

# A world checklist of the genus *Phauda* Walker (Lepidoptera: Phaudidae) with the description of female genitalia of *Phauda flammans* (Walker, 1854)

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**Abstract:** In the present manuscript, the female genitalia of *Phauda flammans* (Walker, 1854), collected from Uttar Pradesh, India, are described, representing the first record of Phaudidae from the state of Uttar Pradesh as well as from the Gangetic Plain biogeographic zone of India. Additionally, a world checklist of *Phauda* Walker is also provided.

**Keywords:** female genitalia, Gangetic plains, India, Uttar Pradesh

## INTRODUCTION

The genus *Phauda* Walker, 1854 was established for *Euchromia flammans* Walker from north India. The genus was initially placed in the subfamily Phaudinae by Kirby (1892) and later in the Zygaenidae by Yen *et al.* (2005), who also discussed the uncertainty surrounding the monophyly of Phaudinae. Kristensen *et al.* (2007) kept Phaudinae as a subfamily of Zygaenidae, but molecular analyses support the status of Phaudinae as a family, Phaudidae, and its sister relationship with Zygaenidae (Niehuis *et al.*, 2006; Mutanen *et al.*, 2010, Zheng *et al.*, 2020). Nieukerken *et al.* (2011) mentioned 3 genera and 15 species in Phaudidae. In the present paper, we report Phaudidae for the first time from Uttar Pradesh, and illustrate the female genitalia of *Phauda flammans* (Walker, 1854). A world checklist of *Phauda* Walker is also provided.

## MATERIALS AND METHODS

Two female specimens were collected using an insect net in late morning near to a *Ficus religiosa* Linnaeus (Moraceae) tree at Aligarh (27.9284684°N 78.0571125°E; 178 m; Figure 1) outside of Aligarh fort in Aligarh district, Uttar Pradesh, on 17 March 2020. The genitalia was dissected and preserved in a solution of alcohol and glycerin (3:1) in a cryotube. Images of the adult were captured by Nikon D7200 camera and Nikkor 105 mm macro lens, and of the genitalia using a camera attached to a Hund Wetzlar stereo-microscope. The voucher specimens are deposited in the ZDAMU (Zoology Department, Aligarh Muslim University, Aligarh, Uttar Pradesh). Species names follow LepIndex (Beccaloni *et al.*, 2003), and the following abbreviations are used: TL= Type locality; TS= Type species.

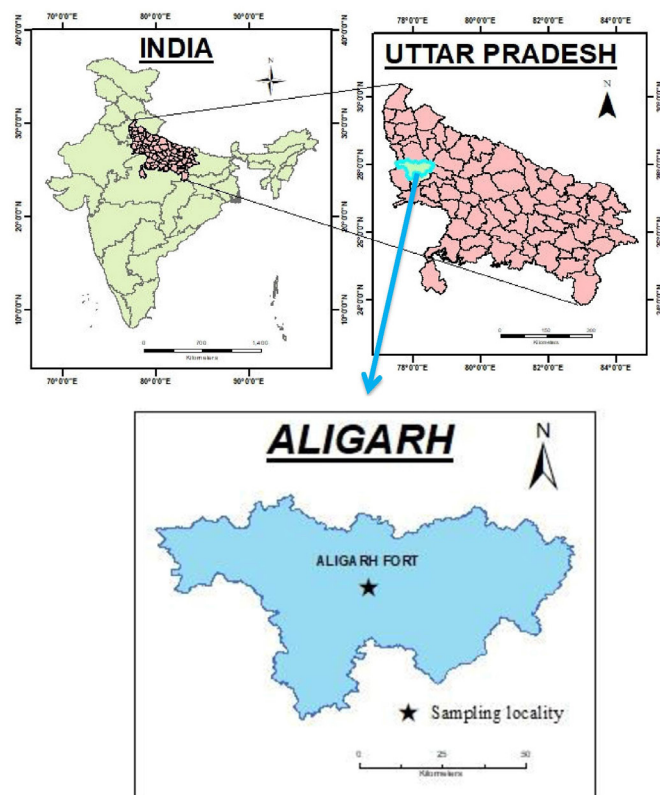


Figure 1. Site of observation of *Phauda flammans* (Walker, 1854).

## RESULTS

## Taxonomy

Genus *Phauda* Walker, 1854

*Phauda* Walker, 1854; *List Spec. Lepid. Insects Colln. Br. Mus.* 1: 256.

TS: *Euchromia flammans* Walker

**Description:** Antennae bipectinate in male, simple in female. Wings long and narrow; forewing with rounded apex, outer margin oblique; hindwing with vein M1 from near middle of discocellular. Mid-tibia and hind-tibia with minute terminal pair of spurs. Abdomen with lateral tufts of hairs excluding first two segments, a pair of long anal tufts in male.

**Distribution:** The genus is distributed in China, India, Indonesia (Java and Sumatra) (Hampson, [1893]); Nepal, Myanmar, China, Hong Kong (Kendrick, 2002; Zheng *et al.*, 2015); Vietnam, Thailand (Zheng *et al.*, 2020).

***Phauda flammans* (Walker, 1854)**

*Euchromia flammans* Walker, 1854; *List Spec. Lepid. Insects Colln. Br. Mus.*, 1: 257.

TL: N. India.

**Material examined:** India, Uttar Pradesh, Aligarh, Aligarh fort, 17.iii.2020, 2 ex. ♀, (Coll. SAF).

**Description:**

**Adult (Figure 2A,B):** Wingspan: 41 mm. Body overall bright red with black patterning. Palpi black; antennae serrate, black with whitish tips; head and thorax scarlet or crimson; abdomen black, sparsely covered with thick scarlet lateral tufts. Forewings red, black towards tips, black part with a strongly curved outline, hind margin more than twice as long as fore margin, fringe black, whitish tips of wings. Hindwings semi-hyaline, reddish with outer area blackish. Legs black.

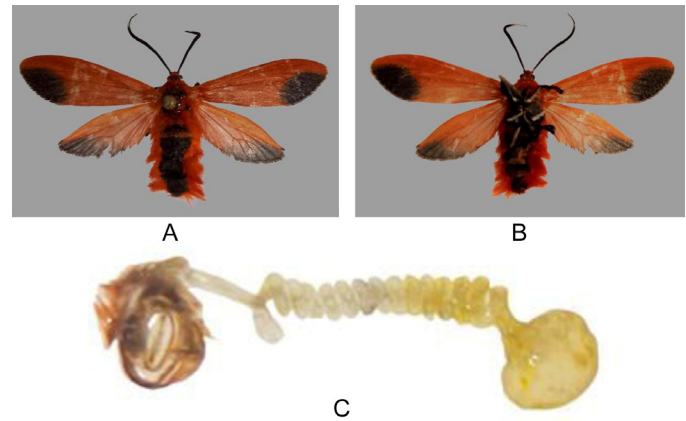
**Female genitalia (Figure 2C):** Ovipositor short and broad. Papillae analis oval-shaped. Apophyses rudimentary or short, heavily fused to 8<sup>th</sup> segment. Lamella postvaginalis narrow, slightly sclerotised. Lamella antevaginalis slightly prominent, sclerotized. Ductus bursae almost straight anteriorly; second part highly coiled, fourteen times. Corpus bursae globular, signum absent.

**Distribution in India:** Himachal Pradesh (Shimla), Sikkim, Pusa, Meghalaya (Cherrapunji) (Fletcher, 1925); South India (Nageshchandra *et al.*, 1972); Uttar Pradesh (Aligarh district) (present study).

**Global records:** Myanmar (Hampson, [1893]); Pakistan (Lahore), Java (Fletcher, 1925); Nepal, Myanmar, China, Hong Kong (Kendrick, 2002; Zheng *et al.*, 2015); Vietnam, Thailand (Zheng *et al.*, 2020).

**Larval Host Plants/ Ecology:** The species was recorded by Verma & Dogra (1982) feeding on *Ficus* Linnaeus (Moraceae) in Himachal Pradesh. Caterpillars of *Phauda flammans* feed on *Ficus* spp. plants' leaves and are often considered as important pests of the plants (Zheng *et al.*, 2015). *Ficus microcarpa* (L.) and *F. racemosa* (L.) are often extensively damaged by the defoliating larvae in China (Liu *et al.*, 2014, 2015a, 2015b).

**Biological control agent:** Several parasitoids: Hymenoptera: *Gotra octocinctus* (Ashmead, 1906), (Ichneumonidae); *Apanteles* Förster, 1862 sp. (Braconidae); *Eurytoma verticillata* (Fabricius, 1798), (Eurytomidae); and Diptera: *Exorista yunnanica* Chao, 1964 (Tachinidae) have been identified as biological control agents for the caterpillars (Zheng *et al.*, 2015).



**Figure 2.** *Phauda flammans* (Walker, 1854). A. Adult female, dorsal view, B. Adult female, ventral view. C. Female genitalia.

**A checklist of *Phauda* species****1. *Phauda arikana* Matsumura, 1911**

*Phauda?* *arikana* Matsumura, 1927; *Journ. Coll. Agricult. Hokkaido*, 19(1): 80.

TL: Taiwan, Koshun.

**2. *Phauda bicolor* Fibiger, Larsen & Buchsbaum, 2011**

*Phauda bicolor* Fibiger, Larsen & Buchsbaum, 2011; *Nota lepidopterologica*, 33(2): 263-269.

TL: Indonesia, north Sumatra.

**3. *Phauda defluiteri* Roepke, 1943**

*Phauda defluiteri* Roepke, 1943; *Natuurh. Maandbl.*, 32: 50.

TL: Indonesia, Java.

**4. *Phauda dichroa* Jordan, 1907**

*Phauda dichroa* Jordan, 1908; *Gross-Schmett. Erde*, 10: 7.

TL: India, Andaman and Nicobar Islands, Port Blair.

**5. *Phauda dimidiata* (Snellen, 1879)**

*Xenares dimidiata* Snellen, 1879; *Tijdschr. Ent.*, 22: 69.

TL: Indonesia, Sulawesi (Celebes).

**6. *Phauda enigma* Hering, 1925**

*Phauda enigma* Hering, 1925; *Deutsche. Ent. Zeitschr. Iris*, 39: 171.

TL: Bangladesh, Sylhet.

**7. *Phauda eos* de Joannis, 1910**

*Phauda eos* de Joannis, 1910; *Bull. Soc. ent. Fr.*, 1910: 246.

TL: Vietnam, Tonkin.

**8. *Phauda flammans* (Walker, 1854)**

*Euchromia* (*Phauda*) *flammans* Walker, 1854; *List Spec. Lepid. Insects Colln. Br. Mus.*, 1: 257.

TL: N. India.

**9. *Phauda fortunii* (Herrich-Schäffer, [1854])**

*Xenares fortunii* Herrich-Schäffer, 1854; *Samml. Aussereurop. Schmett.*, (I)1: 7.

TL: N. China.

**Remarks:** Treated as a synonym of *Phauda triadum* (Walker, 1854) by Kirby (1892) and Bryk (1936); treated as a species of *Phauda* by Alberti (1954).

**10. *Phauda fuscalis* Swinhoe, 1892**

*Phauda fuscalis* Swinhoe, 1892; *Cat. Het. Mus. Oxford*, 1: 60.

TL: India, Assam.

11. *Phauda horishana* Matsumura, 1927  
*Phauda horishana* Matsumura, 1927; *Journ. Coll. Agricult. Hokkaido*, 19: 80.  
TL: Taiwan, Horisha.
12. *Phauda kantonensis* Mell, 1922  
*Phauda kantonensis* Mell, 1922; *Ent. Zeitschrift.* : 126.  
TL: China, Kanton.
13. *Phauda lanceolata* Jordan, 1907  
*Phauda lanceolata* Jordan, 1907; *Gross-Schmett. Erde*, 2: 5.  
TL: China, Yichang.
14. *Phauda limbata* (Wallengren, 1861)  
*Colletis limbata* Wallengren, 1861; *Svenska fregatten Eugenie's Resa*: 361.  
TL: Singapore, Manilla.
15. *Phauda mahisa* Moore, [1860]  
*Phauda mahisa* Moore, 1860; *Cat. Lep. Ins. Mus. Nat. East India House*, 2: 329.  
TL: Indonesia, Java.
16. *Phauda mimica* Strand, 1915  
*Phauda mimica* Strand, 1915; *Archive. f. Naturg.*, 80A(10): 117.  
TL: Taiwan.
17. *Phauda pratti* Leech, 1890  
*Phauda pratti* Leech, 1890; *Entomologist*, 23: 81.  
TL: China, Yichang.
18. *Phauda rubra* Jordan, 1907  
*Phauda rubra* Jordan, 1907; *Gross-Schmett. Erde.*, 10: 7.  
TL: Taiwan.
19. *Phauda similis* Hering, 1925  
*Phauda similis* Hering, 1925; *Deutsche. Ent. Zeitschrift. Iris.*, 39: 172-173.  
TL: Taiwan.
20. *Phauda triadum triadum* (Walker, 1854)  
*Euchromia triadum* Walker, 1854; *List Spec. Lepid. Insects Colln. Br. Mus.*, 1: 257.  
TL: N. China.
21. *Phauda triadum erythra* Jordan, 1907  
*Phauda triadum erythra* Jordan, 1907; *Gross-Schmett. Erde*, 10: 7.  
TL: India, Karnataka, Belgium.
22. *Phauda triadum sumatrensis* Walker, 1864  
*Phauda sumatrensis* Walker, 1864; *List Spec. Lepid. Insects Colln. Br. Mus.*, 31: 106.  
TL: Indonesia, Sumatra.
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