

The Cave Trechids from the Central Part of the
Chûgoku District, Japan
III. The Group of *Trechiana oni* S. UÉNO¹⁾

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In one of his previous papers, the writer²⁾ described a new cavernicolous trechid, which was found in a small limestone cave in the upper course of the Asahi-gawa River. This species, named *Trechiana oni*, was conveniently placed in the subgenus *Pseudotrechiana*, though there were some doubts about the taxonomic position of that trechid. Later, the writer³⁾ gave a brief note on the relationships among the species-groups belonging to *Pseudotrechiana*, intimating that the group of *T. oni* was not only isolated within the subgenus but was different in the history of its distribution from the other species-groups. Since that time, new knowledges have been accumulated. Some features which were formerly considered to be fundamental have been proved to be of secondary importance. The degeneration of the setiferous dorsal pores on *third* elytral stria has become regarded as an evolutionary character, appearing in some groups of trechids irrespective of their phylogenetic relationships. The heterogeneity of *Pseudotrechiana* may be explained from this fact. There seems to be no direct connection between the group of *T. oni* and the groups of *T. habeii* and *T. chikaichii*. The writer is now of the opinion that the former group should have been derived from the ancestral form of the group of *T. ohshimai*. It should therefore be transferred to the subgenus *Trechiana* (s. str.).

The affinity of the group of *T. oni* to that of *T. ohshimai* may also be known from the patterns of their distribution. The latter group occupies an area surrounding Lake Biwa-ko, limited by the Suzuka mountain range in the east and by the western edge of the Tanba highlands in the west of the lake. *T. kosugei*, a representative of the former group, colonizes in the northern part of Kyoto Prefecture, near the western limit of the range of the latter group, from where the group spreads out

1) Contribution No. 18 from the Speleological Society of Japan.

2) UÉNO, S., 1955. Studies on the Japanese Trechinae (IV) (Coleoptera, Harpalidae). Mem. Coll. Sci. Univ. Kyoto, (B), 22, pp. 29-34.

3) UÉNO, S., 1957. Ibid., 24, pp. 183-184.

westwards along the Chûgoku mountain range. The range of the group of *T. oni* is therefore in the extension of that of the group of *T. ohshimai*. This fact supports the descent of these two species-groups. In middle Miocene, when the eastern part of the Chûgoku mountain range was in the form of a peninsula, the ancestors of the group of *T. oni*, which might have been separated from the ancestral form of the group of *T. ohshimai*, might find their way westwards on the ancient peninsula and might settle there. The range of distribution of the former group is therefore continuous into that of the latter, but is widely separated by a gap from that of the group of *T. pluto*, another ancient cavernicole found in western Chûgoku.

As noted in the first part of this series⁴⁾, an ancient cavernicole belonging to this group of trechid is found in the Taishaku limestone area. The species is, however, quite distinct from the other two in having the inverse state of elytral dorsal pores, three pores being present on the third stria and no pore on the fifth. If the presence or absence of dorsal pores on the fifth elytral stria were regarded as having a primary importance, this species would be placed in the genus *Trechus*, belonging to a different phyletic group. The systematic position of this species is, however, clearly indicated by the combination of the other features. There seems hardly to be any doubt concerning the affinity between the Taishaku species and *Trechiamia oni*.

The discriminative characters of the group of *Trechiamia oni* may be summarized as follows :

Body elongate and glabrous, with fore body not strongly narrowed ; depigmented and anophthalmic ; genae glabrous ; mentum tooth variable ; pronotal hind angles large and sharp ; elytra elongate, entirely but superficially striate ; scutellar striole short ; apical striole deep, joining or almost joining stria 5 ; setiferous dorsal pores present either on stria 5 or on stria 3, but not on both the striae ; preapical pore situated at the meeting point of striae 2 and 3 ; humeral group of umbilicate pores regular and aggregated ; anal sternite with one seta in ♂, two in ♀ on each side ; protibiae externally grooved ; aedeagus more or less short and robust ; sagittal aileron usually small ; inner sac with or without developed copulatory piece, but always with one or two groups of large teeth.

Key to the species

- 1 (4) Elytral stria 5 with two setiferous dorsal pores, no dorsal pore on stria 3 ; copulatory piece absent.
- 2 (3) Pronotal postangular seta present ; pronotum more transverse, with basal sinuation at two-ninths from base ; aedeagus shorter and robuster ; aedeagal apical lamella subtriangular, with a tubercle at the extremity ; (environs of Maizuru, endogean) *T. kosugei* S. UÉNO.

4) UÉNO, S., 1958. Mem. Coll. Sci. Univ. Kyoto, (B), 25, p. 181.

- 3 (2) Pronotal postangular seta absent; pronotum less transverse, with basal sinuation at one-sixth from base; aedeagus longer; aedeagal apical lamella long and somewhat spatulate, with apex widely rounded; (Katsuyama-chō, cavernicole) *T. oni* S. UÉNO.
- 4 (1) Elytral stria 5 without dorsal pore, stria 3 with three setiferous dorsal pores⁵⁾; pronotal postangular seta present; copulatory piece present; (Taishaku limestone area, cavernicole) *T. insolitus* sp. nov.

Trechiana (s. str.) kosugei S. UÉNO.

Trechiana (Pseudotrechiana) kosugei S. UÉNO, 1955, Mem. Coll. Sci. Univ. Kyoto, (B), 22, p. 33, fig. 3; type-locality: Magura near Maizuru in Kyoto Pref.

No further record.

Trechiana (s. str.) oni S. UÉNO.

Trechiana (Pseudotrechiana) oni S. UÉNO, 1955, Mem. Coll. Sci. Univ. Kyoto, (B), 22, p. 30, figs. 1-2; type-locality: Oni-no-ana Cave at Kōjiro in Okayama Pref.

This species was originally described on the basis of a single male. A second specimen was taken by ISHIKAWA in a small limestone cave situated at about 3 km ENE of the type-locality.

Specimens examined: 1 ♂ (holotype) (Oni-no-ana Cave, 19-VIII-1955, collected by S. UÉNO); 1 ♀ (Kanba-no-oni-no-ana Cave, 13-VIII-1956, by J. ISHIKAWA).

Both the specimens are preserved in the writer's collection.

Localities: A limestone cave called "Oni-no-ana", at Kōjiro, and a limestone cave called "Kanba-no-oni-no-ana", at Kanba; both in Katsuyama-chō, Okayama Prefecture, on the central massif of the Chūgoku district, western Honshu.

The second specimen collected by ISHIKAWA is somewhat different from the holotype. Being unable to examine any other specimen, it is impossible for the writer to decide whether the difference is sexual or geographical. The matter in question is as given below.

Somewhat larger than the holotype; length: 5.9 mm (from front margin of clypeus to anal end). Frontal furrows a little deeper in front than those in the holotype; mentum tooth stout, slightly bifid at the tip; antennae shorter, reaching apical two-fifths of elytra. Pronotum more transverse and widest more in front than that of the holotype, 1.45 times wider than head, 1.07 times wider than long, widest at about two-thirds from base; the ratio of the greatest width to the width of apex 1.48; lateral sides a little more strongly rounded in front than those in the

5) Rarely, four setiferous dorsal pores present on one elytron.

holotype, sinuate at one-sixth from base; apex about as wide as base. Elytra a little wider and shorter than those of the holotype, 1.70 times wider than pronotum, 1.55 times longer than wide, widest at a little before middle; lateral sides a little more strongly rounded; apical striole longer than that in the holotype, extending beyond the level of preapical pore; stria 5 with two dorsal pores at about one-sixth and three-fifths from base respectively. Anal sternite with two setae on each side in ♀.

Trechiamia (s. str.) **insolitus** S. UÉNO, sp. nov.

Length: 5.6-6.1 mm (from front margin of clypeus to anal end).

Body elongate and depigmented, translucent when alive; surface glabrous. Colour reddish brown, shiny and somewhat iridescent; palpi pale; apical segments of antennae, apical sternites and legs more or less paler than the body.

Head quadrate, with frontal furrows deep throughout and not angulate at middle; supraorbital areas and front moderately convex; microsculpture well marked, formed mostly by wide meshes; eyes not faceted, the trace of them perceptible by a patch situated at a position a little behind the insertion of each antenna; genae gently convex and glabrous; neck constriction fairly deep; mandibles slender, slightly hooked at apices; mentum tooth large and wide, distinctly bifid or at least emarginate at the tip; ligula rounded at apex, paraglossae very narrow and extending well beyond ligula; palpi slender, both apical and penultimate segments thin; antennae fairly long and slender, reaching apical three-eighths of elytra, with segment 3 slightly less than twice as long as segment 2 and about as long as segment 4.

Pronotum cordate and convex, 1.42-1.46 times wider than head (mean 1.45), 1.06-1.16 times wider than long (mean 1.10), widest at about two-thirds from base; the ratio of the greatest width to the width of apex ranging 1.46-1.58 (mean 1.53), that to the width of base 1.34-1.40 (mean 1.36); lateral sides rather widely explanate and reflexed, widely and moderately rounded in front (the curvature variable to a certain extent according to individuals), widely but not very deeply sinuate at one-sixth to one-seventh from base; marginal gutters fairly wide throughout; both lateral and postangular setae present, the latter of which is removed a short distance forwards; apex nearly straight or slightly emarginate; base 1.09-1.16 times wider than apex (mean 1.12), widely emarginate and sometimes slightly bisinuate; front angles hardly advanced and moderately rounded; hind angles acute, projecting both laterally and posteriorly; median line clearly impressed, not reaching apex but widening near base; apical transverse impression shallow, more or less wrinkled longitudinally; basal transverse impression deep and continuous, with a shallow (sometimes vague) fovea on each side of median line, merging on each side into deep basal fovea, which is more or less uneven and extends anteriorly; postangular carina rather long though obtuse; surface impunctured, with vague transverse striations, basal area rugose; microsculpture formed by fine, irregularly transverse lines but partly obliterated.

Elytra oblong-ovate and convex, with basal part more or less depressed, 1.53–1.56 times wider than pronotum (mean 1.55), 1.60–1.68 times longer than wide (mean 1.65), widest at a little before middle; shoulders widely rounded, a little more prominent than those in *T. oni*; lateral sides widely explanate and reflexed,

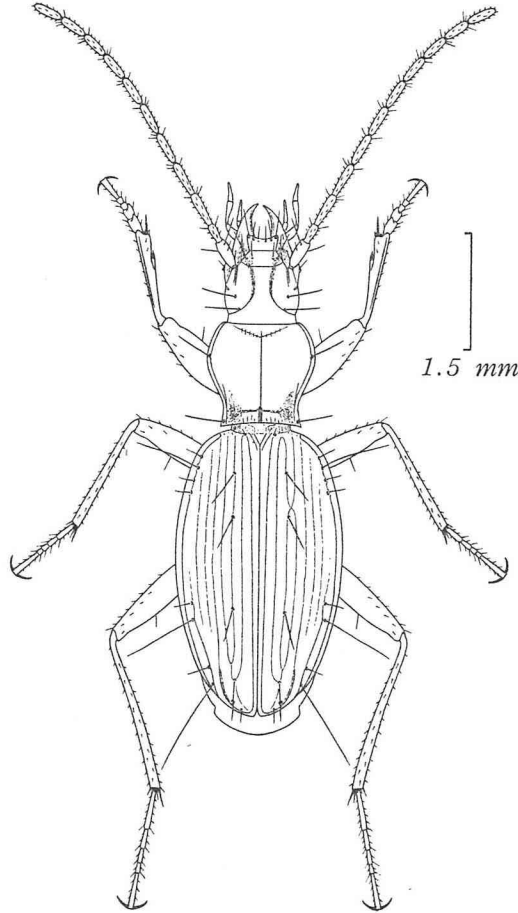


Fig. 1. *Trechiana* (s. str.) *insolitus* sp. nov., ♂, of Hakuun-dō Cave.

with wide marginal gutters, weakly rounded at middle, only very slightly emarginate before apices, each one of which is usually subangulate; striae entire, distinctly crenulate, moderately impressed on the disk but faint on the sides, striae 1–5 deepening near base, stria 8 nearly obsolete before the middle group of marginal

umbilicate pores; scutellar striole short though evident; apical striole relatively long, nearly straight, deeply impressed throughout and joining stria 5; intervals slightly convex on the disk but flat on the sides, apical carina prominent; stria 3 with three setiferous dorsal pores, situated at one-eleventh to one-eighth, two-ninths to two-sevenths and one half to two-thirds from base respectively; stria 5 without dorsal pore; preapical pore placed on the meeting point of striae 2 and 3 evidently behind the level of the termination of apical striole; microsculpture composed of fine transverse lines but indistinct.

Ventral surface glabrous; sternites 3-5 usually with two setae on each side of median line, sometimes with a single seta on one side, and rarely with one seta on each side; anal sternite with one seta in ♂, two in ♀ on each side. Legs long

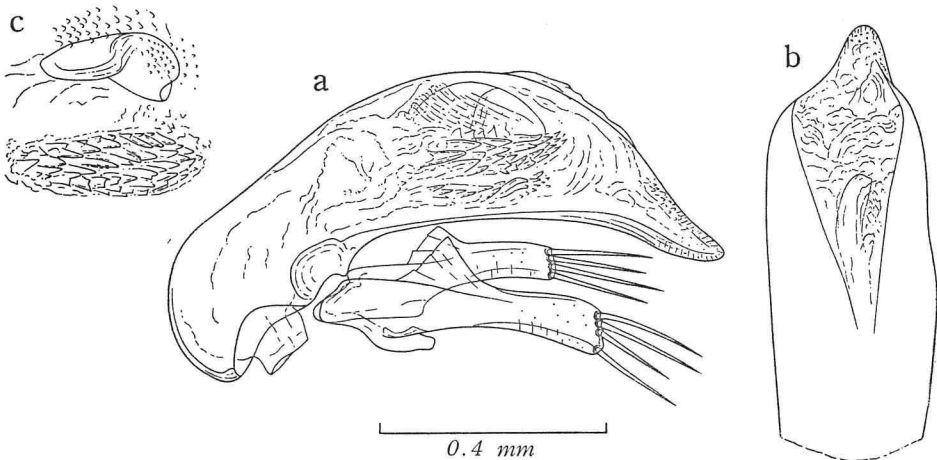


Fig. 2. Male genital organ of *Trechiama insolitus* sp. nov., of Hakuun-dō Cave; left lateral view (a); apical part of aedeagus, dorsal view (b); and, inner sac, showing copulatory piece and the anterior group of large teeth (c).

and slender; protibiae externally grooved; vestige of a few minute pubescence sometimes perceptible on the anterior face of apical part of each protibia; tarsal segment 4 with a long ventral apophysis in pro- and mesotarsi; in ♂ protarsal segments 1 and 2 widely dilated and well produced inwards at apices.

Male genital organ well chitinized. Aedeagus short and robust, not strongly arcuate, widest at about middle and attenuated towards apex; dorsal side semicircularly rounded; basal part elongate and not strongly bent towards ventral side, with large basal orifice, of which lateral sides are deeply emarginate; sagittal aileron very small and sometimes invisible; apical part gently bent towards ventral side and slightly turned up at the tip, which is blunt; in dorsal aspect, apical part suddenly narrowed into a short snout, which is rounded at the extremity; ventral

side slightly concave. Inner sac armed with a copulatory piece and two groups of large teeth; copulatory piece fairly large, of the shape of twisted spatula, situated at the middle inside the sac with the concave side facing the right wall; a larger group of large teeth placed at the left side of copulatory piece and longitudinally folded; a smaller group of teeth situated near apical orifice. Styles wide especially at apices, left style obviously longer than the right, each provided with four apical setae.

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

Holotype: ♂, allotype: ♀ (Hakuun-dō Cave, 21-VIII-1953, collected by S. UÉNO). Paratypes: 1 ♂⁶⁾ (Hakuun-dō Cave, 21-VIII-1953, by S. UÉNO); 3 ♂♂, 1 ♀⁷⁾ (Oni-no-iwaya Cave, 21-VIII-1953, by S. UÉNO).

Further specimens examined: 2 ♂♂, 2 ♀♀ (Onjaku-dō Cave, 23-VIII-1953, by S. UÉNO); 1 ♀⁸⁾ (Amagō-dō Cave, 22-VIII-1953, by S. UÉNO).

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

Type-localities: A limestone cave called "Hakuun-dō", at Taishaku, and a limestone cave called "Oni-no-iwaya", at Kami-Taishaku; both in Tōjō-chō, Hiroshima Prefecture, on the central massif of the Chūgoku district, western Honshu.

Other localities: A limestone cave called "Onjaku-dō", at Nagano, and a limestone cave called "Amagō-dō", at Amagō; both in Nagato of Jinseki-chō, Hiroshima Prefecture.

All the four limestone caves listed above are distributed in the Taishaku limestone area. Two of them, the type-localities, are situated on the left side of the Taishaku-gawa, while the other two, the Caves Onjaku-dō and Amagō-dō, are found on the right side of the ravine. The trechid is found in the depths of these caves, usually near the innermost, where it inhabits under stones or rotten boards placed on muddy floors.

The peculiar arrangement of elytral dorsal pores and the presence of the trace of minute pubescence on the anterior face of protibia are the striking features shown by *T. insolitus*. The latter feature may indicate that the genus *Trechiana* may have been derived from the ancestors that had pubescent protibiae. A similar example towards the evolution of the same group of trechids has been found in the genus *Rakantrechus*, in which the protibiae are usually glabrous on the anterior face but are entirely pubescent in the subgenus *Yamautidius*⁹⁾. The condition of pubescence on the protibiae has usually been adopted in discriminating the phyletic

6) This specimen is a callow.

7) Of these, 1 ♂ and 1 ♀ are teneral.

8) This is a single known specimen taken in Amagō-dō Cave. Unfortunately, however, it is not fully mature.

9) UÉNO, S., 1957. Mem. Coll. Sci. Univ. Kyoto, (B), 24, pp. 186-187.

groups of European trechids. In such an archaic group as the phyletic series of *Trechiana*, however, many characters are not fixed to some definite direction. Thus, the same characteristics as those distinguishing Continental genera are not always available for the classification of Japanese trechids.

There are found some slight difference between the populations of the type-localities and those of the caves situated on the right side of the Taishaku-gawa. This is the reason why the writer has eliminated from the type series the specimens from the latter populations.

The individuals of the Onjaku-dô population are slightly smaller than the type series (5.2-5.8 mm in length), having shorter pronotum which is a little more strongly contracted behind. The ratio of the width of pronotum to that of head ranges 1.33-1.45 (mean 1.39), that of the width to the length of pronotum 1.10-1.15 (mean 1.13); the greatest width to the width of apex ranges 1.43-1.55 (mean 1.50), that to the width of base 1.38-1.45 (mean 1.43); the ratio of the width of pronotal base to that of apex 1.00-1.12 (mean 1.05). The pronotal lateral sides are a little more strongly rounded in front than those in the type series and sinuate at one-sixth from base. The elytra are 1.48-1.56 times wider than pronotum (mean 1.51), 1.61-1.69 times longer than wide (mean 1.65), with the shoulders less effaced than those in the type series.

No detailed comparison has been made between the Amagô-dô specimen and the specimens from the other populations, because of the immaturity of the former. Amagô-dô Cave is, however, more apart from the type-localities than Onjaku-dô Cave is. It is very probable that the existence of some difference will be confirmed in future between the Amagô-dô population and the typical ones.