

New cave-dwelling Trechids of *Kurasawatrechus*-Group
(Coleoptera, Harpalidae)¹⁾

By

Shun-Ichi UENO

Zoological Institute, College of Science, University of Kyoto

(Received Oct. 16, 1956)

At the northern part of the Suzuka mountain range, there is a limestone area called "Ohmi Karst." The area is split up into a number of ridges by several valley systems, some of which lose water beneath the ground, forming limestone caves. Seven those caves are hitherto known to be accessible, and one of them, called "Kawachi-no-kaza-ana," is well known among natives since more than one hundred years. On the other hand, Samé-no-kô-mori-ana Cave, also one of the limestone caves in this area, contained fossil and archaeological deposits and was examined by the specialists of those fields at many times.

Biological surveys, however, began more recently. Prof. Riozo YOSII of Kyoto University is the biologist who made a survey in Kawachi-no-kaza-ana Cave for the first time on October 20th, 1938. Five years later, on December 14th and 15th, 1943, Prof. Hajime TORII of Saitama University examined Samé-no-kô-mori-ana Cave and collected several cave animals. The writer himself explored these two caves for the first time on May 7th, 1950, and succeeded to obtain many cave animals, but his endeavour was vain to find cave trechids. Since that time, these caves have been surveyed repeatedly by several biologists.

On his second visit to these caves made in May of 1952, the writer was able to obtain two individuals of a troglobiontic trechid in Kawachi-no-kaza-ana Cave. This trechid is striking in its appearance, having long antennae, slender legs and regularly elliptical elytra. It is quite dissimilar to any of trechids hitherto known from Japan, though it belongs evidently to *Kurasawatrechus*-group. The writer wishes to give it a new generic name *Ishidatrechus* in honour of Mr. ISHIDA, who assisted the writer in the survey.

In 1955, many notable collections were brought from these caves, thanks largely to the efforts of Mr. Naomasa KOBAYASHI. The collections involve many new animals, which belong to such diverse genera as *Akiyoshia* (a minute aquatic mollusk), *Spelaeochthonius* (a pseudoscorpion), *Grylloblatta*, *Trechiamia*, *Ishidatrechus*, *Pterostichus*, a new troglobiontic genus of liodid, and so on. The dis-

¹⁾ Contribution No. 1 from the Spelaeological Society of Japan.

covery of the second species of *Ishidatrechus* in Samé-no-kô-mori-ana Cave was not expected, because the cave was supposed to be carefully examined before that time.

In the present paper are described the new genus *Ishidatrechus* and the two new species, *I. nitidus* and *I. kobayashii*, which may belong to two different subgenera.

The writer wishes to express his hearty thanks to Prof. Kenji NAKAMURA for his continuous encouragement and to Messrs. Hiroshi ISHIDA of Hyogo Agricultural College and Naomasa KOBAYASHI of our Institute for their enthusiastic collaboration rendered at field works.

Genus *Ishidatrechus* S. UÉNO, gen. nov.

Type-species: *Ishidatrechus nitidus* S. UÉNO, sp. nov.

Apterous. Body convex and rather sparsely pubescent; depigmented; colour reddish brown, translucent when alive.

Head with entire frontal furrows which are deepening before middle and not angulate; eyes absent; genae pubescent and more or less convex; two supraorbital pores present. Labrum transverse, deeply emarginate and sexsetose. Mandibles slender, bidentate, with apices slightly hooked. Mentum fused with submentum, with epilobes extending beyond lateral lobes; mentum tooth porrect, bifid in *Ishidatrechus* (s. str.), simple in *Suzuka*; submentum provided with a transverse row of eight setae in *Ishidatrechus* (s. str.), of six setae (rarely seven) in *Suzuka*; ligula octosetose, two long setae at middle and three shorter ones on each side; paraglossae narrow, extending well beyond ligula. Palpi fairly slender in *Ishidatrechus* (s. str.), rather thick in *Suzuka*, with apical segments slender and tapering towards the blunt tips; penultimate segment asetose in maxillary palpus, inwardly bisetose in labial palpus. Antennae subfiliform in *Ishidatrechus* (s. str.), submoniliform in *Suzuka*, densely pubescent from segment 2; segment 3 much longer than segment 2 in the former, only a little longer than segment 2 in the latter.

Pronotum convex, cordate or subcordate; lateral sides bordered and reflexed, gently rounded in front and distinctly sinuate behind; present both lateral and postangular setae, the latter of which is removed forwards; in *Suzuka*, propleura expanding outwards together with pro-episterna and evidently visible from above; front angles well produced forwards and more or less acute, hind angles sharp and salient; median line deeply impressed, not reaching apex.

Elytra fused together, oval and convex, with a transverse furrow on basal peduncle; scutellum invisible; shoulders effaced; lateral sides regularly rounded and hardly emarginate before apices, which are not angulate; lateral borders ciliated; striae more or less obliterated, scutellar striole absent; apical striole obliterated in *Ishidatrechus* (s. str.), present and apparently directed to the site

of stria 5 in *Suzuka*, two setiferous dorsal pores present on the site of stria 3, scutellar pore large, preapical pore more apart from apex than from suture. Humeral group of umbilicate pores irregular and not aggregated; the first pore removed backwards and close to the second pore, adjoining marginal gutter in *Ishidatrechus* (s. str.), distant from marginal gutter in *Suzuka*; the second, third and fourth pores ranged nearly equidistantly.

Sternites glabrous in *Ishidatrechus* (s. str.), sparsely pubescent on median parts in *Suzuka*; anal sternite with one seta in ♂, two in ♀ on each side.

Legs long and slender in *Ishidatrechus* (s. str.), rather short in *Suzuka*; protibiae without external groove and entirely pubescent; in ♂, protarsal segments 1 and 2 dilated, inwardly produced at apices and provided beneath with sexual adhesive appendages.

Male genital organ small. Aedeagus either elongate and slender (*Ishidatrechus* s. str.) or short and robust (*Suzuka*), with basal part arcuate towards ventral side; apex more or less produced; basal orifice small in *Ishidatrechus* (s. str.), very large in *Suzuka*; sagittal aileron present, though very small in *I. kobayashii*. Inner sac armed with a well developed copulatory piece, which is simple at apex and is placed at the right side inside the sac with the convex face leaning against the right wall; in *I. kobayashii*, a large group of well chitinized teeth or scales present at the left side inside the sac. Styles not very long, each provided at apex with four setae in *Ishidatrechus* (s. str.), with five setae in *Suzuka*.

The present new genus is, no doubt, a close relative of *Kurasawatrechus*, though the appearance is markedly different from the latter. The chief differences between these two genera are found in the structure of the pronotal hind angles, in the position of the postangular setae on pronotum and in the arrangement of the humeral group of umbilicate pores on elytra. In *Ishidatrechus*, the pronotal hind angles are sharp and salient, the postangular setae are removed forwards and distant from the hind angles, and the humeral umbilicate series is irregular and not aggregated. In *Kurasawatrechus*, however, the pronotal hind angles are nearly rectangular, the postangular setae placed on the angles, and the humeral umbilicate series is regular and aggregated.

Some words should be necessary on the validity of the genus *Kurasawatrechus*. JEANNEL (1953, Notes Biospéol., 8, p. 129) considered that *Kurasawatrechus* may be synonymous with the genus *Pseudanophthalmus* of the United States of America, and stated "Le genre *Kurasawatrechus*, du Japon, appartient à la même série phylétique (de *Trechoblemus*) et est même si voisin de *Pseudanophthalmus* qu'on est en droit de se demander s'il mérite d'être retenu comme genre distinct". CHAPPUIS (1955, Notes Biospéol., 10, p. 168) referred to this JEANNEL's opinion. However, *Kurasawatrechus* differs from the North American genus in some important features: the scutellum is invisible, the postangular setae on pronotum are not

removed forwards, the apical striole on elytra joins with fifth stria and not with third, the third and fourth pores of the humeral umbilicate series adjoin the marginal gutter. The structure of the scutellum and of the apical striole, the fusion of labium and the number of the setae on submentum are the features characteristic of *Kurasawatrechus* and its allies, which may belong not to the phyletic series of *Trechoblemus* but to an independent one.

Ishidatrechus may be divided into two subgenera on account of the characters given below. It is surprising that two species of the cavernicolous trechids, belonging to the same genus, are found in two limestone caves, which are situated on the same massif and are distant only 5 km each other, and yet attain subgeneric rank in the difference between them. However, among the characteristics to discriminate the subgenera, two features are particularly striking, i. e. the difference in the structure of mentum tooth and in the number of setae on the submentum. Such differences are usually used with generic rank.

Key to the subgenera

- 1 (2) Mentum tooth bifid, submentum with a transverse row of eight setae; first one of the humeral group of umbilicate pores adjoining marginal gutter; both apical striole and apical carina obsolete; aedeagus elongate and slender, with small basal orifice; each style with four apical setae; (type-species: *Ishidatrechus nitidus* S. UÉNO, sp. nov.) *Ishidatrechus* s. str.
- 2 (1) Mentum tooth simple, submentum with a transverse row of six setae (rarely seven); first one of the humeral group of umbilicate pores removed backwards and distant from marginal gutter; both apical striole and apical carina present; aedeagus short and robust, with very large basal orifice; each style with five apical setae; (type-species: *Ishidatrechus kobayashii* S. UÉNO, sp. nov.)..... **Suzuka** S. UÉNO, subgen. nov.

Ishidatrechus (s. str.) **nitidus** S. UÉNO, sp. nov.

Ishidatrechus nitidus S. UÉNO, 1953 (in litt.), Shin Konchû, Tokyo, 6 (11), p. 45, fig. 4 (lower left).

Length: 3.9–4.3 mm (from front margin of clypeus to anal end).

Colour reddish brown, shiny, palpi and basal segment of antennae yellowish brown; antennae becoming paler towards apices; sternites somewhat paler than the rest of body.

Head subquadrate, with frontal furrows deep especially before middle; both front and supraorbital areas convex, vertex sparsely pubescent; genae slightly convex, with rather long pubescence; microsculpture composed of well impressed

reticulation; mandibles fairly long and slender; mentum tooth porrect, wide and evidently bifid at apex; palpi fairly slender, penultimate segment dilated towards apex and a little shorter than apical segment in maxillary palpus, almost as long as or a little longer than apical segment in labial palpus. Antennae subfiliform and slender, a little longer in ♂ than in ♀, i. e. reaching the middle of elytra in ♂ and basal four-ninths of that in ♀; segment 2 shortest, about three-fifths as long as segment 3 which is obviously longer than segment 4, segment 11 shorter than segment 3 but longer than segment 4.

Pronotum subcordate and convex, covered with long suberect pubescence, about 1.4 times wider than head and a little wider than long in ♂ (somewhat wider in ♀ than in ♂), widest at about three-fourths from base; lateral sides gently rounded in front, sinuate at about basal one-fourth in ♂, at about basal one-fifth in ♀, the sinuation deeper in ♀ than in ♂; lateral gutters narrow at middle and widening both in front and behind; lateral seta placed at about five-sixths from base in ♂, at about four-fifths from base in ♀; apex almost straight or slightly emarginate, distinctly wider than base, which is about seven-eighths as wide as apex and bisinuate (i. e., emarginate on each side, with the median part more or less produced backwards); front angles porrect and subangulate at the extremities, hind angles acute, projecting slightly outwards and much backwards; median line deep, front transverse impression shallow and somewhat wrinkled,

basal transverse impression shallow, merging on each side into basal fovea, which is large, deep and more or less uneven; no postangular carina present; apical area rugose, surface with vague transverse striations; microsculpture composed

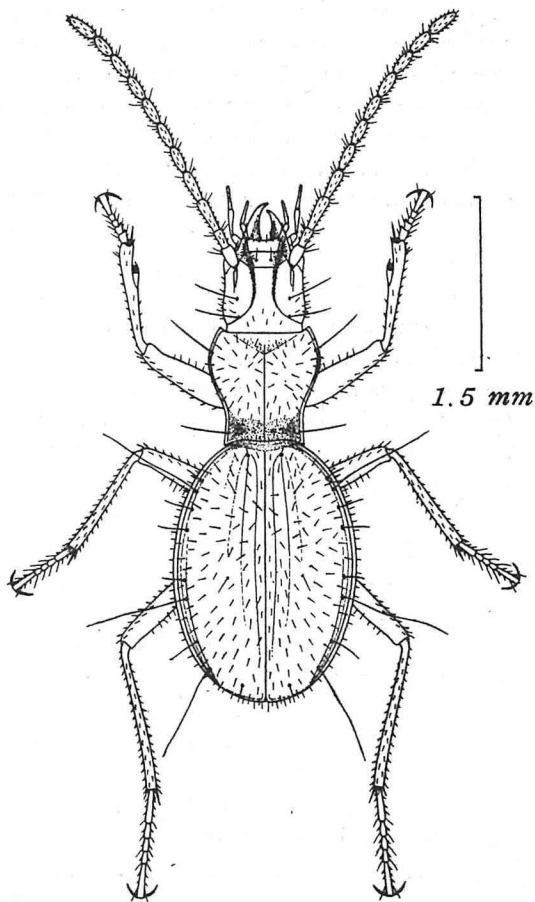


Fig. 1. *Ishidatrechus* (s. str.) *nitidus* S. UÉNO, gen. et sp. nov., ♂, of Kawachi-no-kazana Cave.

of wide meshes though not sharply impressed.

Elytra oval and well convex, covered with erect pubescence, 1.65 times wider than pronotum in ♂, 1.55 times wider than pronotum in ♀, nearly 1.4 times longer than wide, widest at about middle; lateral sides regularly rounded from basal peduncle to apices, with marginal gutters rather wide; striae vestigial, except stria 1 which is moderately impressed, striae 2 and 3 partly visible, stria 8 rudimentary though perceptible on apical half; setiferous dorsal pores small and somewhat difficult to perceive, the first pore placed at one-sixth to one-fifth from base, and the second at three-sevenths from base to the middle; all four pores of the humeral umbilicate series adjoining marginal gutter, the distance between the first and second pores smaller than that between the second and third; microsculpture formed by irregular lines but rather indistinct.

Ventral surface glabrous, except the median area of prosternum, which is sparsely pubescent; each sternite with one to three setae on each side of median line. Legs long and slender; protibiae slightly bowed, meso- and metatibiae slender.

Male genital organ small and rather weakly chitinized. Aedeagus tubular, elongate and slender, with basal part arcuate towards ventral side; apex rounded; ventral side almost straight at middle and slightly emarginate; sagittal aileron large and hyaline. Inner sac scaly, though the scales not remarkably chitinized; copulatory piece spatulate, elongate and somewhat triangular, placed at the right side inside the sac. Styles fairly slender, left style longer than right style, each provided with four long apical setae.

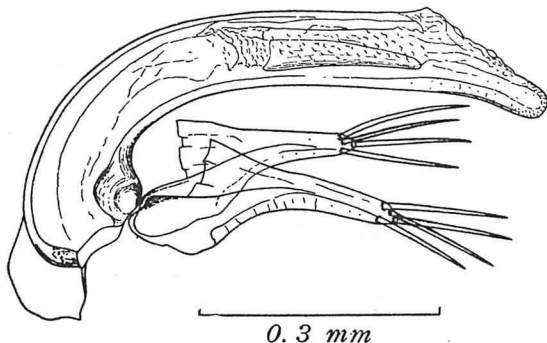


Fig. 2. Male genital organ of *Ishidatrechus nitidus* gen. et sp. nov., of Kawachi-no-kaza-ana Cave; left lateral view.

Holotype: ♂, allotype: ♀ (25-V-1952, collected by S. UÉNO and preserved in his collection).

Type-locality: A limestone cave called "Kawachi-no-kaza-ana", at Seritani, Taga-chô, Shiga Prefecture in Honshu.

A couple of individuals of this remarkable new species were obtained only once on May 25th, 1952, at the depth of the cave "Kawachi-no-kaza-ana". They were found at the bottom of a

heap of rocks fallen from the ceiling, and were not very active. No other cave beetle appeared to dwell in the same habitat with this species. Such cavernicolous beetles as *Trechiana* (sp. nov.) and *Catops ohbayashii* seem to occupy

some other places in the cave as their habitats. The trechid seems to be extremely rare. The writer and his colleagues have endeavoured to obtain some additional specimens of this remarkable beetle, but all their efforts have come to nothing.

Kawachi-no-kaza-ana Cave is open at the side of a ridge under an outcrop of limestone. From the small entrance, a steep slope of silt falls down into a vast chamber, where there is a rapid spouting out beneath a heap of debris, running through the bottom of the chamber and disappearing into a crevice of limestone. Beyond the rapid, the floor turned gently upwards to the innermost. There is found a good deal of vegetable debris on the first slope. The dark zone of the cave is, however, covered largely with rocks fallen from the high ceiling, and is oligotrophic. The habitat of the present trechid is one of the most humid parts in the cave but is scanty of organic matters.

Besides the trechid, many species of cave animals are found in Kawachi-no-kaza-ana Cave, though the number of individuals of each species is usually small. They are: an aquatic gastropod (*Akiyoshia* sp., new to science), a mite, several arachnids, a pseudoscorpion (*Spelaeochthonius* sp., new to science), an amphipod (*Pseudocrangonyx* sp.), a chilopod, two diplopods (*Epanerchodus* sp. and *Antrokoreana uénoi* HAGA) five springtails (*Anurida assimilis* YOSII, *Lobella similis* YOSII, *Onychiurus uénoi* YOSII, *Plutomurus suzukaensis* (YOSII) and *Sinella spinidentata* YOSII), a cricket, a trechid (*Trechiana* sp., new to science), a catopid (*Catops ohbayashii* JEANNEL), and so on. Troglonous species, such as *Mirus reinianus* (KOBELT), *Epanerchodus obliquitruncatus* TAKAKUWA, etc., are also frequently found at the twilight zone.

***Ishidatrechus* (*Suzuka*) *kobayashii* S. UÉNO, sp. nov.**

Length: 2.6–3.0 mm (from front margin of clypeus to anal end).

Colour pale reddish brown, shiny, antennae (becoming paler towards apices) and ventral side of hind body paler than the rest of body; palpi and legs pale.

Head large and wide, rather flat on dorsal side, frontal furrows deepening and widening in front; median line of front forming an obtuse carina, supraorbital areas moderately convex, vertex with a few pubescence; genae convex and sparsely pubescent; microsculpture composed of well impressed reticulation; mandibles slender; mentum tooth subtriangular and well produced, with the simple extremity; palpi rather stout, with apical segments slender, penultimate segments swelling out towards apices and almost as long as apical segments in both maxillary and labial palpi, ante-penultimate segment of maxillary palpus tumid at middle. Antennae submoniliform and fairly stout, reaching basal one-fourth of elytra; segment 2 a little shorter than segment 3 and almost as long as segment 9 or segment 10, segment 4 shorter than segment 3 but still longer than segment 2, segment 11

longest.

Pronotum cordate and well convex, covered with suberect pubescence, nearly 1.3 times wider than head, fully 1.1 times wider than long (the ratios variable to some extent according to individuals), widest at about four-fifths from base; lateral sides moderately rounded in front, distinctly and widely sinuate at about one-fifth from base; lateral gutters narrow, almost obsolete at middle; lateral seta

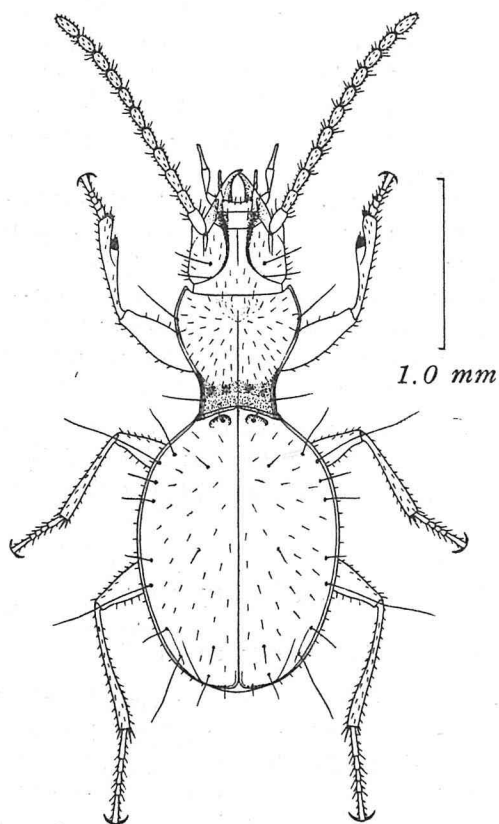


Fig. 3. *Ishidatrechus (Suzuka) kobayashii*
S. UENO, subgen. et sp. nov., ♂,
of Samé-no-kômorî-ana Cave.

located at the widest part; the expansion of ventro-lateral sides obviously visible from above; apex widely emarginate, much wider than base, which is two-thirds to three-fourths of the width of apex according to individuals and deeply emarginate; front angles small, though well advanced and acute, hind angles large and sharp, projecting slightly outwards and strongly backwards; median line deep, front transverse impression obsolete; basal area transversely depressed and rugose, present no distinct basal transverse impression nor basal foveae, though the depression bisected by a transverse ridge which is obtuse and arcuate; microsculpture almost obliterated.

Elytra oval and well convex, with pubescence short, erect and sparse; 1.5–1.6 times wider than pronotum, fully 1.4 times longer than wide (the ratio somewhat variable according to individuals), widest at about or a little before middle; lateral sides gently rounded at middle and rather strongly near apices, which are rounded and separated from one another by a

small re-entrant angle; marginal gutters narrow throughout; striae obliterated, merely stria 8 perceptible as a vestige between apical two umbilicate pores of the marginal series; apical striole shallow but distinct, apical carina obtuse; two distinct dorsal pores present on the site of stria 3 at about basal one-fifth and middle respectively, scutellar pore situated in a deep transverse fovea;

the first pore of the humeral umbilicate series removed backwards and distant from marginal gutter, the third and fourth pores also distant from marginal gutter; microsculpture vanished.

Ventral surface sparsely pubescent except lateral areas; each sternite with one seta (rarely two) on each side of median line. Legs rather short but fairly slender; protibiae slightly bowed, meso- and metatibiae dilated and somewhat compressed near apices.

Male genital organ small and rather weakly chitinized. Aedeagus short, robust and moderately arcuate, somewhat turned to right at apex, which is produced into a short snout in profile and is widely rounded in dorsal aspect; basal part large, with very small sagittal aileron; basal orifice so remarkably large as to form a bell-shaped mouth, with lateral sides not emarginate; ventral side regularly but not deeply concave. Inner sac armed with a large copulatory piece and a large group of teeth or scales; copulatory piece spatulate, placed at the right side inside the sac, with ventral side widely emarginate, apex blunt and situated on the prolongation of ventral border; the group of teeth or scales placed at the left side and twisted around copulatory piece from dorso-proximal to ventro-apical. Styles rather short and wide, left style longer and somewhat wider than right one, each provided with five setae at apex.

Holotype: ♂, allotype: ♀ (5-VIII-1955, collected by N. KOBAYASHI). Paratypes: 2 ♂♂ (25-VI-1955, by S. UÉNO and N. KOBAYASHI); 1 ♂ (5-VIII-1955, by N. KOBAYASHI); 1 ♂, 1 ♀ (4-XII-1955, by S. UÉNO and N. KOBAYASHI).

The type-specimens are deposited in the writer's collection.

Type-locality: A limestone cave called "Samé-no-kômoriana", at Samé, Taga-chô, Shiga Prefecture in Honshu.

Samé-no-kômoriana Cave is situated on the left side of the River Inukami-gawa, about 5 km south of Kawachi-no-kaza-ana Cave and about 10 km south-east of Hikoné. The mouth of the cave is open on a cliff about 27 m above water of the ravine. The cave itself is not very large, distinctly smaller than Kawachi-no-kaza-ana Cave and 100-odd m in the depth of the main gallery, which rises gradually from the entrance to the innermost. The large part of the floor is cluttered with rocks, though there are silty places, several

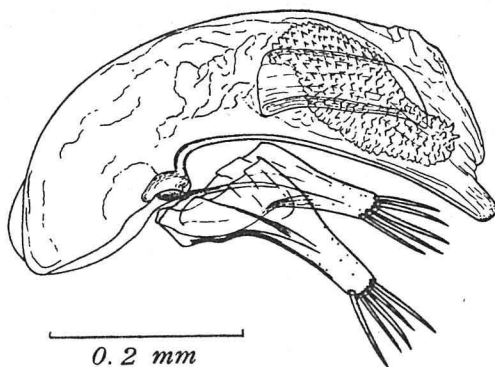


Fig. 4. Male genital organ of *Ishidatrechus kobayashii* sp. nov., of Samé-no-kômoriana Cave; left lateral view.

pools and stalagmitic beds in the depth of the grotto. Organic matters are fairly rich, decayed wood and bats' guano being found plentifully.

At about 30 m from the entrance, there is a small basin which is covered with fragments of rocks and is always wet fed by trickling water. This place, noticed by KOBAYASHI for the first time, is only a known habitat of the new trechid. Not so far from the opening as the place is, even the last glimmer of daylight does not reach there, due to a thick row of columns and the winding corridor near the entrance. The beetle is not very active and is usually found walking on the underside of fragments of rocks.

Like Kawachi-no-kaza-ana Cave, Samé-no-kô-mori-ana Cave is also rich in the fauna. True cave-dwellers obtained in this grotto are as follows: a gastropod (*Cavernacmella kuzuensis* (SUZUKI)), a mite, several arachnids, a pseudoscorpion (*Spelaeochthonius* sp., new to science), an amphipod (*Pseudocrangonyx* sp.), a chilopod, three diplopods (*Epanerchodus ishidai* HAGA, *Epanerchodus* sp. and *Antrokoreana uénoi* HAGA), five springtails (*Hypogastrura communis exilis* YOSHII, *Coecoloba lobella* (YOSHII), *Onychiurus uénoi* YOSHII, *Plutomurus suzukaensis* (YOSHII) and *Sinella spinidentata* YOSHII), a cricket, a notopterid (*Grylloblatta* sp., new to science), the present new trechid, a pterostichid (*Pterostichus* sp., new to science), a catopid (*Catops ohbayashii* JEANNEL), and so on. Three cave animals, *Antrokoreana uénoi*, *Coecoloba lobella* and *Catops ohbayashii*, are especially abundant on the amount of guano. Some troglloxenous species, e. g. *Megalophaedusa martensi* (v. MARTENS), *Ligidium japonicum* VERHOEFF, *Folsomia octoculata* HANDSCHIN, *Elaphe conspiciolata* (BOIE), etc., are also known from the twilight zone of the cave.