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Preliminary survey for lepidopteran diversity of Kolli Hills, Namakkal District, Tamil Nadu

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Abstract
An attempt was made to survey for lepidopteran faunal diversity of Kolli hills, Namakkal District, Tamil Nadu from January to December, 2015. During the study period 1,077 lepidopterans were recorded by using various methods like aerial netting, light trap and host rearing. Out of which, the study area registered with 251 butterflies, 39 skippers and 787 moths. They were identified up to subfamily level with the help of standard taxonomic keys. From the survey, nine superfamilies *viz.*, Papilionoidea, Hesperioidea, Gelechioidea, Sesioidea, Pterophoroidea, Pyraloidea, Bombycoidea, Geometroidea and Noctuoidea were recorded. Among them, Noctuoidea was found to be dominant with 338 individuals followed by Papilionoidea (251). The superfamily, Papilionoidea recorded with four families *viz.*, Papilionidae, Pieridae, Lycaenidae and Nymphalidae while the superfamily Hesperioidea found with only one family Hesperiidae. Among them, Nymphalidae was predominant with 83 numbers followed by Pieridae recorded 62 numbers. There were eight moth families *viz.*, Oecophoridae, Sesiidae, Pterophoridae, Crambidae, Shingidae, Geometridae, Uraniidae and Noctuidae were observed from the study area using various collection methods. Among them, Noctuidae was the dominant family. Out of twenty-four subfamilies recorded from the study area, Noctuinae was found to be superior with 127 numbers followed by Spilomelinae (121).

Keywords: diversity, fauna, Kolli hills, lepidoptera, survey, taxonomy

1. Introduction
In the Class Insecta, Lepidoptera is the second largest order [1]. They are distinguished from other insects by their wings which are more or less densely covered with minute scales of various colours. An estimate showed the occurrence of about 1,42,500 species of Lepidoptera from the globe and diversity within Lepidoptera from the Indian subcontinent revealed that the group comprises over 50,000 species and many more subspecies distributed over 84 families and 18 superfamilies [2]. In the world, about 19,238 species were documented [3]. In Indian subcontinent, there are about 1,501 species of butterflies were recorded [4]. Most of the species feed on green plants and consequently can be in direct competition with man, requiring counter measures and control, many are aesthetic, through their diversity and association with vegetation may reflect the ecological stability of natural environments and persistence of their own populations. They are an integral part of most natural ecosystems. Lepidopterans have important ecosystem roles as they form an important part of food web and act as good pollinators and bioindicators in addition it enhances the aesthetic value of our environment [5]. Butterflies are the best indicators of habitat quality and they are the sensitive to climatic change [6]. The moths play important roles in forest ecosystems as herbivores and as food for various predatory and parasitic organisms. Many of them were serious pests of agricultural, horticultural and plantation crops [7]. Butterflies act an essential role as pollinator in an ecosystem and also population and community ecology studies [8]. It shows that a close relationship between butterflies and plants and their lives are highly interlinked [9], which leads to distribution of butterflies in different patterns depending on the availability of their host plants. The diversity of Lepidoptera in the Western Ghats region was studied to a maximum extent while Eastern Ghats of Tamil Nadu are not concentrated properly. In this context, an attempt was made to initiate to document the Lepidopteran fauna of Kolli hills, Namakkal district of Tamil Nadu.

2. Materials and methods
A survey was made to document the lepidopteran insects from Kolli hills, Tamil Nadu located at 11.2485° N latitude; 78.3387° E longitude during January - December, 2015 from various ecosystems *viz.*, agricultural land, grassland, bushy areas *etc.* Single specimen representing each group was caught with aerial net having aluminium handle and consisting of a metal ring, about 45mm across, which supports a conical net, made of nylon, with a minimum depth of 70 to 80 cm (28 to 32 inches). Killing jars (bottle with wide mouth containing a piece of cotton soaked in ethyl acetate) was used to place the collected butterflies for one hour. For moth collection, white cloth sheet (10'×6') was hung between two vertical poles. A 100-watt incandescent lamp was used as a light source through the night [10]. Any moths that alight on the screen was recorded or collected in jars just after sunset between 18.00 – 23.00 hr. The light trap was operated twice in a month in a particular locality and moths alight on the screen were observed/ collected. The caterpillars of butterflies and skippers were gathered from the field and reared with their respective host plants. The dried leaves were replaced with fresh ones frequently and waste bits and pieces were removed. After adult emergence, they were collected and preserved for identification. The killed specimens were removed and transferred individually into rectangular envelopes were made from semi-transparent, rigid, grease

proof, light weight paper, such as high-quality tracing paper (90-95 gsm). Later the specimens were fixed on the spreading board using entomological pins (size 001/002/003). For identification, the butterfly and skipper wings were cleared and mounted on glass slide following the procedure given by [11]. The collected lepidopteran insect specimens were diagnosed upto superfamily level by following the keys of [12, 13, 14]. The confirmed superfamilies were further diagnosed upto family and subfamily level by following the dichotomous keys provided by [15, 11, 16, 17, 18].

3. Results and discussion

A total of 1,077 lepidopterans recorded from the study area were identified under one suborder Glossata, further they were identified upto subfamily level. Among the methods employed for lepidopteran collection, net sweep method was much suitable for butterfly and skipper due to their diurnal habit, while light trap was effective method to attract nocturnal moths. Least number of lepidopterans was recorded using host rearing (Table. 1). This is in accordance with [19] who suggested that light trap was very effective in collecting nocturnal insects and [11] put forward that aerial net was found to be better for collecting diurnal insect (butterflies).

Table 1: Lepidopterans recorded using various methods during January - December, 2015 in Kolli hills, Tamil Nadu

S. No	Collection methods	Total Lepidopterans
1	Net Sweep	304
2	Light trap	683
3	Host rearing	90
Grand Total		1077

Table 2: Lepidopterans recorded during January - December, 2015 in Kolli hills, Tamil Nadu

S. No	Superfamily	Numbers Recorded	Family	Numbers Recorded	Subfamily	Numbers Recorded
1	Papilionoidea	251	Papilionidae	57	Papilioninae	33
			Pieridae	62	Pierinae	47
					Coliadinae	25
			Lycaenidae	49	Lycaeninae	14
			Nymphalidae	83	Nymphalinae	24
					Satyrinae	12
					Danainae	32
2	Hesperioidea	39	Hesperiidae	39	Hesperiinae	27
3	Gelechioidea	46	Oecophoridae	46	Xylorctinae	46
4	Sesioidea	11	Sesiidae	11	Sesiinae	11
5	Pterophoroidea	34	Pterophoridae	34	Pterophorinae	34
6	Pyraloidea	226	Crambidae	226	Scoenobinae	105
					Spilomelinae	121
7	Bombycoidea	29	Sphingidae	29	Sphinginae	15
					Macroglossinae	14
8	Geometroidea	103	Geometridae	61	Ennominae	61
			Uraniidae	42	Microniinae	42
9	Noctuoidea	338	Noctuidae	338	Noctuinae	127
					Arctiinae	36
					Lymantrinae	25
					Heliothinae	32
					Plusiinae	31
					Aganainae	66
					Erebinae	21
Grand Total						1077

All 1,077 specimens were categorized under nine superfamilies *viz*., Papilionoidea, Hesperioidea, Gelechioidea, Sesioidea, Pterophoroidea, Pyraloidea, Bombycoidea, Geometroidea and Noctuoidea, In that, Noctuoidea was found to be dominant with maximum individuals (338) followed by papilionids (251), pyralids (226), geometrids (103), gelechids (46), hesperids (39), pterophorids (34), bombycoids (29) and sesiids (11). The results are in conformity with [20], who reported that Noctuids showed leading population and it was high due to more complex habitats and had more niches.

All the butterflies belong to the superfamily Papilionoidea and skippers representing the superfamily Hesperioidea. The butterflies recorded in study area were categorized under four families *viz.*, Papilionidae, Pieridae, Lycaenidae and Nymphalidae. Likewise, all skippers were characterized under single family Hesperiidae. In Papilionoidea, Nymphalidae (83) was dominant family followed by Pieridae (62) and least count was observed in the family Lycaenidae with 49 individuals. The result accords the findings of [21] who reported that the least population was recorded in the family, Lycaenidae at Shendurny wildlife Sanctuary, Kerala.

The moths were characterized under seven superfamilies *viz*., Gelechioidea, Sesioidea, Pterophoroidea, Pyraloidea, Bombycoidea, Geometroidea and Noctuoidea and eight families *viz.*, Oecophoridae, Sesiidae, Pterophoridae, Crambidae, Sphingidae, Geometridae, uraniidae and Noctuidae (Table 2). Among eight moth families, Noctuidae was dominant with maximum number of individuals (338) followed by Crambidae (226) and minimum population was recorded under the family Sesiidae with 11 individuals. This is in accordance with the report of [22] who specified that the family Noctuidae was dominant among other family groups in species diversity and numerical strength. The outcome of the present study is not similar to [23] as they reported two families namely Pyralidae and Crambidae under the superfamily Pyraloidea in Silent Valley National Park, Kerala. Dense vegetation and ideal weather in Kolli hills might be the reason for maximum collection of

lepidopterans during the study period. The results are supported with the findings of [24] who reported nearly 4,000 butterflies at Garo Hills of Meghalaya, India.

The recorded lepidopterans were identified under 24 subfamilies. All butterflies were categorized under 7 subfamilies *viz*., Papilioninae, Pierinae, Coliadinae, Lycaeninae, Nymphalinae, Satyrinae and Danainae (Table 2) while all skippers belong to single subfamily Hesperiinae. When comparing these eight subfamilies (both butterflies and skippers), Papilioninae was leading with 57 individuals followed by Lycaeninae (49) and Satyrinae showed least dominant with 16 individuals. The results are in contradictory to the findings of [24], who observed five subfamilies under Lycaenidae and 10 subfamilies under Nymphalidae from Garo Hills, Meghalaya. Similarly, all moths belong to 16 subfamilies *viz*., Noctuinae, Spilomelinae, Schoenobiinae, Aganainae, Ennominae, Plusiinae, Xyloryctinae, Microniinae, Arctiinae, Pterophorinae, Heliothinae, Erebinae, Sphinginae, Lymantriinae, Macroglosiinae and Sesiinae. Among these subfamilies, Noctuinae (127) was dominant followed by Spilomelinae (121) and least number of moths were noticed in the subfamily Sesiinae with 11 individuals. The reason for maximum collection of moths might be due to their nocturnal habit and they are easily attracted to light which enabled them to attract towards the light trap. The diversity of moths is also more because of their habit, habitat and survival in the ecosystem when compared to butterflies and skippers.

4. Conclusion

Among the group of insects, Lepidoptera serve as reliable indicator of plant diversity as they depend directly on plants and environmental factors prevailing in the study area. Many species, act as herbivores, pollinators and food for insectivores. The diversity of this insect group is vital for food web and food chain so as to maintain a natural balance in the ecosystem. From the preliminary survey, the diversity of lepidopterans in Kolli hills of Eastern Ghats provided foundation for further studies. Even though, consecutive survey is needed to prepare a checklist of lepidoptern species in the locality so as to finalize the fauna and abundance.

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6.References

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