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ENGINEERING AND TECHNOLOGY
COLLOQUIUM



THE POWER OF SCIENTIFIC INNOVATION

INTELLIGENT SOLUTIONS FOR A
SUSTAINABLE WORLD

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PREFACE

Welcome to the 2nd International Science, Engineering and Technology Colloquium 2025 (ISETC 2025)!

It is with great pleasure that we present this year's colloquium, a distinguished gathering of scholars, researchers, and professionals dedicated to the advancement of applied sciences. Held virtually on 9th July 2025, ISETC 2025 serves as a platform to highlight cutting-edge research, foster meaningful networking, encourage collaborations, and explore innovative solutions to global challenges.

This year's theme, "The Power of Scientific Innovation: Intelligent Solutions for a Sustainable World" highlights our shared goal to solve global challenges through applied science. It celebrates innovation as a key to building a more sustainable and resilient future. We're proud to feature keynote speakers and presenters who bring fresh insights, bold ideas, and breakthroughs shaping tomorrow's world.

We would like to extend our heartfelt appreciation to the Faculty of Applied Sciences, Universiti Teknologi MARA, Perak Branch, Tapah Campus, for their outstanding support and assistance throughout the planning and execution of the event. Their dedication has been instrumental to the success of this colloquium. We would like to sincerely thank all participants and researchers for their valuable contributions. We also appreciate the reviewers for their careful evaluations and helpful feedback. Your hard work and support mean a lot to us.

As editors, we are proud to present this collection of proceedings. It is an honour to bring together the interesting and meaningful work of our speakers and authors. We hope the ideas shared will lead to new discoveries, encourage more research, and help solve global challenges through science and innovation.

Warm regards,

Dr. Emi Norzehan Mohamad Mahbob

Dr. Saiyidah Nafisah Hashim

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ISETC 2025 Proceedings Editors

PRELIMINARY CHECKLIST OF LEPIDOPTERA AND ODONATA AT UPSI ADVENTURE PARK FRAGMENTED FOREST

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Abstract: Lepidoptera and Odonata plays vital roles in pollination, nutrient cycling and serving as bio-indicators of environmental health. This study aimed to determine the species composition of Lepidoptera and Odonata at UPSI Adventure Park (UAP) fragmented forest. Field surveys were conducted using transect and sweep netting technique. Species identification was carried out by using standard identification keys and reference collections. A total of seven species of Lepidoptera, belonging to four families (Nymphalidae, Pieridae, Tineidae and Papilionidae) were recorded. Meanwhile for Odonata, three species belonging to two families (Libellulidae and Calopterygidae) were identified. This study demonstrated the first checklist of Lepidoptera and Odonata of UAP fragmented forest. It is recommended that future research incorporate long-term monitoring and habitat quality assessments, along with molecular tools for species identification.

Keywords: *Species composition, species richness, species abundance, insect diversity, secondary forest*

INTRODUCTION

Malaysia, located within the Sundaland biodiversity hotspot, is renowned for its rich and diverse ecosystems, ranging from tropical rainforests to freshwater wetlands. This ecological wealth supports a remarkable variety of insect fauna, particularly within the orders Lepidoptera (butterflies and moths) and Odonata (dragonflies and damselflies).

Lepidoptera, one of the largest orders of insects, encompasses both butterflies and moths species. Malaysia is home to over 1200 species of butterflies and thousands of moth species, making it one of the most butterfly-rich countries in South East Asia (Yang et al., 2024). Iconic species such as the Rajah Brooke's Birdwing (*Trogonoptera brookiana*), Malaysia's national butterflies, and various species of Nymphalidae showcase the country's lepidopteran diversity. Meanwhile, the Odonata order, comprising dragonflies and damselflies is also well represented in Malaysia, with over 400 recorded species (Choong, 2023). Dragonflies and damselflies are key bioindicators of freshwater ecosystem health due to their sensitivity to water quality and habitat changes. Malaysia's rivers, peat swamps, waterfalls and forest streams provide ideal breeding grounds for a wide array of odonates. Notable genera include *Rhinocypha*, *Libellago* and *Neurobasis* often found in pristine forest streams, as well as widespread genera like *Orthetrum* and *Trithemis* in disturbed habitats.

Both Lepidoptera and Odonata play crucial ecological roles as pollinators, prey and indicators of ecosystem integrity. However, forest fragmentation caused by logging, agriculture and urban development poses significant threats to their population. Forest fragmentation is the breaking up of continuous forest habitats into smaller and isolated patches. This process has profound impacts on Lepidoptera and Odonata, both of which are heavily influenced by changes in habitat structure, microclimate and resource availability. Butterfly and moth species have specific host plant requirements, and forest fragmentation can reduce the availability of these plants (Das et al., 2025). Dragonflies and damselflies require freshwater habitats for reproduction, but forest fragmentation often disrupts these water bodies or exposes them to sedimentation and pollution. Globally, studies have shown that Lepidoptera and Odonata species richness is significantly lower in fragmented forests compared to contiguous forests (Cleary et al., 2025). Data from previous authors also shown that Lepidoptera and Odonata communities in fragmented forests tend to lack forest specialists and are dominated by disturbance-tolerant species (Kaltsas et al., 2025).

This study aimed to determine the species composition of the Lepidoptera and Odonata at the UPSI Adventure Park fragmented forest because both orders are crucial bio-indicators for a healthy ecosystem.

MATERIALS AND METHODS

Study Area

The study was conducted in the UPSI Adventure Park fragmented forest, characterized by isolated patches of secondary forest interspersed with orchards, rubber plantations, human settlements and university campus. The region experiences a tropical monsoon climate with distinct wet and dry seasons. Vegetation is primarily composed of native species such as *Ploiarium alternifolium*, *Melastoma malabathricum*, *Dillenia suffruticosa*, *Dipterocarpus costulatus*, *Dipterocarpus grandiflorus*, *Shorea curtisii*, *Pterygota alata*, *Camposperma auriculatum*, *Peronema canescens*, *Pometia pinnata*, *Elaeocarpus griffithii*, *Diospyros sp*, *Palaquium sp* and *Buchanania sp*.

Specimen Sampling

Lepidoptera and Odonata sampling were carried out using the sweep netting technique, a standard method for collecting diurnal, low flying Lepidoptera and Odonata in terrestrial habitats (Ruslan et al., 2025). Sampling was conducted during peak activity periods, specifically from 8-11 am and 3-6 pm for four days, under favorable weather conditions (clear skies, minimal wind and dry vegetation). Specimens were collected along 1 km of trail 1 within the study site. At each transect, continuous sweeps were performed by walking slowly through the vegetation and swinging the net in a wider arc to intercept flying and resting specimens. Captured specimens were carefully sacrificed and transferred into labeled envelopes to prevent damage, and subsequently preserved for identification and analysis. To minimize ecological impact, only representative individuals were collected.

Specimen Identification

Collected Lepidoptera and Odonata specimens were identified to the lowest possible taxonomic level using standard identification keys and reference collections where available (Daru, 2025). Identification was carried out under a stereomicroscope to examine key morphological features, including wing patterns, venation and antennae structure. When necessary, expert consultation and comparison with reference collections and digital databases such as the Malaysia Biodiversity Information System (MyBIS) were used to confirm species identification. All specimens were labeled with collection data and cataloged for future reference.

RESULTS AND DISCUSSION

This study recorded seven species of Lepidoptera from four families and three species of Odonata from two families were found at the UPSI Adventure Park (UAP) fragmented forest (Table 1, Table 2, Figure 1 and Figure 2). For the Lepidoptera, family Nymphalidae exhibited the most species, namely, *Faunis canens*, *Ragadia macuta*, *Junonia orithya* and *Terinos clarissa*. Meanwhile, for Odonata, family Libellulidae exhibited the most species, namely, *Rhyothemis phyllis* and *Brachythemis contaminata*. Almost all species found at UAP fragmented forest are categorized by the IUCN as either not evaluated or least concern. Interestingly, Malaysia's national butterfly, *Trogonoptera brookiana* or Rajah Brooke's Birdwing was also observed. This species is a protected species (CITES Appendix II) under the Wildlife Conservation Act 2010. CITES Appendix II listing restricts international trade of the species and requiring permits for export to ensure sustainable use (Hughes et al., 2023).

Table 1. A checklist of Lepidoptera species recorded at the UPSI Adventure Park fragmented forest

No.	Scientific Name	Common Name	IUCN Status
Family: Nymphalidae			
1	<i>Faunis canens</i>	Common Faun	Not Evaluated
2	<i>Ragadia macuta</i>	Malayan Ringlet	Not Evaluated
3	<i>Junonia orithya</i>	Blue Pansy	Least Concern
4	<i>Terinos clarissa</i>	Malayan Assyrian	Not Evaluated
Family: Pieridae			
5	<i>Eurema hecabe</i>	Common Grass Yellow	Least Concern
Family: Tineidae			
6	<i>Tinea sp</i>	Clothes Moth	Not Evaluated
Family: Papilionidae			
7	<i>Trogonoptera brookiana</i>	Rajah Brooke's Birdwing	Least Concern and CITES Appendix II

Table 2. A checklist of Odonata species recorded at the UPSI Adventure Park fragmented forest

No.	Scientific Name	Common Name	IUCN Status
Family: Libellulidae			
1	<i>Rhyothemis phyllis</i>	Yellow-striped Flutterer	Least Concern
2	<i>Brachythemis contaminata</i>	Asian Amberwing	Least Concern
Family: Calopterygidae			
3	<i>Vestalis amoena</i>	Charming Flashwing	Least Concern

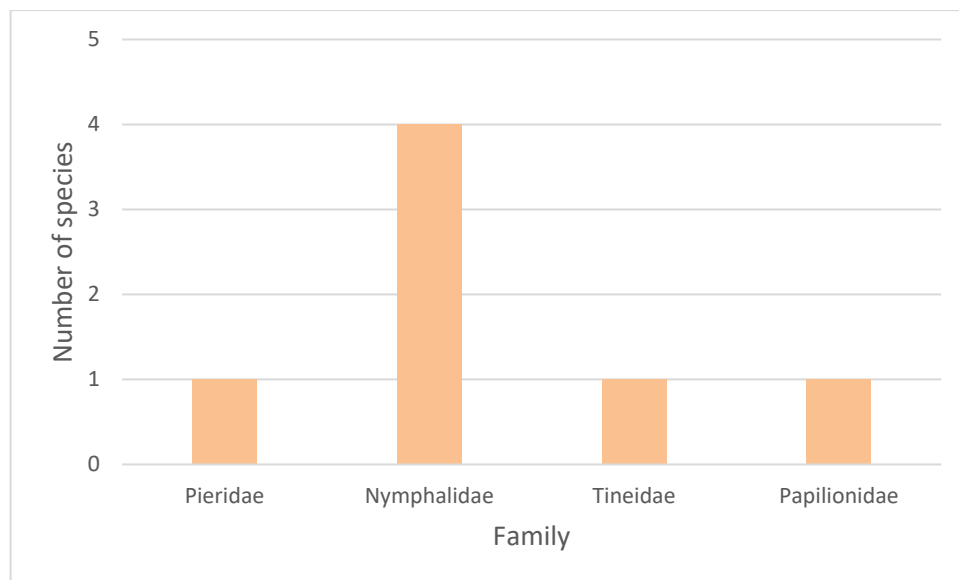


Figure 1. Composition of Lepidoptera species at the UPSI Adventure Park fragmented forest

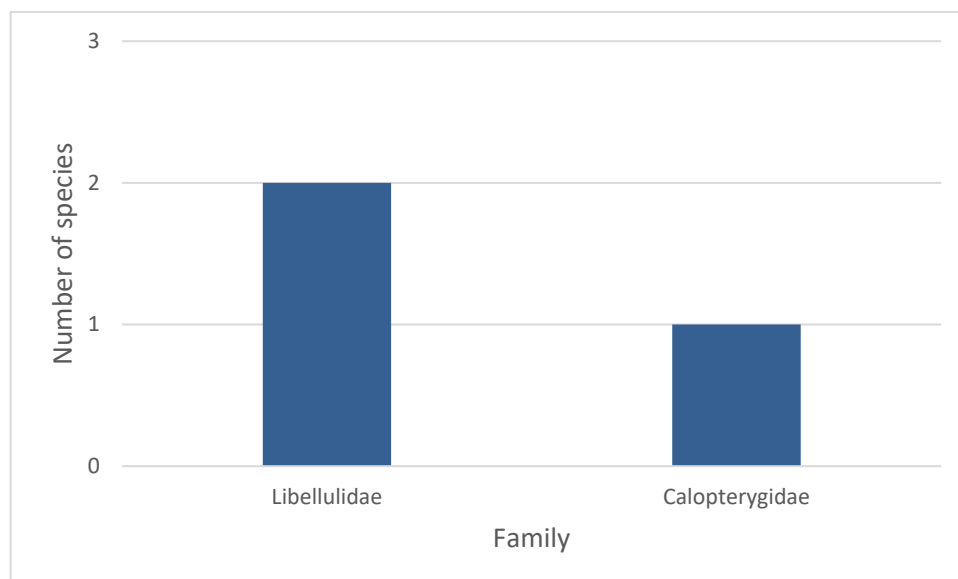


Figure 2. Composition of Odonata species at the UPSI Adventure Park fragmented forest

The current Lepidoptera and Odonata checklist of UAP fragmented forest will serve as a baseline, reinforcing the need for further ecological research. Undertaking this inventory will play a pivotal role in refining the checklist, cataloging the species host plants and enabling a precise and effective conservation strategy for the UAP fragmented forest Lepidoptera and Odonata population.

CONCLUSIONS

This study concluded that the number of Lepidoptera and Odonata species found in the UPSI Adventure Park (UAP) fragmented forest is still low and far from complete. While this may be the first checklist of Lepidoptera and Odonata at the UAP fragmented forest, consistent monitoring and future study is necessary to monitor the health of the forest ecosystem. Future work may involve observing the Lepidoptera and Odonata diversity in the remaining UAP fragmented forest, incorporate long-term monitoring and habitat quality assessments, along with molecular tools for species identification. More species are expected to be found with further research.

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Surat kami : 700-KPK (PRP.UP.1/20/1)
Tarikh : 20 Januari 2023



Prof. Madya Dr. Nur Hisham Ibrahim
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3. Tujuan permohonan ini adalah bagi membolehkan akses yang lebih meluas oleh pengguna perpustakaan terhadap semua maklumat yang terkandung di dalam penerbitan melalui laman Web PTAR UiTM Cawangan Perak.

Kelulusan daripada pihak tuan dalam perkara ini amat dihargai.

Sekian, terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah,

Setuju.

27.1.2023

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