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A Preliminary Study on the Moth Diversity in Rongo Forest, West Bengal, India

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Abstract: A preliminary study on moth diversity was conducted in Rongo Forest, West Bengal, India, using light trap from April 16 to April 19, 2024. In total, 50 moth species from 45 genera across 12 families were documented. Among these, the family Erebididae (s=13) was the most prevalent, followed by the family Noctuididae (s=9), Geometrididae (s=7), Saturniidae (s=6), Crambidae (s=4), Pyralidae (s=4), Sphingidae (s=2). Drepanidae, Eupterotidae, Fabaceae, Limacodidae and Uraniidae (s=1) being the less rich family observed. Among the documented species, 34 were not assessed in the IUCN Red Data Book. Additionally, 2 species were classified as Critically Endangered, 1 as Rare, 4 as Near Threatened, 1 as Threatened, 1 as Globally Endangered, 1 as Vulnerable, 1 as Endangered, and 5 as Least Concern. The significant number of unassessed species is particularly concerning, as it leaves us unaware of their conservation status and potential vulnerabilities. The moth diversity recorded during the present study is being reported for the first time from Rongo forest area.

Keywords: Moths, Diversity, Checklist, Rongo Forest, Erebididae, Noctuididae, Geometrididae, Saturniidae

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Introduction

Moths are phytophagous insects found worldwide, known for their roles as agricultural pests, nocturnal pollinators, and potential bio-indicators. They are primarily active at night (Dar *et al.*, 2021). They represent one of the most taxonomically and ecologically diverse groups of insects, with a wealth of data available for study (Wagner *et al.*, 2021). Worldwide, there are 132,177 species of moths, Various researchers

have estimated the number of moth species in India to be around 15,000. belonging to 75 different families. Currently 10,694 of those species are found in India (Zhang, 2011; Sidhu, 2023). Rongo is a scenic village nestled at the base of the eastern Himalayas, situated along the banks of the Jal Dhaka River. Positioned at an elevation of 450 feet, it lies near the India-Bhutan border within the Kalimpong district of West Bengal,

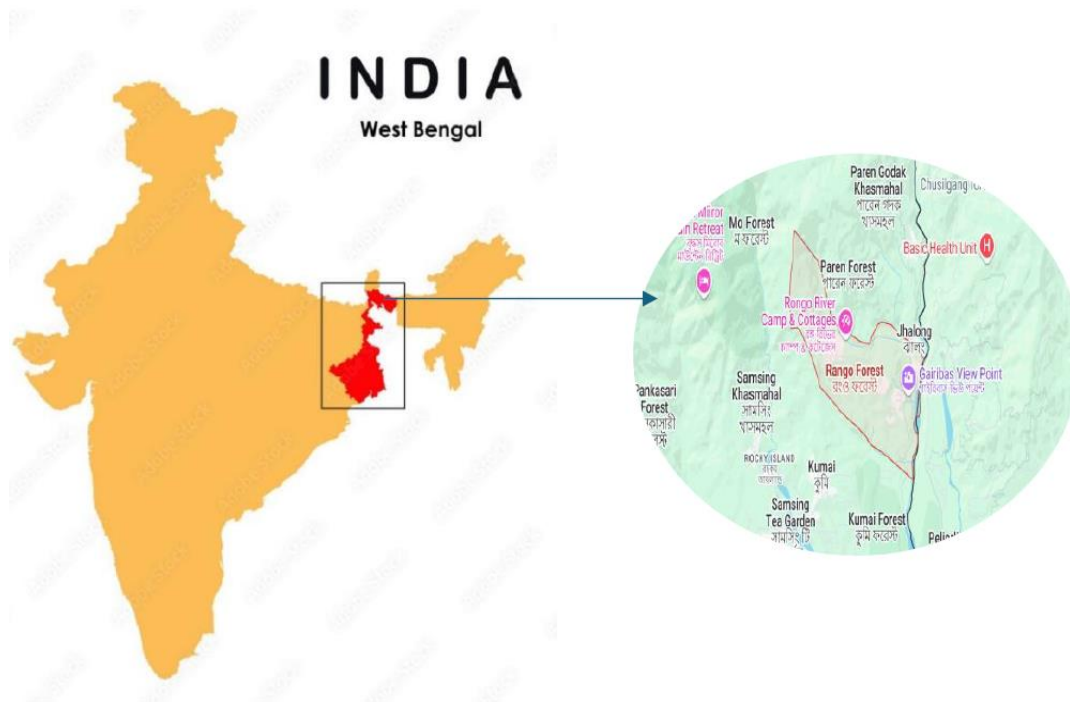


Fig. 1: Map of the study site.

India (Chakraborty and Saha, 2022). Rongo is primarily a rural region, with 77.67% of its population residing in rural areas, while 22.23% live in urban settings. The forests of Rongo are characterized by numerous hills and small streams, rich in a variety of exotic and native Ornamental and medicinal plants (Chakraborty and Saha, 2022). This diverse vegetation supports a vibrant floral ecosystem, which is also advantageous for local moth populations. No prior research had documented the moth diversity in Rongo Forest. To address this lack of information, a study was undertaken to investigate and record the different moth species in the area.

Materials and Methods

Study site

This study was carried out in the Rongo forest (27.0435°N, 88.8335°E) (Fig. 1), located in the Gorubathan CD block of Kalimpong Sadar subdivision, Kalimpong district, West Bengal,

India. Situated along the southeastern edge of Neora Valley National Park in the Jaldhaka River valley, Rongo forest is known for its rich biodiversity, encompassing a diverse range of flora and fauna (Chakraborty and Saha, 2022). Fieldwork took place in April, a moderately cool climate and occasional daytime rain showers. Daytime temperatures averaged between 16°C and 20°C, while nighttime temperatures dropped to 10°C–14°C. April provided ideal conditions, as temperatures remained relatively stable, and the chilly nights attracted a high density of moths. The study area featured rugged, hilly terrain covered with dense vegetation, including numerous shrubs, bushy trees, and a waterfall. The lack of artificial lighting in the area enhanced the effectiveness of light traps used for data collection.

Collection of Moths

Moths were attracted and collected using a box type light trap (Fig. 2) set up from 6 pm to 1 am. Once collected, moths were euthanized using ethyl



Fig. 2: Box type light trap used to capture moths.

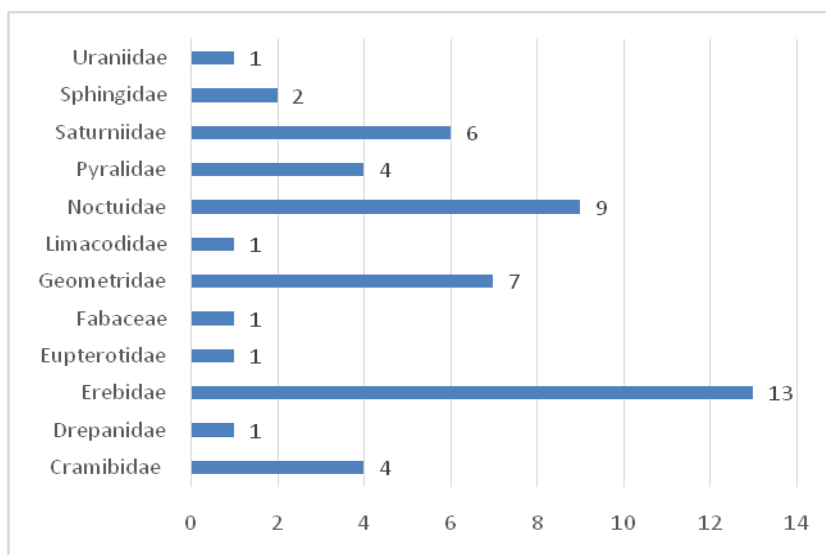


Fig. 3: distribution of moth family based on the number of species.

acetate, a common insect-killing agent. Specimens were then carefully pinned onto an insect stretching board, which helps in setting their wings and body into a proper display for study. The mounted moths were stored in airtight insect boxes containing naphthalene powder, which act as a fumigant to prevent pest infestation and mold growth. This process ensures that the moth specimens remain intact and well-preserved for further examination, classification, or display.

Identification of Moths

The specimens were submitted to the Entomology Laboratory of Vidyasagar College, Saltlake Campus for identification. Available literature and publications were used to identify each specimen.

Results and Discussion

In this study, a total of 50 moth species

representing 45 genera and 12 families were identified in the Rongo forest and the adjacent waterfall area. The Erebiidae family exhibited the highest diversity, with thirteen distinct species, followed by Geometridae with seven species, Noctuidae with nine, and Saturniidae with six. Additionally, four species were recorded in both the Crambidae and Pyralidae families, while Sphingidae had two species. The Drepanidae, Eupterotidae, Fabaceae, Limacodidae, and Uraniidae families each contributed one species to the overall count (Table 1; Figs. 3, 4).

A total of 50 species under 45 genera of moths belonging to 12 families were documented during the present study in the Rongo forest. The checklist of moth species, their distribution in India, and IUCN status are provided in Table 1.

The present study provides a preliminary

Table 1: Moth species observed from light trap in Rongo forest, Kalimpong

S. No.	Family	Scientific name	Distribution in India	IUCN Status
1	Crambidae	<i>Conogethes</i> sp. (Meyrick, [1884])	Northern part of India.	Not evaluated
2		<i>Parotis marginata</i> (Hampson, [1893])	Sikkim, West Bengal, and the Nicobar islands.	Critically endangered
3		<i>Spoladea recurvalis</i> (Fabricius, [1775])	Northeast Himalaya	Not evaluated
4		<i>Udea ferrugalis</i> (Jacob Hübner, [1796])	Northeast part of india.	Not evaluated
5	Drepanidae	<i>Habrosyne fraterialis</i> (Moore, [1888])	Himalayan regions, Western ghats, Eastern ghats, Northeastern states.	Not evaluated
6	Erebidae	<i>Arctornis cygna</i> (Hutton, [1865])	West Bengal, Sikkim.	Near threatened
7		<i>Arctornis marginata</i> (Moore, [1883])	Uttarakhand, West Bengal, Meghalaya, Darjeeling, Himalayas.	Near threatened
8		<i>Asota caricae</i> (Fabricius, [1775])		Rare
9		<i>Britha pactalis</i> (Walker, [1859])	Maharashtra, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Odisha, Telangana, Uttarakhand, Himachal Pradesh, west Bengal, assam, Meghalaya, Arunachal Pradesh.	Not evaluated
10		<i>Cretonotos transiens</i> (Walker, [1855])	Widespread across India	Not evaluated
11		<i>Daddala brevicauda</i> (Wileman & South, [1921])	Himalayan regions, Western ghats, Eastern ghats.	Not evaluated
12		<i>Hyperythra lutea</i> (Stoll, [1781])	Himalayan regions, northeastern states, western ghats.	Not evaluated
13		<i>Lymantria</i> sp. (Herbert Druce, [1890])	Himalayan regions, Western ghats, Eastern ghats, Northeastern states, plains, and coastal regions.	Not evaluated
14		<i>Macotasa nubecula</i> (Moore, [1879])	Northwest Himalayas, Sikkim, Arunachal Pradesh, Jammu.	Threatened
15		<i>Maurilia</i> sp. (Möschler)	Himalayan regions, Western ghats, Eastern ghats, Northeastern states.	Not evaluated
16		<i>Nyctemera adversata</i> (Schaller, [1788])	Assam, Meghalaya, west Bengal, Odisha, Andaman and Nicobar islands.	Least concern

17		<i>Pericyma cruegeri</i> (Butler, [1886])	West and south India including Jharkhand.	Globally endangered
18		<i>Psilochira lineate</i> (Walker, [1855])	Northeast India.	Not evaluated
19	Eupterotidae	<i>Eupterote mollifera</i> (Walker, [1865])	Widespread across India	Not evaluated
20	Fabaceae	<i>Leucania sp.</i> (Ferdinand Ochsenheimer, [1816])	Cold parts of the country.	Least concerned
21	Geometridae	<i>Antipercnia belluaria</i> (Guenée, [1858])	Sikkim, Arunachal Pradesh, Meghalaya, and Mizoram.	Near threatened and very rare.
22		<i>Biston contectataria</i> (Walker, [1860])	Himalayan regions, Western ghats, Eastern ghats, Northeastern states.	Not evaluated
23		<i>Biston panterinaria</i> (Bremer & Grey [1853])	Himalayan regions, Western ghats, Eastern ghats, Northeastern states.	Not evaluated
24		<i>Hypochrosis sp.</i> (Walker, [1860])	Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, Maharashtra, Gujrat, Odisha, west Bengal, Assam, Meghalaya.	Not evaluated
25		<i>Percinia felinaria</i> (Guenée, [1858])	Sikkim, Arunachal Pradesh, Meghalaya, and Mizoram.	Near threatened and very rare.
26		<i>Plagodis reticulata</i> (Warren, [1893])	Himalayan regions, Western ghats, Eastern ghats, Northeastern states.	Not evaluated
27		<i>Xandrames dholaria</i> (Moore, [1868])	Maharashtra, Gujrat, west Bengal	Not evaluated
28	Limacodidae	<i>Alpha nivea</i> (Walker, [1862])	Northern Himalaya	Critically endangered
29	Noctuidae	<i>Agrotis ipsilon</i> (Ochsenheimer, [1816])	West Bengal, Kashmir, Darjeeling.	Least concerned
30		<i>Argyrogramma signata</i> (Fabricius, [1784])	Almost everywhere.	Not evaluated
31		<i>Axylia renalis</i> (Moore, [1881])	Widespread across India	Not evaluated
32		<i>Chasmina candida</i> (Francis Walker, [1865])	Islands of Indian ocean.	Endangered
33		<i>Chrysodeixis sp.</i> (Duponchel, [1829])	Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, Maharashtra, Gujrat, Odisha, west Bengal, Assam, Meghalaya.	Not evaluated
34		<i>Helicoverpa armigera</i> (Hübner, [1808])	Widespread across India	Least concern
35		<i>Mythimna sp.</i> (Francis Walker, [1865])	Northeast part of India.	Not evaluated
36		<i>Spodoptera litura</i> (Fabricius, [1775])	Uttarakhand, Nainital, Almora, Pithoragarh, Chamoli.	Not evaluated
37		<i>Spodoptera mauritia</i> (Boisduval, [1833])	Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, Maharashtra, 8Gujrat, Odisha,	Not evaluated

			west Bengal, Assam, Meghalaya.	
38	Pyralidae	<i>Endotricha</i> sp. (Walker, [1865])	Assam, Meghalaya, Arunachal Pradesh, west Bengal, Odisha, Uttarakhand, Himachal Pradesh, Sikkim, Maharashtra, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Odisha, Telangana, Assam, Meghalaya.	Not evaluated
39		<i>Galleria mellonella</i> (Linnaeus, [1758])	Widespread in India.	Not evaluated
40		<i>Lamoria</i> sp. (Walker, [1863])	Himalayan regions, Western ghats, Eastern ghats, Northeastern states, plains, and coastal regions.	Not evaluated
41		<i>Plodia interpunctella</i> (Hübner, [1813])	Usually, warm areas but sometimes in colder areas.	Not evaluated
42	Saturniidae	<i>Antheraea pernyi</i> (Guérin-Méneville, [1855])	Northeast India	Not evaluated
43		<i>Antheraea roylei</i> (Moore, [1859])	Uttarakhand, Himachal Pradesh, Jammu and Kashmir, Sikkim, West Bengal.	Vulnerable
44		<i>Comparmustilia sphingiformis</i> (Moore, [1878])	Assam, Meghalaya, Arunachal Pradesh, west Bengal, Odisha, Uttarakhand, Himachal Pradesh, Karnataka, Kerala.	Not evaluated
45		<i>Cricula Andrei</i> (Jorda, [1909])	Assam, Meghalaya, Arunachal Pradesh, west Bengal, Odisha, Uttarakhand	Not evaluated
46		<i>Cricula trifenestrata</i> (Walker, [1855])	Assam, Meghalaya, Arunachal Pradesh, west Bengal, Odisha, Uttarakhand, Himachal Pradesh, Sikkim.	Not evaluated
47		<i>Syntypistis sporadochlorus</i> (Bryk, [1949])	Assam, Meghalaya, Arunachal Pradesh, west Bengal, Odisha, Uttarakhand, Himachal Pradesh, Sikkim	Not evaluated
48	Sphingidae	<i>Acosmeryx pseudonaga</i> (Butler, [1881])	Assam, Meghalaya, Arunachal Pradesh, west Bengal, Odisha, Uttarakhand, Himachal Pradesh, Sikkim.	Not evaluated
49		<i>Nephele hespera</i> (Fabricius, [1775])	Himalayan foothills, Western ghats, Eastern ghats, central India, northeastern states, Andaman and Nicobar islands.	Least concern
50	Uraniidae	<i>Epiplema fuscifrons</i> (Hampson, [1895])	Northeast Himalaya	Not evaluated



Family- Crambidae: 1. *Conogethes* sp., 2. *Parotis marginata*, 3. *Spoladea recurvalis*, 4. *Udea ferrugalis*



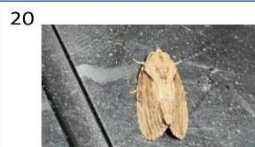
Family- Drepanidae:
5. *Habrosyne fraterna*



Family-Erebidae: 6. *Arctornis cygna*, 7. *Arctornis marginata*, 8. *Asota caricae*, 9. *Britha pactalis*, 10. *Cretonotos transiens*, 11. *Daddala brevicauda*, 12. *Hyperythra lutea*, 13. *Lymantria* sp., 14. *Macotasa nubecula*, 15. *Maurilia* sp., 16. *Nyctemera adversata*, 17. *Pericyma cruegeri*, 18. *Psilochira lineata*



Family- Eupterotidae: 19.
Eupterote mollifera



Family- Fabaceae: 20.
Leucania sp.



Family- Geometridae: 21. *Antipercnia belluaria*, 22. *Biston contectataria*, 23. *Biston panterinaria*, 24. *Hypochrosis* sp., 25. *Percinia felinaria*, 26. *Plagodis reticulata*, 27. *Xandrames dholaria*



**Family-
Limacodidae :** 28.
Alpha nivea



Family- Noctuidae: 29. *Agrotis ipsilon*, 30. *Argyrogramma signata*, 31. *Axylia renalis*, 32. *Chasmina candida*, 33. *Chrysodeixis* sp., 34. *Helicoverpa armigera*, 35. *Mythimna* sp., 36. *Spodoptera litura*, 37. *Spodoptera mauritia*

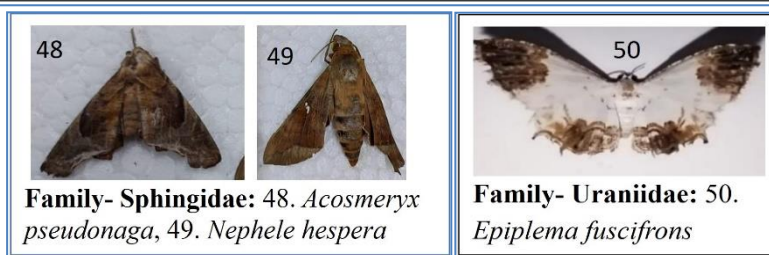
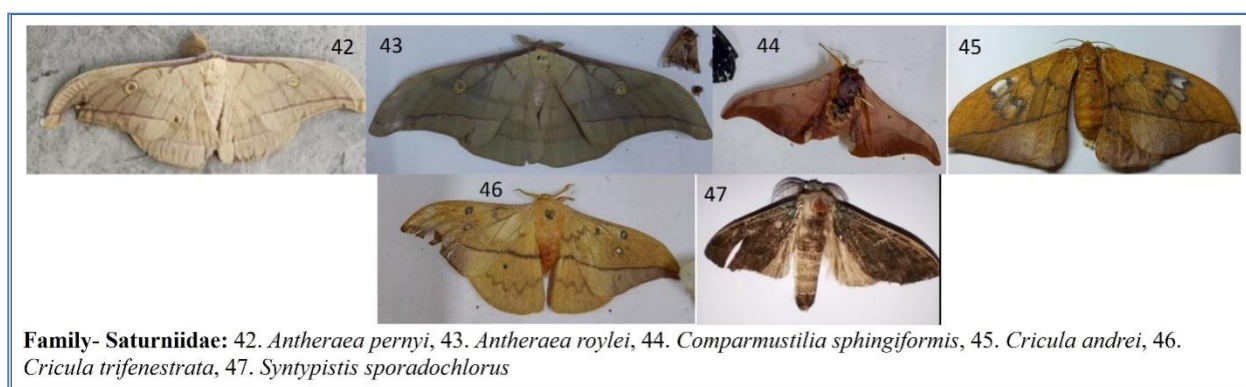
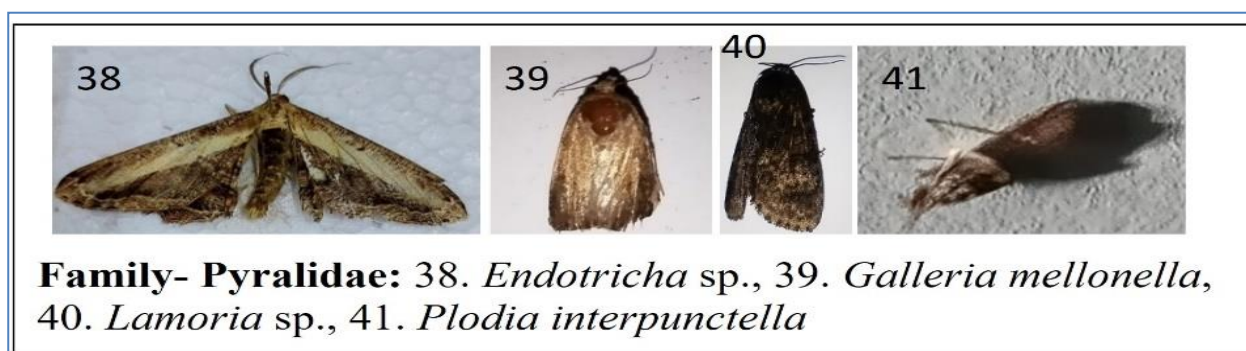


Fig. 4: Photographs of moths collected from light trap in Rongo forest, Kalimpong.

outline about the moth fauna of Rongo forest. It was observed that the moths belonging to the family Erebididae (s=13) is the most abundant followed by the family Noctuidae (s=9), Geometridae (s=7), Saturniidae (s=6), Cramibidae (s=4), Pyralidae (s=4), Sphingidae (s=2). Drepanidae, Eupterotidae, Fabaceae, Limacodidae and Uraniidae (s=1) were observed as the less rich family.

Among the species documented 34 were Not evaluated in the IUCN red data book, while 2 were Critically endangered, 4 were Near threatened, 1 Rare, 1 Threatened, 1 Globally endangered, 1 Vulnerable, 1 Endangered, and 5 Least concern.

Ethical Statement

The authors confirm that all ethical issues have been dealt with the research ethics guidelines provided by the Vidyasagar College, Salt Lake Campus, Kolkata, India.

Author Contributions

Each author has contributed equally to the study's planning, analysis, writing, and editing. All authors have read and agreed to the published version of the manuscript.

Conflict of Interest

The authors declare no conflicts of interest.

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