

CHAPTER 1

GENERAL INTRODUCTION

Boletes are a large fungal group in the phylum *Basidiomycota*. They are well known as the mushroom with fleshy fruiting bodies and poroid hymenophores, several species are edible and a few are poisonous. Most of them form ectomycorrhizae, whilst some are either saprobes or parasites (Kirk *et al.*, 2001). Ectomycorrhizal (ECM) fungi are important components of forest biodiversity and forest restorations. They form symbiotic associations with feeder roots of many host trees and provide mineral nutrients, water and protection from pathogens to plants (Bruns and Bidartondo, 2002). Several boletes have been studied in different regions of the world, such as Australia (Bougher and Bougher, 1991), China (Zang, 1992), England (Laessoe and Conte, 1996; Watling, 1999), Malaysia (Corner, 1972), Thailand (Chandrasrikul *et al.*, 2008; Seehanan and Petcharat, 2008) and USA (McKnight and McKnight, 1987; Singer and Williams, 1992). Most of studies mentioned above are based on morphological characters probably not precise enough to be used for identification of species. Thus, molecular techniques have become important methods to define phylogenetic relationships among species and to rearrange the taxa of boletes, especially for the closely related groups of boletes such as *Agaricales* (gill mushroom) and *Gasteromycetes* (puff ball). Previously, all boletes are member of order *Agaricales* but recently mycologists find that, based on molecular techniques, 117 euagaric clades are present and could be placed in order

Boletales (Moncalvo *et al.*, 2002; Binder and Hibbett, 2006; Halling, 2008). The information about phylogeny of boletes in the world remains to be elucidated and established.

In Thailand, there is insufficient information of boletes. There are very few unpublished records for descriptions and the relationships between them and host plants, their distributions to resolve the question: “Is that depends on their hosts or usually grow at the different soil moisture contents, humidity and altitudes?” However, some tree species have been reported as hosts of various boletes in the temperate forests such as *Betula* spp., *Quercus* spp., *Pinus* spp., and *Elaeocapus* spp., which are also found on the high mountains in upper northern Thailand, so it should be productive to look for similar boletes here as in the temperate regions. The richness of boletes species records are come from the high diversity of plant hosts in the collecting sites. As we known that all national parks in our country are established to protect or conserve the rich endemic biota in the large forestry areas. The main objective of the present study is to study the diversity of boletes in the forests of some national parks in upper northern of Thailand. In addition ribosomal sequences of selected boletes species which are difficult to identify to genera or species level by using morphological characters were analyzed to establish phylogenetic relationships.

An outline of the information included in this thesis is provided in Figure 1.1. General introduction and a comprehensive literature review (diversity and taxonomy of boletes, molecular studies of *Basidiomycota* emphasized on boletes) are shown in Chapter 1 and 2 respectively. Materials and methods used to study the diversity and molecular phylogeny of boletes are described in sufficient detail (Chapter 3). The diversity and phylogenetic relationships among genera of boletes and related genera

were also determined by analyses of partial sequences of the large subunit (28S rDNA) and complete sequences of the ITS regions (including 5.8S rRNA gene) (Chapter 4). The morphological characters and the placement based on the phylogenetic relationship analyses of some interesting boletes species within three major suborders (*Boletineae*, *Sclerodermatineae* and *Suillineae*) are discussed in Chapter 5-7. Finally, a general discussion of this study are presented in Chapter 8.

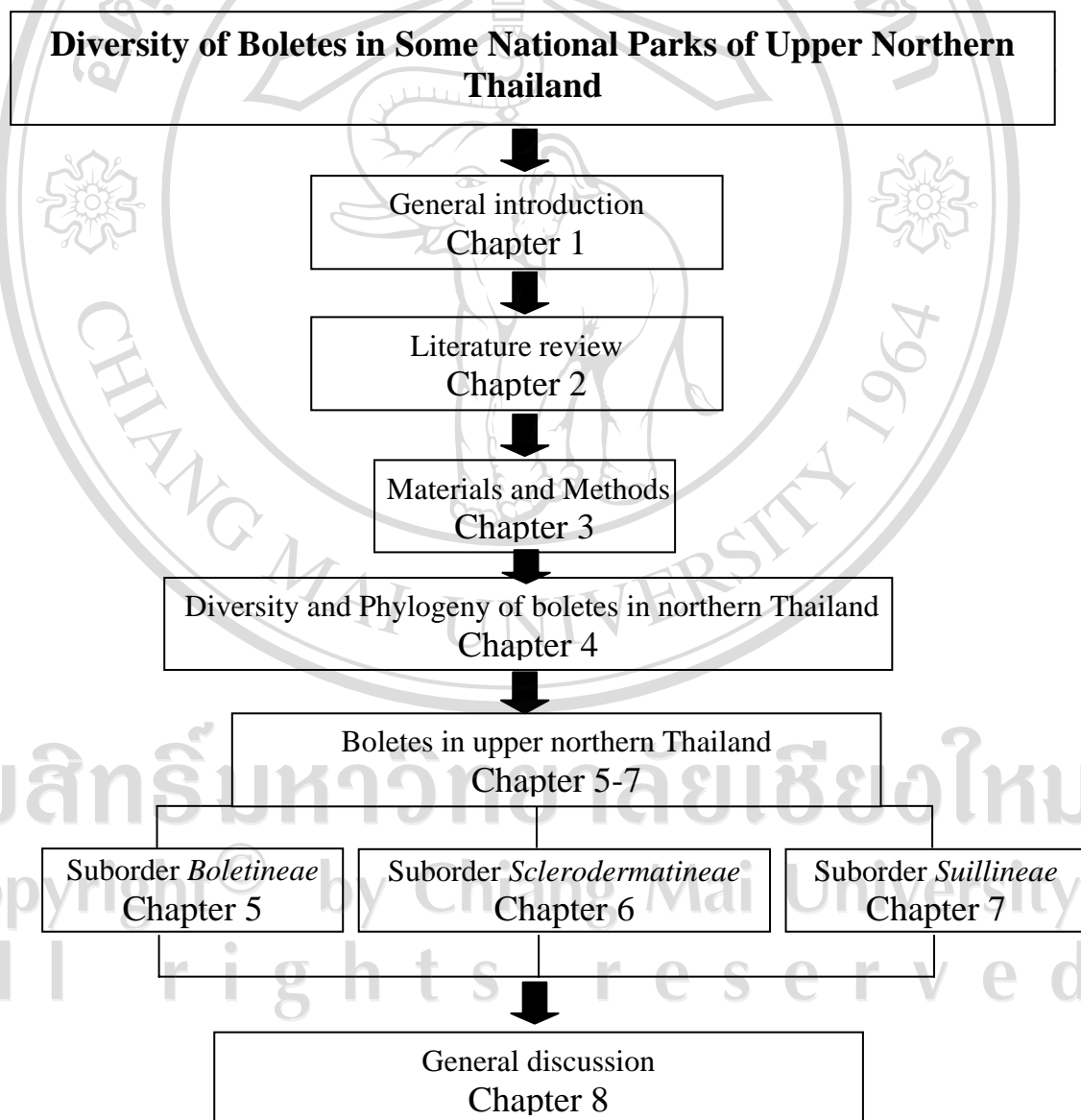


Figure 1.1 Schematic presentation of the relationship between chapters of the thesis.