



## **Insects of Gunung Ledang, Johor, Malaysia**

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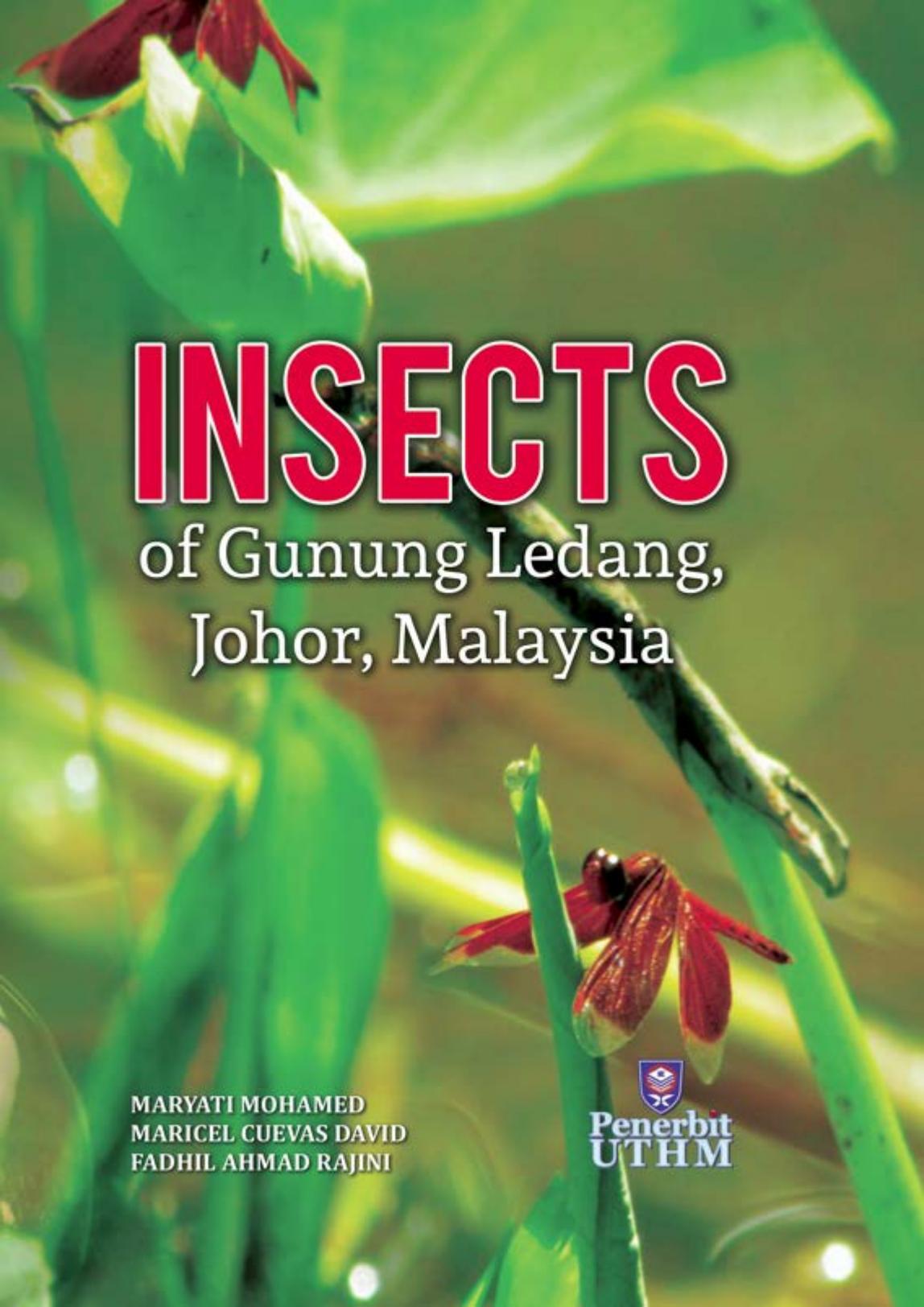
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**Abstract:** This book starts with an introductory overview of insects and entomotourism potential as new type of nature tourism in Gunung Ledang, Johor, Malaysia. The book is divided into four chapters from general information of common group of insect until orders to species name (if possible) of insects. This book is suitable for those who are interested in learning about insect in general.

**Keywords:** Food, feeding, digestion, insects





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of Gunung Ledang,  
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# PREFACE

Insect is the most diverse organisms on earth and can be found on land and in freshwater. They are unique animals, strange and have many admirable characteristics which cannot be seen in other organisms. Insects are beneficial to man ecologically and economically.

This book is written with the intention to provide information on insects of Gunung Ledang, their importance, significance and functions to our ecosystem. Since Gunung Ledang is a national park and one of the tourist destinations in Johor as well as in Malaysia, we believe that this book will serve as a guideline to promote insect as a tourism product in Gunung Ledang, Johor, Malaysia.

Common insect groups herein described are those found along trails used by tourists in Gunung Ledang. Since ants were found to be most common, they are described first. Simply presented, this book aims to educate young readers with interest on insects. With basic information provided, we hope readers would then be encouraged to make effort to learn the importance of insects and eventually participate in their conservation.

Under the memorandum of understanding signed in 2010, UTHM has been continuously doing research in Gunung Ledang. This means more information would be available in the near future to improve this book. Meanwhile, we hope this book will be useful to create awareness to readers on the richness of insects of Gunung Ledang, realized their importance and learn to appreciate them. Happy reading.





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# CHAPTER I

## INTRODUCTION

Insects are among the most successful and the most diverse living creatures on this earth. They readily intrigued anyone with the slightest interest in the natural world (Picker *et al.*, 2004).

Insect is a group of organisms that contributes most to the rich biodiversity in Malaysia and the world. There could be more than a million species of insects worldwide that have been described and the number is constantly increasing (Maryati, 2000). Records of insect estimation show that there are 100,000 species of beetles (Thiessen, 2012), 28,000 species of butterflies (Islam *et al.*, 2011), 3,000 species of phasmids (Australian Museum, 2013), 2,500 species of cicadas (Sueur *et al.*, 2009), 5,500 species of dragonflies (Abbott, 2005), 2,600 species of termites (Ahmed *et al.*, 2011), and more than 12,000 species of ants reported worldwide with further expected numbers of species up to 22,000 (Umair *et al.*, 2012).

In Malaysia, MONRE (2007), estimated 150,000 invertebrates have been identified and most of them are insects. Insect is not only species rich but is generally abundant and a potential conspicuous tourism product. Hence, high diversity of insects, in Malaysia is something to be proud of and is of potential significance in promoting nature tourism particularly **Entomotourism**.

Entomotourism or also known as insect tourism is not a totally new idea in Malaysia. Several butterfly farms have been established around the country, including in Kuala Lumpur, in Penang, and in Sabah. The Cameron Highlands is known as the butterfly capital of Malaysia (Eliot and Bickersteth, 2002). Perhaps another common insect that has attracted people is the fireflies. People has been engaged in tourism of firefly in sites such as Kuala Selangor, in Selangor and along Sungai Garama in Beaufort, Sabah.



# CHAPTER 2

## FOOD, FEEDING AND DIGESTION

All insects need food and water to grow successfully. Food preference depends on kind of insects. Finding and recognition of such foods involves various mechanisms which are also depending on the insect groups and its particular mode of life. Feeding and ingestion involve modification of the mouthparts and physiological adaptations (Yadav, 2003).

### 2.0 Feeding Types of Insects

**2.1 Phytophagous** insects are plant-eaters that feed on variety of plant parts such as flowers, seeds, or leaves or may eat inside the plants' tissues (McGavin, 2000), In addition, nearly half of the phytophagous insects are able to feed on roots, stems, woody parts, buds, flowers and fruits (Yadav, 2003). The group of phytophagous insects are:

- a) Orthoptera (grasshoppers, locust, katydids and crickets)
- b) Lepidoptera (butterflies and moths - larvae)
- c) Homoptera (bugs, leafhoppers, planthoppers, spittle bugs, treehoppers, aphids, jumping plant lice, scale insects and whiteflies)
- d) Thysanoptera (thrips)
- e) Phasmatodea (phasmids, stick-insects or walking stick insects)
- f) Blattodea (termites)
- g) Coleoptera (plant eating families of beetles like Cerambycidae, Chrysomelidae and Curculionidae)
- h) Hymenoptera (symphyta or sawflies)
- i) Diptera (some flies)



# CHAPTER 3

## IMPORTANCE OF INSECTS

Insect is common to everyone and occur everywhere in the world (Howarth and Mull, 1992) except in the polar region and in the oceans (Powell and Hogue, 1980). In every ecological horizon on land and fresh water, insects live in great abundance like in soil, where many feed on decaying organic matter or on plant's roots; low-growing plants such as ferns and mosses; on or in the trunks of shrubs and trees; and on foliage, seeds of flowering plants or flower (Powell and Hogue, 1980).

Insect is a group of organism that contributes most to the rich biodiversity in Malaysia. There are more than a million species of insects worldwide that have been identified and the number is constantly increasing (Maryati, 2000).

At the present time about 1,500,000 species of animal are known, and of these more than 800,000 are insects. The number of individuals of common species that occur is swarms of ants, termites, locusts, and the like can number several thousands of individuals. Hence, on a global basis these populations add up to astronomical numbers.

Insects should not be seen as useless or nuisance creatures because they contribute to the human enterprise in many and different ways (Wagner *et al.*, 2008). Every species of insects has ecological role like pollinator, agent of nutrient cycling, and natural enemies (Wagner *et al.*, 2008).

Insects play an important role in the decomposition and recycling of dead plants, dead animals, and excrement. Thereby, helping to return minerals to the soil and helping to keep balance of atmospheric ratio of gases (Waldbauer, 2001).



## CHAPTER 4

# COMMON INSECTS FOUND IN LEDANG

The common group of insects found in Gunung Ledang were ants, termites, butterflies, dragonflies, damselflies, beetles, cicadas and moths.

Ants are the most visible and abundance insects found in Gunung Ledang regardless of seasons and time. Ants can be found everywhere in Gunung Ledang in different habitats such as leaf-litter, tree trunks, tree leaves and tourist walking trails. Ants are also the most abundant animal groups in tropical rain forest and ants occupy approximately one-third of the total biomass of all insects (Yamane *et al.*, 1996).

Termites in Gunung Ledang are commonly found marching in along the tourist trails during their foraging time. Some are also found in leaf-litter, tree trunks, dead wood, rocks and soil. Termites are highly social insects that feed exclusively on plant material and living colonies. Termites occur in vast numbers in tropical regions. In addition termites nest in soil, mound and trees or logs.

Butterflies in Gunung Ledang are commonly found near the flowering trees and plants where they can suck nectar. Butterflies are also found in different habitats and various types of forest such as natural forest, disturbed forest, and moderately forest.

Dragonflies and damselflies in Gunung Ledang are most visible near water bodies and in the open area. According to Orr (2003), the adults are encountered either when feeding, often far from their breeding places, or at the breeding sites, usually near water, where they mate and lay their eggs. Moreover, odonates are easy



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