Journal of Global Biosciences
ISSN 2320-1355
Volume 4, Number 7, 2015, pp. 2786-2789
Website: www.mutagens.co.in
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researchsubmission@hotmail.com

Research Paper

GENITALIC STUDIES OF *Hemaris fuciformis* LINNAEUS (SPHINGIDAE: LEPIDOPTERA) FROM INDIA

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Abstract

The male and female genitalic features of broad bordered bee hawk moth i.e., *Hemaris fuciformis* Linnaeus (type species) have been studied and illustrated in detail. The genus diagnosis has been updated.
Key words: Taxonomy, *Hemaris*, Sphingidae, genitalia.

INTRODUCTION

The genus *Hemaris* Dalman is represented by twenty one species of bee hawkmoths, out of which three species i.e. *fuciformis* Linnaeus (the type species), *saundersi* Walker and *rubra* Hampson are known from India [3]. The latter two species are known from Kashmir. Rothschild and Jordan [7] and Bell & Scott [1] placed these species in genus *Haemorrhagia* Grote & Robinson and *Hemaris* as its synonym and this nomenclature was also followed by Zhu and Wang [8]. Fletcher & Nye [2] stated both these genera i.e. *Hemaris* Dalman & *Haemorrhagia* Grote & Robinson, as valid generic names with *fuciformis* Linnaeus and *thysbe* Fabricius as their type species respectively. Pittaway [5] and Pittaway & Kitching [6] revived the genus *Hemaris* Dalman and also placed fifteen species including *saundersi* Walker and *rubra* Hampson. The male and female genitalia along with other morphological characters of *H. fuciformis* Linnaeus has been studied in detail in the present studies.

MATERIAL AND METHODS

The studied material was collected from different localities falling in the States of North-East and North-West India. The collected material was treated as per standardized techniques in Lepidopterology. The terminology for naming different parts of genitalia has been followed after Klots [4]. The diagrams were drawn with the help of graph eye-piece fitted in Stereo-zoom binocular.

ABBREVIATIONS

AED: Aedeagus; ANT. APO: Anterior apophyses; CO: Costa; CRP. BU: Corpus bursae; DU. BU: Ductus bursae; JX: Juxta; PAP. A: Papilla analis; PO. APO: Posterior apophyses; SA: Saccus; SL: Sacculus; TG: Tegumen; UN: Uncus; VLV: Valva; VIN: Vinculum.

RESULTS

GENUS *HEMARIS* DALMAN

Dalman, 1816, *K. svenska Vetensk Akad. Hanl.* **1816**: 207; Hampson, 1892, *Moths India,* **1**: 119.

Haemorrhagia, Grote & Robinson, 1865, *Proc. Ent. Soc. Philad.,* **5**: 149, 173; Rothschild & Jordan, 1903, *Novit. Zool.,* 9: 438; i.d., 1907, In Wytsman, *Gen. Ins.,* **57**: 85; Jordan, 1911, In Seitz's *Macrolep. Fauna Pal.,* **2**: 247; Bell & Scott, 1937, *Fauna British India, Moths,* **5**: 239-241.
Chamaesesia Grote, 1877 *Bull. Buffalo Soc. Nat. Sci., 3: 220.*
Cochrania Tutt, 1902, *Nat. Hist. Br. Lepid.,* 3: 503.
Type species : *fuciformis* Linnaeus
Distribution : Nearctic and Palaearctic regions.

DIAGNOSIS

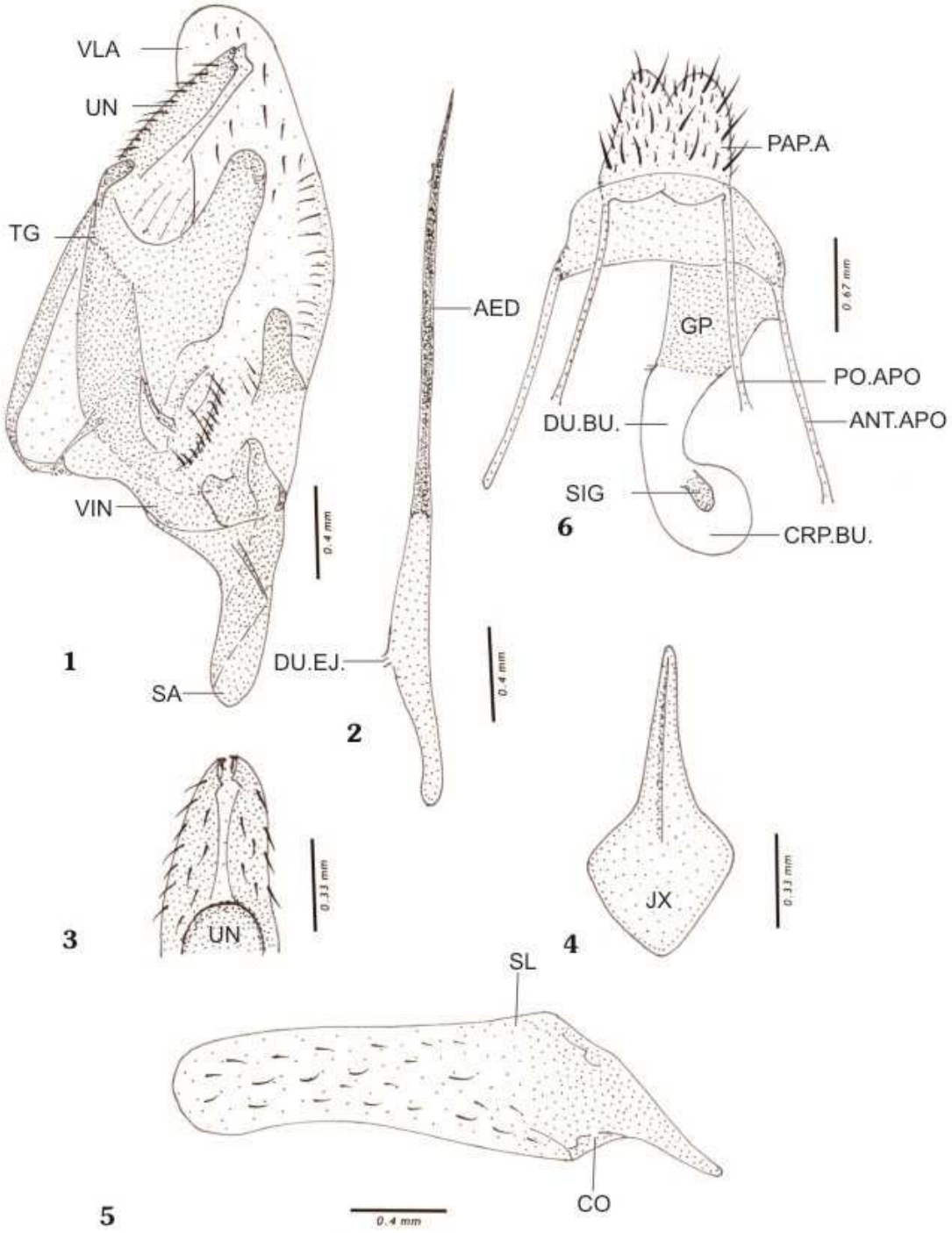
Labial palpus short, upturned. Antenna strongly clubbed in both sexes, thin basally and abruptly narrowed before apex and forming a slender, recurved hook; lateral hair-like scales of frons being hanging down to the eyes. Forewing usually hyaline with rounded apex; anal margin excurved beyond middle; basal one-fourth portion of anal vein forked; Cu_2 from middle of cell; Cu_1 before lower angle; M_2 from below middle of discocellulars; M_3 from angle; M_1 (R_5 , R_4) stalked or M_1 from upper angle; veins R_4 and $R_{(3+2)}$ anastomosing near outer margin; discal cell less than half the length of the wing. Hindwing with apex rounded; Cu_2 from beyond middle; Cu_1 before angle of the cell; M_3 from angle; M_2 from near middle or from middle of discocellulars; M_1 and Rs shortly stalked or from common point on upper angle; discal cell short, about one-third the length of the wing. Male genitalia asymmetrical; uncus divided, distal end clump-like, both arms notched at distal end; gnathos long; tegumen longer than vinculum; saccus U-shaped; valvae differ, left valva with sacculus wanting or vestigial, right valva with sacculus having short saccular projection with rounded tip; no friction patch; aedeagus slender; distal half acicular. Female genitalia with corpus bursae and ductus bursae reduced; anterior apophysis shorter than posterior ones; both pairs with dilated apices.

***Hemaris fuciformis* Linnaeus**

(Figs. 1-6)

Sphinx fuciformis, Linnaeus, 1758, *Syst. Nat.* **10**: 493
Hemaris fuciformis, Hampson, Rothschild & Jordan, 1903, *Novit. Zool.,* **9**: 454; Jordan, 1911, In Seitz's *Macrolep. Fauna Pal.,* **2**: 248; Bell & Scott, 1937, *Fauna British India, Moths,* **5**: 242.
Hemaris simillima, Moore, 1888, *Proc. Zool. Soc. London,* **1888**: 391.
Wing Expanse: Male: 50-54mm; Female: 58-68 mm
Male genitalia: Uncus of moderate size, well sclerotized, distal half bifid, clump-like; both ends notched giving bifid appearance, highly sclerotized; gnathos well developed reaching upto the middle of uncus, well sclerotized, distal end broad, highly sclerotized with blunt tip; tegumen inverted V-shaped, semi sclerotized longer than vinculum; vinculum short, slightly sclerotized, almost half the length of tegumen, ending into broad U-shaped, very slightly sclerotized saccus; juxta with proximal half broad, distal half long, narrow having a medial sclerotized line; transtilla semi sclerotized with backwardly pointed horn-like projection. Valva simple, extending well beyond the level of uncus, bowed; costa well defined, semi sclerotized; sacculus broad having a short, moderately sclerotized saccular projection with rounded distal end; distal end of valva, setosed, long, narrow with rounded tip. Aedeagus long, narrow, proximal half curved, semi sclerotized with rounded tip; distal half acicular, highly sclerotized.
Female genitalia: Corpus bursae very much reduced, globular, membranous; signum present; ductus bursae reduced, membranous, posterior half guarded by moderately sclerotized genital plate; ductus seminalis originating from anterior end of genital plate; anterior apophysis slightly shorter than posterior ones; posterior apophysis narrow; both pairs having slightly dilated, rounded tips; apices nearly membranous; papilla analis ovoid having micro and macro setae.
Material Examined: Himachal Pradesh: Bhanjuradu, 20.VI.1993, 1♂, 6♀♀. Punjab: Patiala, 24.VIII.1992, 4♀♀; 20.VIII.2009, 1♂, 2♀♀; 16.VIII.2012, 2♂♂. Uttarakhand: Kempty Falls, 05.V.1993, 1♂, 2♀♀; Mussorrie, 06.VI.1993, 2♂♂, 1♀.
Distribution: India: Himachal Pradesh: Bhanjuradu; Punjab: Patiala; Uttarakhand: Kempty Falls, Mussourie.
Remarks: The collection of this species from different localities of Himachal Pradesh, Punjab and Uttarakhand are its additional distributional records from North-West India.

PLATE - 1



***Hemaris fuciformis* (Linnaeus)**

1. Male genitalia - lateral view; 2. Aedeagus; 3. Uncus - Ventral view; 4. Juxta - Ventral view; 5. Valva - Ventral view; 6. Female genitalia

ACKNOWLEDGEMENT
The authors are thankful to UGC, New Delhi for financial assistance.

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