

## GENITALIAL MORPHOLOGY OF SOME HAWK MOTHS (LEPIDOPTERA: SPHINGIDAE: SPHINGINAE) FROM NORTHWESTERN INDIA

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### ABSTRACT

External genitalial morphology of seven species belonging to the subfamily Sphinginae (Sphingidae) i.e., *Agrius convolvuli* (Linnaeus), *Psilogramma menophron menophron* (Cramer), *Psilogramma incereta* Walker, *Acherontia styx styx* (Westwood), *Leucophebia emittens* Walker, *Marumba dyras dyras* (Walker) and *Polyptychus trilineatus trilineatus* Moore were studied. Besides this, keys to the subfamilies, tribes, genera and species studied are given.

### KEYWORDS

Genitalia, India, Lepidoptera, Sphingidae

The sphinx or hawk moths are fast fliers and members of the Order Lepidoptera. There are as many as 1354 species and subspecies of these moths in the world, out of which, about 204 belong to India (D'Abbrera, 1986). Before this, Bell and Scott (1937) published an account of 183 species of these moths from British India (Burma, Ceylon, Andamans, India). During the course of our studies, seven species belonging to the subfamily Sphinginae were collected from localities such as Dasua, Dhar, Dunera, Hoshiarpur and Punjabi University, Patiala. Besides re-examination of the adult morphology and wing venation, detailed structure of the male and female genitalia have been furnished to improve diagnosis.

### *Agrius* Hübner

*Agrius* Hübner (1819) 1816, *Verz. bekannter Schmett.*, 140.

Type species: *Sphinx cingulata* Fabricius, 1775, *Syst. Ent.*, 545, by subsequent designation by Tutt, 1902, *Nat. Hist. Br. Lepid.*, 3: 355.

### *Agrius convolvuli* (Linnaeus)

*Sphinx convolvuli* Linnaeus, 1758, *Syst. Nat.* (Edn. 10), 1: 490.

### Material examined

Two Females, 15.x.1999, Dasua, Dist. Hoshiarpur, Punjab, 370m; one male, 26.iv.1998; two males, 2.ix.1998; one male, 11.v.1999; one male, 30.ix.2003, Punjab University Patiala, District Patiala, Punjab, 250m, coll. Rachita Sood & P.C. Pathania.

### Distribution

Throughout the Indian subregion, low altitudes of Eastern Hemisphere, rarely in England (Bell & Scott, 1937).

### Diagnosis

Male genitalia: (Figs. 1-2). Uncus neck broad, weakly sclerotised, apex slightly pointed; gnathos flap-like band; tegumen elongated, weakly sclerotised; vinculum V-shaped; valva elongated, heavily setosed, costa nearly straight, weakly

acurated towards apex, heavily setosed at apex, setae numerous, outer margin nearly straight; sacculus extended into a curved and pointed harpe, harpe divided into a ventral and dorsal process, ventral process somewhat spatulate; transtilla a thin, membranous; juxta broad, U-shaped; aedeagus small, thick, almost straight, weakly sclerotised; vesica not armed with cornuti.

Female genitalia (Fig. 3). Ovipositor lobes distinctive, formed by a number of papillae each emitting a spine; posterior apophyses almost equal to length as that of anterior apophyses; both apophyses long, rod-like, slender; ostium bursae indefinite; ductus bursae rather short gradually given into corpus bursae; corpus bursae oblong, rugose as that of ductus bursae; signi rounded, scobinate patch.

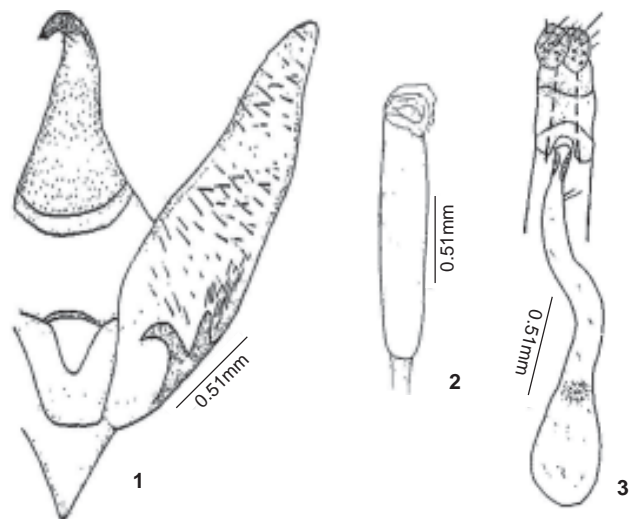
Alar expanse: Male 80-95mm; Female 98-100mm.

### Food plant

Plants of Family Leguminosae and Convolvulaceae (Bell & Scott, 1937).

### Remarks

While reporting the species *convolvuli* Linnaeus under the genus *Herse* Oken, Bell and Scott (1937) have mentioned that it occurs throughout the Indian subregion in both the dry and



Figures 1-3. *Agrius convolvuli* (Linnaeus)  
1 - Male genitalia - ventral view; 2 - Aedeagus;  
3 - Female genitalia

**Key to the subfamilies of the family Sphingidae**

1. Labial palpus without patch of sensory scales or hairs on inner surface of first segment; female genitalia with genital plate well developed ..... Sphinginae
- 1A. Labial palpus with a patch of sensory scales or hairs on the inner surface of first segment; female genitalia with genital plate reduced ..... Macroglossinae

**SUBFAMILY: Sphinginae****Key to the tribes of the subfamily Sphinginae**

1. Proboscis well developed; antennae with end segment longer ..... Sphingini Latereille
- 1A. Proboscis much reduced; antennae with end segment shorter ..... Smerinthini Hübner

**Tribe : Sphingini Latereille****Key to the genera of the tribe Sphingini Latereille**

1. Hindwing conspicuously banded with pinkish yellow (pale bands) scales all over; anterior segments of abdomen marked laterally with pink; male genitalia with uncus single, harpe prominent ..... *Agrius* Hübner
- 1A. Hindwing with pale bands only at anal angle; anterior segments of abdomen not laterally marked with pink; male genitalia with uncus bifid; harpe vestigial ..... 2
2. Thorax with no conspicuous prominent mark; female genitalia with ductus seminalis originating at ostium bursae ..... *Psilogramma* Rothschild and Jordan
- 2A. Thorax with a conspicuous 'death head' skull like mark; female genitalia with ductus seminalis originating at ductus bursae ..... *Acherontia* Lespeyres

wet areas. During the course of the present study, seven specimens of this species were identified to examine the male and the female genitalia critically which have otherwise been briefly outlined with outdated nomenclature being followed for various constituent parts by Bell and Scott (1937) and Pierce and Berine (1938). In the male genitalia, the uncus is entire and the harpe is bifid and these characters conform (congeneric) to the type species, has been as discussed by Holloway (1987). The species, under reference, has erroneously been reported under the genus *Herse* Oken, Bell and Scott (1937), Pierce and Berine (1938) and Rothschild and Jordan (1903) and generic name has been correctly placed as a synonym of *Sphinx* Linnaeus by Fletcher and Nye (1982). D'Abrera (1986) and Holloway (1987) have reported the species under the genus *Agrius* Hübner, the generic name currently followed.

***Psilogramma* Rothschild and Jordan**

*Psilogramma* Rothschild and Jordan, 1903, *Novit. Zool.*, 9 (Suppl.): 29 (Key), 42.

**Type species:** *Sphinx menephron* Cramer, 1780, *Uitlandsche kapellen (Papillons exot.)*, 3 : 164, pl. 285, fig. A, by original designation.

**Remarks**

Rothschild and Jordan (1903) proposed the genus *Psilogramma* with *Sphinx menephron* Franer as its type species and contains four species from the Oriental and Australian regions (D'Abrera, 1986). While dealing various species, Bell and Scott (1937) have stated "the moth very variable in size, colour and markings, some specimens being very dark with subbasal, acute medial, median and post median lines showing plainly, others very grey with these lines obsolescent. The black streaks under R1, M1 and Sc5 are always present".

Holloway (1987) pointed out that the genus has forewing fascia

similar to *Agrius* but the marking on the hindwings, abdomen and those on the labial palpi make them very distinct from each other. During the course of present studies, two specimens have been identified as *Psilogramma menephron menephron* Cramer on the basis of various morphological characters, including genitalia (Bell & Scott, 1937; D'Abrera, 1986; Holloway, 1987). Yet, another sample comprising six specimens has been identified as *P. incerta* Walker. The critical examination of the latter species shows that characters such as a naked stripe over the inner surface of labial palpi and bifid uncus, vestigial harpe, forked apical process of the aedeagus of the male genitalia conform to the diagnosis of the genus, as outlined by Holloway (1987).

***Psilogramma menephron menephron* (Cramer)**

*Sphinx menephron* Cramer, 1780, *Uitlandsche kapellen (Papillon exot.)*, 3: 164, pl. 285, fig. A (z) Amboina.

**Material examined**

One male, 23.x.2001, Dhar, Dist.Gurdaspur, Punjab, 650m; one male, 20.ix.2001, PUP, Dist. Patiala, Punjab, 250m, coll. Rachita Sood & P.C. Pathania.

**Distribution**

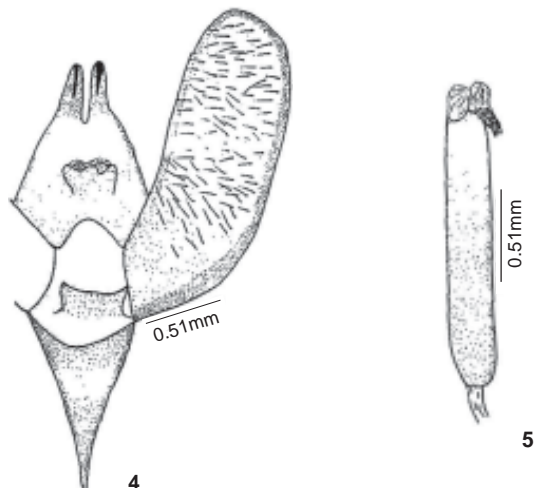
Throughout the Indian sub-region, China, Solomon Islands (Bell & Scott, 1937).

**Diagnosis**

**Male genitalia:** (Figs. 4 - 5). Uncus bifid, process long, slender, curved, apex pointed, bent, sclerotised; gnathos, short broad, sinuated, angles slightly produced, sides distally rounded; vinculum U-shaped; saccus elongated, V-shaped; valva broad, long, highly setosed, costa excurate, apex rounded, sacculus simple; aedeagus of moderate length, straight, slender, a wedge shaped process at the lower tip of sheath, very characteristic,

**Key to the species of the genus *Psilogramma* Rothschild and Jordan**

- 1. Forewing with ground colour brown; male genitalia with saccus present ..... *menophron menophron* (Cramer)
- 1A. Forewing with ground colour grey; male genitalia with saccus absent ..... *incereta* Walker



**Figures 4-5. *Psilogramma menophron menophron* (Cramer)**  
 4 - Male genitalia - ventral view; 5 - Aedeagus

asymmetric in shape, reflexed, short forked.

Alar expanse: Male 108mm.

**Food plant**

*Olea dioicum*, *Jasminum*, *Ligustrum*, *Nyctanthes Arbor-tristis* (family Oleaceae); *Tectona grandis*, *Clerodendron infortunatum*, *Vitex negundo*, *Callicarpa arborea* (Family : Verbenaceae) (Bell and Scott, 1937).

**Remarks**

The species, under reference, appears to be quite scanty in the Shivaliks in view of collection of only two individuals. Thus, no comments can be made on the variability in colour and markings, as pointed out by Bell and Scott (1937). According to D'Abnera (1986), the species *Psilogramma menophron* Cramer has three subspecies i.e., *menophron menophron* Cramer (Oriental region, Australian region, except new Caledonia), *menophron lifuense* Rothschild (New Caledonia, Loyalty Island) and *menophron jordana* Bethune-Baker (Fiji) from the respective geographical regions/locality/country. Accordingly, the present sample from the Shivaliks is referred as *P. menophron menophron* Cramer.

***Psilogramma incereta* Walker**

*Psilogramma incereta* Walker, 1864, *List Lep. Ins. B.M.*, 31 : 36.

**Material examined**

One Female, 15.x.1999, Dasua, Dist. Hoshiarpur, Punjab, 370m; two males, 26.vi.2001; Dunera, Dist. Gurdaspur, 700m; three males, 23.x.2001, Dhar, Dist. Gurdaspur, 650m, coll. Rachita Sood & P.C. Pathania.

**Distribution**

China, India, Japan (Hampson, 1892).

**Diagnosis**

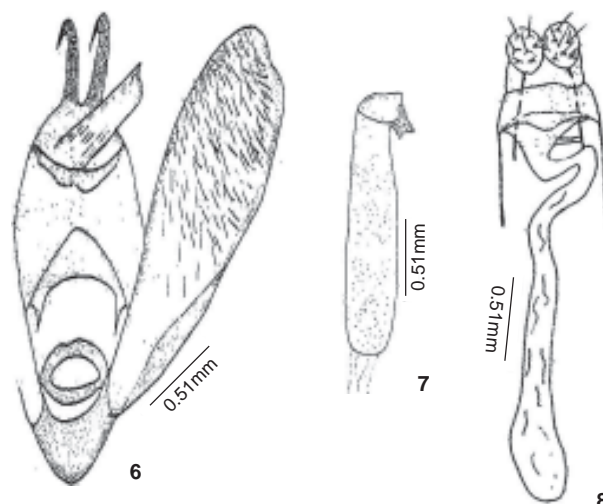
Male genitalia: (Figs. 6 - 7). Uncus well developed, simple long, bifid, bifurcation deep, erect lobiform processes, tip acuminate, curved ventrally, sclerotised heavily at apex; tuba analis present; gnathos slightly bifid mesially or weakly sinuous; tegumen broad, weakly sclerotised; vinculum V-shaped; saccus nearly absent; valva elongated, sole shaped, thickly setosed from the middle to apex; costa sclerotised, margin nearly straight, apex broad; sacculus well developed, marginally sclerotised; transtilla a thin band, edges on lateral sides of aedagus slightly developed; anellus present; aedeagus of moderate length, straight, slender, ankylosed; a wedge shaped process forked at apex.

Female genitalia: (Fig. 8). Ovipositor lobes as that of typical sphingid type; posterior apophyses smaller in length than anterior apophyses, both long, rod-shaped; ostium bursae wid, with an angular free plate, posterior portion of the plate sclerotised, smooth, scaled, half moon shaped, with lateral margins elevated; ductus bursae rather short, thick, weakly sclerotised, curved; ductus seminalis entering nearly the anterior end of ductus bursae; corpus bursae oblong, much elongated.

Alar expanse: Male 85mm; Female 110mm.

**Food plant**

Not known.



**Figures 6-8. *Psilogramma incereta* Walker**  
 6 - Male genitalia - ventral view; 7 - Aedeagus;  
 8 - Female genitalia

**Tribe : Smerinthini Hübner**  
**Key to the genera of the tribe Smerinthini Hübner**

1. Forewing with upperside pink ..... **Leucophlebia Westwood**
- 1A. Forewing with upperside never pink ..... **2**
2. Hind tibiae with one pair of spurs; male genitalia with uncus bifid ..... **Marumba Moore**
- 2A. Hind tibiae with two pairs of spurs; male genitalia with uncus single (simple) ..... **Polyptychus Moore**

**Remarks**

As pointed out under the remarks of the genus *Psilogramma* Rothschild and Jordan, the species *P. incereta* Walker completely agrees with the characters of type species i.e., *Sphinx menophron* Cramer. It may be added that Hampson (1892) has given *incereta* Walker as a synonym of genus *Pseudosphinx discistriga* Waker as *Anceryx incerta* Walker and has reported it from China, India and Japan. Accordingly, the collection of the present sample from the Shivaliks is an additional record.

**Acherontia Laspeyres**

*Acherontia* [Laspeyres], 1809, *Jena. allg. Lit.-Ztg.*, 4(240) : 100.

Type species: *Sphinx atropos* Linnaeus, 1758, *Syst. Nat.* (Edn. 10), 1 : 490, by original designation.

**Acherontia styx styx (Westwood)**

*Sphinx (Acherontia) styx* Westwood, 1847, *Cabinet Oriental Ent.* : [88], pl. 42, fig. 3.

**Material examined**

Three females, 15.ix.2001, Hoshiarpur, Dist. Hoshiarpur, Punjab, 370m, coll. Rachita Sood & P.C. Pathania.

**Distribution**

Burma, Ceylon, Throughout India (Bell and Scott, 1937).

**Diagnosis**

Female genitalia: (Fig. 11). Ovipositor lobes of typical sphingid type, outer lobes made of number of papillae, each emitting a spine, spines very thin, lower spines longer, inner lobes small; posterior apophyses longer than anterior apophyses, both apophyses rod-like; ostium bursae with a proximal transverse flap, which is shallowly sinuate mesially; ostium bursae narrow, rounded, eight sternite sclerotised encircling the ostium; ductus bursae elongated, weakly sclerotised anteriorly; ductus seminalis entering near corpus bursae; corpus bursae elongated, globular pouch, wrinkled interiorly, membranous; signi absent.

Alar expanse: Female 105mm.

**Food plant**

Pest of *Sesamum indicum* (Pedaliaceae) and also fed on plants of family Solanaceae, Verbenaceae, Leguminosae, Oleaceae, Bignoniaceae, Labiatae (Bell & Scott, 1937).



**Figure 11. *Acherontia styx styx* (Westwood) - Female genitalia**

**Leucophlebia Westwood**

*Leucophlebia* Westwood, 1847, *Cabinet Oriental Ent.* : 46.

Type species: *Leucophlebia lineata* Westwood, 1847, *ibidem*, 46, pl. 22, fig. 2, by monotypy.

**Leucophlebia emittens Walker**

*Leucophlebia emittens* Walker, 1866, *List Lep. Ins. B.M.*, 35 : 1858.

**Material examined**

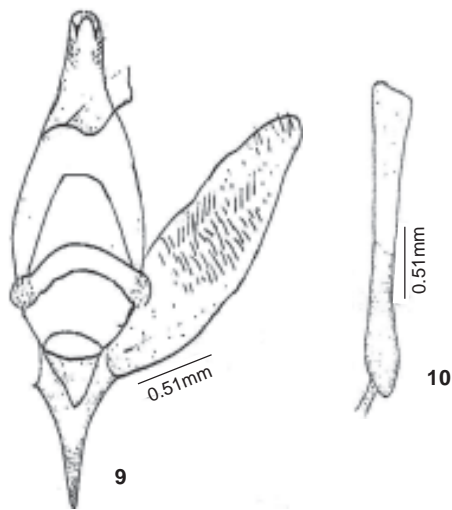
Five males, 26.vi.2001, Dunera, Dist. Gurdaspur, Punjab, 700m, coll. Rachita Sood & P.C. Pathania.

**Distribution**

Western Himalaya, southern India, Burma (Bell & Scott, 1937).

**Diagnosis**

Male genitalia: (Figs. 9 - 10). Uncus broad, somewhat sinuate towards apex, apex bent, pointed at edges; gnathos large, weakly sclerotised, shallowly sinuate at the sides and apex, the strongly produced apical angles being a little produced distad and laterad; tegumen elongated, broad, weakly sclerotised; vinculum broad U-shaped, saccus long V-shaped; valva elongated, simple, setosed, setae numerous from middle to apex, costal margin concave, apex evenly rounded, saccular margin sclerotised; harpe small, a triangular projection; transtilla



Figures 9-10. *Leucophlebia emittens* Walker  
9 - Male genitalia - ventral view; 10 - Aedeagus

modified, a thin curved plate, with a setae well marked at its junction with valva; juxta V-shaped; aedeagus of moderate length, nearly straight, vesica membranous, lacks cornuti.

Alar expanse: Male 50mm.

#### Food plant

Not known.

#### Remarks

According to D'Abrera (1986), the genus *Leucophlebia* Westwood is represented by four species i.e., *L. lineata* Westwood (Afrotropical & Oriental); *L. emittens* Walker (N.W. to Central India), *L. afra* Karsch (Senegal to Angola, to the Sudan) and *L. neumanni* Rothschild (Norther Uganda to Western Ethiopia) from the respective regions mentioned in parenthesis. The former two species have also been reported from India, the first one being from western and eastern southern India. The collection of five specimens from the foothills of Shivaliks is an additional record in Western Himalayas (Bell & Scott, 1937). It may also be added that the tribes for many genera including *Leucophlebia* Westwood is not certain and in the present studies, the latter genus is tentatively described under the tribe Semithrini for the time (Pittaway, pers. comm.).

#### *Marumba* Moore

*Marumba* Moore (1882), 1882-3, *Lepid. Ceylon*, 2 : 8.

Type species: *Smerinthus dyras* Walker, 1856, *List specimens lepid. Insects Colln. Br. Mus.*, 8 : 250, by subsequent designation by Kirby, 1883, in Rye, *Zool. Rec.*, 19 (Insecta) : 183.

#### *Marumba dyras dyras* (Walker)

*Smerinthus dyras* Walker, 1856, *List specimens lepid. Insects Colln. Br. Mus.*, 8 : 250 by subsequent designation by Kirby, 1883, in Rye, *Zool. Rec.*, 19 (Insecta) : 183.

#### Material examined

Two males, 26.vi.2001, Dunera, Dist. Gurdaspur, Punjab, 700m, coll. Rachita Sood & P.C. Pathania.

#### Distribution

Western and Eastern Himalayas, South India, Ceylon, Andaman Islands (Bell and Scott, 1937).

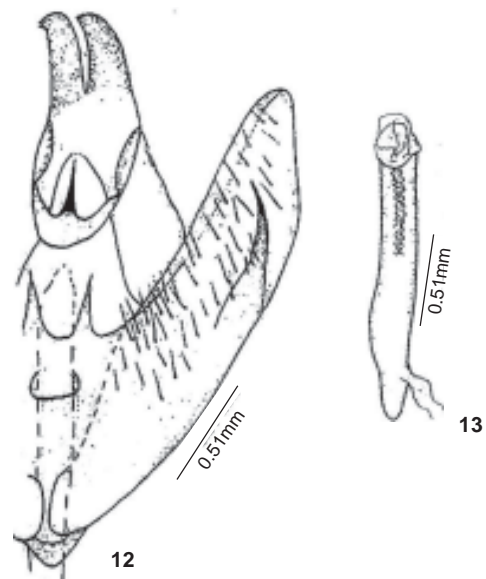
#### Diagnosis

Male genitalia: (Figs. 12-13). Uncus divided into two slender process slight curved neutrad setosed, seta very fair thick, apex acute; gnathos arms narrow medially fused, given off into a thick medial spine like projection, area from the arms towards uncus membranous, setosed basally; tegumen broad, sclerotised; vinculum broad V-shaped; saccus absent; valvae elongated, costa nearly straight sclerotised broadly towards apex valvae sclerotised marginally, strongly setosed, setae very thick, apex rounded blunt, sacculus well developed, given off into harpe, harpe irregularly tuberculate, spously setosed; anellus developed; transtilla spined equally an both sides of aedeagus; aedeagus of moderate length, sheath more or less rugose or granulose towards the end, vesica lacks cornuti.

Alar expanse: Male 90mm.

#### Food plant

Food plants belonging to families Malvaceae (*Bombax*, etc.); Sterculiaceae (*Sterculia*, etc.); Tiliaceae (*Grewia*); Euphorbiaceae (*Bridelia*); Sapindaceae (*Schleichera trijuga* Willd.) (Bell & Scott, 1937).



Figures 12-13. *Marumba dyras dyras* (Walker)  
12 - Male genitalia - ventral view; 13 - Aedeagus

### Remarks

According to D'Abrera (1986), the genus *Marumba* Moore is represented by six species viz., *M. spectabilis* Butler (N. India, Sikkim and Assam), *M. poloitis* Hampson (Ganjam, Orissa (India)), *M. decoratus* Moore (Sikkim, Assam, Peninsula, Malaya, Sumatra), *M. nympa* Rothschild and Jordan (southern India), *M. bengalensis* Hampson (India, Chota-Nagpur) and *M. indicus* Walker (N. Central India) from India. During the course of present studies, two specimens of *M. dyras* Walker has been collected from the Shivaliks in Punjab. Though, Bell and Scott (1937) have mentioned that they have breed this species in Western Himalayas (Shivalik mountains), yet, during the present survey work, only two specimens could be collected, thereby meaning that the species is becoming quite rare. The species, under reference, is represented by four subspecies i.e. *M. dyras dyras* Walker, (Ceylon, N.W. India, southern Myanmar, Indo China, China), *Marumba dyras javanica* Butler (Sundaland to Philippines), *M. dyras andamana* Moore (Andaman Islands) and *M. dyras tenimber* Clark (Tanimbar Island) and accordingly the nominotype is reported as *M. dyras dyras* (Walker). As such the type species is unique in having weakly falcate forewing and with termen somewhat sinous. The male genitalia is conspicuous due to bifid uncus, strongly developed harpe, especially each of the transtilla is developed as strong spine equally on either side of the aedeagus.

### *Polyptychus* Hübner

*Polyptychus* Hübner (1819) 1816, *Verz. bekannter Schmett.*: 141.

Type species: *Sphinx dentatus* Cramer, 1777, *Uitlandsche kapellen (Papillions exot.)*, 2 : 42, pl. 125, fig. G, by subsequent designation by Grote, 1872, *Bull. Buffalo Soc. nat. Sci.*, 1 : 26.

### *Polyptychus trilineatus trilineatus* Moore

*Polyptychus trilineatus* Moore, 1888, *Proc. Zool. Soc. London*, p. 390.

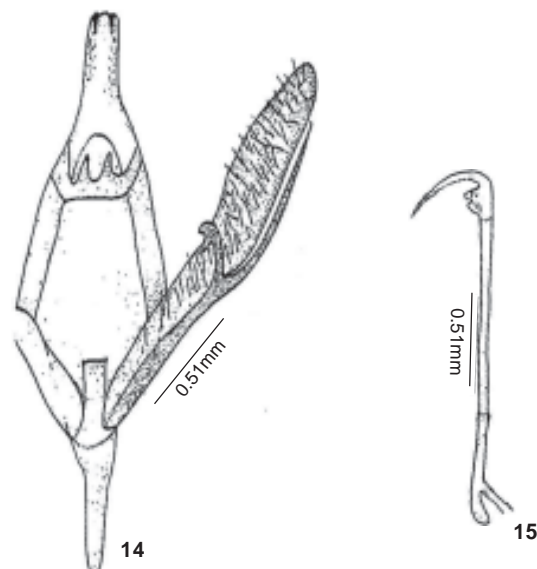
### Material examined

Two males, 23.x.2001, Dhar, Dist. Gurdaspur, Punjab, 650m, coll. Rachita Sood & P.C. Pathania.

### Distribution

Ceylon (Bell and Scott, 1987); northwestern India, Assam, Sikkim, Burma (D'Abrera, 1986).

Male genitalia: (Figs. 14-15). Uncus long, strongly dilated, hood shaped; tuba analis present; gnathos developed, weakly sclerotised, distal edges slightly bisimulate; tegumen elongated, arms somewhat narrower, weakly sclerotised; vinculum V-shaped, broad, saccus elongated, thin slender, weakly sclerotised; valva sole shaped; costal region sparsely setosed, setae very fine, costal margin nearly straight; sacculus gien off into harpe, harpe two in number, right arm of harpe long, pointed, projecting beyond ventral edge of valvae, left arm short, curved; anellus small tube like; aedeagus thin, elongated, slender, apex like fish tailed process, tip acute, sharp much curved bent, vesica membranous.



Figures 14-15. *Polyptychus trilineatus trilineatus* Moore  
14 - Male genitalia - ventral view; 15 - Aedeagus

Alar expanse: Male 74mm.

### Food plant

Not known.

### Remarks

D'Abrera (1986) has remarked, the genus *Polyptychus* Hübner is an heterogenous assemblage of taxa having great variety of wing shape, colouration and marking and is represented by three species i.e., *P. trilineatus* Moore (northwestern to northern India, Assam, Sikkim, Myanmar), *P. draconis* Rothschild and Jordan (Tibet) and *P. dentatus* Cramer (Sri Lanka, India) in the Oriental region. The present sample is reported as *Polyptychus trilineatus trilineatus* Moore (= *undatus* Rothschild & Jordan) and extends from North West to Assam etc. (D'Abrera, 1986). Earlier while reporting the species *Polyptychus dentatus* Cramer, Hampson (1892) has referred three synonyms, viz., *Sphinx timesius* (Eastern Himalaya), *P. trilineatus* Moore and *Sphinx modesta* Fabricius as its forms from N.W. Himalayas. However, Bell and Scott (1937) have correctly reported this species as *P. trilineatus trilineatus* Linnaeus with *P. dentatus* Hampson as its synonym. They have further pointed out that the species is quite rare and they could get it in Shivalik mountains near Dehra Dun at an elevation of 760m. During the course of present survey, only two specimens could be collected from the Shivaliks in Punjab at an elevation of 650m from Dhar, thereby meaning that the species is quite rare in this part of the country.

### DISCUSSION

Moths belonging to the family Sphingidae are long, narrow, with pointed fore wing, short triangular hind wing, large eyes, powerful thorax and sharply pointed abdomen. The eggs are either nearly spherical or more or less oval in shape. The surface is usually smooth and shining, and the colour varies from green

to yellow. The larvae, when full-fed are nearly cylindrical in some subfamilies, but taper more or less strongly towards the head in others, the head being either rounded or triangular. There is always a horn on the twelfth segment, straight and bifid in the first instar, of various shapes and more or less strongly chitinized in the later instars, while it may be reduced to a short tubercle or a knob in some species. The pupae are usually short, cigar-shaped, rounded in front and pointed behind (Bell & Scott, 1937).

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##### 1. Botanist (1 post)

Educational Qualifications: Candidate should be M.Sc. I Class in Botany.

Experience: Should have minimum 2 years experience in field research and proven interest in study / bird monitoring and should have: Should have minimum 2 years experience in field research and proven interest in study / bird monitoring and should have knowledge of computer programmes like MS office and excellent communication skill in English

##### 2. Ornithologist

Educational Qualifications: M.Sc I Class in Ornithology/ Zoology/Wildlife biology/Life Sciences.

Experience: Should have minimum 2 years experience in identification of bird species, study of bird habits, knowledge of computer programmes like MS office and excellent communication skill in English

Job Description: The work for both posts involve extensive travel for field research study like bird monitoring, collection of information/data, preparation of reports, studying the bird habits, identification of bird species which are potentially hazardous to aircraft in and around aerodromes, evolving remedial measures, identification of bird – strike remnants, etc. **Selected candidates will be encouraged and assisted in enrolling for Ph.D. Programme.** Valid driving licence for 4-wheeler will considered additional qualification.

Age limit: Up to 30 years.

Salary: Negotiable.

The appointment will be initially for a period of one year on contract basis. Candidates fulfilling the above requirements may send their applications with detailed bio-data and expected salary within 10 days to:

**Director, Bombay Natural History Society,  
Hornbill House, Shaheed Bhagat Singh Road,  
Mumbai, Maharashtra 40023,, India.  
Website: [www.bnhs.org](http://www.bnhs.org)**