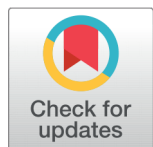


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Two New Record of the Genus *Ampelophaga* (Lepidoptera: Sphingidae) from Different Altitude in Mizoram, North East India

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Abstract

Background/Objectives: Sphingidae are a family of moths belonging to the order Lepidoptera, commonly known as hawk moths or Sphinx moth, named for their hovering, streamlined shape and narrow wings. The current study deals with a detailed description of two species of sphingid moth belonging to the genus *Ampelophaga*: *A. rubiginosa* and *A. dolichoides* from Mizoram, North-east India. **Methods:** Sphingid moths were collected using light trapping method. A white sheet of cloth was hung vertically between two poles and a mercury vapour lamp (160W) as a light source and Honda™ EP1000 portable generator serves as a power source. Moths attracted to light were hand sampled, and killed using petroleum ether. Collected specimens were stored in butter paper with wings folded vertically. Identification and genitalia dissection was done in the Systematics and Toxicology Laboratory, Department of Zoology, Mizoram University. **Findings:** From our study we observed that *A. dolichoides* were more prevalent than *A. rubiginosa* and were found to inhabit much lower elevation whereas *A. rubiginosa* were found only in the ranges above 600m asl. Though extensive literature survey showed that *A. rubiginosa* usually occurs between 1200m and 2200m altitude, the current study documented that *A. rubiginosa* were also found to occur in altitudinal range between 600m-900m asl thereby extending their previously known altitudinal range. **Novelty:** Extensive survey of literature yielded no reports on the genus *Ampelophaga* in Mizoram. The study reported two species of the genus *Ampelophaga* for the first time from Mizoram with notes on their morphological attributes. This study will add to the diversity of sphingid moth of Mizoram and India as well.

Keywords: Sphingidae; Mizoram; Taxonomy; Ampelophaga; Diversity

1 Introduction

The family Sphingidae Latreille, 1802 commonly called as Hawk moths belong to the order Lepidoptera and have a cosmopolitan distribution. They are one of the most well inventoried and documented Lepidoptera, known by 1,602 species under 205 genera worldwide⁽¹⁾. Sphingidae are known by three subfamilies: Macroglossinae, Smerenthinae, and Sphinginae; with Smerenthinae estimated to be the most abundant globally. Adult Sphingid moths, like most Lepidopteran plays important role in agriculture entomology. The larvae of these moths are phytophagous and are major defoliators of agricultural plants. Adult moths are easily identified by their conspicuous morphological feature with stout and large body, pointed triangular forewing and a much more reduced hindwing, and also involved in pollination of many plant species⁽²⁾. The most thorough studies of Indian Sphingid are still those by Cotes and Swinhoe⁽³⁾, who identified 187 species, and Bell and Scott⁽⁴⁾, who identified 183 species, 135 of which were found in the eastern Himalayas⁽⁵⁾.

The genus *Ampelophaga* (Bremer & Grey, 1853) belong to the subfamily Macroglossinae. This genus comprises five species and two sub-species under *A. rubiginosa*. The current study focuses on the first report of two species of Sphingid moth of the genus *Ampelophaga* namely, *A. dolichoides* (R. Felder, [1874]) and *A. rubiginosa* (Bremer & Grey, 1853) from Mizoram, North-east India. The paper includes the first reference, material examined, distribution and characteristic description of the two newly reported species.

2 Methodology

2.1 Study site

Sphingid moths were collected from different part of Mizoram at an elevation ranging from 143m - 804m asl (Table 1). The study site consists of two national wetlands, namely Tamdil lake, Saitual district and Palak lake, Siaha district, the largest lake in Mizoram. The trapping site were usually done to buffer zone of forest where human activities are less or almost none at some site. Sampling localities, altitudinal ranges and GPS coordinates are provided in Table 1.

Table 1. Sampling sites

Sl. No	Study site	GPS coordinates (decimal)		
		Latitude	Longitude	Altitude
1	Tamdil (Site 1)	23.26222222	92.95138889	767
2	Mizoram University (Site 2)	23.73722222	92.66333333	804
3	Palakdil (Site 3)	22.205	92.88666667	273
4	Rahum (Site 4)	24.26694444	92.83361111	143
5	Uibaikawn (Site 5)	24.26222222	92.81305556	615
6	Thenzawl 2 (Site 6)	23.30638889	92.78583333	704

2.2 Collection and preservation:

Trapping of the moth is conducted using a mercury vapour lamp/bulb (160 Watt) and UV lamp (20 Watt, made in Poland) which serve as a light source, and a Honda™ EP1000 portable generator as a of power source. At each sampling site, two light traps were set separately by placing two poles vertically to the ground and white sheet of cloth

as a screen to reflect the light. The moth that settled on the cloth was hand sampled and sacrificed in the field by injecting petroleum ether in their thorax region or by using a killing jar for smaller specimens. The sampled moths were pinned in the Systematics and Toxicology Laboratory, Department of Zoology, Mizoram University, Aizawl. The pinned specimens were kept in an open space for air drying and set aside for identification. Specimens were photographed using camera (Cannon EOS 550D) using a white sheet of paper as a background. Genitalia dissection was carried out following Padwal *et al.* ⁽⁶⁾ Genitalia were photographed using Moticam 1080 microscope. The photographs were then processed using Adobe Photoshop 2020.

2.3 Identification

Identification of the sphingid moth was done based on relevant published literature ⁽⁴⁾ and comparison with database from Sphingidae Museum (<http://en.sphingidae-museum.com/database/>). Morphological attributes such as size, wing shape and colour patterns were taken into consideration for identification. Males are more abundant than females but the female counterpart are usually larger in size than the males in most species. Patterns and coloration can be similar or identical for some of the species which makes it harder to identify.

3 Results and Discussion

Taxonomic account:

Sub-family Macroglossinae Harris, 1839

Genus *Ampelophaga* Bremer & Grey, 1853

Ampelophaga dolichoides (R. Felder, [1874])

Pergesa dolichoides; Moore, [1875], Proc. zool. Soc. Lond. 1874 (4): 577

Identification: Antenna pectinated, creamy white with hoary setae, strongly compressed. Labial palpus pale, no ruddy tinge. Strong proboscis, moderate in length. Forewing with apex not produced, dark grey, with nearly straight oblique grey and blush pink lines, wavy light grey line between two discal lines, attached to sub-marginal line and post marginal line, fine black speck in disco cellular. Hind wing triangular, outer margin with creamy white on both forewing and hindwing. Abdomen dark grey in dorsal, almost same as the hind wing, slightly ferruginous in ventral, numerous spine, fine white line in the middle extending from thorax to abdomen in dorsal side (Figure 1 A).

Male genitalia: Uncus broad at the base, well sclerotized, narrow towards tip, distal half setosed; gnathos sclerotized, narrow towards tip; tegument membranous; valva broad, well setosed with small and large setae; sacculus weakly sclerotized, small sacculus extension projected towards costa; saccus weakly sclerotized, rounded. Aedeagus moderate in size, weakly sclerotized, narrow toward tip, distal end having denticles backwardly directed. (Figure 1 C & D).

Material examined: India, Mizoram; Site 1 (23°44'15"N 92°57'05"E), 767m asl. 14.x.2020 – 9♂ (94, 92, 100, 88, 94, 96, 98, 92, 92), 04.x.2022 – 2♂ (92, 94); Site 3 (22°12'18"N 22°12'18"E), 273m asl. 07.ix.2021 – 3♂ (104, 93, 90), 31.iii.2022 – 1♂ (102); Site 4 (24°16'00"N 92°50'01"E), 143m asl. 13.iii.2021 – 4♂ (96, 86, 96, 89), 06.iv.2022 – 1♂ (92); Site 5 (24°15'44"N 92°48'47"E) 615m asl. 21.vii.2022 – 1♂ (90); Site 6 (28°18'23"N 92°47'09"E) 704m asl. 24.viii.2022 – 1♂ (92).

Remarks: Wingspan of examined specimen 88 – 104mm, slightly larger than the type specimen 80 – 100mm.

Distribution:

India; Northeastern India,

Global: Bhutan, Nepal, across Thailand Malaysia. China

Ampelophaga rubiginosa Bremer & Grey, 1853

Ampelophaga rubiginosa Bremer & Grey, 1853, in Motschulsky (ed.), Etudes ent. 1: 61.

Identification: Antenna slender, filiform, pectinated, creamy white with dark setae. Head ferruginous, Forewing with apex not produced, reddish brown with an oblique apical line indistinctly continued in zigzag form to the hind margin, outer margin dark brown. Hind wing apex, testaceous antemedial faded toward medial line, postmedial ferruginous, creamy white outer margin. (Figure 1 B).

Male genitalia: Uncus broad at base and narrow toward tip, sclerotized, lower half setosed with few setae; gnathos sclerotized; tegument membranous; valva short, well setosed with small and large setae; scculus well sclerotized, projection broad at base, longer than *Ampelophaga dolichoides*; short saccus, well defined, weakly sclerotized. Aedeagus long, sclerotized, narrow towards tip, single denticle backwardly directed. (Figure 1 E & F).

Material examined: India, Mizoram, Site 2 (23°44'12"N 92°39'48"E) 804m asl. 18.iii.2021 – 2♂ (96, 90); Site 5 (24°15'44"N 92°48'47"E) 615m asl. 21.vii.2022 – 1♂ (90).

Distribution:

India: Assam, Himachal Pradesh, Meghalaya, Sikkim.

Global: China, South Korea, Japan, Russia, Taiwan, Thailand, Russia and Russian Far East.

Remarks: Similar in appearance to *A. khasiana*, the oblique apical lines of the fore wings are indistinctly continued but straight whereas in *A. rubiginosa* oblique apical lines are indistinctly continued with zigzag lines. Though studies conducted in the Himalayan foothills of northern India and Tibet showed that *A. rubiginosa* usually occurs between 1200m and 2200m altitude⁽⁴⁾, the current study documented that *A. rubiginosa* were also found to occur in an altitudinal range between 600m - 900m asl thereby extending their previously known altitudinal range. Flight periods begin in early March, a bit earlier than those reported in Korea, i.e. early May to early August⁽⁷⁾.

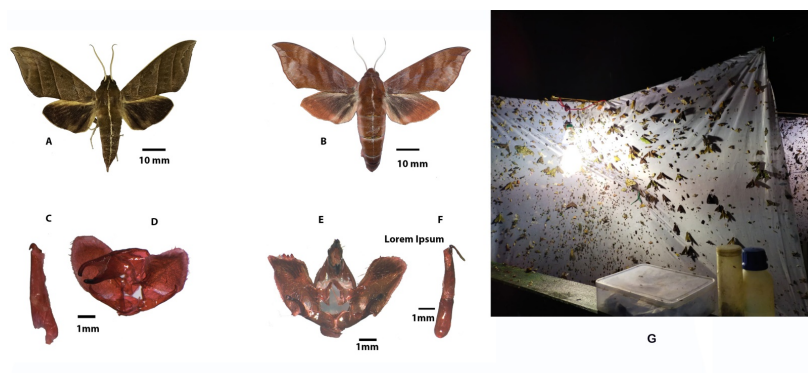


Fig 1. (A) Dorsal side of *Ampelophaga dolichoides*, (B) Dorsal side of *Ampelophaga rubiginosa*, (C) Aedeagus and (D) male genitalia of *Ampelophaga dolichoides*, (F) Aedeagus, (E) male genitalia of *Ampelophaga rubiginosa*. (G) Picture of light trap, using mercury vapour lamp as light source

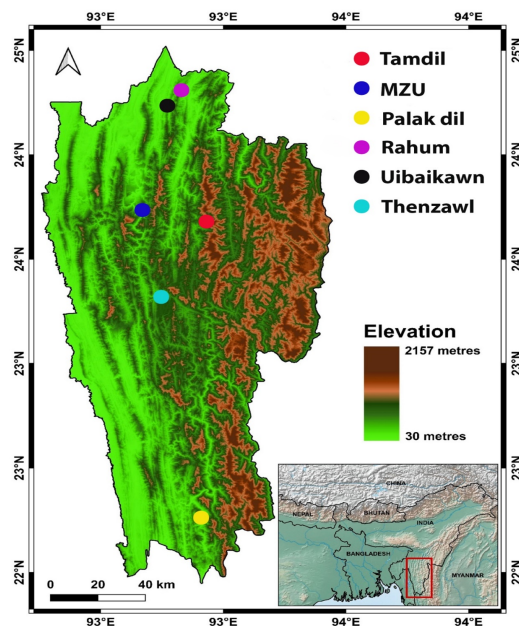


Fig 2. Map of Mizoram showing the collection sites of the specimens examined in the study

4 Conclusion

The study reported two species of the genus *Ampelophaga* for the first time from Mizoram with a detailed description of their morphological attributes thereby enriching the diversity of sphingid moths of Mizoram and India as well. The result shows that *A. dolichoides* are more prevalent than *A. rubiginosa*, and they prefer a lower elevational range compared to *A. rubiginosa*. The

difference in the pattern of abundance with varying elevation may be attributed to the availability of host plants specific to the species.

5 Declaration

Presented in 4th Mizoram Science Congress (MSC 2022) during 20th & 21st October 2022, organized by Mizoram Science, Technology and Innovation Council (MISTIC), Directorate of Science and Technology (DST) Mizoram, Govt. of Mizoram in collaboration with science NGOs in Mizoram such as Mizo Academy of Sciences (MAS), Mizoram Science Society (MSS), Science Teachers' Association, Mizoram (STAM), Geological Society of Mizoram (GSM), Mizoram Mathematics Society (MMS), Biodiversity and Nature Conservation Network (BIOCON) and Mizoram Information & Technology Society (MITS). The Organizers claim the peer review responsibility.

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