Research Paper

Volume : 4 | Issue : 1 | January 2015 • ISSN No 2277 - 8179

Taxonomic Studies on Light Trap Collected Species of Abraxas Leach Under Agro-Climatic Condition in Mandi District of Himachal Pradesh

Biotechnology

KEYWORDS : Taxonomic, Genitalia, Wing, Adeagus

VIKRANT THAKUR — Forest Protection Division, Himalayan Forest Research Institute, Conifer Campus Panthaghati, Shimla Himachal Pradesh 171009

MANOJ KUMAR — Faculty of Biotechnology, Shoolini university, Solan HP-172230

ABSTRACT

The light trap collection by using mercury lamp indicated that Abraxas Leach under agro-climatic condition of Mandi district of Himachal Pradesh is comprises of three species viz. Abraxas picaria Moore, Abraxas leucostola Hampson and Abraxas sylvata Scopoli. These species obatain their peak in July- August . Abraxas leucostola Hampson was found most abundant followed by Abraxas picaria Moore and Abraxas sylvata Scopoli on the basis of daily catches. The taxonomic study on these species carried out and described in detail. A key to the species of Abraxas Leach has also been provided for their easy identification.

Introduction:

This moth is mostly white with brownish patches across all of the wings. There are small areas of pale gray on the forewings and hind wings. They resemble bird droppings while resting on the upper surface of leaves. The adults fly from late May to early August. They are attracted to light. The wingspan is 38 mm. to 48 mm. The moth is nocturnal and is easy to find during the day. They are easy to find resting during the morning. The moth starts being active at early dusk. The moths eat the plants *Betula, Corylus, Fagus, Prunus*, and *Frangula*. Frons without frontal tuft. Antennae of male serrate and fasciculate, simple in female. Labial palpi not very long, porrect, shortly sealed. Forewing with R_1 becoming coincident with Sc; R_1, R_2 stalked; R_3, R_4, R_5 stalked; M_2 from little above middle of discocellulars; Cu_1 from before angle of discal cell. Hindwing with termen rounded; Rs from before upper and Cu_1 from before lower angle of discal cell. Hind tibiae dilated in male, both pairs of short spurs present.

Material and Method:

Mandi district of Himachal Predesh is located at the altitude ranges from 1000 to 3900 amsl was surveyed during May to September, 2010-2012 every year for the collection of geometrid fauna. Different locality of different conifer forests were chosen as ideal site for setting up of temporary laboratory to execute the entire field work of setting light lure system, collection, stretching, drying, labelling and storage of procured species of family Geometridae of order Lepidoptera. A light lure system comprising of a 3 × 3 meters white sheet tied between a pair of vertical poles and sheet nicely illuminated by two mercury lamps of 160W each was used to attract the moths. Exclusively picking alone the geometrids out of diverse moth fauna belonging to different lepidopteran families appearing at the installed system was made possible by a slide show. Collection of geometrid fauna was done throughout the night as plenty of specimens of different species keep arriving.

Collection Method:

The sheet method was used, which allows specimen collection individually without any damage. A white sheet (10'x6') was hung between two vertical poles in such a way that it touched the surface and extended forward over the ground slightly away from direct source of light placed at such a point that the whole sheet from edge to edge brightly reflected the light. A 160 watt mercury vapour lamp was used as light source through the night. The moths started collecting on the sheet just after sunset between 1800-2300 hr, after that the abundance of moths slowly decline.

Identification

The moths collected from different localities were identified, and classified with the available literature (Hampson 1894-96; Bell &Scott 1937) and their current nomenclature is based on LEPINDEX (Beccaloni et.al. 2003). The hierarchy of different moth is given by Van Nieukerken *et al.* (2011)

Result:

***Abraxas picaria* Moore**

picariaMoore, 1868, *Proc. zool. Soc. Lond.* **1893**(2): 393 (*Abraxas*).

Adult: Head with vertex black, suffused with orange; frons black. Antennae less than half of wing length; flagellum black. Labial palpi with first and second segments pale yellow, third black. Eyes grey, with marginal black patches. Thorax black. Legs ochraceous. Abdomen orange, marked with series of prominent black spots – one dorsal, two on lateral and ventral sides each

Wing venation:

Forewing: Forewing with costal margin straight, arched near apex; apex rounded; termen suberect; tornus obtusely angulate; inner margin nearly straight. Ground colour white, largely covered by black; costa marked with four orange spots, with incomplete antemedial line from first and series of postmedial spots from fourth, concolorous; irregular spots between these two and beyond postmedial series white; discocellular prominent spot dark black; marginal series of lunules black; marginal fringe alternately black and white.

Hindwing: Hindwing with costal margin arched, straight near apex; apex rounded; termen evenly curved; tornus obtusely angulate; inner margin slightly arched. Ground colour white, marked with small basal and variable number of antemedial spots; medial series of three black spots prominent; postmedial series of black spots partially double from tornus to vein M_3, with orange band gradually fading; marginal spots and fringe as in forewing. Discal cell almost half of wing length.

Male genitalia: Male genitalia with hood-like uncus highly sclerotized, setose; tuba analis well defined; gnathos ring-like; tegumen broad, as long as vinculum; labides reaching beyond tip of uncus, its distal end bird-head-like; vinculum broadly U-like; saccus indistinct; juxta rectangular, plate-like; valvae sclerotized, narrowed in distal half, bearing a strong and many short spines on distal tip. Aedeagus narrow proximally, broad distally, its distal end bearing short conical spines; vesica adorned with numerous rows of short denticles; opening of ductus ejaculatorius lateral.

Female genitalia: Female genitalia with corpus bursae globular; signum circular with numerous denticles; ductus bursae shorter than corpus bursae, sclerotized; anterior apophyses almost half of posterior apophyses; ovipositor lobes oblong, setose.

Abraxas leucostola Hampson

*leucostola*Hampson, 1893, *Illust. typical. Specimens lepid. Heterocera Colln Br. Mus.,* **9**: 36, 143.

Adult: Head with frons and vertex fulvous. Antennae somewhat thickened by appressed serrations and with fascicles of cilia; scape and pedicel yellowish white; shaft fuscous. Eyes black margined with orange scales. Labial palpi porrect furnished with orange scales. Thorax, collar and tegula orange spotted with black. Legs orange spotted with fuscous; hind tibiae of male dilated with two pair of spurs. Abdomen orange decorated with black spots on upper and under sides.

Forewing: Forewing with ground colour silvery white; an olive fuscous patch at base and another with more prominent silvery markings on inner margin beyond middle; a ring spot at end of cell and two costal spots on forewing remaining dark; a curved postmedial series of spots with short dark streaks on them at the veins and often other spots beyond them; some spots on the margin expanding into a patch at middle; vein R1 and R2 stalked; R1 becoming coincident with Sc ; R3-R5 stalked from before upper angle of cell; Cu1 from before lower angle of cell; Cu2 from cell.

Hindwing: Hindwing with ground colour same as in forewing with a more or less complete antemedial series of spots; a large olive fuscous patch with some silvery marks on it on inner margin; a more or less developed marginal series of spots; vein Sc+R1 anastomoses with cell at base; Rs from before upper angle of cell; Cu1 from before lower angle of cell; Cu2 from cell.

Male genitalia: Male genitalia with uncus long, stick like with swollen apex; acrotergite present; gnathos absent; tegumen longer than uncus, broad, u-shaped; vinculum as long as tegumen, well sclerotized, deep u-shaped; saccus wanting. Valvae well developed, differentiated into parts; costa produced to finger like arm, curved, sparsely setosed with fine hairs; sacculus well developed, sclerotized; ampulla well developed, sclerotized having 2-3 dentate processes; harpe produced to a triangular structure, apex pointed; cucullus weakly developed; valvula very well developed, excavate before apex, setosed with few hairs. Transtilla weakly developed; juxta very well developed, sclerotized, plate like. Aedeagus long, narrow at proximal end, broader towards distal end; vesica membranous without cornuti; ductus ejaculatorious entering laterally.

Female genitalia: Female genitalia with corpus bursae rounded, membranous; signum star shaped with well developed outwardly projected spines; ductus bursae short, broad, sclerotized towards ostium bursae; posterior apophyses as long as anterior apophyses; papilla analis oblong, setosed with fine setae.

Abraxas sylvata Scopoli

*sylvata*Scopoli, 1763, *Ent. Carniolica,* **1763**: 220.

Abraxas microtate Wehrili, 1931, *Mitt.dtsch. ent. Ges.,***2**: 107.

Abraxas sylvata microtate, Wehrli, 1935, *Ent. Rdsch.,***52**: 101.

Abraxas (Calospilos) sylvata microtate Inoue, 1972, *Bull. Fac. domestic Sci., Otsuma Woman's Univ.,***8**: 145.

Calospilos sylvata Ko, 1969, *A list of forest insect pests in Korea,* **1969**: 107.

Calospilos sylvata ijimal Kim, *et al.,* 1975, *Rept.,* 7: 214.

Abraxas sylvata Shin, 1996, *Synonymic list and distribution of the Geometridae of Korea,* **1996**: 68.

Adult: Head with frons and vertex fulvous. Antennae of male with fascicles of cilia. Eyes grey margined with orange scales. Labial palpi porrect furnished with fuscous scales. Thorax with collar and tegula suffused with fulvous scales. Legs orange; hind tibiae of male dilated having two pair of spurs.Abdomen orange irrorated with black spots on upper and under sides.

Forewing: Forewing with ground colour white; an olive fuscous patch at base, and another with some silvery marks on it on inner margin beyond middle; a grey patch with a dark mark on it at end of cell extending to the costa; a curved postmedial series of spots; some spots on the margin expanding into a patch at middle; vein R1 stalked with R2 and becoming coincident with Sc; vein R2 forming a short stalk with R3 and R4; R3-R5 stalked from before upper angle; Cu1 from before lower angle of cell; Cu2 from cell.

Hindwing: Hindwing with ground colour same as in forewing having more or less complete antemedial series of spots; a postmedial series of spots with fulvous streaks on them at the veins, often with other spots beyond them, and ending on inner margin in a large olive fuscous patch with some silvery marks on it; a more or less developed marginal series of spots; vein Sc+R1 anastomoses with cell at base; Rs from before upper angle of cell; Cu1 from before lower angle of cell; Cu2 from cell.

Male genitalia: Male genitalia with uncus long, bent inwards, triangular at base, tip swollen; acrotergite present; gnathos absent; tegumen longer than uncus, broad, u-shaped; vinculum as long as tegumen, well sclerotized, deep u-shaped; saccus weakly defined. Valvae well developed, differentiated into parts; costal arm finger like, curved, sparsely setosed with fine hairs at tip; sacculus well developed, sclerotized; ampulla well developed, sclerotized with two to three dentate projections; harpe produced to a triangular structure with pointed apex; cucullus simple; valvula very well developed, excavate before apex, setosed with few hairs. Transtilla weakly developed, membranous; juxta very well developed, sclerotized, plate like, setosed with fine hairs. Aedeagus long, narrow at proximal end, broader towards distal end, produced to a sclerotized process; vesica membranous without cornuti; ductus ejaculatorious entering laterally.

KEY TO THE SPECIES OF GENUS *ABRAXAS* LEACH

1. Forewing white, largely covered with black; discocellular spot prominent, dark black; male genitalia with uncus hood-like; gnathos present; female genitalia with ductus bursae gradually broadened distally. .....***Picaria* Moore**

– Forewing white, sparsely spotted with grey; discocellular spot never black; male genitalia with uncus knobbed at tip; gnathos absent; female genitalia with ductus bursae of uniform width throughout.

2. Genitalia with acrotergite present.....3

Male genitalia with acroterg absent.....4

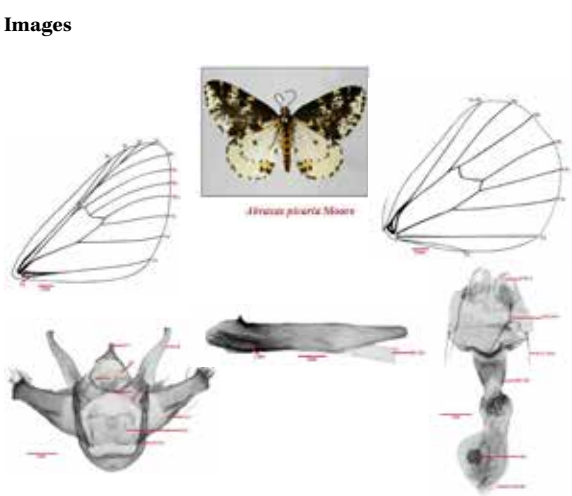
3. Forewing with ground colour silver white; a ring spot at end of cell and two costal spots on forewing remaining dark .....***leucostala* Hampson**

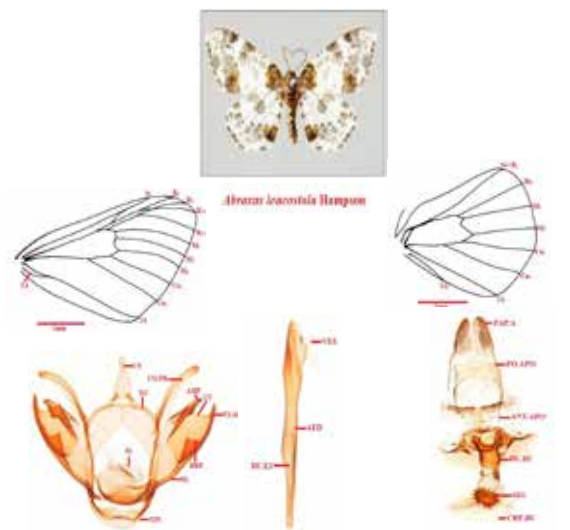
– Forewing with ground colour white; a grey patch with a dark mark on it at end of cell extending to the costa.....5

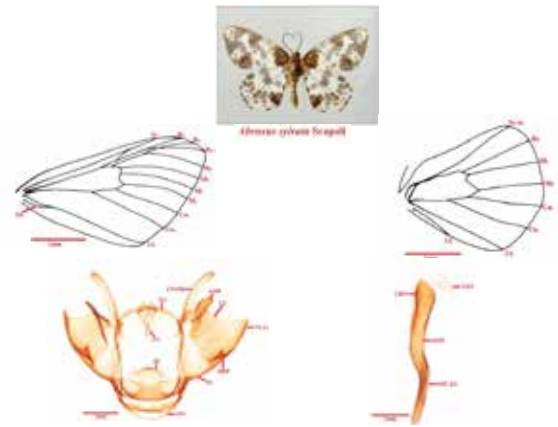
4. Male genitalia with uncus long and bent inwards having swollen tip. Head with frons and vertex fulvous.....***sylvata* Scopoli**

Volume : 4 | Issue : 1 | January 2015 • ISSN No 2277 - 8179

Images







REFERENCE

Bell, T.R.D. and Scout, F.B. (1937). The fauna of british india including Ceylon and Burma- Moths 5. Taylor and Francis, London, 537 pp. | Hampson, G.F. (1894). Fauna of British India, Moths including Ceylon and Burma. Taylor and Francis Ltd., 528 pp. | Hampson, G.F. (1896). Fauna of British India, Moths including Ceylon and Burma.Taylor and Francis Ltd., 4: 1-594. | Beccaloni, G.W.,Scouble,M.J. Robinson,G.S., Downton, A.C. and Lucas S.M. (2003). Lepindex – The Global Lepidopteran Name Index: An online website published by the Natural History Museum, London. | Van Nieukerken, E.J. et.al. (2011) Order Lepidoptera Linnaeus, 1758. In: Zhang, Z.-Q. (Ed) 2011: Animal biodiversity: an Outline of higher level classification and survey of taxonomic richness. Zootaxa 3148:212-221. |