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Study on biodiversity of moth fauna in assumption college premises, changanassery

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Abstract
Moths are a group of insects related to butterflies, belonging to the Order Lepidoptera. Most of the species are nocturnal, but there are also crepuscular and diurnal species. They play a major role in biodiversity as food for predators, pollinators, biological indicators and crop pests. This study on moth diversity which includes the diversity, taxonomic details, and monthly variations was conducted in the premises of Assumption College, Changanassery. The study was carried out for a period of three months from December 2018 - February 2019. Throughout the course of the study, 70 species of moths belonging to 12 families were identified. Most of the species observed, belonged to the family Erebidae. The result showed that the species diversity of moths was directly proportional to the light intensity and climatic conditions of the study area.

Keywords: Assumption College, biodiversity, *Cnaphalocrocis medinalis*, moth, species richness

Introduction

Moths belong to the order Lepidoptera. Based on certain characteristics, moth species are categorized into nocturnal, crepuscular and diurnal species. Moths vary greatly in size, their wingspan ranging from about 4 mm (0.16 inch) to nearly 30 cm (about 1 foot). Highly adaptive, they live in all habitats except the polar region. They are a major part of our biodiversity and play a vital role in the ecosystem, affecting many other types of wildlife (Irungbam Jatishwor Singh *et al*., 2014). Lepidoptera consists of about 157,424 species in 15,578 genera, distributed in some 132 families, in which about 20,000 species belong to butterflies and about 137,424 are moths (Van Nieukerken *et al*., 2011).

There are so many morphological differences to differentiate moths and butterflies in the Order Lepidoptera. The main differences in their antennae and body are important factors to distinguish them. The antennae of butterflies are thin and have small balls or clubs at tip. In the case of the antennae in moths, the club at the tip is absent, and the antennae face backwards. The comb-like antennae are another feature of moths. The size of the body of the moth is comparatively heavier than butterflies. Like butterflies, moths undergo complete metamorphosis during their life cycle: egg, larva (caterpillar), pupa (cocoon) and adult (Irungbam Jatishwor Singh *et al.*, 2014).

The antennae of moths appear to be the main organs of smell. Many moth species fly only at night, or comprises flightless females, and so use pheromones for sexual attraction.

Moths are numerous and widespread, living all over the world in different habitats. They play a major role in biodiversity.

They play vital roles as food for predators, pollinators, a biological indicator, and pest to crops. Both adult moths and their caterpillars are food for many insects, birds, lizards, frogs, but the caterpillars are especially important for feeding the young. As pollinators, moths are very important in our ecosystem. Moths help pollinate the flowers when feeding on their nectar. (Irungbam Jatishwor Singh *et al.*,2014).

Materials and Methods

Study area

To study the faunal diversity of moth, Changanassery-Assumption college premises was selected.

Assumption College is located at 9^{0}27’5.8” North (9.45160 N) and 76^{0}32’26.1” East (76.54060 E) in the district of Kottayam. The campus is eco-friendly and has territorial borders with paddy fields of Vazhapally, Kavalam, Kuttanad etc.

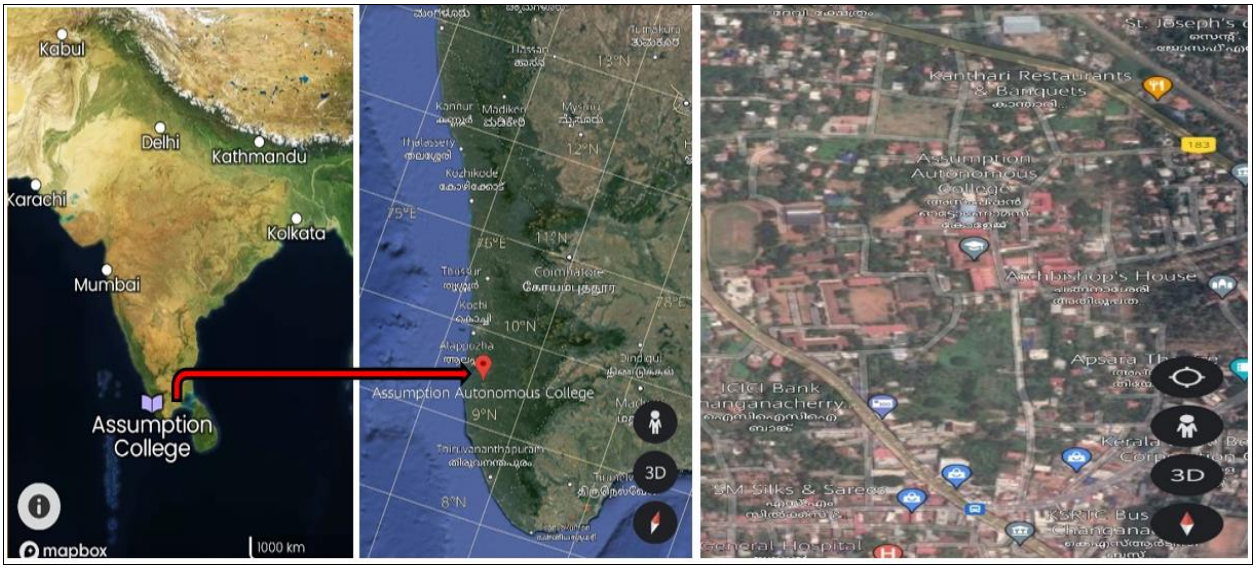

Fig 1: Location of study sites. Satellite imagery from Mapcarta and Google Earth.

Study period

The study was conducted for a period of three months (December 2018-February 2019). Observations were noted a week from 6 p.m. to 11p.m., and the frequency of occurrence of different moth species was noted down.

Design of the study

Mainly, two methods were used for the study, the light trap and Apple cider vinegar trap. The light trap comprised of a white cloth stretched between two trees in front of, which hung a light. The light traps were operated overnight, and the moths were observed. The light traps were switched off to allow the moth to disperse before sun rise. This was done to prevent their predation by birds. The moths attracted to the light traps were photographed.

The Apple cider vinegar trap was set-up in a small bucket in which the solution was diluted with an appropriate amount of water. The bucket was then hung or kept near the selected area, and it was observed that more moths were attracted when the bucket was kept near the light. The specimens were then collected from the rim of the bucket. Specimens were photographed using a camera.

Identification and data analysis

The identification done by the available literature of moths, including Moore (1880-1840) [12], Hampson (1891-1895) [4], Mathew G and Rahamathulla V K (1995) [11], Yash Sondhi *et al.* (2018) [23], Kitching IJ *et al.* (2018) [9], and Pratheesh Mathew *et al.* (2018) [17] was followed. Total number of species and number of individuals in each species were counted at site. The data analysed based on the influence of the climate and frequency of the pollution on species richness.

Results

Table 1: Checklist of species from the study area during the study period.

Sl No	Family	Name of species	No. of species observed		
			December	January	February
1.	Erebidae	*1. Simplica cornicalis*	3	0	0
		2. Syntomoides imaon	11	5	0
		3. Hulodes caranea	4	0	0
		4. Thyas coronata	1	0	0
		5. Asota caricae	3	1	0
		6. Mocis frugalis	4	0	0
		7. Amata phegea	6	0	2
		8. Creatonotos gangis	4	0	0
		9. Siccia sp.	2	0	0
		10. Eudocima materna	1	0	0
		11. Asota plana	0	4	0
		12. Euproctis fraterna	2	0	0
		13. Euproctis scintillans	5	2	0
		14. Mocis undata	2	0	0
		15. Zanclognatha cruralis	1	0	0
		16. Olepa ricini	1	1	0
		17. Serrodes campana	2	0	0
		18. Arctornis sp.	1	0	0
		19. Amata kruegeri	0	2	0
		20. Avatha sp.	0	1	0
		21. Hydrillodes lentalis	1	0	0
		22. Hypocala violacea	1	0	0
		23. Ercheia cyllaria	1	0	0
		24. Trigonodes hyppasia	0	0	1

2.	Bombycidae	*25. Trilocha varians*	0	1	0
3.	Limacodida	*26. Miresa argentifera*	1	0	0
		27. Thosea sp.	0	0	1
4.	Geometridae	*28. Scopula opicata*	24	12	0
		29. Agathia lycaenaria	3	2	0
		30. Scopula benitaria	17	0	0
		31. Scopula subpunctaria	3	0	0
		32. Hypomecis costaria	0	0	1
		33. Chlorochoma sp.	0	0	3
		34. Hemithea tritonaria	0	0	2
		35. Nemoria lixaria	0	0	1
5.	Noctuidae	*36. Spodoptera litura*	4	2	0
		37. Chrysodeixis eriosoma	0	1	0
		38. Trigonodes cephise	1	0	0
		39. Polytela gloriosae	1	0	0
		40. Leucania yu	1	0	0
		41. Helicoverpa zea	0	1	0
		42. Zalissa sp.	0	0	1
		43. Adrapsa sp.	1	0	0
		44. Antiblemma concinnula	1	0	0
		45. Spodoptera Mauritia	4	2	0
6.	Lasiocampidae	*46.Kunugia latipennis*	1	0	0
7.	Thyrididae	*47. Striglina scitaria*	1	0	0
8.	Sphingidae	*48. Theretra silhetensis*	0	1	0
		49. Hippotion rosetta	2	0	0
9.	Tortricidae	50. *Adoxophyes sp.*	1	0	0
10.	Nolidae	*51. Eligma narcissus*	7	2	0
		52. Xanthodes transversa	1	0	0
11.	Crambidae	*53. Herpetogramma bipunctalis*	5	2	0
		54. Spoladea recurvalis	0	3	0
		55. Cnaphalocrocis medinalis	126	267	63
		56. Omphisa anastomosalis	0	2	0
		57. Maruca vitrata	7	11	0
		58. Parotis marginata	3	0	0
		59. Sameodes cancellalis	6	0	0
		60. Agrioglypta itysalis	1	0	0
		61. Patania iopasalis	3	0	0
		62. Nausinoe perspectata	2	0	0
		63. Parapoynx stagnalis	8	9	3
		64. Cnaphalocrocis poeyalis	0	4	1
		65. Glyphodes caesalis	4	0	0
		66. Herpetogramma licarsisalis	6	8	2
		67. Hodebertia testalis	0	2	0
		68. Palpusia plumipes	0	4	0
		69. Conogethes punctiferalis	0	31	0
12.	Drepanidae	*70. Phalacra vidhisara*	1	0	0

Table 2: Table showing the number of species belonging to different families in the study area.

SI.No	Name of the family	No. of species
1.	Erebidae	27
2.	Bombycidae	1
3.	Limacodidae	2
4.	Geometridae	8
5.	Noctidae	11
6.	Lasiocampidae	1
7.	Thyrididae	1
8.	Sphingidae	2
9.	Tortricidae	1
10.	Nolidae	2
11.	Crambidae	18
12.	Drepanidae	1

The study on the Biodiversity of moth fauna was conducted in the premises of Assumption College. During the study period, 758 moths were collected, which represented 70 species belonging to 12 different families. The observed families were Erebidae, Bombycidae, Lamacodidae, Geometridae, Noctuidae, Lasiocampidae, Thyrididae, Sphingidae, Tortricidae, Nolidae, Crambidae, and Drepanidae.

Out of the 758 moths, *Cnaphalocrocis medinalis*, was the most observed species during the study, which was 456 in number. This was due to the paddy field cultivation near the college. In the species *Cnaphalocrocis medinalis*, of the family Crambidae, the larvae are considered a pest on *Oryza sativa, Zea mays*, *Saccharum*, *Sorghum*, and *Triticum*.

Discussion

In December, the dominant families were Erebidae and Crambidae. In the present study, the month of December showed the highest number of moth fauna. This sudden increase in moth population was due to the onset of winter. The agriculture in that area also played a role in the increased number of moths during the study period. In January, 31 species were observed. The most observed species belonged to the following families, namely, Erebidae and Crambidae; whereas the families, Noctuidae, Bombycidae, Geometridae and Sphingidae were found in

least number. This change was due to the seasonal variations. In February, 10 species were observed, which indicated a reduction in the number of species, as compared to other months. During the month of February Geometridae and Crambidae were abundant, whereas, the family Erebidae had the least number of species. This could be due to the end of the winter season.

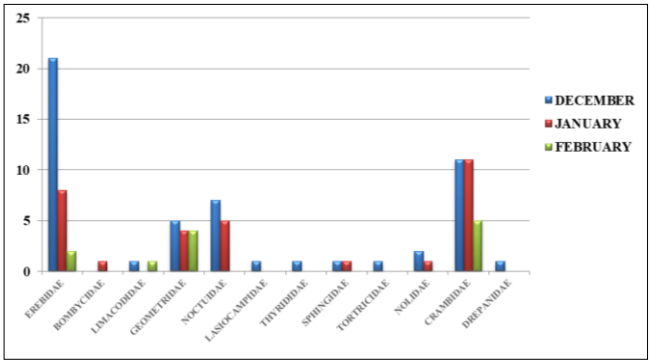

Fig 2: Graph showing the monthly variations of moth species.

Conclusion

The present study was based on the diversity, taxonomic details, and monthly variations of moths, in the Assumption College premises, Changanassery. This study was characterised by the presence of a large population of Erebidae, Crambidae, Noctuidae and Geometridae, which were found to be the most diverse families of this region, other families being relatively rare. During the study period, 758 numbers of individuals were observed, which represented 12 families and 70 species. *Cnaphalocrocis medinalis* was the most observed species during this study, about 456 in number. During the month of December, totally 50 species were observed, and that was reduced to 31 species in January. The most abundant species during these months were found in Erebidae and Crambidae families. In February, 10 species were observed, and the most abundant species were from Geometridae and Crambidae. It is concluded that the richness of moths in this area indicate that there is lower frequency of pollution. This is an eco-friendly area which provide a good habitat for moth fauna.

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