

LECITHOCERID FAUNA (MICROLEPIDOPTERA) FROM SIWALIKS OF NORTHWESTERN INDIA

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ABSTRACT

In a survey on Lecithocerid moths from northwestern Siwaliks during November 1997 to November 2001, twenty-two species were collected and identified. Diagnosis, nomenclature aspects and distribution are presented in this paper.

KEYWORDS

Inventory, Lecithoceridae, Lepidoptera, Siwaliks

ABBREVIATIONS

1A - First anal vein; 2A - second anal vein; 3A - third anal vein; CuA₁ - first cubital vein; CuA₂ - second cubital vein; Cup - cubital posterior vein; M₁ - first median vein; M₂ - second median vein; M₃ - third median vein; R₁ - first anal vein; R₂ - second anal vein; R₃ - third anal vein; R₄ - fourth anal vein; R₅ - fifth anal vein; Rs - radial sector

The Siwaliks ranges mountain having elevation reaching upto 1500m above m.s.l. extends from/bordered by river Kali in Uttaranchal to river Indus in Jammu and Kashmir (Chitkara, 1998) (Fig. 1). The authors have undertaken insect survey-cum-collection tour to various localities in the region such as Kangra, Palampur, Dharamshala, Tanyhar, Sarkaghat, Baijnath, Andhretta, Solan, Dharampur, Nauni, Sabathu, Renuka lake, Nahan, Paunta Sahib (Himachal Pradesh), Jammu, Katra, Mansar Lake (Jammu & Kashmir), Dehradun, Haridwar, Vikasnagar (Uttarakhand), Kalka, Pinjore (Haryana), Pathankot, Hoshiarpur, Dasua, Dhar, Roopnagar, Dunera, Mirzapur, Nawanshahar and Anandpur (Punjab) during different seasons between November, 1997 to November, 2001.

METHODOLOGY

The adults were collected during the night time with the help of portable light traps. Besides this, some specimens were also collected by hanging the source of light (125-Watt mercury vapour lamp) on a white sheet or white washed wall. The collected Lecithocerid moths were killed by using 1,1,2,2, tetrachloro ethane or ethyl acetate. The methodology discussed by workers such as Lindquist (1956), Tagestad (1974), Zimmerman (1978), Mikkola (1986) as well as Landry and Landry (1994) were followed for the pinning, stretching and preservation of specimens. The standard techniques given by Zimmerman (1978) and Robinson (1976) have been followed for wings and genitalia respectively. To write the taxonomic descriptions on various morphological characters (Robinson, 1976; Hodges, 1998; Park, 1995), wing venation (Zimmerman, 1978; Common, 1970) and external genitalia (Klots, 1970) were followed. Using a Camera Lucida attached to a stereoscopic light microscope drawn all illustrations. The coloured

photographs of all the specimens were taken before dissection.

OBSERVATIONS

Earlier, Meyrick (1894,1905, 1907, 1908, 1908a, 1909, 1910, 1911, 1912-1916, 1913, 1914, 1916-1923, 1923-1930, 1930-1936); Fletcher, (1929); Gaede (1937); Marchand (1947); Diakonoff (1952, 1954); Janse (1954), Clarke (1955,1965); Gozmány (1971, 1972, 1973, 1978); Nye & Fletcher (1991); Park & Omelko (1994); Robinson *et al.* (1994); Park & Hodges (1995); Ueda (1995); Lovovsky (1996); Wu & Park (1998, 1999, 1999a, 1999b, 1999c); Park (1999, 2000) and Park & Heppner (2000) have made detailed studies on this group of insects. In this study, 22 species of Lecithoceridae have been recorded. Holotypes of the new species described under this study have been deposited in the Lepidoptera Laboratory, Department of Zoology, Punjabi University, Patiala.

Superfamily: Gelechioidea

Diagnosis

Vertex and frons decorated with smooth scales; labial palpus three segmented, upturned, third segment long, acute; forewing with veins R₄+R₅ stalked; hind tibia with dorsal surface furnished with long slender scales.

Family: Lecithoceridae

Lecithoceridae Le Marchand, 1947, *Revue fr. Lepidopt.*, 11: 153 (as Lecithocerinae).

Type-genus: *Lecithocera* Herrich-Schäffer, 1853, *Syst. Bearb. Schm. Eur.*, 5: 11 (key), 45.

Diagnosis: Vertex and frons studded with smooth scaled; antenna longer than 3/4th length of forewing; labial palpus long, upturned, second segment long, acute; forewing with Cup (expand this under Abbreviations) absent; hindwing with outer margin slightly excavated posterad of apex; male genitalia with uncus thorn-shaped, tapering to slender, acute apex or narrowed base and broad, bilobed apex; female genitalia with corpus bursae ovate or subovate in shape.

Subfamily: Lecithocerinae

Lecithocerinae Le Marchand, 1947, *Revue Fr. Lepidopt.*, 11 : 153.

Timyridae Clarke, 1953, *Cat. Type Specimens Microlepid. BMNH* described by E. Meyrick, 1: 21.

Type-genus: *Timyra* Walker, 1864, *List Secimens lepid. Insects Colln Br. Mus.*, 29: 782.

Type-genus: *Lecithocera* Herrich-Schaffer, 1853, *Syst. Bearb. Schm. Eur.*, 5: 11 (key), 45 pl.

Diagnosis: Uncus with narrow base and broad, bilboed apex and slender sclerite extending from base of tegumen to mesial surae of valva, a strongly sclerotized bridge-like structure connecting tegumen and costa of valvae.

I. Genus: *Lecithocera* Herrich-Schäffer

Herrich-Schäffer, 1853, *Syst. Bearb. Schm. Eur.*, 5 : 11 [key], 45, pl.

Manuscript 1523; © ZOO; Date of publication 21 June 2007

Received 14 February 2006; Revised received 24 April 2007;

Finally accepted 01 June 2007

Microlepid. XII, figs 10, 11.

Quassitagma Gozmány, 1978, in Amsel. et al., *Microlepid. Palaearctica*, 5: 132. Type species : *Frisilia indigens* Meyrick, 1914, *Supplta ent.*, 3: 50.
Recontracta Gozmány, 1978, in Amsel et al., *Microlepid. Palaearctica*, 5: 148. Type species : *Recontracta frasilina* Gozmány, 1978, *ibidem*, 5: 149.
Nyctocyrra Gozmány 1978, in Amsel et al., *Microlepid. Palaearctica*, 5: 149. Type species : *Nyctocyrra fraudatrix* Gozmány, 1978, *ibidem*, 5: 151.
Psammoris Meyrick, 1906, *J. Bombay nat. Hist. Soc.*, 17: 149. Type species: *Psammoris carpaea*, Meyrick, 1906, *ibidem*, 17: 149.
Type-species: *Carcina luticornella* Zeller, 1839, *Isis, Leipzig*, 197, by monotypy.

Diagnosis: Vertex and frons covered with smooth scales; labial palpus long, upturned, second segment scaled, third segment long and acute; antenna long, filiform, longer than the length of forewing; metathoracic leg with hair like scales on hind tibia; forewing with veins $R_3+R_4+R_5$ arising from a common stalk, R_3 from base or near base of the stalk, R_4 to costa, R_5 to termen, CuA_1 and CuA_2 stalked or connate, however, the forewing venation with the stalk of M_2 and M_3 can not be a good separable character, because the venation is so variable with in genus (Park, 2000); hindwing with $Rs+M$, stalked, Rs to costa, M_1 to termen, M_3+CuA , stalked. Male genitalia: uncus characteristically bilobed, setose; gnathos broader at base, apically pointed; vinculum U or Vshaped; saccus absent; juxta bilobed apically; valvae elongated, cucullus broader or narrow, bearing setae or hair on the inner surface, ventrally with spiniform row of setae or without, a bridge-like sclerotized structure connecting costa and tegumen; aedeagus broad or small; vesica with multishaped cornutus present or absent. Female genitalia: papillae anales sparsely setose; anterior apophyses rod-like, basally broad, posterior apophyses thin; antrum present; corpus bursae long or small, broad or narrowed, ovate or subovate shaped; signum present or lacking.

1. *Lecithocera affusa* Meyrick

Lecithocera affusa Meyrick, 1923, *Exot. Microlepid.*, 3: 40.

Material examined: 2 males, 2 females, 10.ix.1998; 2 males, 1 female, 11.ix.1998; 4 males, 11.ix.1999, 8 males, 12.ix.1999; 2 males, 13.ix.1999, University of Horticulture and Forestry, Nauni, Dist. Solan, Himachal Pradesh, 1360m; 2 males, 16.vi.1999; 8 males, 2 females, 16.vii.1999, Dharampur, Dist. Solan, Himachal Pradesh, 1200m, coll. P.C. Pathania.

Distribution: Khasi Hills (Assam) (Clarke, 1965); Nauni, Dharampur (Himachal Pradesh) (present work)

Larval host plant: Unknown

2. *Lecithocera gozmanyi* Pathania and Rose

Lecithocera gozmanyi Pathania and Rose, 2004, *Geobios*, 311: 228-229.

Material examined:

Holotype: Male, 21.iv.1999, Forest Research Institute, Dehradun, Dist. Dehradun, Uttarakhand, 700m, coll. P.C. Pathania

Paratypes: 6 males, 21.iv.1999; 1 male, 22.iv.1999; 2 males, 2 females, 23.iv.1999; 3 males, 2 females, 25.iv.1999; 2 males, 19.iv.2000, Forest Research Institute, Dehradun, Dist. Dehradun, Uttarakhand, 700m; 2 males, 28.iv.1998, 2 males, 1 female, 29.ix.1998, Punjabi University, Dist. Patiala, Punjab, 250m, coll. P.C. Pathania and Rachita Sood.

Distribution: Dehradun (Uttarakhand), Patiala (Punjab) (present work)

Larval host plant: Unknown

3. *Lecithocera aulias* Meyrick

Lecithocera aulias Meyrick, 1910, *J. Bombay nat. Hist. Soc.*, 20: 447.

Material examined: 4 males, 2 females, 24.vi.1999; 3 males, 3 females, 25.vi.1999, Krishi Vishwavidyalaya, Palampur, Dist. Kangra, Himachal Pradesh, 700m, coll. P.C. Pathania.

Distribution: Khasi Hills (Assam) (Clarke, 1965); Palampur (Himachal Pradesh) (present work)

Larval host plant: Unknown

4. *Lecithocera semirupta* Meyrick

Lecithocera semirupta Meyrick, 1910, *J. Bombay nat. Hist. Soc.*, 20: 445.

Material examined: 4 males, 3 females, 12.iv.1999; 2 males, 21.iv.2000, Renuka Lake, Dist. Sirmour, Himachal Pradesh, 740m, coll. P.C. Pathania

Distribution: Khasi Hills (Clarke, 1965); Renuka Lake (Himachal Pradesh) (present work)

Larval host plant: Unknown

5. *Lecithocera ianthodes* Meyrick

Lecithocera ianthodes Meyrick, 1931, *Exot. Microlepid.* 4: 80.

Material examined: 2 males, 1 female, 27.vi.1999, Norha Richard Holiday Home, Andhretta, Dist. Kangra, Himachal Pradesh, 900m; 3 males, 18.iv.2000; 3 males, 19.iv.2000, Forest Research Institute, Dehradun, Dist. Dehradun, Uttarakhand, 700m, coll. P.C. Pathania.

Distribution: Dehradun (India) (Clarke, 1965); Andhretta (Himachal Pradesh); Dehradun (Uttarakhand) (present work)

Larval host plant: Unknown

6. *Lecithocera immobilis* Meyrick

Lecithocera immobilis Meyrick, 1918, *Exot. Microlepid.*, 2: 103

Material examined: 1 male, 13.iii.1998; 1 male, 24.iii.1998; 2 males, 25.iii.1998; 3 males, 30.iii.1999; 3 males, 8.iv.1999, 2 males, 29.iii.2000, Punjabi University, Patiala, Dist. Patiala, Punjab, 250m; 2 males, 24.vi.1998; 2 males, 25.vi.1999, Krishi Vishwavidyalaya, Palampur, Dist. Kangra, Himachal Pradesh, 700m; 2 males, 24.ix.1999, 2 females, 19.iv.2000, Forest Research Institute, Dehradun, Dist., Dehradun, Uttarakhand, 700m; 4 males, 09.xi.2001, Jammu University Campus, Dist. Jammu, Jammu and Kashmir, 350m, coll. P.C. Pathania, Rachita Sood and Amit Katewa.

Distribution: Coimbatore (S.India) (Clarke, 1965); Patiala (Punjab); Palampur (Himachal Pradesh); Dehradun (Uttarakhand); Jammu (Jammu & Kashmir) (present work)

Larval host plant: Unknown

7. *Lecithocera syntropha* Meyrick

Lecithocera syntropha Meyrick, 1918, *Exot. Microlepid.*, 2: 109.

Material examined: 2 males, 1 female, 27.vi.1999, Norha Richard Holiday Home, Andhretta, Dist. Kangra, Himachal Pradesh, 900m; 3 males, 18.iv.2000; 3 males, 19.iv.2000, Forest Research Institute, Dehradun, Dist. Dehradun, Uttarakhand, 700m, coll. P.C. Pathania.

Distribution: Quetta (N.W.India) (Clarke, 1965); Andhretta (Himachal Pradesh); Dehradun (Uttarakhand) (present work)

Larval host plant: Unknown

8. *Lecithocera choritis* Meyrick

Lecithocera choritis Meyrick, 1910, *J. Bombay nat. Hist. Soc.*, 20: 448

Material examined: 2 males, 13.ix.1999; 2 males, 14.iv.1999, University of Horticulture and Forestry, Nauni, Dist. Solan, Himachal Pradesh, 1360m; 2 males, 24.vi.1999, Krishi Vishwavidyalaya, Palampur, Dist. Kangra, Himachal Pradesh, 700m, coll. P.C. Pathania.

Distribution: India, Palni Hills, Nilgiri Hills (Meyrick, 1910); Nauni, Palampur (Himachal Pradesh) (present work)

Larval host plant: Unknown

9. *Lecithocera metacausta* Meyrick

Lecithocera metacausta Meyrick, 1910, *J. Bombay nat. Hist. Soc.*, 20: 446.

Material examined: 3 males, 11.ix.1999; 2 males, 14.ix.1999; 1 male, 5.iv.2000, University of Horticulture and Forestry, Nauni, Dist. Solan, Himachal Pradesh, 1360m, coll. P.C. Pathania.

Distribution: Khasi Hills (Assam) (Clarke, 1965); Nauni (Himachal Pradesh) (present work)

Larval host plant: Unknown

Subfamily: Torodorinae

Torodorinae Gozmány, 1978, in Amsel et al., *Microlepid. Palaearctica*, 5: 189.

Type-genus: *Torodora* Meyrick, 1894, *Trans. ent. Soc. Lond.*, 16.

Diagnosis: Male genitalia with uncus thorn-shaped, tapering to slender, acute apically, without a strongly sclerotized bridge-like structure connecting tegumen and costa of valvae.

II. Genus: *Hygroplasta* Meyrick

Hygroplasta Meyrick, 1925, in Wytzman, *Genera Insect.*, 184: 5 [key], 244.

Type-species: *Gelechia spoliatella* Walker, 1864, *List Specimens lepid. Insects Colln Br. Mus.*, 29: 659.

Key to the subfamilies of the family Lecithoceridae

1. Uncus bilobed, a bridge-like structure connecting tegumen and valvae in male genitalia present Lecithocerinae
(GENUS: *Lecithocera* Herrich-Schäffer)
- 1A. Uncus simple, lacking the bridge-like structure connecting tegumen and valvae lacking in male genitalia Torodorinae
(GENERA: *Hygroplasta* Meyrick, *Philoptyla* Meyrick, *Torodora* Meyrick)

Key to the species of the genus *Lecithocera* Herrich-Schäffer

1. Forewing with veins R3+R4+R5 stalked 2
- 1A. Forewing with veins R3 free, R4+R5 stalked 6
2. Forewing with veins CuA1 and CuA2 stalked 3
- 2A. Forewing with veins CuA1 and CuA2 not stalked (connate or free) 4
3. Forewing with veins CuA1 and CuA2 on a longer stalk; male genitalia with saccular margin of each valva irregular, aedeagus curved, vesica without cornutus; female genitalia with anterior apophyses shorter and thick *affusa* Meyrick
- 3A. Forewing with veins CuA1 and CuA2 on a shorter stalk, male genitalia with saccular margin of each valva relatively regular, produced into a spatulate structure, aedeagus straight, vesica armed with a arrow head and Y-shaped cornuti; female genitalia with anterior apophyses relatively longer and thin *gozmanyi* Pathania and Rose
4. Hindwing with stalk of veins M3 and CuA1 long, almost 2/3rd length of vein; forewing with vein CuA1 and CuA2 connate; female genitalia with anterior and posterior apophyses almost equal in length; corpus bursae large and broad vesica with Yshaped cornuti on the aedeagus *aulias* Meyrick
- 4A. Hindwing with stalk of veins M3 and CuA1 short, less than 1/5th of the vein; forewing veins CuA1 and CuA2 wide apart, basally; female genitalia with anterior apophyses always shorter than posterior apophyses, corpus bursae relatively large or small 5
5. Hindwing with discocellulars poorly developed, stalk of veins Rs+M1 long; male genitalia with valva almost irregular or leaf-like, saccular margin straight, uncus slightly notched; female genitalia corpus bursae broad, signum rounded *semirupta* Meyrick
- 5A. Hindwing with discocellulars relatively better developed, stalk of veins Rs+M1 short; male genitalia with valva elongated, saccular margin convex, uncus deeply notched; female genitalia corpus bursae small, signum spinde-shaped *ianthodes* Meyrick
6. Forewing with vein R3 from before anterior angle of discal cell, alar expanse 16-17mm; juxta almost excurved anteriorly; each valva more or less rectangular, aedeagus with one of the walls fringed with conspicuous hair *immobilis* Meyrick
- 6A. Forewing with vein R3 from anterior angle of discal cell, alar expanse 14-24mm; juxta not as above; each valva broadly triangular or rectangular, aedeagus with both the walls smooth 7
7. Hindwing with veins M3+CuA1 on a longer stalk; forewing with veins CuA1 and CuA2 widely spaced after stalk; aedeagus long, longer than each valva, slightly bent at 2/5th from base, gradually curved, vesica beset with two long plate and two sigmoid shaped cornuti *syntropha* Meyrick
- 7A. Hindwing with veins M3+CuA1 a shorter; forewing with veins CuA1 and CuA2 narrowly spaced after stalk; aedeagus relatively shorter slender, less arched, not bend as above, vesica beset with slit-like or tear drop like cornuti 8
8. Alar expanse 21-24mm; forewing light fuscous in colour; hindwing with vein CuP represented near anal margin; male genitalia with costa convex at base, then slightly concave, vesica with tear shaped or one Y-shaped cornuti present in aedeagus *choritis* Meyrick
- 8A. Alar expanse 14-15mm; forewing half longitudinally yellowish from base to apex, white towards costa; hindwing with vein CuP strongly present; male genitalia costa slightly convex, vesica with slit-like cornuti present in aedeagus *metacausta* Meyrick

Diagnosis: Vertex and frons decorated with smooth scales; labial palpus long, upturned, second segment beset with scales, third segment long and acute; antenna long, filiform, almost equal to the length of forewing; metathoracic leg with small hair like scales on hind tibia; forewing with two black spots on discocellular or discal cell, distinguishable or indistinguishable, veins R₄+R₅ stalked, R₃ absent, CuA₁ and CuA₂ stalked; hindwing with vein Rs+M₁ stalked, Rs to costa, M₁ to termen, M₃ and CuA₁ connate. Male genitalia: uncus characteristically long, pointed at apex; socii absent; gnathos hook-like, tegumen hood-like; valvae simple, dorso-distally pointed; saccus present, long or small, vesica with cornutus present or lacking. Female genitalia: papillae anales small in size; anterior apophyses broader at base; ductus bursae long or small, sclerotized; ductus seminalis enter in corpus bursae; corpus bursae ovate or subovate shaped; signum present.

10. *Hygroplasta spoliatella* (Walker)

Gelechia spoliatella Walker, 1864, *List Specimens lepid. Insects Colln Br. Mus.*, 29: 659

Material examined: 1 male, 5.ix.1999, Tanyhar, Dist. Mandi, Himachal Pradesh, 1120m, coll. P.C.Pathania

Distribution: Sri Lanka (Wu and Park, 1998); Tanyhar (Himachal Pradesh) (present work)

Larval host plant: Unknown

11. *Hygroplasta chunshengi* Pathania and Rose

Hygroplasta chunshengi Pathania and Rose, 2004, *SHASHPA*, 11(2): 94-96.

Material examined:

Holotype: Male, 13.ix.1999, University of Horticulture and Forestry, Nauni, Dist. Solan, Himachal Pradesh, 1360m, coll. P.C. Pathania

Paratypes: 1 males, 5.ix.1999, Renuka Lake, Dist. Sirmour, Himachal Pradesh,

740m; 1 males, 13.ix.1999, University of Horticulture and Forestry, Nauni, Dist. Solan, Himachal Pradesh, 1360m; 1 male, 16.ix.1999, Dharampur, Dist. Solan, Himachal Pradesh, 1500m; 2 males, 19.iv.2000, Forest Research Institute, Dehradun, Dist. Dehradun, Uttarakhand, 700m, coll. P.C. Pathania.
Distribution: Nauni, Dharampur, Renuka Lake (Himachal Pradesh); Dehradun (Uttarakhand) (present work)
Larval host plant: Unknown

12. *Hygroplasta lygaea* (Meyrick)

Pachnistis lygaea Meyrick, 1911, *J. Bombay nat. Hist. Soc.*, 20: 707.

Material examined: 2 males, 2 females, 10.ix.1998; 1 male, 11.ix.1998; 2 males, 13.ix.1998; 2 males, 1 females, 11.ix.1999; 3 males, 12.ix.1999; 19 males, 4 females, 13.ix.1999; 3 males, 2 females, 14.ix.1999, University of Horticulture and Forestry, Nauni, Dist. Solan, Himachal Pradesh, 1360m; 3 males, 16.vii.1999, Dharampur, Dist. Solan, Himachal Pradesh, 1500m; 3 males, 25.vi.1999, Krishi Vishwavidyalaya, Palampur, Dist. Kangra, Himachal Pradesh, 700m; 3 males, 19.iv.2000, Forest Research Institute, Dehradun, Dist. Dehradun, Uttarakhand, 700m; 2 males, 3 females, 09.xi. 2001, Jammu University Campus, Dist. Jammu, Jammu and Kashmir, 350m, coll. P.C. Pathania, Rachita Sood and Amit Katewa.

Distribution: Dalhousie, Kashmir (Meyrick, 1910); Nauni, Dharampur, Palampur (Himachal Pradesh); Dehradun (Uttarakhand); Jammu (Jammu & Kashmir) (present work)

Larval host plant: Unknown

III. Genus: *Philoptila* Meyrick

Philoptila Meyrick, 1918, *Exot. Microlepid.*, 2: 111.

Type-species: *Philoptila effrenata* Meyrick, 1918, *ibidem.*, 2: 111.

Diagnosis: Vertex and frons decorated with smooth scales; labial palpus long, upturned, second segment with smooth scales, third segment long and acute; antenna long, filiform, almost equal to the length of forewing; metathoracic leg with small hair on hind tibia; forewing with veins $R_3+R_4+R_5$ stalked, arising from a common stalk at angle of discal cell; hindwing with veins $Rs+M_1$ stalked, M_2 absent, M_3+CuA_1 stalked, $1A+2A$ forked at base. Male genitalia: uncus thorn-like, apex pointed; socii absent; gnathos broader at base, pointed at apex; valvae small, large and broad, cucullus inner surface densely setose, apically rounded or irregular; aedeagus long and broad; vesica with small or long cornutus present.

13. *Philoptila* sp.

Material examined: 2 males, 3.iv.1998; 2 males, 10.ix.1998; 2 males, 24.xi.1998; 2 males, 25.xi.1998; 1 male, 13.x.1999; 2 males, 14.x.1999; 1 male, 30.ix.1999, Punjabi University, Patiala, Dist. Patiala, Punjab, 250m; 2 males, 5.iv.2000, University of Horticulture and Forestry, Nauni, Dist. Solan, Himachal Pradesh, 1360m, coll. P.C. Pathania.

Distribution: Patiala (Punjab); Nauni (Himachal Pradesh) (present work)

Larval host plant: Unknown.

IV. Genus: *Torodora* Meyrick

Torodora Meyrick, 1894, *Trans. ent. Soc. Lond.*, : 16.

Habrogenes Meyrick 1918, *Exot. Microlepid.*, 2: 102.

Type-species: *Lecithocera eupatris* Meyrick, 1910, *J. Bombay nat. Hist.*

Soc., 20: 443.

Brachmia Hübner (1825) 1816, *Vertz. bekannter. Schmett.* : 419. Type species: *Tinea dimidiella* [Dennis & Schiffermüller], 1775 *Ankündigung syst. Werks Schmett. Wienergegend.*: 141

Panplatyceros Diakonoff, 1951, *Ark. Zool.* 3: 76. Type species: *Panplatyceros serpentina* Diakonoff, 1951, *Ark. Zool.* 3: 76.

Type-species: *Torodora characteris* Meyrick, 1894, *Trans. ent. Soc. Lond.*, 16. Clarke, 1955, *Cat. Type Specimens Microlepid. BMNH* described by E. Meyrick, 1: 21.

Diagnosis: Vertex and frons covered with smooth scales; labial palpus long, upturned, second segment with small scales, third segment long and acute; antenna long, filiform, longer than $3/4^{\text{th}}$ length of forewing; metathoracic leg with hair-like scales on hind tibia; forewing relatively broad, apex rounded, termen slightly sinuate; vein M_1 arising far from stalk of $R_3+R_4+R_5$, M_1 and M_2 parallel; M_2 and M_3 free, CuA_1 and CuA_2 stalked, cell closed; hindwing much broader than forewing, $Rs+M_1$ stalked, Rs to costa or apex, M_3+CuA_1 connate or stalked; however, the venation of both wings do not quite agree in all species of the genus *Torodora*, especially in the condition of M_2 and M_3 on the forewings and M_2 and CuA_1 on hindwings; (1) M_2 and M_3 free on the forewing, M_3 and CuA_1 also free on the hindwing, as in the type-species, *characteris* Meyrick; (2) M_2 and M_3 stalked near base on forewing and M_3+CuA_1 stalked near $1/5^{\text{th}}$ on hindwing; (3) M_2 and M_3 stalked near middle on forewing, M_2 and CuA_1 stalked before middle in hindwing; (4) M_2 and M_3 stalked near middle on the forewing, M_3+CuA_1 stalked near or beyond middle on the hindwing. Male genitalia: uncus simple, thorn-like or broad, broader basally, socii absent; gnathos beak-like, broader at base, sclerotized, apex pointed; saccus absent; valvae broad, cucullus with tuft of long hair or without, inner surface setose, ventrally with spiniform setae or without; aedeagus broad; vesica with or without cornutus. Female genitalia: anterior apophyses rod-like, broader at base; ostium bursae centrally placed; antrum present; ductus seminalis open at middle of ductus bursae; corpus bursae ovate or subovate shaped; signum present.

14. *Torodora parafuscoptera* Rose and Pathania

Torodora parafuscoptera Rose and Pathania, 2003, *Bioved.* 14 (1,2): 143-144

Material examined:

Holotype: Male, 21.iv.1999, Forest Research Institute, Dehradun, Dist. Dehradun, Uttarakhand, 700m, coll. P.C. Pathania

Paratypes: 2 males, 2 females, 21.iv.1999; 2 males, 22.iv.1999; 2 males, 25.iv.1999; 1 male, 23.ix.1999; 1 male, 18.iv.2000; 3 males, 19.iv.2000, Forest Research Institute, Dehradun, Dist. Dehradun, Uttarakhand, 700m, coll. P.C. Pathania.

Distribution: Dehradun (Uttarakhand) (present work)

Larval host plant: Unknown

15. *Torodora pubesensovalvata* Rose and Pathania

Torodora pubesensovalvata Rose and Pathania, 2003, *Bioved.* 14 (1-2): 144-146.

Material examined:

Holotype: Male, 12.iv.1999, Renuka Lake, Dist. Sirmour, Himachal Pradesh, 740m, coll. P.C. Pathania

Key to the species of the genus *Hygroplasta* Meyrick

1. Alar expanse 23mm; dorsal surface of forewing with discocellular spot rounded and more clear, another indistinguishable spot present in discal cell; male genitalia with valvae broad, saccus moderately long, aedeagus long, straight, bent near apex, apex acute *spoliatella* Walker
- 1A. Alar expanse 18-22mm; dorsal surface of forewing with discocellular spot relatively more prominent, discal cell with spot prominent; male genitalia with valvae small, saccus long or small, aedeagus relatively long or small.....2
2. Male genitalia with saccus very long, uniformly broad throughout, sacculus margin convex basally then straight, costa convex medially, aedeagus long, vesica without cornutus; female genitalia with ductus bursae open at middle of corpus bursae, signum rounded *chunshengi* Pathania and Rose
- 2A. Male genitalia with saccus relatively smaller, broader distally, sacculus margin concave medially, costa concave medially, aedeagus short, vesica with cornutus; female genitalia with ductus bursae open near middle of corpus bursae, signum spindle-shaped *lygaea* Meyrick

Paratypes: 3 males, 2 females, 12.iv.1999; 2 males, 13.iv.1999; 2 males, 3.ix.1999; 2 males, 5.ix.1999, Renuka Lake, Dist. Sirmour, Himachal Pradesh, 740m, coll. P.C. Pathania.

Distribution: Renuka Lake (Himachal Pradesh) (present work)

Larval host plant: Unknown

16. *Torodora ponomarenkoae* Rose and Pathania

Torodora ponomarenkoae Rose and Pathania, 2003, *Bioved*, 14 (12): 146-148.

Material examined:

Holotype: Male, 11.ix.1998, University of Horticulture and Forestry, Nauni, Dist. Solan, Himachal Pradesh, 1360m, coll. P.C. Pathania

Paratypes: 1 male, 11.ix.1998; 4 males, 12.ix.1999; 2 males, 13.ix.1999; 1 male, 11.ix.1999, University of Horticulture and Forestry, Nauni, Dist. Solan, Himachal Pradesh, 1360m, coll. P.C. Pathania.

Distribution: Nauni (Himachal Pradesh) (present work)

Larval host plant: Unknown

17. *Torodora nyctiphron* (Meyrick)

Lecithocera nyctiphron Meyrick, 1931, *Exot. Microlepid.*, 4: 81.

Material examined: 4 males, 5.ix.1999, Tanyhar, Dist. Mandi, Himachal Pradesh, 1120m, coll. P.C. Pathania.

Distribution: Sikkim, Gangtok (Clarke, 1965); Tanyhar (Himachal Pradesh) (present work)

Larval host plant: Unknown

18. *Torodora fuscoptera* Rose and Pathania

Torodora fuscoptera Rose and Pathania, 2003, *Bioved*, 14(1,2): 148-151.

Material examined:

Holotype: Male, 11.ix.1998, University of Horticulture and Forestry, Nauni, Dist. Solan, Himachal Pradesh, 1360m, coll. P.C. Pathania

Paratypes: 12 males, 11.ix.1998; 9 males, 11.ix.1999; 6 males, 12.ix.1999; University of Horticulture and Forestry, Nauni, Dist. Solan, Himachal Pradesh, 1360m; 3 females, 16.vi.1999; 2 females, 16.vii.1999; 1 female, 14.ix.1999, Dharampur, Dist. Solan, Himachal Pradesh, 1500m, coll. P.C. Pathania.

Distribution: Nauni, Dharampur (Himachal Pradesh) (present work)

Larval host plant: Unknown

19. *Torodora parasema* (Meyrick)

Brachmia parasema Meyrick, 1913, *Exot. Microlepid.*, 1: 66.

Material examined: 2 males, 13.iv.1999, Renuka Lake, Dist. Sirmour, Himachal Pradesh, 740m; 3 males, University of Horticulture and Forestry, Nauni, Dist. Solan, Himachal Pradesh, 1360m, coll. P.C. Pathania.

Distribution: Bengal, Pusa (Clarke, 1965); Renuka Lake, Nauni (Himachal Pradesh) (present work)

Larval host plant: Unknown

20. *Torodora fortis* (Meyrick)

Lecithocera fortis Meyrick, 1918, *Exot. Microlepid.*, 2: 111

Material examined: 4 males, 14.ix.1999, Dharampur, Dist. Solan, Himachal Pradesh, 1500m, coll. P.C. Pathania

Distribution: Nilgiri Hills (India) (Clarke, 1965); Dharampur (Himachal Pradesh) (present work)

Larval host plant: Unknown

21. *Torodora deltoaspila* (Meyrick)

Lecithocera deltoaspila Meyrick, 1911, *J. Bombay nat. Hist. Soc.*, 20: 706.

Material examined: 1 male, 12.iv.1999; 2 males, 14.iv.1999; Renuka Lake, Dist. Sirmour, Himachal Pradesh, 740m; 1 male, 6.vii.1999, Tanyhar, Dist. Mandi, Himachal Pradesh, 1120m; 1 male, 23.ix.1999; 2 males, 18.iv.2000, Forest Research Institute, Dehradun, Dist. Dehradun, Uttarakhand, 700m; 3 males, 09.xi.2001, Jammu University Campus, Dist. Jammu, Jammu and Kashmir, 350m, coll. P.C. Pathania, Rachita Sood and Amit Katewa.

Distribution: Khasi Hills (Assam) (Clarke, 1965); Renuka Lake, Tanyhar (Himachal Pradesh); Dehradun (Uttarakhand); Jammu (Jammu & Kashmir) (present work)

Larval host plant: Unknown

22. *Torodora neodeltoaspila* Rose and Pathania

Torodora neodeltoaspila Rose and Pathania, 2003, *Bioved*, 14(1,2): 152-155.

Material examined:

Holotype: Male, 13.iv.1999, Renuka Lake, Dist. Sirmour, Himachal Pradesh, 740m, coll. P.C. Pathania

Paratypes: 1 male, 13.iv.1999; 2 males, 4.ix.1999, Renuka Lake, Dist. Sirmour, Himachal Pradesh, 740m; 1 male, 10.ix.1998, University of Horticulture and Forestry, Nauni, Dist. Solan, Himachal Pradesh, 1360m; 2 males, 25.vi.1999, Krishi Vishwavidyalaya, Palampur, Dist. Kangra, Himachal Pradesh, 700m, coll. P.C. Pathania

Distribution: Renuka Lake, Nauni, Palampur (Himachal Pradesh) (present work)

Larval host plant: Unknown

DISCUSSION

According to Park (1999), "the taxonomic status of the family Lecithoceridae has not been well defined, due to various differing opinions as to its rank". Marchand (1947) proposed the subfamily Lecithocerinae with *Lecithocera* Herrich-Schäffer as the type-genus, which was placed under the family Gelechiidae by Diakonoff (1954) and Janse (1954). In a recent publication, Park (1999) has stated, "there is no doubt that it should be considered as a family rank by such autapomorphic characters, as antenna being longer than forewing length (except Oditinae established by Lovovsky, 1996) and gnathos always bent downwardly." Gozmány (1978) established three new subfamilies under Lecithoceridae *i.e.*, Lecithocerinae Le Marchand (based on the genus *Lecithocera* Herrich-Schäffer), Ceuthomadarine Gozmány (based on the *Ceuthomadarus* Gozmány), and *Torodorinae* Gozmány (based on the genus *Torodora* Meyrick). The subfamily Lecithocerinae has the distinction of having a bridge-like structure connecting the tegumen and costa of the valvae in the male genitalia, whereas, in the *Torodorinae* these structures are wanting. *Lecithocera* is a widely distributed genus having sixty-two species listed under it from India (Gaede, 1937). Though, the venation is somewhat variable in this genus yet, various species can be adequately put under it in view of totality of characters, particularly the genitalic characters.

In subfamily *Torodorinae*, three genera *i.e.*, *Hygroplasta* Meyrick, *Philoptila* Meyrick and *Torodora* Meyrick were studied. Meyrick (1925) proposed the genus *Hygroplasta* with *Gelechia spoliatella* Walker as its type-species kept the same in the family Gelechiidae. However, Clarke (1965) transferred the genus from the latter family to the family Lecithoceridae, under which it is being dealt with presently. It has been observed that different individuals of this genus complex may have one or two black spots on the wings, which may be conspicuous, faint or even obscure. The genus *Philoptila* was proposed with *P. effrenata* Meyrick as its type-species by Meyrick (1918). Its diagnosis was based on a single male specimen collected from Kanara (southern India). Clarke (1965) has furnished a photograph of its male genitalia and a line drawing of the wing venation. While doing so, the author has also stated that, "the type was destroyed after photography and palpus are not available for illustration". The genus, under reference, is conspicuous in having the veins R_3 , R_4 , R_5 and M_1 , CuA_1 , CuA_2 stalked in the forewing, whereas, the vein M_2 is wanting in the hindwing. The genus has been listed under the family Gelechiidae (spelled as Gelechiadea) and

Lecithoceridae by Fletcher (1929) and Clarke (1965) respectively.

Meyrick (1894) proposed the genus *Torodora* with *T. characteris* Meyrick as its type-species and included it in the family Gelechiidae (Fletcher, 1929). However, Clarke (1955) considered it under the family Lecithoceridae (Nye and Fletcher, 1991). On the contrary, with *Torodora* Meyrick as its type-genus, Gozmány (1978) proposed a new subfamily Torodorinae under the family Lecithoceridae. Recently, Wu and Park (1999) have mentioned that the latter family contains about eight hundred species spread over in about one hundred genera worldwide. However, according to Park and Heppner (2000), the genus *Torodora* Meyrick possesses about 85 species, out of which 82 belong to the Oriental, two to Palaearctic and one to the Ethiopian regions. While revising the diagnosis of the genus under reference, though the aforesaid workers have given due emphasis to the structure of the wing venation, it has been stated that the venation of both wings do not quite agree in all species of the genus *Torodora* especially in the condition of M_2 and M_3 on the forewings and M_3 and CuA_1 on the hindwings. Due to the inconsistency in the wing venation, Wu and Park (1999) have framed separate keys for interspecific discrimination of the males and females of the same species on the basis of their respective genitalia. Similarly, Park and Heppner (2000) proposed two keys to sort out the species of the genus *Torodora* from Taiwan did not use venation for specific discrimination due to this inconsistency. One of the keys formulated by then was on the basis of the wing maculation, hind tibia and wing shape and the other on the basis of the male genitalia only. Somehow or the other, the female genitalia has not been discussed at all. In addition to this, these authors have also segregated/placed all the seven species from Taiwan into four groups. They have also recorded distributional range of the genus from India to Southeast Asia, including Burma. Prior to this, Gozmány (1972) has also dealt with some Lecithocerid genera i.e., *Aproparia*, *Parrhasastris*, *Rhyparomatrix* besides eleven new species combinations under the genus *Torodora* after shifting them from the genus *Lecithocera* Herrich-Schäffer. Being true *Torodora*, a thorough examination of the male genitalia reveals that the costal bridge-like structure connecting the tegumen and the valvae in the male genitalia is wanting and the uncus is always present and well developed (more or less thorn-like in lateral view) in all the taxonomic treated nine species of this genus.

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Key to the genera of the subfamily *Torodorinae*

1. Forewing upper surface with two black spots, vein R3 absent; male genitalia with vinculum produced anteriorly into a well developed saccus *Hygroplasta* Meyrick
- 1A. Forewing not as above, vein R3 present; male genitalia with vinculum without saccus 2
2. Forewing with veins M3+CuA1+CuA2 arising from common stalk at angle of cell; male genitalia with gnathos small, broad basally, apically pointed *Philoptila* Meyrick
- 2A. Forewing with veins CuA1+CuA2 stalked; male genitalia with gnathos long, beak like *Torodora* Meyrick

Key to the species of the genus *Torodora* Meyrick

1. Forewing without black streaks or black dots; male genitalia with gnathos well developed 2
- 1A. Forewing with black streaks or black dots; male genitalia with gnathos relatively less developed 6
2. Forewing with veins CuA₁ and Cu₂ on a relatively shorter stalk 3
- 2A. Forewing with veins CuA₁ and CuA₂ comparatively on a longer stalk 4
3. Male genitalia with each valva elongated, broader at base, tapering in distal half, beset with small setae, vesica with cornuti present *parafuscoptera* Rose and Pathania
- 3A. Male genitalia with each valva relatively smaller, distal half leaf like, not tapering, inner surface beset with a long hair directed anteriorly, vesica without cornutus *pubesensovalvata* Rose and Pathania
4. Forewing with veins M₂ and M₃ connate; male genitalia with each valva sickle-shaped, vesica without definite cornuti in aedeagus *ponomarenkoae* Rose and Pathania
- 4A. Forewing with veins M₂ and M₃ not connate, widely spaced; male genitalia with each valva not sickle-shaped, vesica with definite cornuti in aedeagus 5
5. Hindwing with vein Rs reaching precisely on apex; male genitalia with valva with costa convex at base, then straight, cucullus small, furnished with very long hair-like setae, vesica with a row of needle-like cornuti present *nyctiphron* Meyrick
- 5A. Hindwing with vein Rs ending at costa near apex; male genitalia with valva with costa concave, cucullus broad, furnished with smaller setae, vesica with a triangularly shape cornutus present *fuscopptera* Rose and Pathania
6. Forewing with veins M₂ and M₃ connate, veins CuA₁ and CuA₂ short stalked; male genitalia with each valva somewhat elongated, parallel sided 7
- 6A. Forewing with veins M₂ and M₃ not connate, widely spaced, veins CuA₁ and CuA₂ long stalked; male genitalia with valvae not as above 8
7. Alar expanse 14mm; forewing costal margin with two, broad, black unequal sized lines vertically present; male genitalia with each valva with costa straight, aedeagus long and broad, almost equal to the length of each valva, bent at 1/3rd basally *parasema* Meyrick
- 7A. Alar expanse 18mm; forewing costal margin with two, thin, black equal sized lines vertically present; male genitalia with each valva with costa curved, aedeagus small and narrowed, bent at middle *fortis* Meyrick
8. Hindwing with vein Rs to costa; male genitalia with each valva sickle-shaped, pointed apically, cucullus narrowed, aedeagus with rounded apex *deltospila* Meyrick
- 8A. Hindwing with vein Rs to apex; male genitalia with each valva sequestered in the basal half, expanded distally, cucullus broad, apically rounded, aedeagus with pointed apex *neodeltospila* Rose and Pathania

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ACKNOWLEDGEMENTS

The authors are thankful to the Ministry of Environment and Forests (GOI), New Delhi, for funding the project on moths and to the Vice Chancellor, Punjabi University, Patiala for providing facilities to run the Coordinating centre on Microlepidoptera under an All India Coordinated Project on Taxonomy (AICOPTAX). We also thank Dr. K.T. Park (Korea) for sending much needed literature and valuable suggestions during the course of these studies.

