CHAPTER 6

CONCLUSIONS AND REMAINING PROBLEMS

From the results of this thesis, it can be concluded as followed:

Conclusion 1. A total of 23,196 adult male caddisflies were collected by light trapping during January 2004 to July 2005. Eighteen families, 46 genera and 215 species of caddisflies were collected in this study. Of the 215 species, 21 species of caddisflies were newly to science. The family Hydropsychidae contained the greatest number of species (46) inventoried, followed by Leptoceridae (43) Ecnomidae (23) Polycentropodidae (20) Psychomyiidae (19) Philopotamidae (18) Goeridae (7) Rhyacophilidae (8) Calamoceratidae (6) Xiphocentronidae (6) Lepidostomatidae (5) Odontoceridae (4) Hydroptilidae (3) Helicopsychidae (2) Dipseudopsidae (2) Stenopsychidae (1) Glossosomatidae (1) and Brachycentridae (1).

Many caddisflies species, such as *Chimarra bombltona*, *C. monorum*, *Diplectrona gombak,* and *Hydropsyche brontes* were most dominant and distributed at almost all collecting sites. Several species may be endemic to the southern Thailand, e.g. *Rhyacophila tantichodoki, Ecnomus neri*, *Cheumatopsyche trilari* and many species were newly recorded for Thailand, such as *Diplectrona pseudofasciata*, *Hydropsyche biton*, *H. butes, Macrostemum albardana*, and *Anisocentropus magnus*.

Conclusion 2. Larval-adult associations were made by simultaneously collecting metamorphotypes (pharate adults). Twenty three unknown larvae belonging to 9

genera were associated with identifiable adults of Hydropsychidae: *Diplectrona gombak*, *Cheumatopsyche charites*, *C. copia*, *C. tramota*, *Potamyia chaos*, *P. phaidra*, *Hydropsyche assarakos*, *H. brontes*, *H. butes*. *H. camillus*, *H. dolosa*, *H. pallipenne*, *Hydatomanicus adonis*, *H. klanklini*, *Hydromanicus abiud*, *H. inferior*, *H. serubabel*, *Macrostemum dohrni*, *M. hestia*, *M. fenestratum*, *Pseudoleptonema quinquefasciatum*, *P. supalak*, *Trichomacronema tamdao*. Three of 23 species of hydropsychid larvae (*Hydatomanicus adonis*, *H. klanklini*, and *Macrostemum dohrni*) were reared from pupae and emerged to the adult stage.

Conclusion 3. Using molecular markesr, the partial nucleotide sequence analysis of 178 bp of NADH dehydrogenase subunit 4 (*ND4*) and 523 bp nucleotide of cytochrome oxidase subunit I (*COI*) may be used to confirm larva-adult association of three hydropsychid species.

Conclusion 4. Characters utilized in the key to facilitate separation of species include: color pattern of head; morphology of frontoclypeus; morphology of mandibles; morphology of prosternite plates; morphology of submentum; condition of fore trochantin; presence of large tubercle on center of anterior ventral apotome; morphology of posterior ventral apotome; morphology of setae on dorsum of head, thoracic and abdominal segments; presence of large, heavily sclerites spike-like setae on venter of anal legs; the number and an arrangement of abdominal gills.

Remaining problems

Undoubtedly the discovery and more association between larvae and adults or inclusion of molecular data of Hydropsychidae species will lead to a greater understanding the entire family. In the vital task of associating the adults, pupae, and larvae of particular species, the method was adopted of utilizing mature pupae in which the adult genitalia were already fully developed. It is possible in this way to associate adult features with both features on the pupal integument and larval characters evident in the cast larval skin deposited in the end of the pupal case. Comparisons can then be made between larval skins and entire larvae, and between mature pupae with fully formed genitalia and emerged adults captured by light trapping. However, the limitation for these method are that it requires collecting the pupa at precisely the appropriate time of year, a few hours before adult emergence, and generally it requires capture of a male pupa. A process for rearing adult from larva and pupa in a laboratory may be difficult for hydropsychids because particular current and temperature regimes are often difficult to simulate, whereas field rearing is subject to the inconstant of weather, shifting substrate, and changing water levels.

Mitochondrial genes are easy to amplify and many conserved primers have been described in the literature (e.g. Kocher *et al*., 1989; Simon *et al*., 1994). The rapidly increasing number of mtDNA sequences in public databases facilitates the design of new primers for specific research interests. This process reinforces itself and continues to drive the steady increase of mitochondrial sequence data. Although DNA sequencing can be completed in 12-24 hours for less than $2.50 per specimen (Taylor *et al*., 1996), this method has seen limited use in Trichoptera for this study.

In this study, I used two regions of mitochondrial DNA markers (*ND4* and *COI*). For the *ND4* gene, the primers I used, might be appropriate for some larvae and adults of Hydropsychidae, e.g. *Hydromanicus klanklini* and *Diplectrona gombak*. The *COI* gene also might be useful for larva and adult *Macrostemum hestia*. Further study is necessary to determine appropriate primers and optimization of the PCR conditions to suit the needs of particular taxa.