

STUDIES ON THE GENITALIA OF SOME SYNTOMID MOTHS (HYMENOPTERA: LEPIDOPTERA) FROM NORTHWESTERN INDIA

Rachita Sood¹, H.S. Rose² and P.C. Pathania³

^{1,2} Department of Zoology, Punjabi University, Patiala, Punjab 147002, India

³ Dolphin (PG) College of Life Sciences, Chuni-Kalan, Punjab 160059, India

Email: ³ pathaniapc@yahoo.co.in (corresponding author)

ABSTRACT

Five species i.e., *Eressa confinis* (Walker), *Syntomoides imaon* Cramer, *S. hydatina* Butler, *Amata minor* (Warren), *A. bicincta* (Kollar) were collected from North-West India. Besides giving an illustrated account of the genitalia, keys to their genera and species studied has also furnished.

KEYWORDS

Genitalia, India, Lepidoptera, north-west, syntomid

While surveying the macrolepidopteran moths of northwestern India, species of Syntomids of the subfamily Ctenuchinae referable to three genera viz., *Eressa* Walker, *Syntomoides* Hampson, *Amata* Fabricius were collected. Hampson (1892) has not studied the genitalia of these species. The genitalia, in fact, play an important role in the segregation of different biological species and in order to fill up this gap, the genitalic studies of the species i.e., *Eressa confinis* (Walker), *Syntomoides imaon* Cramer, *Syntomoides hydatina* Butler, *Amata minor* (Warren) and *Amata bicincta* (Kollar) have been dealtwith in the present studies. This subfamily is being characterized by the well developed proboscis, short, porrect labial palpus, down-curved or upturned; variable antennae which is simple to bipectinate in males and simple to serrate in females; forewing with vein M_2 from near the lower angle of cell, anal vein 2A forked at base R_5 stalked with R_3+R_4 , hindwing small, $Sc+R_1$ absent or rudimentary, rarely forming a fork with R_5 ; frenulum present; tibiae with spurs short (Hampson, 1892)

Eressa Walker

Eressa Walker, 1854, *List Specimens Lepid. Insects Coll. Br. Mus.*, 1: 149.

Type species: *Glaucopsis confinis* Walker, 1854, *ibid.*, 1: 149, by monotypy.

Eressa confinis (Walker)

(Figs. 1-3)

Glaucopsis confinis Walker, 1854, *ibidem*, 1: 149, by monotypy.

Distribution: Almora, Kullu (Hampson, 1892).

Food plant: Not known.

Material examined: 2 males, 5.iii.1998; 3 males, 10.iii.1998; 5 males, 17.iii.1998; 1 female, 17.iii.1998; 5 males, 23.iii.1998; 2 males, 21.iv.1998; 1 female, 28.iv.1998; 1 male, 13.v.1998; 1 male, 16.vi.1998; 4 males, 29.iii.1998; 2 males, 5.iv.1998; 2 males, 24.iv.1998; 3 males, 5.v.1998; 1 male, 10.v.1998; 3 males, 17.v.1998; 4 males, 1.iii.1999; 1 male, 8.iii.1999; 1 male, 20.viii.1999; Punjabi University Campus, Patiala, Dist. Patiala, Punjab, 250m; 1 male, 3.vi.2000; 1 female, 2.vi.2000; 1 male, 2 females, 26.vi.2001; Dunera, Dist. Gurdaspur; Punjab, 700m; 1 female, 1.vi.2000, Dhar, Dist. Gurdaspur, Punjab, 650m; 4 females, 27.vi.2002, Chohal, Dist. Hoshiarpur, Punjab, 400m; 2 female, 24.vii.2000, Ropar, Dist. Roopnagar, Punjab, 370m; 2 male, 23.v.2000, Anandpur Sahib, Distt Ropar, Punjab, 345m, coll. Rachita Sood and P.C. Pathania.

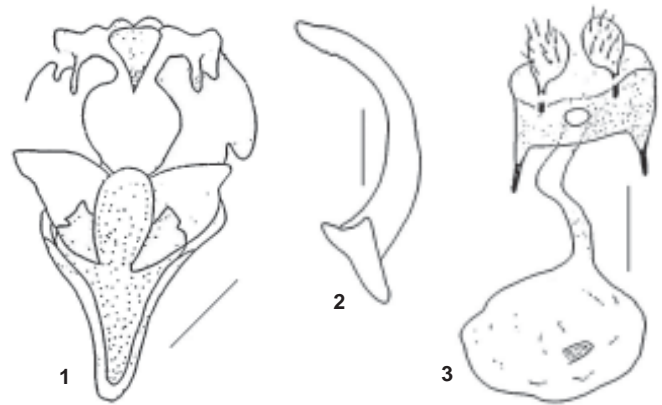


Figure 1-3. *Eressa confinis* (Walker)
1 - Male genitalia-ventral view; 2 - Aedeagus;
3 - Female genitalia-ventral view. scale - 0.51mm

Male genitalia: (Figs. 1 & 2) Uncus broad, triangular, slightly lobed basally and laterally; tegumen robust, with internal processes; vinculum U-shaped, broad; saccus much elongated, slightly curved proximally; valvae short, rounded, slightly, convex at tip, costa, saccular margins well marked, marginally setose, setae small; juxta like a rounded inverted 'V' between the saccular bases; aedeagus slender, evenly curved, vesica unornamented.

Female genitalia: (Fig. 3) Ovipositor lobes short, broad, slightly rectangular in shape, beset with dense setae; posterior and anterior apophyses short, broad, not extending eight segment; eighth segment darkly sclerotised ring of even thickness; ostium rounded, centrally placed in the darkly sclerotised eighth segment; ductus bursae of moderate length, weakly sclerotised; corpus bursae globular, membranous; signum single, central, rhomboidal, scobinate patch.

Alar expanse: Male 22-26 mm; Female 26-28 mm.

Remarks

Hampson (1892) listed, as many as, 53 species under the genus *Syntomis* Ochseneimer in three sections, viz., *Syntomis*, *Hydrusa* and *Eressa*. The presently collected material goes under the latter section, which is based on the species, *Syntomis musa* Swinhoe. Zerny (1912) included 10 species in this genus, whereas, Fletcher (1925) has excluded one of its species i.e., *Eressa simplex* Rothschild, and thus reducing the number of Indian species to nine. Obratzsov (1954) published notes on the type species, *Glaucopsis confinis* Walker and used the generic name *Eressa* Walker, which has been reviewed by Arora (1980), who dealt with most typical members of this genus. In fact, the latter worker has furnished detailed diagnosis of the genus, including fine details of the wing venation, as well. While upholding the use of

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generic name *Eressa* Walker, Holloway (1988) has discussed the male and female genitalia of its type species. The examination of the genitalia of the species, under reference, reveals that its uncus (broad, triangular, with slight lobes basally and laterally), valvae (short, rounded), juxta (rounded inverted V), aedeagus (slender, evenly curved), unornamented vesica and centrally placed ostium bursae completely conform to the type species, and accordingly, it is reported as *Eressa confinis* Walker.

Syntomoides Hampson

Syntomoides Hampson (1893) 1892, *Fauna Br. India (Moths)*, 1: xiv, 209. Type species: *Sphinx imaoon* Cramer, 1779, *Uitlandsche kapellen (Papillons exot.)*, 3: 94, 175, pl. 248, fig. E, by original designation.

Syntomoides imaoon Cramer

(Figs. 4-6)

Syntomoides imaoon Cramer, 1780, *Uitl. kapellen*, 3: 94.

Distribution: Khasis hills, Sikkim, Bengal, Manipal, Nagas, throughout the plains of India, Burma, Sumatra, Ceylon, Yunnan, Coromandel, Malacca (Hampson, 1892).

Food plant: Citrus (Holloway, 1988).

Material examined: 1 female, 13.iv.1998; 1 male, 6.v.1999; 2 males, 20.iii.1998; 1 male, 4.ix.1998; 1 male, 6.vii.1999; 1 male, 17.v.1999; 1 male, 10.iii.1998; 2 males, 17.iii.1998; 1 male, 10.v.1998, 1 male, 20.xi.1998; 2 males, 4.iii.1999; 1 male, 18.viii.1999, Punjabi University, Campus, Patiala, Dist. Patiala, Punjab, 250m; 4 males, 2.vi.2000; 3 males, 1 female, 3.vi.2000; 1 male, 26.vi.2001; 21 males, 1 female, 27.x.2001, Dunera, Dist. Gurdaspur, Punjab, 700m; 4 males, 21.x.1999, Roopnagar, Dist. Roopnagar, Punjab, 350m; 3 males, 1 female, 27.vii.1999, 1 female, 16.x.1999, Anandpur Sahib, Dist. Ropar, Punjab, 345m; 1 male, 30.v.1999, Nangal, Dist. Ropar, Punjab, 370m; 1 female, 23.v.2000, Taragarh, Dist. Ropar, Punjab, 350m; 3 males, 14.x.1999, Dasua, Dist. Hoshiarpur, Punjab, 370m; 3 males; 27.vi.2002, Chohal, Dist. Hoshiarpur, Punjab, 400m, coll. Rachita Sood and P.C. Pathania.

Male genitalia: (Figs. 4 & 5) Uncus triangular, short, sclerotised slightly, beset with hair like setae on upper side, base broader than tip which is sharply bent downwards, tip pointed, basal part raised mid dorsally into a ridge; tegumen broadened into two massive shoulders on which uncus is based; vinculum very broad, giving rise to a pair of apodemes rather than a central saccus; valvae simple, rather rounded, mid dorsal margin sclerotised, beset with same setae; apex narrower; juxta simple, slightly sclerotised; aedeagus basally globular, apically narrower, smoothly curved in the middle giving a sickle shaped appearance, tip narrow, vesica small, without cornuti.

Female genitalia: (Fig. 6) Ovipositor lobes elongated, broad basally, beset with setae; posterior and anterior apophyses short, broad, sclerotised slightly; eighth segment narrow; ostium bursae wide, sclerotised, funnel shaped; ductus bursae slender, wide, sclerotised, twisted; ductus seminalis entering at the ductus bursae; cervix bursae very small membranous; corpus bursae membranous, elliptical in shape, signum small subrounded patch.

Alar expanse: Male 28-32mm; Female 32mm.

Remarks

Hampson (1892) while giving diagnosis of the genus *Syntomoides* (type species *Sphinx imaoon* Cramer), has mentioned that *godartii* Boisduval and *hydatina* Butler as two distinct species and *sargania*

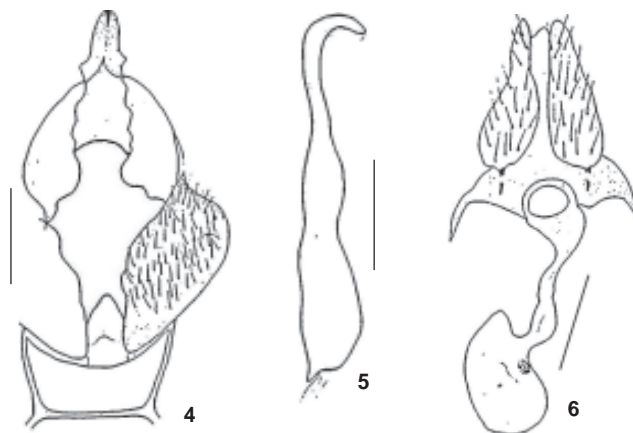


Figure 4-6. *Syntomoides imaoon* Cramer
4 - Male genitalia-ventral view; 5 - Aedeagus;
6 - Female genitalia-ventral view. scale - 0.51mm

Butler as a form of *imaoon*. Fifty-nine males and five females collected from various localities were identified as *S. godartii* Boisduval, following Hampson (1892). However, some of the individuals of this large sample show slight population variations in wing venation, alar expanse and colour of the frons. Upon dissection of their genitalia, such individuals have been found to be completely conspecific. While reporting *imaoon* Cramer as a new record from Andaman Islands, Arora (1980) has described it under the genus *Ceryx* Wallengren. Recently, Holloway (1988) has pointed out that the latter genus shares some characters with *Syntomoides* Hampson, especially in reduction of veins arising from the discal cell of the hindwing and in presence of a single hyaline patch in the space posterior to CuA_2 . However, these two genera can be well differentiated on the basis of their male genitalia, which is more robust in *Syntomoides* Hampson than *Ceryx* Wallengren. In addition to this, *Syntomis sargania* Butler, *S. approximata* Walker, *S. fusiformis* Walker, *S. cupreipennis* Butler and *S. mola* Swinhoe have been given as synonyms of *S. imaoon* Cramer. Accordingly, the present sample is reported as *Syntomoides imaoon* Cramer and the species appears to be quite common in the Shivaliks and adjoining areas.

Syntomoides hydatina Butler

(Fig. 7)

Syntomoides hydatina Butler, 1876, *Journ. Linn. Soc. Zool.*, 12: 346.

Distribution: Calcutta, Central India (Hampson, 1892).

Food plant: Not known.

Material examined: 4 males, 23.v.2000, Punjabi University Campus, Patiala, Dist. Patiala, Punjab, 250m, coll. Rachita Sood and P.C. Pathania.

Male genitalia: Not examined.

Female genitalia: (Fig. 7) Ovipositor lobes much elongated, broad basally, beset with setae; posterior and anterior apophyses short, broad, sclerotised slightly; eighth segment narrower; ostium bursae wide, funnel shaped; ductus bursae wider, moderately long, weakly sclerotised; corpus bursae globular, small, membranous, signum a rounded patch.

Alar expanse: Female 24mm.

Remarks

The species is being reported for the first time from northern India.

Amata Fabricius

Amata Fabricius, 1807, *Magazin Insektenk.* (Illiger), 6: 289.

Type species: *Zygena passalis* Fabricius, 1781, *Species Insect.*, 2 : 159, by subsequent designation by Hampson, 1898, *Cat. Lepid. Phalaenae Br. Mus.*, 1: 59.

Amata minor (Warren)

(Figs. 8-10)

Syntomis minor Warren, 1888, *Proc. Zool. Soc. Lond.*, 294.

Distribution: Punjab (Hampson, 1892).

Food plant: Not known.

Material examined: 3 males, 20.iii.1998; 2 males, 18.vi.2000, Punjabi University Campus, Patiala, Dist. Patiala, Punjab, 250m, coll. Rachita Sood and P.C. Pathania.

Male genitalia: (Figs. 8 & 9) Uncus small, thumb like; tegumen very well developed, much broader, elongated, lateral lobes lacking; vinculum Ushaped; saccus small; valvae asymmetrical, simple, left valva with apex rounded, sacculus margin folded, right valva apically produced, decorated with setae, setae modified, sacculus portion produced into a acute saccular fold; aedeagus, slender, elongated, basally broader, apically narrower, vesica armed with numerous cornuti, cornuti present in a row.

Female genitalia: (Fig. 10) Ovipositor lobes short, nearly rectangular, setosed; posterior apophyses relatively longer than anterior apophyses; anterior apophyses short, broad, thick; ostium bursae arise between the eighth and seventh tergite; ductus bursae short sclerotised distally, membranous proximally; ductus seminalis originates near corpus bursae; corpus bursae globular, two bar shaped signi present.

Alar expanse: Male 20mm; Female 32mm.

Remarks

The collection of adults of this species from Punjabi University representing Shivaliks of Himalaya is an additional precise locality from northern India.

Amata bicincta (Kollar)

(Figs. 11-12)

Syntomis bicincta Kollar, 1848, *In Hugel's Kashmir*, 4 : 460, pl. 19, fig. 8.

Distribution: Kangra, Kullu, Sikkim, Khasis (Hampson, 1892).

Food plant: Not known.

Material examined: 3 males, 2.vi.2999; 11 males, 26.vi.2001, Dunera, Dist. Gurdaspur, Punjab, 700m, coll. Rachita Sood and P.C. Pathania.

Male genitalia: (Figs. 11 & 12) Uncus coniform, setosed; tegumen slightly narrower, long, extended into lobiform process, lobes very small, granulose; vinculum V-shaped; saccus small, weakly sclerotised; valva elongated, weakly sclerotised; costa extended into asymmetrical lobes, light lobe narrower and longer than left, left rounded, broader at tip, cucullus portion extended into hook shaped projection, marginally setosed apically, sacculus well developed, margin folded; juxta elongated; aedeagus long, slender; vesica armed with cornuti arranged in row.

Female genitalia: Not examined.

Alar expanse: Male 34mm.

Remarks

The reporting of the species from the Shivaliks of Punjab is an additional distribution record.

DISCUSSION

While proposing the genus *Syntomoides* with *Sphinx imacon* Cramer as its type species, Hampson (1892) has emphasized that the genus is conspicuous owing to an absence of the vein CuA_1 in the hindwings and the same arises from beyond end of the cell in the forewings and the veins M_2 and M_3 in the forewing originate from end of the cell, and CuA_1 from before the cell. According to this diagnosis, a sample comprising sixty-seven individuals has been found to belong to two species i.e., *Syntomoides hydatina* Butler and *S. godarti* Boisduval. The female genitalia of the latter conforms to the former species (which is the type species of this genus) in respect of characters such as narrow eighth segment, ostium bursae funnel-like or inverted bell shaped. Both the congeneric species can, however, be separated by the key given below.

Hampson (1892) reported two species i.e., *bicincta* Kollar and *minor* Warren under the waste basket genus *Syntomis* Ochseneimer. In addition to this, the genera such as *Hydrusa* Walker, *Eressa* Walker and *Trianeura* Butler have been listed as its synonyms (Hampson, *loc. cit.*). While revising the Palaearctic species, Obraztsov (1966) has considered *Syntomis* as a subgenus of *Amata* Fabricius. The latter generic name has also been adopted by Arora (1980) while dealing



Figure 7. *Syntomoides hydatina* Butler
7 - Female genitalia-ventral view. scale - 0.51mm

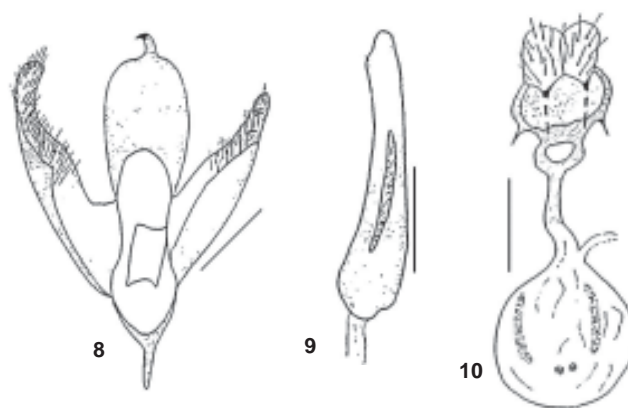


Figure 8-10. *Amata minor* (Warren)
8 - Male genitalia-ventral view; 9 - Aedeagus;
10 - Female genitalia-ventral view. scale - 0.51mm

Key to the genera of the subfamily Ctenuchinae

1. Antennae bipectinate in male, serrate in female; male genitalia with tegumen robust, possess an internal process **Eressa Walker**
- Antennae never pectinate in male; simple in female; male genitalia with tegumen not as above, without such modification **2**
2. Hindwing with vein CuA₁ absent; male and female genitalia symmetrical, male genitalia with tegumen broadened into two massive shoulders; vinculum broad, apodemes arise from it rather than saccus; female genitalia with single signum in corpus bursae **Syntomoides Hampson**
- Hindwing with vein CuA₁ present; male and female genitalia asymmetrical; tegumen not broadened into shoulders; vinculum gives rises to saccus; female genitalia with double bar-shaped signum in corpus bursae..... **Amata Fabricius**

Key to the species of the genus Syntomoides Hampson

1. Forewing with a hyaline patch at junction of veins CuA₁ and CuA₂; male genitalia with tegumen broadened into shoulder like structures; female genitalia with ductus bursae narrower **imaon Cramer**
- Forewing without hyaline patch at junction of veins CuA₁ and CuA₂; male genitalia not studied; female genitalia with ductus bursae relatively broader **hydatina Butler**

Key to the species of the genus Amata Fabricius

1. Thorax with collar yellow; forewing with hyaline spots small, transparent in colour; male genitalia with uncus small, thumb-like, tegumen lacks prominent lateral lobes **minor Warren**
- Thorax with collar black; forewing with hyaline spots relatively larger, not transparent but slightly yellow tinged; male genitalia with uncus coniform; tegumen with prominent lateral lobes **bicincta Kollar**

with four species from Andamans (India). The species referable to this genus show great variations in wing pattern, abdominal banding and thus, are best defined on the basis of their genitalic characters (Obraztsov, 1966; Holloway, 1988). The genus is conspicuous in having asymmetrical genitalia in either sex. The examination of the male genitalia of the presently studied taxa shows that the tegumen is well developed and also possesses prominent lateral lobes. The asymmetrical valvae bear asymmetrical process originating from base of each costa. The vesica is always beset with cornuti referred to as vesica ornamentation, a characteristic of the genus *Amata*, according to Holloway (1988). Because of these characters, both the presently collected species are transferred from the genus *Syntomis* Ochseneimer to form combinations as *Amata bicincta* (Kollar) and *A. minor* (Warren). It will not be out of place to mention here that Fletcher (1925) has recorded, five species under the aforesaid genus Andaman Islands (India). However, according to revised work by Holloway (1988), the genera *Syntomis* Ochseneimer, *Coenochromia* Hübner, *Hydrusa* Walker, *Asinusca* Wallengren, *Buthysia* Wallengren, *Callitomis* Butler and *Leopoldina* Hering are all synonyms of *Amata* Fabricius and there is no subgeneric category.

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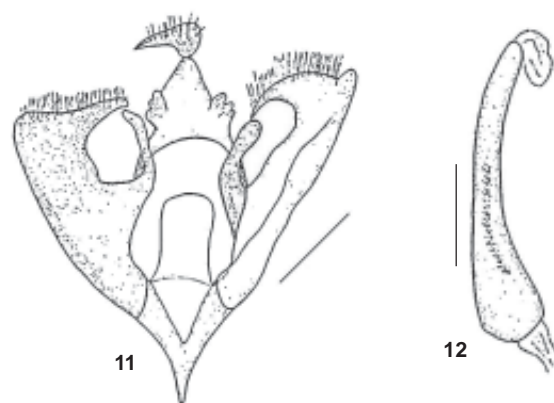


Figure 11-12. Amata bicincta (Kollar)
11 - Male genitalia-ventral view; 12 - Aedeagus. scale - 0.51mm

descriptions of a new species and a new subspecies (Ctenuchidae). *Lepidopterists News* 8: 135-139.

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