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Butterflies and moth at Singapore Changi Airport

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Abstract

To pollinate flowers, the significance of butterflies or moth is noteworthy within the other insects. Its longevity is remarkable due to honey sucking from the flowers. In addition, its ornamental wings are perfect to attract someone. Experts of the horticulture sector of the 'Singapore Changi Airport' is maintaining their number and breeding all the year round. They use a significant emergence cage for successful outcome of adults of all butterflies and moth. Workers do not maintain specific temperature and humidity for the emergence of butterflies and moth. As usual temperature and humidity of the garden are enough to emerge butterflies and moth from the emergence box. Some papers suggested breeding-related parameters ranges from 27-28 °C temperature, humidity 60-80%, incubation 2-10 days, larval development 11-26 days, and pupation 5-28 days as well. The emergence rate of the butterflies at this garden was found remarkable. Most of the butterflies and moth were seen all the year-round. Collected healthy pupae from this garden or other places put within the emergence cage to avoid natural disasters and adverse climatic condition. The number of butterflies is increasing and now this place is considered a remarkable recreational spot for everybody.

Keywords: Butterfly, butterfly garden, moth, availability, breeding, emergence, Changi Airport, Singapore

Introduction

The 'Changi Airport' is one of the largest airports in Asia (Plate 1). It has opened in the year 1981 and the butterfly garden in 2008 with 330 square meters. This airport has six terminals where the butterfly garden is located terminal 3 and level 2 and 3. Ms Tamilselvi (Selvi) of the Changi Airport Group's Horticulture team led this butterfly garden for the past seven years (Jemangin, 2024). Under this airport it has fifteen tourist spots including remarkable butterfly garden. The horticulture sector of this airport is controlling this butterfly garden. They have experts and workers to maintain this garden. Within this garden for foraging and breeding of such butterflies lots of plants that are related to the breeding of butterflies are playing an important role (Table 3; Table 4). Flowering plants and provided fruits especially cut pineapples are their only food. Due to sucking honey from the nectar gland of flowers, butterflies get higher longevity than other insects. Depending on the season, butterflies are emerged. The experts check always the fitness of butterflies as well as their

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pupae. They collect healthy pupae from the plants of this garden then attach to the stick inside the emergence box. For proper emergence, they do not maintain specific temperature and humidity. Till now, adults are emerging at the as usual garden's climatic condition. At the regular interval, this box is opened to release the newly emerged butterflies (Plate 6). Butterflies are important group of model organisms to investigate many areas like pest control, embryology, evolution, genetics, population dynamics, and biodiversity conservation (Afrin et al., 2015). Based on the ecological balance as well as the pollination of many flowers the significance of butterflies can be mentionable. To focus the tropical paradise, educational experience, waterfall feature, species diversity, protective design, and pollinator focus this garden has been established (Butterfly Garden, 2025). The objective of this write-up is to mention the availability and breeding performance of butterflies and moth on the verge of biodiversity conservation.

Plate 1. Butterfly Garden at Changi Airport

Materials and Methods

Butterfly species: There were found 30 species of butterflies and moth with a remarkable number (Plates 3-5). An emergence cage was sufficient to keep pupae for emergence (Plate 6). Some common flower picking appliance and knives for cutting pineapple were used in this garden. There are 1000 butterflies and moth with 25-45 species native to Southeast Asia. Inside this garden, there is a striking six-meter-tall grotto-waterfall. Each Wednesday, about 600 pupae butterfly arrive from overseas (Jemangin, 2024).

Table 1. Status of butterflies and moth at Changi Airport

Serial	Names (numbers)	Family	Status
	Family: Papilionidae (6)		
1	Common rose, *Pachliopta aristolochiae*	Papilionidae	Year-round
2	Common mime, *Chilasa clytea*	Papilionidae	Year-round
3	Lime butterfly, *Papilio demoleus*	Papilionidae	Year-round
4	Great mormon, *Papilio memnon*	Papilionidae	Year-round
5	Common mormon, *Papilio polytes*	Papilionidae	Year-round
6	Common birdwing, *Troides helena*	Papilionidae	Year-round
	Family: Nymphalidae (19)		
7	Common sergeant, *Athyma perius*	Nymphalidae	Year-round
8	New lacewing, *Cethosia cnane*	Nymphalidae	Year-round
9	Plain tiger, *Danaus chrysippus*	Nymphalidae	Year-round
10	Autumn leaf, *Doleschallia bisaltide*	Nymphalidae	Year-round
11	Plain blue-crow, *Euploea modesta*	Nymphalidae	Year-round
12	Great egg-fly, *Hypotimnas bolina*	Nymphalidae	Year-round
13	Tree nymph, *Idea leuconoe*	Nymphalidae	Year-round
14	Indian leaf-butterfly, *Kallima paralekta*	Nymphalidae	Year-round
15	Arachduke, *Lexias dirtea*	Nymphalidae	Year-round
16	Common sailor, *Neptis hylas*	Nymphalidae	Year-round
17	Yellow grassy tiger, *Parantica aspasia*	Nymphalidae	Year-round
18	Clipper, *Parthenos sylvia*	Nymphalidae	Year-round (rare and opportunistic visitor)
19	Common leopard, *Phalanta phalantha*	Nymphalidae	Year-round
20	Peacock pansy, *Precis almana*	Nymphalidae	Year-round

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21	Grey pansy, *Precis atlites*	Nymphalidae	March, May, June, September (dry season)
22	Chocolate pansy, *Precis iphita*	Nymphalidae	Year-round
23	Blue glassy tiger, *Rodena vulgaris*	Nymphalidae	Year-round
24	Common earl, *Tunaecia julii*	Nymphalidae	Year-round
25	The cruiser, *Vindula dejone*	Nymphalidae	April, May
	Family: Pieridae (4)		
26	Common albatross, *Appias libythea*	Pieridae	Year-round
27	Chocolate albatross, *Appias lyncida*	Pieridae	Year-round
28	Orange emigrant, *Catopsilla scylla*	Pieridae	Year-round
29	Common grass yellow, *Eurema hecabe*	Pieridae	Year-round
	Family: Saturniidae (1)		
30	Atlas moth, *Attacus atlas*	Saturniidae	November-January, but found year-round

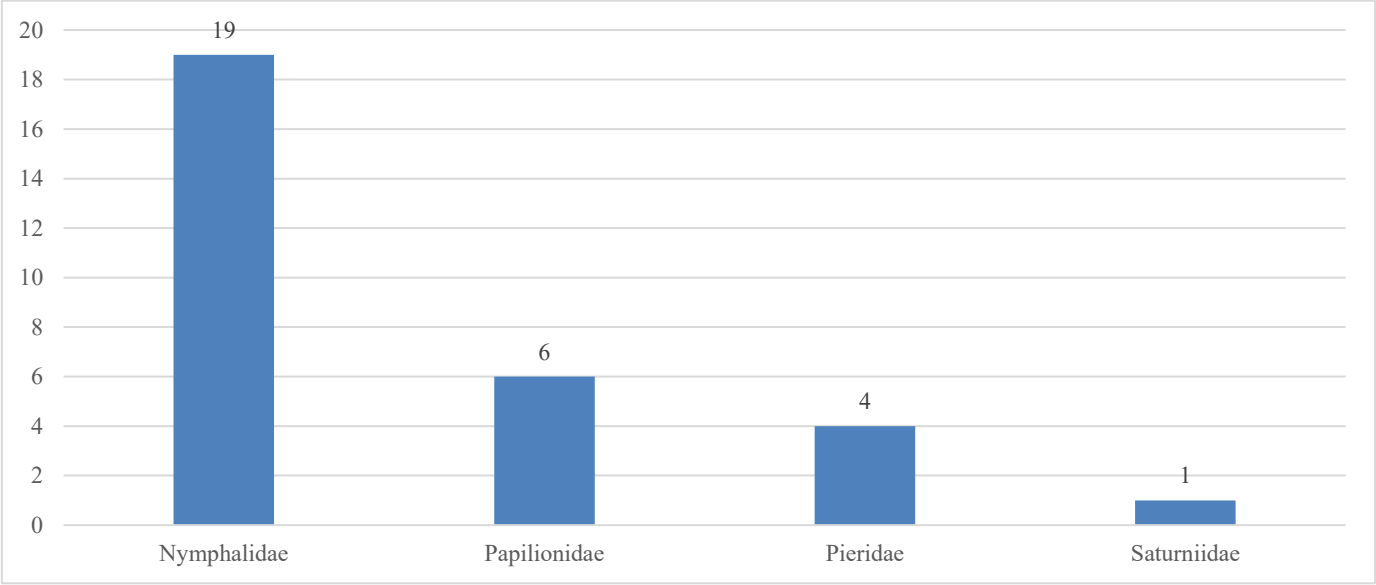

Figure 1. Number of butterflies and moth on the basis of their corresponding families

Table 2. Characteristics of the families of butterflies and moth

Families	Characteristics of the families	Examples	Images
Nymphalidae	Brush-footed butterflies; reduced forelegs (useless for walking); diverse wing pattern; undersides are used for the camouflage; feeding on nectar, sap, or dung	Cruiser, sergeant, new lacewing, plain tiger, autumn leaf, plain blue-crow, great egg-fly, tree nymph, Indian leaf-butterfly, arachduke, common sailor, yellow glassy tiger, clipper, common leopard, peacock pansy, grey pansy, chocolate pansy, blue glassy tiger, common earl	 Plate 2. Clipper butterfly
Papilionidae	Large sized; bright colours; many species have distinctive hindwing tails; well-developed proboscis; caterpillars use scent-emitting organ to repel predators	Mime, common rose, lime butterfly, great mormon, common mormon, common birdwing	

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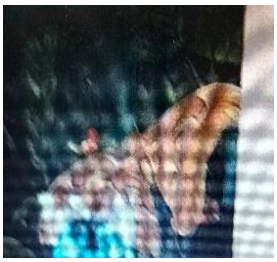
			Plate 3. Common birdwing
Pieridae	Unique forewings have radial vein with 3 or 4 branches; use waste products pigments for their colours; three sets of functional legs; larvae known as 'cabbage-worm' and pest for the cruciferous plants	Common albatross, chocolate albatross, orange emigrant, common grass yellow	 Plate 4. Plain tiger
Saturniidae	Silk moth; reduced mouthparts; prominent eyespots are used for predator defense; life-cycle is large	Atlas moth	 Plate 5. Atlas moth

Host plants: There were nine types of remarkable host plants inside this garden. Those plants provided shelter, nectar, and food for the butterflies. When plants brought into this garden are carefully checked to ensure they are pest-free (Jemangin, 2024). The most common colour of larvae was found green and this is important to hide themselves in nature (Cibulkova et al., 2014). Caterpillars are liked to be camouflaged on stems, while adults are camouflaged on the trunks of trees or leaves (Gaitonde et al., 2018).

Table 3. Host plants for butterflies

Serial	Names	Family	Importance for caterpillars
1	Peacock flower, *Caecalpinia pulcherrima*	Fabaceae	Leaves
2	Pink bottlebrush, *Calliandra surinamensis*	Fabaceae	Nectar
3	Red bottlebrush, *Calliandra emarginata*	Fabaceae	Nectar
4	Indian birthwort, *Aristolochia acuminata*	Aristolochiaceae	Leaves
5	Calico plant, *Aristolochia elegans*	Aristolochiaceae	Leaves
6	Coral vine, *Antigonon leptepus*	Polygonaceae	Nectar
7	Chinese violet, *Asystasia gangetica*	Acanthaceae	Leaves
8	Butterfly reest, *Calathea lutea*	Marantaceae	Nectar; Protection (for larger leaves)
9	Golden fiddlewood, *Citharexylum fruticosum*	Verbenaceae	Nectar

Emergence box: A steel emergence box was used to maintain the emergence of such butterflies. Glue was used to attach those pupae inside the bar of the emergence box. At regular interval the emerged adult butterflies came out from this box by the help of the workers of this garden. Workers did not allow weak pupae within this box. The sponge base of the emergence box ensures any falls of the pupae (Jemangin, 2024). Workers do not maintain any specific temperature and humidity for the emergence of butterflies and moth from the emergence cage. As usual temperature and humidity of this garden is enough to emerge of such butterflies and moth.

Plate 6. Emergence cage

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Results and Discussion

Number of butterflies: Due to proper maintenance all species of butterflies were found adequate (Table 1; Table 2; Figure 1). This garden has two sections. Side by side partition and height of this garden, and waterfall for controlling of moisture of this area allowed to increase the number of butterflies. Actually, the environment of butterflies of this garden is impeccable. Second floor of this garden is perfect to count the number of butterflies at all. Species in Nymphalidae family (Table 2) were found the highest number (19 out of 30 species). A study in Bangladesh focused the highest nymphalid butterflies that were 12 out of 23 species (Kabir, 2024).

Feed for them: As butterflies are honey eater, so flowers of this garden and introduced gerbera flowers helped to suck nectar (Plate 2). Additionally, for glucose content, pineapple was perfect. the overall fitness of those butterflies was found significant. Healthy butterflies were seen at the time of this visit. Potted nectar-producing plants are replaced weekly to ensure a varied diet for fresh natural nectar. Supplementary feeding stations, stocked with cut red gerberas and fresh pineapple slices (twice a week). Rock and soil of this garden provide vital nutrient for the butterflies (Jemangin, 2024).

Breeding biology: To protect butterflies, these areas are disinfected before each replacement, preventing pests like ants and lizards. Butterflies are only active when it is bright and warm weather (Jemangin, 2024). Clipper butterfly (*Parthenos sylvia*) (Plate 2) which is extinct in the wild in Singapore, thrives here in a full swing (Jemangin, 2024). Experts and workers are always select and collect healthy butterflies for the breeding. In natural ecosystem, they laid sufficient eggs upper side or underside of the leaves. Caterpillars are used to feed enormously the leaves of plants. At a certain day that are depended on the species, caterpillars stop feeding and transformed into pupae. These pupae are attached to the stems or leaves of plants. Due to unwanted climatic change and for visitors sometimes these pupae can be destroyed, so the gardeners collect such pupae and through the emergence box, they got adult butterflies.

Table 4. Breeding biology of some butterflies and moth

Common names (family)	Temperature and humidity	Incubation (days)	Larval development (days)	Pupation (days)	References
Common rose (Papilionidae)	28 ± 3 °C 70 ± 5%	5 ± 0.6	11 ± 0.3	12 ± 0.63	Alam et al., 2014
Orange emigrant (Pieridae)	27-30 °C 60-70%	1.5-2	11-13	7	Weei, G. C., 2001; Kumar, D. N. T., 2024
Peacock pansy (Nymphalidae)	28 ± 2 °C 80 ± 10%	3	15-16	5-7	Rayalu, B. M., 2012
Atlas moth (Saturniidae)	27 ± 1 °C 75-80%	10	26.5	28	Sathe and Kavane, 2014

Conclusions

The butterfly garden of Singapore Changi Airport is playing a conservation role. Till now, this is just a recreational place for the visitor. If the authority makes it for the research-oriented site, this garden will be more developed. In front of this garden, the information about butterflies (list of species, list of host plants, life-cycle of butterflies, food stations, etc.) were remarkable for the visitors' preliminary ideas. This garden could collaborate with research intuitions to enhance scientific studies. Due to buildings and roads in urban areas, butterflies face greater risk to their easy movements (Jain et al., 2018; Jain and Chan, 2021). In this sense, this type of protective garden could play a significant role for the ultimate conservation of butterflies and moth.

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