Project Report

INVESTIGATION ON THE LEPIDOPTERAN DIVERSITY IN KOLLAM DISTRICT, KERALA

Dissertation submitted to the University of Kerala in partial fulfillment of the requirements for the award of the degree of

BACHELOR OF SCIENCE

in

ZOOLOGY

(2018-21 batch)

ANILA V M	250 18 142003
ANWAR KHAN S	250 18 142004
LAKSHMI BIJU	250 18 142008
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DEPARTMENT OF ZOOLOGY
TKM COLLEGE OF ARTS AND SCIENCE
KOLLAM-691005, KERALA

MARCH 2021

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CERTIFICATE

This is to certify that the dissertation entitled **'Investigation on the Lepidopteran Diversity in Kollam District, Kerala'** is an authentic record of the work done by the following students of **B. Sc Zoology, 2018-21 batch** under my supervision as partial fulfillment of the requirements for the award of the Degree of **Bachelor of Science** in **Zoology** and this report has not been submitted earlier for the award of any degree or diploma or any other similar titles anywhere.

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EXAMINERS:

1.

2.

DECLARATION

We do hereby declare that this dissertation '**Investigation on the Lepidopteran Diversity in Kollam District, Kerala**' is a bona fide report of the project work carried out by us, under the supervision and guidance of Dr. Jasin Rahman V.K, Asst. Professor, Department of Zoology, TKM College of Arts and Science, Kollam as a partial fulfillment of the requirements for the award of the Degree of **Bachelor of Science** in **Zoology**.

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30.03.2021

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CONTENTS

DEDICATED TO OUR PARENTS AND TEACHERS…

INTRODUCTION

Order Lepidoptera of Class Insecta under the Phylum Arthropoda includes Moths and Butterflies. Both moths and butterflies assume the status of pests and pollinators of many agricultural crops. When larvae act as pests adults serve as pollinators. The butterfly fauna of the southern part of the Indian peninsula is very rich and diverse compared to other parts of the peninsula due to the availability of diverse habitats, a wide range of altitudinal gradients and associated microclimatic regimes (Gaonkar, 1996). Butterflies are the beautiful, flying insect with large scaly wings. They have a spiritual meaning that they are deep and powerful representation of life. Many cultures associate the butterflies with our souls. Around the world, people view the butterfly as representing endurance, change, hope and life. Butterflies are best rapid indicators of habit quality and the sensitive indicators of the climatic change. Since butterflies are the first indicators of any drastic change in the environment, including climate change, the study of butterfly diversity can spread light on the changes in landscape and ecological impact. These are insects belongs to *macro lepidopteran* clade Rhopalocera from the order Lepidoptera, which also includes moths. Butterflies are the most tantalizing and beautiful creatures, among the insect group, there are an often regarded as flagship species. These are perhaps the most studied and well known insect group. In terms of indicator organisms for biodiversity studies on butterflies are an excellent choice as they are

common almost everywhere, attractive and easy to observe. The butterfly diversity high in tropics compared to temperate regions of the world. Adult butterflies have large, often brightly coloured wings, and conspicuous, fluttering flight. They are day fliers and play an important role in ecosystem acting as plant pollinators and fine composition are severely affected butterflies. Butterflies are the most attractive and colourful insects. They play a crucial role in the food-chain of the birds, reptiles, amphibians. Butterflies and there caterpillars are dependent on specific host plants for food, thus the diversity of butterflies indirectly reflects overall plant diversity especially that of shrubs and herbs in the given area. Most butterflies are strictly seasonal and prefer to a specific habitat (Kunte, 1997).

Butterflies do not have any chewing mouth parts. Instead they eat by sipping liquids, most often nectar, through their proboscis. A butterfly's proboscis can be found curled neatly on the lower side of the head when the butterfly is not eating. Average adult butterfly lives for only 2 weeks and butterflies are cold blooded which really means that they do not generate enough heat from their own metabolism to provide them with the heat and energy they need to fly. They can raise their internal temperature higher than the temperature around them in a way. Some butterflies live in habitats such as rain forest understories, where there is not a constant supply of flowers with nectar for the butterflies to eat. Like all insects, they have six jointed legs, three body parts, a pair of antennae, compound eyes, and an exoskeleton. The three parts are head, thorax, and abdomen. The butterfly's body is covered with sensory hairs. A butterfly's wings are covered by

thousands of tiny scales and these scales reflect light in different colours. But underneath all of those scales, a butterfly wing is actually formed by layers of chitin, the same protein that makes up an insect exoskeleton. These layers are so thin you can see right through them. As a butterfly ages, scales fall off the wings, leaving spots of transparent where the chitin layer is exposed.

The life cycle of moths and butteflies includes four stages, viz., egg, larva, pupa and adult. Caterpillars need to eat a lot, and adults need to reproduce. Depending on the species, the life cycle may take anywhere from month to a whole year. They reproduce the way other animals do sperm from a male fertilizes eggs from a female. They also recognize each other through pheromones, or scents. During mating, males use clasping organs on their abdomens to grasp females. Many males deliver more than just sperm to their mates. In February and March, the final generation of hibernating butterflies comes out of hibernation to find a mate. They then migrate in order to find a place to lay their eggs. This starts stage one and generation one of the newer for the butterflies. Females lay eggs 5 to 7 days after emerging from the chrysalis. The eggs hatch after 3 days. Caterpillars emerge from the eggs and eat for 10 to 12 days before forming chrysalides. Adult butterflies emerge from the chrysalides in 7 to 10 days.

These insects are cold blooded and cannot withstand winter conditions in an active state. They may survive cold weather by hibernating in protected locations. They may use the peeling bark of trees, perennial plants, logs, or old fences as their overwintering sights. They may hibernate at any

stage but generally each species goes dormant in only one stage. The surrounding air temperature has a big impact on their ability to function. If the temperature false below 55 degree, the butterflies are rendered immobile, unable to flee from predators or feed. When air temperature ranges between 82 degree to 100 degree F, butterfly can fly with ease. In cooler days butterflies warm up the flight muscles, either by shivering or basking in the sun.

Adults and caterpillars are preyed upon by birds, spider, lizards and various other animals. Largely defenseless against many of these hungry predators, Lepidoptera have developed a number of passive ways to protect themselves. One way is by making themselves inconspicuous through the use of camouflage. Caterpillars may be protectively coloured or have structures that allow them to seemingly disappear into the background. A special character that shown by the butterflies are that they taste with their feet they have taste receptor's on their feet to help them find their host plant and locate food. A female butterfly lands on different Plants, drumming the leaves with her feet until the Plant releases its juices. Spines on the back of her legs have chemoreceptor that detects the right match of plant chemical. When she identified the right plant, she lays her eggs. Adults only feed liquids, usually nectar. Their mouth parts are modified for enable them to drink, but they can't chew solids. The proboscis, which functions as a drinking straw, stays curled under the butterfly's chin until it find source of nectar or other liquid nutrition. It then unfurls the long, tubular structure

and sips up a meal. A few butterflies feed on sap, and some even resort to sipping from decaying carrion. Whatever the meal they suck it up a straw.

Many hundreds of Lepidoptera injures plants useful to humans, including most important sources of food, fabrics, fodder and timber. The great majority of the injurious species are moths, and the detrimental life stage is always the larva. However, unlike the members of other insect order, lepidopterans do not act as carriers of plant diseases, nor are any of them parasites of or injurious to humans. However, some species feed on open wounds or bodily secretions of wild or domestic animals.

The list of valuable plants subject to damage by lepidopterans is a long one, including may drains, sugar beets and sugar canes, cotton, tobacco, some root crops and leaf crops, many fruits, and timber and shade trees. The damage may involve the leaves stems roots or fruits. Woollens, furs, silk, and even feathers are eaten by fungus moths of several genera. The greater wax moth (*Galleria mellonella*) causes considerable damage in bee hives.

A few Lepidoptera are directly beneficial to humans nearly all silk is obtained by the domesticated silk worm (*Bombyx mori*) which is originally from china. Other silks such as shantung and tussah are the products of various Asiatic giant silkworm moths (Family Saturniidae). The larvae and sometimes the adults of a few species are used for food. The larvae of one skipper are collected in large quantities in the Congo, and the 10 cm (4 inch) caterpillars of giant skippers, known in Mexico as *Gusanos de maguey*, are both consumed domestically and canned and exported for consumption as

hors d'oeuvre. The south American cactus moth has been highly beneficial in weed control, clearing more than 150 million in Australia of alien prickly pear cactus. Doubtless, humans also benefit from much unrecognized weed eating by caterpillars and flower pollination by adults.

OBJECTIVES

- To observe and scientifically identify the butterflies and moths in the Kollam district
- To list out the Lepidopteran fauna in the study area
- To create an awareness on conserving the butterflies which are the major pollinators
- To be aware about the economic importance of moths which are pests on many agricultural crops

REVIEW OF LITERATURE

Many surveys have been conducted in Kerala and all over the India for exploring the diversity of Butterflies. Butterflies are insects from the order Lepidoptera. Adult butterflies have large, often different coloured wings and are very attractive. Butterfly fossils date back to the Paleocene era, which is about 56 million years ago.

India has around 1501 species of butterflies. Out of these, 316 species were reported at Kerala (Palot et al. 2012). Mathew and Rahmathullah (1993) have reported 100 species of butterflies from Silent Valley National Park. At Thenmala and Rosemala, Nymphalidae had the highest dominant index and this was followed by Papilionidae (Shamsudeen and Mathew, 2010). This study deserves importance in the context of the need of extensive surveys yet to be conducted in Kollam district. The main causes for the decline of butterfly populations are deforestation, habitat destruction for urbanization, industrialization and agriculture causes changes in temperature, humidity and rainfall. Prevalence of unfavorable weather conditions often affect habitat suitability leading to local extinction of butterflies. Unfortunately developmental activities and resulting habitat fragmentation create threats to the survival of butterflies worldwide.

Some of the earlier documentation on butterfly fauna from Kerala and adjacent areas include Mathew and Rahamathulla (1993), (100 species of

butterflies from Silent Valley National Park), Sudheendrakumar et al. (2000), (124 species of butterflies from Parambikulam Wildlife Sanctuary), Arun (2003) (75 species from Siruvani Reserved Forests), Ambrose and Raj (2005) (24 species from Kalakkad-Mundanthurai Tiger reserve), Eswaran and Pramod (2005) (75 species from Anaikatty near Coimbatore), Prasad et al. (2010) (52 species from Kerala University campus, Thiruvananthapuram) and Toms et al. (2010) (109 species from Mahatma Gandhi University campus, Kottayam). A total of 139 species of butterflies belonging to six families were identified from the KAU campus, including four species that are endemic to the Western Ghats and nine species protected under various schedules of the Indian Wildlife (Protection) Act, 1972 (Aneesh et al. 2013). A butterfly survey conducted at the Periyar Tiger Reserve in Kerala's Idukki district, has recorded 246 butterfly species and the survey revealed that the reserve has around 30-32 butterfly species that are seen only in the Western Ghats (Anonymous). The butterflies recorded from Shenduruny Wild life sanctuary (73 species), formed nearly one third of butterflies recorded from whole of Kerala (314 species) and of the Western Ghats (330 species) (Shamsudeen and Mathew, 2010). The annual butterfly survey in the Aralam Wildlife Sanctuary recorded 178 species of butterflies, including 9 species that are endemic to the Western Ghats (Anonymous). The oraganizers said the survey had added two new species to the sanctuary-Nilgiri Grass Yellow and Silver Streak Acacia Blue. Both are extremely rare and unknown only from very few specimens from the Western Ghats. With these two additions, the total number of butterflies in the Aralam WLS is 257, the highest in any

of the protected areas of the state. The family Nymphlaidae (Brush-footed butterflies) is more diverse with 67 species followed by Lycaenidae-blue (50 species), Hesperiidae-skippers (25 species), Pieridae-whites and yellow (20 species), Papilionidae-swallowtails (16 species) and a single species from the family Riodinidae Judies and Punches (Anonymous). The first ever comprehensive butterfly survey held in Munnar Wildlife division has spotted as many as 206 new species (Anonymous). In a three day survey conducted by the Kerala Forest Department in association with the Travancore National History Society (TNHS) and the Kottayam Nature Society(KNS], the survey team has systematically reviewed the Chinnar Wildlife Sanctuary as well as the four national park of Mathikettan Shola, Pampadum Shola, Anamudy Shola and the Kurinjimala Wildlife Sancturay and the highest number was recorded at Mathikettan Shola with 148 species, followed by the Chinnar Wildlife Sanctuary with 141 species, the Anamudi Shola with 94 species and Pamapdum Shola with 88 species (Kuttoor, 2015). Survey organized by forest and wildlife department and Wayanad based Ferns naturalist society found 221 species and 11 new species of butterflies at Parambikulam tiger reserve (Anonymous). In a survey conducted by Shamsudeen and Mathew (2010) noticed altogether, 73 species from Shendurny Wild Life Sanctuary in which Rosemala area contained 69 species and Thenmala had 63 species.

India is one of the 17 mega biodiversity countries of the world. It is host to a spectacular number of butterflies, many of which are endemic to the Indian Region, which makes this an especially important region for

butterfly diversity and conservation. The migration of butterflies from Palani plains to Chinnar area of Western Ghats is a common phenomenon after the south-west monsoon (Anonymous). Mathew et al. (2004a) catalogued 202 species of Lepidoptera from Shendurny Wildlife Sanctuary, Kerala; of these 73 were butterflies and 129 were moths from nine families, of which the dominant families were Noctuidae (including Erebidae) and Pyralidae. In a survey conducted by Mathew et al. (2018) A total of 675 moth specimens were collected from the Vagamon hills (Western Ghats), Idukki district, Kerala which represented 112 species from 16 families and eight super families. Out of these 15 species were first records for the state of Kerala. In a survey conducted by Sondhi et al. (2018) 282 species of moths were recorded from Shendurney Wildlife Sanctuary (WLS) and Ponmudi, Kerala, India of which 14 were new records for Kerala, one a new record for India, and one a new species.

There are few more studies that have examined regional moth diversity in southern India, and specific studies on the moth diversity of Kerala. Mathew and Rahamathulla (1995) reported 318 species of moths from the Silent Valley National Park during five months of survey. Sudheendrakumar and Mathew (1999) reported 277 species of moth from Parambikulam Wildlife Sanctuary during three years of survey. Mathew et al. (2004b) reported 87 species of moths from Peppara Wildlife Sanctuary during two months of survey. Mathew et al. (2005) reported 113 species of moths from Peechi-Vazhani Wildlife Sanctuary. Mathew et al. (2007) reported 90 species of moths from Neyyar Wildlife Sanctuary during two

months of survey. Mathew and Menon (1984) reported 155 species of Pyralid moths from Kerala.

MATERIALS AND METHODS

Study Area

The study areas include various domestic and commercial agricultural landscapes especially horticultural ecosystems in Kollam District (Plate 1). This district is located on the southwest part of Kerala State and extends from Lakshadweep Sea to the Western Ghats. It is bordered by Trivandrum district on the South, Alapuzha and Pathanamthitta districts in the North, Thirunelveli district of Tamilnadu State in the East and Lakshadweep sea in the west. It lies between North latitudes 8° 45′ and 9° 07′ and East longitudes 76° 29′ and 77° 17′. It has a geographical area of 2491 sq. km which is about 6.48% of the total geographical area of the State. This district has been gifted with sea, lakes, plains, mountains, rivers, streams, backwaters, forest, vast green fields and tropical crop of every variety, both food and cash crop, hence called God's own Capital. The district is drained by three west flowing rivers, Achenkovil, Kallada and Ithikara, originating in the eastern hilly region. These rivers together with their tributaries exhibit dendritic pattern of drainage. The whole district of the study area has a tropical humid climate, with an oppressive summer, plentiful seasonal rainfall and cool winters. Temperature is almost steady throughout the year. The average temperature is around 25° C to 32° C. Summers usually begin from March and extend till May. The rest of the year is generally dry. The monsoons begin by June and end by September. The district receives an

average rainfall of about 2555 mm annually. The major source of rainfall is South West monsoon from June to September which contributes nearly 55% of the total rainfall of the year. The North East monsoon season from October to December contributes about 24% and the balance 21% is received during the month of January to May as pre-monsoon showers. Winter is from November to February during which temperature is moderately cool hovering from 18° C to 25° C. The Relative humidity is higher during the monsoon period and it is higher all through the year during the morning hours. Ecologically Kollam district belongs to Agasthyamalai Biosphere Reserve. The vegetation consists of typical southern subtropical flora. Though the rural areas are gifted with many undisturbed habitats, most areas are on the threat of unscientific construction activities and destruction of wetlands and rain groves.

Methodology

Regular visits were made in various ecosystems of the study area from the first week of December 2019 to the first week of March 2021. Areas including buildings, Gardens, Agroecosystems, Shrubs and herbs, Grasslands and Ponds were visited. Typical and unique features of the wings, abdomen and pattern of colouration of all body parts were noted down. The pattern of colour patches and print distribution were marked. Insects were photographed from different angles as often as possible to obtain sufficient photographs to enable positive identification of species. Descriptions and photographs were compared with literature and the

species were identified based on the collected data and available reference, both printed and electronic. Species identity of butterflies was confirmed with the help of the field guides by Kunte (2000) and Kehimkar (2008) and the book of Kasambe (2018). Taxonomy and nomenclature have been updated. Identity of moths was confirmed using various literatures like 'The fauna of British India' (Hampson, 1894), 'The fauna of British India, including Ceylon and Burma' (Bell and Scot, 1937) and other publications. Web resources dedicated to lepidopteran diversity were also utilized to confirm or to check the species names.

RESULTS AND DISCUSSION

A total of 28 species of butterflies belonging to 5 families (Table 1) and 48 species of moths belonging to 9 families (Table 2) were observed. Family Nymphalidae registred more number of butterflies (12 species) viz., *Euthalia aconthea*, *Euploea core*, *Melanitis leda*, *Melanitis* sp., *Neptis hylas*, *Danaus genutia*, *Danaus* sp., *Hypolimnas misippus*, *Tirumala septentrionis dravidarum*, *Hypolimnas bolina*, *Junonia lemonias*, and *Acraea terpsicore*. 7 species were recorded family Lycanidae, viz., *Jamides celeno blairana*, *Rathinda amor*, *Jamides celeno celeno*, *Pseudozizeeria maha*, *Leptosia nina*, *Neopithecops zalmora* and *Talicada nyseus*, 5 from Papilionidae viz., *Papilio polymnestor*, *Papilio polytes*, *Pachliopta hector*, *Papilio demoleus*, and *Graphium Agamemnon*, 3 from Pieridae, viz., *Eurema hecabe*, *Catopsilia Pomona* and *Delias eucharis* and 1 from Hesperiidae, viz., *Udaspes folus*. The present study recorded butterflies mostly from garden habitats, agricultural fields, grassy and shrubby areas, and areas near water bodies.

More number of moths were recorded from the family Erebidae (16 species); viz., *Mocis undata*, *Lymantria dispar, Amata cyssea*, *Spirama retorta, Amata passalis, Mocis frugalis, Euproctis subfasciata, Arctorinis* sp., *Curoba sangarida, Miltochristalyclene* sp., *Artena dotata*, *Creatonotos transiens*, *Erebus ephesperis*, *Erebus hieroglyphica*, *Euproctis* sp. and *Olepa ricini* followed by family Geometridae (10 species). *Dysphania palymra*, *Agathia lycaenaria*,

Pingasa chlora, *Idaea* sp., *Naxa seriaria*, *Scopula opicata*, three *Scopula* spp. and *Pentagodes* sp. were recorded from Geometridae. 9 species viz., *Spoladea recurvalis, Diaphania indica, Bocchoris inspersalis*, *Eurrhyparodes bracteolalis, Herpetogramma* sp., *Parotis* sp., *Pyrausta* sp., *Thysanoidma* sp. and *Cnaphalocrocis* sp., were recorded from the family Crambidae. 6 species viz., *Chrysodeixix eriosoma, Bastilla joviana, Chasmina* sp., *Spodoptera litura, Chalciope mygdon*, and *Mythimna unipunctata* were recorded from Noctuidae and 3 species viz., *Eligma narcissus*, *Selepa celtis* and *Xanthodes transversa* were recorded from Nolidae. 1 species each was recorded from Drepanidae, Hepialidae, Sphingidae, and Uraniidae, viz., *Phalacra* sp., *Endoclita* sp. *Theretra silhetensis* and *Micronia aculeata* respectively.

Arun and Azeez (2003) and Nandakumar (2015) has noted that Family Nymphalidae represent the maximum species of butterflies in the forests of Kerala. The findings of the present study underline the highest diversity of Nymphalidae followed by Lycanidae, Papilionidae, Pieridae and Hesperidae. The present study recorded maximum butterfly species in garden habitat followed by agricultural field. Agricultural sites had significantly more butterflies than non-agricultural sites (Grossmueller and Lederhouse, 1987). Habitat selection in butterflies is directly related to the availability of preferred food plants for larvae and adults (Thomas, 1995 and Erica, 1999). Although more than 300 butterflies are reported to be present in the Southern Western Ghats, many recent studies from other areas in Kerala such as Parambikulam Wildlife Sanctuary (Sudheendrakumar et al. 2000) and Silent valley National Park (Poyry et al. 2009) report much less diversity

with maximum species richness in the evergreen habitats. In a study on the moths of Vagamon hills (Western Ghats), Idukki district, Kerala by Mathew et al. (2018), the highest species richness was shown by the family Erebidae and the least by the families Lasiocampidae, Uraniidae, Notodontidae, Pyralidae, Yponomeutidae, Zygaenidae and Hepialidae with one species each.

The present study reveals that the study areas provide favorable ecological conditions and habitat for Lepidopteran species. It might be due to the availability of sufficient host plants and favorable climatic conditions for the development and growth of these organisms.

Table 1. List of the butterflies recorded from the study area		
Sl. No.	**Common name**	**Scientific name**
Lycaenidae		
01	Andaman Common Cerulean	*Jamides celeno blairana* Cramer, 1775
02	Monkey Puzzle	*Rathinda amor* Fabricius, 1775
03	Oriental Common Cerulean	*Jamides celeno celeno* Cramer, 1775
04	Pale Grass Blue	*Pseudozizeeria maha* Kollar, 1844
05	Psyche	*Leptosia nina* Fabricius, 1793
06	Quaker	*Neopithecops zalmora* Butler, 1870
07	Red Pierrot	*Talicada nyseus* Guerin, 1843
Nymphalidae		
08	Common Baron	*Euthalia aconthea* Cramer, 1777
09	Common Crow	*Euploea core* Cramer, 1780
10	Common Evening Brown	*Melanitis leda* Linnaeus, 1758
11	Common Evening Brown	*Melanitis* sp.
12	Common sailor	*Neptis hylas* Linnaeus, 1758
13	Common Tiger	*Danaus genutia* Cramer, 1779
14	Common Tiger	*Danaus* sp.
15	Danaid Eggfly	*Hypolimnas misippus* Linnaeus, 1764
16	Dark Blue Tiger	*Tirumala septentrionis dravidarum* Butler, 1874
17	Great Eggfly	*Hypolimnas bolina* Linnaeus, 1758
18	Lemon Pansy	*Junonia lemonias* Linnaeus, 1758
19	Tawny Coster	*Acraea terpsicore* Linnaeus, 1758
Papilionidae (Swallow tails)		
20	Blue Mormon	*Papilio polymnestor* Cramer, 1775
21	Common Mormon	*Papilio polytes* Linnaeus, 1758
22	Crimson Rose	*Pachliopta hector* Linnaeus, 1758
23	Lime butterfly	*Papilio demoleus* Linnaeus, 1758
24	Tailed Jay	*Graphium agamemnon* Linnaeus, 1758
Pieridae (Sulphur & Cabbage butterflies)		
25	Common grass yellow	*Eurema hecabe* Linnaeus, 1758
26	Common/Lemon Emigrant	*Catopsilia Pomona* Fabricius, 1775
27	Common Jezebel	*Delias eucharis* Drury, 1773
Hesperiidae (Skippers)		
28	Grass demon	*Udaspes folus* Cramer, 1775

Table 2. List of the moths recorded from the study area		
Sl. No.	**Common name**	**Scientific name**
Crambidae		
01	Beet webworm moth or Hawaiian beet webworm	*Spoladea recurvalis* Fabricius, 1775
02	Cucumber moth or Cotton caterpillar	*Diaphania indica* Saunders, 1851
03	Dotted sable	*Bocchoris inspersalis* Zeller, 1852
04	Grass moth	*Eurrhyparodes bracteolalis* Zeller, 1852
05	--	*Herpetogramma* sp.
06	--	*Parotis* sp.
07	--	*Pyrausta* sp.
08	--	*Thysanoidma* sp.
09	--	*Cnaphalocrocis* sp.
Drepanidae		
10	--	*Phalacra* sp.
Erebidae		
11	Brown-striped semilooper	*Mocis undata* Fabricius, 1775
12	Gypsy moth	*Lymantria dispar* Linnaeus, 1758
13	Handmaiden moth	*Amata cyssea* Stoll, 1782
14	Indian owlet moth	*Spirama retorta* Clerck, 1764
15	Sandalwood defoliator	*Amata passalis* Fabricius, 1781
16	Sugarcane looper	*Mocis frugalis* Fabricius, 1775
17	Tufted spinner	*Euproctis subfasciata* Walker, 1865
18	Tussock moth	*Arctorinis* sp.
19	--	*Curoba sangarida* Stoll, 1782
20	--	*Miltochristalyclene* sp.
21	--	*Artena dotata* Fabricius, 1794
22	--	*Creatonotos transiens* Walker, 1855
23	--	*Erebus ephesperis* Hübner, 1827
24	--	*Erebus hieroglyphica* Drury, 1773
25	--	*Euproctis* sp.
26	--	*Olepa ricini* Fabricius, 1775
Geometridae		
27	Blue tiger moth or blue day moth	*Dysphania palymra* Stoll, 1790
28	Inchworm moth	*Agathia lycaenaria* Kollar, 1848
29	White looper moth	*Pingasa chlora* Stoll, 1782
30	--	*Idaea* sp.
31	--	*Naxa seriaria* Motschulsky, 1866
32	--	*Scopula opicata* Fabricius, 1798
33	--	*Scopula* sp. 1
34	--	*Scopula* sp. 2

Table 2 continued		
35	--	*Scopula* sp. 3
36	--	*Pelagodes* sp.
Hepialidae		
37	--	*Endoclita* sp.
Noctuidae		
38	Green garden looper	*Chrysodeixix eriosoma* Doubleday, 1843
39	--	*Bastilla joviana* Stoll, 1782
40	--	*Chasmina* sp.
41	Tobacco cutworm or cotton leaf worm	*Spodoptera litura* Fabricius, 1775
42	Triangular-striped moth	*Chalciope mygdon* Cramer, 1777
43	True armyworm moth	*Mythimna unipunctata* Haworth, 1809
Nolidae		
44	Ailanthus defoliator	*Eligma narcissus* Cramer, 1775
45	Hairy caterpillar moth	*Selepa celtis* Moore, 1858
46	Transverse moth or Hibiscus caterpillar	*Xanthodes transversa* Guenée, 1852
Sphingidae (Sphinx or Hawk moth)		
47	Brown-banded hunter hawkmoth	*Theretra silhetensis* Walker, 1856
Uraniidae		
48	--	*Micronia aculeata* Guenée, 1857

BUTTERFLIES RECORDED FROM THE STUDY AREA

1

Andaman Common Cerulean
***Jamides celeno blairana* Cramer, 1775**

2

Monkey Puzzle
***Rathinda amor* Fabricius, 1775**

3

Oriental Common Cerulean
***Jamides celeno celeno* Cramer, 1775**

4

Pale Grass Blue
***Pseudozizeeria maha* Kollar, 1844**

5

Psyche
***Leptosia nina* Fabricius, 1793**

6

Quaker
***Neopithecops zalmora* Butler, 1870**

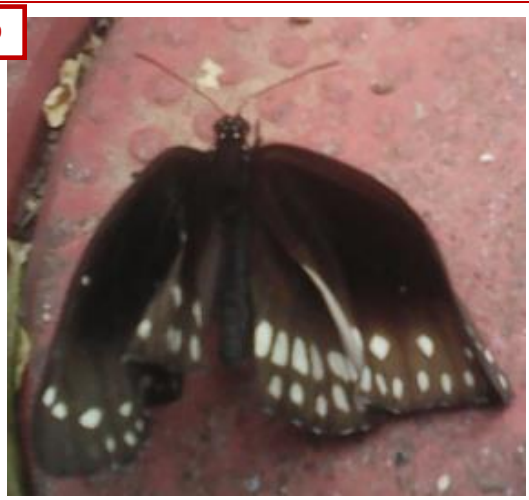
7

Red Pierrot
***Talicada nyseus* Guerin, 1843**

8

Common Baron
***Euthalia aconthea* Cramer, 1777**

9



Common Crow
***Euploea core* Cramer, 1780**

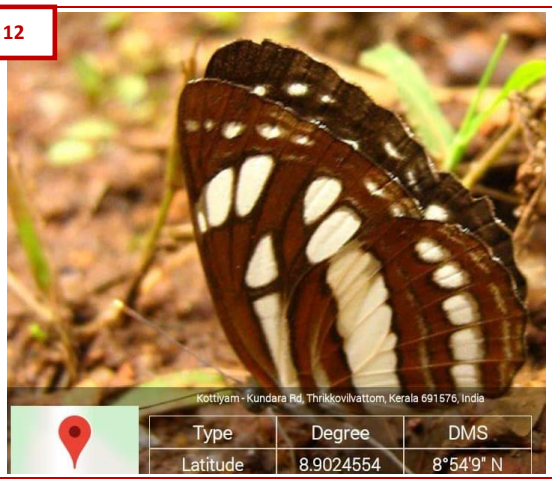
10

Common Evening Brown
***Melanitis leda* Linnaeus, 1758**

11

Common Evening Brown
***Melanitis* sp.**

12



Common sailor
***Neptis hylas* Linnaeus, 1758**

13

Common Tiger
***Danaus genutia* Cramer, 1779**

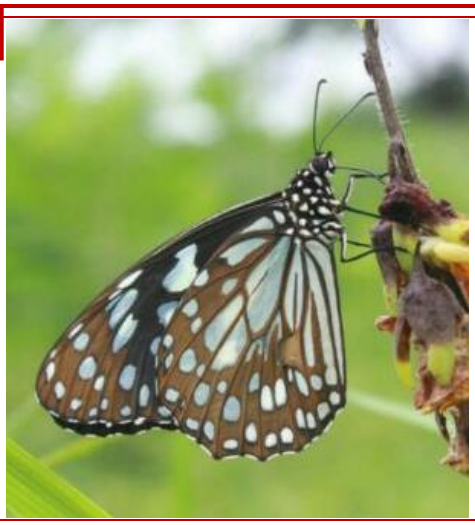
14

Common Tiger
***Danaus* sp.**

15

Danaid Egg fly
***Hypolimnas misippus* Linnaeus, 1764**

16

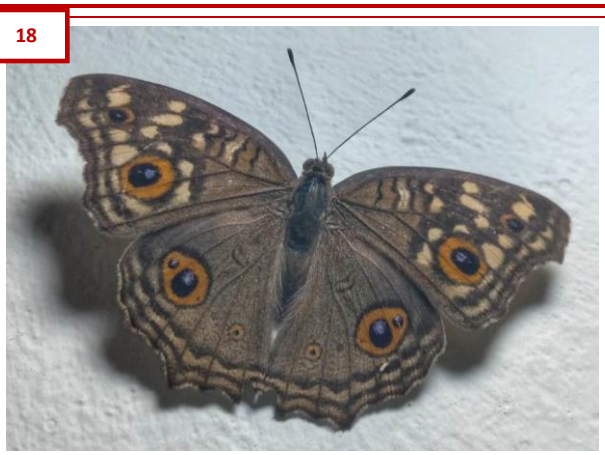


Dark Blue Tiger
***Tirumala septentrionis dravidarum* Butler, 1874**

17

Great Egg fly
***Hypolimnas bolina* Linnaeus, 1758**

18



Lemon Pansy
***Junonia lemonias* Linnaeus, 1758**

--

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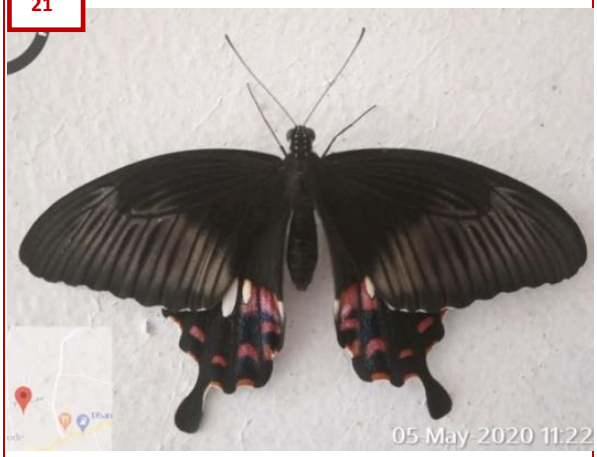
19

Tawny Coster
***Acraea terpsicore* Linnaeus, 1758**

20

Blue Mormon
***Papilio polymnestor* Cramer, 1775**

21



Common Mormon
***Papilio polytes* Linnaeus, 1758**

22

Crimson Rose
***Pachliopta hector* Linnaeus, 1758**

23

Lime butterfly
***Papilio demoleus* Linnaeus, 1758**

24

Tailed Jay
***Graphium agamemnon* Linnaeus, 1758**

25

Common grass yellow
***Eurema hecabe* Linnaeus, 1758**

26

Common/Lemon Emigrant
***Catopsilia Pomona* Fabricius, 1775**

27

Common Jezebel
***Delias eucharis* Drury, 1773**

28

Grass demon
***Udaspes folus* Cramer, 1775**

MOTHS RECORDED FROM THE STUDY AREA

1

Spoladea recurvalis **Fabricius,1775**

2

Diaphania indica **Saunders, 1851**

3

Bocchoris inspersalis **Zeller, 1852**

4

Eurrhyparodes bracteolalis **Zeller, 1852.**

5

Herpetogramma **sp.**

6

Parotis **sp.**

7

Pyrausta **sp.**

8

Thysanoidma **sp.**

9

Cnaphalocrocis **sp.**

10

Phalacra **sp.**

11

Mocis undata **Fabricius, 1775**

12

Lymantria dispar **Linnaeus, 1758**

13

Amata cyssea **Stoll, 1782**

14

Spirama retorta **Clerck, 1764**

15

Amata passalis **Fabricius, 1781**

16

Mocis frugalis **Fabricius, 1775**

17

Euproctis subfasciata **Walker, 1865**

18

Arctorinis **sp.**

19

Curoba sangarida **Stoll, 1782**

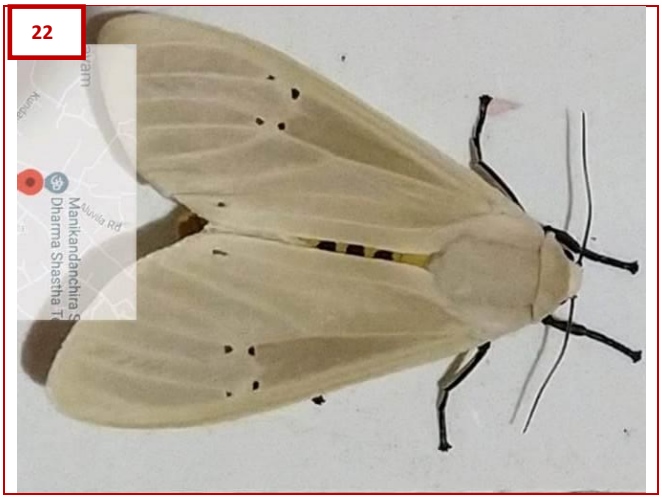
20

Miltochristalyclene **sp.**

21

Artena dotata **Fabricius, 1794**

22



Creatonotos transiens **Walker, 1855**

23

Erebus ephesperis **Hübner, 1827**

24

Erebus hieroglyphica **Drury, 1773**

25

Euproctis **sp.**

26

Olepa ricini **Fabricius, 1775**

27

Dysphania palymra **Stoll, 1790**

28

Agathia lycaenaria **Kollar, 1848**

29

Pingasa chlora **Stoll, 1782**

30

Idaea **sp.**

31

Naxa seriaria **Motschulsky, 1866**

32

Scopula opicata **Fabricius, 1758**

33

Scopula **sp. 1**

34

Scopula **sp. 2**

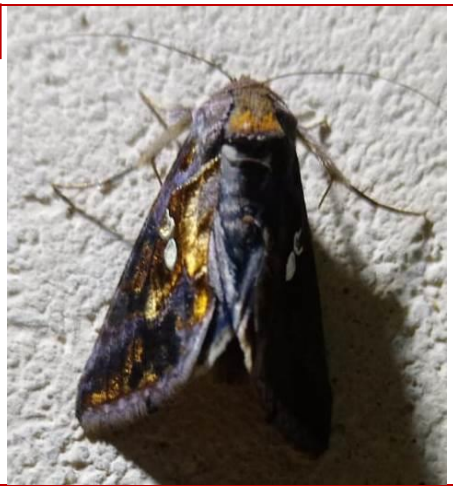
35

Scopula **sp. 3**

36

Pelagodes **sp.**

37



Endoclita **sp.**

38

Chrysodeixix eriosoma **Doubleday, 1843**

39

Bastilla joviana **Stoll, 1782**

40

Chasmina **sp.**

41

Spodoptera litura **Fabricius, 1775**

42

Chalciope mygdon **Cramer, 1777**

43

Mythimna unipunctata **Haworth, 1809**

44

Eligma narcissus **Cramer, 1775**

45

Selepa celtis **Moore, 1858**

46

Xanthodes transversa **Guenée, 1852**

47

Theretra silhetensis **Walker, 1856**

48

Micronia aculeata **Guenée, 1857**

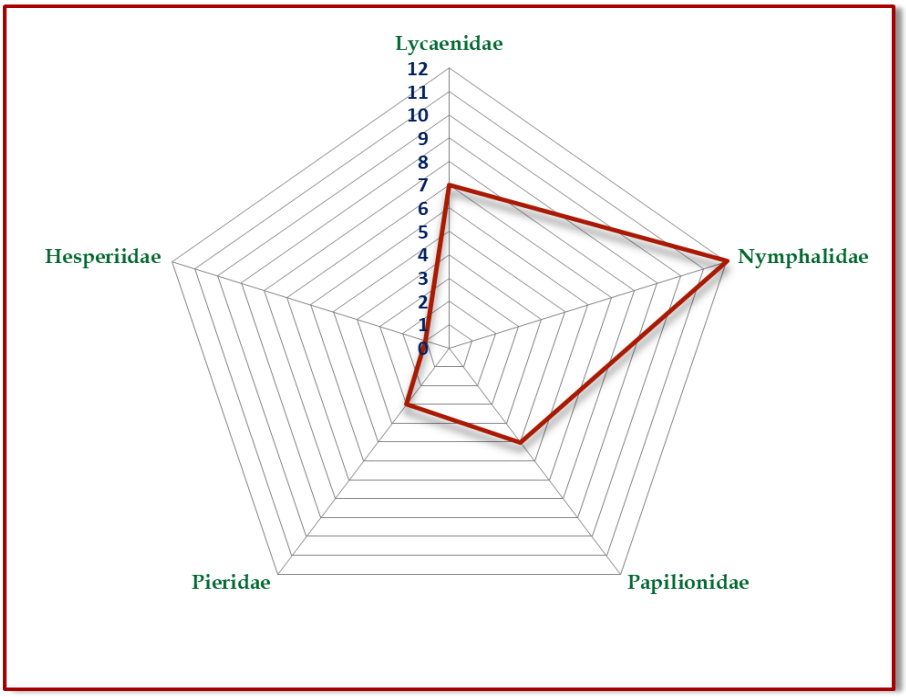


Fig. 1. Number of butterfly species observed in each family

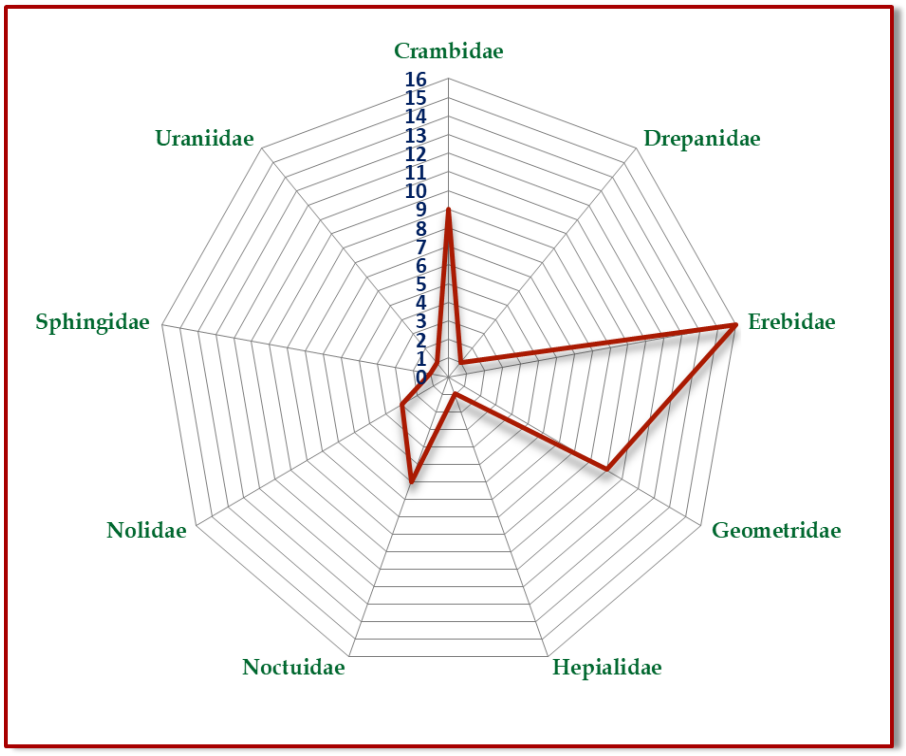


Fig. 2. Number of moth species observed in each family

SUMMARY AND CONCLUSION

The present study recorded 28 species of butterflies from 5 families and 48 species of moths from 9 families. Family Nymphalidae recorded more number of butterfly species, followed by Lycanidae, Papilonidae, Pieridae and Hesperidae. Family Erebidae showed more number of moth species followed by Geometridae, Crambidae, Noctuidae, Nolidae, Drepanidae, Hepialidae, Sphingidae, and Uraniidae. More number of butterflies and moths was observed in garden habitats, grassy and shrubby areas, agricultural fields, and areas near water bodies. The study areas were found to support a rich diversity of lepidopteran species. The present list of Lepidoptera is neither conclusive nor exhaustive hence future exploration will be continued to update this checklist. In addition, further research is needed to be initiated for the documentation of this insect order and thereby the conservation and management of the Lepidopteran community.

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