

## Saturniidae and Brahmaeidae of the Palaearctic Region: How many species are there?

Wolfgang A. NÄSSIG & Stefan NAUMANN

**Summary:** The authors intend to write chapters on different families of Bombycoidea for a volume of the new book series “Palaearctic Macrolepidoptera”, to be published by Apollo Books. The families covered are Saturniidae (ca. 150 species), Brahmaeidae (including the former family Lemoniidae, ca. 20 species), Endromidae (1–2 species) and Eupterotidae (ca. 77 species). Phylogenetic and systematic issues concerning the classification of these families are shortly discussed.

**Key words:** Book series “Palaearctic Macrolepidoptera”, Saturniidae, Brahmaeidae, Eupterotidae, Lemoniidae, Endromidae.

### Introduction

In 2008, Alexander SCHINTLMEISTER’s book on the Palaearctic Notodontidae was published by Apollo Books in the new book series “Palaearctic Macrolepidoptera”. This is the second modern launch of a series on the Lepidoptera fauna of the entire Palaearctic realm, after the “Handbook of Palaearctic Macrolepidoptera”, which only saw a first volume published, ŠPATENKA *et al.* (1999) on the Sesiidae, and then regrettably died with its editor, Clas M. NAUMANN, in 2004. Although the scopes of these two series are slightly different, the main goals are the same.

We had intended to contribute a section on some Bombycoidea families to NAUMANN’s series and in 2004 were in an early stage of preparing the manuscript, and when the new book series was initiated in 2008, we set out to complete and update this contribution. It was clear from the beginning that the families Saturniidae and Brahmaeidae (*sensu classico*) would be included — hence the title of the presentation given at the SEL Congress in Cluj, as above —, but in subsequent consultation with the effective managing editor of the new series, Alexander SCHINTLMEISTER, we decided to expand the scope of this manuscript to also include some other families of bombycid moths, namely Endromidae *sensu classico*, Lemoniidae *sensu classico* (both families now interpreted differently on basis of recent phylogenetic studies, see below) and Eupterotidae. Other families of Bombycoidea will be dealt with by other authors.

### Geographical limits of the Palaearctic Region

The geographical limits of the Palaearctic Region are difficult to define, as there is no clear borderline between the Palaearctic and Indo-Australian faunistic regions in eastern Asia, and different authors delimit these regions in different ways. We decided to restrict the region slightly differently from the definitions used by SCHINTLMEISTER (2008) and as employed in the presentation given in Cluj, i.e. to exclude the southern Arabian Peninsula, which contains, for the families treated, only African but no Palaearctic species, and with a few other changes.

The Palaearctic Region is delimited, in the south, approximately by the 25<sup>th</sup> or 26<sup>th</sup> degree northern latitude lines, thus including Africa north of the Sahara desert, the northern parts of the Near East and Iran and Pakistan but not the Arabian islands in the Red Sea. The limit then runs along the Pakistan–India border, bends to the east to include Jammu and Cashmere and follows the southern borders of Nepal, Sikkim and Bhutan and in NE India the southern foothills of the Himalaya, then loops south through western Myanmar to include the Chin Hills and in the NE the Kambaiti area, and finally follows the southern Chinese national border and includes Hainan, Taiwan and the Japanese Archipelago (see map).

### Species numbers for the families

Of the family Saturniidae there are, according to



Figure. Approximate delimitation of the Palearctic Region as used in the book. (Map based on a map from OMC Online Map Creation M. Weinelt, modified.)

present classification (which is still under study; see, e.g., OBERPRIELER 1997, ROUGERIE & ESTRADÉL 2007, REGIER *et al.* 2008b and others), three subfamilies represented in the Palearctic Region, the Agliinae, Salassinae and Saturniinae, the former two monotypic but the last with three tribes, Urotini, Attacini and Saturniini. Altogether the family comprises ca. 15 genera (some of them containing subgenera) in the Palearctic Region (see table).

The Brahmaeidae in the classical sense comprise only 2 genera with together ca. 9 species in the Palearctic Region (*Brahmaea* with additional species in the tropical part of Asia). However, recent morphological (MINET 1994) as well as molecular studies (REGIER *et al.* 2008a, ZWICK 2008) have demonstrated that Lemoniidae in the classical sense (comprising the Palearctic genus *Lemonia* and the African genus *Sabalia*) are not only closely related to Brahmaeidae, but further that the African brahmaeid (*sensu classico*) genus *Dactyloceras* appears to be the sister-group to *Sabalia*, so that the family Brahmaeidae in the classical sense is a paraphyletic construct. Recent classification, therefore, unites Lemoniidae and Brahmaeidae under the older name Brahmaeidae. This adds the ca. 10 species of *Lemonia* (in need of revision) to the family in the Palearctic Region.

The family Endromidae (again in the classical sense) comprises a single genus with 1–2 species. The

relationships of *Endromis* are much less resolved; recent studies (REGIER *et al.* 2008a, ZWICK 2008) based on different sets of species and genes place the genus at different nodes in their phylogenetic trees. We tentatively follow REGIER *et al.* (2008a) for the concept and phylogenetic placement of this monotypic family.

Several problems also pertain to the classification of Eupterotidae in the Palearctic Region, the ca. 77 species there representing two subdivisions. The higher classification of this family used here is based on OBERPRIELER *et al.* (2003) and NÄSSIG & OBERPRIELER (2007, 2008); recent molecular results by ZWICK (2008), diverging in part from this morphology-based classification, are not fully conclusive.

The present estimation of the species numbers of these families in the Palearctic Region is based on current knowledge and still tentative. We are still in the process of collating and aligning distributional and systematic data, and the numbers presented here thus deviate somewhat from those provided in the abstract (submitted in early April 2009) and in the presentation (May 2009).

As a consequence of recent collecting and study, the species numbers of Bombycoidea in the Palearctic Region have increased significantly in the last 2–3 decades, especially in China but also elsewhere.

Table. Estimated palaeartic species numbers of the families planned for inclusion into the book publication (estimations of 2009).

| <b>Genus</b>                                | <b>Estimated species number</b>       |
|---|---------------------------------------|
| <b>Saturniidae</b>                          | <b><i>family total: ca. 147</i></b>   |
| Agliinae                                    | <i>subfamily total: ca. 4</i>         |
| <i>Aglia</i>                                | 4                                     |
| Salassinae                                  | <i>subfamily total: ca. 14</i>        |
| <i>Salassa</i>                              | ca. 14                                |
| Saturniinae: Urotini                        | <i>tribe total: 1</i>                 |
| <i>Sinobirma</i>                            | 1                                     |
| Saturniinae: Attacini                       | <i>tribe total: 8 (+1)</i>            |
| <i>Samia</i>                                | 5 (+1 domesticated form)              |
| <i>Archaeosamia</i>                         | 1                                     |
| <i>Archaeoattacus</i>                       | 1                                     |
| <i>Attacus</i>                              | 1                                     |
| Saturniinae: Saturniini                     | <i>tribe total: ca. 120</i>           |
| <i>Rhodinia</i>                             | ca. 7                                 |
| <i>Actias</i>                               | ca. 19                                |
| <i>Saturnia</i> (with 4 subgenera)          | ca. 46                                |
| <i>Cricula</i>                              | ca. 7                                 |
| <i>Loepa</i>                                | ca. 22                                |
| <i>Lemaireia</i>                            | ca. 2                                 |
| <i>Solus</i>                                | 3 or 4                                |
| <i>Antheraea</i> (with 3 subgenera)         | ca. 13                                |
| <b>Brahmaeidae</b>                          | <b><i>family total: ca. 19</i></b>    |
| <i>Calliprogonos</i>                        | 1                                     |
| <i>Brahmaea</i>                             | ca. 8                                 |
| <i>Lemonia</i>                              | ca. 10? (unrevised)                   |
| <b>Endromidae</b> ( <i>sensu classico</i> ) | <b><i>“family” total: ca. 1–2</i></b> |
| <i>Endromis</i>                             | 1–2                                   |
| <b>Eupterotidae</b>                         | <b><i>family total: ca. 77?</i></b>   |
| Eupterotinae                                | <i>subfamily total: ca. 40?</i>       |
| <i>Dreata</i>                               | ca. 1? (unrevised)                    |
| <i>Eupterote</i> (with some subgenera)      | ca. 25? (unrevised)                   |
| <i>Nisaga</i>                               | ca. 2? (unrevised)                    |
| <i>Palirisa</i>                             | ca. 10? (unrevised)                   |
| <i>Sangatissa</i>                           | ca. 2? (unrevised)                    |
| “ <i>Ganisa</i> group”                      | <i>“subfamily” total: ca. 37?</i>     |
| <i>Apha</i>                                 | ca. 10? (unrevised)                   |
| <i>Apona</i>                                | ca. 12? (unrevised)                   |
| <i>Ganisa</i>                               | ca. 10? (unrevised)                   |
| <i>Pseudojana</i>                           | ca. 5? (unrevised)                    |

This is mainly due to the discovery and description of new species, but in part also to revisions of particular genera. Several genera, however, remain to be comprehensively revised. In Saturniidae, the number of ca. 35 species recorded from the Palaearctic area (in a somewhat different definition) in the SEITZ series (JORDAN 1911, BOLLOW 1932) has increased to ca. 147 species as enumerated here, representing an increase of about 4.2 times over the last over 75 years. A similar increase in species numbers (3.4 times since SEITZ) was also recorded by SCHINTLMEISTER (2008) for Notodontidae.

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Wolfgang A. NÄSSIG,  
Entomologie II, Senckenberg,  
Senckenberganlage 25,  
D-60325  
Frankfurt am Main, Germany,  
wolfgang.naessig@senckenberg.de

Stefan NAUMANN,  
Hochkirchstrasse 11,  
D-10829  
Berlin, Germany,  
sn@saturniidae.com

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