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Alternative order

Tentative tribal system of Ennominae based on current family-group names (2006)

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Subfamily Ennominae

This is a working tribal system of the Ennominae improved from Beljaev (1994); it includes only described family-group names in the subfamily and does not pretend to assign all of the ennomine genera into tribes. The phylogenetic cladogram, which provides the framework for this system is presented in:

E. Beljaev. 2006. Morphological approach to the Ennominae phylogeny (Lepidoptera: Geometridae) - SPIXIANA 29 (3/4).

Supertribus Azelinidii

Plesiomorphic and paraphyletic taxon. Treated as primitive Ennominae incertae sedis.

Tribus Campaeini (Campaeini Forbes, 1948; Metrocampidae Tutt, 1896).

No specific ennomine characters in male and female genitalia.

Tribus Cheimoptenini (Cheimoptenini Kuznetsov & Stekolnaikov, 1982).

No specific ennomine characters in male and female genitalia.

Tribus Azelinini (Azelinini Forbes, 1948)

Signum (when present) typically ennomine-type. Transtilla of primitive fold-like type. Probable autapomorphy - cucullus separated as distinct plate.

Tribus Diptychini (Diptychini Janse, 1933)

Based on Callioratis signum typically ennomine-type; transtilla of primitive fold-like type; Labides are not intromitted in ductus bursae at copulation. Notion that in this genus, in tympana, ansa merged with lacinia (Staude, 2001, page 130) is erroneous and based on misidentification of dry muscles as sclerites (loc. cit., pl. 9).

Supertribus Caberidii

Labides, if present, orientated in frontal plane, usually fused with dorso-basal part of valva and articulated with juxta or separated from juxta (apomorphy). Tegumen long and very narrow (apomorphy, but probably not basal, functionally connected with attenuation of uncus). Ring-like gnathos without medial dilation or process (apomorphy?). Vinculum and tegumen are separated by deep narrowing; resulting in tegumen and vinculum articulated and able to move relative to each other in sagittal plane (plesiomorphy).

Tribus Aleuciini

(Cheimatobiidi Tutt, 1896; Aleucini Djakonov, 1936; Baptini Forbes, 1948; Lomographinae Wehrli, 1939; Theriini Herbulot, 1963)

Cristae integrated in the juxta plate laterally (apomorphy). Theria is morphologically very close to Lomographa and, especially, to Aleucis, except for the presence of labides (plesiomorphy) and complicated modification of uncus. **Tribus Plutodini** (Plutodinae Warren, 1894)

Sacculi with pointed and curved distal process.

Tribus Palyadini (Palyadae Guenée, 1858).

Socii enlarged (apomorphy).

Tribus Caberini

(Caberites Duponchel, 1845; Erastridae Herrich-Schäffer, 1845; Deiliniinae Warren, 1893; Catopyrrhinae Warren, 1894)

Sacculi articulated to each other directly, often connected to each other with transverse sclerotized bar; juxta placed posterior of sacculi (apomorphy).

Tribus Deveniliini (Deveniliini Beljaev, 1998)

Subordinated to Baptini sensu Holloway (1994) by Stüning (2000). However pattern of apomorphies in Caberidii suggests position of Devenilia as basal to (Aleuciini + Plutodini + Palyadini) and separate from Caberini. Dvenilia has a number of unique apomorphies in the genitalia musculature but range of their distribution in the allied genera needs to be studied.

Tribus Sphacelodini (Brotini Grote, 1882; Sphacelodinae Hulst, 1902)

Based on the illustrations in Pitkin (2002), the tribe may be close to or synonym of Deviniliini.

Supertribus Epionidii

Epionidii can be characterized by usual presence of horn-like sclerotized labides with bases located more or less dorso-ventrally (plesiomorphy). Vinculum and tegumen separated by deep narrowing (plesiomorphy). Top of aedeagus usually in form of sclerotized triangular pointed process (apomorphy?).

A. Loose Epionidii

Mnesampela genus-group.

Based on the genitalia illustrations (McQuillan, 1984, 1985); possess characters typical for Epionidii except labides thick, not flattened, and not intromitted into ductus bursae during the copulation. Association with Epionidii is tentative.

Tribus Cystidiini

(Cystidiini Kuznetsov & Stekolnikov, 1982; Obeidiini Inoue, 1992 unavailable; Obeidiini Holloway, 1994).

Placed in Epionidii based on the construction of uncus-gnathos system, tegumen and vinculum and pointed aedeagus. It is uncertain if the true labides present.

B. Core Epionidii

Labides flattened, pointed, intromitted in ductus bursae during copulation (apomorphy?).

Tribus Odontoperini

(Odontoperinae Tutt, 1896; Crocallidi Tutt, 1896; Nacophorini Forbes, 1948).

Nacophorini in its broad concept (Rindge, 1983) is evidently paraphyletic taking into account Afro-Eurasian Odontoperini, which morphologically fall completely into the Nacophorini concept.

Tribus Pachynemiini

(Pachynemiidae Kirby, 1903; Lithinini Forbes, 1948; Epirrhanthini Forbes, 1948; Lacarini Orfila & Schajovskoy, 1959)

In Pachynemia construction of male and female genitalia (musculature not examined) fall well into concept of Lithinini of Rindge (1986). Epirrhanthini undoubtedly are closely related to core group Lithinini: female with typical Lithinini-type signum, which is unique for Ennominae; male genitalia also Lithinini-type except labides reduced (occurs frequently through the tribe).

Tribus Epionini

(Epionidae Bruand, 1846; Hypochrosinae Guenée, 1858; Scardamiinae Warren, 1894; Seleniidi Tutt, 1896; Anagogini Forbes, 1948).

Hypochrosini sensu Holloway (1994) in the genitalia, morphology (including musculature) differs from Epionini only by presence of labides (horn-like processes). The labides of the Hypochrosini type in Epione are certainly secondarily reduced. This is indicated by a deeply invaginated juxta, which is formed in Ennominae only in presence of very long labides, articulated with juxta. Genus Scardamia is morphologically very close to Epione and probably needs to be synonymised with the latter.

Supertribus Ennomidii

The group is characterized by usual presence of flat elongated sclerotized labides laterad of aedeagus, which are connected with juxta. Possibly related to "Epionidii", but vinculum and tegumen separated by relatively shallow narrowing (state transitional relative to "Gnophidii").

Tribus Ennomini

(Ennomites Duponchel, 1845; Urapteridae Bruand, 1846; Odopteridi Stephens, 1850; Emplocidae Guenée, 1858; Oxydiini Butler, 1886; Pantheridae Moore, 1887; Nephodiinae Warren, 1894: 423; Leuculinae Hulst, 1896: 249; Cingiliini Forbes, 1948).

The broad concept of Ennomini proposed here is based on distinct apomorphies: vinculum subdivided ventrally with narrow, longitudinal (i.e. along longitudinal axis of body) interruption; vinculum-juxta muscle paired, attached to juxta by special apodeme – invagination at the base of juxta.

Tribus Prosopolophini

(Ligidae Guenée, 1858; Prosopolophinae Warren, 1894; Colotoinae Wehrli, 1940; Wilemaninae Wehrli, 1941: 428; Comptosierini Herbulot, 1963; Apochimini Viidalepp, 1989; Zamacrini Viidalepp, 1989) Characterized by prominent frons, heavily sclerotized male genitalia without gnathos and similar life cycles adapted to imago activity in cool season.

Ennomidii incertae sedis

Tribus Apeirini

(Apeirini Kuznetzov & Stekolnikov, 1982) This tribe is a morphologically isolated group with labides absent. I include it in “Ennomidii” because of similar construction of articulation of tegumen and vinculum and because of similarities in superficial appearance.

Tribus Rumiini (Rumiinae Tutt, 1896). Could be related to Ennomini (sensu lato).

Supertribus Gnophidii

This taxon can be characterized by the absence of the sclerites homologous to lateral lobes of anellus (apomorphy). Tegumen and vinculum fused into complete and broad ring, without lateral narrowing; as a result they cannot move relative to each other in sagittal plane (or have restricted mobility) (apomorphy).

Tribus Gnophini

(Gnophites Duponchel, 1845; Sionites Duponchel, 1845; Aspilatites Duponchel, 1845; Dasydites Duponchel, 1845; Angeronini Forbes, 1948; Psodinae Povolny & Moucha, 1955; Diaprepesillini Kuznetzov & Stekolnikov, 1982) Supported by 2 probable apomorphies: costa of valva with dorso-medial process bearing strong thorn-like spines; muscle m1 (uncus-tegumen) attached to dorsal wall of uncus.

Tribus Boarmiini

(Boarmites Duponchel, 1845; Cleorites Duponchel, 1845; Fidonites Duponchel, 1845; Amphidasites Duponchel, 1845; Hibernites Duponchel, 1845; Bistonidi Stephens, 1850; Selidosemidae Meyrick, 1892; Ascotinae Warren, 1893; Eubyjinae Warren, 1893; Braccinae Warren, 1894; Eranniinae Tutt, 1896; Melanchroiinae Hulst, 1896; Daliminae Wehrli, 1940; Phaseliinae Wehrli, 1941; Melanolophini Forbes, 1948; Glaucinini Rindge, 1959; Bupalini Herbulot, 1963; Desertobiini Viidalepp, 1989; Milioniini Inoue, 1992, unavailable; Milioniini Holloway, 1994) This tribe is accepted in Holloway's broad concept except Gnophini.

Tribus Macariini

(Zerenites Duponchel, 1845; Macaridae Guenée, 1858; Abraxinae Warren, 1893; Semiothisinae Warren, 1894; Fernaldellinae Hulst, 1896; Atomorphinae Wehrli, 1953; Cassymini Holloway, 1994; Eutoeini Holloway, 1994). The broad concept of Macariini here is based on a distinct apomorphy: valva is deeply divided into costal (including cucullus) and saccular lobes, valvula reduced, and based on poorly defined morphological distinctions between the currently accepted tribes: Abraxini, Cassymini, Macariini and Eutoeini.

Gnophidii incertae sedis

Tribus Gonodontini (Gonodontini Forbes, 1948)

Tribus Onychorini (Onychorini Herbulot, 1963)

Tribus Thinopterygini (Thinopterygini Holloway, 1994)