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FIRST RECORD AND DESCRIPTION OF A NEW *SCABRINA* SPECIES (GASTROPODA: CYCLOPHORIDAE) FROM PENINSULAR MALAYSIA

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ABSTRACT: A new species *Scabrina belang* from the limestone hills of north-western Peninsular Malaysia is described. This operculated land snail of the family Cyclophoridae differs from its nearest congeners *S. calyx* and *S. inglisianus* in a combination of characters namely, a notched inner peristome, a wing-like extension at the outer peristome at the parieto-palatal region and a flatter shell. This is the first record of the genus *Scabrina* in Peninsular Malaysia, extending the known range of the genus 1,000 km southwards.

KEY WORDS: land snail; Perlis; Kedah; Perak; taxonomy; limestone karst

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INTRODUCTION

The genus *Scabrina* Blanford, 1863 has a widely umbilicated and discoid to almost discoid shell typical of some medium-sized cyclophorid genera in Southeast Asia (KOBELT 1902, HIRANO et al. 2019, SUTCHARIT et al. 2019). However, it can be distinguished from these genera by a combination of the following characters: a thick, rough and hirsute periostracum and a thin proteinaceous operculum with raised edges and spirally coiled lamella (BENSON 1857, BLANFORD 1863, 1864, KOBELT 1902, GUDE 1921, HIRANO et al. 2019). NEVILL (1878) designated *Cyclophorus pinnulifer* Benson, 1857 from Teria Ghat, India, as the type species for the genus *Scabrina*.

The genus is hitherto reported from Sri Lanka, Nepal, northeast India, central Myanmar, northern Thailand, Laos, northern Vietnam and southern China (BENSON 1851, KOBELT 1902, PRESTON 1909, GUDE 1921, HEMMEN & HEMMEN 2001, BUDHA et al. 2015, DO et al. 2015, BEDO 2017, INKHAVILAY et al. 2019, SUTCHARIT et al. 2019, THACH 2020, Fig. 1). Here, we describe a new species, *Scabrina belang*, representing the first record of this genus in Peninsular Malaysia, 1,000 km south of the nearest known record of *Scabrina*.

MATERIAL AND METHODS

The material examined was obtained from leaf litter collected in limestone karst forests during malacofaunal surveys of the limestone hills in the State of Perlis, Langkawi archipelago (State of Kedah),

and Batu Kurau (State of Perak) in Malaysia in 2010, 2011 and 2016. The litter was air dried before mollusc specimens were extracted (LIEW et al. 2008, FOON et al. 2017). The material is deposited in the BORNEENSIS collection (BOR/MOL), Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah. Additional material from the second author's collection (ME) was also examined. To ensure unambiguous reference to the localities of the examined material of *S. belang*, we provide the unique code numbers, names and coordinates of limestone outcrops derived from the Malaysian limestone karst database, Mykarst 2.0 (LIEW et al. 2021a, 2021b, 2021c). To map all the currently recognised *Scabrina* species (Fig. 1), we consulted BLANFORD (1864), MÖLLENDORFF (1884, 1885), GREDLER (1887), HOANG et al. (2018, 2020), DO et al. (2020), and MOLLUSCABASE (2022) as well as all other literature mentioned in this study.

The study is based on shell characters only, as all the specimens were air dried and no live animals were preserved in ethanol due to the sample processing method. To illustrate the range of shell size variation, the holotype and four paratypes of *S. belang* were photographed with a Leica DFC495 Digital Microscope Camera mounted on a Leica M205C microscope (Figs 2–6). We also showed fresh specimens without (Figs 3, 5, 6, 7) and with periostracum (Figs 2, 4, 8) to illustrate their differences. The operculum of a paratype was figured (Figs 9–12). To illustrate the differences in peristomal structures, especially at the parieto-palatal area, the peristome of *S. belang* types was compared with the peristome of the types of its geographically nearest congeners *S. calyx* (Benson, 1856) and *S. inglisianus* (Stoliczka, 1871) (Figs 13–21).

Measurements of shell height (SH), shell width (SW), aperture height (AH) and aperture width (AW), umbilical width (UW) and number of whorls (NOW) were taken from 41 specimens of the new species (1 holotype and 40 paratypes), following the methods of VERMEULEN & WHITTEN (1998). The ratios of shell height to shell width (SH/SW), umbilical width to shell width (UW/SW) and shell width to number of whorls (SW/NOW) were also calculated to quantify the shell and umbilicus shape, respectively. We also measured the types of the nearest congeners *S. calyx* and *S. inglisianus* based on photographs in SUTCHARIT et al. (2019) and included the measurements from STOLICZKA (1871). These measurements are presented in Table 1.

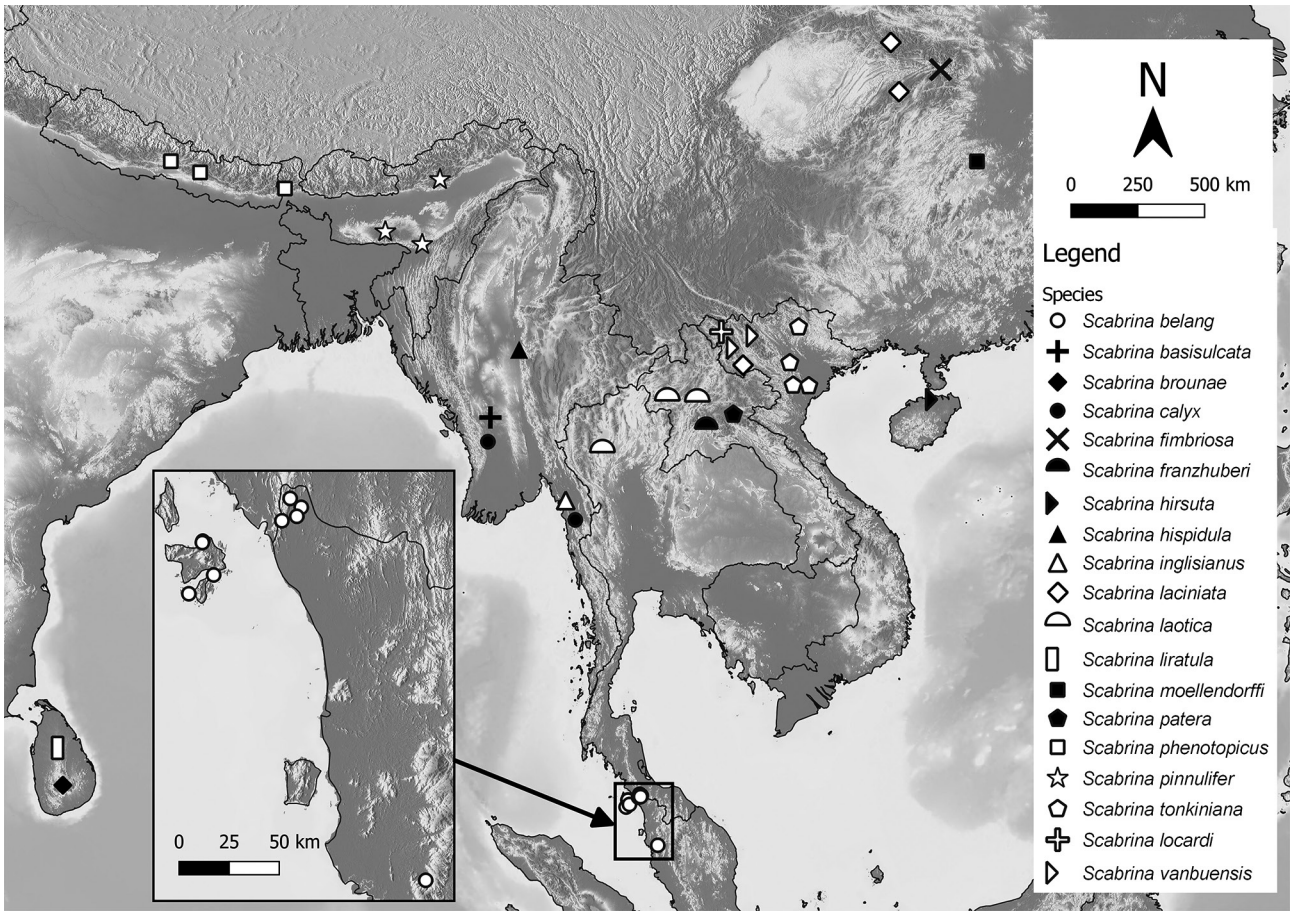

Fig 1. Distribution of *Scabrina belang* sp. nov. in relation to all other currently recognised *Scabrina* species

Table 1. Shell size and dimension measurements for *Scabrina belang* sp. nov. and the geographically nearest congeners, *Scabrina calyx* and *Scabrina inglisianus*. Abbreviations: SH – shell height; SW – shell width; SH/SW – shell height to shell width ratio; NOW – number of whorls; AH – aperture height; AW – aperture width; UW – umbilical width; UW/SW – umbilicus width to shell width ratio; SW/NOW – shell width to number of whorls ratio. All measurements are in millimetres except SH/SW, UW/SW and SW/NOW

Specimen	Locality	SH	SW	SH/SW	NOW	AH	AW	UW	UW/SW	SW/NOW
Scabrina belang										
Holotype, BOR/MOL 14255	Malaysia, State of Perlis, mykarst-1017	5.45	12.27	0.44	4.5	3.68	4.51	3.75	0.31	2.73
Paratype, ME885/1	Malaysia, State of Perlis, Prs 64 Wang Ulu, Kaki Bukit	5.37	11.24	0.48	4.8	3.16	3.27	4.44	0.40	2.34
Paratype, ME885/2	Malaysia, State of Perlis, Prs 64 Wang Ulu, Kaki Bukit	5.74	10.92	0.53	4.8	3.12	3.21	4.17	0.38	2.28
Paratype, ME885/3	Malaysia, State of Perlis, Prs 64 Wang Ulu, Kaki Bukit	4.76	10.87	0.44	4.8	2.94	3.09	4.5	0.41	2.26
Paratype, ME885/4	Malaysia, State of Perlis, Prs 64 Wang Ulu, Kaki Bukit	6.60	12.23	0.54	4.8	3.50	3.49	4.95	0.40	2.55
Paratype, ME885/5	Malaysia, State of Perlis, Prs 64 Wang Ulu, Kaki Bukit	5.12	11.99	0.43	4.8	3.01	3.29	5.02	0.42	2.50
Paratype, ME885/6	Malaysia, State of Perlis, Prs 64 Wang Ulu, Kaki Bukit	5.31	11.95	0.44	4.8	3.32	3.42	5.05	0.42	2.49
Paratype, ME885/7	Malaysia, State of Perlis, Prs 64 Wang Ulu, Kaki Bukit	5.92	11.74	0.50	5	3.28	3.27	4.86	0.41	2.35
Paratype, ME885/8	Malaysia, State of Perlis, Prs 64 Wang Ulu, Kaki Bukit	5.01	10.16	0.49	4.8	3.10	2.92	3.90	0.38	2.12
Paratype, ME885/9	Malaysia, State of Perlis, Prs 64 Wang Ulu, Kaki Bukit	5.09	11.09	0.46	4.8	3.11	3.18	4.41	0.40	2.31
Paratype, ME885/10	Malaysia, State of Perlis, Prs 64 Wang Ulu, Kaki Bukit	5.02	10.11	0.50	4.7	3.05	2.89	3.88	0.38	2.15
Paratype, BOR/MOL 14256	Malaysia, State of Perlis, Prs 64 Wang Ulu, Kaki Bukit	6.04	11.46	0.53	5	3.50	4.45	4.58	0.40	2.29
Paratype, BOR/MOL 14257	Malaysia, State of Perlis, Prs 64 Wang Ulu, Kaki Bukit	4.98	10.98	0.45	4.5	3.34	4.24	4.17	0.38	2.44
Paratype, BOR/MOL 6982	Malaysia, State of Perlis, Prs 64 Wang Ulu, Bukit Ayer	5.20	12.00	0.43	5	3.44	4.27	4.83	0.40	2.40
Paratype, ME888/1	Malaysia, State of Perlis, Prs 17 Bkt Chabang	5.55	12.31	0.45	4.8	3.24	3.25	4.66	0.38	2.56

Table 1 continued

Paratype, ME888/2	Malaysia, State of Perlis, Prs 17 Bkt Chabang	4.87	10.03	0.49	4.7	2.76	2.78	3.82	0.38	2.13
Paratype, ME888/3	Malaysia, State of Perlis, Prs 17 Bkt Chabang	5.26	11.04	0.48	4.8	2.94	3.07	4.44	0.40	2.30
Paratype, ME888/4	Malaysia, State of Perlis, Prs 17 Bkt Chabang	5.38	11.47	0.47	4.8	3.04	3.23	4.56	0.40	2.39
Paratype, ME888/5	Malaysia, State of Perlis, Prs 17 Bkt Chabang	5.41	11.54	0.47	4.8	3.25	3.25	4.62	0.40	2.40
Paratype, ME888/6	Malaysia, State of Perlis, Prs 17 Bkt Chabang	5.71	12.36	0.46	4.8	3.41	3.45	5.01	0.41	2.58
Paratype, ME888/7	Malaysia, State of Perlis, Prs 17 Bkt Chabang	4.86	10.93	0.44	4.7	3.10	3.13	4.26	0.39	2.33
Paratype, ME888/8	Malaysia, State of Perlis, Prs 17 Bkt Chabang	5.12	11.53	0.44	4.8	3.10	3.15	4.63	0.40	2.40
Paratype, ME888/9	Malaysia, State of Perlis, Prs 17 Bkt Chabang	5.49	11.49	0.48	4.8	3.19	3.19	4.52	0.39	2.39
Paratype, ME888/10	Malaysia, State of Perlis, Prs 17 Bkt Chabang	5.23	10.97	0.48	4.8	2.96	3.02	4.72	0.43	2.29
Paratype, BOR/MOL 6972	Malaysia, State of Perlis, Prs 17 Bkt Chabang	5.83	12.76	0.46	5	3.54	4.34	5.00	0.39	2.55
Paratype, BOR/MOL 14254	Malaysia, State of Perak, Prk 59 Bt. Batu Kurau	6.59	14.14	0.47	5	4.00	5.05	5.75	0.41	2.83
Paratype, ME886/1	Malaysia, State of Kedah, Langkawi Island, mykarst-198	5.65	10.55	0.54	4.8	3.02	2.69	4.25	0.40	2.20
Paratype, ME886/2	Malaysia, State of Kedah, Langkawi Island, mykarst-198	5.3	10.52	0.50	5	2.89	2.91	4.37	0.42	2.10
Paratype, ME886/3	Malaysia, State of Kedah, Langkawi Island, mykarst-198	4.84	9.9	0.49	4.7	2.97	2.86	3.92	0.40	2.11
Paratype, ME886/4	Malaysia, State of Kedah, Langkawi Island, mykarst-198	4.99	9.78	0.51	4.7	2.73	2.74	3.79	0.39	2.08
Paratype, ME886/5	Malaysia, State of Kedah, Langkawi Island, mykarst-198	5.18	10.29	0.50	4.8	3.03	3.12	4.05	0.39	2.14
Paratype, ME886/6	Malaysia, State of Kedah, Langkawi Island, mykarst-198	5.11	10.48	0.49	4.8	2.97	2.91	4.09	0.39	2.18
Paratype, ME886/7	Malaysia, State of Kedah, Langkawi Island, mykarst-198	5.43	11.11	0.49	4.8	3.33	3.31	4.56	0.41	2.31

Table 1 continued

Paratype, ME886/8	Malaysia, State of Kedah, Langkawi Island, mykarst-198	5.13	10.16	0.50	4.8	2.81	2.88	4.05	0.40	2.12
Paratype, ME886/9	Malaysia, State of Kedah, Langkawi Island, mykarst-198	4.92	9.52	0.52	4.8	2.63	2.69	3.51	0.37	1.98
Paratype, ME886/10	Malaysia, State of Kedah, Langkawi Island, mykarst-198	4.69	9.8	0.48	4.7	2.77	2.71	3.78	0.39	2.09
Paratype, BOR/MOL 14259	Malaysia, State of Kedah, Langkawi Island, mykarst-197 Tanjong Batu Kulat	4.11	9.64	0.43	4	3.29	3.56	3.75	0.39	2.41
Paratype, BOR/MOL 14258	Malaysia, State of Kedah, Langkawi Island, mykarst-197 Tanjong Batu Kulat	5.03	10.27	0.49	4	3.43	3.87	3.83	0.37	2.57
Paratype, ME889/1	Malaysia, State of Kedah, Singa Besar Island, mykarst-285	7.38	13.47	0.55	5	4.01	3.98	5.29	0.39	2.69
Paratype, ME889/2	Malaysia, State of Kedah, Singa Besar Island, mykarst-285	6.34	12.12	0.52	5	3.71	3.69	4.61	0.38	2.42
Paratype, ME889/3	Malaysia, State of Kedah, Singa Besar Island, mykarst-285	6.87	13	0.53	5	3.91	3.89	5.08	0.39	2.60
Range, mean and standard deviation (no. of specimens)		4.11–7.38, 5.41±0.63 (n = 41)	9.52–14.14, 11.22±1.08 (n = 41)	0.43–0.55, 0.48±0.03 (n = 41)	4–5, 4.78±0.22 (n = 41)	2.63–4.01, 3.21±0.33 (n = 41)	2.69–5.05, 3.37±0.57 (n = 41)	3.51–5.75, 4.43±0.50 (n = 41)	0.31–0.43, 0.39±0.02 (n = 41)	1.98–2.83, 2.35±0.20 (n = 41)
Scabrina calyx										
Syntype, NHMUK 1954.6.2.1542–1544 (SUTCHARIT et al. 2019: fig. 3G)	Myanmar, Pyay District, Padaung Township Akauk Taung.	8.09	14.76	0.55	4.5	4.76	5.95	5.00	0.33	3.28
Syntype, NHMUK 1954.6.2.1542–1544 (SUTCHARIT et al. 2019: fig. 3H)	Myanmar, Pyay District, Padaung Township Akauk Taung.	8.33	14.29	0.58	4.5	5.48	6.42	5.24	0.37	3.17
Specimens measured by STOLICZKA (1871)	Myanmar, south of Mawlamyine	7.2	12.0–14.0	0.5–0.6	4.5	5	4	NA	NA	2.7–3.1
Scabrina inglisianus										
Possible syntype, NHMUK 20170363 (SUTCHARIT et al. 2019: fig. 7A)	Myanmar, Mawlamyine District, Mawlamyine Township, Dhammatat Cave	6.13	10.50	0.58	4.5	3.13	3.88	3.63	0.35	2.33
Specimens measured by STOLICZKA (1871)	Myanmar, Mawlamyine District, Mawlamyine Township, Dhammatat Cave	5.0	7.5–9.0	0.6–0.7	4.5	3.0	2.7	NA	NA	1.7–2.0

The new species is described and compared with its geographically nearest congeners: *S. calyx*, with reference to the type photographs in Sutcharit et al. (2019) and descriptions (Benson 1856, Pfeiffer 1858, 1860, Reeve 1862, Blanford 1863, Stoliczka 1871, Kobelt 1902, Gude 1921); *S. inglisianus*, with reference to the type photographs in Sutcharit et al. (2019) and descriptions (Stoliczka 1871, Kobelt 1902, Gude 1921). Additional comparisons of the new species with nine other congeners further afield in Southeast Asia were also made, namely with *S. basisulcata* (Martens, 1897) with reference to the type illustrations in Martens (1899), measurements and descriptions (Martens 1897, 1899, Kobelt 1902, Gude 1921); *S. franzhuberi* Thach, 2020 with reference to the type photographs, measurements and descriptions in Thach (2020); *S. hispidula* (Blanford, 1863) with reference to the type photographs in Sutcharit et al. (2019) and descriptions (Blanford 1863, Pfeiffer 1876, Kobelt 1902, Gude 1921); *S. laciniata* (Heude, 1885) with reference to the type photographs in the Smithsonian National Museum of Natural History (2022), illustrations, measurements and descriptions (Heude 1885, Kobelt 1902, Yen 1939); *S. laotica* Möllendorff, 1897, with reference to the photographs of the type (Zilch 1955), topotype (Inkhavilay et al. 2019), measurements and descriptions (Möllendorff 1897, Kobelt 1902); *S. locardi* (Mabille, 1887), with reference to the type illustrations, measurements and descriptions (Mabille 1887, Kobelt 1902); *S. patera* (Pfeiffer, 1854), with reference to the illustrations (Pfeiffer 1854, Reeve 1864), topotypes (Inkhavilay et al. 2019) measurements and descriptions (Reeve 1864, Kobelt 1902); *S. vanbuensis* (Smith, 1896), with reference to the type photographs (Inkhavilay et al. 2019, Sutcharit et al. 2019), measurements and descriptions (Smith 1896, Kobelt 1902). The type of *S. tonkiniana* (Mabille, 1887) has never been illustrated in the literature but its descriptions and measurements in Mabille (1887) and Kobelt (1902) are sufficient for comparative purposes. The type photographs and description of *S. thaitieni* Thach, 2021 was also examined and the species is considered not to be a member of the genus *Scabrina* (see Remarks).

SYSTEMATIC PART

Family Cyclophoridae Gray, 1847

Genus *Scabrina* Blanford, 1863

Scabrina belang sp. nov.

Figs 2–18

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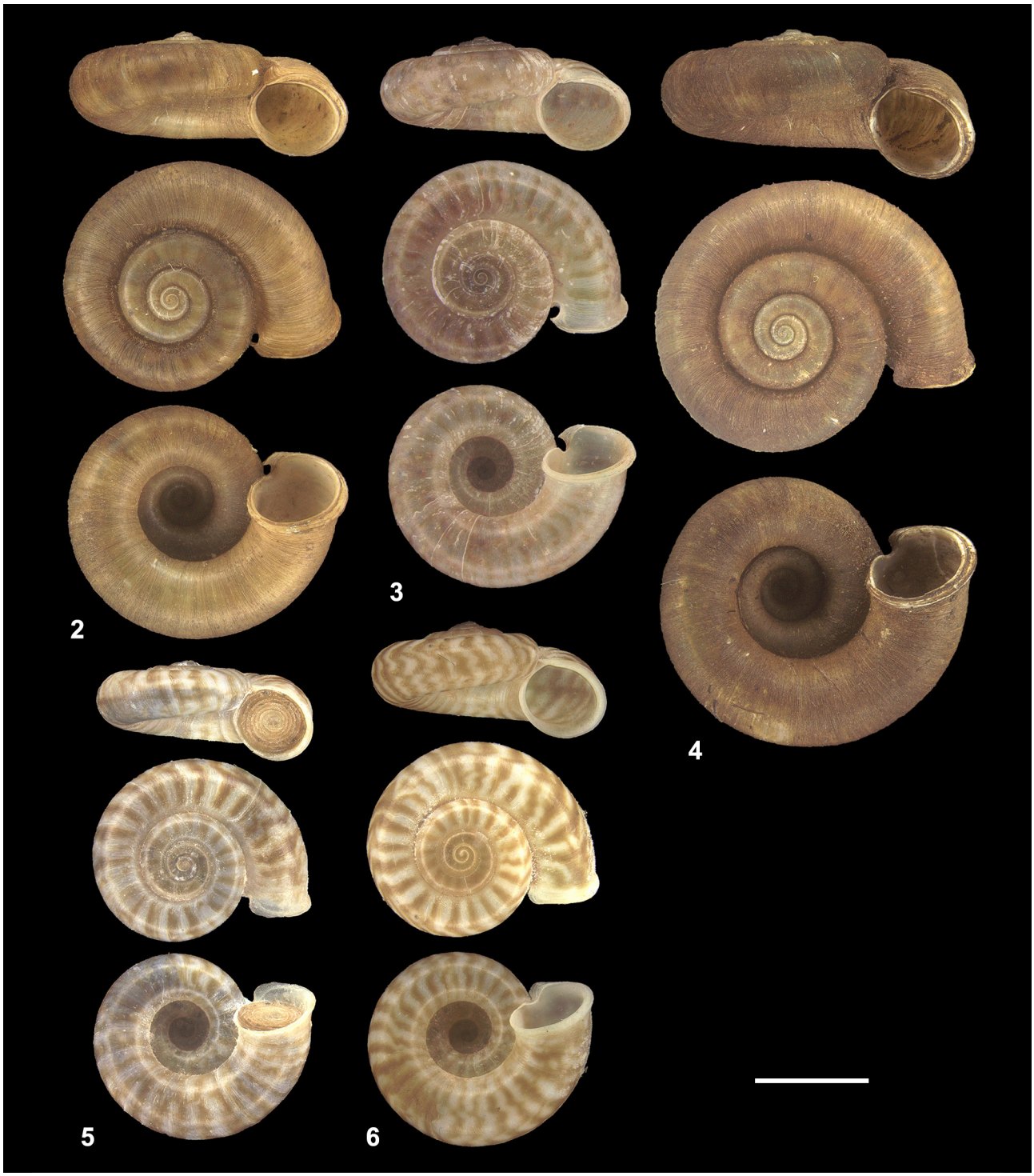
Examined materials. **Holotype**, Malaysia, State of Perlis, mykarst-1017 (06°33.79'N, 100°14.14'E) (BOR/MOL 14255). **Paratypes**, Malaysia, State of Kedah, Langkawi Island: mykarst-197 Tanjong Batu Kulat (06°27.10'N, 99°48.75'E) (BOR/MOL 14258, 1 shell; BOR/MOL 14259, 1 shell); mykarst-198 (06°26.71'N, 99°48.64'E) (ME 886, >10 shells); mykarst-269 Tanjong Chawat (06°17.98'N, 99°51.70'E) (ME 10954, 5 shells). Malaysia, State of Kedah, Singa Besar Island: mykarst-285 (06°12.91'N, 99°44.99'E) (ME 889, 6 shells). Malaysia, State of Perlis: Prs 64 Wang Ulu, Kaki Bukit (06°38.62'N, 100°12.35'E) (BOR/MOL 14256, 2 shells; BOR/MOL 14257, 1 shell; ME 885, >10 shells; ME 887, 5 shells); Prs 17 Bkt Chabang (06°36.23'N, 100°15.34'E) (BOR/MOL 6972, 1 shell; ME 888, >10 shells); Prs 64 Wang Ulu, Bukit Ayer (06°32.60'N, 100°10.11'E) (BOR/MOL 6982, 1 shell). Malaysia, State of Perak, Prk 59 Bt. Batu Kurau (04°55.61'N, 100°48.92'E) (BOR/MOL 14254, 1 shell).

Description. Shell discoid with a slightly raised spire, rather solid, opaque. Upon removal of periostracum, shell colour yellowish or reddish with irregular brown radial markings on the dorsal whorl surface and occasionally the ventral whorl surface, the brown markings may sometimes be vaguely outlined or developed into zig-zag patterns at the peripheral zone. Surface shiny when periostracum is removed. Spire slightly raised, almost flat. Apex somewhat acute, whorls convex. Suture deep, channelled, punctate with inconspicuous pits. Periostracum thick, yellowish-brown, with very fine radial folds along where the growth lines predominate, short hairs line both sides of the sutural channel, very fine spiral striations on the wall of the ultimate and penultimate whorls in the umbilical area. Protoconch smooth, of one whorl. Teleoconch with fine radial growth lines predominating. Spiral sculpture absent. Aperture circular. Peristome double, the inner one not reflected, its rim slightly protruding from the outer one; the outer peristome expanded, concave. Parieto-palatal area of the inner peristome developed into a notch near suture, the outer peristome slightly expanded near suture, folded into a wing-like structure of variable degree of extension, sometimes slightly reflected. Umbilicus open, very wide. Operculum proteinaceous, translucent brown, flat, flexible; its exterior with seven whorls, surface raised at periphery, flattened at nucleus; interior smooth, with a single cen-

tral nipple. Dimensions. Shell height 4.11–7.38 mm; shell width 9.52–14.14 mm; shell height to shell width ratio 0.43–0.55; number of whorls 4–5; aperture height 2.63–4.01 mm; aperture width 2.69–5.05 mm; umbilical width 3.51–5.75 mm; umbilical width to shell width ratio 0.31–0.43.

Ecology. *S. belang* inhabits leaf litter in limestone outcrop forests.



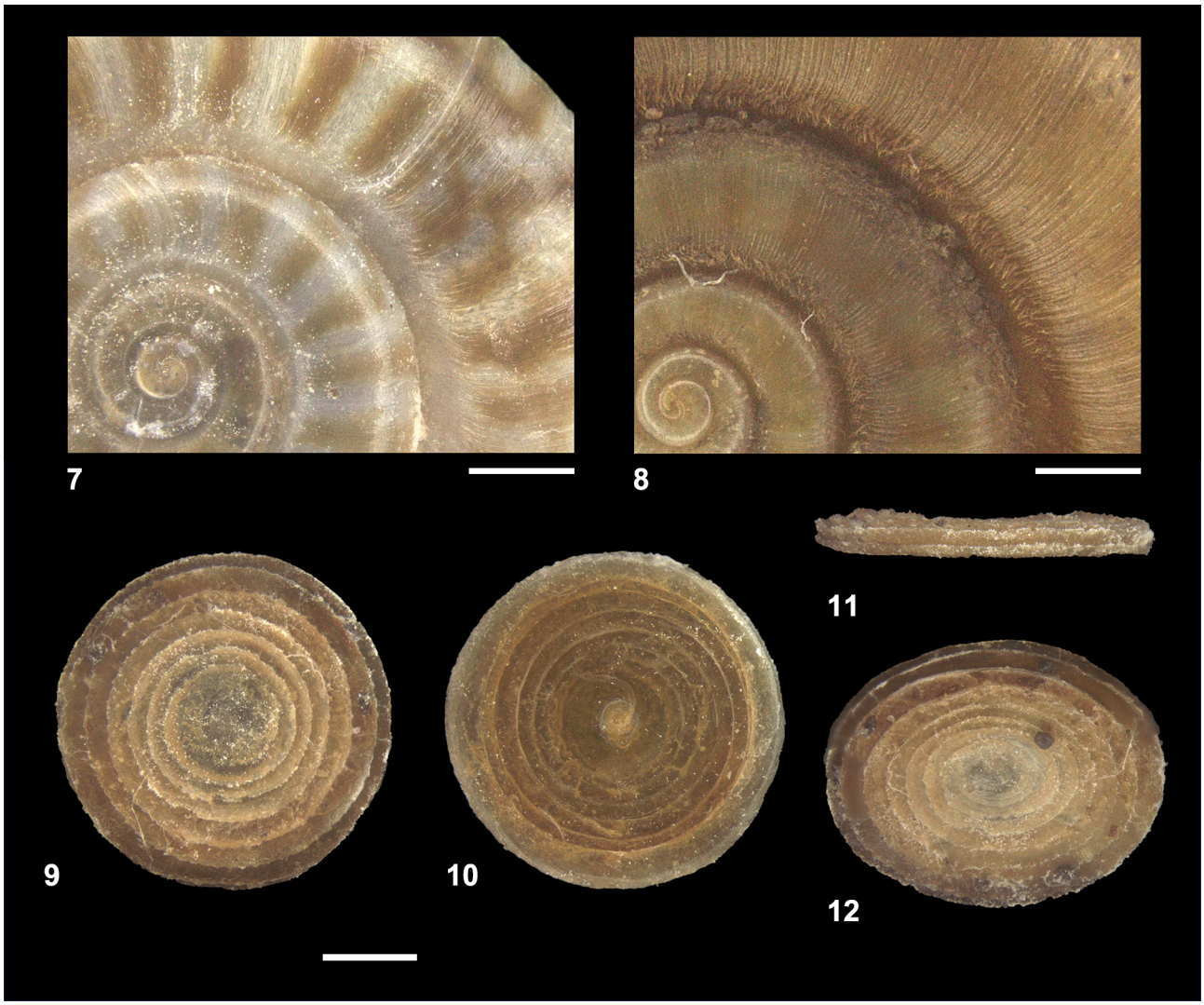
Figs 2–6. Standard shell views of *Scabrina belang* sp. nov. showing fresh shells with periostracum (2, 4) and without periostracum (3, 5, 6): 2 – Holotype (BOR/MOL 14255), Malaysia, State of Perlis, mykarst-1017; 3 – Paratype (BOR/MOL 14257), Malaysia, State of Perlis, Prs 64 Wang Ulu, Kaki Bukit; 4 – Paratype (BOR/MOL 14254), Malaysia, State of Perak, Prk 59 Bt. Batu Kurau; 5 – Paratype (BOR/MOL 14259), Malaysia, State of Kedah, Langkawi Island, mykarst-197 Tanjong Batu Kulat; 6 – Paratype (BOR/MOL 14258), Malaysia, State of Kedah, Langkawi Island, mykarst-197 Tanjong Batu Kulat. Scale bar 5 mm

Distribution. Known only from north-western Peninsular Malaysia in Perlis, Langkawi archipelago (Kedah) and Batu Kurau (Perak).

Cross diagnosis. The characters of the widely umbilicated shell, the thick hirsute periostracum and the proteinaceous operculum with spiral lamellae are shared by *S. belang* and its congeners.

The species of *Scabrina* geographically nearest to *S. belang* are *S. calyx* and *S. inglisianus* (Fig. 1). *S. belang* differs most distinctly from *S. calyx* and *S. inglisianus* in the peristomal structures of the parieto-palatal area (Figs 13–21). The character of the outer peristome with the wing-like extension is shared by *S. belang* and *S. calyx* but *S. belang* has an inner peristome with a notch whereas *S. calyx* has a simple and straight inner peristome. The parieto-palatal area of *S. belang* and *S. inglisianus* are both characterised by the notch in the inner peristome but the outer peristome in *S. belang* has a wing-like extension while *S. inglisianus* has a simple outer peristome. The wing-like extension of *S. belang* is consistently present in mature specimens albeit with some intraspecific variation in the degree of extension. The variation in shell height, shell width, number of whorls and umbilical width overlap between *S. belang*, *S. inglisianus* and *S. calyx* and shows no clear differentiation (Table 1). However, *S. belang* has a flatter shell (slightly smaller shell height to shell width ratio) compared to *S. calyx* and *S. inglisianus* (Table 1). *S. belang* has less rapidly expanding whorls (smaller shell height to number of whorls ratio) compared to *S. calyx* (Table 1).

Compared with Southeast Asian species further afield, *S. belang* resembles *S. hispidula* (Blanford, 1863) in having an almost flat spire and a double per-

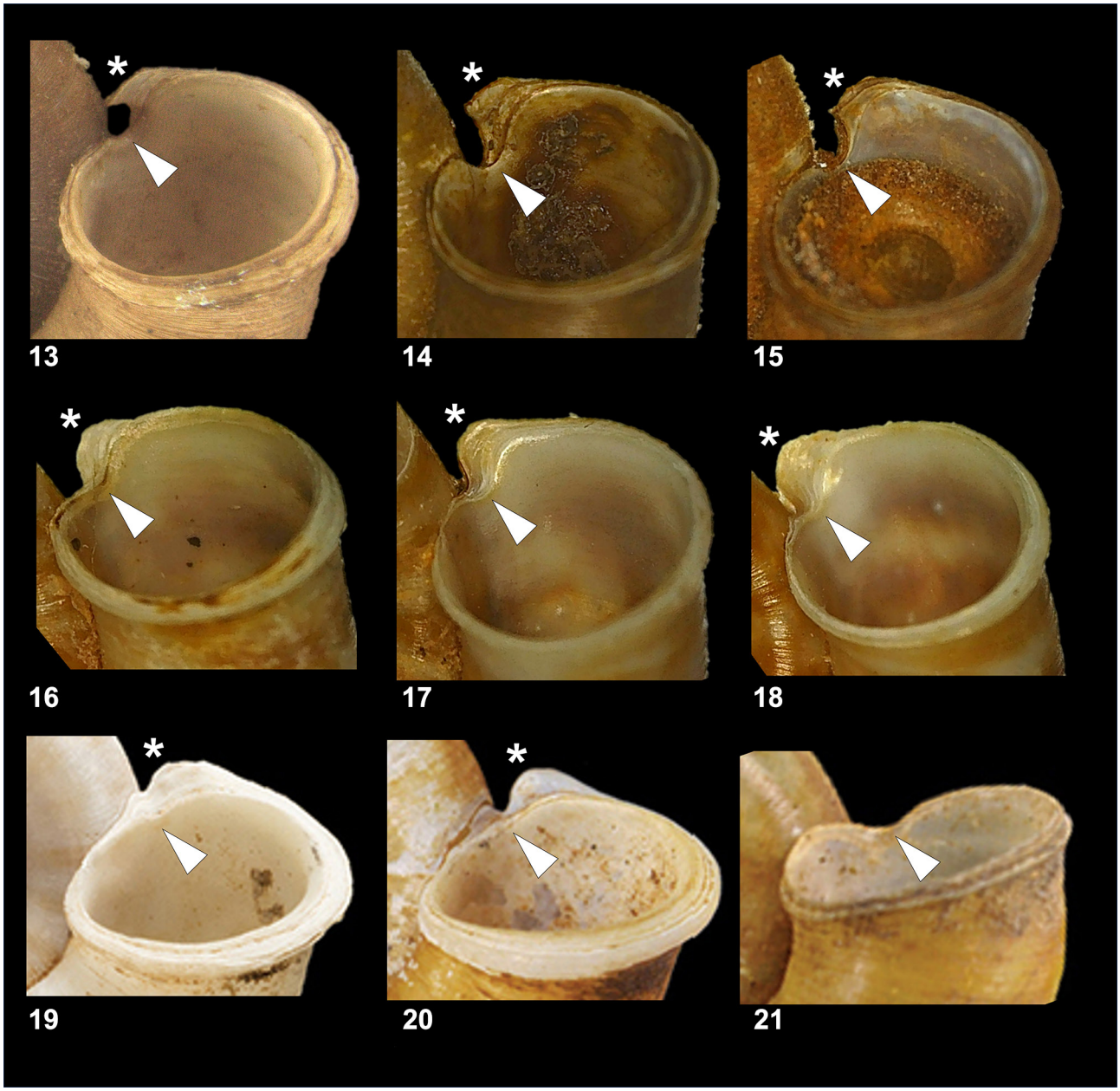


Figs 7–12. Various views of *Scabrina belang* sp. nov.: 7 – close up of whorls without periostracum, showing the deep channelled suture and growth lines on the shell (BOR/MOL 14259); 8 – close up of whorls with periostracum, showing the periostracal hairs covering the deep channelled suture and fine periostracal folds along the growth lines (BOR/MOL 14255); 9–12 – close up of operculum (BOR/MOL 14259): (9 – exterior view, 10 – interior view, 11 – side view, 12 – oblique view). Scale bars 1 mm

istome but differs from *S. hispidula* in the absence of strong spiral striations on the whorls and in the presence of the notch in the parieto-palatal region of the inner peristome as well as in the wing-like extension of the outer peristome. The variation in shell dimensions of *S. belang* overlaps with that of *S. hispidula* (shell height 7 mm, shell width 12–14 mm, aperture width 5 mm).

S. belang resembles *S. basisulcata* in having an almost flat spire, a double peristome and a wing-like extension in the parieto-palatal region of the outer peristome, but differs from it in the presence of the notch in the parieto-palatal region of the inner peristome. *S. belang* has a smaller shell and aperture compared to *S. basisulcata* (shell height 9 mm, shell width 13–16 mm, aperture width 4 mm).

S. belang resembles *S. patera* in having an almost flat spire but *S. patera* differs in possessing a simple peristome with no wing-like extension of the outer peristome and no notch in the inner peristome at the parieto-palatal area as well as in the presence of periostracal hairs at the periphery. The shell of *S. belang* is larger compared to *S. patera* (shell height 2.5 mm, shell width 8–10 mm).



Figs 13–21. Peristome of *Scabrina belang* sp. nov. (13–18), *S. calyx* (19–20) and *S. inglisianus* (21). The arrow indicates the parieto-palatal region of the inner peristome. The asterisk indicates the wing-like extension of the outer peristome. *S. belang*: 13 – holotype (BOR/MOL 14255); 14–15 – paratypes (ME 887); 16–18 – paratypes (ME 886). *S. calyx*: 19–20 – syntypes (NHMUK 1954.6.2.1542–1544), reproduced from SUTCHARIT et al. (2019). *S. inglisianus*: 21 – possible syntype (NHMUK 20170363), reproduced from SUTCHARIT et al. (2019)

The periostracal hairs of *S. belang* are located at the suture whereas those of *S. laciniata* are located at the periphery. Both *S. belang* and *S. laciniata* have a double peristome but differ in the parieto-palatal area where *S. belang* has an inner peristome with a notch and an outer peristome with a wing-like extension near the suture while *S. laciniata* has a simple peristome with no extensions or notches. The shell of *S. belang* is smaller than that of *S. laciniata* (shell height 8 mm, shell width 13–15 mm).

S. belang and *S. laotica* share the notched inner peristome but *S. belang* has a relatively flat spire and an outer peristome with a wing-like extension, unlike the taller-spired *S. laotica* with a simple outer peristome. The variation in shell dimensions of *S. belang* overlaps with that of *S. laotica* (shell height 5.5 mm, shell width 9.5 mm).

S. belang and *S. vanbuensis* share the notched inner peristome but *S. belang* has an outer peristome with a wing-like extension while *S. vanbuensis* has a simple, non-extended outer peristome. The shell of *S. belang* is slightly larger than that of *S. vanbuensis* (shell height 5 mm, shell width 8.5–10 mm).

The periostracal hairs of *S. belang* are present at the sutural channel only, whereas parallel rows of periostracal hairs are located above and below the periphery in *S. locardi*. *S. belang* has a notched inner peristome and a wing-like outer peristome at the parieto-palatal area whereas *S. locardi* has a simple circular peristome. The variation in shell sizes and dimensions of *S. belang* overlaps with that of *S. locardi* (shell height 5 mm, shell width 11–14 mm).

S. belang has a notch at the inner peristome in the parieto-palatal area and tightly coiled whorls while *S. franzhuberi* has a simple peristome and more rapidly expanding whorls. *S. belang* has a lower shell and smaller aperture compared to *S. franzhuberi* (shell height 6.0–6.4 mm, shell width 12.6–12.7 mm, aperture height 4.9–5.3 mm, aperture width 5.3–5.7 mm, shell height to shell width ratio 0.48–0.51).

S. belang has periostracal hairs at the suture, a notched inner peristome and a wing-like extension at the outer peristome while *S. tonkiniana* differs in having periostracal hairs throughout many parts of the shell and a simple, circular inner and outer peristome. The variation in dimensions of *S. belang* partly overlaps with that of *S. tonkiniana* (shell height 4 mm, shell width 10–13 mm).

Remarks. There is an intraspecific variation in the degree of expansion of the wing-like structure in the outer peristome at the parieto-palatal region but the notch of the inner peristome remains a constant character in every studied population of *S. belang* (Figs 13–18). The periostracum and periostracal hairs at the suture are present in live individuals across all populations of *S. belang*.

Scabrina resembles *Japonia* Gould, 1859 and *Lagocheilus* Blanford, 1864 in its hairy periostracum, proteinaceous operculum and circular aperture with a notch at the parieto-palatal area, but differs from the other two genera in its more discoid shell, operculum with slightly raised edges and much wider umbilicus (Blanford 1864, Kobelt 1902, Lee et al. 2008, Vermeulen et al. 2015, Hirano et al. 2019).

The record of *Scabrina belang* in Peninsular Malaysia represents the first record of *Scabrina* in this region, as this genus was not known to occur there prior to this study (Hemmen & Hemmen 2001, BEDO 2017, Maassen 2001, Foon et al. 2017, Phung et al. 2018). We note that *S. thaitieni* Thach, 2021 from southern Vietnam has a calcareous operculum with spiral lamellae exterior and a proteinaceous interior, which indicates an affinity to the genus *Cyclotus* Guilding in Swainson, 1840 rather than *Scabrina* (Swainson 1840, Blanford 1864, Kobelt 1902, Egorov 2009).

Etymology. The species name refers to the Malay word for striped "belang", used as a noun in apposition, for the distinctive brown markings on its shell. In addition, the name is also a homage to the Malayan tiger, known as "harimau belang" in Malay.

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