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New Species in the Genus *Sarbena* WALKER, 1862 Investigations on Asian Nolidae I (Lepidoptera, Nolidae)

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Abstract

The present paper contains the descriptions of four new species of the Noline genus *Sarbena* WALKER, 1862 (*Sarbena sumatrana* sp. nov., *S. ketipati* sp. nov., *S. hollowayi* sp. nov. and *S. inouei* sp. nov.) and additional data to the knowledge of the taxonomy and distribution of *Sarbena ustipennis* (HAMPSON, 1895) and *S. lignifera* WALKER, 1862. The publication is illustrated by twenty figures.

Key words: Nolidae, *Sarbena*, new species, new records.

Zusammenfassung

Die vorliegende Arbeit enthält Neubeschreibungen von vier Arten der Noliniine Gattung *Sarbena* WALKER, 1862 (*Sarbena sumatrana* sp. nov., *S. ketipati* sp. nov., *S. hollowayi* sp. nov. und *S. inouei* sp. nov. sowie neue Erkenntnisse zur Taxonomie und Verbreitung von *Sarbena ustipennis* (HAMPSON, 1895) und *Sarbena lignifera* WALKER, 1862.

Introduction

Sarbena WALKER, 1862 is a rather characteristic genus of the Nolidae, the external appearance and structure of the genitalia of its species are quite unique within the whole family. The last taxonomic (and faunistical) work dealing with the genus was published by INOUE (1996) clarifying the specific status of *Sarbena ustipennis* (HAMPSON, 1895), which has long been considered as synonymous with the type species of the genus, *S. lig-*

nifera WALKER, 1862. In his paper he reported the first Japanese records of *S. ustipennis* from Okinawa and described the preimaginal stages and the foodplant of this species.

The recent faunistical exploration of the eastern Asian Lepidoptera fauna resulted from a vast material of the Nolidae from this area. The treatment of this new stock of material led to a much better understanding of the distribution of the genus, giving also the chance for a more detailed taxonomic analysis of the *Sarbena* species found in Nepal, Thailand, Vietnam, Taiwan, the Philippines, Indonesia and Melanesia. As a result of the taxonomic investigation of the new material (preserved in the collections of BMNH, HNHM, HSS, MWM, TFRI, ZFMK, ZMUC, G. BEHOUNEK and M. FIBIGER) significant, sometimes conspicuous differences were found between the genitalia of the otherwise externally hardly distinguishable species.

The material examined contains altogether six species, including the two formerly described taxa mentioned above, the other four species are new to science. The genus seems to be a typical tropical-subtropical group, its northernmost occurrence is Okinawa. *Sarbena* species are found regularly at the lower or medium-high elevations within their ranges.

The data about the preimaginal stages and the bionomics of the species of the genus should be used critically, due to the problems of their identification. The populations treated formerly as *S. lignifera* represent a complex of numerous, partly sympatric *Sarbena* species whose identification can be done satisfactorily only by the examination of their genitalia. Thus, the former records for the preimaginal stages and foodplant of *S. lignifera* (BIGGER 1988) require confirmation. On the other hand, the bionomical data given by INOUE (1996) for *S. ustipennis* are already supported by the proper identification based on the study of the male genitalia of the reared specimen.

The present paper contains the descriptions of four new *Sarbena* species found in the above mentioned vast area, as well as new records of distribution of *S. ustipennis* (HAMPSON, 1895) and *S. lignifera* WALKER, 1862. As the different species have no reliable external differences, the diagnoses and the descriptions are based on their genital features. The external appearance of each species is shown on the pictures.

Abbreviations: BMNH = The Natural History Museum, London; HNHM = Hungarian Natural History Museum, Budapest; HSS = Heterocera Sumatrana Society, Goettingen; MWM = Museum Witt, Munich; TFRI = Taiwan Forestry Research Institute, Taipei; ZFMK = Zoologisches Forschungsinstitut und Museum Alexander Koenig, Bonn; ZMUC = Zoological Museum of the University, Copenhagen; LGN = Nolidae genital slide of Gyula LÁSZLÓ; W = slide of the WITT Museum, Munich.

Sarbena WALKER, 1862

Sarbena WALKER, 1862, J. Proc. Linn. Soc. (Zool.) 6: 137. Type-species: *Sarbena lignifera* WALKER, 1862, ibidem 6: 137, by monotypy. Type-locality: Borneo, Sarawak. Lectotype, male, designated (as type) by SWINHOE, Cat. east and Aust. Lepid. Heterocera 2: 589.

The characteristic external appearance of the species belonging to the genus *Sarbena* WALKER, 1862 is rather unique within the family Nolidae. The most conspicuous external feature is the beige-brown ("ligneous") ground colour of the forewing with darker brown,

relatively broad longitudinal stripes at the costal and ventral margins and at the middle of the wing. The species are relatively large (wingspan: 20-30 mm, length of forewing: 9-15 mm) comparing with most species of the subfamily Nolinae. The genus displays relatively strong sexual dimorphism being expressed in the different size of body (the males are much smaller than the females) and the configuration of the antenna (bipectinate in males, filiform in females). This feature is not rare in the family, but usually less expressed than in case of *Sarbena*. The structure of the male genitalia is even more characteristic than the external appearance. The presence of the usually well-developed penicular lobes and the large, acute, thorn-like process of the harpe and ampulla are completely unique within the Nolinae; in addition the simple, narrow, elongate, slightly curved aedeagus is also very characteristic to this genus. The female genitalia display also unical features, by its typical, narrow, stick-like twin signa of the corpus bursae and the presence of a membranous, globular appendix.

The species of the genus cannot be distinguished by their external features, the correct identification requires the examination of the genitalia. In spite of the uniform external appearance, the genitalia show conspicuous specific differences in both sexes. On the basis of the male genitalia the genus can obviously be divided into three species-groups which are as follows:

The *lignifera* group: The only described species belonging to this group has a large, very broad, deeply incised, apically pointed, bifid uncus, a reversed triangular tegumen, rather short penicular lobes, distally opened fultura inferior, relatively broad and short, slightly curved valva without saccular lobes and a very narrow and long, slightly curved aedeagus. Species of the group: *lignifera* WALKER, 1862.

The *ustipennis* group: The species of this group have a relatively short and narrow, bifid uncus with variously deep medial incision, an elongate trapezoidal tegumen, well developed, thorn-like penicular lobes and distally opened fultura inferior, rather narrow and long valva without saccular lobes and a relatively broad and short, slightly curved aedeagus. Species of the group: *ustipennis* (HAMPSON, 1895), *sumatrana* sp. nov., *ketipati* sp. nov.

The *hollowayi* group: The species of this group have a simple, short and narrow, apically pointed or rounded uncus, an elongate-quadrangular tegumen, well developed, strongly lobate peniculi, apically fused arms of fultura inferior, relatively broad and long valva with saccular lobe or well-developed saccular processi; the aedeagus is similar to that of the *ustipennis* group. Species of the group: *hollowayi* sp. nov., *inouei* sp. nov.

Descriptions of the new species

Sarbena sumatrana sp. nov. (Figs 1, 2, 11, 12)

Holotype: ♂, "Sumatra, Prapat HW3 [= Holzweg 3 = wood road 3], 25.10.1984, Dr. DIEHL leg."; slide No. LGN 419 (coll. HSS).

Paratypes: Sumatra: 4♂♂, from the same site as the holotype, but collected at 6.II.1983, 2/3.III.1984, 30.XI.1982, 24.I-8.III.1985 (slides No. LGN 416, 413, 423, 420); 2♀♀, same site, but collected at 30.XI.1982, 21.X.1982 (slides No. LGN 421, 422); 2♀♀, Sitahoan, 1.XII.1981, 24/25.XII.1981 (slides No. LGN 424, 427); 1♀, Aek Nauli, Sima-

lungen, Prapat, Holzweg 3, 1040-1150 m, 4.XI.1983, DIEHL, E.W. leg. (slide No. LGN 508 = W8272) (coll. HSS, HNHM, Budapest and MWM, Munich). Java: 1 ♀, Nongkodjadjar, 4000', I.1934, leg. A.M.R. WEGNER (slide No. LGN 736) (coll. BMNH).

Diagnosis: The new species is closely related to *S. ustipennis*, but differs from it by the following features: the base of the uncus of *S. sumatrana* is significantly narrower than that of *S. ustipennis*, the articulation between uncus and tegumen is much more flexible in the new species than in *S. ustipennis*. The apical part of the arms of the uncus is tapering in *S. sumatrana*, while that of *S. ustipennis* is truncate. The thorn-like penicular lobe of the tegumen of the new species is somewhat shorter, broader, more robust than that of *S. ustipennis*. The configuration of the harpe shows also a remarkable difference between the two species: the stronger process of *S. sumatrana* is significantly shorter than that of *S. ustipennis*. The two closely related species display slight, but significant differences in the configuration of female genitalia, too. The new species has somewhat longer papillae anales than *S. ustipennis*; the 8th tergite is somewhat narrower, the eighth sternite somewhat longer than those of *S. ustipennis*. The two, stick-like signa of the corpus bursae are obviously shorter and narrower in *S. sumatrana* than in *S. ustipennis*.

Male genitalia (Fig.11). Uncus bifid, medially deeply incised, arms of uncus almost straight, tapering, apically pointed. Base of uncus much narrower than distal margin of tegumen, articulation between uncus and tegumen rather flexible. Tegumen broad, trapezoidal, with robust, basally broad, apically pointed, relatively short, thorn-like penicular lobe. Fultura inferior short, horseshoe-shaped with divergent arms, broad at base; vinculum rather short. Valva narrow, relatively long, medially slightly constricted, proximal half strongly sclerotized, distal half membranous. Ampulla with two, more or less equal, rather short, strongly curved, apically pointed processi; harpe with two, more or less straight, apically pointed processi, ventral one twice as long as dorsal one. Tip of valva broadly rounded, membranous. Aedeagus rather narrow, medium long, slightly curved, tapering. Vesica membranous, without cornuti field.

Female genitalia (Fig.12). Ovipositor slightly elongated, papillae anales trapezoidal, apophyses posteriores rather short. 8th tergite conspicuously short, ribbon-like, relatively narrow. Apophyses anteriores very short; last sternite medium long, trapezoidal. Ostium weakly sclerotized, tubular. Ductus bursae rather narrow, membranous, relatively short. Cervix bursae relatively broad, corpus bursae relatively large, elongated, sack-shaped, with two, separated, basally broad but suddenly tapering, medially and apically rather narrow, stick-like signa. Corpus bursae with membranous, globular appendix.

Bionomics and distribution. All but one specimens of *Sarbena sumatrana* are known from Sumatra, the exceptional specimen was collected in E. Java. The species is distributed most probably in the entire Sundaland. The species is supposedly multivoltine, the preimaginal stages and the foodplant are unknown.

Sarbena ketipati sp. nov. (Figs 3, 13)

Holotype: ♂, "Indonesia, Bali sept., 1 km N Lake Bulyan Desa Vanagiri, Dura tirta Ketipat, 1340 m, 14-16.1.1999, Nebelwald, leg. Karel CERNY" (slide No. LGN 388 = W9115) (ex coll. G. BEHOUNEK in coll. MWM).

Diagnosis: The new species displays closer relationship with *S. ustipennis* by its similar

structure of the harpe and ampulla, the bifid uncus and the simple, thorn-like peniculus. Nevertheless the two species are very easily distinguishable by the following features: The uncus of the new species is Y-shaped, narrower, moderately incised medially, while that of *S. ustipennis* is much larger, with V-shaped, much deeper medial incision. The penicular lobes of *S. ketipati* are shorter, basally much broader, somewhat volcano-like, while those of *S. ustipennis* are much longer, more robust, basally narrower, thorn-like. The new species has single, rather large, straight, thorn-like ampulla, while that of *S. ustipennis* has two, considerably shorter, curved processi. The harpe of *S. ketipati* armed with three, more or less straight, thorn-like processi projecting towards the costal margin of the valva, while that of *S. ustipennis* has only two, slightly curved processi, projecting towards the valval apex. The apical part of the valva of the new species is significantly narrower than that of *S. ustipennis*. The fultura inferior of both species is U-shaped, but much broader at base in *S. ketipati*, having conspicuously shorter apical arms than in *S. ustipennis*.

Male genitalia (Fig. 13). Uncus bifid, narrow at base, Y-shaped with relatively short and narrow, apically rounded arms. Tegumen elongated-trapezoidal; penicular lobes rather broad basally, relatively short, apically pointed, "volcano-like". Fultura inferior rather short, broad at base, with divergent, apically broadly rounded arms; vinculum rather short. Valva narrow, relatively long, with more or less parallel margins, slightly arcuate, proximal half strongly-sclerotized, distal half membranous; tip of valva broadly rounded. Ampulla single, robust, straight, apically pointed, thorn-like. Harpe consisted of three more or less straight, different long, robust, parallel, thorn-like processi, projecting towards the costal margin. Aedeagus rather narrow, medium long, slightly curved, tapering; vesica membranous, without cornuti field.

Female unknown.

Bionomics and distribution: The species is known only by its holotype, which is collected in the middle of January, on the island of Bali, at a middle elevation deciduous forest. The foodplant and preimaginal stages of the species are unknown.

Sarbena hollowayi sp. nov. (Figs 4, 5, 14, 15)

Holotype: ♂, "Vietnam, Prov. Nghe An, Distr. Que Phong, Ban Khom, 280 m, 19°40, 542'N, 104°54,147'E, 21-23.I.1999, leg. L. PEREGOVITS & G. RONKAY" (slide No. LGN 261 = W8266) (coll. MWM).

Paratypes: **Vietnam:** 1♂, with the same data as holotype (slide No. LGN 398) (coll. HNHM); 1♂, Fan-si-pan, Cha Pa, 2400 m, 22°15'N, 103°46'E, 8-29.V.1993, leg. SINJAEV & SIMONOV (slide No. LGN 384 = W9117) (ex coll. G. BEHOUNEK in coll. MWM). **India:** 1♂, Assam, Garampani, Nambor Reserve Forest, 26°00'N, 94°20'E, 100 m, 21-29.XI.1997, leg. SINJAEV & MURZIN (slide No. LGN 389 = W8269) (coll. MWM); 1♀, Sikkim, IX.1909, leg. F. MOLLER (slide No. LGN 735) (coll. BMNH). **Thailand:** 1♂, Nakhon Nayok Prov., Khao Yai Nat. Park, ca.700 m, 29.IX.-6.X.1984, leg. KARSHOLT, LOMHOLDT & NIELSEN (slide No. LGN 579) (coll. ZMUC). **Philippines:** 1♂, Palawan, S. Vicente, 20 km NE Roxas, 10,21°N, 119,10°E, 400 m, 12.I.-17.I.1988, leg. CERNY & SCHINTLMEISTER (slide No. LGN 768) (coll. ZFMK). **Sumatra:** 1♀, Prapat HW2, 17.X.1985 (slide No. LGN 414); 1♀, same site, 25.XII.1989 (slide No. LGN 507 = W8271); 1♀, Prapat, HW3, 21.X.1982; 1♀, same site, 21.IX.1983 (slide No. LGN 426); 1♂, Dolok

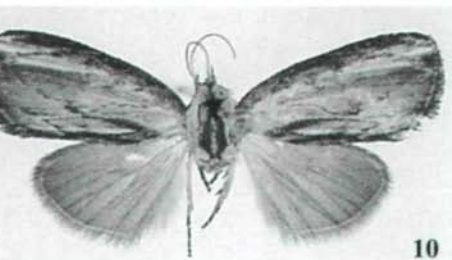
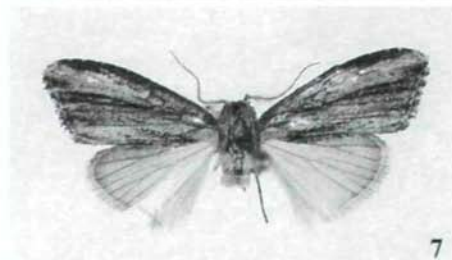
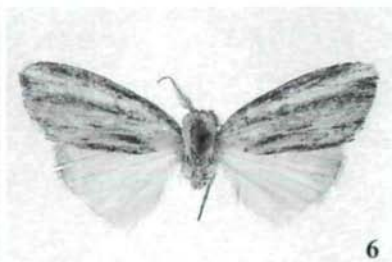
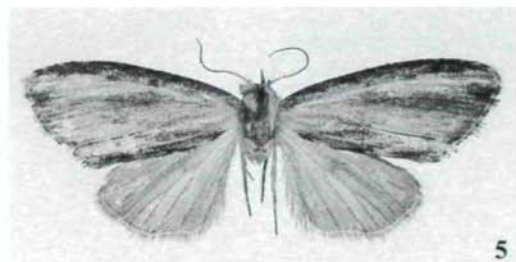
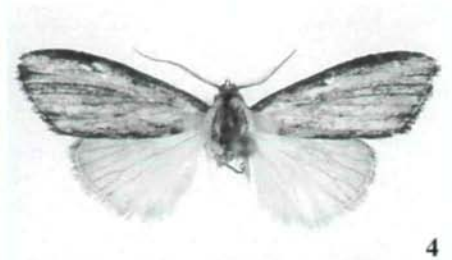
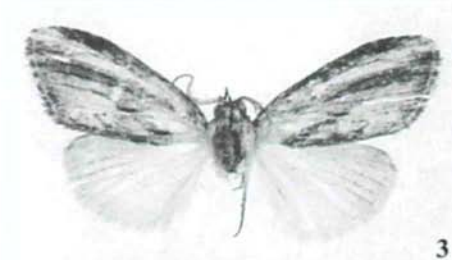
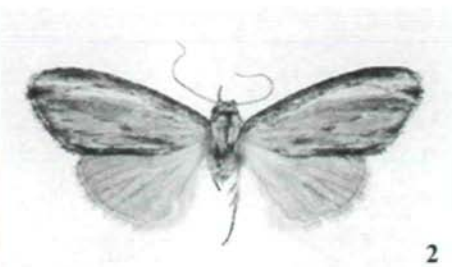
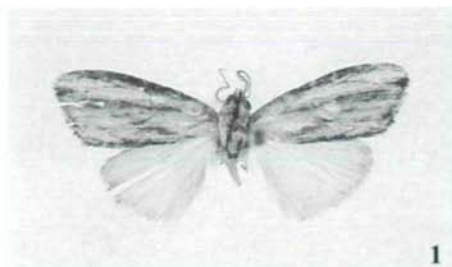
Merangir, 20.IV.-7.V.1981 (slide No. LGN 415); 1♂ 1♀, Sitahoan, 24-25.XII.1981 (slide No. LGN 417); 1♂, Ketambe, 30.XI.1981 (slide No. LGN 418); 1♀, Paritohan, 700 m, 2.XI.1980 (slide No. LGN 425); 1♀, Aek Tarum, Gunung Malayu, 4.I.1983 (slide No. LGN 429) (coll. HSS); 1♂, Siantor, 325-385 m, 21.XII.1998, leg. DIEHL (slide No. LGN 506 = W8270) (coll. MWM); 1♂, Bukit Subang, Air Sirah, 14.I.1984, leg. WIDEGDO (slide No. LGN 509 = W8273) (coll. MWM); 1♂, Rimbo Pauti, 250 m, 00°20'50"N, 100°04'07"E, 24-25.II.2002 (slide No. LGN 583); 1♂, Bukittingi, 980 m, 00°15'30"S, 100°21'13"E, 19.-23.II.2002, leg. K. LARSEN & M. FIBIGER (slide No. LGN 584) (coll. M. FIBIGER). **Malaysia:** 1♂, Selangor, Ulu Gombak Fieldstation 30km N Kuala Lumpur, A.III.1984, leg. NÄSSIG (slide No. LGN 428) (coll. HSS). **Celebes:** 1♂ 1♀, G. Tompoe, Paloe, 2700', II.1937 (slides No. LGN 737, 739); 1♂, Sidaonta, Paloe, 4500', VI.1937 (slide No. LGN 740); 1♂, Koelawi, Paloe, 3100', III.1937, leg. J.P.A. KALIS (slide No. LGN 741) (coll. BMNH). **Malaya:** 1♂ 1♀, Penang Batu Feringgi, 26 and 23.I.1966, leg. N.T. PAGDEN (slides No. LGN 742, 743) (coll. BMNH). **Seram:** 2♂♂, Kamarlan, 0-400 m, 3°20'N, 128°38'E, 16.I.-2.II.1986, leg. A. SCHINTLMEISTER (slides No. LGN 766, 767) (coll. ZFMK). **Papua New Guinea:** 1♂, Southern Highlands, Bosavi, 2300 ft, 7.I.1986, leg. D.J.L. AGASSIZ (slide No. LGN 744); 1♂, Aroa river, 1915, leg. A.S. MEEK (slide No. LGN 746) (coll. BMNH). **Irian Jaya:** 1♂, Oetakwa, Snow Mts, 3500 ft, X-XII.1910, leg. A.S. MEEK (slide No. LGN 745) (coll. BMNH). **Solomon Islands:** 1♀, Kolombangara, 12.VIII.1979, leg. M. BIGGER (slide No. LGN 738) (coll. BMNH).

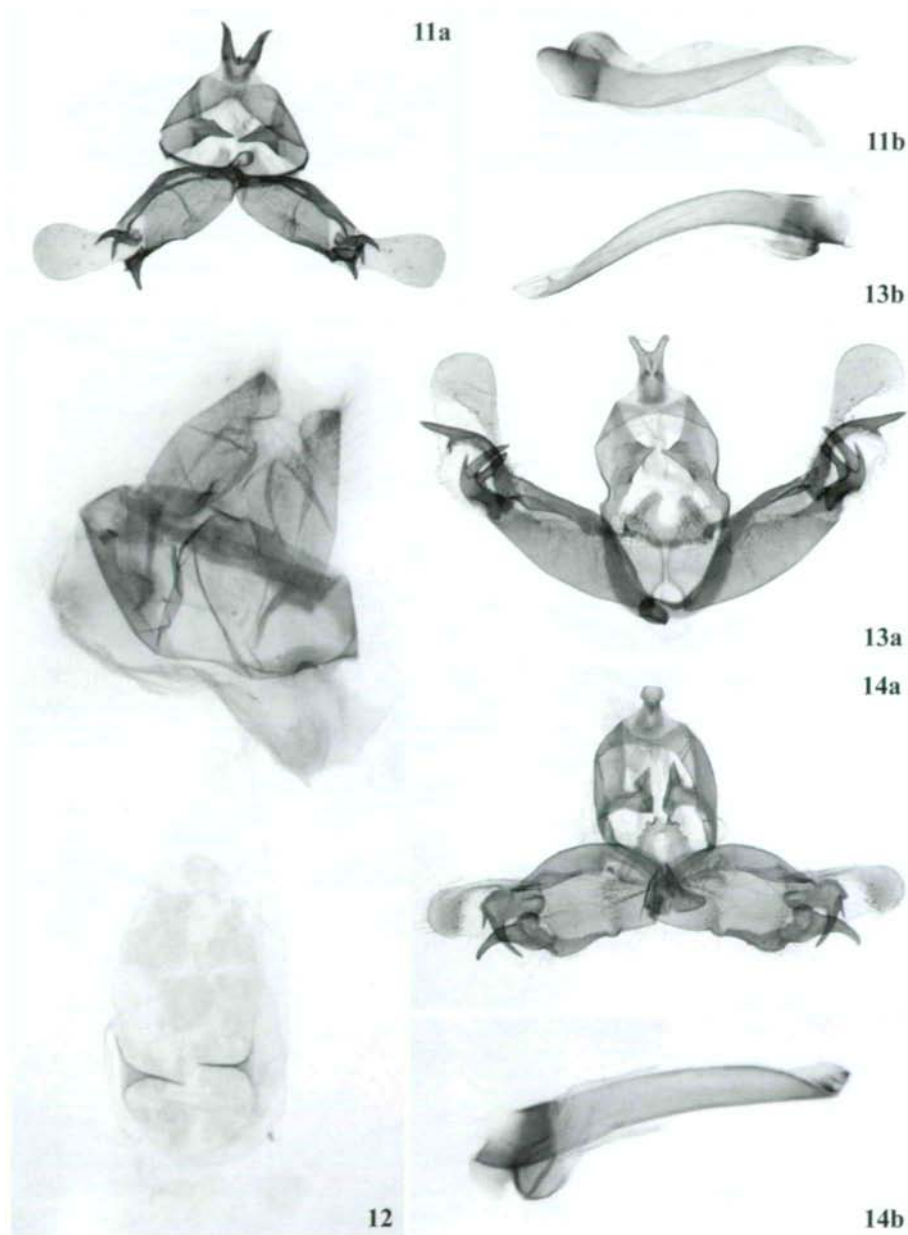
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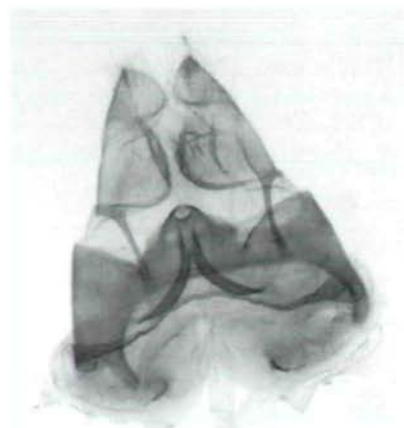
- Fig.1: *Sarbena sumatrana* sp.n., male, Holotype, Sumatra.
Fig.2: *Sarbena sumatrana* sp.n., female, Paratype, Sumatra.
Fig.3: *Sarbena ketipati* sp.n., male, Holotype, Bali.
Fig.4: *Sarbena hollowayi* sp.n., male, Holotype, Vietnam.
Fig.5: *Sarbena hollowayi* sp.n., female, Paratype, Solomon Islands.
Fig.6: *Sarbena inouei* sp.n., male, Holotype, Philippinen, Cebu.
Fig.7: *Sarbena lignifera* Walker, 1862, male, Thailand.
Fig.8: *Sarbena ustipennis* (Hampson, 1895), male, Thailand.
Fig.9: *Sarbena ustipennis* (Hampson, 1895), male, Japan.
Fig.10: *Sarbena ustipennis* (Hampson, 1895), female, Japan.

Genitalia:

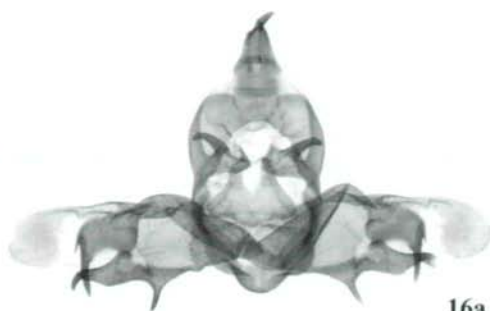
- Fig.11: *Sarbena sumatrana* sp.n., male, Paratype, Sumatra (LGN 420).
Fig.12: *Sarbena sumatrana* sp.n., female, Paratype, Sumatra (LGN 424).
Fig.13: *Sarbena ketipati* sp.n., male, Holotype, Bali (LGN 388).
Fig.14: *Sarbena hollowayi* sp.n., male, Holotype, Vietnam (LGN 398).
Fig.15: *Sarbena hollowayi* sp.n., female, Paratype, Sumatra (LGN 425).
Fig.16: *Sarbena inouei* sp.n., male, Holotype, Philippinen, Cebu (LGN 387).
Fig.17: *Sarbena lignifera* Walker, 1862, male, Philippinen (LGN 580).
Fig.18: *Sarbena ustipennis* (Hampson, 1895), male, Thailand (LGN 386).
Fig.19: *Sarbena ustipennis* (Hampson, 1895), male, Japan (LGN 510).
Fig.20: *Sarbena ustipennis* (Hampson, 1895), female, Japan (LGN 511).







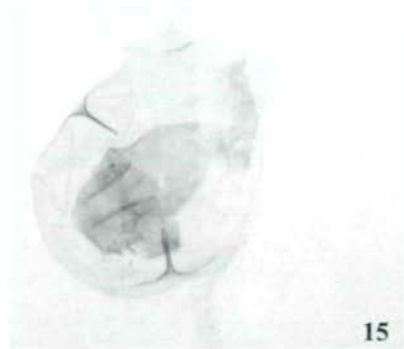
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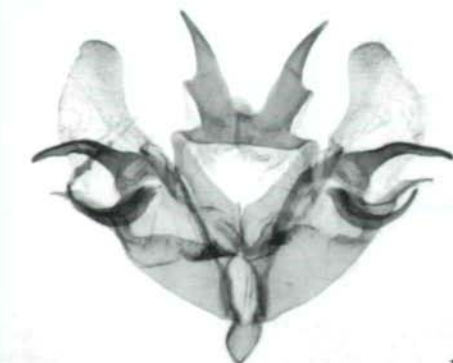
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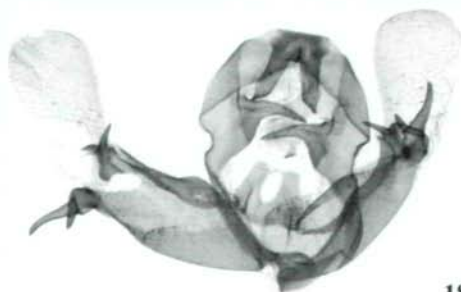
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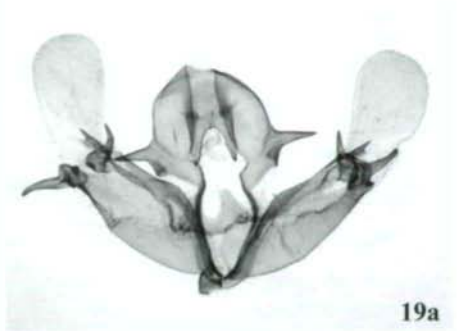
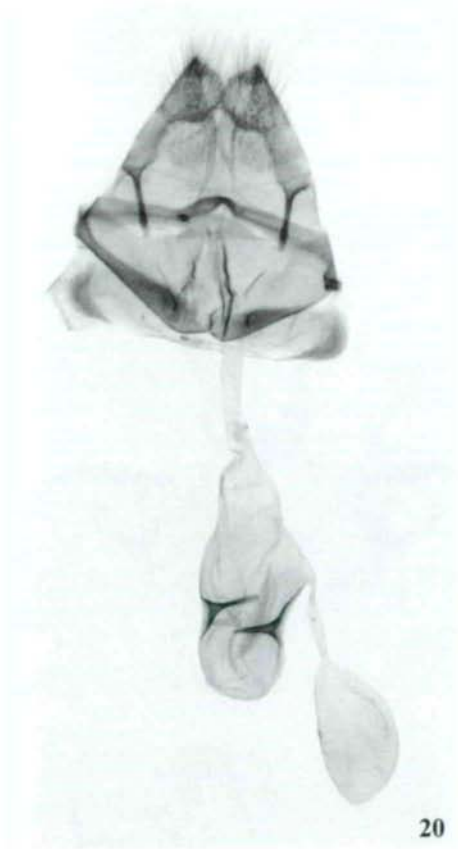
18a



18b



18a



Diagnosis: *Sarbena hollowayi* differs from all other species of the genus by its unique, apically broadened-rounded, somewhat mushroom-shaped uncus. The configuration of penicular lobe and fultura inferior of the new species, and the presence of saccular lobe display closer relationship with *Sarbena inouei* sp.n. Both species have proximally fused fultura inferior, with dentate apical part in *S. hollowayi* and without dentation in *S. inouei*. The penicular lobe of *S. hollowayi* and *S. inouei* are similarly elongate-quadrangular, but that of *S. hollowayi* has a trapezoidal, twisted-crenulate apical lobe, while that of *S. inouei* is armed with a large, slightly curved, thorn-like dorsal process. *S. hollowayi* has very short, rounded saccular lobe, which is an acute, thorn-like process in *S. inouei*.

Male genitalia (Fig.14). Uncus relatively short, basally narrow, apically broadened with a medially slightly incised, somewhat mushroom shaped, rounded plate. Tegumen quadrangular; penicular lobes elongate-quadrangular with trapezoidal, distally twisted and crenulate apical lobe. Fultura inferior deltoid-shaped, broad at base, apically fused, with well developed apical dentation; vinculum short. Valva rather broad at base, relatively short, proximal half strongly, distal one weakly sclerotized, apically rounded. Ampulla armed with a large, slightly arcuate thorn projecting towards the ventral margin of the valva, often with a rather small associate-spine basally. Harpe rather large, thorn-like, evenly arcuate ventrally; saccular lobe very short, broadly rounded. Aedeagus rather short, almost straight; vesica membranous, without cornuti field.

Female genitalia (Fig.15). Ovipositor trapezoidal, papillae anales rather short; apophyses posteriores medium-long. 8th tergite short, relatively broad, ribbon-like; apophyses anteriores very short. Ostium well-sclerotized, with strongly sclerotized, moderately curved, ribbon-like ostial plate, forming a reversed infundibulum. Ductus bursae narrow, relatively short; cervix bursae fine, membranous. Corpus bursae sack-like, laterally with a membranous, rather small, elongate appendix. Signum bursae consists of two separated, more or less equally long, narrow, pin-like processi.

Bionomics and distribution: The new species is broadly distributed in the subtropical parts of SE-Asia and the tropical islands of Indonesia, Melanesia and the Philippines. The type series contains specimens from Sikkim, Assam, Thailand, N. Vietnam, Malaysia, Sumatra, Celebes, the Philippines, Irian Jaya, Papua New Guinea and the Solomon Islands. It occurs sympatrically with *S. ustipennis*, *S. lignifera* and *S. sumatrana*. The polivoltine species inhabits similarly to the other *Sarbena* species the deciduous forests and secondary vegetations of the lower elevations. The early stages and the foodplant are unknown, the caterpillars feed probably on *Terminalia* species.

Sarbena inouei sp. nov. (Figs 6, 16)

Holotype: ♂, "Philippinen, Insel Z. Cebu, 5 km N Cebu-city, 250 m, (Sekundärbusch/Steppe) 10°20'N, 123°54'O, 8.-10. Okt. 1988, leg. CERNY & SCHINTLMEISTER" (slide No. LGN 387 = W9116) (ex coll. G. BEHOUNEK in coll. MWM).

Paratypes: 1♂, "Philippines, Balabac, Dalawan Bay, 7. Oct. 1961, Noona Dan Exp. 61-62, Caught by Mercury-light, 19.00-06.00" (slide No. LGN 582) (coll. ZMUC); 1♂, Philippines, Mindoro Occid., 10 km E San Jose, Paciol, 12°22'N, 121°08'E, 100 m, 28.I.-4.II.1988, leg. CERNY & SCHINTLMEISTER (slide No. LGN 769) (coll. ZFMK).

Diagnosis: The new species differs from all other *Sarbena* species by its simple,

apically pointed uncus and the presence of the acute, thorn-like saccular process. Its closest relative is *S. hollowayi*, the relationship is expressed by the similar basic structure of the uncus, penicular lobes and harpe-ampulla complex, in addition the similar shape of valva. The between the two species are given in the diagnosis of *S. hollowayi*.

Male genitalia (Fig. 16). Uncus simple, relatively short, broad at base, tapering, apically pointed. Tegumen short-quadrangular, peniculi elongate-quadrangular, with a rather long, robust, slightly arched, evenly tapering, apically narrowly rounded dorsal process. Fultura inferior deltoidal-shaped, rather broad at base, distally fused with finely scobinated membrane; vinculum rather short. Valva broad at base, relatively short, proximal half strongly, distal one weakly sclerotized, apically rounded. Ampulla armed with a large, straight thorn projecting towards the ventral margin of the valva, often with a rather small associate-spine basally. Harpe rather robust, thorn-like, evenly sinuous; sacculus with a conspicuous, relatively long, acute, straight, thorn like process. Aedeagus rather short, slightly curved; vesica membranous, without cornuti field.

Female unknown.

Bionomics and distribution: The species seems to be restricted to the south-western islands of the Philippines, the specimens of the type-series were collected in the lower parts of Cebu, Palawan and Mindoro. The species is probably multivoltine, inhabiting the low altitude deciduous forests and the secondary vegetation. The foodplant and the pre-imaginal stages are unknown.

Sarbenia lignifera WALKER, 1862 (Figs 7, 17)

Sarbenia lignifera WALKER, 1862, J. Proc. Linn. Soc. (Zool.) 6: 137. Type-locality: Borneo, Sarawak. Lectotype, male, designated (as "type") by Swinhoe, Cat. east and Aust. Lepid. Heterocera 2: 589.

Type material examined. Lectotype male: the drawing of its genitalia made by Prof. H. INOUE; slide No. 395-1959 (Coll. Hope Department, Oxford).

Additional material examined. **Philippines:** 1♂, Balabac, Dalawan Bay 8.X.1961, leg. Noona Dan Exp. (slide No. LGN 580) (coll. ZMUC). **Thailand:** 1♂, Prov. Chiang Mai, between Chiang Dao and Kariang, 900 m, 98°48'E, 19°25'N, 26.X.2002 (slide No. LGN 749); 1♂, Prov. Nan, 5 km N of Ban Luang, 350 m, between Pi Nai and Pi Tai, 100°27'E, 18°56'N, 4.XI.2002, leg. B. HERCZIG & G. RONKAY (slide No. LGN 751) (coll. HNHM and MWM).

Distribution. The species has formerly been considered as a member of the fauna of the Indo-Australian tropics, New Guinea and the Solomons (HOLLOWAY 2003). The data of distribution listed above move the northern border of the distribution of the species to North Thailand and the south-western parts of the Philippines.

Sarbenia ustipennis (HAMPSON, 1895) (Figs 8, 9, 10, 18, 19, 20)

Cyphotopsyche ustipennis HAMPSON, 1895, Trans. ent. Soc. Ld. 1895: 297. Type-locality: Bhutan. Lectotype, male, designated (as "type") by HAMPSON, 1900, Cat. Lepid. Phalaenae Br. Mus. 2: 52.

Type material examined. Lectotype male, "Bhutan, 95-37, 2500 ft, 4.12.94" (slide No.

BM Noctuidae 15924) (coll. BMNH).

Additional material examined. **Thailand:** Prov. Chiang Mai, 2♂♂, 6 km SE of Pang Faen, 1100 m, 29.I.1999, leg. A. SZABÓ & Z. CZERE (slides No. LGN 385 = W8267, LGN 386 = W8268) (coll. MWM); 1♂, 750 m, 11.XII.1985, leg. M.G. ALLEN (slide No. LGN 732) (coll. BMNH); 1♂, Prov. Nan, 5 km N of Ban Luang, 350 m, between Pi Nai and Pi Tai, 100°27'E, 18°56'N, 4.XI.2002, leg. B. HERCZIG & G. RONKAY (slide No. LGN 750) (coll. HNHM). **Taiwan:** Prov. Pingtung: 3♂♂ 2♀♀, Kenting N.P., 300 m, 21°57'62"N, 120°48'89"E, 17-18.IV.1997, leg. A. KUN & L. PEREGOVITS (slide No. LGN 136 = W 8265) (coll. MWM); 1♂ 2♀♀, Kentingkunyen, 7. and 9.X.1982, leg. Y.C. CHANG (slides No. LGN 514, 512, 513) (coll. TFRI). **Japan:** Okinawa, 1♂ 1♀, Kisenbaru, Ounesou, 20.XI.1994 (slides No. LGN 510, 511) (coll. HNHM).

Distribution. The species earlier was known from Nepal (INOUE 1998), Bhutan, Ceylon and a very southern locality of Japan (Okinawa INOUE 1996). Due to the intensive field work of the last two decades in Taiwan and Thailand, the species has been collected in these countries. The range of *S. ustipennis* covers probably the whole subtropical lowlands and hilly regions of India and Indochina.

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Literaturbesprechung

ASKEW, R.R. 2004: The Dragonflies of Europe, second edition. Harley Books, Colchester, England.

Das großformatige Standardwerk der in Europa tätigen Odonatologen erfährt mit der vorliegenden zweiten Auflage im Taschenbuchformat eine Erweiterung. So wurde nicht nur die Artenliste von 114 auf 124 Arten der in Europa heimischen Arten ausgedehnt, unter denen eine neu beschriebene Art aufgeführt ist, sondern auch in einem Supplement die Gäste unter den Libellen in Europa mit Kommentar aufgelistet. Dabei ist ein Hauptaugenmerk auch auf die Neunachweise auf den Britischen Inseln gerichtet. Unverändert geblieben ist die Darstellung der einzelnen Arten im systematischen Teil, die die Artbeschreibung, Biologie, Flugzeiten und Verbreitung mit einer Verbreitungskarte enthält. Den Arten ist jeweils eine Bestimmungsliste bei der kurzen Vorstellung der Gattung mit ausführlichen Merkmalen und zahlreichen Abbildungshinweisen (insges. 650) vorangestellt. Sieht man von den Platycnemididae ab, deren Larven nicht artlich differenziert werden können, so ist auch der Bestimmungsteil der Larven übersichtlich, wobei einige der aufgeführten Merkmale bei Einbeziehung der gesamten Variationsbreite in Europa nicht immer klar abgrenzbar sind. Eingeleitet wird dieser umfassende systematische Teil des Werkes durch eine Check-Liste, dem beschließenden Supplement folgt eine umfangreiche Literatursammlung zu den hier zusätzlich aufgenommenen Daten. Die übrigen Zitate beziehen sich vor allem auf neuere Zusammenfassungen. Die ersten Kapitel sind weitgehend unverändert geblieben wie die Einführung, die Phaenologie, Biologie, Morphologie der adulten Libellen und deren Verbreitungsschemata. Den Abschluß dieser Zusammenfassung bieten die besonderen Farbabbildungen der in Europa heimischen Libellen. Bedauerlicherweise ist keine gründlichere Revision über dieses Standardwerk gegangen, so daß einige Bereiche wie auch Verbreitungskarten lückenhaft und oberflächlich geblieben sind.

E.-G. BURMEISTER

DETTNER, K. & PETERS, W. (Hrsg.) 2003: Lehrbuch der Entomologie, 2. Auflage. - Spektrum Akademischer Verlag Heidelberg Berlin.

Überraschend bald nach der ersten Auflage dieser Zusammenfassung der Insektenkunde war eine zweite notwendig, was an die Reproduktionsgeschwindigkeit aber auch an die Anzahl der Insekten erinnert. Der gesamte Text wurde überarbeitet und vor allem aktualisiert. Innerhalb von 3 Jahren haben sich zahlreiche neue Erkenntnisse ergeben, die in diese vorliegende Auflage integriert wurden. Allein im molekularen Bereich konnte die gesamte Sequenz des Genoms von *Drosophila melanogaster*, der Malariaeizelle *Anopheles gambiae* und des durch sie übertragenen Malariaerregers *Plasmodium* analysiert und publiziert werden. Die neue Ordnung der Mantophasmatodea hat weltweit für Aufsehen gesorgt, obwohl die Tiere bereits als Fossilien bekannt aber nicht entsprechend zugeordnet waren. Auch wurden die potentiellen Artenzahlen immer wieder neu formuliert und die Erfahrungen aus den Tropen in ein neues Gefügemfeld gestellt, was nicht zuletzt dazu führte, die zu erwartenden Artenzahlen deutlich nach unten zu korrigieren. Diese Entwicklungen zeigen nicht nur die ungemeine Fülle an Informationsgehalten in dieser Tiergruppe sondern auch die Kreativität der zahlreichen Entomologen bei der

Erschließung dieser faszinierenden Merkmale, Funktionen, Verhaltensäußerungen etc.. So wurden im vorliegenden Band das Kapitel über die Genetik der embryonalen Musterbildung neu etabliert und das des Atemsystems und Hämolymphe/Hämolymphttransport vollständig neu bearbeitet. Das System wurde ebenso aktualisiert, wobei jedoch bei der phylogenetischen Betrachtung auf das Lehrbuch zur Speziellen Zoologie (DATHE 2003) verwiesen wird. Neu eingebrachte Abbildungen und Tabellen zeugen von den Anregungen zahlreicher Entomologen, die die Herausgeber und Autoren dadurch in vielen Punkten unterstützt haben. Die 27 Kapitel behandeln die verschiedenen Organsysteme, wobei Anatomie und Physiologie ineinandergreifen, die Fortpflanzung, soziale Insekten, Coevolution von Insekten und Pflanzen, Insekten und ihre Freifeinde, entomophage Insekten, Leuchtvermögen, Beziehung zu Mikroorganismen als Symbionten bis zu deren Anwendung zur Beherrschung von Kalamitäten, medizinische Entomologie, biologisch-chemische Schädlingsbekämpfung, Regulationsmechanismen der Populationsdichte, Tiergeographie, Systematik und eine Übersicht über die Vielfalt dieser erdbeherrschenden Tiergruppe. Es ist besonders tragisch, das der Mitherausgeber Prof. Werner Peters, das Erscheinen der 2. stark erweiterten Auflage dieses unumgänglichen Lehrbuches der Entomologie nicht mehr erleben konnte.

E.-G. BURMEISTER

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