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"Sitala" rumbangensis E. SMITH, 1895 (Mollusca, Pulmonata) – an unexpected inhabitant of the Zoo in Vienna

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Abstract

A tropical species of land snails has been found in the Zoo of Vienna. This species has been described from Kalimantan under the name *Sitala rumbangensis* E. SMITH, 1895. The anatomical investigation has shown that actually this species belongs to a new genus, *Schwammeria* gen.n. (family Helicarionidae). Conchological redescription of the species, along with a description of its anatomy and a discussion of its taxonomic position is presented.

Key words: Gastropoda, Ariophantidae, *Schwammeria*, new genus, taxonomy, Tiergarten.

Zusammenfassung

Eine tropische Landschneckenart wurde im Tiergarten Schönbrunn in Wien gefunden. Sie wurde als die Art *Sitala rumbangensis* E. SMITH, 1895 bestimmt, die aus Kalimantan (Borneo) beschrieben wurde. Anatomische Untersuchungen zeigten, dass diese Art in eine neue Gattung, *Schwammeria* gen.n. (Familie Helicarionidae) zu stellen ist. Die Art wird anhand ihrer Schale wiederbeschrieben, zusammen mit ihrer Anatomie und ihre systematische Stellung wird erörtert.

Introduction

On 18 and 21 April 2008, the author, together with Mag. Anita and Magdalena Eschner, collected in the Tropenhaus of Tiergarten Schönbrunn (Vienna Zoo) 49 specimens of a species which has been determined as *Sitala rumbangensis* E. SMITH, 1895.

The exact locality from which these snails came is unknown, but I have been told that the plants, soil and debris (pieces of wood, dry leaves) in the Tropenhaus were brought from Borneo (Kalimantan). Evidently, the snails were introduced together with soil and plant material.

Anatomical investigation showed that this species substantially differs from all other Helicarionoidea and must be segregated as a new genus.

Conchological redescription of this species, along with a description of its anatomy and a discussion of its taxonomic position is presented.

Material and methods

Three specimens were dissected and drawings of the shell and the reproductive tract were made using an Olympus SZ 51 stereo microscope. The material is deposited in the

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Naturhistorisches Museum Wien, Austria (NHMW) and the Zoological Museum of Moscow State University, Russia (ZMMU). Other abbreviations used: NHML, The Natural History Museum, London, UK.

Comparative material examined: *Kaliella barrakporensis* (L. PFEIFFER, 1852). "Wewa Inhalagala, Forest Yoda Ela FR [Sri Lanka], alt. 73 m, 2.12.1999", NHML 2008.1052.

Taxonomy

Helicarionidae GODWIN-AUSTEN, 1882

Schwammeria gen.n.

Type species. *Sitala rumbangensis* E. SMITH, 1895

Derivatio nominis. The genus is named in honor of Dr. Harald Schwammer (Tiergarten Schönbrunn), who kindly permitted me to collect the material in the Tropenhaus.

Diagnosis. Shell small, trochoid, thin-walled, with filiform keel; upper surface (above keel) finely radially striated, basal surface (below keel) with delicate spiral lines. Umbilicus closed.

Conchologically, *Schwammeria* is similar to *Kaliella* and *Sitala*; anatomically it differs from both by its rudimentary penis. It also differs from *Kaliella* by the presence of a well-developed spermatheca, and from *Sitala* by the peculiar shape of the spermathecal reservoir.

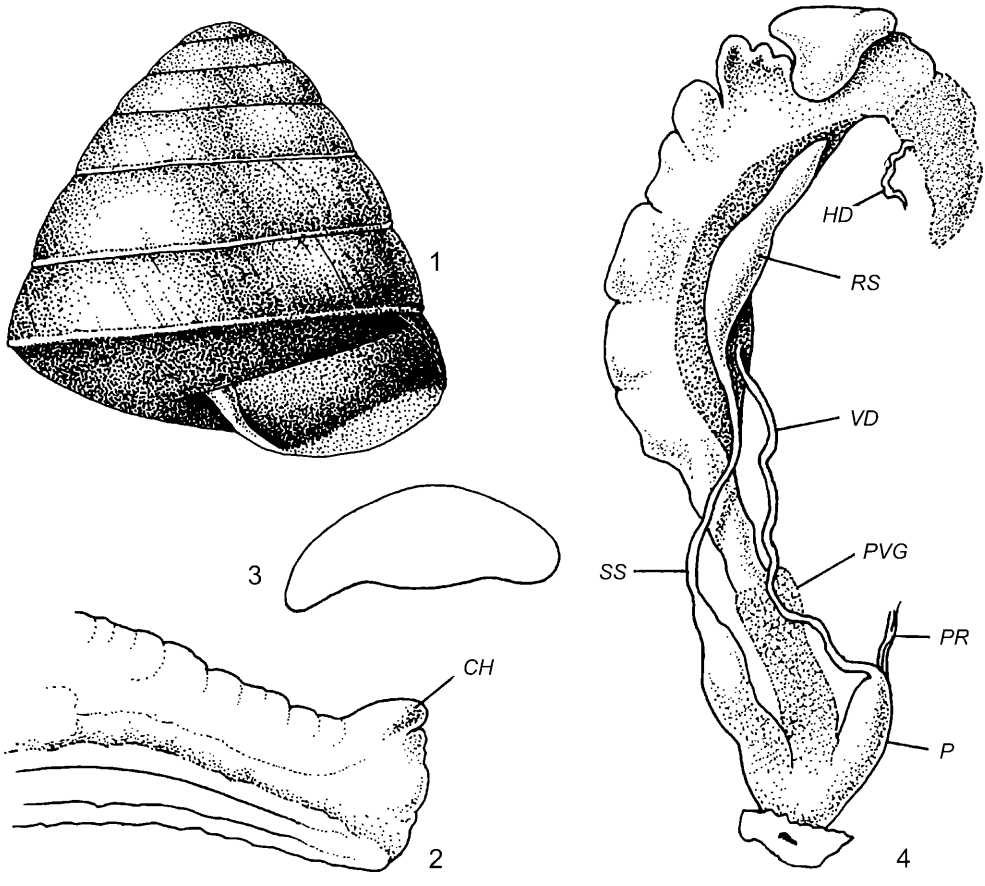
Schwammeria rumbangensis (E. SMITH, 1895) comb.n.
(Figs 1–4)

Sitala rumbangensis E. Smith, 1895: 110.

Material. NHMW 106514, 25 specimens in alcohol; ZMMU Lc-37412, 19 specimens in alcohol (3 dissected), 5 dry shells.

Locus typicus. "Rumbang, Sarawak, and Mount Rabong" [Kalimantan = Borneo].

Redescription. Shell (Fig. 1) trochoid, thin, translucent, silky glossy. Outline of spire very slightly convex (tangent-line not straight), whorls much flattened. Suture shallow, margined. Last whorl not descending, with thread-like peripheral keel that is visible above suture on earlier whorls and becomes weaker toward aperture. Color uniformly corneous. Embryonic whorls with hardly expressed radial wrinklets (nearly smooth), subsequent whorls with very delicate, crowded, not very regular radial wrinklets; basal surface below keel with fine but quite distinct, impressed spiral lines. Aperture semilunate, moderately oblique, with simple, fragile margins; columellar margin shortly reflexed, scarcely thickened. Umbilical depression shallow, umbilicus completely covered. Whorl number up to 6.5. Height up to 3.7, diameter up to 3.3 mm; dimensions of pictured shell: height 3.7, diameter 3.3 mm.



Figs 1–4: *Schwammeria rumbangensis* (E. SMITH, 1895) comb.n.: (1) Shell from Tiergarten Schönbrunn; (2) posterior end of cephalopodium; (3) jaw; (4) reproductive tract. *CH*, caudal horn; *HD*, hermaphroditic duct; *P*, penis; *PR*, penial retractor; *PVG*, perivaginal gland; *RS*, reservoir of spermatheca; *SS*, spermathecal stalk; *VD*, vas deferens.

Cephalopodium (Fig. 2) with blunt caudal projection ("horn") and indistinct caudal foss.

Jaw (Fig. 3) oxygnathous, thin, with wide, blunt projection on cutting edge.

Vas deferens uniformly slender, entering penis subapically at sharp angle. Flagellum or epiphallus absent. Penis very small, simple, rudimentary (Fig. 4 depicts specimen with the largest penis), without sheath; no special inner structure detected. Penial retractor thin, attached to penis apically at entrance of vas deferens. Free oviduct long, its distal half surrounded by distinct perivaginal gland. Vagina as such practically absence because spermathecal stalk is branched off from genital atrium. Basal portion of spermathecal stalk strongly expanded, internally with circular folds (as seen in transmitted light). This expanded portion passes to a thread-like duct; reservoir of spermatheca elongated, of peculiar sandglass shape (with narrowing in middle). Reservoir lies on male side of spermoviduct, barely not reaching albumen gland.

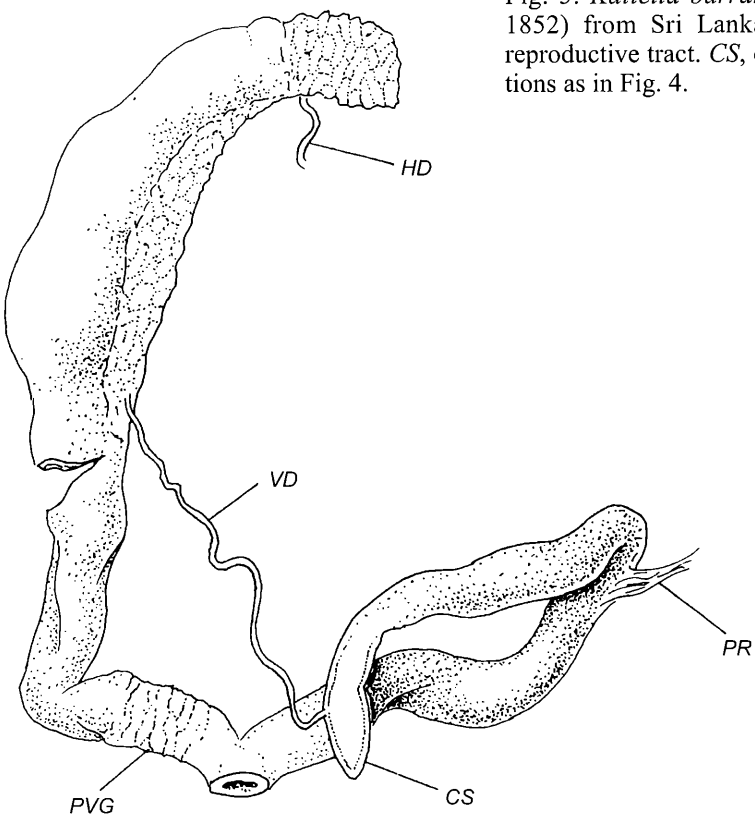


Fig. 5: *Kaliella barrakporensis* (L. PFEIFFER, 1852) from Sri Lanka (NHML 2008.1052), reproductive tract. *CS*, calc-sac; other abbreviations as in Fig. 4.

Discussion

On the species name. Dr. Menno Schilthuizen and Dr. Jaap Vermeulen (pers. comm.) suppose, with some reservations, that *K. rumbangensis* could be a junior synonym of *Kaliella barrakporensis* (L. PFEIFFER, 1852). To clarify this problem I am citing the original description of *Helix barrakporensis* (L. PFEIFFER 1852: 156):

"H. testa subperforata, elevato-trochiformi, tenui, striatula, nitida, pellucida, fusco-cornea; spira conica, acutiuscula; sutura profunda; anfract. 6, convexis, lente accrescentibus, ultimo carinato, non descendente, basi convexiuscula; apertura vix oblique, depressa, subangulato-lunari; perist. simplice, tenui, margine columellari brevi, ad perforationem punctiformem reflexiuscula. Diam. 3½, alt. 3½ mill. Hab. ad Barrakpore, Indiae (Bacon)."

The shells from the Tropenhaus differ from the above description by at least five characters: 1) spire rather cupola-like than conical; 2) summit obtuse rather than "acutiuscula"; 3) suture is shallow, by no means profound; 4) whorls flattened, not "convexis"; 5) umbilicus definitely closed (shell is not "subperforata"). Above all, Pfeiffer did not mention the presence of a spiral striation on the basal surface.

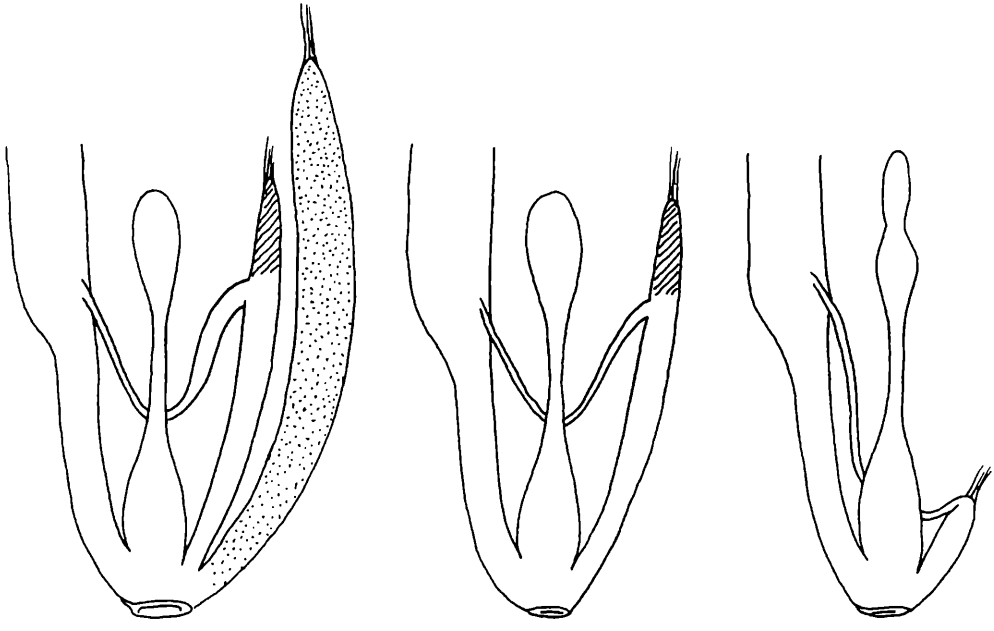


Fig. 6: Comparison of structure of reproductive tracts of *Conulema*, *Sitala* and *Schwammeria* gen.n. (schematized). Sarcobelum dotted, caecum shaded.

The original description of *Sitala rumbangensis* SMITH, 1895 is as follows: "Testa vix perforata, conica, fusco-cornea, nitida, ad peripheriam filo-carinata, lineis incrementi levibus striata, inferne striis concentricis tenuissimis sculpta; spira obtuse conoidalis; anfractus 6, convexi, lentea ccrescentes, sutura carina saturatiore marginata sejuncti; apertura parva, lunata; peristoma tenue, margine columellari fortiter incrassato, leviter reflexo. Diam. maj. 4.5 millim., min. 4, alt. 4.5."

Besides, SMITH (1895) adds an unnamed variety: "Var. Testa typo paulo angustior, anfractibus 6 1/2 striisque basalibus minus conspicuis. Diam. maj. 3.3 millim., min. 3.2, alt. 4. Hab. Mulu Mountain, N. Borneo."

The comparison of the descriptions of the mollusks I investigated with the original one shows no essential differences between them except for the umbilicus: in the original description "teste vix perforate", whereas in my shells the umbilicus closed. It is possible that this difference depends on the quality of the optics: under a simple lens it is difficult to establish whether the umbilicus is closed or barely open.

Shell photographs of the syntypes of *Sitala rumbangensis* and *Helix barrakporensis* (deposited in the NHML) which Dr. Naggs kindly sent me, convinced me that my material was identified correctly.

Taxonomic position of the genus *Schwammeria.* *Helix barrakporensis* L. PFEIFFER, 1852 is the type species of the genus *Kaliella* BLANFORD, 1863 (subsequent designation

by GODWIN-AUSTEN, 1882). Its anatomy has been studied by GODWIN-AUSTEN (1883: 146, pl. 38, fig. 5). BLANFORD & GODWIN-AUSTEN (1908: 259; fig. 81A) have repeated the original anatomical description and illustration. According to GODWIN-AUSTEN (1883), *K. barrakporensis* has normally a developed penis provided with calc-sac; no indication of the presence of spermatheca. Besides, Godwin-Austen did not mention the presence of a perivaginal gland. Through courtesy of Dr. Fred Naggs and Dr. Jonathan Ablett I have dissected two specimens of *Kaliella barrakporensis* from Sri Lanka (unfortunately, both specimens were retracted). The dissection (Fig. 5) showed that the description and illustration made by Godwin-Austen are correct, except for one detail: this author did not mention the perivaginal gland. This organ actually is present, but not very distinct, that's why it has been overlooked by Godwin-Austen. The calc-sac in the individual I dissected (Fig. 5) looks like a flagellum, but is filled with milky-white fluid – a peculiar character of ariophantoid calc-sacs. Jaw and the structure of the posterior end of the cephalopodium in *K. barrakporensis* are very similar to that of *Schwammeria rumbangensis* (Fig. 6).

Even if we admit that the snails from the Tiergarten are hemiphallic or aphallic representatives of *Kaliella* (the phenomenon of hemiphallia or aphallia is well known among Stylommatophora), the presence of well-developed spermatheca testifies against this species belonging to the same genus as *barrakporensis*, i.e. to the genus *Kaliella*.

Many species under the generic name "*Kaliella*" are known, but unfortunately we know little about their anatomy (except for the type species – *barrakporensis*). This is why it is impossible to determine how many of them really belong to the genus *Schwammeria*, which conchologically does not differ reliably from *Kaliella*. This group needs thorough revision on an anatomical basis.

As the species *rumbangensis* originally has been placed in the genus *Sitala* H. ADAMS, 1865 (type species – *Helix infula* BENSON, 1848, by original designation), it should be noted that my material anatomically differs from this genus by the rudimentary penis (in *Sitala* the penis is normally developed) and the absence of an epiphallic caecum to which the penial caecum is attached (for the anatomy of *Sitala infula* see STOLICZKA 1871, pl. 18, figs 5–9).

Among Euconulidae or Helicarionidae, I have not found any genus to which the species with the above-described anatomical characters could be assigned. I suppose that *Schwammeria* is a relative of *Sitala* for three reasons: 1) The shape of the spermathecal stalk is similar to that of *Schwammeria*, in particular, the basal section of the stalk is expanded; 2) The absence of a vagina because the spermathecal stalk sits on the genital atrium. 3) If we mentally remove the caecum in *Sitala infula*, we obtain a situation similar to that observed in *Schwammeria*.

STOLICZKA (1971: 237, pl. 18, fig. 1–4) describes and illustrates another species – *Sitala attegia* (BENSON, 1859) (from Nyanmar). It differs from *S. infula* by the presence of a well-developed sarcobelum. Stoliczka's illustrations of the anatomy of *Sitala infula* and *S. attegia* were recently reproduced by SCHILEYKO (2002: 1290, fig. 1694). Note that STOLICZKA (1871: 237) stated: "The presence or absence of an amatorial gland (i.e. sarcobelum) cannot be accepted as a generic character, which will be evident from what I shall presently say in comparing the generative organs of *C. attegia* with those of *C.*

infula." STOLICZKA (1871) assigned these species to the genus *Conulema* STOLICZKA, 1871: 236 (type species *Helix attegia* BENSON, 1859, by original designation). From a phylogenetic point of view, I think Stoliczka is correct. Based on the analysis of vast material, I have suggested that the disappearance of accessory organs of the reproductive tract in Pulmonata, in particular in helicarionoid groups, is a common path of morphological evolution (SCHILEYKO 1991a, b, 2003). If true, the new genus would occupy the last place in the evolutionary row: *Sitala attegia* (both sarcobelum and caecum are present) – *S. infula* (sarcobelum is absent, caecum is present) – *Schwammeria* gen.n. (both sarcobelum and caecum are absent) (Fig. 6).

With regard to the taxonomical position of the genus *Kaliella*, it should be noted, that this genus and three other considered genera (*Sitala*, *Conulema* and *Schwammeria* gen.n.), according to the family diagnoses, belong to different families: *Kaliella* to Euconulidae (Kaliellinae), the three other genera to Helicarionidae.

At the same time, phylogenetics and taxonomy are different disciplines. This calls for discussing the problem of formal taxonomy, since the three mentioned, evidently related species (*attegia*, *infula* and *rumbangensis*) differ from one another by qualitative characters (presence/absence of accessory organs). In this connection I would like to indicate an analogous case in the quite different family Enidae: this family contains three genera – *Euchondrus*, *Senaridenta* and *Improvisa* – which have very similar shells but differ by the combination of features: in *Euchondrus* there is a penial appendix and a diverticle of the spermathecal stalk; in *Senaridenta*, the appendix is absent but the diverticle present, and in *Improvisa* the appendix is present but the diverticle absent (see SCHILEYKO 1998: 235–237, figs 291–293). By analogy, in this case it would be reasonable to select three genera: *Conulema* STOLICZKA, 1871, *Sitala* H. ADAMS, 1865 and *Schwammeria* gen.n. (Fig. 6).

Such a taxonomic decision does not deny the fact that these three genera are closely related and constitute a natural evolutionary row.

It should be added that in the same Tropenhaus, together with *Schwammeria rumbangensis*, four additional species have been found: *Subulina octona* (BRUGUIÈRE, 1792), *Allopeas gracile* (HUTTON, 1834), *Zonitoides arboreus* (SAY, 1821), and *Deroceras agreste* (LINNAEUS, 1758) juv. One more species has been introduced in the Glashaus in Vienna (which has not been found in the Tropenhaus) – *Afropunctum seminium* (MORELET, 1873) (LEISS et al. 2008).

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