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Short Notes

Land and Freshwater Snails of Imbak Canyon Conservation Area (ICCA), Sabah, Northern Borneo

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Abstract

This paper presents the first checklist of land and freshwater snails of Imbak Canyon Conservation Area (ICCA) as part of the Imbak Crayon Scientific Expedition 2017. The specimens of land and freshwater snails were collected from six standard sampling plots and several random locations around Batu Timbang Basecamp between 17th and 19th August 2017. A total of 21 species of land snail and one species of freshwater snail are presented in a checklist. Currently, 24 species of land snails and one species of freshwater snail are recorded in ICCA, after including two species that were previously recorded but yet to be published.

Keywords: Borneo, Malaysia, Lahad Datu, Mollusca, lowland forest, Species diversity

Introduction

Imbak Canyon Conservation Area (ICCA), together with the Danum Valley Conservation Area and Maliau Basin Conservation Area are among the most important conservation areas in Sabah (Reynolds et al., 2011). Several malacological studies have been conducted in the tropical lowland rainforests, covering several localities across Sabah's mainland (Schilthuizen & Rutjes, 2001; Schilthuizen et al., 2002; Liew et al., 2008; Uchida et al., 2013), but there is hitherto no published information on the malacofauna diversity of the ICCA. Ten land snail species were recorded in ICCA based on specimens previously collected and deposited in the *BORNEENSIS* collection at Universiti Malaysia Sabah, but there is thus far no systematic survey on the snail diversity in Imbak Canyon and Maliau Basin. As part of the Imbak Canyon Scientific Expedition 2017, a systematic sampling and an opportunistic search for land and freshwater snails were carried out around the Batu Timbang Basecamp, which is located at the southwest of Imbak Canyon.

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Methodology

This sampling was conducted at Batu Timbang, located at the southwest of Imbak Canyon Conservation Area (ICCA), around 30km away from the Imbak Canyon Research Centre, between 17th August 2017 and 19th August 2017. We surveyed six standard plots (20m x 20m) along the three trails, namely West Summit Trail, Rafflesia Trail and Lanap Trail (Table 1). Snails encountered opportunistically around Batu Timbang were also collected. Land snail sampling and sorting were carried out according to methodology described in Phung et al. (2017) and Schilthuizen et al. (2003). Each specimen was identified to the lowest taxonomic level (or unit) possible by referring to the manuscript *Field Guide to the Land Snails of Sabah* (Vermeulen & Liew*in prep*), Vermeulen et al. (2015) and the *BORNEENSIS* collection in Universiti Malaysia Sabah. The specimens were catalogued and deposited in the BORNEENSIS collection at the Institute of Tropical Biology and Conservation, Universiti Malaysia Sabah (BOR/MOL 13315-13316, BOR/MOL 16618-13336, BOR/MOL 13339, BOR/MOL 13380-13402).

Table 1. Details and coordinates for all sampling locations.

Sampling locations	Latitude (˚)	Longitude (˚)
ICCA expedition, Batu Timbang Basecamp. Standard Plot No. 1 along West Summit Trail.	5.0041	117.0736
ICCA expedition, Batu Timbang Basecamp. Standard Plot No. 2 along West Summit Trail.	5.0028	117.0644
ICCA expedition, Batu Timbang Basecamp. Standard Plot No. 3 along West Summit Trail.	5.0048	117.0711
ICCA expedition, Batu Timbang Basecamp. Standard Plot No. 4. along Rafflesia Trail, beside waterfall.	4.9976	117.0791
ICCA expedition, Batu Timbang Basecamp. Standard Plot No. 5. along Rafflesia Trail.	4.9960	117.0769
ICCA expedition, Batu Timbang Basecamp. Standard Plot No. 6. along Lanap Trail.	5.0038	117.0802
ICCA expedition, random locations along Batu Timbang's river.	NA	NA
ICCA expedition, random locations along Batu Timbang Basecamp.	NA	NA
ICCA expedition, random locations along Batu Timbang 300 m from Lanap trail.	NA	NA

Results

The checklist reports a total of 21 land snail species belonging to 11 families and 19 genera (Table 2). *Clea* sp., a member of the family Nassariidae, was the only freshwater snail recorded during this expedition. Ariophantidae, with five species recorded, was the most species-rich family found in Imbak Canyon, followed by the family Trochomorphidae with three species recorded. Microsnails (size less than 5 mm) from genera *Microcystina*, *Charopa*, *Discocharopa*, *Diplommatina*, *Philalanka*, *Kaliella*, *Paralaoma*, accounted for approximately half of the total number of species documented in this study.

Table 2. Checklist of snails collected during Imbak Canyon Expedition 2017 at Batu Timbang. (#) indicates freshwater snail and (*) indicates land snail recorded previously.

Species	Standard Plot						Opportunistic search		
	1	2	3	4	5	6	River	Base Camp	300 m from Lanap trail
Ariophantidae									
**Hemiplecta humphreysiana* (Lea, 1841)				/		/			/
**Macrochlamys* sp.						/			
Microcystina microrhynchus Vermeulen, Liew & Schilthuizen, 2015			/	/	/	/			
Microcystina muscorum (Van Benthem Jutting, 1959)				/					
Vitrinula descrepignyi (Higgins, 1868)						/			
Camaenidae									
**Amphidromus martensi* (Boettger, 1894)				/		/			
Chloritis kinibalensis (Kobelt, 1894)								/	
Charopidae									
Charopa lissobasis Vermeulen, Schilthuizen & Liew, 2007		/		/	/	/			
Discocharopa aperta (von Möllendorff, 1888)			/	/		/			
Cyclophoridae									
Japonia sp.				/					
Opisthoporus sp.						/			
Diplommatinidae									
Diplommatina sp.			/	/		/			
Dyakiidae									
**Everettia paulbasintali* Liew, Schilthuizen & Vermeulen, 2009	/		/	/	/	/		/	
Endodontidae									

Philalanka kusana (Aldrich, 1889)			/		/			
Euconulidae								
Kaliella dendrophila (van Benthem Jutting, 1950)		/						
Kaliella microconus (Mousson, 1865)	/							
#Nassariidae								
Clea sp.						/		
Punctidae								
Paralaoma angusta Vermeulen, Liew & Schilthuizen, 2015		/						
Subulinidae								
Paropeas achatinaceum (Pfeiffer, 1846)			/	/				
Trochomorphidae								
**Bertia brookei* (Adams & Reeve, 1848)								/
**Geotrochus meristotrochus* Vermeulen, Liew & Schilthuizen, 2015			/	/	/			
**Videna metcalfei* (Pfeiffer, 1845)							/	

Discussion

This study adds 16 new records to the previously unpublished records of five land snail species in the ICCA. These new records are *Everettia paulbasintali*, *Japonia* sp., *Opisthoporus* sp., *Clea* sp., and *Chloritis kinibalensis* , *Microcystina microrhynchus*, *Microcystina muscorum*, *Vitrinula descrepignyi*, *Charopa lissobasis*, *Discocharopa aperta*, *Diplommatina* sp., *Philalanka kusana*, *Kaliella dendrophila*, *Kaliella microconus*, *Paralaoma angusta*, and *Paropeas achatinaceum*. Nevertheless, three species previously recorded in 2000 at the Transit Camp, *Leptopoma undatum* (BOR/MOL 231), *Everettia subconsul* (BOR/MOL 925,927,967,5272) and *Dyakia hugonis* (BOR/MOL 914), were not re-encountered during this study. The relatively large number of new records suggests that the current sampling efforts for snail fauna on ICCA are insufficient to be regarded as representative of the true land snail diversity. Therefore, this study which recorded a total of 24 species of land snails and one species of freshwater snail in ICCA to date should be treated as preliminary.

The species assemblage of ICCA is similar to the land snail fauna in the east coast of Sabah, namely, Lower Kinabatangan Valley, Danum Valley, Tawau Hills Park and Tabin Wildlife Reserve (Schilthuizen et al., 2003, 2005; Schilthuizen & Rutjes 2001). We recommend future studies to increase the geographical

coverage and number of sampling plots so as to assess better the snail diversity in Imbak Canyon.

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