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A checklist of the wild silk moth (Lepidoptera: Saturniidae) diversity in Tinsukia district of Assam, India

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Abstract
This list reports 10 species of wild silk moths belonging to 5 genera and two tribes. The moths were captured using light trapping and opportunistic sighting across different sites in the district over a two-year period from 2017 to 2019. Identification of the moths was conducted through material and visual examination of the samples, utilizing relevant literature and online databases for reference. The study also emphasizes the significance of these lesser-known wild silk moth species and investigates potential reasons for their declining populations, aiming to conserve them for socio-economic benefits to the local communities.

Keywords: Wild silk moth, checklist, light trap, lepidoptera, tinsukia, Assam

Introduction
Insects form the fundamental biological framework for terrestrial ecosystems, constituting the most crucial group among terrestrial organisms (Grimaldi and Engel, 2005) [3]. Their significance is underscored by the fact that the disappearance of insects could likely imperil humanity within a few months (Wilson, 1992) [17]. Insects play a pivotal role in both tropical diversity (Lewinsohn *et. al.*, 2005) [8] and ecological equilibrium (Wilson, 1987) [16]. Among insects, Lepidoptera stands out as the most easily identifiable due to its highly specialized coloration, encompassing moths, skippers, and butterflies (Richards and Davies, 1979) **[4]**.

Among Lepidopteran insects, the members of the family Bombycidae and Saturniidae produce silk which falls under the superfamily Bombycoidea. The Saturniids represent the largest family within Bombycoidea *sensu stricto*, encompassing approximately 3459 species (Boldsystems, 2023) [2] distributed across 162 genera and nine subfamilies according to the classification of Lemaire & Minet (1998) [8]. These insects, known for their captivating presence, comprise some of the most sizable and visually stunning species of Lepidoptera, exhibiting varying voltinism depending on climatic conditions, and inhabit both temperate and tropical regions (Regier *et. al.*, 2008) [12]. Within the Saturniidae family, silk moths showcase a broad spectrum of life history variation, encompassing distinct physiological conditions, morphological traits, and feeding behaviors from egg to adulthood. Additionally, Saturniids are found in mountainous regions, with a notable percentage (15-20%) of endemics occurring in arid and semi-arid areas (Lemaire and Minet, 1998) [8].

Of the 1.50-1.74 million described eukaryotic species worldwide (May, 1998) [10], insects' account for 58-67%. India alone harbors approximately 0.1 million insect species (Roonwal, 1989) [13], of which 60,000 species have been described, leaving 0.4 to 0.6 million species awaiting discovery and cataloging (Narendran, 2001) [11]. Northeastern India, one of the 25 global hotspots, boasts rich floral and faunal diversity, with 3,624 insect species recorded and many more yet to be explored (Tripathi and Barik, 2003) [16]. With this in mind, the current study has been formulated to examine the diversity of wild silk moths in the Tinsukia district of Assam.

Materials and Methods
Study Area
Located in the extreme northeast corner of Assam, the study area, Tinsukia district, spans around 3790 square kilometers, extending from 27.23° to 27.95° N latitude and 95.22° to 95.98° E longitude. The district features diverse environmental conditions, with elevations ranging from 80 meters along the flood-prone banks of the Brahmaputra River to over 400 meters in the highlands adjacent to the Patkai foothills. Temperatures range from 8°C in the coldest months to 39°C in summer. Forests cover approximately 40.42% of the district, showcasing significant diversity. Tinsukia's forests consist of a blend of tropical evergreen and semi-evergreen forests, with varying proportions of deciduous trees characteristic of the area.

Between 2017 and 2019, an extensive survey was conducted in Tinsukia district of Assam to collect wild silk moths and document their host plants based on existing literature. The survey primarily took place during autumn, summer, and spring seasons, as many wild silk moths enter diapause during winter. Data was gathered from the State and Central sericulture departments, as well as from private rearers' and local residents, who helped identify the presence or absence of the moths through photographs. Visual observation and opportunistic collection methods were employed (Sutherland, 1996) [15]. Lepidoptera (Saturniidae) adults were manually collected in the field using sweep nets during the day and portable light traps with mercury vapor light sources at night. Additionally, some collections were made by placing a makeshift light source (Philips UVA TL – D 18) on a white sheet or wall (Intachat *et. al.*, 2001) [5]. Benzene was used to preserve the collected insects, which were then stretched, pinned, labeled, identified, and stored in wooden collection boxes.

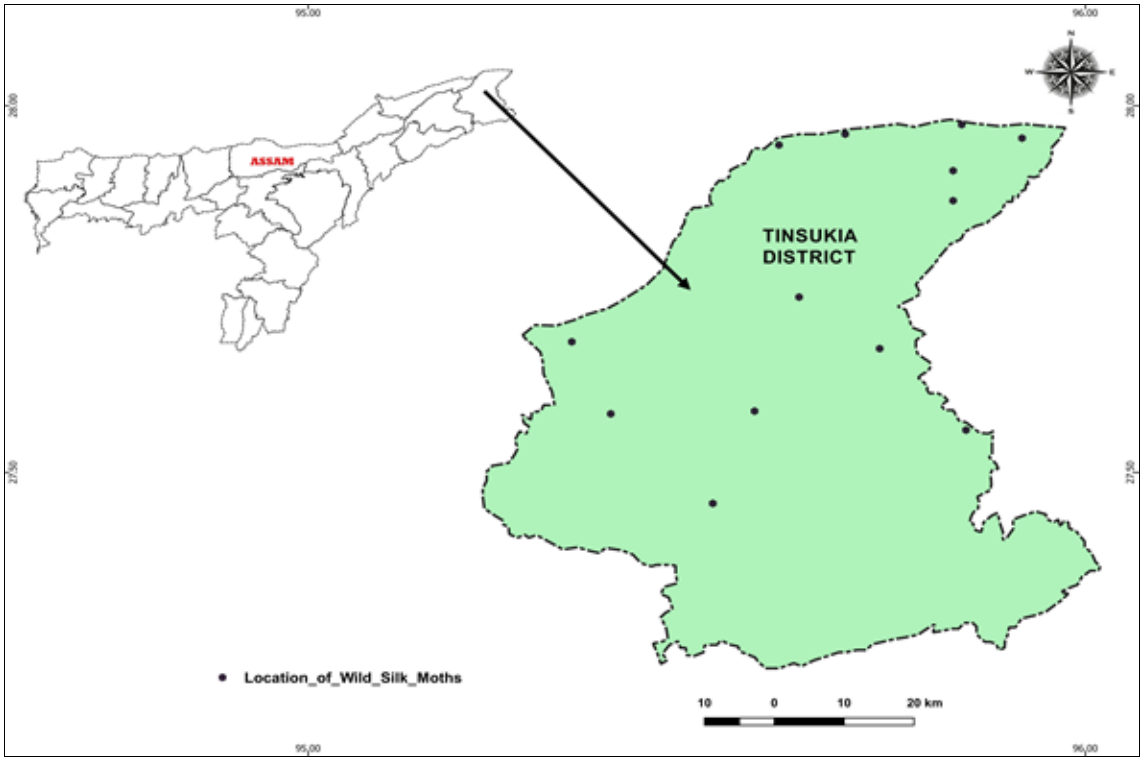

Fig 1: A map of Tinsukia District showing different collection site

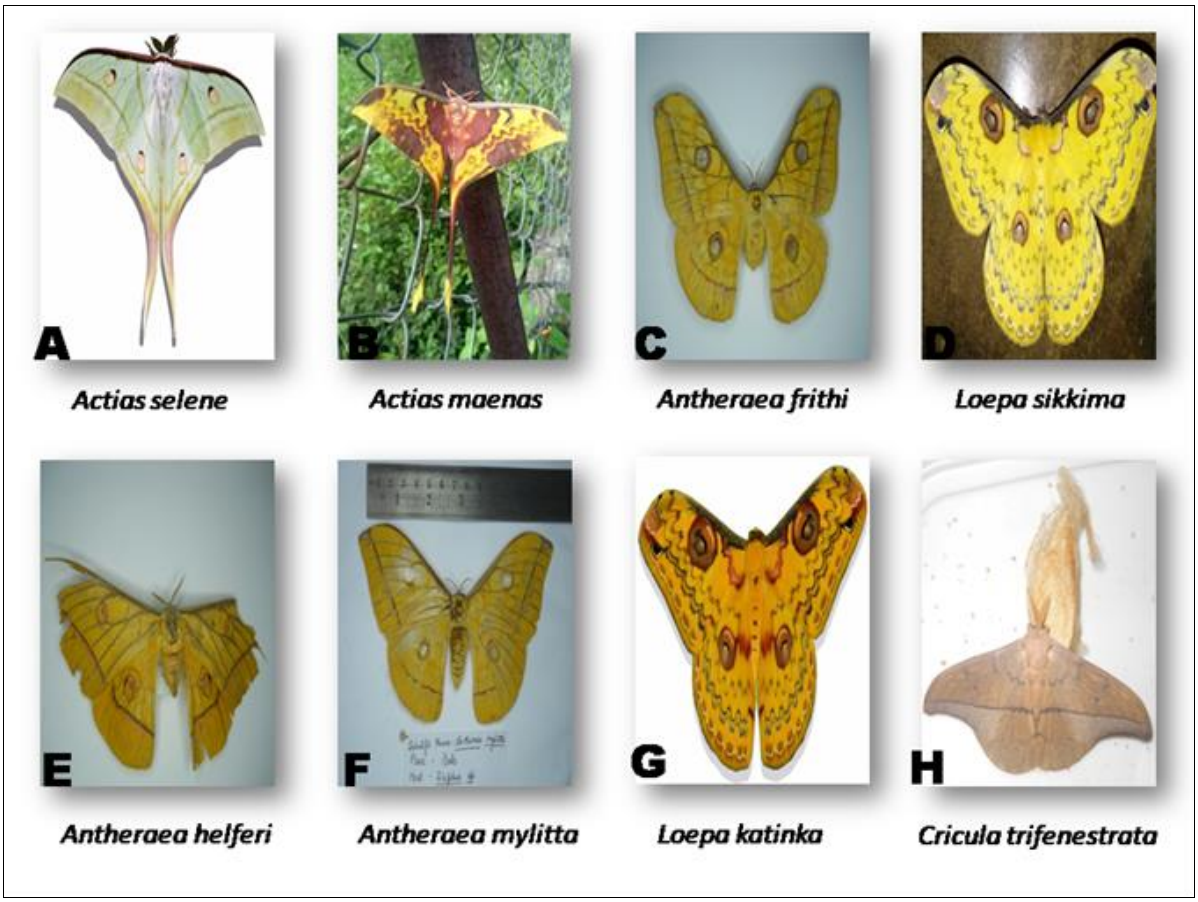

Fig 2: Diversity of wild silk moths from Tinsukia district.

Results and Discussion

The study reveals the presence of ten species of wild silk moths belonging to five genera and two tribes. The tribe Saturniini includes four genera and nine species: *Antheraea assamensis*, *Antheraea frithi*, *Antheraea mylitta*, *Antheraea helferi*, *Actias selene*, *Actias maenas*, *Cricula trifenestrata*, *Loepa katinka*, and *Loepa sikkima*. The tribe Attacini comprises one genera and one species: *Samia canningi*. Among these, four species—*Antheraea helferi*, *Actias maenas*, *Loepa katinka*, and *Loepa sikkima*—were exclusively collected in their adult stage using light traps.

Table 1: Checklist of wild silk moths found during the study

Sl. No.	Tribe	Species	Latitude	Longitude
1.	Saturniini	*Actias maenas* Doubleday 1847	27.41° N	95.54°E
2.	Saturniini	*Actias selene* Hübner 1806	27.41° N	95.54°E
3.	Saturniini	*Antheraea frithi* Moore 1858	27.41° N	95.54°E
			27.57° N	95.36°E
4.	Saturniini	*Antheraea assamensis* Helfer 1837	27.57° N	95.32°E
5.	Saturniini	*Antheraea helferi* Moore 1858	27.41° N	95.54°E
6.	Saturniini	*Antheraea mylitta*, Drury 1773	27.57° N	95.32°E
7.	Saturniini	*Cricula trifenestrata* Helfer 1837	27.57° N	95.36°E
			27.57° N	95.32°E
			27.39° N	95.60°E
8.	Saturniini	*Loepa katinka* Westwood 1848	27.41° N	95.54°E
9.	Saturniini	*Loepa sikkima* Moore 1865	27.39° N	95.60°E
10.	Attacini	*Samia canningi* Hutton 1860	27.57° N	95.36°E

The diversity of wild silk moths in Assam and other northeastern states is notably high, likely attributed to the region's designation as part of two major biodiversity hotspot regions. Documentation reveals approximately 65 species of sericigenous insects in India, with over 40 species reported from the North-Eastern states alone (Singh & Chakravorty, 2006) [14]. In the current study, eleven species of sericigenous insects have been identified in Assam, representing seven genera and two tribes. Kalita & Dutta (2014) [6] and Kumar *et. al.,* (2017) [7] previously reported the presence of nine species of sericigenous insects in Assam, which is significant with the current findings. Arora & Gupta (1979) [1] also noted the presence of *Actias maenas* in Assam, although they did not specify any particular locality in their report. Interestingly, *Antheraea helferi*, a newly discovered species in Assam, was collected from Dehing Patkai National Park during the present study. The habitat preference of this species, as indicated in "The Moths of Borneo," aligns with the findings of the present investigation, suggesting a preference for low-land rainforest habitats.

These inventory surveys at the species level provide crucial baseline data on the geographic distribution of moth species, essential for habitat management and preservation. Local-level inventories offer insights for various economic and educational activities, including recreation, eco-tourism, forestry, and research. Ecological studies, such as those focusing on species behavior and community structure, heavily rely on inventory data. Furthermore, new discoveries and reference vouchers collected during these surveys aid in developing phylogenetic relationships, identification keys, and range extensions, contributing to the identification of conservation hotspots.

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