

A preliminary checklist of butterflies from the Pachamalai Hill, Chennai District, Tamil Nadu, India

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Abstract

A study on the checklist of butterflies from the Pachamalai Hill, Chennai, Tamil Nadu was recorded from March 2025 to February 2026. A total of 60 different species with 3245 individuals from the various families such as Nymphalidae (22 species), followed by Lycaenidae (15 species), Pieridae (11 species), Papilionidae and Hesperidae (six species) each. Further percentage distribution of butterflies family wise reveals that 37% of species belong to Nymphalidae, 25% of Lycaenidae, 18% of Pieridae, 10% of Papilionidae and Hesperidae. The Wildlife Protection Amendment Act (2022) ^[10], reveals that four species comes under Schedule II category (*Pachliopta hector*, *Hypolimnas misippus*, *Charaxes solon* and *Appias albina*). These findings highlight the ecological significance of Pachamalai Hill as an important habitat supporting rich butterfly diversity and needs conservation.

Keywords: Butterfly, Diversity, Checklist, Pachamalai Hill, Chennai

Introduction

Butterflies are some of the most fascinating and ecologically significant insects, with 19,500 species identified worldwide (Van Nieukerken *et al.*, 2011; Kawahara *et al.*, 2023) ^[12, 21]. Butterflies are a huge group of insects in the order lepidoptera. The name is derived from the Greek words Lepido, which means "Scale," and Ptera, which means "Wings," referring to a distinguishing characteristic of mature butterflies and the microscopic scales covering their wings (Abdullahi, 2019) ^[1].

Butterflies react quickly to changes in vegetation and environmental circumstances. Hence, they are widely acknowledged as sensitive bio-indicators of ecosystem health (Gardner *et al.*, 1995) ^[9]. They are also one of the most studied insect groups (Robbins and Opler, 1997) ^[18]. Their significance in biodiversity is highlighted by their ecological roles as pollinators and essential components of food webs (Tiple *et al.*, 2006) ^[19]. Regional documentation of butterflies is still lacking, and diversity is frequently underestimated even in well-known taxa (Willmott *et al.*, 2001) ^[22]. The existence or absence of butterflies can function as crucial bio-indicators of ecological and environmental health (Fleishman and Murphy, 2009) ^[7]. Butterflies are primary consumers in food chains and are essential components of terrestrial food webs (Bonebrake *et al.*, 2010; Heppner, 1998) ^[4, 11]. They are indispensable for pollination, aiding in fertilization and enhancing the productivity of producer plants (Tiple *et al.*, 2006) ^[19], and they also serve as food for birds, amphibians, reptiles, spiders, and other insects (Tiple and Bhagwat 2023) ^[20]. They are also significant for assessing environmental quality in terrestrial ecosystems (Ghazoul, 2002) ^[10]. Hence, they play a major role in biodiversity monitoring and are considered umbrella species in conservation efforts (New, 1997) ^[15]. The objective of the current study was to investigate the diversity of butterflies from Pachamalai Hill,

Chennai. The current work may serve as a baseline data because there was previously no published checklist of butterflies from the Pachamalai Hill, Chennai, Tamil Nadu, India.

Materials and Methods

Study Area

Pachamalai Hill, which means "Green Hillock" in Tamil, which is found behind the Tambaram Sanatorium Hospital in Chennai, Tamil Nadu, India (Figure 1). It is situated between 12.9455° N and 80.1265° E. This hillock rises approximately 9 to 100 meters above sea level, standing out as a peaceful green haven amid the city's concrete sprawl. Pachamalai is an area of lush green vegetation having large trees, bushy shrubs, and grasses that provide shelter to the butterflies. There are various nectarine and host plants on the hill which provides a good source of nectar, and a suitable place for egg-laying and enables butterflies to complete their life cycle. Hence, it is a biodiversity hotspot that supports a variety of flora and fauna. Flora includes *Turnera subulata* (White buttercup), *Catunaregam spinosa* (mountain pomegranate), *Abrus precatorius* (rosary pea), *Wrightia tinctoria* (jaundice curative tree), *Pongamia pinnata* (indian beech), *Dichrostachys cinerea* (aroma), *Abutilon indicum* (indian mallow), *Evolvulus alsinoides* (tropical speedwell), *Morinda coreia* (indian mulberry), *Calotropis gigantea* (crown flower), *Pigea enneasperma* (spade flower), *Senna auriculata* (matura tree), *Barleria longiflora*, *Tridax procumbens* (tridax daisy), *Canthium coromandelicum* (coromandel boxwood), *Lantana camara*, *Ziziphus oenopolia* (jackal jujube) and so on. As far as fauna is concerned, butterflies, ants, spider, birds, lizards, snake, snail, wasps, bugs, bees, slug, dragon flies and so on are recorded in this area. Conserving and protecting this green space is vital to maintain biodiversity of the Pachamalai Hill, Chennai, Tamil Nadu, India.



Fig 1: Map depicting the Pachamalai, Tambaram Sanatorium, Chennai.

Survey and Identification

Butterflies were documented using the “Pollard Walk” method (Pollard, 1977) ^[16] in the field, it is more practical for long-term monitoring of the species. A line transect method was employed for systematic sampling of butterfly abundance and diversity. The positions of transects were determined randomly based on accessibility for regular monitoring in the study area. Transects were walked at a slow, uniform pace, recording all butterflies and surveyed fortnightly for a period of one year from March 2025 to February 2026. During the survey details such as the observed butterfly species, individual species count, date & time were recorded in the data sheet. The survey was conducted early in the morning, from 8:00 AM to 12:00 AM, and at mid-noon, from 1:00 PM to 3:00 PM coinciding with peak butterfly activity and optimal weather conditions (Chowdhury and Rahman, 2024; Balogun and Kehinde, 2021 and Checa *et al.*, 2019) ^[3, 6].

Species Identification

Butterflies were primarily identified directly in the field with the help of field guides (Kunte, 2000; Kehimkar, 2016 and YNT, 2024) ^[13, 14] and photographs were taken using Canon Eos R50 camera with 18-55mm lens and 55-210mm

lens. No specimens were collected or trapped, ensuring minimal disturbance. All activities were complied as per the conservation guidelines.

Statistical data analysis

The data collected were used to analyze the diversity indices of the butterfly using a statistical programme PAST version 5.3 developed by Øyvind Hammer (2024) ^[6], University of Oslo’s Natural History Museum.

$$\text{Simpson index (1-D): } 1 - D = 1 - \frac{\sum ni (ni - 1)}{N(N - 1)}$$

$$\text{Shannon index (H')}: H' = - \sum_{i=1}^S pi \log(pi)$$

$$\text{Evenness (J')}: J' = \frac{H}{\log S}$$

Here, N is the total number of said species living in the same area. ni is the number of individuals of ith species and pi is the proportion of the individuals of species i relative to the total number of individuals (ni/N), is the observed value of Shannon-Wiener index and S is the number of species (Revathy and Kumar 2025) ^[17].

Results and Discussion

Table 1: Checklist of butterflies recorded from the Pachamalai Hill, Chennai, Tamil Nadu from March 2025 to February 2026

No.	Family	Scientific Name	Common Name	No. of Individuals	WL(P)AA, 2022
1	Papilionidae (Swallowtails)	<i>Papilio polytes</i> Linnaeus, 1758	Common Mormon	107	
2		<i>Papilio demoleus</i> Linnaeus, 1758	Lime Swallowtail	84	
3		<i>Pachliopta hector</i> Linnaeus, 1758	Crimson Rose	72	Schedule II
4		<i>Pachliopta aristolochiae</i> Fabricius, 1775	Common Rose	32	
5		<i>Graphium doson</i> C. & R. Felder, 1864	Common Jay	21	
6		<i>Graphium agamemnon</i> Linnaeus, 1758	Tailed Jay	28	
7	Nymphalidae (Brush-footed)	<i>Ariadne merione</i> Cramer, 1777	Common Castor	65	
8		<i>Ariadne ariadne</i> Linnaeus, 1763	Angled Castor	23	
9		<i>Danaus chrysippus</i> Linnaeus, 1758	Plain Tiger	118	
10		<i>Danaus genutia</i> Cramer, 1779	Striped Tiger	18	
11		<i>Tirumala limniace</i> Cramer, 1775	Blue Tiger	135	
12		<i>Tirumala septentrionis</i> Butler, 1874	Dark Blue Tiger	29	
13		<i>Parantica aglea</i> Stoll, 1782	Glassy Blue Tiger	17	
14		<i>Euploea core</i> Cramer, 1780	Common Crow	93	
15		<i>Euploea sylvester</i> Fabricius, 1793	Double Branded Crow	8	
16		<i>Acraea terpsicore</i> Linnaeus, 1758	Tawny Coster	268	
17		<i>Phalanta phalantha</i> Drury, 1773	Common Leopard	120	

18		<i>Neptis hylas</i> Linnaeus, 1758	Common Sailer	122	
19		<i>Neptis jumbah</i> Moore, 1857	Chestnut Streaked Sailer	1	
20		<i>Junomia iphita</i> Cramer, 1779	Chocolate Pansy	114	
21		<i>Junomia lemonias</i> Linnaeus, 1758	Lemon Pansy	194	
22		<i>Junomia orithya</i> Linnaeus, 1758	Blue Pansy	1	
23		<i>Junomia hierta</i> Fabricius, 1798	Yellow Pansy	1	
24		<i>Hypolimnas bolina</i> Linnaeus, 1758	Great Eggfly	16	
25		<i>Hypolimnas misippus</i> Linnaeus, 1764	Danaid Eggfly	48	Schedule II
26		<i>Charaxes solon</i> Fabricius, 1793	Black Rajah	1	Schedule II
27		<i>Mycalasis subdita</i> Moore, 1890	Tamil Bushbrown	1	
28		<i>Mycalasis perseus</i> Fabricius, 1775	Common Bushbrown	5	
29	Pieridae (Whites and Yellows)	<i>Catopsilia pyranthe</i> Linnaeus, 1758	Mottled Emigrant	207	
30		<i>Catopsilia pomona</i> Fabricius, 1775	Common or Lemon Emigrant	242	
31		<i>Eurema hecabe</i> Linnaeus, 1758	Common Grass yellow	138	
32		<i>Eurema drona</i> Cramer, 1780	Small Grass yellow	24	
33		<i>Leptosia nina</i> Fabricius, 1787	Psyche	82	
34		<i>Pareronia hippia</i> Fabricius, 1787	Indian Wanderer	87	
35		<i>Cepora nerissa</i> Fabricius, 1775	Common Gull	48	
36		<i>Colotis aurora</i> Cramer, 1780	Plain Orange Tip	113	
37		<i>Appias albina</i> Boisduval, 1836	Common Albatross	5	Schedule II
38		<i>Belenois autrota</i> Fabricius, 1793	Pioneer	3	
39		<i>Delias eucharis</i> Drury, 1773	Common Jezebel	3	
40	Hesperiidae (Skippers)	<i>Parnara bada</i> Moore, 1878	Oriental Straight Swift	13	
41		<i>Spialia galba</i> Fabricius, 1793	Asian Grizzled Skipper	13	
42		<i>Hasora chromus</i> Cramer, 1782	Common Banded Awl	4	
43		<i>Gomalia elma</i> Trimen, 1862	African Marbled Skipper	4	
44		<i>Coladenia indrani</i> Moore, 1865	Tricolour Pied Flat	1	
45		<i>Pelopidas mathias</i> Fabricius, 1798	Small Branded Swift	1	
46	Lycaenidae (Blues)	<i>Castalius rosimon</i> Fabricius, 1775	Common Pierrot	143	
47		<i>Jamides celeno</i> Cramer, 1775	Common Cerulean	77	
48		<i>Leptotes plinius</i> Fabricius, 1793	Zebra Blue	87	
49		<i>Zizula hylax</i> Fabricius, 1775	Tiny Grass Blue	10	
50		<i>Pseudozizeeria maha</i> Kollar, 1844	Pale Grass Blue	2	
51		<i>Zizina otes</i> Fabricius, 1787	Lesser Grass Blue	26	
52		<i>Zizeeria karsandra</i> Moore, 1865	Dark Grass Blue	7	
53		<i>Freyeria putli</i> Kollar, 1844	Jewelled Grass Blue	28	
54		<i>Azanus jesous</i> Guerin – Meneville, 1847	African Babul Blue	13	
55		<i>Chilades lajus</i> Stoll, 1780	Lime Blue	104	
56		<i>Prosotas nora</i> R. Felder, 1860	Common Line Blue	1	
57		<i>Prosotas dubiosa</i> Semper, 1879	Tailless Line Blue	3	
58		<i>Lampides boeticus</i> Linnaeus, 1767	Pea Blue	6	
59		<i>Catochrysops Strabo</i> Fabricius, 1793	Forget-Me-Not	4	
60		<i>Curetis thetis</i> Drury, 1773	Indian Sunbeam	4	

The butterfly diversity of Pachamalai Hill, Chennai, Tamil Nadu between March 2025 and February 2026 exhibits a total of 60 species of butterflies, with maximum of 22 species from Nymphalidae family followed by 15 species of Lycaenidae and 11 species of Pieridae. The least number of six species each were under the Papilionidae and Hesperiidae family. The Checklist of species recorded has been listed in Table 1. A total of 3245 individuals of butterfly were documented from the five different families. Among them, the Nymphalidae family had the highest of 1398 individuals, out of which *Acraea terpsicore* (Tawny Coster) was highest with 268 individuals and the lowest species were *Neptis jumbah* (Chestnut Streaked Sailer), *Junomia orithya* (Blue Pansy), *Junomia hierta* (Yellow Pansy), *Charaxes solon* (Black Rajah) and *Mycalasis subdita* (Tamil Bushbrown) with one individual each. In Lycaenidae family 515 individuals were recorded, out of which *Castalius rosimon* (Common Pierrot) shows the highest individual with 143 and lowest with one individual from *Prosotas nora* (Common Line Blue). In Pieridae, 952 individuals were observed the highest individual recorded was *Catopsilia pomona* (Common Emigrant) with 242 individuals, where the lowest, *Belenois autrota* (Pioneer)

and *Delias eucharis* (Common Jezebel) with three individuals each. Papilionidae family with 344 individuals, *Papilio polytes* (Common Mormon) with highest count of 107 and least count documented from *Graphium doson* (Common Jay) with 21 individuals. Hesperiidae family shows 36 individuals with highest individuals reported were *Parnara bada* and *Spialia galba* (Oriental Straight Swift and Asian Grizzled Skipper) with 13 individuals each and least count from *Coladenia indrani* and *Pelopidas mathias* (Tricolour Pied Flat and Small Branded Swift) with one individual each. Furthermore, four species *Pachliopta hector* (Crimson Rose), *Hypolimnas misippus* (Danaid Eggfly), *Charaxes solon* (Black Rajah), and *Appias albina* (Common Albatross) were listed under Schedule II of the Wildlife (Protection) Act, 2022. ^[10] The dominance of Nymphalidae and Pieridae families indicated their resilience and adaptability to open habitats, while the representation of Papilionidae and Hesperiidae signified specialized host plant associations and the Lycaenidae diversity pointed towards microhabitat heterogeneity. Photographs of the butterflies recorded at Pachamalai Hill, Chennai, Tamil Nadu from March 2025 to February 2026 are given in the Fig 3.

Table 2: Family wise composition of number and percentage of species recorded from Pachamalai Hill, Chennai from March 2025 to February 2026

S. No.	Family	No. of Species	Percentage (%)
1	Nymphalidae	22	37
2	Lycaenidae	15	25
3	Pieridae	11	18
4	Papilionidae	6	10
5	Hesperiidae	6	10

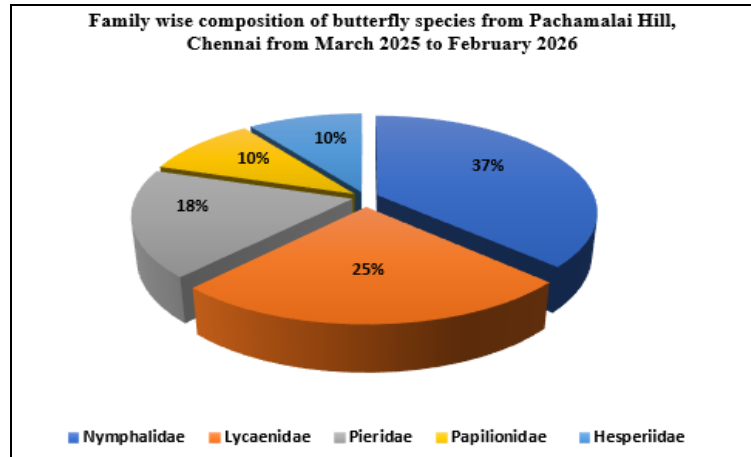
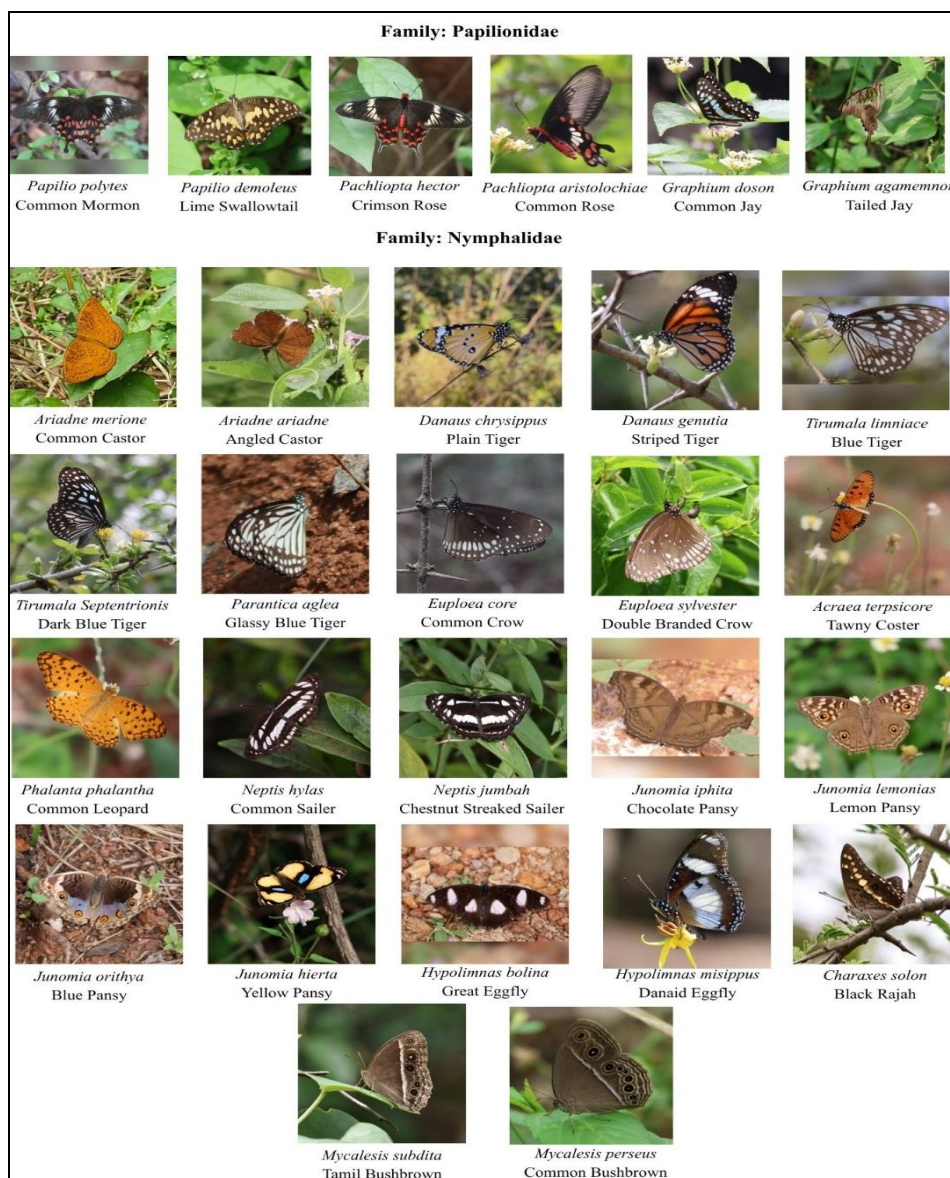


Fig 2: Family wise composition of the butterfly species from the Pachamalai Hill, Chennai, Tamil Nadu



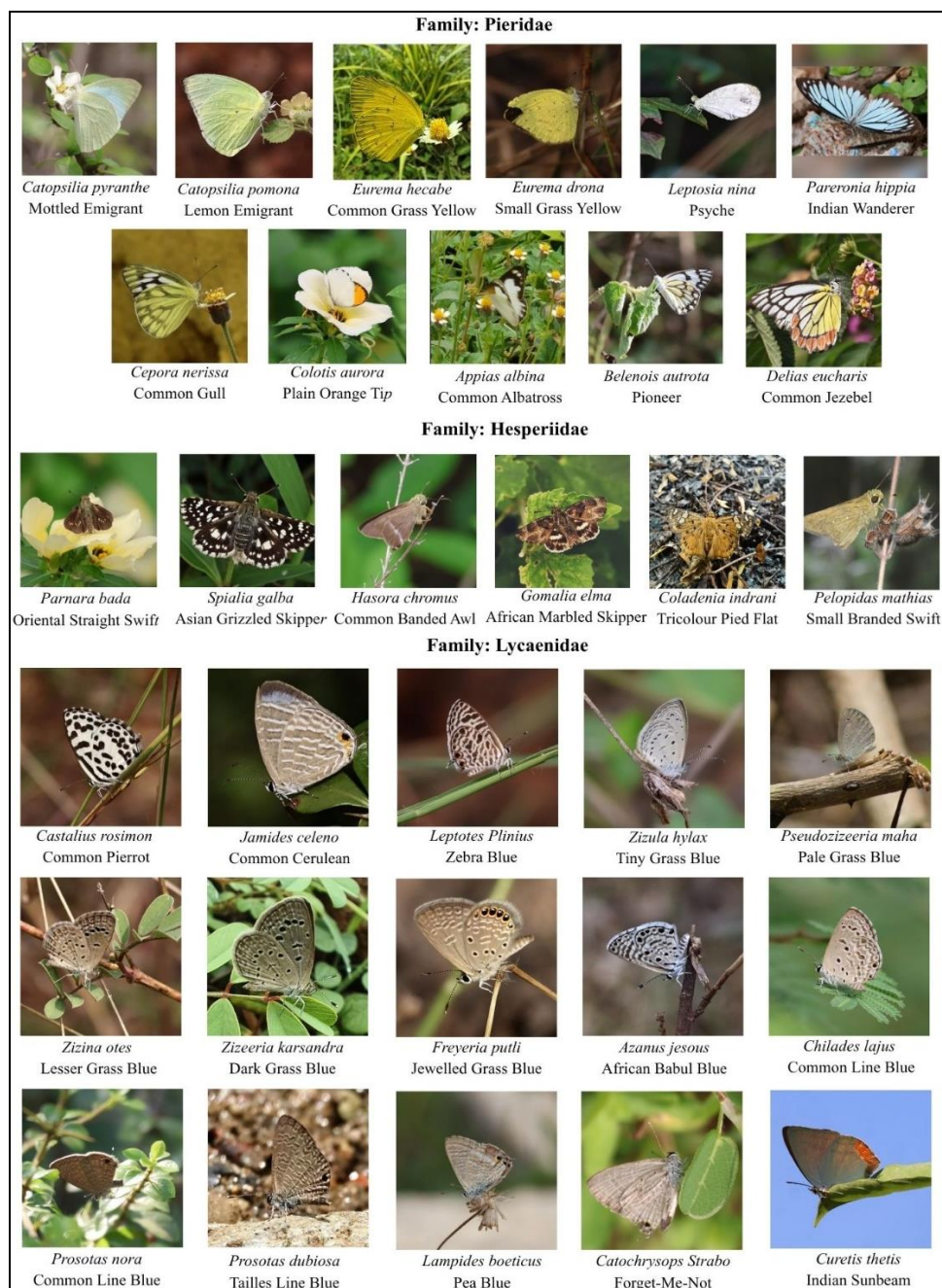


Fig 3: Photographs of the butterflies recorded at Pachamalai Hill from March 2025 to February 2026

The family-wise composition of butterflies recorded from Pachamalai Hill, Chennai, Tamil Nadu between March 2025 and February 2026 showed that Nymphalidae was the most dominant family (22 species, 37%) followed by Lycaenidae (15 species, 25%), Pieridae contributed (11 species, 18%), while both Papilionidae and Hesperidae families had equal contributions (six species each, 10%) shown in the (Table 2 and Figure 2). Therefore, it is concluded that the study area is rich in butterfly diversity, further research on butterfly diversity for the conservation of butterflies in the study area is of great concern. The current checklist is based on a survey conducted for one year. Butterfly abundance is a sign of a healthy ecosystem. A slight alteration in the surroundings could cause the butterfly population to drastically decline. Decrease in butterflies may result in the "butterfly effect," which has an ongoing impact on the environment at all trophic levels (Altermatte & Pearse, 2011)^[2].

Table 3: Diversity Indices of butterflies from the Pachamalai Hill from March 2025 to February 2026

Diversity Metrics	Value
Shannon diversity index (H')	3.446
Simpson dominance (1-D)	0.960
Pielou's evenness (J')	0.842

The diversity indices calculated for butterflies of Pachamalai Hill between March 2025 and February 2026 are given in Table 3. The Shannon diversity index (H') was 3.446 indicating the species richness of the Pachamalai Hill from March 2025 to February 2026. The Simpson index (1-D) typically falls between 0 and 1, (1-D = 0.960), indicating a very high diversity. The Pielou's evenness (J') was 0.842 signifying the even distribution of individuals among the species. Similar findings was reported by National-level reviews (e.g., Gaonkar, 1996; Kehimkar, 2016)^[8, 13] emphasized that India's butterfly fauna was among the

richest in Asia, with checklists serving as baseline data for biodiversity monitoring and ecological assessments. Overall, the butterfly diversity and the family-wise composition suggested that Pachamalai Hill supported butterflies, implying an ecologically balanced system where conservation strategies should be adopted to protect host plants, maintaining and monitoring rare and protected species to sustain butterfly diversity.

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