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The Cave Trechids from the Central Part of the Chûgoku District, Japan

II. The Geographical Races of *Trechiama yokoyamai* S. UÉNO[1)]

By

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It was already noticed in the first part of this series that *Trechiama yokoyamai* was a widespread species and might be a recent cave dweller. Its range of distribution covers the central part of the Chûgoku mountain range and the limestone areas in Okayama Prefecture. Only an exception may be a limestone area that is situated at the northern part of the town of Katsuyama-chô in the upper course of the Asahi-gawa River. In the caves in this area, there is found a cave trechid *Trechiama oni*, belonging to a group quite different from that to which *T. yokoyamai* belongs. The known localities of *T. yokoyamai* are, however, not uniformly spread within its distribution range. This phenomenon may have come partly from inadequate investigations of both epigean and endogean habitats, but more largely from the existence of ecological barriers between those localities.

Nineteen localities to be inhabited by *T. yokoyamai* have hitherto been known, two of which, situated on the northern side of the watershed, are the epigean habitats along mountain streams. The other seventeen are limestone caves distributed in the drainages of the Takahashi-gawa and the Asahi-gawa Rivers, the waters of which are emptied into the Inland Sea or Seto-Naikai (*cf.* Fig. 1). The populations of these localities are in many cases allopatric, even if the underground drainage systems are taken into account, and are more or less different from each other. As these differences are usually quantitative, it is difficult to regard them as having the specific value. They are sometimes very slight, but sometimes they are considerably large and almost attain the distinction of species rank. The population of Ja-no-ana Cave, for example, is markedly different from the populations of the other localities, and would be regarded as specifically distinct if it alone were compared with the typical populations of the Taishaku limestone area. The gap between them is, however, bridged by intermediate populations. More complicated is the population complex of the Atetsu-Jôbô limestone area, where there is found a series of intergrades between the two extremes. In such a cavernicole of recent origin as *T. yokoyamai*, each population was strictly isolated only in a

1) Contribution No. 13 from the Spelaeological Society of Japan.

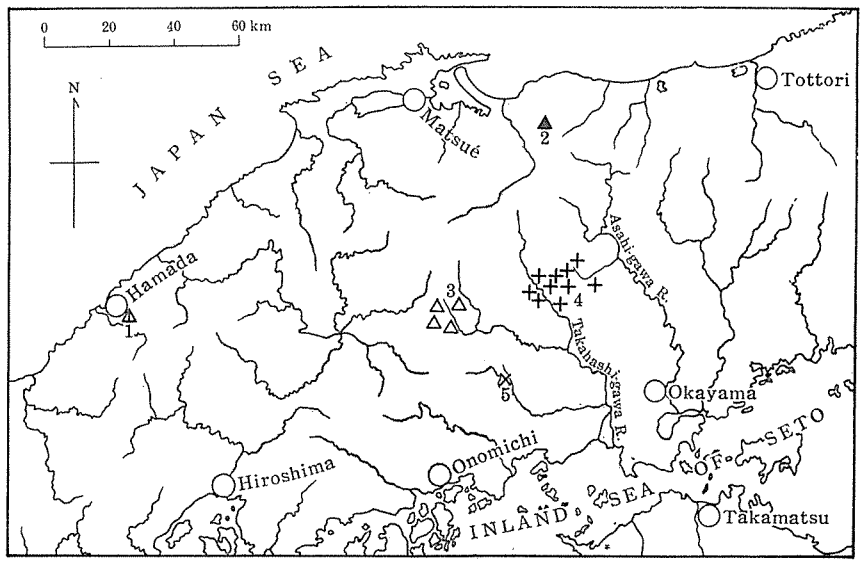


Fig. 1. Sketch map showing the distribution of *Trechiama yokoyamai* S. UÉNO. — 1. Hamada-gawa River, at the foot of Mt. Kakinoki-yama (*T. yokoyamai hamadaensis* subsp. nov.). — 2. Mt. Daisen (T. *yokoyamai montanus* subsp. nov.). — 3. Taishaku limestone area (*T. yokoyamai yokoyamai* s. str.). — 4. Atetsu-Jôbô limestone area (*T. yokoyamai ishikawai* subsp. nov.). — 5. Ja-no-ana Cave (*T. yokoyamai rectus* subsp. nov.).

recent time, probably late in Pleistocene. The differentiation among them seems not to have been progressed greatly. A population group, which occupies an area sufficiently distant from those which are occupied by the other population groups, may be classified as a subspecies, but the populations which show a continuous distribution cannot be separated into well defined subspecies. In this respect, the writer prefers to distinguish only five subspecies in the present paper, considering the others as clinal. These subspecies will be discriminable by the following diagnosis.

Key to the subspecies

1 (2) Eyes larger, genae slightly longer than eyes; aedeagal apical part prolonged into a narrow long beak; (Hamada, epigean) .... *T. yokoyamai hamadaensis* subsp. nov.

2 (1) Eyes smaller, genae more than 1.5 times as long as eyes.

3 (8) Aedeagus with rounded dorsal side in profile or with the basal part bending ventrally.

4 (5) Aedeagal basal part only weakly bent towards the ventral side, apical part prolonged into a narrow long beak; pronotal base wide; (Mt. Daisen, epigean) ..... *T. yokoyamai montanus* subsp. nov.

5 (4) Aedeagal basal part evidently bent towards the ventral side.
6 (7) Basal sinuation of pronotal lateral sides close to hind angles; pronotal base narrower; aedeagus more robust, with a short apical part; (Taishaku limestone area, cavernicole)..... *T. yokoyamai yokoyamai* s. str.
7 (6) Basal sinuation of pronotal lateral sides distant from hind angles; pronotal base wider; aedeagus slenderer, with the apical part more or less prolonged into a narrow beak; (Atetsu-Jôbô limestone area, cavernicole) .... *T. yokoyamai ishikawai* subsp. nov.
8 (3) Aedeagus nearly straight in profile, with the dorsal side nearly parallel to the ventral side and with the basal part only weakly bent towards the ventral side; pronotal base wide; (Shitsuki limestone area, cavernicole)... ..... *T. yokoyamai rectus* subsp. nov.

Trechiama (s. str.) **yokoyamai hamadaensis** S. UÉNO, subsp. nov.

Length: 5.8 mm (from front margin of clypeus to anal end).

Distinguished from the typical form chiefly by its large eyes as well as by the shape of pronotum and of aedeagus.

Eyes large though flat, only slightly shorter than genae; antennae reaching apical one-third of elytra. Pronotum 1.49 times wider than head, 1.08 times wider than long, widest at five-eighths from base; the ratio of the greatest width to the width of apex is 1.58, that to the width of base is 1.47; lateral sides more strongly rounded in front and more strongly convergent anteriorly than those in the typical form; base wider than that in the typical form, 1.08 times wider than apex; disk much more convex. Elytra 1.55 times wider than pronotum, 1.59 times longer than wide, widest at about middle; stria 3 with two dorsal pores on right elytron and three dorsal pores on left elytron, stria 5 with a single dorsal pore.

Aedeagus similar to that of the typical form, with the exception of the apical part which is prolonged into a narrow long beak bending ventrally; basal part somewhat larger.

Female unknown.

Type-specimen: Holotype: ♂ (2-X-1955, collected by K. MASIDA and deposited in UÉNO's collection).

Type-locality: Hamada-gawa River, at the foot of Mt. Kakinoki-yama, Hamada City, Shimané Prefecture, on the coast of the Japan Sea, in western Honshu.

According to the collector, only a single known specimen, the holotype, of this new subspecies was found in a heap of vegetable debris on the dried bed of the Hamada-gawa River. It was dissected before submitted to the writer for identification, and lost the apical sternite.

This subspecies occurs in the westernmost locality hitherto known within the range of *T. yokoyamai* (*cf.* Fig. 1). It is about 100 km west of the Taishaku

limestone area and placed on the opposite side over the watershed. The Nariha-gawa River, which is a tributary of the Takahashi-gawa and irrigates the Taishaku limestone area, drains into the Inland Sea, while the Hamada-gawa River empties into the Japan Sea.

Trechiama (s. str.) **yokoyamai montanus** S. UÉNO, subsp. nov.

Length: 5.7–6.0 mm (from front margin of clypeus to anal end).

Distinguished from the typical form and subsp. *hamadaensis* chiefly by the shapes of pronotum, elytra and aedeagus.

Genae a little less convex than those in the typical form and subsp. *hamadaensis*, with the neck constriction somewhat deeper; antennae somewhat slenderer and reaching apical two-fifths of elytra. Pronotum slightly wider and distinctly less contracted behind than that of the typical form, 1.41–1.46 times wider than head (mean 1.44), 1.07–1.13 times wider than long (mean 1.11), widest at two-thirds to three-eighths from base according to individuals; the ratio of the greatest width to the width of apex ranging 1.53–1.57 (mean 1.56), that to the width of base ranging 1.35–1.41 (mean 1.36); lateral sides regularly and rather strongly rounded in front, deeply sinuate just before hind angles; front angles hardly advanced, hind angles acute; base evidently wider than that of the typical form and subsp. *hamadaensis*, 1.11–1.16 times wider than apex (mean 1.14) and nearly straight; the convexity of the disk similar to that in the typical form. Elytra ovate, wider and shorter than those of the typical form and subsp. *hamadaensis*, 1.58–1.63 times wider than pronotum (mean 1.62), 1.57–1.64 times longer than wide (mean 1.60), widest at about middle; shoulders a little less salient, prehumeral borders more oblique and lateral sides a little more rounded; chaetotaxy similar to that of the typical form (*cf.* Table 1).

Aedeagus slenderer than that of the typical form, with the apical part prolonged into a narrow long beak, which inclines ventrally; basal part elongate and hardly bending towards ventral side; sagittal aileron larger than that of the typical form.

Female unknown.

Type-specimens: Described on the basis of 5 specimens, as listed below.

Holotype: ♂ (22-VII-1956, collected by H. ISHIDA). Paratypes: 1♂ (20-VIII-1954, by T. MARUYAMA); 3♂♂ (22-VII-1956, by H. ISHIDA).

The holotype is preserved in the writer's collection. The paratypes are in the collections of S. UÉNO and H. ISHIDA.

Type-locality: Mt. Daisen (northwestern slope), Tottori Prefecture, on the coast of the Japan Sea, in western Honshu.

Mt. Daisen, the type-locality of the present new subspecies, is a volcano, highest in the Chûgoku district (1,713 m above the sea). The water system on the northwestern slope irrigates the forest land and drains into the Japan Sea. The trechid was found under stones on the dried bed of one of such streams at 800–900 m in altitude, coexisting with the species belonging to the genera *Nebria* and *Pterostichus*.

Trechiama (s. str.) **yokoyamai ishikawai** S. UÉNO, subsp. nov.

Length: 4.9–6.2 mm (from front margin of clypeus to anal end).

Discriminated from the typical form and the preceding subspecies chiefly by the shapes of pronotum, elytra and aedeagus.

Head similar to that of the typical form, with the exception of genae which are usually a little more convex. Pronotum slightly narrower and less contracted behind than that of the typical form, with the basal part obviously longer behind the sinuation than that in the typical form or in the two preceding subspecies; 1.37–1.45 times wider than head (mean 1.42), always a little wider than long (range 1.04–1.10, mean 1.07), widest at three-fifths to two-thirds from base according to individuals (widest at about five-eighths from base in the majority of specimens examined); the ratio of the greatest width to the width of apex ranging 1.47–1.60 (mean 1.52), that to the width of base ranging 1.35–1.48 (mean 1.40); lateral sides usually a little less rounded in front than those in the typical form, deeply sinuate at some distance before hind angles, the distance from the sinuation to the tip of hind angle evidently larger than that in the typical form, subsp. *hamadaensis* or subsp. *montanus*; hind angles larger; base always wider than apex (range 1.03–1.16, mean 1.08). Elytra narrower and usually a little more convex than those in the typical form, 1.44–1.58 times wider than pronotum (mean 1.52), 1.59–1.74 times longer than wide (mean 1.65), widest at about middle; shoulders less salient and prehumeral borders much more oblique than those in the typical form or even than those in subsp. *montanus*; lateral sides less rounded than those in the typical form; striae somewhat shallower; chaetotaxy similar to that of the typical form (*cf.* Table 1).

Aedeagus much slenderer than that of the typical form, with the apical part prolonged into a long narrow beak; basal part relatively large, more strongly bent towards ventral side than in the typical form; ventral side nearly straight or slightly concave.

Type-specimens: Described on 54 specimens as listed below.

Holotype: ♂, allotype: ♀ (16-VIII-1956, collected by S. UÉNO). Paratypes: 21♂♂, 15♀♀ (15-VIII-1955, by S. UÉNO and G. IMADATÉ); 8♂♂, 5♀♀ (16-VIII-1956, by S. UÉNO); 2♂♂, 1♀ (13-VIII-1957, by S. UÉNO).

Further specimens examined: 1♂, 2♀♀ (Marble-dô Cave, 19-VIII-1955, by G. IMADATÉ); 3♂♂, 1♀ (Ryûgû-dô Cave, 19-VIII-1955, by G. IMADATÉ); 2♀♀ (Kimen-dô Cave, 19-VIII-1955, by G. IMADATÉ); 4♂♂, 2♀♀ (Rashômon Cave, 16-VIII-1955, by S. UÉNO and G. IMADATÉ); 2♂♂ (Uyama-dô Cave, 6-V-1954, by J. ISHIKAWA); 2♂♂, 2♀♀ (Uyama-dô Cave, 17-VIII-1955, by S. UÉNO and G. IMADATÉ); 2♂♂ (Uyama-dô Cave, 10-VIII-1957, by S. UÉNO); 4♂♂, 5♀♀ (Maki-no-ana Cave, 16-VIII-1955, by S. UÉNO and G. IMADATÉ); 1♂, 2♀♀ (Maki-no-ana Cave, 12-VIII-1957, by S. UÉNO); 1♀ (Himesaka-kanachi-ana Cave, 5-V-1954, by J. ISHIKAWA); 8♂♂, 5♀♀ (Himesaka-kanachi-ana Cave, 17-VIII-1955, by S. UÉNO and G. IMADATÉ); 7♂♂, 1♀ (Shimizugawa-no-ana Cave, 15-VIII-1956, by S. UÉNO);

12♂♂, 4♀♀ (Iwaya-no-ana Cave, 15–VIII–1956, by S. UÉNO); 4♂♂, 13♀♀ (Kanachi-ana Cave, 18–VIII–1955, by S. UÉNO and G. IMADATÉ); 6♂♂, 2♀♀ (Kozumori-daini-dô Cave, 11–VIII–1957, by S. UÉNO and K. MORIKAWA).

All the specimens examined, including the type series, are preserved in the writer's collection.

Type-locality: A limestone cave called "Kômori-ana", Kuraida, at Miyoshi of Niimi City, Okayama Prefecture, on the central massif of the Chûgoku district, western Honshu.

Other localities: A limestone cave called "Marble-dô", Ikurano, at Ishigasato of Niimi City; two limestone caves called "Ryûgû-dô" and "Kimen-dô", Kashiwa, at Ishigasato of Niimi City; a limestone cave called "Rashômon", Matsunagi, at Kusama of Niimi City; a limestone cave called "Uyama-dô"[2], Uyama, at Toyonaga of Niimi City; a limestone cave called "Maki-no-ana"[3], Maki, at Toyonaga of Niimi City; a limestone cave called "Himesaka-kanachi-ana", at Toyonaga of Niimi City; a limestone cave called "Shimizugawa-no-ana", Haramo, at Azai of Hokubô-chô; a limestone cave called "Iwaya-no-ana", Akuchi, at Azai of Hokubô-chô; a limestone cave called "Kanachi-ana", Idono, at Kami-Mizuta of Hokubô-chô; a limestone cave called "Kozumori-daini-dô", at Kusama of Niimi City; all in Okayama Prefecture, on the central massif of the Chûgoku district, in western Honshu.

All the twelve limestone caves listed above are distributed in the Atetsu-Jôbô limestone area, which stretches over the drainage areas of the Takahashi-gawa and the Asahi-gawa Rivers, and is roughly divided into four parts. The westernmost of them is called Ishiga-dai and is situated on the right side of the main course of the Takahashi-gawa. The second part, Kusama-dai, is situated on the left side of the main stream opposite to Ishiga-dai. The third part, Toyonaga-dai, is separated from Kusama-dai by the Sabushi-gawa River, one of the branches of the Takahashi-gawa, and makes the watershed between the tributaries of the Takahashi-gawa and the Asahi-gawa. The easternmost part, Jôbô-dai, belongs to the Asahi-gawa drainage and is irrigated by the Bitchû-gawa, one of the branches of the Asahi-gawa River.

There are three caves along the eastern edge of Ishiga-dai. One of them, Marble-dô Cave, is about 5 km SSW of Kômori-ana Cave, the type-locality, which is situated at the northwestern edge of Kusama-dai. The other two are about 2.5 km SE of Marble-dô and closely placed by each other. At the eastern edge of Kusama-dai about 5 km ESE of Kômori-ana Cave, there is found a deep doline called Rashômon, where the bottom is perforated by Rashômon Cave. Uyama-dô Cave belongs to Toyonaga-dai and situated at about 1.5 km east of Rashômon Cave. Maki-no-ana Cave also belongs to Toyonaga-dai and is found at about 3.5 km north of Uyama-dô. At about 2 km ENE from Maki-no-ana, near the northeastern edge

2) Sometimes called "Uyama-no-ana".

3) Sometimes called "Maki-dô" or "Manki-dô".

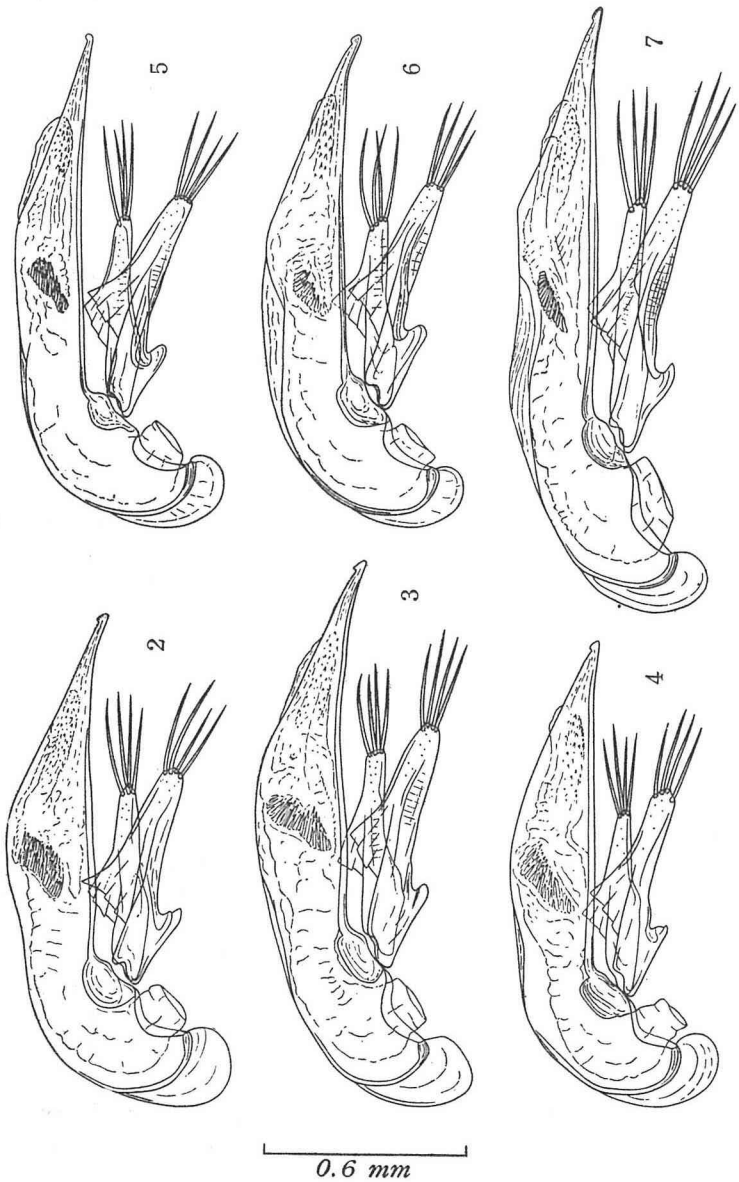
of Toyonaga-dai, there is a large ponor known by the name of Himesaka-kanachi-ana. It is unknown whether the water in this cave belongs to the drainage system of the Takahashi-gawa or to that of the Asahi-gawa. The two caves Shimizugawa-no-ana and Iwaya-no-ana are situated at the northern end of Jôbô-dai about 4 km NNE of Himesaka-kanachi-ana. They are separated from the other caves by the course of the Bitchû-gawa. On the right side of this river, there is a southern half of Jôbô-dai, where a ponor called Kanachi-ana is located. The situation of this cave is about 7.5 km ESE of Himesaka-kanachi-ana Cave and about 8.5 km SE of Iwaya-no-ana Cave. A group of three caves is found at the southeastern edge of Kusama-dai near the water of the Sabushi-gawa. They bear the names Kozumori-daiichi-dô, Kozumori-daini-dô and Kozumori-daisan-dô, and the first one is often called Nakai-dô. The trechid was taken only in the second, which was situated at about 4 km south of Rashômon Cave.

As *T. yokoyamai ishikawai* is usually found in the depths of limestone caves[4], the populations of these twelve caves may be regarded as mutually exclusive, excepting a few rare cases that the subterranean streams may connect two or three caves. Consequently, these populations are more or less different from each other. A fixed tendency is usually observed in each population in the shapes of pronotum and elytra as well as in the number of elytral dorsal pores. However, the range of variation in the individuals of one population always overlaps the ranges of variation in the individuals of its neighbouring populations. Even the difference in the shape of their aedeagi, which is peculiar to respective population, is not large. It seems to be better to refrain from splitting them as several distinct subspecies. It may, however, be desirable to give here the trend of variation in each population.

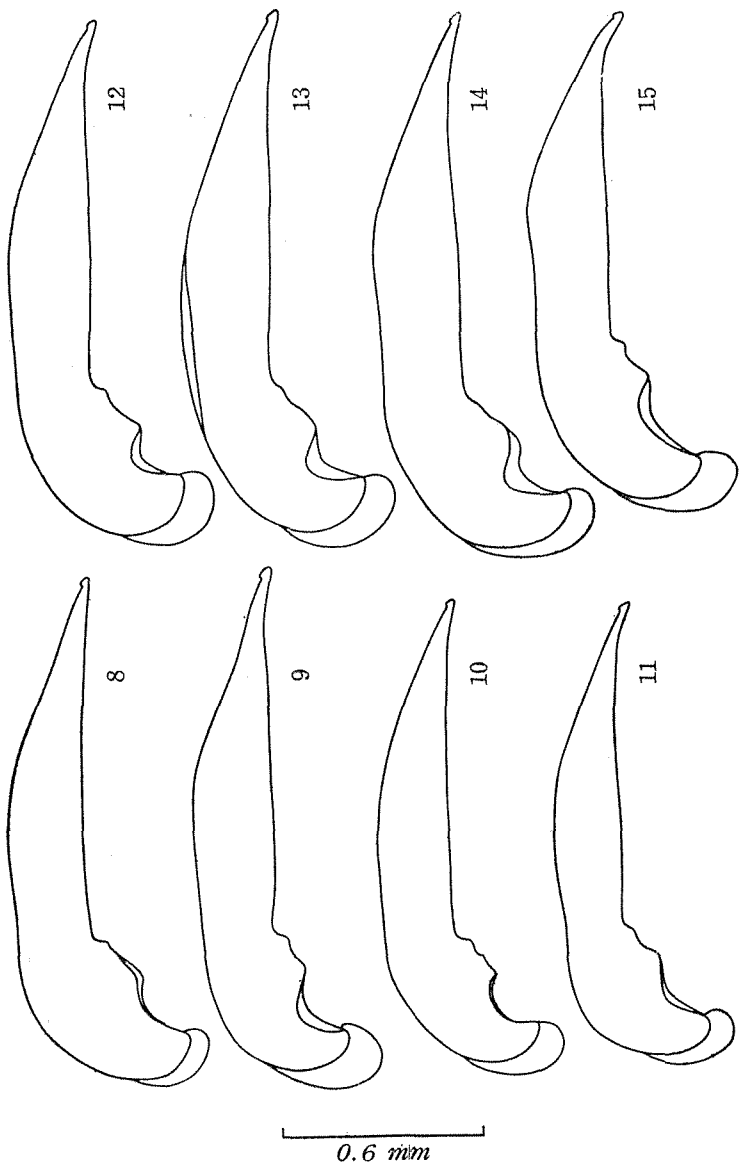
In the population found in the three limestone caves at Ishiga-dai Karst (Marble-dô Cave, Ryûgû-dô Cave and Kimen-dô Cave), the pronotal base is somewhat wider comparing with that in the type-specimens (the ratio of the width of base to that of apex ranging 1.10–1.14, with the mean 1.12), the elytra are a little wider (the ratio of the width of elytra to that of pronotum ranging 1.52–1.61, with the mean 1.57), with the prehumeral borders a little less oblique, and the aedeagus is somewhat swollen at middle.

In the Rashômon population, the pronotum is relatively transverse (the ratio of the width to the length of pronotum ranging 1.09–1.15, mean 1.11) and usually has a narrower base (the ratio of the greatest width to the width of base ranging 1.41–1.48, mean 1.45; the ratio of the width of base to that of apex ranging 1.05–1.07, mean 1.06), the pronotal lateral sides are more regularly rounded than those in the type series (the Kômori-ana population), and the prehumeral borders of elytra are a little less oblique. The aedeagus is similar to that in the type series, but the ventral side is slightly convex in the Rashômon specimens.

4) Only a single individual of this new subspecies was taken at the entrance of Himesaka-kanachi-ana Cave, where there was exposed to the sun. It was found under a large stone deeply buried in the soil.



Figs. 2-7. Male genital organ, left lateral view. — 2. *Trechiama yokoyamai hamadaensis* subsp. nov., of Hamada-gawa River. — 3. *T. yokoyamai montanus* subsp. nov., of Mt. Daisen. — 4. *T. yokoyamai yokoyamai* s. str., of Aidogô-no-kaza-ana Cave. — 5. *T. yokoyamai ishikawai* subsp. nov., of Kômori-ana Cave. — 6. Same subspecies, of Iwaya-no-ana Cave. — 7. *T. yokoyamai rectus* subsp. nov., of Ja-no-ana Cave.



Figs. 8-15. Outlines of aedeagus, left lateral view; showing the variation according to the populations of *Trechiama yokoyamai ishikawai* subsp. nov. — 8. Specimen of Kômori-ana Cave. — 9. Specimen of Ryûgû-dô Cave. — 10. Specimen of Uyama-dô Cave. — 11. Specimen of Maki-no-ana Cave. — 12. Specimen of Himesaka-kanachi-ana Cave. — 13. Specimen of Shimizugawa-no-ana Cave. — 14. Specimen of Kanachi-ana Cave. — 15. Specimen of Kozumori-daini-dô Cave.

The Uyama-dô population is similar to the Rashômon population. In the former, however, the proportion of the greatest width of pronotum to the width of its base (or to the width of its apex) is intermediate between the proportions in the populations of Kômori-ana Cave and Rashômon Cave.

The Maki-no-ana population is remarkable by the multiplication in the number of setiferous dorsal pores on elytra. The individuals of this population always have more than three pores on the third stria and more than two pores on the fifth stria. The number attains as many as four on the third stria and as many as three on the fifth stria on both the elytra (*cf.* Table 1). Further, the pronotum is more strongly contracted in front and behind than that in the type series (the ratio of the greatest width to the width of apex ranging 1.55–1.59, mean 1.57; that to the width of base ranging 1.41–1.45, mean 1.43; the ratio of the width of base to that of apex ranging 1.08–1.10, mean 1.10). The elytra are relatively wide and elongate (the ratio of the width of elytra to that of pronotum ranging 1.52–1.64, mean 1.59; that of the length to the width of elytra ranging 1.60–1.67, mean 1.64), with the prehumeral borders obviously less oblique than those in the type series and resembling those in *T. yokoyamai yokoyamai*. The aedeagus is similar to, but slenderer than, that in the type series.

In the population of Himesaka-kanachi-ana Cave, the genae are a little less convex than those in the individuals of the populations mentioned above. The pronotum is relatively transverse as in the Uyama-dô population (the ratio of the width to the length of pronotum ranging 1.05–1.16, mean 1.10), and is more strongly contracted both in front and behind (the ratio of the greatest width to the width of apex ranging 1.54–1.64, mean 1.59; that to the width of base ranging 1.40–1.46, mean 1.43; the ratio of the width of base to that of apex ranging 1.06–1.16, mean 1.12). The curvature of the pronotal lateral sides is similar to that of the Uyama-dô population. The elytra are relatively narrow and elongate, resembling those in the type series (the ratio of the width of elytra to that of pronotum ranging 1.44–1.56, mean 1.50; that of the length to the width of elytra ranging 1.64–1.71, mean 1.66). The aedeagus resembles those in the populations of the limestone caves at Ishigadai Karst, but the basal part is longer and the ventral side is less convex at middle.

The populations of Shimizugawa-no-ana Cave and Iwaya-no-ana Cave are similar to each other, being characterized by the wide base of pronotum and the shape of aedeagus. The genae are similar to those in the Himesaka-kanachi-ana specimens or still less convex. The pronotum resembles that of the Himesaka-kanachi-ana specimens, but the base is markedly wider than that in the latter (the ratio of the greatest width to the width of apex ranging 1.50–1.61 (mean 1.55) in the population of Shimizugawa-no-ana Cave, 1.49–1.56 (mean 1.53) in the population of Iwaya-no-ana Cave; that to the width of base ranging 1.33–1.42 (mean 1.38) in the former population, 1.33–1.44 (mean 1.36) in the latter population; the ratio of the width of base to that of apex ranging 1.08–1.17 (mean 1.12) in both the populations). The elytra are a little wider than those in the type series and resemble those in the individuals of the Uyama-dô population. The aedeagus is relatively wide in

profile and gradually attenuated towards apex from middle. Its basal part is elongate and less bent towards the ventral side than that in the type series. The apical beak is more or less bent towards the ventral side.

It is Shimizugawa-no-ana Cave where there occur the largest individuals of this subspecies. The largest individual examined attains 6.6 mm in body length.

The Kanachi-ana population resembles the Uyama-dô population in many respects and almost agrees to the latter in the proportions of various parts of body. The apical beak of aedeagus is, however, longer and narrower than that in the Uyama-dô specimens. In the four populations of Himesaka-kanachi-ana Cave, Shimizugawa-no-ana Cave, Iwaya-no-ana Cave and Kanachi-ana Cave, there is a distinct tendency to lose the third dorsal pore on the third stria on one or two elytra (*cf.* Table 1).

Finally, the population of Kozumori-daini-dô Cave is different from the others in the shape of pronotum and of aedeagus. In this population, the pronotum is more strongly contracted anteriorly and much less so posteriorly than that in the type series. The pronotal base is therefore very wide. The ratio of the greatest width to the width of apex has a range 1.51–1.61, mean 1.56; that to the width of base ranging 1.28–1.40, mean 1.36; the ratio of the width of base to that of apex ranging 1.09–1.21, mean 1.15. The elytra are wider and a little shorter than those in the type series (the ratio of the width of elytra to that of pronotum ranging 1.57–1.64, mean 1.60; that of the length to the width of elytra ranging 1.61–1.66, mean 1.63). The humeral borders of elytra are somewhat less oblique than those in the type series. The aedeagus has an elongate basal part, which is not strongly bent towards the ventral side, and has a narrow apical beak which is well bent ventrally.

Trechiama (s. str.) **yokoyamai rectus** S. UÉNO, subsp. nov.

Length: 6.1–6.5 mm (from front margin of clypeus to anal end).

Subspecies of large size, characterized chiefly by the peculiar shape of its aedeagus.

Head wide, flat on dorsal side; both supraorbital areas and front evidently less convex and frontal furrows shallower than those in any of the other subspecies; eyes flat but relatively large; genae slightly convex, a little more than 1.5 times as long as eyes; neck wide; antennae fairly long, extending beyond the middle of elytra.

Pronotum distinctly less contracted behind than that of the typical form, 1.40–1.46 times wider than head (mean 1.43), 1.04–1.11 times wider than long (mean 1.08), widest at three-fifths to two-thirds from base according to individuals (usually widest at about two-thirds from base); the ratio of the greatest width to the width of apex ranging 1.48–1.58 (mean 1.54), that to the width of base ranging 1.35–1.40 (mean 1.38); lateral sides widely and moderately rounded in front, shortly but rather deeply sinuate just before hind angles; base distinctly wider than apex, the

ratio of the width of base to that of apex ranging 1.08–1.16 (mean 1.11); basal transverse impression relatively wide, usually without foveae near median line.

Elytra a little longer than those of the typical form, 1.50–1.64 times wider than pronotum (mean 1.58), 1.64–1.72 times longer than wide (mean 1.67), widest at about or a little before middle; humeral borders oblique as in *T. yokoyamai ishikawai*; lateral sides less rounded than those in the typical form; stria 3 always with two dorsal pores placed at one-ninth to one-seventh from base and about middle respectively, stria 5 always with one dorsal pore at one-fifth to two-ninths from base.

Aedeagus markedly different from those of the other subspecies in its straight tubular structure; elongate, not arcuate and relatively wide behind middle, with the dorsal side not regularly rounded and nearly parallel to the ventral side; basal part elongate and only weakly bent towards the ventral side, with a large sagittal aileron; basal orifice large, with lateral sides moderately emarginate; apical part prolonged into a narrow beak which is slightly bent towards ventral side; ventral side very slightly convex at middle; styles long.

Type-specimens: Described on the basis of 7 specimens, as listed below.

Holotype: ♂, allotype: ♀, paratypes: 1♂, 4♀♀ (17-VIII-1956, collected by S. UÉNO and preserved in his collection).

Type-locality: A limestone cave called "Ja-no-ana", Hina, at Kyôwa of Yoshii-chô, Okayama Prefecture, western Honshu.

So far as hitherto known, Ja-no-ana Cave is the southernmost locality within the range of *T. yokoyamai* (*cf.* Fig. 1). It belongs to the Shitsuki limestone area in the upper course of the Shigi-gawa River, that flows in the Oda-gawa and then into the Takahashi-gawa. There are two openings of the cave just above the water on the right side of the river, from where the cave gradually slopes downwards to the innermost which is choked by mud and gravel. The floor is largely clayey, having stones and gravels scattered on it. The habitat of the beetle is restricted to the dark zone, where it is found under stones or rotten boards which are kept on the wet muddy floor.

Table 1. Individual variation in the number of elytral dorsal pores.

Localities / Number of elytral dorsal pores*)	Hamada-gawa River	Mt. Daisen	Aidogô-no-kaza-ana Cave	Kozaru-ga-ana Cave	Natsumori-daiichi-dô Cave	Oni-no-iwaya Cave	Kômori-ana Cave	Marble-dô Cave	Ryûgû-dô Cave	Kimen-dô Cave	Rashômon Cave	Uyama-dô Cave	Maki-no-ana Cave	Himesaka-kanachi-ana Cave	Shimizugawa-no-ana Cave	Iwaya-no-ana Cave	Kanachi-ana Cave	Kozumori-daini-dô Cave	Ja-no-ana Cave
4, 4 ; 3, 3														1					
3, 3 ; 3, 3													1						
4, 4 ; 2, 3													1						
4, 3 ; 3, 2													1						
4, 3 ; 2, 3													1						
3, 3 ; 2, 3													1						
4, 3 ; 2, 2													4						
3, 4 ; 2, 2													2						
3, 3 ; 2, 2													1						
2, 3 ; 2, 2			1																
3, 4 ; 2, 1							1												
3, 3 ; 2, 1							4		1										
3, 3 ; 1, 2			3																
3, 2 ; 2, 1			1				1												
3, 2 ; 1, 2			1				1												
2, 3 ; 2, 1			1				1												
2, 3 ; 1, 2			1																
3, 4 ; 1, 1			1																
3, 3 ; 1, 1		4	79	2	1	4	39	3	3	2	5	7					3	6	
3, 2 ; 1, 1			11			3	4				1			3		1	3	1	
2, 3 ; 1, 1	1	1	11			1	3									1	4	1	
2, 2 ; 1, 1			6									1		10	8	14	7		7
Total number of specimens examined	1	5	116	2	1	8	54	3	4	2	6	8	12	14	8	16	17	8	7

*) The numbers of dorsal pores are arranged in the following order: that on stria 3 of right elytron, that on stria 3 of left elytron; that on stria 5 of right elytron, that on stria 5 of left elytron.

Example. Read the line 4, 3; 2, 3 as follows: 4 pores on stria 3 of right elytron, 3 pores on stria 3 of left elytron; 2 pores on stria 5 of right elytron, and 3 pores on stria 5 of left elytron.