

Revisionary notes on family Eupterotidae (Lepidoptera: Bombycoidea) with remarks on genus *Eupterote* Hübner and *Apona* Walker from India



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Abstract

The revision of family Eupterotidae (Bombycoidea) is very less reviewed and studied by various entomologists around the globe. Later, family name was reinstated, synonymized or re-described and remain as a mystery. The purpose of this manuscript is to know about the current status of family Eupterotidae in the present scenario. This paper is providing the review, classification, economic significance of this family along with detailed remarks on two genus namely *Eupterote* and *Apona* with special reference to their wing venation and external genitalia of their type species.

Keywords

Eupterotidae, re-description, classification, notes, *Eupterote* Hübner, *Apona* Walker

1. Introduction

Family Eupterotidae was never thoroughly revised and according to [1] the family was not even treated within the “Lepidopteran Catalogue”. Eupterotidae is a small but most diverse group of moths in Africa and Oriental Region [2]. The family name Eupterotidae was given by Swinhoe [3]. However, three older names i.e. Striphnopterygidae Wallengren, Phialidae Wallengren and Janidae Aurivillius were used instead of Eupterotidae. Striphnopterygidae Wallengren has been used as the valid name for the family by many workers. Eupterotidae gained almost universal acceptance as the name of the family since about 1928. Application of Article 35.5, introduced in the current 4th edition of the Code [4], allowed the retention of the name Eupterotidae as the valid family name. No revision has been published except the revisional analysis on generic level by Forbes [5] and some notes by Holloway [2]. The families which are most closely related to Eupterotids are Lemoniidae, Australian Anthelidae, Afrotropical Sabaliidae and American Apatelodidae.

1.1 Classification

Two subfamilies Striphnopteryginae and Janinae under this family [6,7]. Later on, five tribes described under subfamily Eupterotinae (Janini, Tissangini, Eupterotini, Phialini and Cotanini) [5]. Five subfamilies namely

Hibrildinae, Tissanginae, Janinae, Eupterotinae and Panacelinae (Cotanini) and included subfamily Striphnopteryginae were added under Eupterotinae[8]. Oberprieler [9] classified the family into three subfamilies viz., Janinae (Tissanginae and Hibrildinae), Eupterotinae (Cotanini) and Striphnopteryginae along with an informal *Ganisa* group. Kristensen [10] divided this family into five subfamilies namely Eupterotinae, Hibrildinae, Janinae, Panacelinae and Tissanginae. Pugaev and Du [11] divided this family into two subfamilies i.e., Eupterotinae, Janinae and *Ganisa* group. Laurent [12] suggested five subfamilies viz., Eupterotinae, Janinae, Panacelinae, Striphnopteryginae and *Ganisa* group under this family. The same has been followed in the present work. (Table 1)

Table-1 Showing Different Systems of Classification of Eupterotidae

Distant [6], Gaede [7]	Forbes [5]	Minnet [8]	Oberprieler [9]	Kristensen [10]	Pugaev and Du [11]	Laurent [12]
Janinae Striphnopteryginae	Eupterotinae (Janini Tissangini Eupterotini Phialini Cotanini)	Eupterotinae Hibrildinae Janinae Panacelinae (Cotanini) Tissanginae	Eupterotinae (Cotanini) Janinae Striphnopteryginae <i>Ganisa</i> group	Eupterotinae Hibrildinae Janinae Panacelinae Tissanginae	Eupterotinae Janinae <i>Ganisa</i> group	Eupterotinae Janinae Panacelinae Striphnopteryginae <i>Ganisa</i> group

1.2 Economic Importance

Its caterpillars are also associated with number of plants. The caterpillars of *Eupterote fabia* Cramer are polyphagous in nature and feed upon *Bombax* (Malvaceae), *Sorgho* (Poaceae), *Moringa* (Moringaceae), *Piper* (Piperaceae), *Randia* (Rubiaceae), *Vitex* (Lamiaceae) and *Litsea* (Lauraceae). *Eupterote undata* Blanchard as a major pest of large cardamom in Sikkim. *Eupterote fabia* Cramer was recorded as a major defoliator of cardamom in South India. *Eupterote undata* Blanchard causes heavy infestation on *Gmelina arborea* Roxburgh in Assam. *Eupterote undata* Blanchard are defoliators of *Bombax ceiba* Linnaeus, *Campsis grandiflora* (Thunberg), *Cedrela toona* Roxburgh, *Dalbergia monetaria* Linnaeus, *Erythrina orientalis* Murray, *Gmelina arborea* Roxburgh, *Lantana camara* Linnaeus, *Tectona grandis* Linnaeus, *Vitex negundo* Linnaeus, *Planchonia careya* (Mueller), *Quisqualis indica* Linnaeus, *Ricinus communis* Linnaeus and *Shorea robusta* Roth. *Ganisaplana* Walker feeds on *Jasminum officinale* Linnaeus

2. Systematic Accounts

FAMILY EUPTEROTIDAE SWINHOE

Swinhoe, 1892, Cat. East. Aust. Lepid. Heterocera Colln. Oxf. Univ. Mus., 1892: 271.

Note on genus *Eupterote* Hübner: From Indian, seventeen species belonging to this genus, out of which thirteen species were known [13]. A new species *Sarmalia decolorata* from Assam was reported [14] which was later transferred under genus *Eupterote* Hübner [15]. Seven species were recorded from Borneo, out of which three species were new to science [2]. Three species i.e., *Eupterote geminata* Walker, *Eupterote primularis* Moore and *Eupterote unicolor* Hampson were synonymised under *Eupterote hibisci* (Fabricius), *Eupterote diffusa* Walker and *Eupterote undata* Blanchard respectively [16]. At present, this genus is represented by seventeen species.

Note on genus *Apona* Walker: Genus was proposed with *cashmirensis* Kollar as its type species [17]. This genus was considered under family Lasiocampidae [18]. Later on, this genus under family Eupterotidae [13] and described three species namely *cashmirensis* Kollar, *plumose* Moore and *shevaroyensis* Moore under this genus from India. Instead of placing this genus in recognized subfamilies, and placed under '*Ganisa* group' along with four other genera viz., *Apha* Walker, *Ganisa* Walker, *Melanothrix* Felder and *Pseudojana* Hampson [11]. The present genus i.e., *Apona* Walker completely conforms to the characterization of subfamily Eupterotinae. Hence, in the present studies this genus is placed under subfamily Eupterotinae and its placement is justified. At present, this genus is represented by seven species from the globe [11].

Diagnosis: Labial palpus hairy. Antennae broad and evenly bipectinate in the males, filiform in females. Thorax thickly fringed with scales. Forewing broad; apex triangular, tornus rounded; scaling dense; without ocelli; discal cell closed, usually short, perhaps only one-thirds length of wing; vein 1A+2A forming a basal fork; 3A absent; M₃ from lower angle of cell; M₂ from or from above the middle of discocellulars; R₂ always absent; Sc from base of wing not reaching upto apex. Hindwing broad, circular, almost of equal size of forewing; scaling dense; frenulum weak, sometimes absent; 1A and 2A present separately; 3A absent; M₃ from lower angle of cell;

M₂ from or from above the middle of discocellulars; Sc+R₁ from base of wing, forming a bar with discal cell. Legs clothed with scales; foreleg with epiphysis; mid-tibia with one pair and hind-tibia with two pairs of tibial spurs; tarsi naked; claws prominent. Abdomen clothed with scales. Male genitalia with well developed, strong, broad, bifid uncus; socii absent; gnathos may be present or absent; valva relatively simple, reduced, setosed; sometimes divided apically; aedeagus with vesica simple, usually completely or partially armed with fine denticles. Female genitalia without signum (except in genus *Ganisa* Walker), ductus bursae simple; both pairs of apophyses relatively long; papilla analis armed with micro and macro setae.

2.1 Subfamily Eupterotinae Swinhoe

Swinhoe, 1892, Cat. East. Aust. Lepid. Heterocera Colln. Oxf. Univ. Mus., 1892: 275.

Type genus: *Eupterote* Hübner

Diagnosis: Labial palpus slight and porrect. Forewing with M₂ from above the middle of discocellulars. Hindwing with M₂ from above the middle of discocellulars. Male genitalia with uncus fused with tegumen, having no demarcations; gnathos absent; valva simple, corrugated.

2.2 Key to the studied genera of subfamily Eupterotinae Swinhoe

1. Wings with discocellulars nearly straight; gnathos absent in male genitalia.....*Eupterote* Hübner
 - Wings with discocellulars angled below vein M₂; gnathos present in male genitalia.....*Apona* Walker

GENUS *EUPTEROTE* HÜBNER

Hübner, 1818, Verz. bekannter Schmett., 1818: 187; Hampson, 1892; Moths India, 1: 54; Holloway, 1987, Moths Borneo, 3: 63; Pugaev and Du, 2011, 4th Economic Scientific Conference on Natural Resources and Resources, 2011: 311-315.

Distribution: India, Bhutan, China, Indonesia (Flores and Sulawesi), Nepal, Philippines, Sri Lanka, Sundaland (Borneo)

Typespecies: *Eupterote fabia* Cramer

Diagnosis: Labial palpus slight and porrect. Antenna bipectinate in male, pectination well developed, filiform in female, branches moderately long. Forewing broad, outer margin rounded, postmedial line double, well developed; discal cell closed; 1A+2A basally forked, basal one-fifths portion forked; M₃ from lower angle of cell; M₁ stalked with R₅, R₄, and R₃ or originated from the cell; R₂ absent; Sc from base of wing not reaching up to apex. Hindwing broad, almost same size of forewing; 1A not reaching tornus, 2A reaching tornus; 3A absent; M₃ from lower angle of cell; M₁ and R_s stalked or from upper angle of cell. Legs thickly dressed with scales; foreleg with epiphysis; mid-tibia with one pair and hind-tibia with two pairs of tibial spurs; tarsi naked; claws prominent. Abdomen decorated with scales. Male genitalia with uncus bifid, completely fused with tegumen, having no demarcation; gnathos absent; saccus well developed; valva simple, saccular area setosed; aedeagus tubular or slightly swollen; vesica with fine scobinations. Female genitalia with corpus bursae without any signum; apophyses long (Figure, 1-6).

Wing Expanse: Male: 96-97mm; Female: 102mm

Body Length: Male: 34-35mm; Female: 31mm

Material Examined: Himachal Pradesh: Basantpur, 9.vii.2013, 2♂♂; Naina Tikkar, 5.vii.2014, 2♂♂; Narkanda, 17.vii.2013, 1♂1♀.

Distribution: Throughout India; Bhutan; Sri Lanka.

Remarks: Its larvae are polyphagous in nature and feed on *Bombax* (Malvaceae), *Sorgho* (Poaceae), *Moringa* (Moringaceae), *Piper* (Piperaceae), *Randia* (Rubiaceae), *Vitex* (Lamiaceae) and *Litsea* (Lauraceae)

GENUS *APONA* WALKER

Walker, 1856, List Spec. Lepid. Insects Colln. Br. Mus., 7: 1762; Hampson, 1892, Moths India, 1: 52; Pugaev and Du, 2011, 4th Economic Scientific Conference on Natural Resources and Resources, 2011:313.

Distribution: India, China, Myanmar, Nepal, Pakistan, Sri Lanka, Sundaland (Sumatra), Thailand

Type species: *Apona cashmirensis* Kollar

Diagnosis: Labial palpus slight, upturned or porrect, thickly fringed with scales. Antennae bipectinate, branches very long and slender in the males, shorter in females. Thorax clothed with scales. Forewing broad, outer margin rounded; postmedial line double; discal cell closed; 1A+2A basally forked; M₃ from lower angle of cell; M₁ from upper angle or stalked with R₅, R₄ and R₃ from upper angle of cell; R₂ absent; Sc from base of wing not

reaching up to apex. Hindwing with discal cell closed; 1A and 2A present, 2A reaching tornus; M_3 from lower angle of cell; M_1 and R_s stalked or free; $Sc+R_1$ arising from base of wing, having a bar with discal cell. Legs clothed with scales; foreleg with epiphysis; mid-tibia with one pair and hind-tibia with two pairs of spurs; claws prominent. Abdomen clothed with scales. Male genitalia with bifid uncus, no demarcation from tegumen; gnathos present; valva short and broad; female genitalia with both apophyses long; papilla analis armed with short and long setae (Figure, 7-12).

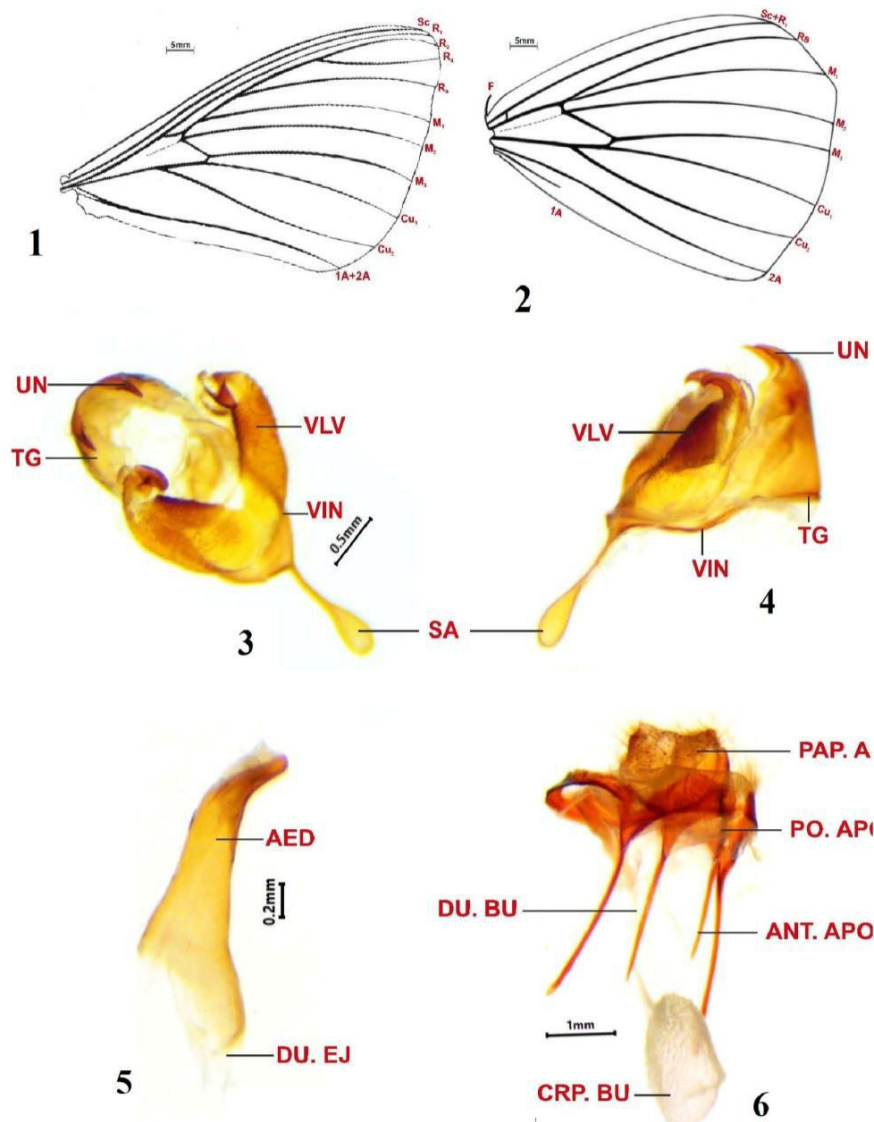
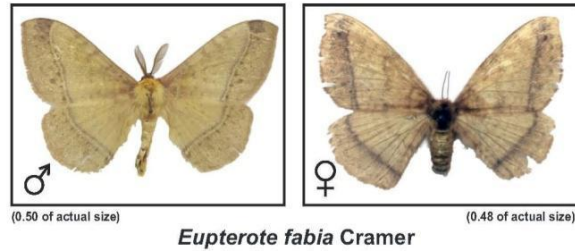


Figure: 1-6 (1: Forewing; 2: Hindwing; 3-4: Male genitalia; 5:Aedeagus; 6: Female genitalia)

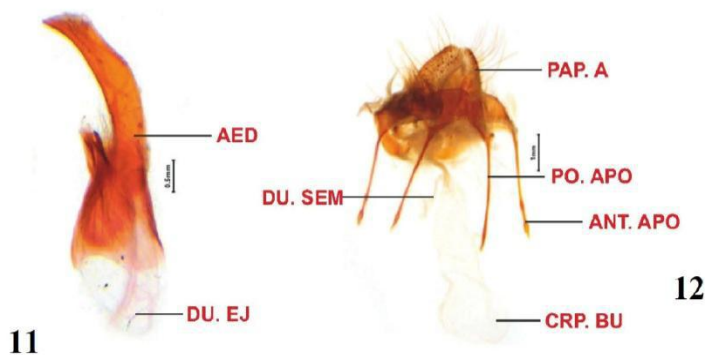
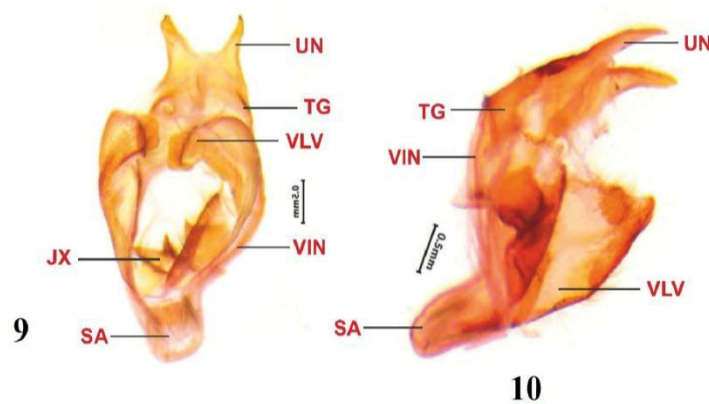
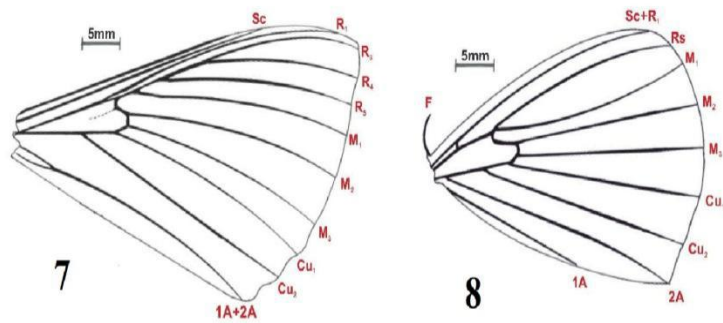
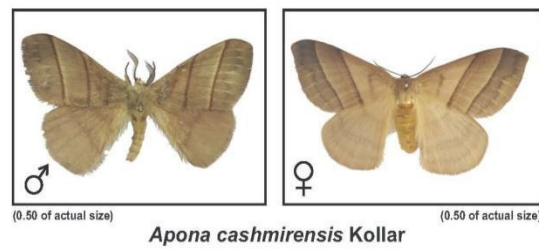


Figure: 7-12 (7: Forewing; 8: Hindwing; 9-10: Male genitalia; 11: Aedeagus;12: Female genitalia)

Wing Expanse: Male: 84-85mm; Female: 92mm

Body Length: Male:32-33mm; Female: 38mm

Material Examined: Himachal Pradesh: Basantpur, 9.vii.2013, 3♂♂; Gadamau (Mahunaag), 11.vii.2013, 2♂♂; Jammu and Kashmir: Sialkot, 24.vii.2014, 2♀♀.

Distribution: India: North-West Himalayas, Sikkim; Nepal; Pakistan.

Remarks: It is distinct with respect to the prominent submarginal wavy line on forewing and genitalic characters such as uncus and valva in male genitalia and apophyses and papilla analis in female genitalia.

3. Acronyms

1A- First anal vein; 2A-Second anal vein; CU₁-First cubital vein; CU₂-Second cubital vein; M₁-First median vein; M₂-Second median vein; M₃-Third median vein; R₁-First radial vein; R₂-Second radial vein; R₃-Third radial vein; R₄-Fourth radial vein; R₅-Fifth radial vein; RS-Radial Sector; SC-Subcosta; SC+R₁-Subcosta+ First Radial vein.

Conflict of Interest

There is no conflict of interest.

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