

THREE NEW SPECIES AND A NEW GENUS
OF HYPSELOSTOMATIDAE (GASTROPODA: PULMONATA)
FROM CONG TROI CAVE, NORTHERN VIETNAM

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The Hypselostomatidae Zilch, 1959 comprise a family of minute pupilloid snails usually endemic to limestone habitats in single hills, adjacent hill ranges, and in caves of Southeast Asia. Except for one molecular study, their taxonomy is largely conchologically driven. In this work, shell material derived from sediment samples from the Cong Troi Cave in Northern Vietnam is examined and taxonomically assessed. Altogether, five species are recognized. Three new species are described: *Angustopila stochi* Páll-Gergely et Jochum, sp. n., *Tonkinospira tomasini* Páll-Gergely et Jochum sp. n. and *Dentisphaera maxema* Páll-Gergely et Jochum, sp. n. For the latter species, *Dentisphaera* Páll-Gergely et Jochum a new genus is erected. Another hypselostomatid species is found to be identical with the original sample of *Angustopila subelevata* Páll-Gergely et Hunyadi, 2015 from Guangxi, China. This is the first record of *A. subelevata* from Vietnam. The fifth species closely resembles *Pupisoma* sp. from Thailand. Though figured here, it is not assessed taxonomically in this work.

Key words: cave snails, limestone habitats, Vietnam, micro snails.

INTRODUCTION

The family Hypselostomatidae Zilch, 1959 comprises a group of terrestrial snails characterized by shells smaller than 5 mm. Most of these possess several teeth in their aperture. Although nearly all species and genera are known from shells, anatomical and molecular data have been reported in a few cases (TONGKERD *et al.* 2004). According to SCHILEYKO (1998), this family inhabits Indochina, Indonesia, Australia and the Philippines, and contains the following genera: *Boysidia* Ancey, 1881 (with the subgenera *Paraboysidia* Pilsbry, 1917 and *Dasypupa* Thompson et Dance, 1983), *Anauchen* Pilsbry, 1917, *Bensonella* Pilsbry et Vanatta, 1900, *Aulacospira* Möllendorff, 1890, *Pseudostreptaxis* Möllendorff, 1890, *Gyliotrachela* Tomlin, 1930, *Hypselostoma* Benson, 1856, *Campolaemus* Pilsbry, 1892, *Boysia* L. Pfeiffer, 1849 and *Acinolaemus*

Thompson et Upatham, 1997. SCHILEYKO (1998) concluded that *Systemostoma* Bavay et Dautzenberg, 1909 (currently *Tonkinospira* Jochum, Slapnik et Páll-Gergely, 2014; not *Systemostoma* Marsson, 1887 [Bryozoa]) probably does not belong to Hypselostomatidae, but rather, to the Helicodiscidae due to the characteristic spiral sculpture. Later, he postulated that the genus is possibly related to *Aulacospira* as considered by PILSBRY (1917) or to *Pupisoma* Stoliczka, 1873 (Valloniidae) (SCHILEYKO 2011). The hypselostomatid genus *Angustopila* Jochum, Slapnik et Páll-Gergely, 2014 was erected for some Thai and a Chinese species. Additional species were recently added to that genus from southern China (PÁLL-GERGELY *et al.* 2015).

In the present paper, we examined microsnails from the Cong Troi Cave, Ha Giang Province, Northern Vietnam. We examined material collected at three different sites of the cave. We recognize five species, four of which are members of the Hypselostomatidae (Fig. 1). New species of *Tonkinospira* and *Angustopila* are described. A third new species is classified into its own genus (*Dentisphaera* gen. n.). The fourth hypselostomatid species is identical with the original sample of *Angustopila subelevata* Páll-Gergely et Hunyadi, 2015 from Guangxi, China. The fifth species shows affinity with *Pupisoma* sp. from Thailand (PANHA & BURCH 2005), which belongs to the family Pupillidae, and though figured here, is not assessed taxonomically. Although all specimens

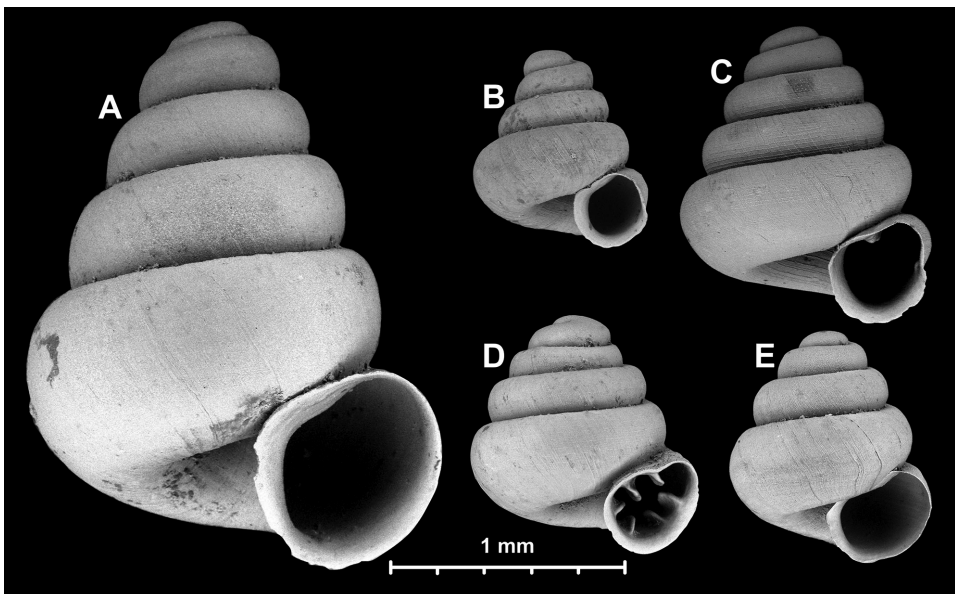


Fig. 1. Synoptic view of microsnails found in the Cong Troi Cave, Ha Giang Province, Northern Vietnam. A = *Tonkinospira tomasini* sp. n., B = *Angustopila subelevata*, C = *Angustopila stochi* sp. n., D = *Dentisphaera maxema* sp. n., E = *Pupisoma* (?) sp.

are known only from empty shells, we have no reason to believe that the species described here are extinct.

MATERIALS AND METHODS

The specimens were scooped by a plankton net (100 micrometers mesh size) from pools of drip water in Cong Troi Cave. Shells were cleaned with moistened, fine cosmetic brushes. After cleaning, the shells were viewed without coating under a low vacuum SEM (Miniscope TM-1000, Hitachi High-Technologies, Tokyo). Shell whorl number was counted to the nearest quarter whorl according to KERNEY and CAMERON (1979).

Measurements of the holotype of *Angustopila stochi* sp. n., were taken using SEM images. Measurements of all other shells were taken from images obtained by a Nikon Digital Sight DS-F11 microscope camera attached to a Nikon SMZ 800 Zoom Stereomicroscope. For the species descriptions, shell measurements are expressed as ratios such as SW/SH and AW/AH.

Abbreviations: AH: aperture height, AW: aperture width, HNHM: Hungarian Natural History Museum (Budapest, Hungary), MZUF Natural History Museum University of Florence, Zoological Section "La Specola" Firenze (Florence, Italy), PGB: Collection Barna Páll-Gergely (Mosonmagyaróvár, Hungary), SD: standard deviation, SH: shell height, SW: shell width.

TAXONOMIC DESCRIPTIONS

Genus *Angustopila* Jochum, Slapnik et Páll-Gergely, 2014

Angustopila Jochum, Slapnik et Páll-Gergely, In: JOCHUM *et al.*, ZooKeys 410: 26.

Type species: *Systemostoma tamlod* Panha et Burch 1999, by original designation.

Content: *concava* (Thompson et Upatham, 1997), *dominikae* Páll-Gergely et Hunyadi, 2015, *elevata* (Thompson et Upatham, 1997), *huoyani* Jochum, Slapnik et Páll-Gergely, 2014, *fabella* Páll-Gergely et Hunyadi, 2015, *singuladentis* Inkhavilay et Panha, 2016, *subelevata* Páll-Gergely et Hunyadi, 2015, *stochi* Páll-Gergely et Jochum, sp. n., *szekeresi* Páll-Gergely et Hunyadi, 2015, *tamlod* (Panha et Burch, 1999).

Distribution: This genus is distributed in northern Thailand, southern China and northern Vietnam (Fig. 7).

***Angustopila stochi* Páll-Gergely et Jochum sp. n.** (Figs 1C, 3A–H)

Type material: C03-N39 (locality code), Northern Vietnam, Ha Giang Province, Quan Ba District, Tam Son, Cong Troi Cave, 980 m, 23°02'44.7"N, 104°59'23.9"E, WGS84, at the

entrance, gours of dripping water, leg. G. TOMASIN, 28.01.2010., Holotype MZUF GC/49405; C04-N74 (locality code), Northern Vietnam, Ha Giang Province, Quan Ba District, Tam Son, Cong Troi Cave, 980 m, 23°02'44.7"N, 104°59'23.9"E, WGS84, internal canyon, gours of dripping water, leg. G. TOMASIN, 29.01.2010., MZUF GC/49412 (figured paratype, juvenile).

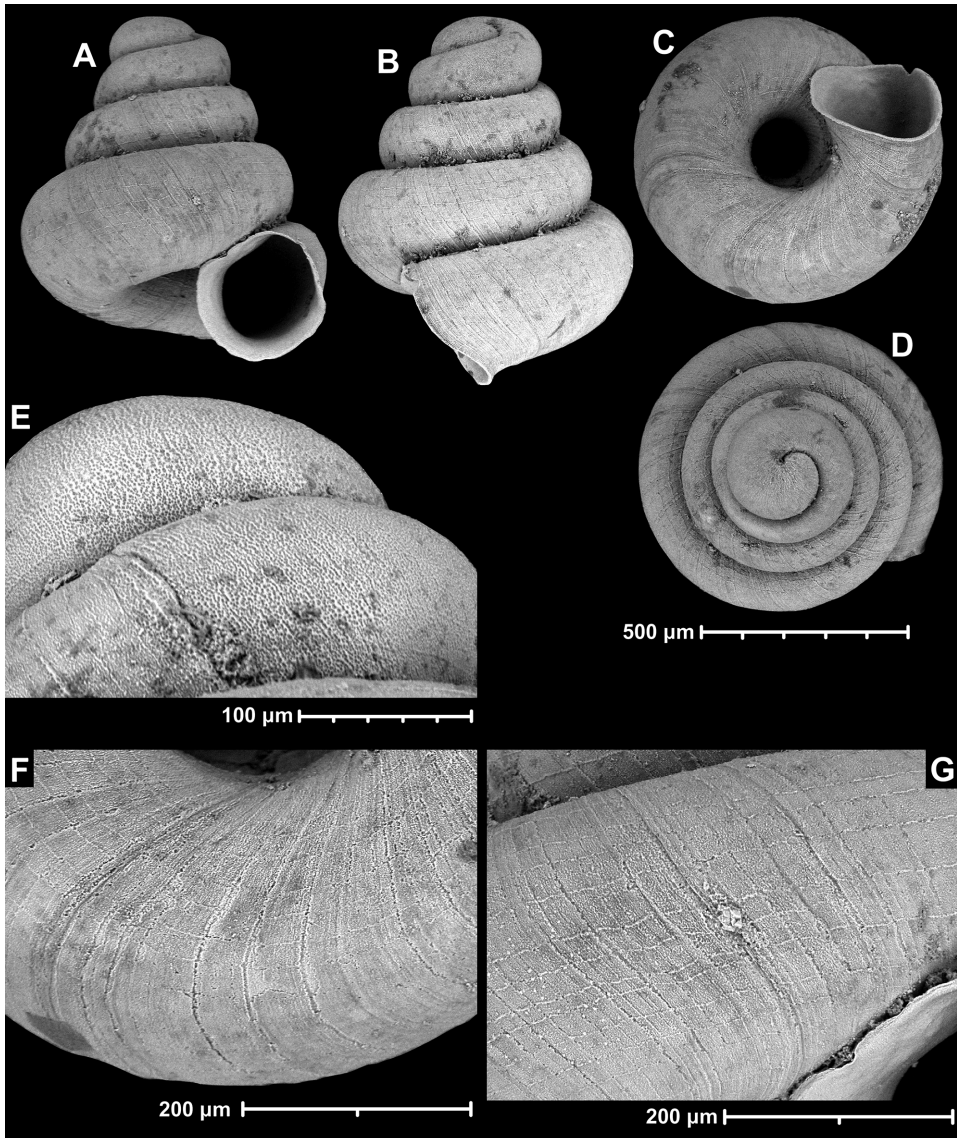


Fig. 2. *Angustopila subelevata* from Cong Troi Cave, Ha Giang Province, Northern Vietnam. A–D = different views of the shell, E = protoconch, F = sculpture of the base of the shell (umbilical side), G = sculpture of the body whorl.

Diagnosis: a tiny, convexly conic species with an ovate-subquadrate aperture, a tuberculated parietal and a low palatal denticle.

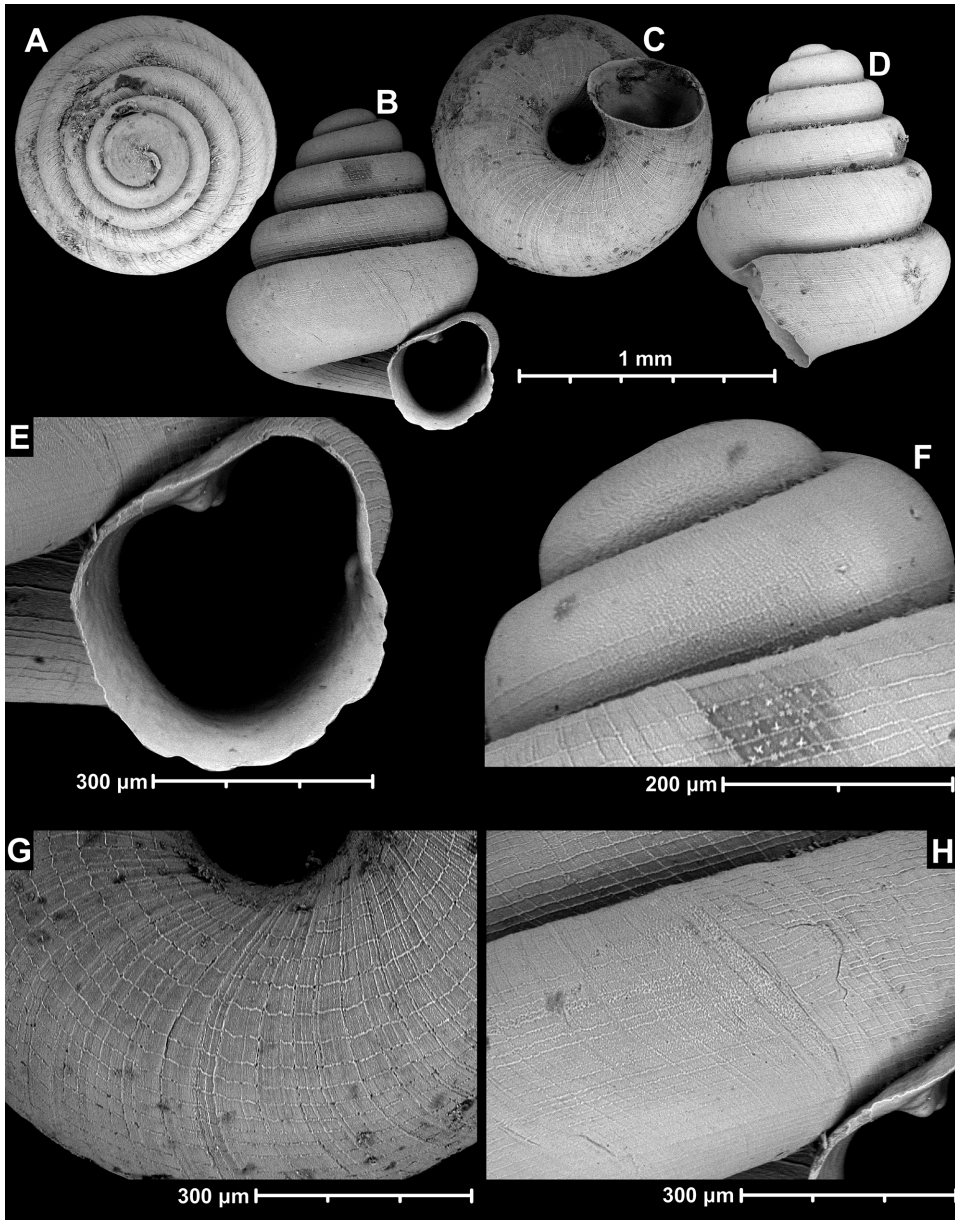


Fig. 3. *Angustopila stochi* sp. n. B, D and E = holotype, A, C, F–G = paratype. A–D = different views of the shell, E = aperture, F = protoconch, G = sculpture of the base of the shell (umbilical side), H = sculpture of the body whorl

Description: Shell minute, greyish white, very fragile, spire convexly conic with obtuse apex; whorls shouldered; spire tilted slightly left; fine equidistant rows of striae radiate from the nuclear whorl, starting at a zone of granulose wrinkles and continuing onto the teleoconch; teleoconch sculpture finely retiform with irregularly-spaced radial growth lines crossed by fine rows of spiral threads; the 4.75 rounded, evenly increasing whorls are separated by a deep suture; aperture ovate-subquadrate; parietal denticle deeply-set, consisting of three tubercles running inside, the first conspicuously lower than the subsequent two; opposite of the parietal denticle is a small, deeply-set, low palatal plica; distal portion of body whorl forms a short detached tuba; peristome thin at uppermost right region, basally slightly reflected; umbilical zone highly reticulate; umbilicus narrow; penultimate whorl bulges decidedly beyond the plane of the aperture by ca, 1/6 the max. breadth of shell (lateral view).

Measurements (in mm): SH = 1.26; SW = 1.06; AH = 0.43; AW = 0.42 (holotype).

Differential diagnosis: *Angustopila stochi* sp. n. differs from the sympatric *A. subelevata* by the larger shell and the presence of two denticles in the aperture. Three *Angustopila* species possess two apertural teeth similar to *A. stochi* sp. n., namely, *A. huoyani*, *A. tamlod* and *A. dominikae*. These species are considerably smaller than *A. stochi*. Moreover, *A. huoyani*, *A. tamlod* and *A. dominikae* bear a more pronounced, tuberculated parietal denticle causing the aperture to appear heart-shaped. *A. dominikae* has a more accentuated palatal denticle and a subglobose-conical shell.

Etymology: This new species is dedicated to Dr. Fabio Stoch, who sent the samples to Dr. Marco Bodon who kindly provided us the material.

Distribution: *Angustopila stochi* sp. n. is known from sediment samples from the Cong Troi Cave in Northern Vietnam.

Remarks: The last quarter whorl of the holotype (the only known adult shell) got damaged during the SEM imaging. Hence, these two shell fragments are deposited in the MZUF. This breakage is probably due to shell decay on account of its previous preservation in formaldehyde (Marco Bodon, pers. comm.).

Angustopila subelevata Páll-Gergely et Hunyadi, 2015
(Figs 1B, 2A–G, 7E–F.)

Angustopila subelevata Páll-Gergely et Hunyadi, In: PÁLL-GERGELY *et al.* 2015, ZooKeys 523: 39–42, Fig. 4.

Material examined: C05-N5 (locality code), Northern Vietnam, Ha Giang Province, Quan Ba District, Tam Son, Cong Troi Cave, 980 m, 23°02'44.7"N, 104°59'23.9"E, WGS84, at the entrance, lake with dripping water, leg. G. TOMASIN, 29.01.2010., 2 strongly corroded shells, MZUF GC/49398; C03-N39 (locality code), Northern Vietnam, Ha Giang Province, Quan Ba District, Tam Son, Cong Troi Cave, 980 m, 23°02'44.7"N, 104°59'23.9"E, WGS84,

Table 1. Mean, minimum, maximum and standard deviation of shell and aperture sizes in specimens of *Angustopila subelevata* Páll-Gergely et Hunyadi, 2015 from the Cong Troi Cave, Northern Vietnam (locality 74) (n = 12). Abbreviations: SH = shell height, SW = shell width, AH = aperture height, AW = aperture width, 100SW/SH = shell width shared with shell height and multiplied by 100, 100AW/AH = aperture width shared with aperture height and multiplied by 100.

	SH	SW	AH	AW	100SW/SH	100AW/AH
Mean	0.89	0.82	0.35	0.34	93	99
Minimum	0.82	0.78	0.32	0.33	83	92
Maximum	0.94	0.86	0.36	0.35	99	104
Standard deviation	0.037	0.024	0.011	0.0074	5.2	3.1

at the entrance, gours of dripping water, leg. G. TOMASIN, 28.01.2010., MZUF GC/49404 (1 shell); C04-N74 (locality code), Northern Vietnam, Ha Giang Province, Quan Ba District, Tam Son, Cong Troi Cave, 980 m, 23°02'44.7"N, 104°59'23.9"E, WGS84, internal canyon, gours of dripping water, leg. G. TOMASIN, 29.01.2010., Specimen 1 (figured shell), Specimen 2 (figured shell), additional 26 shells, MZUF GC/49411; Same data, HNHM 99733/1; Same data, PGB/2.

Measurements (in mm): SH = 0.82–0.94; SW = 0.78–0.86; AH = 0.32–0.36; AW = 0.33–0.35 (n = 12) (Table 1).

Distribution: *Angustopila subelevata* was described from Guangxi, southern China. The locality reported in this paper represents the first locality from Vietnam.

Remarks: The Vietnamese specimens are slightly larger than the type material from Guangxi, China (Min. SH: 0.83, max SH: 0.91, mean: 0.87: Páll-Gergely *et al.* (2015), but no other conchological differences were found. The parietal callus of one of the shells forms a tooth-like projection (Fig. 7F).

The material examined here has spiral threads on the umbilicus and at the base of the shell in sync with PÁLL-GERGELY *et al.* (2015). PANHA and BURCH (2005) did not observe this characteristic in their investigations of the most similar Thai species *Angustopila elevata* (Thompson et Upatham, 1997).

Dentisphaera Páll-Gergely et Jochum gen. n.

Type species: *Dentisphaera maxema* Páll-Gergely et Jochum, sp. n.

Differential diagnosis: *Dentisphaera* differs from *Angustopila* by the presence of six teeth in the aperture, and the elongation of the tuba (most conspicuously visible from dorsal view).

Etymology: The name *Dentisphaera* refers to the presence of multiple teeth in the peristome and the ovoid, almost spherical shape of the shell.

Dentisphaera maxema Páll-Gergely et Jochum sp. n.
(Figs 1D, 4, 7C–D)

Type material: C04-N74 (locality code), Northern Vietnam, Ha Giang Province, Quan Ba District, Tam Son, Cong Troi Cave, 980 m, 23°02'44.7"N, 104°59'23.9"E, WGS84, internal canyon, gours of dripping water, leg. G. TOMASIN, 29.01.2010., Holotype MZUF GC/49408; Same data, MZUF GC/49409/12 paratypes; Same data, HNHM 99732/1 paratype; Same data, PGB/2 paratypes; Same data, MZUF GC/49410/1 juvenile shell (not paratype); C05-N5 (locality code), Northern Vietnam, Ha Giang Province, Quan Ba District, Tam Son, Cong Troi Cave, 980 m, 23°02'44.7"N, 104°59'23.9"E, WGS84, at the entrance, lake with dripping water, leg. G. TOMASIN, 29.01.2010., 2 corroded paratypes, MZUF GC/49397; C03-N39 (locality code), Northern Vietnam, Ha Giang Province, Quan Ba District, Tam Son, Cong Troi Cave, 980 m, 23°02'44.7"N, 104°59'23.9"E, WGS84, at the entrance, gours of dripping water, leg. G. TOMASIN, 28.01.2010., Specimen1 (figured paratype), additional 8 paratypes, MZUF GC/49402; Same data, 4 shell fragments (2 apical, 2 lower parts; not paratypes), MZUF GC/49403.

Diagnosis: Shell tiny, ovate-conoid with shouldered whorls, umbilicus narrow, tuba protruding, six robust teeth (1 parietal, 1 angular, 2 palatal, 2 columellar).

Description: Shell minute, ovate, very fragile, light grey with spire convexly conic with obtuse apex; protoconch recessed to the right at antepenultimate whorl; nuclear whorl begins with a pattern of granulose wrinkles, merging into a pattern of dense, shallow pits; the 4.5 convex, unevenly increasing whorls are separated by a deep suture; teleoconch sculpture finely retiform with raised equidistantly-spaced spiral threads; small aperture piriform; six prominent, deeply set denticles form robust barriers; parietal denticle slightly contorted and aligned directly opposite the deeper-set, palatal denticle; angular denticle slants to the right; body whorl thick; aperture oblique to shell axis; tuba end of body whorl detached and projecting slightly downward past penultimate whorl (lateral view); tuba deflects to the right of the umbilicus; umbilical zone faintly reticulate; umbilicus narrow and deep.

Measurements (in mm): SH = 0.87–1.06; SW = 0.85–0.96; AH = 0.38–0.45; AW = 0.38–0.44 (n = 18) (Table 2).

Etymology: The specific epithet derives from the Hungarian word "mákszem" (poppy seed), referring to the tiny shell. This name is to be used as a noun in apposition.

Table 2. Mean, minimum, maximum and standard deviation of shell and aperture sizes in specimens of *Dentisphaera maxema* Páll-Gergely et Jochum sp. n. (n = 18). For abbreviations see Table 1.

	SH	SW	AH	AW	100SW/SH	100AW/AH
Mean	0.97	0.90	0.41	0.41	94	100
Minimum	0.87	0.85	0.38	0.38	98	100
Maximum	1.06	0.96	0.45	0.44	91	102
Standard deviation	0.052	0.032	0.020	0.018	4.4	3.4

Distribution: *Dentisphaera maxema* sp. n. is known from sediment samples from the Cong Troi Cave in Northern Vietnam.

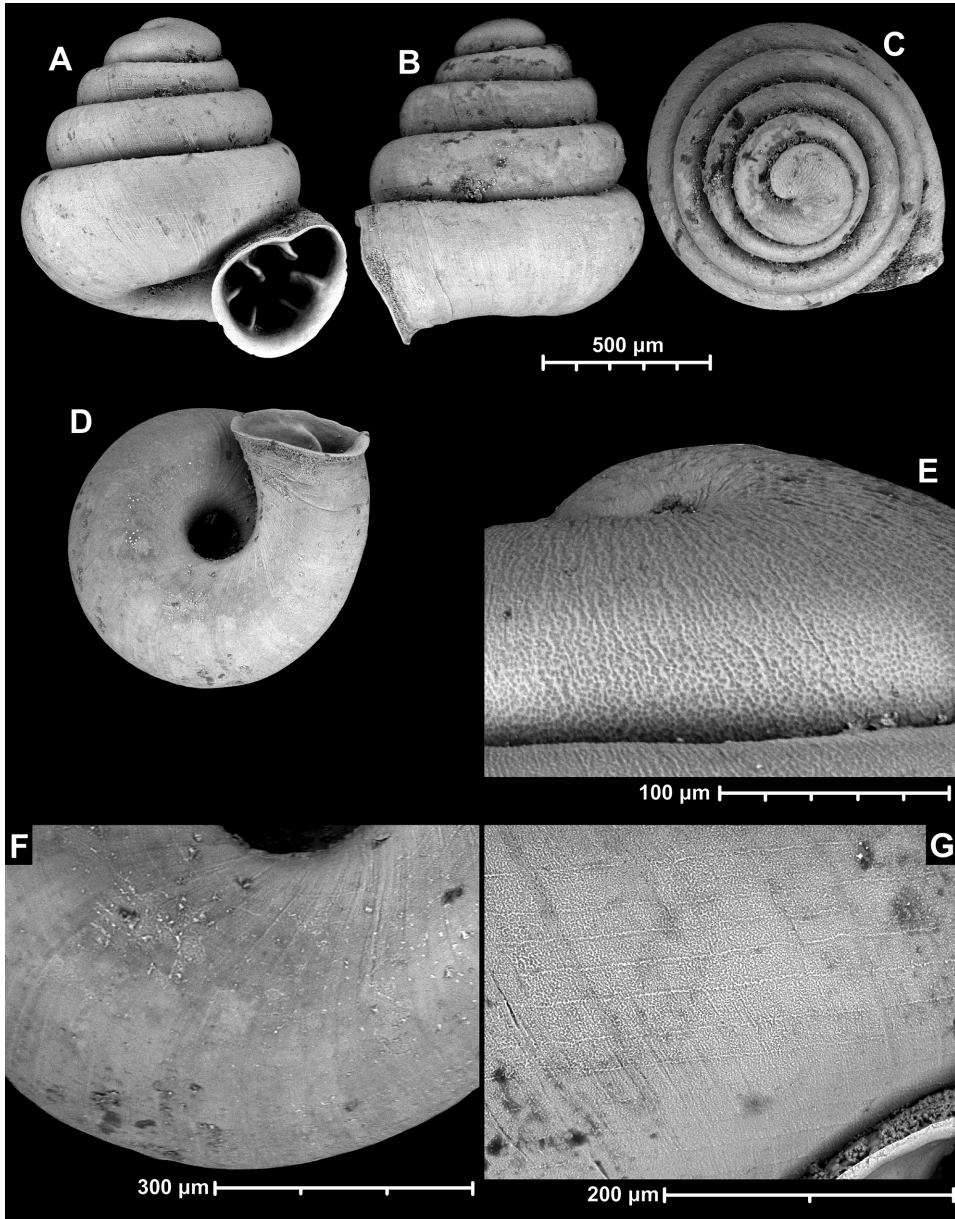


Fig. 4. Holotype of *Dentisphaera maxema* sp. n. A–D = different views of the shell, E = protoconch, F = sculpture of the base of the shell (umbilical side), G = sculpture of the body whorl

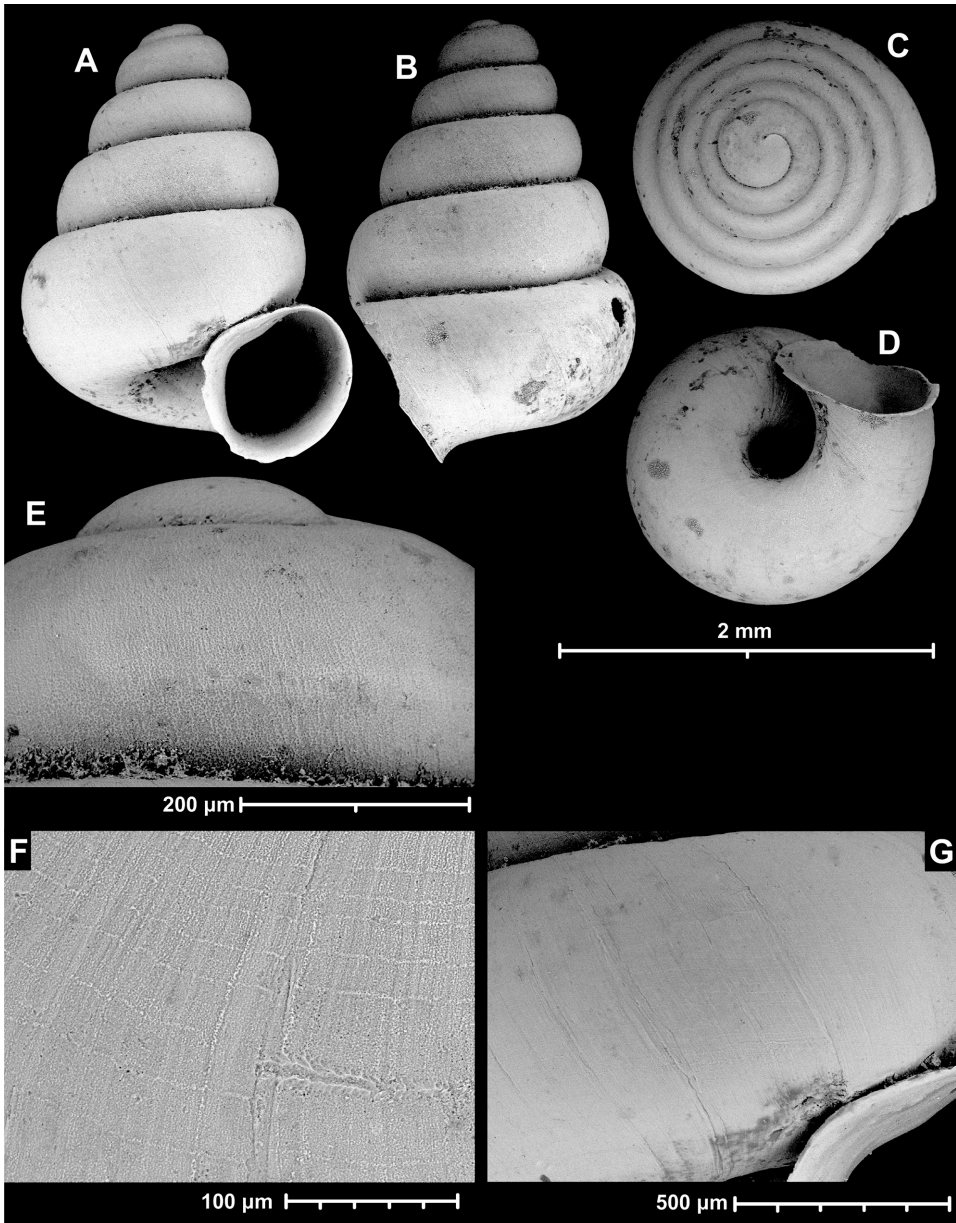


Fig. 5. Holotype of *Tonkinospira tomasini* sp. n. A–D = different views of the shell, E = protoconch, F = sculpture of the base of the shell (umbilical side), G = sculpture of the body whorl

Tonkinospira Jochum, Slapnik et Páll-Gergely, 2014

Systemostoma Bavay & Dautzenberg, 1908: Journal de Conchyliologie, 56: 243. not *Systemostoma* Marsson, 1887 [Bryozoa]. Established as a subgenus of *Helix*.

Systemostoma — Bavay & Dautzenberg, 1908, Journal de Conchyliologie, 57: 196. (diagnosis).

Tonkinospira Jochum, Slapnik et Páll-Gergely, 2014: In: JOCHUM et al., ZooKeys 410: 31.

Type species: *Helix (Systemostoma) pauperrima* Bavay et Dautzenberg, 1908 by subsequent designation (PILSBRY 1917).

Content: *defixa* (Bavay et Dautzenberg, 1912), *depressa* (Jaekel, 1950), *pauperrima* (Bavay et Dautzenberg, 1908), *pulverea* (Bavay et Dautzenberg, 1908), *tomasini* Páll-Gergely et Jochum, sp. n.

Distribution: *Tonkinospira* species are known from Northern Vietnam so far (PÁLL-GERGELY et al. 2015 and this study).

***Tonkinospira tomasini* Páll-Gergely et Jochum sp. n.**
(Figs 1A, 5, 6, 7A–B)

Type material: C03-N39 (locality code), Northern Vietnam, Ha Giang Province, Quan Ba District, Tam Son, Cong Troi Cave, 980 m, 23°02'44.7"N, 104°59'23.9"E, WGS84, at the entrance, gours of dripping water, leg. G. TOMASIN, 28.01.2010., Specimen1 (= holotype, MZUF GC/49399); Same data, Specimen2 (figured paratype), Specimen3 (figured paratype), additional 4 paratypes, MZUF GC/49400; Same data, HNHM 99731/1 paratype; Same data, PGB/1 paratype; Same data, 2 juvenile shells (not paratypes), MZUF GC/49401; C04-N74 (locality code), Northern Vietnam, Ha Giang Province, Quan Ba District, Tam Son, Cong Troi Cave, 980 m, 23°02'44.7"N, 104°59'23.9"E, WGS84, internal canyon, gours of dripping water, leg. G. TOMASIN, 29.01.2010., MZUF GC/49407/1 paratype.

Diagnosis: Small conical shell with convex whorls, less than 1.95 mm broad; aperture edentate.

Description: Shell convexly conic with obtuse apex, greyish white; nuclear whorl begins with a pattern of granulose wrinkles, merging into a pattern of dense, shallow pits

Table 3. Mean, minimum value, maximum value and standard deviation of a set of values (SD) for *Tonkinospira tomasini* Páll-Gergely et Jochum sp. n. (n = 8). For abbreviations see Table 1.

	SH	SW	AH	AW	100SW/SH	100AW/AH
Mean	2.41	1.80	0.84	0.87	75	103
Minimum	2.23	1.70	0.79	0.82	55	96
Maximum	2.98	1.93	0.91	0.94	81	109
Standard deviation	0.251	0.077	0.038	0.040	5.5	4.5

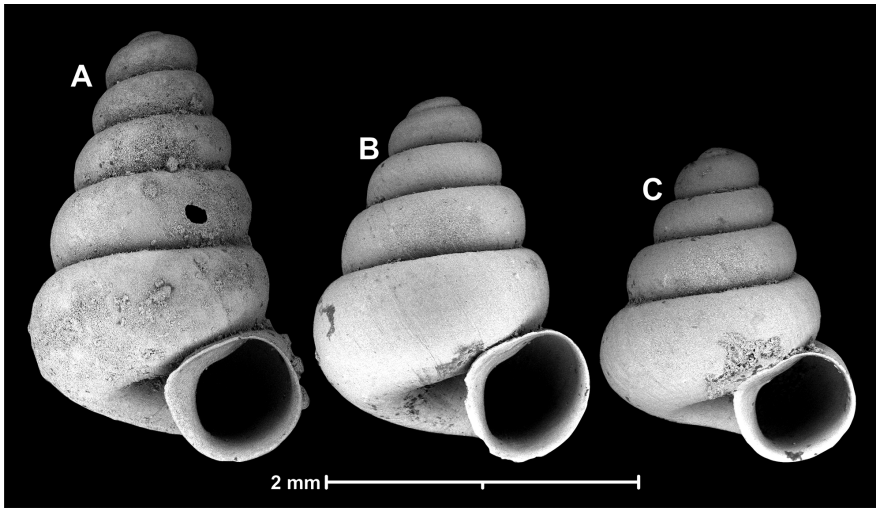


Fig. 6. Variation of shell shape in *Tonkinospira tomasini* sp. n. A = n39, Specimen2, B = n39, Specimen1 (holotype); C = n39, Specimen3

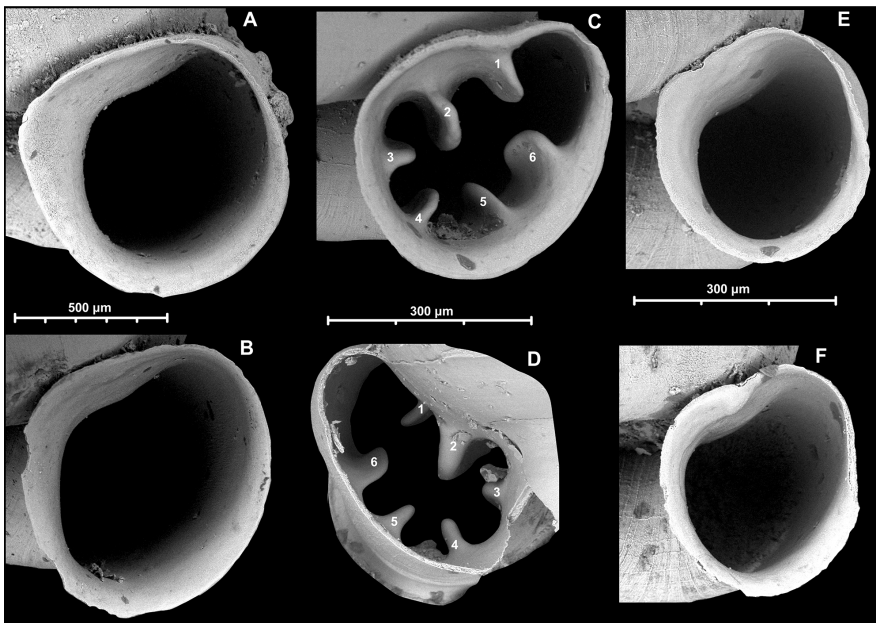


Fig. 7. Apertures of Hypselostomatidae found in the Cong Troi Cave, Ha Giang Province, Northern Vietnam. A–B = *Tonkinospira tomasini* sp. n. (A = n39, Specimen2, B = n39, Specimen1); C–D = *Dentisphaera maxema* sp. n. (n39, Specimen1, Fig. D was taken after removing the body whorl), E–F = *Angustopila subelevata* (E = n74, Specimen2, F = n74, Specimen1). Enumeration of teeth of *D. maxema* are the following. 1 = angular, 2 = parietal, 3–4 = columellar, 5–6 = palatal

without spiral threads, granular texture; suture deep; protoconch consists of approximately 1.5 whorls; teleoconch retiform with faint spiral threads; protoconch and teleoconch consists of 5 evenly increasing convex whorls; aperture quadrate-reniform, adnate; left outer margin thickly angular with decreasing thickness descending towards the basal margin and ascending towards the upper right portion of the peristome; basal-most section of peristome folds back slightly; distal end of the body whorl does not proceed past penultimate whorl but rather aligns even with the ventral convexity of the penultimate whorl in profile view; distal end of body whorl deflects to the right of the umbilicus; umbilicus narrow and deep.

Measurements (in mm): SH = 2.23–2.98; SW = 1.7–1.93; AH = 0.79–0.91; AW = 0.82–0.94 (n = 8) (Table 3).

Differential diagnosis: The most similar *Tonkinospira* species is *T. pauperima*, which has a wider shell, a lower spire and shows a more pronounced spiral striation than *T. tomasini* sp. n.

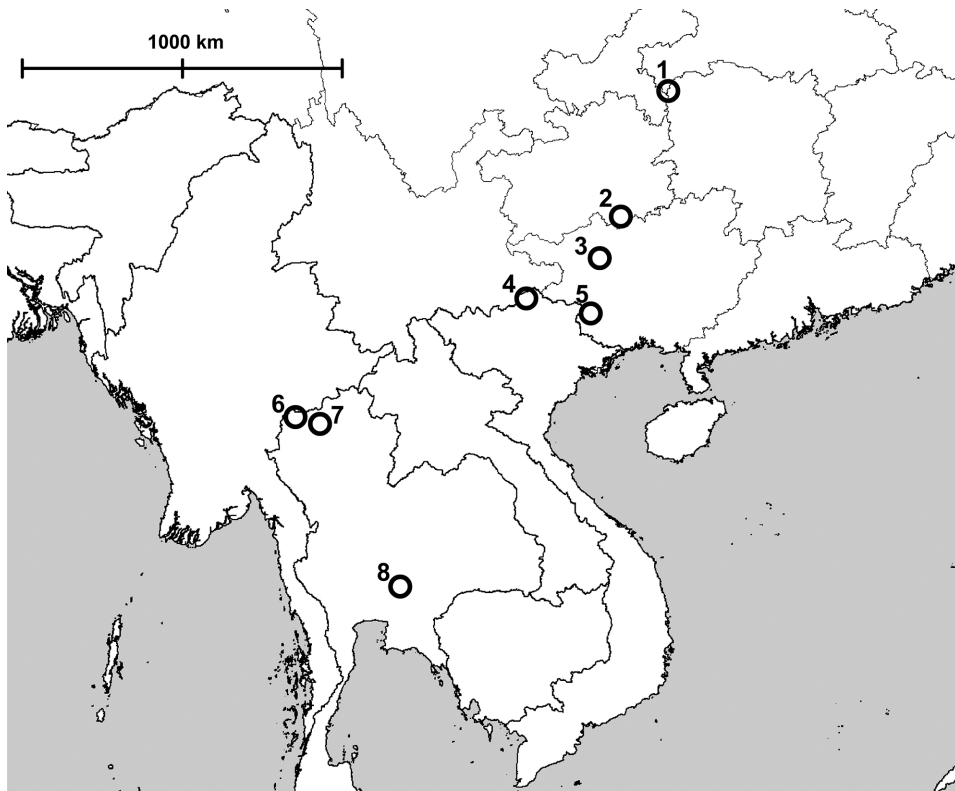


Fig. 8. Distribution of *Angustopila* species. 1 = type locality of *A. huoyani*, 2 = other locality of *A. huoyani* (see PÁLL-GERGELY *et al.* 2015), 3 = type locality of *A. dominikae*, *A. subelevata* and *A. szekeresi*, 4 = type locality of *A. stochi* sp. n. (Cong Troi Cave) and other locality of *A. subelevata*, 5 = type locality of *A. fabella*, 6 = type locality of *A. tamlod*, 7 = type locality of *A. elevata*, 8 = type locality of *A. concava*

Etymology: The new species is named after G. Tomasin, who collected the material from Cong Troi Cave.

Distribution: *Tonkinospira tomasini* sp. n. is known from sediment samples from the Cong Troi Cave in Northern Vietnam.

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REFERENCES

- ANCEY, C.-F. (1881): Descriptions de mollusques terrestres nouveaux. – *Le Naturaliste: Journal des échanges et des nouvelles* **1**(47): 373–374.
- BAVAY, A. & DAUTZENBERG, PH. (1908): Molluscorum terrestrium Tonkinorum diagnoses. – *Journal de Conchyliologie* **56**: 229–251.
- BAVAY, A. & DAUTZENBERG, PH. (1909): Description de coquilles nouvelles de l’Indo-Chine. – *Journal de Conchyliologie* **57**: 163–206.
- BAVAY, A. & DAUTZENBERG, PH. (1912): Description de coquilles nouvelles de l’Indo-Chine. – *Journal de Conchyliologie* **60**: 1–54.
- BENSON, W. H. (1856): Remarks on the genera Tanystoma, Nematura, and Anaulus. – *The Annals and Magazine of Natural History* **2**(17): 342–343. <https://doi.org/10.1080/00222935608697520>
- INKHAVILAY, K., SUTCHARIT, C., TONGKARD, P. & PANHA, S. (2016): New species of micro snails from Laos (Pulmonata: Vertiginidae and Diapheridae). – *Journal of Conchology* **42**(4): 213–232.
- JAECKEL, S. H. (1950): Die Mollusken eines tropischen Flußgenistes aus Tonkin. – *Archiv für Molluskenkunde* **79**: 15–20.
- JOCHUM, A., SLAPNIK, R., KAMPSCHULTE, M., MARTELS, G., HENEKA, M. & PÁLL-GERGELY, B. (2014): A review of the microgastropod genus *Systemostoma* Bavay & Dautzenberg, 1908 and a new subterranean species from China (Gastropoda, Pulmonata, Hypselotomatidae). – *ZooKeys* **410**: 23–40. <https://doi.org/10.3897/zookeys.410.7488>
- KERNEY, M. P. & CAMERON, R. A. D. (1979): *A field guide to the land snails of Britain and North-west Europe*. – Collins, London, 288 pp.

- MARSSON, T. F. (1887): Die Bryozoen der weissen Schreibkreide der Insel Rügen. – *Paläontologische Abhandlungen* 4: 1–122.
- MÖLLENDORFF, O. F. VON (1890): Die Landschnecken-Fauna der Insel Cebu. – *Bericht über die Senckenbergische Naturforschende Gesellschaft in Frankfurt am Main 1889–1890*: 189–292.
- PÁLL-GERGELY, B., HUNYADI, A., JOCHUM, A. & ASAMI, T. (2015): Seven new hypselostomatid species from China, including some of the world's smallest land snails (Gastropoda, Pulmonata, Orthurethra). *ZooKeys* 523: 31–64. <https://doi.org/10.3897/zookeys.523.6114>
- PANHA, S. & BURCH, J. B. (1999): New taxa of Pupillidae (Pulmonata: Stylommatophora) from Thailand. – *Walkerana* 10(24): 113–134.
- PANHA, S. & BURCH, J. B. (2005): An introduction to the microsnails of Thailand. – *Malacological review* 37–38: 1–155.
- PFEIFFER, L. (1849): Neue Molluskengattungen. – *Zeitschrift für Malakozoologie* 6: 97–105.
- PILSBRY, H. A. (1892): New mollusks of St. Helena. – *The Nautilus* 6: 96.
- PILSBRY, H. A. (1916–1918): *Manual of Conchology, Second Series: Pulmonata, Vol. 24, Pupillidae (Gastrocoptinae)*. – Conchological Department, Academy of Natural Sciences of Philadelphia, Philadelphia, 380 pp., plates 1–50.
- PILSBRY, H. A. & VANATTA, E. G. (1900): A partial revision of the Pupæ of the United States. – *Proceedings of the Academy of Natural Sciences of Philadelphia* 52: 582–611.
- SCHILEYKO, A. A. (1998): Treatise on recent terrestrial pulmonate molluscs. Part 2. Gastrocoptidae, Hypselostomatidae, Vertiginidae, Truncatellinidae, Pachnodidae, Enidae, Sagdidae. – *Ruthenica Suppl.* 2: 129–262.
- SCHILEYKO, A. A. (2011): Check-list of land pulmonate molluscs of Vietnam (Gastropoda: Stylommatophora). – *Ruthenica* 21(1): 1–68.
- STOLICZKA, F. (1873): On the land-shells of Penang island, with descriptions of the animals and anatomical notes; part second, Helicacea. – *Journal of the Asiatic Society of Bengal* 42(2): 11–38.
- THOMPSON, F. G. & DANCE, S. P. (1983): Non-marine mollusks of Borneo. II Pulmonata: Pupillidae, Clausiliidae. III Prosobranchia: Hydrocenidae, Helicinidae [J]. – *Bulletin of the Florida Museum of Natural History, Biological Sciences* 29(3): 101–152.
- THOMPSON, F. G. & UPATHAM, S. (1997): Vertiginid land snails from Thailand (Gastropoda, Pulmonata, Pupilloidea). – *Bulletin of the Florida Museum of Natural History, Biological Sciences* 39(7): 221–245.
- TOMLIN, J. R. (1930): Some preoccupied generic names. – *Proceedings of the Malacological Society of London* 19: 22–24.
- TONGKARD, P., LEE, T., PANHA, S., BURCH, J. B. & O'FOIGHIL, D. (2004): Molecular phylogeny of certain Thai gastrocoptine micro land snails (Stylommatophora: Pupillidae) inferred from mitochondrial and nuclear ribosomal DNA sequences. – *Journal of Molluscan Studies* 70: 139–147. <https://doi.org/10.1093/mollus/70.2.139>
- ZILCH, A. (1959–1960): *Handbuch der Paläozoologie*, 6 (2) *Euthyneura*. – Gebrüder Borntraeger, Berlin, pp. 481–834.

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