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* Hübnner, 1819 ("1816") in the subgenus *Antheraea* from Sundaland is described: *A. (A.) broschi* 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 alloctype 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.) ulrichbroschi* 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)


Introduction

Within the genus *Antheraea* Hübnner, 1819 ("1816"), three subgenera are known (Nässig 1991; Telea Hübnner, 1819 ("1816"), *Antheraeopsis* Wood-Mason, 1886 and *Antheraea* Hübnner, 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 lateron 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 morpshpecies 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 Sunda-nian 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 CGT, CWAN) and in CUBH were examined during the preparation of the present publication; this series is conspecific to the pair of synotypes 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. 1. 1997, leg. G. R. Pinc”. 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 & Brosch 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 Nässis 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 & Brosch; 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.) friathi 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 Nässis 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 SCHINTLMESTER 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/ fri thi-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 Broschi 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 southeastern 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 Nässis 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.) allenii Holloway, 1987, and A. (A.) zwickei, 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. TREADEAWAY, now in SMFL.
CMBH collection Martin Beek, Hille, Germany.
CSLL collection Swen LÖPFLEER, Lichtenstein, Germany.
CSNB collection Stefan NAUMANN, Berlin, Germany.
CRLN collection Rudolf E. J. LAMPE, Nürnberg, Germany.
CWAN collection Wolfgang A. Nässis, now in SMFL.
SMFL Lepidoptera collection of the Senckenberg-Museum, Frankfurt am Main, Germany.
ZMA Institut voor Systematiek en Populatiebiologie (Zoölogisch Museum), Afdeling Entomologie, Amsterdam, The Netherlands.

Antheraea (Antheraea) broshi n. sp.
Holotype (Figs, 1, 2): ♂, Ostmalaysia, Sabah, Kinabalu Park Headquarters, 1500 m, 13.–25. ii. 2000, LF, leg. R. ZERKER, 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-Uni-
versität zu Berlin, Germany.
Paratypes (in total 37 ♂♂, 3 ♀♀):
imen 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 broschi spec. nov. ♂, holotype, dorsal. Fig. 2: A. broschi 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. TOXOPUS", nomen nudum). Fig. 6: Antheraea sp. ♂, dorsal, paratype of A. ulrichbroschi, 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. BROSCH.
ingly. The other paratypes with blue paratype labels: 2 ♂♂, same data as holotype (CSNB); 1 ♂♂, 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 Rudder (CSNB); 1 ♂, Crocker Range, 1200 m, iii. 1994, leg. Martini (CSNB); 1 ♂, Keningau, 800 m, 10. v. 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).


Additional material, no paratypes:


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.) broschi 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.) broschi 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.) broschi 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 National 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 broschi, 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. broschi spec. nov., Sabah, GP 489/00 SNB [S. NAUMANN]. Fig. 18: A. broschi 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. BROSCH] 065 = 629 UPW [U. PAUKSTART]. 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. BROSCH.
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 realative 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 Brosch (Hille), David Goedder (London), Willem Hogenes (Amsterdam), Rienk de Jong (Leiden), Axel Kallies (Berlin), Rudolf E. J. Lampe (Nürnberg), Swen Löfler (Lichtenstein), Karl Martin (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 Bchinong).

References


Received: 3. v. 2001