

Primitive Trechids of the Subgenus *Epaphiopsis*

By

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The genus *Epaphiopsis* was established by myself in 1953 for a primitive trechid which was named *Epaphiopsis fukukii* at the same time (S. UÉNO, 1953 a, p. 32). In the same year, I (1953 b, pp. 39-40) mentioned the genus again and noticed that there were three other new species in my cabinet, though not attempting to describe them. Since then, many years have passed by and a good deal of new information has been accumulated. SUENSON (1957, p. 86) reported a new trechid from the environs of Mt. Fuji-san and placed it in the new genus *Glabrotrechus*. This genus, however, no doubt falls into a synonym of *Epaphiopsis*. On the other hand, it has become evident that several species, which were formerly considered as belonging to the subgenus *Epaphius* of the grand genus *Trechus*, are phylogenetically closer to the members of *Epaphiopsis* than to those of the cited subgenus, irrespective of the marked similarity between these forms and true *Epaphius*-species. They may better be transferred to the genus *Epaphiopsis* but seem to require a particular subgenus for their residence. Recent investigation has also revealed that some members of this genus are distributed on the high mountains of Formosa, where they have become so segregated from the Japanese forms as to constitute their own subgenus.

Thus enlarged, the genus *Epaphiopsis* (in a new sense) has become a trechine group that consists of some two dozens of species, most of which are still awaiting descriptions. A comprehensive monograph is required to bring them out into science. I am, therefore, going to sum up the knowledge hitherto gained on the genus, though the materials available are not yet wholly satisfactory. The present paper is the first contribution to the subject and comprises the subgenus *Epaphiopsis*.

To simplify the descriptions, the following abbreviations are used throughout this paper: HW—greatest width of head (including eyes if they protrude); PW—greatest width of pronotum; PL—length of pronotum, measured along the mid-line; PA—width of pronotal apex; PB—width of pronotal base; EW—greatest width of elytra; EL—greatest length of elytra; M—arithmetic mean.

In preparing this paper, I have received invaluable aid from many colleagues

and friends. I am greatly indebted to Mr. Eigin SUENSON for re-examination of the type-specimens of *Glabrotrechus fujii*, to Mr. Yoshio YANO for information on the type-locality of *Epaphiopsis fukukii*, and to Mr. Naomasa KOBAYASHI and Mr. Takuji UÉNO, my brother, for cooperation in the field. Hearty thanks are also due to the following persons who supplied me with many valuable specimens: Dr. Kuniyasu MORIKAWA, Dr. Katsura MORIMOTO, Messrs. Shozo FUKUKI, Masahiro IGA, Yoshikazu IKUTANI, Hiroshi ISHIDA, Ryôsuke ISHIKAWA, Atsushi MATSUDA, Mutsuo MIYATAKE, Yasuyoshi OKADA, Kôhei SAKAGUTI, Osamu SATÔ, Shunji SHIBANAI, Taichi SHIBATA, Yasuaki WATANABE and Noboru YATÔ.

Genus **Epaphiopsis** S. UÉNO, *sensu novo*.

Small or medium-sized trechines belonging to the group of *Trechiamma* but usually resembling that of *Trechus* in general appearance. Body more or less depigmented and always devoid of inner wings; dorsal surface either glabrous or pubescent on pronotum. Head with deep entire frontal furrows; eyes always faceted; genae more or less developed, either pubescent or perfectly glabrous; supraorbital pores two in number; a premolar tooth present on right mandible but not on the left; mentum free, not fused with submentum; mentum tooth variable; submentum usually sexsetose, but an innermost pair of setae sometimes reduced to a single median seta (see Fig. 2) or disappearing altogether.

Pronotum more or less transverse, with lateral sides bordered throughout, basal sinuation either absent or very short; both lateral and postangular setae present, the latter being on hind angle or slightly removed forwards; hind angles small. Elytra with two series of dorsal pores, one on stria 3 or interval 3 and 1-6 in number, the other on stria 5 or interval 5 and 1-7 in number; preapical pore either present or absent; scutellar striole variable, but usually short and often rudimentary; apical striole free at the anterior end or joining stria 5 (sometimes joining stria 3); humeral group of umbilicate pores aggregated and adjoining marginal gutter, four pores ranging equidistantly.

Ventral surface either pubescent or glabrous; anal sternite provided on each side with a single seta in ♂, two setae in ♀. Legs normal; protibiae externally grooved, with or without a few minute hairs on the anterior face at the apical portion; in ♂, protarsal segments 1 and 2 dilated, inwardly spurred and furnished beneath with adhesive appendages.

Male genital organ variable both in size and in shape. Aedeagus without ventral hook at apex; sagittal aileron either present or absent; inner sac armed with large teeth or scales; sclerotized copulatory pieces usually absent but sometimes present. Apical setae on styles variable in number.

Range: Japan (southwestern provinces of Honshu, Shikoku and its fringing islands, Kyushu, Is. Yaku-shima) and Formosa.

This genus possesses an interesting combination of morphological features and seems to span the gap between the phyletic group of *Trechiamma* and that

of *Trechus*. It is assigned to the former group mainly because of the presence of two series of elytral dorsal pores. This feature is found in every genus of *Trechiamma*-line but is rarely met with in the other phyletic groups of trechines. Even such chaetotaxially anomalous groups as *Trechiotus* JEANNEL (1954 a, p. 14), *Elgonotrechus* JEANNEL (1954 b, p. 159) and *Elgonophyes* JEANNEL (1954 b, p. 176), all belonging to the phyletic group of *Trechus*, have only a single series of dorsal pores on elytra. On the other hand, *Epaphiopsis* shows a strong resemblance to *Epaphius*, an assemblage of primitive species within the genus *Trechus*, in the body form and particularly in the shape of prothorax. There is, indeed, no decided difference between *Epaphius* and certain *Epaphiopsis*, if the presence or absence of premolar tooth on right mandible and of the external series of elytral dorsal pores is not taken into account. This intermediate condition of *Epaphiopsis* is no doubt ascribed to its primitiveness. The genus may be a natural assemblage of survivals of the ancestral stock, from which both *Trechiamma*- and *Trechus*-lines have been derived. If this assumption be correct, all the existing *Trechus*-like species may have evolved from the ancestral forms resembling *Epaphiopsis* (s. str.) through *Pseudepaphius*-like stage, while the members of *Trechiamma*-line may be legitimate but have not been so successful as their competitors and remain at present only in the Far East.

The present paper is not designed to include the Formosan species of the genus, but, for convenience, I prefer to make below a proposal of a new combination.

***Epaphiopsis formosana* (JEDLIČKA, 1946), comb. nov.**

Tasmanorites formosanus JEDLIČKA, 1946, Descript. Carab. nouv. Asie orient, Praha, p. 2, pl. 2, fig. 12; type-locality: Arisan (=Mts. A-li Shan).

JEDLIČKA's original account cited above, based on a single imperfect specimen, is quite perplexing. Fortunately, however, I could obtain half a dozen topotypical specimens of this trechid in the early summer of 1961. A renewed description of the species, together with a discussion on the genus *Tasmanorites*, will be given in a forthcoming paper.

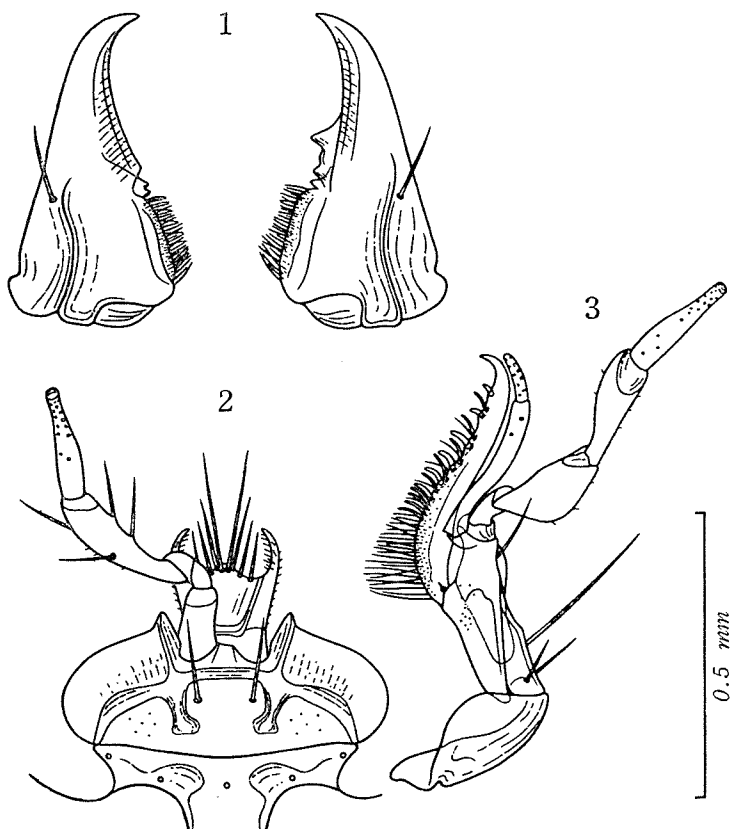
Subgenus *Epaphiopsis* S. UÉNO, *sensu stricto*.

Epaphiopsis S. UÉNO, 1953, Ent. Rev. Japan, Osaka, 6, p. 32; type-species: *Epaphiopsis fukukii* S. UÉNO, 1953; 1953, Shin Konchû, Tokyo, 6 (11), p. 39.

Glabrotrechus SUENSON, 1957, Ent. Medd., 28, p. 86; type-species: *Glabrotrechus fujii* SUENSON, 1957. (New synonymy.)

Head and elytra glabrous; pronotum covered with suberect pubescence. Eyes small; genae well developed and more or less pubescent, or at least with a few hairs; labrum emarginate at apex, not trilobed; mentum tooth usually simple or truncated at apex, but sometimes emarginate or bifid; ligula porrect at the median part, with two long setae at middle and three (rarely four) shorter

ones on each side; paraglossae narrow, extending well beyond ligula; palpi normal; antennae subfiliform. Pronotal hind angles more or less denticulate, each with a postangular seta on it; postangular carina absent. Elytra superficially striate, stria 6 rarely visible, stria 7 always evanescent; stria 8 more or less deep at the apical part but disappearing anteriorly; scutellar striae either rudimentary or absent; apical striae always short and free at the anterior end; internal series of dorsal pores composed of four or five setiferous pores and usually situated on stria 3, external series of two or three pores and on stria 5; preapical pore always absent.



Figs. 1-3. Buccal appendages of *Epaphiopsis* (s. str.) *okadai* sp. nov., ♀, of Sanzūkōchi on Mt. Ohdaigahara.—1. Mandibles, dorsal view.—2. Labium, ventral view.—3. Left maxilla, ventral view.

Microsculpture reticulate on head but composed of fine transverse lines both on pronotum and on elytra. Ventral surfaces of head and thoraces

glabrous; sternites more or less pubescent. Protibiae usually with a few minute hairs at the apical portion of the anterior face.

Aedeagus widely open (or membranous) on the dorsal side but closed at the basal part; apex more or less hooked on the dorsal side; sagittal aileron usually absent but present in *E. okadai* and *E. elongata*; inner sac entirely covered with large teeth or scales; sclerotized copulatory pieces absent except for *E. fukukii*.

Range: Central Honshu (mainly on the Pacific coast).

In his original description of *Glabrotrechus fujii*, Mr. SUENSON did not mention the characteristic pubescence covering the pronotum of that species. Answering my request, however, he re-examined the type-specimens of the species in question and informed me, "I have examined my *Glabrotrechus Fujii* under the microscope and found that there are fine hairs clearly visible on the pronotum" (personal communication, May 4, 1960). No doubt, therefore, remains as regards the synonymy proposed here.

Of particular interest and importance is that in this subgenus the aedeagus is widely 'open' on the dorsal side. This dorsal 'opening' is either membranous or moderately chitinated, extending from the apical orifice to the dorsal side of the basal part, which is, however, always closed and not bilobed. It is therefore not comparable to the perfectly gutter-shaped aedeagi found in the genera of the tribe Trechodini. Such a peculiar aedeagal structure is, however, quite exceptional within the tribe Trechini, to which *Epaphiopsis* belongs. A similar but much more perfect status of dorsally 'open' aedeagus is found in *Trechiella subornatella* (BLACKBURN), from Victoria in southeastern Australia, a beautiful species that is currently belonged to the tribe Homaloderini. I have become aware of this peculiarity of the Australian species while studying on a series of specimens of the homaloderoid trechines, which I have been able to examine with the generous support of Dr. P. J. DARLINGTON, JR. and Dr. B. P. MOORE. I am now not in the situation to discuss whether the tribe Homaloderini really stands or not, but it is, of course, improbable that the imperfect condition of aedeagi is suggestive of certain relationship between the Far Eastern and the Australian genera. The feature may only be indicative of their primitive status, which may have been preserved in the respective genera independently. The peculiar aedeagal structure in *Trechiella* has also been noticed by Dr. MOORE himself (personal communication, June 24, 1961), who will clarify the accurate status of the genus in one of his forthcoming papers.

The beetles that make up the subgenus *Epaphiopsis* are primarily saprophilous. They inhabit the floor biotope in broadleaved forests at moderate elevations, and have a marked preference to damp places. Early stages have been unknown but the development may possibly take place in leaf mould.

This subgenus consists of the species that are superficially similar to one another and usually difficult to identify. There is, however, a great divergence

in the structure of male genitalia, which provides the best character not only for separating species or subspecies but also for recognizing phylogenetical lines. External features of special value for discriminating species are the number of setiferous dorsal pores on the fifth elytral stria and the shape of elytra. That the members of the subgenus are always allopatric and that the range of each species or subspecies is confined to a limited area are also helpful for the practical purposes of determination.

The following key to the species and the subspecies is artificial and not perfect because of sporadic occurrence of aberrant individuals. Unfortunately, however, I have been unable to design a better one, as the members of this subgenus are, as I have indicated, more or less alike in external features. Any single external characters are not reliable for recognizing a species. Careful examination of aedeagal structure is, therefore, inevitable to make definite identification of given specimens.

Key to the species and the subspecies

- 1 (12) Elytra shorter, less than 1.50 times as long as wide, with striae 1-3 more or less evanescent apically; aedeagal basal part more or less bent towards the ventral side.
- 2 (7) External dorsal series on elytra normally composed of two pores.
- 3 (6) Aedeagus smaller, less than two-fifths as long as elytra, and more or less arcuate from base to apex; pronotal base narrower.
- 4 (5) Aedeagal apex subtruncated in dorsal aspect, with much larger recurrent hook; head relatively wide, with swollen genae; elytra oval, with ampler apical part; elytral striae a little deeper
..... *E. okadai* sp. nov.
- 4a (4b) Aedeagus short and robust; length: 3.8-4.4 mm; (Ohdaigahara mountains) *E. okadai okadai* s. str.
- 4b (4a) Aedeagus much slenderer and more regularly arcuate; length: 3.9-4.5 mm; (Ohminé mountains) ... *E. okadai tenuis* subsp. nov.
- 5 (4) Aedeagal apex produced into a short apical beak in dorsal aspect, with recurrent hook very small and obtuse; head relatively narrow, with genae less convex; elytra ovate, less ample in apical half, with shallower striae; length: 3.8-4.1 mm; (Amagi mountains)
..... *E. watanabei* sp. nov.
- 6 (3) Aedeagus very large, about a half as long as elytra, hardly arcuate but with abruptly bent basal part; aedeagal apex sharply triangular in dorsal aspect; pronotal base very wide; length: 4.3 mm; (environs of Mt. Fuji-san) *E. fujii* (SUENSON).
- 7 (2) External dorsal series on elytra composed of three pores.
- 8 (11) Elytral striae shallower, stria 5 evanescent or nearly so; smaller species (3.9-4.0 mm).

- 9 (10) Pronotum larger, with smaller postangular denticles; elytra less ample in apical half, with very shallow striae and nearly effaced shoulders; aedeagal apex produced into a long apical beak in dorsal aspect; (Hakoné)..... *E. machiko* sp. nov.
- 10 (9) Pronotum smaller, with larger postangular denticles; elytra much ampler in apical half, with deeper striae and distinct shoulders; (Midori-dani in Neo-mura) *E. matsudai* sp. nov.
- 11 (8) Elytral striae deeper, stria 5 visible though interrupted; larger species (4.5–4.6 mm), with ample elytra and distinct elytral shoulders; aedeagus robust and not arcuate, with sclerotized copulatory pieces; (Shimoizumi in Shizuoka Prefecture)..... *E. fukukii* S. UÉNO.
- 12 (1) Elytra more elongate, nearly 1.55 times longer than wide, with striae 1–3 discernible throughout; aedeagal basal part not bent towards the ventral side; elytral dorsal pores five on stria 3 and three on stria 5; length: 4.6 mm; (Mt. Gomanodan-yama on the Obako mountains) *E. elongata* sp. nov.

***Epaphiopsis* (s. str.) *watanabei* S. UÉNO, sp. nov.**

Length: 3.8–4.1 mm (from front margin of clypeus to anal end).

Colour reddish brown, very shiny, somewhat iridescent; palpi pale yellowish brown; apical segments of antennae, epipleura, apical sternites and tarsi pale reddish brown or yellowish brown.

Head wide, rather depressed on dorsal side though both frons and supraorbital areas moderately convex, with deep frontal furrows which are entire and subangulate at middle; meshes of microsculpture more or less wide; eyes flat though not very small; genae convex, about four-sevenths as long as eyes; neck wide, with distinct neck constriction; labrum moderately emarginate; mandibles slender, sharply hooked at apices; mentum tooth porrect, narrowly rounded or subtruncated at apex; palpi fairly slender; antennae subfiliform and stout, reaching or extending beyond basal one-sixth of elytra, with thick basal segment; antennal segment 2 about six-sevenths as long as segment 3, segment 4 slightly longer than segment 2 but slightly shorter than segment 3.

Pronotum ample, transverse and convex, widest at about three-fifths from base; PW/HW 1.48–1.51 (M 1.50), PW/PL 1.17–1.25 (M 1.20), PW/PA 1.51–1.56 (M 1.54), PW/PB 1.34–1.46 (M 1.41); lateral sides entirely but narrowly bordered, widely and rather strongly rounded in front, hardly sinuate behind; apex advanced at middle, with front angles rounded; base somewhat produced backwards at the median part, emarginate on each side inside hind angle, which projects outwards as a minute tooth; PB/PA 1.06–1.13 (M 1.10); median line distinct, reaching neither apex nor base; apical transverse impression vague though more or less rugose; basal transverse impression formed by a continuous sulcus, which is close to basal border, smooth at the bottom, provided with a

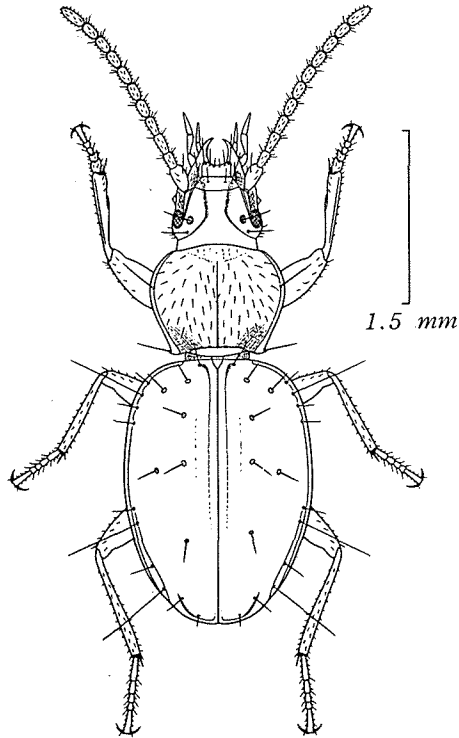


Fig. 4. *Epaphiopsis* (s. str.) *watanabei* sp. nov., ♂, of Iwabi in Amagi-Yugashima-chô.

transverse fovea on each side of median line and merges on each side into basal fovea; basal foveae small but deep, smooth at the bottoms and extending anteriorly along the side borders; apical area longitudinally strigose, basal area usually smooth; microsculpture composed of fine, irregularly transverse lines but indistinct on the disk.

Elytra ovate and well convex, EW/PW 1.36-1.42 (M 1.40), EL/EW 1.37-1.49 (M 1.42), widest at about four-ninths from base; shoulders distinct though widely rounded; prehumeral borders somewhat oblique; lateral sides gently rounded at middle and hardly emarginate before apices which are not angulate; striae more or less obliterated, stria 1 distinctly crenulate on the disk and deepening near base but obsolete on apical one-third, stria 2 evidently shallower than stria 1 and usually obsolete, stria 3 either rudimentary or effaced, striae 4-7 vanished (stria 4 rarely visible near base), stria 8 deeply impressed behind the middle group of marginal umbilicate pores; apical striae short but fairly deep; disk smooth, apical carina distinct; four setiferous dorsal pores present on the site of stria 3 at $1/16-1/11$, $1/5-1/4$, $1/3-1/2$ and $5/8-3/4$ from base re-

spectively, *two* setiferous dorsal pores on the site of stria 5 at 1/11–1/8 and 2/5–4/9 from base respectively; microsculpture consisting of fine transverse lines.

Sternites sparsely pubescent; pubescence on sternites 3–5 becoming denser posteriorly on each sternite. Legs rather short and stout.

Male genital organ very small and rather poorly chitinized. Aedeagus¹⁾ only one-third as long as elytra, moderately arcuate and attenuated towards apex, with the dorsal side semicircularly rounded in profile; basal part elongate and well bent towards the ventral side, with large basal orifice, of which the lateral sides are hardly emarginate; viewed laterally, apical beak slightly turned up and obtusely hooked on dorsal side at the extremity; viewed dorsally, apical part wide, with *very short* apical beak which curves slightly to the right; ventral side slightly but widely concave at middle. Inner sac twisted and wholly covered with large teeth or scales; sclerotized copulatory pieces absent. Styles fairly wide, left style longer and more or less slenderer than the right, each provided with four setae at apex; several (one, two or four) shorter setae often present on one style.

Female unknown.

Type-specimens: Holotype: ♂ (Iwabi, 4-X-1960, collected by Y. WATANABE). Paratypes: 2♂♂ (Mt. Amagi-san, 3-IX-1939, by Y. YANO); 1♂ (Iwabi, 4-X-1960, by Y. WATANABE).

One of the paratypes is deposited in Mr. WATANABE's collection. All the others, including the holotype, are in my collection.

Type-localities: Iwabi, at the northern foot of Mt. Hachikubo-yama in Amagi-Yugashima-chô, and Mt. Amagi-san; both on the Izu Peninsula in Shizuoka Prefecture, on the Pacific coast of central Honshu.

The present new species is no doubt closer to *E. fujii* (SUENSON) than to *E. fukukii* S. UENO, mainly on account of the absence of differentiated copulatory pieces. There is, however, a decided difference between this and SUENSON's species in the size and the shape of aedeagus. Besides, *E. watanabei* is smaller than *E. fujii*, and has larger head, narrower pronotal base and stouter legs. The parameres are also different, being shorter and wider than those in *E. fujii*.

The range of distribution of *E. watanabei* seems to be restricted to the Amagi mountains on the Izu Peninsula. Iwabi, the locality of the holotype and one of the paratypes, is a valley in the upper courses of the Kano-gawa River and is situated at the northern foot of Mt. Hachikubo-yama on the Amagi mountains. It is about 70 km distant to SSE from Shôji, the type-locality of *E. fujii*. According to Mr. WATANABE, the beetle was found in a damp shaded place at an elevation of about 350 m, under heaps of dead leaves which had been accumulated along a stream. As for the specimens taken by Mr. YANO, no exact data on the habitat have been obtainable.

1) The lengths of aedeagi are measured along the longest chord of aedeagal arc.

Epaphiopsis (s. str.) machiko S. UÉNO, sp. nov.

Length: 3.9–4.0 mm (from front margin of clypeus to anal end).

Very closely allied to *E. watanabei* and answering to the description of the latter in every detail except those noted below.

Head with deep frontal furrows which are not angulate at middle; eyes evidently more convex, especially in ♂, than those in *E. watanabei*; genae a little more convex, about three-fifths as long as eyes; antennae somewhat longer, reaching or extending a little beyond basal one-fifth of elytra. Pronotum with lateral sides a little less strongly rounded in front, widest at about three-fifths from base; PW/HW 1.49, PW/PL 1.20–1.21, PW/PA 1.46–1.55, PW/PB 1.37–1.40, PB/PA 1.05–1.13; basal area longitudinally strigose similarly to apical area.

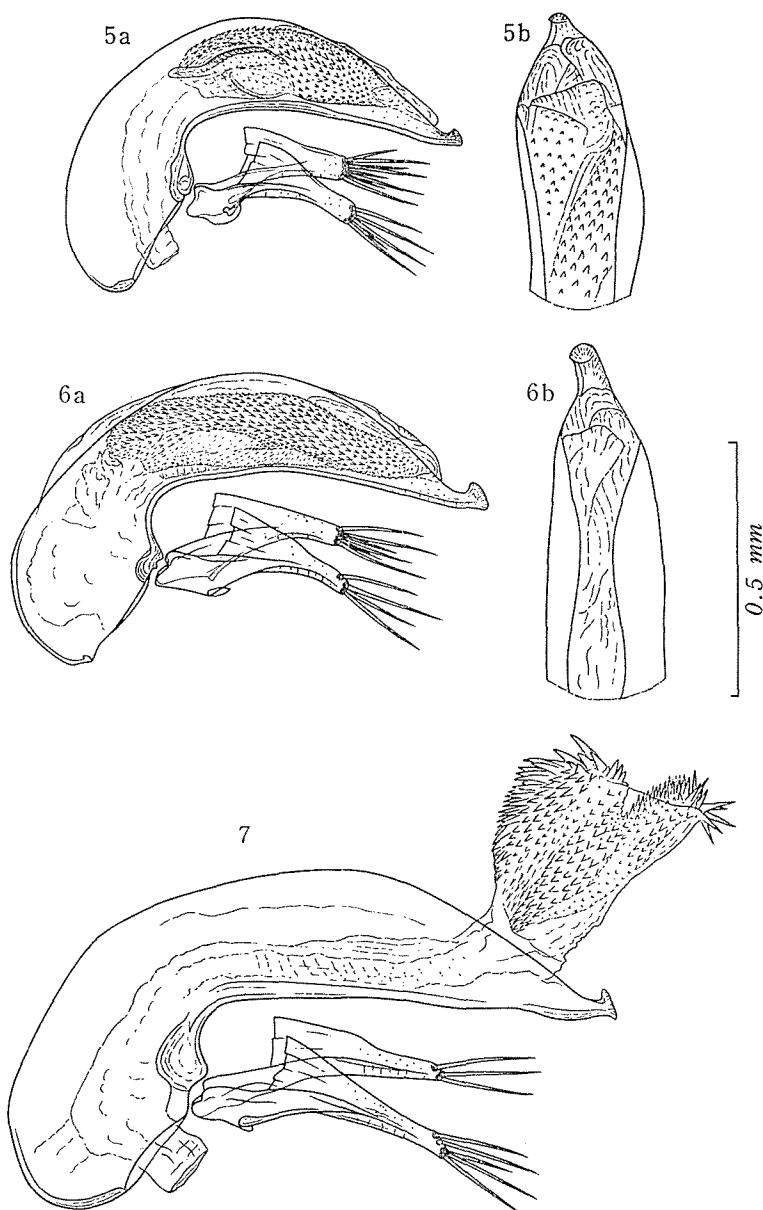
Elytra widest at about four-ninths from base, with prehumeral borders a little more oblique, EW/PW 1.37–1.38, EL/EW 1.41–1.42; in the holotype, four setiferous dorsal pores present on the site of stria 3 at 1/11, 1/4–2/7, 3/7–1/2 and 2/3 from base respectively, an accessory pore present on interval 3 on right elytron just before the level of the first pore on stria 3; in the allotype, a fifth dorsal pore present between the second and the third pores on left elytron and behind the fourth pore on right elytron, an accessory pore also present on interval 3 on left elytron before the level of the first pore on stria 3; *three* setiferous dorsal pores present on the site of stria 5 at 1/10–1/9, 2/5 and 1/2–5/9 from base respectively.

Male genital organ small though larger than that in *E. watanabei*; rather poorly chitinized. Aedeagus more elongate than that in *E. watanabei*, about two-fifths as long as elytra, with the dorsal side less strongly rounded; basal part fairly large and less strongly bent towards the ventral side than in *E. watanabei*; viewed laterally, apical hook much larger than that in *E. watanabei*; viewed dorsally, apical part fairly slender, with *long* apical beak which curves slightly to the right. Inner sac elongate and twisted, wholly covered with large teeth or scales but without differentiated copulatory pieces. Styles as in *E. watanabei*, each provided with four apical setae; in the holotype, two shorter setae present on right style.

Type-specimens: Holotype: ♂, allotype: ♀ (24–VI–1961, collected by R. ISHIKAWA and deposited in UÉNO's collection).

Type-locality: Ubako, at the northwestern foot of Mt. Kami-yama, Hakoné, in Kanagawa Prefecture, on the Pacific coast of central Honshu.

This new species is so closely allied to the preceding one that it would be regarded as a geographical race of the latter if there were no genital differentiation between them. In *E. machiko*, the aedeagal apical beak is long and has a well developed apical hook, whereas, in *E. watanabei*, it is very short and but obtusely hooked at the extremity. The number of the setiferous dorsal pores on the fifth elytral stria is also constantly different between the two forms,



Figs. 5-7. Male genital organ.—5. *Epaphiopsis* (s. str.) *watanabei* sp. nov., of Iwabi in Amagi-Yugashima-chô; left lateral view (a), and apical part of aedeagus, dorsal view (b).—6. *E.* (s. str.) *machiko* sp. nov., of Ubako at Hakoné; left lateral view (a), and dorsal view of the apical part of aedeagus (b).—7. *E.* (s. str.) *fujii* (SUENSON), of Ichigômé on Mt. Fuji-san; left lateral view.

three in the present species and two in *E. watanabei*.

Mt. Kami-yama (1,438 m in height) is one of the volcanoes at Hakoné and towers on the northeastern coast of Lake Ashi-no-ko. It is situated at about 42 km N of Iwabi and at the same distance SE of Shōji. The type-specimens of *E. machiko* were taken from under stones along a mountain road about 950 m above sea-level. This road was made on a wooded slope behind the village of Ubako at the northwestern foot of the volcano. The habitat of the beetle was damp, though remote from streams, and was shaded by evergreen broadleaved trees.

***Epaphiopsis* (s. str.) *fujii* (SUENSON), comb. nov.**

Glabrotrechus fujii SUENSON, 1957, Ent. Medd., 28, p. 86, pl. 1, upper left; type-locality: Shoji at the foot of Mount Fuji.

Length: 4.3 mm (from front margin of clypeus to anal end).

Again close to *E. watanabei* and fitting to the same description in every respect except the features given below.

Somewhat larger in size. Head smaller, with frontal furrows hardly angulate at middle; meshes of microsculpture less wide and nearly isodiametric at the anterior part of frons; genae slightly more convex, about two-thirds as long as eyes; antennae longer, reaching basal one-fourth of elytra, with segment 2 about five-sixths as long as segment 3. Pronotum more strongly contracted anteriorly and obviously less so posteriorly than that in *E. watanabei*, though widest at about three-fifths from base similarly to that in the latter species, with lateral sides more widely rounded in front; PW/HW 1.58, PW/PL 1.28 (1.21 in the holotype according to the original description), PW/PA 1.59, PW/PB 1.33; base wider than that in *E. watanabei*, PB/PA 1.20; postangular denticles more obtuse; disk uneven due to the presence of minute depressions at the bases of pubescence.

Elytra widest at about middle, with prehumeral borders a little more oblique, EW/PW 1.41 (1.48 in the holotype according to the original description), EL/EW 1.45 (1.41 in the holotype according to the original description); striae more or less deeper than those in *E. watanabei*, stria 1 fairly deep on the disk and nearly reaching apex, 2 distinct on the disk, 3 visible before middle, 8 deep at the apical part; apical striole much deeper than that in *E. watanabei* and nearly straight; apical carina prominent; in the specimen examined, stria 3 with four setiferous dorsal pores on right elytron at about 1/11, 1/4, 1/2 and 2/3 from base respectively, five on left elytron at about 1/12, 1/5, 1/3, 1/2 and 2/3 from base respectively²⁾; two setiferous dorsal pores present on the site of stria 5 at about 1/8 and 3/7 from base respectively; in the specimen examined, an extra

2) Taking the original description into account, it is probable that *E. fujii* may normally have four setiferous dorsal pores on the third elytral stria.

umbilicate pore present on left elytron between the seventh and the eighth pores of the marginal series³⁾.

Legs slenderer than those in *E. watanabei*.

Male genital organ very large and well chitinized, of the same type as those of the preceding species though considerably different in appearance. Aedeagus elongate, hardly arcuate and gradually attenuated towards apex, about a half as long as elytra; basal part fairly large, elongate and rather abruptly bent towards the ventral side; basal orifice small, with the lateral sides hardly emarginate; viewed laterally, apical beak slightly turned up, forming a recurrent hook on the dorsal side and obtusely angulate on the ventral side at the extremity; viewed dorsally, apical beak short, forming a sharp triangle, with the recurrent hook curving to the right; ventral side nearly straight at middle but evidently convex just before apex. Inner sac wholly covered with large teeth but without sclerotized copulatory pieces. Styles very slender, left style slightly longer than the right, the former with five (four large and one small) apical setae, while the latter with only three apical setae.

Female unknown to me.

Specimen examined: 1♂ (1-VIII-1939, collected by M. YAGO and preserved in UENO's collection).

Locality: Ichigōmē on Mt. Fuji-san, in Shizuoka Prefecture, on the Pacific coast of central Honshu.

Range: Known so far only from Mt. Fuji-san.

As there are several homonymous places on Mt. Fuji-san, it is not certain which 'Ichigōmē' is the exact locality of the specimen examined. It may, however, be somewhere on the eastern or the southern side of the volcano, because the 'Ichigōmē' is said to be in Shizuoka Prefecture. In any case, the specimen must have been taken on a forested slope of over 1,000 m in altitude. I am not acquainted by myself with the habitats of this trechid. According to SUENSON (1957, p. 87), his two specimens were found at the northwestern foot of the volcano (in Yamanashi Prefecture) "among dead leaves on a moist well wooded slope about 3000 feet above sea-level" and "in a big heap of dead leaves in woods" respectively.

The specimen, based on which I have prepared the above description, is no doubt conspecific with those described by SUENSON. In several respects, however, it does not accord with the original account. Quite unexpected is the discrepancy in the number of umbilicate pores of the marginal series. According to SUENSON (1957, p. 86), "there is a marginal setigerous puncture just outside of this angle⁴⁾" in the holotype. Contrary to this comment, there is no um-

3) According to the original description, the holotype of this species seems to be such an individual as has an extra umbilicate pore on either elytron.

4) With this expression, SUENSON has described the terminal (innermost) point of prehumeral border.

bilicate pore (SUENSON's 'setigerous puncture') near the base of prehumeral border in the specimen examined. The presence of such an extra umbilicate pore is itself quite exceptional among trechines, and had never been reported up to that time so far as concerned with the Japanese forms. In *E. fujii*, however, supernumerary of marginal umbilicate pores may probably be frequent, as is suggested by the common occurrence of such individuals having an extra umbilicate pore between the two apical pores of the marginal series⁵⁾.

***Epaphiopsis* (s. str.) *fukukii* S. UÉNO.**

Epaphiopsis fukukii S. UÉNO, 1953, Ent. Rev. Japan, Osaka, 6, p. 33, pl. 7, fig. 2; type-locality: Shimoizumi in Shizuoka Pref.; 1953, Shin Konchû, Tokyo, 6 (11), p. 39.

Length: 4.5–4.6 mm (from front margin of clypeus to anal end).

Superficially similar to *E. fujii* but a little larger, with larger fore-body and with three dorsal pores on elytral stria 5 instead of two. Distinguished from all the known species of the subgenus by the *presence* of sclerotized copulatory pieces.

Colour dark reddish brown, darker than in the preceding species, shiny and somewhat iridescent. Head larger than that in *E. fujii* but otherwise similar to that of the latter, with the exception of genae which are a little less convex and about five-sixths as long as eyes; antennae nearly reaching basal one-fourth of elytra, with segment 2 about five-sixths as long as segment 3. Pronotum larger and more strongly convex than that in *E. fujii*, widest at about three-fifths from base; PW/HW 1.48–1.51, PW/PL 1.22–1.26, PW/PA 1.55–1.58, PW/PB 1.33–1.35, PB/PA 1.14–1.19; postangular denticles larger and less obtuse than those in *E. fujii*; basal transverse impression uneven; both apical and basal areas longitudinally strigose.

Elytra ampler than those in *E. fujii*, widest at about middle, with wider basal part and deeper striae; EW/PW 1.35–1.37, EL/EW 1.47–1.48; shoulders much more obvious than those in *E. fujii*, with prehumeral borders somewhat oblique; lateral sides nearly straight behind shoulders, gently rounded behind middle and very slightly emarginate before apices; striae obviously deeper than those in the three preceding species, evidently crenulate, striae 1–3 moderately impressed and more or less deepening near base, though obliterated apically, stria 4 shallower than the inner but deepening near base, 5 still shallower and fainter, 6 just visible before middle, 7 obsolete, 8 deeply impressed behind the middle group of marginal umbilicate pores; apical striole deep but short and nearly straight; intervals flat, apical carina rather obtuse; stria 3 with five setiferous dorsal pores located at 1/13–1/12, 1/6–1/4, 3/8–3/7, 5/9–2/3 and 3/4–4/5 from base respectively, stria 5 with *three* setiferous dorsal pores at about 1/9, 3/10–3/8 and 4/9–1/2 from base respectively.

5) Refer also to the description given above.

Sternites evenly pubescent. Legs relatively slender.

Male genital organ markedly different from those of the three preceding species. Aedeagus robust and not arcuate, about two-fifths as long as elytra, widely membranous on the dorsal side but the boundaries between the membranous portion and sclerotized aedeagal walls not clearly defined; basal part large, moderately bent towards the ventral side; basal orifice relatively small, with the lateral sides hardly emarginate; viewed laterally, apical part abruptly attenuated near apex, which forms a short rod curving ventrally and has a triangular hook on the dorsal side; viewed dorsally, apical part wide, slightly

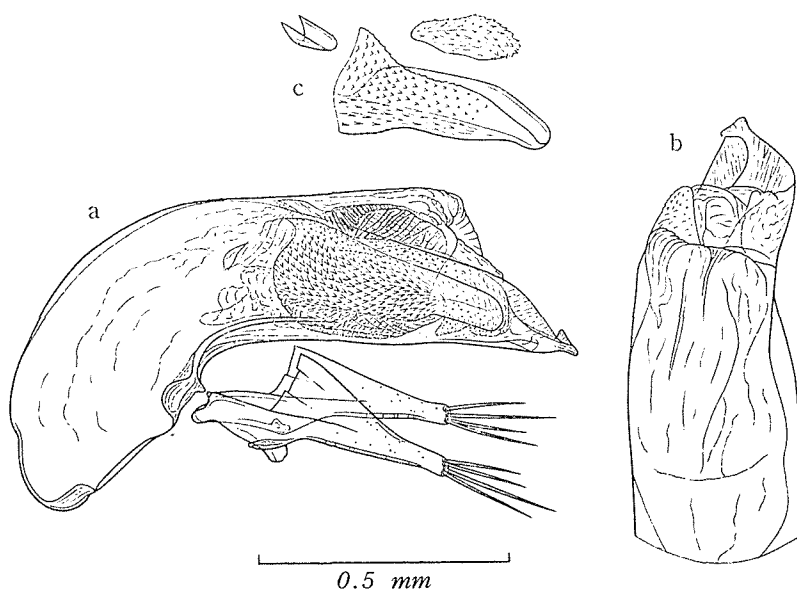


Fig. 8. Male genital organ of *Epaphiopsis* (s. str.) *fukukii* S. UENO, of Shimoizumi; left lateral view (a), dorsal view of the apical part of aedeagus (b), and separated copulatory pieces (c).

curving to the left, ridged along the median line and abruptly narrowing near apex, with the recurrent hook curving to the right; ventral side nearly straight at middle and slightly convex just before apex. The structure of the armatures of inner sac is very much complicated and difficult to interpret correctly in whole mounts; two differentiated copulatory pieces present, one very large and the other small; the larger piece spatulate, becoming membranous and scaly at the base, and situated inside the sac with the basal part inclined towards the left aedeagal wall; the smaller piece also spatulate but very short, situated at the dorsal side of the basal part of the larger piece and partially enveloped by the latter; both the two pieces are enveloped by sheets of large teeth, fusion

of which occurs partly, especially at a portion just before apical orifice, where the teeth are fused into an irregular plate. Styles slender and nearly equal in length to each other, each furnished with four apical setae.

Female unknown.

Specimens examined: 2♂♂ (holotype and paratype) (31-VIII-1939, collected by Y. YANO and preserved in UÉNO's collection).

Locality: Shimoizumi in Shizuoka Prefecture, on the Pacific coast of central Honshu.

Range: Known so far only from the type-locality.

No one knows for certain where is the exact location of the type-locality of this trechid. Even Mr. Yoshio YANO, of whom I have inquired about the matter in a private correspondence, has forgotten all about the collecting data of the insect. All he can inform me is that the 'Shimoizumi' may be a place not so remote from Shizuoka City. If the locality is the 'Shimoizumi' in the Ôi-gawa drainage, at about 25 km W of Shizuoka City, it is about 70 km distant to SW from Shôji, the type-locality of *E. fujii*. Future collectings are, however, necessary to confirm the above assumption, which will not be so difficult in view of the high endemicity of this kind of trechines.

In preparing the present synopsis of *Epaphiopsis*, I have become aware of the taxonomic importance of the recurrent hook at aedeagal apex. As for this species, however, presence of such a hook is not mentioned in the original description, nor in the accompanying drawing, both of which were drawn on the basis of the dissected male genitalia of the paratype. After a careful re-examination, it has become evident that the apical hook is broken off by some accident in that specimen. I have therefore dissected the holotype and prepared the new description and drawings given in the present article.

***Epaphiopsis* (s. str.) *matsudai* S. UÉNO, sp. nov.**

Length: 4.0 mm (from front margin of clypeus to anal end).

Superficially similar to *E. watanabei*, with which it agrees in most of the external features, but different from that species in the smaller pronotum, ampler apical part of elytra, deeper elytral striae and in having three dorsal pores on elytral stria 5 instead of two. These differences are likewise useful in discriminating *E. matsudai* from *E. machiko*, with the exception of the number of elytral dorsal pores, which is identical between the two.

Body somewhat darker than in *E. watanabei*. Head a little more transverse than that in the latter species, with frontal furrows not angulate at middle; frons wider and less convex; genae about three-fourths as long as eyes; mentum tooth truncated at apex; antennae slenderer, nearly reaching basal one-fourth of elytra, with segment 2 about three-fourths as long as segment 3, which is nearly as long as segment 4.

Pronotum smaller than that in *E. watanabei*, widest at about three-fifths from base, with lateral sides less strongly rounded in front and slightly sinuate just before hind angles; PW/HW 1.46, PW/PL 1.23, PW/PA 1.51, PW/PB 1.40, PB/PA 1.09; hind angles nearly rectangular, much larger than those in *E. watanabei*; median line deep and nearly reaching base; basal transverse impression relatively wide, imperfectly interrupted at middle, provided with a longitudinal fovea on each side of median line and merging on each side into deep basal fovea; both apical and basal areas provided with vague longitudinal striations; in the holotype, an extra marginal seta present on the right side behind the normal one.

Elytra ampler in apical half than those in *E. watanabei*, widest at a level slightly before middle, with shoulders prominent and much less widely rounded than those in *E. watanabei*; EW/PW 1.44, EL/EW 1.45; lateral sides nearly straight behind shoulders, moderately rounded behind middle and not emarginate before apices; striae obviously deeper than those in *E. watanabei* or in *E. machiko*, rather coarsely punctate, striae 1-3 more or less distinct and deepening near base, though evanescent on apical one-third, stria 4 shallower than the inner but still punctate, 5 nearly obsolete on the disk but deepening near base, 6-7 completely vanished, 8 deep on apical half; apical striole very short, relatively shallow and moderately curved; intervals flat, apical carina obtuse; stria 3 with four setiferous dorsal pores located at about 1/10, 1/7-3/10, 1/2-5/9 and 2/3-7/9 from base respectively; *three* setiferous dorsal pores present on the site of stria 5 at 1/9-1/8, 1/3 and 1/2-5/9 from base respectively.

Sternites evenly pubescent.

Male unknown.

Type-specimen: ♀ (16-X-1961, collected by A. MATSUDA and deposited in UENO's collection).

Type-locality: Midori-dani, in Neo-mura of Gifu Prefecture, central Honshu.

The true affinity of this new species is highly problematical, and I am now of the opinion that, regardless of a striking resemblance in external features, *E. matsudai* may not represent a phylogenetical line common with *E. watanabei*. This assumption is based partly on the difference in the shape of elytra and partly on the analysis of the distributional pattern shown by the members of the subgenus. As was already noticed before, the beetles which constitute the subgenus *Epaphiopsis* are superficially similar to one another, and the sound classification may only be set up on the basis of a comparative study of their aedeagi. It is to be hoped that future collectings will yield male specimens of *E. matsudai* and permit an examination of their aedeagi.

The type-locality of *E. matsudai* is situated at the southern edge of the Etsubi mountains, which range on the boundary between Fukui and Gifu Prefectures, and in the upper courses of the Neo-gawa, a tributary of the Ibi-gawa River that empties into the Bay of Isé. It is about 200 km apart to the

west from Mt. Fuji-san and about 160 km apart to NNE from Mt. Ohdaigahara (the type-locality of *E. okadai okadai*). Adding to the remoteness, the mountains on which is situated the type-locality are not on the Pacific coast but in the heart of the Island of Honshu, and belong to the watershed chain of the island. On the other hand, all the known localities of the other species are situated on coastal or peninsular massifs. It is therefore most unexpected that a representative of the subgenus *Epaphiopsis* occurs in such a place as Midori-dani, which is isolated both geographically and topographically from the hypothetical coastal range of distribution of the subgenus.

The type and unique specimen of this interesting trechid was found under dead leaves accumulated at the side of a mountain road along a stream about 200 m above sea-level. The place was situated at the margin of a deciduous forest, though not so perfectly shaded. I visited the locality at the end of November, 1961, but failed in obtaining additional specimens. It was already cold then, and the beetle might have hibernated in larval stage.

***Epaphiopsis* (s. str.) *okadai* S. UENO, sp. nov.**

Epaphiopsis okadai S. UENO, 1953 (in litt.), Shin Konchû, Tokyo, 6 (11), p. 40.

Length: 3.8–4.4 mm (from front margin of clypeus to anal end).

Superficially similar to *E. fujii* but distinguished by the larger head, narrower pronotal base, oval form of elytra and so on. Discriminated from all the preceding species, of which the males are known, by the different shape of aedeagus, especially of its apical part.

Colour variable to some extent according to individuals, reddish brown to dark reddish brown, very shiny and feebly iridescent; hind body usually a little lighter than the fore-body; palpi pale; apical segments of antennae, epipleura and tarsi pale reddish brown or yellowish brown.

Head large and wide, much larger than that in *E. fujii*; frontal furrows not angulate in most of the specimens examined, but rarely forming on each side a very obtuse angle; meshes of microsculpture more or less wide; eyes small, usually as long as or slightly longer than genae, but sometimes increasing in dimension and attaining to a size about 1.6 times longer than genae; genae swollen, usually expanding outwards beyond eyes; neck very wide, with deep neck constriction; mentum tooth usually truncated at the tip, sometimes simple, rarely emarginate at apex or even bifid; antennae usually a little longer in ♂ than in ♀, reaching basal one-fourth of elytra in the former but barely reaching basal one-fifth of elytra in the latter, but the lengths are variable to some extent according to individuals; antennal segment 2 about five-sixths as long as segment 3, segment 4 longer than segment 2 but slightly shorter than segment 3.

Pronotum much less contracted anteriorly and more strongly narrowing posteriorly than that in *E. fujii*, widest at about three-fifths from base, with lateral sides widely and evenly rounded in front and hardly sinuate behind;

PW/HW 1.39–1.46 (M 1.44), PW/PL 1.13–1.25 (M 1.20), PW/PA 1.39–1.52 (M 1.46), PW/PB 1.35–1.43 (M 1.40); apex nearly straight or advanced at middle according to individuals, with front angles either rounded or slightly advanced; base usually a little wider than apex but rarely as wide as the latter, PB/PA 1.00–1.11 (M 1.05), with the median part produced backwards; hind angles formed on each side by an obtuse denticle; median line often widening behind basal transverse impression and nearly reaching base; both apical and basal transverse impressions as well as basal foveae similar to those in *E. fujii*; both apical and basal areas usually with longitudinal striations but sometimes smooth; microsculpture as in *E. watanabei*.

Elytra oval and well convex, usually widest at a level slightly before middle; EW/PW 1.36–1.47 (M 1.42), EL/EW 1.38–1.50 (M 1.45); shoulders widely rounded or almost effaced; prehumeral borders more or less arcuate and not so oblique at the inner ends; lateral sides gently rounded from behind shoulders to apices, without distinct preapical emargination; striae superficial though crenulate, stria 1 distinct on the disk and deepening near base but disappearing on apical one-third, 2 also distinct on the disk, 3 usually visible but faint and often obsolete, 4–5 usually absent though visible in extreme individuals, 6–7 evanescent, 8 relatively shallow and often discontinuous even at the apical part; apical striole short but distinct, nearly straight or only feebly curved; disk smooth, apical carina rather obtuse; normally four setiferous dorsal pores present on the site of stria 3 at $1/13$ – $1/9$, $1/5$ – $1/3$ (usually at about $1/4$), $5/9$ – $2/3$ (usually at about $3/5$) and $3/4$ – $4/5$ (usually at about $7/9$) from base respectively, apical two of these four pores sometimes removed onto interval 3; normally two setiferous dorsal pores present on the site of stria 5 at $1/12$ – $1/8$ (usually at about $1/10$) and $1/3$ – $1/2$ (usually at about $3/7$) from base respectively; regarding the variation in the number of setiferous dorsal pores, refer to the paragraph of 'chaetotaxial variation' given later; microsculpture as in *E. watanabei*.

Sternites evenly pubescent. Legs similar to those in *E. fujii*.

Male genital organ relatively small and rather poorly chitinized. Aedeagus short and robust, though variable to some extent, especially in median thickness, according to individuals, about two-fifths as long as elytra, with the dorsal side widely membranous; basal part elongate and always strongly bent towards the ventral side; lateral sides of basal orifice moderately emarginate; sagittal aileron present though rudimentary; viewed laterally, apical part attenuated towards the tip which is rolled up to form a recurrent hook; viewed dorsally, apical part gradually narrowing towards the tip which is *not* produced into a narrow beak; ventral side slightly but widely concave. Inner sac twisted and entirely covered with teeth or scales, those at the ventral side being much larger than those at the right and the dorsal sides; sclerotized copulatory pieces absent. Styles not so slender, left style longer than the right, each furnished with four or five setae at apex, but right style rarely with only three setae.

Chaetotaxial variation: Of the total forty-two specimens examined, eight or 19.0% are more or less aberrant in the number of setiferous dorsal pores on elytra. They are shown in Table 1.

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

Sex	Position of dorsal pores	Left elytron		Right elytron	
		Stria 5	Stria 3	Stria 3	Stria 5
♀		2	3	4	2
♂		2	4	5	2
♂		2	5	4	2
♂		2	5	4	2
♂		2	5	4	2
♀		3	4	4	2
♀		2	5	4	3
♂		3	4	5	3

It may be recognized from this table that the stability of the number of dorsal pores is much higher on the fifth stria than on the third. Only three or 7.1% of the total specimens examined are not normal in regard to the number of dorsal pores on the fifth elytral stria, whereas seven or 16.7% are more or less aberrant in that of the internal series (i.e. six have an excess pore on one elytron and one has lost one of the normal pores on left elytron). Moreover, symmetrical aberrancy in the number of dorsal pores on the fifth elytral stria is found only in a single specimen, or 2.4% of the total specimens examined. It may therefore be safe to conclude that the number of dorsal pores on the *fifth* elytral stria is highly reliable for classification of the subgenus *Epaphiopsis*. I dissected the male specimen having three dorsal pores on the fifth stria of both the elytra and found that it was quite identical in aedeagal features with chaetotaxially normal specimens.

Type-specimens: Described on the basis of 42 specimens as listed below.

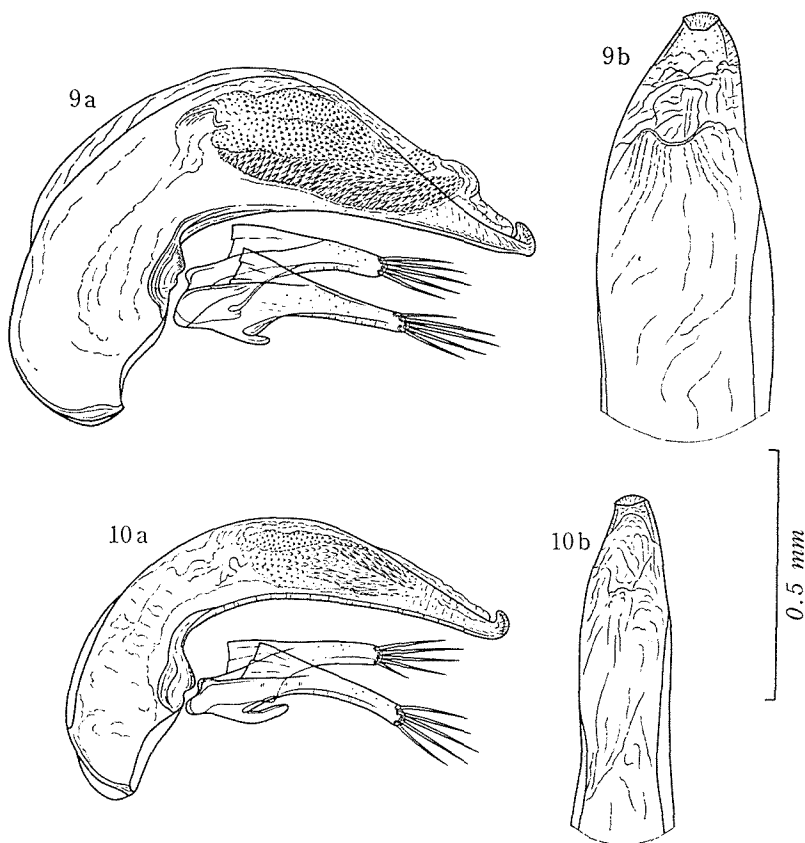
Holotype: ♂, allotype: ♀ (Sanzukōchi, 9-VII-1960, collected by S. & T. UENO). Paratypes: 1 ♀ (Ushiishigahara, 29-VII-1952, by Y. OKADA); 2 ♂♂, 2 ♀♀ (Sanzukōchi, 30-VII-1952, by Y. OKADA and O. SATO); 4 ♂♂, 1 ♀ (Sanzukōchi, 19-VII-1953, by M. IGA); 3 ♂♂, 2 ♀♀ (Sanzukōchi, 21-VII-1953, by H. ISHIDA); 1 ♂, 1 ♀ (Okimi-tōgē, 22-VII-1953, by H. ISHIDA); 2 ♂♂, 3 ♀♀ (Sanzukōchi, 6~8-VIII-1954, by S. UENO); 8 ♂♂, 10 ♀♀ (Sanzukōchi, 9~10-VII-1960, by S. & T. UENO).

The holotype and the allotype are preserved in my collection. The paratypes are in the collections of S. UENO, H. ISHIDA and the Museum of Comparative Zoölogy at Harvard College.

Type-localities: Sanzukōchi and Ushiishigahara on Mt. Ohdaigahara, on the

boundary between Nara and Mié Prefectures, and Okimi-tôgê Pass at Dôkura, in Mié Prefecture; all on the Daikô mountains of the central massif of the Kii Peninsula.

This and the following new species are different from the others in the characteristic structure of their aedeagi and seem to represent a peculiar phylogenetical line within the subgenus. *Epaphiopsis okadai* is commoner between the two and seems to be divided at least into two subspecies. The nominate form is an inhabitant of the Daikô mountains and usually occurs in broadleaved forests at 1,000–1,500 m in altitude. It is not rare in summer, being found under stones or fallen leaves in damp shaded places, but has never been met with in colder seasons. Teneral individuals occur early in July and, according to Mr.



Figs. 9–10. Male genital organ; left lateral view (a), and dorsal view of the apical part of aedeagus (b). — 9. *Epaphiopsis* (s. str.) *okadai okadai* sp. et subsp. nov., of Sanzukôchi on Mt. Ohdaigahara. — 10. *E.* (s. str.) *okadai tenuis* subsp. nov., of Sanjô-dani in Tenkawa-mura.

SHIBATA, ordinarily in June. Hibernation may therefore take place in the larval stage.

***Epaphiopsis* (s. str.) *okadai tenuis* S. UÉNO, subsp. nov.**

Length: 3.9–4.5 mm (from front margin of clypeus to anal end).

Externally very similar to the nominate subspecies and difficult to distinguish from the latter. There is, however, a striking aedeagal difference between the two forms.

Head and pronotum quite similar to those in the nominate subspecies, with the exception of pronotal hind angles which are usually a little larger than in the latter; PW/HW 1.38–1.44 (M 1.41), PW/PL 1.15–1.23 (M 1.20), PW/PA 1.36–1.50 (M 1.45), PW/PB 1.36–1.47 (M 1.40), PB/PA 0.97–1.09 (M 1.03). Elytra usually a little less convex, especially in apical half, than those in the nominate subspecies, widest at about middle, with shoulders usually distinct though rounded; EW/PW 1.39–1.48 (M 1.43), EL/EW 1.40–1.47 (M 1.44); lateral sides nearly straight behind shoulders in most of the specimens examined; striae usually a little deeper and more coarsely crenulate.

Male genital organ markedly different from that of the nominate subspecies, though of the same type as that of the latter. Aedeagus relatively small, about three-eighths as long as elytra, much slenderer and more regularly arcuate than in *E. okadai okadai*, much more gradually attenuated towards apex in both lateral and dorsal aspects; lateral sides of basal orifice only feebly emarginate; sagittal aileron obviously larger; ventral side moderately concave at middle. Styles somewhat slenderer than those in the nominate subspecies, each provided with four or five setae at apex.

Type-specimens: Holotype: ♂, allotype: ♀ (Sanjō-dani, 28-VII-1955, collected by S. UÉNO and N. KOBAYASHI). Paratypes: 2♀♀ (Sanjō-dani, 28-VII-1955, by S. UÉNO and N. KOBAYASHI); 4♂♂, 1♀ (Mt. Inamura-ga-také, 23-VII-1957, by Y. IKUTANI).

The holotype and the allotype are deposited in my collection. The paratypes are in the collections of S. UÉNO and Y. IKUTANI.

Type-localities: Sanjō-dani at the western foot of Mt. Kwannonminé-yama, in Tenkawa-mura, and Mt. Inamura-ga-také on the Ohminé mountains; both on the central massif of the Kii Peninsula.

The present new subspecies is so similar in external features to the nominate one that I have hesitated long in deciding to give it a new scientific name. Minor differences found in pronotum and elytra are always proved unstable by the occurrence of intermediate individuals, though still indicating the general trends of respective races. A startling and constant divergence, however, occurs in their aedeagi, being short and robust in the nominate subspecies and very slender in *E. okadai tenuis*. Such a great difference might be regarded almost as specific if there were external evidences supporting the independency

of the two forms. At the present moment, I prefer to recognize the populations of the Ohminé mountains as a distinctive subspecies of *E. okadai*.

Sanjō-dani is a valley in the upper courses of the Ten-no-kawa, a tributary of the Kumano-gawa River, and is situated at the western foot of Mt. Kwannon-miné-yama (1,348 m in height) that is on a western branch of the Ohminé mountains. Mt. Inamura-ga-také (1,726 m in height) is another peak on a western branch of the mountain range and is situated at about 5 km E of Sanjō-dani and about 17 km WNW of Sanzukōchi on Mt. Ohdaigahara. The Ohminé mountain range itself stretches from north to south parallel with the Daikō mountain range, and is separated from the latter by the deep ravines of the Yoshino-gawa and the Kitayama-gawa Rivers. The habitats of the trechid are similar to those of the nominate subspecies. The Sanjō-dani specimens were found under a heap of fallen leaves in a damp shaded place at an elevation of about 750 m, and the Inamura-ga-také ones were taken along a mountain path about 1,500 m above the sea, under fallen leaves in a broadleaved forest.

There are subtle differences between the two known populations of *E. okadai tenuis*. The specimens of the Sanjō-dani population are usually darker in colour than those of the Inamura-ga-také one. The PW/PA value is also different between the two, 1.36–1.44 (mean 1.41) in the former and 1.43–1.50 (mean 1.47) in the latter. They are, however, otherwise quite in accordance with each other and are regarded as to belong to the same geographical race. Chaetotaxial variants are found in both the populations, one specimen in each. These specimens are aberrant in the number of setiferous dorsal pores on the third elytral stria and not on the fifth.

Through the courtesy of Mr. SHIBATA, I have been able to examine a trechine specimen with a label inscribed "Mt. Kooya, Wakayama-Pref., 22-VII-1959, Coll. Mitsuo Goto". It has, therefore, come from Mt. Kōya-san (=Mt. Kooya), a locality at about 30 km W of Mt. Inamura-ga-také and at the northern part of the Obako mountain range. Though being a female, this specimen is very similar, at least superficially, to the specimens of *E. okadai tenuis*. It has relatively large pronotal hind angles, rather distinct shoulders and gently-sloping apical parts of elytra, and shows the following ratios of body parts: PW/HW 1.45, PW/PL 1.22, PW/PA 1.48, PW/PB 1.45, PB/PA 1.02, EW/PW 1.38 and EL/EW 1.40. The length of the body measures 4.3 mm from the apical margin of clypeus to the apices of elytra. Under the present circumstances, however, it is impossible to decide conclusively whether the Kōya-san population is subspecifically identical with the Ohminé populations or not.

***Epaphiopsis* (s. str.) *elongata* S. UENO, sp. nov.**

Length: 4.6 mm (from front margin of clypeus to anal end).

Allied to *E. okadai* but readily recognized from that species by the smaller

head and pronotum, elongate elytra, deeper elytral striae, different number of setiferous dorsal pores, peculiar shape of aedeagus, and so on. Not quite unlike *E. fukukii* in certain features, but obviously narrower, with much smaller pronotum, and decidedly different in the aedeagal structure.

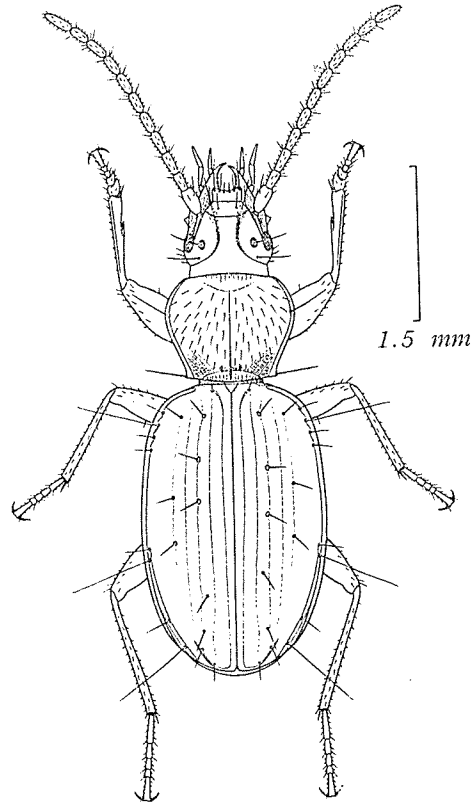


Fig. 11. *Epaphiopsis* (s. str.) *elongata* sp. nov.,
♂, of Komori-dani on Mt. Gomanodan-yama.

Colour as in the darker individuals of *E. okadai*.

Head rather elongate, much less wide than that in *E. okadai*, with deep frontal furrows which are hardly angulate at middle; both frons and supra-orbital areas moderately convex; microsculpture relatively faint, composed mostly of wide meshes but partially of isodiametric ones; eyes flat; genae less convex than those in *E. okadai*, about three-fifths as long as eyes; neck not so wide as in *E. okadai*; mandibles slenderer; mentum tooth bifid; palpi rather thin; antennae relatively long, reaching basal three-tenths of elytra, with segment 2 about four-fifths as long as segment 3, which is slightly longer than segment 4.

Pronotum small and rather square, moderately convex, widest at about five-eighths from base; PW/HW 1.45, PW/PL 1.19, PW/PA 1.54, PW/PB 1.40; lateral sides narrowly but strongly rounded in front, very slightly sinuate behind; hind angles nearly rectangular or rather obtuse, formed on each side by a denticle that is slightly produced outwards; front angles rather narrowly rounded; apex advanced at middle; base evidently wider than apex, slightly produced backwards at the median part and slightly oblique on each side inside hind angle; PB/PA 1.11; median line fairly deep on the disk, not reaching apex, but widening near base and nearly reaching it; apical transverse impression rather obvious though irregular; basal transverse impression continuous, with a longitudinal fovea on each side of median line, outwardly merging into basal foveae, which are deep and extend anteriorly along side-borders; both apical and basal areas longitudinally strigose; microsculpture formed by fine transverse lines.

Elytra elongate-ovate, widest at about middle, well convex though rather depressed on the disk before middle; EW/PW 1.45, EL/EW 1.54; shoulders obvious though rounded, with prehumeral borders slightly arcuate and slightly oblique; lateral sides slightly rounded behind shoulders, nearly straight before middle, then slightly rounded again to near the preapical emarginations, which are very slight; striae deeper than those in any of the other known species of the subgenus, coarsely crenulate, striae 1-3 moderately impressed on the disk and traceable throughout though becoming shallower apically, stria 1 deepening near base, 4 shallower than the inner but still distinct, 5 visible on the disk, 6-7 evanescent, 8 deeply impressed behind the middle group of marginal umbilicate pores; apical striole deep and nearly straight; disk smooth, intervals slightly convex near suture but flat at the sides, apical carina prominent; stria 3 with five setiferous dorsal pores located at about 1/10, 1/4-2/7, 2/5-4/9, 2/3-3/4 and 6/7 from base respectively, the fourth pore of this series being removed onto interval 3 in the holotype; stria 5 with *three* setiferous dorsal pores at about 1/10, 1/3-3/8 and 5/9 from base respectively; microsculpture composed of fine, irregularly transverse lines.

Sternites evenly pubescent. Legs relatively long and slender.

Male genital organ very large and well chitinized, notably different from that in *E. okadai* though of the same type as the latter. Aedeagus elongate and moderately arcuate, about a half as long as elytra, widely open on the dorsal side; basal part remarkably large and *not* bent towards the ventral side, with a very small sagittal aileron; lateral sides of basal orifice slightly emarginate; viewed laterally, apical part gradually attenuated towards apex which is narrowly prolonged and rolled up at the extremity to form a large recurrent hook; viewed dorsally, apical part wide and rather abruptly terminating in a subtruncated tip; ventral side widely and rather deeply concave. Inner sac entirely covered with teeth or scales, those at the ventral side being much larger and stouter than those at the other parts and partially enveloped by a

sheet of smaller scales, which itself is the extension of the ventral teeth sheet rolled round the right and the dorsal sides and continuing to the left side; differentiated copulatory pieces absent. Styles very slender, left style a little longer than the right, each furnished with four apical setae.

Female unknown.

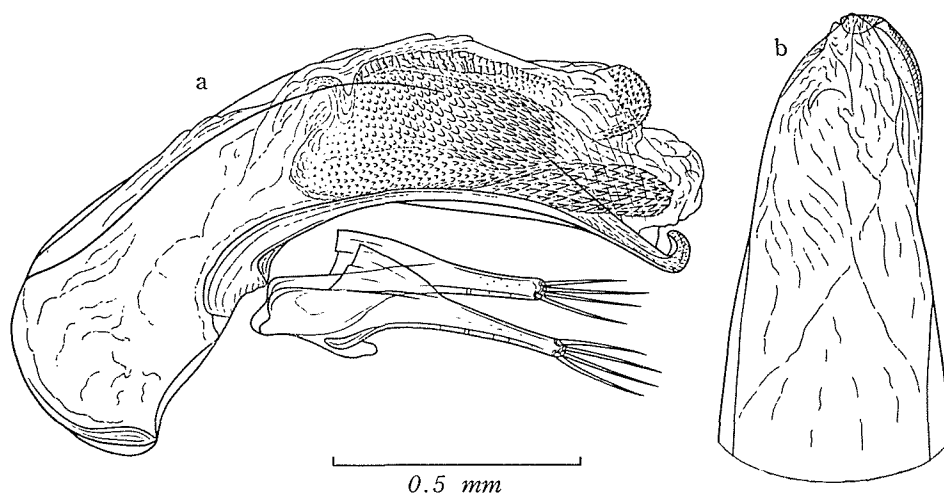


Fig. 12. Male genital organ of *Epaphiopsis* (s. str.) *elongata* sp. nov., of Komori-dani on Mt. Gomanodan-yama; left lateral view (a), and dorsal view of the apical part of aedeagus (b).

Type-specimen: Holotype: ♂ (6-VIII-1952, collected by N. YATÔ and preserved in UENO's collection).

Type-locality: Komori-dani, on Mt. Gomanodan-yama of the Obako mountains, in Wakayama Prefecture, on the central massif of the Kii Peninsula.

Within the subgenus *Epaphiopsis*, this new species is unique in its slender body form, exceedingly small prothorax and deep elytral striae. On the other hand, the structure of its aedeagus bespeaks a close relationship to *E. okadai*. Provided that the aedeagal characters are of primary importance for the classification of these trechines, the two species, *E. okadai* and *E. elongata*, appear to form a species-group segregated from the others on the central massif of the Kii Peninsula, regardless of the difference in external anatomy.

Epaphiopsis elongata is now known only from the holotype specimen, which was taken from under a stone at the side of a trail in a broadleaved forest, at an elevation of about 600 m. The place was damp and shaded, being situated on the left side of the Komori-dani in the upper courses of the Hidaka-gawa River and at the SSW foot of Mt. Gomanodan-yama (1,370 m in height). This

mountain is the highest point on the Obako mountain range and is about 40 km distant to SW over the deep ravine of the Totsu-gawa from Mt. Inamura-ga-také, one of the type-localities of *E. okadai tenuis*. It is interesting that such a distinctive species as *E. elongata* has been segregated at the central part of the Obako mountain range, of which the northern part is occupied by a race of *E. okadai*.

General Consideration

The subgenus *Epaphiopsis* is a homogeneous group of trechines. All the members share many external features that indicate close relationship. There is, however, a marked divergence in the structure of male genitalia, based on

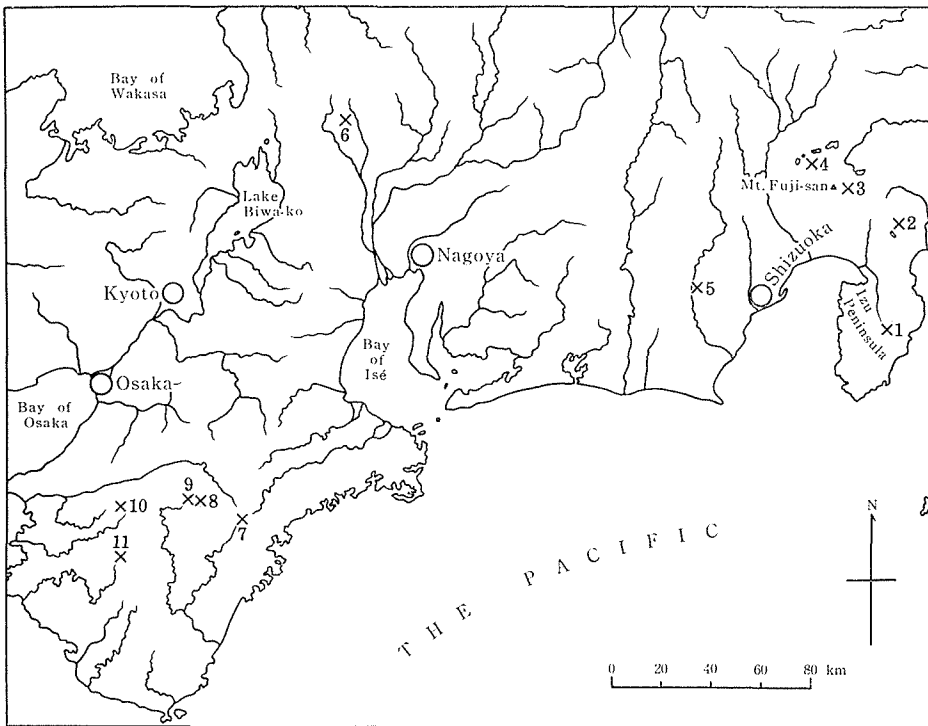


Fig. 13. Sketch map showing the distribution of *Epaphiopsis* (s. str.).—1. Iwabi in Amagi-Yugashima-chô and Mt. Amagi-san (*E. watanabei* sp. nov.).—2. Ubako at Hakoné (*E. machiko* sp. nov.).—3. Ichigômé on Mt. Fuji-san (*E. fujii* (SUENSON)).—4. Shôji (*E. fujii* (SUENSON)).—5. Shimoizumi (*E. fukukii* S. UENO).—6. Midori-dani in Neo-mura (*E. matsudai* sp. nov.).—7. Mt. Ohdaigahara and Okimi-tôgê Pass (*E. okadai okadai* sp. et subsp. nov.).—8. Mt. Inamura-ga-také (*E. okadai tenuis* subsp. nov.).—9. Sanjô-dani in Tenkawa-mura (*E. okadai tenuis* subsp. nov.).—10. Mt. Kôya-san (*E. okadai* subsp. inedit.).—11. Mt. Gomanodan-yama (*E. elongata* sp. nov.).

which the seven species hitherto known may be classified into several minor groups. The first of them comprises *E. watanabei*, *E. machiko* and *E. fujii*, being characterized by the absence of copulatory pieces as well as by the dorsal aspect of aedeagal apex, which is more or less produced into a narrow beak or at least triangular. The distributional range of this group covers an area from the Izu Peninsula in the southeast to Mt. Fuji-san in the northwest. In the immediate west of this area occurs a large species, *E. fukukii*, which may be regarded as representing the second phylogenetical line within the subgenus. The short robust form of its aedeagus and particularly the presence of sclerotized copulatory pieces are unique among the members of the subgenus, showing a maximum stage of aedeagal differentiation. The aedeagal internal structure of *E. fukukii* is, however, otherwise similar to that of *E. elongata* of the Obako mountains. This seems suggestive of the formation of copulatory pieces, which may have been derived from fusion of chitinized scales covering the internal surface of inner sac. Such a fusion seems to take place especially at a folded portion of sac membrane and to result in forming a more or less 'spatulate' piece.

Far apart to the west from Mt. Fuji-san, there occurs a small species at the northeast of Lake Biwa-ko. This is *E. matsudai* known from Midori-dani in Gifu Prefecture and may probably represent the third phylogenetical line, though the structure of its aedeagus is not yet known. The native place of this species is perfectly isolated from the ranges of the other members. This seems to offer an interesting problem to the zoogeography of Japanese trechids. Finally, the central massif of the Kii Peninsula is occupied at least by two species which seem to constitute the fourth phylogenetical line within the subgenus. They are *E. okadai* and *E. elongata*, in both of which the aedeagal apex is not prolonged into a narrow beak in dorsal aspect and the inner sac is not armed with differentiated copulatory pieces. The former species has rather a wide range of distribution, inhabiting three different mountain ranges and starting in raiation.

As a whole, the distributional range of the subgenus *Epaphiopsis* stretches mainly along the Pacific coast of central Honshu, from the Izu Peninsula in the east to the Kii Peninsula in the west. No species of the subgenus has invaded westwards across the Kii Channel. On the other hand, members of the subgenus *Pseudepaphius* are distributed over the Islands of Shikoku and Kyushu, their fringing islands and the northwestern provinces of Honshu (S. UENO, unpublished data). Moreover, the known distributional ranges of these two subgenera are mutually exclusive, though almost contiguous at the northeast of Lake Biwa-ko. It is of particular importance that the barrier formed by the Kii Channel has been so effective in preventing them from occupying the same area. The only reasonable inference drawn from this fact is that the ancestors of these trechines had lost their flying ability before the submergence of the Kii Channel took place and could not cross the newly established water barrier.

There are geological evidences to show that, before the middle Pliocene, the Kii Peninsula was continuously connected with Shikoku as the eastern part of the ancient Kuma-Kii mountain range. Therefore, the isolation of the two subgenera must have been accomplished after that period. On the other hand, it seems quite improbable that such an isolation took place after the onset of severe climate in the Pleistocene, for the main pattern of distribution shown by the existing species of *Epaphiopsis* (s. str.) is very suggestive of the influence of cold climate, which their ancestors underwent during the Glacial Periods, and is hard to be accounted for by the post-Glacial dispersal. There is, indeed, some evidence that the Kii Channel was eliminated by lowerings of sea-level during the Glacial Phases, but it might still be a barrier for the dispersal of such saprophilous beetles as had already become wingless and confined to forest floors. Thus, it may be concluded that the ancestors of the members of the subgenus *Epaphiopsis* were segregated from those of *Pseudepaphius* during the late Pliocene or the early Pleistocene, that they were trapped during the Glacial Periods in an area limited by high mountains to the north and by the Kii Channel to the west, and that all the existing forms have been derived from such stocks as survived in this area.

Next to arise is the problem how phylogenetical divergence has occurred within the subgenus. This is much more difficult a subject to analyse than that discussed above. To make the matters worse, the striking homogeneity of the subgenus makes it difficult even to determine which species is relatively advanced as compared with the others. Assuming that the aedeagal characters are indicative of this relation, we must conclude that *E. fukukii* is the most advanced. There is, however, nothing in external features to back such a view up, and the elytral chaetotaxy of this species contrariwise remains in a primitive state. It may be said that the members of the subgenus are more or less on a similar level of differentiation, and that the notable similarity among them has been brought forth, at least partly, by the primitiveness of the subgenus. That they are ecologically equivalent to one another may have played an important rôle in preserving among them many common characters that might be the property of their Tertiary ancestors. Under this situation, only a clue for solving the problem may be the fact that the distributional range of each phylogenetical group is confined to rather a small area. How, then, such a localization has been resulted?

There is every reason to believe that the existing Japanese forms of *Epaphiopsis* originated from an ancestral stock that had invaded southwestern Japan from the Yang-tze region of central China, though I have no intention at present to go further into this problem. Provided that this premise is correct, their ancestors must have radiated from the ancient Kuma-Kii mountain range, as many other genera of the group of *Trechima* did, and dispersed from west to east along the Pacific coast. This means that the Izu-Hakone area (and presumably the southeastern part of the Kwantô mountain range)

might be the easternmost place they could have reached. Some of them might spread northwards along the coast of the ancient Lake of Isé, which persisted during the Pliocene in the place now called Nōbi Plain. *Epaphiopsis matsudai* may be a survival of such immigrants. As they became saprophilous and predominantly wingless, their ability to expand their ranges must have been gradually lost. They might spread and recede during the Pleistocene in harmony with the climatic changes, but the extent of northward invasions, which no doubt followed expansions of temperate broadleaved forests, might not be very large. Accordingly, these ancestral trechines might become divided first into several local groups (now recognized as phylogenetical ones), and then, subdivided within the respective areas into more restricted populations. Every one of these populations may have differentiated in isolation into a form that is now regarded as a distinctive species. It is desirable that future collectings will clarify the northern limit of the range of *Epaphiopsis* and reveal more precisely the speciation pattern of the subgenus.

Appendix

It seems to be advantageous to give here a brief account of a new subgenus, whose name has appeared in the discussions given on the foregoing pages.

Subgenus *Pseudepaphius* S. UÉNO, nov.

Type-species: *Epaphiopsis ishizuchiensis* S. UÉNO, sp. nov.

Similar in most ways to *Epaphius* but decidedly different from the latter in having a premolar tooth on right mandible and a setiferous dorsal pore on the fifth elytral stria. Readily discriminated from the nominate subgenus by the glabrous pronotum and sternites, glabrous (or nearly so) genae, and by the smaller and much more constant number of elytral dorsal pores (two or three in the internal series and only one in the external series). Further description will be given in a separate paper.

Range: Honshu (throughout the Chūgoku district; extending along the coast of the Sea of Japan as far east as the Ryōhaku mountains), Shikoku with its fringing islets, Kyushu and Is. Yaku-shima.

Besides the type-species, the following three species, hitherto placed in *Epaphius*, seem to belong to the present subgenus.

Epaphiopsis (*Pseudepaphius*) *unzenensis* (JEANNEL, 1930), comb. nov.

Trechus (*Epaphius*) *unzenensis* JEANNEL, 1930, L'Abeille, Paris, 34, p. 82; type-locality: mont Unzen.—S. UÉNO, 1953, Shin Konchū, Tokyo, 6 (11), pp. 40, 42.—SUENSON, 1957, Ent. Medd., 28, p. 85.

Epaphiopsis (Pseudepaphius) punctatostrata (PUTZEYS, 1877), comb. nov.

Trechus punctato-striatus PUTZEYS, 1877, Dtsch. ent. Z., 21, p. 85; type-locality: Hagi.

Trechus punctatostratus: H. W. BATES, 1883, Trans. ent. Soc. London, 1883, p. 266.

*Trechus (Epaphius) punctatostratus*⁶⁾: JEANNEL, 1927, L'Abeille, Paris, 33, pp. 131, 136.—
S. UÉNO, 1953, Shin Konchû, Tokyo, 6 (11), pp. 40, 41.

Epaphiopsis (Pseudepaphius) janoi (JEANNEL, 1937), comb. nov.

Trechus (Epaphius) Janoi JEANNEL, 1937, Bull. Soc. ent. France, 42, p. 82; type-locality: Ile Yakushima, Mananoego (misreading of Hananoégô).

Trechus (Epaphius) janoi: S. UÉNO, 1953, Shin Konchû, Tokyo, 6 (11), pp. 40, 42.

The subgenus *Pseudepaphius* comprises still many other species and sub-species to be described. Their descriptions, together with re-descriptions of the species cited above, will appear in a forthcoming revision.

Epaphiopsis (Pseudepaphius) ishizuchiensis S. UÉNO, sp. nov.

Trechus (Epaphius) ishizuchiensis S. UÉNO, 1953 (in litt.), Shin Konchû, Tokyo, 6 (11), pp. 40, 42.

Length: 3.0–3.5 mm (from front margin of clypeus to anal end).

Allied to *E. unzenensis* but distinguished at first sight from that species by the following points: colour evidently darker; antennae shorter, with thicker scape and much ovaler apical segments; pronotum more transverse, with more strongly and widely rounded lateral sides; pronotal hind angles less obtuse; elytra relatively short. Aedeagi are also different between the two species.

Colour reddish brown and shiny, with more or less lighter appendages. Head large and wide, with frontal furrows rather shallow and not angulate; eyes small and flat; genae moderately convex, about a half to two-thirds as long as eyes; neck wide; mentum tooth bifid; antennae short, reaching basal one-eighth to one-seventh of elytra in ♂ and usually a little shorter in ♀ than in ♂; antennal segments 2–4 usually equal in length to one another, 7–10 oval. Pronotum ample, transverse and convex, with the greatest width at about three-fifths from base; PW/HW 1.43–1.53 (M 1.48), PW/PL 1.39–1.47 (M 1.43), PW/PA 1.49–1.56 (M 1.52), PW/PB 1.21–1.27 (M 1.24); lateral sides widely and rather strongly rounded, not sinuate before hind angles; base bisinuate and obviously wider than apex, PB/PA 1.21–1.27 (M 1.23); front angles rounded though a little advanced; postangular denticles rectangular or somewhat sharp; median line not widening basally but nearly reaching base; basal transverse sulcus nearly smooth and almost continuous; basal foveae rather shallow and smooth. Elytra

6) Under this name, SUENSON (1957, p. 85) recorded a trechid from Mukden (=Shenyang) in Manchuria. His specimens, however, belong to true *Epaphius*, hence not identical with PUTZEYS' species.

ovate and convex, widest a little before middle, with prominent shoulders; EW/PW 1.29–1.35 (M 1.32), EL/EW 1.34–1.42 (M 1.38); prehumeral borders perpendicular to the mid-line; punctate-striate throughout, striae becoming shallower at the sides, stria 3 curving outwards at apex and not joining stria 2; apical striole deep and usually joining stria 3; three setiferous pores in the internal dorsal series usually located at $1/10$ – $1/9$, $1/3$ and $5/7$ from base respectively, the anterior two being on stria 3 and the third on interval 3 or adjoining stria 2; external dorsal series of a single pore usually situated on interval 5 a little behind middle. Microsculpture composed mostly of wide meshes and partly of transverse lines on head, consisting of transverse lines both on pronotum and on elytra. Legs short and stout.

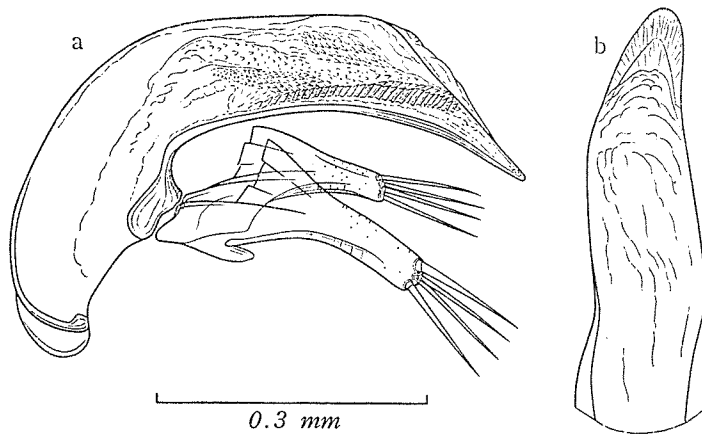


Fig. 14. Male genital organ of *Epaphiopsis* (*Pseudepaphius*) *ishizuchiensis* subgen. et sp. nov., of Omogō-kei Valley at the southern foot of Mt. Ishizuchi-yama; left lateral view (a), and dorsal view of the apical part of aedeagus (b).

Aedeagus very small but well chitinized, only one-fourth as long as elytra, feebly arcuate at middle and rather abruptly attenuated towards apex; basal part elongate and well bent towards the ventral side; sagittal aileron well developed; apical part narrowly produced and blunt at the tip in lateral view, rather widely rounded at apex in dorsal view; ventral side widely concave; inner sac provided with a large ventral sheet of large teeth and a small right dorsal group of large teeth; copulatory pieces absent; styles (particularly left style) large and wide, each with four setae at apex.

Type-specimens: Holotype: ♂ (Omogō-kei Valley, 8-V-1954, collected by K. MORIKAWA). Allotype: ♀ (Omogō-kei Valley, 9-V-1954, by K. MORIKAWA). Paratypes: 1 ♂, 1 ♀ (Omogō-kei Valley, 9-V-1954, by K. MORIKAWA); 1 ♂, 6 ♀♀ (Omogō-kei Valley, 4-VIII-1954, by K. MORIKAWA); 1 ♀ (Mt. Ishizuchi-yama,

31-VII-1951, by T. NOMACHI); 1 ♀ (Mt. Ibuki-yama, 25-VII-1949, by K. MORIMOTO); 3 ♂♂ (Mt. Sara-ga-miné, 5-V-1954, by K. MORIKAWA); 1 ♂ (Mt. Sara-ga-miné, 16-V-1954, by M. HORIKAWA).

The holotype and the allotype are deposited in my collection. The paratypes are distributed to the collections of S. UENO, the Entomological Laboratory of Ehime University and the Museum of Comparative Zoology at Harvard College.

Type-localities: Omogō-kei Valley, Mt. Ishizuchi-yama, Mt. Ibuki-yama and Mt. Sara-ga-miné; all on the Ishizuchi mountain range, in Ehime Prefecture, the Island of Shikoku.

Besides the type series, I have seen specimens from some other localities situated on different mountain ranges. Local variations are, however, observed within the species, so that the type series is limited to the specimens taken on the Ishizuchi mountain range. This species will be re-described in some detail in one of my future papers.

Mt. Ishizuchi-yama, 1,981 m in height, is the highest peak in the Island of Shikoku. The Omogō-kei Valley takes its rise in this peak and flows southwards to the Bay of Tosa. These two localities are, therefore, very close to each other, though different in altitude. Mt. Ibuki-yama (1,503 m in height) is also close to Mt. Ishizuchi-yama, being situated at about 6 km E of the latter. On the other hand, Mt. Sara-ga-miné (1,271 m in height) is on the westerly extension of the Ishizuchi mountain range and is about 21 km distant to WSW from Mt. Ishizuchi-yama in a bee-line.

Epaphiopsis ishizuchiensis is primarily saprophilous and is usually taken by sifting leaf mould with a Berlese funnel. The Omogō-kei specimens were found in such moulds as had been scraped in a mixed forest (*Abies*, *Tsuga*, *Lindera*, etc.) about 800 m above sea-level. The Sara-ga-miné ones were likewise found in Berlese samples, but the habitat was in a beech forest on the northern slope at an elevation of about 950 m. Contrary to these, both the Ishizuchi-yama and the Ibuki-yama specimens were taken from under stones above 1,450 m in altitude.

Summary

Saprophilous trechine beetles of the subgenus *Epaphiopsis* are enumerated. A discussion is devoted to the status of the genus *Epaphiopsis*, which is defined as a group of such primitive trechines as have an appearance like *Epaphius*, have a premolar tooth on right mandible but not on the left, and have two series of setiferous dorsal pores on elytra. The genus is regarded as representing the ancestral type common between *Trechiana*- and *Trechus*-lines. Application of the subgenus *Epaphiopsis* is limited to such species with pubescent pronotum and sternites, four or five pores in the internal dorsal series and two or three pores in the external one, and without preapical pore. *Glabrotrechus* SUENSON is synonymized with this subgenus.

Seven species and a subspecies are recognized within the subgenus *Epaphiopsis*. All these forms are described, or re-described, and a key to them is given. New taxa established here are *Epaphiopsis* (*Epaphiopsis*) *watanabei*, *E.* (*E.*) *machiko*, *E.* (*E.*) *matsudai*, *E.* (*E.*) *okadai* (with subsp. *tenuis*) and *E.* (*E.*) *elongata*. Phylogenetical divergence within the subgenus is discussed in relation to the analysis of the existing pattern of distribution. In addition, a new subgenus *Pseudepaphius* is erected for a new species, *E.* (*P.*) *ishizuchiensis*, that occurs in the Island of Shikoku. Four new combinations are also proposed.

References

- BATES, H. W., 1883. Supplement to the geodephagous Coleoptera of Japan, chiefly from the collection of Mr. George LEWIS, made during his second visit, from February, 1880, to September, 1881. Trans. ent. Soc. London, 1883: 205-290.
- CSIKI, E., 1928. Carabidae: Harpalinae II. In JUNK & SCHENKLING, Coleopterorum Catalogus, pars 98, 227-345. Berlin, W. Junk.
- JEANNEL, R., 1927. Monographie des Trechinae. Morphologie comparée et distribution géographique d'un groupe de Coléoptères. (Deuxième livraison). L'Abeille, Paris, 33: 1-592.
- 1930. Ditto. (Quatrième livraison). Supplément. Ibid., 34: 59-122.
- 1937. Nouveaux Trechinae paléarctiques [Col. Carabidae]. Bull. Soc. ent. France, 42: 82-88.
- 1954a. Trois Tréchites orientaux nouveaux. Rev. franç. Ent., 21: 10-14.
- 1954b. Les *Trechus* du mont Elgon (Coleoptera Trechidae). Mém. Mus. Hist. nat. Paris, n. s. (A), 7: 147-177.
- JEDLIČKA, A., 1946. Description des Carabides nouveaux des l'Asie orient. Pp. 1-16. Praha, private publication.
- PUTZEYS, J., 1877. Beiträge zur Käferfauna von Japan, meist auf R. HILLER's Sammlungen basirt. (Erstes Stück.). Japanische Carabidae. Dtsch. ent. Z., 21: 84-86.
- SUENSON, E., 1957. Trechinae from the Far East with description of new species collected by E. SUENSON. Ent. Medd., 28: 84-96.
- UÉNO, S., 1953a. Studies on the Japanese Trechinae (I) (Coleoptera, Harpalidae). Ent. Rev. Japan, Osaka, 6: 30-34.
- 1953b. The Coleoptera of Japan [12]. Shin Konchū, Tokyo, 6 (11): 38-45. (In Japanese.)