

CHAPTER VII

Conclusion

7.1 Conclusion

7.1.1 Species diversity and Distribution of butterfly lizards

According to the present taxonomic status and the survey from this study, three species of butterfly lizards were found in Thailand, comprising *Leiolepis belliana* (with two subspecies, *Leiolepis belliana belliana* (Gray, 1827) and *Leiolepis belliana ocellata* Peters, 1971), *Leiolepis reevesii rubritaeniata* (Gray, 1831), and *Leiolepis boehmei* Darevsky & Kupriyanova, 1993.

L. b. ocellata was found only in upper northern Thailand. *L. b. belliana* was the most common and distributed from northern to western, eastern and southern Thailand whereas *L. r. rubritaeniata* was found only in the northeast. *L. boehmei*, a parthenogenetic species, inhabited in Songkhla and Nakhon Si Thammarat Provinces, southern Thailand.

7.1.2 Habitat characteristics of butterfly lizards

In general, all *Leiolepis* species were found in the open area. The slope of the ground where their burrows existed was flat. The burrows of them occurred in the area mostly consisted of sand. *L. boehmei* presented in the limited areas in southern Thailand which supported the opinion of Cuellar (1971) who stated that the

parthenogenetic species were usually found in more unfavorable habitat conditions. It indicated that the conservation management for the small population of *L. boehmei* should be conducted.

7.1.3 Morphological variations in butterfly lizards

Variations in the body color and body pattern of butterfly lizards could be used to identify species and subspecies. The differences in the body shape among species and between sexes based on morphometric studies were less noticeable. In addition, the differences between sexes in *L. b. ocellata* could be identified by the present of reddish pigments under the chin in the female and was absent in the male whereas the female of *L. b. belliana* was similar to the male and difficult to identify. Sexes of *L. r. rubritaeniata* could be separated by the flank pattern in which the male presented the black vertical bars about half of the entire flank whereas this character was absent in the female.

7.1.4 Karyological studies of butterfly lizards

Two subspecies of butterfly lizards, *L. b. belliana* and *L. r. rubritaeniata*, have the same chromosome numbers, consisting of $2n = 36$ with six pairs of macrochromosomes and twelve pairs of microchromosomes. The difference in karyotypic data suggested that *L. b. ocellata* should be considered as a valid species because the chromosome numbers of *L. b. ocellata* was $2n = 34$. *L. boehmei* was unisexual and presented $2n = 34$ chromosomes.

7.2 Recommendation

7.2.1 The results of the present study suggested that population densities of all butterfly lizards species in Thailand are low. They are under the pressure from human exploitation and habitat degradation in many areas surveyed and are under threat of local extinction. Immediate protection in some considerable risk areas and detailed studies on the population biology of each species should be carried out as soon as possible before it disappears. *L. boehmei* should receive the first conservation priority because of its small population densities in restricted habitat.

7.2.2 In this study, it was found that *L. boehmei* was a diploid parthenogenetic species with $2n = 34$ and it should not be a parent species of *L. triploida*. Therefore, the origin of both species remains an unsolved problem. Further detailed study on the parental forms of these two species should be conducted.

7.2.3 It was found that *L. b. ocellata* has $2n = 34$ which is different from $2n = 36$ of *L. b. belliana*, suggesting that *L. b. ocellata* should be a separate species, *L. ocellata*. Therefore, further detailed studies, especially on the genetic distance of these two groups are necessary.

7.2.4 Molecular and phylogenetic studies of all *Leiolepis* species should be examined throughout their distribution ranges in order to clarify the relationship among them.