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On the pleurotomariid gastropod genus *Trachybembix* from the Middle Triassic Marmolada Limestone, South Alps, Italy

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Abstract

The Middle Triassic (Ladinian) gastropod genus *Trachybembix* from the Marmolada Limestone in South Tyrol, Italy is reviewed based on the study of type material. Contrary to previous suggestions, *Trachybembix* has a selenizone and thus represents a member of the order Pleurotomariida. The genus is placed in the family Eotomariidae, an essentially Palaeozoic group of gastropods. Lectotypes are designated for the type species of *Trachybembix*, *T. junonis* Kittl, 1894 and for *T. salomoni* Böhm, 1895. Besides the type species *Trachybembix junonis*, *T. jovis* and *T. salomoni*, all from the Marmolada Limestone, undoubtedly represent the genus *Trachybembix*. A synonymy of these three taxa seems to be possible but at least *T. salomoni* is probably a species distinct from the type species *T. junonis*. Other species assigned to *Trachybembix* (all from China) are based on poorly preserved or documented material so that their generic assignment needs corroboration i.e., *Trachybembix cyclosis* Pan, 1982 (Early Triassic), *Trachybembix raris* Pan, 1977 (Late Triassic) and *Trachybembix incerta* Wang, 1982 (Late Permian).

Key words: Gastropoda, Pleurotomariida, Triassic, Systematics

Zusammenfassung

Die mitteltriassische (Ladinium) Gastropodengattung *Trachybembix* aus dem Marmoladakalk Südtirols (Italien) wird basierend auf dem Studium von Typusmaterial revidiert. Im Gegensatz zu früheren Angaben besitzt *Trachybembix* ein Schlitzband und ist also ein Vertreter der Ordnung Pleurotomariida. Die Gattung wird der Familie Eotomariidae zugeordnet, einer im Wesentlichen paläozoischen Gruppe der Gastropoden. Für die Typusart von *Trachybembix*, *T. junonis* Kittl, 1894 und für *T. salomoni* Böhm, 1895 werden Lectotypen festgelegt. Neben *Trachybembix junonis* sind *T. jovis* und *T. salomoni* - alle aus dem Marmoladakalk - zweifellos Vertreter der Gattung *Trachybembix*. Eine Synonymie dieser drei Taxa erscheint möglich, jedoch ist wenigstens *T. salomoni* wahrscheinlich eine von *T. junonis* verschiedene Art. Die drei anderen Arten, die *Trachybembix* zugeordnet wurden (alle aus China) basieren auf schlecht erhaltenem oder ungenügend dokumentierten Material, so dass die Gattungszuordnungen der Überprüfung bedürfen. Dies betrifft die Arten *Trachybembix cyclosis* Pan, 1982 (Untere Trias), *Trachybembix raris* Pan, 1977 (Obere Trias) und *Trachybembix incerta* Wang, 1982 (Oberes Perm).

Schlüsselwörter: Gastropoda, Pleurotomariida, Trias, Systematik

1. Introduction

The great Middle Triassic gastropod faunas of the carbonate platforms of the South Alps were comprehensively studied in the second half of the 19th century (Stoppani 1868–70; Kittl 1894, 1899; Böhm 1895). The gastropod fauna of the Marmolada and Esino Limestones comprise ca. 150 described species making these formations the most diverse Middle Triassic gastropod occurrences worldwide. However, little additional work on these faunas has been done subsequently. A characteristic genus present in the Marmolada Limestone is *Trachybembix*. This genus was initially placed in the family Pleurotomariidae but has been considered to be of doubtful systematic placement subsequently (Haas 1953; Knight et al. 1960). Based on Kittl's (1894) and Böhm's (1895) type material from the Marmolada present in the Natural History Museum, Vienna and the Bavarian State Collection, Munich, this genus is revised in the following.

2. Systematic Palaeontology

Class Gastropoda Cuvier, 1797
Subclass Vetigastropoda Salvini-Plawen, 1980
Order Pleurotomariida Cox & Knight, 1960
Superfamily Eotomarioidea Wenz, 1938
Family Eotomariidae Wenz, 1938
Subfamily Eotomariinae Wenz, 1938

Remarks: *Trachybembix* was initially placed in Pleurotomariidae Swainson, 1840 by Böhm (1895) based on the presence of a selenizone (slitband). Wenz (1938) tentatively retained *Trachybembix* in that family. In his extensive discussion of the genus *Guidonia* (family Trochonematidae), Haas (1953) discussed the systematic placement of *Trachybembix* and doubted the presence of a true selenizone and hence also doubted that *Trachybembix* is a pleurotomarioid. As a consequence, Knight et al. (1960) placed it in the superfamily Pleurotomarioidea but did not assign it to a family. They noted: "The presence of this selenizone is not obvious in published figures and needs verification; if there is no selenizone, the genus should be removed from Pleurotomariacea" (Knight et al. 1960, p. I223). Wang Hui-ji (1982) placed *Trachybembix* in Pleurotomariidae again, when treating a Permian species from China which allegedly belongs to this genus (see below).

As will be shown, *Trachybembix* has a narrow selenizone bordered by sharp crests and the selenizone lies at an angulation of the whorl face. These characters place *Trachybembix* close to Late Palaeozoic genera such as *Ananias* Knight, 1945 or *Glabrocingulum* Thomas, 1940 both of which are currently placed in the family Eotomariidae. I therefore place *Trachybembix* in this family although the Ordovician type species of *Eotomaria* is quite distinct from the mentioned Late Palaeozoic taxa as well as from *Trachybembix*. A placement in Pleurotomariidae is less likely. *Trachybembix* and several Late Palaeozoic to Early Mesozoic genera might require a new family.

Genus *Trachybembix* Böhm, 1895

Type species: *Pleurotomaria junonis* Kittl, 1894, subsequent designation by B. B. Woddward, 1896 (The Zoological Record 32, p. 76).

Diagnosis: Shell low-spired, turbiniform, gradate with angulated whorl face; narrow, concave selenizone present on whorl angulation at about middle of whorl face, demarcated by sharp crests; whorls ornamented with strong spiral cords; base evenly rounded, convex, distinctly phaneromphalous.

Trachybembix junonis (Kittl, 1894)
Plate 1, Plate 2, Figures 1–4

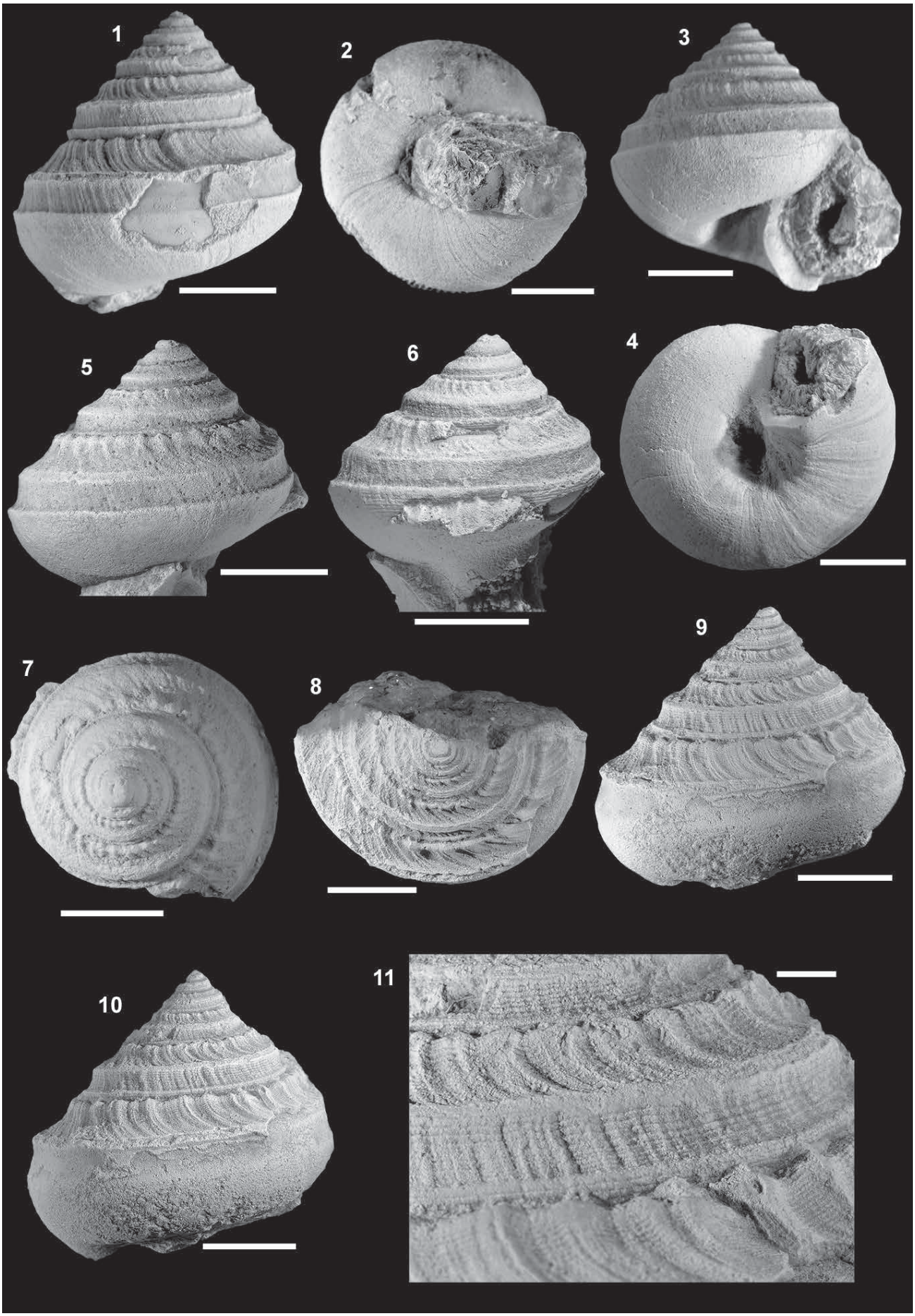
*v	1894	*Trachybembix junonis* n. sp. – Kittl, 220, pl. 9, fig. 11.
v	1895	*Trachybembix junonis* – Böhm, 220, pl. 9, fig. 11.
	1899	*Trachybembix junonis* – Kittl, p. 9.
	1953	*Trachybembix junonis* – Haas, p. 60.

Material: Two syntypes of Kittl (1894), one of which designated as lectotype herein, NHMW 1969/1085/0002, specimen figured by Kittl (1894, pl. 1, fig. 17) and here (Pl. 1, Figs 1, 2); another syntype is designated as paralectotype herein, NHMW 1969/1085/0001, specimen figured by Kittl (1894, pl. 1, fig. 15) and here (Pl. 1, Figs 3, 4); three specimens to Böhm (1895), SNSB-BSPG 1887 XI 83, 780, 781. All specimens are from the Marmolada Limestone.

Description: Shell low-spired, turbiniform; lectotype designated herein comprising 5 to 6 whorls (protoconch missing), 15.6 mm high, 16.3 mm wide; spire gradate with angulated whorl face; narrow, concave selenizone present on whorl angulation at about middle of whorl face respectively above midwhorl; selenizone demarcated by sharp crests; whorl face with steep ramp and more steeply inclined between selenizone and abapical suture; whorl face distinctly concave above and below median angulation; whorls ornamented with a subsutural spiral bulge or spiral cord and a suprasutural spiral cord; suprasutural spiral cord forms angular transition from whorl face to base; whorls ornamented with irregularly strengthened growth lines; growth lines strongly prosocyrt and prosocline between adapical suture and median angulation, strongly backward curving towards selenizone; growth lines straight prosocline below median crest, less oblique than growth lines above crest, abruptly curving backward just below selenizone towards selenizone; strengthened growth lines forming nodes or short riblets on subsutural bulge; whorls ornamented with numerous spiral threads; base strongly convex, evenly rounded, distinctly phaneromphalous with a circumumbilical edge; growth lines on base much weaker than on whorl face, more or less radial; base ornamented with numerous very fine spiral threads; aperture approximately as high as wide with rounded outer and columellar lip, acute adapically.

Remarks: The lectotype of *Trachybembix junonis* as well as well-preserved specimens from Böhm's (1895) material are clearly conspecific. The studied material shows that the growth lines curve backward at the angulation of the outer face both, in the adapical and abapical portion of the whorl face. There-

Plate 1: *Trachybembix junonis* Kittl, 1894. All scale bars 5 mm except Fig. 11: scale bar 1 mm. **(1, 2)** Lectotype, NHMW 1969/1085/0002, specimen figured by Kittl 1895, pl. 1, fig. 17. **(3, 4)** Paralectotype, NHMW 1969/1085/0001, specimen figured by Kittl 1895, pl. 1, fig. 15. **(5–7)** SNSB-BSPG 1887 XI 781; material to Böhm (1895). **(8–11)** SNSB-BSPG 1887 XI 780; material to Böhm (1895).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fore *Trachybembix* has a narrow selenizone on the angulation. The selenizone is concave and bordered by sharp crests. However, due to preservation it remains unclear how deep the slit was and the selenizone itself is also not obvious.

Trachybembix salomoni Böhm, 1895
Plate 2, Figures 5–9

*v	1895	*Trachybembix salomoni* n. sp. – Böhm, p. 221, pl. 9, fig. 10.
	1899	*Trachybembix salomoni* – Kittl, p. 9.

Material: Three syntypes of Böhm (1895), one of which designated as lectotype herein, SNSB-BSPG 1887 XI 85, figured by Böhm (1895, pl. 9, figs 10, 10a–c) and here (Pl. 2, Figs 5–8); other syntype of Böhm (1895) is an axially sectioned specimen SNSB-BSPG 1887 XI 783, figured by Böhm (1895, pl. 9, fig. 10d) and here (Pl. 2, Fig. 9); a third syntype of Böhm (1895), SNSB-BSPG 1887 XI 784, is a small and poorly preserved specimen. All specimens are from the Marmolada Limestone.

Remarks: *Trachybembix salomoni* resembles *T. junonis* but *T. salomoni* has a much lower spire and a wider umbilicus (lectotype designated herein comprising ca. 6 whorls, 11.5 mm high, 17.5 mm wide). Its circumumbilical edge moves to the middle of the base of the whorls in the last apart of the last whorl whereas the edge remains close to the umbilicus in *T. junonis*. The preservation does not facilitate a detailed description of the shell ornament. Kittl (1899) noted that *T. salomoni* could represent a synonym of *T. junonis*, the latter being allegedly a very variable species. Based on the present material, this seems to be unlikely and both taxa are probably distinct but many more specimens must be examined to test Kittl's (1899) claim.

Trachybembix jovis Kittl, 1894
Plate 2, Figures 10–12

*	1894	*Trachybembix jovis* n. sp. – Kittl, p. 220, pl. 1, fig. 14.
v	1895	*Trachybembix jovis* – Böhm, p. 221, pl. 9, fig. 38.
	1899	*Trachybembix jovis* – Kittl, p. 9.

Material: Two specimens from Böhm's (1895) material, SNSB-BSPG 1887 XI 84, figured by Böhm (1895, pl. 9, fig. 38) and here (Pl. 2, Figs 10–12); SNSB-BSPG 1887 XI 782. Both specimens are from the Marmolada Limestone.

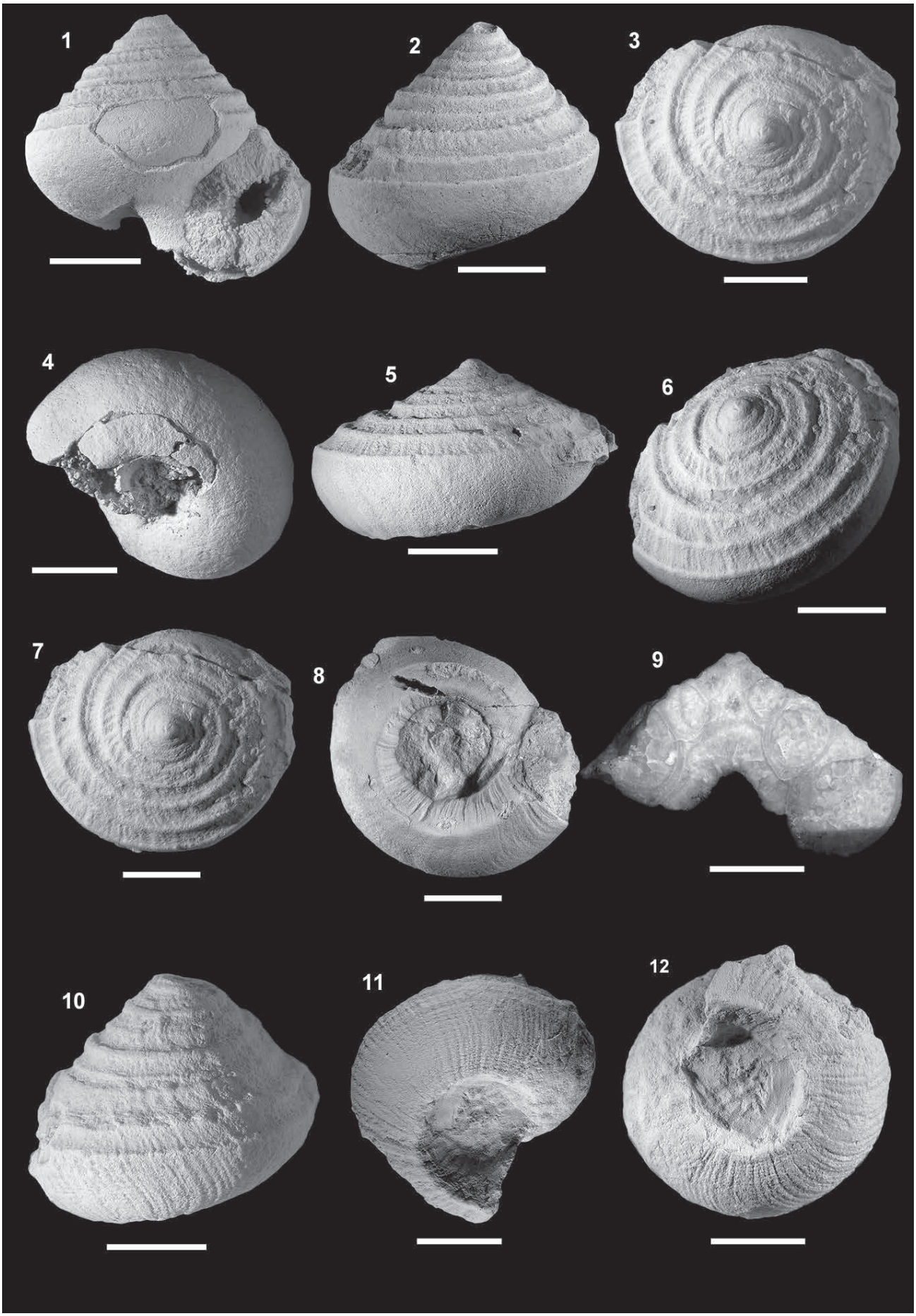
Remarks: *Trachybembix jovis* closely resembles *T. junonis* in shape but *T. jovis* has a wider umbilicus and the ornament on the base is distinctly stronger. As previously discussed by Kittl (1894), *Trachybembix jovis* could be a morphological variety of *T. junonis*.

3. Discussion

It could be shown that the type species of the genus *Trachybembix* is a slitband gastropod (Pleurotomariida) as was initially proposed by Kittl (1894) and Böhm (1895). Later discussions whether a selenizone was really present or not (Haas 1953; Knight et al. 1960) are obsolete now. *Trachybembix* could be closely related to a large group of Late Palaeozoic turbiniform pleurotomariid gastropods with gradate spire in which the selenizone is situated on a prominent whorl angulation for instance, *Ananias* Knight, 1945 or *Glabrocingulum* Thomas, 1940 both of which are currently placed in the family Eotomariidae. Although the Ordovician type species of the type genus *Eotomaria* differs widely from *Trachybembix* and the mentioned Late Palaeozoic gastropods, the family Eotomariidae seems preliminarily to be an appropriate place for *Trachybembix*.

At present, certain members of *Trachybembix* are only known from the Marmolada Limestone: *Trachybembix junonis*, *T. jovis* and *T. salomoni*. A synonymy of these three taxa seems to be possible but at least *T. salomoni* is probably a species distinct from *T. junonis* as is indicated by the very low spire and the extremely wide umbilicus. Kittl (1899, p. 226) mentioned that *Trachybembix* was short-lived and obviously only present in the Marmolada- and Esino Limestones. He also observed that it was present with numerous specimens in the Marmolada Limestone with three closely related species whereas only a single specimen representing *Trachybembix junonis* (most abundant species in the Marmolada Limestone) was found in the Esino Limestone. The genus *Trachybembix* is thus lacking in the other diverse Triassic gastropod faunas from the Alps such as those from the Carnian Cassian Formation and the Norian Hallstatt Limestone. Three other species - all from China – have been assigned to *Trachybembix*: *Trachybembix incerta* Wang, 1982 (Late Permian), *Trachybembix cyclosis* Pan, 1982 (Early Triassic) and *Trachybembix raris* Pan, 1977 (Late Triassic). These species are based on poorly preserved or documented material so that their generic assignment needs corroboration. *Trachybembix* is part of the strong peurotomariid rebound after the end-Permian mass extinction which hit this group particularly hard (e.g., Hickman 1985; Nützel 2005).

Plate 2: All scale bars 5 mm. **(1–4)** *Trachybembix junonis* (Kittl, 1894), SNSB-BSPG 1887 XI 83; material to Böhm (1895, pl. 9, fig. 11a–d). **(5–8)** *Trachybembix salomoni* Böhm, 1895, lectotype, SNSB-BSPG 1887 XI 85, material to Böhm (1895, pl. 9, fig. 10). **(9)** *Trachybembix salomoni* Böhm, 1895, paralectotype, SNSB-BSPG 1887 XI 783, material to Böhm (1895, pl. 9, fig. 10d). **(10–12)** *Trachybembix jovis* (Kittl, 1894), SNSB-BSPG 1887 XI 84; material to Böhm (1895, pl. 9, fig. 38).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