

## A New Species-complex of the Genus *Trechiana* (Coleoptera, Trechinae), with Descriptions of Three New Taxa<sup>1)</sup>

By

**Shun-Ichi UÉNO**

Department of Zoology, National Science Museum, Tokyo

### Introduction

Late in the autumn of 1978, Mr. Tetsuo KAWASAWA picked up a hind body of a trechine beetle while investigating the fauna of a schist cave at the northern part of central Shikoku, Southwest Japan. As no anophthalmic trechines had theretofore been known in that area, he at once submitted his finding to me for examination. It looked like a *Trechiana* at a glance, but its elytral chaetotaxy showed a pattern slightly different from the usual setal arrangement of the genus. At that time, only four species of *Trechiana* were known in the island, that is, *T. instabilis* S. UÉNO (1981, p. 12, figs. 1–3), *T. satoui* S. UÉNO (1975, p. 204, figs. 1–3), *T. chikaichii* S. UÉNO (1957, p. 179, figs. 2–3) and *T. kawanoi* S. UÉNO (1975, p. 207). Since all these species were recorded from the northeastern area of Shikoku and since the greater part of the island was known to be inhabited by other genera of anophthalmic trechines, it was difficult to determine immediately the true affinity of the trechine remains.

The schist cave, called Ôyamasama-no-ana, lies on the northwestern slope of Mt. Shiozuka-miné in the Dôzan-gawa drainage. Being small and open at two ends, it was subject to a considerable climatic fluctuation. Even its deepest portion was cold and dry through the winter and spring, and the whole cave was dripping wet through the summer and autumn. Diurnal change of temperature was also substantial as the cave is located at rather a high spot (about 630 m above sea-level). Besides, the floor was largely rugged being formed by rocks choked in a crack. Accordingly, the fauna was not abundant if not actually poor. In view of this unfavourable situation, we almost gave up pursuing our investigation and decided to look for the trechine in nearby cavities.

However, this decision was soon proved wrong. We did succeed in finding out two new localities of an anophthalmic trechine beetle; one was an abandoned adit of a copper mine about 2 km to the west by south of the schist cave, and the other was a prospecting adit about 2.6 km to the northeast of the cave. They harboured the same species of *Trechiana* already described under the name of *T. fujiwaraorum* (UÉNO, 1981, p. 15, figs. 4–6), which was greatly different from the hind body of the trechine discovered in the schist cave.

1) This study is supported in part by the Grant-in-aid for Scientific Research No. 00434039 from the Ministry of Education, Science and Culture, Japan.

Thus, it became evident that some perfect specimens from the Ôyamasama-no-ana population were requisite for clarifying the identity of the trechine remains. The only way to ensure a successful result seemed to be an improvement of habitat condition in the cave, and therefore, we made it blind by closing the smaller opening (a skylight hole) with blocks and soil, built several small platforms with clay, and brought in various organic material, especially straw-mats. At the same time, baited traps were set continuously to attract the beetle. Our attempt soon brought about the desired effect on the environment, and only five months after the operation, seven individuals of the trechine were found gathering under a decayed straw-mat placed on a muddy platform under the closed skylight hole. This collection enabled me to ascertain that the species was not only new to science but held a much isolated position in the group of *Trechiana chikaichii*.

In the meantime, a dead body of a trechine beetle very similar to the new species under consideration was found by Mr. Shinzaburo SONE in another schist cave about 20.5 km to the south by west of Ôyamasama-no-ana Cave. This was most unexpected, as the cave, called Sarugataki-dô, had been investigated many times by several bio-speologists but had never yielded trechines before. Very unfortunately, the environmental condition was still worse in this cave than in Ôyamasama-no-ana, and repeated searches brought forth only a trechine larva in middle stage. In this spring, however, a male specimen in a perfect condition, which was apparently identical with the dead one, was obtained from the upper hypogean zone of the same hill that the schist cave lies. It proved to differ strikingly in genitalic structure from the northern species, though very similar to the latter in external morphology and doubtless belonging to the same group. More recently, a male specimen of the *Trechiana* was at last taken by Mr. Toshiki MOHRI at the same spot in Sarugataki-dô Cave as the dead body had been found, and the specific identity of the cave population was confirmed beyond all doubt.

A year before the clarification of the systematic status of the southern species, another habitat of the same group of trechine beetle was discovered in an abandoned adit of a copper mine lying between the two schist caves, about 15.3 km to the south by west of Ôyamasama-no-ana Cave and about 5.4 km to the north by west of Sarugataki-dô Cave. At first sight, it looked different from either of the two species in the configuration of prothorax and elytra, but a careful examination of its male genitalia revealed that the trechine should be conspecific with the northern species. This was not expected, as the mine adit is geographically much nearer to the latter than to the former though topographically separated from the latter by the main course of the Yoshinogawa River. In view of certain peculiarities in both the external and genitalic characters, this trechine seems better to be regarded as an isolated geographical race. Unfortunately, no more specimens from the type population of this new subspecies are obtainable at present because of the subsequent collapse of the adit.

In the present paper, I am going to describe these new species and subspecies. As was delineated at some length in the foregoing paragraphs, all of them are very difficult

to obtain by ordinary means. However, it is important to introduce them into science, because they form a peculiar species-complex in the group of *Trechiamia chikaichii* and delimit the southwestern periphery of the range of generic distribution in the Japanese Islands. The location of the two schist caves and the mine adit is indicated on the sketch map inserted in a previous paper of mine (cf. fig. 55 in UÉNO, 1982, p. 63; three squares ranging along the right-hand edge: Sarugataki-dô Cave, Kamizeki Mine and Ôyamasama-no-ana Cave from below). The abbreviations used in this article are the same as those explained in other papers of mine.

*Trechiamia* (s. str.) *cornutus cornutus* S. UÉNO, sp. et subsp. nov.

[Japanese name: Ôyama-mekura-chibigomimushi]

(Figs. 1–4)

Length: 4.85–5.80 mm (from apical margin of clypeus to apices of elytra).

Externally similar to *T. kawanoi* S. UÉNO (1975, p. 207) of the Akui-gawa drainage, but the fore body is larger, the antennae are stouter, the prothorax is obviously broader at base, the elytra are more strongly convex in apical two-thirds and have less oblique prehumeral borders, and the legs are shorter and stouter.

Medium-sized species of elongate body form, with fairly large fore body and relatively stout appendages; depigmented and anophthalmic; inner wings absent. Colour reddish brown, shiny, faintly iridescent on elytra; palpi, scape and apical half of antennae, ventral surface of hind body, and legs yellowish brown to light reddish brown.

Head quadrate, slightly wider than long, and depressed above; frontal furrows deep, entire, not angulate at middle, and rather gradually divergent in front and behind; frons and supraorbital areas gently convex; microsculpture distinct, largely consisting of wide meshes but partially of isodiametric ones; genae either flat or very weakly convex except for the posterior parts; labrum deeply emarginate at apex, which is distinctly bisinuate with porrect central portion; mandibles fairly stout and rather weakly arcuate; mentum tooth porrect and sharply bifid; palpi slender; antennae fairly long, reaching apical third of elytra, with segment 2 about four-sevenths as long as segment 3 or 4, segments 8–10 cylindrical, each about 3.5 times as long as wide, terminal segment about as long as segment 7, longer but obviously narrower than scape.

Pronotum subcordate, much wider than head, usually somewhat wider than long, widest at about two-thirds from base, and a little more roundly contracted in front than behind, with long ample basal part; PW/HW 1.47–1.55 (M 1.51), PW/PL 1.00–1.08 (M 1.03), PW/PA 1.47–1.59 (M 1.54), PW/PB 1.28–1.40 (M 1.34); surface convex, with a shallow longitudinal depression on each side before the widest part; microsculpture formed by fine irregular transverse lines though partially obliterated; sides entirely bordered though the borders become finer between the middle and the ante-basal sinuation, rather strongly arcuate in front, almost straight at middle, distinctly sinuate at about one-fifth from base, and then more or less divergent towards hind angles, which are acute and produced more backwards than outwards; two marginal setae present,

the posterior one being widely distant from hind angle; apex either slightly emarginate or straight at middle, with front angles narrowly rounded and slightly produced; base wider than apex and widely emarginate, PB/PA 1.10–1.21 (M 1.15); median line distinct, widening in basal area; apical transverse impression indistinct, somewhat wrinkled; basal transverse impression deep, continuous, with a longitudinal foveole on each side of median line, and laterally merging into basal foveae, which are fairly large and deep, and extend antero-laterally; postangular carinae usually distinct, sometimes very obtuse; basal area more or less uneven.

Elytra oblong-oval, evidently wider than prothorax, widest at about middle, and equally narrowed towards bases and towards apices, with a transverse depression on basal peduncle for receiving pronotal base; EW/PW 1.54–1.61 (M 1.58), EL/EW 1.56–1.63 (M 1.60); surface rather strongly convex, especially in apical two-thirds, but depressed in basal area inside interval 5; microsculpture formed by fine transverse lines though not very sharp; shoulders distinct though very obtuse, with prehumeral borders oblique and almost straight; sides rather widely reflexed before middle, either straight or very slightly emarginate behind shoulders, gently arcuate at middle, less so behind, and slightly emarginate before rounded apices, which form a small re-entrant angle at suture; striae almost entire except for stria 8 though shallow, indistinctly crenulate, moderately impressed on the disc but becoming shallower at the side, striae 1–5 more or less deepening near base, 8 deeply impressed in apical half but very fine and nearly obsolete before the fifth pore of the marginal umbilicate series; scutellar striole very short though distinct; apical striole also short, deep, feebly curved in front and directed to stria 5; intervals flat even on the disc, apical carina salient though obtuse; stria 3 with a single setiferous dorsal pore at  $2/7$ – $3/8$  (usually  $1/3$ ) from base, proximal pore always missing though in one of the male paratypes, there exists a second pore on the left elytron at about  $3/5$  from base; stria 5 with two setiferous dorsal pores at  $1/8$ – $1/7$  and  $1/2$ – $2/3$  (usually  $4/7$ ) from base respectively; preapical pore present at the apical anastomosis of striae 2 and 3 within the field of apical striole; humeral set of marginal umbilicate pores not constantly aggregated, the four pores being ranged equidistantly along the marginal gutter in many specimens examined but the fourth pore is rather frequently isolated from the anterior three.

Ventral surface smooth; anal sternite provided with a pair of marginal setae in ♂, with two pair of them in ♀. Legs long though fairly stout; protibiae straight, gently dilated towards apices, longitudinally grooved on the external face, and entirely glabrous on the anterior face; tarsi relatively thick, protarsal segments 1 and 2 in ♂ widely dilated, stoutly produced inwards at apices and furnished beneath with adhesive appendages.

Male genital organ fairly large, robust and heavily sclerotized. Aedeagus about two-fifths as long as elytra (about three-tenths as long as elytra excluding apical lobe), gently arcuate, and abruptly narrowed at the apical part of apical orifice, with very long and slender apical lobe, which is abaxial to the left, gently curved ventrad, and longitudinally concave on the dorsal side in apical half; basal part elongate, not particularly

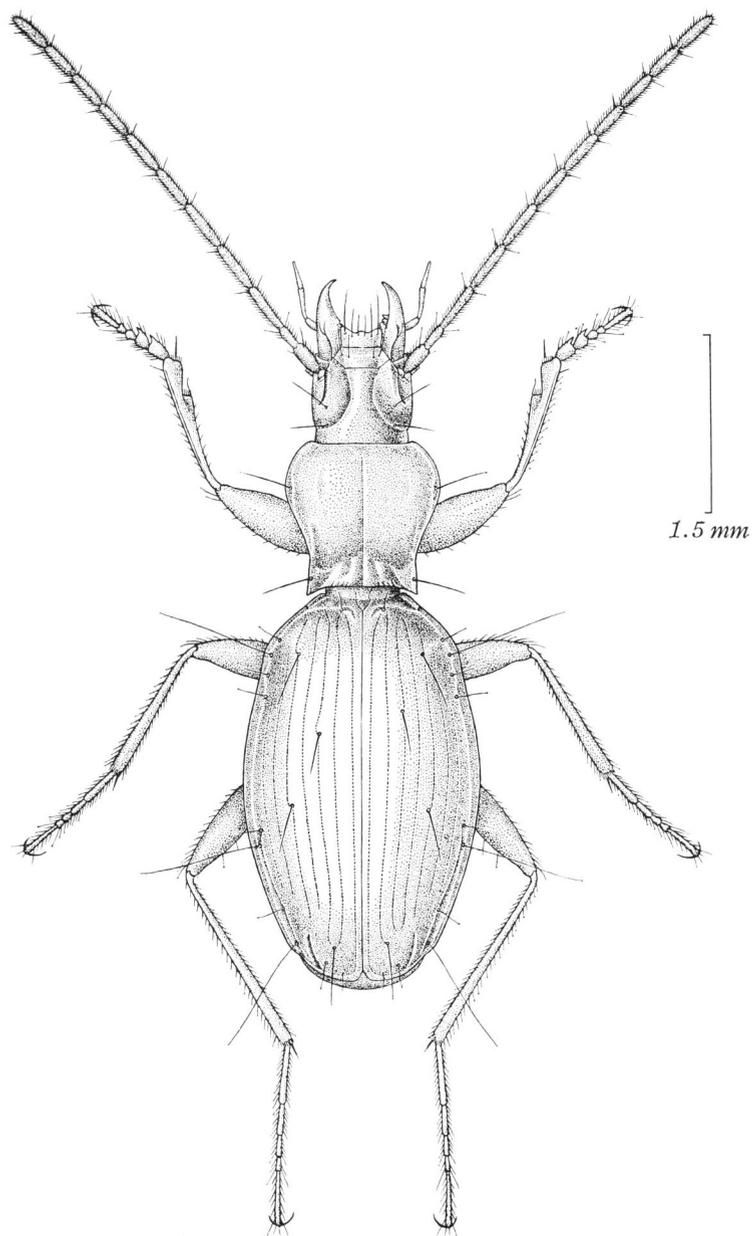


Fig. 1. *Trechiana* (s. str.) *cornutus cornutus* S. UÉNO, sp. et subsp. nov., ♂, from Ôyamasama-no-ana Cave in Shingû-mura.

curved ventrad, with fairly large basal orifice deeply emarginate at the sides; sagittal aileron present though small; viewed dorsally, apical lobe narrow, almost straight or very slightly curved to the left, gradually narrowed from behind middle, and pointed at the extremity; viewed laterally, apical lobe slightly widened at the median part, slightly turned up just before apex, and ventrally curved again at the narrow terminal portion; ventral margin widely emarginate at middle in profile. Inner sac armed with a very large, peculiarly shaped copulatory piece and two patches of sclerotized teeth; apical teeth-patch small, consisting of small teeth and lying at the medio-dorsal part of inner sac just inside apical orifice; proximal teeth-patch much larger than the apical, consisting of larger teeth, covering the left face of the basal half of left apical lobe of copulatory piece, proximally extending inwards into the concavity of the piece, and curving apicad along the concavity. Copulatory piece about four-ninths as long as aedeagus, trilobed, and twistingly rolled from the right dorso-proximal to the ventro-apical sides; proximal lobe twofold, dorsal lamella being distally dilated and acutely pointed at the anterior end; right apical lobe almost vertical, twisted, and ventro-internally curved at the blunt apex; left apical lobe oblique, dilated towards apex, which forms an oblique subtriangular concavity perpendicular to the axis of the lobe. Styles slender, left style obviously longer than the right and curved ventrad at the apical part, each usually bearing four apical setae, one of which is sometimes missing on the right style.

*Type-series.* Holotype: ♂, 23-VIII-1981, S. SONE leg. Allotype: ♀, 23-VIII-1981, S. UÉNO leg. Paratypes: 1 ♀, 30-XI-1980, S. UÉNO leg. (found in a baited trap set by K. ISHIKAWA on 31-X-1980); 2 ♂♂, 3 ♀♀, 23-VIII-1981, S. UÉNO leg.; 6 ♂♂, 3 ♀♀, 5-XII-1982, S. SONE leg. (all but 1 ♂ were found in baited traps set by S. SONE on 18-III-1982). All deposited in the collection of the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

*Further specimen examined.* 1 ♀ (hind body only), 23-XI-1978, T. KAWASAWA leg. (NSMT).

*Type-locality.* Schist cave called Ôyamasama-no-ana, at Tanouchi of Shingû-mura, Ehimé Prefecture, at the northern side of the central part of the Island of Shikoku, Southwest Japan.

*Notes.* For a member of the genus *Trechiana*, this new species is very exceptional in showing individual variation in the arrangement of the humeral set of marginal umbilicate pores on elytra. It has been considered very stable in the subfamily Trechinae, and has currently been adopted as a key character in discriminating genera and subgenera. If the remains first discovered in Ôyamasama-no-ana Cave had had a regular humeral set of umbilicate pores, I should not have hesitated in assigning it to a *Trechiana*. As it was, we had to bear all the troubles of searching for perfect specimens of the beetle in the schist cave, which was not easily accessible and not particularly pleasant to enter.

At present, it has become evident that the new species belongs to the genus *Trechiana* beyond all doubt. It bears basic similarities to *T. chikaichii* S. UÉNO of Mt. Tsurugi-san, which lies about 42 km to the east by south of Ôyamasama-no-ana Cave.

Even the unique conformation of its aedeagal apical lobe and copulatory piece can be regarded as an extreme modification of the type possessed by *T. chikaichii*. A similar tendency of hypertrophied copulatory piece is already known in *T. yoshidai* S. UÉNO (1983, p. 37, figs. 1–3), a close relative of the latter. However, this and the following species, *T. perissus* sp. nov., seem too much isolated to be simply included in the same group as *T. chikaichii* and *T. yoshidai*. Besides the instability of the arrangement of marginal umbilicate pores, its elytral chaetotaxy is peculiar in lacking the proximal dorsal pore on the 3rd stria. The loss of this particular pore is unusual even in the chaetotaxially variable genus *Trechiamia*, and is only sporadically known in *T. insperatus* S. UÉNO (1970 a, p. 65, figs. 1–2; group of *T. habeii*), *T. inexpectatus* S. UÉNO (1980, pp. 203, 258, figs. 65–68; group of *T. ohshimai*), *T. kawanoi* S. UÉNO, and a few aberrant individuals of several other species. Of course, no supraspecific value can be attached to this feature alone, but it seems to provide a useful diagnostic character when combined with other peculiarities.

Here comes under consideration the ultra-evolved male genitalia of the two new species. Though all the component parts of this organ seem homologous between the two species and *T. chikaichii*, at least the aedeagal apical lobe has undergone such a drastic change in the former that they cannot be comparable to those of any other members of the genus. It seems to me that a new species-complex in the group of *T. chikaichii* had better be recognized for *T. cornutus* and *T. perissus* on the basis of the peculiarities in elytral chaetotaxy and aedeagal structure. This subgroup, to be called the *cornutus* complex, is one of the most derivative constituents of *Trechiamia*, but at the same time, maintains a primitive condition of the marginal umbilicate series of elytra. It is possible that *T. kawanoi*, which has been known from only a single female accidentally obtained, may also belong to this complex.

Ôyamasama-no-ana, the type-locality of *T. cornutus cornutus*, is a small cave developed along several cracks in glaucophane epidote schist. As was already described in the introduction of this paper, it had two natural openings at the two ends on different levels. At present, only the lower entrance is available; it is a very narrow, almost horizontal crack without roof, at the end of which opens a small vertical hole leading down to the main part of the cave. This passage steeply slants upwards to the skylight hole now completely closed with blocks and soil. All the known specimens of the *Trechiamia* were found under the closed hole, that is, near the upper end of the cave. A single female specimen of an undescribed *Ishikawatrechus* was obtained two years ago near the bottom of the entrance shaft, where no *Trechiamia* has ever been met with.

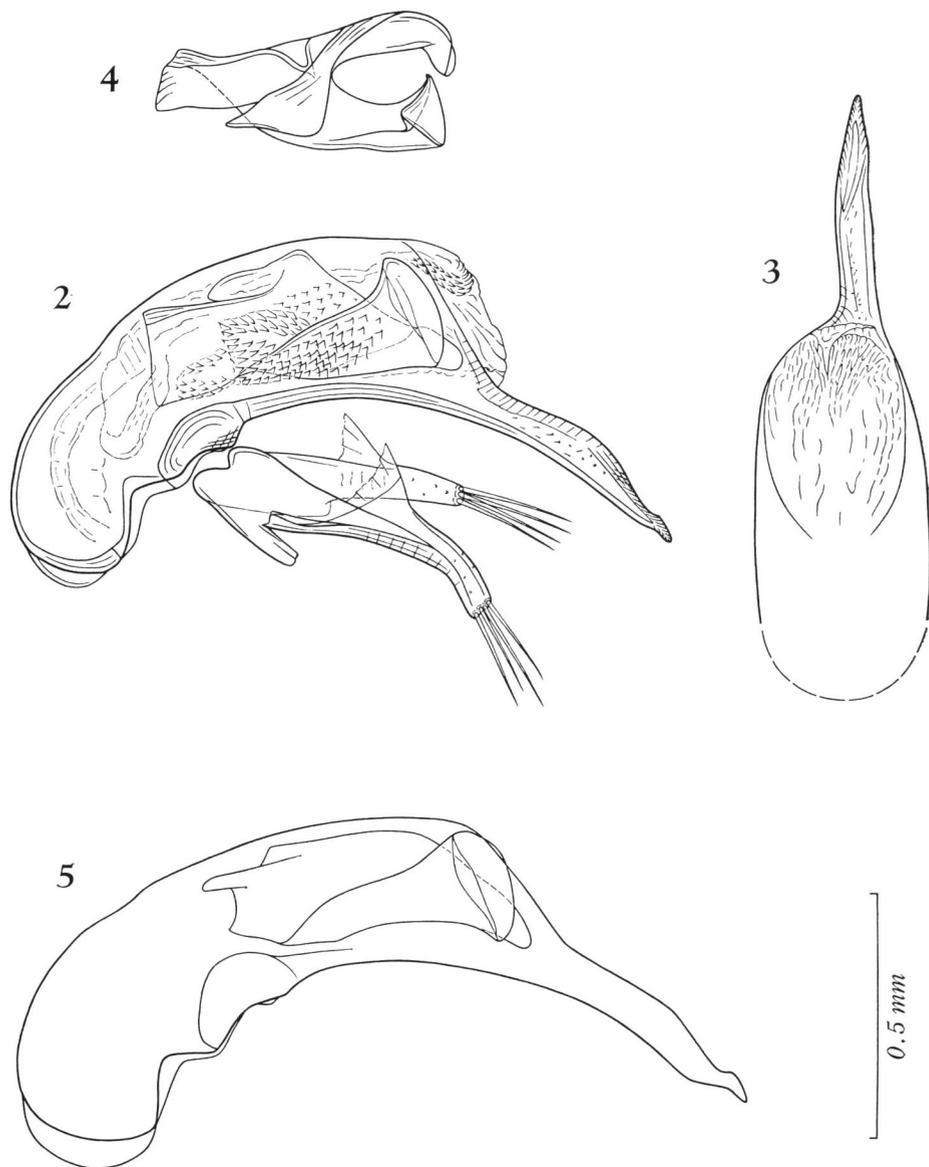
*Trechiamia* (s. str.) *cornutus longior* S. UÉNO, subsp. nov.

[Japanese name: Kamizeki-mekura-chibigomimushi]

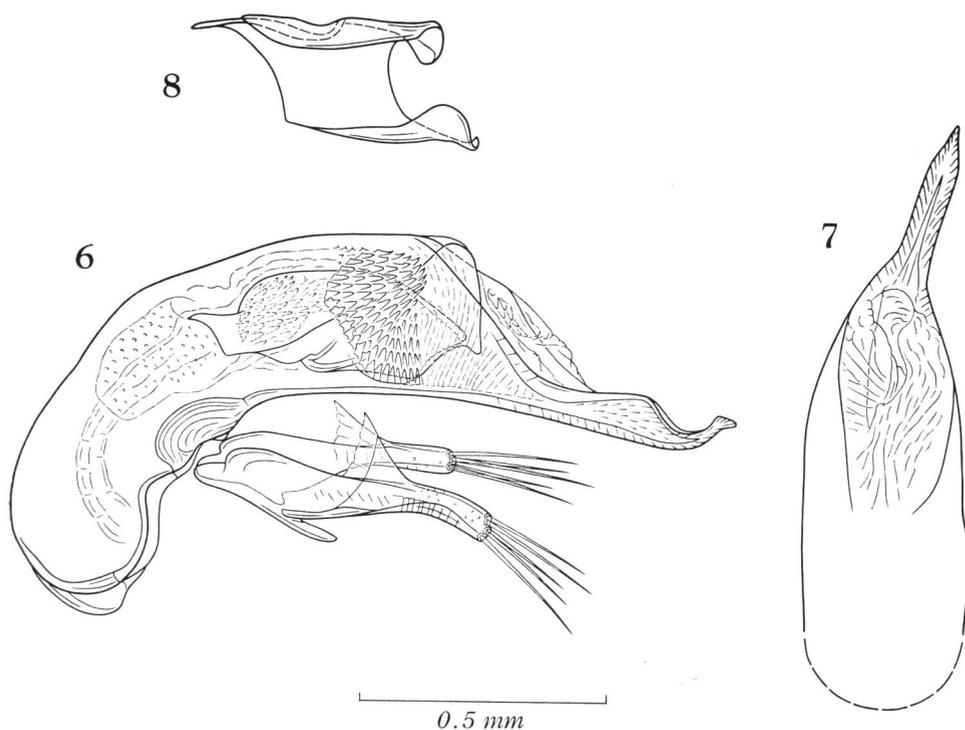
(Fig. 5)

Length: 5.30–5.95 mm (from apical margin of clypeus to apices of elytra).

A little larger on an average than the nominate subspecies, being distinguished from



Figs. 2-5. Male genitalia of *Trechiama* (s. str.) *cornutus* S. UÉNO, sp. nov.; left lateral view (2), apical part of aedeagus, dorso-apical view (3), separated copulatory piece, dorsal view (4), and outline of aedeagus and copulatory piece, left lateral view (5). — 2-4. *T. c. cornutus* S. UÉNO, subsp. nov., from Oyamasama-no-ana Cave in Shingû-mura. — 5. *T. c. longior* S. UÉNO, subsp. nov., from Kamizeki Mine in Motoyama-chô.



Figs. 6-8. Male genitalia of *Trechiana* (s. str.) *perissus* S. UÉNO, sp. nov., from Furuta in Motoyama-chô; left lateral view (6), apical part of aedeagus, dorso-apical view (7), and separated copulatory piece, dorsal view (8).

the latter mainly by the shape of prothorax which is strongly contracted behind, obviously narrower elytra with clearly impressed 8th stria and much longer scutellar striole, more elongate aedeagus with the apical lobe much more strongly sinuate at the terminal portion, and certain details of copulatory piece, especially of its proximal lobe.

Head as in the nominate subspecies, though the mandibles are a little more slender and the antennae are a little shorter, the latter reaching apical three-sevenths of elytra. Pronotum somewhat wider on an average and more strongly contracted behind than in the nominate subspecies, with the sides more strongly rounded in front, more rapidly convergent behind the widest part, and almost parallel to each other behind the ante-basal situation; base evidently narrower than in the nominate subspecies, with hind angles produced backwards but hardly outwards; PW/HW 1.47-1.63 (M 1.54), PW/PL 1.05-1.11 (M 1.07), PW/PA 1.53-1.67 (M 1.59), PW/PB 1.46-1.53 (M 1.50), PB/PA 1.02-1.09 (M 1.06). Elytra obviously narrower than in the nominate subspecies, with the sides more feebly arcuate at middle; EW/PW 1.46-1.54 (M 1.50), EL/EW 1.65-1.71 (M 1.68); striae evenly impressed on the disc and at the side, stria 8 clearly visible even in proximal half; scutellar striole much longer than in the nominate subspecies;

humeral set of marginal umbilicate pores not perfectly aggregated in all the specimens examined. Legs a little stouter than in the nominate subspecies, with thicker femora.

Male genital organ a little larger than in the nominate subspecies and more heavily sclerotized. Aedeagus about three-sevenths as long as elytra, more elongate and a little less arcuate than in the nominate subspecies, with larger and more elongate basal part and larger sagittal aileron; apical lobe much more strongly sinuate at the terminal portion in lateral view. Copulatory piece about three-sevenths as long as aedeagus; dorsal lamella of proximal lobe narrower than in the nominate subspecies and hardly dilated, ventral lamella deeply emarginate at the anterior end and proximally produced at the dorso-internal corner; right apical lobe more gradually narrowed towards apex.

*Type-series.* Holotype: ♂, 19-III-1982, Y. NISHIKAWA leg. Allotype: ♀, 19-III-1982, S. UÉNO leg. Paratypes: 2 ♂♂, 19-III-1982, Y. NISHIKAWA leg. All deposited in the collection of the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

*Type-locality.* Abandoned adit of the copper mine called Kamizeki-kôzan, at Hameno of Kamizeki in Motoyama-chô, Kôchi Prefecture, at the central part of the Island of Shikoku, Southwest Japan.

*Notes.* This is a distinctive geographical race seemingly different from the Ôyama-sama-no-ana form at the species level. Perhaps, the ancestor of *T. cornutus* was once widespread in the upper hypogean zone of Sanbôji-yama and its neighbouring hills at the easternmost part of the Ishizuchi Mountains, but was later divided into isolated populations at different sides of the watershed and became differentiated into the two local races.

Kamizeki-kôzan is an abandoned copper mine lying on the right side of the Namé-kawa, a small tributary of the Yoshino-gawa River. Its adit was dug into pelitic schist just above the stream at an altitude of about 470 m, and was partly immersed in the water. The trechine beetle dwelt in the left-hand branch passage, and was usually found in very wet places, from under stones and rotten logs lying on the muddy floor.

***Trechiana* (s. str.) *perissus* S. UÉNO, sp. nov.**

[Japanese name: Kinozu-mekura-chibigomimushi]

(Figs. 6-8)

Length: 5.50-5.75 mm (from apical margin of clypeus to apices of elytra).

Externally very close to the nominate subspecies of *T. cornutus*, and barely discriminated from the latter by longer antennae, less convex elytra, longer scutellar striole, and entire 8th elytral stria. Strikingly different from *T. cornutus* in the conformation of male genitalia, as will be described in the following page.

Colour as in *T. cornutus cornutus*. Head and prothorax almost identical with those of *T. c. cornutus*, with the exception of antennae, which are a little longer and more slender than in the latter, reaching apical fourth of elytra, with segments 8-10 each about 4 times as long as wide; PW/HW 1.55 in the holotype, 1.54 in the paratype,

PW/PL 1.08 in the holotype, 1.03 in the paratype, PW/PA 1.56 in the holotype, 1.57 in the paratype, PW/PB 1.32 in the holotype, 1.34 in the paratype, PB/PA 1.18 in the holotype, 1.17 in the paratype. Elytra also very similar to those of *T. c. cornutus*, except that they are less convex even in apical two-thirds, that the humeral angles are more obtuse, that the striae are so clearly impressed even at the side that the 8th stria is complete anteriorly to the humeral set of marginal umbilicate pores, and that the scutellar striole is about twice as long as that of the latter subspecies; EW/PW 1.58 in the holotype, 1.56 in the paratype, EL/EW 1.55 in the holotype, 1.58 in the paratype. Ventral surface and legs as in *T. c. cornutus*.

Male genital organ large and robust, larger than in *T. c. cornutus*, and heavily sclerotized. Aedeagus three-sevenths as long as elytra, only very feebly arcuate at middle, and rather gradually narrowed apicad along apical orifice, which is asymmetric being inclined to the left, with long apical lobe also inclined to the left and longitudinally concave on the dorsal side in apical half; basal part elongate and moderately curved ventrad, with large basal orifice deeply emarginate at the sides; sagittal aileron present though not particularly large; viewed dorsally, apical lobe narrow, straight, acuminate in terminal two-fifths, and acutely produced at the extremity; viewed laterally, apical lobe gradually dilated towards middle, then abruptly narrowed and sharply turned up, forming deeply sinuate dorsal margin, with the tip narrowly produced posteriad; ventral margin slightly but widely emarginate in profile. Inner sac armed with a large asymmetric copulatory piece and two patches of sclerotized teeth; apical teeth-patch right dorsal and small, lying just inside apical orifice; proximal teeth-patch much larger than the apical, compact, and more extensive than in *T. c. cornutus*, extending from the left ventral side of inner sac along the left wall to the dorsal concavity of copulatory piece, then turned anteriorly and forming an elongate patch of poorly sclerotized scales along the concavity. Copulatory piece a little smaller than in *T. c. cornutus* though of the same basic structure as the latter, about two-fifths as long as aedeagus, with amply spatulate ventral part; proximal lobe right lateral and twofold, dorsal lamella being much narrower than in *T. c. cornutus* and not dilated, ventral lamella with the dorsal portion narrowly produced anteriorly and sharply pointed at the tip; right apical lobe high, obviously shorter than the left, twisted, and ventro-internally curved at the blunt apex; left apical lobe also high, larger than in *T. c. cornutus*, with the apical margin simply arcuate, not campanulate, and obliquely produced inwards at the ventral corner. Styles as in *T. c. cornutus* though smaller, each bearing five apical setae in the holotype, four apical setae in the paratype.

Female unknown.

*Mature larva.* Length: 7.0 mm (from the apex of clypeal lobe to the tip of anal tube).

Very similar to the mature larva of *T. ovoideus* S. UÉNO (1970 b, p. 368, figs. 3–9) and answering its description in every detail. Only the exception is in the shape of prothorax, which is less transverse than in *T. ovoideus* and has very feebly arcuate, almost parallel sides.

*Type-series.* Holotype: ♂, Furuta, 30-III-1983, S. UÉNO leg. Paratypes: 1 ♂, Sarugataki-dô Cave, 5-V-1983, T. MOHRI leg.; 1 mature larva, Furuta, 30-III-1983, Y. NISHIKAWA leg.; 1 larva in middle stage, Sarugataki-dô Cave, 6-VI-1982, S. SONE leg. (found in a baited trap set by S. SONE on 20-III-1982). All deposited in the collection of the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

*Further specimen examined.* 1 ex. (♂ ?, body without three apical segments of abdomen, and right hind leg), Sarugataki-dô Cave, 25-I-1981, S. SONE leg. (NSMT).

*Localities of the specimens examined.* Furuta, 490 m in altitude (type-locality!), and Sarugataki-dô Cave at Kinozu, both in Motoyama-chô of Kôchi Prefecture, at the central part of the Island of Shikoku, Southwest Japan.

*Notes.* This is an interesting species combining the external features of the two subspecies of *T. cornutus*. It is closely similar in facies to the nominate subspecies of the latter, but is identical with subspecies *longior* in the striation of elytra. Its male genitalia are less monstrous than in *T. cornutus*, and though the aedeagal apical lobe shows a peculiar modification, the copulatory piece still partially retains a spatulate form common to many species of *Trechiana*. In this respect, *T. perissus* is intermediate between *T. chikaichii* and *T. cornutus*, though very much closer to the latter than to the former.

As was described in the introduction of this paper, this species was first made known by a dead body found in the schist cave called Sarugataki-dô. This cave is an almost straight, vertical crack in pelitic schist lying on the right side of the Kinozu-gawa, a small tributary of the Yoshino-gawa River opposite to the Namé-kawa, at an altitude of about 310 m. Its floor is very narrow, steeply slanting and thickly covered with gravel. Besides, the temperature is unusually low throughout the year even at the deepest portion. We have made every possible effort to ameliorate the environmental condition, but have barely obtained a male of *T. perissus* after painstaking searches. A *Ryugadous* also occurs in this schist cave, but has so far been known from only two females caught in a baited trap set beneath a straw-mat.

The dead body found by Mr. SONE perfectly agrees with the other specimens of *T. perissus*. It is about 5.75 mm in the length of body, whose parts have the following ratios: PW/HW 1.49, PW/PL 1.05, PW/PA 1.55, PW/PB 1.31, PB/PA 1.18, EW/PW 1.55, EL/EW 1.60. The second-instar larva (6.0 mm in the length of body) is also similar to the mature paratype, except for lesser number of minute hairs on the body surface due to the younger stage.

The spot at which the holotype of this new species was obtained is a gully near the head spring of one of the small branch streams of the Kinozu-gawa, about 2.2 km to the south of Sarugataki-dô Cave, and about 490 m above sea-level. The gully is at the southern (upper) edge of the small village of Furuta on the northern slope of Mt. Tsué-gamori, and was shaded by a shrubbery between a cryptomeria plantation and a paddy field. It did not appear particularly good for looking for anophthalmic trechines, but had small colluvia at a side. Since better collecting sites were not found along the upper reaches of the Kinozu-gawa, Mr. NISHIKAWA and I concentrated our energies on the colluvia and finally succeeded in digging out a male and a mature larva of the tre-

chine beetle from the depth of about 70 cm. We excavated the colluvia down to the bed schist, but failed in bringing forth any more specimens.

It is worth noting that the main course of the Yoshino-gawa River seems to have been an effective barrier to the dispersal of anophthalmic trechines. As was already noted, the distance between Sarugataki-dô Cave and Kamizeki Mine is only 5.4 km, and the schist cave is only 500 m removed from the right bank of the Yoshino-gawa. And yet, the speciation of *Trechiana* is complete between the two cavities. This fact suggests that the dispersal of anophthalmic trechines may have been effected mainly through the upper hypogean zone of the same range of hills and that any long-standing water bodies of moderate size may have impeded their movement.

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### Summary

Two new species and a new subspecies of the trechine genus *Trechiana* are described from the central part of the Island of Shikoku, Southwest Japan. One of them, named *T. cornutus*, is known only from a schist cave, and its subspecies, *T. c. longior*, from a mine adit, while the other new species, *T. perissus*, has been found both in a schist cave and from the upper hypogean zone. A new species-complex is recognized for these species in the group of *T. chikaichii*, because of the peculiarities of elytral chaetotaxy and male genitalia.

### References

- UÉNO, S.-I., 1957. Studies on the Japanese Trechinae (VI) (Coleoptera, Harpalidae). *Mem. Coll. Sci. Univ. Kyoto*, (B), **24**: 179–218, pl. 1.
- 1970 a. A new anophthalmic *Trechiana* (Coleoptera, Trechinae) from Central Japan. *Bull. natn. Sci. Mus., Tokyo*, **13**: 65–70.
- 1970 b. Occurrence of a peculiar cave species of *Trechiana* (Coleoptera, Trechinae) in the Suzuka Mountains of Central Japan. *Ibid.*, **13**: 363–372.
- 1975. Two new *Trechiana* (Coleoptera, Trechinae) from eastern Shikoku, Japan. *Ibid.*, (A), **1**: 203–212.
- 1980. The anophthalmic trechine beetles of the group of *Trechiana ohshimai*. *Ibid.*, (A), **6**: 195–274.
- 1981. New anophthalmic *Trechiana* (Coleoptera, Trechinae) from northern Shikoku, Japan. *J. speleol. Soc. Japan*, **6**: 11–18.

- UÉNO, S.-I., 1982. *Yamautidius* (Coleoptera, Trechinae), an example of remarkable genitalic differentiation. *J. speleol. Soc. Japan*, 7: 5-65.
- 1983. A new *Trechiana* (Coleoptera, Trechinae) from the upper hypogean zone of eastern Shikoku, Southwest Japan. *Proc. Jap. Soc. syst. Zool., Tokyo*, (25): 36-42.