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First report of seven moth species (*Lepidoptera*: *Heterocera*) from Kerala: A survey from Ranipuram, Kasaragod, Kerala, India

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Abstract
Moths play a vital role in ecosystems as pollinators, decomposers, and prey species; however, they remain underrepresented in biodiversity assessments, particularly in regions characterized by complex agroecosystems such as northern Kerala, India. This study presents the first records of seven moth species from the state: *Zeiraphera griseana* (Hübner, [1799]), *Toccolosida ganeshgudiensis* N. Singh, Kirti & Ranjan, 2020, *Tingena ombrodella* (Hudson, 1950), *Pyla hanhamella* Dyar, 1904, *Herpetogramma semilaniata* Hampson, 1895 [8], *Antiblemma alcinoe* Druce, 1890, and *Adiopa* sp. Schaus, 1940. Specimens were collected from forest ecosystems in Ranipuram, Kasaragod District, Kerala, India, during surveys conducted between February and March 2024. These records extend the known geographic distribution of the species and provide additional insights into their morphological features and ecological associations. The findings contribute significantly to the growing documentation of Kerala's lepidopteran fauna and underscore the ecological importance of forest habitats in sustaining diverse moth populations.

Keywords: *Lepidoptera*, *Heterocera*, *Noctuidae*, erebidae, *Crambidae*, pyralidae, *Oecophoridae*, *Tortricidae*, faunistic records, Kerala

Introduction

Ranipuram is a hill station in Kasaragod district of Kerala, which is about 750 meters above sea level in the Western Ghats. It is approximately 48 km from Kanhangad Town and 107 km from Mangalore, Karanataka State. It is part of the Western Ghats, a designated UNESCO World Heritage Site. It plays a crucial role in sustaining regional biodiversity and serves as a vital habitat for numerous species. Formerly known as Madathumala, Ranipuram holds historical importance as a tribal settlement. The local communities play a vital role in preserving traditional knowledge about the region's flora and fauna, contributing to its ecological and cultural heritage. The Landscape of Ranipuram have Rolling grasslands, shola forests, and hills blanketed with evergreen vegetation. Rich in medicinal plants and endemic plant species. While focusing on the natural features, the climate is Cool and misty throughout the year, with heavier rainfall during the monsoon season (June to September). The destination is known for its eco-tourism initiatives, providing excellent camping opportunities amidst nature. Visitors can enjoy breathtaking panoramic views of Kerala and the neighboring state of Karnataka from various vantage points.

Ranipuram hosts a diverse array of fauna. The area also supports wildlife such as elephants, leopards, deer, and numerous bird species. Additionally, its butterfly diversity is remarkable, drawing the interest of researchers and nature enthusiasts. Lepidoptera in Ranipuram play vital roles as pollinators and as prey for many other animals, maintaining the food web in the ecosystem. The region's forests and grasslands offer diverse environments, attracting a wide variety of butterfly species. The moths and butterflies contribute significantly to the local flora's reproductive success through pollination, helping preserve the diversity of plant species. Common butterfly species include the Malabar raven (*Coraces malabaricus*), Common Swallowtail (*Papilio machaon*), the Blue Tiger (*Tirumala limniace*), and the Common Jezebel (*Delias eucharis*). Ranipuram's rich moth diversity includes both diurnal and nocturnal species. Large and colorful moths such as the and Giant Wood Moth (*Endoclita hoenei*) are found in the area. Some species of moths in Ranipuram could be new records for India, making it an exciting location for entomological research. The area's forests and grasslands provide critical habitats for different moth species, including those with specialized feeding and reproductive habits. Given the diversity and presence of potentially endemic species, Ranipuram is a critical area for lepidopteran conservation. Protecting its unique habitats ensures the survival of these species and helps researchers gain insights into biodiversity conservation strategies.

Materials and Methods

The present study was conducted in Ranipuram Hills of Kasaragod district, Kerala, India, which located in part of Southern Western Ghats. Ranipuram, known as the Ooty of Kerala, lies in 12.4211140 N 75.3500750 E and spread in 50 Km2. This district is bounded in the North by Dakshina Kannada, on the East by Coorg district of Karnataka state, on the south by Kannur District of Kerala state and on the West by Arabian Sea. It merges with the Talacauvery wildlife sanctuary on its east side. Fieldwork was conducted from December 2024 to January 2025. Moths were collected using vertical light traps equipped with two 65W CFL bulbs and a 160W mercury vapor lamp, set up on a 4 × 5 ft white cotton screen. Sampling was performed over 10 nights, with specimens captured and preserved according to established lepidopterological methods. Specimens were then identified up to species level based on comparisons with existing literature on morphological characteristics and other relevant sources following protocols detailed by Moore (1890, 1892), Hampson (1891, 1892, 1893, 1894, 1895 and

1896) [3, 4, 5, 6, 8, 11], Bell and Scott (1937), Barlow (1982), Holloway (1983, 1985, 1986, 1988, 1989, 1996, 1997, 1998, 2003 and 2011), K. S. S. Nair (1988), Pinratana and Lampe (1990), Mathew *et al*., (1994, 2003, 2004) [24], Kendrick (2002), Kononenko and Pinratana (2005, 2013), and Kirti and Singh (2016). A. Krishnan (2016), Pratheesh Mathew *et al*., (2018) [22] V.Balakrishnan (2019) [2], Sondhi *et al*., (2018, 2021) [30] K. Swafvan and P.M. Sureshan (2020, 2022), Katewa and Pathania (2019) Alex *et al*., (2021) [1] S. R Sreelakshmi and J Roopavathy (2021), *Unnimaya et al.*, (2022). Specimens were photographed using a Canon PowerShot SX430, with measurements taken from preserved specimens. The collected specimens were deposited at Farook College, Kozhikode.

Fig.1

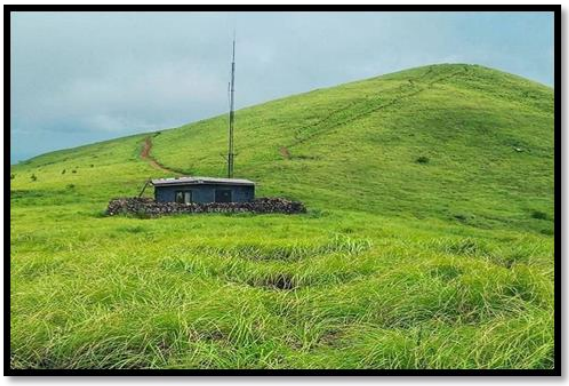


Fig.2

Fig.3

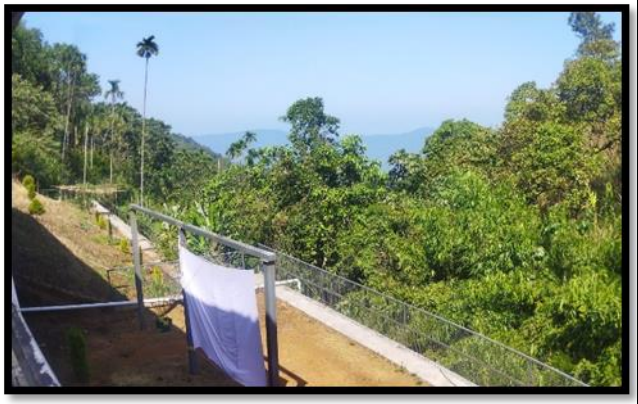


Fig.4

Fig 1-4: Areas of collection

Results and Discussion

This study presents seven new moth species records from Kerala:

1. *Zeiraphera griseana* (Hübner, [1799])

Family: Tortricidae, Subfamily: Olethreutinae

Zeiraphera griseana; Ferris & Kruse, 2008, *J. Lep. Soc.* 62 (1): 32

Diagnosis: Head, thorax and abdomen are dark yellowish brown.

Forewing is yellowish brown with irregular black markings and a small blackish linear mark in the costa. Outer margin slightly fringed; Hindwings are also yellowish brown with irregular black markings and slightly fringed outer margins; antennae filiform; tectiform resting position; Wings span 18–22 mm. The record of *Zeiraphera griseana* from Kerala underscores the richness of the moth fauna in the Western Ghats and the ecological value of maintaining diverse habitat types. This species' appearance is distinct from other Tortricidae in Kerala, suggesting potential niche specialization within local agroecosystems.

Month of activity: February, March.

Habitats observed: They are nocturnal, collected from forest ecosystems.

2. *Toccolosida ganeshgudiensis* N. Singh, Kirti & Ranjan, 2020

Family: Pyralidae, subfamily: Pyralinae

Diagnosis: Head, thorax and abdomen are dark brown colored. Forewing is pale yellowish brown with pale yellow upper margin and the outer margin is fringed with pale yellow fringes; Hindwings are also yellowish brown with pale brown lower margin. fringed outer margins; pectinate antennae; tectiform resting position; Wings span 28–32 mm. The record of *Toccolosida ganeshgudiensis* from Kerala underscores the richness of the moth fauna in the Western Ghats and the ecological value of maintaining diverse habitat types. The identification of *Toccolosida ganeshgudiensis* underscores the importance of detailed faunistic studies in understanding the diversity and distribution of Pyralidae.

Month of activity: February, March.

Habitats observed: They are nocturnal, collected from forest ecosystems.

3. *Tingena ombrodella* (Hudson, 1950)

Family: Oecophoridae, subfamily: Oecophorinae

Diagnosis: Head, thorax and abdomen are dark grey colored. Forewing is pale yellowish grey with small black

spots on the cell region. The outer margin is fringed with pale yellow fringes; Hindwings are also pale yellowish grey with fringed outer margins; filiform antennae; tectiform resting position; Wings span 20–25 mm. The record of *Tingena ombrodella* from Kerala underscores the richness of the moth fauna in the Western Ghats and the ecological value of maintaining diverse habitat types. This species adds to the known diversity of Oecophoridae in Kerala and suggests a potential role in the pollination ecology of local crops.

Month of activity: February, March.

Habitats observed: They are nocturnal, collected from forest ecosystems.

4. *Pyla hanhamella* Dyar, 1904

Family: Pyralidae, subfamily: Phycitinae

Pyla hanhamella Dyar, 1904; *Proc. ENT. Soc. Wash.* 6 (2): 109

Diagnosis: Head, thorax and abdomen are dark ash colored. Forewing is ash colored with pale wavy vertical lines in medial and post medial region. The outer margin is slightly fringed; Hindwings are also pale yellowish ash with fringed outer margins; pale grey upper margin. Filiform antennae; tectiform resting position; Wings span 25–32 mm. The record of *Pyla hanhamella* from Kerala underscores the richness of the moth fauna in the Western Ghats and the ecological value of maintaining diverse habitat types. This species' distinctive wing markings set it apart from other known Pyralidae in the region. The discovery of *Pyla hanhamella* in Kerala contributes to the understanding of Pyralidae distribution in the Western Ghats and highlights the region's role in supporting unique moth species.

Month of activity: February, March.

Habitats observed: They are nocturnal, collected from forest ecosystems.

5. *Herpetogramma semilaniata* Hampson, 1895 [8]

Family: Crambidae, subfamily: Spilomelinae

Diagnosis: Head, thorax and abdomen are pale black colored. Forewing is pale black colored with pale grey outer margin. Black vertical line through post basal and pale black incomplete vertical line through discal region; Hindwings are also pale black colored with pale grey upper margin pale grey outer margin with Black outer margin. Filiform antennae; tectiform resting position; Wings span 20–22 mm. The record of *Herpetogramma semilaniata* from Kerala underscores the richness of the moth fauna in the Western Ghats and the ecological value of maintaining diverse habitat types.

Month of activity: February, March.

Habitats observed: They are nocturnal, collected from forest ecosystems.

6. *Antiblemma alcinoe* Druce, 1890

Family: Erebidae, subfamily: Eulepidotinae

Capnodes alcinoe Druce, 1890; 417, pl. 33, f. 25

Diagnosis: Head, thorax and abdomen are pale greyish black colored. Forewing is grey colored with thick pale black wavy vertical line through post-basal and sub-discal region. Pale black Sub-apical region. Upper outer margin slightly concave. Outer margin slightly fringed. Black vertical line through post basal and pale black incomplete vertical line through discal region; Hindwings are also grey colored with pale grey upper margin. Pale black wavy vertical discal and post-discal line. Outer margin slightly fringed. Filiform antennae; tectiform resting position; Wings span 25–32 mm. The record of *Antiblemma alcinoe* from Kerala underscores the richness of the moth fauna in the Western Ghats and the ecological value of maintaining diverse habitat types.

Month of activity: February, March.

Habitats observed: They are nocturnal, collected from forest ecosystems.

7. *Adiopa* sp. Schaus, 1940

Family: Noctuidae, subfamily: Calpinae

Diagnosis: Head, thorax and abdomen are pale yellowish brown colored. Forewing is pale yellowish brown with pale brown vertical wavy sub-discal and post-discal line. Hindwings are also pale yellowish brown colored with pale brown sub-marginal region. Outer margin slightly fringed. Filiform antennae; tectiform resting position; Wings span 28–35 mm. The record of *Adiopa* sp. From Kerala underscores the richness of the moth fauna in the Western Ghats and the ecological value of maintaining diverse habitat types. This species' appearance is distinct from other Noctuidae in Kerala, suggesting potential niche specialization within forest ecosystems. The identification of *Adiopa* sp. underscores the importance of detailed faunistic studies in understanding the diversity and distribution of Noctuidae.

Month of activity: February, March.

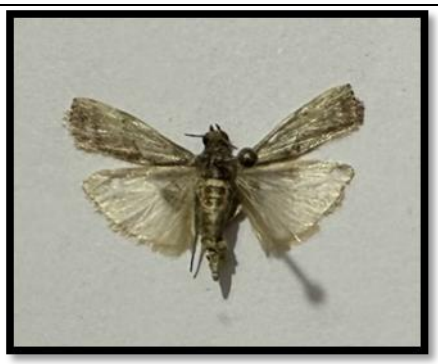
Habitats observed: They are nocturnal, collected from forest ecosystems.

Plates

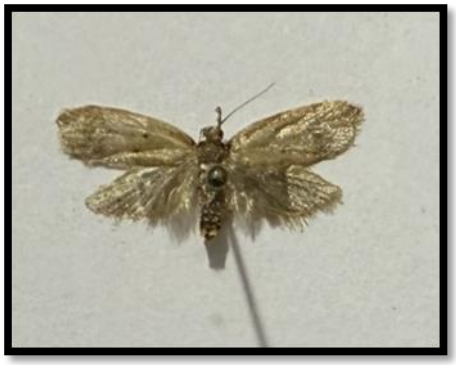
Adiopa sp.

Antiblemma alcinoe

Herpetogramma semilaniata



Pyla hanhamella



Tingena ombrodella

Toccolosida ganeshgudiensis

Zeiraphera griseana

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