

**NEW DISTRIBUTION RECORD OF *Opisthostoma platycephalum*
(CAENOCASTROPODA: DIPLOMMATINIDAE) FROM PADANG BINDU
KARST, SOUTH SUMATRA, INDONESIA**

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ABSTRACT

A fauna expedition has been conducted in Padang Bindu Karst, South Sumatra in 2021. Among the collected samples, a total of 111 specimens of *Opisthostoma platycephalum* (Caenogastropoda: Diplommatinidae) were collected from six sampling plots. This discovery is the first record of the land snail species in the southern of Sumatra island, as previous research only recognized its presence in Aceh, North Sumatra, and Peninsular Malaysia. This discovery contributes to the understanding of the biodiversity of South Sumatran land snails and highlights the importance of protecting limestone habitats.

Key words: biodiversity, Indonesia, land snail, limestone, Mollusca

INTRODUCTION

Studies on land snails in Sumatra were carried out by van Benthem Jutting (1929, 1934, 1935a, 1935b, 1959). The studies were based on specimens collected from several expeditions by Mr. J. C. van der Meer Mohr in 1928, 1930 and 1931. In addition, van Benthem Jutting also identified specimens from collections of Dr. J. P. Kleiweg de Zwaan during 1910–1911, collections of Mr. J. P. van Niel who lived in Sumatra from 1951–1956, and museum collections from Naturalis Biodiversity Center (formerly Amsterdam Zoological Museum (ZMA) and Rijksmuseum van Natuurlijke Historie Leiden (RMNH)), Senckenberg Museum Frankfurt (SMF), the Natural History Museum, London (formerly British Museum (Natural History)), and the Museum Zoologicum Bogoriense (MZB). Based on studies conducted by van Benthem Jutting (1929, 1934, 1935a, 1935b, 1959), nine species of Diplommatinidae were recorded in Sumatra, namely *Diplommatina tweediei* Laidlaw, 1949, *D. strophosa* van Benthem Jutting, 1959, *D. tardigrada* van Benthem Jutting, 1959, *D. liwaensis* Aldrich, 1898, *D. simulabris* Möllendorff, 1902, *D. ventriculus* Möllendorff, 1891, *Opisthostoma paulucciae* Crosse & G. Nevill, 1879, *O. clerxi* Maassen, 2002b, and *Palaina pumila* van Benthem Jutting, 1959.

Furthermore, Maassen (2000, 2002a, 2002b) also identified several samples collected by Mr. K. Kittel. At least 22 species of Diplommatinidae were recorded with 11 of them being new species. This number is quite low compared to the number in West Malaysia and Kalimantan

(Maassen, 2002b). Among the 22 species that have been recorded, five species belong to the genus *Opisthostoma* (namely *O. secretum* Maassen, 2002b, *O. platycephalum* van Benthem Jutting, 1952, *O. paulucciae* Crosse & G. Nevill, 1879, *O. clerxi* Maassen, 2002b, and *O. blanki* Maassen, 2002b). Marwoto (2016) listed 25 species of Diplommatinidae from Sumatera. However, based on her publication, the five species of *Opisthostoma* were assigned to *Plectosotoma*.

It was emphasized by Nurinsiyah & Hausdorf (2017) that many Diplommatinidae species have a limited geographic distribution so their endemism is high. This genus is recorded living in volcanic and limestone areas (Nurinsiyah & Hausdorf, 2017). There are many large limestone areas in Sumatra (Maassen, 2002b). Limestone hills in tropical areas are considered “arks” of biodiversity because they contain high levels of species endemism (Schilthuizen, 2004; Clements et al., 2006; Chua et al., 2009; Liew et al., 2014). Padang Bindu is one of these areas, where it is still a natural ecosystem, no mining activity, and so far has been used only for ecotourism and plantations (Qodri et al., 2023). Therefore, it could be expected that a number of new species could be discovered from the Padang Bindu karst area.

The research focused on the micro snail *O. platycephalum*. The genus of *Opisthostoma* often have restricted distribution. Therefore it is highly likely to be endemic in certain areas and prone to extinction when their habitat is disturbed. The species *O. platycephalum* was recorded 20 years ago in Sumatra particularly in Aceh and North Sumatra (Maassen, 2002b). Before, it was recorded only from peninsular Malaysia (van Benthem Jutting, 1952). The record in Padang Bindu area is a new distribution record for this species in Sumatra, especially in South Sumatra. It implies that the species may have wider distribution than expected.

MATERIALS AND METHODS

Sample Collection

Samples of land snail species are the result of the Padang Bindu karst fauna expedition in South Sumatra, Indonesia, carried out by the author (ASN) in May–June 2021. The expedition covers seven sampling plots at coordinates 4°04'00.42”S-04°04'14.47”S and 103°55'22.18”E-103°55'45.7”E with an altitude of ~64 m above sea level (Fig. 1). Snail samples and samples in the form of litter and soil were sent to the Research Center for Biosystematics and Evolution, National Research and Innovation Agency (BRIN). All collected specimens are deposited at the Museum Zoologicum Bogoriense (MZB), Soekarno Science and Technology Area, National Research and Innovation Agency (BRIN).

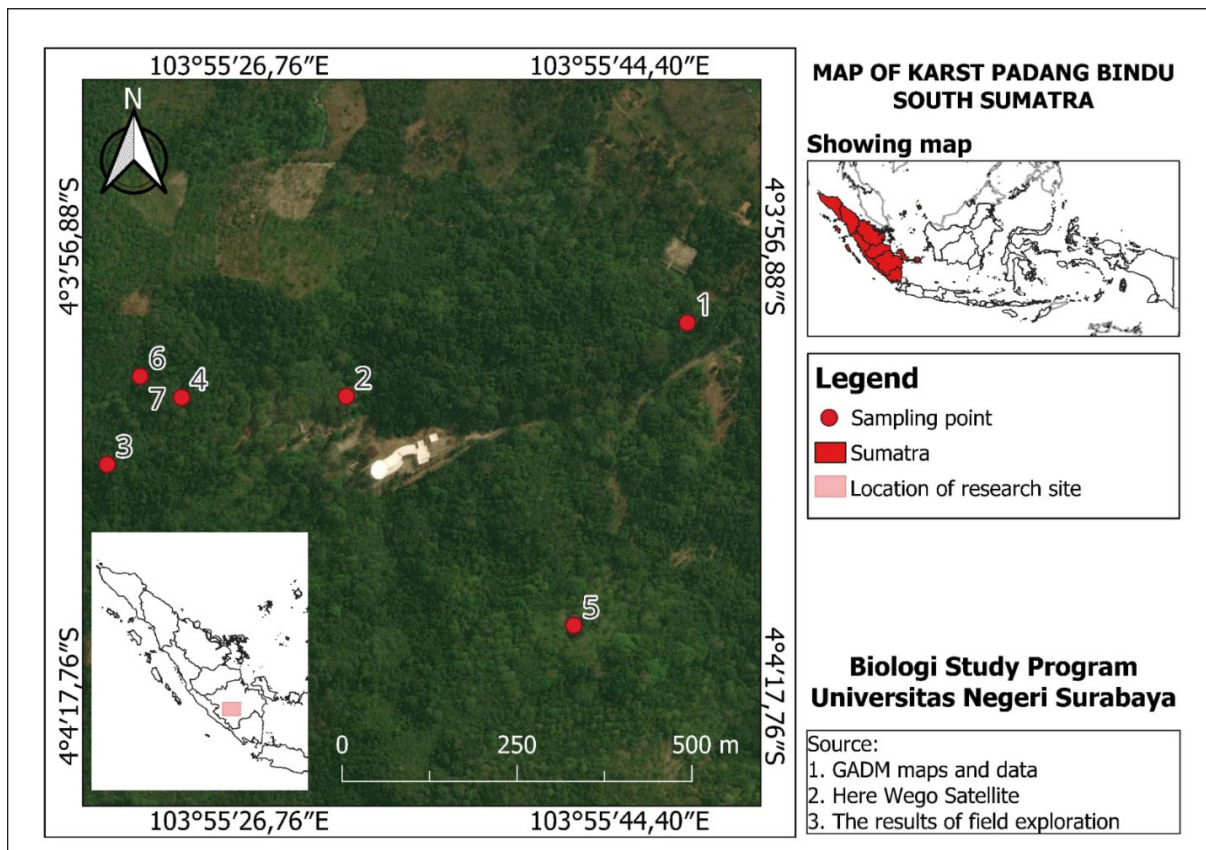


Figure 1. Sampling points at Padang Bindu Karst, South Sumatra, Indonesia.

Samples Handling

The processing of litter and soil samples was carried out in March–November 2023 at the Research Center for Biosystematics and Evolution, BRIN. Soil and litter samples were processed using the dry sieving method, namely examining coarse soil and litter samples using a sieve to obtain micro land snails (less than 10 mm in size). After obtaining medium-thickness soil, it was filtered again using a 3–4 mm mesh/sieve. The fine soil was then filtered using a mesh measuring 0.8–1.0 mm (Mahlfeld et al., 2016). The collected shells were then cleaned by rubbing the shell with 70% alcohol or cleaned slowly using a brush or needle or washed with Ultra Sonic Cleaner (USC).

The process of identifying and validating snails based on shell characters refers to the publications on Diplomatinae from Sumatra Province by Maassen (2002b) and Liew et al. (2014). Visualization and measurement of snail shells were implemented by L.A.S V4.13.0 software adapted to a Leica Z6 APO microscope provided by the National Research and Innovation Agency (BRIN).

RESULTS

Based on the results of the direct collection and sieving litter and soil samples from Padang Bindu Karst, a total of 111 individuals of *O. platycephalum* were collected. The specimens were found in six (from 7) sampling points. Here are the details regarding the systematics and description of this species.

Systematics

Kingdom Animalia

Phylum Mollusca

Class Gastropoda

Order Architaenioglossa

Family Diplommatinidae L. Pfeiffer, 1856

Genus *Opisthostoma* W. T. Blanford & H. F. Blanford, 1860

Species *Opisthostoma platycephalum* van Benthem Jutting, 1952

(Fig. 2, Table 1)

Opisthostoma (Opisthostoma) platycephalum van Benthem Jutting, 1952: 26, Figure 11

Opisthostoma platycephalum — Maassen, 2001: 35

Opisthostoma platycephalum — Maassen, 2002b: 178, Figure 43-44

Plectostoma platycephalum — Marwoto, 2016: 18

Material examined. Specimens of MZB, Indonesia, South Sumatra: Karst Padang Bindu 04°04'00.42"S 103°55'47.55"E (MZB.Gst.23866/12), Behind basecamp 04°04'03.83"S 103°55'31.74"E (MZB.Gst.23867/39), Cave 2 04°04'7"S 103°55'20.65"E (MZB.Gst.23868/25), Cave 3 04°04'03.89"S 103°55'24.10"E (MZB.Gst.23869/2), Yamaye Cave 04°04'14.47"S 103°55'42.29"E (MZB.Gst.23870/3), Candi Cave 04°04'02.91"S 103°55'22.18"E (MZB.Gst.23871/16), coll. AS Nurinsiyah, May-June 2021.

Diagnosis. The shell of *O. platycephalum* is characterized by a small, short ellipsoid shell, smooth protoconch, teleoconch with dense ribs at the beginning of the whorl and become broader on the following whorl.

Description. Shell rotates to the right or dextral. Apical spire whorl with a depressed conical shape. Shell ellipsoid with penultimate whorl somewhat larger compared to the body whorl, whitish color and slightly transparent. Number of whorls 3 (not including tubes). The protoconch is smooth. On the second whorl, the ribs are smooth and dense. The ribs are less smooth and broader in the following whorl. The ribs are slightly curved with number of ribs 9–20 per mm or a total of 18–26 in the penultimate whorl. Thin spiral lines are present in between ribs. The tuba is gradually coiling downward (but not coiling to a different direction as in tuba type 2 in Liew et al. 2014). Shell height 1.19–1.90 mm (average 1.57 mm). The shell diameter without

tuba 1.17–1.85 mm (average 1.50 mm), while with tuba 1.76–2.66 mm (average 2.26 mm). Aperture is rounded with diameter 0.72–0.99 mm (average 0.86 mm) and height 0.71–1.08 mm (average 0.89 mm). The peristome doubled with a prominent outer peristome. The umbilicus is open, deep, but very narrow.

Remarks. All specimens of *O. platycephalum* from Padang Bindu Karst, South Sumatra are larger than those described by van Benthem Jutting (1952). Holotype: shell height 0.6 mm, shell diameter 1.2 mm, diameter aperture 0.4 mm; Paratype with shell height 0.6–0.7 mm, shell diameter 1.1–1.2 mm, and diameter aperture 0.4 mm. According to van Benthem Jutting (1952), *O. platycephalum* has a shell that is not transparent, whereas a few *O. platycephalum* specimens from the Padang Bindu Karst are slightly transparent. Based on the overall characteristics of the shell morphology, the *Opisthostoma* samples found in Padang Bindu were identified as *O. platycephalum*.

Table 1. Shell measurements of the species *Opisthostoma platycephalum* (n= 45). Abbreviations: d=shell diameter (with tuba); dwa=shell diameter without tuba; h=shell height; max=maximum; min=minimum; rpw(mm)=number of ribs per mm on the penultimate whorl; rpws=number of ribs (total in one whorl) on the penultimate whorl; rbw(mm)=number of ribs per mm on the body whorl; rbws=number of ribs (total in one whorl) on the body whorl; std= standard deviation; W = number of whorl

No.	Measurement	Range (Min-Max) in mm	Average (Mean±std) in mm
1	D	1.76–2.66	2.26 ± 0.26
2	Dwa	1.17–1.85	1.50 ± 0.17
3	H	1.19–1.90	1.57 ± 0.21
4	Da	0.72–0.99	0.86 ± 0.07
5	Ha	0.71–1.08	0.89 ± 0.08
6	W	3.5–3.5	3.50 ± 0.00
7	D/H	1.26–1.69	1.45 ± 0.10
8	D/da	2.27–3.03	2.62 ± 0.20
9	H/ha	1.39–2.19	1.76 ± 0.21
10	da/ha	0.77–1.13	0.97 ± 0.06
11	rpw (mm)	9–20	13.11 ± 2.17
12	rpws	18–26	21.97 ± 2.30
13	rbw (mm)	4–8	6.27 ± 1.10
14	rbws	12–18	15.42 ± 1.36

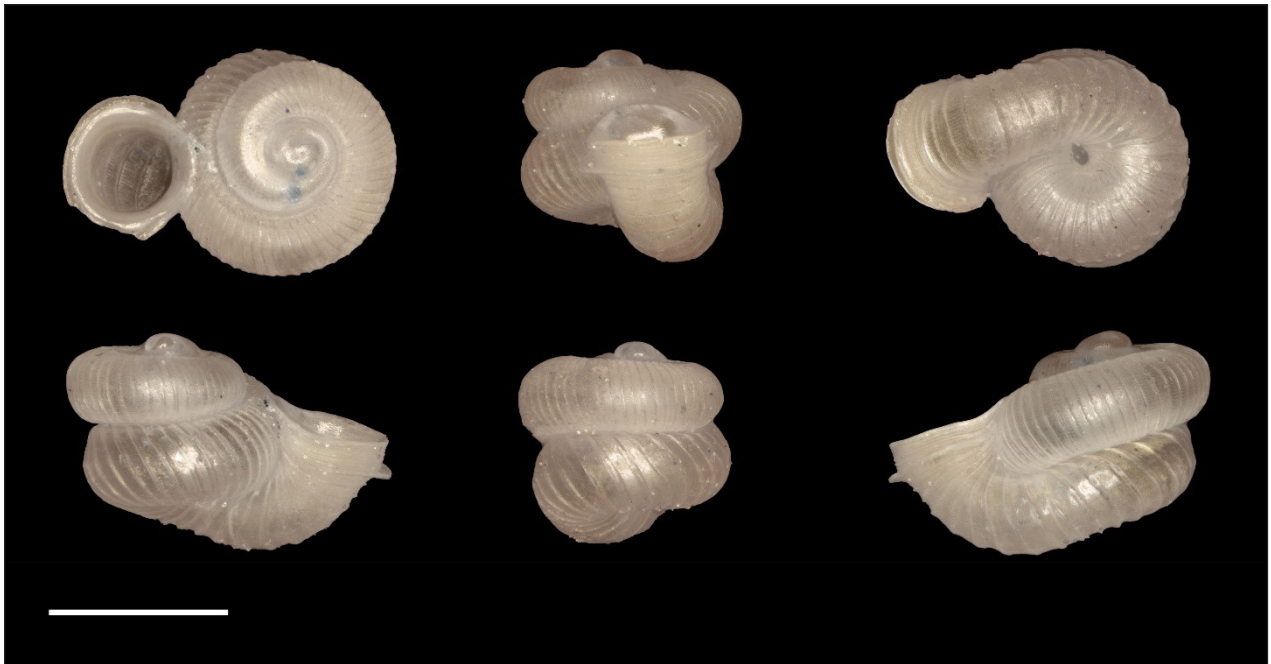


Figure 2. Shell of *Opisthostoma platycephalum* from Padang Bindu Karst. Scale bar: 1 mm.

DISCUSSION

Based on shell morphology, we follow van Benthem Jutting (1959) and Maassen (2002b) who assigned *O. platycephalum* to the genus *Opisthostoma* instead of *Plectostoma* (Marwoto, 2016). This also applies to the other four species i.e. *O. secretum* Maassen, 2002b (not *Plectostoma secretum*), *O. paulucciae* Crosse & G. Nevill, 1879 (not *P. paulucciae*), *O. clerxi* Maassen, 2002b (not *P. clerxi*), and *O. blanki* Maassen, 2002b (not *P. blanki*). *Plectostoma kitteli* (Maassen, 2002b) is assigned to the genus *Plectostoma* (Maassen, 2002b; Liew et al., 2014; Marwoto, 2016). The two genera can be differentiated by the adult shell colouration (white or pale yellowish in *Opisthostoma*, orange of pinkish in *Plectostoma*) and ecological divergence (Liew et al., 2014).

Karst habitats support two to five times the life of land snails compared to non-karst areas (Burch, 1955; Vermeulen & Whitten, 1999; Hotopp, 2002). Several other karst areas in Sumatra have a potential to be habitats for *O. platycephalum* or other *Opisthostoma* species. The genus is a soil dweller snail and found living in leaf litter (Liew et al., 2014). Thus, using the litter and soil sieving method can increase the probability of finding this group of micro land snails. According to van Benthem Jutting (1951), most soil samples contain at least one or two different species, especially in karst areas, which are suitable habitats favored by land snails, especially the genus *Opisthosoma* (Heryanto, 2012). So far, limited records of the distribution of *O. platycephalum* have been reported from Peninsular Malaysia, Aceh, and North Sumatra among limestone rocks (Maassen, 2002b). The record in Padang Bindu karst is a new distribution record of *O. platycephalum* in the southern part of Sumatra or South Sumatra in particular.

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