CHAPTER I
Introduction

Pollen analysis is the interpretation of the natural phenomena (Moore and Webb, 1978). It can give us useful information about condition of the target area in the present and the past by using the microfossil, pollen grains aand spores (West, 1971). Since the outer side of pollen grain wall is made of highly resistant material, the pollen grains and spores from 400 million years ago can be found today (Moore, Webb and Collinson, 1991). Each pollen grain and spore is different in structure and shape, thus, the morphology is key to understanding the kinds of vegetation that existed and their evolutionary development (Faegri, Iverson and Waterbolk, 1964).

The sediment samples can be analyzed for pollen grains and spores. The slide preparation of which are made and identified through high-power microscope. Then a pollen diagram, the graphical presentation of pollen analysis, can be constructed in consideration with sampling scrutiny. Analysis of this kind were first produced by the Swedish geologist Von Post in about 1916 (West, 1971). From the pollen diagram, information can be obtained about vegetational, floristic and climatic changing which took place in the past. The difference in the amount of pollen in 1 cm cubic sample tells us about the condition of the forest. For example, if the amount of pollen grains is small, it could be the tundra (moss), and the larger amounts indicate the deciduous forests (vegetation which depends on pollen or spore reproduction)(West, 1971). As the studying of the pollen analysis, researchers have to deal with many aspects such as wind direction, vegetation identification of surrounding area, pollen traveling distance, sediment deposition, turn-over rate of the sampling-site ecosystem, etc. (Moore and Webb, 1978).

Plant pollen grains and spores are often used to help making the predictions. Their outer shell of pollen grains or spores is indestructible and

can survive in certain sediments for tens and thousands of years (Vance and Mathewes, 1993). In pollen analysis the exines or shells of pollen grains are taken from soil and studied underneath the microscope. At this time the identification is done according to the distinctive shape and surface of exine (Moore and Webb, 1978). Once all the information is qualified the identifications are plotted as curves on a pollen diagram. Fluctuations in the curve for each plant category may indicate signs of climatic changes or forest clearance and crop planting by humans (Rhodes and Dawis, 1995; Aronson *et al*, 1993). Stratigraphy of pollen and spores provides evidence of chronology for vegetational changes in the drainage bog related to change in temperature, rainfall, soil development, and the disturbances cause by the activities of human (Ledru *et al*, 1996). Pollen stratigraphy is used in all comprehensive studies to combine other paleoecological analysis to the changes in the plant communities surrounding the area where is studied (Mancini, 1994; Rego and Rodriguez, 1993).

Moreover, the fruits, seeds, megaspores, and tissue fragments of a plant called plant macrofossils, are often found in sediments but are less abundant than microfossils. Plant macrofossils help to reconstruct the past, changes in plant succession, water levels, climate, etc.(Moore Webb and Collinson, 1983) They can be used to support the microfossil evidences.

Moore and Webb (1978) had mentioned about the value of microfossils as follow:

" Microfossils, especially pollen grains and spores, have proved so valuable as indicators of condition in the past. In the first place they are preserved much more easily than many other parts of plants due to their structural chemistry. The wall of pollen grains and spores are constructed of a complex material called sporopollenin. This material is a polymer of carotenoids and carotenoid esters and under conditions of low microbial activity, especially waterlogged, acid situations, it is decomposed very

slowly. Pollen and spores are therefore preserved in considerable abundance in peat deposits, lake sediments, etc.

The second important feature possessed by these microfossils is their small size and therefore their tendency to be carried some distance from their source, suspended in turbulent air masses. In some respects this is valuable, in others it can prove a problem. The property of transportation means that the pollen grains falling upon a site suitable for their preservation did not all originate in the immediate vicinity. So the differential and long-distance transportation is therefore the factor which must be taken into account when interpreting pollen assemblages in a sediment. Macroscopic fossils in a deposit, e.g. fruits, seeds, cones, twigs, etc., because of their large size and poor dispersal, are mainly derived from the local flora. This is a result in an over-representation of wet land species in the macroscopic fossil flora. Pollen grains represent a flora from a wider area surrounding land.

The third valuable feature of pollen and spore is that their structure and sculpturing may make it a highly recognizable object. This mean that identification can often be taken to the special level, though sometimes it is only possible to deduce the genus or the family which it comes. In this respect some types of macrofossils (e.g. seeds and fruits) may be identified with a higher degree of precision and are therefore more valuable as fossil material.

The fourth useful feature is abundance with which they occur in many sediments. This abundance allows a quantitative recording of the various types to be made, though there are considerable statistical difficulties involved in the treatment of this data and in its final interpretation."

In this study, a palynological study of deposits of the intramontane peat bog at Doi Inthanon, a national park in Chiang Mai Province, which hosts a vast biodiversity, was investigated. The attempt to study the ancient pollen grains and spores, which are in Holocene period about 4,300 B.P.

(Hasting and Leinsakul, 1984), was carried out to reconstruct the pollen diagram of the past depositions which had occurred on the mentioned area. The result might provide the beneficial information on the vegetational history, the microclimate of the past to the future, the archeological research and the geological investigations. It could be the linking data to fulfil the missing evidence of the previous researches upon that site.

The aims of thesis :

1) To study the spore and pollen morphology of present and ancient plants at intramontane peat bog of Doi Inthanon Cniang Mai Province.
2) To collect the pollen and spore types from peat deposits in the pollen type collection at Professor Kasin Suvatabandu Herbarium (BCU)
3) To reconstruct the pollen and spore diagrams and summerize the plant vegetation in the past up to present
4) To interpret the palaeo-climate and palaeo-environment of sampling site