

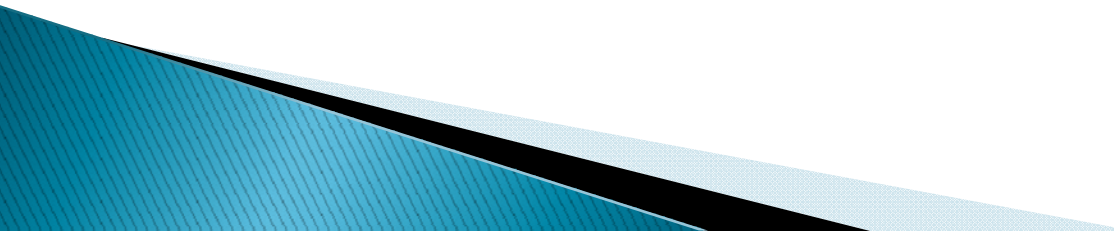
Ecology of the snails in family Viviparidae in water reservoirs in three districts, Khon Kaen province, Thailand

Present by

Mr.Surat Haruay

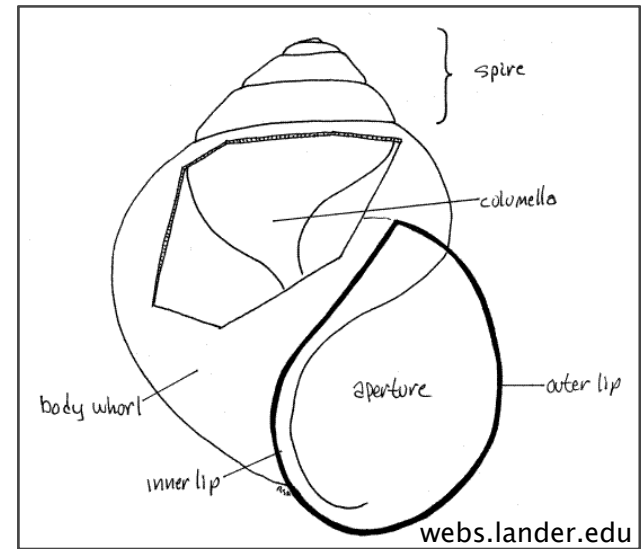
Correspondence:
Assoc. Prof. Dr.Smarn Tesana

Contents

- ▶ Introduction
 - ▶ Materials & methods
 - ▶ Results
 - ▶ Conclusion
- 

Characteristics of Thai Viviparidae

- ▶ Size: medium
- ▶ Shape: sub-globose, ovate-conic, or pyramidal
- ▶ Surface: smooth or sculptured with spiral lines or ridge or tubercles
- ▶ Right tentacles of the males transform into a male copulatory organ
- ▶ The females are **ovoviviparous**

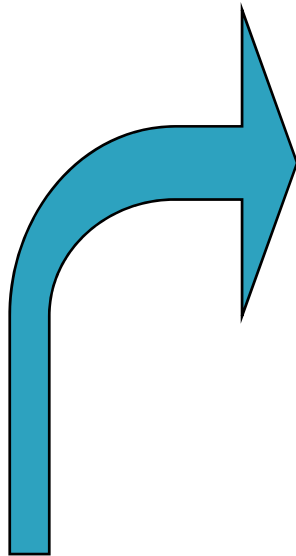
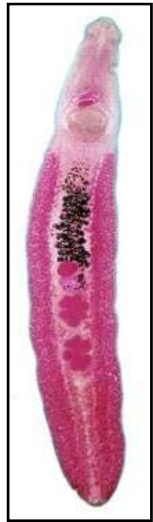


Importance

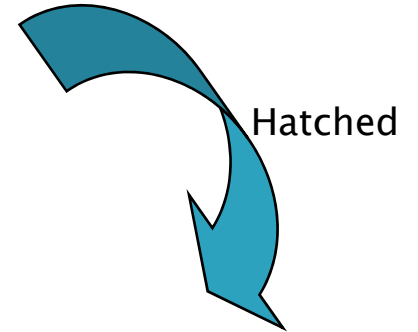
- ▶ Food for Thai: farmers and restaurants
- ▶ Second intermediate host of Echinostome
- ▶ Intermediate host of *Angiostrongylus cantonensis*



Life cycle of family Echinostomatidae



Adults
and
eggs

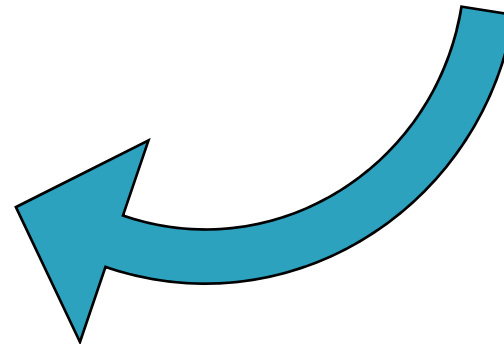


Hatched



1st IH

Miracidium
Sporocyst
Redia
Cercaria



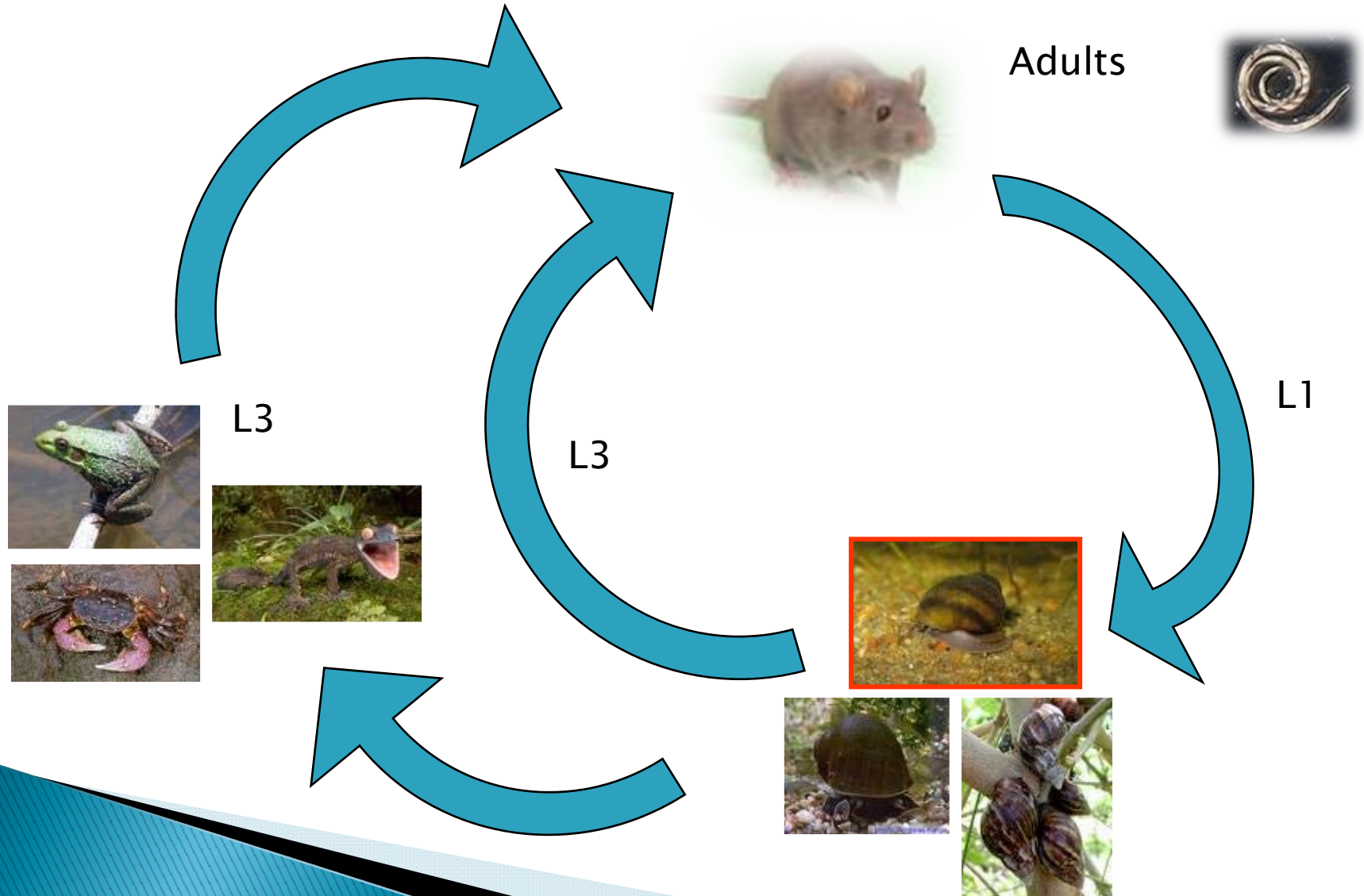
2nd IH



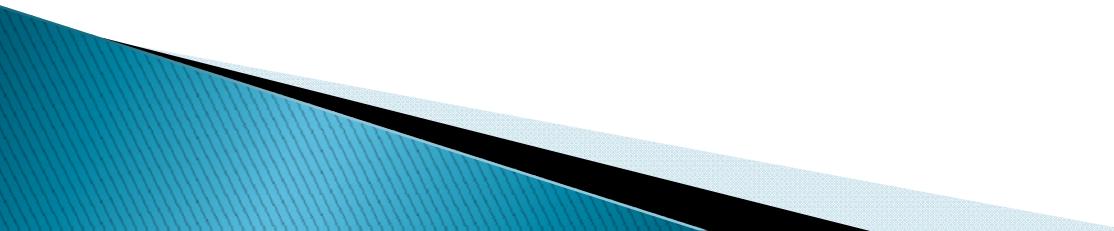
Metacercaria



Life cycle of *Angiostrongylus cantonensis*

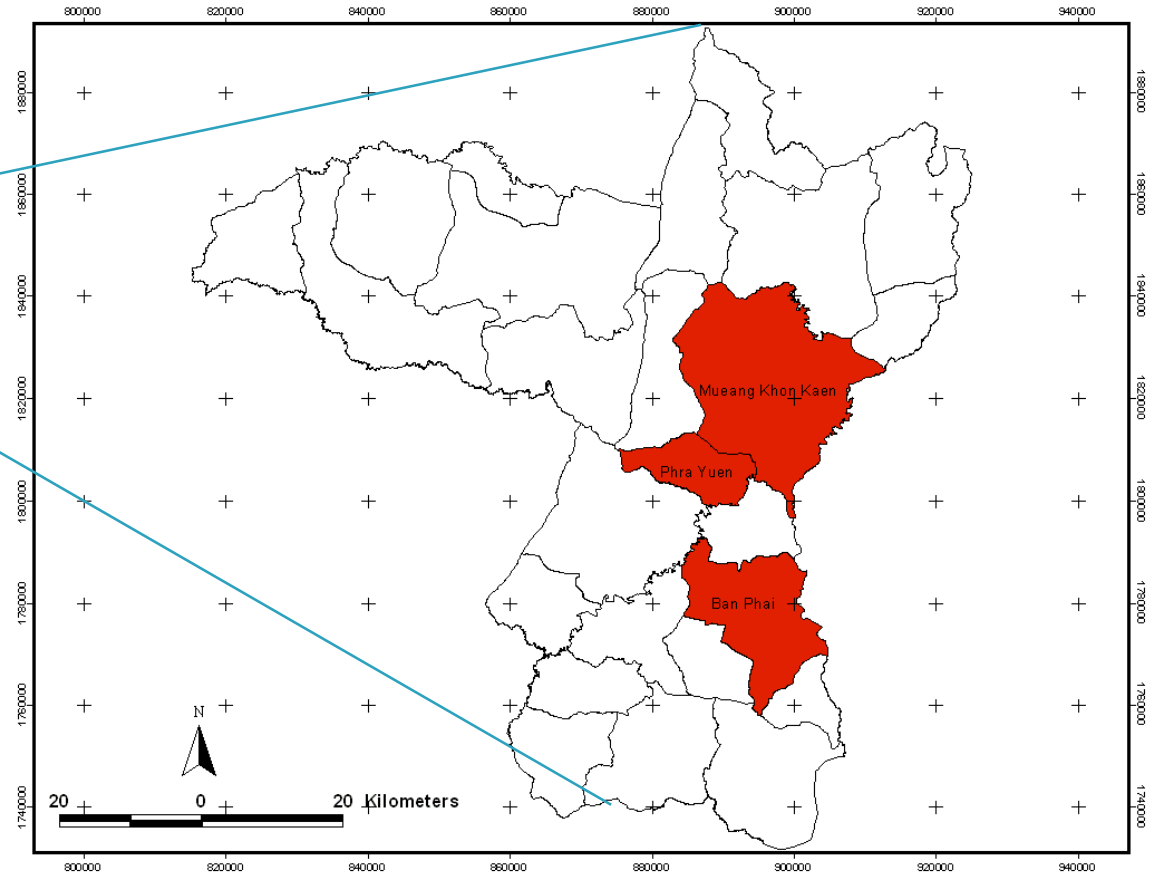


Objective

- ▶ To study an ecology of snails in family Viviparidae
 - ▶ To study type of ingested organisms in digestive tract of Viviparidae snails
- 

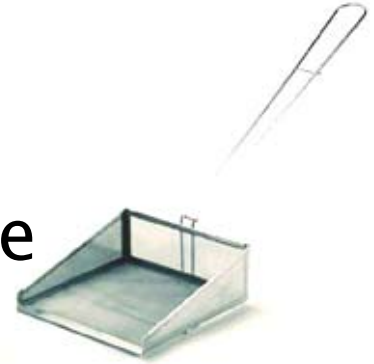
Materials and Methods

Study area



Mollusk collection

- ▶ 10 Localities
- ▶ 10 collection stations in each locality
- ▶ 5 minute search sampling
- ▶ Hand and/or scoop and Ekman dredge
- ▶ Put in labeled plastic bags
- ▶ Some of Viviparid snails were fixed in 80% ethanol



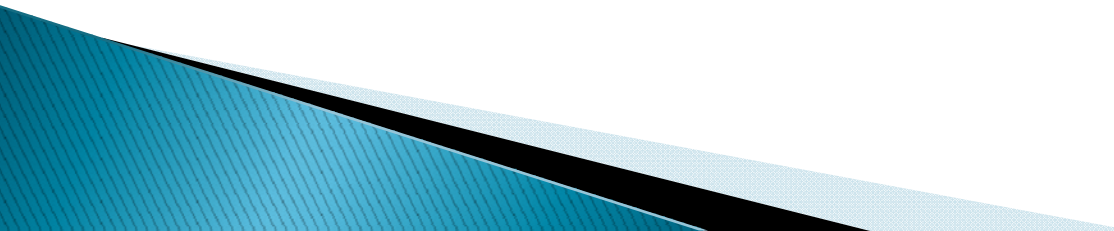
Water quality

- ▶ Using Portable Electrochemical Analyser (TPS model 90FL, Australia) to measurement of water temperature, pH, salinity, conductivity, and dissolved oxygen
- ▶ Turbidity was measured using Turbidimeter (HACH model 2100P, USA)



Results

Water quality

- ▶ Temperature: 23–27°C
 - ▶ pH: 6.85–8.01
 - ▶ Turbidity: 3.26–19.45 NTU
 - ▶ Salinity: 0.47–5.69 ppk
 - ▶ Conductivity: 0.94–10.25 $\mu\text{s}/\text{cm}$
 - ▶ Dissolved oxygen: 0.43–0.82 ppm
- 

Snails in family Viviparidae

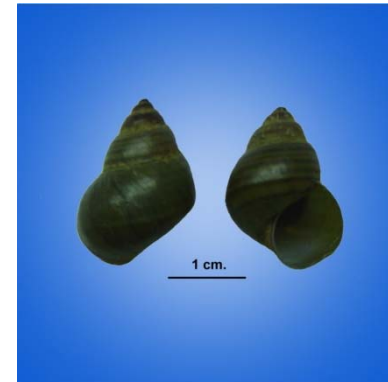
- ▶ Found Viviparidae snails 3 species from 4 out of 10 localities
 - *Filopaludina (Siamopaludina) martensi martensi*
 - *Filopaludina (Siamopaludina) martensi munensis*
 - *Filopaludina (Filopaludina) speciosa*



Filopaludina (Siamopaludina) martensi martensi



Filopaludina (Siamopaludina) martensi munensis



Filopaludina (Filopaludina) speciosa

Sympatric species

- ▶ 10 species: 4 order 8 family 10 genus
 - *Bithynia siamensis goniomphalos*
 - *Melanoides tuberculata*
 - *Tarebia granifera*
 - *Pomacia canaliculata*
 - *Clea (Anentome) helina*
 - *Indoplanorbis exustus*
 - *Lymnaea (Radix) auricularia rubiginosa*
 - *Corbicula* sp.
 - *Scabies crispata*
 - *Scaphula pinna*



Bithynia siamensis goniomphalos



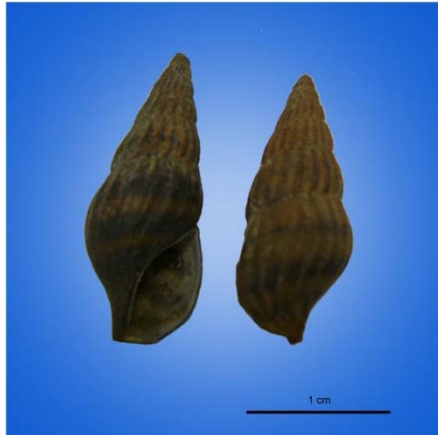
Pomacea canaliculata



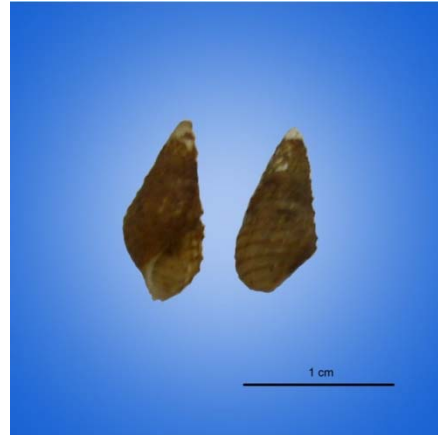
Melanoides tuberculata



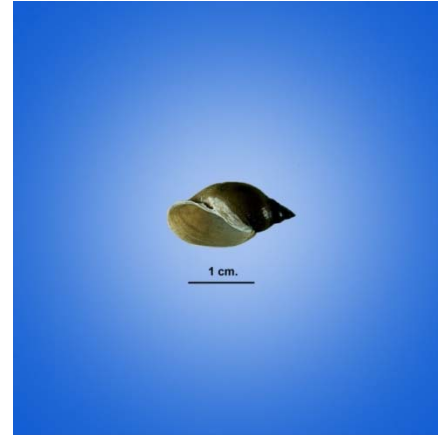
Indoplanorbis exustus



Clea helina



Tarebia granifera



Lymnaea (Radix) auricularia rubiginosa



Corbicula sp.



Scabies crispata



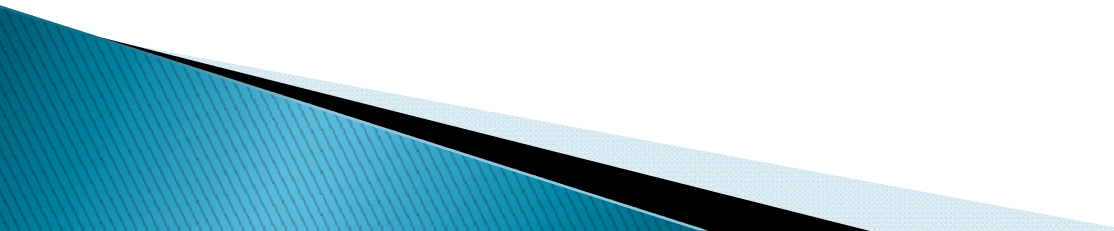
Scaphula pinna

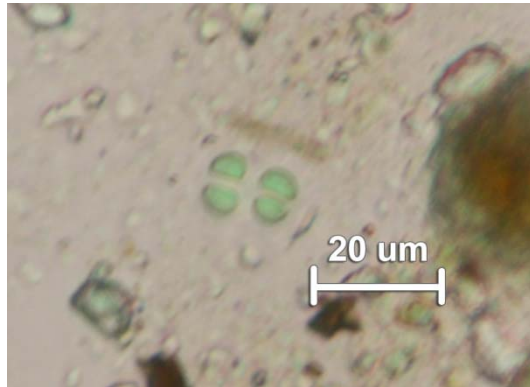
Aquatic plants

- ▶ *Typha angustifolia*
- ▶ *Ipomoea aquatica*
- ▶ *Eichhornia crassipes*
- ▶ *Salvinia cucullata*
- ▶ *Brachiaria mutica*
- ▶ *Nymphaea lotus*
- ▶ *Neptunia oleracea*
- ▶ *Brachiaria mutica*



Planktons

- ▶ Division Cyanophyta
 - ▶ Division Chlorophyta
 - ▶ Division Euglenophyta
 - ▶ Division Chrysophyta
 - ▶ Rotifer
 - ▶ Protozoan
- 



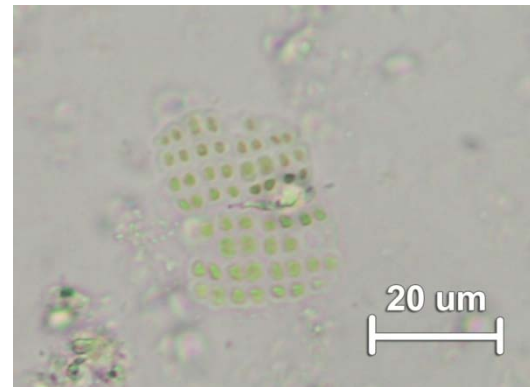
Chroococcus sp.



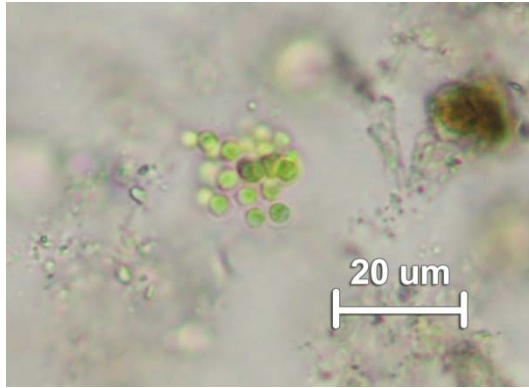
Merismopedia sp.



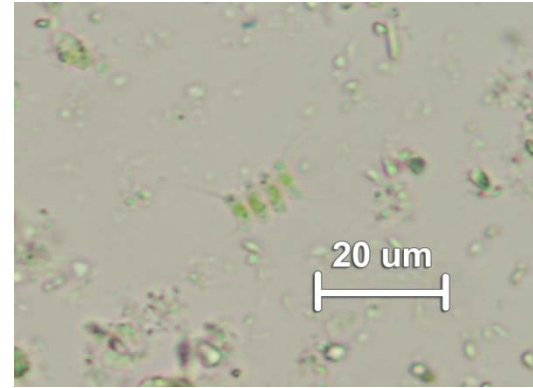
Gloeocapsa sp.



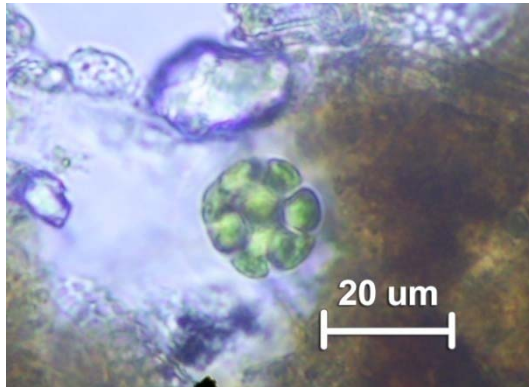
Merismopedia elegans



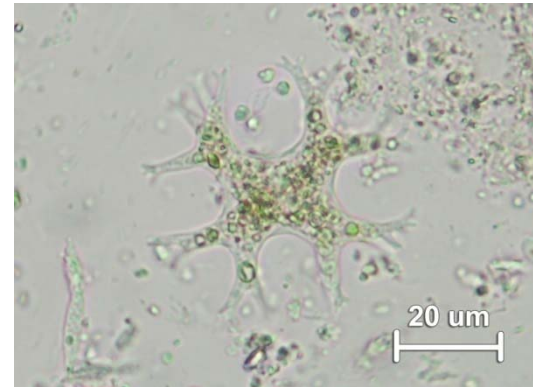
Eudorina sp.



Scenedesmus sp.



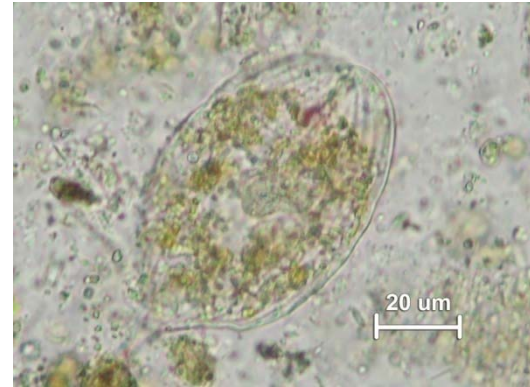
Pandorina sp.



Staurastrum sp.



Euglena sp.



Phacus sp.



Diatoms



Rotifer



Picture from www.lifesciences.napier.ac.uk

Population density

- ▶ **Salinity** $r_s = -0.433$ ($p < 0.01$)
- ▶ **Conductivity** $r_s = -0.430$ ($p < 0.01$)
- ▶ **DO** $r_s = 0.386$ ($p < 0.01$)
- ▶ **pH** $r_s = 0.375$ ($p < 0.01$)
- ▶ **Turbidity** $r_s = 0.323$ ($p < 0.05$)

Conclusion

- ▶ Population density of Viviparid snails were negative correlation with salinity
- ▶ Viviparid snails not found in the locality with the salinity higher than 7.94 ppk
- ▶ Same organisms in food contents of Viviparid snails as in *Bithynia siamensis goniomphalos*

“Give me a lever long enough and a fulcrum on which to place it, and I shall move the world.”

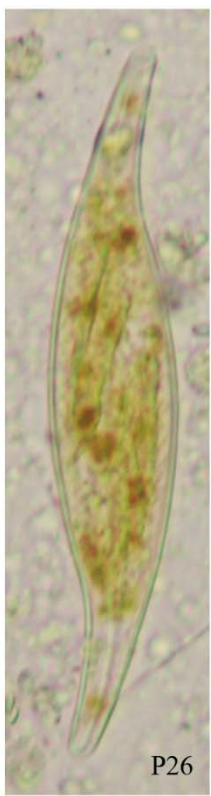
Archimedes



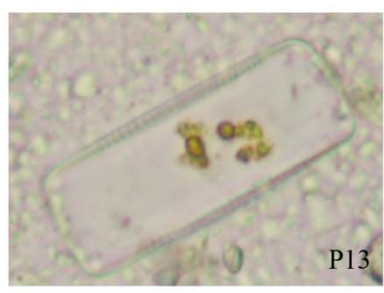
Appendix



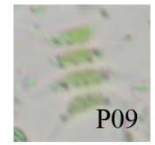
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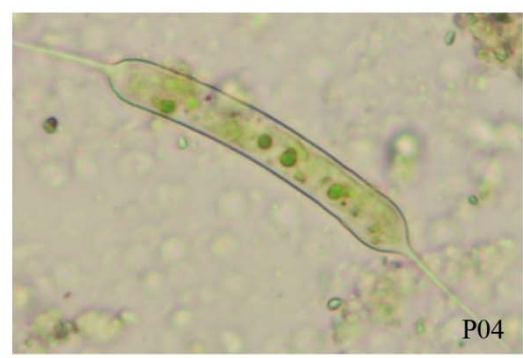
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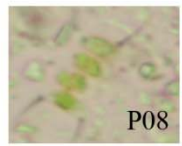
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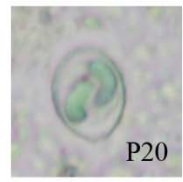
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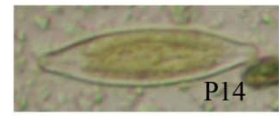
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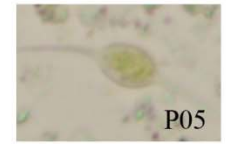
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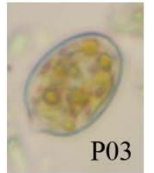
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P14



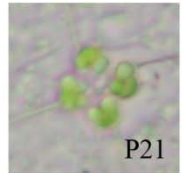
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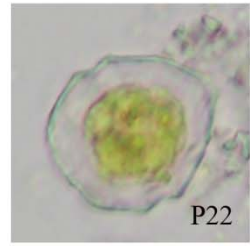
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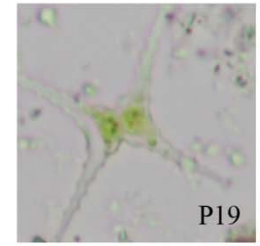
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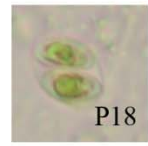
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P22



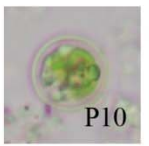
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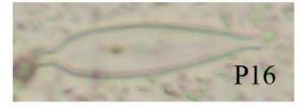
P18



P06



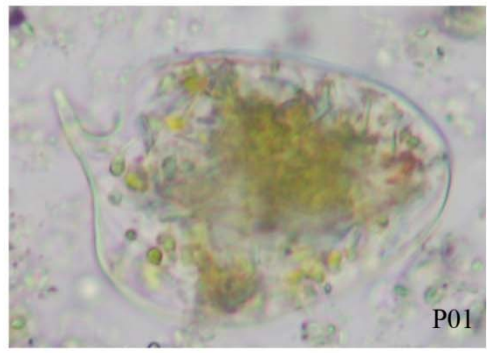
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P16



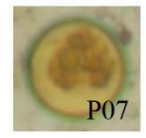
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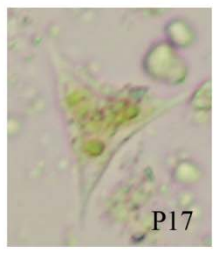
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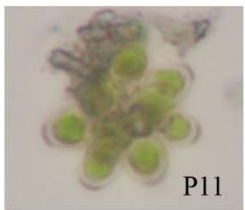
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P07



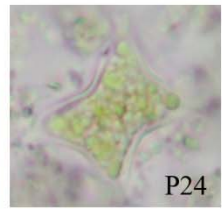
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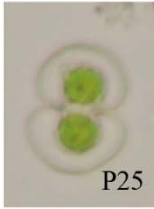
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P15



P24

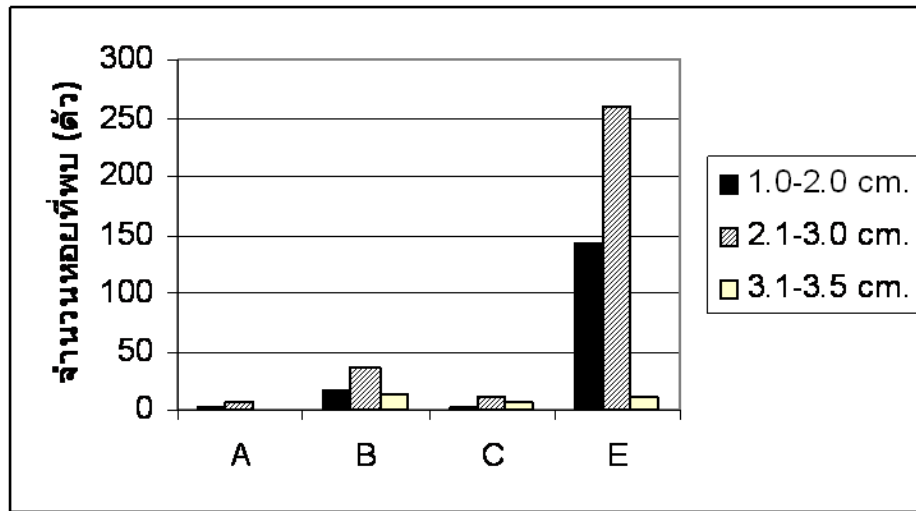


P25



P27

อันดับ (order)	วงศ์ (family)	ชื่อวิทยาศาสตร์ (Scientific Name)	ชื่อไทย (Thai Name)	สถานที่สำรวจ				
				A	B	C	D	E
Mesogastropoda	Bithyniidae	1. <i>siamensis goniomphalos</i>	หอยไซ	401	192	248	459	23
	Thiaridae	2. <i>Melanoides tuberculata</i>	หอยเจดีย์	5	105	1518	88	40
		3. <i>Tarebia granifera</i>	หอยเจดีย์	0	0	184	0	44
	Ampullariidae	4. <i>Pomacia canaliculata</i>	หอยเชอร์รี่	17	81	0	0	131
	Thiaridae	5. <i>Clea (Anentome) helina</i>	หอยเจดีย์	20	0	0	0	0
Basomatophora	Planorbidae	6. <i>Indoplanorbis exustus</i>	หอยคัน	1	72	0	0	149
	Lymnaeidae	7. <i>Lymnaea (Radix) auricularia rubiginosa</i>	หอยคัน	0	2	0	0	0
Uinonoida	Corbiculidae	8. <i>Corbicula iravadica</i>	หอยกาบ	2	64	0	0	0
	Amblemidae	9. <i>Scabies crispata</i>	หอยกาบลาย	3	15	0	0	4
Arcoida	Arcidae	10. <i>Scaphula pinna</i>	หอยกาบ	0	44	0	0	0



ค่าที่ทำกรตรวจวัด	สถานที่สำรวจ (X±SD)						
	A	B	C	D	E	F	G
1. pH	8.01±0.15	7.20±0.23	7.28±0.13	6.85±0.09	7.41±0.04	6.95	6.86
2. Temperature (°C)	24.20±0.08	27.33±0.25	23.17±0.23	24.83±1.48	23.06±0.82	25.8	24.2
3. Turbidity (NTU)	19.45±1.35	3.26±0.49	12.57±0.61	4.26±3.37	16.08±3.88	15.3	8.33
4. Conductivity (µs/cm)	10.25±0.12	0.94±0.01	4.39±0.06	16.69±0.82	3.29±0.01	33.2*	14.15
5. Salinity (ppk.)	5.69±0.08	0.47±0.00	2.35±0.02	9.33±0.63	1.74±0.01	19.12*	7.94
6. DO (ppm.)	0.43±0.03	0.79±0.53	0.45±0.05	0.59±0.10	0.82±0.18	0.53	9.98
7. BOD (ppm.)	-	-	0.10±0.05	0.23±0.10	0.55±0.05	-	-

กลุ่มของแพลงก์ตอน	ชื่อวิทยาศาสตร์ (Scientific name)	สถานที่สำรวจ (Locality)			
		A	B	C	E
Chlorophyta	1. Eudorina sp.	+	+	+	+
	2. Eucapsis sp.	+	-	-	-
	3. Oedogonium sp.	+	-	+	-
	4. Scenedesmus sp.	-	-	+	+
	5. Staurastrum sp.	-	-	-	+
Chrysophyta	1. Diatoms	+	+	+	+
Cyanophyta	1. Agmenellum sp.	-	-	-	+
	2. Chroococcus sp.	-	-	+	-
	3. Gloeobacter sp.	-	-	-	+
	4. Gloeocapsa sp.	+	+	+	+
	5. Merismopedia sp.	+	-	+	+
	6. Surirella sp.	+	+	-	+
Euglenophyta	1. Euglena	+	-	-	+
	2. Phacus spp.	-	-	-	+
Rotifer	1. Rotifer	+	-	+	+
Protozoa	1. Ceratium sp.	-	+	+	-

spearman's rho	pH	Conductivity	Salinity	DO	Turbidity	sp.
<i>F. martensi martensi</i>	.375**	-.430**	-.433**	.386**	.323*	-.349*
Sig. (1-tailed)	.008	.003	.002	.006	.020	.025
N	41	41	41	41	41	41