

## CHAPTER 1

### INTRODUCTION

The Asian elephants (*Elephas maximus* Linnaeus, 1758) are the second largest terrestrial animal in the present world, next below the African Bush elephants (*Loxodonta africana* Blumenbach, 1797). They are belonging in the Proboscidean mammals with long evolutionary history beginning from the Eocene. Two genera are existing in a present world, Asian and African elephants, they were split from together around 5 million years ago with based on fossil (Shoshani, 1992). The elephants are generalist herbivore as a hind gut fermentation animal. Their consumption requires approximately 10 % of body weight for feed and about 200 liters for fresh water per day. The elder female is a head, called matriarchs, she leads her family members to a feed and water. Asian elephants are subdivided into three subspecies (Appendix A). The Asian elephants in Thailand are belonging in mainland or Indian subspecies (*Elephas maximus indicus*), they are biggest group of Asian elephant subspecies. The Asian elephants are important role in Thai history, religion and culture as same as the around countries for a long time. The elephants in Thailand are classified into 2 types, wild and domesticate. The wild elephants are living in remote area with rain forest habitat. They are distributed in segmented forests of protected areas with a small population (Lungka, 2000). The largest wild population is found along in Burma and Thailand border. The most domesticated elephants are employing in a logging industry in the past. Today they are work in a tourist industry after the logging ban in

year 1989. Besides being in the work, the few elephants are work on illegal logging, street wandering and circus.

In the present, the Asian elephants are the endangered species. They are classified on Appendix 1 of the Convention on International Trade in Endangered Species of wild fauna and flora (CITES), and Endangered (ED) class of the International Union for Conservation of Nature and Natural Resource (IUCN). The threatening are particularly the poaching and ivory trade, elephant-human conflict and habitat lost. According to a high price of a white gold or ivory is a cause to elephant hunting for the ivory. Similar to the ivory price, a demand for a baby or young elephants is higher than a supply too. They are poached for some people because of them attractive to human. However main causes of a threat are an elephant-human conflict and habitat lost. The elephant need a lowland area for consuming a large number of foliages as same as human's plantation. The wild elephants invade an agricultural lands closed to the forest edge in some time for consumption, especially in the dry season. About the reasons of the changing elephant culture in Thailand, domesticated elephants decrease in number from a many factors (Lungka, 2000), as a wild elephants that threaten by a causes.

Similar to other countries where elephants exist, elephants in Thailand are protected by regulations, both international and local regulations. The wild elephants are listed on Protected Animal under the Conservation Act. 1992, and the domesticated ones are considered commercial animals under the 1939 Beast of Burden Act (Lohanan, 2002). However the domesticated elephants in Thailand are listed in two organizations, Ministry of Interior which is responsible for the registration of domesticated elephants, and Ministry of Agriculture and Co-operatives

which is responsible for health care of the elephants. Around 100 years ago, their number was approximately 100,000 domesticated elephants in Thailand. Most of them worked in the logging industry. The Department of Livestock Development reported that the number of domesticated elephants had decreased to 11,192 in 1965, to 3,381 in 1985 and to 2,257 in 1998. That means, the decreasing rate of population appears to be about 3 percent per year (Tipprasert, 2002). World Wildlife Foundation (WWF) Thailand (1999) reported 2,910 domesticated elephants in Thailand, the largest group living in the northern part.

Since 1989, Royal Thai government has declared the logging ban to preserve the existing forest lands across the country, as a consequence most of domesticated elephants were forced to engage in illegal logging or became workers in tourism industry or roamed the streets of big cities (Ratanakorn, 2002, Tipprasert, 2002 and Sawala, 2002). Both government and private organizations try to solve these problems but without success.

The one of problem is elephant smuggling. In 1999, the Registration Division, Ministry of Interior, reported that there were 2,042 registered and 703 unregistered domesticated elephants (Mahasawankul, 2001). However, their biographies are unclear. It is often found that the some registered elephants are in fact wild elephants. Due to The regulation involving domesticated elephants are ineffective and outdated, the Beast of Burden Act. 1939 (Lair, 1997, Lungka, 2000 and Mahasawankul, 2001). Why the elephant registration fraud is still found in present, because of the elephant can make a high income for the owner especially the attractive baby or young elephants. That is a main cause of the registration fraud of domesticated elephants and also distorted the sex ratio and effective population size of wild elephants (Lair, 1997,

Lungka, 2000 and Lohanan, 2002). According to a conversation of minimum requirements for health status and management of Asian elephants in Southeast Asia that held by The National Identity Office, Secretariat of the Prime Minister (1999), these problems can be prevented by totally registration reformation from birth to death with accuracy using microchip plus DNA recording (Lungka, 2000 and Ratanakorn, 2002).

The DNA technology now provides a tool for genetic management of endangered species. DNA analyses can be employed not only for individual identification, but also for providing critical information on breeding system (inbreeding), parentage test, sex and founder relationship in many animal species (Frankham *et al.*, 2002). In elephant population, DNA analysis is used for studying evolution, genetic variation and structure, such as group relatedness, inbreeding effect, paternity and effective population size (Whitehouse and Herley, 2001, Frankham *et al.*, 2002, Siripunkaw, 2003 and Hollister-Smith *et al.*, 2004). The genetic markers, like highly polymorphic microsatellite loci of nuclear DNA, D-loop and Cytochrome *b* region of mitochondrial DNA (mtDNA), are very powerful for such studies, especially individual identification and parentage test in elephants (Siripunkaw, 2003).

The individual identification and parentage test are common used for the forensic medicine by various methods, such as DNA fingerprints with restriction fragment length polymorphisms (RFLPs), multi-locus minisatellite, single-locus minisatellite, or variable number tandem repeats (VNTRs) and DNA Sequencing (Phupat, 1994 and Randi *et al.*, 2002 and Frankham *et al.*, 2002). In the domestic and wild animals, the microsatellite loci are used as a markers for a routine parentage test with a various methods, dairy and beef cattle (Gerjan *et al.*, 1993 and Heyen *et al.*, 1997), horse

(Bowling *et al*, 1997, Anunciacao and Astolfi-Filho, 2000), bison (Mommens *et al*, 1998), domestic dog (Tsumagari *et al*, 2003), almost for support a breeding management. The mtDNA was used to identify a maternal inheritance in a forensic medicine (Rojanasunan, 2000) and animal's evolution (Frankham *et al.*, 2002). According to domesticated elephants in Thailand is a lack of genetic data, then the present study aims to use the published genetic markers of Asian elephant for the parentage testing of domesticated elephants. The method could be used for an essential first step is the establishment of a standardized identification and parentage test in order to trace the origin of individual animals and to provide proof of illegal poaching and registration fraud in Thailand.

### **OBJECTIVE**

To identify individual and pedigree of domesticated Asian elephants by use autosomal microsatellites and mitochondrial DNA.

## EDUCATIONAL ADVANTAGES

1. Parentage test and individual identification for domesticated Asian elephants would be established.
2. Illegal poaching of elephant calf for the smuggled elephant in Thailand might be prevented.
3. The domesticated Asian elephant registration in Thailand might be verified and reformed the registration form.
4. Breeding program in domesticated Asian elephants in Thailand would be developed.