 ♂, Kenin-gau, 800 m, 10. viii. 1986, leg. MARTINI (CSNB); 1 ♂, Crocker Range, 16 miles NW Keningau, 1400 m, 2.–26. iv. 1984, leg. S. NAGAI, ex coll. ARITA, via A. KALLIES, (CSNB); 1 ♂, Crocker Range, Mt. Alab, 1600 m, 15.–24. ii. 2000, leg. P. SPONA & R. ZENKER (CSLL); 3 ♂♂, Trus Madi, 1600 m, iv. 1997, leg. B. & C. MARTINI (CSNB); 1 ♂, Kinabalu Nat. Park, Headquarters area, 1560 m, sample Sat. 36, open area with mountain rainforest, 17. xi. 1989 at light, leg. M. J. & J. P. DUFFELS, GP 856/95 W. A. NÄSSIG (ZMA); 5 ♂♂, 1 ♀, Mt. Kinabalu, Eingang zum Nationalpark, 116° 32.688' E 06° 00.182' N [sic], 1509 m, 19.–28. iii. 2001, leg. S. LÖFFLER (CSLL).

Brunei: 1 ♂, Bukit Retak, 1618 m, montane forest, 25. iv. [19]81, leg. Lt. Col. M. G. ALLEN (BMNH); 2 ♂♂, Labi, 25. ix. 1992, leg. G. R. PING, GP 486/00 SNB (CSNB); 1 ♂, Labi,

24. ix. 1992, leg. G. R. PING (CMBH); 4 ♂♂, Ram Payon, Labi, 24. & 25. ix. 1992, 2 × 28. ix. 1997, leg. G. R. PING (CCGT in SMFL).

Additional material, no paratypes:

West Malaysia: 1 ♂, Cameron Highlands, vi. 1989, leg. H. F. WONG, GP 488/00 SNB (CSNB); 8 ♂♂, 2 ♀♀, Cameron & Genting Highlands, xii. 1980, iv. 1981, ii. 1982, viii. 1982, xi. 1982, viii. 1983 [as mentioned in LAMPE 1984: 10] (CRLN).

Indonesia, Sumatra: 1 ♂, N. Sumatra, Pakkat, 10. xi. 1985, leg. E. DIEHL, GP 552/87 W. A. NÄSSIG (CWAN in SMFL) (specimen illustrated in NÄSSIG et al. 1996: pl. 3, fig. 12).

Derivatio nominis: The new species is named in honour of my friend Ulrich Brosch, after his other patronship in the genus *Antheraea* now became a synonym.

Description

♂ (Figs. 1, 2, 9–14, 16): Antenna ochreous brown, 11.2–12.9 mm long, longest rami 2.9–3.2 mm, quadripec-tinate, apical 1.8 mm with very short rami and only

bipectinate. Length of right forewing from basis to forewing apex 53–63 mm (average 58.4 mm, $n = 15$; holotype 59 mm). Ground colour a dark greyish to chestnut brown with yellowish-orange markings. Proximal two thirds of costa grey, apical in wing colours, antemedian field orange, median field in dark ground colour, only anterior to the wing ocellus, along basal margin and apical anterior to the postmedian line orange pattern elements. Ocellus black bordered, then basal pink and white, to apical with yellow line, the center dark olive and yellow with hyaline center; 5–9 mm in diameter (average 7.3 mm, $n = 13$), hyaline center 2–5 mm (average 3.3 mm, $n = 13$) in maximum diameter. Anterior to the postmedian line a shadow of another dark wavy line, postmedian band itself nearly straight, just to lower wing margin a little indented at the veins. Postmedian area with a narrow violet shadow behind this line, then greyish and only the outer margin in center parts of the wing more or less darkened. Angle between lower and outer margin nearly rectangular, forewing apex quite falcate. Hindwing in same colour and pattern, wing ocellus 4.5–8 mm in maximum diameter (average 6.5 mm, $n = 13$), hyaline center 1–2.5 mm (average 1.5 mm, $n = 13$) in maximum diameter. Postmedian area darker than on forewing, suffused with orange scales.

Underside greyish with brown antemedian line, broad median line through the wing ocelli and outer margin. Ocelli without the pink colour. On forewing apex near the costal margin and on hindwing near upper margin a typical black patch, on the hindwing a row of additional dark violet marginal patches, one each between the veins.

♂ **genitalia** (Figs. 17, 18): As already mentioned in many descriptions of *Antheraea* species, the differences of ♂ genitalia within the so-called *mylitta/frithi*-group are only minor between the different species. So, due to similar “architecture”, only minor differences between different species of Borneo *Antheraea* in size of certain structures can be found. The aedeagus in *A. (A.) broschii* with a length of about 9.0 mm is the longest among Sundanian *mylitta/frithi*-group members, compared to *A. (A.) gschwandneri* (Fig. 22) with 6.6–7 mm, *A. (A.) moultoni* (Fig. 19) with ca. 8.0 mm, *A. (A.) steinkeorum* (Figs. 23–25) with 7.8–8.4 mm, or *A. (A.) zwicki* (Figs. 20, 21) with ca. 8.3 mm. The dorsal processi of the valvae on their dorsal margin with a row of bristles similar in size to *A. (A.) zwicki*, but shorter than in *A. (A.) gschwandneri* or *A. (A.) steinkeorum*. While in *A. (A.) broschii* and *A. (A.) gschwandneri* the two large bristles of these processi are ending nearly in a pointed tip, the longer ones in *A. (A.) steinkeorum* and also *A. (A.) moultoni* are ending more club-like.

♀: As typical for the genus *Antheraea*, the ♀ has much less falcate wings with much larger wing area, the hyaline part of the wing ocelli is much bigger, and the markings are less intensive. In the following mainly the differences to ♂ specimens are noted: Antenna ochreous

brown, ca. 11 mm long. Length of right forewing from basis to forewing apex 71–80 mm (average 74 mm, $n = 3$). Ground colour variable, so far greyish, greyish brown and chestnut brown morphs are known. Wings with all the same pattern elements, but hyaline part of forewing ocellus 11–13.5 mm in maximum diameter, of hindwing ocellus 5.5–6.0 mm. Outer margin of the postmedian band with more pinkish or red scales than in ♂♂. The underside again more greyish and lighter than upperside.

Discussion

It is unclear why this new taxon remained unnamed such a long time. Perhaps mainly this was due to ignorance of existing type material as well as the resulting confusion in literature. The new species was figured several times (e.g., LAMPE 1984, 1985, HOLLOWAY 1987), but none of the authors ever tried to solve the problem by examining the original descriptions and types of the taxa involved.

So far, no records of the new species exist from the huge Indonesian part of Borneo (Kalimantan) and from Sarawak, East Malaysia. The reason most probably might be the general lack of collecting in these hardly accessible areas; when searched for, *A. (A.) broschii* should be found in the mountainous areas of the southern parts in Borneo as well.

From southeastern Borneo around Samarinda the author located two ♀♀ with nearly identical data, one each in the collections of Nationaal Natuurhistorisch Museum Naturalis, Leiden, Netherlands (Fig. 5), and in Museum Zoologicum Bogoriense, Cibinong, Indonesia. Both bear the handwritten label “Samarinda, E. Borneo, ca. 50 m, leg. Mrs. WALSH”, the Leiden specimen a determination label “♀ *Antheraea samarindana* TOX. [= TOXOPEUS] n. subsp., Type”. This obviously is a nomen nudum; no description by TOXOPEUS for this taxon was found so far (compare PAUKSTADT et al. 2000: 14). Both specimens most probably do not belong to the taxon *broschii*, the ♀♀ look quite different.

After all this we now know the following closely related taxa in the *mylitta/frithi*-group (plus others which may be not so closely related or so far were not confused with those dealt with in this work) from Sundaland:

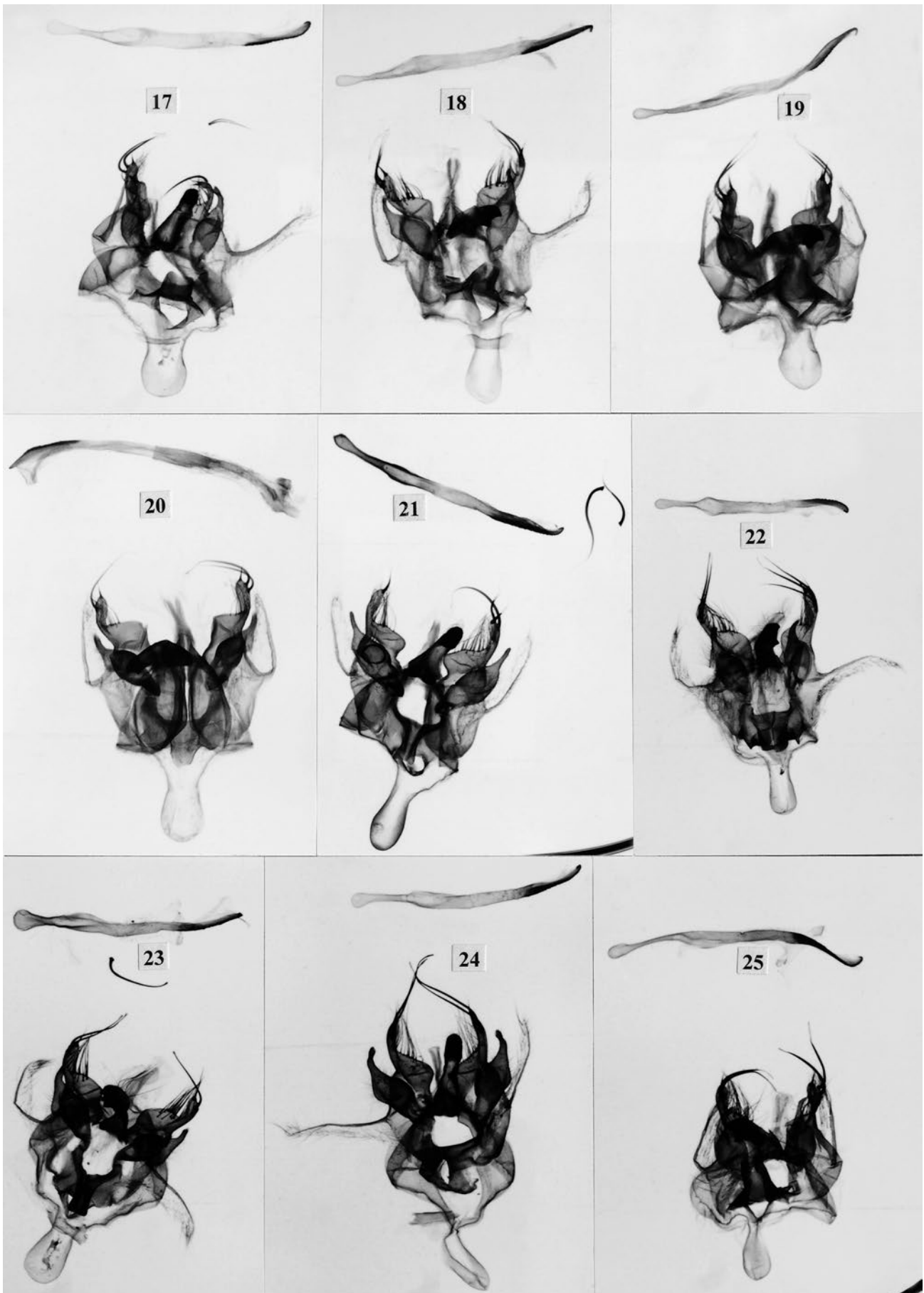
A. (A.) gschwandneri from Sumatra, southern Thailand and southern Myanmar, with its typical yellow-brownish and often violet colouration;

A. (A.) sumatrana, endemic to Sumatra;

A. (A.) moultoni, endemic to Borneo, with closed wing ocelli with no or only minor hyaline centre; in Brunei most recently unusual dark brown ♂ specimens were collected, samples are in CCGT (Fig. 8);

A. (A.) alleni, a very small endemic of Borneo which cannot be confused with any other taxon;

A. (A.) zwicki from Palawan Island, Philippines, and now also known from Brunei, Borneo, to be distinguished from *A. (A.) moultoni* by its hyaline centres in the wing ocelli and by its wing pattern;



Black & white plate: ♂ genitalia of Sundanian *Antheraea* of the *mylitta/frithi*-group. Fig. 17: *A. broschii* spec. nov., Sabah, GP 489/00 SNB [S. NAUMANN]. Fig. 18: *A. broschii* spec. nov., West Malaysia, GP 488/00 SNB. Fig. 19: *A. moultoni*, Brunei, GP 495/00 SNB. Fig. 20: *A. zwicki*, Brunei, GP CBH [U. BROSCHE] 065 = 629 UPW [U. PAUKSTADT]. Fig. 21: *A. zwicki*, Palawan, GP 494/00 SNB. Fig. 22: *A. gschwandneri*, Myanmar, GP 490/00 SNB. Fig. 23: *A. steinkeorum*, Thailand, GP 491/00 SNB. Fig. 24: *A. steinkeorum*, West Malaysia. Fig. 25: *A. steinkeorum*, Sabah. — Figures 17–25 at the same scale. Photographs U. BROSCHE.

A. (*A.*) *steinkeorum* from southern parts of Myanmar and Thailand, West Malaysia, Sumatra, and Borneo; and A. (*A.*) *broschi*, described here from Borneo, West Malaysia, and Sumatra;

further the Sulawesian relative A. (*A.*) *celebensis*, which I consider at the moment to be restricted to Sulawesi and adjacent smaller islands.

Acknowledgements

For their help in various ways I would like to thank the following persons: Yutaka ARITA (Nagoya), Martin BEEKE (Hille), Ulrich BROSCHE (Hille), David GOODGER (London), Willem HOGENES (Amsterdam), Rienk DE JONG (Leiden), Axel KALLIES (Berlin), Rudolf E. J. LAMPE (Nürnberg), Swen LÖFFLER (Lichtenstein), Karl MARTINI (Ingolstadt), Frank MEISTER (Prenzlau), Wolfgang A. NÄSSIG (Frankfurt am Main), Richard S. PEIGLER (San Antonio), Glen R. PING (Bandar Seri Begawan), Yayuk SUHARDJONO, and Hari SUTRISNO (both Cibinong).

References

- ALLEN, M. G. (1981): The saturniid moths of Borneo with special reference to Brunei [including appendix by J. D. HOLLOWAY, pp. 121–126]. — *Brunei Museum Journal* 5: 100–126.
- BROSCHE, U., NAUMANN, S., PAUKSTADT, L. H., PAUKSTADT, U., TCHERNIAK, I., & BEEKE, M. (1999): Anmerkungen zur Brahmaeiden- und Saturniidenfauna von Laos und Kambodscha (Lepidoptera: Bombycoidea). — *Galathea, Berichte des Kreises Nürnberger Entomologen*, **Suppl.** 6: 33–58.
- FELDER, C., & FELDER, R. (1861): *Lepidoptera nova a D^{no} Carolo SEMPER in insulis Philippinis collecta diagnosibus exposuit C. et R. FELDER, Series prima*. — *Wiener Entomologische Monatsschrift* 5 (10): 297–306.
- HOLLOWAY, J. D. (1976): Moths of Borneo with special reference to Mount Kinabalu. — *Kuala Lumpur (Malay. Nature Soc., Sabah Found.)*, 264 pp.
- (1981): Appendix. The genus *Cricula* WALKER and the *Antheraea friihi* MOORE group. — Pp. 121–126 in: ALLEN, M. G., *The saturniid moths of Borneo with special reference to Brunei*. — *Brunei Museum Journal* 5: 100–126.
- (1987): *The Moths of Borneo*. Part 3, [internal title: Superfamily Bombycoidea], Lasiocampidae, Eupterotidae, Bombycidae, Brahmaeidae, Saturniidae, Sphingidae. — *Kuala Lumpur (Southdene)*, 199 pp, 163 b&w pls, 20 col. pls.
- , & HALL, R. (1998): SE Asian geology and biogeography: an introduction. — Pp. [1]–23 in: HALL, R., & HOLLOWAY, J. D. (eds.), *Biogeography and geological evolution of SE Asia*. — Leiden (Backhuys Publishers), [iv] + 417 pp.
- , NAUMANN, S., & NÄSSIG, W. A. (1996): *The Antheraea HÜBNER (Lepidoptera: Saturniidae) of Sulawesi, with descriptions of new species*. Part 2: The species of the *friihi*-group. — *Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main*, N.F. 17 (3): 225–258.
- ICZN (= International Commission on Zoological Nomenclature) (1999): *International Code of Zoological Nomenclature [ICZN]*. — London (International Trust for Zoological Nomenclature), XXIX + 306 pp.
- LAMPE, R. E. J. (1984): *Die Saturniiden der Cameron- und Genting-Highlands in West-Malaysia (Lepidoptera: Saturniidae)*. — *Neue Entomologische Nachrichten, Keltern*, 11: 2–15, 8 pls.
- (1985): *Malayan Saturniidae from the Cameron & Genting Highlands. A guide for collectors* [internal title: *The Saturniidae of the Cameron and Genting Highlands of Western Malaysia*]. [English translation of LAMPE (1984).] — Faringdon (E. W. Classey), 16 pp., 8 pls.
- MOORE, F. (1859): *Synopsis of the known Asiatic species of Silk-producing Moths, with descriptions of some New Species from India*. — *Proceedings of the Scientific Meetings of the Zoological Society of London (London)*, 27: 237–270; *Annulosa*, pls. LXIV–LXV.
- NÄSSIG, W. A. (1991): *New morphological aspects of Antheraea HÜBNER and attempts towards a reclassification of the genus (Lepidoptera, Saturniidae)*. — *Wild Silkmoths '89/'90* (eds. H. AKAI & M. KIUCHI): 1–8.
- , LAMPE, R. E. J., & KAGER, S. (1996): *The Saturniidae of Sumatra (Lepidoptera)*. [Including: Appendix I: The preimaginal instars of some Sumatran and South East Asian species of Saturniidae, including general notes on the genus *Antheraea* (Lepidoptera).] — *Heterocera Sumatrana, Göttingen*, 10: 3–170.
- , & TREADAWAY, C. G. (1998): *The Saturniidae (Lepidoptera) of the Philippines*. — *Nachrichten des Entomologischen Vereins Apollo, Frankfurt am Main*, **Suppl.** 17: 223–424.
- NAUMANN, S. (1995): *Die Saturniidenfauna von Sulawesi, Indonesien*. — *Doctoral thesis, Freie Universität Berlin*, 145 pp., 15 col. pls., 2 b&w pls.
- NIEPELT, W. (1918): *Fam. Saturniidae*. — P. [1] in: NIEPELT, W. (ed.), *Nachträge zur Lepidoptera Niepeltiana*. [with contributions by E. STRAND and W. NIEPELT]. — [Supplement to:] *Lepidoptera Niepeltiana, Abbildungen und Beschreibungen neuer und wenig bekannter Lepidoptera aus der Sammlung W. NIEPELT* [ed. W. NIEPELT, worked upon by E. STRAND], 2 parts. — Zirlau (W. NIEPELT), pp. [1]–4, pls. XII–XVIII.
- (1926): *Zwei neue indo-australische Saturniden* [sic]. — *Internationale Entomologische Zeitschrift, Guben*, 20 (29): 257–259., 1 pl.
- PAUKSTADT, U., BROSCHE, U., & PAUKSTADT, L. H. (2000): *Preliminary checklist of the names of the worldwide genus Antheraea HÜBNER, 1819 („1816“)* (Lepidoptera: Saturniidae). Part I. — *Galathea, Berichte des Kreises Nürnberger Entomologen*, **Suppl.** 9: 1–59.
- , & PAUKSTADT, L. H. (1999): *Antheraea (Antheraea) ulrich-broschi* n. sp., eine neue Saturniide von West Malaysia (Lepidoptera: Saturniidae). — *Galathea, Berichte des Kreises Nürnberger Entomologen*, **Suppl.** 6: 90–98.
- , —, & BROSCHE, U. (1998): *Antheraea (Antheraea) myanmarensis* n. sp., eine neue Saturniide von Südostasien (Lepidoptera: Saturniidae). — *Entomologische Zeitschrift, Essen*, 108 (2): 57–64.
- , —, & — (1999): *Antheraea (Antheraea) steinkeorum* n. sp., eine neue Saturniide von Südostasien (Lepidoptera: Saturniidae). — *Galathea, Berichte des Kreises Nürnberger Entomologen*, **Suppl.** 6: 81–89.
- WATSON, J. A. (1915): *Some new forms of Malayan Saturnidae* [sic]. — *Tijdschrift voor Entomologie* 58: 279–280.
- (1927): *Some new Asian Saturnidae* [sic] (Lep. Het.). — *The Entomologist* 1927: 35–38.

Received: 3. v. 2001

ZOBODAT - www.zobodat.at

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Nachrichten des Entomologischen Vereins Apollo](#)

Jahr/Year: 2001

Band/Volume: [22](#)

Autor(en)/Author(s): Naumann Stefan

Artikel/Article: [Notes on some Antheraea of Sundaland, with description of a new species 67-74](#)