CHAPTER 5

DISCUSSION

Amongst 16 *Rhiostoma*, 9 species were described and reported from Thailand, they are *Rhiostoma asiphon* Moellendorff, 1894; *R. bernadii* Pfeiffer, 1862; *R. dalyi* Blanford, 1902; *R. housei* (Haines, 1855); *R. samuiense* Tomlin, 1931; *R. smithi* Bartsch, 1932; *R. tomlini* Salisbury, 1947; *R. chupingense* Tomlin, 1938; and *R. jalorensis* Sykes, 1903. In the present revision 6 species were classified with 9 additional unidentified morphotypes. They are *Pterocyclus asiphon* (Moellendorff, 1894); *R. chupingense* Tomlin, 1938; *R. hainesi*, *R. housei*, *R. jalorensis*, *R. samuiense*, and other 9 unidentified morphotypes.

There are still some misidentification problems that brought to the following discussion. *R. housei* has *R. dalyi* as synonym. *R. hainesi has R. smithi* and *R. tomlini* as synonym.

There are not enough specimens and information that could be confirmed *R. bernardii* existing in *Rhiostoma* classification. The description and report of Pfeiffer (1862) and Blanford (1903) should be revised by further advanced morphological and statistical analysis.

Anatomical characteristic of genitalia of rhiostomid snails are closely relate to *Cyclophorus volvulus* such as bursa copulathrix long cylindrical shape in *C. volvulus* but various shape from lunate convolute to sickle shape. The lack of seminal vesicle is another distinct character of *Rhiostoma* from *Cyclophorus*. The lack of verge is also a clear character of Cyclophoridae, which opposite in American Cyclophoroidea. (Table 5.2)

There are a lot of distinctive characters of *R. asiphon* which almost different from rhiostomid species and the cladogram also supported the different. The main characters such as operculum, genital opening in male, and 1st marginal teeth (Table 5.1-5.3) fell into the genus *Pterocyclus*. *P. asiphon* (Moellendorff, 1894) would be the new name for this species.

The mean ratios of 8 characters were analyzed by ANOVA Duncan's multiple range test was able to grouped the snails significantly difference at $p<0.05$. Each species seem to has its suitable ratios as following, *P. asiphon* differ from other species by MI/MA value. *R. housei* differ from other species by SW/MA, AH/MA, IA/MA, and OA/MA values. *R. hainesi* differ from other species by SW/MA, AH/MA, IA/MA,OA/MA, and AP/MA values. *R. samuiense* differ from other species by SW/MA, SH/MA, AH/MA,IA/MA, and OA/MA values. *R.*sp.5 differ from other species by SW/MA, AH/MA, IA/MA, OA/MA, and AP/MA values. *R.*sp.6 differ from other species by SH/MA and AH/MA values.

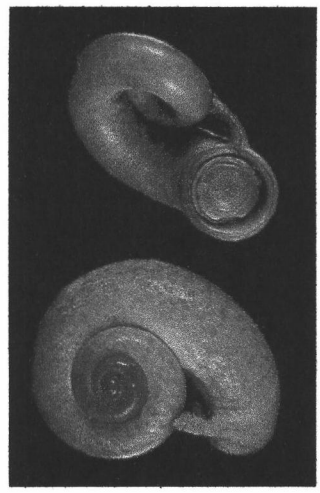
AH/MA ratio is the best common ratio for many species but SP/MA is not appropriated value for identification. This method is good to be an assistant for conventional morphological taxonomy.

The phylogeny using shell, radula, and some anatomical characters indicated that *P. asiphon* is separated from rhiostomid group in closely related to the outgroup, *C. volvulus*.

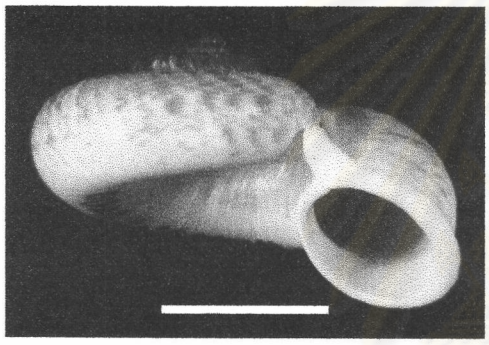
R. housei presents plesiomorphic characters, *R.* sp.6, *R.* sp.4, *R.* sp.2, *R.* sp.8, *R.* sp.7, and *R.* sp.9 seem to be the derived species. *R. jalorensis*, *R. samuiense*, *R.* sp.5, *R. hainesi*, *R. chupingense*, *R.* sp.1, and *R.* sp.3 seem to be the advance species.

The allopatric speciation distinctly appears in this genus. All species seem to have their own territory without overlapping zone. *R. housei* distributed in north, north-eastern, and central area. While *R.* sp.1 dominate in north, *R. jalorensis* dominate in south along Phuket Mountain range, and *R. hainesi* dominate in east along Chanthaburi Mountain range.

a



b



c

d

Figure 5.1 *Rhiostoma* shell specimens a) the type specimens of *R. dalyi* Blanford, 1902 from British Museum of Natural History; b) *R. housei* (Haines, 1858) in Abbott (1989); c) and d) *R. housei* from the present study.

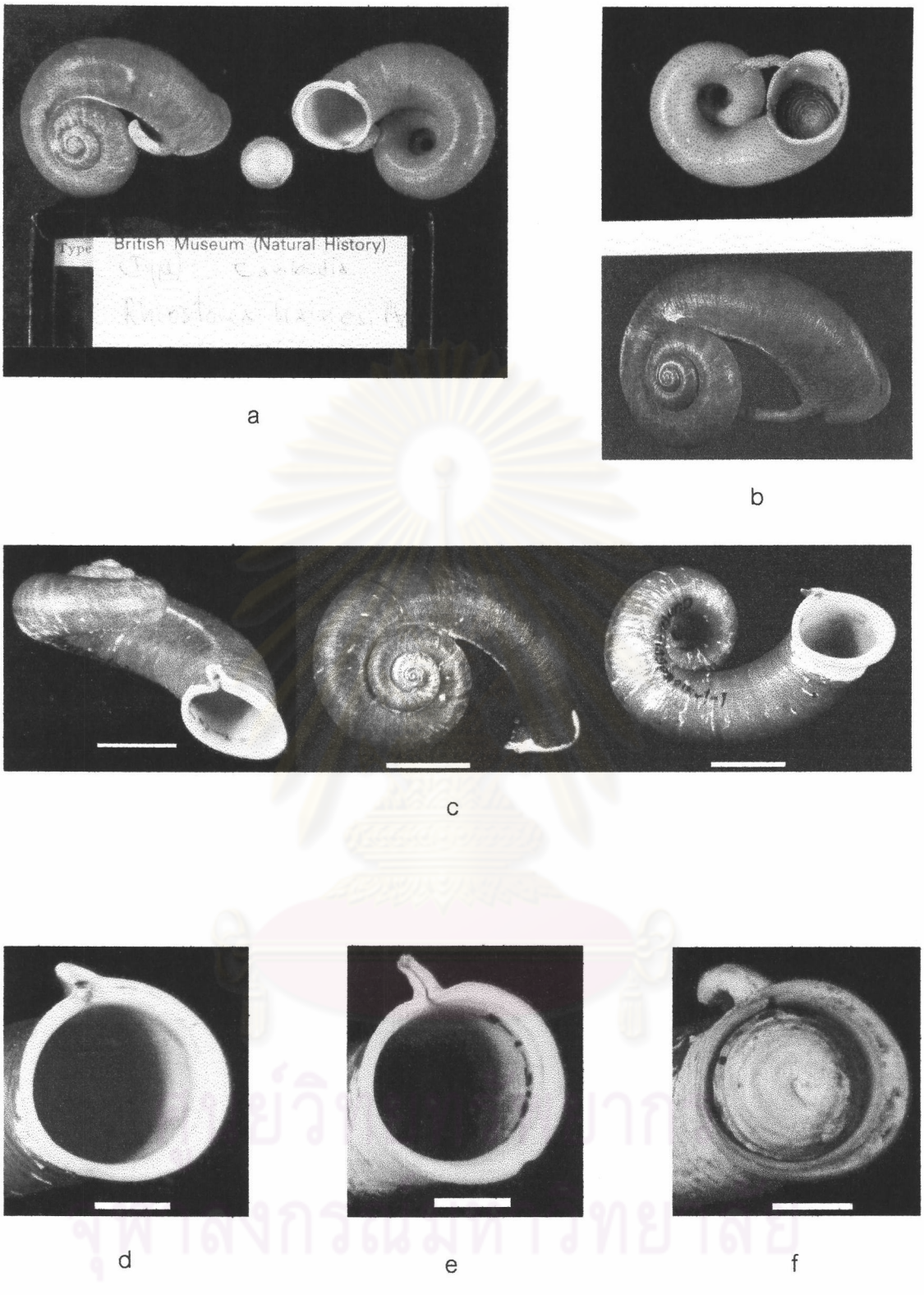


Figure 5.2 *Rhiostoma* shell specimens a) type specimens of *R. hainesi* Pfeiffer, 1862 from British Museum of Natural History; b) paratype of *R. smithi* Bartsch, 1932 from Kao Sabah, Thailand in Abbott (1989); c)-f) specimens of the present study from Namtok Phlio National Park; c) three dimension of tubeless type shell; d) tubeless type shown short projection; e) incomplete tube type; f) complete tube type

Table 5.1 Some shell morphological characters comparison between *Pterocyclus asiphon* and *Rhiostoma* spp.

Characters	*Pterocyclus asiphon*	*Rhiostoma* spp.
1.Shell - swell ridge	present	absent
2.Operculum		
- structure	shallow cylindrical	deep cylindrical
- outside surface	concave	convex

Table 5.2 Some reproductive characters comparison of Poteriids, *Cyclophorus volvulus*, *Pterocyclus asiphon* and *Rhiostoma* spp.

Characters	Poteriids (Thompson, 1969)	*C. volvulus* (Kumpratuang, 1988)	*P. asiphon* (present study)	*Rhiostoma* spp. (present study)
Female				
Albumin gland	present	absent	absent	absent
Bursa copulartrix	absent	present	present	present
Vagina length	short	very long	short	short
Male				
Verge	present	absent	absent	absent
Seminal vesicle	absent	present	absent	absent
Genital opening length	tiny	long	short	long

Table 5.3 Radular morphological comparison of *Pterocyclus* sp., *P. asiphon*, and *Rhiostoma* spp.

Character	*Pterocyclus* sp. (Sutcharit *et al.*, 2000)	*P. asiphon* (present study)	*Rhiostoma* spp. (present study)
cusps of 1st marginal teeth	4	4	3

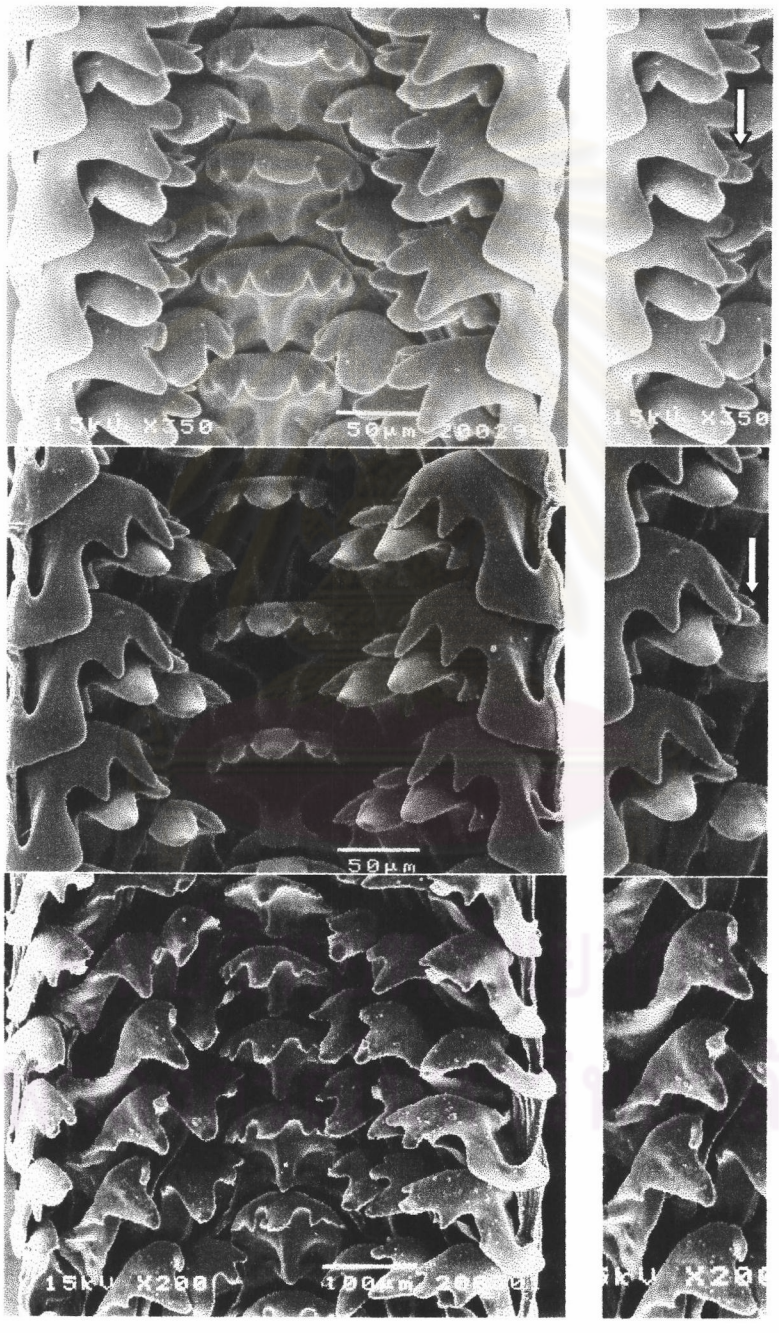


Figure 5.3 First marginal teeth comparison of *Pterocyclus* sp. (above), *P. asiphon* (central), and *Rhiostoma* spp. (below).