

# CHAPTER I

## INTRODUCTION

### **Rationale and significance of the study**

Insects are the largest group of living organisms in the world and they are also the most diverse group. The order Hymenoptera, with over 130,000 species, is the third largest group of insect orders. This order contains 2 suborders: Symphyta (sawflies) and Apocrita. The Apocrita is divided into 2 infraorders or series: Parasitica (parasitic wasps) and Aculeata. The infraorder Aculeata contains 3 superfamilies: Apoidea, Chrysidoidea and Vespoidea. These include bees, wasps and ants. They are found in all continents except Antarctica. Large numbers of this group have been reported in tropical areas (Goulet and Huber, 1993; Gauld and Bolton, 1996).

Each of aculeate species plays various important roles in ecosystem. The bees which are one of the members in this infraorder are primary consumers (herbivore) in the food chain. For herbivores, apart of some phytophagous insects, they feed on pollen and/or nectar of economic crops and wild plants. These, fortunately, lead to the fertilization of those plants via insect pollination (Speight, Hunter and Watt, 1999). In ecosystems, aculeate bees maintain plant diversity. Insect pollinators, which usually mean the bees in superfamily Apoidea, are important for the survival of many flowering plants in tropical forests. The bees move pollen from plant to plant, ensuring seed set and gene flow between plants and plant populations (O'Toole and Raw, 1999; Sato, 2002). In return, the plants provide the bees with floral resources (nectar and pollen) that are vital to their own survival. Furthermore, in term of benefits to humans, the bees are providers of natural products. For instance, honey is not the only product of bee exploitation, propolis, bee pollen, and royal jelly are used in many dietary supplements. In addition, they are used as a component in medicine and the cosmetic industry. Further more, some ants and wasps (Vespoidea) have been used in biological pest control programs. They are, therefore, important for balancing and functioning the food webs of most ecosystems.

Species diversity among insects differs according to different geographic structures such as climate, latitude, habitat and forest types. High diversity in geographic structure (habitat or spatial heterogeneity) gives rise to a higher species diversity in aculeate bees. This is because heterogeneous habitats can support more species complex than homogeneity habitats (Finnamore, 1997; Painka, 2000; Araújo, Antonini and Araújo, 2006). The northern region of Thailand is characterized by a heterogeneous structure, dominated by tropical forests i.e. mixed deciduous forests and deciduous dipterocarp forests. The species number of nectar feeding insects in those forests is directly correlated with the number species of plants. At present, national parks and wildlife sanctuaries in northern Thailand have been deforested all the time. This is one of the most serious threats, including human settlements and commercial agriculture etc, to biodiversity as well as changing climate and geography. LaSalle and Gauld (1997) proposed that the aculeate bees are sensitive to the change in habitat, thus, the deforestation may reduce both populations and species diversity. Although some parts of this region have been deforested and converted for agricultural purposes, this region is one of the most biologically diverse areas in Thailand. Moreover, forests in the north of Thailand are important natural resources for local people because they provide many valuable products including medicinal herbs, floral greenery, water and other resources. Biological diversity is a basic characteristic of forests. Understanding biodiversity within this region is essential to the future management of ecosystems within them.

The northern region of Thailand was investigated as the study area for species survey and taxonomic study of the insects in infraorder Aculeata. The obtained results provided useful knowledge on taxonomy and species diversity of the infraorder Aculeata in the north of Thailand. This knowledge, therefore, will be used for further study in biology, taxonomy and sustainable conservation of aculeate bees in Thailand and elsewhere.

### **Purpose of the study**

This study aims to survey species diversity and taxonomic study of insects in the infraorder Aculeata found in the north of Thailand.

### Scope of the study

Areas in the Northern region of Thailand: Chiang Mai, Chiang Rai, Kamphaeng Phet, Lampang, Lamphun, Mae Hong Son, Nakhon Sawan, Nan, Phayao, Phetchabun, Phichit, Phitsanulok, Phrae, Sukhothai, Tak and Uttaradit was chosen as the study site at latitude 15.5 degrees north and longitude 100.5 degrees east. The surveys and sample collections were carried out during January 2006 to June 2007. The technique of systematic random sampling was used for sample collections. The specimens were identified using taxonomic literatures and references, and confirmed by experienced taxonomists from Natural History Museum (National Science Museum, Thailand), the Center of Excellence: Bee biology, biodiversity of insects and mites (Chulalongkorn University, Thailand), Department of Biology (Chiang Mai University, Thailand), Insect Museum (Kasetsart University, Kamphaeng Saen Campus, Thailand) and Institute of Zoology (Bulgarian Academy of Sciences, Bulgaria).

