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Taxonomic Studies on Three Indian Species of Genus Amphipyra Ochsenheimer (Lepidoptera: Noctuidae)

Mudasir Ahmad Dar
Department of Zoology, Punjabi University, Patiala - 147002, Punjab, India
email: mudasirahmad26@gmail.com.

Jagbir Singh Kirti
Department of Zoology, Punjabi University, Patiala - 147002, Punjab, India

Z. H. Khan
Division of Entomology, SKUAST-K, Shalimar

Abstract: **A comprehensive and a comparative taxonomic account of species of the genus *Ampiphyra* Ochsenheimeris provided herewith. Three species are recognized in the genus: *Amphipyrapyramidea* (Linnaeus), *Amphipyramonolitha* (Guenee) and *Amphipyraherrichschaefferi* Hacker and Peks. Male and female external genitalic attributes are provided. Supplementary photographs and illustrations are also provided.**

Keywords: **Comprehensive, External, Genitalia, *Amphipyra***

I. Introduction

The genus *Amphipyra* Ochsenheimer, 1816 has been rife with taxonomic problems including numerous undescribed taxa and cryptic species, due to its circumscribed species-groups and the similarities in genitalia to other member-species. Genus *Amphipyra* was erected by Ochsenheimer in 1816 on the type species *Phalaenatragopoginis* Clerck, but included as *tragopogonis* an incorrect spelling. Correct name was subsequently designated by Duponchel in 1829. Hampson (1894) in his fauna studied seven species i.e. *Amphipyramonolitha* (Guenee), *Amphipyra magna* Walker, *Amphipyralivida* Schiff., *Amphipyracupreipennis* Moore, *Amphipyraalbicilia* Hampson, *Amphipyra spectrum* Espenser and *Amphipyrahimalayica*Hampson from India. Poole (1989) included 35 species in the genus *Amphipyra*. Babics*et al.,* (2013) described a new species *Amphipyraamentet*, from China. In the present study representatives of three species i.e. *pyromidae* (Linnaeus), *monolitha* (Guenee) and *herrichschaefferi* Hacker andPeks were collected and dissected out for examination of external genitalic attributes besides fore and hindwing structures adult photographs are also provided. All the collected species of genus *amphipyra* Ochsenheimer have been identified with the help of relevant literature (Hampson 1894), comparison with the reference collections lying in different museums and with the help of some eminent taxonomists (Dr. Laszlo Ronkay HNHM, Hungary and Dr. Oleg Pekarsky). The critical examinations of the structures of male and female genitalia reveal that all the species differ with respect to each other with some prominent charters which are provided in the keys. Taxonomic nomenclatures used in this study were constituted according to taxonomical experts and relevant literature (Miller 1993; Hauser 1993; Justus and Mitchell 1999; Kononenko 2005; Kononenko & Han 2007;Mikkola 2007, 2008). For external genitalic attributes Klots (1970) terminology has been adopted.

II. Materials and Method

The specimens were collected with the help of light trap, after killing the specimens were pinned and stretched properly and preserved in insect cabinets (fig. 1). The study was conducted during 2011- 2012 from different far flung areas and agro forestry habitats in Kashmir Himalaya. Different collection sites were selected for the purpose of collection with an altitudinal distribution ranging from 1500m – 4000m amsl. The specimens were identified with the help of available literature and other electronic and non electronic sources. The male and female genitalia of the species were dissected out for confirmation of species identification. Forewing and hindwing of each species were detached from the body of an adult by giving upward jerk followed by dipping into 70% alcohol for 1-2 minutes, then placing in sodium hypochlorite for 10-20 minutes depending upon the size of the insect for descaling, then transferring the wings into glacial acetic acid for 10 minutes, latter on into carbo-xylol for 15 minutes and mounted finally on a glass slides in DPX mountant. The genitalia were dipped overnight or boiled for 20-30 minutes with 10% KOH solution to get the musculature sufficiently relaxed. Later on KOH was removed by washing in distilled water for 2 or 3 times. The dissection was performed within a cavity block, with the help of fine

forceps and needles under an Olympus SZX7 binocular stereoscope microscope. The dissected parts were transferred to acetic acid glacial in another cavity block for 10-15 minutes and finally transferred to carboxylol for 15 minutes. After clearing then mounted finally on a slide in DPX mountant and covered with cover slip. The drawing of wings was done on camera lucida attached to binocular

microscope. The photographs of genitalia and other parts were taken by the help of Olympus digital camera (CAMEDIA C-7070).

The collected materials have been deposited in Department of Zoology and Environmental Sciences, Punjabi University Patiala for future reference.

III. OBSERVATIONS

Diagnostic characters of subfamily amphipyrinae:

Distinguished by the absence of spinose tibiae, hairy eyes and ciliated eyes; the species embraced by it are much more numerous than in any of the others, areole being sometimes absent in the forewing, and in other cases vein 8 of the hindwing anastomoses for some distance with the upper margin of cell; The larvae are smooth, with single bristles from the tubercles, and, have all the prolegspresent

Genus Amphipyra Ochsenheimer

Ochsenheimer, 1816, *Schmett.Eur.* 4 : 70.

Type species: Phalaenatragopoginis Clerck

Diagnosis: Palpi less developed; the second segment of palpi being smoothly scaled like the terminal, instead of fringed with hair, and the terminal longer and more pointed; thorax, abdomen and legs being clothed with hair instead of scales; the abdomen with lateral fringes of hair.

1. Amphipyrapyramidea (Linnaeus)

Linnaeus, 1758, *Sys Nat.* 10: 518. *(Plate - 1)*

Male Gemitalia: Uncus flat, tongue like, fringed with dense hairs, tegumen moderately long, tuba analis long, vinculum sclerotized, rather v-shaped, saccus small and membranous. Valve symmetrical and massive, with wide parallel margins, cucullus triangular with pointed apex, clavus small with membranous, costal margin with slight depresion.Aedeagus pointed, wide basally, tapering towards tip, cornuti long, strong and narrow, more than 10, spirally coiled tips with each other forming a compact structure, base of cornuti broad and with highly sclerotized diverticulum.

Female Genitalia: Ovipositor lobes well developed, papilla analis fleshy, trapezoidal, densely setose, apex rounded, anterior apophysis twice as long as posterior apophysis, ostium bursae short, ductus bursae long and narrow, membranous, corpus bursae elongate, rather bag like, lightly sclerotized with dense striation throughout the corpus bursae; signum absent.

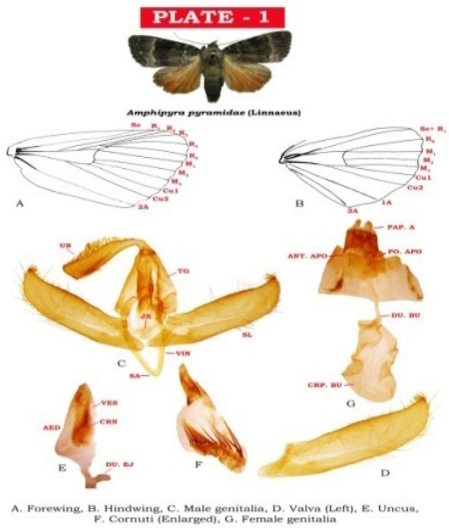
Material examined Bandipora: Dawar, 2434m, 1♀, 28.vi.2011.

Baramulla: Gulmarg, 2843m, 2♀♀,15.vi.2012; Khilanmarg, 3300m, 6♂♂, 4.ix.2011.

Ganderbal: Baltal, 3000m, 5♂♂, 14.ix.2011, 5.vii.2012, 29.ix.2012.

Srinagar: Kashmir Botanical Garden, 1627 m, 3♀♀, 6♂♂, 10.vi.2012.

Distributed: Europe, North Africa, Near East, Iran, South Siberia, N. India, Korea, Japan.



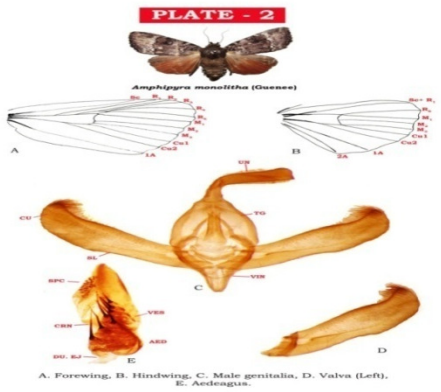
2. Amphipyramonolitha (Guenee)

Guenee, 1852, *Noct.*,2: 414.*(Plate - 2)*

Male Gemitalia: Uncus flat, hairy, with flattened and rounded tip, arms of tegumen wide and broad, tubaanalis short sclerotized and well developed. Vinculum tubular in shape, highly sclerotized.Saccus blunt lobe like. Valve symmetrical very long, curved from both margins; cucullus triangular fringed with dense strong sclerotized hairs, costa with centrally salience and subapically concave. Clavus triangular membranous, sacculus tube like curved ventrally. Aedeagus short and broad, posterior end round and anterior pointed, with a group of spicules laterally, cornuti long, strong and highly sclerotized, spirally coiled with each other, usually 5-7, base of cornuti broad and with highly sclerotized diverticulum.

Material examined: Anantnag: Daksum, 2600m, 3♂♂, 15.vi.2011; *Baramulla:* Allapather, 4200m, 2♂♂, 17.vi.2012;Gulmarg, 2843m, 4♂♂, 15.vi.2012; Khilanmarg, 3300m, 2♂♂, 4.ix.2011. *Budgam:* Doodpather, 2870m, 4♂♂, 20.vi.2012; Yousmarg, 2600m, 5♂♂, 19.vi.2012.

Distribution: N.W. Himalaya; Japan, China; Dharmsala and Sikhim.



A. Forewing, B. Hindwing, C. Male genitalia, D. Valva (Left), E. Aedeagus.

3. Amphipyraherrichschaefferi Hacker and Peks

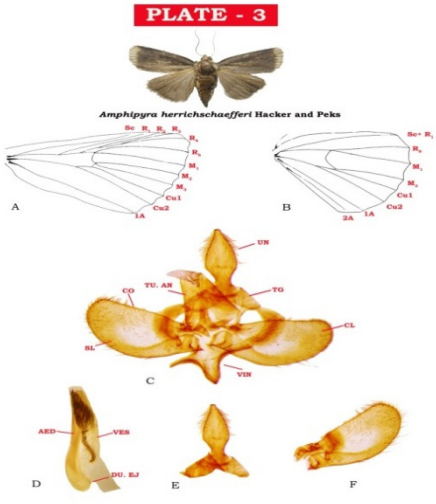
Hacker, H. and Peks, H. (1992): Neue Taxa himalayanischerNoctuidae. *Esperiana* **3**: 151-183. **(Plate - 3)**

Male Genitalia: Uncus arrow head shaped, scaphium with tuba analis highly sclerotized very broad cone like, tegument short and broad, vinculum tube like highly sclerotized, saccus small, valvae flat and leaf like, fringed with fine hairs. Costal margin nearly straight, distal margin curved. Aedeagus short and stout, vesica composed of a patch of spicules and with s-shaped cornuti.

Material examined: Bandipora: Izmarg, 2500m, 2♂, 7.ix. 2012.

Distribution: Afghanistan.

Remarks: This species has been reported for the first time from Kashmir Himalayas and India.



A. Forewing, B. Hindwing, C. Male genitalia, D. Aedeagus, E. Uncus (Enlarged), F. Valva

Key to the studied species of genus Amphipyra Ochsenheimer

1. Male genitalia with uncus tongue shaped; valva long **2**

- Male genitalia with uncus arrow hear shaped; valva short and broad ..... ….....***herrichschaefferi*** **Hacker and Peks**

2. Male genitalia with tegumen long; vinculum v-shaped; aedeagus with more than 10 cornuti..…….. ……..…….***pyramidea*****(Linnaeus)**

- Male genitalia with tegumen broad; vinculum tubular; aedeagus with 5-7 cornuti…….. ...***monolitha*** **(Guenee)**

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AUTHOR'S PROFILE

Mudasir Ahmad Dar
Department of Zoology, Punjabi University, Patiala - 147002, Punjab, India
email: mudasirahmad26@gmail.com.

Jagbir Singh Kirti
Department of Zoology, Punjabi University, Patiala - 147002, Punjab, India

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