

New Cave Trechids from the Gokasé-gawa  
Drainage Area of Kyushu<sup>1)</sup>

By

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In the present paper, a new subgenus *Paratrechiamia* will be established as the fifth group of *Rakantrachus*, chiefly on the basis of the presence of a basal setiferous pore on the fifth elytral stria. It has a wide range of distribution, which covers almost all parts of the limestone cave area in central Kyushu. There is, however, a considerable difference in the grade of subterranean evolution between the two extremes of this subgenus. Highly evolved species are alike *Rakantrachus* (s. str.) or *Yamautidius* in appearance, while some of the less evolved ones resemble *Uozumitrechus* in body form and in colour. There may be distinguishable within the subgenus five distinct species-groups, one of which, spread over the upper courses of the Gokasé-gawa and the Kita-gawa Rivers, seems to the writer to be a legitimate one and is designated as to comprise the type-species. It will be called the group of *Rakantrachus kurosai*, of which the species spread over the Gokasé-gawa drainage will be enumerated in this paper.

The writer's hearty thanks are due to Prof. Kenji NAKAMURA for his kind supervision during the course of the present study; to Professors Jūjirō ISHIKAWA and Riozo YOSII as well as to Dr. Kazuyoshi KUROSA and the late Mr. Sigeru NOMURA for their kindness in aiding him at field works or in giving him many useful information.

***Paratrechiamia* S. UÉNO, subgen. nov.**

*Type-species*: *Rakantrachus kurosai* S. UÉNO, sp. nov.

Discriminated from all the other four subgenera chiefly by the presence of two setiferous dorsal pores on elytral stria 5. Further, this new subgenus is distinguished from *Yamautidius* by the absence of pubescence on the anterior face of the apical part of each protibia, from *Pilosotrechiamia* by the glabrous body surface, from *Rakantrachus* (s. str.) by the absence of developed copulatory piece (except-

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ing two undescribed new species of the caves in Kumamoto Prefecture), and from *Uzomitrechus* by the shape of its aedeagus.

A full description of *Paratrechiana* will be given after the representatives of all the five species-groups will be described.

**Rakantrechus (Paratrechiana) kurosai** S. UÉNO, sp. nov.

Length: 3.6–4.1 mm (from front margin of clypeus to anal end).

Colour reddish brown, shiny, translucent when alive; palpi pale; antennae becoming somewhat paler towards apices; elytra more or less lighter than the fore body; apical sternites and legs yellowish brown.

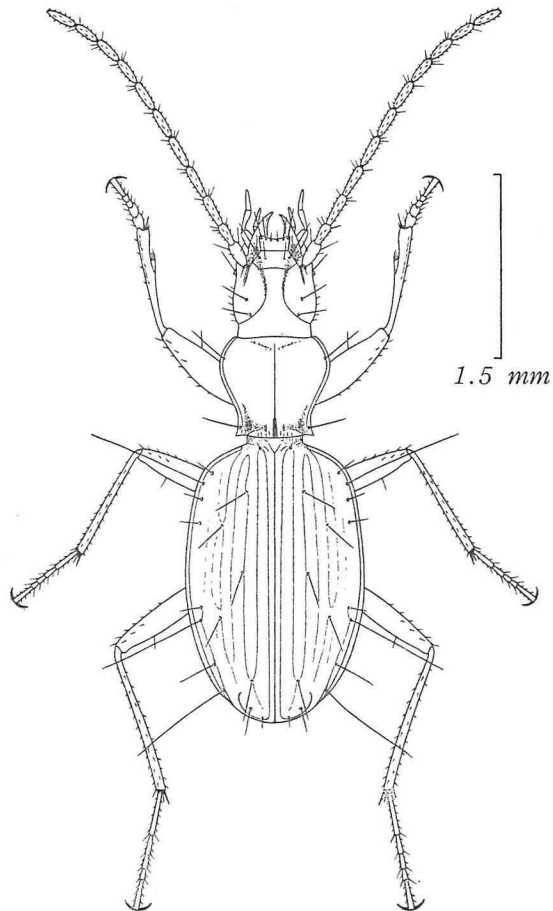


Fig. 1. *Rakantrechus (Paratrechiana) kurosai* subgen. et sp. nov., f. typ., ♂, of Tsugenotaki-dô Cave.

Head subquadrate, with supraorbital areas and front moderately convex; frontal furrows deep throughout and not strongly curved at middle; microsculpture distinct, formed mostly by wide meshes; genae gently convex and sparsely pubescent; mandibles slender, especially in ♀, and slightly hooked at apices; mentum tooth fairly elongate, narrowly truncated or slightly emarginate at the tip in the majority of the specimens examined, but simple in rare cases; palpi fairly slender, with apical segments subacuminate towards the tips; penultimate segment of maxillary palpus well tumid in apical two-thirds; antennae long but fairly stout, longer in ♂ than in ♀, reaching apical two-fifths of elytra in ♂, extending slightly beyond the middle of elytra in ♀, with segment 3 about as long as segment 4 and nearly 1.5 times longer than segment 2.

Pronotum cordate and convex, 1.28-1.34 times wider than head (mean 1.30), 1.05-1.10 times wider than long (mean 1.08), widest at three-fourths to five-sevenths from base; the ratio of the greatest width to the width of apex ranging 1.35-1.44 (mean 1.41); lateral sides narrowly bordered and reflexed, with marginal gutters even and close to the side borders, moderately rounded in front, deeply sinuate at one-fifth to one-sixth from base; postangular seta situated at about one half of the way from the tip of hind angle to the sinuation; apex slightly emarginate or slightly bisinuate; base nearly as wide as apex or somewhat narrower than that in most of the individuals examined, but a little wider than apex in a few specimens, nearly straight at middle and distinctly emarginate on each side just inside hind angle; front angles slightly advanced and rounded; hind angles very sharp, well projecting both outwards and backwards; median line distinct, not reaching apex but widening and deepening near base; apical transverse impression shallow, with vague longitudinal wrinkles; basal transverse impression wide, interrupted on each side of median line by a deep longitudinal fovea, merging on each side into deep basal fovea, which is not very large but extends anteriorly along the side border; postangular carina absent; surface smooth, with vague, irregularly transverse striations; microsculpture composed of fine transverse lines. The expansion of the ventro-lateral sides of prothorax only very slightly visible from above.

Elytra ovate and convex, 1.60-1.69 times wider than pronotum (mean 1.65), 1.46-1.54 times longer than wide (mean 1.50), widest at about middle; shoulders distinct though widely rounded; lateral sides rather narrowly explanate and reflexed, gently rounded at middle and slightly emarginate before apices, which are rounded; striae superficial, inner striae entire, distinctly crenulate and deepening near base, striae 6-7 obliterated, stria 8 visible only in apical part; scutellar striole vestigial: apical striole short, though fairly deep and well curved, suddenly interrupted at the end and apparently directed to the termination of stria 5; intervals flat, except interval 1 which is moderately convex in basal half, apical carina rather obtuse; stria 3 with two dorsal pores placed at basal one-seventh to one-sixth and basal two-fifths to the middle respectively, stria 5 with two dorsal pores at one-fourth to two-sevenths and three-fifths to two-thirds from base respectively; preapical pore situated at the meeting point of striae 2 and 3 a good distance before the termination

of apical striole; humeral group of umbilicate pores irregular and not aggregated, pore 1 somewhat distant from marginal gutter, pores 3 and 4 widely distant from marginal gutter, and pore 4 more or less isolated from the other three; microsculpture formed by fine transverse lines but rather indistinct.

Ventral surface glabrous and smooth; anal sternite with one seta on each side in ♂, two in ♀. Legs long and slender; each protibia with a slight external groove, sparsely pubescent on the external face but glabrous on the anterior face even on its apical portion; in ♂, protarsal segments 1 and 2 widely dilated and well produced inwards at apices.

Male genital organ small and moderately chitinized. Aedeagus relatively short and wide, gently arcuate, and attenuated towards apex which is widely rounded; basal part only weakly bent towards the ventral side, with a small sagittal aileron; lateral sides of basal orifice slightly emarginate; ventral side not deeply but evenly concave. Inner sac without developed copulatory piece but covered with weakly chitinized scales, a group of large teeth present on the left side inside the sac just before the middle. Styles fairly wide, left style obviously longer than the right, each with four setae at apex.

*Type-specimens*: Holotype: ♂, allotype: ♀ (Tsugenotaki-dô Cave, 20-XI-1957, collected by S. UÉNO). Paratypes: 2 ♂♂ (Tsugenotaki-dô Cave, 3-VIII-1954, by J. ISHIKAWA); 2 ♂♂, 1 ♀ (Tsugenotaki-dô Cave, 22-III-1955, by R. YOSHI); 4 ♂♂, 6 ♀♀<sup>2)</sup> (Tsugenotaki-dô Cave, 20-XI-1957, by S. UÉNO); 1 ♀ (Taikoïwa-dô Cave, 20-XI-1957, by S. UÉNO).

All the type-specimens are preserved in the writer's collection.

*Type-localities*: Two limestone caves called "Tsugenotaki-dô" and "Taikoïwa-dô", at Kuronita, Takachiho-chô, Miyazaki Prefecture, on the central massif of the Island of Kyushu.

The present new species is dedicated to Mr. Kazuyoshi KUROSA, who investigated for the first time the cave faunas of eastern and central Kyushu. There are four populations of this species, of which the two are geographically very close and quite identical. The remaining two populations are, however, obviously allopatric and may belong to two different subspecies, the descriptions of which will be found on the later pages.

Tsugenotaki-dô Cave is a celebrated grotto in the vicinities of the town of Takachiho-chô. It is situated at about 5 km south of Mitai, on the right side of a brook that flows in the Gokasé-gawa River at the right side. Its mouth is open at the foot of a large outcrop of limestone, facing the north. The cave consists of a horizontal main gallery and several sloping branches. Near the innermost of the former, where the cave floor is largely of silt, there is a groove made by erosion in the past days. Most of the specimens of the trechid were found either on the bottom or on the sides of this ditch-like groove, where they hid themselves under stones or in the crevices of clay.

2) Of these 10 paratypes, 1 ♂ and 3 ♀♀ are teneral.

Taikoïwa-dô Cave is situated at the higher part of the slope, where there is found Tsugenotaki-dô Cave at the lower part. This is also a horizontal cave, but is much smaller and drier than Tsugenotaki-dô Cave. Only a single known specimen of the trechid was found at the innermost, where there was relatively wet in its whole extent.

**Rakantrechus (Paratrechiamia) kurosai maeander** S. UÉNO, subsp. nov.

Length: 3.5–4.1 mm (from front margin of clypeus to anal end).

Distinguished from the typical form chiefly by the shape of the humeral part of elytra.

Head similar to that of the typical form. Pronotum a little more transverse, 1.30–1.34 times wider than head (mean 1.33), 1.09–1.14 times wider than long (mean 1.11), widest at about three-fourths from base; the ratio of the greatest width to the width of apex ranging 1.39–1.42 (mean 1.40); apex usually a little wider than base but rarely as wide as the latter, the ratio of the width of apex to the width of base ranging 1.00–1.07 (mean 1.04).

Elytra relatively narrow and elongate, 1.59–1.66 times wider than pronotum (mean 1.61), 1.50–1.56 times longer than wide (mean 1.53), widest at about middle; shoulders more clearly marked and more narrowly rounded than those in the typical form, with prehumeral borders more oblique and straight; lateral sides nearly straight behind shoulders, gently rounded at middle and slightly emarginate before apices; striae more or less shallower than those in the typical form, stria 3 with two dorsal pores at one-eighth to one-seventh and three-eighths to two-fifths from base respectively, stria 5 also with two dorsal pores at about one-fourth and four-sevenths to three-fifths from base respectively; preapical pore situated at the meeting point of striae 2 and 3 widely distant from the level of the termination of apical striole (as in the typical form).

Aedeagus similar to that of the typical form, but with apical part somewhat narrower and with the sagittal aileron obviously larger.

*Type-specimens*: Holotype: ♂, paratypes: 4 ♂♂ (24-III-1955, collected by R. YOSII and preserved in UÉNO's collection).

*Type-locality*: A limestone cave called "Nanaoré-dô", at Tokuzumi, Hinokagé-chô, Miyazaki Prefecture, on the central massif of the Island of Kyushu.

Nanaoré-dô Cave is situated on the left side of the Gokasé-gawa River at about 6.5 km NE of Tsugenotaki-dô Cave and about 8.5 km east of Chichi-no-iwaya Cave. It lies, therefore, at the opposite side over the deep ravine of the main course of the Gokasé-gawa from the Caves Tsugenotaki-dô and Chichi-no-iwaya. The writer has no opportunity to visit the cave up to the present. According to Prof. YOSII, however, the trechid was found by him under rotten boards which were placed at a very wet part in the depth of the cave.

**Rakantrechus (Paratrechiamia) kurosai lactarius** S. UÉNO, subsp. nov.

Length: 3.4–3.8 mm (from front margin of clypeus to anal end).

Relatively small in size and distinguished from the typical form and subsp. *maeander* chiefly by the ovaler form of elytra, lateral sides of which are evidently contracted towards shoulders.

Head and pronotum quite similar to those of the typical form; antennae reaching apical two-fifths of elytra in ♂, extending a little beyond the middle of elytra in ♀ (as in the typical form); pronotum 1.27–1.32 times wider than head (mean 1.30), 1.07–1.11 times wider than long (mean 1.10), widest at three-fourths to five-sevenths from base; the ratio of the greatest width of pronotum to the width of apex ranging 1.38–1.43 (mean 1.41); pronotal apex always a little wider than base, the ratio of the width of apex to the width of base ranging 1.04–1.07 (mean 1.05).

Elytra oval and convex, contracted both in front and behind, 1.63–1.69 times wider than pronotum (mean 1.66), 1.45–1.53 times longer than wide (mean 1.49), widest at about middle; shoulders a little less evident than those in the typical form or in subsp. *maeander*, with prehumeral borders oblique as those in subsp. *maeander*; lateral sides rather strongly rounded from behind shoulders to apices, with the pre-apical emargination very slight; striae shallower even than those in subsp. *maeander*, stria 3 with two dorsal pores at one-eighth to one-seventh and two-fifths to one half from base respectively, stria 5 also with two dorsal pores at one-fourth to two-sevenths and three-fifths to two-thirds from base respectively; preapical pore situated on the meeting point of striae 2 and 3, which is found on the level of the termination of apical striole or a little before that level; the distance between the level of preapical pore and that of the termination of apical striole more or less smaller than in the typical form or in subsp. *maeander*.

Aedeagus similar to that of subsp. *maeander*, but a little narrower.

*Type-specimens*: Holotype: ♂, allotype: ♀ (20-XI-1957, collected by S. UÉNO). Paratypes: 1 ♂, 1 ♀ (21-III-1955, by R. YOSHII); 3 ♂♂<sup>3)</sup> (20-XI-1957, by S. UÉNO).

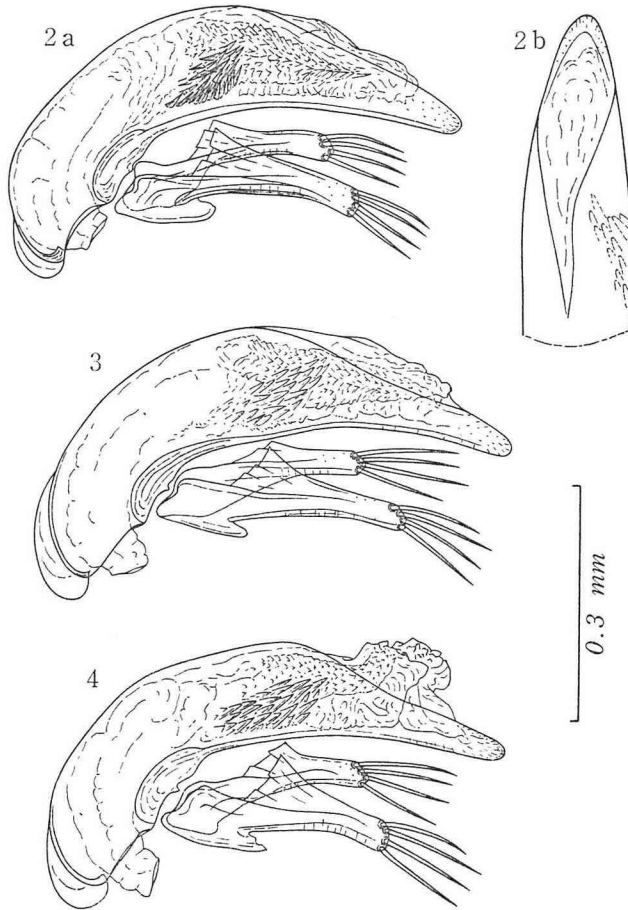
All the type-specimens are deposited in the writer's collection.

*Type-locality*: A limestone cave called "Chichi-no-iwaya"<sup>4)</sup>, at Kodaniuchi, Takachiho-chô, Miyazaki Prefecture, on the central massif of the Island of Kyushu.

Chichi-no-iwaya Cave is a small grotto, situated at about 4.5 km NW of Tsugenotaki-dô Cave. It is therefore not so remote from the latter in a bee-line, but belongs to the drainage of another branch of the Gokasé-gawa. These two caves are separated from one another by a distance of 12.5 km, when measured along water courses. The entrance of Chichi-no-iwaya Cave is found in a bush at the foot of an outcrop of limestone on the left side of the brook. It is a peculiar cave, developing between the limestone and the underlying rocks, so that the floor is not of limestone, especially in the depth. The trechid was found in the dark zone, walking among pebbles on the sloping floor. It was not very active and easily captured with an aspirator.

3) Of these, 1 ♂ is teneral.

4) Sometimes called "Chichi-ga-iwaya".



Figs. 2-4. Male genital organ. — 2. *Rakantrechus (Paratrechiana) kurosai* subgen. et sp. nov., f. typ., of Tsugenotaki-dô Cave; left lateral view (a), and apical part of aedeagus, dorsal aspect (b). — 3. *R. (P.) kurosai maeander* subsp. nov., of Nanaoré-dô Cave; left lateral view. — 4. *R. (P.) kurosai lactarius* subsp. nov., of Chichi-no-iwaya Cave; left lateral view.

***Rakantrechus (Paratrechiana) constrictus* S. UÉNO, sp. nov.**

Length: 3.5 mm (from front margin of clypeus to anal end).

Closely allied to *R. kurosai*, but different from the latter chiefly in the shape of pronotum, which is more transverse and much more strongly contracted behind.

Concolorously yellowish brown in the holotype. This single specimen examined is, however, not fully mature; the confirmation of body colour is desirable.

Head large, a little more transverse than that of *R. kurosai*, with more convex

genae; frontal furrows widely distant from one another; mentum tooth simply triangular, with the tip blunt; antennae somewhat longer than those in *R. kurosai*, reaching apical two-fifths of elytra in ♀.

Pronotum evidently shorter than that of *R. kurosai*, with much narrower base, 1.29 times wider than head, 1.19 times wider than long, widest at about three-fourths from base; the ratio of the greatest width to the width of apex 1.40, that to the width of base 1.70; lateral sides strongly rounded in front, widely and moderately sinuate at about basal one-fifth; apex widely but not deeply emarginate, 1.21 times wider than base, which is nearly straight; front angles slightly advanced and rounded; hind angles acute, hardly projecting outwards but salient backwards; other features similar to those in *R. kurosai*.

Elytra<sup>5)</sup> oblong-oval, a little narrower and longer than that of *R. kurosai*, 1.57 times wider than pronotum, longer than wide in a same proportion, widest at about middle; shoulders less marked than those in *R. kurosai*, with prehumeral borders very oblique and nearly straight; lateral sides gently rounded at middle and hardly emarginate before apices; striae very shallow and obliterated on the sides, where they are marked by rows of minute punctures; scutellar striole absent, apical striole deep; intervals flat, apical carina evident but obtuse; stria 3 with two dorsal pores at one-sixth and three-sevenths from base respectively, stria 5 also with two dorsal pores at two-sevenths and two-thirds from base respectively; preapical pore situated at the meeting point of striae 2 and 3 slightly before the level of the termination of apical striole; the first pore of the humeral group of umbilicate series removed a little more backwards than in *R. kurosai*.

Legs similar to those of *R. kurosai*.

Male unknown.

*Type-specimen*: Holotype: ♀ (21-XI-1957, collected by S. UÉNO and preserved in his collection).

*Type-locality*: A limestone cave called "Shirataki-dô"<sup>6)</sup>, at Nishinouchi, Iwato-mura, Miyazaki Prefecture, on the central massif of the Island of Kyushu.

Shirataki-dô Cave is situated at about 10 km NNE of Nanaoré-dô Cave. Its mouth is found at the foot of a large outcrop of limestone on the right side of the Iwato-gawa, that flows in the Gokasé-gawa at the left side. The cave is not very large, being formed by a narrow ascending corridor, a steep winding passage and an innermost (and uppermost) room. The floor is relatively dry at the lower parts, where there were found many springtails, diplopods and pseudoscorpions. The trechid was, however, obtained at a wet place a half way up the winding passage, where it was found under a large stone, coexisting with a tanypleurine pselaphid.

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5) In the holotype in the dried state, the elytra and the sternites are somewhat deformed due to immaturity. The description of elytra given above was made in a rehydrated state in using heated 50% acetic acid.

6) Cited by YOSII (1956) as "Nishinouchi-dô"; erroneously by MORIKAWA (1957) as "Kanmachidani-dô".