

The Diversity of Land Snail Fauna in Chonburi Province, Eastern Thailand

Pratin Boonngam*, Pongrat Dumrongrojwattana and Surin Matchacheep

ABSTRACT

Land snails diversity were investigated in several habitats in Chonburi Province, Eastern Thailand. Snails were collected from 14 areas throughout Chonburi Province. A total of 16 families 29 genera and 48 species were recorded, 22 of which had been previously reported. The others could be identified into genus level and at least nine of them are being proposed as new to science.

Key words: land snail, Gastropoda, Chonburi province

INTRODUCTION

Land snails belong to the Phylum Mollusca, Class Gastropoda and include two groups prosobranchs and pulmonates. Prosobranchs, frequently have heavily calcified shells and opercula covering the aperture or opening or their shells. Pulmonates, lack opercula and used lung in gas exchange process. As herbivores, snails eat many kinds of fresh and dead leaves and are eaten by many animals such as some predacious insects, snakes, birds and small mammals. They live under leaves, litter, logs, stones and trash. Some land snails carry serve as hosts for some parasites such as *Hemiplecta distincta* can be consumed by people in northeastern Thailand and also would be an intermediate host of a rat lung worm *Angiostrongylus cantonensis* causing human meningitis (Panha, 1987; 1988). However earlier land snails especially non-marine mollusks of Thailand have attracted the attention of comparatively few specialists. Species list of land

snail were reported for Chonburi Province previously by Panha (1996) Hemmen and Hemmen (2001) Panha and Burch (2005). The present study was undertaken to update the species list of land snails in Chonburi Province.

MATERIALS AND METHODS

Specimens were collected from several habitats in Chonburi Province. Methods consisted of collecting soil samples where shells or fragments of shells were found, or where snails were suspected to be present. Limestone soils are by far the richest source of snails in Chonburi Province. Soil samples consisting of a mixture of limestone particles, leaf litter, taken from rock ledges and crevices at the foot of steep cliffs or among limestone boundaries will yield many species.

Snails could found three habitats. The habitat of those found among leaves and branches is described as “vegetation” (veg.), that for those found in leaf litter as “ground” and that for those



Figure 1 Study areas: 1. Wat Kao Tum, 2.Lublai Cave, 3.Khaomee Cave, 4.Khao Dinosaur, 5.Kangkao Cave, 6.Khao Cha-ang-aon, 7.Angchangnum Waterfall, 8.Chuntathen Waterfall, 9.Khao Sammook, 10.Bangsaen, 11.Sirijaroenwut garden, 12.Khao Shechan, 13.Khao She-aon, and 14. Koh Sichang.

associated with limestone particles as “limestone”

Under the category of status “endemic” refer to species that are native only to the Chonburi Province. The term “indigenous” refers to species that are native to Chonburi Province, but also found elsewhere. The terms “introduced” are used interchangeably, and refer to all species that are non-indigenous to Thailand, having been introduced either accidentally or deliberately (Rundell, 2005).

Specimens were identified from the taxonomic criteria given by Van Jutting (1961a; 1961b), Solem (1965; 1966), Panha (1996), Abbott (1989), Vermeulen and Whitten (1998), Vermeulen (1999), Hemmen and Hemmen (2001), Panha and Burch (2005) and Dumrongrojwattana and Maassen (2008).

RESULTS

A total of 16 Families, 29 Genera and 48 species of land snails in Chonburi province were recorded from several habitats. The data are shown in Table 1.

DISCUSSION

From the result thirty of land snails 48 species (62.5%) are indigenous, with 27.1% endemic, and 10.4% introduced. The major groups of land snails in Chonburi belong to Family Ariophantidae (25.8%) and Cyclophoridae (23.2%) and much small contribution of 1.3% from each of Alycaeidae, Pupilidae, Trochomorphidae and Succineidae respectively. *Cryptozonia siamensis* are the most diverse in Chonburi province. Fifteen of the 48 species are undescribed. Nowadays, list of land snails species 282 were described in Thailand (including both native and introduced species) (Hemmen and Hemmen, 2001; Panha and Burch, 2005). Twenty two species of which were recorded in the present survey and 26 species out of the list. This substantially increases the number of species recorded in Thailand including nine that will soon be proposed as new species.

Table 1 Lists of land snails which were collected in Chonburi province including habitat and status.

Taxa	Habitat	Status
Class : Gastropoda		
Subclass : Prosobranchia		
Order : Archeogastropoda		
Family : Hydrocenidae		
Genus : <i>Georissa</i>		
<i>Georissa</i> sp. 1	Limestone	Indigenous
<i>Georissa</i> sp. 2	Limestone	Indigenous
<i>Georissa</i> sp. 3	Limestone	Indigenous
Order : Caenogastropoda		
Superfamily : Cyclophoroidea		
Family : Cyclophoridae		
Genus : <i>Cyclophorus</i>		
<i>Cyclophorus volvulus</i>	Ground	Indigenous
<i>Cyclophorus malayanus</i>	Ground	Indigenous
Genus : <i>Leptopoma</i>		
<i>Leptopoma vitreum</i>	Ground	Indigenous
Genus : <i>Pterocyclus</i>		
<i>Pterocyclus</i> sp.	Ground	Indigenous
Genus : <i>Rhiostoma</i>		
<i>Rhiostoma cambodjensis</i>	Ground	Indigenous
<i>Rhiostoma housei</i>	Ground	Indigenous
<i>Rhiostoma</i> sp. 1	Ground	Endemic
<i>Rhiostoma</i> sp. 2	Ground	Endemic
<i>Rhiostoma</i> sp. 3	Ground	Endemic
Family : Pupinidae		
Genus : <i>Pupina</i>		
<i>Pupina siamensis</i>	Ground/veg.	Endemic
<i>Pupina</i> sp.	Ground	Endemic
Family : Alycaecidae		
Genus : <i>Alyceaus</i>		
<i>Alyceaus somwangi</i>	Limestone	Endemic
Subclass : Pulmonata		
Order : Stylommatophora		
Suborder : Orthurethra		
Superfamily : Pupiloidea		
Family : Pupilidae		
Genus : <i>Acinolaemus</i>		
<i>Acinolaemus colpodon</i>	Ground/Limestone	Indigenous
Genus : <i>Aulacospira</i>		
<i>Aulacospira samaesarnensis</i>	Limestone	Endemic
<i>Aulacospira pluangtongensis</i>	Limestone	Indigenous

Table 1 Lists of land snails which were collected in Chonburi province including habitat and status (cont.).

Taxa	Habitat	Status
Family : Pyramidulidae		
<i>Pyramidulus</i> sp.	Limestone	Indigenous
Family : Vertiginidae		
Genus : <i>Gastrocopta</i>		
<i>Gastrocopta</i> sp.	Ground	Endemic
Genus : <i>Gyliotrachela</i>		
<i>Gyliotrachela diarmaidi</i>	Limestone	Indigenous
<i>Gyliotrachela sichang</i>	Limestone	Endemic
<i>Gyliotrachela srirachaensis</i>	Limestone	Endemic
Family : Subulinidae		
Genus : <i>Lamellaxis</i>		
<i>Lamellaxis gracillis</i>	Ground	Introduced
Superfamily : Achatinoidea		
Family : Achatinidae		
Genus : <i>Achatina</i>		
<i>Achatina fulica</i>	Ground	Indigenous
Superfamily : Streptaxoidea		
Family : Streptaxidae		
Genus : <i>Diaphera</i>		
<i>Diaphera</i> sp.	Limestone	Indigenous
Genus : <i>Gulella</i>		
<i>Gulella (Huttonella) bicolor</i>	Ground	Introduced
Genus : <i>Odontartemon</i>		
<i>Odontartemon cosulatus</i>	Ground	Indigenous
<i>Odontartemon</i> sp.	Ground	Endemic
Superfamily : Plectopylidoidea		
Family : Plectopylidae		
Genus : <i>Plectopylis</i>		
<i>Plectopylis achatina</i>	Ground	Endemic
Family : Succineidae		
Genus : <i>Succinea</i>		
<i>Indosuccinea</i> sp.	Ground	Indigenous
Suborder : Elasmognatha		
Superfamily : Helixarionoidea		
Family : Ariophantidae		
Genus : <i>Cryptozona</i>		
<i>Cryptozona siamensis</i>	Ground/veg.	Indigenous
Genus : <i>Durgella</i>		
<i>Durgella libas</i>	Ground/veg.	Indigenous

Table 1 Lists of land snails which were collected in Chonburi province including habitat and status (cont.).

Taxa	Habitat	Status
Genus : <i>Hemiplecta</i>		
<i>Hemiplecta distincta</i>	Ground	Indigenous
<i>Hemiplecta siamensis</i>	Ground	Indigenous
Genus : <i>Macrochlamys</i>		
<i>Macrochlamys</i> sp.	Ground/veg.	Indigenous
<i>Macrochlamys</i> cf. <i>resplendens</i>	Ground/veg.	Indigenous
Genus : <i>Quantula</i>		
<i>Quantula weinkauffiana</i>	Ground	Indigenous
Family : Trochomorphidae		
Genus : <i>Trochomorpha</i>		
<i>Trochomorpha</i> sp.	Ground	Endemic
Superfamily : Camaenoidae		
Family : Camaenidae		
Genus : <i>Amphidromus</i>		
<i>Amphidromus atricallosus</i>	Ground/veg.	Indigenous
<i>Amphidromus schomburgki</i>	Ground/veg.	Indigenous
<i>Amphidromus inversus</i>	Ground/veg.	Indigenous
Genus : <i>Chloritis</i>		
<i>Chloritis siamensis</i>	Ground	Indigenous
Genus : <i>Ganesella</i>		
<i>Ganesella</i> cf. <i>capitium</i>	Ground	Indigenous
<i>Ganesella</i> sp.	Ground	Indigenous
Genus : <i>Landouria</i>		
<i>Landouria</i> cf. <i>smiroensis</i>	Ground	Introduced
<i>Landouria winteriana</i>	Ground	Introduced
Family : Bradybaenidae		
Genus : <i>Pseudobuliminus</i>		
<i>Pseudobuliminus siamensis</i>	Ground	Indigenous

CONCLUSION

Land snails were collected throughout Chonburi Province. A total of 16 families, 29 genera and 48 species were found. Nine of the undescribed species are proposed as being new to science.

ACKNOWLEDGEMENTS

This research was partially by a Research Development Grant from the Faculty of Science, Burapha University. We would like to thanks Prof. Dr. Wim J.M. Massan, collection manager terrestrial mollusks. National Museum of Natural History, Leiden, The Netherlands for his comment and an anonymous reviewers for their comments on the manuscript and thanks Miss Nuttakarn Popijit whom found *G. bicolor* and support specimens.

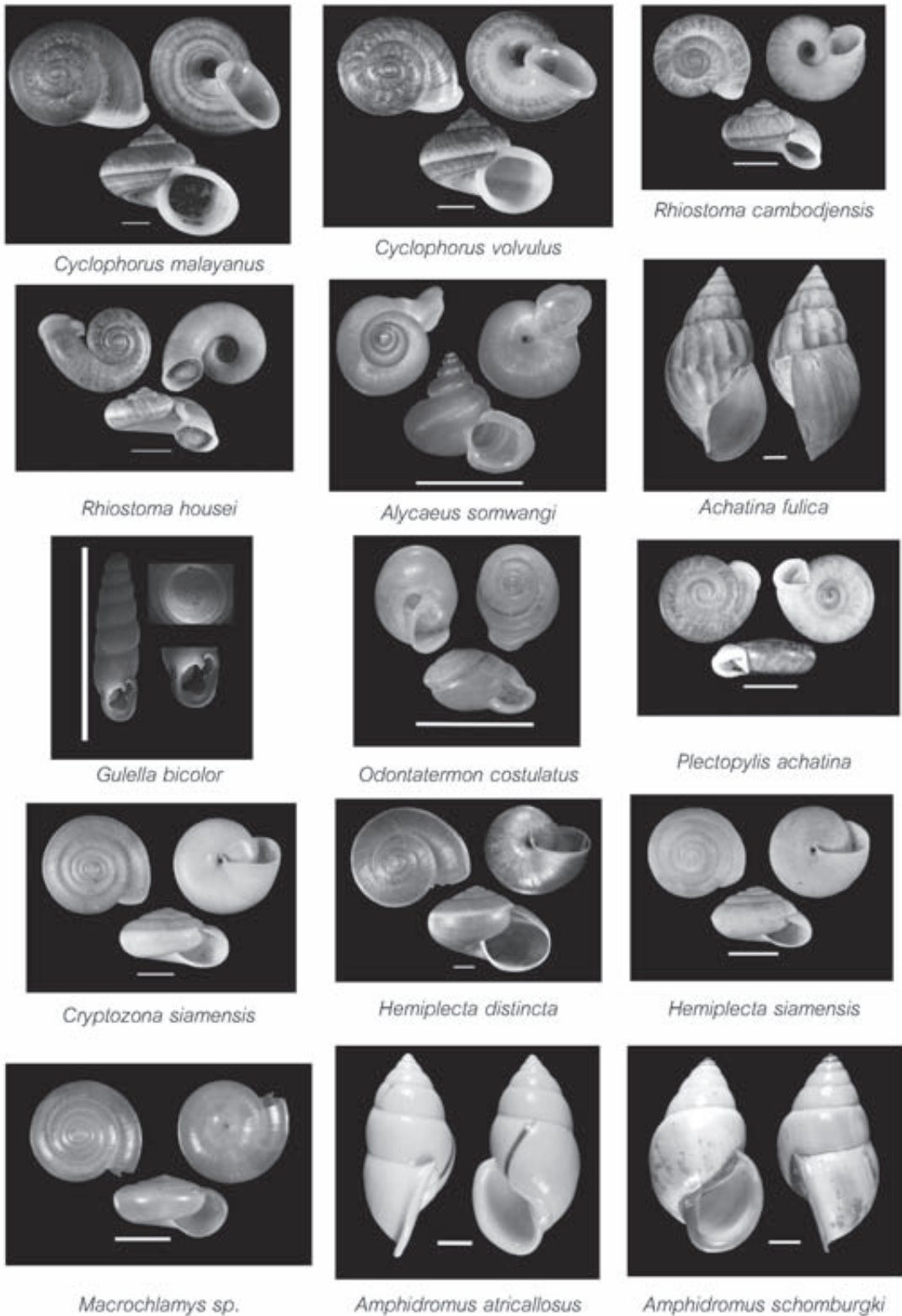


Figure 2 Some land snails species in Chonburi Province (scale bar = 1 cm).

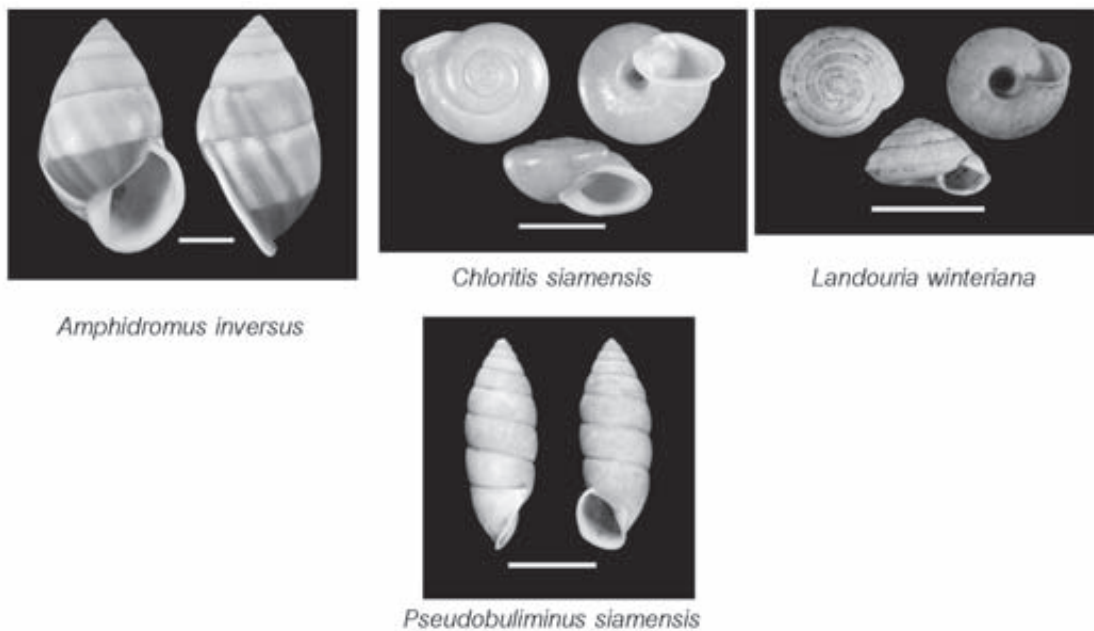


Figure 2 Some land snails species in Chonburi Province (scale bar = 1 cm) (cont.).

LITERATURE CITED

- Abbott, R.T. 1989. **Compendium of Land Shell**. Melbourne, Australia : American Malacologist. 420 p.
- Dumrongrojwattana, P. and W.J.M. Maassen. 2008. Two new species of *Alycaeus* from Eastern Thailand (Gastropoda, Caenogastropoda, Cyclophoridae). **The Thailand Natural History Museum Journal** 3(1): 1-4.
- Hemmen, J. and C. Hemmen. 2001 Aktualisierte liste der terrestrischen gastropoden Thailands. **Schr. Malakozool.** 18: 35-70.
- Panha, S. 1987. The breeding data of Thai edible land snail *Hemiplecta distincta* (Pfeiffer). **Venus** 46(1): 25-34.
- Panha, S. 1988. Natural infection of the rat lungworm *Angiostrongylus cantonensis* in a Thai edible land snail, *Hemiplecta distincta*. **J. Sci. Soc.** 14: 233-239.
- Panha, S. 1996. A checklist and classification of the terrestrial pulmonate snails of Thailand. **Walkerana** 8(19): 31-40.
- Panha S. and J.B. Burch. 2005. An introduction to the microsnailes of Thailand. **Malacological Review** Vol. 37/38 : 1-155.
- Rundell, R.J. 2005. The land snails of Belau: survey of the 16 states. **Committee of Evolutionary Biology** 1-18.
- Solem, A.1965. Land snails of the genus *Amphidromus* from Thailand (Mollusca: Pulmonata: Camaenidae). **Proceedings of the United State National Museum** 117: 615-631.
- Solem, A. 1996. Some non-marine mollusks from Thailand, with notes on classification of the Helicarionidae. **Spolia Zoologica Musei Hauniensis** 24: 1-114.
- Van Jutting, W.S.S.1961a. Additional new species and new localities of the family Vertiginidae and genera Oophana and Opisthostoma from Malaya. **Bulletin of the Raffles Museum** 26 : 34-48.

- “_____” 1961b. The Malayan Streptaxidae genera *Huttonella* and *Sinoennea*. **Bulletin of the Raffles Museum** 26 : 5-33.
- Vermeulen, J.J. 1999. Notes on the non-marine molluscs of the island of Borneo 9. The genera *Cyclophorus*, *Leptopoma*, and *Craspedotropis* (Gastropoda Prosobranchia: Cyclophoridae). **Basteria** 63 (4-6): 139-163.
- Vermeulen, J.J. and A.J. Whitten. 1998. **Guide to the Land Snails of Bali, Fauna Malesiana Field and Study Guide Series** The Netherlands : The Netherlands, & the Fauna Malesiana Foundation. 164 p.