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Plume moths of family Pterophoridae (Microlepidoptera) from Shiwaliks of North-West India

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Abstract

Survey tours were undertaken for the collection of Pterophorid moths from various localities falling in the jurisdiction of North-Western Shiwaliks. In all, 26 species belonged to 18 genera of the family Pterophoridae(25 species of subfamily Pterophorinae and 01 Deuterocopinae) were examined and identified. The keys to subfamilies, synonymy, distribution and remarks for all the species are also provided in detail.

Keywords: Microlepidoptera, North-West, Plume Moths, Pterophoridae

Introduction

The Microlepidoptera is one of the large groups of moths under order Lepidoptera. On world basis, 45735 species belonging to 4626 genera of 73 families under 19 superfamilies are present. The superfamily Pterophoroidea is a unique group from other Lepidopteran insects is having slender moths, long and slender legs and long abdomen and wings narrow clefted. The wings are narrow. Forewing is divided with 01, sometimes 02 and 03 clefts (rarely), whereas, 02 clefted are present in hindwing. The moths belonged to the same superfamily are commonly called as 'Plume-moths'. At rest the wings are placed rectangular to the body, which looks like T-shaped.

The family Pterophoridae is present in the Superfamily Pterophoroidea, represented by 1318 species belonging to 90 genera worldwide (Meyrick, 1912-36; Van Nieukerken *et al.,* 2011). The Pterophoridae family is characterized by smooth scaled head, chaetosemata and ocelli are lacking, unscaled proboscis, vestigial maxillary palpi, slender labial palpus, the forewing with cleft wings, venous scales at the underside along with veins M_3 and Cu_2 and hindwings are double cleft. The wings are narrower and when they are in resting stage placed wings rectangularly and looking like T-shaped. Due to very minute/small size of these moths, the taxonomical study is very difficult and the same moths group poses very serious problems in field collections, pinning, stretching, labelling and as well as in identification. Keeping in mind all above, the present research is undertaken on the Pterophorid moths from the area under reference.

Material and Methods

Study Area

The study areas include the various localities of states such as Himachal Pradesh, Jammu & Kashmir, Uttarakhand and Punjab falling under the North-Western Shiwaliks within an altitudinal range reaching upto 1500 m above m.s.l. The authors have undertaken insect survey-cum-collection tour to various localities such as Dharamshala, Palampur, Kangra, Sarkaghat, Baijnath, Tanyhar, Andhretta, Solan, Nauni, Dharampur, Renuka lake, Sabathu, Paunta Sahib, Nahan (Himachal Pradesh), Mansar lake, Katra, Jammu, (J&K), Dehradun, Haldwani Vikasnagar, Haridwar, (Uttarakhand), Anandpur Sahib, Nawanshahar Hoshiarpur, Pathankot, Dhar, Dasua, Roopnagar, Mirzapur, Dunera, (Punjab), Pinjore, Kalka, (Haryana) falling in the Siwaliks of North-Western

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Himalaya were visited during different monsoon and seasons (Figures 1&2). According to Chitkara (1998), the elevation of the Siwalik range extends upto 1500m ASL. Some selected localities, which are rich in Pterophorid moths were explored many times for the more collections. Some of the materials were also examined from the old collections housed in the Museum of the different universities.

Figure 1. Map of India.

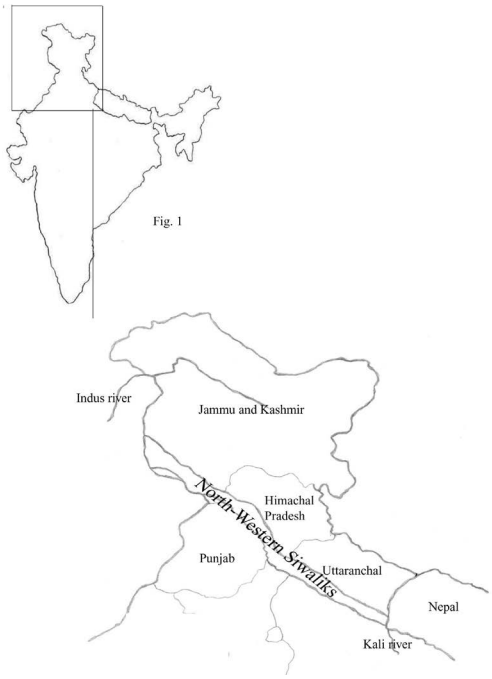

Figure 2. North Western Siwaliks (not exact to the scale).

Methodology

The adults of Pterophoridae were collected during the night time (nocturnal habit) with the help of portable light traps (Figure 3). Besides this, some specimens were also collected in the test tubes/killing bottles by different light source such as 125-Watt mercury vapors lamp fitted on a white sheet in different places like Forest/PWD guest houses in the same area. All the collected individuals were killed by various chemicals such as ethyl acetate or with tetrachloro ethane. For pinning, stretching, double mounting, labelling and proper preservation (fumigation etc) of the specimens, methodology adopted by Lindquist (1956), Tagestad (1974), Zimmerman (1978), Mikkola (1986) and Landry and Landry (1994) were followed. The standard techniques for the study of wings and genitalia, Zimmerman (1978) and Robinson (1976) have been followed. Zimmerman (1978), Common (1970) and (Klots, 1970) were consulted for the writing of the descriptions on their morphological characters, venation of the wing and genitalic studies.

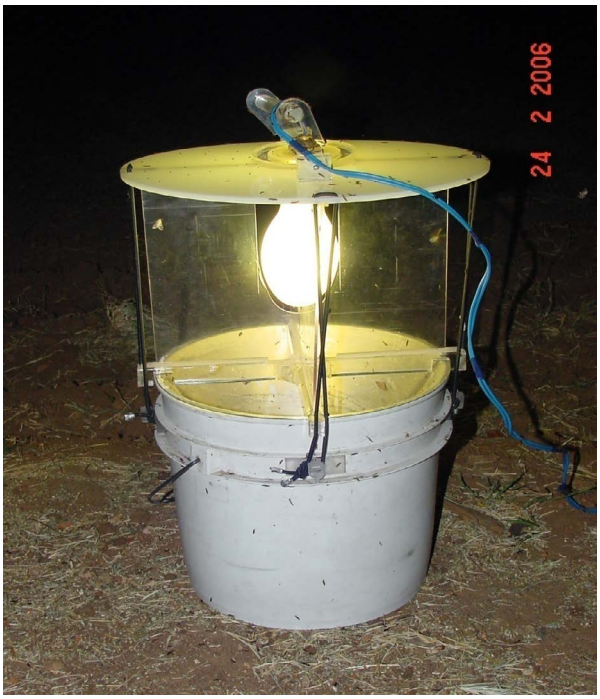

Figure 3. Portable light trap used for the collection of pterophorid moths.

Observations

Survey tours were undertaken for the collection of Pterophorid moths from various localities of North-Western

Shiwaliks during different seasons. 26 species belonged to 18 genera of the family Pterophoridae were explored and identified (Gielis, 1993; Rose and Pooni, 2005). The names of identified species are as under:

Systematic Account

Order LEPIDOPTERA
Superfamily PTEROPHOROIDEA
Family PTEROPHORIDAE

Pterophoridae Latreille, (1802), *An X, Hist. Nat. gen. Particuliere Crustaces Insects* **3**: 418 (as Pterophorii).

Type-genus: Pterophorous Schaffer, 1766, *Elementa Entomologica*: pl. 104, figs. 2,3.

Key to Subfamilies of Pterophoridae

1 Forewing always clefted (only 01)..... Pterophorinae
– Forewing clefted (02 or 03) ..... Deuterocopinae

Subfamily PTEROPHORINAE
Pterophorinae Zeller, 1841, **10**: 755.
Type-genus: *Pterophorous* Schaffer, 1766: *pl.* 104, figs. 2,3.

Genus ***Amblyptilia*** Hubner [1825]
Hubner, [1825] 1816, *Verz. bekannter Schmett*: 430.

1. ***Amblyptilia forcipeta*** (Zeller)
Amblyptilia forcipeta (Zeller), 1867, *Stettiner Entomologische Zeitung*, **28**: 412.

Material examined: Himachal Pradesh: Solan district: Solan, 140mASL, 24.ix.1999, 1ex., 12-14.ix.1999, 3exs, coll. Harjit Singh & P. C. Pathania).
Distribution: Darjeeling, Sikkim (India) (Fletcher, 1931).
Remarks: 25 species reported under this genus on world basis, only this species is present in India (Gielis, 1993).

Genus ***Crombrugghia*** Tutt, 1906
Zeller, 1847. *Isis Jena* **31**(12): 902.

2. ***Crombrugghia distans*** (Zeller, 1847)
Pterophorus distans Zeller, 1847. *Isis Jena* **31**(12): 902.

Material examined: Solan district, University of Horticulture and Forestry, Nauni, 1360mASL, 04.vii.2016, 2exs. coll. P. C. Pathania.

Distribution: Kumaon, Muktesar, 7000 feet, September (*Fletcher*); 2 ex.
Remarks: The collection of this species is the additional distribution record from the areas under reference.

Genus ***Exelastis*** Meyrick, 1907
Meyrick, 1907, *Journal of the Bombay natural History Society*, **17**: 730.

3. ***Exelastis phlyctaenias*** (Meyrick)
Marasmarcha phlyctaenias Meyrick, 1911, *Journal of the Bombay natural History Society*, **21**:106.

Material examined: Punjab: Patiala district, Punjabi University, Patiala, 250mASL, 6-29 .ix.1998, 4ex, 10.ix.2016, 1ex., coll. Harjit Singh & P. C. Pathania
Distribution: Coorg (India), Sri Lanka (Fletcher, 1931).
Remarks: The identification was done from the Meyrick (1911) and the information sought from Gielis (pers. comm.)

4. ***Exelastis pumilo*** (Zeller)
Mimeseoptilus pumilio Zeller, 1873. *Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien* **23**: 324.

Material examined: Punjab: Patiala district, Punjabi University, Patiala, 250mASL, 4.iii.1998, 2ex, 12-14.v. 1998, 8 exs., 3-25.x., 1999, 35 exs,; Himachal Pradesh: Sirmour district, Renuka Lake, 740mASL, 29.vii.2001, 2exs., Solan district, Chambaghat, 25.09. 1999, 8 exs, Palampur district, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, 27.v.2001, 1ex.; Uttarakhand: Dehradun district, Forest Research Institute, 700mASL, 2-8.ix.1999, 7 exs.; Chandigarh, 330mASL, 20.ix.1999, 3 exs., 20.viii.2016, 1ex. coll. Harjit Singh & P. C. Pathania
Distribution: Cosmopolitan (Fletcher, 1931; Gielis, 1993).
Remarks: Cosmopolitan in distribution and is the most commonest species of this genus. The species has identified by examined male and female genitalia figures (Gielis, 1993).

Genus ***Gypsochares*** Meyrick, 1890
Meyrick, 1980, *Transactions of the Entomological Society of London*, **1890**: 488.

5. ***Gypsochares catharotes*** Meyrick
G. catharotes Meyrick, 1908, *Transactions of the Entomological Society of London*, **1907**: 491.

Material examined: Himachal Pradesh: Solan district, Chambaghat, 1200mASL, 25-26.ix.1999, 3exs. coll. P. C. Pathania and Harjit Singh.
Distribution: Kumaon, Cherrapunji, Khasi Hills, Sikkim, Muktesar, Bhim Tal, (India), Pakistan (Fletcher, 1931; Gielis, 1993).
Remarks: Reported earlier from this area and are lesser in number.

Genus ***Lantanophaga*** Zimmerman, 1958
Zimmerman, 1958, *Insects Hawaii*, **8**: 400.

6. ***Lantanophaga anellatus*** Rose and Pooni
Material examined: Punjab, Gurdaspur district, Forest Rest House, Dhar, 700mASL, 23.x.2001, 42exs, 10.xi.2001, 14exs; Himachal Pradesh, Kangara district, Ghatasani, 1100m, 26.x.2001, 37 exc. coll P. C. Pathania and Harjit Singh.
Distribution: Dhar (Punjab), Ghatasani (Himachal Pradesh), (Rose and Pooni, 2005).
Remarks: The name of this species is given on the male genitalic characters, anellus lobes around the aedeagus.

Genus ***Megalorrhipida*** Amsel, 1935
Megalorrhipida Amsel, 1935, *Mitteilungen aus dem Zoologischen Museum in Berlin*, **20**: 293.

7. ***Megalorrhipida paradefectalis*** Rose and Pooni
Material examined: Himachal Pradesh, Solan district, Solan, 1300mASL, 24.ix. 1973, 1ex. coll Harjit Singh and P. C. Pathania
Distribution: Solan (Himachal Pradesh), (Rose and Pooni, 2005)
Remarks: The single male specimens are collected from the area.

8. ***Megalorrhipida defectalis*** (Walker)
Megalorrhipida defectalis (Walker), 1864, *List Specimens lipid. Insects Colln Br. Mus.*, **30**: 943.

Material examined: Punjab, Patiala district, Punjabi University, Patiala, 250mASL, 17.xi.1999, 2exs, Hoshiarpur district, Forest Rest House, Chohal. 400mASL, 27.vi. 2001 1ex., coll Harjit Singh and P. C. Pathania.
Distribution: Cosmopolitan (Gielis, 1993).
Remarks: Earlier reported from Poona, Coimbatore, Pusa and Chapra (Bengal) and is the type-species (Fletcher, 1932).

9. ***Megalorrhipida gielisi*** Rose and Pooni
Material examined: Himachal Pradsh, Solan district, Chambaghat, 1200mASL, 27.ix.1999, 2exs, Chandigarh, Panjab University, Chandigarh, 20.ix.1997, 3 exs, coll. Harjit Singh and P. C. Pathania
Distribution: Chambaghat, Solan (HP), (Rose and Pooni, 2005).
Remarks: The species named after worker Cees Gielis, The Netherlands, who worked on this family.

Genus ***Oidaematophorus*** Wallengren, 1862
Wallengren, 1862, *K svenska Vetensk Akad. Handl.* **3** (7): 19.

10. ***Oidaematophorus parshuramus*** Rose and Pooni
Material examined: Himachal Pradesh: Sirmaur district, Renuka Lake, 740mASL. 12.vii.1999, 3exs. coll P. C. Patahnia and Harjit Pooni.
Distribution: Renuka Lake, HP (Rose and Pooni, 2005)
Remarks: The species is name after a saint Parshuram, son of goddess Renuka.

Genus ***Oxyptilus*** Zeller, 1841
Zeller, 1841, *Isis Oken, Leipzig,* **1841**: 765.

11. ***Oxyptilus causodes*** Meyrick
Oxyptilus causodes Meyrick, 1905. *Journal of the Bombay natural History Society*, **16**: 582.

Material examined: Himachal Pradesh, Solan district, 1400mASL, 24.ix.1999, 1ex. coll P. C. Pathania and Harjit Singh.
Distribution: Dehradun, Bengal, South India, (India), Sri Lanka (Fletcher, 1931).
Remarks: Earlier reported from Dehradun (Fletcher, 1931).

Genus ***Platyptilia*** Hubner [1825]
Hubner [1825] 1816, *Verz. bekannter Schmett.*: 429.

12. ***Platyptilia duneraensis*** Rose and Pooni
Material examined: Punjab: Gurdaspur district, Dunera, 700mASL, 27.x.2001, 2exs. coll. Harjit Singh and P. C. Pathania.

Distribution: Dunera (Punjab) (Rose and Pooni, 2005)
Remarks: Named after the type-locality, which is the highest in the state.

13. ***Platyptilia socrates*** Meyrick, 1924
Platyptilia socrates Meyrick, 1924, *Exotic Microlepidoptera,* **4**: 334

Material examined: Solan district, University of Horticulture and Forestry, Nauni, 1360mASL, 06.vii.2016, 3exs. coll. P. C. Pathania.
Distribution: Kashmir, Killanmarg (Fletcher)
Remarks: Earlier, four examples of this species is collected from the height of 10,000 feet in the Kashmir Himalaya.

14. ***Platyptilia sedata*** Meyrick, 1932
Platyptilia sedata Meyrick, 1932, *Exotic Microlepidoptera,* **4**: 334.

Material examined: Solan district, University of Horticulture and Forestry, Nauni, 1360mASL, 03.vii.2016, 1exs. coll. P. C. Pathania.
Distribution: Kashmir, Killanmarg (Fletcher)
Remarks: Earlier, one examples of this species is collected from the height of above 10,500 feet in the Kashmir Himalaya.

15. ***Platyptilia semnocharis*** Meyrick, 1932
Platyptilia semnocharis Meyrick, 1932, *Exotic Microlepidoptera*, 4: 335.

Material examined: Solan district, University of Horticulture and Forestry, Nauni, 1360mASL, 03.vii.2016, 2exs. coll. P. C. Pathania.
Distribution: Kashmir, Killanmarg (Meyrick, 1932)
Remarks: Earlier, one examples of this species is collected from the height of above 10,500 feet in the Kashmir Himalaya.

Genus ***Prichotilus*** Rose and Pooni, 2005
Rose and Pooni, 2005. *Zoo's Print Journal* **20**(3): 1787-1803.

16. ***Prichotilus bidens*** (Meyrick)
Trichoptilus bidens Meyrick, 1930, *Exotic Microlepidoptera*, **3**: 564.

Material examined: Himachal Pradesh: Sirmour district, Renuka Lake, 740mASL, 12-13.iv.1999, 6exs., 06.v.2016, 02 exs. coll. Harjit Singh and P. C. Pathania
Distribution: Khasi Hills (India) (Fletcher, 1931).
Remarks: Common species found in the areas.

Genus ***Procapperia*** Adamczewski
Adamczewski, 1951, *Bulletin of the Natural History Museum, (Ent)* **1**: 338.

17. ***Procapperia pelecyntes*** (Meyrick)
Procapperia pelecyntes (Meyrick), 1907, Transactions of the Entomological Society of L*ondon*: 477.

Material examined: Himachal Pradesh, Solan district, University of Horticulture and Forestry, Nauni, 1360mASL, 12.iv. 1999, 2exs., 06.vi.2015, 02 exs. coll. Harjit Singh and P. C. Pathania
Distribution: Khasi Hills (India), Sri Lanka, Chaina (Fletcher, 1921).
Remarks: The species is quite rare in this area.

Genus ***Sphenarches*** Meyrick
Meyrick, 1886, *Transactions of the Entomological Society of London*, **1886**: 8.

18. ***Sphenarches anisodactylus*** (Walker)
Oxyptilus anisodactylus Walker, 1864, *List Specimens lepid. Insects Colln Br. Mus.*, **30**: 934.

Material examined: Punjab: Patiala district, Punjabi University, Patiala, 250m, 17.vii.1999, 1ex; 14.vi.2015, 2exs. Himachal Pradesh, Solan district, Chambaghat, 1200mASL, 25.ix.. 1999, 3 exs, Uttarakhand: Dehradun district, Forest Research Institute, 700mASL, 16-18.v.1999, 7exs., 02.vii. 2016, 4exs., coll. Harjit Singh & P. C. Pathania
Distribution: Cosmopolitan (Fletcher, 1931; Gielis, 1993).
Remarks: The genus *Sphenarches* was proposed on the basis of a new species i.e., *S. synophrys* by Meyrick (1886), this species is very common in these areas.

Genus ***Stenodacma*** Amsel
Amsel, 1959, *Stuttgarter Beiträge zur Naturkunde*, **28**: 29.

19. ***Stenodacma pyrrhodes*** (Meyrick)
Stenodacma pyrrhodes (Meyrick), *Proceedings of the Linnean Society of New South Wales*, **1889**: 1113.

Material examined: Himachal Pradesh, Solan district, University of Horticulture and forestry, Nauni, 1360mASL, 10-14.ix. 1999, 9 exs., Uttarakhand, Dehradun district, Forest Research Institute, Dehradun

700mASL, 25.iv.1999, 4 exs. coll. Harjit Singh and P. C. Pathania
Distribution: India, Australia (Fletcher, 1931, Gielis, 1993)
Remarks: The species identified by Gielis (per.comn) and common in the said areas.

20. *Stenodacma wahlbergi* (Zeller)
Stenodacma wahlbergi (Zeller), 1852, *Linn. Entomology*, **6**: 346.

Material examined: Punjab, Patiala district, Punjabi University, Patiala, 250mASL, 24.vi.1998, 1ex., 4.x.1999, 1ex., 25.iv.2000, 2exs., Gurdaspur district, Dunera, 700mASL, 1ex, coll. P. C. Pathania and Harjit Singh
Distribution: Palini Hills, Coimbatore, Coorg, Pusa, Banglore, Bhim Tal, sheveroys, Shillong, Dharamshala (India), Pakistan, Sri Lanka (Fletcher, 1931).
Remarks: Identified after genitalic studies (Gielis, 1993).

Genus ***Stenoptilia*** Hubner
Hubner [1825]1816, *Verz. bekannter Schmett*., 430.

21. *Stenoptilia petraea* Meyrick
Stenoptilia petraea Meyrick, 1908, *Transactions of the Entomological Society of London*: 504.

Material examined: Punjab: Gurdaspur district, Dunera, 700mASL, 27.x.2001, 4exs, Himachal Pradesh, Solan district, 27.x.1999, 1ex, Sirmour district, Renuka Lake, 740mASL, 12.iv.2002, coll. Harjit Singh and P. C. Pathania.
Distribution: Nilgiri Hills, Palni Hills (India) (Gielis, 1993).
Remarks: New distributional areas of the species.

22. *Stenoptiala himachala* Arenberger, 1999
S. himachala Arenberger, 1999, *Quandrifina*, 2: 218, figs 3, 11, 12.

Material examined: Solan district, University of Horticulture and Forestry, Nauni, 1360mASL, 03.vii.2016, 1exs. coll. P. C. Pathania.
Distribution: India, Himachal Pradesh
Remarks: Additional record of the species from Himachal Pradesh.

Genus ***Stenoptilodes*** Zimmerman
Zimmerman, 1958, *Insects Hawaii*, **8**: 407.

23. *Stenoptilodes taprobanes* (Felder and Rogenhofer)
Stenoptilodes taprobanes (Feld. and Rog.), 1875, *Reise Nov. Lepid. Het*.: plate 140, figures 54, Moore, 1887, Lepidoptera Ceyl. **3**: 527.

Material examined: Himachal Pradesh: Solan district, Solan, 27.ix.1999, 1ex. coll Harjit Singh and P. C. Pathania.
Distribution: Pusa, Coorg, (India), USA, Sri Lanka, Australia, Brazil, Burma, South Africa, Hawaiian Islands, Mauritius, (Fletcher, 1931).
Remarks: This genus alone species present in India (Gielis, 1993).

Genus ***Tetraschalis*** Meyrick, 1887
Tetraschalis arachnodes Meyrick, 1887

24. *Tetraschalis deltozela* Meyrick, 1924
Etraschalis deltozela Meyrick, 1924, *Exotic Microlepidoptera*, **3**(3): 92.

Material examined: Uttarakhand, Dehradun district, Forest Research Institute, 700mASL, 8.ix.1999, 2 exs.; Solan district, University of Horticulture and Forestry, Nauni, 1360mASL, 03.vii.2016, 1exs. coll. P. C. Pathania.
Distribution: India, Masuri (Meyrick, 1924)
Remarks: Additional distribution record of this species from the areas.

Genus ***Tomotilus*** Yano
Yano, 1961, *Mushi*, 35: 87.

25. *Tomotilus saitoi* Yano
Tomotilus saitoi Yano, 1961, *Mushi,* 35: 88, figures, 1-2.

Material examined: Punjab, Hoshirpur district, Forest Rest House, Chohal, 400mASL, 27.vi.2001, 1ex, (coll. Harjit Singh), Solan district, University of Horticulture and Forestry, Nauni, 1360mASL, 02.vii.2016, 2exs. coll. P. C. Pathania.
Distribution: Japan (Gielis, 1993).
Remarks: This species reported after many years from the areas.

Subfamily DEUTEROCOPINAE
Genus ***Deuterocopus*** Zeller
Zeller, 1852, *Linn. entomology* **6**: 402.

26. *Deuterocopus planeta* Meyrick
Deuterocopus planeta Meyrick, 1908. *Transactions of the Entomological Society of London*, 1908.

Material examined: Punjab: Patiala district, Punjabi University, Patiala, 250m, 4.ii.1998, 1ex, 4-20. viii.1998, 12exs., 5.x.1999, 1ex., 02.vi.2016, 2exs. Coll. Harjit Singh & P. C. Pathania)

Old Distribution: Khasi Hills, Coorg, (India), Thailand, Sri Lanka, Timor, Burma, Kei Island (Robinson *et al.,* 1994).

Remarks: Most common species in India (Fletcher, 1931; Robinson *et al.,* 1994).

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