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Preliminary study of insect diversity at Nilachal Hill, Kamrup (M) Assam, India

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Abstract
To document the insect diversity at Nilachal hill a study was conducted at Nilachal hill during January to June 2025.Observation was carried out primarily during the early morning hours (around 6:00 a.m. to 9:00 a.m.) when insect activity is at its peak. A combination of methods was employed to collect specimens. Insects were photographed on spot using a mobile camera to aid in later identification and record-keeping. Identification of the collected insects was carried out with the help of relevant literature, online databases, and reference articles. A total of 45 insect species from 25 families and 8 orders were documented. Lepidoptera was the most dominant order, followed by Coleoptera, Hemiptera, and Hymenoptera, while Orthoptera, Odonata, Neuroptera, and Diptera were less represented. The findings underscore the ecological richness of Nilachal Hills and highlight the importance of documenting insect fauna for understanding ecosystem health, conservation planning, and regional biodiversity management, informing conservation strategies to preserve regional biodiversity.

Keywords: Insect diversity, ecosystem, bio-indicators, Nilachal Hill, Assam

Introduction
Insects are one of the most diverse and successful groups of organisms. They belong to the phylum Arthropoda and are classified into two main types: wingless forms (Apterygota) and winged forms (Pterygota). Insects make up more than 66% of all known species on Earth (Zhang, 2011) [12] and can be found in almost every environment. In India, nearly 658 insect families from 27 orders have been recorded (Akhilandeshwari *et al*., 2024) [1], with the most common groups being Coleoptera, Lepidoptera, Hymenoptera, Diptera, and Hemiptera. Insects play vital roles in the ecosystem as pollinators, decomposers, predators, and nutrient recyclers. They also indicate environmental health. Kamrup is a biodiversity hotspot with hills and plain areas and the Nilachal hills, where the shaktipeeth maa Kamakhya temple is located is very rich in species diversity and varied habitats, is home to many insect species. Though the Nilachal Hill encompasses diverse habitats but now a day it is dominated by human settlements, leaving a very few dense forest areas. Diversity of butterflies by Basfore and Deka, (2024) [4] documented 45 butterfly species at Nilachal Hills. However the study of diversity of insects is still left behind. Therefore, this study aims to explore and document the insect diversity of Nilachal Hills in Kamrup (M), Assam, and to provide basic information on their ecological importance and biodiversity.

Materials and Methods
Study Area
The study took place at Nilachal Hill in the western part of Guwahati. This city is the largest urban, administrative, economic, and cultural hub of north-eastern India. It lies along the southern bank of the Brahmaputra River. The hill covers an area of 2.6 km^2 situated at 26.167 ^{0}N and 91.711^{0}E. Guwahati is an important gateway that connects north eastern India to the rest of the country through a network of transportation. Nilachal Hill rises about 171 meters above sea level and is significant for its religious and cultural importance. It is home to the Kamakhya Temple, a major center of Shakti worship and the site of the annual Ambubachi Mela. Beyond its spiritual value, the hill has important ecological features. It supports a variety of tropical and subtropical plants as well as rich wildlife, including different species of reptiles and insects. The study ran from January to June 2025, during which the region saw temperatures between 20°C and 37°C and varying humidity levels. These conditions were favourable for assessing biodiversity.

Collection and Identification
Field surveys for insect collection were conducted from January to June 2025 during the early morning hours (approximately 6:00 a.m. onward) for 2–3 hours, corresponding to peak insect activity periods. A combination of standard entomological methods was employed, including the use of insect nets for capturing flying insects and manual handpicking for collecting other accessible species. In addition, photographic documentation of live specimens was carried out on-site using a mobile phone camera for record maintenance and subsequent identification. Species identification was performed using morphological characteristics with the support of relevant scientific literature, online databases, and published reference studies, including works by Uniyal *et al*. (1998) [11], Basfore and Deka (2024) [4], and Parveen *et al.* (2024) [9], ensuring accurate taxonomic classification of the collected insect fauna.

Data analysis: Data analysis was done based on their abundance by Shanon-Weiner diversity index and bar diagram was prepared based on the percentage of insect orders.

Result and Discussion: A total of 45 insect species from 25 families and 8 orders were documented. The highest number of species belonged to the order Lepidoptera, comprising 16 species from 7 families, including Erebidae, Pieridae,

Lasiocampidae, Papilionidae, Lycaenidae Nymphalidae, and Hesperiidae. Pieridae is the dominant family with 5 species. Coleoptera was represented by 8 species from 6 families, where Chrysomelidae was dominant with 3 species. Hemiptera and Hymenoptera each recorded 6 species, while Orthoptera included 5 species from Acrididae and Gryllidae. Diptera, Odonata, and Neuroptera were represented by 1, 2, and 1 species respectively. The total relative abundance of insect families was 99.91%. The recorded species, along with their respective orders, families, common names, and scientific names are presented in Table 1.and fig.2.

The Shannon–Wiener diversity index value obtained was 3.729, indicating greater species richness and ecological significance within the study area. Similar findings were reported by Basfore and Deka (2024) [4] in Nilachal Hills, Parveen *et al.* (2024) [9] in Balipara, Assam, and highlighted the dominance of Lepidoptera in their respective regions.

Arjun *et al*. (2022) [2], studied the diversity and abundance of beetles in Lakhimpur, Assam, and concluded 25 species of beetles belonging to 13 different families. Arya *et al.* (2023) [3] studied insect diversity and their response to the ecosystem in Nandhour landscape, India, where they have recorded 230 insect species belonging to 47 families and 9 orders. A survey was conducted by Dolai *et al*. (2025) [6] in Kalyani Lake Park, Nadia District, West Bengal, India, and discovered 25 species of dragonflies,10 species of damselflies, and 75 species of Butterflies. Singh and Babu (2021) [10] recorded 39 species of edible insects from 19 families and 7 orders in a wetland ecosystem, Manipur. In the study the species richness and abundance of the order Lepidoptera was found to be dominant with highest species which is similar with the findings of Jana (2014) [7], Bhat (2018) [5] and Jana *et al*. (2021) [8]. This findings are also similar with the findings of Parveen *et al*.(2024) [9].

Fig 1: Map showing the study area (source: https://earth.google.com/web)

Table 1: Relative abundance of insect families and checklist of insects documented at Nilachal Hills

Sl. No.	Common name	Scientific name	Family	Order	No of species	No of individuals	Relative abundance (%)
1	Kapok Bug	*Probergrothius nigricornis*	Pyrrhocoridae	Hemiptera	2	4	4.44%
2	Red-cotton stainer	*Dysdercus cingulatus*	Pyrrhocoridae			3	
3	Squash bug	*Anasa tristis*	Corcidae		1	4	2.22%
4	Boxelder bug	*Boiseatri vittata*	Rhopalidae		1	5	2.22%
5	Rice Stink bug	*Oebalus pugnax*	Pentatomidae		1	4	2.22%
6	Largus bug	*Largussuccinctus*	Largidae		1	3	2.22%
7	Clay-coloured weevil	*Otiorhynchus singularis*	curculionidae	Coleoptera	1	2	2.22%
8	Darkling beetle	*Pterohelaeuss triatopunctatus*	Tenebrionidae		1	3	2.22%
9	Rain beetle or black clock beetle	*Pterostichus melanarius*	Carabidae		1	2	2.22%
10	Oriental beetle	*Anomala orientalis*	Scarabaeidae		1	5	2.22%
11	Hug plum beetle	*Podontiaquatuordec impunctata*	Chrysomelidae		3	5	6.66%
12	Poplar leaf beetle	*Chrysomela populi*	do			4	
13	Pumpkin beetle	*Aulacophora foveicollis*	Do	Coleoptera	4	6	
14	Click beetle	*Denticollis linearis*	Elateridae		1	4	2.22%
15	Asian Weaver Ant	*Oecophylla smaragdina*	Formicidae	Hymenoptera	4	15	8.88%
16	Pine-tree Acrobat ants	*Crematogaster pinicola*	Do			5	
17	Jet ant	*Lasius fuliginosus*	Do			7	
18	Meat ant	*Iridomyrmex purpureus*	Do			5	
19	Blue carpenter bee	*Xylocopa violacea*	Apidae		2	5	4.44%
20	Black carpenter bee	*Xylocopa sp.*	Do			4	
21	Common field grasshopper	*Chorthippus brunneus*	Acrididae	Orthroptera	3	7	6.66%
22	Egyptian grasshopper	*Anacridium aegyptium*	Do			7	
23	Cattail toothpick grasshopper	*Phlaeoba antennata*	Do			5	
24	House cricket	*Acheta domesticus*	Gryllidae		2	9	4.44%
25	Japanese burrowing Cricket	*Velarifictorus micado*	Gryllidae			5	
26	Handmaiden moth	*Syntomoides imaon*	Erebidae	Lepidoptera	1	2	2.22%
27	Indian cabbage white	*Pieris canidia*	Pieridae		5	4	11.11%
28	Small white butterfly	*Pieris rapae*	Do			5	
29	Common emigrant	*Catopsilia pomona*	Do			7	
30	Common grass yellow	*Eurema hecabe*	Do			8	
31	Small Grass Yellow	*Eurema brigita*	Do			5	
32	Saw-edged lappet moth	*Lasiocampa serrula*	Lasiocampidae		1	5	2.22%
33	Lime butterfly	*Papilio demoleus*	Papilionidae		2	5	4.44%
34	Common mormon	*Papilio polytes*	Do			7	
35	Red pierrot	*Talicada nyseus*	Lycaenidae		2	9	4.44%
36	Common cerulean	*Jamides celeno*	Do			5	
37	Peacock pansy	*Junonia almana*	Nymphalidae		4	6	8.88%
38	Common lascar	*Pantroporia hordonia*	Do			5	
39	Angled castor	*Ariadne ariadne*	Do			5	
40	Tiger butterfly	*Danaus genutia*	Do			9	
41	Coras satyr	*Polites coras*	Hesperiidae		1	8	2.22%
42	Black soldier fly	*Hermetia illucens*	Stratiomyidae	Diptera	1	7	2.22%
43	Common red skimmer	*Orthetrum pruinosum*	Libellulidae	Odonata	2	5	4.44%
44	Blue marsh hawk	*Orthetrum glaucum*				6	
45	Punic antlion	*Myrmeleon punicanus*	Myrmeleontinae	Neuroptera	1	7	2.22%
					Total 45	Total 99.91	

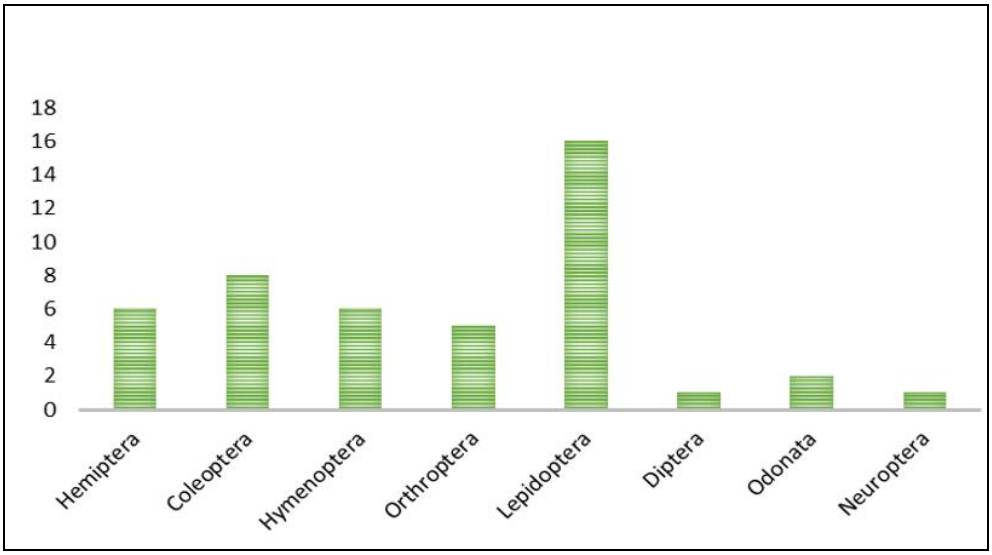

Fig 2: Percentage of insect orders available at the study sites.

Diversity index	Value
Shannon-Wiener index	3.729

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