LEPIDOPTERAN FAUNA OF ANNAMALAINAGAR, CUDDALORE DISTRICT, TAMILNADU

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Abstract : A study was conducted in Annamalainagar, Cuddalore district, Tamil Nadu to document the lepidopteran fauna of that area from January to December, 2016. During the study period 679 lepidopterans were recorded in the study area by using transect method, aerial netting, light trap and host rearing. Out of 679 lepidopterans, 158 butterflies, 10 skippers and 511 moths were recorded. They were identified with the help of standard keys up to subfamily level. There were nine superfamilie were identified, out of which, Noctuoidea was found to be dominant with 224 individuals followed by Papilionoidea (158). Twenty four subfamilies *viz.*, Papilioninae (38), Pierinae (26), Coliadinae (21), Lycaeninae (17), Nymphalinae (11), Satyrinae (19), Danainae (26) were categorized under Papilionoidea while Hesperiinae (10) under Hesperoidea, Xyloryctinae (29), Sesiinae (7), Pterophorinae (21), Schoenobiinae (67), Spilomelinae (82), Sphinginae (9), Macroglossinae (7), Ennominae (41), Microniinae (24), Noctuinae (92), Arctiinae (34), Lymantriinae (7), Heliothinae (13), Plusiinae (15), Aganainae (46) and Erebinae (17) were recognized under seven different superfamilies of Lepidoptera in the study area.

IndexTerms: Coastal area**,** Diversity, Fauna, Lepidoptera, Subfamily

I. INTRODUCTION

Lepidoptera is the second largest order of class Insecta (Benton, 1995). They are distinguished from other insects by their wings which are more or less densely covered with minute scales of various colours. The order comprises an enormous number of different species is further divided into two sub-orders Heterocera or moths and Rhopalocera or butterflies (Shields, 1989). An estimate by Alfred *et al.* (1998) 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. There are about 1,501 species of butterflies in Indian subcontinent (Gaonkar, 1996). Butterflies are providing the best rapid indicators of habitat quality and they are the sensitive indicators of climatic change (Ramana, 2010). Butterflies have important ecosystem roles including pollination and they are useful in studies of population and community ecology (Pollard, 1991). There is an intimate association between butterflies and plants and their lives are exceptionally interlinked (Feltwell 1986), which leads to different patterns in their distribution depending on

the availability of their food plants. Many studies have been conducted with respect to taxonomy, demography, economic role and diversity of Lepidoptera in various regions of our country by many lepidopterists as early as from 1767 by Linnaeus onwards and subsequently Marshall and de Niceville during 1883 – 1890 followed by Hampson during 1892 – 1896 *etc*. Then, Evans and Talbot worked on Lepidoptera in 1940's and published a book on "Identification of Indian butterflies" and contributed to lepidoptera taxonomy. In the recent past, Varshney (1994), Gupta (1997), Gunathilagaraj (1998), Kunte (2000), Srivastava (2002), and Sambath (2014) worked on butterflies and moth taxonomy and diversity studies in various parts of the country. The diversity of Lepidoptera in the Western Ghats region were studied to a maximum extent while certain pockets of Tamil Nadu have not been studied especially in coastal areas. Hence, an attempt was made to document lepidopterans in Annamalainagar, Cuddalore District, Tamil Nadu.

Materials and methods

The lepidopteran insects were recorded from Annamalainagar, Tamil Nadu located at 11.39ºN latitude and 79.71ºE longitude during January – December, 2016 from various ecosystems *viz.*, agricultural land, grassland, bushy areas *etc*. The butterflies were observed using a line transect method as per Kunte (2000). The transects were fixed in the routes along the paths twice in a month covering a section of 50 meter around a radius of 5 meter front from the observer and 2.5m on his either sides. The transect was fixed covering various habitats of the study area and the butterflies were observed or captured during 7:30 to 11:30 am. The collected butterflies were placed in the killing jars (wide mouthed bottle containing a piece of cotton soaked in ethyl acetate) for one hour. 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).

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 (Chandra and Sambath, 2013). 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 larvae of butterflies and skippers were collected from the field and were reared with their respective food material. 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 Triplehorn and Jhonson (1989). The collected lepidopteran insect specimens were diagnosed upto superfamily level by following the keys of Dugdale (1988), Holloway (1989) and Richard

and Davies (2013). The confirmed superfamilies were further diagnosed upto family and subfamily level by following the dichotomous keys provided by Hampson (1892), Evans (1932), Triplehorn and Johnson (1989), Solis and Mitter (1992), Schmidt (1998) and Talbot (2013).

Results and discussion

From the study, it was observed that 679 lepidopterans were recorded and 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 were recorded using host rearing (Table 1). The results of the present study are in accordance with the findings of Fry and Waring (1996) who reported that using light trap is effective method to attract moths while net sweep found better in collecting butterflies was reported by Triplehorn and Johnson (1989).

Table 1. Lepidopterans observed through various methods during January – December, 2015 at Annamalainagar

S.No.	Collection methods	Number of individuals recorded in Annamalainagar
1.	Net sweep	239
2.	Light trap	346
3.	Host rearing	94
Total		**679**

From the collection, nine superfamilies were recorded in which, two superfamilies *viz.*, Papilionoidea (158) and Hesperioidea (10) comprises butterflies and skippers respectively (Table 2). Under the superfamily Papilionoidea, four families were recorded. Among them, Nymphalidae was dominant with 56 individuals followed by Pieridae (47) and Papilionidae (38) (Table 3). Under the superfamily Hesperioidea, the only family Hersperiidae was recorded with 10 individuals. Seven superfamilies comprises moths, out of which, Noctuoidea was found to be dominant with 224 individuals followed by Papilionoidea (158), Pyraloidea (149), Geometroidea (65), Gelechioidea (29), Pterophoroidea (21), Bombycoidea (16), Hesperioidea (10) and Sesioidea (7) (Table 2). The results are supported by Bazzaz (1975), who reported that the population dynamics of Noctuoidea may high due to more complex habitats and had more niches.

The results are in tune with the findings of Shamsudeen and Mathew (2010), Krishna and Swamy (2014) and Patil and Shende (2014), they reported that Nymphalidae was predominant in their collections. The results are contrary to the findings of Kumar and Murugesan (2014) and Hussain *et al.* (2011), as they stated that the family Pieridae was dominant at Kudankulam area. Further, Rajagopal *et al.* (2011) and Arya *et al.* (2014) who reported the family Pieridae was found to be dominant at Arignar Anna Zoological Park, Chennai, Tamilnadu and Kumaun University, Nainital, Uttarakhand respectively. The results are in accordance with the findings of Shamsudeen and Mathew (2010) who reported that the family Lycaenidae

were recorded with least population when compared to other families in Shendurny wildlife Sanctuary, Kerala.

Table 2. Lepidopteran superfamilies observed during January – December, 2015 at Annamalainagar

S.No	Superfamily	Numbers observed in Annamalainagar
1	Papilionoidea	158
2	Hesperioidea	10
3	Gelechioidea	29
4	Sesioidea	07
5	Pterophoroidea	21
6	Pyraloidea	149
7	Bombycoidea	16
8	Geometroidea	65
9	Noctuoidea	224
Total		**679**

The family Papilionidae had only one subfamily Papilioninae (38) was recorded in the study area. Likewise, Pieridae comprises two subfamilies Pierinae (26) and Coliadinae (21). Lycaeninae (17) is the only subfamily recorded under Lycaenidae. Similarly, Nymphalinae (11), Satyrinae (19), Danainae (26) were identified under the Nymphalidae. The results are in contrary to the report of Kunte *et al.* (2012) reported 10 subfamilies under Nymphalidae and five subfamilies under Lycaenidae from Garo Hills of Meghalaya. Under the family Hesperiidae, Hesperiinae was recorded with 10 individuals. The subfamily Papilioninae (38) was to be dominant followed by Pierinae (26) and Danainae (26) (Table 3).

Table 3. Families and subfamilies of Lepidoptera observed during January – December, 2015 at Annamalainagar

S.No	Superfamily	Family	Subfamily	Numbers observed in Annamalainagar
1.	Papilionoidea	Papilionidae	Papilioninae	38
		Pieridae	Pierinae	26
			Coliadinae	21
		Lycaenidae	Lycaeninae	17
		Nymphalidae	Nymphalinae	11

			Satyrinae	19
			Danainae	26
2.	Hesperoiidea	Hesperiidae	Hesperiinae	10
Total				**168**

The family, Oecophoridae (29) is the only family identified under Gelechioidea. Similarly, the family Sesiidae was observed under Sesioidea. Pterophoridae is the one family documented under Pterophoroidea with 21 numbers., Pyraloidea comprises one family Crambidae (149), Bombycoidea recorded with single family Sphingidae (16). Geometrid moths belong to two families Geometridae (41) and Uraniidae (24) under Geometroidea. Among the collection, moths belong to family Noctuidae were recorded with maximum numbers with 224 under Noctuoidea. From the study area only one family, Crambidae (149) was recorded under Pyraloidea but Chandra and Sambath (2013) and Mathew and Rahamathulla (1995) recorded two families namely Pyralidae and Crambidae in Andhra Pradesh and Silent Valley National Park, Kerala respectively. In the present study, Noctuidae (224) was dominant family followed by Crambidae (149), Geometridae (41), Oecophoridae (29), Uraniidae (24), Pterophoridae (21) and Sphingidae (16). This is in accordance with Srivastava (2002) who stated that Noctuidae was dominant among other family groups in species diversity and numerical strength. Moths were identified under 16 subfamilies during the study period at Annamalainagar, Cuddalore. Oecophoridae recorded single subfamily Xylorctinae (29). Likewise, Sesiidae comprises single subfamily Sesiinae (7) while Perophorinae (21) is the only subfamily recorded under the family Pterophoridae, Ennominae is the only subfamily recorded under Geometridae with 41 numbers, Uraniidae comprises single subfamily Microniinae (24). Two subfamilies have been recorded under Crambidae *viz.*, Schoenobiinae (67) and Spilomelinae (82). Similarly, Sphinginae (9) and Macroglossinae (7) are the two subfamilies reported under Sphingidae. Noctuidae moths belongs to seven subfamilies *viz.*, Noctuinae (92), Arctiinae (34), Lymantiinae (7), Heliothinae (13), Plusiinae (15), Aganainae (46) and Erebinae (17) (Table 4).

Table 4. Subfamilies of moths observed during January – December, 2015 at Annamalainagar

S.No	Superfamily	Family	Subfamily	Numbers observed Annamalainagar
1.	Gelechioidea	Oecophoridae	Xyloryctinae	29
2.	Sesioidea	Sesiidae	Sesiinae	7
3.	Pterophoroidea	Pterophoridae	Pterophorinae	21
4.	Pyraloidea	Crambidae	Schoenobiinae	67
			Spilomelinae	82
5.	Bombycoidea	Sphingidae	Sphinginae	9
			Macroglossinae	7

6.	Geometroidea	Geometridae	Ennominae	41
		Uraniidae	Microniinae	24
7.	Noctuoidea	Noctuidae	Noctuinae	92
			Arctiinae	34
			Lymantriinae	7
			Heliothinae	13
			Plusiinae	15
			Aganainae	46
			Erebinae	17
		Total		**511**

Among 16 moth subfamilies, Noctuinae (92) was found to be dominant followed by Spilomelinae (82), Schoenobiinae (67) and Aganainae (46). In contrary, Chandra and Sambath (2013) who recorded two subfamilies under Uraniidae *viz.*, Microniinae and Epipleminae. Elanchezhian *et al*. (2014) reported seventeen subfamilies under Noctuidae family at Mukurthi National park.

Conclusion

It appears that Lepidoptera diversity can serve as reliable indicator of plant diversity as they depend directly on plants and particular set of 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. Hence, conservation of Lepidopterans will be given utmost importance in the near future. Further, extensive survey will also be needed for few consecutive years to furnish the accurate diversity of the locality.

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