

Two New Subterranean Trechines (Coleoptera, Trechinae) from Southwestern Hokkaido, Northeast Japan¹⁾

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Abstract Two new subterranean trechine beetles are described from the Pacific side of the Oshima Peninsula in southwestern Hokkaido, Northeast Japan. One of them, named *Epaphiopsis (Epaphiama) gracilentata*, is endogean and oligophthalmic, while the other, named *Accoella thermalis*, is upper hypogean and anophthalmic. They occur in the same colluvia along a stream, but at different depth. The male genitalic characters of the genus *Accoella* are first introduced into science.

Five years ago, a very strange anophthalmic trechine beetle was reported under the name *Accoella akirai* on the basis of a single female specimen unexpectedly collected at the southwestern tip of the Oshima Peninsula in southwestern Hokkaido (UÉNO, 1990, p. 170, fig. 1), with the comment that its true affinity was indeterminable at that time. In the same paper, another blind trechine, *Epaphiopsis (Epaphiama) oligops*, which had theretofore been considered endogean in the alpine zone, was recorded from the upper hypogean zone of the same locality. Since then, nothing new has been added to our knowledge of the monotypical genus *Accoella* in spite of careful searches continuously made by its discoverer.

In the summer of 1994, Masaaki NISHIKAWA visited a hot spring lying at the other side of the Oshima Peninsula, and came across a habitat of an oligophthalmic species of *Epaphiama* at the side of a nearby stream. While collecting this trechine beetle, he was surprised to find an individual of a large anophthalmic species, which looked to him as a member of *Accoella*. He then submitted all his collection to me for taxonomic investigation. His expectation was fulfilled by my study of the specimen; it proved to be a second species of the problematical genus. Unfortunately, however, the single specimen known was a female as in the case of the type species, so that further searches were needed for clarifying the systemaic status of the genus. At my request, Shinzaburo SONE made an intensive survey in that area about a month after NISHIKAWA's discovery, and finally succeeded in obtaining long-awaited males of *Accoella*. I myself found an opportunity to pay a visit to the collecting site early in

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the summer of this year, and with the aid of Dr. Akiko SAITO, carefully examined the condition of existence of the two trechines in question.

Before the present discovery, subterranean trechines in southwestern Hokkaido were known from only the Oshima Mountains arcuately stretching from north to south along the axis of the Oshima Peninsula. The new locality of *Epaphiama* and *Accoella* near the hot spring lies at the eastern foot of the Kameda Hills on the Kameda Sub-peninsula, which are separated from the Oshimas by the recent volcano Koma-ga-také, the Oh-numa lake area and the Hakodaté Plain. As is readily understood from this topography, the new locality is so isolated from those of the previously known species, that speciation of subterranean trechines between them is naturally expected. This is amply verified at present, though the two species are closely related beyond doubt to the forms occurring on the southern part of the Oshimas.

In the present paper, the two new species will be described under the names *Epaphiopsis* (*Epaphiama*) *gracilentata* and *Accoella thermalis*. Male genitalic characters of the genus *Accoella* will be introduced into science for the first time, and a brief comment will be made on the affinity of the genus. The abbreviations used herein are the same as those explained in previous papers of mine.

Before going into further details, I wish to thank Messrs. Masaaki NISHIKAWA and Shinzaburo SONE as well as to Dr. Akiko SAITO for their kind help in preparing the present paper.

Epaphiopsis (*Epaphiama*) *gracilentata* S. UÉNO, sp. nov.

[Japanese name: Kakkumi-chibi-gomimushi]

(Figs. 1-3)

Length: 3.50–4.05 mm (from apical margin of clypeus to apices of elytra).

Rather variable species related to *E. oligops* S. UÉNO (1978, pp. 128, 140, figs. 10–12; 1985, p. 66, pl. 13, fig. 10) and *E. nishikawai* S. UÉNO (1987, p. 124, figs. 1–3), both from the southern part of the Oshima Mountains, but the fore-body is larger on an average, the eyes are more or less faceted though small, the genae are usually glabrous, the prothorax is a little narrower at the base in most individuals, and the elytra are more strongly punctato-striate. Distinguished at first sight from the two species of the Oshima Mountains by the differently shaped aedeagus, which is larger, slenderer and remarkably depressed.

Colour as in *E. oligops*, concolorously dark reddish brown, with lighter palpi and legs.

Head generally similar to that of *E. oligops*, but larger with distinctly faceted eyes; genae almost always glabrous, usually a little longer than (1.05–1.35 times as long as) eyes but sometimes shorter than (3/4–9/10 as long as) the latter; eyes variable in both size and convexity, nearly always flat but very slightly convex in rare exceptional individuals, ommatidia more or less distinct though somewhat reduced in a few individuals; antennae short and stout, usually reaching basal fourth of elytra in both

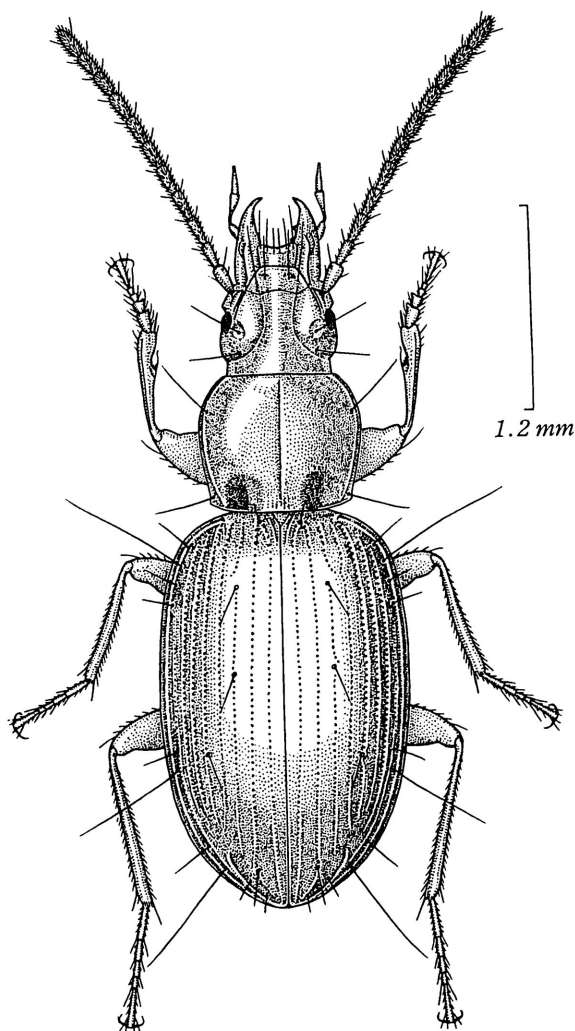
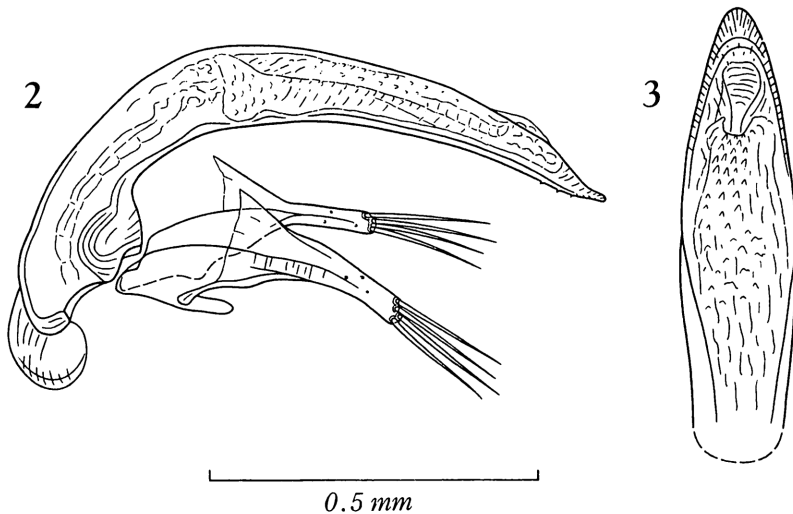


Fig. 1. *Epaphiopsis (Epaphiama) gracilentata* S. UENO, sp. nov., ♂, from Kakkumi-kôén.

♂ and ♀, though variable to some extent in length according to individuals and sometimes barely reaching basal fifth of elytra.

Pronotum usually similar to that of *E. oligops* though a little narrower at the base in most individuals, widest at about three-fifths from base and more strongly narrowed towards apex than towards base; in some individuals, pronotum widest at about four-sevenths from base, more gradually narrowed anteriorly, and more strongly so posteriorly; reflexed lateral margins also variable in width, sometimes broader than usual in posterior halves; PW/HW 1.41–1.52 (M 1.46), PW/PL 1.19–1.31 (M 1.24), PW/PA 1.52–1.67 (M 1.57), PW/PB 1.18–1.29 (M 1.24), PB/PA 1.21–1.34 (M 1.27).



Figs. 2-3. Male genitalia of *Epaphiopsis (Epaphiama) gracilentia* S. UÉNO, sp. nov., from Kakkumi-kôén; left lateral view (2), and apical part of aedeagus, dorsó-apical view (3).

Elytra more strongly convex than in *E. oligops*, widest at about or a little before the middle, with the sides less evenly arcuate in basal two-thirds; EW/PW 1.44–1.53 (M 1.49), EL/EW 1.45–1.52 (M 1.48); shoulders distinct though rounded, with prehumeral borders almost perpendicular to the mid-line at the innermost portions; striae deeply impressed throughout, more coarsely punctate than in *E. oligops*, stria 3 with two setiferous dorsal pores at $1/8-1/6$ and $3/8-3/7$ from base, respectively, stria 5 with a single setiferous dorsal pore at about $2/3$ from base; preapical pore lying on the apical anastomosis of striae 2 and 3 at about or a little behind the level of the terminus of apical striole.

Legs as in *E. oligops*.

Male genital organ basically similar to those of *E. oligops* and *E. nishikawai*, but obviously larger, more elongate, and heavily sclerotized. Aedeagus very slender, nearly three-sevenths as long as elytra, depressed, gently arcuate, and rather abruptly bent ventrad at the basal part, with fairly long apical lobe slightly reflexed at the terminal part; viewed laterally, aedeagus very gradually tapered towards apex from proximal two-fifths, with apical lobe very thin at the reflexed part; basal part rather small, shallowly emarginate at the sides of small basal orifice, and provided with a large sagittal aileron; viewed dorsally, aedeagus broadest at apical third and gradually tapered apicad from there, with symmetrical apical lobe narrowly rounded at the extremity; ventral margin widely emarginate in profile. Inner sac wholly covered with small scales, which are poorly sclerotized except near apical orifice. Styles small, with narrow apical parts, left style longer than the right, each bearing four slender setae at the apex.

Type series. Holotype: ♂, allotype: ♀, 28-VI-1995, S. UÉNO leg. Paratypes: 9 ♂♂,

3 ♀♀, 15–VIII–1994, M. NISHIKAWA leg.; 11 ♂♂, 8 ♀♀, 16–VIII–1994, M. NISHIKAWA leg.; 1 ♂, 1 ♀ (both teneral), 28–VI–1995, S. UÉNO & A. SAITO leg.; 1 ♂, 3 ♀♀, 29–VI–1995, S. UÉNO & A. SAITO leg. Four paratypes (CBM–ZI 33971–33974) are deposited in the collection of the Natural History Museum and Institute, Chiba. All the others including the holotype and the allotype are deposited in the collection of the National Science Museum (Nat. Hist.), Tokyo.

Type locality. Kakkumi-kôên, 90 m in altitude, in Minamikayabé-chô of Oshima, southwestern Hokkaido, Northeast Japan.

Notes. This new species seems less adapted to the subterranean life than *E. oligops* and *E. nishikawai*, as is indicated by the lesser extent of the reduction of eyes. It dwells in the same colluvia that *Accoella* inhabits, but is usually found just below the surface and does not penetrate into the upper hypogean zone. On the other hand, this species does not seem humicolous like *E. brevis*, since it has not been collected by sifting dead leaves in nearby forests.

Accoella thermalis S. UÉNO, sp. nov.

[Japanese name: Kakkumi-mekura-chibigomimushi]

(Figs. 4–5)

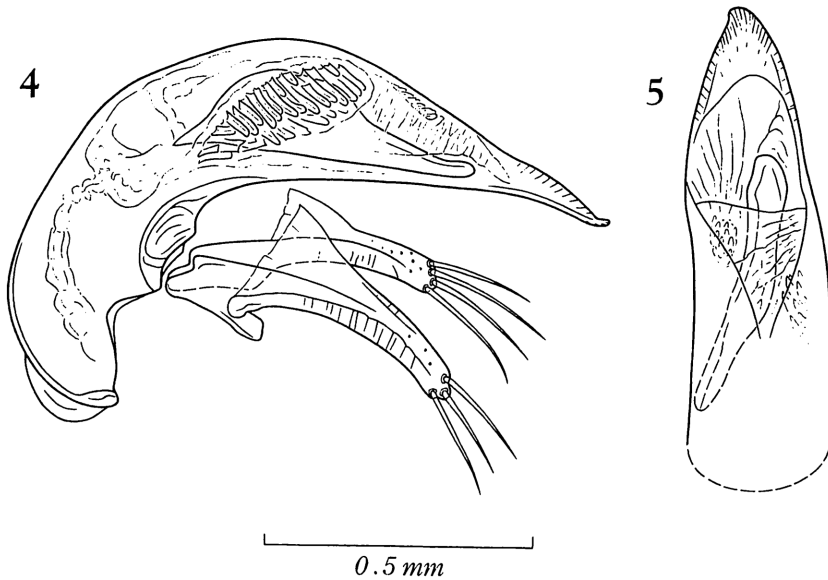
Length: 5.30–5.80 mm (from apical margin of clypeus to apices of elytra).

Closely similar to *A. akirai* S. UÉNO (1990, p. 170, fig. 1) of Ohmori-yama in Matsumaé-chô, but different in the following points:

Head a little larger, with more regularly convex genae, especially at the posterior parts, and more deeply marked neck constriction at the sides; antennae reaching or nearly reaching the middle of elytra in both ♂ and ♀. Pronotum wider at apical third or three-eighths, with the sides more strongly arcuate in front and feebly so even in basal halves, though hardly sinuate before hind angles, which are either obtuse or rectangularly denticulate; reflexed margins narrower, especially near front angles, which are slightly more apparent; PW/HW 1.24–1.34 (M 1.29), PW/PL 0.98–1.04 (M 1.02), PW/PA 1.42–1.52 (M 1.47), PW/PB 1.24–1.31 (M 1.28), PB/PA 1.10–1.20 (M 1.15).

Elytra longer and more parallel-sided, widest at about or slightly before the middle, with a distinct, anteriorly slanting depression on each basal part; EW/PW 1.73–1.79 (M 1.77), EL/PL 2.89–3.08 (M 3.01), EL/EW 1.64–1.70 (M 1.67); surface a little more convex, especially at the sides; striae somewhat deeper and more coarsely punctate; apical striole usually directed to or almost joining stria 7 without terminal curve, but sometimes briefly curved inwards at the anterior end; intervals convex though less sharply convex at the side than in *A. akirai*; stria 3 with three setiferous dorsal pores at 1/8–1/7, 2/7–1/3 and 3/5–2/3 from base, respectively; in the allotype, an extra dorsal pore present on the left elytron between the second and the third pores; stria 5 with two setiferous dorsal pores at 2/13–1/5 and 3/8–1/2 from base, respectively, the proximal pore being more distant from base than in *A. akirai*.

♂: Anal sternite provided with a pair of marginal setae; two proximal



Figs. 4-5. Male genitalia of *Accoella thermalis* S. UENO, sp. nov., from Kakkumi-kôen; left lateral view (4), and apical part of aedeagus, dorso-apical view (5).

protarsomeres widely dilated, stoutly protrudent inwards at apices, and furnished beneath with adhesive appendages.

Male genital organ small though rather heavily sclerotized. Aedeagus only one-third as long as elytra, not depressed, highest at about middle, and gradually tapered towards apex, with large basal part strongly bent ventrad; dorsal margin semicircularly rounded before the middle in profile; basal part rather elongate, almost rectangularly emarginate at the sides of basal orifice, and provided with a small hyaline sagittal aileron; viewed dorsally, apical lobe elongated subtriangular, somewhat asymmetrical, with the terminal portion slightly curved to the right; viewed laterally, apical lobe narrow, gradually tapered, slightly curved ventrad, and briefly reflexed at the extremity; ventral margin almost straight in apical two-thirds in lateral view except for that of apical lobe. Inner sac armed with a large copulatory piece and two patches of sclerotized teeth; copulatory piece elongate, about a half as long as aedeagus, lying diagonally at the ventral side of inner sac from right proximal to left apical, and narrowly rounded at the apex, with the left dorsal edge dorsally expanded in proximal three-fifths and forming a hyaline semicircular lamella; left proximal teeth-patch large and elongate, obliquely lying at about middle, and consisting of large, heavily sclerotized teeth; dorso-apical teeth-patch very small, lying at the right side just inside apical orifice, and consisting of very small teeth. Styles fairly large, left style obviously longer than the right, each bearing three or four setae at the apex.

Type series. Holotype: ♂, allotype: ♀, 16-IX-1994, S. SONE leg. Paratypes: 1 ♀, 15-VIII-1994, M. NISHIKAWA leg.; 2 ♂♂, 16-IX-1994, S. SONE leg.; 1 ♀, 28-VI-1995,

S. UENO leg: All deposited in the collection of the Department of Zoology, National Science Museum (Nat. Hist.), Tokyo.

Type locality. Kakkumi-kôen, 90 m in altitude, in Minamikayabé-chô of Oshima, southwestern Hokkaido, Northeast Japan.

Notes. Describing *Accoella akirai*, the type species of the genus, I suggested that it might have some remote affinity to the members of the group of *Trechiana oreas* mainly because of the similarity in elytral chaetotaxy. This suggestion proved wrong by examination of the male genitalia of *A. thermalis*. Though generally similar to those of *Trechiana*, they are unique in conformation of the inner armature, which is utterly different from those in any lineages of the *oreas* group.

The unique configuration of the prothorax of *Accoella*, especially of its hind angles, reminds us of that of "*Trechiana*" *siamensis* DEUVE (1988, p. 287, figs. 1–8), an isolated species described from a limestone cave in Central Thailand. *Accoella* is also similar to the Thailand species in the elytral chaetotaxy. They are, however, decisively different in conformation of the male genitalia, those in the latter being primitive and similar to those of *Trechiotetes luticola* (cf. UENO, 1995, pp. 179–180, figs. 3–4). I have the impression that "*Trechiana*" *siamensis* may be more closely related to *Trechiotetes* than to *Trechiana*, in spite of the marked difference in the shape of prothorax and in the arrangement of setiferous dorsal pores on elytra. Anyway, "*T.*" *siamensis* is a tropical species like the members of *Trechiotetes*, both retaining plesiomorphic states of various characters. On the other hand, *Accoella* is an advanced genus in the *Trechiana* group, seeing that the aedeagal inner armature has become highly differentiated. Its peculiar prothorax may represent a plesiomorphic character state, though I am not certain of this. What is important is that it has no direct relatives in northeastern Honshu. This seems to mean that the origin of *Accoella* cannot be sought in that direction. It is possible that like the Hokkaido species of *Epaphiama*, *Accoella* may have been derived from an ancestor that reached southwestern Hokkaido directly from somewhere in the Asian Continent.

As was mentioned in the introduction of this paper, the only known habitat of *Accoella thermalis* lies at the eastern foot of the Kameda Hills. It is about 84 km distant to the northeast from Ohmori-yama, the type locality of *A. akirai*. Generally speaking, the Kakkumi area is not favourable for harbouring upper hypogean fauna, since most streams cut through compact tuff formation and do not deposit loose screes at their sides. In the immediate vicinity of the hot spring called Kakkumi-onsen, however, the tuff has been metamorphosed by the hot water and has formed innumerable subparallel cracks. *Accoella* dwells in these cracks always beneath thick colluvia. The six known specimens were dug out from four colluvia deposited at the sides of the stream called the Kakkumi-gawa within a distance of only 300 m. We were unable to find any favourable colluvia outside this small place along the stream in spite of careful searches made for seven man-days.

要 約

上野俊一：北海道南西部の地中から見つかったチビゴミムシ類の2新種。—— 1994年の夏，渡島半島南東部で，西川正明氏によって，2種のチビゴミムシが採集された。そのひとつは，キタチビゴミムシ亜属に含まれる地中性の新種で，カクミチビゴミムシ *Epaphiopsis (Epaphiama) gracilentata* S. UÉNO と命名して記載した。他のひとつは，ホソメクラチビゴミムシ属の第二の種で，カクミメクラチビゴミムシ *Accoella thermalis* S. UÉNO と命名したが，その生息域が地下浅層だと確認された。また，この属の雄交尾器の構造が初めて明らかになり，ナガチビゴミムシ群の祖先的な形態を残す一群であろうと推定された。どちらの種も渡島山地のものに類縁が近く，亀田山地に隔離されたことによって，共通の祖先から分化したものだと考えられる。

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