

## SNAILS COMPOSITION IN THE SOUTHERN PART OF GVJSUNG HALIMUN NATIONAL PARK

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### ABSTRACT

Snails inventory in the southern part of Gunung Halimun National Park (GHNP) was conducted in two locations i.e., Ciptarasa and Simaresmi, in July and November 2000. It was found 36 species of snails that belongs to 16 families. It means that snails in the southern part of GHNP differs from that of the central part of the Park. Those snails were discovered in 9 habitat types.

Key words: Snails, inventory, habitat types, species composition, land snails, freshwater snails, Gunung Halimun National Park

### INTRODUCTION

This paper reports the study result of snails in Gunung Halimun National Park (GHNP). The research was conducted in July dan November 2000, surround Ciptarasa and Simaresmi Villages, Cisolok District, Sukabumi.

Those two places were chosen because both of them were located at the southern part of GHNP, whereas the previous research were conducted in the central part (Marwoto, 1998; Subasli and Munandar, 1999). The southern part of the Park is connected by a series of river and stream to Indian Ocean. Because of that, it can be assumed that this part is more vary, in term of snail habitats, from that of central area. Therefore, the species diversity of snails living in this part is also more vary.

This research is purposed to explore the species composition of snails in the southern part of Gunung Halimun National Park add the data that obtained previously by Marwoto (1998) and Subasli and Munandar (1999). It is expected that **the** information of mollusc diversity in GHNP increases comprehensively.

### The Study Areas

It was identified as many as 9 types of snails habitats in Gunung Halimun National Park. As follows:

#### 1. *Leaves litter*

This type of habitats were found generally on the forest floor where the forest dominated by high canopy vegetation (tall trees). The habitat can be located at the slope and tip of mountains. The top section of leaves litter usually dry whereas the bottom section where in contact with the ground, thus wet or damp.

#### 2. *Trees*

This habitat in the form of canopy and trunk of tall trees (mostly taller than 3 m) where snails can attach to them.

#### 3. *Low vegetation*

Low vegetation preferred by snails to live on mostly grows at the edge river and stream. Some of them also can be seen at the bottom of dales. They were consist of non woody vegetation with pulpy stem, therefore wet or damp condition were almost permanent.

#### 4. *Rotten fallen tree*

Rotten fallen trees were found frequently in the forest, by natural or human for firewood purpose. However, there is a difference between them. The first one generally rotten faster and has cavities inside, whereas the second mostly solid wood. The rotten fallen trees commonly has small vegetation growing on it.

5. *Space between sago stems*

Space between sago stems usually intercepts and retains rainwater. This wet environment is a suitable place for some snails to live within. However, it is not without drawback, the space is very thin. Therefore the space is limited for the snails which possess very thin shell, or with various degree rudimentary shell, or without shell at all.

6. *River and stream*

Some freshwater snails live in river and stream, especially at the edge of the water where the water is not excessively swift. The bottom of this habitat type is stony or sandy, with rock boulders here and there. The border of the river and stream can be a simple edge without vegetation or grew by grasses.

7. *Paddy field and pond*

Paddy field and pond are found not in the National Park, but surround the Park, are run by the Park border inhabitants. The water mostly stagnant or with a small current. The bottom of this environment mostly dominated by mud.

8. *Rock boulders*

This habitat can be in the form of steep rocky hill, rocky boulder, or rocky terrace on a steep hill. All of them have diameter of more than 2 meters.

9. *The thick mat of moss*

Mat of moss mostly grows on large rock that shaded by the higher vegetation. The mat is usually wet.

## MATERIALS AND METHODS

Materials are consist of snails specimen taken from GHNP and its adjacent areas. Sampling was conducted randomly by which was fulfilled by free collection and purposive sampling methods.

In the free collection, snails were opportunistically collected by visual searching and handpicking them from their prime habitat as determined by collector experience. They were collected from standing vegetation (on the bark, on and behind the leaves), and fallen trunks (under the trunk and behind rotten bark), rocks, under leave litter, and streams.

In purposive sampling, many plots of 0.09 m<sup>2</sup> (30cm x 30cm) were established in each type of habitat e.g. water and leaf litter and debris. In the water, a net of 0.2 mm mesh size was run to collect snails in and on the water bottom, attached to water plants, and on and under rocks. The specimen found were put in plastic bottles and shifted to the base camp for further process.

To get the tiny snails, less than 3 mm, leaf litter from several locations was collected and stored in cotton bags. The litter was then transported to Malacology Laboratory of Museum Zoologicum Bogoriense in Cibinong, Bogor where it was dried, sieved and extracted its snails contents.

In case the life snails were not found, empty shells from the field and litter extraction were also collected. The assumption that corresponding with the collection was that the shells came from the life animals that live not so far from the shells' whereabouts. The empty shells were dry stored, and body contained shell were stored in 70% alcohol solution. All specimens were deposited Museum Zoologicum Bogoriense.

## RESULTS

A total of 36 snail species belongs to 16 families was collected in the field. Most of the species are land snails (26 species from 11 families), whereas 10 species (5 families) are freshwater species. A complete list of snails found in GHNP and its adjacent areas is presented in the Table 1.

Table 1. List of snails fauna found in GHNP according to location

No.	Species	Location	
		1	2
	Family THIARIDAE		
1.	<i>Brotia testudinaria</i> (VON DEM BUSCH, 1842)	✓	
2.	<i>Brotia spadicea</i>		✓
3.	<i>Melanooides torulosa</i>		✓
4.	<i>Melanooides tuberculata</i> (MULLER, 1774)	✓	
5.	<i>Thiara scabra</i> (MULLER, 1774)	✓	
6.	<i>Thiara herklotzi</i> (PETIT, 1853)	✓	
	Family VIVIPARIDAE		
7.	<i>Bellamyia javanica</i> (VON DEM BUSCH, 1844)	✓	
	Family AMPULLARIIDAE		
8.	<i>Pila ampulla</i> (LINNE, 1758)	✓	✓
	Family CYCLOPHORIDAE		
9.	<i>Cyclophorus rafflesi rafflesi</i> (BRODERIP & SOWERBY)	✓	✓
10.	<i>Cyclophorus perdix perdix</i> (BRODERIP & SOWERBY)	✓	✓
11.	<i>Cyclotus discoides</i> SOWERBY	✓	✓
	Family PUPINIDAE		
12.	<i>Pupina junghuhni</i> MARTENS	✓	✓
13.	<i>Pupina treubi</i> BOETTGER	✓	
	Family EUCONULIDAE		
14.	<i>Coneuplecta bandongensis</i> BOETTGER 1890		✓
	Family DIPLOMMATIDAE		
15.	<i>Diplommatina auriculata</i> MOELLENDORFF	✓	
	Family VAGINULIDAE		
16.	<i>Filicaulis bleekeri</i> KEFERST	✓	
	Family PLANORBIDAE		
17.	<i>Gyraulus convexiusculus</i> (HUTTON, 1849)	✓	✓
	Family LYMNEAIDAE		
18.	<i>Lymnea rubiginosa</i> (MICHELIN, 1831)	✓	✓
	Family ARIOPHANTIDAE		
19.	<i>Liardetia convexoconica</i> (MOELLENDORFF, 1897)	✓	
20.	<i>Elaphroconcha bataviana</i> (VON DEM BUSCH, 1842)	✓	✓
21.	<i>Elaphroconcha patens</i> (MARTENS, 1898)	✓	
22.	<i>Parmarion pupillaris</i> HUMBERT, 1864	✓	
23.	<i>Microparmarion</i> sp.	✓	
	Family CAMAENIDAE		
24.	<i>Landouria rotatoria</i> (VON DEM BUSCH, 1842)	✓	✓
25.	<i>Landouria ciliocincta</i> (MOELLENDORFF, 1897)	✓	
26.	<i>Landouria smironensis</i> (MOUSSON, 1849)	✓	
27.	<i>Chloritis crassula</i> (PHILIPPI, 1844)	✓	
28.	<i>Amphidromus alticola</i> FULTON, 1896	✓	✓
	Family CLAUSILIIDAE		
29.	<i>Pseudonania javana</i> (PFEIFFER, 1841)	✓	
	Family SUBULINIDAE		
30.	<i>Prosopeas achatinaceum</i> (PFEIFFER, 1846)	✓	
31.	<i>Subulina octona</i> (BRUGUIERE, 1792)	✓	
	Family HELIXARIONIDAE		
32.	<i>Geotrochus conus</i> (PHILLIPPI, 1841)	✓	
33.	<i>Helicarion albellus</i> MARTENS, 1867		✓
34.	<i>Liardetia angigyra angigyra</i>		✓
35.	<i>Liardetia convexoconica</i> (MOELLENDORFF, 1897)	✓	
	Family TROCHOMORPHIDAE		
36.	<i>Trochomorpha planorbis</i> (LESSON, 1831)	✓	✓
	Total	31	16

1 = Ciptarasa/Sirnarasa, 2 = Simaresmi, ✓ = present.

**Table 2. List of snails found in GHNP according to habitat type**

No.	Species	Habitat type								
		1	2	3	4	5	6	7	8	9
	Family THIARIDAE						•	•		
1.	<i>B. testudinaria</i> (VON DEM BUSCH, 1842)						•	•		
2.	<i>B. spadicea</i>						•	•		
3.	<i>M. torulosa</i>						•			
4.	<i>M. tuberculata</i> (MULLER, 1774)						•			
5.	<i>T. scabra</i> (MULLER, 1774)						•			
6.	<i>T. herklotzi</i> (PETIT, 1853)						•			
	Family VIVIPARIDAE									
7.	<i>B. javanica</i> (VON DEM BUSCH, 1844)							•		
	Family AMPULLARIIDAE									
8.	<i>P. ampulla</i> (UNNE, 1758)							•		
	Familia CYCLOPHORIDAE									
9.	<i>C. rafflesi rafflesi</i> (BRODERIP & SOWERBY)	/							•	
10.	<i>Perdixperdix</i> (BRODERIP & SOWERBY)	•							•	
11.	<i>C. discoides</i> SOWERBY	•							✓	
	Family PUPINIDAE									
12.	<i>P. junghuhni</i> MARTENS			•						
13.	<i>P. treubi</i> BOETYCEK			•						
	Family EUCONULIDAE									
14.	<i>C. bandongensis</i> BOETTGEK%90	•								
	Family DIPLOMMATIDAE									
15.	<i>D. auriculata</i> MOELLENDORFF									•
	Family VAGINULIDAE									
16.	<i>F. bleekeri</i> KEFERST	•								
	Family PLANORBIDAE									
17.	<i>G. convexiusculus</i> (HUTTON, 1849)							•		
	Family LYMNEAIDAE									
18.	<i>L. rubiginosa</i> (MICHELIN, 1831)							•		
	Family ARIOPHANTIDAE									
19.	<i>Convexoconica</i> (MOELLENDORFF, 1897)	•								
20.	<i>E. bataviana</i> (VON DEM BUSCH, 1842)	•								
21.	<i>E. patens</i> (MARTENS, 1898)	•								
22.	<i>P. pupillaris</i> HUMBERT, 1864	•		•		•				
23.	<i>Microparmarion</i> sp.	✓		•		•				
	Family CAMAENIDAE									
24.	<i>L. rotatoria</i> (VON DEM BUSCH, 1842)	•								
25.	<i>L. ciliocincta</i> (MOELLENDORFF, 1897)	•								
26.	<i>L. smironensis</i> (MOUSSON, 1849)	•								
27.	<i>C. crassula</i> (PHILIPPI, 1844)	•								
28.	<i>A. alticola</i> FULTON, 1896		•							
	Family CLAUSILIIDAE									
29.	<i>P. javana</i> (PFEIFFER, 1841)				✓					
	Family SUBULINIDAE									
30.	<i>P. achatinaceum</i> (PFEIFFER, 1846)		•		•					
31.	<i>S. octona</i> (BRUGUIERE, 1792)		•		•					
	Family HELIXARIONIDAE									
32.	<i>G. conus</i> (PHILLIPPI, 1841)			✓	✓					
33.	<i>H. albellus</i> MARTENS, 1867			•		•				
34.	<i>L. angigyra angigyra</i>	•								
35.	<i>L. convexoconica</i> (MOELLENDORFF, 1897)	•								
	Family TROCHOMORPHIDAE									
36.	<i>T. planorbis</i> (LESSON, 1831)					•				
	Jumlah	16	3	6	4	4	7	7	2	1

1 = leaves litter, 2 = tree, 3 = low vegetation/bush, 4 = rotten fallen tree, 5 = space between sago stems, 6 = river and stream, 7 = pady field and pond, 8 = rock boulder, 9 = moss mat, J = present.

Of the 36 species collected 16 found in or on leaves litter, or the highest number of snails species in a habitat type. It was followed by river and stream, then paddy field and pond (7 species respectively). The fourth position is positioned by the low vegetation. The snails list found in various habitat types is given in Table 2.

## DISCUSSION

Compared to Marwoto (1998) and Subasli and Munandar (1999), this research achieved a more comprehensive results as it is reflected by a more species number. At least, this is caused by two components. Firstly, Marwoto (1998) only discussed land snails. Even though Subasli and Munandar (1999) were also included fresh water snails to their report, the snail species number is still lower than that of this research. Secondly, Marwoto (1998) only mention 4 habitat types whereas Subasli and Munandar (1999) did not state it. However, it can be stated that the more differs the habitat type in a location the more chance to find various snail. It is also stated by Krebs (1978) that difference or alteration of physical environment is the main subject of organism diversification that live in this environment.

There is almost no difference, in terms of habitat, between research location in Ciptarasa and that of Sirnaresmi. However, the species number found in both locations were different. This difference is most probable caused by obstacles during sampling such as weather. In November, when sampling in Sirnaresmi was progressing, rain was heavily occurred. The rain influenced the clarity and distance of visibility in searching the snails. Therefore, the snails found was less than that of encountered in July 2000.

Compared with that of Gede-Pangrango (TNGP) which contained 95 spesies of land snails (Jutting 1948, 1950 and 1952), the result in GHNP is far low below. However the possibility to find many more snails in is high since it has larger area 40,000 ha (Arief *et al.*, 1999) compared to 15,196 ha of TNGP (Hideki and Hartanti, 1999). Also tthe

core zone of GHNP is relatively still excellent condition and has more snail's habitat type. Thus, more intensive study in GHNP is needed in the future.

Based on the number of snails, it can be seen that leaves litter is preferred by most of the snails. It is likely that leaves litter as the habitat is a comfortable place for snails to live within. The thicknesses of the litter is competently keep the moisture relatively stable, especially near and at the bottom where it touches ground. The comparable condition is also prevail for temperature, eventhough the top part of the litter intensely dry. Moisture and temperature are the most important physical factor that influence the live of land animals (Krebs, 1978). Snails need a moist and stable temperature to keep their wet and soft bodies from desiccation.

Food scarcity is not a problem for the life under leaves litter. Rotten leaves grew by fungi as food of snails available continuously from time to time. Field observation discovered snails were endeavoring wet rotting leaves even tough it was not clear whether they were attracted by the leaves or by the fungi grew on the leaves. On the other occasion Heryanto (1994) also found mangrove snails feed on rotting mangrove leaves and fruits. It was stated by Purchon (1977) that snails such as *Cyclophorus* and *Diplommatina* are herbivorous.

Leaves litter also provides shelter to the snails that live underneath from predation. The litter conceals them from their predators such as birds. However, some heaps of snail's shell, mostly of *C. rafflesi rafflesii* (BRODERIP & SOWERBY) and *C. perdix perdix* (BRODERIP & SOWERBY) found frequently on rocky areas as a result of predation. Most of the shells were perforated or broken. It seems that in order to obtain the snails' body, the birds peck and strike the shells to the rocks. Besides, leaves litter is loose. This characteristics makes the snails move without obstruction, especially for large snails such as *C. rafflesii rafflesii* (BRODERIP & SOWERBY) and *C. perdix perdix* (BRODERIP & SOWERBY).

Fresh water habitat such as river, stream, paddy field, and pond is dwelled the second largest snail species number. One would expect that this kind of habitat offers a suitable environment for those inhabitants that live within. The temperature of the river and stream is relatively stable. The edge of the streams and rivers grew by low vegetation which also provides protection for the freshwater snails in the river and stream.

In contrast with the previous habitats, the water temperature in pond, and especially in paddy field, is very fluctuate. More over, water in paddy field eventually drained, creates an overwhelming condition for the snails. Therefore, the snails in paddy field and pond should be able to tolerate a wide range of temperature, even an extreme situation. In paddy field and pond, food resources such as algae occurs abundantly. Predation is very low, mostly by human being such as for *P. ampulla* (LINNE, 1758) and *B. javanica* (VON DEM BUSCH, 1844) and by fish (for *G. convexiusculus* (HUTTON, 1849)).

Even though a large rotten fallen tree was dry at its bark, but a damp situation was still preserved under the bark. Some small species such as *P. javana* and *S. octona* still live comfortably under the bark. The hardness of the bark provides the snails with safeness from threatening sunlight and predators. More species, such as *G. conus*, occurs frequently in the large cavity of the fallen tree, often with a surprising size since no hole, as the entry way for the snails, can be located. It seems that the snails set their foot in the cavity when they were still in smaller size.

The space between stems and midrib of sago palm is very compress. It is different from leaves litter which is loose. This constricts space allows only snails with slender shell, likes *T. planorbis* (LESSON, 1831) or rudimentary shell likes *P. pupillaris* HUMBERT, 1864 and *H. albellus* MARTENS, 1867, can live in the last habitat. Contradictory with its constricts, the space itself provides the snails with comfort. As stated

previously, the space retains rainwater, and keeps the atmosphere moistened. Nourishment is plenty since the stems are pulpy. Field observation showed several snails were feeding on the stem, eventhough it need more deeper examination whether they feed on the pulp of stems or the microscopic organism lied on the stems. Shelter is also provided by the hardness of stem's bark.

The same condition, in the term of moisture, food, and protection, as the other habitat types was occur at rock boulders. The rock keeps leaves that fell on its top and the space among them. The litters retains water and then grown by small vegetation, and a damp environment is built. Automatically, food is plentiful for snails. Most of the snails found on rock boulders live concealed themselves under the litters and the rock, therefore they are protected from predation.

It can be concluded that in a location of various habitat the snail composition is also diverse. Most of the snails are live in the habitat that conform with their foremost requirement such as moisture, food and protection.

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