

Notes on *Sinaphaenops* (Coleoptera, Trechinae), with Descriptions of Two New Species

Shun-Ichi UÉNO

Department of Zoology, National Science Museum (Nat. Hist.),
3–23–1 Hyakunin-chô, Shinjuku, Tokyo, 169–0073 Japan

and

Jingcheng RAN

Research Department of Maolan National Reserve,
131 Shichanglu, Yuping Zhen, Libo Xian,
Guizhou, 558400 P. R. China

Abstract Aphaenopoid trechine beetles belonging to the genus *Sinaphaenops* are dealt with. Three cave populations hitherto found in Libo Xian of southeastern Guizhou are represented by three different species, two of which are new to science and described in the present paper. The new names given are *Sinaphaenops wangorum* and *S. gracilior*. The latter new species is closely allied to the type of the genus, while the former is rather specialized. A key is provided to all the known species, and some accounts of their bionomics are also given.

The aphaenopoid genus *Sinaphaenops* was erected for *S. mirabilissimus* discovered in 1991 in a limestone cave of southeastern Guizhou. It shows a striking morphological modification adaptive to subterranean existence, and is regarded as the species that has undergone the highest degree of specialization within the subfamily Trechinae. Its true affinity is not certain because of the utmost modification and isolation. VIGNA TAGLIANTI (1997, p. 40) offered an opinion that “*Sinaphaenops mirabilissimus* would be possibly the highest specialized taxon of the same line [as *Sinotroglodytes bedosae*]”, though his opinion needs verification by discovery of certain semi-aphaenopoid species that might bridge the wide gap between *Sinotroglodytes* and *Sinaphaenops*.

Unfortunately, no additional specimens of this extraordinary species have been met with due to the reason explained on the later pages (pp. 58–59), but a second habitat of *Sinaphaenops* was recently discovered by the junior author in a limestone cave about 34 km distant to the northeast from Tianzhong Dong, the type cave of *S. mirabilissimus*. This cave, called Lasuo Dong, was reexamined by five biospeologists in September 1997, and yielded a short series of *Sinaphaenops*, which is basically sim-

ilar to the type species but is evidently different from it in the narrower facies and in the loss of the posterior pair of the supraorbital setae. The latter character state is of particular interest, since the number and position of these setae are usually fixed in single genera of the Trechinae. It is true that they are exceptionally variable in anophthalmic trechines from Chinese caves; the posterior pair is absent in *Guizhaphaenops* (VIGNA TAGLIANTI, 1997, pp. 34–35), the anterior pair is absent in *Libotrechus* (UENO, 1998, pp. 44–45), and both are not discernible in *Dongodytes* (DEUVE, 1993, pp. 292–293). However, such peculiarities are always generic, not infra-generic, so that the Lasuo Dong species can be regarded as a rare exception.

On the next day of the visit to Lasuo Dong Cave, a third locality of *Sinaphaenops* was found out by the senior author in Shuiboshui Dong Cave, which is 11.7 km distant to the north-northwest from Lasuo Dong. In spite of such a location, this cave harbours a *Sinaphaenops* which is closer to the Tianzhong Dong species than to the Lasuo Dong one in view of the similarity of aedeagal configuration. In facies, however, it is similar to the Lasuo Dong species, and therefore considered specifically different from either of the two species.

In the present paper, the authors are going to describe the two new species and to give a key to all the known species of *Sinaphaenops*. Some accounts of the type locality of *S. mirabilissimus* will also be given. The abbreviations used herein are the same as those explained in UENO and WANG (1991, pp. 127–128), with the addition of HL, which means the length of head measured from the apical margin of clypeus to the apical margin of pronotum.

Before going into further details, the authors wish to thank Dr. Yoshiaki NISHIKAWA, Dr. and Mrs. WANG Fuxing, and Mr. Toshio KISHIMOTO for their kind help extended to the present authors in field works.

Key to the Species

- 1 (2) Posterior supraorbital seta absent, at least on one side; body narrow, PL/PW 1.54 on an average, EL/EW 1.92 on an average; aedeagus slenderer in profile and regularly arcuate, with apical lobe widely rounded at the apex in dorsal view; aedeagal basal part smaller, moderately emarginate at the sides of small basal orifice and with larger sagittal aileron protrudent ventro-proximally; length 7.30–8.90 mm; (Lasuo Dong Cave) *S. wangorum* sp. nov.
- 2 (1) Posterior supraorbital seta always present; aedeagus more robust in profile and less regularly arcuate, with apical lobe subtriangular and narrowly rounded at the apex in dorsal view; aedeagal basal part larger, either shallowly or hardly emarginate at the sides of large basal orifice and with smaller sagittal aileron not protrudent ventrad.
- 3 (4) Body narrower, PL/PW 1.45–1.57, EL/EW 1.88–1.95; lateral margins of elytra more or less visible at middle from above; aedeagus with the left wall higher to the side of apical orifice and then abruptly narrowed to apical lobe, which

- is longer and narrowly produced ventro-apicad; length 6.80–8.20 mm; (Shuiboshui Dong Cave) *S. gracilior* sp. nov.
- 4 (3) Body broader, PL/PW 1.40–1.43, EL/EW 1.69–1.81; lateral margins of elytra concealed by lateral expansion of dorsum and invisible at middle from above; aedeagus with the left wall gradually narrowed to apical lobe from behind middle, which is shorter and only slightly curved ventrad; length 7.60–8.30 mm; (Tianzhong Dong Cave) *S. mirabilissimus* S. UÉNO et F. WANG, 1991.

***Sinaphaenops wangorum* S. UÉNO et RAN, sp. nov.**

(Figs. 1, 4–5)

Length: 7.30–8.90 mm (from apical margin of clypeus to apices of elytra).

Related to *S. mirabilissimus* S. UÉNO et F. WANG (1991, p. 132, figs.1–3), with which it agrees in most basic characters, but the body is evidently narrower, the elytral dorsum is less convex and not laterally expanded over the side borders at middle, the posterior pair of supraorbital pores is almost always lacking, and the aedeagus is much slenderer and differently shaped.

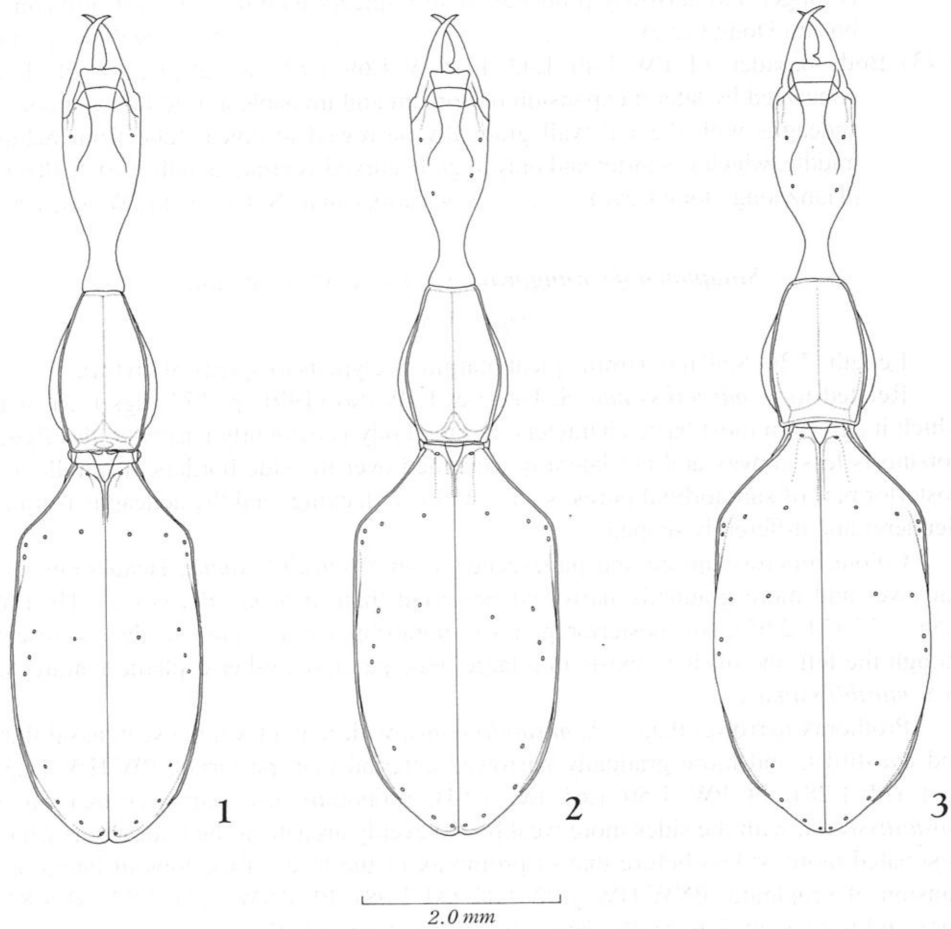
Colour, microsculpture and pubescence as in *S. mirabilissimus*. Head somewhat narrower and more gradually narrowed posteriad than in *S. mirabilissimus*, HL/HW 2.55–2.77 (M 2.65); the posterior pair of supraorbital pores almost always absent, though the left one of them exists in a large male paratype; other cephalic features as in *S. mirabilissimus*.

Prothorax narrower than in *S. mirabilissimus*, widest at a level between basal third and two-fifths, and more gradually narrowed anteriorly than posteriorly, PW/HW 1.23–1.31 (M 1.28), PL/PW 1.50–1.61 (M 1.54); pronotum also narrower than in *S. mirabilissimus*, with the sides more weakly and evenly arcuate at the widest part which is situated more or less before that of prothorax or the level of the tops of lateral expansion of propleura, PNW/HW 1.02–1.12 (M 1.08), PL/PNW 1.74–1.92 (M 1.82); apex and base as in *S. mirabilissimus*, though the former looks wider in proportion to the greatest width of pronotum, PNW/PA 1.69–2.29 (M 2.02), PNW/PB 1.33–1.48 (M 1.39), PB/PA 1.34–1.62 (M 1.48); other prothoracic features as in *S. mirabilissimus*.

Elytra obviously narrower and more parallel-sided at middle than in *S. mirabilissimus*, widest at about or a little behind the middle, and less strongly convex on dorsum; EW/PW 1.90–2.01 (M 1.96), EL/EW 1.83–2.03 (M 1.92); shoulders more prominent than in *S. mirabilissimus*, prehumeral borders more oblique and somewhat emarginate near basal peduncle; sides narrowly bordered throughout, visible throughout in dorsal view, either straight or very slightly emarginate behind shoulders, very feebly arcuate at middle, and conjointly rounded at apices; basal foveole on each elytron transverse, not externally delimited as in *S. mirabilissimus*; other elytral features inclusive of chaetotaxy as in *S. mirabilissimus*.

Ventral surface and legs as in *S. mirabilissimus*.

Male genital organ very small and rather lightly sclerotized, markedly different in



Figs. 1–3. *Sinaphaenops* spp., ♂; outline of body. — 1, *S. wangorum* S. UENO et RAN, sp. nov., from Lasuo Dong Cave; 2, *S. gracilior* S. UENO et RAN, sp. nov., from Shuiboshui Dong Cave; 3, *S. mirabilissimus* S. UENO et F. WANG, from Tianzhong Dong Cave.

configuration from those of the other species. Aedeagus a little less than one-fifth as long as elytra, depressed throughout, gently arcuate, and widely membraneous on dorsum, with small basal part only slightly curved ventrad, slender and gradually narrowed towards apex in lateral view, nearly parallel-sided and fairly broad to near apex in dorsal view; basal part with small basal orifice whose sides are moderately emarginate; sagittal aileron elongate and protrudent ventro-proximally; viewed laterally, apical lobe narrow, abruptly curved ventrad at the apex, and truncate at the ventral extremity; viewed dorsally, apical lobe widely rounded at the extremity; ventral margin widely emarginate in profile, particularly behind middle. Copulatory piece very large

but hyaline, a little less than one-third as long as aedeagus, spatulate, narrowed towards blunt apex, and narrowly covered with scales along the sides of proximal part. Styles relatively large and fairly broad, left style longer than the right, each bearing two or three apical setae, the dorsal one of which is usually thicker than the other(s).

Type series. Holotype: ♂, 12-IX-1997, F. WANG leg. Allotype: ♀, 14-IX-1997, S. UÉNO leg. Paratypes: 2 ♂♂, 5 ♀♀, 12 & 14-IX-1997, S. UÉNO, Y. NISHIKAWA, F. WANG, T. KISHIMOTO & J. RAN leg. All deposited at present in the collection of the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

Type locality. Limestone cave called Lasuo Dong, at Bai'ai (=Baiyan) of Yongkang Xiang in Libo Xian, southeastern Guizhou, South China.

Notes. Though similar at first sight to *S. mirabilissimus*, this new species is decisively different from the latter in the loss of the posterior pair of the supraorbital setae and the differently shaped male genitalia. Its slender body form with less strongly convex dorsum of the elytra is also different from the relatively broad prothorax and the hemi-ovoidally convex elytra of the type species.

As was noticed in the description given above, one of the nine specimens examined of *S. wangorum* has the posterior supraorbital seta at the left side just as in the other species of the genus. This aberrancy can be regarded as a reversion of the cephalic chaetotaxy seldom found in the Trechinae, though reversion of the dorsal and preapical setae on the elytra has been recorded in certain genera of the *Trechiana* and *Agonotrechus* series.

A brief account of Lasuo Dong, the type cave of this interesting species, was already given in the *Notes* following the description of *Libotrechus nishikawai* (UÉNO, 1998, p. 49). *Sinaphaenops wangorum* was found leisurely walking on wet walls or large stalagmites, but when disturbed, it flew with a lightning speed into crevices or maze of cave corals. Four specimens collected on September 14 were found in baited traps set two days before on flowstones or at the bottom of calcareous walls.

It is a real pleasure for the present authors to dedicate this beautiful trechine beetle to Dr. and Mrs. WANG Fuxing, who rendered invaluable help in making cave investigations in Libo Xian. Besides, Dr. WANG is the discoverer of *Sinaphaenops mirabilissimus*, which is the first aphaenopsoid trechine beetle recorded from a Chinese cave.

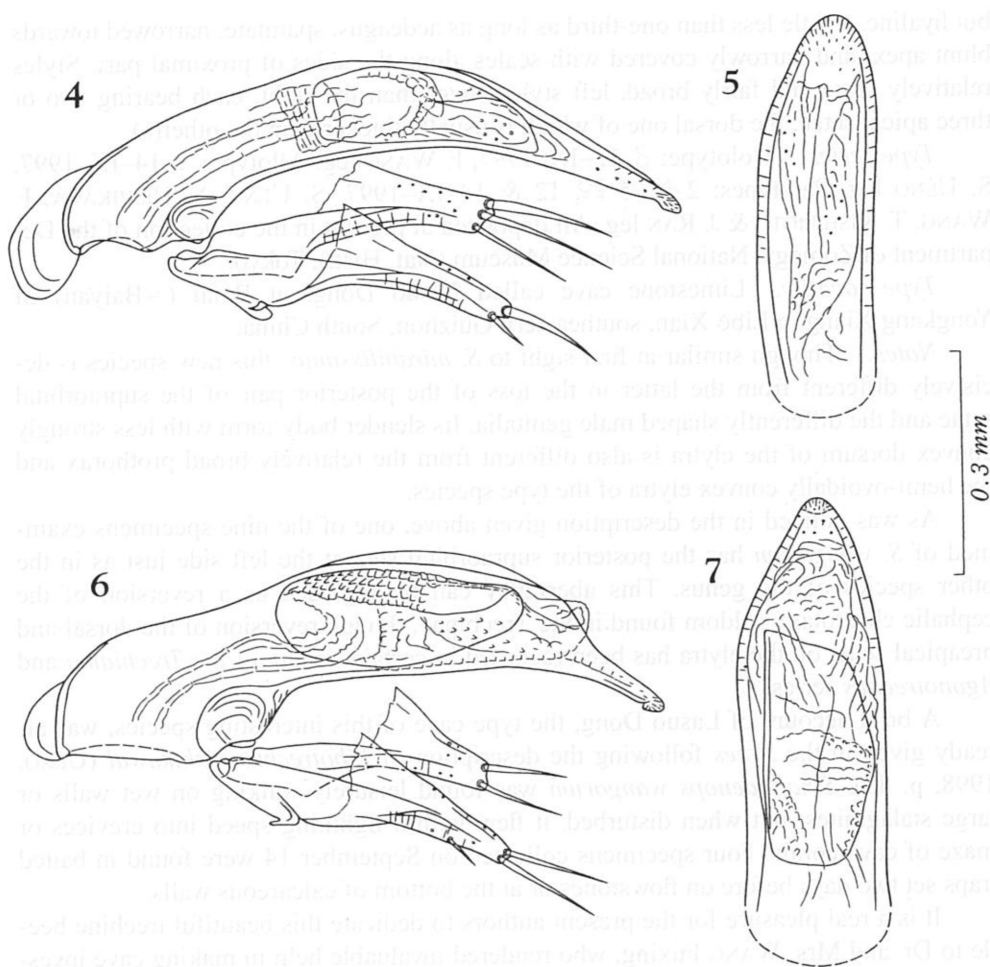
***Sinaphaenops gracilior* S. UÉNO et RAN, sp. nov.**

(Figs. 2, 6-7)

Length: 6.80-8.20 mm (from apical margin of clypeus to apices of elytra).

Closely allied to *S. mirabilissimus*, but the body is evidently narrower as in *S. wangorum*, and the male genitalia are differently shaped, especially in the apical part of aedeagus and copulatory piece.

Colour, microsculpture and pubescence as in *S. mirabilissimus*. Head similar to that of *S. mirabilissimus*, but more gradually narrowed posteriad and with longer neck constriction, HL/HW 2.41-2.67 (M 2.51); other cephalic features as in *S. mirabilis-*



Figs. 4-7. Male genitalia of *Sinaphaenops* spp.; left lateral view (4, 6), and apical part of aedeagus, dorso-apical view (5, 7). — 4-5. *S. wangorum* S. UENO et RAN, sp. nov., from Lasuo Dong Cave. — 6-7. *S. gracilior* S. UENO et RAN, sp. nov., from Shuiboshui Dong Cave.

simus.

Prothorax similar to that of *S. wangorum*, obviously narrower than in *S. mirabilissimus*, widest at a level between basal third and two-fifths, PW/HW 1.26-1.35 (M 1.32), PL/PW 1.45-1.57 (M 1.51); pronotum as in *S. wangorum*, PNW/HW 1.06-1.17 (M 1.11), PL/PNW 1.66-1.94 (M 1.79), PNW/PA 1.99-2.26 (M 2.12), PNW/PB 1.27-1.40 (M 1.33), PB/PA 1.53-1.65 (M 1.59); other prothoracic features as in *S. wangorum*.

Elytra also obviously narrower than in *S. mirabilissimus*, but like those of the lat-

ter species, the basal areas are relatively ample, the prehumeral borders are somewhat less oblique and the dorsum is strongly convex, widest at about five-ninths from bases; EW/PW 1.94–2.02 (M 1.99), EL/EW 1.88–1.95 (M 1.91); shoulders distinct, though a little less prominent than those of *S. wangorum*, prehumeral borders slightly emarginate near basal peduncle; sides narrowly bordered throughout and barely visible at middle in dorsal view being partially concealed by lateral expansion of dorsum, straight for a short way behind shoulders, very feebly arcuate at middle, and conjointly rounded at apices; basal foveole on each elytron not sharply delimited laterad but forming a longitudinal flattened area along suture; other elytral features inclusive of chaetotaxy as in *S. mirabilissimus*.

Ventral surface and legs as in *S. mirabilissimus*.

Male genital organ small though moderately sclerotized, generally similar to that of *S. mirabilissimus* but different in the configuration of aedeagus, above all of apical lobe. Aedeagus a little less than two-ninths as long as elytra, lightly depressed, hardly arcuate at middle, widely membranous on dorsum, highest well behind middle, and rather abruptly narrowed towards apical lobe from behind apical orifice in lateral view; basal part very large, only gently curved ventrad, with very large basal orifice whose sides are hardly emarginate; sagittal aileron small and not protrudent ventrad; viewed laterally, apical lobe narrowly produced ventro-apicad and obtusely tuberculate ventrad at the extremity; viewed dorsally, apical lobe subtriangular, slightly inclined to the left, and narrowly rounded at the extremity; in profile, ventral margin not emarginate at middle but gently so at the base of apical lobe. Copulatory piece large, about two-fifths as long as aedeagus, with the dorsal margin rolled to the left and covered with scales except for apical portion; apex narrowly rounded in lateral view but subangulate at the right side in dorsal view. Styles short; left style longer than the right, with a small additional seta on the ventral margin in a paratype; each style provided with two setae at the apex.

Type series. Holotype: ♂, 13-IX-1997, S. UENO leg. Allotype: ♀, same date, T. KISHIMOTO leg. Paratypes: 2 ♂♂, 1 teneral ♀, same date, S. UENO & T. KISHIMOTO leg. All deposited at present in the collection of the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

Type locality. Limestone cave called Shuiboshui Dong, at Shuibozhai of Shuipucun in Yuping Zhen, Libo Xian, southeastern Guizhou, South China.

Notes. This taxon could be regarded as a subspecies of *S. mirabilissimus* because of a close similarity of aedeagal conformation. It is, however, evidently closer to *S. wangorum* in external morphology, even though its elytra show the same trend of ample basal areas as in *S. mirabilissimus*. Since its type cave is about 34 km distant from that of the latter species and located on the other side of the Zhong Jiang Valley, and since this situation is the same as Lasuo Dong Cave which harbours *S. wangorum*, the authors prefer to regard the Shuiboshui Dong population as specifically differing from *S. mirabilissimus*, at least for the time being. Still other populations of *Sinaphaenops* will doubtless be found in future when careful investigations are carried

out in the Libo area which abounds in limestone caves of moderate size. Only when this can be done, we shall be able to classify the members of this trechine genus on a sounder basis.

As was already described in the *Notes* following the description of *Oodinotrechus kishimotoi* (UÉNO, 1998, pp. 43–44), Shuiboshui Dong Cave is a ponor, into which tumbling torrents of surface water carrying a large quantity of vegetable debris sink in rainy seasons. The walls of the main gallery are covered with innumerable pieces of rotten wood, dead leaves and twigs up to a height of 3 m or more, above all in small bays in which the flood waters must have swirled. *Sinaphaenops gracilior* was found in two of those bays, leisurely walking among vegetable debris sticking on smooth walls and sometimes on ceilings. Like *S. wangorum*, it is very agile when disturbed, but has never been seen to take refuge under organic matters.

Sinaphaenops mirabilissimus S. UÉNO et F. WANG, 1991

(Fig. 3)

Sinaphaenops mirabilissimus S. UÉNO et F. WANG, 1991, *Elytra*, Tokyo, **19**, p. 132, figs. 1–3; type locality: Tianzhong Dong Cave.

No additional record. So far known only from the three specimens of the type series collected on January 29, 1991.

Known locality. Limestone cave called Tianzhong Dong, above Laguan of Yaoshan Xiang in Libo Xian, southeastern Guizhou, South China.

Notes. It is most unfortunate that the type habitat of this remarkable species has been destroyed since 1991 when it was discovered as the first troglobiontic trechine beetle from China. We visited the cave on September 11 and 14, 1997, and were indignantly surprised at finding that the shallow lake at the bottom of the main gallery was completely dried up in the lapse of six years and a half, no doubt due to the air current resulting from the excavation of an artificial tunnel for commercialization. That lake was surrounded by walls crusted with flowstone and had many wet columns and large stalagmites, on one of which were found the type specimens of *Sinaphaenops mirabilissimus*.

The cave had two openings on the opposite sides of a small rocky peak, and the larger one above the small village Laguan was used as the main entrance. From there, the floor steeply slanted down to the bottom room with high ceiling and then very steeply sloped upwards to the smaller opening through a narrow winding passage. The gap in floor levels between the main entrance and the bottom lake was about 30 m. When the cave was open for tourists, a horizontal straight tunnel with an artificial entrance of the size a little larger than human height was excavated from near the smaller entrance, inadvertently making the ceiling leveller than before. This seems to have caused continuous air current through the cave, which took away the vapour from the bottom lake. Most probably for this drought, we were unable to find any additional specimens of the trechine beetle, and baited traps set around the former bottom lake

did not attract any specimen, either. It may still survive somewhere in inaccessible recesses below the lake level, but may not appear in the main gallery except in very wet seasons.

Incidentally, the location of the cave “at Maolan” given in the original description (p. 134) is not correct. It is true that the cave lies near the edge of the Maolan National Reserve but is widely distant from the village Maolan. Its correct location is as given above.

要 約

上野俊一・冉景丞：*Sinaphaenops*属のアシナガメクラチビゴミムシ類。——中国贵州省荔波県の石灰洞からアシナガメクラチビゴミムシの2新種を記載し、永康多白岩の拉梭洞のものに *Sinaphaenops wangorum* S. UÉNO et RAN, 玉屏鎮水浦村水拔寨の水拔水洞のものに *S. gracilior* S. UÉNO et RAN という新名を与えた。どちらも同じように、基準種の *S. mirabilissimus* S. UÉNO et F. WANG よりも体形が細いが、雄交尾器の形状は両者のあいだでいちじるしく異なり、*S. gracilior* のほうが基準種のものに似た雄交尾器をもつものに対して、*S. wangorum* の雄交尾器は図示したように特異である。また、この種では、チビゴミムシとしては例外的に、眼上毛の後方の1対がなくなっている。なお、基準種の基準産地である天钟洞の所在地を、瑤山多拉关の上と訂正し、洞内の生息場所が観光開発によって破壊された結果、この種が幻の虫となってしまったことを報告した。

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