

Revisional notes on Philippine Eupterotidae: *Sarmalia* WALKER 1866 another new synonym of *Eupterote* HÜBNER [1822] (Lepidoptera: Eupterotidae)¹

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Abstract: The type species of *Sarmalia*, *radiata* WALKER 1866 from Luzon, agrees in all apomorphic characters of the male genitalia with the species of *Eupterote*. From the southern Philippines (Mindanao) there are specimens known (probably an undescribed new species) which are intermediate between the normal pattern and colouration of small yellow *Eupterote* species and "*Sarmalia*" *radiata*. The species *radiata* is therefore combined with *Eupterote* (**comb. nov.**), resulting in the **new synonymy** of *Sarmalia* with *Eupterote*. The two further species described in *Sarmalia*, *S. alba* SWINHOE 1892 and *S. decolorata* GRÜNBERG 1914 (of which at least *S. alba* shares the synapomorphies of the male genitalia with *Eupterote*), are combined with *Eupterote*, **comb. nov.** The relationships within the presumably not monophyletic group are tentatively discussed. *Apha gonioptera* WEST 1932 is a **new synonym** of *Pseudoganisa currani* SCHULTZE 1910.

Anmerkungen zu einer Revision der philippinischen Eupterotidae: *Sarmalia* WALKER 1866 ein weiteres neues Synonym von *Eupterote* HÜBNER [1822] (Lepidoptera: Eupterotidae)

Zusammenfassung: Die Typusart von *Sarmalia*, *radiata* WALKER 1866 aus Luzon, die wegen ihrer einfarbig gelben Farbe in ein separates Genus gestellt wurde, stimmt in allen apomorphen Merkmalen der ♂ Genitalarmaturen mit der Gattung *Eupterote* überein. Auf südlichen Philippineninseln (z. B. Mindanao) gibt es eine Art (noch unbeschrieben), die habituell intermediär zwischen den kleinen gelben *Eupterote*-Arten und „*Sarmalia*“ *radiata* steht. Deswegen wird *radiata* hier mit *Eupterote* kombiniert (**comb. nov.**); daraus ergibt sich automatisch die Synonymie von *Sarmalia* mit *Eupterote* (**n. syn.**). Zwei weitere *Sarmalia*-Arten, *S. alba* SWINHOE 1892 and *S. decolorata* GRÜNBERG 1914, von denen zumindest die erste auch die synapomorphen Merkmalsausprägungen in Genitalapparat zeigt, werden gleichfalls zu *Eupterote* gestellt (**comb. nov.**). Die Verwandtschaftsverhältnisse in der Gruppe werden andiskutiert; für eine detaillierte Ausarbeitung sind noch zuwenig Daten bekannt.

¹ Studies of Eupterotidae (Eupterotiden-Studien) no. 2. (No. 1: NÄSSIG, W. A., 1989: A new species of the genus *Eupterote* HÜBNER [1822] from Sumatra (Lepidoptera, Eupterotidae). – Heterocera Sumatrina 2 (7): 169–174.)

Innerhalb der Großgattung *Eupterote* wird die Verwendung von Untergattungen zur feineren Untergliederung empfohlen. *Apha gonioptera* WEST 1932 ist ein neues Synonym von *Pseudoganisa currani* SCHULTZE 1910.

Introduction

The family Eupterotidae was never thoroughly revised. There is no treatment of the family within the "Lepidopterorum Catalogus", and the paragraph on the group in SEITZ (by SEITZ & STRAND 1922 for the Indo-Australian area), the only compilation of eupterotid taxa of the Indo-Australian area besides unpublished museum catalogues, is not very accurate in details, long outdated, and contains numerous errors. No recent revision has been published except the revisional analysis on generic level by FORBES (1955) and some notes by HOLLOWAY (1982, 1987). A revision based on phylogenetic reasoning is lacking.

During studies on bombycoid moths *sensu lato* of the Philippines some new results were achieved concerning endemic taxa of Eupterotidae.

Presently, there are two genera of Eupterotidae known confined to the Philippine Islands: *Pseudoganisa* SCHULTZE 1910 (only species included and type species by original designation: *Pseudoganisa currani* SCHULTZE 1910; new synonym: *Apha gonioptera* WEST 1932; HT in BMNH, London, examined), and *Sarmalia* WALKER 1866 (two Philippinian species; for the North Indian species see below).

According to its ♂ genitalia morphology, *Pseudoganisa* is related to *Ganisa* WALKER 1855 (not to *Apha* WALKER 1855), but sufficiently distinct in external morphology so that the genus can be taken as typologically valid for the time being. But closer examination of *Sarmalia* resulted in evidence that this genus must be synonymized with *Eupterote*.

Sarmalia a new synonym of *Eupterote*

The genus *Sarmalia* was described within the family Saturniidae by WALKER (1866; List Specimens Lepid. Insects Coll. Brit. Mus. 35: 1945). Its type species by monotypy is *Sarmalia radiata* WALKER 1866 (List Specimens Lepid. Insects Coll. Brit. Mus. 35: 1945) from the [northern] Philippine Islands [most likely Luzon].

The type species of *Sarmalia*, *radiata*, is a monochromous yellow species, commonly found in North Luzon. The "radiation" responsible for the

species' name is not a colour pattern; the wing venation is visible through the scaling of the wings, and when a specimen becomes worn, the veins are much more visible. This visibility of the wing venation is at least partially an artifact; it is mostly expressed in old, worn specimens, which had undergone a very wet relaxing period before setting, because the veins turn blackish through this process. Fresh specimens from Luzon, ♂♂ as well as ♀♀, usually are uniform yellow with only a weak pronounciation of the veins. Only a very few specimens exhibit traces of two faint dark dots in the anal edge of the forewings and of a postdiscal fascia. The ground colour is variable to some degree, from bright yellow to deep yellow, but always the whole specimen is uniform yellow (except the antennae, which can be blackish in some individuals).

Dissection of the male genitalia of "*Sarmalia*" *radiata* (Fig. 1) revealed that the valves as well as the uncus are strongly reduced to some kind of hooks and are nearly immobile, fixed to the tegumen-complex; in addition, also the tube of the aedeagus is somehow fused with the juxta (or annellus or vinculum of authors²), that the tube cannot be moved as much as usual; only the scobinate vesica can be everted. This construction is typical for the genus *Eupterote* HÜBNER [1822]. Illustrations for this type of construction in other species can be found, for example, in HOLLOWAY (1976: Fig. 354; 1987: Figs. 75-83) and NÄSSIG (1989: Figs. 7 & 8). These hooks do no longer work like a triple forceps, as they do in many other lepidoptera (in fact, in most other groups of the Bombycoidea *sensu lato*); the only part of the male genitalia which still is truly moveable is only the vesica of the aedeagus. This is a highly modified, apomorphic construction and surely represents a valuable synapomorphy, which induced HOLLOWAY's (1982, 1987) synonymizations.

There are specimens of an apparently undescribed yellow *Eupterote* species known from the island of Mindanao (in colls. NÄSSIG and TREADAWAY) which exhibit an intermediate external appearance between *Eupterote radiata* and other small yellow *Eupterote* species like, for example, *E. lineosa* WALKER 1855, *E. todara* MOORE 1884 and others from the Asiatic mainland or *E. kageri* NÄSSIG 1989 from Sumatra, etc. These specimens show a faint brownish pattern (especially two dark dots in the anal edge of the forewings and a postdiscal line) more prominent than in any of the

² A convincing phylogenetic interpretation of the evolutionary origin and internal relationships of the different parts of the ♂ genitalia of the *Eupterote* group is thus far lacking; there are only some interesting ideas in FORBES' (1955) paper, which need a re-evaluation on a phylogenetic base.

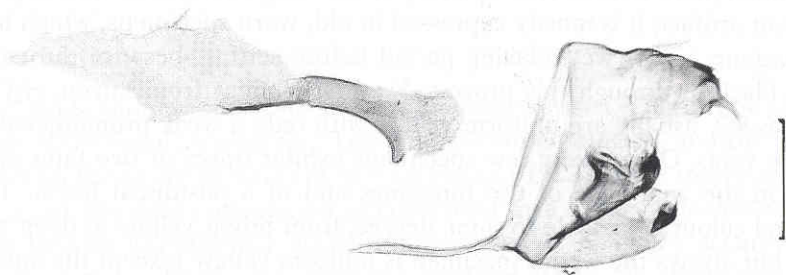


Fig. 1: Male genitalia of "*Sarmalia*" *radiata* = *Eupterote radiata*, **comb. nov.**, Luzon (dissection no. 686/93 NÄSSIG, scale = 1 mm).

Luzon specimens of *E. radiata*, but less prominent than in, e.g., *E. kageri* and are perfect intermediates between these two taxa with respect to habitus. The antennae are to some degree individually variable in most of these taxa: most often yellow, but sometimes blackish.

These morphological studies result in the following: The type species of *Sarmalia*, *radiata*, belongs to the genus *Eupterote*, **comb. nov.**, which automatically results in the synonymy of *Sarmalia* with *Eupterote*, **syn. nov.**

Other species described in *Sarmalia* and combined with it by, e.g., SEITZ & STRAND (1922) are the following:

- *Sarmalia alba* SWINHOE 1892 (Catalogue of the eastern and Australian Lepidoptera Heterocera in the Collection of the Oxford University Museum. 1. Sphingines and Bombyces: 275); locus typicus (l. t.) Philippines [Luzon?].

"*S.*" *alba* (illustrated in SEMPER 1896) is a somehow aberrant species both in colouration and pattern, but basically the genitalia do not differ from typical *Eupterote*. On the other side, there appears not to be any close relationship with *E. radiata*: *E. radiata* obviously belongs to the group of "small yellow" *Eupterote* species of North India, the Indomalayan Peninsula and Sundaland, while we do not know the

closest relative of *alba* presently. Thus, "*S.*" *alba* may be an old endemic species of the Philippines with several autapomorphic character states. Therefore, the classic concept of *Sarmalia* evidently was not monophyletic anyway. "*S.*" *alba* must be combined with *Eupterote* as well, **comb. nov.**

- *Sarmalia decolorata* GRÜNBERG 1914 (Entomol. Rundsch. 31 (13): 76); l. t. Assam, Khasi Hills.

E. decolorata is known from the type series only (1 ♂, 1 ♀, in Zoologisches Museum der Humboldt-Universität, Berlin, examined). These two specimens appear to be aberrant specimens; I suppose that they may be individual aberrations of one of the North Indian "small yellow" *Eupterote* species. No additional specimens have obviously ever been collected. I have not yet dissected them, but there is no doubt to me that they belong to the "small yellow" *Eupterote* species as well, **comb. nov.**

Notes about the relationships of *Eupterote* and the Eupterotini

HOLLOWAY (1982, 1987) based a new, much wider concept of the genus *Eupterote* on these similarities in evidently synapomorphic character states of the male genitalia cited above. I support this view; however, the new concept is such broad that it comprises probably far more than a hundred species now. The use of subgenera could be a tool to bring some structure into that large pool. I do not propose any changes here, as there are still many taxa which I have not yet examined. In addition, a phylogenetic interpretation of the relationships within the new, wide concept of *Eupterote* is still lacking; such subgenera should be monophyletic and therefore must be defined by apomorphic character states.

Many genera have been described in the Asiatic Eupterotidae based on external evidence only. Closer examination, especially studies of the male genitalia armatures, resulted in many synonymies, as published by, e.g., HOLLOWAY. According to HOLLOWAY (1987), the synonymy of *Eupterote* comprised no less than 10 genera; besides *Sarmalia*, further additional genera like, e.g., *Dreata* WALKER 1855 will later as well have to be synonymized with it, according to preliminary studies. Even *Apona* WALKER 1856 and *Palirisa* MOORE 1884 share the very special male genitalia, although their diverging wing pattern may, in a typological view, support their exclusion as separate genera for the time being.

FORBES' (1955) concept of a tribe Eupterotini – mainly based on wing venation – included several Asiatic genera which do not share these genitalia apomorphies listed above: *Melanothrix* FELDER 1874, *Apha* WALKER 1855, *Ganisa* WALKER 1855, *Pseudojana* HAMPSON [1893] and others. I think that FORBES' concept needs a re-evaluation on basis of phylogenetic reasoning; the question whether these genera really are Eupterotini, i.e., whether they share relevant synapomorphies with *Eupterote* etc., is not yet satisfactorily solved.

References

- FORBES, W. T. M. (1955): The subdivision of the Eupterotidae (Lepidoptera). – Tijdschr. Entomol. 98 (2): 85-132.
- GRÜNBERG, K. (1914): Neue indo-australische Eupterotiden. – Entomol. Rundsch. 11 (13): 75-76.
- HOLLOWAY, J. D. (1976): Moths of Borneo with special reference to Mount Kinabalu. – Kuala Lumpur (Malays. Nature Soc.), 264 pp.
- (1982): Taxonomic appendix. Pp. 176-271 in: BARLOW, H. S., An introduction to the moths of South East Asia. – Kuala Lumpur (the author), 305 pp., 50 pls.
- (1987): The moths of Borneo, part 3, Lasiocampidae, Eupterotidae, Bombycidae, Brahmaeidae, Saturniidae, Sphingidae. – Kuala Lumpur (Southdene), 200 pp. + pls.
- NÄSSIG, W. A., (1989): A new species of the genus *Eupterote* HÜBNER [1822] from Sumatra (Lepidoptera, Eupterotidae). – Heterocera Sumatrana 2 (7): 169-174.
- SEITZ, A., & STRAND, E. (1922 [1924]): 10. Familie, Eupterotidae; pp. 417-432 in: SEITZ, A. (ed.), Die Großschmetterlinge der Erde, vol. 10, Die indo-australischen Spinner und Schwärmer. – Stuttgart (A. Kernen).
- SEMPER, C. (1896): Reisen im Archipel der Philippinen, zweiter Theil, Wissenschaftliche Resultate, sechster Band, Die Schmetterlinge der Philippinischen Inseln, Beitrag zur indo-malayischen Lepidopterenfauna, zweite Abtheilung, Die Nachtfalter – Heterocera. – Wiesbaden (C. W. Kreidel).
- SWINHOE, C. (1892): Catalogue of the eastern and Australian Lepidoptera Heterocera in the Collection of the Oxford University Museum. 1. Sphinges and Bombyces. – Oxford (Clarendon), viii + 324 pp.
- WALKER, F. (1866): List of the specimens of lepidopterous insects in the collection of the British Museum, part 35. – London (BMNH).