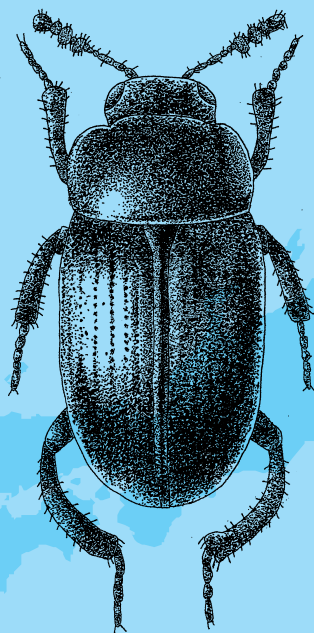




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# ACTA ENTOMOLOGICA

MUSEI NATIONALIS PRAGAE



**Review of the tribes  
Sogdini and Leiodini from Japan  
and North Chishima Islands.  
Part II. Genera *Hydnobius* and  
*Leiodes* (Coleoptera: Leiodidae)**

Hideto Hoshina

**52(suppl.1)**  
**2012**



# Acta Entomologica Musei Nationalis Pragae

Volume 52 (supplementum 1)

Date of issue: September 15, 2012

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Published biannually by the National Museum, Václavské náměstí 68, CZ-115 79 Praha 1, Czech Republic.

**Scope of the journal:** *Acta Entomologica Musei Nationalis Pragae* (AEMNP) publishes entomological papers focused on taxonomy, nomenclature, morphology, bionomics and phylogeny as well as catalogues, faunistic papers dealing with large areas and short notes.

**Manuscripts should be sent to:** AEMNP journal office, Department of Entomology, National Museum, Kunratic 1, CZ-148 00 Praha 4, Czech Republic.

E-mails: [aemnp.editors@gmail.com](mailto:aemnp.editors@gmail.com), [aemnp@nm.cz](mailto:aemnp@nm.cz).

**Journal web page:** <http://www.nm.cz/publikace/acta.php>; <http://www.aemnp.eu>

Typeset & design: M. Fikáček.

Printed by H.R.G. spol. s r.o., Svitavská 1203, Litomyšl, Czech Republic.

Distributed by the Department of Entomology, National Museum, Praha.

Indexed in Biological Abstracts, EBSCO, Entomology Abstracts, SCOPUS, BIOSIS Previews, Zoological Record and Scientific Citation Index Expanded.

ISI Impact Factor (2011): 0.72

**ISSN 0374-1036 (Print)**

© Národní muzeum, Praha – 2012

**ISSN 1804-6487 (Online)**

**ISBN 978-80-7036-353-9**

This is Supplementum 14 of the *Acta Entomologica Musei Nationalis Pragae*.

Cover: *Leiodes osawai* Nakane, 1963 (Coleoptera: Leiodidae). Drawn by Hideto Hoshina.

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volume 52 (supplementum 1)

National Museum, Prague  
2012



## Review of the tribes Sogdini and Leiodini from Japan and North Chishima Islands.

### Part II. Genera *Hydnobius* and *Leiodes* (Coleoptera: Leiodidae)

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**Abstract.** The species of the genera *Hydnobius* Schmidt, 1841 and *Leiodes* Latreille, 1797 in Japan and the North Chishima Islands (= North Kuril Islands) are revised. Until now, only one species of *Hydnobius* and ten species of *Leiodes* were recorded from Japan, none of them from the North Chishima Islands. In *Hydnobius*, one new species, *H. enomotoi* sp. nov. (Matua Island, Simushir Island, Ketoi Island) is described, and *H. akitsuensis* Hoshina & Sunada, 2003 is recorded for the first time from the North Chishima Islands. In *Leiodes*, twenty-four new species are described: *L. kandai* sp. nov. (Honshu), *L. yoshidai* sp. nov. (Shikoku), *L. juzoi* sp. nov. (Hokkaido: Rishiri Is.), *L. yasudai* sp. nov. (Hokkaido), *L. yoshitakei* sp. nov. (Hokkaido), *L. masatsugui* sp. nov. (Honshu), *L. toyoshimai* sp. nov. (Honshu, Shikoku), *L. araii* sp. nov. (Honshu), *L. haradai* sp. nov. (Shikoku), *L. hijikatai* sp. nov. (Honshu), *L. kiuchii* sp. nov. (Honshu, Shikoku), *L. sakaii* sp. nov. (Shikoku), *L. naraharai* sp. nov. (Ryukyus), *L. shuheii* sp. nov. (Ryukyus), *L. kamezawai* sp. nov. (Ryukyus), *L. yukihihikoi* sp. nov. (Honshu, Kyushu), *L. akiyamai* sp. nov. (Shikoku), *L. iwakirii* sp. nov. (Kyushu), *L. nagayamai* sp. nov. (Hokkaido), *L. ohtai* sp. nov. (Ryukyus), *L. ozakii* sp. nov. (Honshu), *L. shigehisai* sp. nov. (Hokkaido), *L. tanakai* sp. nov. (Honshu, Shikoku), and *L. yamauchii* sp. nov. (Shikoku, Kyushu). Another three species are added to the fauna of Japan and the North Chishima Islands: *Leiodes koreana* Park & Ahn, 2007 (new to Japan: Honshu, Shikoku, Kyushu), *Leiodes longitarsis* Baranowski, 1993 (new to North Chishima Isl. and Hokkaido: Rishiri Is.), and *L. rhaetica* (Erichson, 1845) (new to North Chishima Isl.). *Leiodes alpicola* Nakane, 1963, syn. nov., and *L. cooteri* Park & Ahn, 2007, syn. nov., are synonymized with *L. lucens* (Fairmaire, 1855); *L. izuensis* Nakane, 1989, syn. nov., is synonymized with *L. circinipes* (Rye, 1873). Japanese species are divided into seven species groups, while some species are left as *incertae sedis*, without a group assignment. Relevance of selected taxonomic characters and zoogeography of the Japanese species of *Leiodes* are also discussed.

**Keywords.** Coleoptera, Leiodidae, Sogdini, Leiodini, *Hydnobius*, *Leiodes*, taxonomy, Japan, North Chishima Islands (= North Kuril Islands), Palearctic Region.

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## Introduction

The subfamily Leiodinae of the family Leiodidae contains six tribes (NEWTON 1998, BOUCHARD et al. 2011), five of which are known to occur in Japan: Sogdini, Leiodini, Scotocryptini, Pseudoliadini, and Agathidiini (HOSHINA 2002a, PERREAU 2004). The current study is a result of the examination of many specimens of Sogdini and Leiodini, collected from Japan and the North Chishima Islands (= North Kuril Islands). Three genera of Sogdini and four of Leiodini have been recorded in those regions. Two sogdine genera, *Triarthron* Märkel, 1840 and *Hinomoto* Hoshina, 2002, and the leiodine genus *Liocyrtusa* Daffner, 1982 were reviewed in Part I of this revision (HOSHINA 2010). The present volume includes the second part of the revision, focusing on the genera *Hydnobius* Schmidt, 1841 (Sogdini) and *Leiodes* Latreille, 1797 (Leiodini).

The genus *Hydnobius* comprises only 12 species confined to the Palaearctic Region (DAFFNER 1983, HOSHINA & SUNADA 2003). In East Asia, three species of *Hydnobius* have been recorded from Mongolia and China (ANGELINI & ŠVEC 1994; DAFFNER 1983; HLISNIKOVSKÝ 1965, 1967a,b) and two species from the Russian Far East (DAFFNER 1983, LAFER 1989a). HOSHINA & SUNADA (2003) recorded *Hydnobius* in Japan for the first time, based on a new species, *H. akitsuensis* Hoshina & Sunada, 2003. No other records of *Hydnobius* from Japan and the North Chishima Islands have been published.

*Leiodes* comprises about 200 species distributed worldwide (NEWTON 1998) and is the largest genus in the tribe Leiodini. Fifty-eight species were recorded from the neighbouring regions of Japan: 31 species from China (ŠVEC 1991, ANGELINI & ŠVEC 1994, COOTER & KILLIAN 2002, ŠVEC 2008, ŠVEC & COOTER 2010), 6 species from Korea (PARK & AHN 2007), one species from Taiwan (DAFFNER 1983), and 20 species from the Russian Far East (DAFFNER 1983; PERKOVSKY 1988, 1990; LAFER 1989a; RŮŽIČKA 2009). In Japan, the first records were those by RYE (1873) who described *Anisotoma multipunctata* Rye, 1873 and *A. circinipes* Rye, 1873, which were both later transferred to *Leiodes* by PORTEVIN (1914) and HATCH (1929). Subsequently, ten further species were added to the Japanese fauna as result of studies by PORTEVIN (1927), NAKANE (1963, 1989) and LAFER (1989a). In contrast, no species of *Leiodes* have been recorded from the North Chishima Islands until now.

For this study, specimens of *Hydnobius* and *Leiodes* examined were collected in Japan and the North Chishima Islands, and one new species of *Hydnobius* and twenty-four new species of *Leiodes* were discovered. Moreover, three already described species were also identified and are recorded as new to Japan and the North Chishima Islands. All species of both genera are revised, and identification keys to species are provided. The relevance of the taxonomic characters selected are also discussed along with comments on the zoogeography of the genus *Leiodes* in Japan.

## Material and methods

**Collecting methods.** It is generally difficult to collect specimens of the genera *Hydnobius* and *Leiodes*. Therefore, the number of specimens preserved in the Japanese collections is generally relatively small. I tried to accumulate and examine as many specimens as possible,



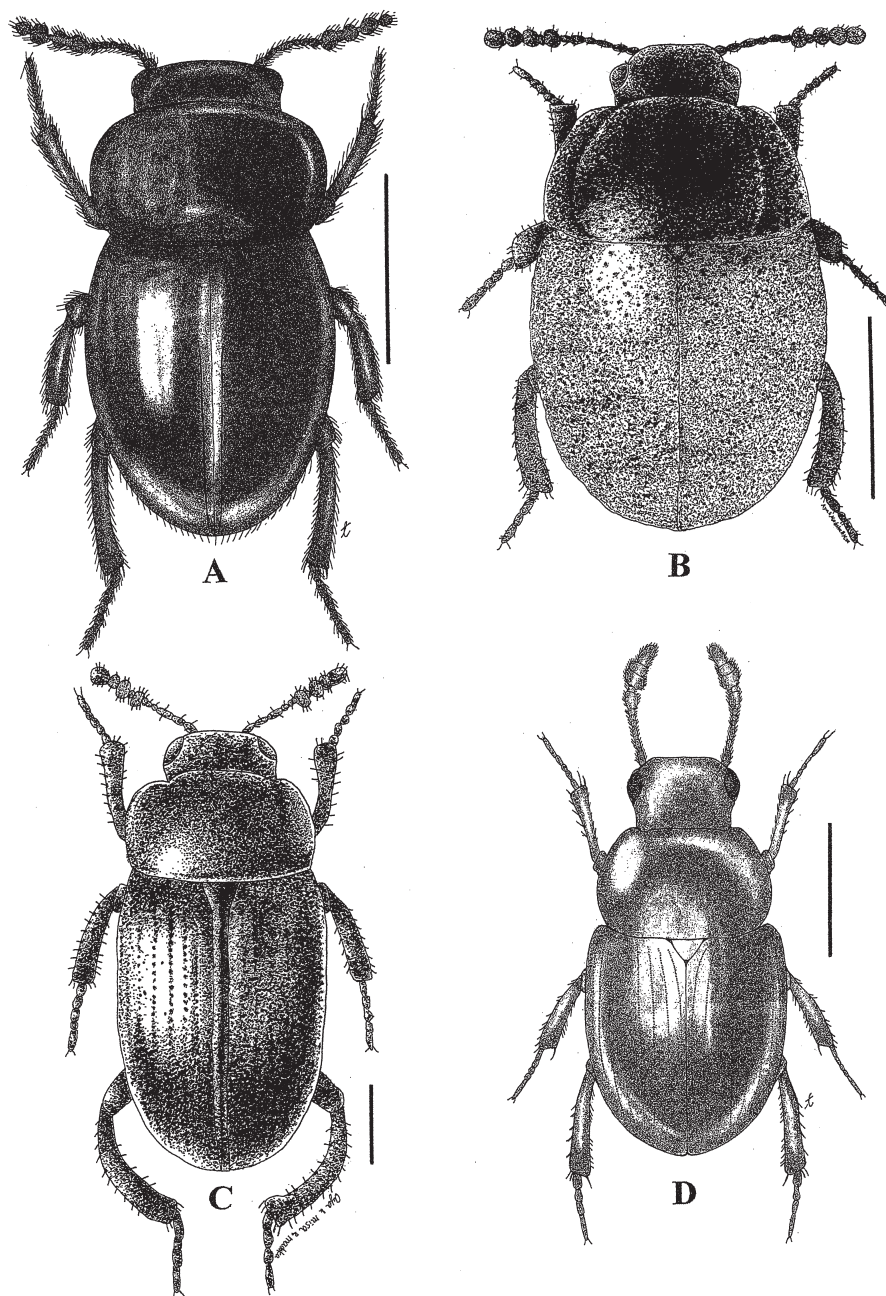


Fig. 1. Habitus. A – *Hydnobius akitsuensis* Hoshina & Sunada, 2003 (from HOSHINA & SUNADA 2003); B – *Leiodes kiuchii* sp. nov.; C – *L. osawai* Nakane, 1963; D – *L. kamezawai* sp. nov. Scale bars: 1 mm.

both from public institutional collections and private collections of Japanese entomologists. Most specimens were collected in flight intercept traps (FIT; most of the specimens examined), others in pitfall traps (PT), Malaise traps (MT), or extracted from leaf-litter samples using the Tullgren apparatus (TA). Collecting methods of many specimens loaned from the collections remain unknown.

**Study and preparation of the material.** Part of the material examined was dissected, and the aedeagi were cleared in 5% KOH solution for about 12 hours at room temperature. Drawings of aedeagi, antennae, legs, and other important features were prepared using a stereomicroscope and a compound light microscope with an attached drawing tube.

Length and width of bodies and their parts (head, pronotum, elytra, antennae) are measured using an ocular grid. Body length refers to the length from anterior margin of the clypeus to the apex of elytra and is measured in specimens mounted on cards. The length of the head is measured from the base to the front margin of the clypeus. The length to width ratio of the body and body parts is an average value based on measurements of ca. 10 specimens (except for species in which less than 10 specimens are available). Relative length of antennomeres 2–11 is given in such a way that length of antennomere 8 is always taken as 1.0 (antennomere 8 is the shortest in most species of *Hydnobius* and *Leiodes*). The morphological terminology used in this study follows BARANOWSKI (1993).

I consider the male morphological features as being of high taxonomic value for the description of new species (see also Discussion of taxonomic characters, p. 7, 13). However, two new species are described based on female specimens only because they may be easily distinguished from other known species by distinctive features even without the reference to sexual characters.

**Depositories.** The following acronyms are used for the depositories of the material examined for this study:

- CNUIC Chungnam National University Insect Collection, Daejeon, Korea;
- EUMJ Entomological Laboratory, Ehime University, Matsuyama, Japan;
- FUFJ Fukui University, Fukui, Japan;
- HUMS Hokkaido University Museum, Sapporo, Japan;
- JCHE Jonathan Cooter private collection, Hereford, England;
- MNHAH Museum of Nature and Human Activities, Hyōgo, Japan;
- NSMT National Science Museum (Natural History), Tokyo, Japan;
- ZSPC Zdeněk Švec private collection, Prague, Czech Republic.

The holotypes designated in this study are deposited in the collections of MNHAH, EUMJ, and HUMS. Other material, including paratypes, holotypes of known species, and additional material examined is preserved in the institutional collections of EUMJ, HUMS, CNUIC, FUFJ, and NSMT, and in the private collections of JCHE and ZSPC.

**Geographic scope.** All Japanese species are redescribed in detail and keyed. Species from the Chishima Islands (= Kuril Islands) are also included as the fauna of these islands is closely related to and forms an integrative biogeographic entity with that of Japan. The Chishima Islands is an archipelago situated between Hokkaido (Japan) and Kamchatka Peninsula

(Russia), which is divided into North Chishima (many small islands north of Urup Is.) and South Chishima (four islands south of Etorofu Is.). At present, Japan has not negotiated a peace treaty with Russia and the border between Japan and Russia has not been defined yet. Therefore, I use the geographic name 'North Chishima Islands' for the area rather than to refer it as a part of Japan or Russia. In this study, I did not examine any specimens collected from South Chishima Islands and cite the distributional data of *Leiodes* species in the islands from PORTEVIN (1927) and LAFER (1989a).

## Taxonomy

### Genus *Hydnobius* Schmidt, 1841

*Hydnobius* Schmidt, 1841:193. Type species: *Anisotoma punctatum* Sturm, 1807, designated by THOMSON (1859)

*Hydnobius*: HATCH (1929): 6 (synonymy and references); VOGT (1961): 142 (diagnosis of the genus, key to Central and North European species); DAFFNER (1983): 27 (key to Palaearctic species); DOWNIE & ARNETT (1996): 329 (key to the Northeast American species); PECK & COOK (2009): 11 (diagnosis of the genus, key to North and Central American species).

See HATCH (1929) for complete synonymy and respective references, and VOGT (1961) and PECK & COOK (2009) for the diagnosis of the genus.

### Diagnostic morphological characters in *Hydnobius*

The shape of the male metafemur is considered an important taxonomic character for the species-level taxonomy of *Hydnobius* (VOGT 1961, DAFFNER 1983). In contrast, male aedeagus of almost all species shares the similar triangular pyramid-shape, and usually does not show remarkable differences between related species although parameres are often used as a diagnostic character in identification keys. Moreover, the inner sac of the aedeagus usually does not have any distinct sclerites (for example, see the aedeagus of *H. akitsuensis*, Figs. 3A, 3B), and therefore, also, does not provide useful taxonomic characters. PECK & COOK (2009) found that mandibles, female abdominal sternite 8, female coxites, male metafemora, and the aedeagus are useful taxonomic characters at specific level. In this study, I examined two species of *Hydnobius* occurring in Japan and the North Chishima Islands, and confirm that especially the female abdominal sternite 8 shows morphological differences between these species.

### Key to species of *Hydnobius* in Japan and North Chishima Islands

1. Body length 2.5–3.0 mm, body ca. 1.9× as long as wide (Fig. 2A); male metafemora bearing a large toothed projection (Fig. 2E); female abdominal sternite 8 bearing a robust spiculum ventrale at anterior margin (Fig. 3C). ..... 1. *H. akitsuensis* Hoshina & Sunada, 2003
- Body length 2.1–2.4 mm, body ca. 1.7× as long as wide (Fig. 4A); male metafemora bearing a small toothed projection (Fig. 4E); female abdominal sternite 8 with a thin spiculum ventrale at anterior margin (Fig. 5C). ..... 2. *H. enomotoi* sp. nov.

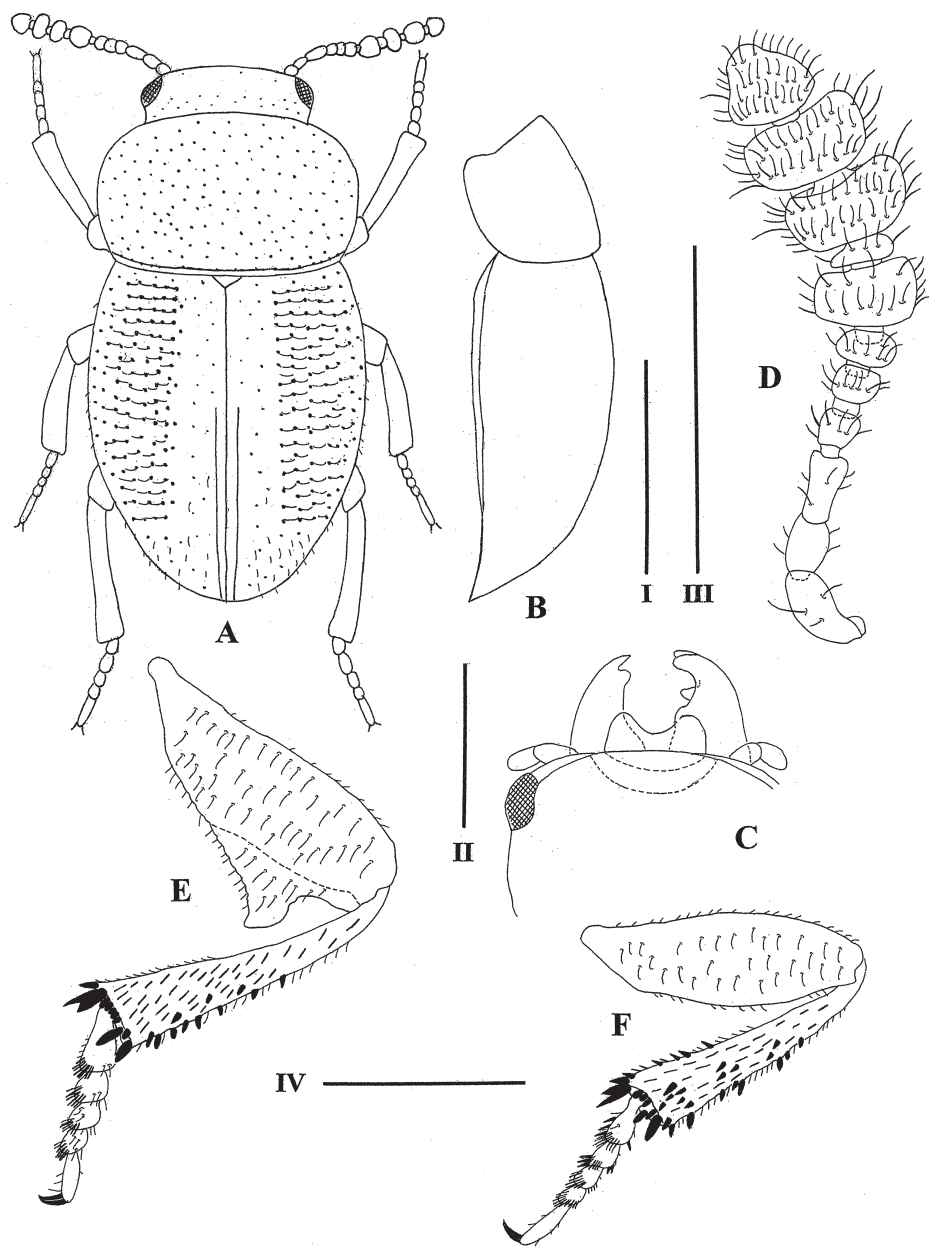


Fig. 2. *Hydnobius akitsuensis* Hoshina & Sunada, 2003. A – body, dorsal view; B – ditto, lateral view; C – head; D – antenna; E – male hind leg; F – female hind leg. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.5 mm for D; IV: 0.5 mm for E and F.

**1. *Hydnobius akitsuensis* Hoshina & Sunada, 2003**

Japanese name: Akitsu-chadutsu-tamakinokomushi

(Figs. 1–3)

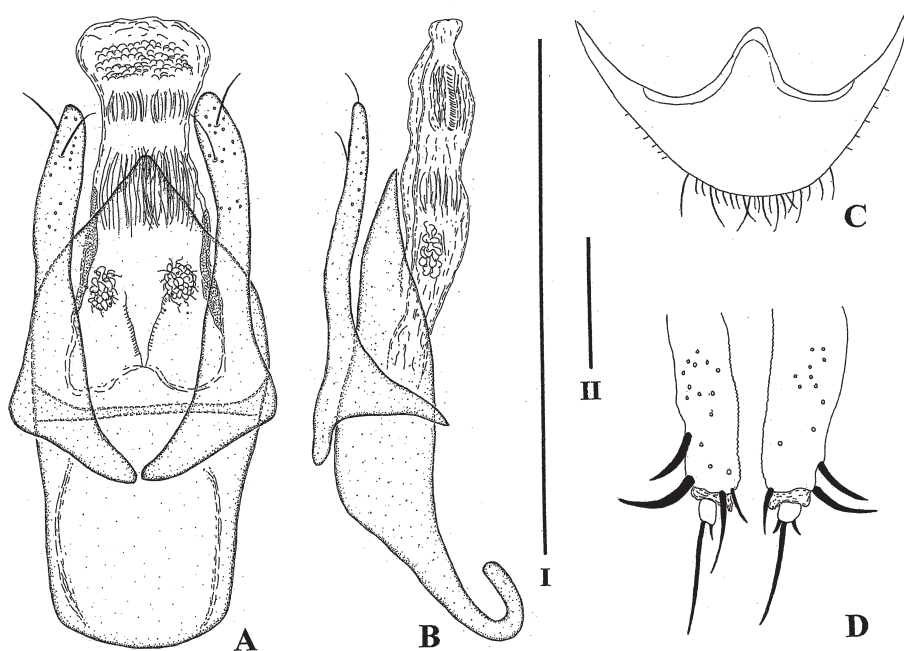
*Hydnobius akitsuensis* Hoshina & Sunada, 2003: 107.**Type locality.** Japan, Honshu, Yamanashi Pref., Mt. Hôô, Hôô-goya.**Type material examined.** JAPAN: HOLOTYPE: ♂, HONSHU: Yamanashi Pref., Mt. Hôô, Hôô-goya, 28.viii.1989, K. Hosoda leg. (MNHAH).**Additional material examined.** JAPAN: HONSHU: 1 ♀, Yamanashi Pref., Mt. Fuji, Aokigahara, 23.viii.1982, S. Naomi leg. (FUFJ). NORTH CHISHIMA ISLANDS: 1 ♂, Usishir Is., Kraternaya Bay, Yankicha, 20.viii.1995, M. Ôhara leg. (HUMS).**Diagnosis.** Coloration. Pronotum and elytra brown to dark brown; head a little darker than pronotum; coxae and trochanters reddish brown; femora, tibiae, and tarsi brown; antennomeres 3–6 brown; antennomeres 1–2 slightly paler than 3–6; antennomere 8 slightly darker than 3–6; antennomeres 7 and 9–11 dark brown.Body length 2.5–3.0 mm, ca.  $1.9\times$  as long as wide (Figs. 1A, 2A), relatively flat (Fig. 2B), and almost glabrous on dorsum except for very fine, short, and sparse pubescence along lateral margins and near apex of elytra. Head minutely punctate; right mandible bidentate apically; left mandible with a tooth in apical fourth of inner margin (Fig. 2C); antennomeres 1–3 longer than wide; antennomere 4 almost as long as wide; remaining antennomeres each wider than long (Fig. 2D); antennomere 11 transversely oval. Pronotum densely punctate,

Fig. 3. *Hydnobius akitsuensis* Hoshina & Sunada, 2003. A – aedeagus, dorsal view; B – ditto, lateral view; C – female abdominal sternite 8; D – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and 0.1 mm for D.

with a fine transverse basal groove. Elytra transversely strigose; punctures of elytra dense, and slightly larger than those on pronotum (Fig. 2A); sutural stria distinct, arising from apex to ca. apical 2/3 of elytral length. Metathoracic wings fully developed.

**Male.** Metafemur relatively slender, almost straight at anterior margin, and with an internally curved tooth in distal fifth on posterior margin (Fig. 2E); aedeagus as shown in Figs. 3A, 3B.

**Female.** Metafemur relatively slender, almost straight at anterior margin, feebly curved posteriorly along posterior margin (Fig. 2F); abdominal sternite 8 bearing a robust spiculum ventrale at anterior margin (Fig. 3C); coxites and stylus as shown in Fig. 3D.

**Differential diagnosis.** *Hydnobius akitsuensis* is similar to *H. tibialis* Sahlberg, 1903 in dorsal appearance, but may be separated from it by having the slender hind femora and short aedeagus. In contrast, *H. tibialis* has the relatively robust hind femora and slender aedeagus.

**Distribution.** Japan: Honshu (Yamanashi Prefecture) and North Chishima Islands (Usishir Island). New to North Chishima Islands.

**Note.** The species was described on the basis of the only male specimen examined by HOSHINA & SUNADA (2003). Here, we record two additional specimens, including the first record for the North Chishima Islands. Female morphological features are described for the first time in this study.

## 2. *Hydnobius enomotoi* sp. nov.

Japanese name: Enomoto-chadutsu-tamakinokomushi

(Figs. 4–5)

**Type locality.** North Chishima Islands, Matua Is., inland from Dvoynaya Bay.

**Type material.** **NORTH CHISHIMA ISLANDS:** HOLOTYPE: ♂, Matua Is., inland from Dvoynaya Bay, 5.viii.1996, M. Ôhara leg. (HUMS). PARATYPES: 1 ♀, Simushir Island, inland costal margin of Milna Cove in Kitoboynaya Bay, 10.viii.1995, M. Ôhara leg. (HUMS); 1 ♀, Simushir Island, inland costal margin of Malaya Bay, 18.viii.1995, M. Ôhara leg. (HUMS); 2 ♀♀, Ketoi Island, near Cape Storozhena, east of Kaskead water fall, 15.viii.1995, M. Ôhara leg. (HUMS).

**Diagnosis.** Body 2.1–2.4 mm. Head and pronotum brown or dark brown, minutely punctate. Elytra brown, strongly punctate, and transversely strigose. Male metafemora with a small toothed spiculum.

**Description.** Measurements of the holotype: Body length 2.3 mm; head length 0.41 mm; head width 0.70 mm; pronotum length 0.67 mm, pronotum width 1.1 mm; elytra length 1.5 mm, elytra width 1.3 mm.

**Coloration.** Dorsum shining, almost unicolor or bicolored; head and pronotum brown or dark brown; elytra brown; antennomeres 1–6 brown; antennomere 9 reddish brown; remaining antennomeres dark brown; legs brown with light brown tarsi; mesoventrite and metaventrite dark brown; abdominal ventrites brown.

Body length 2.1–2.4 mm, body ca. 1.7× as long as wide, a little convex (Fig. 4B) and almost glabrous on dorsum except for very fine, short, and sparse pubescence along lateral margins and near apex of elytra.

Head about 1.6 times as wide as long, minutely punctate (Fig. 4A), ca. 0.65× as long as and ca. 0.62× as wide as pronotum; right mandible bidentate apically; left mandible with a tooth in apical third of inner margin (Fig. 4C); antennomeres 1–4 each longer than wide; antenno-



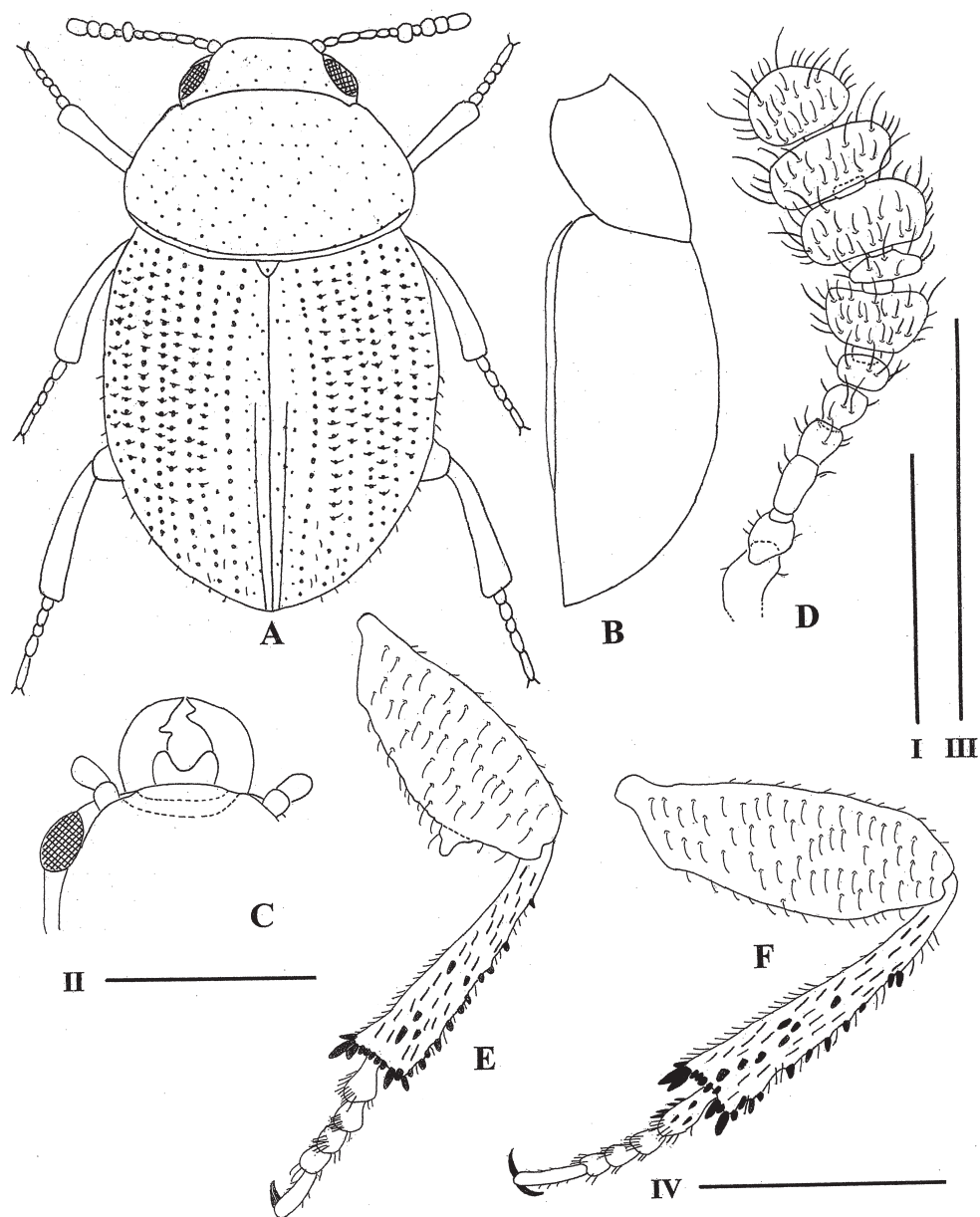


Fig. 4. *Hydnobius enomotoi* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – head; D – antenna; E – male hind leg; F – female hind leg. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.5 mm for D; IV: 0.5 mm for E and F.

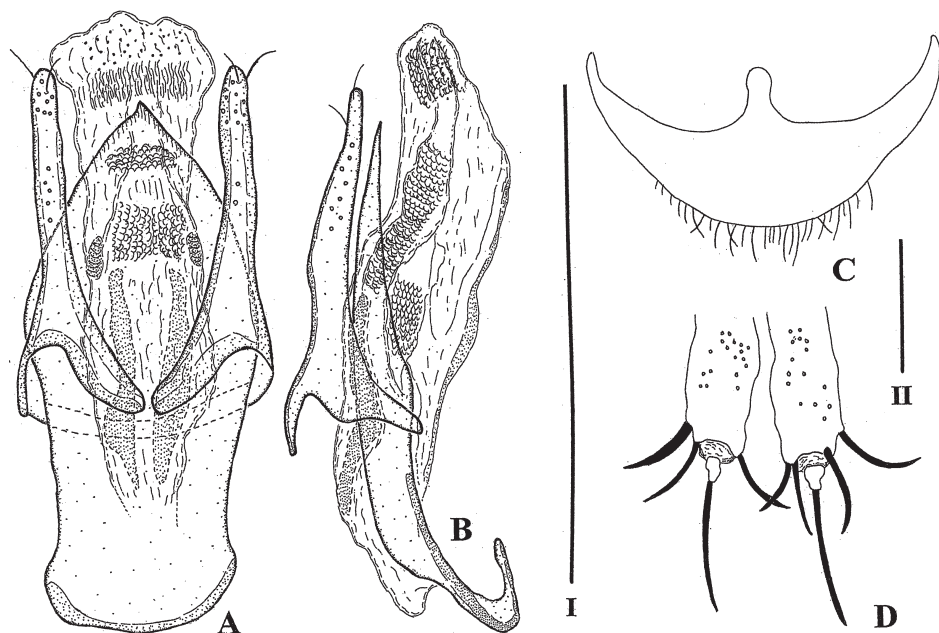


Fig. 5. *Hydnobius enomotoi* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – female abdominal sternite 8; D – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and 0.1 mm for D.

mere 5 about as long as wide; remaining antennomeres each wider than long; antennomere 11 robust (Fig. 4D); relative lengths from antennomeres 2 to 11 as follows: 2.4 : 2.5 : 1.9 : 1.9 : 1.5 : 2.5 : 1.0 : 2.9 : 2.5 : 3.1.

Pronotum ca. 1.7× as wide as long, widest ca. at basal 1/4, densely and minutely punctate (Fig. 4A), bearing a fine transverse basal groove; ca. 0.44× as long as and ca. 0.81× as wide as elytra.

Scutellum punctate as elytra.

Elytra ca. 1.1× as long as wide (Fig. 4A), widest ca. at basal 2/5 (Fig. 4A), transversely and shortly strigose, densely punctate; punctures of elytra larger than those on head and pronotum (Fig. 4A); sutural stria distinct, arising from apex to ca. apical half of elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, and almost glabrous except for the sparsely pubescent area between both mesocoxae; metaventricle minutely pubescent and moderately microreticulate except for smooth central part; setiferous punctures of metaventricle minute.

Legs showing distinct sexual dimorphism on metafemora as in other species of *Hydnobius*; metatibiae almost straight, with short and robust spines along lateral and distal margins (Figs. 4E, 4F).

**Male.** Metafemur ca. 2.5× times as long as wide (excluding length of projection), weakly crenulate in ca. basal 2/3 of posterior margin, with a small toothed projection at ca. apical 1/4 of posterior margin; toothed projection apically rounded (Fig. 4E).



Aedeagus robust; median lobe triangular apically in dorsal view (Fig. 5A), slender and pointed apically in lateral view (Fig. 5B). Each paramere simply straight ca. in apical 3/5, rounded apically in dorsal view (Fig. 5A), feebly dorsally expanded between apical 3/5 and 1/5, and apically rounded in lateral view (Fig. 5B); apex bearing two setae.

**Female.** Metafemora about 2.9 times as long as wide; abdominal sternite 8 bearing a thin spiculum ventrale at midwidth of anterior margin (Fig. 5C); coxites and stylus as shown in Fig. 5D.

**Differential diagnosis.** The new species resembles *Hydnobius punctulatus* Hampe, 1861 (Europe, Russia incl. Far East) in having the male metafemora with small toothed projections. *Hydnobius enomotoi* sp. nov. may be distinguished from *H. punctulatus* by having the parameres almost straight to about the apical 3/5 in dorsal view (Fig. 5A). In contrast, *H. punctulatus* has distinctly sinuate parameres. *Hydnobius enomotoi* sp. nov. is also similar to *H. tibialis* Sahlberg, 1903 in dorsal appearance, but can be separated from it by having relatively slender metafemora in both sexes and a small toothed projection on the male metafemora and median lobe of the aedeagus relatively weakly swollen laterally ca. at the apical 2/5 of the lateral margins in dorsal view (Fig. 5A) (in contrast, metafemora are robust, the femoral projection is large, and median lobe relatively strongly swollen laterally in *H. tibialis*).

**Etymology.** The specific name is dedicated to a shogun's retainer, Takeaki Enomoto (1836–1908), who contributed to the reclamation of Hokkaido and Chishima Islands.

**Distribution.** North Chishima Islands (Matua Island, Simushir Island, Ketoi Island).

### Genus *Leiodes* Latreille, 1797

*Leiodes* Latreille, 1797: 22. Type species: *Sphaeridium ferrugineum* Fabricius, 1787, designated by LATREILLE (1802).

*Leiodes*: HATCH (1929): 13 (synonymy and references); DAFFNER (1983): 38 (key to Palearctic species); PEEZ (1971): 247 (key to Central European species); LAFER (1989a): 321: (key to species in the Russian Far East); BARANOWSKI (1993): 16 (key to North and Central American species); COOTER (1996): 233 (key to British species); DOWNIE & ARNETT (1996): 330 (key to the Northeast American species); ŠVEC (2008): 242 (key to Chinese and Nepalese species).

See HATCH (1929) and BARANOWSKI (1993) for detailed synonyms and diagnosis of the genus.

### Diagnostic characters of *Leiodes*

Almost all species of *Leiodes* show sexual dimorphism in the hind legs, especially in the shape of the metatibiae. DAFFNER (1983) considered the median carina of the mesoventrite, male metatibiae and the aedeagus (in dorsal view) to be important characters for species-level taxonomy of the genus. Later, BARANOWSKI (1993) added another taxonomic characters: shape of protibiae, length of metatarsi, presence/absence of elytral subhumeral row (= a part of row 9) and presence/absence of metathoracic wings. In this study, I generally follow BARANOWSKI (1993) in use of diagnostic characters, but also tried to find additional ones by examining mainly Japanese specimens of *Leiodes*. In this chapter, I discuss some of these morphological characters important for species-level taxonomy.

**Head.** Characters of the head are of rather minor importance for distinguishing species in principle (Figs. 6A–6I) (BARANOWSKI 1993). For example, the mandibles of all species examined in this study look like those on Figs. 6J, 6K and are not useful for identification. As

an exception, *Leiodes yukihihikoi* sp. nov. has a characteristic head with a distinctly concave frons and vertex (Fig. 6E). Antennae sometimes show diagnostic features on antennomeres 7 and 9–11. The relative width of antennomere 11 compared with antennomere 10 is important. Moreover, antennomere 11 of *L. ohtai* sp. nov. is unique in shape (Fig. 85D). Furthermore, coloration of antennomeres 7 and 9–11 is usually clearly darker than that of the remaining antennomeres, and is therefore not useful for identification. However, *L. araii* sp. nov. has almost unicolor antennae and hence may be easily separated from related species by antennal coloration.

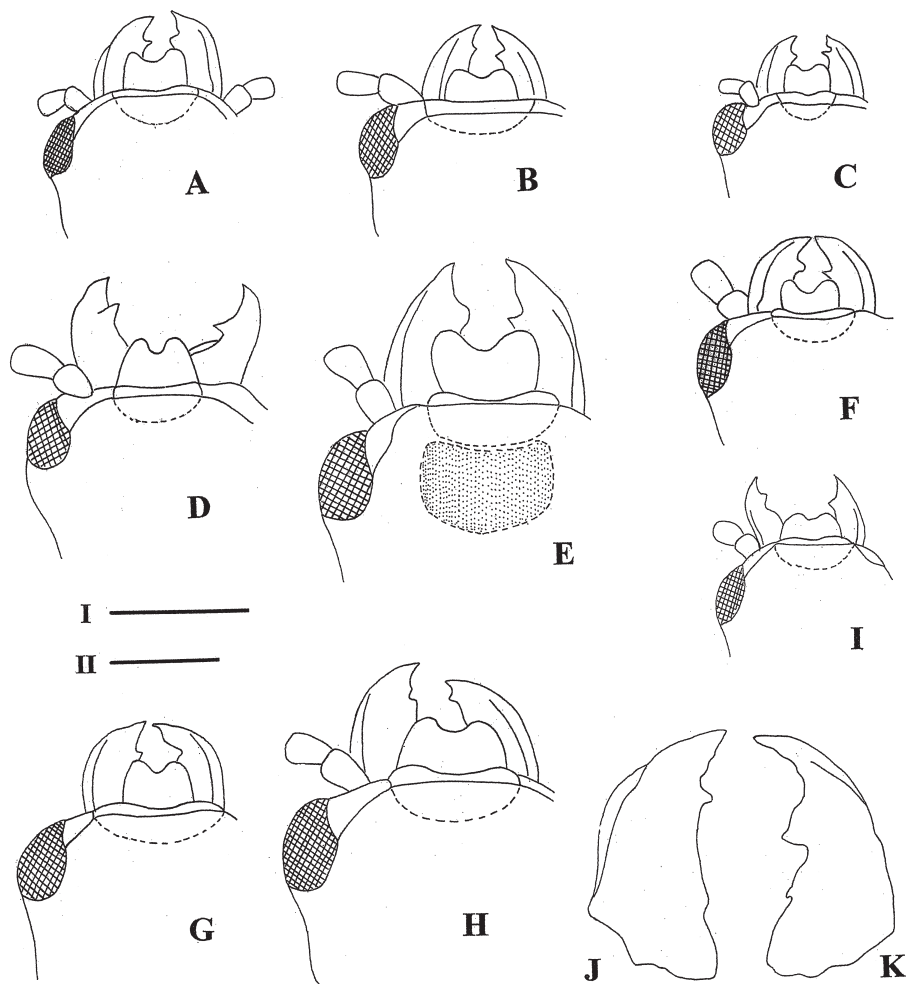


Fig. 6. Heads (A–I) and mandibles (J and K) of *Leiodes* spp. A – *Leiodes yasudai* sp. nov.; B – *L. multipunctata* (Rye, 1873); C – *L. irregularis* Hatch, 1929; D – *L. osawai* Nakane, 1963; E – *L. yukihihikoi* sp. nov.; F – *L. okawai* Nakane, 1963; G – *L. tanakai* sp. nov.; H, J, K – *L. lucens* (Fairmaire, 1855); I – *L. yoshidai* sp. nov. Scale I: 0.5 mm for A–I; II: 0.2 mm for J and K.

**Pronotum.** Most Japanese species of *Leiodes* have the pronotum with dense and distinct minute discal punctures and some large punctures near the basal margins (see figure of body of any species). The only exception is *L. ohtai* sp. nov., whose pronotum is almost impunctate (Fig. 85A). BARANOWSKI (1993) used the presence of very minute punctures on the posterior margin of pronotum as a taxonomic character. In fact, some Japanese species have those punctures (see, e.g., Fig. 33D for *L. toyoshimai* sp. nov.), but the punctures are extremely small and a very careful examination is needed to determine their presence or absence. In this study, I do not attach a high diagnostic value to this character.

**Elytra.** In previous studies of *Leiodes*, the shape of elytra and the size and density of elytral punctures are treated as useful taxonomic characters at the species level. In this study, I follow these traditionally used characters as well.

**Metathoracic wings.** Some species inhabiting North and Central America have reduced metathoracic wings (BARANOWSKI 1993), and the wing reduction may be used as diagnostic feature for identification of species. However, all species of *Leiodes* in Japan and North Chishima Islands have fully developed wings. Therefore, wings do not provide useful taxonomic characters for this study.

**Ventral body parts.** The configuration of the median and transverse carinae on the meso-ventrite is frequently considered of great taxonomic value, both to separate related species and to distinguish species groups. In this study, characters are used from previous studies and illustrations of these characters are provided for all species. Moreover, it is clear that the pubescence on the middle portion of the metaventrite sometimes show distinct (e.g., Figs. 21F, G) or indistinct (e.g., Figs. 64F, G) sexual dimorphism which was not recognized in previous studies, although it often becomes an effective character to distinguish the species. Similar dimorphism is for example known in the Scaphidiini (Staphylinidae) which possesses a patch of closely packed setae on the middle portion of the male metaventrite (LESCHEN & LÖBL 1995). In contrast to the Scaphidiini, in which nearly all species exhibit this dimorphism, in Japanese *Leiodes* the metaventral pubescence is present only in males of some species. Moreover, the sexual dimorphism in the pubescence of the metaventrite of *Leiodes* seems not to represent a synapomorphy of species groups, but rather are parallelisms among various species. For example, in the *L. circinipes* species group, *L. yoshitakei* sp. nov. has the sexual dimorphism on the metaventrite (Figs. 24G, H) but *L. circinipes* does not have this dimorphism. In Leiodidae, *Colon itoi* species group (Coloninae) is known to exhibit sexual dimorphism on the metaventrites (HOSHINA 2009b). In this case, the dimorphism does not concern the pubescence, but concavities on the middle portion of the metaventrite.

**Legs.** Most species of *Leiodes* exhibit sexual dimorphism in the shape of legs (some or all of them). Male morphological features of legs, especially of metatibiae, are very important taxonomic characters at species level. In *Leiodes* of Japan and the North Chishima Islands, profemora do not show distinct morphological differences among species (see figures of fore leg of all species) in both sexes. In contrast, male protarsi are useful for specific identification. For example, the male of *L. toyoshimai* sp. nov. has extremely expanded protarsi and mesotarsi (Figs. 34A, C), whereas those of *L. irregularis* Portevin, 1927 are only slightly expanded

Table 1. List of important morphological features for identification of species

Species name	Dorsal color	Elytral punctures	Elytral striation	Excavation of mesoventrite	Sexual dimorphism of mesotibiae	Male metafibiae	Number of female spicula
<b><i>L. babai</i> group</b>							
1. <i>L. babai</i>	unicolor	ordered rows	absent	present	absent	feebly curved	one
2. <i>L. kandai</i>	unicolor	ordered rows	absent	present	absent	weakly curved	one
3. <i>L. yoshidai</i>	unicolor	ordered rows	absent	present	absent	weakly curved	one
<b><i>L. circinipes</i> group</b>							
4. <i>L. circinipes</i>	bicolored	irregular rows	present	absent	present	feebly/distinctly curved	one
5. <i>L. juzoi</i>	bicolored	irregular rows	absent	absent	—	weakly curved	—
6. <i>L. yasudai</i>	unicolor	irregular rows	absent	absent	present	distinctly curved	one
7. <i>L. yoshitakei</i>	bicolored	irregular rows	present	absent	present	feebly curved	one
<b><i>L. koreana</i> group</b>							
8. <i>L. koreana</i>	unicolor	ordered rows	absent	present	absent	distinctly curved	two
9. <i>L. masatsugui</i>	unicolor	ordered rows	absent	absent	absent	distinctly curved	two
10. <i>L. toyoshimai</i>	unicolor	ordered rows	absent	present	present	feebly curved	two
<b><i>L. longitarsis</i> group</b>							
11. <i>L. longitarsis</i>	unicolor	ordered rows	absent	absent	absent	weakly curved	one
<b><i>L. multipunctata</i> group</b>							
12. <i>L. araii</i>	unicolor	irregularly punctate	absent	present	absent	feebly curved	one
13. <i>L. haradai</i>	unicolor	irregularly punctate	absent	present	—	feebly curved	—
14. <i>L. hijikatai</i>	unicolor	irregularly punctate	absent	present	—	distinctly or weakly curved	—
15. <i>L. kiuchi</i>	usually bicolored	irregularly punctate	absent	present	absent	feebly curved	one
16. <i>L. multipunctata</i>	unicolor or bicolored	irregularly punctate	absent	present	absent	distinctly curved or straight	one
17. <i>L. sakaii</i>	bicolored	irregularly punctate	absent	present	—	distinctly curved	—
<b><i>L. naraharai</i> group</b>							
18. <i>L. naraharai</i>	bicolored	ordered rows	absent	absent	absent	feebly curved	one
19. <i>L. shuheii</i>	bicolored	ordered rows	absent	absent	absent	feebly curved	one
<b><i>L. okawai</i> group</b>							
20. <i>L. kamezawai</i>	unicolor	ordered rows	absent	present	absent	distinctly curved	one
21. <i>L. okawai</i>	unicolor	ordered rows	absent	present	absent	feebly curved	one
22. <i>L. yukihikoi</i>	unicolor	ordered rows	absent	present	absent	feebly curved	one

Table 1 continued.

Species name	Dorsal color	Elytral punctures	Elytral striation	Excavation of mesoventrite	sexual dimorphism of mesotibiae	Male metatibiae	Number of female spicula
<i>Incertae sedis</i>							
23. <i>L. akiyamai</i>	unicolor	ordered rows	absent	absent	—	—	—
24. <i>L. fracta</i>	unicolor	ordered rows	absent	absent	absent	distinctly curved	one
25. <i>L. iwakiritii</i>	unicolor	ordered rows	absent	present	—	straight	—
26. <i>L. lucens</i>	unicolor	ordered rows	absent	present	absent	weakly curved	one
27. <i>L. nagayamai</i>	unicolor	ordered rows	absent	absent	—	distinctly curved	—
28. <i>L. obesa</i>	usually unicolor	ordered rows	absent	absent	absent	distinctly curved	one
29. <i>L. ohitai</i>	unicolor	ordered rows	absent	absent	—	—	one
30. <i>L. osawai</i>	bicolored	ordered rows	absent	present	present	distinctly curved or straight	one
31. <i>L. ozakii</i>	unicolor	ordered rows	absent	absent	—	distinctly curved	—
32. <i>L. irregularis</i>	usually bicolored	ordered rows	absent	absent	absent	feebly or weakly curved	one
33. <i>L. rhaetica</i>	unicolor	ordered rows	absent	absent	absent	distinctly curved	one
34. <i>L. shigehisai</i>	bicolored	ordered rows	present	present	absent	straight	one
35. <i>L. tanakai</i>	unicolor	ordered rows	absent	present	absent	distinctly curved or straight	one
36. <i>L. yamauchii</i>	unicolor	ordered rows	absent	present	absent	feebly curved	one

(Fig. 94A). Some species show sexual dimorphism in the shape of protibiae, and that is also helpful for identification. The length and shape of male mesotarsi are also helpful taxonomic characters, as they are in protarsi.

Mesotibiae sometimes show distinct sexual dimorphism at interoapical corners (e.g., Figs. 25C, D) and are useful features for identification. This character of the male mesotibia may be considered a synapomorphy for the *L. circinipes* species group (see below under species groups for details).

The shape of the metafemora of both sexes is a useful character for identification (they may be robust or slender, for example), and sometimes show sexual dimorphism in the shape of the dorsal posteroapical projection (see, e.g., Figs. 65G, 65 H for *L. okawai* Nakane, 1963).

The shape of male metatibiae is one of the most important taxonomic characters in *Leiodes*. However, metatibiae sometimes show considerable intraspecific variation, which usually correlates with body size or sometimes with the distribution of the species. For example, in *L. tanakai* sp. nov., small males have metatibiae similar to those of females (Figs. 102D, E), and both small and large males are distributed in the same localities. In contrast, male specimens of *L. irregularis* have distinctly curved metatibiae in Honshu (Fig. 94D) and almost straight in Hokkaido (Fig. 94C). For this reason, it is possible that new species diagnosed solely by the shape of the male metatibiae may later become synonyms.

The sexual dimorphism on metatarsi is rarely valuable for taxonomy (e.g., Figs. 37C, D). Males of *L. okawai*

Nakane, 1963 and *L. yukihihikoi* sp. nov. have characteristic metatarsomere 1 (Figs. 65C, 68C) and the character seems to indicate the close relationship between both species.

**Abdominal sternite 8.** Abdominal sternite 8 of both sexes has not been used as taxonomic character at the species level. BARANOWSKI (1993) mentioned that the usefulness of female abdominal sternite 8 as a diagnostic character is unknown. I examined male and female abdominal sternites 8 of all species included in this study. As a result, it is clear that abdominal sternite 8 in both sexes exhibit important characters for distinguishing species or defining species groups. Male abdominal sternite 8 is strongly or weakly curved, but tend to be similar in related species and its morphology may reflect phylogenetic relationships. The abdominal sternite 8 of females is almost semicircular in general shape and bears a spiculum ventrale at about midwidth of the anterior margin (e.g., Fig. 18D). However, the female abdominal sternite of *L. koreana* Park & Ahn, 2007, *L. masatsugui* sp. nov., and *L. toyoshimai* sp. nov., bears two distinct projections (Figs. 29D, 32D, 35E). The latter three species seem to be closely related (see also Zoogeography and Species groups below) and the abdominal sternite 8 may be considered a synapomorphy of the *L. koreana* species group. Moreover, the female abdominal sternite 8 of *L. yamauchii* sp. nov. has a thick spiculum ventrale at the anterior margin (Fig. 106E). I suppose the following transformation series for the female spiculum ventrale: the shape on Fig. 18D seems to represent the plesiomorphic state, which first became thickened (Fig. 106E), then bifurcated (Fig. 29D), and finally two projections were isolated from each other (Figs. 32D, 35E).

**Aedeagus.** The aedeagus is one of the most important characters for species-level taxonomy for many families of Coleoptera. Previous taxonomic studies of *Leiodes*, except those by PEEZ (1971) and PARK & AHN (2007), only illustrated the dorsal aspect of the aedeagus. However, lateral view of the aedeagus is also very useful for specific identification. In this study, I provide figures of both dorsal and lateral views for all species except of *L. akiyamai* sp. nov. and *L. ohtai* sp. nov. in which only females are described. Some characters have to be evaluated with caution. For example, the parameres may be straight or curved in different species, but the degree of bending of the parameres sometimes shows some intraspecific variation (see, e.g., Figs. 52B, C). Those differences are correlated neither to distribution nor to body size. Soaking the aedeagus in 5% KOH for about 12 hours in order to examine the sclerites of the inner sac, resulted in the almost straight parameres becoming bent. The differences of the parameres appears to not be morphological variations but are related to the condition of the specimens, as sometimes the variations of the parameres were observed even before their soaking in KOH. In any case, discrimination of related species by the degree of bending of the parameres is at risk of misidentification.

**Stylus and coxite.** BARANOWSKI (1993) did not use female genitalia for taxonomic characters at the species level. In this study, I examined the stylus and coxite of most species except for *L. juzoi* sp. nov., *L. haradai* sp. nov., *L. hijikatai* sp. nov., *L. sakaii* sp. nov., *L. nagayamai* sp. nov., *L. iwakirii* sp. nov., *L. rhaetica* (Erichson, 1845), and *L. ozakii* sp. nov. The stylus is oval (e.g., Fig. 90E) or shortly cylindrical (e.g., Fig. 23E) and usually bears a very long seta at the apex, and some relatively short setae at laterally. The coxite is cylindrical in general

(e.g., Fig. 41F), and bears less than five setae. Female genitalia are not used as taxonomic characters in many genera of the Leiodidae, and it is therefore difficult to compare stylus and coxite of *Leiodes* with those of related genera. It is certain that the stylus and coxite of *Leiodes* are similar to those of the tribe Agathidiini (WHEELER 1979, WHEELER & MILLER 2005).

The stylus and coxite of the species of *Leiodes* examined sometimes show small interspecific differences e.g. in the ratio of length of the stylus and the coxite, or in the length and density of their pubescence.

### Species groups of *Leiodes* in Japan and its neighbouring regions

BARANOWSKI (1993) recognized 26 species groups of *Leiodes* in North and Central America. In contrast, two main revisional works of *Leiodes* in the Palaearctic Region, DAFFNER (1983) and ŠVEC (2008) did not establish any species groups. The phylogenetic relationship among all 36 species of *Leiodes* in Japan and the North Chishima Islands is unclear. In this study, I recognize seven species groups containing a total number of 24 species distributed in Japan and the North Chishima Islands (22) as well as Korea (2). The remaining species are left as *incertae sedis* without a group assignment for the time being. As female characters, which are important for dividing the species into species groups, were not described in detail in the original descriptions of the Eurasian continental species, I establish the species groups mainly on the basis of the species occurring in Japan and the North Chishima Islands.

### Biology

The knowledge of the life history of *Leiodes* is limited. The most effective method for collecting *Leiodes* is by flight intercept traps. Many species of *Leiodes* apparently specialize on hypogaeal fungi, e.g. truffles (FOGEL & PECK 1975, NEWTON 1984, PECK 2001). Japanese species of *Leiodes* have to occur on the surface of litter layers because they are often collected in pitfall traps without bait. They are also caught by flight intercept traps, and Malaise traps, but almost never by sifting leaf litter. Japanese *Leiodes* may be active mainly at night, however, in the middle of the night of 15<sup>th</sup>, July 2011, attempts were made to collect *Leiodes* by sweeping and sifting leaf litter in Ôno City, Fukui Pref., but resulted in no specimens. It is also unclear at the present, when Japanese *Leiodes* activate during the day.

### Key to species of *Leiodes* in Japan and North Chishima Islands

Important morphological characters useful for the identification of species in Japan and North Chishima Islands are also listed in Table 1 on pp. 16–17.

1. Elytra densely and strongly punctate between rows of punctures, superficially appearing not to bear punctural series (e.g., Figs. 16A, 39A). ..... 2
  - Elytra with ordered rows of punctures; most punctures between rows smaller than serial punctures (e.g., Fig. 27A), or punctures between rows almost absent (Fig. 85A). ..... 12
2. Median carina of mesoventrite clearly projecting ventrally in lateral view near a transverse carina (Fig. 70E). Shikoku. .... 23. *L. akiyamai* sp. nov.
  - Median carina low and not projecting ventrally (e.g., Figs. 7E, 16F). ..... 3



3. Mesoventrite without excavations between median carina and transverse carina (Figs. 16F, 19F, 21E, 24F); male mesotibia strongly protuberant at interoapical corners (Figs. 17C, 20B, 22C, 25C). ..... 4
- Mesoventrite with one distinct excavation between median carina and transverse carina (Figs. 39E, 42E, 44E, 47H, 50H, 53F); mesotibia simply slender in both sexes and not showing sexual dimorphism. .... 7
4. Elytra not transversely strigose. .... 5
- Elytra transversely strigose (Figs. 16E, 24E). .... 6
5. Elytra almost unicolor, brown; male metafemur with an inwardly curved dorsal projection posteroapically (Fig. 22I). Hokkaido. .... 6. ***L. yasudai* sp. nov.**
- Elytra brown with dark brown stripes (Fig. 19C); male metafemur with a small posteroapical projection (Fig. 20E). Hokkaido (Rishiri Is.). .... 5. ***L. juzoi* sp. nov.**
6. Body ca. 1.8× as long as wide (Fig. 24A); head and pronotum dark brown; basal half of parameres relatively slender in lateral view (Fig. 26B). Hokkaido. .... 7. ***L. yoshitakei* sp. nov.**
- Body ca. 1.6× as long as wide (Fig. 16A); head and pronotum brown; basal half of parameres relatively thick in lateral view (Fig. 18B) Honshu, Shikoku, Kyushu. .... 4. ***L. circinipes* (Rye, 1873)**
7. Antenna almost unicolor, brown. Honshu. .... 12. ***L. araii* sp. nov.**
- Antennomeres 7 and 9–11 dark reddish brown or dark brown, darker than remaining antennomeres. .... 8
8. Head relatively large, ca. 0.62× as long as pronotum (Fig. 42A). Shikoku. .... 13. ***L. haradai* sp. nov.**
- Head relatively small, less than 0.60× as long as pronotum (Figs. 44A, 47A, 50A, 53A). .... 9
9. Metafemur relatively slender, with a narrow but distinct ventral rectangular projection posteroapically in males (Figs. 45B, 45C, 54B) (females unknown). .... 10
- Metafemur relatively robust and weakly expanded posteroapically in both sexes (Figs. 48E, 48F, 51C, 51D, 51E, 51F). .... 11
10. Body ca. 1.7× as long as wide (Fig. 44A); aedeagus broadly but irregularly rounded at apex in dorsal view (Fig. 46A). Honshu. .... 14. ***L. hijikatai* sp. nov.**
- Body ca. 2.1× as long as wide (Fig. 53A); aedeagus acuminate, nearly triangular at apex in dorsal view (Fig. 54F). Shikoku. .... 17. ***L. sakaii* sp. nov.**
11. Body ca. 1.9× as long as wide (Fig. 50A); metaventricle sparsely pubescent in both sexes; median lobe of aedeagus bluntly pointed apically in dorsal view (Fig. 52A). Honshu, Shikoku. .... 16. ***L. multipunctata* (Rye, 1873)**
- Body ca. 1.7× as long as wide (Fig. 47A); metaventricle densely pubescent in male (Fig. 48A), sparsely pubescent in female (Fig. 48B); median lobe of aedeagus rectangular apically and with a tiny but distinct projection in dorsal view (Fig. 49A). Honshu, Shikoku. .... 15. ***L. kiuchii* sp. nov.**
12. Antennomere 11 sharply curved in lateral view (Fig. 85D). Ryukyus. .... 29. ***L. ohtai* sp. nov.**
- Antennomere 11 simply oval. .... 13



13. Elytra transversely strigose (Fig. 98G). Hokkaido. .... 34. ***L. shigehisai* sp. nov.**
- Elytra not transversely strigose. .... 14
14. Elytra bicolored (Figs. 55C, 55D, 58C, 58D, 82D, 87C, 87D, 93D, 93E, 93F, 93G).  
..... 15
- Elytra unicolor. .... 19
15. Body cylindrical (Fig. 87A); mesoventrite with one distinct excavation between median carina and transverse carina (Fig. 87I). Honshu. .... 30. ***L. osawai*** Nakane, 1963
- Body oval or elongate oval; mesoventrite without excavations between median carina and transverse carina (Figs. 55G, 58G, 82G, 93J). .... 16
16. Elytra without dark stripes along lateral margins (Figs. 82D, 93D, 93E, 93F, 93G). .... 17
- Elytra with black or dark brown stripes along lateral margins (Figs. 55C, 55D, 58C, 58D). .... 18
17. Body elongate oval, body length 2.4–4.0 mm (but usually less than 3 mm); male metatibiae very weakly curved inwards (Figs. 94C, 94D); median lobe of aedeagus triangular at apex in dorsal view (Fig. 95A). South Chishima Islands, Hokkaido, Honshu. .... 32. ***L. irregularis*** Portevin, 1927 (bicolored type)
- Body oval, body length 3.0–4.0 mm; male metatibiae distinctly curved inwards (Figs. 83C, 83D); median lobe of aedeagus rounded at apex in dorsal view (Fig. 84A). South Chishima Islands, Hokkaido. .... 28. ***L. obesa*** (Seidlitz, 1841) (bicolored type)
18. Elytra with relatively large black spots (Figs. 58C, 58D); each paramere of aedeagus bearing a small transparent lobe (Fig. 60A). Ryukyus (Yonaguni Island). .... 19. ***L. shuheii* sp. nov.**
- Elytra with slender black stripes near suture and along lateral margins (Figs. 55C, 55D); parameres of aedeagus with fringed apices (Fig. 57A). Ryukyus (Amami-Ōshima Island, Okinawa Islands.). .... 18. ***L. naraharai* sp. nov.**
19. Elytral row 9 almost straight, parallel to elytral lateral margin (Figs. 61B, 64B, 67B, 72B). .... 20
- Basal 1/3 or 1/4 of elytral row 9 of punctures divergent from elytral lateral margins (e.g., Fig. 82B). .... 23
20. Mesoventrite without excavations between median carina and transverse carina (Fig. 72E); male metafemur strongly protuberant ca. at midlength of posterior margin (Figs. 73C, 73D). Honshu. .... 24. ***L. fracta*** (Seidlitz, 1875)
- Mesoventrite with one distinct excavation between median carina and transverse carina (Figs. 61E, 64E, 67E); male metafemur weakly protuberant posteriorly at posterior margin (Figs. 62C, 65C, 68C). .... 21
21. Body length 3.8–4.5 mm; head concave from frons to vertex (Fig. 6E); median lobe of aedeagus slightly constricted at lateral margins in apical fourth in dorsal view (Fig. 69A). Honshu, Kyushu. .... 22. ***L. yukihihoi* sp. nov.**
- Body length 2.6–3.5 mm; head almost flat; median lobe of aedeagus almost straight at lateral margins in dorsal view (Figs. 63A, 66A). .... 22
22. Antennomere 11 clearly narrower than antennomere 10 (Fig. 64C); male metafemur feebly protuberant ca. at midlength of posterior margin (Fig. 65C). Honshu, Shikoku, Kyushu. .... 21. ***L. okawai*** Nakane, 1963

- Antennomere 11 about as wide as antennomere 10 (Fig. 61C); male metafemur largely protuberant ca. at midlength of posterior margin (Fig. 62C). Ryukyus (Amami-Ōshima Island). ..... 20. *L. kamezawai* sp. nov.
- 23. Mesoventrte without excavations between median carina and transverse carina (e.g., Fig. 80E). ..... 24
- Mesoventrte with one distinct or shallow excavation between median carina and transverse carina (e.g., Fig. 33F). ..... 30
- 24. Parameres of aedeagus much shorter than median lobe (Figs. 81F, 97F). ..... 25
- Parameres of aedeagus nearly as long as median lobe (e.g., 38A). ..... 26
- 25. Antennomere 11 narrower than antennomere 10 (Fig. 80C); male metafemur triangularly protuberant ca. at midlength of posterior margin (Fig. 81B). Hokkaido. .... 27. *L. nagayamai* sp. nov.
- Antennomere 11 almost as wide as antennomere 10 (Fig. 96C); male metafemora almost straight and weakly narrowing from basal 3/4 to apex (Fig. 97B). North Chishima Islands. .... 33. *L. rhaetica* (Erichson, 1845)
- 26. Punctures comprising elytral striae relatively large sized. .... 27
- Punctures comprising elytral striae moderately sized. .... 28
- 27. Dorsum usually brown; median lobe of aedeagus apically rounded in dorsal view (Fig. 84A). South Chishima Islands, Hokkaido. .... 28. *L. obesa* (Seidlitz, 1841) (unicolor type)
- Dorsum usually dark reddish brown; median lobe of aedeagus weakly emarginate at apex in dorsal view (Fig. 38A). North Chishima Islands, Hokkaido (Rishiri Is.). .... 11. *L. longitarsis* Baranowski, 1993
- 28. Body ca. 1.6× as long as wide; aedeagus robust in lateral view (Fig. 32B). Honshu. .... 9. *L. masatsugui* sp. nov.
- Body more than 1.8× as long as wide; aedeagus slender in lateral view (Figs. 92G, 95B). ..... 29
- 29. Body length ca. 3.5 mm; elytra with densely arranged very fine punctures between elytral series (Fig. 91D); aedeagus sharply curved near base in lateral view (Fig. 92G). .... Honshu. .... 31. *L. ozakii* sp. nov.
- Body length usually less than 3 mm; elytra with moderate number of very fine punctures between elytral series (Fig. 93I); aedeagus weakly curved in lateral view (Fig. 95B). South Chishima Islands, Hokkaido, Honshu. .... 32. *L. irregularis* Portevin, 1927 (unicolor type)
- 30. Punctures comprising elytral striae relatively large sized. .... 31
- Punctures comprising elytral striae small sized. .... 36
- 31. Mesoventrte with a shallow excavation between median carina and transverse carina (Fig. 27E). Honshu, Shikoku, Kyushu. .... 8. *L. koreana* Park & Ahn, 2007
- Mesoventrte with a distinct excavation between median carina and transverse carina. (e.g., Fig. 33F). ..... 32
- 32. Body length 2.2–3.1 mm. .... 33
- Body length 3.2–5.0 mm. .... 35

33. Male protarsi and mesotarsi extremely expanded (Figs. 34A, 34C); female abdominal sternite 8 with two distinct projections on anterior margin (Fig. 35E). Honshu, Shikoku. .... 10. *L. toyoshimai* sp. nov.
- Male protarsi and mesotarsi weakly or moderately expanded (Figs. 76A, 102A); female abdominal sternite 8 with a simple spiculum ventrale at anterior margin (Fig. 103F). ... 34
34. Antennae almost unicolor; parameres slightly expanded at apex (Fig. 76H). Kyushu. ... 25. *L. iwakirii* sp. nov.
- Antennae bicolored; parameres largely expanded at apex (Fig. 103D). Honshu, Shikoku. .... 35. *L. tanakai* sp. nov.
35. Male metafemora robust but simple (Fig. 105C); male aedeagus relatively thick (Fig. 106A); spiculum ventrale of female abdominal sternite 8 relatively thick (Fig. 106E). Shikoku, Kyushu (Yakushima Is.). .... 36. *L. yamauchii* sp. nov.
- Male metafemora very sharply protuberant in proximal fourth of posterior margin (Fig. 78C); male aedeagus relatively slender (Fig. 79B); spiculum ventrale of female abdominal sternite 8 relatively slender (Fig. 79D). Hokkaido, Honshu, Shikoku. .... 26. *L. lucens* (Fairmaire, 1885)
36. Excavation of mesoventrite relatively deep (Fig. 7E). Honshu. .... 1. *L. babai* Nakane, 1989
- Excavation of mesoventrite relatively shallow (Figs. 10E, 13E). .... 37
37. Aedeagus relatively slender in dorsal view (Fig. 12A); each paramere with a thin transparent lobe at apex (Fig. 12A). Honshu. .... 2. *L. kandai* sp. nov.
- Aedeagus relatively robust in dorsal view (Fig. 15A); each paramere with a large transparent lobe at apex (Fig. 15A). Shikoku. .... 3. *L. yoshidai* sp. nov.

### *Leiodes babai* species group

**Species included.** *Leiodes babai* Nakane, 1989, *L. kandai* sp. nov., *L. odaesanensis* Park & Ahn, 2007, *L. yoshidai* sp. nov.

**Diagnosis.** Elytra unicolor and with sparsely arranged punctures between punctural rows (Figs. 7D, 10D, 13D); punctures of rows relatively minute (Figs. 7A, 10A, 13A); mesoventrite with one distinct or shallow excavation between median carina and transverse carina (Figs. 7E, 10E, 13E); protarsi showing sexual dimorphism, tarsomeres 2–4 of male protarsi a little expanded (Figs. 8A, 11A, 14A); mesotibiae without sexual dimorphism, simply square at interoapical corner; dorsal posteroapical projection of metafemur small and not sexually dimorphic (Figs. 8G, 8H, 11G, 11H, 14G, 14H); pubescence of metaventrite not showing distinct sexual dimorphism; aedeagus robust and bearing some small sclerites in inner sacs (Figs. 9A, 12A, 15A); male abdominal sternite 8 feebly curved (Figs. 9C, 12C, 15C); female abdominal sternite 8 with a spiculum ventrale at midwidth of anterior margin (Figs. 9D, 12D, 15D).

**Differential diagnosis.** *Leiodes babai* species group can be separated from other species groups by having minute serial punctures on elytra, and aedeagus robust and bearing some small sclerites in inner sacs.

**1. *Leiodes babai* Nakane, 1989**

Japanese name: Baba-ô-tamakinokomushi

(Figs. 7–9, 110)

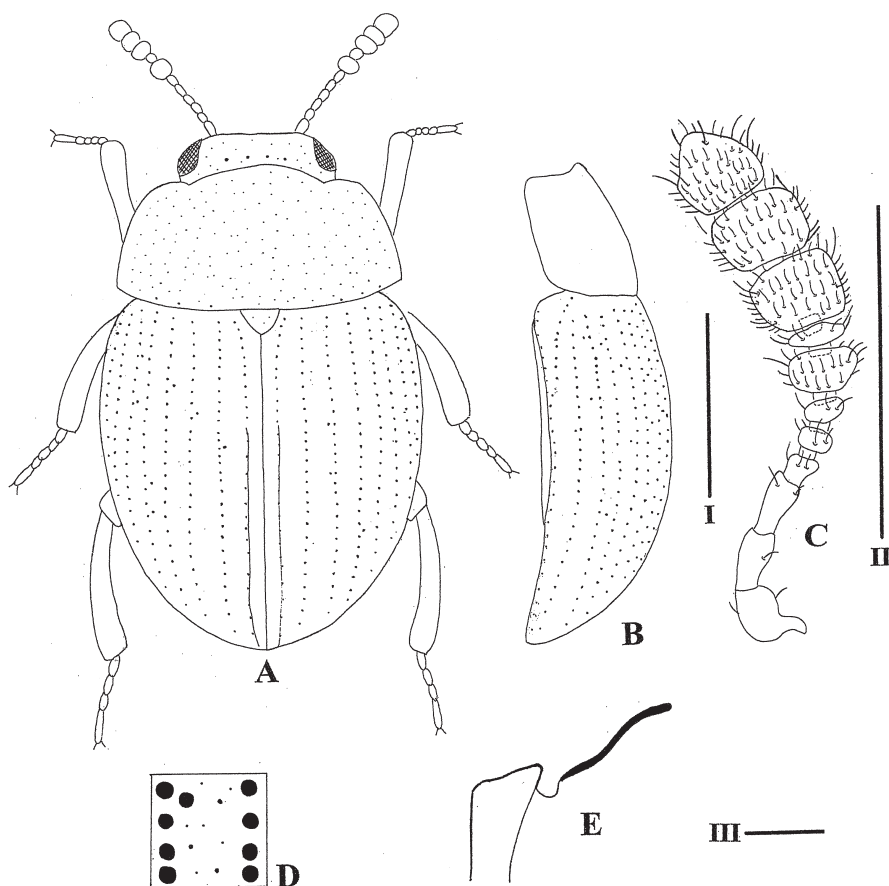
*Leiodes babai* Nakane, 1989: 147; PERREAU (2004): 194 (catalogue).**Type locality.** Japan, Honshu, Niigata Pref., N. Echigo, Mt. Ooishi.**Type material examined. JAPAN: HONSHU:** HOLOTYPE, ♂, Niigata Pref., N. Echigo, Mt. Ooishi, 20.vi.1972, K. Baba leg. (HUMS).**Additional material examined. JAPAN: HONSHU:** 1 ♂ 1 ♀, Saitama Pref., Ohtaki Village, Nakatsukawa-keikoku, Oku-Chichibu-rindô (alt. 1300m), 30.vii–7.viii.2004, K. Arai & S. Arai leg. (FIT) (FUFJ); 1 ♂, 1 ♀, Tokyo Pref., Hinohara Village, Mt. Mitôsan, (alt. 1100 m), 23–30.vii.2008, H. Takano leg. (FIT) (FUFJ).**Diagnosis.** Coloration. Dorsum almost unicolor, brown; antennomeres 1–6 and 8 brown; antennomeres 7, 9, 10, and basal 3/5 of antennomere 11 dark brown; apical 2/5 of antennomere 11 light brown.

Fig. 7. *Leiodes babai* Nakane, 1989. A—body, dorsal view; B—ditto, lateral view; C—antenna; D—elytral punctures; E—mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.2 mm for E.

Body 2.6–3.0 mm long, ca.  $1.7\times$  as long as wide (Fig. 7A). Head densely and very minutely punctate, bearing some large punctures (Fig. 7A); antennomeres 1–4 longer than wide; remaining antennomeres each wider than long; antennomere 11 oval (Fig. 7C). Pronotum simply and very feebly curved at posterior margin and densely and very minutely punctate (Fig. 7A). Elytra not transversely strigose; each elytron bearing nine rows of punctures with small number of punctures and moderate number of very fine punctures between rows (Fig. 7D); row 9 invisible in dorsal view, subhumeral row as long as  $1/4$  of elytral length (Fig. 7B); elytral rows composed of minute but larger punctures than those of pronotum (Fig. 7A); sutural stria fine, arising from apex to ca. apical  $3/5$  of elytral length. Metathoracic wings fully developed. Mesoventrite with one distinct excavation between median carina and transverse

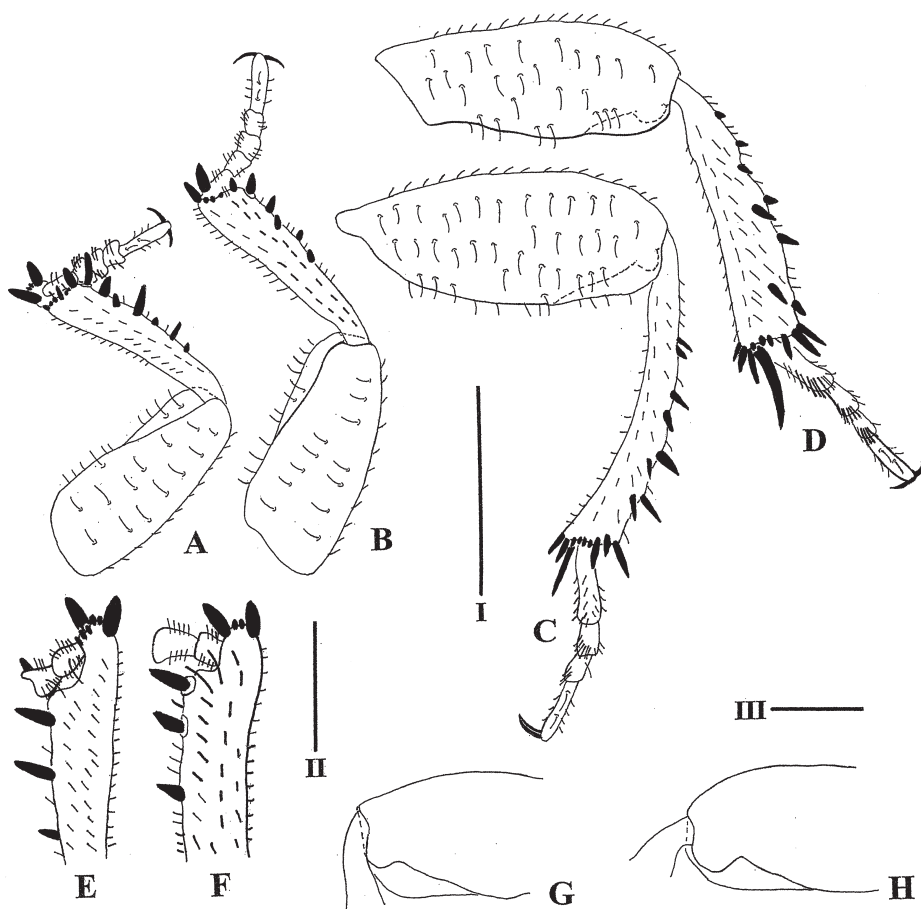


Fig. 8. *Leiodes babai* Nakane, 1989. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male hind leg, ventral view; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 0.5 mm for A–D; II: 0.2 mm for E and F; III: 0.2 mm for G and H.

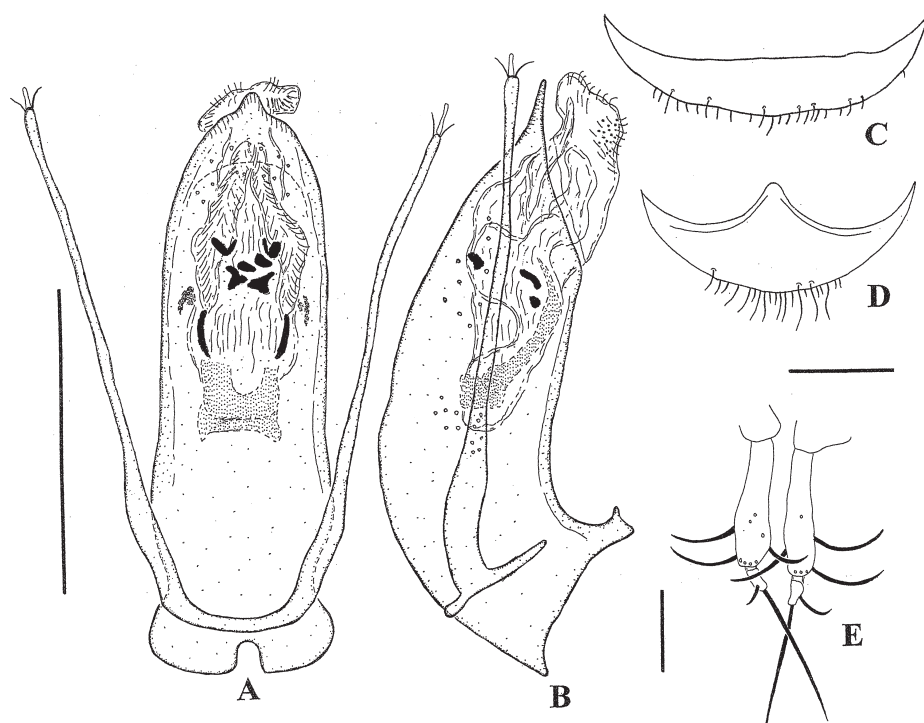


Fig. 9. *Leiodes babai* Nakane, 1989. A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D and E; III: 0.1 mm for E.

carina (Fig. 7E); median carina of mesoventrite low (Fig. 7E); metaventrite without sexual dimorphism. Legs with weak sexual dimorphism on protarsi, mesotarsi, and metatibiae; protibiae gradually and very feebly widening from base towards apex (Figs. 8E, 8F); metafemur with a small dorsal projection posteroapically (Figs. 8G, 8H).

**Male.** Tarsomeres 2–4 of protarsi and mesotarsi feebly expanded (Fig. 8A); metatibiae feebly curved inwards (Fig. 8C); abdominal sternite feebly curved (Fig. 9C); aedeagus as shown in Figs. 9A, 9B.

**Female.** Protarsi and mesotarsi slender (Fig. 8B); metatibiae almost straight (Fig. 8D); abdominal sternite 8 with a spiculum ventrale at a central point of anterior margin (Fig. 9D); coxites and stylus as shown in Fig. 9E.

**Differential diagnosis.** *Leiodes babai* is similar to the Korean *L. odaesanensis* Park & Ahn, 2007 which it resembles in the morphology of the elytral punctures, but may be distinguished from it by having a relatively robust median lobe of the aedeagus (Fig. 9A).

**Distribution.** Japan: Honshu (Niigata, Saitama, and Tokyo Prefectures). *Leiodes babai* was described on the basis of a single specimen from Niigata Prefecture. In this study, additional specimens from other areas are recorded for the first time.

**2. *Leiodes kandai* sp. nov.**

Japanese name: Kanda-ô-tamakinokomushi  
(Figs. 10–12, 110)

**Type locality.** Japan, Honshu, Gifu Pref., Shirakawa Village, Ô-shirakawa.

**Type material. JAPAN: HONSHU:** HOLOTYPE, ♂, Gifu Pref., Shirakawa Village, Ô-shirakawa, 4.ix.2004, K. Toyoshima leg. (MNHAH). PARATYPES: same data as holotype except for dates: 1 ♀, 3.vii.2004 (FUFJ), 1 ♂, 1 ♀, 19.vii.2004 (FUFJ), 1 ♀, 24.vii.2004 (FUFJ), 1 ♂, 31.vii.2004 (FUFJ), 2 ♂♂, 3 ♀♀, 22.viii.2004 (FUFJ). All type specimens were collected by FIT.

**Diagnosis.** Body 2.4–2.6 mm in length, ca. 1.6× as long as wide. Dorsum brown. Each elytron with distinct nine rows of punctures, subhumeral row as long as ca. 1/3 of elytral length. The rows composed of minute punctures. Mesoventrite with one shallow excavation between median carina and transverse carina. Median carina of mesoventrite low. Mesotibiae without distinct sexual dimorphism. Metafemora robust. Male metatibiae weakly curved. Female abdominal sternite 8 with a spiculum ventrale.

**Description.** Measurements of holotype: Body length 2.6 mm; head 0.42 mm in length and 0.75 mm in width; pronotum 0.80 mm in length and 1.4 mm in width; elytra 1.8 mm in length and 1.6 mm in width.

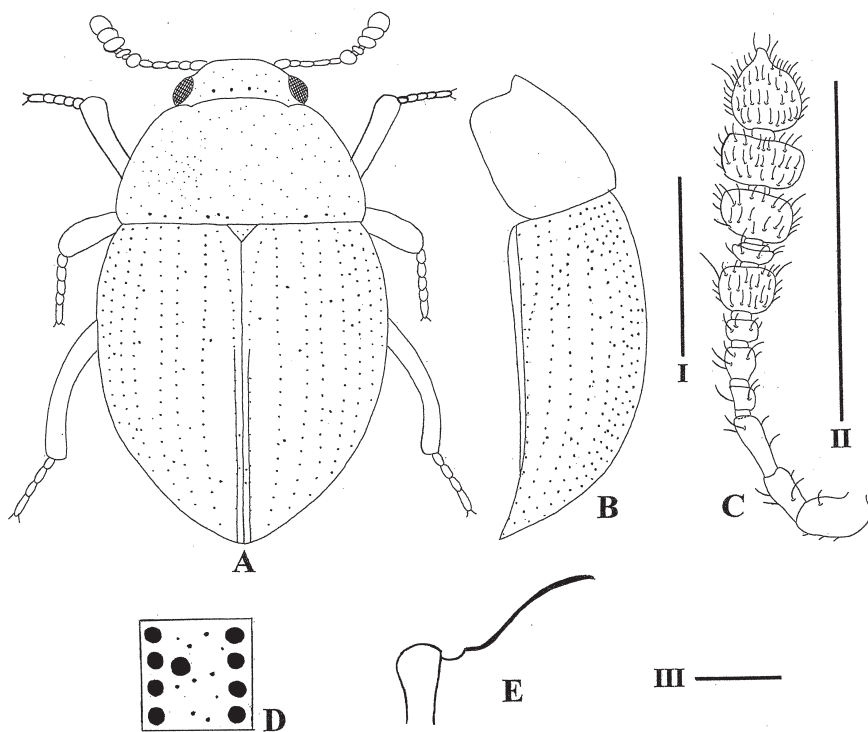


Fig. 10. *Leiodes kandai* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.2 mm for E.

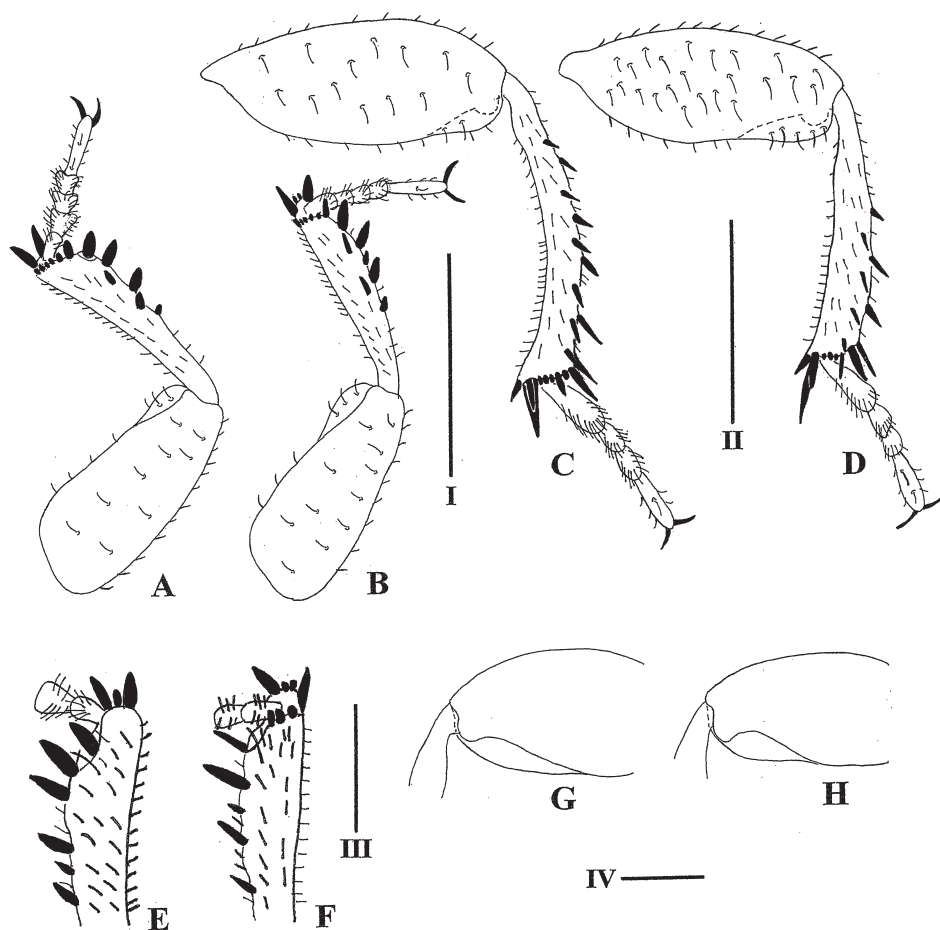


Fig. 11. *Leiodes kandai* sp. nov. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male hind leg, ventral view; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 0.5 mm for A and B; II: 0.5 mm for C and D; III: 0.2 mm for E and F; IV: 0.2 mm for G and H.

**Coloration.** Dorsum shining and almost unicolor, brown; antennomeres 1–6 and 8 brown; antennomeres 7, 9, 10, and basal 3/5 of 11 blackish dark brown; apical 2/5 of antennomere 11 light brown; legs brownish and slightly paler than dorsum; mesoventrite, metaventricle, and abdominal ventrites brown.

Body 2.4–2.6 mm in length, ca.  $1.6\times$  as long as wide.

Head ca.  $1.8\times$  as wide as long, ca.  $0.52\times$  as long as and  $0.54\times$  as wide as pronotum, densely and very minutely punctate (Fig. 10A), usually bearing some large punctures (Fig. 10A); antennomeres 1–4 each longer than wide; antennomeres 5 and 11 each about as long as wide; remaining antennomeres each wider than long; antennomere 11 oval (Fig. 10C); relative lengths of antennomeres 2 to 11 : 2.8 : 3.3 : 1.2 : 1.6 : 1.2 : 2.4 : 1.0 : 2.5 : 2.5 : 4.2.



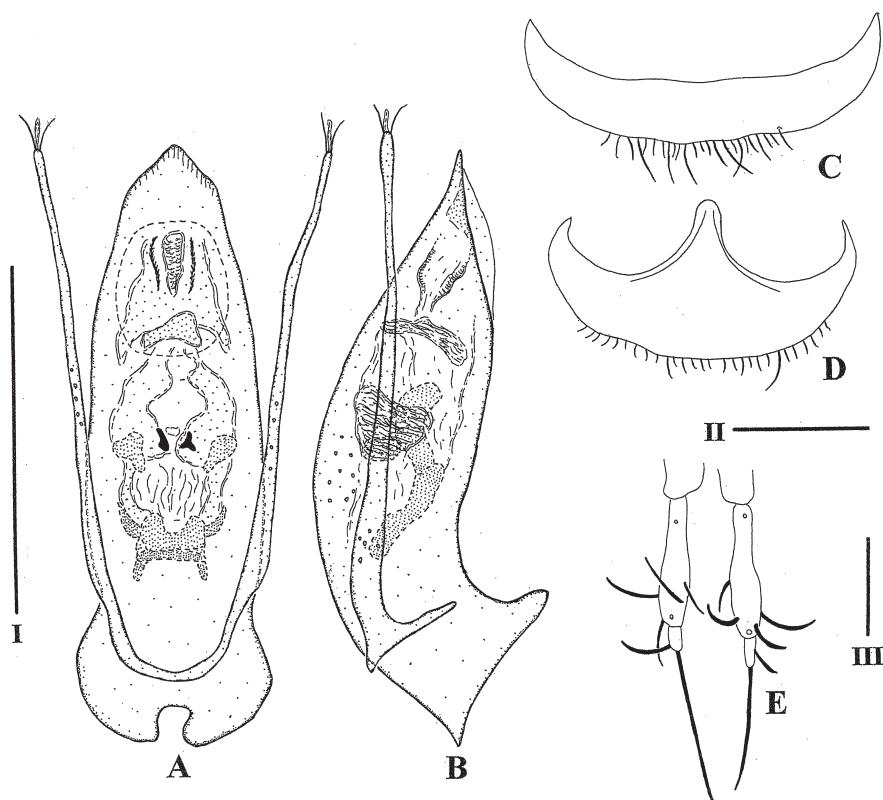


Fig. 12. *Leiodes kandai* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D; III: 0.1 mm for E.

Pronotum ca.  $1.8\times$  as wide as long, ca.  $0.46\times$  as long as and  $0.86\times$  as wide as pronotum, widest near base, simply and very feebly curved at posterior margin, distinctly and very minutely punctate, punctation same as that on head (Fig. 10A).

Scutellum very minutely punctate.

Elytra almost as long as wide or a little longer than wide in dorsal view, widest ca. at basal  $1/3$  (Fig. 10A), not transversely strigose; each elytron bearing nine rows of punctures with small number of punctures, with moderate number of very fine punctures between rows (Fig. 10D); row 9 invisible in dorsal view, subhumeral row ca. as long as  $1/3$  of elytral length (Fig. 10B); elytral rows composed of minute but larger punctures than those of pronotum (Fig. 10A); sutural stria fine, arising from apex to ca. apical  $3/5$  of the elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, and with a shallow excavation between median carina and transverse carina (Fig. 10E); median carina of mesoventrite low (Fig. 10E); metaventrite without sexual dimorphism, sparsely pubescent, distinctly microreticulate except for almost smooth middle portion.

Legs showing sexual dimorphism on protarsi, mesotarsi, and metatibiae; protibiae gradually and very feebly widening from base towards apex (Figs. 11E, 11F); metafemur robust, and with a small dorsal projection posteroapically (Figs. 11G, 11H).

**Male.** Tarsomeres 2–4 of protarsi and mesotarsi a little expanded (Fig. 11A); metatibiae weakly curved inwards (Fig. 11C); abdominal sternite 8 feebly curved (Fig. 12C); aedeagus relatively robust (Figs. 12A, 12B); median lobe triangular at apex in dorsal view (Fig. 12A), pointed apically in lateral view (Fig. 12B); each paramere bearing two apical setae and one small transparent lobe at apex, feebly expanded in ca. apical 1/10 in lateral view (Fig. 12B); inner sac complex (Fig. 12A).

**Female.** Protarsi and mesotarsi slender (Fig. 11B); metatibiae almost straight (Fig. 11D); abdominal sternite 8 with a spiculum ventrale at a central point of anterior margin (Fig. 12D); coxites and stylus as shown in Fig. 12E.

**Differential diagnosis.** *Leiodes kandai* sp. nov. is similar to *L. babai* in having relatively minute elytral punctures, but may be distinguished from the latter by the relatively small body (2.4–2.6 mm), male metatibiae distinctly curved inwardly (Fig. 11C), and having the median lobe triangular at the apex in dorsal view (Fig. 12A). In contrast, *L. babai* has a relatively large body (2.6–3.0 mm), male metatibiae feebly curved (Fig. 8C), and the median lobe protuberant apically (Fig. 9A). *Leiodes kandai* sp. nov. is also similar to *L. subtilis* (Reitter, 1885) inhabiting Central Asia and the Russian Far East by having elytral rows composed of minute punctures, but may be separated from it by having the median carina of the mesoventrite low (Fig. 10E) while *L. subtilis* has a high carina of the mesoventrite.

**Etymology.** The specific name is dedicated to an excellent scholar of Western learning, Takahira Kanda (1830–1898), who was born in the type locality, Gifu Prefecture.

**Distribution.** Japan: Honshu (Gifu Prefecture).

### 3. *Leiodes yoshidai* sp. nov.

Japanese name: Tsurugi-ô-tamakinokomushi

(Figs. 6, 13–15, 110)

**Type locality.** Japan, Shikoku, Tokushima Pref., Higashi-iyayama Village, Nagoro, Otome-dani.

**Type material.** JAPAN: SHIKOKU: HOLOTYPE, ♂, Tokushima Pref., Higashi-iyayama Village, Nagoro, Otome-dani, 12–24.vii.2006, K. Tanaka leg. (FIT) (MNHAH). PARATYPES, 6 ♂♂, 4 ♀♀, same data as holotype except for the date, 5–12.viii.2006; 2 ♀♀, Tokushima Pref., Kisawa Village, Mt. Jirôgyû, 14–19.vii.2004, K. Tanaka leg. (FIT); 1 ♂, 2 ♀♀, Tokushima Pref., Mt. Tsurugi, Minokoshi (alt. 1340 m), 2–17.vii.2006, K. Tanaka leg. (FIT); 1 ♂, 1 ♀, 17–28.vii.2006, 8 ♂♂, 5 ♀♀, same data as the former except for the date, 28.vii–5. viii.2006; 1 ♂, 1 ♀, Tokushima Pref., Higashi-iyayama Village, Mt. Tsurugi (alt. 1750–1800 m), 7.viii.2004, H. Kamezawa leg.; 6 ♂♂, 5 ♀♀, Tokushima Pref., Mima City, Koyadaira, Mt. Maruzasayama, Kawakami (alt. 1380 m), 18–22.vii.2007, K. Tanaka leg. (FIT); 1 ♂, Tokushima Pref., Mima City, Koyadaira, Mt. Ichinomori, Fujinoikedani (alt. 1300 m), 17.vii–1.viii.2007, K. Tanaka leg. (FIT); 2 ♂♂, Ehime Pref., Mt. Odamiyama, Namakusa-dani, 6.vii.1995, E. Yamamoto leg. All paratypes preserved in FUFJ.

**Diagnosis.** Body length 2.4–2.8 mm, ca. 1.6× as long as wide. Dorsum brown or dark brown. Each elytron with nine distinct rows of punctures and subhumeral row as long as ca. 1/3 of elytral length. The rows composed of minute punctures. Mesoventrite with one shallow excavation between median carina and transverse carina. Median carina of mesoventrite low.

Metafemora robust. Mesotibiae without distinct sexual dimorphism. Male metatibiae weakly curved. Each paramere of aedeagus with a transparent large lobe. Female abdominal sternite 8 with a spiculum ventrale.

**Description.** Measurements of holotype: Body length 2.5 mm; head 0.40 mm in length and 0.74 mm in width; pronotum 0.76 mm in length and 1.3 mm in width; elytra 1.5 mm in length and 1.5 mm in width.

**Coloration.** Dorsum shining and almost unicolor, brown or dark brown; antennomeres 1–6, 8, and apical 2/5 of antennomere 11 brown; antennomeres 7, 9, 10, and basal 3/5 of antennomere 11 a little darker; legs brownish; all tarsi slightly paler than remaining parts of legs; mesoventrite, metaventrite, and abdominal ventrites brown.

Body 2.4–2.8 mm in length, ca.  $1.6\times$  as long as wide.

Head ca.  $1.8\times$  as wide as long, ca.  $0.53\times$  as long as and  $0.56\times$  as wide as pronotum, densely and very minutely punctate (Fig. 13A), usually bearing some large punctures (Fig. 13A); antennomeres 1–5 each longer than wide; antennomere 11 about as long as wide; remaining

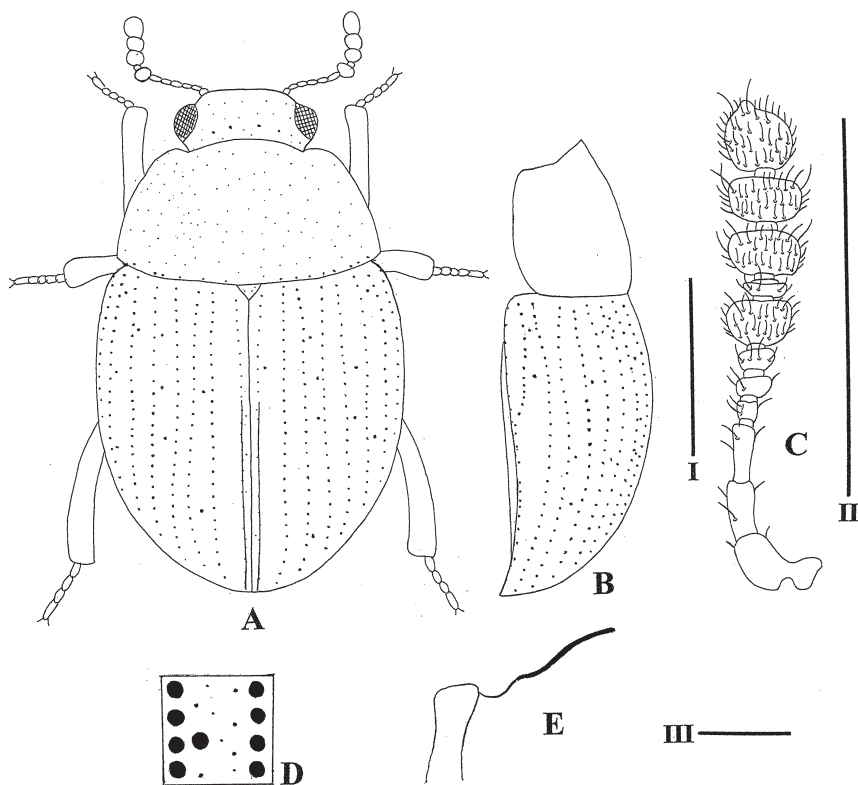


Fig. 13. *Leiodes yoshidai* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.2 mm for E.

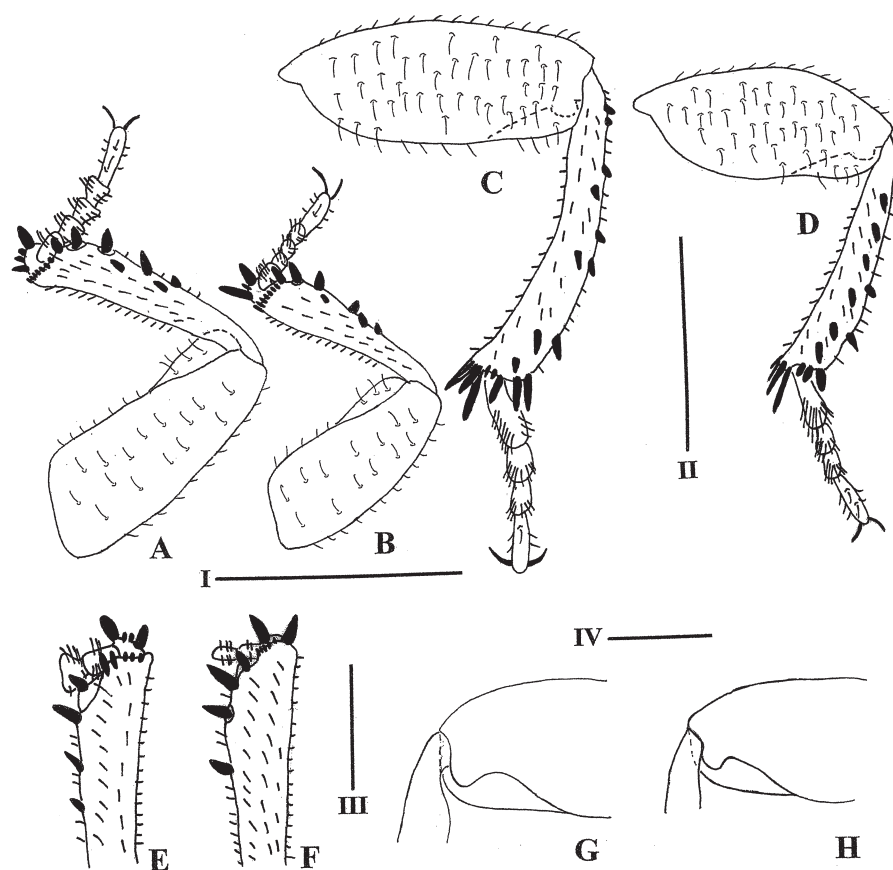


Fig. 14. *Leiodes yoshidai* sp. nov. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male hind leg, ventral view; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 0.5 mm for A and B; II: 0.5 mm for C and D; III: 0.2 mm for E and F; IV: 0.2 mm for G and H.

antennomeres each wider than long; antennomere 11 oval (Fig. 13C); relative lengths of antennomeres 2 to 11 as follows: 4.0 : 4.0 : 1.3 : 1.5 : 1.2 : 3.0 : 1.0 : 3.0 : 3.0 : 4.7.

Pronotum ca. 1.7× as wide as long, ca. 0.48× as long as and 0.84× as wide as elytra, widest near base, simply and very feebly curved at posterior margin, distinctly and very minutely punctate, punctation same as that on head (Fig. 13A).

Scutellum very minutely punctate.

Elytra ca. as long as wide in dorsal view, widest ca. at basal 1/3 (Fig. 13A), not transversely strigose; each elytron bearing nine rows of punctures with small number of punctures, with moderate number of very fine punctures between rows (Fig. 13D); row 9 invisible in dorsal view, subhumeral row ca. as long as 1/3 of elytral length (Fig. 13B); elytral rows composed

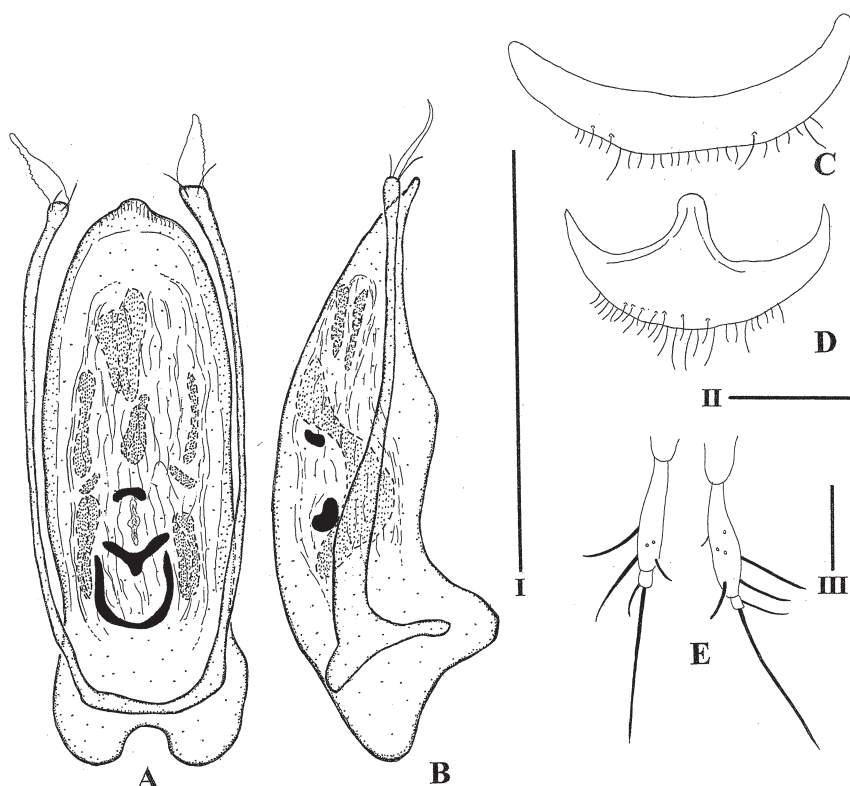


Fig. 15. *Leiodes yoshidai* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D; III: 0.1 mm for E.

of minute but larger punctures than those of pronotum (Fig. 13A); sutural stria fine, arising from apex to ca. apical 3/5 of the elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, and with one shallow excavation between median carina and transverse carina (Fig. 13E); median carina of mesoventrite low (Fig. 13E); metaventrte without sexual dimorphism, sparsely pubescent, distinctly microreticulate except for almost smooth middle portion.

Legs showing sexual dimorphism on protarsi, mesotarsi, and metatibiae; protibiae gradually and very feebly widening from base towards apex at internal margins (Figs. 14E, 14F); metafemur robust, and with a small dorsal projection posteroapically (Figs. 14G, 14H).

**Male.** Tarsomeres 2–4 of protarsi and mesotarsi a little expanded (Fig. 14A); metatibiae weakly curved inwards (Fig. 14C); abdominal sternite 8 feebly curved (Fig. 15C); aedeagus robust (Figs. 15A, 15B); median lobe slightly protuberant apically (Fig. 15A), pointed apically

in lateral view (Fig. 15B); each paramere bearing two apical setae and a transparent large lobe at apex (Fig. 15A); inner sac complex (Fig. 15A).

**Female.** Protarsi and mesotarsi slender (Fig. 14B); metatibiae almost straight (Fig. 14D); abdominal sternite 8 with a spiculum ventrale at a central point of anterior margin (Fig. 15D); coxites and stylus as shown in Fig. 15E.

**Differential diagnosis.** *Leiodes yoshidai* sp. nov. is similar to *L. babai* Nakane, 1989 in having relatively minute elytral punctures, but may be distinguished from it by having a relatively small body (2.4–2.8 mm), the aedeagus relatively robust in dorsal view (Fig. 15A), and each paramere with a large transparent lobe (Fig. 15A). In contrast, *L. babai* has a relatively large body (2.7–3.0 mm), relatively slender aedeagus (Fig. 9A), and parameres with small lobes (Fig. 9A). Moreover, *L. yoshidai* sp. nov. is also similar to *L. subtilis* (Reitter, 1885) inhabiting Central Asia and the Russian Far East in having elytra with the rows composed of minute punctures, but can be separated from it by having a low median carina of the mesoventrite (Fig. 13E). In contrast, *L. subtilis* has a high mesoventral carina.

**Etymology.** This species is dedicated to Mr. Masataka Yoshida, who kindly donated many valuable specimens of *Leiodes* used in this study to me.

**Distribution.** Japan: Shikoku (Tokushima and Ehime Prefectures).

### *Leiodes circinipes* species group

**Species included.** *Leiodes circinipes* (Rye, 1873), *L. juzoi* sp. nov., *L. yasudai* sp. nov., *L. yoshitakei* sp. nov.

**Diagnosis.** Elytra unicolor or bicolored, with densely arranged large punctures between rows of punctures, and therefore superficially appearing not to bear rows of punctures (Figs. 16E, 19E, 21D, 24E); mesoventrite without distinct excavation between median carina and transverse carina (Figs. 16F, 19F, 21E, 24F); protarsi sexually dimorphic, male protarsomeres 2–4 expanded (Figs. 17A, 20A, 22A, 25A); male mesotibiae strongly protuberant at an interoapical corner, female mesotibiae simply quadrate interoapically (Figs. 17C, 17D, 22C, 22D, 25C, 25D); dorsal posteroapical projection of metafemur sexually dimorphic (Figs. 22I, 22J) or not (Figs. 17H, 17I, 25I, 25J); pubescence of metaventrite showing distinct sexual dimorphism (Figs. 21F, 21G, 24G, 24H) or not; aedeagus slender, without distinct large sclerites in inner sac (Figs. 18A, 19F, 23A, 26A); male abdominal sternite 8 strongly curved (Figs. 18C, 20H, 23C, 26C); female abdominal sternite 8 with a spiculum ventrale at a central point of anterior margin (Figs. 18D, 23D, 26D).

Representatives of the genus *Leiodes* occasionally show sexual dimorphism in the shape of the spines at the interoapical corner of the mesotibiae (BARANOWSKI 1993). Among *Leiodes* from Japan and the North Chishima Islands, *L. circinipes* group is the only group having this character (Table 1).

**Differential diagnosis.** The *Leiodes circinipes* species group can be separated from other species groups by having elytra with densely arranged large punctures between rows of punctures and having the male mesotibiae strongly protuberant at the interoapical corner.

**4. *Leiodes circinipes* (Rye, 1873)**

Japanese name: Kurosuji-ô-tamakinokomushi  
(Figs. 16–18, 111)

*Anisotoma circinipes* Rye, 1873: 132.

*Liodes circinipes*: PORTEVIN (1914): 226; PORTEVIN (1927): 74 (key to Japanese species of *Leiodes*).

*Leiodes circinipes*: HATCH (1929): 35; DAFFNER (1983): 46 (redescription); PERKOVSKY (1988): 80 (new to Russia); PERREAU (2004): 195 (catalogue).

*Leiodes izuensis* Nakane, 1989: 148; PERREAU (2004): 196 (catalogue). **Syn. nov.**

**Type locality.** Japan, Kyushu, Nagasaki.

**Type material examined.** *L. circinipes*: Not examined. Type series of *L. circinipes* has not been found (DAFFNER 1983). According to RYE (1873), the type specimens of *L. circinipes* were collected by George Lewis. Most Lewis's collections are preserved in the Natural History Museum, London, but the specimens have not been found there following my request (Martin Brendell, pers. comm.).

*L. izuensis*: **JAPAN: HONSHU:** HOLOTYPE, ♂, Izu Islands, Shikine Is., Tokyo Pref., 11.ii.1984, Y. Kunimi leg. (HUMS). PARATYPE, 1 ♂, Izu Islands, Ohshima Is., Tokyo Pref., 7.ii.1984, Y. Kunimi leg. (HUMS).

**Additional material examined.** **JAPAN: HONSHU:** 1 ♂, Tochigi Pref., Ashikaga City, Ô-numata-chô (alt. 100m), 29.iv.–5.v.2011, H. Ohkawa leg. (FIT) (FUFJ); 1 ♂, Izu Islands, Miyake Is., 1.iv.1976, Y. Kurosawa leg. (NSMT). **SHIKOKU:** 1 ♀, Kôchi Pref., forest in Aki (33°32'30"N 134°01'22"E, alt. 700 m), 22.v.2009, M. Makiyara leg. (PT) (FUFJ).

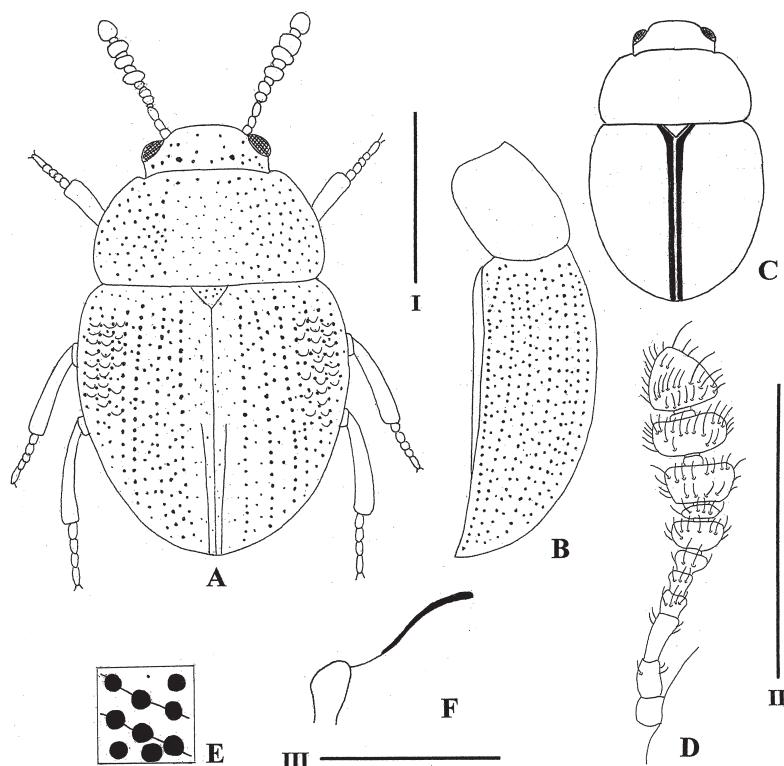


Fig. 16. *Leiodes circinipes* (Rye, 1873). A – body, dorsal view; B – ditto, lateral view; C – dorsal color; D – antenna; E – elytral punctures; F – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for D; III: 0.5 mm for F.

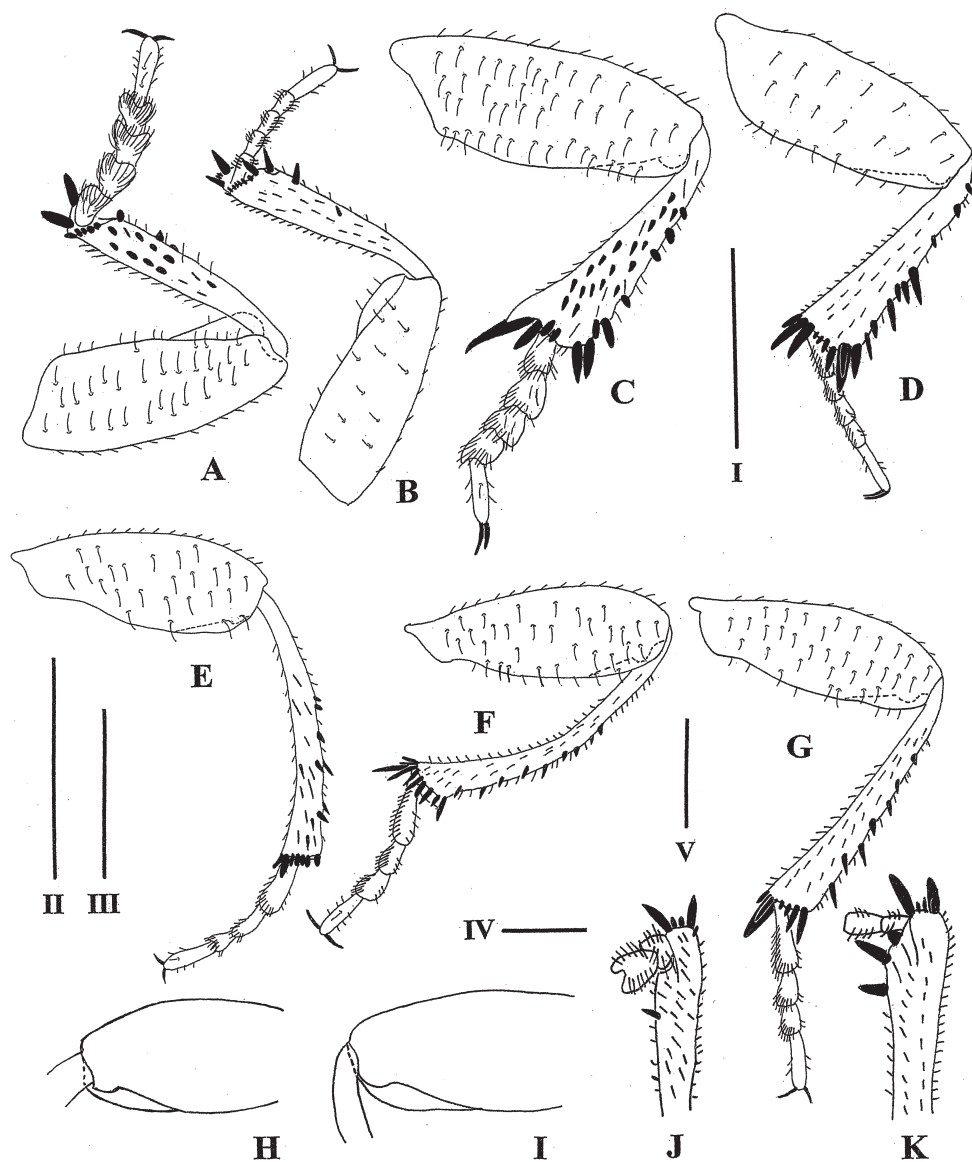


Fig. 17. *Leiodes circinipes* (Rye, 1873). A – male fore leg, ventral view; B – female fore leg, ventral view; C – male middle leg, ventral view; D – female middle leg, ventral view; E – male hind leg, ventral view; F – ditto; G – female hind leg, ventral view; H – male metafemur, dorsal view; I – female metafemur, dorsal view; J – male protibiae, dorsal view; K – female protibiae, dorsal view. Scale I: 0.5 mm for A–D; II: 0.5 mm for E; III: 0.5 mm for F and G; IV: 0.2 mm for H and I; V: 0.2 mm for J and K.



**Diagnosis.** Coloration. Head and pronotum brown; scutellum dark brown; elytra yellowish brown, but black near elytral suture (Fig. 16C); antennomeres 1–6 and 8 brown; antennomeres 7 and 9, 10, and basal half of antennomere 11 dark brown; apical half of antennomere 11 light brown.

Body 2.4–2.9 mm long, ca. 1.6× as long as wide (Fig. 16A); head densely punctate, bearing some large punctures (Fig. 16A); antennomeres 1 and 2 each longer than wide; antennomeres 3 and 4 each about as long as wide; remaining antennomeres each wider than long; antennomere 11 robust (Fig. 16D). Pronotum simply and very feebly curved at posterior margin, bearing punctation similar to that on head (Fig. 16A). Elytra transversely and sparsely strigose (Fig. 16E); most punctures of elytra denser and coarser than those of head and pronotum, elytra superficially not appearing to bear punctural rows (Fig. 16A, 16B, 16E); sutural stria fine, reaching from apex ca. to apical half of elytral length. Metathoracic wings fully developed. Metaventricle without distinct excavation between median carina and transverse carina (Fig. 16F); median carina of mesoventrite low (Fig. 16F); metaventricle without sexual dimorphism. Legs showing sexual dimorphism on protarsi, mesotibia, mesotarsi, and metatibia; protibiae gradually and very feebly widening from base towards apex (Figs. 17J, 17K); metafemur with a small dorsal projection posteroapically (Figs. 17H, 17I).

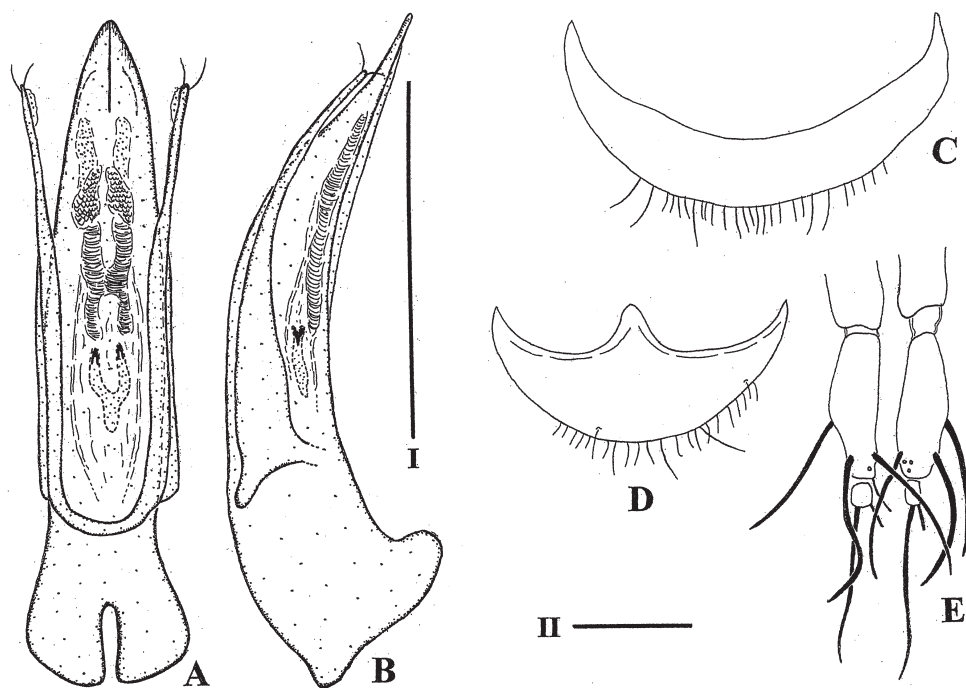


Fig. 18. *Leiodes circinipes* (Rye, 1873). A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D and 0.1 mm for E.

**Male.** Tarsomeres 2–4 of protarsi and mesotarsi expanded (Figs. 17A, 17C); mesotibia strongly protuberant and bearing a robust spine at an interoapical corner (Fig. 17C); metatibiae weakly or distinctly curved inwards (Figs. 17E, 17F); abdominal sternite 8 strongly curved (Fig. 18C); aedeagus as shown in Figs. 18A and 18B.

**Female.** Protarsi and mesotarsi slender (Figs. 17B, 17D); mesotibiae not expanded at interoapical corner (Fig. 17D); metatibiae almost straight (Fig. 17G); abdominal sternite 8 with a spiculum ventrale at a central point of anterior margin (Fig. 18D); coxites and stylus as shown in Fig. 18E.

**Differential diagnosis.** *Leiodes circinipes* is similar to *L. rugosa* Stephens, 1829 by having the elytra transversely strigose, but can be separated from it by having a bicolored dorsum (Fig. 16C) and almost straight parameres of the aedeagus in dorsal view (Fig. 18A). In contrast, *L. rugosa* has almost unicolor elytra and sinuate parameres.

**Distribution.** Japan (Kyushu, Shikoku, Honshu, and Izu Islands) and Russian Far East (PERKOVSKY 1988, needs confirmation). New to Honshu, Shikoku, and Honshu.

**Taxonomic note.** In the original description of *L. izuensis*, NAKANE (1989) mentioned that the elytra of *L. izuensis* are not strigose which may separate the species from *L. circinipes*. However, I examined the type series of *L. izuensis* and found that its elytra are strigose. In addition, other morphological characters of *L. izuensis*, dorsal coloration, punctures of elytra, and the shape of the mesotibiae and metatibiae are almost the same as those of *L. circinipes*. Therefore, I conclude that it is not possible to distinguish *L. izuensis* from *L. circinipes*, and *L. izuensis* thus becomes a junior subjective synonym of *L. circinipes*.

PERKOVSKY (1988) recorded a single specimen of *L. circinipes* from the Russian Far East and did not provide any figures and morphological diagnosis justifying his identification, nor did the author examine Japanese specimens or type material. It is therefore possible that the specimen is misidentified and I express doubts about the presence of *L. circinipes* in the Russian Far East. The specimen identified by PERKOVSKY (1988) may be *Leiodes rugosa* whose elytra are transversely strigose as *L. circinipes*.

### 5. *Leiodes juzoi* sp. nov.

Japanese name: Jūzō-ō-tamakinokomushi

(Figs. 19–20, 111)

**Type locality.** Japan, Hokkaido, Rishiri Is., Kutsukata.

**Type material.** JAPAN: HOKKAIDO: HOLOTYPE, ♂, Rishiri Is., Kutsukata, 3.x.1968, Y. Hori leg. (EUMJ).

**Diagnosis.** Body about 2.5 mm long, ca. 1.6× as long as wide. Dorsum bicolored. Elytra light brown with dark brown stripes. Mesoventrite without distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Mesotibia protuberant at interoapical corner. Metatibiae weakly curved inwards.

**Description.** Measurements of holotype: Body length 2.5 mm; head 0.35 mm in length and 0.70 mm in width; pronotum 0.71 mm in length and 1.2 mm in width; elytra 1.6 mm in length and 1.4 mm in width.

**Coloration.** Dorsum shining and bicolored (Fig. 19C); head brown; pronotum light brown; elytra light brown with dark brown stripes placed near elytral suture and lateral margins (Fig. 19C); antennomeres 1, 2, and apical 2/5 of antennomere 11 light brown; antennomeres 3–6

and 8 brown; antennomeres 7, 9, 10, and basal 3/5 of antennomere 11 dark brown; legs brown; mesoventrite, metaventrite, and abdominal ventrites brown.

Head distinctly and densely punctate and bearing some large punctures (Fig. 19A); antennomeres 1–3 each longer than wide; antennomeres 4 and 11 each about as long as wide; remaining antennomeres each wider than long; antennomere 11 robust (Fig. 19D); relative lengths of antennomeres 2 to 11 : 3.2 : 4.0 : 2.2 : 1.8 : 1.8 : 3.2 : 1.0 : 4.6 : 4.2 : 5.8.

Pronotum widest at base, simply and very feebly curved at posterior margin, distinctly punctate, punctuation similar to that on head (Fig. 19A).

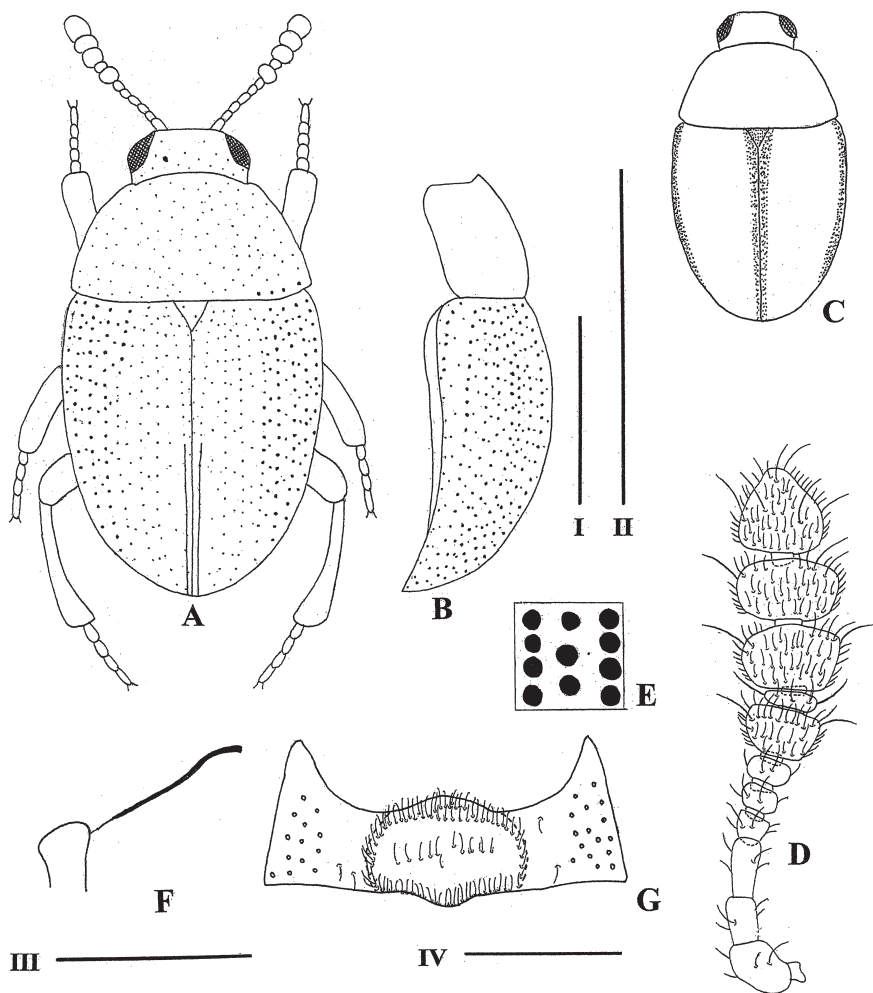


Fig. 19. *Leiodes juzoi* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – dorsal color; D – antenna; E – elytral punctures; F – mesoventrite, lateral view; G – male metaventrite. Scale I: 1 mm for A and B; II: 0.5 mm for D; III: 0.5 mm for F; IV: 0.5 mm for G.

Scutellum minutely punctate.

Elytra widest ca. at basal 1/3 (Fig. 19A), not transversely strigose; each elytron bearing nine rows of punctures, with many punctures between rows and therefore superficially not appearing to bear rows of punctures (Figs. 19A, 19B, 19E); most punctures of elytra larger than those of pronotum (Fig. 19A); sutural stria fine, reaching from apex ca. to apical half of elytral length.

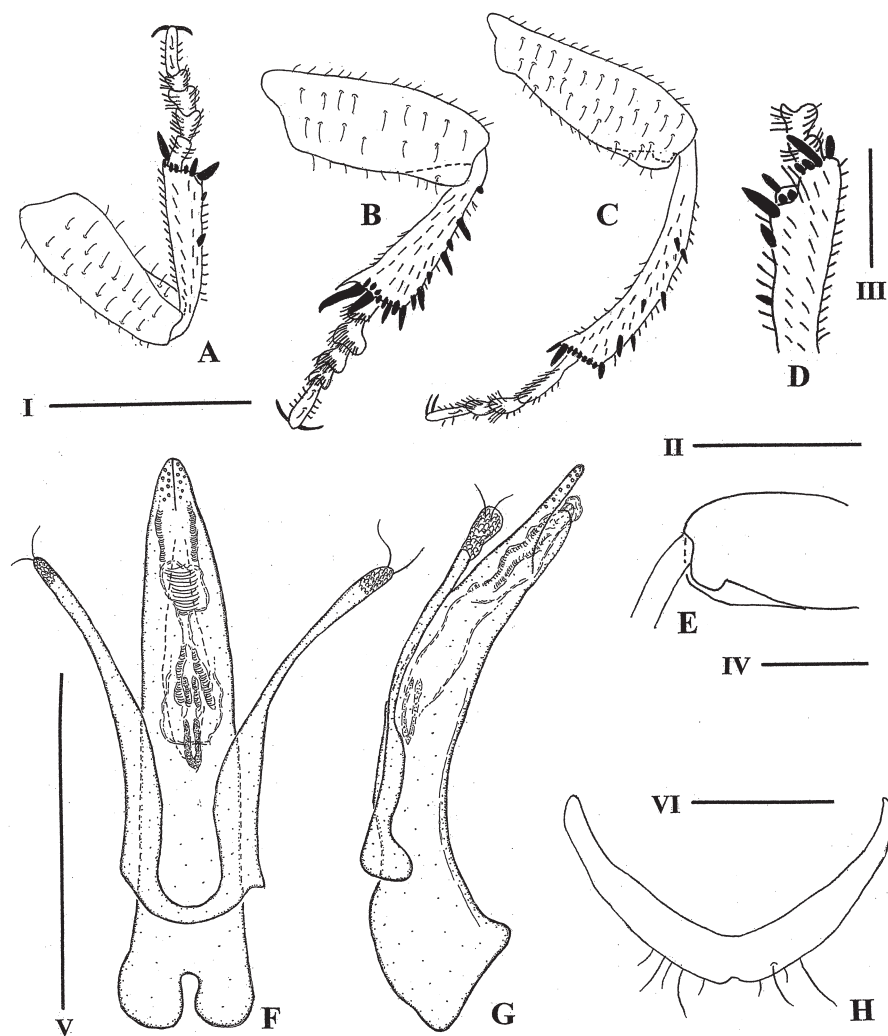


Fig. 20. *Leiodes juzoi* sp. nov. A – male fore leg, ventral view; B – male middle leg, ventral view; C – male hind leg, ventral view; D – male protibia, dorsal view; E – male metafemur, dorsal view; F – aedeagus, dorsal view; G – ditto, lateral view; H – male abdominal sternite 8. Scale I: 0.5 mm for A and B; II: 0.5 mm for C; III: 0.2 mm for D; IV: 0.2 mm for E; V: 0.5 mm for F and G; VI: 0.2 mm for H.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, and without distinct excavation between median carina and transverse carina (Fig. 19F); median carina of mesoventrite low (Fig. 19F); metaventrite sparsely and finely pubescent, and strongly microreticulate except for almost smooth middle portion; middle portion of metaventrite with dense and erect pubescence (Fig. 19G).

Protibiae gradually and very feebly widening from base towards apex (Fig. 20D); tarsomeres 2–4 of protarsi and mesotarsi expanded (Figs. 20A, 20B); mesotibia strongly protuberant and bearing a robust spine at interoapical corner (Fig. 20B); metafemur with small dorsal projection posteroapically (Fig. 20E); metatibiae weakly curved inwards (Fig. 20C).

Abdominal sternite 8 strongly curved (Fig. 20H); aedeagus generally slender (Figs. 20F, 20G); median lobe simply stick-like, rounded at apex in dorsal view (Fig. 20F), feebly curved in lateral view (Fig. 20G); each paramere bearing a small transparent lobe and two setae at apex (Fig. 20F); inner sac as shown in Fig. 20F.

**Female.** Unknown.

**Differential diagnosis.** *Leiodes juzoi* sp. nov. is similar to *L. yasudai* sp. nov. by the shape of the aedeagus, but can be distinguished from it by having the elytra with dark brown stripes (Fig. 19C) and male metafemur with a small dorsal posteroapical projection (Fig. 20E). In contrast, *L. yasudai* sp. nov. has almost unicolor elytra and male metafemur with a long projection curved inwards (Fig. 22I). *Leiodes juzoi* sp. nov. also resembles *L. circinipes*, but can be separated from it by having non-strigose elytra. In contrast, *L. circinipes* has strigose elytra (Fig. 16E).

**Etymology.** This species is dedicated to a famous explorer, Jûzô Kondô (1771–1829), who made a venture to the type locality, Rishiri Island.

**Distribution.** Japan: Hokkaido (Rishiri Is.).

**Morphological note.** The elytra of *L. yasudai* sp. nov. have many punctures between the rows of punctures (Fig. 21A), and therefore appear unstriate superficially. In contrast, the elytral rows of *L. juzoi* sp. nov. are a little more distinct than those of *L. yasudai* sp. nov. (Fig. 19A). However, the elytral morphology of both species is just quantitative difference of punctures. *L. yasudai* sp. nov. and *L. juzoi* sp. nov. have similar male middle legs and aedeagus (Figs. 20B, 20F, 22C, 23A), and may be related to each other.

## 6. *Leiodes yasudai* sp. nov.

Japanese name: Daisetsu-ô-tamakinomushi  
(Figs. 6, 21–23, 111)

**Type locality.** Japan, Hokkaido, Mts. Daisetsu, Mt. Kurodake.

**Type material.** JAPAN: HOKKAIDO: HOLOTYPE, ♀, Mts. Daisetsu, Mt. Kurodake, 4.ix.1990, N. Yasuda leg. (MNHAH). PARATYPE: 1 ♂, Mts. Daisetsu, Mikura-zawa, 7.–15.viii.1999, S. Hori leg. (MNHAH). Opposite to the usual practice, I have designated the female specimen as the holotype, as the above male specimen is teneral.

**Diagnosis.** Body 2.8–3.0 mm long and ca. 1.8× as long as wide. Dorsum brownish. Elytra densely and strongly punctate between striae, and not transversely strigose between punctures. Mesoventrite without distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Male metaventrite bearing erect and dense pubescence

medially. Male mesotibia protuberant at interoapical corner. Male metatibiae strongly arcuate. Female abdominal sternite 8 with a spiculum ventrale.

**Description.** Measurements of holotype: Body length 2.8 mm; head 0.45 mm in length and 0.77 mm in width; pronotum 0.74 mm in length and 1.3 mm in width; elytra 1.9 mm in length and 1.6 mm in width.

Coloration (based on holotype only). Dorsum shining and brownish; elytra slightly paler than head and pronotum; antennomeres 1–6 and 8 brown; antennomere 7 a little darker than 6;

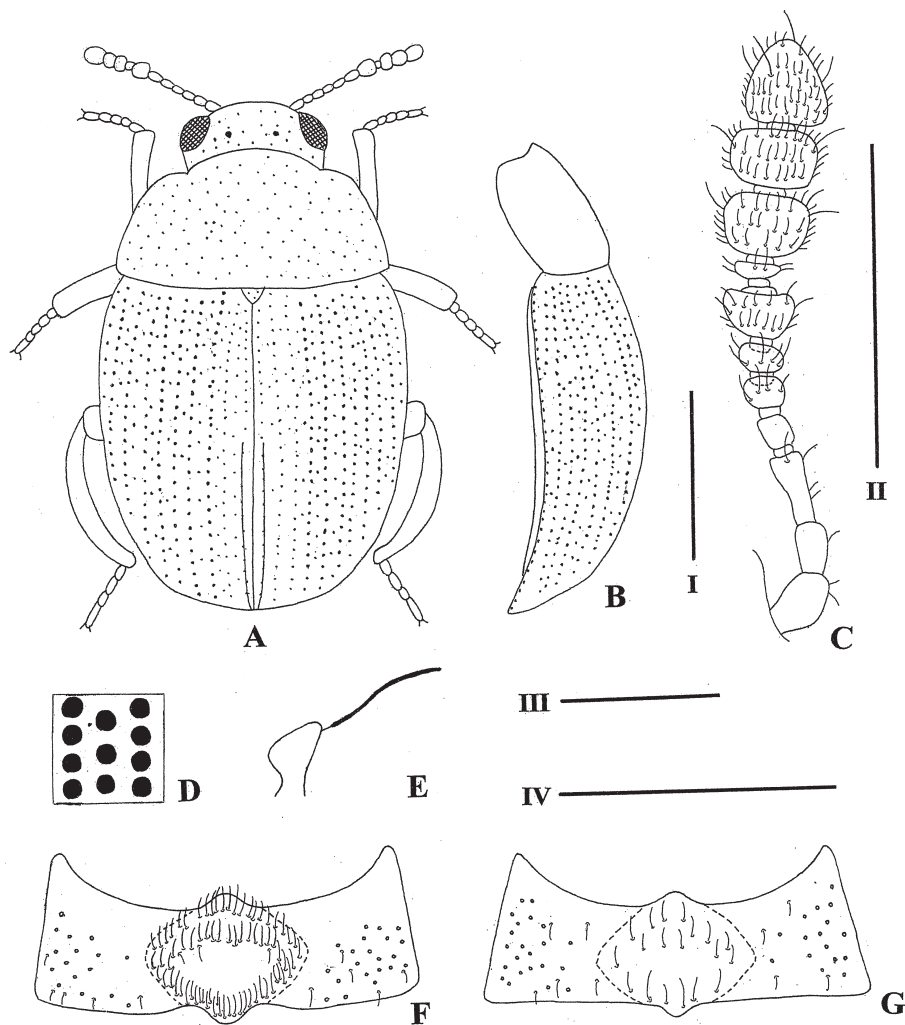


Fig. 21. *Leiodes yasudai* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view; F – male metaventrte; G – female metaventrte. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.5 mm for E; IV: 0.5 mm for F and G.

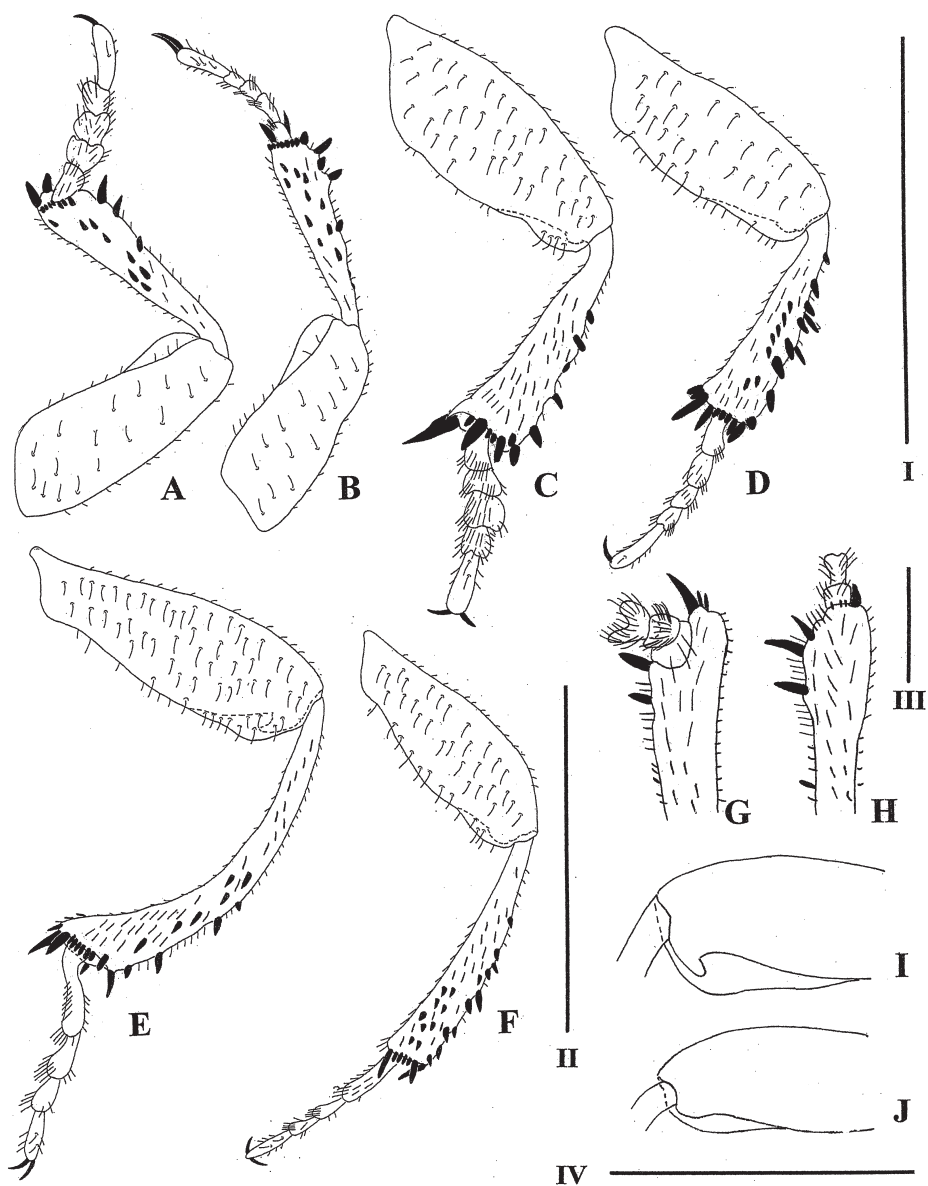


Fig. 22. *Leiodes yasudai* sp. nov. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male middle leg, ventral view; D – female middle leg, ventral view; E – male hind leg, ventral view; F – female hind leg, ventral view; G – male protibia, dorsal view; H – female protibia, dorsal view; I – male metafemur, dorsal view; J – female metafemur, dorsal view. Scale I: 1 mm for A–D; II: 1 mm for E and F; III: 0.2 mm for G and H; IV: 0.5 mm for I and J.



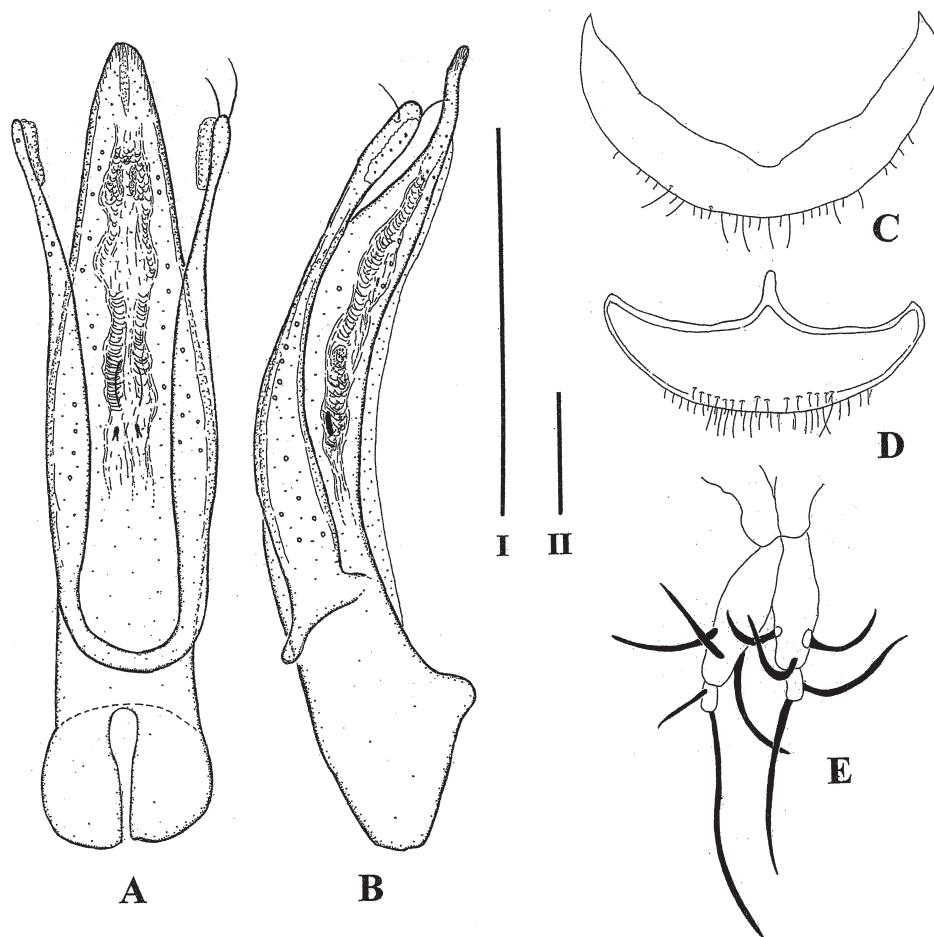


Fig. 23. *Leiodes yasudai* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D, and 0.1 mm for E.

antennomeres 9, 10, and basal 2/3 of antennomere 11 dark brown; apical 1/3 of antennomere 11 light brown; coxae, mesotrochanters, and metatrochanters brown; remaining parts of legs yellowish brown; mesoventrite, metaventrite, and abdominal ventrites brown.

Body 2.8–3.0 mm in length, ca.  $1.8\times$  as long as wide.

Head ca.  $1.7\times$  as wide as long, ca.  $0.61\times$  as long as and  $0.56\times$  as wide as pronotum, distinctly punctate, bearing some large punctures (Fig. 21A); antennomeres 1–4 each longer than wide; antennomere 11 about as long as wide; remaining antennomeres each wider than

long; antennomere 11 oval (Fig. 21C); relative lengths of antennomeres 2 to 11 – 2.8 : 4.3 : 1.9 : 1.8 : 1.6 : 2.8 : 1.0 : 3.4 : 3.1 : 4.5.

Pronotum ca. 1.8× as wide as long, ca. 0.40× as long as and 0.87× as wide as elytra, widest at base, simply and very feebly curved at posterior margin, distinctly punctate, punctuation similar to that on head (Fig. 21A).

Scutellum minutely punctate.

Elytra ca. 1.2× as long as wide in dorsal view, widest ca. at basal 1/3 (Fig. 21A), not transversely strigose, densely and strongly punctate between striae, therefore superficially not appearing to bear rows of punctures (Figs. 21A, 21B, 21F); most punctures of elytra larger than those of head and pronotum (Fig. 21A); sutural stria fine, reaching from apex to ca. apical half of elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, without distinct excavation between median carina and transverse carina (Fig. 21E); median carina of mesoventrite low (Fig. 21E); metaventre showing sexual dimorphism (Figs. 21F, 21G), sparsely and finely pubescent, and strongly microreticulate except for almost smooth middle portion.

Legs showing distinct sexual dimorphism of protarsi, protibia, mesotibia, mesotarsi, metafemur, and metatibia; metafemora weakly expanded at about apical 1/4 of posterior margins (Figs. 22E, 22F).

**Male.** Middle portion of metaventre with dense erect pubescence (Fig. 21F); protibiae strongly curved inwards along dorsoapical margins in dorsal view (Fig. 22G); tarsomeres 2–4 of protarsi and mesotarsi expanded (Figs. 22A, 22C); mesotibia strongly protuberant and bearing a robust spine at interoapical corner (Fig. 22C); metafemur with a long dorsal projection posteroapically, projection curved inwards (Fig. 22I); metatibiae strongly arcuately curved (Fig. 22E); abdominal sternite 8 strongly curved (Fig. 23C); aedeagus slender (Figs. 23A, 23B); median lobe simply narrowed from apical 1/3 towards apex, rounded at apex in dorsal view (Fig. 23A), feebly curved and apically pointed in lateral view (Fig. 23B); each paramere bearing a small transparent lobe at apex (Fig. 23A); inner sac as shown in Fig. 23A.

**Female.** Middle portion of metaventre with sparse erect pubescence (Fig. 21G); protibia not curved inwards on dorsoapical margin in dorsal view (Fig. 22H); protarsi and mesotarsi slender (Fig. 22B, 22D); mesotibia with a slender spine at interoapical corner (Fig. 22D); metafemur with a small dorsal projection posteroapically (Fig. 22J); metatibiae almost straight (Fig. 22F); abdominal sternite 8 with a spiculum ventrale at central point of anterior margin (Fig. 23D); coxites and stylus as shown in Fig. 23E.

**Differential diagnosis.** *Leiodes yasudai* sp. nov. is similar to *L. circinipes* (Rye, 1873) in elytral punctuation, but can be separated from it by having almost unicolor elytra and strongly curved male metatibiae (Fig. 22E). In contrast, *L. circinipes* has brownish elytra with black stripes near the elytral suture (Fig. 16C) and relatively weakly curved male metatibiae (Figs. 17E, 17F).

**Etymology.** This species is dedicated to the collector of the holotype, Dr. Nobunori Yasuda.

**Distribution.** Japan: Hokkaido (Daisetsu Mts.).

### 7. *Leiodes yoshitakei* sp. nov.

Japanese name: Yoshitake-ô-tamakinokomushi  
(Figs. 24–26, 111)

**Type locality.** Japan, Hokkaido, Ebetsu City, Nopporo Forest Park

**Type material.** JAPAN: HOKKAIDO: HOLOTYPE, ♂, Ebetsu City, Nopporo Forest Park, 31.x.2001, S. Hori leg. (FIT) (MNHAH). PARATYPES, 2 ♂♂, 2 ♀♀, same data as holotype (FUFJ); 1 ♀, same data as holotype except for the date, 6.vi.2001 (FUFJ); 1 ♂, same data as holotype except for the date, 24.x.2001 (FUFJ).

**Diagnosis.** Body 2.6–3.1 mm long, ca. 1.8× as long as wide. Dorsum bicolored. Head and pronotum dark brown. Elytra yellowish brown with black stripes, densely and strongly punctate between rows of punctures, transversely strigose. Mesoventrite without distinct

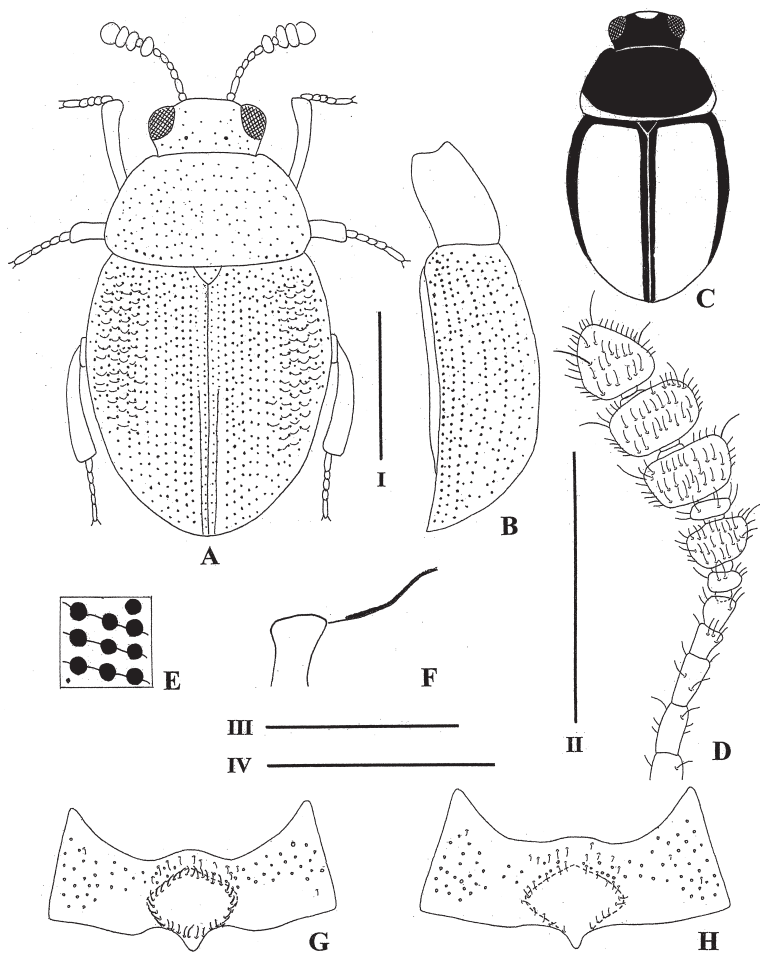


Fig. 24. *Leiodes yoshitakei* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – dorsal color; D – antenna; E – elytral punctures; F – mesoventrite, lateral view; G – male metaventricle; H – female metaventricle. Scale I: 1 mm for A and B; II: 0.5 mm for D; III: 0.5 mm for F; IV: 1 mm for G and H.

excavation between median carina and transverse carina. Median carina of mesoventrite low. Male mesotibia protuberant at interoapical corner. Male metatibiae weakly curved. Female abdominal sternite 8 with a spiculum ventrale.

**Description.** Measurements of holotype: Body length 3.0 mm; head 0.45 mm in length and 0.77 mm in width; pronotum 0.74 mm in length and 1.3 mm in width; elytra 1.9 mm in length and 1.6 mm in width.

**Coloration.** Dorsum shining and bicolored (Fig. 24C); head usually dark brown, rarely brown, always with yellowish brown clypeus; pronotum usually dark brown, rarely brown; scutellum black; elytra yellowish brown with black stripes near elytral suture, elytral bases and lateral margins (Fig. 24C); antennomeres 1, 6, and 8 brown; antennomeres 7, 9, 10, and basal 3/5 of antennomere 11 black; apical 2/5 of antennomere 11 light brown; legs brownish; mesocoxae and metacoxae dark reddish brown; remaining parts of legs brown; mesoventrite and metaventrite dark reddish brown; abdominal ventrites brown.

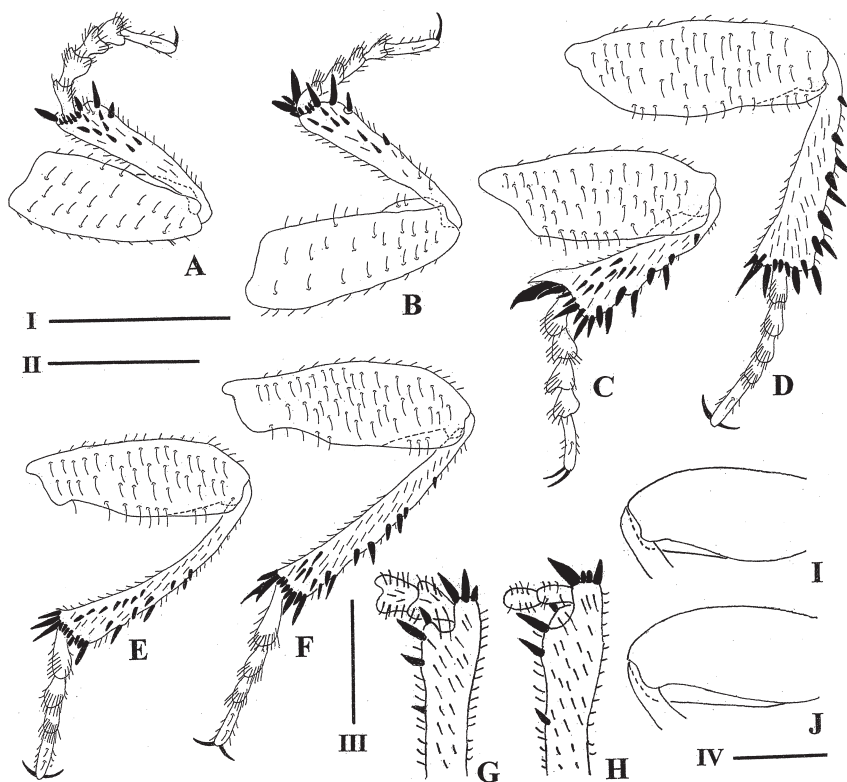


Fig. 25. *Leiodes yoshitakei* sp. nov. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male middle leg, ventral view; D – female middle leg, ventral view; E – male hind leg, ventral view; F – female hind leg, ventral view; G – male protibia, dorsal view; H – female protibia, dorsal view; I – male metafemur, dorsal view; J – female metafemur, dorsal view. Scale I: 0.5 mm for A–D; II: 0.5 mm for E and F; III: 0.2 mm for G and H; IV: 0.2 mm for I and J.

Body 2.6–3.1 mm in length, ca.  $1.8\times$  as long as wide.

Head ca.  $1.8\times$  as wide as long, ca.  $0.56\times$  as long as and  $0.57\times$  as wide as pronotum, distinctly punctate (Fig. 24A), usually bearing some large punctures (Fig. 24A); antennomeres 1–4 each longer than wide; antennomere 11 about as long as wide; remaining antennomeres each wider than long; antennomere 11 robust (Fig. 24D); relative lengths of antennomeres 2 to 11 : 2.8 : 2.9 : 1.7 : 1.7 : 1.2 : 2.3 : 1.0 : 2.8 : 3.0 : 4.0.

Pronotum ca.  $1.9\times$  as wide as long, ca.  $0.38\times$  as long as and  $0.86\times$  as wide as elytra, widest at base, simply and very feebly curved at posterior margin, distinctly punctate, punctuation similar to that on head (Fig. 24A).

Scutellum minutely punctate.

Elytra ca.  $1.2\times$  as long as wide in dorsal view, widest ca. at basal  $2/5$  (Fig. 24A), transversely strigose, densely, irregularly, and strongly punctate between rows of punctures, therefore superficially appearing not to bear rows of punctures (Fig. 24A, 24B, 24E); most punctures of elytra larger than those of head and pronotum (Fig. 24A); sutural stria fine, arising from apex to ca. apical half of the elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, and without distinct excavation between median carina and transverse carina (Fig. 24F); median carina of mesoventrite low (Fig. 24F); metaventrite showing indistinct sexual dimorphism (Figs. 24G, 24H), sparsely and finely pubescent, strongly microreticulate except for almost smooth middle portion.

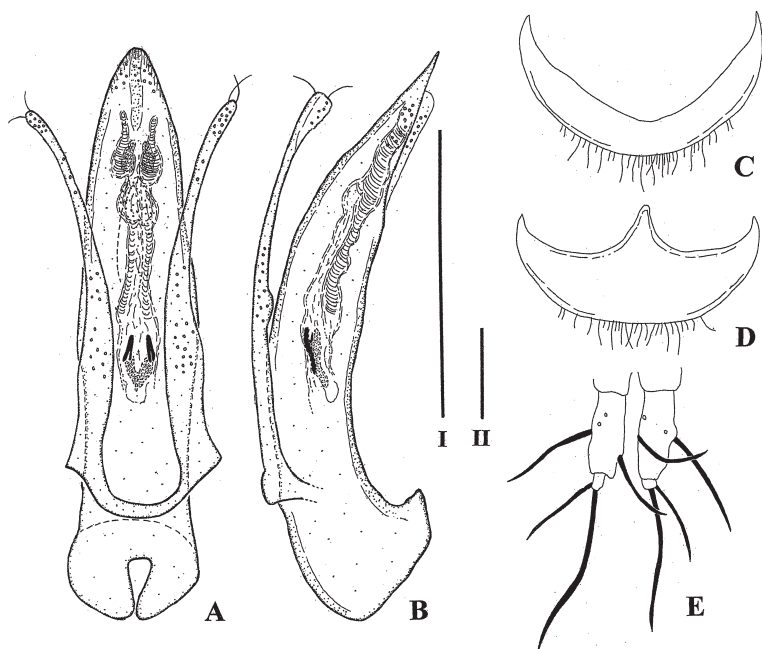


Fig. 26. *Leiodes yoshitakei* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D and 0.1 mm for E.

Legs showing distinct sexual dimorphism on protarsi, mesotibia, mesotarsi, and metatibia; protibiae feebly and gradually widening from base towards apex in dorsal view (Figs. 25G, 25H); metafemur slender (Figs. 25E, 25F), and with a small dorsal projection posteroapically (Figs. 25I, 25J).

**Male.** Pubescence of middle portion of metaventrite a little denser and thicker than in female (Figs. 24G, 24H); tarsomeres 2–4 of protarsi and mesotarsi expanded (Figs. 25A, 25C); mesotibia strongly protuberant and bearing a robust spine at interoapical corner (Fig. 25C); metatibiae weakly curved (Fig. 25E); abdominal sternite 8 strongly curved (Fig. 26C); aedeagus slender (Figs. 26A, 26B); median lobe gradually narrowed from apical 1/6 towards apex, and apically pointed in dorsal view (Fig. 26A), feebly curved and apically pointed in lateral view (Fig. 26B); each paramere transparent near apex, bearing two apical setae (Fig. 26A); inner sac as shown in Fig. 26A.

**Female.** Pubescence of middle portion of metaventrite relatively sparse and thin (Fig. 14H); protarsi and mesotarsi slender (Figs. 25B, 25D); mesotibia with slender spines at interoapical corner (Fig. 25D); metatibiae almost straight (Fig. 25F); abdominal sternite 8 with a spiculum ventrale at central point of anterior margin (Fig. 26D); coxites and stylus as shown in Fig. 26E.

**Differential diagnosis.** *Leiodes yoshitakei* sp. nov. is similar to *L. circinipes* (Rye, 1873) by the transversely strigose elytra, but may be distinguished from the latter by having the body about 1.8 times as long as wide (Fig. 24A), head and pronotum being dark brown (Fig. 24C), metaventrite showing sexual dimorphism in pubescence of the median portion, and basal half of parameres relatively slender in lateral view (Fig. 26B). In contrast, *L. circinipes* has the body about 1.6 times as long as wide (Fig. 16A), the head and pronotum are brown (Fig. 16C), the metaventrite does not showing sexual dimorphism in pubescence, and the basal half of parameres is relatively thick in lateral view (Fig. 18B). Moreover, *L. yoshitakei* sp. nov. is also similar to *L. rugosa* Stephens, 1829 inhabiting Russian Far East by having striate elytra, but can be separated from it by parameres with two apical setae. In contrast, *L. rugosa* has parameres fringed with multiple setae at apex.

**Etymology.** This species is dedicated to Yoshitake Shima (1822–1874) who contributed to the reclamation of the Hokkaido island.

**Distribution.** Japan: Hokkaido.

### *Leiodes koreana* species group

**Species included.** *Leiodes koreana* Park & Ahn, 2007, *L. masatsugui* sp. nov., *L. toyoshimai* sp. nov.

**Diagnosis.** Elytra unicolor, with sparsely arranged large punctures between rows of punctures (Figs. 27D, 30D, 33E); mesoventrite with or without excavation between median carina and transverse carina (Figs. 27E, 30E, 33F); tarsomeres 2–4 of male protarsi expanded (Figs. 28A, 31A, 34A); mesotibiae without sexual dimorphism, simply square at interoapical corner (*L. koreana* and *L. masatsugui* sp. nov.) or sexually dimorphic, with male mesotibiae more widening from base to apex than in female (in *L. toyoshimai* sp. nov, Figs. 34C, D); dorsal posteroapical projection of metafemora small and not showing sexual dimorphism (Figs. 28G, 28H, 31H, 31I, 34I, 34J); pubescence of metaventrite without or with indistinct sexual

dimorphism (Figs. 33G, 33H); aedeagus robust, bearing some large sclerites in inner sac (Figs. 29A, 32A, 35A); male abdominal sternite 8 weakly to strongly curved (Figs. 29C, 32C, 35D); female abdominal sternite 8 with a bifurcate projection (Fig. 29D) or two projections distant from each other at anterior margin (Figs. 32D, 35E).

**Differential diagnosis.** The *Leiodes koreana* species group can be separated from other species groups by having a robust aedeagus with large sclerites in the inner sac, and female abdominal sternite 8 with a bifurcate projection or two projections distant from each other at the anterior margin.

**Note.** Female abdominal sternite 8 of most of species of Palearctic *Leiodes* has not been examined until now. Hence, I cannot exclude that additional Palearctic species also having females with similar abdominal sternite 8's and belonging to the *L. koreana* group.

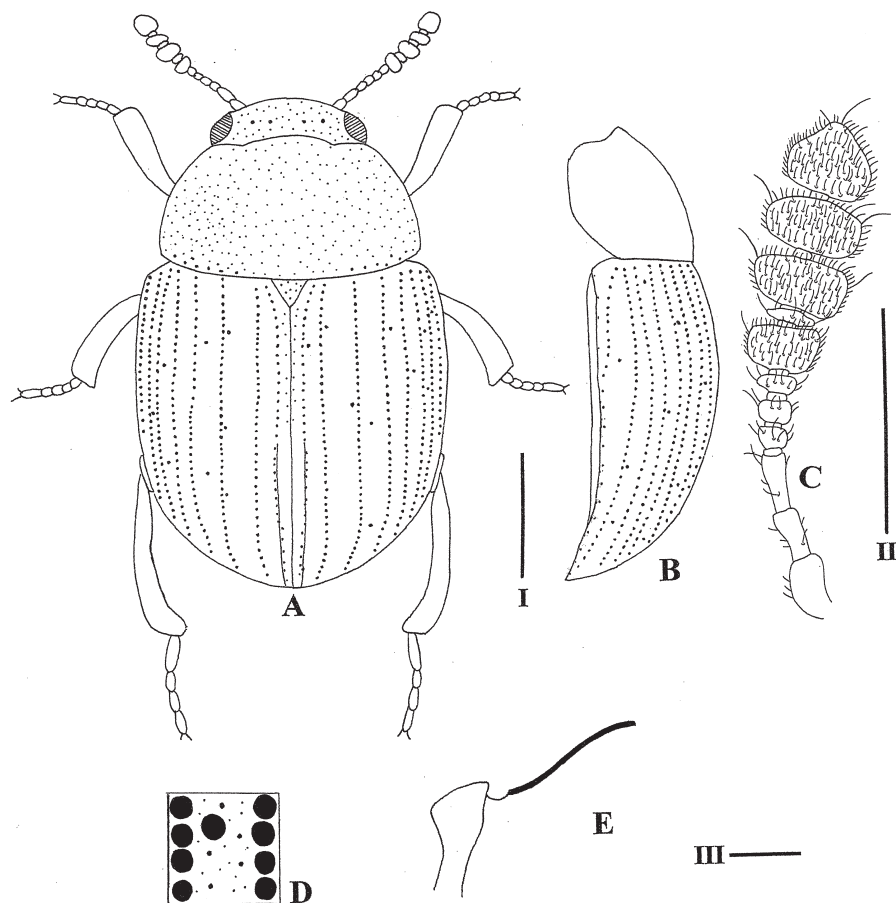


Fig. 27. *Leiodes koreana* Park & Ahn, 2007. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.2 mm for E.



**8. *Leiodes koreana* Park & Ahn, 2007**

Japanese name: Chôsen-ô-tamakinokomushi  
(Figs. 27–29, 112)

*Leiodes koreana* Park & Ahn, 2007: 38.

**Type locality.** Korea, Chungnam Prov., Gongju City, Banpo-myeon, Mt. Gaeryongsan

**Specimens examined.** **JAPAN:** **KYUSHU:** 1 ♂, 1 ♀, Miyazaki Pref., Takaoka, Takafusa, 27.v.2007, K. Iwakiri leg. (FIT) (FUFJ); 1 ♀, same data as the former except for the date, 24.vi.2007; 1 ♂, 1 ♀, Saga Pref., Mt. Sefuri-san (alt. 1000m), 16.–23.vi.2010, S. Nomura et al. leg. (FIT) (FUFJ). **SHIKOKU:** 1 ♂, 1 ♀, Ehime Pref., Uchiko Town, Shiromawari, 9.vii.1995, E. Yamamoto leg. (FUFJ); 1 ♂, 2 ♀♀, Kagawa Pref., Ayagawa Town, Sogisho-higashi, Shôzaka, 12.–18.iv.2009, H. Fujimoto leg. (FIT) (FUFJ); 1 ♂, same data as the former except for the date, 13.–19.vi.2009; 5 ♂♂, 2 ♀♀, Tokushima Pref., Yamakawa Town, Okunoi, 23.–29.vi.2003, K. Tanaka leg. (FIT) (FUFJ); 4 ♂♂, 1 ♀,

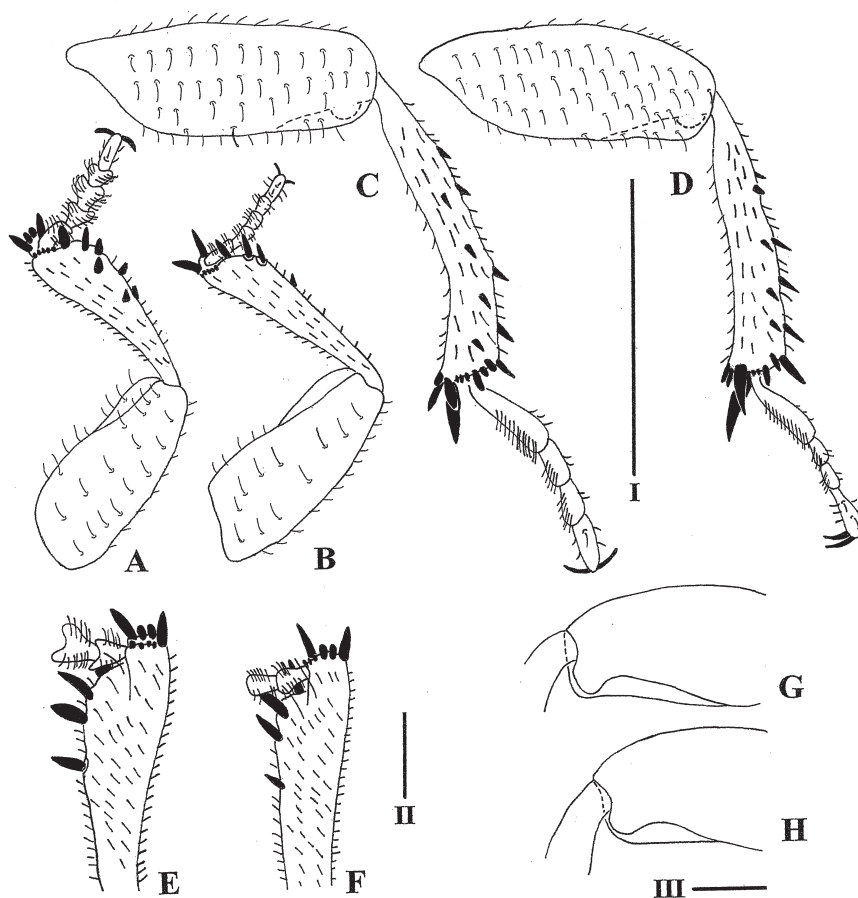


Fig. 28. *Leiodes koreana* Park & Ahn, 2007. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male hind leg, ventral view; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 1 mm for A–D; II: 0.2 mm for E and F; III: 0.2 mm for G and H.

Tokushima Pref., Yamakawa Town, Mt. Kôtsu, 25.vii.–2.viii.2003, K. Tanaka leg. (FIT) (FUFJ); 1 ♂, Tokushima Pref., Misato Village, Ôhira (alt. 800m), 14–23.vii.2003, Y. Kurota leg. (FUFJ). **HONSHU:** 3 ♂♂, 1 ♀, Osaka Pref., Minoo City, Minoo Park, 13–15.v.2007, T. Lackner leg. (1 ♂ in ZSPC, others in JCHE); 2 ♂♂, Mie Pref., Suzuka City, Nishi-Shônai-chô, Ichinotani, 6.v.2004, H. Yokozeki leg. (FUFJ); 1 ♂, 1 ♀, Gifu Pref., Kani City, Yasaka-Rindô, 18.v.2003, K. Toyoshima leg. (FIT) (FUFJ). **KOREA:** 1 ♂, Chunbuk Prov., Chôngûp, Naejangsan, Paekyang Area, 25.–26.v.1999, U.-S. Hwang & H.-J. Kim leg. (FIT) (CNUIC); 1 ♂, Kangwon Prov., Wonju City, Chiaksan, Kuryong Area, 10.vii.1999, U.-S. Hwang & H.-J. Kim leg. (FIT) (CNUIC).

**Diagnosis.** Coloration. Dorsum brown; antennomeres 1–6 and 8 brown; antennomeres 7, 9, 10, and basal half of antennomere 11 dark brown, apical half of antennomere 11 light brown.

Body 3.2–4.4 mm long, ca.  $1.7\times$  as long as wide (Fig. 27A). Head densely punctate, usually bearing some large punctures (Fig. 27A); antennomeres 1–3 each longer than wide; remaining antennomeres each wider than long; antennomere 11 robust (Fig. 27C). Pronotum simply and very feebly curved at posterior margin, punctation similar to that on head. Elytra not transversely strigose; each elytron bearing nine punctate rows with small number of large punctures

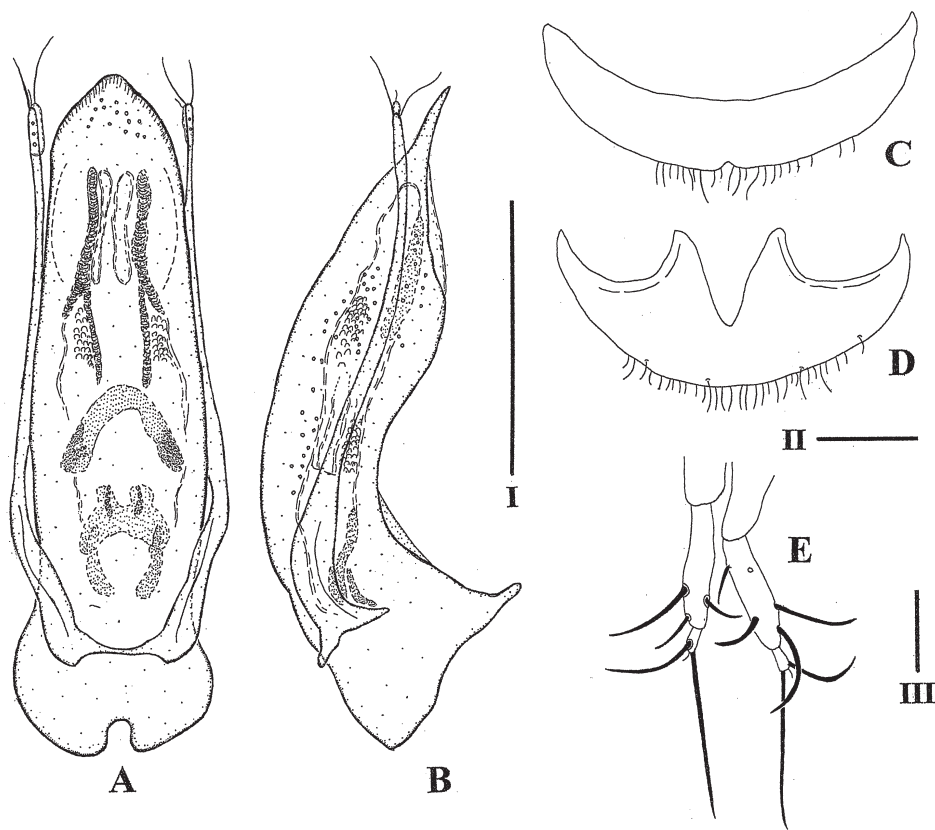


Fig. 29. *Leiodes koreana* Park & Ahn, 2007. A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D; III: 0.1 mm for E.

and moderate number of very fine punctures between rows (Fig. 27D); row 9 invisible in dorsal view, subhumeral row as long as ca. 1/3 of elytral length (Fig. 27B); elytral rows composed of larger punctures than those of pronotum (Fig. 27A); sutural stria fine, arising from apex ca. to apical 2/5 of the elytral length. Metathoracic wings fully developed. Mesoventrite with one shallow excavation between median carina and transverse carina (Fig. 27E); median carina of mesoventrite low (Fig. 27E); metaventrite without sexual dimorphism. Legs showing sexual dimorphism on protarsi, protibiae, mesotarsi, and metatibiae; metafeur robust, with small dorsal posteroapical projection (Figs. 28G, 28H).

**Male.** Protibiae gradually and distinctly widening from base towards apex at internal margins (Fig. 28E); tarsomeres 2–4 of protarsi and mesotarsi expanded (Fig. 28A); metatibiae curved inwards (Fig. 28C); abdominal sternite 8 weakly curved (Fig. 29C); aedeagus as shown in Figs. 29A, 29B.

**Female.** Protibiae gradually and very feebly widening from base towards apex at internal margins (Fig. 28F); protarsi and mesotarsi slender (Fig. 28B); metatibiae almost straight (Fig. 28D); abdominal sternite 8 forked in middle of anterior margin (Fig. 29D); coxites and stylus as shown in Fig. 29E.

**Differential diagnosis.** *Leiodes koreana* is similar to *L. masatsugui* sp. nov. by the characteristic shape of the female abdominal sternite 8 (see Figs. 29D and 35E), but may be distinguished from the latter by having males with a relatively slender aedeagus (Fig. 29A). In contrast, males of *L. masatsugui* sp. nov. have a robust aedeagus (Fig. 32A).

**Distribution.** Japan (Kyushu, Shikoku, and Honshu), Korea. New to Japan.

### 9. *Leiodes masatsugui* sp. nov.

Japanese name: Azuma-ô-tamakinokomushi  
(Figs. 30–32, 112)

**Type locality.** Japan, Honshu, Saitama Pref., Ohtaki Village, Nakatsukawa-keikoku, Oku-Chichibu-rindô (alt. 1300m).

**Type material.** JAPAN: HONSHU: HOLOTYPE, ♂, Saitama Pref., Ohtaki Village, Nakatsukawa-keikoku, Oku-Chichibu-rindô (alt. 1300m), 30.vii.–7.viii.2004, K. Arai & S. Arai leg. (FIT) (MNHAH); 1 ♂, 1 ♀, same data as holotype (FUFJ); 1 ♀, Saitama Pref., Naguri Village, Mt. Arimayama (alt. 1200 m), 17.–24.ix.2004, K. Arai & S. Arai leg. (FIT) (FUFJ); 1 ♂, Tokyo Pref., Hinohara Village, Mt. Mitôsan (alt. 1100m), 16.–23.vii.2008, H. Takano leg. (FIT) (FUFJ); 2 ♂♂, same data as the former except for the date, 23–30.vii.2008; 2 ♂♂, 1 ♀, Yamanashi Pref., Ôtsuki City, Matsuhime-tôge (alt. 1250m), 1–8.vii.2004, S. Nomura leg. (FUFJ); 1 ♀, Tochigi Pref., Sano City, Mt. Himuroyama (alt. 1000m), 21–26.v.2011, H. Ohkawa leg. (FIT) (FUFJ); 1 ♂, Miyagi Pref., Sendai City, Futakuchi-rindô, 25.v.–1.vi.2005, M. Oikawa leg. (FIT) (FUFJ); 1 ♀, Miyagi Pref., Sendai City, Mt. Izumigadake, Kuwanuma-rindô, 12.–22.vii.2009, M. Oikawa leg. (FIT) (FUFJ); 1 ♂, 1 ♀, Yamagata Pref., Ôkura Village, Yunodai, 24.v.–3.vi.2006, M. Oikawa leg. (FIT) (FUFJ); 2 ♂♂, same data as the former except for the date, 17.vi.–16.vii.2006; 2 ♂♂, 2 ♀♀, Yamagata Pref., Ôkura Village, Fujitasawa, 17.–25.vi.2006, M. Oikawa leg. (FUFJ); 1 ♂, 2 ♀♀, Yamagata Pref., Nishikawa Town, Shidu, 22–28.vi.2008, M. Oikawa leg. (FIT) (FUFJ); 1 ♀, Akita Pref., Yurihonjô City, Chôkai-chô, Sarukura, 16.–24.ix.2005, M. Oikawa leg. (FUFJ).

**Diagnosis.** Body 3.6–3.8 mm long, ca. 1.6× as long as wide. Dorsum brown or light brown. Each elytron with distinct nine rows of punctures and subhumeral row as long as ca. 1/3 of elytral length. Mesoventrite without distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Mesotibiae without sexual dimorphism. Male

metatibiae distinctly curved. Female abdominal sternite 8 with two distinct projections near both sides of anterior margin.

**Description.** Measurements of holotype: Body length 3.7 mm; head 0.58 mm in length and 1.0 mm in width; pronotum 1.1 mm in length and 1.9 mm in width; elytra 2.5 mm in length and 2.2 mm in width.

**Coloration.** Dorsum shining and almost unicolor, brown or light brown; antennomeres 1–6 and 8 brown; antennomeres 7, 9, 10, and basal 3/5 of antennomere 11 dark brown; apical 2/5 of antennomere 11 light brown; legs brown or light brown; all tarsi slightly paler than remaining parts of legs; mesoventrite and metaventrite brown; abdominal ventrites light brown.

Body 3.6–3.8 mm in length, ca.  $1.6\times$  as long as wide.

Head ca.  $1.7\times$  as wide as long, ca.  $0.52\times$  as long as and  $0.53\times$  as wide as pronotum, distinctly and densely punctate (Fig. 30A), usually bearing some large punctures (Fig. 30A);

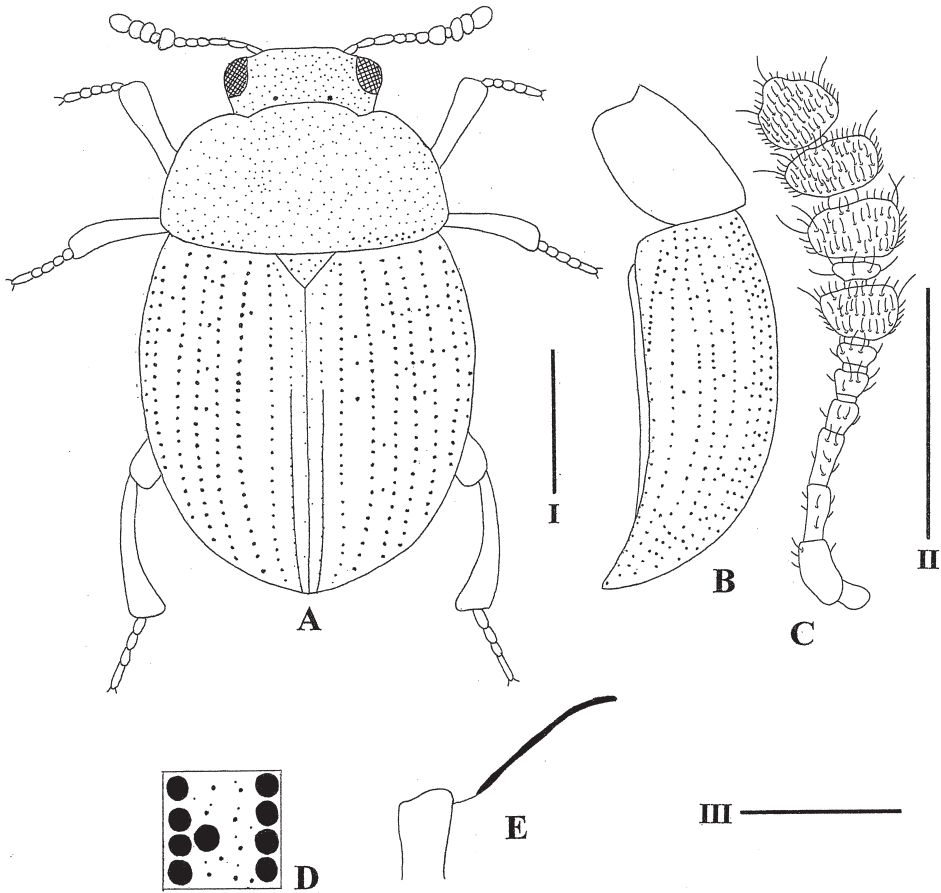


Fig. 30. *Leiodes masatsugui* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.5 mm for E.

antennomeres 1–4 each longer than wide; remaining antennomeres each wider than long; antennomere 11 oval (Fig. 30C); relative lengths of antennomeres 2 to 11 – 3.3 : 3.3 : 1.9 : 1.4 : 1.1 : 3.0 : 1.0 : 3.4 : 3.1 : 4.3.

Pronotum ca. 1.7× as wide as long, ca. 0.45× as long as and 0.83× as wide as elytra, widest near base, simply and very feebly curved at posterior margin, distinctly and densely punctate, punctation similar to that on head (Fig. 30A).

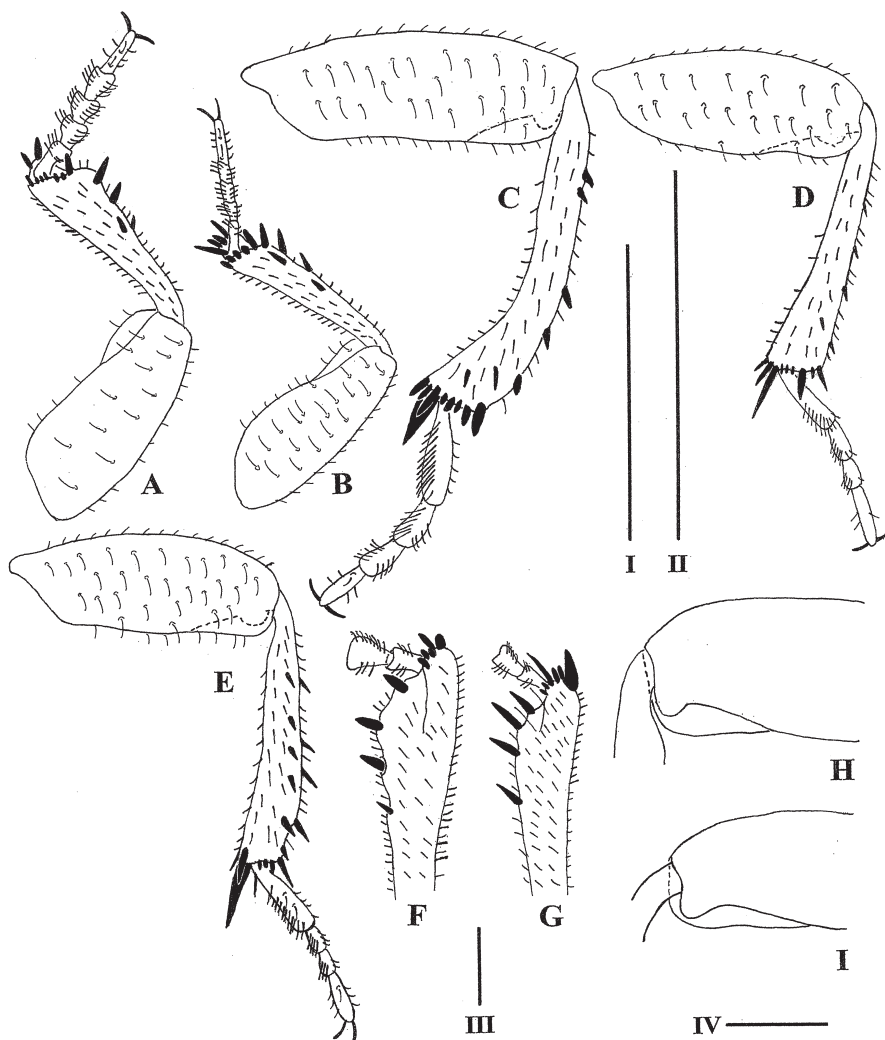


Fig. 31. *Leiodes masatsugui* sp. nov. A – male fore leg, ventral view; B – female fore leg, ventral view; C – hind leg of male (body size: 4 mm), ventral view; D – ditto (body size: 3.2 mm); E – female hind leg, ventral view; F – male protibia, dorsal view; G – female protibia, dorsal view; H – male metafemur, dorsal view; I – female metafemur, dorsal view. Scale I: 1 mm for A–C and E; II: 1 mm for D; III: 0.2 mm for F and G; IV: 0.2 mm for H and I.

Scutellum distinctly punctate.

Elytra ca.  $1.1\times$  as long as wide in dorsal view, widest ca. at basal  $1/3$  or  $2/5$  (Fig. 30A), not transversely strigose; each elytron bearing nine rows of punctures with small number of large punctures and moderate number of very fine punctures between rows (Fig. 30D); row 9 invisible in dorsal view, subhumeral row as long as ca.  $1/3$  of elytral length (Fig. 30B); elytral rows composed of larger punctures than those of pronotum (Fig. 30A); sutural stria fine, arising from apex to ca. apical half of elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, without distinct excavation between median carina and transverse carina (Fig. 30E); median carina of mesoventrite low (Fig. 30E); metaventrite without sexual dimorphism, sparsely pubescent, distinctly microreticulate except almost smooth middle portion.

Legs showing sexual dimorphism in shape of protarsi, protibiae, mesotarsi, and metatibiae; metafemur robust, with small dorsal posteroapical projection (Figs. 31H, 31I).

**Male.** Protibiae gradually and distinctly widening from base towards apex at internal margins (Fig. 31F); tarsomeres 2–4 of protarsi and mesotarsi a little expanded (Fig. 31A); metatibiae distinctly or very feebly curved inwards (Figs. 31C, 31D); abdominal sternite 8 moderately curved (Fig. 32C); aedeagus relatively robust (Figs. 32A, 32B); median lobe a little protuberant apically (Fig. 32A), pointed apically in lateral view (Fig. 32B); each paramere bearing two apical setae and one transparent very small lobe at apex (Fig. 32A); inner sac with some small sclerites (Fig. 32A).

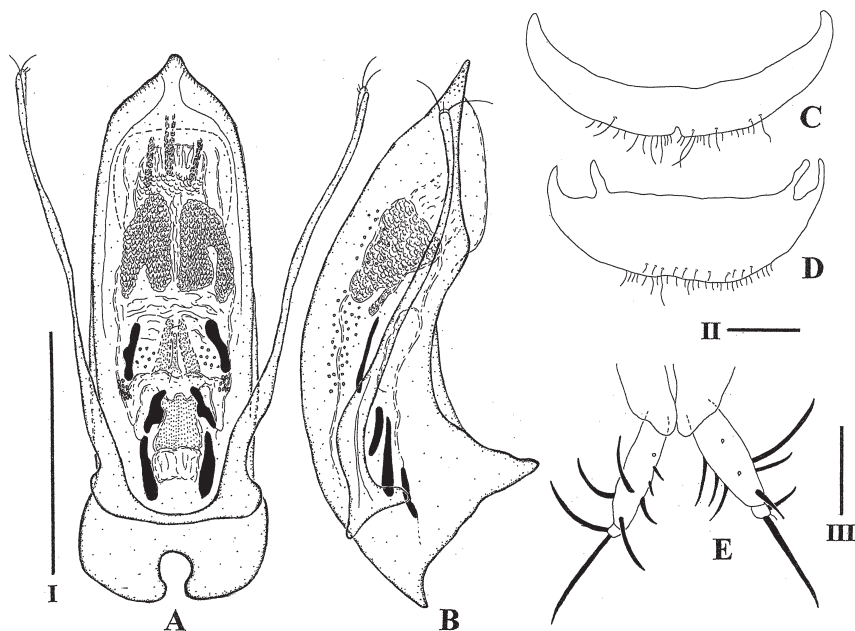


Fig. 32. *Leiodes masatsugui* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D; III: 0.1 mm for E.

**Female.** Protibiae very feebly widening from base towards apex at internal margins (Fig. 31G); protarsi and mesotarsi slender (Fig. 31B); metatibiae almost straight (Fig. 31E); abdominal sternite 8 with two projections near sides of anterior margin (Fig. 32D); coxites and stylus as shown in Fig. 32E.

**Differential diagnosis.** *Leiodes masatsugui* sp. nov. has a characteristic female abdominal sternite 8 with two distinct projections situated near both sides of the anterior margin (Fig. 32D). This species is similar to *L. babai* Nakane, 1989 in having a thick aedeagus, but can be distinguished from it by the relatively large body (3.5–3.8 mm) and mesoventrite without a distinct excavation between the median carina and transverse carina (Fig. 30E). In contrast, *L. babai* has a relatively small body (2.7–3.0 mm) and mesoventrite with a distinct excavation (Fig. 7E). *Leiodes masatsugui* sp. nov. is also similar to *L. silesiaca* (Kraatz, 1852) inhabiting the Russian Far East in having a robust body, but can be separated from it by having the median lobe protuberant apically in dorsal view (Fig. 32A). In contrast, *L. silesiaca* has the median lobe simply triangular apically.

**Morphological variability.** The shape of the male metatibiae of *L. masatsugui* show individual variation (Figs. 31C, 32D) which is not regional, but is correlated to the body size. Small males do not have distinct secondary sexual characters on the metatibiae. Figs. 31C and 31D were drawn from male specimens whose body sizes are 4.0 mm and 3.2 mm, respectively.

**Etymology.** This species is dedicated to Mr. Masatsugu Oikawa, who kindly offered the valuable specimens of *Leiodes* for this study.

**Distribution.** Japan: eastern Honshu.

### 10. *Leiodes toyoshimai* sp. nov.

Japanese name: Tsumebuto-ô-tamakinokomushi  
(Figs. 33–35, 112)

**Type locality.** Japan, Honshu, Gifu Pref., Shirakawa Village, Ô-shirakawa.

**Type material. JAPAN: HONSHU:** HOLOTYPE, ♂, Gifu Pref., Shirakawa Village, Ô-shirakawa, 31.vii.2004, K. Toyoshima leg. (FIT) (MNHAH). PARATYPES, 1 ♂, 5 ♀♀, same data as holotype (FUFJ); 2 ♀♀, same data as holotype except for the date, 24.vii.2004 (FUFJ); 1 ♂, 3 ♀♀, same data as holotype except for the date, 8.viii.2004 (FUFJ); 3 ♀♀, same data as holotype except for the date, 22.viii.2004 (FUFJ); 2 ♂♂, 3 ♀♀, Saitama Pref., Ohtaki Village, Nakatsukawa-keikoku, Oku-Chichibu-rindô (alt. 1300 m), 30.vii.–7.viii.2004, K. Arai & S. Arai leg. (FIT) (FUFJ); 1 ♀, Saitama Pref., Naguri Village, Mt. Arimayama (alt. 1200 m), 17.–24.vii.2004, K. Arai and S. Arai leg. (FIT) (FUFJ); 1 ♂, Kanagawa Pref., Hakone Town, Ôwakudani, 17.–27.viii.2007, T. Watanabe leg. (FUFJ); 1 ♂, Ishikawa Pref., Mts. Hakusan, Sarukabe-entei, 2.–22.viii.2002, H. Hoshina leg. (FIT) (FUFJ); 3 ♂♂, 1 ♀, Tokushima Pref., Higashi-iyayama Village, Nagoro, Otome-dani Valley, 5.–12.viii.2006, K. Tanaka leg. (FUFJ).

**Diagnosis.** Body 2.9–3.5 mm long, ca. 1.8× as long as wide. Dorsum brown. Each elytron with nine distinct rows of punctures and subhumeral row as long as ca. 1/4 of elytral length. Mesoventrite with one distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Mesotibiae showing distinct sexual dimorphism. Male metafemora a little curved posteriad at posterior margins. Tarsomeres 2 and 3 of male protarsi and mesotarsi extremely expanded. Male metatibiae feebly curved inwards. Female abdominal sternite 8 with two distinct projections on anterior margin.

**Description.** Measurements of holotype: Body length 3.2 mm; head 0.47 mm in length and 0.87 mm in width; pronotum 1.0 mm in length and 1.6 mm in width; elytra 1.9 mm in length and 1.8 mm in width.



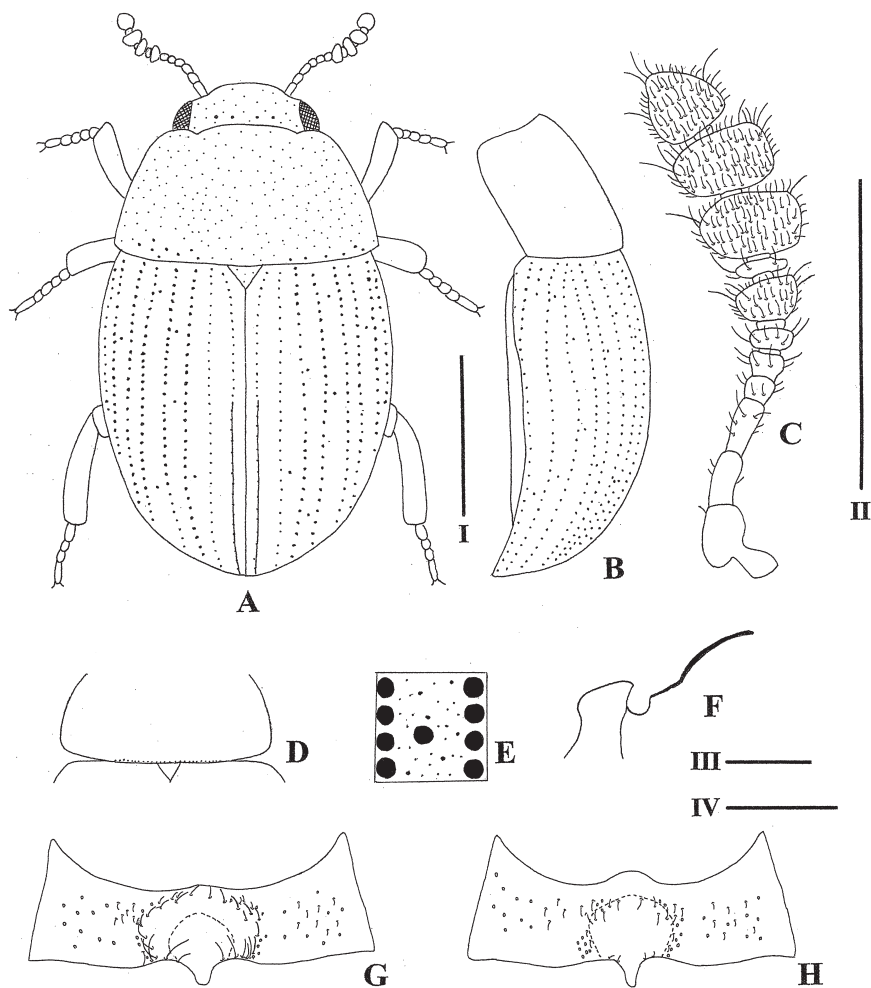


Fig. 33. *Leiodes toyoshimai* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – basal margin of pronotum; E – elytral punctures; F – mesoventrite, lateral view; G – male metaventricle; H – female metaventricle. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.2 mm for F; IV: 0.5 mm for G and H.

**Coloration.** Dorsum shining and almost unicolor, brown; antennomere 1 light brown; antennomeres 2–6 and 8 brown; antennomeres 7, 9, 10, and basal 2/3 of antennomere 11 blackish dark brown; apical 1/3 of antennomere 11 light brown; legs brownish; tarsi often light brown; mesoventrite and metaventricle brown; abdominal ventrites slightly paler than metaventricle.

Body 2.9–3.5 mm in length, ca. 1.8× as long as wide.

Head ca. 1.8× as wide as long, ca. 0.48× as long as and 0.54× as wide as pronotum, densely and minutely punctate (Fig. 33A), usually bearing some large punctures (Fig. 33A); antennomeres 1–3 each longer than wide; antennomeres 4 and 11 about as long as wide; remaining

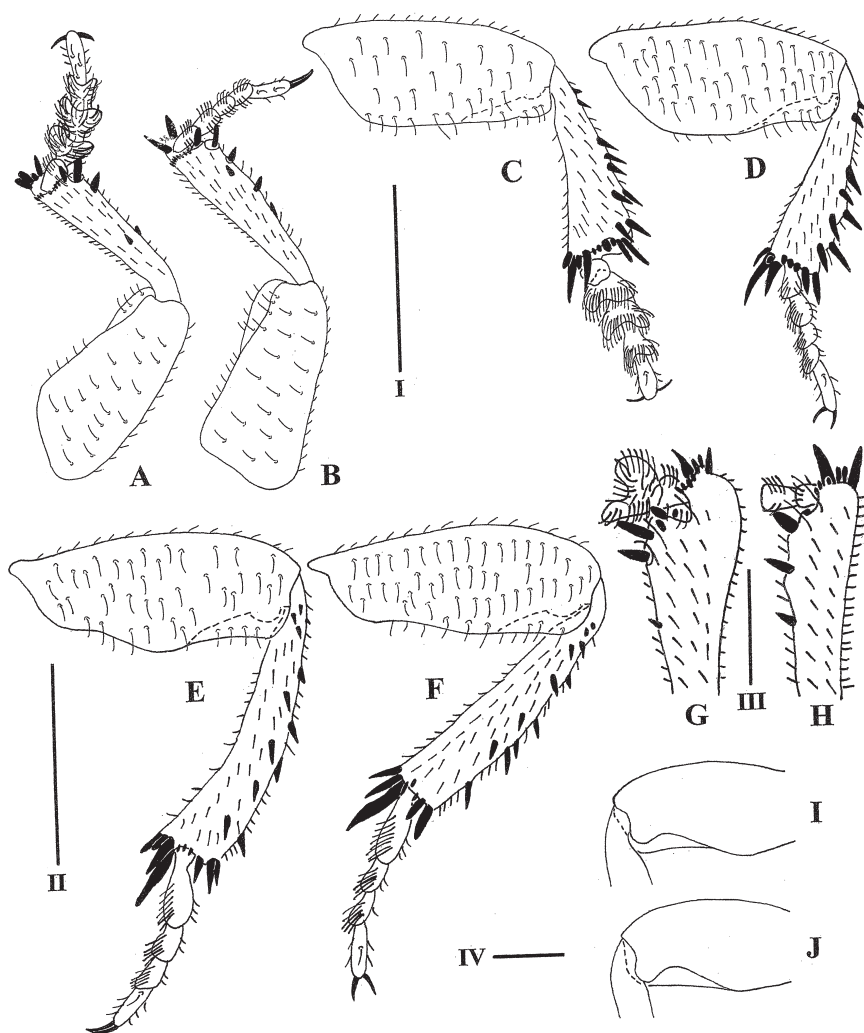


Fig. 34. *Leiodes toyoshimai* sp. nov. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male middle leg, ventral view; D – female middle leg, ventral view; E – male hind leg, ventral view; F – female hind leg, ventral view; G – male protibia, dorsal view; H – female protibia, dorsal view; I – male metafemur, dorsal view; J – female metafemur, dorsal view. Scale I: 0.5 mm for A–D; II: 0.5 mm for E and F; III: 0.2 mm for G and H; IV: 0.2 mm for I and J.

antennomeres each wider than long; antennomere 11 robust (Fig. 33C); relative lengths of antennomeres 2 to 11 – 3.5 : 3.7 : 1.5 : 1.5 : 1.3 : 2.7 : 1.0 : 3.8 : 3.6 : 3.7.

Pronotum ca. 1.6× as wide as long, ca. 0.51× as long as and 0.91× as wide as elytra, widest near base, simply and very feebly curved at posterior margin, distinctly and minutely punctate, punctation similar to that on head (Fig. 33A).

Scutellum minutely punctate.

Elytra ca.  $1.1\times$  as long as wide in dorsal view, widest ca. at basal  $1/4$  (Fig. 33A), not transversely strigose; each elytron bearing nine rows of punctures with small number of large punctures and dense very fine punctures between rows (Fig. 33E); row 9 invisible in dorsal view, subhumeral row as long as ca.  $1/4$  of elytral length (Fig. 33B); elytral rows composed of coarse or minute punctures, larger than those of pronotum (Fig. 33A); sutural stria fine, arising from apex to ca. apical half of the elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, and with one distinct excavation between median carina and transverse carina (Fig. 33F); median carina of mesoventrite low (Fig. 33F); metaventrite showing indistinct sexual dimorphism, sparsely pubescent, and distinctly microreticulate except for almost smooth middle portion.

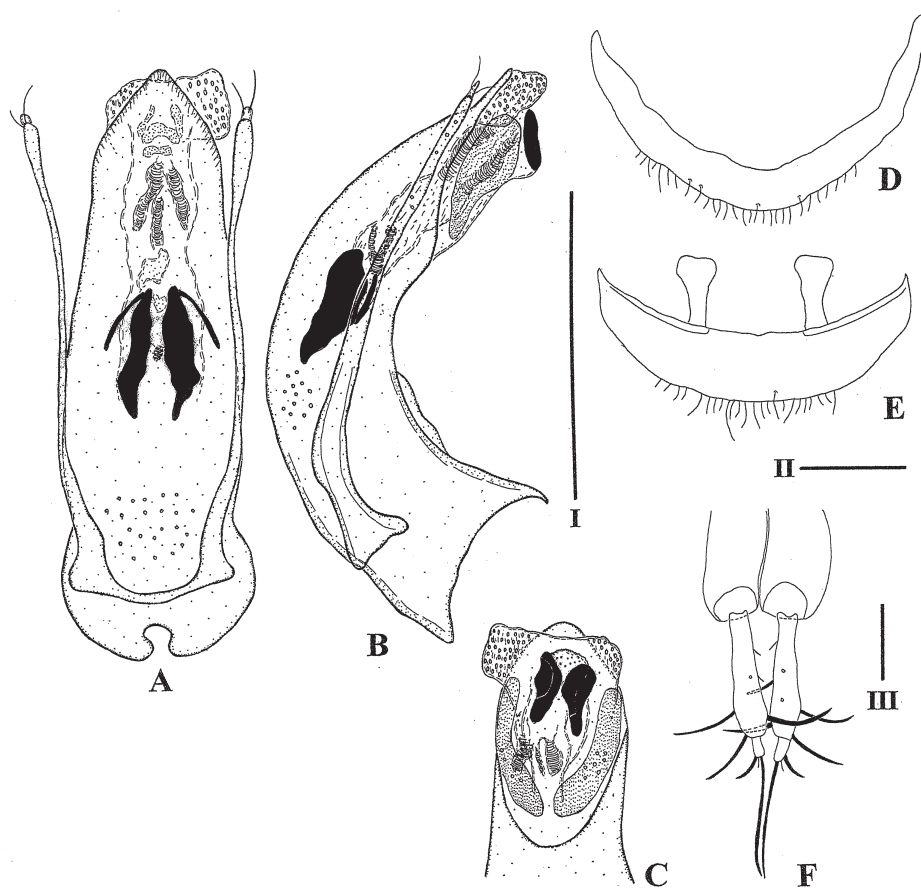


Fig. 35. *Leiodes toyoshimai* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – apex of aedeagus, ventral view; D – male abdominal sternite 8; E – female abdominal sternite 8; F – coxite and stylus. Scale I: 0.5 mm for A–C; II: 0.2 mm for D and E; III: 0.1 mm for F.

Legs showing distinct sexual dimorphism on protarsi, protibiae, mesotarsi, metafemora, and metatibiae; mesotibiae showing indistinct sexual dimorphism; metafemur robust, with small dorsal posteroapical projection (Figs. 34I, 34J).

**Male.** Metaventricle with relatively robust pubescence around middle portion (Fig. 33G); protibiae gradually and strongly widening from base towards apex at internal margins (Fig. 34G); tarsomeres 2–4 of protarsi and mesotarsi expanded and tarsomeres 2 and 3 extremely broadened (Figs. 34A, 34C); mesotibiae relatively strongly broadening from base towards apex (Fig. 34C); metafemora a little curved posteriad at posterior margins (Fig. 34E); metatibiae feebly curved inwards (Fig. 34E); abdominal sternite 8 strongly curved (Fig. 35D); aedeagus relatively robust (Figs. 35A, 35B); median lobe triangular at apex in dorsal view (Fig. 35A), strongly curved and pointed apically in lateral view (Fig. 35B); each paramere bearing two apical setae and transparent very small lobe at apex (Fig. 35A); inner sac with some large sclerites (Figs. 35A, 35C).

**Female.** Metaventricle with relatively thin pubescence (Fig. 33H); protibiae gradually and very feebly widening from base towards apex at internal margins (Fig. 34H); protarsi and mesotarsi slender (Figs. 34B, 34D); mesotibiae relatively weakly broadening from base towards apex (Fig. 34D); metafemora almost straight at posterior margins (Fig. 34F); metatibiae almost straight (Fig. 34F); abdominal sternite 8 with two projections at anterior margin (Fig. 35E); coxites and stylus as shown in Fig. 35F.

**Differential diagnosis.** *Leiodes toyoshimai* sp. nov. is similar to *L. koreana* in elytral appearance, but can be distinguished from the latter by having a relatively small body (2.9–3.5 mm), mesoventrite with a distinct excavation between the median carina and transverse carina (Fig. 33F), and male protarsi and mesotarsi with extremely expanded tarsomeres 2 and 3 (Figs. 34A, 34C). In contrast, *L. koreana* has a relatively large body (3.2–4.4 mm), mesoventrite with a shallow excavation (Fig. 27E) and tarsomeres 2 and 3 of male protarsi and mesotarsi moderately expanded (Fig. 28A). *Leiodes toyoshimai* sp. nov. is also similar to *L. dubia* (Kugelann, 1794) inhabiting Europe and the Russian Far East by having a robust body, but can be separated from it by having a relatively robust aedeagus (Fig. 35A). In contrast, *L. dubia* has a slender aedeagus.

**Etymology.** This species is dedicated to Mr. Kentarô Toyoshima, who kindly gave me many valuable specimens of *Leiodes* used in this study.

**Distribution.** Japan: Honshu (Saitama, Kanagawa, Gifu, and Ishikawa Prefectures) and Shikoku (Tokushima Prefecture).

### *Leiodes longitarsis* species group

**Species included.** *Leiodes longitarsis* Baranowski, 1993

**Diagnosis.** Elytra unicolor, with sparsely arranged large punctures between rows of punctures (Fig. 36D); mesoventrite without distinct excavation between median carina and transverse carina (Fig. 36E); protarsi showing sexual dimorphism, tarsomeres 2–4 of male protarsi expanded (Fig. 37A); mesotibiae without sexual dimorphism, simply square at interoapical corner; dorsal posteroapical projection of metafemora small and not showing sexual dimorphism (Figs.

37G, 37H); pubescence of metaventrite sexually dimorphic (Figs. 36F, 36G); aedeagus thick, with some large sclerites in inner sac (Fig. 38A); male abdominal sternite 8 strongly curved (Fig. 38C); female abdominal sternite 8 with a spiculum ventrale at central point of anterior margin (Fig. 38D).

**Note.** *Leiodes longitarsis* was described from North America and is a common species in the Holarctic Region. The *L. longitarsis* species group was established for this single species by BARANOWSKI (1993), who distinguished it from related species groups by male sexual

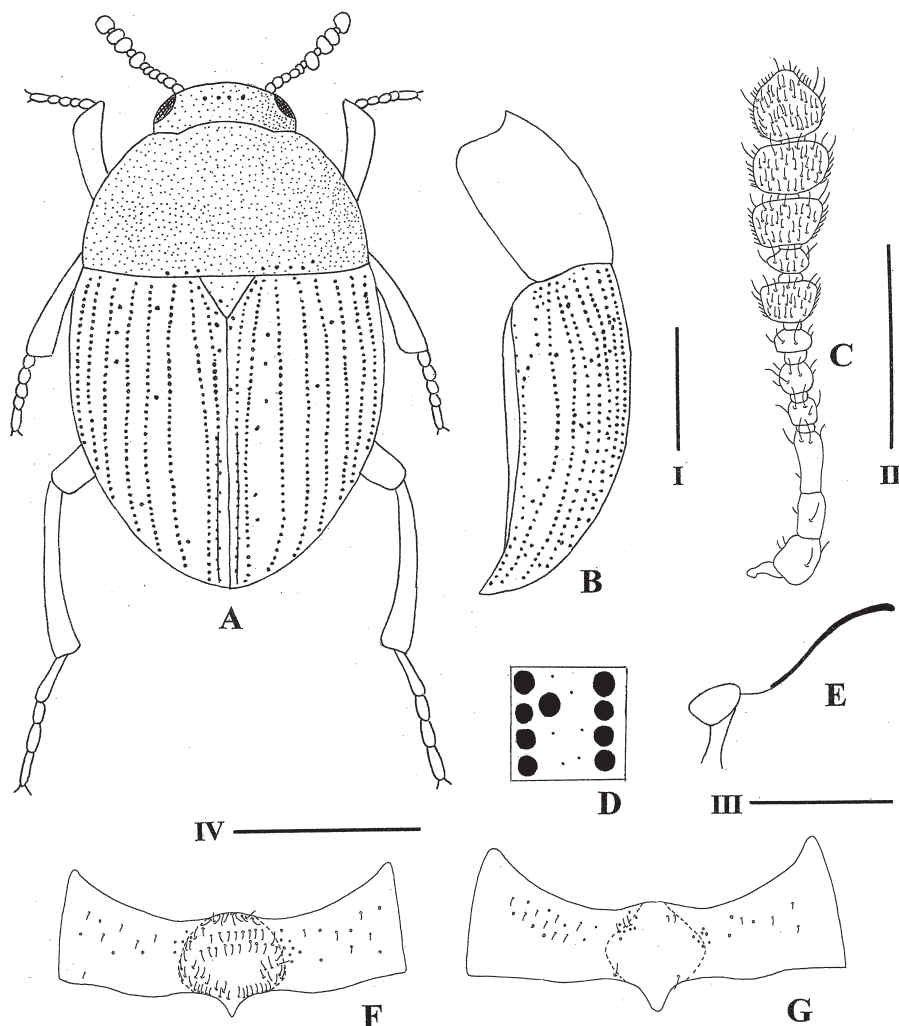


Fig. 36. *Leiodes longitarsis* Baranowski, 1993. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view; F – male metaventrite; G – female metaventrite. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.5 mm for E; IV: 1 mm for F and G.

characters on the legs, and by the shape of the aedeagus. An especially notable morphological feature of this group are the male metatarsi which are clearly longer than those of females (Figs. 37C, 37D).

### 11. *Leiodes longitarsis* Baranowski, 1993

Japanese name: Tsumenaga-ô-tamakinokomushi

(Figs. 36–38, 113)

*Leiodes longitarsis* Baranowski, 1993: 43.

**Type locality.** Canada, Alberta, Banff National Park.

**Material examined.** NORTH CHISHIMA ISLANDS: 7 ♂♂, 4 ♀♀, Ushishir, Yankicha Island, Environs of Kraternaya Bay, 20.viii.1995 (HUMS); 2 ♀♀, Simushir Island, Inland costal margin of Malaya Bay, 18.viii.1995 (HUMS);

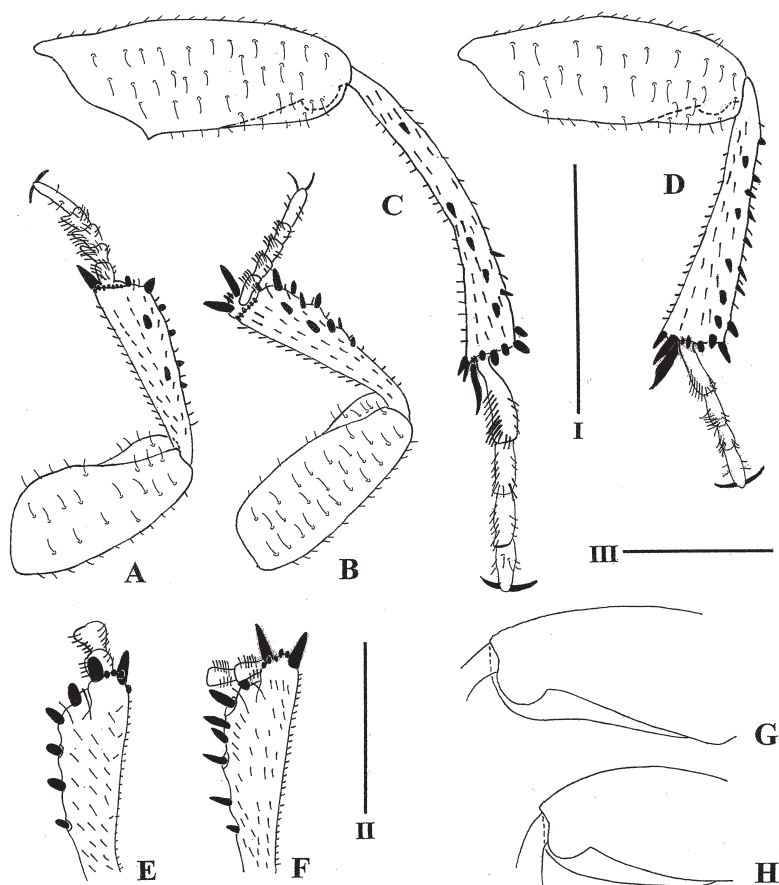


Fig. 37. *Leiodes longitarsis* Baranowski, 1993. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male hind leg, ventral view; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 1 mm for A, B, C, and D; II: 0.5 mm for E and F; III: 0.5 mm for G and H.

1 ♂, Simushir Island, Inland costal margin of Srednaya Bay, 21.viii.1995 (HUMS). **JAPAN: HOKKAIDO:** 1 ♂, Rishiri Is., Mt. Rishiri, 4.–7.vii.1979, H. Henmi leg. (HUMS); 1 ♂, Rishiri Is., Mt. Rishiri, 8.viii.1990, K. Kishimoto leg. (FUFJ); 4 ♂♂, 3 ♀♀, Rishiri Is., Mt. Rishiri (alt. 1700 m), 17.–31.vii.2001, S. Hori & M. Maruyama leg. (FUFJ).

**Diagnosis.** Coloration. Dorsum usually unicolor, dark reddish brown; antennae brownish; antennomeres 7, 9, 10, and basal 3/5 of antennomere 11 often darker than others; apical 2/5 of antennomere 11 often light brown.

Body 3.5–4.5 mm long, ca. 1.7× as long as wide (Fig. 36A); head densely and minutely punctate, bearing some large punctures (Fig. 36A); antennomeres 1–3 each longer than wide; antennomeres 4, 5 and 11 about as long as wide; remaining antennomeres each wider than long; antennomere 11 oval (Fig. 36C). Pronotum feebly sinuate at posterior margin, densely and minutely punctate (Fig. 36A). Elytra not transversely strigose; each elytron bearing nine rows of punctures with small number of large punctures and moderate number of fine punctures between rows (Fig. 36D); row 9 invisible in dorsal view, subhumeral row as long as ca. 1/4 or 1/3 of elytral length (Fig. 36B); elytral rows composed of larger and deeper punctures than those of pronotum (Fig. 36A); sutural stria fine, arising from apex to ca. apical half of the

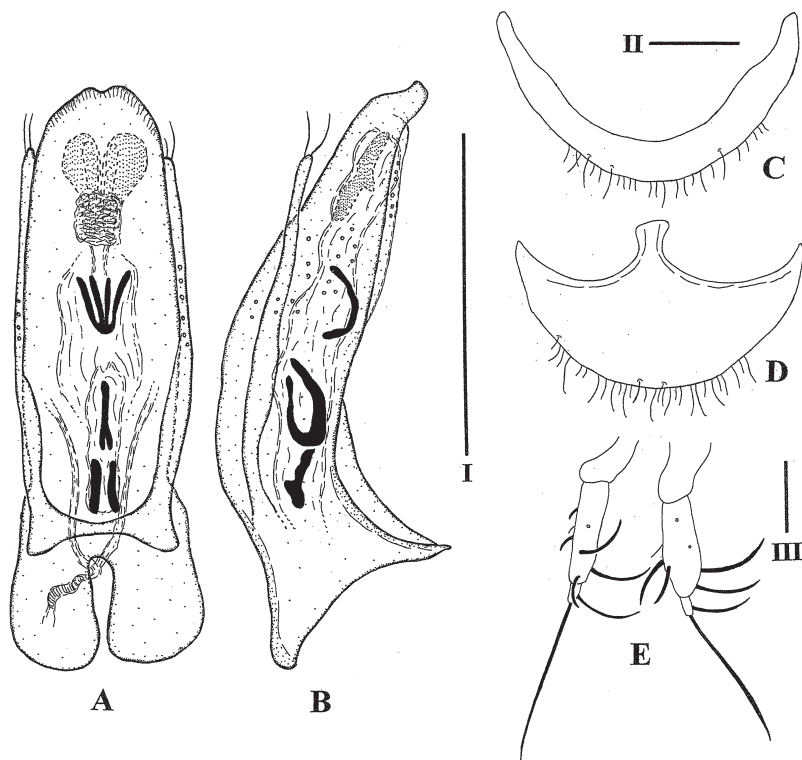


Fig. 38. *Leiodes longitarsis* Baranowski, 1993. A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D; III: 0.1 mm for E.



elytral length. Metathoracic wings fully developed. Mesoventrite without distinct excavation between median carina and transverse carina (Fig. 36E); median carina of mesoventrite low (Fig. 36E); metaventrite showing sexual dimorphism. Legs showing distinct sexual dimorphism of protarsi, mesotarsi, metafemora, metatibiae, and metatarsi; protibiae gradually and distinctly widening from base towards apex (Figs. 37E, 37F); metafemur with moderate dorsal posteroapical projection (Figs. 37G, 37H).

**Male.** Tarsomeres 2–4 of protarsi and mesotarsi expanded (Fig. 37A); metafemora triangularly protuberant ca. at basal 1/3 of posterior margins (Fig. 37C); metatibiae relatively slender and weakly curved inwards (Fig. 37C); metatarsi clearly longer than those of female (Fig. 37C); metaventrite with dense golden-yellow pubescence on middle portion (Fig. 36F); abdominal sternite 8 strongly curved (Fig. 38C); aedeagus as shown in Figs. 38A, B.

**Female.** Protarsi and mesotarsi slender (Fig. 37B); metafemora almost straight at posterior margins (Fig. 37D); metatibiae relatively robust and almost straight (Fig. 37D); metaventrite with sparse semitransparent pubescence at middle portion (Fig. 36G); abdominal sternite 8 with spiculum ventrale at central point of anterior margin (Fig. 38D); coxites and stylus as shown in Fig. 38E.

**Differential diagnosis.** *Leiodes longitarsalis* is similar to *L. obesa* (Schmidt, 1841) in elytral appearance, but can be distinguished from the latter by having a large body (3.5–4.5 mm), dark reddish dorsum, weakly curved male metatibiae (Fig. 37C), and the median lobe of the aedeagus with the feebly excised apex (Fig. 38A). In contrast, *L. obesa* has a relatively small body (3.0–4.0 mm), usually brown dorsum, relatively strongly curved male metatibiae (Figs. 83C, 83D), and median lobe with a simply rounded apex (Fig. 84A).

**Distribution.** U.S.A (Arizona and Colorado), Canada (Alberta, British Columbia, and Manitoba) (BARANOWSKI 1993), North Chishima Islands, Japan: Hokkaido (Rishiri Is.). New to North Chishima Islands and Japan. *Leiodes longitarsis* is recorded here for the first time from the Palearctic Region.

### *Leiodes multipunctata* species group

**Species included.** *Leiodes araii* sp. nov., *L. haradai* sp. nov., *L. hijikatai* sp. nov., *L. indigesta* Park & Ahn, 2007, *L. kiuchii* sp. nov., *L. multipunctata* (Rye, 1873), *L. sakaii* sp. nov.

**Diagnosis.** Elytra unicolor or bicolored, with dense and irregular punctures and without distinct rows of punctures (Figs. 39A, 42A, 44A, 47A, 50A, 53A); mesoventrite with one distinct excavation between median carina and transverse carina (Figs. 39E, 42E, 44E, 47H, 50H, 53F); protarsi showing sexual dimorphism, tarsomeres 2–4 of male protarsi expanded (Figs. 40A, 43A, 45A, 48C, 51A, 54A); mesotibiae without sexual dimorphism, simply square at interoapical corner; dorsal posteroapical projection of metafemora small and not showing sexual dimorphism (Figs. 40G, 40H, 48I, 48J, 51I, 51J); pubescence of metaventrite with or without sexual dimorphism (Figs. 39F, 39G, 48A, 48B); aedeagus slender without distinct sclerites in inner sac (Figs. 41A, 43F, 46A, 49A, 52A, 54F); male abdominal sternite 8 weakly to strongly curved (Figs. 41D, 43E, 45F, 49D, 52D, 54D); female abdominal sternite 8 with a spiculum ventrale at central point of anterior margin (Figs. 41E, 49E, 52E).

**Differential diagnosis.** The *Leiodes multipunctata* species group can be separated from other species groups by having elytra with dense and irregular punctures.

**Note.** Two European species, *L. punctulata* (Gyllenhal, 1810) and *L. inordinata* (Sahlberg, 1898), have elytra densely and irregularly punctate, slender aedeagi, and the mesoventrite bearing a distinct excavation as do the species of the *L. multipunctata* group (DAFFNER 1983). It is possible that these European species are also members of this group. However, I refrain from the decision on the species group assignment of both latter species here, because I have not examined specimens of *L. inordinata*.

### 12. *Leiodes araii* sp. nov.

Japanese name: Musashi-ô-tamakinokomushi

(Figs. 39–41, 114)

**Type locality.** Japan, Honshu, Saitama Pref., Naguri Village, Mt. Arimayama (alt. 1200 m).

**Type material. JAPAN: HONSHU:** HOLOTYPE, ♂, Saitama Pref., Naguri Village, Mt. Arimayama (alt. 1200 m), 17–24.ix.2004, K. Arai and S. Arai leg. (FIT) (MNHAH). PARATYPES: 2 ♂♂, 12 ♀♀, same data as holotype (FUFJ); 1 ♀, Saitama Pref., Mt. Ryogamisan, Tachiya-bori (alt. 800 m), 31.x.1999, T. Kishimoto & T. Shimada leg. (TA) (FUFJ).

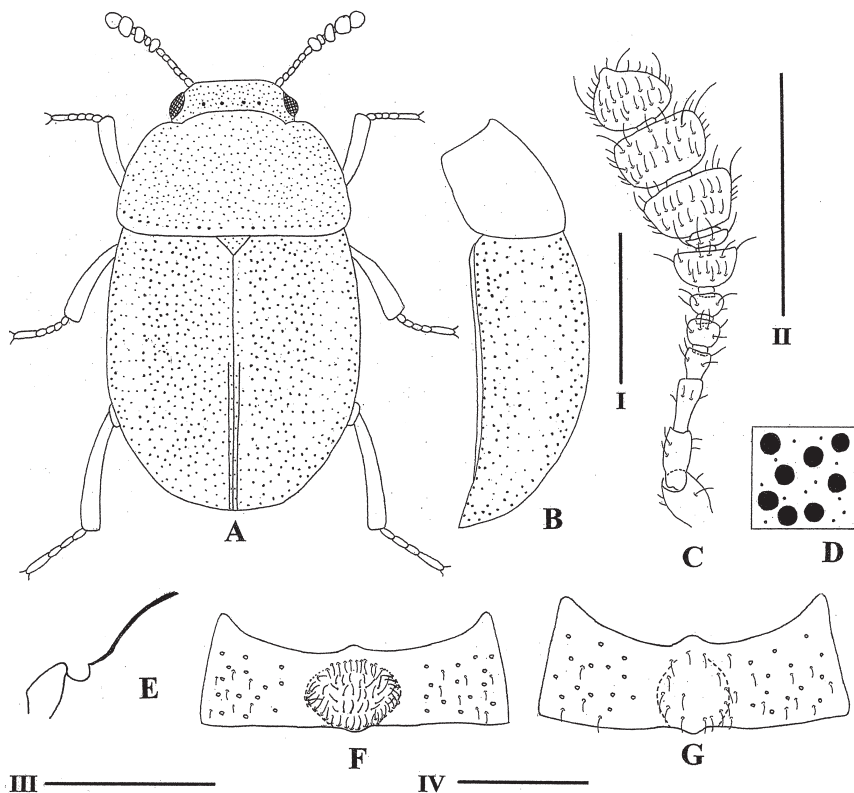


Fig. 39. *Leiodes araii* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventricle, lateral view; F – male metaventricle; G – female metaventricle. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.5 mm for E; IV: 0.5 mm for F and G.

**Diagnosis.** Body about 2.5–3.2 mm long, ca. 1.8× as long as wide. Dorsum and antennae almost unicolor, brownish. Elytra densely, irregularly, and coarsely punctate. Mesoventrite with one distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Male metaventrte bearing dense erect pubescence at middle portion. Mesotibiae without sexual dimorphism. Male metatibiae feebly curved. Median lobe of aedeagus almost straight at apical margins in dorsal view. Female abdominal sternite 8 with a spiculum ventrale.

**Description.** Measurements of holotype: Body length 3.0 mm; head 0.38 mm in length and 0.75 mm in width; pronotum 0.76 mm in length and 1.4 mm in width; elytra 1.8 mm in length and 1.6 mm in width.

**Coloration.** Dorsum shining and unicolor, brown; antennae brownish, antennomere 11 slightly whitish; legs brown with light brown tarsi; mesoventrite, metaventrte, and abdominal ventrites brown.

Body 2.5–3.2 mm in length, ca. 1.8× as long as wide.

Head ca. twice as wide as long, ca. 0.48× as long as and 0.55× as wide as pronotum, distinctly and densely punctate (Fig. 39A), usually bearing some large punctures (Fig. 39A);

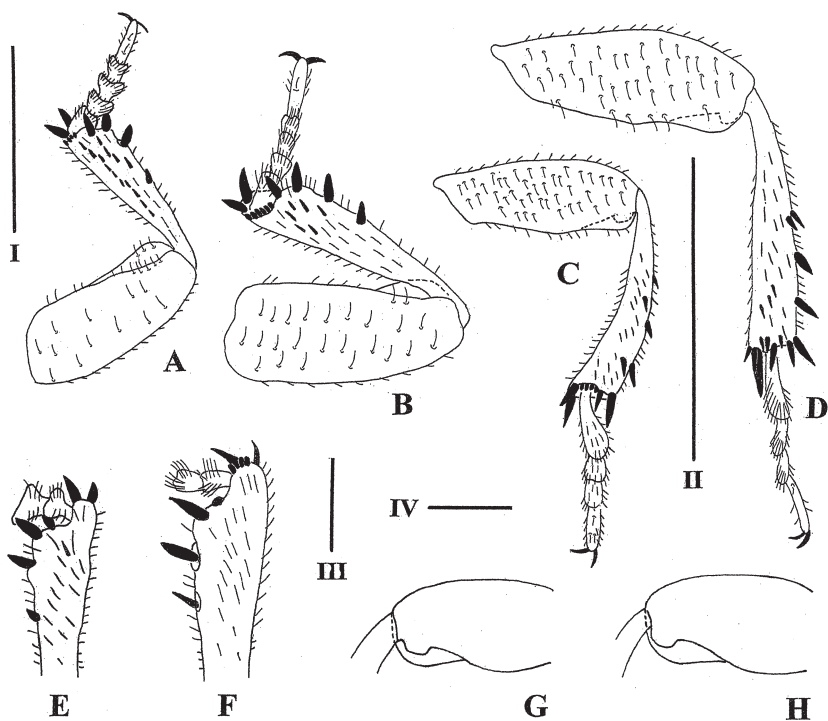


Fig. 40. *Leiodes araii* sp. nov. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male hind leg, ventral view; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 0.5 mm for A and B; II: 1 mm for C and D; III: 0.2 mm for E and F; IV: 0.2 mm for G and H.

antennomeres 1–4 each longer than wide; antennomere 5 ca. as long as wide; remaining antennomeres each wider than long; antennomere 11 robust (Fig. 39C); relative lengths of antennomeres 2 to 11 – 4.6 : 5.0 : 3.0 : 2.4 : 2.0 : 3.4 : 1.0 : 5.0 : 5.2 : 6.2.

Pronotum ca.  $1.7\times$  as wide as long, ca.  $0.44\times$  as long as and  $0.88\times$  as wide as elytra, widest at base, simply and very feebly curved at posterior margins, distinctly and densely punctate, punctuation similar to that on head (Fig. 39A).

Scutellum minutely punctate.

Elytra ca.  $1.2\times$  as long as wide in dorsal view, widest ca. at basal half (Fig. 39A), not transversely strigose, densely, irregularly, and coarsely punctate (Figs. 39A, 39B); punctuation of elytra consisting of punctures of various sizes (Fig. 39D); sutural stria fine, arising from apex to ca. apical half of the elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, and with one distinct excavation between median carina and transverse carina (Fig. 39E); median carina of mesoventrite low (Fig. 39E); metaventrite showing sexual dimorphism, strongly microreticulate except for almost smooth middle portion.

Legs showing distinct sexual dimorphism of protarsi, mesotarsi, and metatibiae; protibiae gradually and very feebly widening from base towards apex (Figs. 40E, 40F); metafemur simply straight at posterior margin, with a small dorsal projection posteroapically (Figs. 40G, 40H).

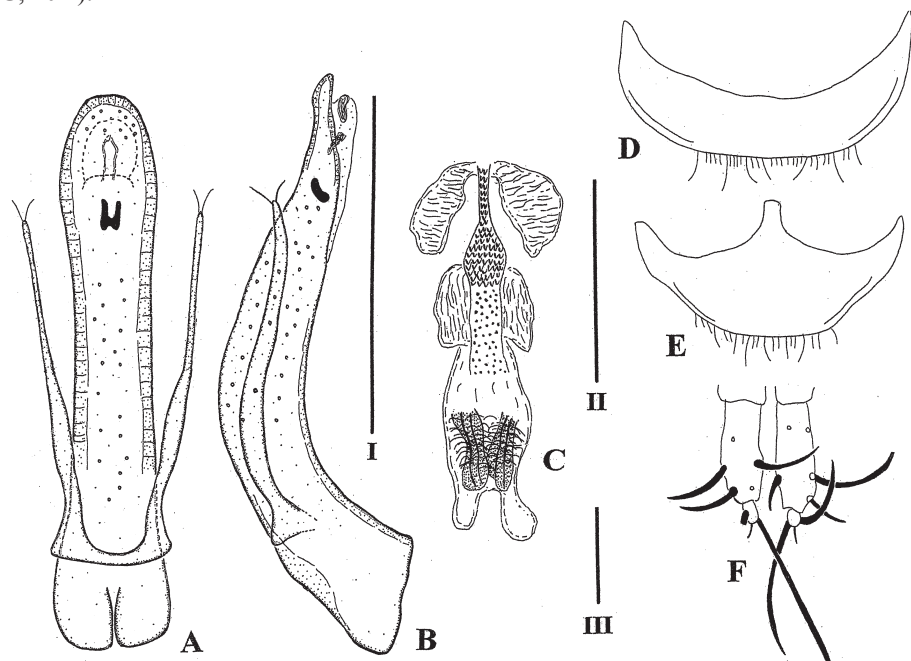


Fig. 41. *Leiodes araii* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – inner sac, dorsal view; D – male abdominal sternite 8; E – female abdominal sternite 8; F – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.1 mm for C; III: 0.2 mm for D and E, and 0.1 mm for F.

**Male.** Middle portion of metaventricle with dense erect pubescence (Fig. 39F); tarsomeres 2–4 of protarsi and mesotarsi expanded (Fig. 40A); metatibiae very weakly curved (Fig. 40C); abdominal sternite 8 moderately curved (Fig. 41D); aedeagus slender (Figs. 41A, 41B); median lobe almost straight and very feebly expanded laterally from about apical 1/4 towards apex, almost straight on apical margins in dorsal view (Fig. 41A), moderately curved and bluntly pointed apically in lateral view (Fig. 41B); each paramere bearing two apical setae (Fig. 41A); inner sac as shown in Fig. 41C

**Female.** Middle portion of metaventricle with sparse decumbent pubescence (Fig. 39G); protarsi and mesotarsi slender (Fig. 40B); metatibiae almost straight (Fig. 40D); abdominal sternite 8 with a spiculum ventrale at central point of anterior margin (Fig. 41E); coxites and stylus as shown in Fig. 41F.

**Differential diagnosis.** The present new species is similar to *L. multipunctata* in irregularly punctate elytra, but may be distinguished from the latter by being unicolor brown in coloration. In contrast, *L. multipunctata* has a blackish antennal club. *Leiodes araii* sp. nov. also resembles *L. yasudai* sp. nov. in dorsal appearance, but can be separated from it by having the median lobe almost straight at the apical margins (Fig. 41A), whereas the median lobe is triangular at the apex in *L. yasudai* sp. nov. (Fig. 23A).

**Etymology.** This species is dedicated to Mr. Koji Arai who kindly gave me many valuable specimens used in this study.

**Distribution.** Japan: Honshu (Saitama Prefecture).

### 13. *Leiodes haradai* sp. nov.

Japanese name: Harada-ô-tamakinokomushi

(Figs. 42–43, 114)

**Type locality.** Japan, Shikoku, Ehime Pref., Oda Town, Miyanodani (alt. 400 m).

**Type material.** JAPAN: SHIKOKU: HOLOTYPE, ♂, Ehime Pref., Oda Town, Miyanodani (alt. 400 m), 2.i.1995, E. Yamamoto leg. (EUMJ).

**Diagnosis.** Body 2.4 mm long, ca. twice as long as wide. Dorsum brown. Head relatively large. Antennal club dark brown. Elytra densely, irregularly and coarsely punctate. Mesoventrite with one distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Metafemur with a distinct ventral rectangular projection posteroapically. Metatibiae very feebly curved.

**Description.** Measurements of holotype: Body length 2.4 mm; head 0.40 mm in length and 0.68 mm in width; pronotum 0.64 mm in length and 1.1 mm in width; elytra 1.4 mm in length and 1.2 mm in width.

Coloration. Dorsum shining and unicolor, brown; antennomeres 1–6 and 8 brown; remaining antennomeres dark brown; legs brown with tarsi slightly paler than remaining parts of legs; mesoventrite and metaventricle brown; abdominal ventrites light brown.

Head distinctly and densely punctate, bearing two large punctures (Fig. 42A); antennomeres 1–3 and 11 each longer than wide; antennomere 4 about as long as wide; remaining antennomeres each wider than long; antennomere 11 oval (Fig. 42C); relative lengths of antennomeres 2 to 11 – 2.8 : 2.8 : 1.7 : 1.3 : 1.2 : 1.9 : 1.0 : 2.7 : 2.8 : 4.7.

Pronotum widest at base, simply and very feebly curved at posterior margin, and distinctly and densely punctate, punctuation similar to that on head (Fig. 42A).

Scutellum minutely punctate.

Elytra widest ca. at basal 1/3 (Fig. 42A), not transversely strigose, and densely, irregularly, and strongly punctate (Figs. 42A, 42B); punctuation of elytra consisting of punctures of various sizes (Fig. 42D); sutural stria fine, reaching from apex to ca. apical half of the elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, with a distinct excavation between median carina and transverse carina (Fig. 42E); median carina of mesoventrite low (Fig. 42E); metaventrite sparsely pubescent, strongly microreticulate except for almost smooth middle portion.

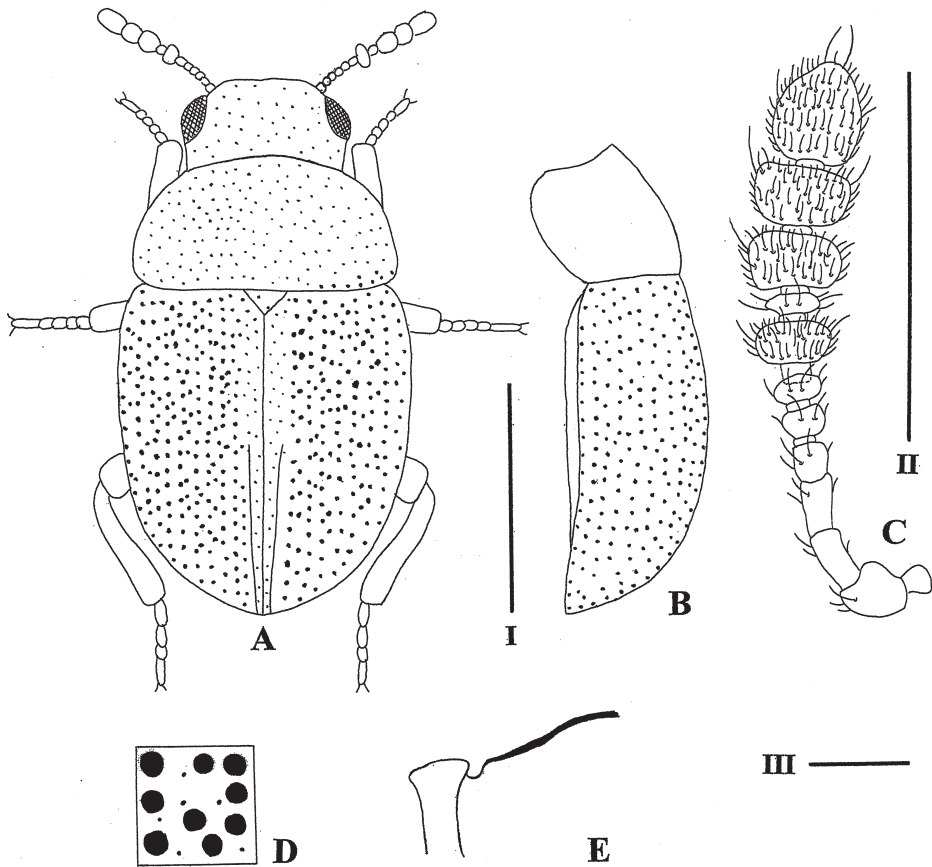


Fig. 42. *Leiodes haradai* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.2 mm for E.

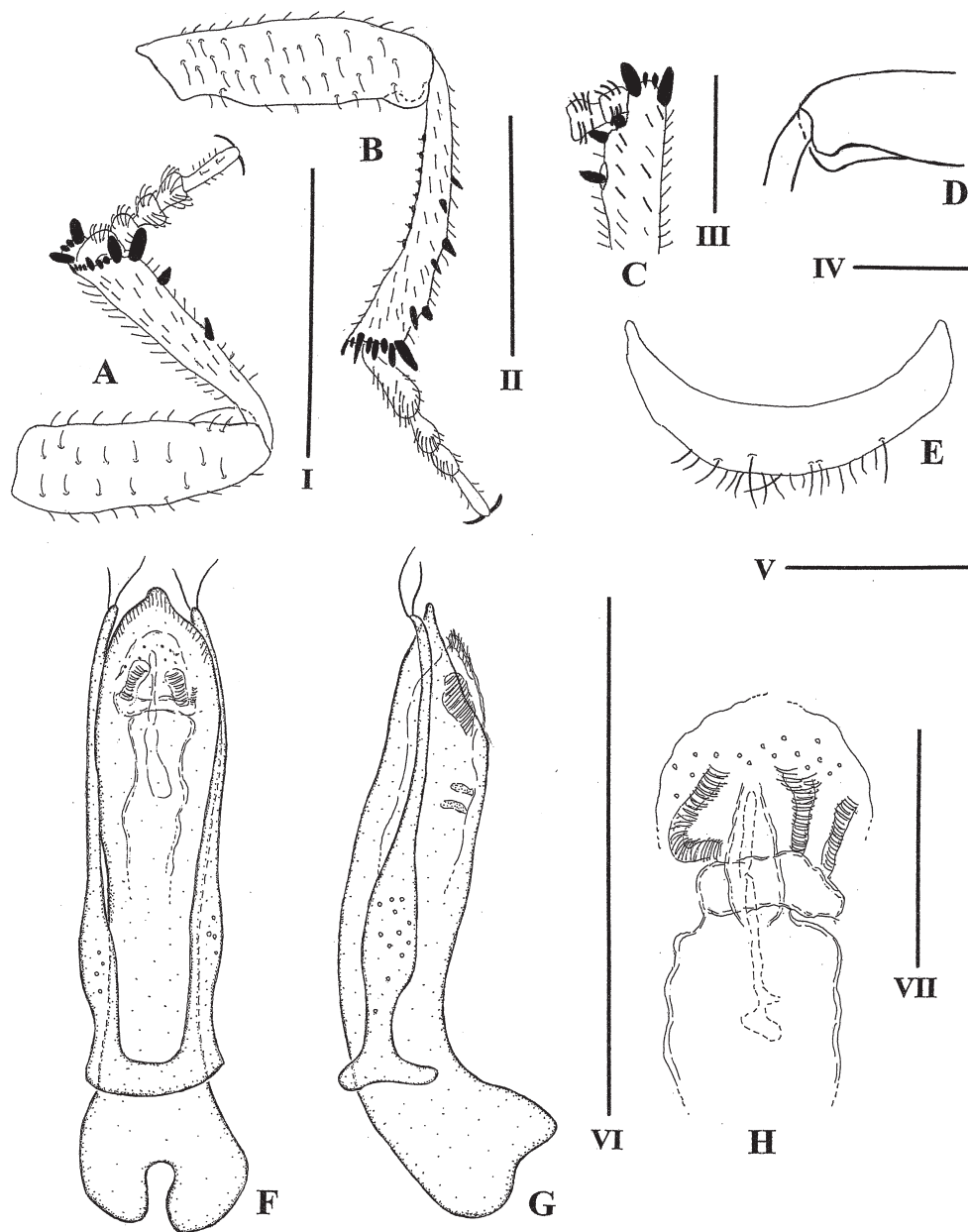


Fig. 43. *Leiodes haradai* sp. nov. A – male fore leg, ventral view; B – male hind leg, ventral view; C – male protibia, dorsal view; D – male metafemur, dorsal view; E – male abdominal sternite 8; F – aedeagus, dorsal view; G – ditto, lateral view; H – inner sac, dorsal view. Scale I: 0.5 mm for A; II: 0.5 mm for B; III: 0.2 mm for C; IV: 0.2 mm for D; V: 0.2 mm for E; VI: 0.5 mm for F and G; VII: 0.1 mm for H.



Protibiae gradually and very feebly widening from base towards apex (Fig. 43C); tarso-meres 2–4 of protarsi and mesotarsi expanded (Fig. 43A); metafemur with a distinct ventral rectangular projection (Fig. 43B) and a small dorsal projection posteroapically (Fig. 43D); metatibiae bearing less than ten small robust spines at about basal 3/5 of internal margins, very feebly curved inwardly (Fig. 43B).

Abdominal sternite 8 moderately curved (Fig. 43E); aedeagus slender (Figs. 43F, 43G); median lobe weakly expanded laterally from about apical half towards apex, lateral margins a little protuberant at apex (Fig. 43F), moderately curved in lateral view (Fig. 43G); each paramere bearing two apical setae (Fig. 43G); inner sac without distinct sclerites (Fig. 43H).

**Female.** Unknown.

**Differential diagnosis.** *Leiodes haradai* sp. nov. is similar to *L. multipunctata* in the irregularly punctate elytra, but may be separated from it by having relatively slender parameres in dorsal view (Fig. 43F). In contrast, the parameres of *L. multipunctata* are relatively thick in the basal half (Fig. 52A). *Leiodes haradai* sp. nov. also resembles *L. hijikatai* sp. nov. in the shape of the metafemora, but may be distinguished from it by having the head ca. 0.6× as long as the pronotum (Fig. 42A) and the median lobe of the aedeagus feebly expanded laterally at the apical 2/5 of the lateral margin (Fig. 43F). In contrast, *L. hijikatai* sp. nov. has the head ca. 0.5× as long as pronotum (Fig. 44A) and the median lobe relatively strongly expanded laterally at apical half of the lateral margin (Fig. 46A).

**Etymology.** This species is dedicated to a very popular samurai Sanosuke Harada (1840–1868) who was born in the Ehime Prefecture in which the type locality of this species is situated.

**Distribution.** Japan: Shikoku (Ehime Prefecture).

#### 14. *Leiodes hijikatai* sp. nov.

Japanese name: Hijikata-ô-tamakinokomushi  
(Figs. 44–46, 114)

**Type locality.** Japan, Honshu, Tokyo Pref., Okutama Town, Nipper, Mt. Kintaisan (alt. 1300 m).

**Type material.** JAPAN: HONSHU: HOLOTYPE, ♂, Tokyo Pref., Okutama Town, Nipper, Mt. Kintaisan (alt. 1300 m), 3.xi.2006, H. Kamezawa leg. (MNHAH). PARATYPE: 1 ♂, Nagano Pref., Tone Village, near Kuribara-gawa River, 12.x.1996, S. Hatsushiba leg. (FUFJ).

**Diagnosis.** Body 2.9–3.0 mm long, ca. 1.7× as long as wide. Dorsum light brown. Antennal club dark reddish brown. Elytra densely, irregularly and coarsely punctate. Mesoventrite with one distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Metafemur with a distinct ventral rectangular projection posteroapically. Metatibiae weakly or strongly curved.

**Description.** Measurements of holotype: Body length 3.0 mm; head 0.41 mm in length and 0.83 mm in width; pronotum 0.83 mm in length and 1.4 mm in width; elytra 1.9 mm in length and 1.7 mm in width.

Coloration (based on the holotype only as the paratype is teneral). Dorsum shining and unicolor, light brown; antennomere 1 brown; antennomeres 2–6 and 8 reddish brown; remaining antennomeres dark reddish brown; legs brownish; trochanter reddish brown; tarsi brown; remaining parts of legs light brown; mesoventrite, metaventrite, and abdominal ventrites light brown.

Body 2.9–3.0 mm in length, ca.  $1.7\times$  as long as wide.

Head ca.  $2.1\times$  as wide as long, ca.  $0.48\times$  as long as and  $0.58\times$  as wide as pronotum, distinctly and densely punctate (Fig. 44A); antennomeres 1–4 each longer than wide; antennomere 11 about as long as wide; remaining antennomeres each wider than long; antennomere 11 oval (Fig. 44C); relative lengths of antennomeres 2 to 11 – 2.8 : 3.6 : 2.3 : 1.9 : 1.6 : 2.7 : 1.0 : 2.9 : 2.7 : 5.1.

Pronotum ca.  $1.7\times$  as wide as long, ca.  $0.44\times$  as long as and  $0.85\times$  as wide as pronotum, widest at base, simply and very feebly curved at posterior margin, distinctly and densely punctate, punctation similar to that on head (Fig. 44A).

Scutellum minutely punctate.

Elytra ca.  $1.1\times$  times as long as wide in dorsal view, widest ca. at basal  $2/5$  (Fig. 44A), not transversely strigose, densely, irregularly and coarsely punctate (Figs. 44A, 44B, 44D);

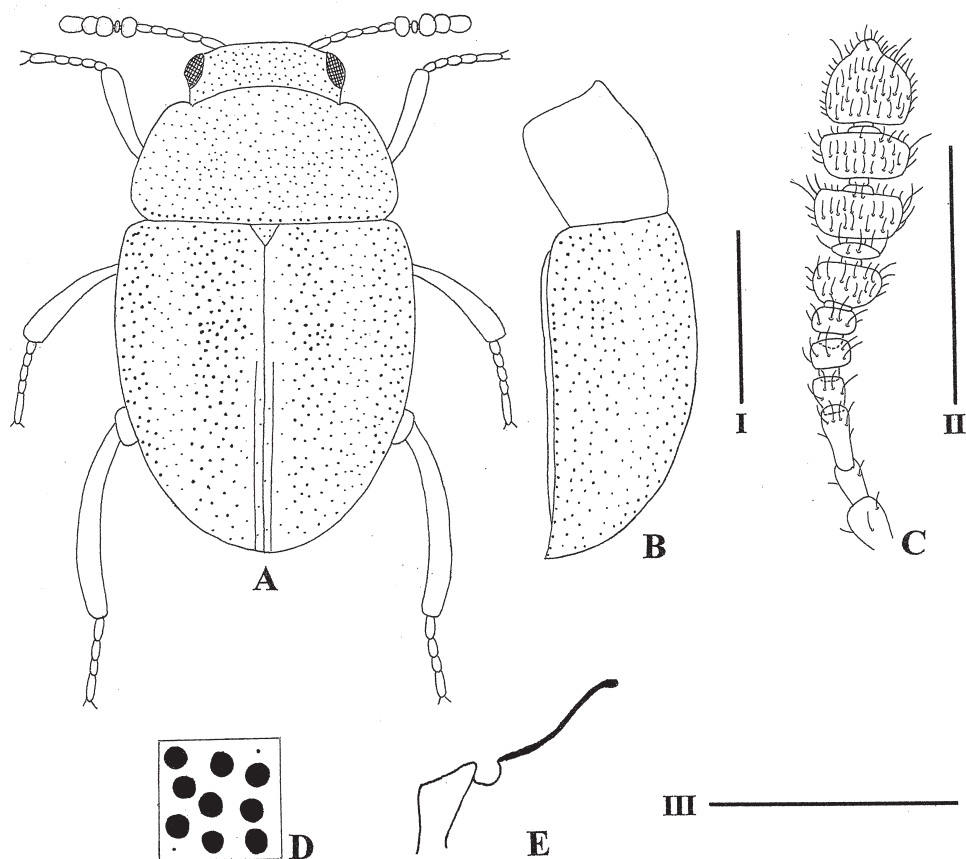


Fig. 44. *Leiodes hijikatai* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.5 mm for E.

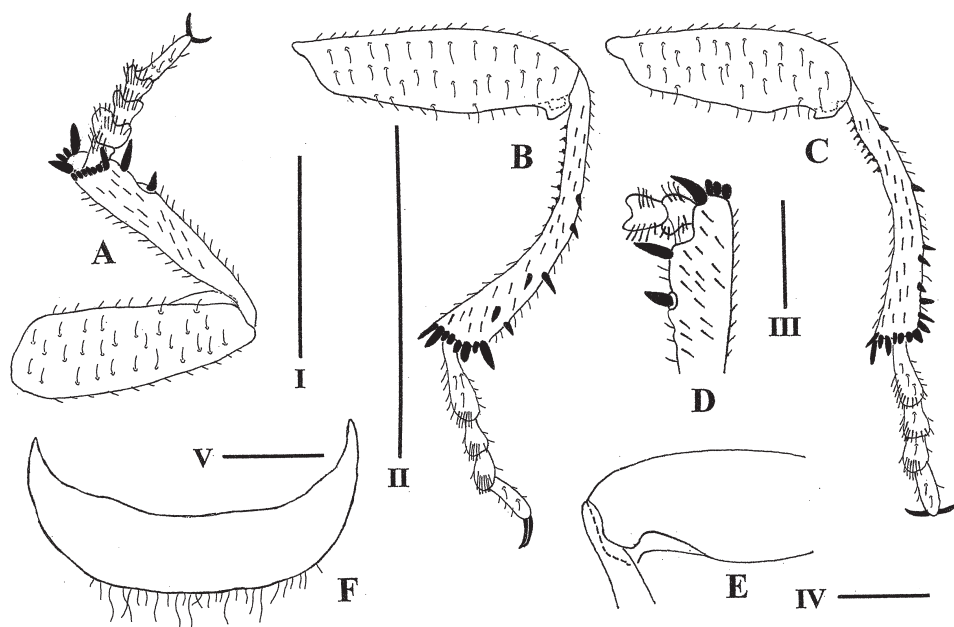


Fig. 45. *Leiodes hijikatai* sp. nov. A – male fore leg, ventral view; B – male hind leg of paratype, ventral view; C – ditto of holotype; D – male protibia, dorsal view; E – male metafemur, dorsal view; F – male abdominal sternite 8. Scale I: 0.5 mm for A; II: 0.5 mm for B and C; III: 0.2 mm for D; IV: 0.2 mm for E; V: 0.5 mm for F.

most punctures of elytra a little larger than those on head and pronotum (Fig. 44A); sutural stria fine, reaching from apex to ca. apical half of elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, with a distinct excavation between median carina and transverse carina (Fig. 44E); median carina of mesoventrite low (Fig. 44E); metaventrite sparsely pubescent, strongly microreticulate except for almost smooth middle portion.

Protibiae gradually and very feebly widening from base towards apex (Fig. 45D); tarso-meres 2–4 of protarsi and mesotarsi expanded (Fig. 45A); metafemur with a distinct ventral rectangular projection (Figs. 45B, 45C) and a small dorsal projection posteroapically (Fig. 45E); metatibiae bearing less than ten small robust spines at about basal 1/3 of internal margins, weakly curved in holotype (Fig. 45C) and strongly curved in paratype (Fig. 45B).

Abdominal sternite 8 moderately curved (Fig. 45F); aedeagus slender (Figs. 46A, 46B); median lobe weakly expanded laterally in apical half of lateral margins and feebly curved at apex in dorsal (Fig. 46A), moderately curved in lateral view (Fig. 46B); each paramere bearing two apical setae and one transparent slender lobe (Fig. 46A); inner sac without distinct sclerites (Fig. 46C).

**Female.** Unknown.

**Differential diagnosis.** *Leiodes hijikatai* sp. nov. is similar to *L. araii* sp. nov. in the form of the elytral punctures but can be distinguished from it by having dark reddish brown anten-

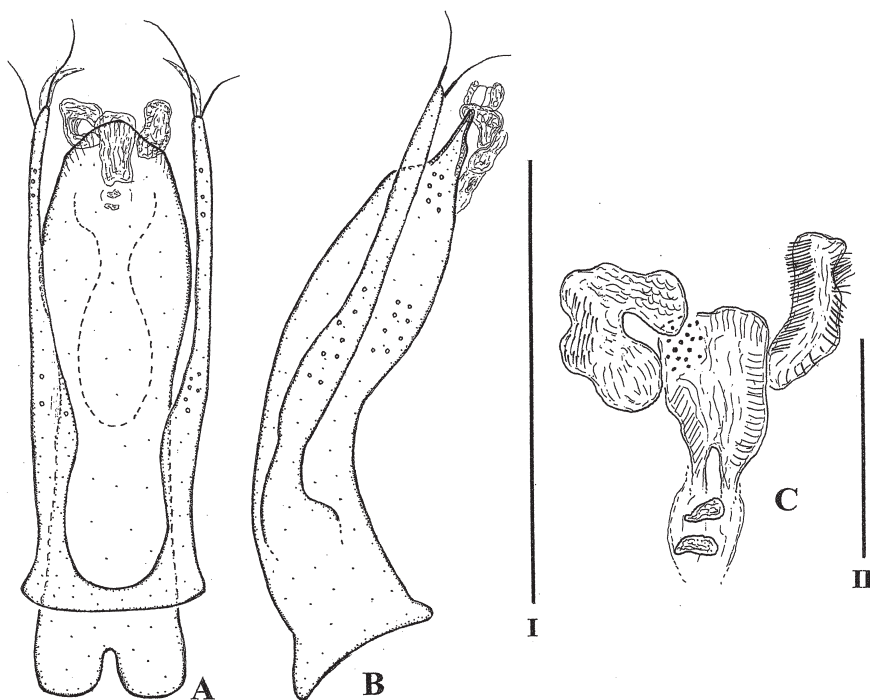


Fig. 46. *Leiodes hijikatai* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – inner sac, dorsal view. Scale I: 0.5 mm for A and B; II: 0.1 mm for C.

nal club and having the metafemur with a distinct ventral posteroapical projection (Figs. 45B, 45C). In contrast, *L. araii* sp. nov. has the antennae almost uniformly brown and the metafemora weakly expanded posteriorly (Figs. 40C, 40D). *Leiodes hijikatai* sp. nov. is also similar to the European *L. punctulata* (Gyllenhal, 1810) by the irregularly punctate elytra and the mesoventrite bearing an excavation, but can be separated from it by having the lateral margins of the median lobe feebly curved at the apex in dorsal view (Fig. 46A). In contrast, *L. punctulata* has the median lobe protuberant apically.

**Etymology.** This species is dedicated to a very popular samurai Toshizô Hijikata (1835–1869) who was born in the Tama Region in which the type locality of this species is situated.

**Distribution.** Japan: Honshu (Tokyo and Nagano Prefectures).

### 15. *Leiodes kiuchii* sp. nov.

Japanese name: Marukogatano-ô-tamakinokomushi  
(Figs. 1, 47–49, 114)

**Type locality.** Japan, Shikoku, Tokushima Pref., Kisawa Village, Okunoi

**Type material.** JAPAN: SHIKOKU: HOLOTYPE, ♂, Tokushima Pref., Kisawa Village, Okunoi, 12.–18.ix.2003, K. Tanaka leg. (FIT) (MNAH). PARATYPES: 1 ♀, Tokushima Pref., Kisawa Village, Mt. Okunonoyama, 31.viii.2003, M. Yoshida leg. (FUFJ); 1 ♂, Tokushima Pref., Kisawa Village, Okuyarito, 23.ix.–5.x.2003, K. Tanaka leg. (FIT) (FUFJ); 1 ♂, same data as the former except for the date and a collector, 3.–10.viii.2004, M. Yoshida leg.; 1 ♀,

Tokushima Pref., Nagoro-Higashiya, Otomedani Valley, 12.–24.viii.2006, K. Tanaka leg. (FUFJ). **HONSHU:** 1 ♂, Kyoto Pref., Mt. Minetoko, 31.ix.1998, H. Hoshina leg. (FUFJ).

**Diagnosis.** Body 2.3–2.7 mm long, ca. 1.7× as long as wide. Dorsum usually bicolored. Elytra densely, irregularly and coarsely punctate. Mesoventrite with one distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Male metaventrite bearing erect and dense pubescence at middle portion. Mesotibiae without distinct sexual dimorphism. Metatibiae of both sexes relatively robust. Male metatibiae very feebly curved. Median lobe of aedeagus rectangular apically and bearing a tiny but sharply protuberant apex in dorsal view. Female abdominal sternite 8 with a spiculum ventrale.

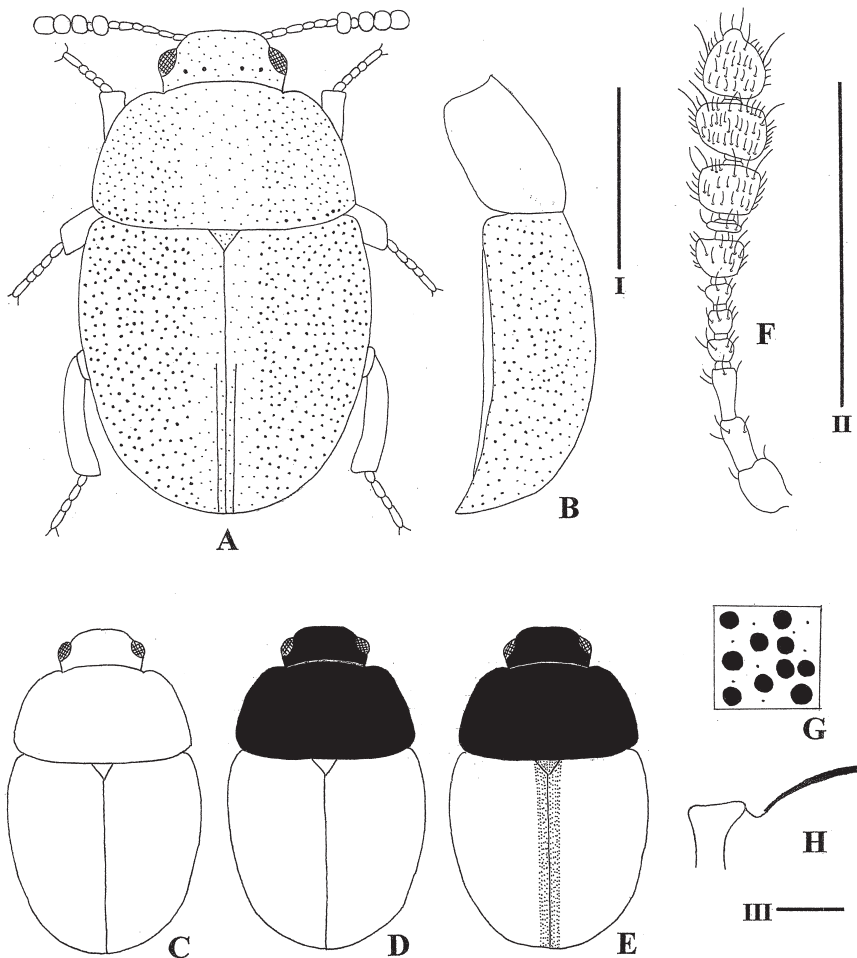


Fig. 47. *Leiodes kiuchii* sp. nov. A – body, dorsal view; B – ditto, lateral view; C, D, and E – dorsal color; F – antenna; G – elytral punctures; H – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for F; III: 0.2 mm for H.

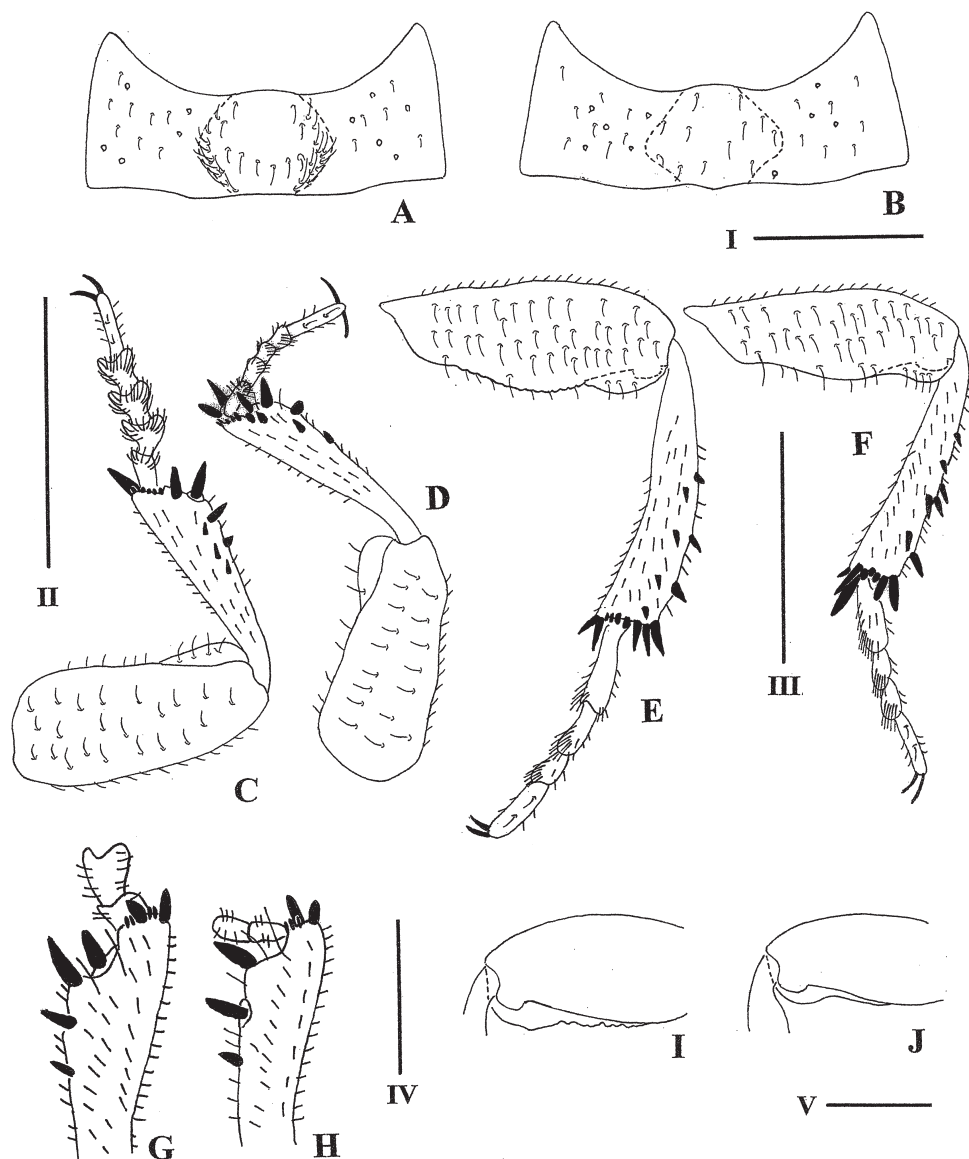


Fig. 48. *Leiodes kiuchii* sp. nov. A – male metaventrite; B – female metaventrite; C – male fore leg, ventral view; D – female fore leg, ventral view; E – male hind leg, ventral view; F – female hind leg, ventral view; G – male protibia, dorsal view; H – female protibia, dorsal view; I – male metafemur, dorsal view; J – female metafemur, dorsal view. Scale I: 0.5 mm for A and B; II: 0.5 mm for C and D; III: 0.5 mm for E and F; IV: 0.2 mm for G and H; V: 0.2 mm for I and J.

**Description.** Measurement of holotype: Body length 2.6 mm; head 0.39 mm in length and 0.68 mm in width; pronotum 0.82 mm in length and 1.3 mm in width; elytra 1.7 mm in length and 1.4 mm in width.

Coloration. Dorsum shining, usually bicolored (Figs. 47D, 47E), rarely unicolor (Fig. 47C); head and pronotum brown, dark brown or blackish brown; elytra brown or dark brown, sometimes with dark brown stripe near elytral suture (Fig. 47E); antennomeres 1–6 and 8 brown; antennomere 11 light brown in apical 2/5; remaining antennomeres dark brown; legs brown with light brown tarsi; mesoventrite, metaventrite, and abdominal ventrites brown.

Body 2.3–2.7 mm in length, ca.  $1.7\times$  as long as wide.

Head ca.  $1.9\times$  as wide as long, ca.  $0.46\times$  as long as and  $0.52\times$  as wide as pronotum, distinctly and densely punctate (Fig. 47A), often bearing some large punctures (Fig. 47A);

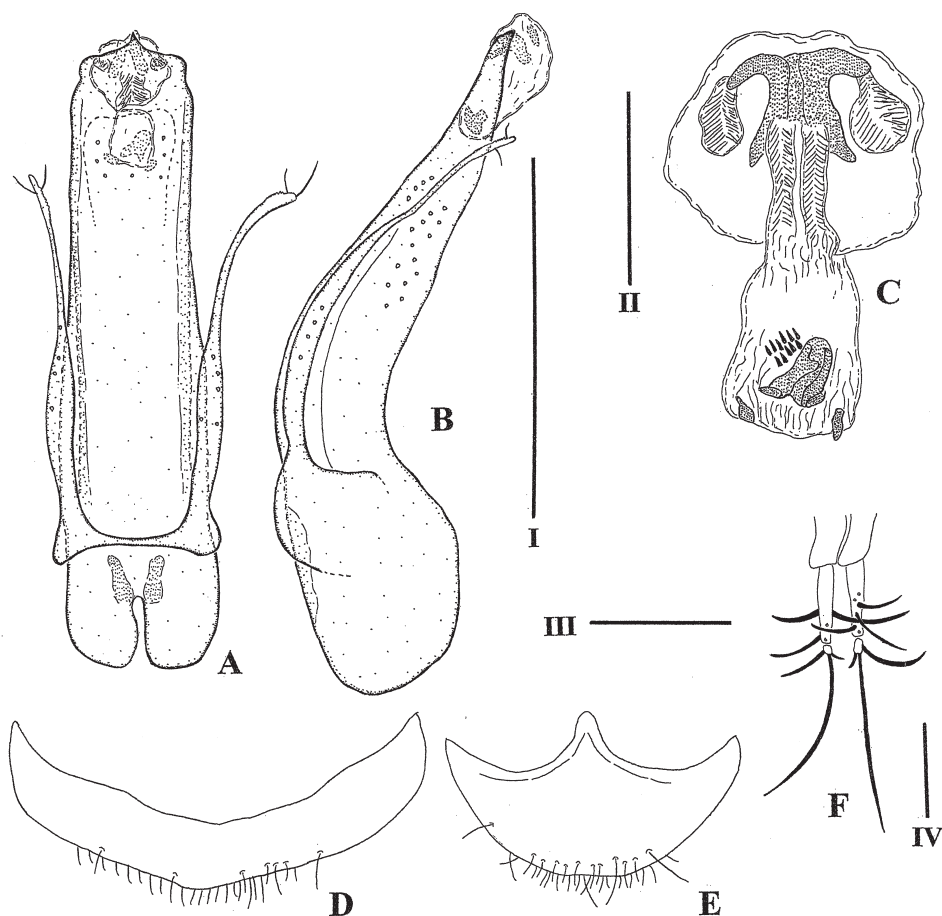


Fig. 49. *Leiodes kiuchii* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – inner sac, dorsal view; D – male abdominal sternite 8; E – female abdominal sternite 8; F – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.1 mm for C; III: 0.2 mm for D and E; IV: 0.1 mm for F.



antennomeres 1–3 each longer than wide; antennomeres 4, 5, and 11 each about as long as wide; remaining antennomeres each wider than long; antennomere 11 oval (Fig. 47F); relative lengths of antennomeres 2 to 11 – 5.8 : 5.6 : 2.4 : 2.4 : 2.2 : 4.0 : 1.0 : 5.4 : 5.6 : 7.2.

Pronotum ca. 1.6× as wide as long, ca. 0.47× as long as and 0.90× as wide as elytra, widest at base, simply and very feebly curved at posterior margin, distinctly and densely punctate, punctation similar to that on head (Fig. 47A).

Scutellum minutely punctate.

Elytra ca. 1.2× as long as wide in dorsal view, widest ca. at basal 1/3 (Fig. 47A), not transversely strigose, densely, irregularly and coarsely punctate (Figs. 47A, 47B); punctation of elytra consisting of punctures of various sizes (Fig. 47G); sutural stria fine, reaching from apex to ca. apical half of the elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, and with a distinct excavation between median carina and transverse carina (Fig. 47H); median carina of mesoventrite low (Fig. 47H); metaventrite showing sexual dimorphism, microreticulate except for almost smooth middle portion.

Legs with distinct sexual dimorphism on protarsi, protibiae, mesotarsi, metafemora, and metatibiae; metafemur expanded posteroapically (Figs. 48E, 48F) with small dorsal projection posteroapically (Figs. 48I, 48J); metatibiae relatively robust (Figs. 48E, 48F).

**Male.** Middle portion of metaventrite with erect pubescence (Fig. 48A); protibiae relatively strongly widening from base towards apex (Fig. 48G); tarsomeres 2–4 of protarsi and mesotarsi expanded (Fig. 48C); metafemora crenulate ca. at midlength of posterior margins (Fig. 48E); metatibiae very feebly curved (Fig. 48E); abdominal sternite 8 weakly curved (Fig. 49D); aedeagus slender (Figs. 49A, 49B); median lobe rectangular apically, bearing a tiny but a distinct projection at apex in dorsal view (Fig. 49A), moderately curved and pointed apically in lateral view (Fig. 49B); each paramere bearing two apical setae (Fig. 49A); inner sac as shown in Fig. 49C.

**Female.** Middle portion of metaventrite with sparse decumbent pubescence (Fig. 48B); protibiae gradually and very feebly widening from base towards apex (Fig. 48H); protarsi and mesotarsi slender (Fig. 48D); metafemur moderately sinuate at posterior margin (Fig. 48F); metatibiae almost straight (Fig. 48F); abdominal sternite 8 with a spiculum ventrale at a central point of anterior margin (Fig. 49E); coxites and stylus as shown in Fig. 49F.

**Differential diagnosis.** *Leiodes kiuchii* sp. nov. resembles *L. hijikatai* sp. nov. in the shape of the median lobe of the aedeagus, but may be distinguished from it by having relatively robust metatibiae (Figs. 48E, 48F) and the median lobe with a tiny but distinct projection at the apex in the dorsal view (Fig. 49A). In contrast, *L. hijikatai* sp. nov. has relatively slender metatibiae (Figs. 45B, 45C) and the median lobe with feebly curved lateral margins at the apex (Fig. 46A). *Leiodes kiuchii* sp. nov. is also similar to the European species *L. ruficollis* (J. Sahlberg, 1898), in having the median lobe of the aedeagus distinctly protuberant apically, but can be separated from it by having the elytra irregularly punctate (Figs. 47A, 47B). In contrast, *L. ruficollis* has elytra with ordered rows of punctures.

**Etymology.** This species is dedicated to Mr. Morisato Kiuchi who kindly donated many valuable specimens of *Leiodes* used in this study.

**Distribution.** Japan: Honshu and Shikoku.

### 16. *Leiodes multipunctata* (Rye, 1873)

Japanese name: Arame-ô-tamakinokomushi

(Figs. 6, 50–52, 114)

*Anisotoma multipunctata* Rye, 1873: 131.

*Liodes multipunctata*: PORTEVIN (1914): 226; PORTEVIN (1927): 74 (key to Japanese species of *Leiodes*).

*Leiodes multipunctata*: HATCH (1929): 35; DAFFNER (1983) (redescription): 47; PERREAU (2004): 197 (catalogue).

**Type locality.** Japan, Honshu, Hyôgo.

**Type specimens.** Type series of the present species have not been found as well as those of *L. circinipes*. See the part of “Type series of *L. circinipes*” (p. 35) for details.

**Additional specimens examined. JAPAN:** SHIKOKU: 2 ♂♂, Tokushima Pref., Kisawa Village, Okuyarito, 28–31.v.2004, K. Tanaka leg. (FIT); 1 ♂, Tokushima Pref., Mt. Tsurugi, Minokoshi (alt. 1340m), 28.v.–5.vi. 2006, K.

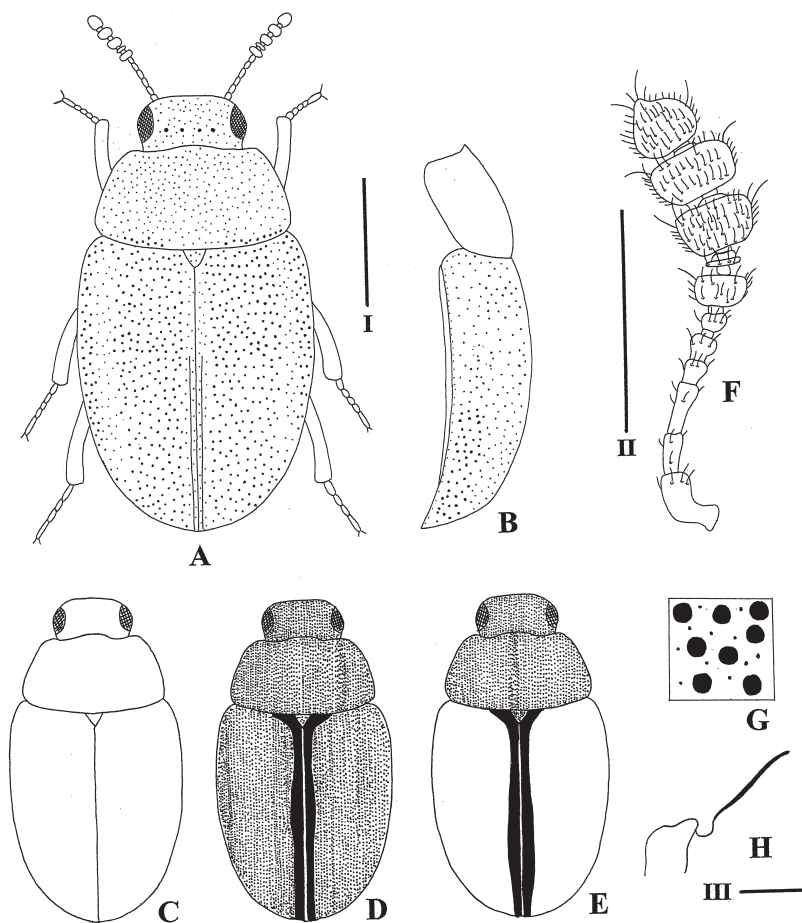


Fig. 50. *Leiodes multipunctata* (Rye, 1873). A – body, dorsal view; B – ditto, lateral view; C, D, and E – dorsal color; F – antenna; G – elytral punctures; H – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for F; III: 0.2 mm for H.

Tanaka leg. (FIT). **HONSHU:** 1 ♂, 2 ♀♀, Okayama Pref., Chuka Village, Mt. Yamanorisen, 26.vi.2004, Y. Fujitani leg. (FIT); 1 ♂, Okayama Pref., Nagi Town, Mt. Nagisan, 15.–17.v.2005, S. Suzuki leg. (FIT); same data as the former except for the dates: 1 ♀, 11.–18.vi.2005, 1 ♂, 24.ix.–1.x.2005, 1 ♂, 3 ♀♀, 15.–29.x.2005, 1 ♂, 29.x.–3.xi.2005, 3 ♂♂, 2 ♀♀, 3.–12.xi.2005, 1 ♂, 1 ♀, 12.–23.xi.2005; 1 ♂, Kyoto Pref., Keihoku Town, Shūzan, 3.xi.1979, T. Ito leg.; 1 ♂, Wakayama Pref., Susami Town, Kotonotaki, 26.x.1992, I. Matoba leg. (TA); 3 ♂♂, Saitama Pref., Mt. Ryogamisan, Tachiya-bori (alt. 800 m), 31.x.1999, T. Kishimoto and T. Shimada leg. (TA); 1 ♂, Yamagata Pref., Ôkura Village, Yunodai, 16.–23.ix.2006, M. Oikawa leg.; 2 ♂♂, 2 ♀♀, same data as the former except for the date, 23–30.ix.2006; 1 ♂, 1 ♀, Yamagata Pref., Mogami-murayama, 29.x.2008, H. Makiyama leg. (MT); 4 ♂♂, 6 ♀♀, Akita Pref., Chôkai-chô, Sarukura, 16–24.ix.2005, M. Oikawa leg.; 2 ♂♂, 1 ♀, Miyagi Pref., Sendai City, Mt. Izumigadake, Kuwanumairindô, 4–17.ix.2009, M. Oikawa leg. (FIT); 1 ♀, Aomori Pref., Aomori City, Jyogakura, 22.vii.1995, T. Ozaki leg. (collected under the stones); 1 ♀, Aomori Pref., Aomori City, Sugaya, 8.viii.1995, T. Ozaki leg.; 1 ♂, Aomori Pref., Towada City, Tsuta, 5.x.1996, T. Ozaki leg.; 1 ♂, Aomori Pref., Ajigasawa Town, Kôsei Rindô, 5.vii.1998, T. Ozaki leg.; 1 ♂, Gunma Pref., Tsumagoi Village, Mt. Asashiki, 24.vii.1979, K. Ito leg. (EUMJ). All specimens except for the last specimen are preserved in FUFJ.

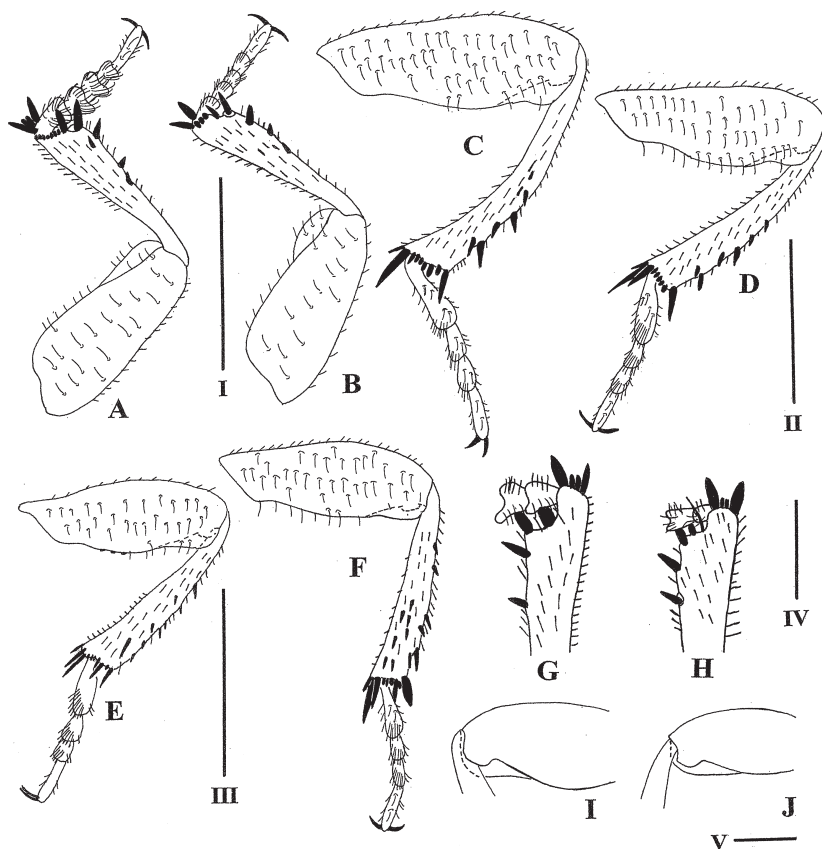


Fig. 51. *Leiodes multipunctata* (Rye, 1873). A – male fore leg, ventral view; B – female fore leg, ventral view; C, D, and E – male hind legs, ventral view; F – female hind leg, ventral view; G – male protibia, dorsal view; H – female protibia, dorsal view; I – male metafemur, dorsal view; J – female metafemur, dorsal view. Scale I: 0.5 mm for A and B; II: 1 mm for C, D, and F; III: 0.5 mm for E; IV: 0.2 mm for G and H; V: 0.2 mm for I and J.

**Diagnosis.** Coloration. Dorsum almost unicolor (Fig. 50C) or clearly bicolored (Figs. 50D, 50E); head, pronotum and scutellum brown or dark brown; elytra brown or dark brown, sometimes black near elytral suture (Figs. 50D, 50E); antennomeres 1–6 and 8 brown; antennomeres 7, 9, 10, and basal half of antennomere 11 dark brown; apical half of antennomere 11 light brown.

Body 2.1–3.4 mm in length, ca.  $1.9\times$  as long as wide (Fig. 50A); head densely and minutely punctate, sometimes bearing some large punctures (Fig. 50A); antennomeres 1–4 each longer than wide; antennomere 5 about as long as wide; remaining antennomeres each wider than long; antennomere 11 robust (Fig. 50F). Pronotum simply and very feebly curved at posterior margin, its punctation similar to that on head (Fig. 50A). Elytra not transversely strigose; punctures of elytra dense and very irregular, not forming rows (Figs. 50A, 50B), consisting of various sizes of punctures (Fig. 50G); sutural stria fine, reaching from elytral apex to ca. apical half of elytral length. Metathoracic wings fully developed. Mesoventrite with one distinct excavation between median carina and transverse carina (Fig. 50H); median carina of mesoventrite low (Fig. 50H); metaventrite without sexual dimorphism. Legs sexually dimorphic on protarsi, mesotarsi, and metatibiae; protibiae gradually and very feebly widening from base towards apex (Figs. 51G, 51H); metafemur with a small dorsal projection posteroapically (Figs. 51I, 51J).

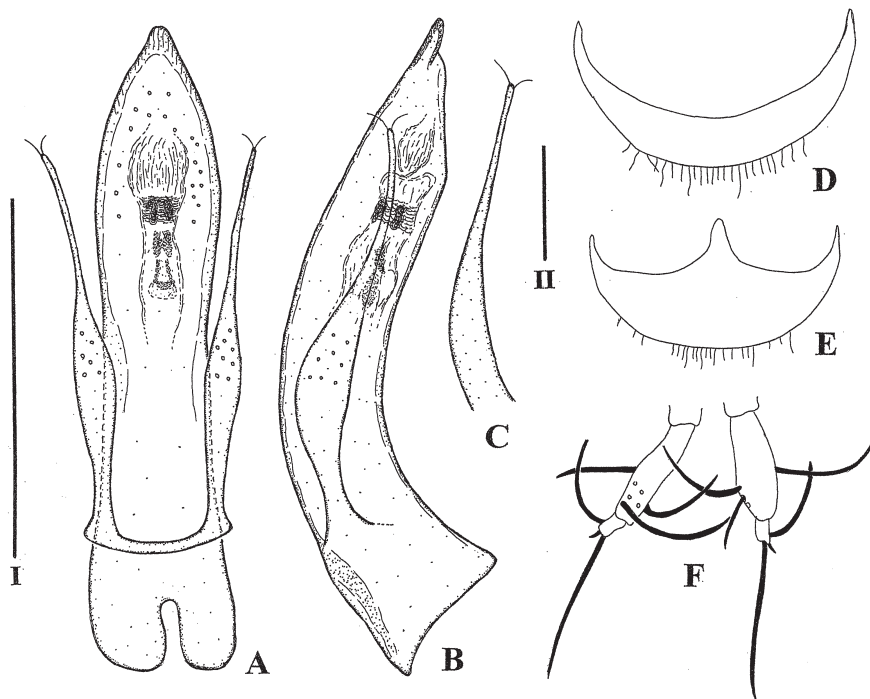


Fig. 52. *Leiodes multipunctata* (Rye, 1873). A – aedeagus, dorsal view; B – ditto, lateral view; C – parameres, lateral view; D – male abdominal sternite 8; E – female abdominal sternite 8; F – coxite and stylus. Scale I: 0.5 mm for A, B, and C; II: 0.2 mm for D and E, and 0.1 mm for F.

**Male.** Tarsomeres 2–4 of mesotarsi expanded (Fig. 51A); metafemora sometimes with some tiny crenellation on posterior margins (Fig. 51E); metatibiae almost straight or inwardly curved (Figs. 51C, 51D, 51E); abdominal sternite 8 strongly curved (Fig. 52D); aedeagus as shown in Figs. 52A, 52B.

**Female.** Protarsi and mesotarsi slender (Fig. 51B); metatibiae almost straight (Fig. 51F); abdominal sternite 8 with a spiculum ventrale at central point of anterior margin (Fig. 52E); coxites and stylus as shown in Fig. 52F.

**Morphological variability.** Dorsal color and male metatibiae of *L. multipunctata* have some morphological variation. These differences do not correlate to region, nor to body size.

**Differential diagnosis.** *Leiodes multipunctata* resembles *L. indigesta* Park & Ahn, 2007 in the densely arranged elytral punctures but can be distinguished from it by having the median lobe of the aedeagus relatively weakly curved in lateral view (Fig. 52B). In contrast, *L. indigesta* has the median lobe strongly curved.

**Distribution.** Japan: Honshu and Shikoku.

### 17. *Leiodes sakaii* sp. nov.

(Japanese name: Hosomomo-ô-tamakinokomushi)

(Figs. 53–54, 114)

**Type locality.** Japan, Shikoku, Ehime Pref., Mt. Odamiyama.

**Type material.** JAPAN: SHIKOKU : HOLOTYPE, ♂, Ehime Pref., Mt. Odamiyama, 2.xi.1969, M. Sakai leg. (EUMJ).

**Diagnosis.** Body 3.2 mm long, ca.  $2.1\times$  as long as wide. Head and pronotum brown. Elytra light brown on disc, dark brown near elytral suture. Antennal club dark brown. Elytra densely, irregularly, and coarsely punctate. Mesoventrite with one distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Metafemur with a distinct ventral rectangular posteroapical projection. Metatibiae moderately curved.

**Description.** Measurements of holotype: Body length 3.2 mm; head 0.45 mm in length and 0.75 mm in width; pronotum 0.78 mm in length and 1.3 mm in width; elytra 2.0 mm in length and 1.5 mm in width.

**Coloration.** Dorsum shining; head and pronotum brown; elytral disc light brown, elytra dark brown near suture (Fig. 53C); antennomeres 1–6 brown; antennomere 8 dark reddish brown; apical half of antennomere 11 light brown; remaining antennomeres dark brown; legs brown; mesoventrite and metaventrite brown; abdominal ventrites light brown.

Body almost glabrous.

Head distinctly and densely punctate, bearing some large punctures (Fig. 53A); antennomeres 1–4 each longer than wide; antennomere 5 about as long as wide; remaining antennomeres each wider than long; antennomere 11 robust (Fig. 53D); relative lengths of antennomeres 2 to 11 – 3.5 : 3.5 : 2.1 : 2.1 : 1.5 : 3.0 : 1.0 : 4.0 : 3.5 : 5.1.

Pronotum widest at base, simply and very feebly curved at posterior margin, distinctly and densely punctate, punctation similar to that on head (Fig. 53A).

Scutellum minutely punctate.

Elytra widest ca. at basal 1/4 (Fig. 53A), not transversely strigose, densely, irregularly and coarsely punctate (Figs. 53A, 53B); punctation of elytra consisting of punctures of

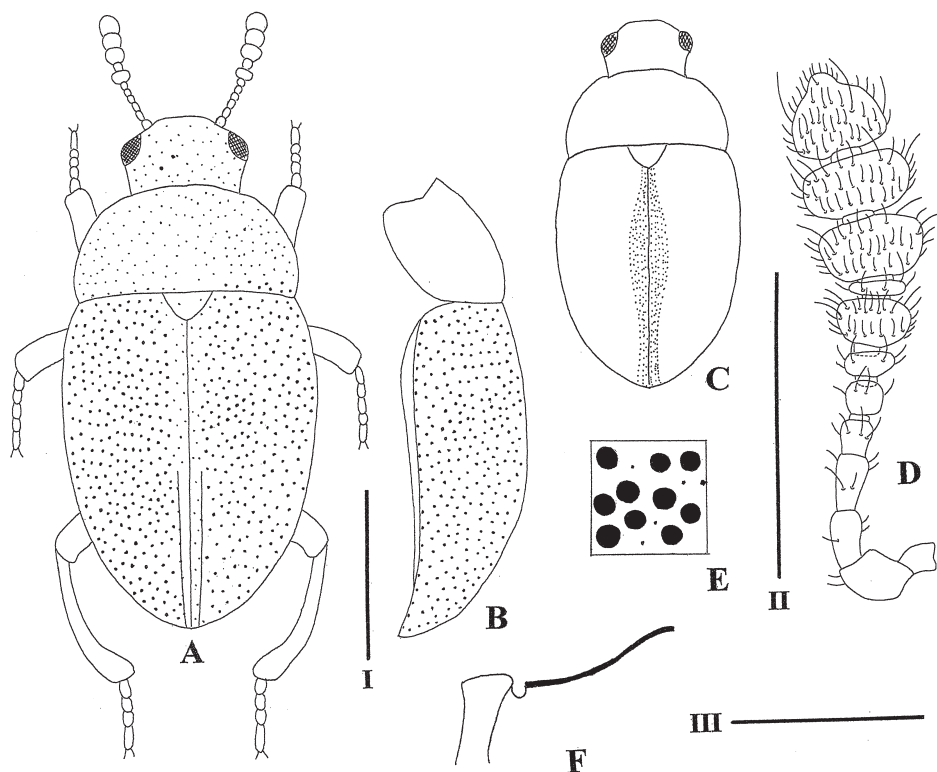


Fig. 53. *Leiodes sakaii* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – dorsal color; D – antenna; E – elytral punctures; F – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for D; III: 0.5 mm for F.

various sizes (Fig. 53E); sutural stria fine, reaching from apex to ca. apical 2/5 of the elytral length.

Metathotactic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, and with a distinct excavation between median carina and transverse carina (Fig. 53F); median carina of mesoventrite low (Fig. 53F); metaventrite sparsely pubescent, strongly microreticulate except for almost smooth middle portion.

Protibiae gradually and feebly widening from base towards apex (Fig. 54C); tarsomeres 2–4 of protarsi and mesotarsi expanded (Fig. 54A); metafemur with a distinct ventral rectangular projection (Fig. 54B) and a small dorsal projection posteroapically (Fig. 54D); metatibiae bearing some small robust spines at internal margins, moderately curved inwards (Fig. 54B).

Abdominal sternite 8 moderately curved (Fig. 54E); aedeagus very slender (Figs. 54F, 54G); median lobe very feebly expanded laterally, with lateral margins feebly protuberant at apex (Fig. 54F), moderately curved in lateral view (Fig. 54G); each paramere bearing two apical setae (Fig. 54F); inner sac without distinct sclerites (Fig. 54H).

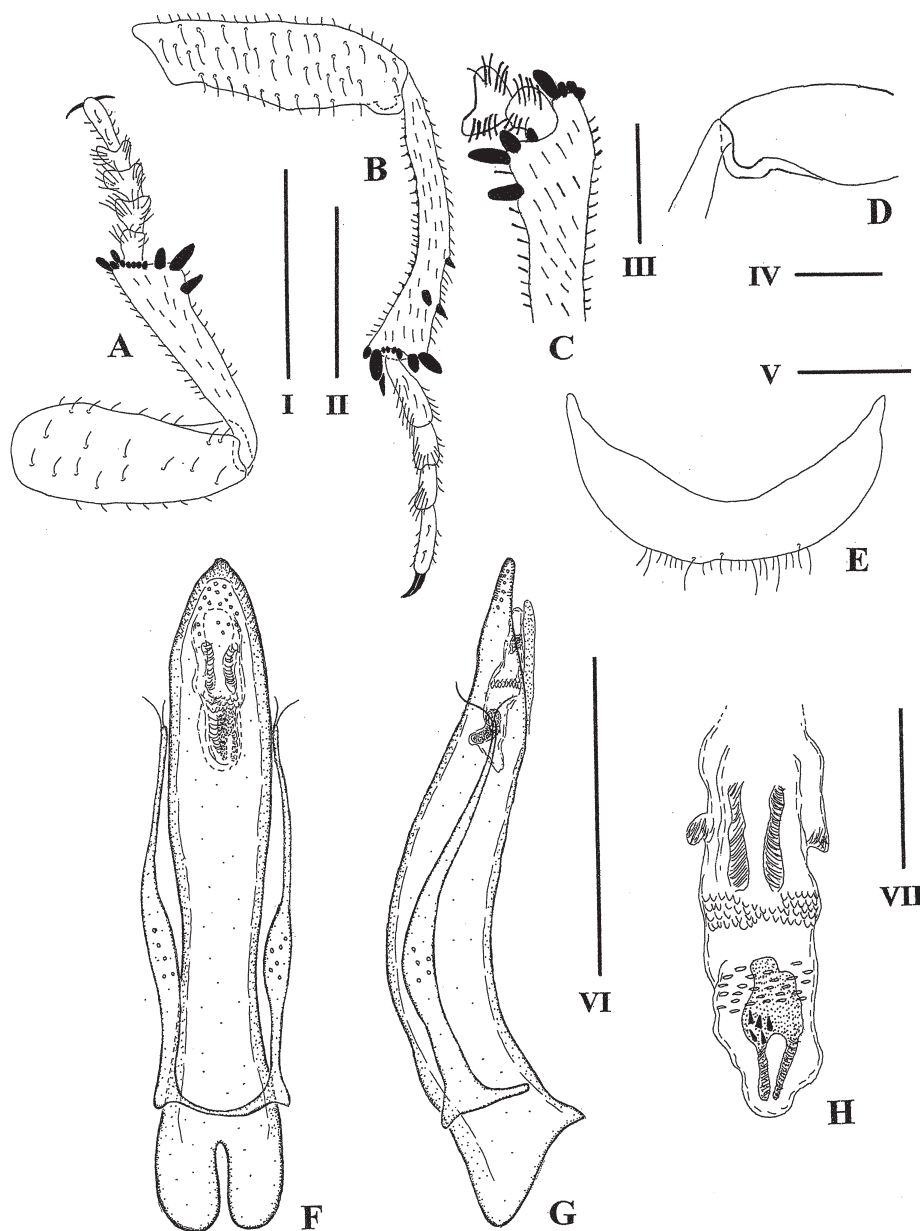


Fig. 54. *Leiodes sakaii* sp. nov. A – male fore leg, ventral view; B – male hind leg, ventral view; C – male protibia, dorsal view; D – male metafemur, dorsal view; E – male abdominal sternite 8; F – aedeagus, dorsal view; G – ditto, lateral view; H – inner sac, dorsal view. Scale I: 0.5 mm for A; II: 0.5 mm for B; III: 0.2 mm for C; IV: 0.2 mm for D; V: 0.2 mm for E; VI: 0.5 mm for F and G; VII: 0.1 mm for H.



**Female.** Unknown.

**Differential diagnosis.** *Leiodes sakaii* sp. nov. is similar to *L. multipunctata* in elytral punctures but can be distinguished from it by having the metafemur with a distinct ventral rectangular projection posteroapically (Fig. 54B) and the relatively slender median lobe of the aedeagus (Fig. 54F). In contrast, *L. multipunctata* has metafemora without distinct ventral projections (Figs. 51C, 51D, 51E, 51F) and a relatively robust median lobe (Fig. 52A).

**Etymology.** This species is dedicated to Dr. Masahiro Sakai, the collector of the holotype.

**Distribution.** Japan: Shikoku (Ehime Prefecture).

### *Leiodes naraharai* species group

**Species included.** *Leiodes naraharai* sp. nov., *L. shuheii* sp. nov.

**Diagnosis.** Elytra clearly bicolored, with black stripes along lateral margins (Figs. 55C, 55D, 58C, 58D) and with sparsely arranged large punctures between rows of punctures (Figs. 55F, 58F); mesoventrite without distinct excavations between median carina and transverse carina (Figs. 55G, 58G); tarsomeres 2–4 of protarsi sexually dimorphic, a little expanded in male (Figs. 56A, 59A); mesotibiae without sexual dimorphism, simply square at interoapical corner; male metafemur bearing a prominent dorsal projection posteroapically, the projection clearly smaller in female (Figs. 56G, 56H, 59G, 59H); pubescence of metaventrite not showing sexual dimorphism; aedeagus relatively robust, without distinct and large sclerites in inner sacs (Figs. 57A, 60A); male abdominal sternite 8 weakly curved (Figs. 57C, 60C); female abdominal sternite 8 with a spiculum ventrale at a central point of anterior margin (Figs. 57D, 60D).

**Differential diagnosis.** The *Leiodes naraharai* species group can be separated from other species groups by the elytra with black stripes along the lateral margins and the male metafemur bearing a prominent dorsal projection posteroapically.

### 18. *Leiodes naraharai* sp. nov.

Japanese name: Narahara-ô-tamakinokomushi

(Figs. 55–57, 115)

**Type locality.** Japan, Ryukyus, Kagoshima Pref., Amami-Ôshima Is., Santarô-tôge Pass.

**Type material.** JAPAN: RYUKYUS: HOLOTYPE, ♂, Kagoshima Pref., Amami-Ôshima Is., Santarô-tôge Pass, 24–27.ii.2010, S. Nomura leg. (FIT) (MNHAN). PARATYPES: 1 ♂, Kagoshima Pref., Amami-Ôshima Is., Mt. Yuwandake, 24–27.ii.2010, S. Nomura leg. (FIT) (FUFJ); 1 ♀, Kagoshima Pref., Amami-Ôshima Is., Yamato Village, 18.iii.2010, T. Lackner leg. (JCHE); 1 ♂, Okinawa Pref., Okinawa Is., Oku, 30.i.2003, H. Irei leg. (FUFJ); 1 ♀, Okinawa Pref., Okinawa Is., Kunigami Village, Aha, 4–17.ii.2009, K. Sugino leg. (MT) (FUFJ); 3 ♂♂, 2 ♀♀, Okinawa Pref., Okinawa Is., Kunigami Village, Ie-Rindô, 13–22.ii.2004, S. Nomura leg. (FIT) (FUFJ); 1 ♂, Okinawa Pref., Okinawa Is., Kunigami Village, Mt. Nishimedake, 13–22.ii.2004, S. Nomura leg. (FIT) (FUFJ).

**Diagnosis.** Body 2.5–3.0 mm long, ca. 1.7× as long as wide. Elytra bicolored. Each elytron with nine distinct rows of punctures and a subhumeral row ca. as long as 1/4 or 1/3 of elytral length. Mesoventrite without distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Mesotibiae without distinct sexual dimorphism. Metafemora sexually dimorphic. Male metatibiae feebly curved. Female abdominal sternite 8 with a spiculum ventrale.

**Description.** Measurement of holotype: Body length 3.0 mm; head 0.50 mm in length and

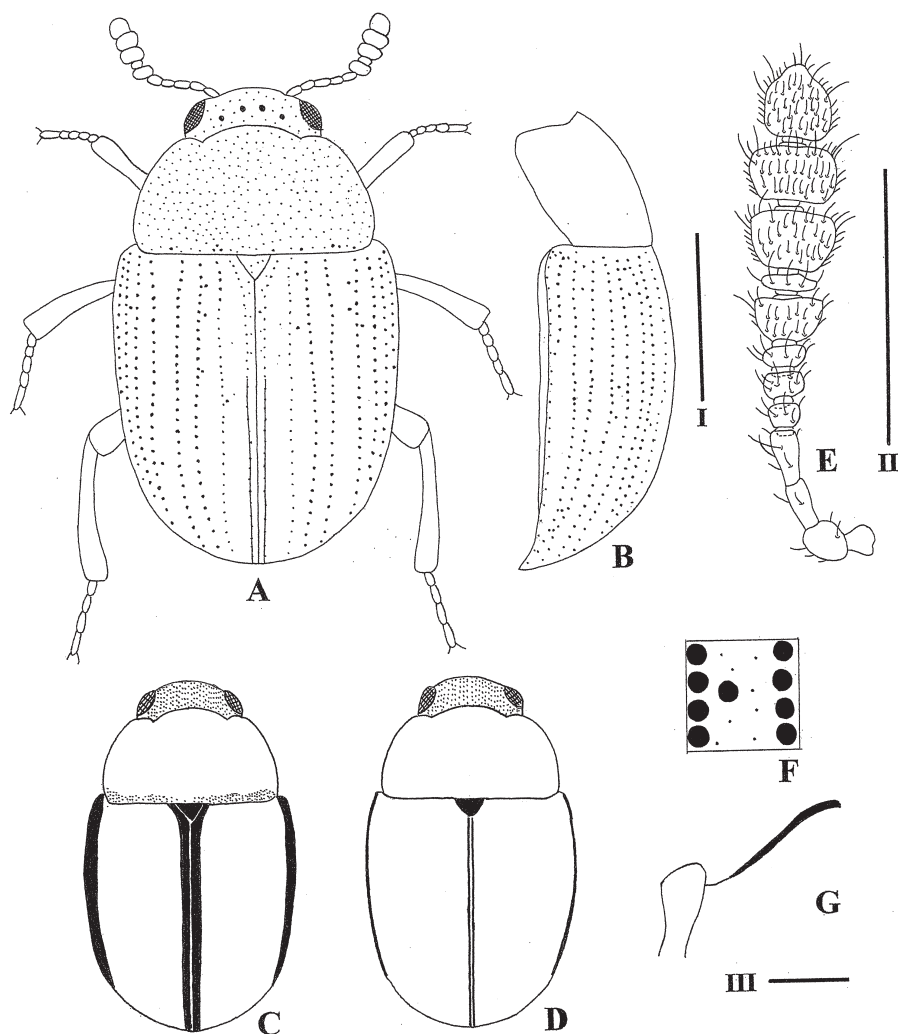


Fig. 55. *Leiodes naraharai* sp. nov. A – body, dorsal view; B – ditto, lateral view; C and D – dorsal color; E – antenna; F – elytral punctures; G – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for E; III: 0.2 mm for G.

0.81 mm in width; pronotum 0.86 mm in length and 1.5 mm in width; elytra 1.9 mm in length and 1.7 mm in width.

**Coloration.** Dorsum shining; head brown; pronotum usually yellowish brown, rarely brown, sometimes blackish near posterior margin (Figs. 55C, 55D); elytra bicolored, yellowish brown with black stripes near elytral suture and lateral margins (Figs. 55C, 55D); antennomeres 1–6 brown; antennomere 8 dark reddish brown; antennomeres 7, 9, 10, and basal 3/5 of antenno-

mere 11 blackish brown; apical 2/5 of antennomere light brown; legs brownish; procoxae, metacoxae, and all trochanters brown; remaining parts of legs light brown; mesoventrite, metaventrite and abdominal ventrites light brown.

Body 2.5–3.0 mm in length, ca.  $1.7\times$  as long as wide.

Head ca.  $1.7\times$  as wide as long, ca.  $0.56\times$  as long as and  $0.58\times$  as wide as pronotum, distinctly and densely punctate (Fig. 55A), usually bearing some large punctures (Fig. 55A); antennomeres 1–3 each longer than wide; antennomere 11 about as long as wide and oval; remaining antennomeres each wider than long (Fig. 55E); relative lengths of antennomeres 2 to 11 – 3.1 : 3.3 : 1.4 : 1.6 : 1.4 : 2.6 : 1.0 : 3.4 : 3.3 : 4.4.

Pronotum ca.  $1.7\times$  as wide as long, ca.  $0.43\times$  as long as and  $0.83\times$  as wide as elytra, widest near base, simply and very feebly curved at posterior margin, distinctly and densely punctate, punctation similar to that on head (Fig. 55A).

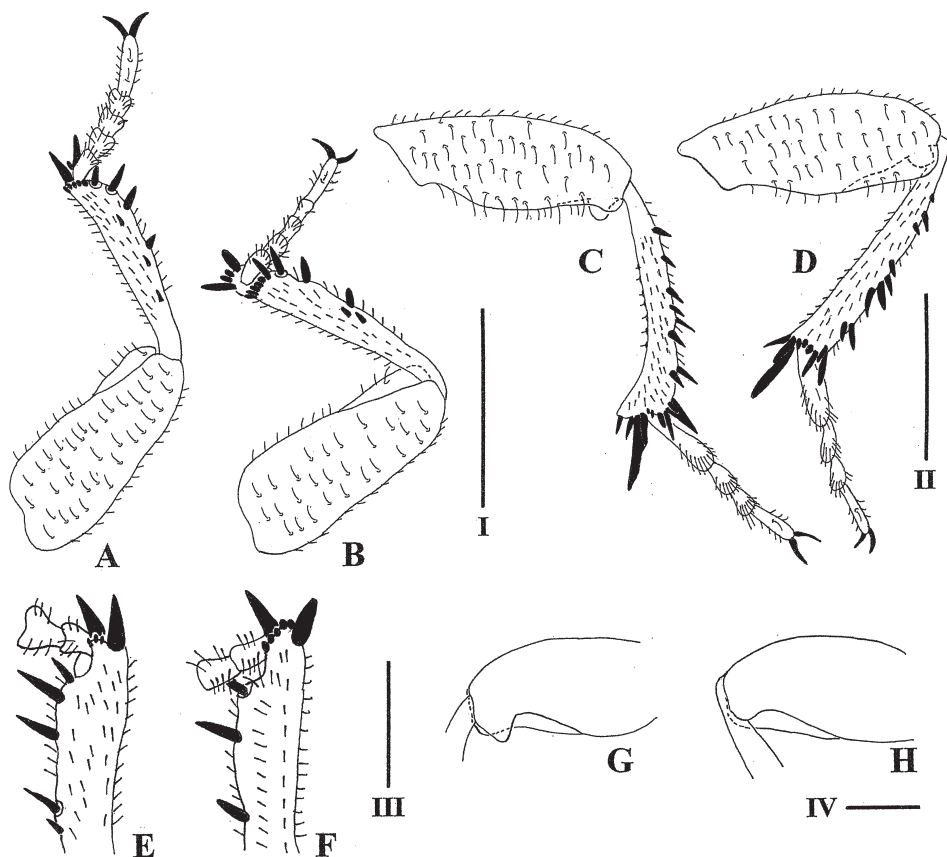


Fig. 56. *Leiodes naraharai* sp. nov. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male hind leg, ventral view; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 0.5 mm for A and B; II: 0.5 mm for C and D; III: 0.2 mm for E and F; IV: 0.2 mm for G and H.

Scutellum distinctly punctate.

Elytra ca.  $1.1\times$  as long as wide in dorsal view, widest ca. at basal  $1/3$  (Fig. 55A), not transversely strigose; each elytron with nine rows of punctures, bearing small number of large punctures and moderate number of very fine punctures between rows (Fig. 55F); row 9 invisible in dorsal view, subhumeral row ca. as long as  $1/4$  or  $1/3$  of elytral length (Fig. 55B); rows composed of puncture larger than those on pronotum (Fig. 55A); sutural stria fine, reaching from apex to ca. apical half of elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, without distinct excavation between median carina and transverse carina (Fig. 55G); median carina of mesoventrite low (Fig. 55G); metaventrite without sexual dimorphism, sparsely pubescent, distinctly microreticulate except for almost smooth middle portion.

Legs sexually dimorphic on protarsi, mesotarsi, metafemora, and metatibiae; protibiae gradually and very feebly widening from base towards apex (Figs. 56E, 56F).

**Male.** Tarsomeres 2–4 of protarsi and mesotarsi a little expanded (Fig. 56A); metafemur with a large dorsal projection posteroapically (Fig. 56G); metatibiae feebly curved inwards, with some small robust spines along internal margins (Fig. 56C); abdominal sternite 8 weak-

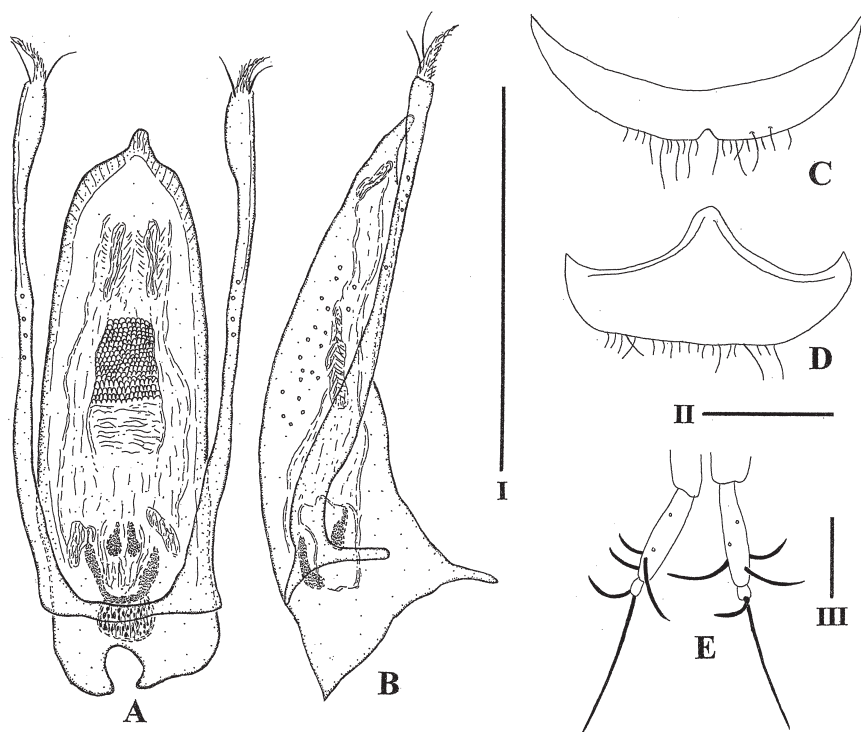


Fig. 57. *Leiodes naraharai* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D; III: 0.1 mm for E.

ly curved (Fig. 57C); aedeagus relatively robust (Figs. 57A, 57B); median lobe distinctly protuberant at apex in dorsal view (Fig. 57A), bluntly pointed apically in lateral view (Fig. 57B); each paramere pubescent at apex, bearing two apical setae, expanded in about apical 1/7 in dorsal view (Fig. 57A).

**Female.** Protarsi and mesotarsi slender (Fig. 56B); metafemora with a small dorsal projection posteroapically (Fig. 56H); metatibiae almost straight (Fig. 56D); abdominal sternite 8 with a spiculum ventrale at central point of anterior margin (Fig. 57D); coxites and stylus as shown in Fig. 57E.

**Morphological variability.** *Leiodes naraharai* sp. nov. shows intraspecific variation of dorsal coloration (Figs. 55C, 55D). The differences do not correlate to geographic region nor to the body size.

**Differential diagnosis.** *Leiodes naraharai* sp. nov. is similar to *L. osawai* Nakane, 1963 in having a bicolored dorsum, but can be distinguished from it by the oval body shape (Fig. 55A) and the mesoventrite without an excavation between the median carina and transverse carina (Fig. 55G). In contrast, *L. osawai* has a cylindrical body shape (Fig. 87A) and mesoventrite with a distinct excavation (Fig. 87I). *Leiodes naraharai* sp. nov. is also similar to *L. bicolor* (Fairmaire, 1858) inhabiting Europe and the Russian Far East by having a bicolored dorsum, but can be separated from it by having the median lobe protuberant apically (Fig. 57A). In contrast, *L. bicolor* has the median lobe rounded at the apex.

**Etymology.** The species name is dedicated to a prefectural governor Shigeru Narahara (1834–1918) who contributed to the modernization of Okinawa Island.

**Distribution.** Japan: Ryukyus (Amami-Ōshima and Okinawa Islands).

### 19. *Leiodes shuheii* sp. nov.

Japanese name: Sakishima-kuromon-ô-tamakinokomushi  
(Figs. 58–60, 115)

**Type locality.** Japan, Ryukyus, Yonaguni Is., Mt. Kubura-dake.

**Type material.** JAPAN: RYUKYUS: HOLOTYPE, ♂, Yonaguni Is., Mt. Kubura-dake, 15.–19.iii.2005, S. Nomura leg. (FIT) (MNHAH). PARATYPES: 1 ♂, same data as holotype; 5 ♀♀, Yonaguni Is., Mt. Inbi-dake 15.–19.iii.2005, S. Nomura leg. (FIT) (FUFJ).

**Diagnosis.** Body 2.4–2.8 mm long, ca. 1.9× as long as wide. Elytra bicolored. Each elytron with nine distinct rows of punctures and a subhumeral row as long as ca. 1/4 or 1/3 of elytral length. Mesoventrite without distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Mesotibiae without distinct sexual dimorphism. Metafemora showing sexual dimorphism. Male metatibiae feebly curved. Female abdominal sternite 8 with a spiculum ventrale.

**Description.** Measurements of holotype: Body length 2.8 mm; head 0.50 mm in length and 0.78 mm in width; pronotum 0.75 mm in length and 1.2 mm in width; elytra 1.7 mm in length and 1.4 mm in width.

Coloration. Dorsum shining; head brown; pronotum yellowish brown or brown (Figs. 58C, 58D); elytra bicolored, yellowish brown with black spots near elytral suture and lateral margins (Figs. 58C, 58D); antennomeres 1–6 brown; antennomere 8 dark reddish brown; antennomeres 7, 9, 10, and basal 3/5 of antennomere 11 blackish brown; apical 2/5 of antennomere 11 light

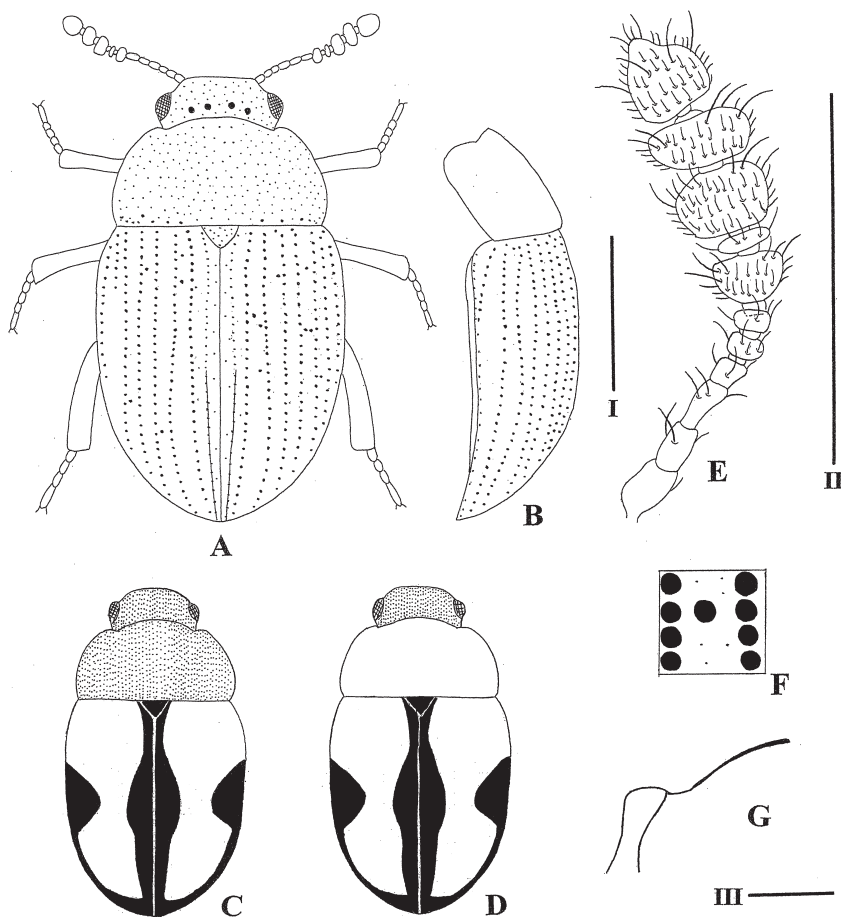


Fig. 58. *Leiodes shuheii* sp. nov. A – body, dorsal view; B – ditto, lateral view; C and D – dorsal color; E – antenna; F – elytral punctures; G – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for E; III: 0.2 mm for G.

brown; legs light brown or brown; procoxae, metacoxae and all trochanters a little darker than other parts; mesoventrite, metaventrite, and abdominal ventrites light brown.

Body 2.4–2.8 mm in length, ca.  $1.9\times$  as long as wide.

Head ca.  $1.6\times$  as wide as long, ca.  $0.64\times$  as long as and  $0.61\times$  as wide as pronotum, distinctly and densely punctate (Fig. 58A), usually bearing some large punctures (Fig. 58A); antennomeres 1–3 each longer than wide; antennomeres 4 and 11 each about as long as wide; remaining antennomeres each wider than long; antennomere 11 oval (Fig. 58E); relative lengths of antennomeres 2 to 11 – 3.0 : 3.1 : 1.7 : 1.4 : 1.3 : 2.9 : 1.0 : 3.9 : 3.0 : 5.0.

Pronotum ca.  $1.7\times$  as wide as long, ca.  $0.44\times$  as long as and  $0.90\times$  as wide as elytra, widest near base, simply and very feebly curved at posterior margin, distinctly and densely punctate, punctuation similar to that on head (Fig. 58A).

Scutellum distinctly punctate.

Elytra ca.  $1.2\times$  as long as wide in dorsal view, widest ca. at basal 1/3 (Fig. 58A), not transversely strigose; each elytron with nine rows of punctures, bearing small number of large punctures and moderate number of very fine punctures between rows (Fig. 58F); row 9 invisible in dorsal view, subhumeral row ca. as long as 1/3 of elytral length (Fig. 48B); rows composed of punctures larger than those on pronotum (Fig. 58A); sutural stria fine, reaching from apex to ca. apical half of the elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, without distinct excavation between median carina and transverse carina (Fig. 58G); median carina of mesoventrite low (Fig. 58G); metaventrite without sexual dimorphism, sparsely pubescent, distinctly microreticulate except for almost smooth middle portion.

Legs sexually dimorphic on protarsi, mesotarsi, metafemora, and metatibiae; protibiae gradually and very feebly widening from base towards apex (Figs. 59E, 59F).

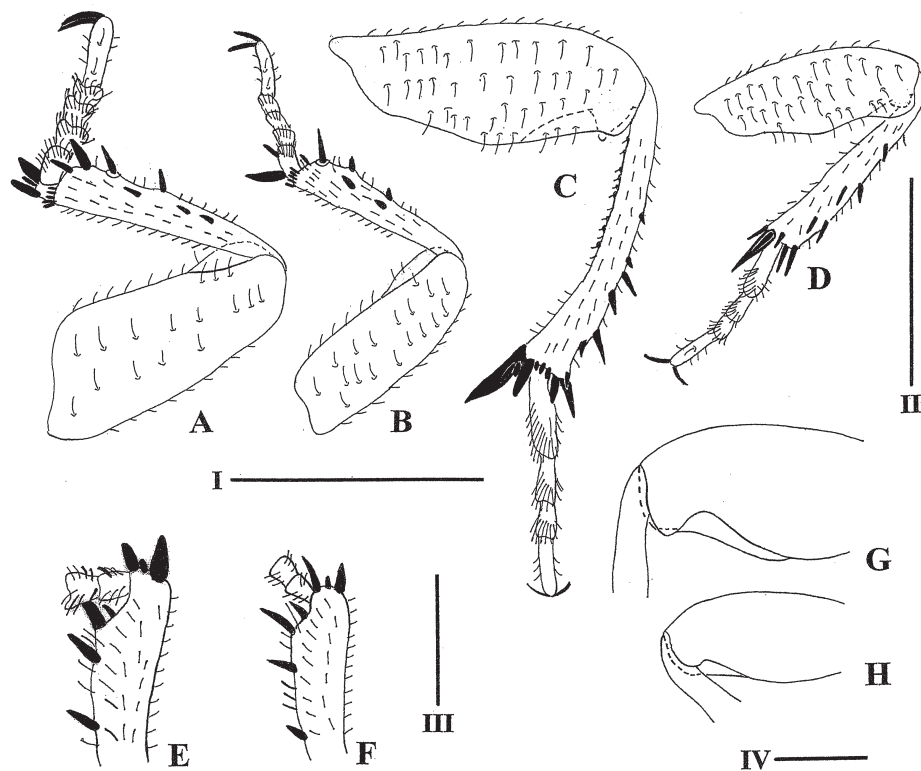


Fig. 59. *Leiodes shuheii* sp. nov. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male hind leg, ventral view; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 0.5 mm for A and B; II: 0.5 mm for C and D; III: 0.2 mm for E and F; IV: 0.2 mm for G and H.



**Male.** Tarsomeres 2–4 of protarsi and mesotarsi a little expanded (Fig. 59A); metafemur with a large dorsal projection posteroapically (Fig. 59G); metatibiae feebly curved inwards, with some tiny spines along internal margins (Fig. 59C); abdominal sternite 8 weakly curved (Fig. 60C); aedeagus relatively robust (Figs. 60A, 60B); median lobe distinctly protuberant at apex in dorsal view (Fig. 60A), bluntly pointed apically in lateral view (Fig. 60B); each paramere bearing two apical setae and a transparent small apical lobe, feebly expanded ca. in apical 1/7 in dorsal view (Fig. 60A).

**Female.** Protarsi and mesotarsi slender (Fig. 59B); metafemur with a small dorsal projection posteroapically (Fig. 59H); metatibiae almost straight (Fig. 59D); abdominal sternite 8 with spiculum ventrale at central point of anterior margin (Fig. 60D); coxites and stylus as shown in Fig. 60E.

**Morphological variability.** *Leiodes shuheii* sp. nov. shows intraspecific variation of dorsal coloration (Figs. 58C, 58D). The differences do not correlate to body size.

**Differential diagnosis.** *Leiodes shuheii* sp. nov. is very similar to *L. naraharai* sp. nov. in the morphology of the aedeagus, but can be distinguished from it by having the elytra with relatively large black spots (Figs. 58C, 58D) and each paramere bearing a transparent small lobe at the apex (Fig. 60A). In contrast, *L. naraharai* sp. nov. has the elytra with slender black stripes (Figs. 55C, 55D) and each paramere pubescent at the apex (Fig. 57A). *Leiodes shuheii*

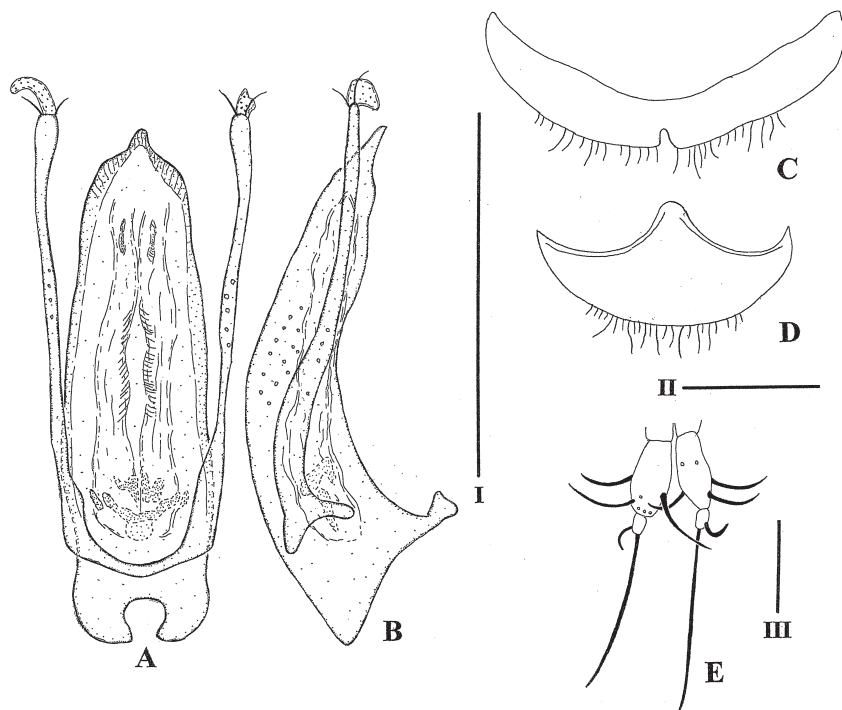


Fig. 60. *Leiodes shuheii* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D; III: 0.1 mm for E.

sp. nov. resembles the Nepalese species *L. fuscoturalis* Švec, 2008 in the dorsal coloration, but can be separated from it by having an almost unicolor pronotum and the median lobe distinctly protuberant apically (Fig. 60A), whereas the pronotum is maculate and the median lobe is simply triangular at the apex in *L. fuscoturalis*.

**Etymology.** The species name is dedicated to Dr. Shûhei Nomura who kindly donated me many valuable specimens of *Leiodes* used in this study.

**Distribution.** Japan: Ryukyus (Yonaguni Island).

### *Leiodes okawai* species group

**Species included.** *Leiodes kamezawai* sp. nov., *L. okawai* Nakane, 1963, *L. yukihiroi* sp. nov.

**Diagnosis.** Elytra unicolor and with sparsely arranged large punctures between rows of punctures (Figs. 61D, 64D, 67D); mesoventrite with distinct excavation between median carina and transverse carina (Figs. 61E, 64E, 67E); protarsi sexually dimorphic, tarsomeres 2–4 a little expanded in males (Figs. 62A, 65A, 68A); mesotibiae without sexual dimorphism, simply square at interoapical corner; male metafemur bearing prominent dorsal projection posteroapically, projection of female much smaller than in male (Figs. 62G, 62H, 65G, 65H, 68G, 68H); pubescence of metaventricle distinctly or indistinctly sexually dimorphic (Figs. 61F, 61G, 64F, 64G, 67F, 67G); aedeagus relatively small compared to body size, with one or a few small sclerites in inner sacs (Figs. 63A, 66A, 69A); male abdominal sternite 8 moderately or strongly curved (Figs. 63C, 66D, 69C); female abdominal sternite 8 with a spiculum ventrale at central point of anterior margin (Figs. 63D, 66E, 69D).

**Differential diagnosis.** *Leiodes okawai* species group can be separated from other species group by having the male metafemur bearing a prominent dorsal projection posteroapically and the aedeagus relatively small compared to the body size.

### 20. *Leiodes kamezawai* sp. nov.

Japanese name: Amami-ô-tamakinokomushi

(Figs. 1, 61–63, 116)

**Type locality.** Japan, Ryukyus, Kagoshima Pref., Amami-Ôshima Is., Mt. Yuwandake.

**Type material.** JAPAN: RYUKYUS: HOLOTYPE, ♂, Kagoshima Pref., Amami-Ôshima Is., Mt. Yuwandake, 21.–24.ii.2010, S. Nomura leg. (FIT) (MNHAH). PARATYPES: 5 ♀♀, same data as holotype (FUFJ); 4 ♀♀, Kagoshima Pref., Amami-Ôshima Is., Mt. Yuwandake, 26.–27.iii.2002, H. Sugaya leg. (FIT) (FUFJ); 1 ♂, Kagoshima Pref., Amami-Ôshima Is., Sumiyô Village, near Santarô-tôge, 27.ii.2004, H. Kamezawa leg. (FIT) (FUFJ).

**Diagnosis.** Body 2.6–3.4 mm long, ca. 1.9× as long as wide. Dorsum brown or light brown. Each elytron with nine distinct rows of punctures, without subhumeral row. Mesoventrite with a distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Mesotibiae without distinct sexual dimorphism. Male metafemur slender, bearing large dorsal projection posteroapically. Male metatibiae distinctly curved. Female abdominal sternite 8 with a spiculum ventrale.

**Description.** Measurement of holotype: Body length 2.9 mm; head 0.60 mm in length and 0.87 mm in width; pronotum 0.82 mm in length and 1.4 mm in width; elytra 1.8 mm in length and 1.6 mm in width.

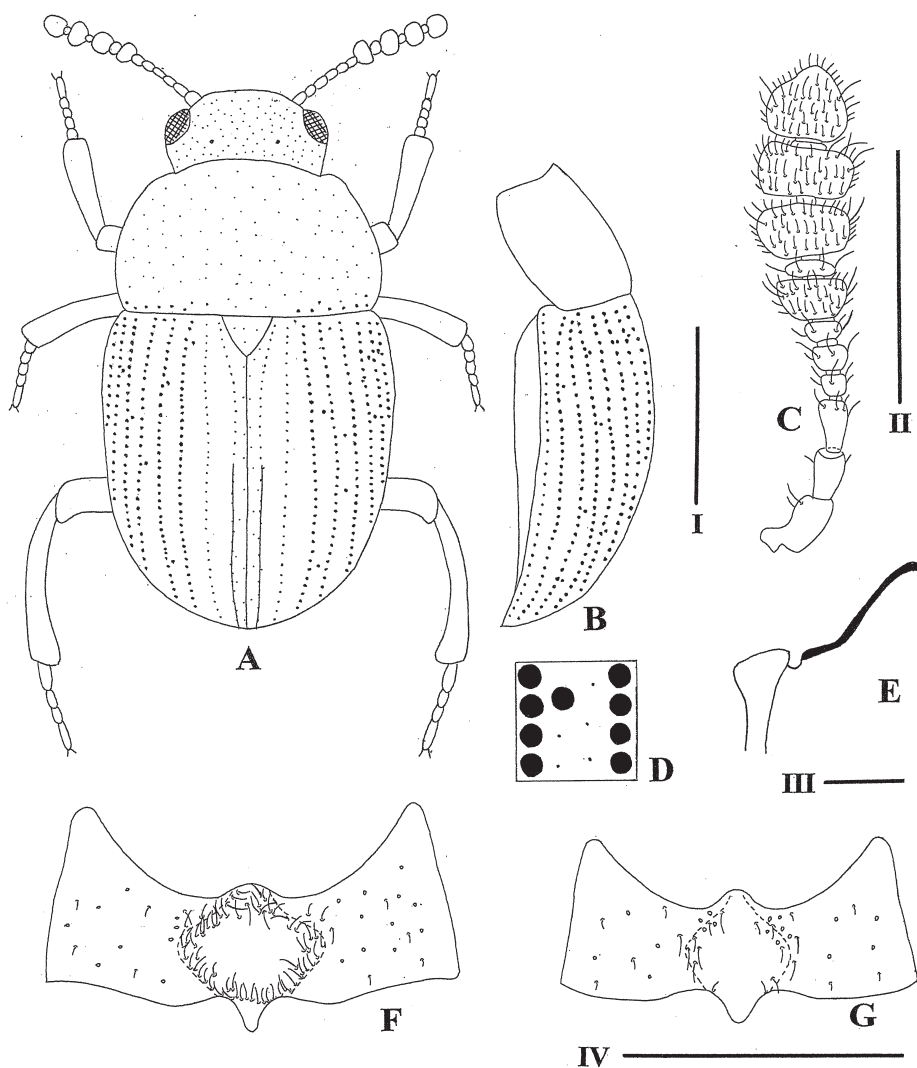


Fig. 61. *Leiodes kamezawai* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view; F – male metaventrite; G – female metaventrite. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.2 mm for E; IV: 1 mm for F and G.

**Coloration.** Dorsum shining and almost unicolor, brown or light brown; antennomeres 1–6 and 8 brown; antennomeres 9, 10, and basal 2/5 of 11 dark brown; apical 3/5 of antennomere 11 light brown; legs brown or light brown; mesoventrite, metaventrite and abdominal ventrites brown or light brown.

Body 2.6–3.4 mm in length, ca. 1.9× as long as wide.

Head ca.  $1.6\times$  as wide as long, ca.  $0.65\times$  as long as and  $0.63\times$  as wide as pronotum, minutely and densely punctate (Fig. 61A) and usually bearing some large punctures (Fig. 61A); antennomeres 1–3 each longer than wide; antennomeres 4 and 11 each as long as wide; remaining antennomeres each wider than long; antennomere 11 robust (Fig. 61C); relative lengths of antennomeres 2 to 11 –  $2.4 : 3.3 : 1.3 : 1.6 : 1.3 : 2.7 : 1.0 : 3.6 : 3.4 : 4.8$ .

Pronotum ca.  $1.6\times$  as wide as long, ca.  $0.48\times$  as long as and  $0.88\times$  as wide as elytra, widest near base, simply and very feebly curved at posterior margin, minutely and densely punctate, punctation similar to that on head (Fig. 61A).

Scutellum distinctly punctate.

Elytra ca.  $1.1\times$  as long as wide in dorsal view, widest ca. at basal  $1/4$  (Fig. 61A), not transversely strigose; each elytron with nine rows of punctures, bearing small number of

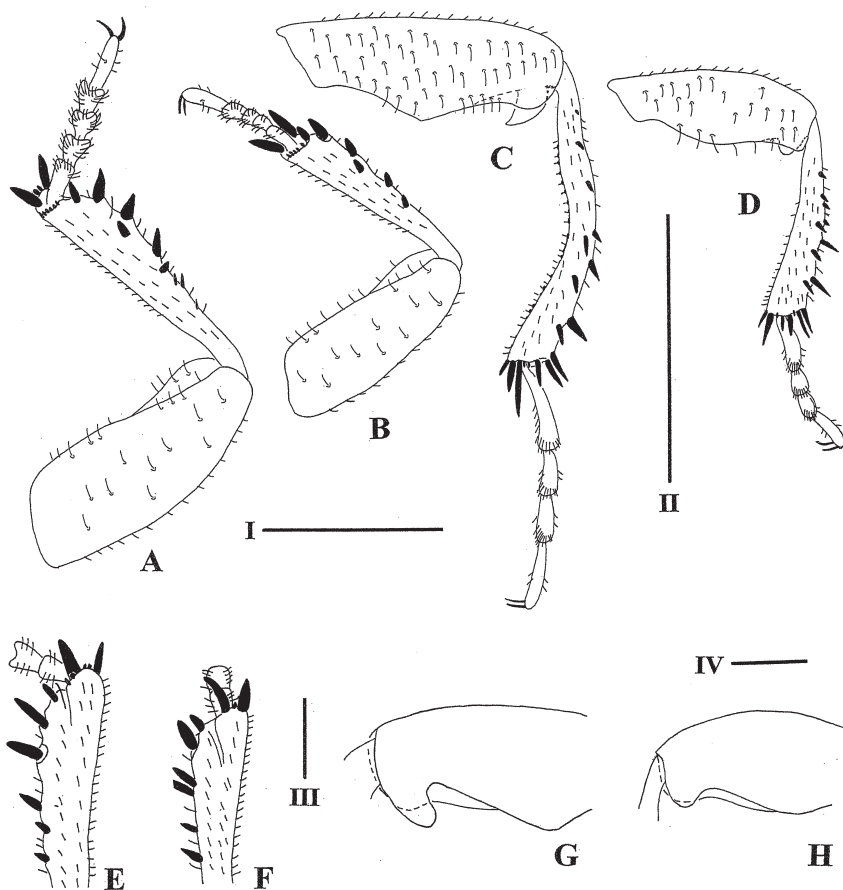


Fig. 62. *Leiodes kamezawai* sp. nov. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male hind leg, ventral view; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 0.5 mm for A and B; II: 1 mm for C and D; III: 0.2 mm for E and F; IV: 0.2 mm for G and H.

large punctures and moderate number of very fine punctures between rows (Fig. 61D); row 9 almost straight, subhumeral row absent (Fig. 61B); rows composed of punctures larger than those of pronotum (Fig. 61A); sutural stria fine, reaching from apex to ca. apical half of the elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, with distinct excavation between median carina and transverse carina (Fig. 61E); median carina of mesoventrite low (Fig. 61E); metaventrite sexually dimorphic, sparsely pubescent, distinctly microreticulate except for almost smooth middle portion.

Legs showing sexual dimorphism on protarsi, mesotarsi, metafemora, and metatibiae; protibiae gradually widening from base towards apex at internal margins (Figs. 62E, 62F).

**Male.** Middle portion of metaventrite densely and finely pubescent (Fig. 61F); tarsomeres 2–4 of protarsi and mesotarsi a little expanded (Fig. 62A); metafemur slender, triangularly protuberant ca. at midlength of posterior margin (Fig. 62C), bearing large dorsal projection posteroapically (Fig. 62G); metatibiae slender, curved inwards, bearing some very tiny spines

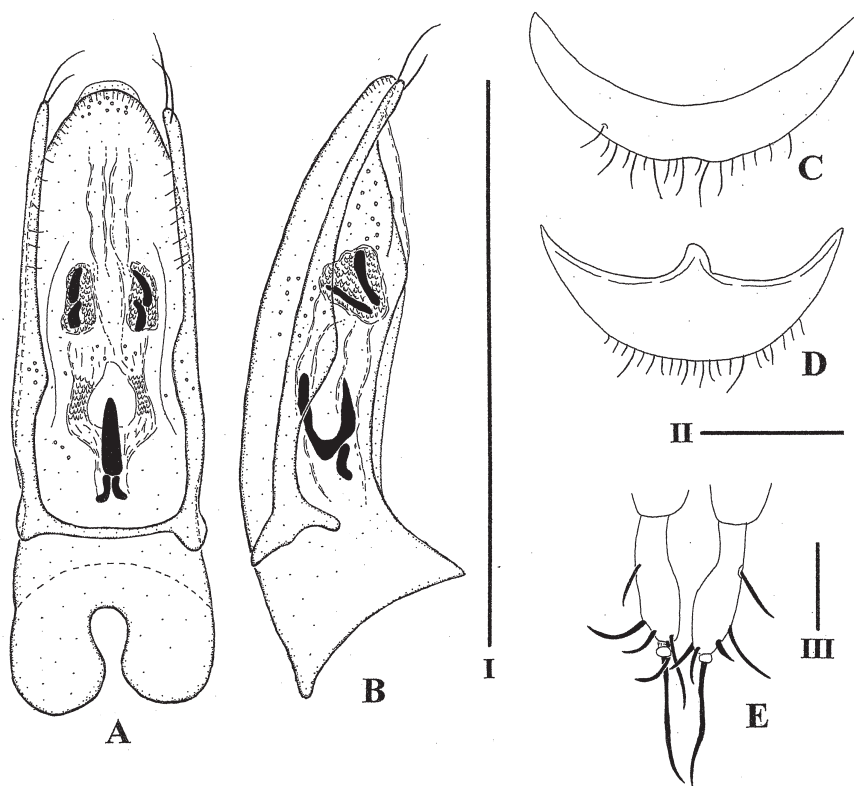


Fig. 63. *Leiodes kamezawai* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D; III: 0.1 mm for E.

at internal margins (Fig. 62C); abdominal sternite 8 moderately curved (Fig. 63C); aedeagus relatively thick (Figs. 63A, 63B); median lobe simply styloid in dorsal view (Fig. 63A), feebly curved in lateral view (Fig. 63B); each paramere slender, distinctly expanded at about basal 2/5, bearing two apical setae (Fig. 63A).

**Female.** Middle portion of metaventrite sparsely and finely pubescent (Fig. 61G); protarsi and mesotarsi slender (Fig. 62B); metafemur relatively robust, weakly curved along posterior margins (Fig. 62D), with moderate dorsal projection posteroapically (Fig. 62H); metatibiae almost straight and relatively robust (Fig. 62D); abdominal sternite 8 with spiculum ventrale at central point of anterior margin (Fig. 63D); coxites and stylus as shown in Fig. 63E.

**Differential diagnosis.** *Leiodes kamezawai* sp. nov. is similar to *L. okawai* in having slender metafemora, but can be distinguished from the latter by having antennae with antennomere 11 only a little narrower than antennomere 10 (Fig. 61C) and the male metatibiae distinctly curved (Fig. 62C). In contrast, *L. okawai* has antennomere 11 clearly narrower than antennomere 10 (Fig. 64C) and male metatibiae feebly curved (Fig. 65C). *Leiodes kamezawai* sp. nov. is also similar to the Chinese species *L. nikodymi* Švec, 1991 by having slender metafemora and metatibiae, but can be separated from it by having the median lobe of the aedeagus rounded apically in dorsal view (Fig. 63A). In contrast, *L. nikodymi* has the median lobe protuberant apically.

**Etymology.** The species is dedicated to Mr. Hiromu Kamezawa who kindly offered valuable specimens of *Leiodes* used in this study.

**Distribution.** Japan: Ryukyus (Amami-Ōshima Island).

## 21. *Leiodes okawai* Nakane, 1963

Japanese name: Kiuro-ô-tamakinokomushi

(Figs. 6, 64–66, 116)

*Leiodes okawai* Nakane, 1963: 41; DAFFNER (1983): 108 (redescription); PERREAU (2004): 197 (catalogue).

**Type locality.** Japan, Honshu, Mie Pref., Hirakura.

**Type material examined.** JAPAN: HONSHU: HOLOTYPE, ♂, Mie Pref., Hirakura, 12.vi.1960, T. Okawa leg. (HUMS).

**Additional material examined.** JAPAN: KYUSHU: 1 ♂, Kumamoto Pref., Ue Village, Mt. Shiragadake 14.viii.2000, K. Kido leg.; 1 ♂, Kumamoto Pref., forest in Itsukimura Village (32°28'36"N 130°46'42"E, alt. 900 m), 17.vii.2009, M. Makiyama leg. (PT). SHIKOKU: 1 ♂, Kôchi Pref., forest in Aki (33°39'15.2"N 134°09'28.9"E, alt. 700 m), 30.vi.2010, M. Makiyama leg. (PT); 1 ♂, Kôchi Pref., forest in Aki (33°39'14.9"N 134°09'28.8"E, alt. 700 m), 4.viii.2010, M. Makiyama leg. (MT); 5 ♂♂, 1 ♀, Ehime Pref., West ravine of Mt. Shiratsue, 3.vii.1986, T. Nagata leg. (collected by treacle traps) (EUMJ); 3 ♂♂, 1 ♀, Tokushima Pref., Yamakawa Town, Mt. Kôtsu, 2–10.viii.2003, K. Tanaka leg. (FIT); 2 ♂♂, 1 ♀, Tokushima Pref., Yamakawa Town, Okunoi, 3–8.vii.2003, K. Tanaka leg. (FIT); 1 ♂, 1 ♀, 8–14.vii.2003, same data as the former except for the date. HONSHU: 2 ♂♂, 2 ♀♀, Okayama Pref., Chûka Village, Mt. Yamanorisen, 11.vii.2004, Y. Fujitani leg. (FIT); 1 ♂, 3 ♀♀, Okayama Pref., Nagi Town, Takiyama, 29.vi.–9.vii.2005, S. Suzuki leg. (FIT); 1 ♂, same data as the former except for the date, 14.–23.vii.2005; 6 ♂♂, 4 ♀♀, Okayama Pref., Nagi Town, Mt. Nagisan, 29.vi.–9.vii.2005, S. Suzuki leg. (FIT); 1 ♂, 1 ♀, Mie Pref., Mt. Nonobori, 8.vii.2001, M. Inagaki leg. (FIT); 1 ♀, same data as the former except for the date, 12.vii.2001; 1 ♂, 2 ♀♀, same data as the former except for the date, 15.vii.2001; 1 ♂, same data as the former except for the date, 22.vii.2001; 1 ♂, Gifu Pref., Shirakawa Village, Ō-shirakawa, 3.vii.2004, K. Toyoshima leg. (FIT); 1 ♂, 1 ♀, 19.vii.2004, same data as the former except for the date; 1 ♂, 1 ♀, same data as the former except for the date, 31.vii.2004; 1 ♂, 1 ♀, Fukui Pref., Ōno City, Heikedaira, 1.viii.1997, S. Inoue leg.; 1 ♂, Shizuoka Pref., Sakuma Town, Mt. Ryuto-zan, 7.vii.1995, T. Kishimoto leg.; 4 ♂♂, Tokyo Pref., Hinohara Village, Mt. Mitôsan (alt. 1100 m), 16–23.vii.2008, H. Takano leg. (FIT); 1 ♂, 1 ♀, same data as the former except for the date, 16–23.vii.2008; 2 ♂♂, Saitama Pref., Ohtaki Village,

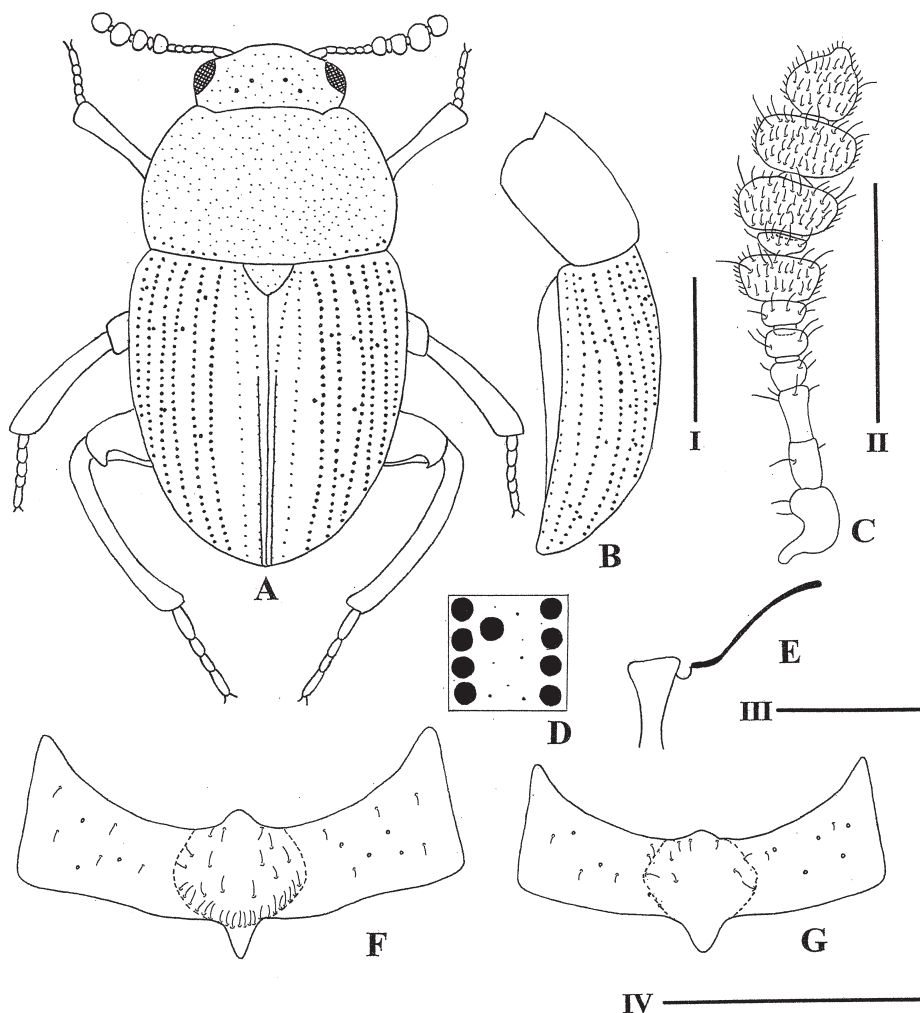


Fig. 64. *Leiodes okawai* Nakane, 1963. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view; F – male metaventricle; G – female metaventricle. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.5 mm for E; IV: 1 mm for F and G.

Nakatsukawa-keikoku, Oku-Chichibu-rindô (alt. 1300m), 30.vii.–7.viii. 004, K. Arai & S. Arai leg. (FIT); 2 ♀♀, Saitama Pref., Naguri Village, Mt. Arimayama (alt. 1200 m), 17.–24.ix.2004, K. Arai and S. Arai leg. (FIT); 5 ♂♂, 1 ♀, Miyagi Pref., Sendai City, Mt. Izumigadake, Kuwanuma-rindô, 12.–22.vii.2009, M. Oikawa leg. (FIT); 1 ♀, Aomori Pref., Kuroishi City, Nagayasawa, 28.v.1998, T. Ichita leg.; 1 ♂, Aomori Pref., Mutsu City, Kanauchi-chô, Yunokawa-tôge, 24.vii.1999, S. Araki leg. All specimens except for type series are preserved in FUFJ.

**Diagnosis.** Coloration. Dorsum usually unicolor, brown or yellowish brown; antennomeres 1–6 and 8 brown; antennomeres 7, 9, 10, and basal 3/5 of antennomere 11 dark brown; apical 2/5 of antennomere 11 light brown.



Body 2.6–3.5 mm in length, ca. 1.8× as long as wide (Fig. 64A). Head densely and minutely punctate, bearing some large punctures (Fig. 64A); antennomeres 1–3 longer than wide; antennomere 11 about as long as wide; remaining antennomeres each wider than long; antennomere 11 robust and clearly narrower than antennomere 10 (Fig. 64C). Pronotum feebly sinuate at posterior margin, densely and minutely punctate (Fig. 64A). Elytra not transversely strigose; each elytron with nine rows of punctures, bearing small number of large punctures and moderate number of very fine punctures between rows (Fig. 64D); row 9 invisible in dorsal view, almost straight, subhumeral row absent (Fig. 64B); rows composed of punctures larger and deeper than those on pronotum (Fig. 64A); sutural stria fine, reaching from apex to ca. apical 3/5 of the elytral length. Metathoracic wings fully developed. Mesoventrite with one distinct excavation between median carina and transverse carina (Fig. 64E); median carina of mesoventrite low (Fig. 64E); metaventrite sexually dimorphic. Legs showing distinct sexual

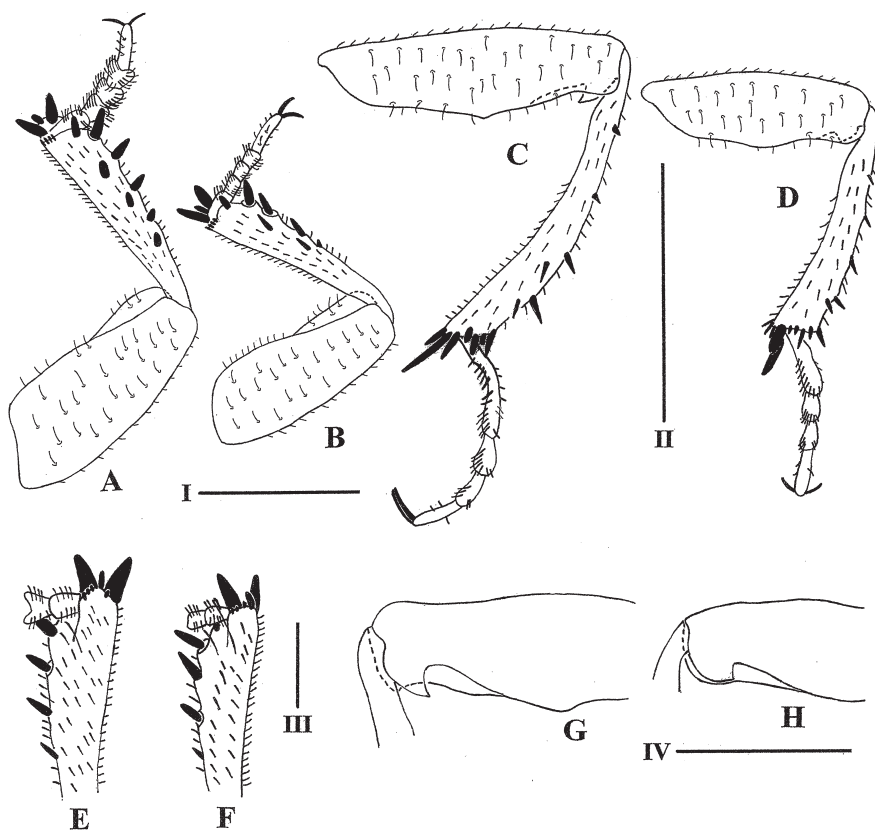


Fig. 65. *Leiodes okawai* Nakane, 1963. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male hind leg, ventral view; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 0.5 mm for A and B; II: 1 mm for C and D; III: 0.2 mm for E and F; IV: 0.5 mm for G and H.

dimorphism on protarsi, mesotarsi, metafemora, metatibiae, and metatarsi; protibiae gradually widening from base towards apex at internal margins (Figs. 65E, 65F).

**Male.** Middle portion of metaventrite moderate pubescent (Fig. 64F); tarsomeres 2–4 of protarsi and mesotarsi a little expanded (Fig. 65A); metafemur very slender, weakly and triangularly protuberant at about middle of posterior margins (Fig. 65C), with large dorsal projection posteroapically (Fig. 65G); metatibiae slender and feebly curved (Fig. 65C); tarsomere 1 of metatarsi very long and feebly curved (Fig. 65C); abdominal sternite 8 strongly curved (Fig. 66D); aedeagus (Figs. 66A, 66B) relatively small, its length less than 1/5 of body length; inner sac as shown in Fig. 66C.

**Female.** Middle portion of metaventrite sparsely pubescent mainly on basal half and almost glabrous near metacoxae (Fig. 64G); protarsi and mesotarsi slender (Fig. 65B); metafemur moderately slender (Fig. 65D), with a moderate dorsal projection posteroapically (Fig. 65H); metatibiae almost straight (Fig. 65D); tarsomere 1 of metatarsi almost straight (Fig. 65D); abdominal sternite 8 with spiculum ventrale at central point of anterior margin (Fig. 66E); coxites and stylus as shown in Fig. 66F.

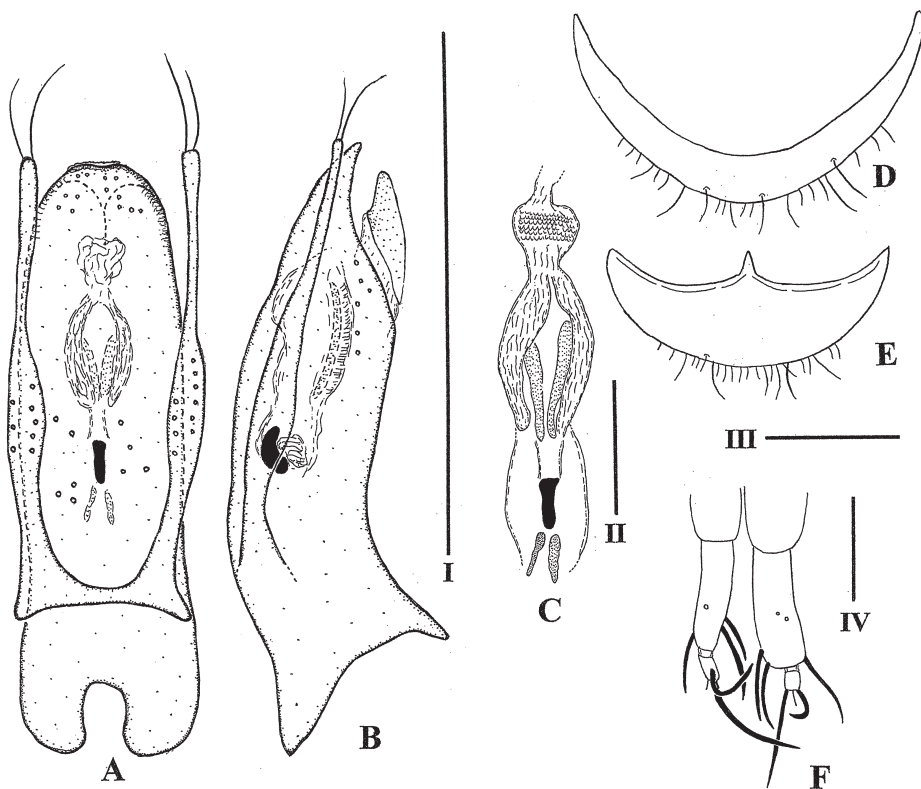


Fig. 66. *Leiodes okawai* Nakane, 1963. A – aedeagus, dorsal view; B – ditto, lateral view; C – inner sac, dorsal view; D – male abdominal sternite 8; E – female abdominal sternite 8; F – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.1 mm for C; III: 0.2 mm for D and E; IV: 0.1 mm for F.

**Differential diagnosis.** *Leiodes okawai* is similar to the European *L. cinnamomea* (Panzer, 1793) in having the male metafemora with a large dorsal projection posteroapically but can be distinguished from the latter by having the pronotum feebly sinuate at the posterior margin, the male metatibia feebly curved (Fig. 65C), and the aedeagus relatively robust (Fig. 66A). In contrast, *L. cinnamomea* has the pronotum straight at the posterior margin, the male metatibia strongly curved, and the aedeagus relatively slender.

**Distribution.** Japan: Honshu, Shikoku, and Kyushu. New to Shikoku and Kyushu.

## 22. *Leiodes yukihiroi* sp. nov.

Japanese name: Momonaga-ô-tamakinokomushi  
(Figs. 6, 67–69, 116)

**Type locality.** Japan, Kyushu, Miyazaki Pref., Aya Town, Kawanaka.

**Type material.** **JAPAN:** KYUSHU: HOLOTYPE, ♂, Miyazaki Pref., Aya Town, Kawanaka, 26.iv.2007, K. Iwakiri leg. (MNHAH); PARATYPES: 1 ♂, 1 ♀, same data as holotype (FUFJ); 3 ♂♂, Miyazaki Pref., Miyazaki City, Takaoka, Takafusa, 7.v.2007, K. Iwakiri leg. (FIT) (FUFJ); 3 ♂♂, 5 ♀♀, same data as the former except for the date, 27.v.2007; 2 ♂♂, 2 ♀♀, same data as the former except for the date, 6.vi.2004. **HONSHU:** 2 ♂♂, Okayama Pref., Mt. Nagi Town, Nagisan, 1.–8.vi.2005, S. Suzuki leg. (FIT) (FUFJ); 2 ♂♂, Mie Pref., Suzuka City, Ogisu-chô, Takigatani, 20.iv.2004, H. Yokozeki leg.; 1 ♂, same data as the former except for the date, 24.iv.2004; 1 ♀, Gifu Pref., Kani City, Ôgaya, Yasaka-rindô, 11.v.2003, K. Toyoshima leg. (FIT) (FUFJ); 1 ♂, same data as the former except for the date, 18.v.2003; 1 ♀, same data as the former except for the date, 1.vi.2003; 2 ♂♂, 2 ♀♀, Shizuoka Pref., Gotenba City, Kamiyama, Nishikawa (alt. 300 m), 3–5.v.1980, K. Harusawa leg. (FUFJ); 3 ♂♂, Kanagawa Pref., Odawara City, 18.iv.1952, Y. Hirano leg. (NSMT); 1 ♂, Chiba Pref., Kimitsu City, Gôdaihata, 18.–22.iv.1997, N. Nitta leg. (MT) (FUFJ); 2 ♀♀, Tochigi Pref., Ashikaga City, Nagusakami-chô, 23–30.v.2007, H. Ohkawa leg. (FIT) (FUFJ); 1 ♂, Tochigi Pref., Ashikaga City, Omata-chô, Naruishi, 21.–27.v.2010, H. Ohkawa leg. (FIT) (FUFJ); 1 ♂, Aomori Pref., Mutsu City, Kawauchi-chô, Mt. Yunosawayama, 22.vi.1999, S. Araki leg. (FUFJ).

**Diagnosis.** Body 3.8–4.5 mm long, ca. 1.8× as long as wide. Dorsum brown or yellowish brown. Head concave on frons and vertex. Each elytron with nine distinct rows of punctures, subhumeral row absent. Mesoventrite with distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Male metafemur very slender, weakly and triangularly protuberant at ca. basal 2/5 of posterior margins, with a large dorsal projection posteroapically. Mesotibiae without distinct sexual dimorphism. Male metatibiae very feebly curved. Metatarsi with tarsomere 1 extremely long and distinctly curved. Aedeagus relatively small and its length less than 1/4 of the body length. Female abdominal sternite 8 with a spiculum ventrale.

**Description.** Measurement of holotype: Body length 4.5 mm; head 0.80 mm in length and 1.3 mm in width; pronotum 1.4 mm in length and 2.1 mm in width; elytra 2.8 mm in length and 2.5 mm in width.

**Coloration.** Dorsum shining and almost unicolor, brown or yellowish brown; antennae almost unicolor, brownish or bicolored; in bicolored antennae, antennomeres 1–8 brown; antennomeres 9, 10, and basal half of 11 dark brown; apical half of antennomere 11 slightly paler than 8; legs brown or yellowish brown; mesoventrite and metaventrite brown; abdominal ventrites brown or yellowish brown.

Body 3.8–4.5 mm in length, ca. 1.8× as long as wide.

Head ca. 1.7× as wide as long, ca. 0.58× as long as and 0.63× as wide as pronotum, distinctly and densely punctate (Fig. 67A), rough dorsally, distinctly concave on frons and

vertex (Fig. 6E), sometimes bearing some large punctures (Fig. 67A); antennomeres 1–4 each longer than wide; antennomere 11 as long as wide; remaining antennomeres each wider than long; antennomere 11 oval and clearly narrower than 10 (Fig. 67C); relative lengths from antennomeres 2 to 11 – 3.2 : 4.2 : 2.4 : 1.8 : 1.4 : 2.8 : 1.0 : 4.0 : 3.5 : 4.9.

Pronotum ca. 1.6× as wide as long, ca. 0.49× as long as and 0.88× as wide as elytra, widest near base, feebly sinuate at posterior margin, distinctly and densely punctate as head (Fig. 67A).

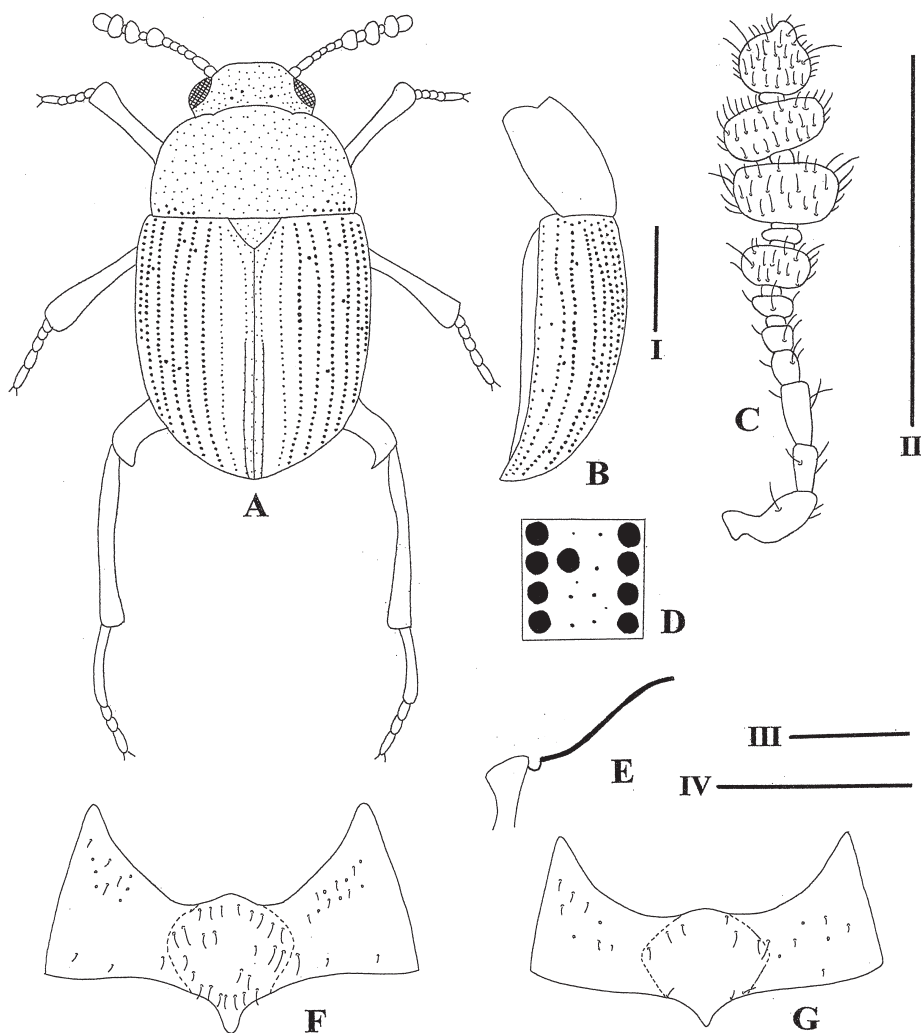


Fig. 67. *Leiodes yukihihoi* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view; F – male metaventrite; G – female metaventrite. Scale I: 1 mm for A and B; II: 1 mm for C; III: 0.5 mm for E; IV: 1 mm for F and G.

Scutellum distinctly punctate.

Elytra ca.  $1.1\times$  as long as wide in dorsal view, widest ca. at basal  $2/5$  (Fig. 67A), and not transversely strigose; each elytron with nine rows of punctures, bearing number of large punctures and moderate number of very fine punctures between rows (Fig. 67D); row 9 almost straight, subhumeral row nearly absent (Fig. 67B); the rows composed of larger punctures than those of pronotum (Fig. 67A); sutural stria fine, arising from apex to ca. apical half of the elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, with a distinct excavation between median carina and transverse carina (Fig. 67E); median carina of mesoventrite low (Fig. 67E); metaventrite sexually dimorphic, sparsely pubescent and distinctly microreticulate except for the almost smooth middle portion.

Legs showing sexual dimorphism on protarsi, mesotarsi, metafemora, metatibiae, and metatarsi; protibiae gradually widening from base towards apex at internal margins (Figs. 68E, 68F).

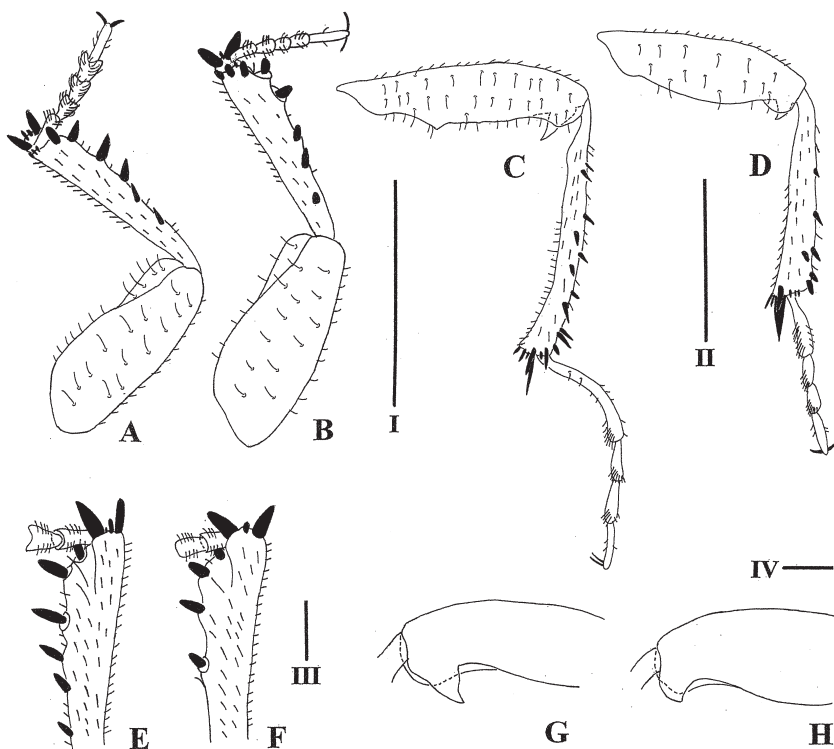


Fig. 68. *Leiodes yukihihikoi* sp. nov. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male hind leg, ventral view; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 1 mm for A and B; II: 1 mm for C and D; III: 0.2 mm for E and F; IV: 0.2 mm for G and H.

**Male.** Middle portion of metaventrite densely and finely pubescent (Fig. 67F); tarsomeres 2–4 of protarsi and mesotarsi a little expanded (Fig. 68A); metafemur very slender, weakly and triangularly protuberant at about basal 2/5 of posterior margins (Fig. 68C), with a large dorsal projection posteroapically (Fig. 68G); metatibiae slender, very feebly curved, feebly sinuate at internal margins (Fig. 68C); tarsomere 1 of metatarsi extremely long and curved (Fig. 68C); abdominal sternite 8 strongly curved (Fig. 69C); aedeagus relatively short and relatively small, its length less than 1/4 of body length (Figs. 69A, 69B); median lobe a little constricted at apical 1/4 of lateral margins and apically round in dorsal view (Fig. 69A), almost straight in lateral view (Fig. 69B); each paramere relatively thick and bearing two apical setae (Fig. 69B).

**Female.** Middle portion of metaventrite sparsely and finely pubescent (Fig. 67G); protarsi and mesotarsi slender (Fig. 68B); metafemur relatively robust, weakly curved along posterior margin (Fig. 68D), with moderate dorsal projection posteroapically (Fig. 68H); metatibiae almost straight and relatively robust (Fig. 68D); tarsomere 1 of metatarsi almost straight (Fig. 68D); abdominal sternite 8 with spiculum ventrale at central point of anterior margin (Fig. 69D); coxites and stylus as shown in Fig. 69E.

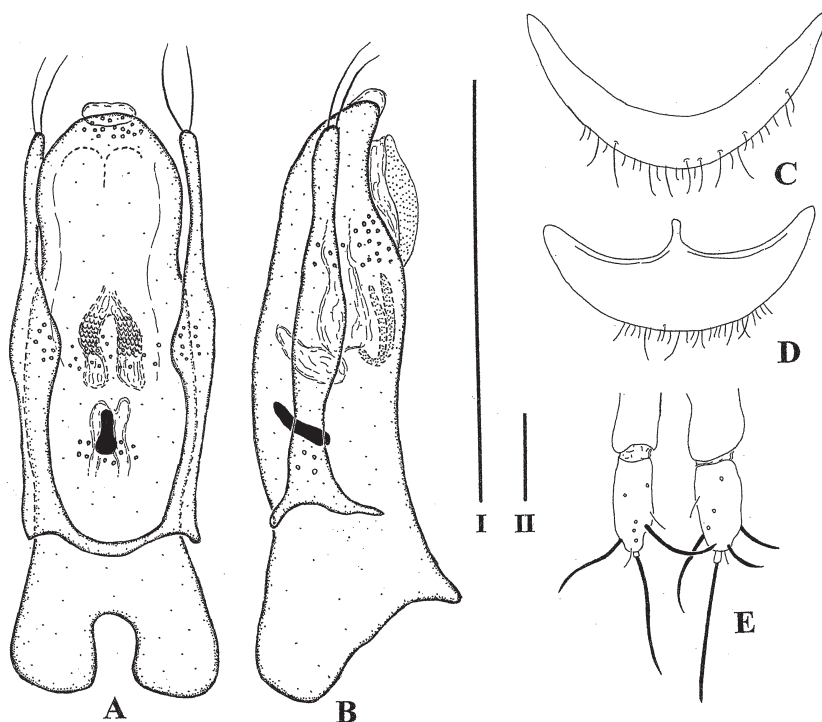


Fig. 69. *Leiodes yukihikoi* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D, and 0.1 mm for E.

**Differential diagnosis.** *Leiodes yukihiroi* sp. nov. is similar to *L. okawai* in having slender metafemora but can be distinguished from it by having a large body (3.8–4.5 mm), the head concave on frons and vertex (Fig. 6E), the male metafemur weakly and triangularly protuberant at about the basal 2/5 of the posterior margins (Fig. 68C), the median lobe a slightly constricted at the apical 1/4 of the lateral margins in the dorsal view (Fig. 69A). In contrast, *L. okawai* has a relatively small body (2.6–3.5 mm), almost flat head, the male metafemur feebly protuberant at about the middle of the posterior margins (Fig. 65C), and the median lobe almost straight at the lateral margins (Fig. 66A). The present species is also similar to *L. rubiginosa* (Schmidt, 1841) inhabiting Europe and the Russian Far East in having a thick aedeagus, but can be separated from it by the large body and mesoventrite with a distinct excavation between the median carina and transverse carina (Fig. 67E), whereas in *L. rubiginosa*, the body is 2.3–3.2 mm in length and the mesoventrite does not have any excavation.

**Etymology.** This species is dedicated to Mr. Yukihiro Hirano, who kindly offered the valuable specimens of *Leiodes* used in this study.

**Distribution.** Japan: Honshu and Kyushu.

### Species not assigned to species groups

#### 23. *Leiodes akiyamai* sp. nov.

Japanese name: Akiyama-ô-tamakinokomushi

(Figs. 70–71)

**Type locality.** Japan, Shikoku, Ehime Pref., Matsuyama City, Komenono.

**Type material.** JAPAN: HONSHU: HOLOTYPE: ♀, Ehime Pref., Matsuyama City, Komenono, 21.i.2007, Y. Satô leg. (EUMJ). PARATYPE: 1 ♀, same data as the holotype (EUMJ).

**Diagnosis.** Body 3.2–3.4 mm long, ca. 1.9× as long as wide. Dorsum and antennae almost unicolor, brown. Elytra densely, irregularly and coarsely punctate. Median carina of mesoventrite low except for extremely projecting portion near transverse carina. Basal four tarsomeres of female pro- and mesotarsi expanded. Female abdominal sternite 8 with a spiculum ventrale.

**Description.** Measurement of holotype: Body length 3.4 mm; head 0.60 mm long and 0.95 mm wide; pronotum 1.0 mm long and 1.6 mm wide; elytra 2.2 mm long and 1.8 mm wide.

Coloration. Dorsum shining and almost unicolor, brown; antennae almost unicolor, brown; legs brown; mesoventrite, metaventrite and abdominal ventrites brown.

Body 3.2–3.4 mm long, ca. 1.9× as long as wide.

Head ca. 1.5× as wide as long, ca. 0.62× as long as and 0.60× as wide as pronotum, distinctly and densely punctate, bearing some large punctures (Fig. 70A); antennomeres 1–3 each longer than wide; antennomeres 4 and 11 each about as long as wide; remaining antennomeres each wider than long; antennomere 11 oval (Fig. 70C); relative lengths of antennomeres 2 to 11 – 2.8 : 4.3 : 1.9 : 1.8 : 1.4 : 2.8 : 1.0 : 3.4 : 3.4 : 5.1.

Pronotum ca. 1.6× as wide as long, ca. 0.46× as long as and ca. 0.87 as wide as elytra, widest near base, feebly sinuate at posterior margin, distinctly and densely punctate, punctuation similar to that on head (Fig. 70A).

Scutellum distinctly punctate.



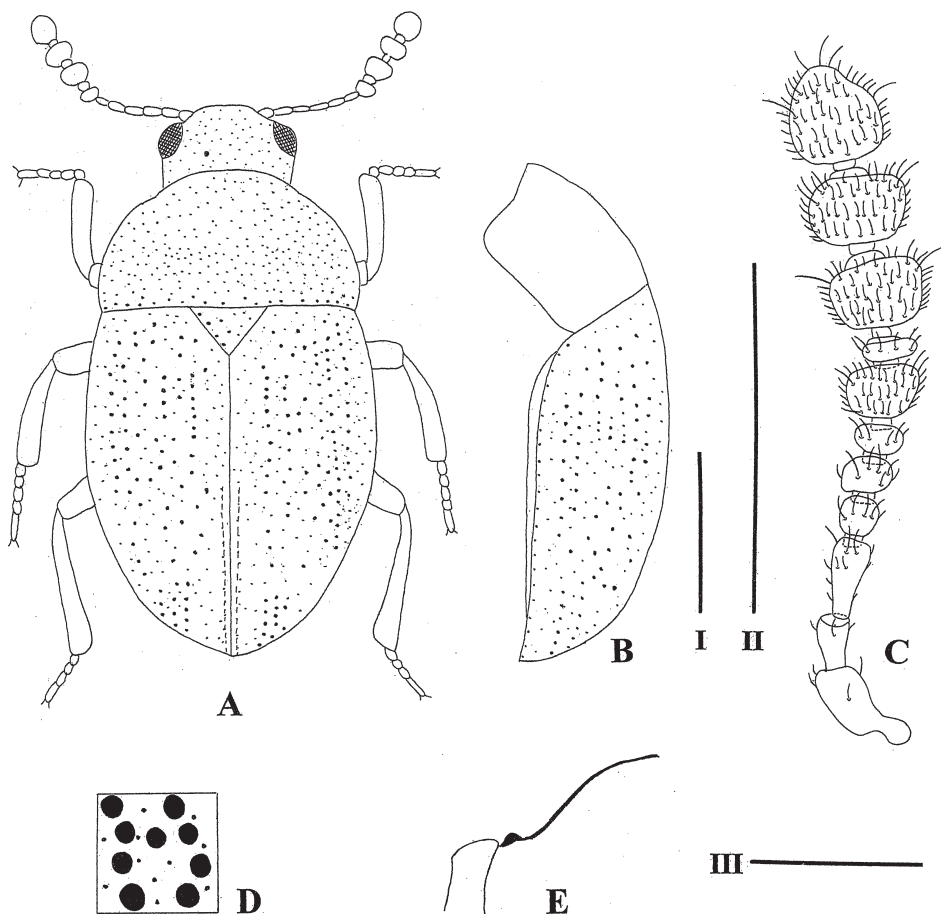


Fig. 70. *Leiodes akiyamai* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.5 mm for E.

Elytra ca.  $1.2\times$  as long as wide in dorsal view, widest ca. at basal  $2/5$  (Fig. 70A), not transversely strigose, densely, irregularly and coarsely punctate (Figs. 70A, 70B); punctuation of elytra consisting of punctures of various sizes (Fig. 70D); sutural stria very fine, reaching from apex to ca. apical  $2/5$  of elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, and almost glabrous; median carina of mesoventrite with distinct hump near a transverse carina (Fig. 70E); metaventricle sparsely and finely pubescent, strongly microreticulate.

All femora slender; protibiae gradually and feebly widening from base to apex (Fig. 71C); tarsomeres 1–4 of protarsi and mesotarsi expanded (Fig. 71A); metafemur with a small dorsal projection posteroapically (Fig. 71D); metatibiae almost straight (Fig. 71B).

Abdominal sternite 8 with a spiculum ventrale at central point of anterior margin (Fig. 71E); coxites and stylus as in Fig. 71F.

**Male.** Unknown.

**Differential diagnosis.** *Leiodes* species are usually described on the basis of male specimens. However, the above female specimens differ substantially from all known *Leiodes* by the characters mentioned below, allowing me to describe the new species even though its male remains unknown.

DAFFNER (1983) considered the median carina of the mesoventrite as an important morphological character at the subgeneric level. *Leiodes akiyamai* sp. nov. has a distinctive median carina (Fig. 70E) and can be therefore easily distinguished from all other species inhabiting Japan and neighbouring regions. Moreover, the female protarsi and mesotarsi of most of species of *Leiodes* are slender, whereas tarsomeres 1–4 of the pro- and mesotarsi are expanded in *L. akiyamai* sp. nov. (Fig. 71A), as is generally the case in the male protarsi and mesotarsi of most species of *Leiodes*. In this character, *Leiodes akiyamai* sp. nov. is similar to *L. stocki* Švec, 1996 in which the female protarsi and mesotarsi are also expanded, but can be separated from it by having a distinctive median carina of the

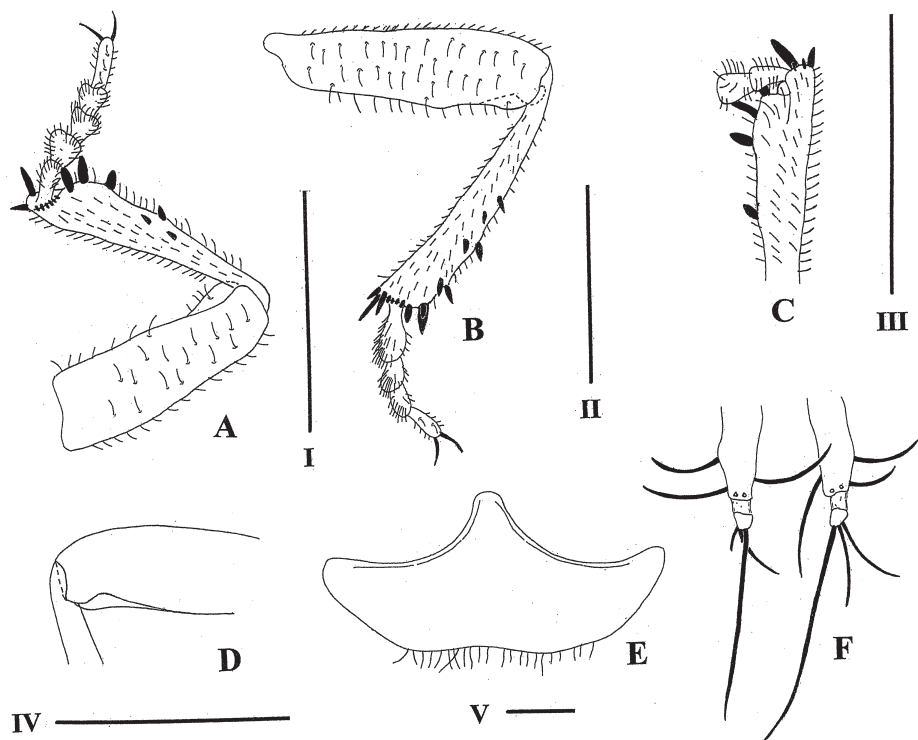


Fig. 71. *Leiodes akiyamai* sp. nov. A – female fore leg, ventral view; B – female hind leg, ventral view; C – female protibia, dorsal view; D – female metafemur, dorsal view; E – female abdominal sternite 8; F – coxite and stylus. Scale I: 0.5 mm for A; II: 0.5 mm for B; III: 0.5 mm for C; IV: 0.5 mm for D; V: 0.2 mm for E, and 0.1 mm for F.

mesoventrite and the metafemora feebly expanded posteroapically at the dorsal side (Fig. 71D). In contrast, *L. stocki* has a low median carina similar to that on Fig. 16F, and its metafemora are strongly expanded.

**Etymology.** This species is dedicated to Saneyuki Akiyama (1868–1918), a hero of a popular novel *Saka-no-ue-no-kumo* whose story is situated in the Matsuyama City, the type locality of *L. akiyamai* sp. nov.

**Distribution.** Japan: Shikoku (Ehime Prefecture).

## 24. *Leiodes fracta* (Seidlitz, 1875)

Japanese name: Takei-ô-tamakinokomushi  
(Figs. 72–74)

*Anisotoma fracta* Seidlitz, 1875: 209.

*Liodes fracta*: REITTER (1885): 106.

*Leiodes fracta*: HATCH (1929): 19 (as aberration of *Leiodes rhaetica*); DAFFNER (1983): 77 (redescription); PERREAU (2004): 196 (catalogue).

*Leiodes takeii* Nakane, 1963: 40; DAFFNER (1983): 77 (synonymized with *L. fracta*).

See HATCH (1929) and DAFFNER (1983) for additional synonymy and references.

**Type locality.** Estonia.

**Type material examined.** *Anisotoma fracta*: not examined for this study.

*Leiodes takeii*: **JAPAN: HONSHU:** HOLOTYPE: ♂, Gunma Pref. Numata, 20.xi.1952, T. Takei leg. (HUMS).

**Additional specimens examined.** **JAPAN: HONSHU:** 1 ♀, Miyagi Pref., Tôgatta, 15.ix.1951, without collector (EUMJ); 1 ♂, same locality, 8.x.1951 (EUMJ). **SWEDEN:** 1 ♂, 1 ♀, Helsingland, without additional data (FUFJ).

**Published records from Japan** (not examined): 1 spec., **HONSHU:** Nagano Pref., Kamikôchi (NMPC) (DAFFNER 1983).

**Diagnosis.** Coloration. Dorsum usually unicolor, brownish; antennomeres 1 and apical 2/5 of antennomere 11 light brown; antennomeres 2–6 and 8 brown; remaining antennomeres dark brown.

Body 3.5–6.0 mm long, ca. 1.7× as long as wide (Fig. 72A); head densely and minutely punctate, bearing some large punctures (Fig. 72A); antennomeres 1–3 each longer than wide; antennomere 11 about as long as wide; remaining antennomeres each wider than long; antennomere 11 robust and clearly narrower than 10 (Fig. 72C). Pronotum simply and very feebly curved at posterior margin, densely and minutely punctate (Fig. 72A). Elytra not transversely strigose; each elytron with nine rows of punctures, bearing small number of large punctures and densely arranged very fine punctures between rows (Fig. 72D); row 9 invisible in dorsal view, almost straight, subhumeral row absent (Fig. 72B); rows composed of punctures larger and deeper than those on pronotum (Fig. 72A); sutural stria fine, reaching from apex to ca. apical half of the elytral length. Metathoracic wings fully developed. Mesoventrite without distinct excavation between median carina and transverse carina (Fig. 72E); median carina of mesoventrite low (Fig. 72E); metaventrite without sexual dimorphism. Legs showing distinct sexual dimorphism on protarsi, mesotarsi, metafemora, and metatibiae; protibiae gradually widening from base towards apex at internal margins (Figs. 73F, 73G); metafemur with large dorsal projection posteroapically, apex of projection pointed (Figs. 73H, 73I).

**Male.** Tarsomeres 2–4 of protarsi and mesotarsi expanded (Fig. 73A); metafemora triangularly protuberant at about midlength of posterior margins (Fig. 73C, 73D); metatibiae relatively slender, distinctly and complexly curved (Figs. 73C, 73D), bearing crenellated tiny spines at internal margins (Figs. 73C, 73D); abdominal sternite 8 moderately curved (Fig. 74C); aedeagus as shown in Figs. 74A, 74B.

**Female.** Protarsi and mesotarsi slender (Fig. 73B); metafemora weakly curved at posterior margins (Fig. 73E); metatibiae relatively robust, weakly sinuate at internal margins, without crenellated tiny spines (Fig. 73E); abdominal sternite 8 with a spiculum ventrale at central point of anterior margin (Fig. 74D); coxites and stylus as shown in Fig. 74E.

**Morphological variability.** Two male specimens examined for this study show the morphological variation of the metatibiae. Figs. 73C and 74D were drawn based on specimens

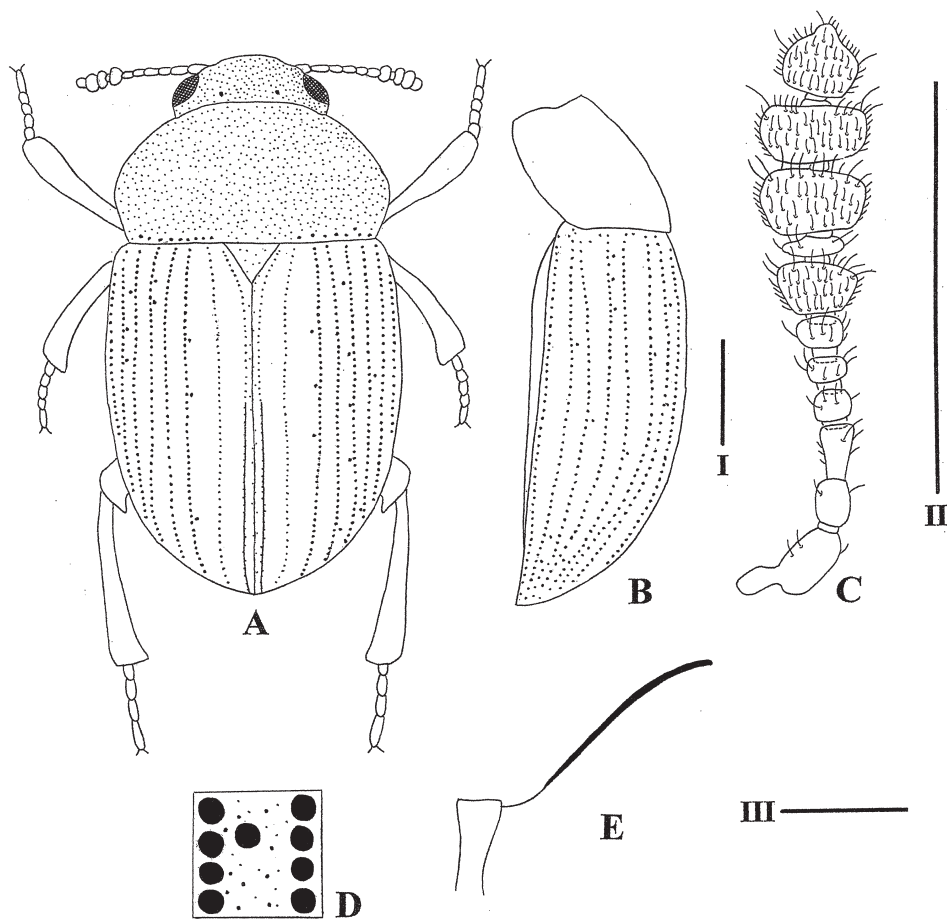


Fig. 72. *Leiodes fracta* (Seidlitz, 1875). A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 1 mm for C; III: 0.5 mm for E.

whose body lengths are 5.8 mm and 4.8 mm, respectively. It is possible that larger males have relatively more distinct secondary sexual characters on the metatibiae.

**Differential diagnosis.** *Leiodes fracta* is similar to *L. lucens* (Fairmaire, 1855) in having a large body but can be distinguished from it by having the mesoventrite without a distinct excavation between the median carina and transverse carina (Fig. 72E). In contrast, *L. lucens* has the mesoventrite with one distinct excavation (Fig. 77E).

**Note.** In Japan, *Leiodes fracta* (Seidlitz, 1875) is a very rare species. Only four specimens have been collected until now (see above).

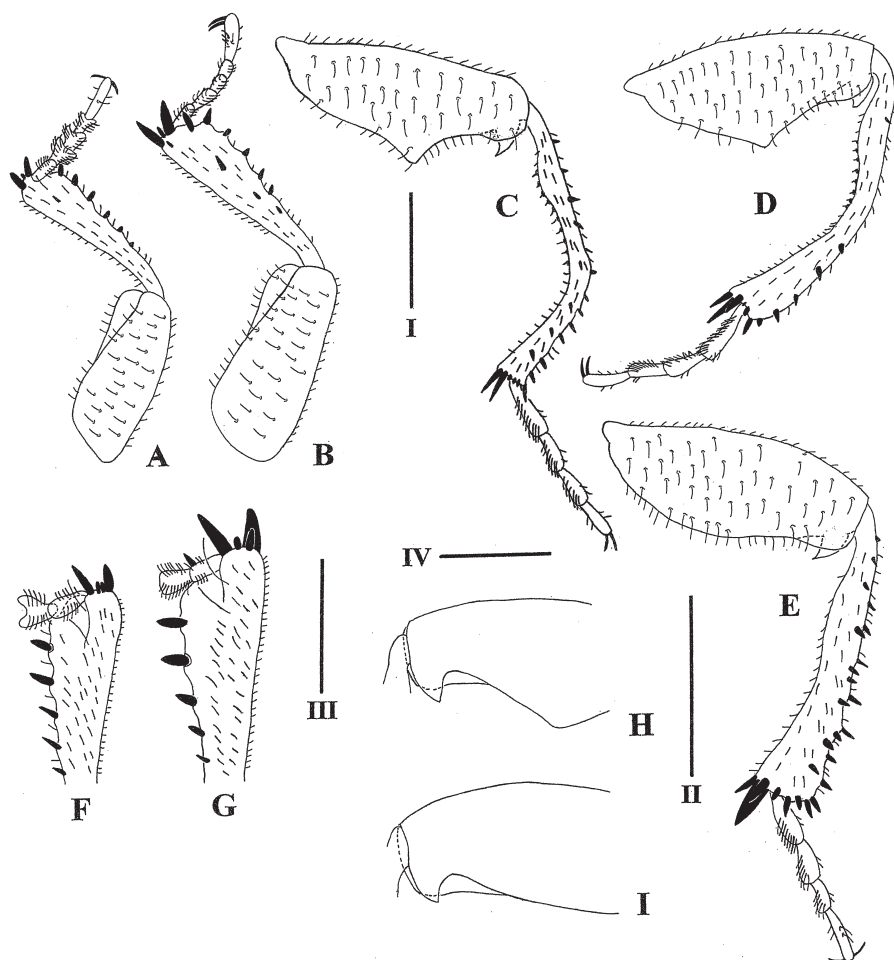


Fig. 73. *Leiodes fracta* (Seidlitz, 1875). A – male fore leg, ventral view; B – female fore leg, ventral view; C and D – male hind legs, ventral view; E – female hind leg, ventral view; F – male protibia, dorsal view; G – female protibia, dorsal view; H – male metafemur, dorsal view; I – female metafemur, dorsal view. Scale I: 1 mm for C; II: 1 mm for A, B, D, and E; III: 0.5 mm for F and G; IV: 0.5 mm for H and I.

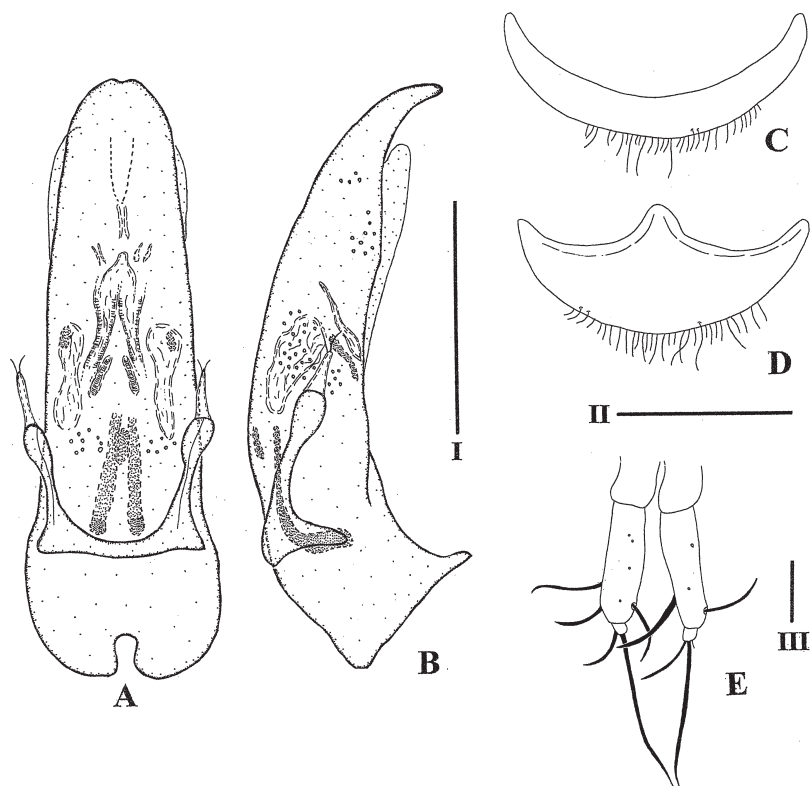


Fig. 74. *Leiodes fracta* (Seidlitz, 1875). A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.5 mm for C and D; III: 0.2 mm for E.

I have reexamined the holotype of *L. takeii* and compared them with the specimens from Europe. Based on this comparison, I may confirm the synonymy of the latter species with *L. fracta* proposed by DAFFNER (1983).

**Distribution.** Europe, Russia (European Russia, Siberia, Russian Far East) (DAFFNER 1983), and Japan (Honshu).

## 25. *Leiodes iwakirii* sp. nov.

(Japanese name: Hyûga-ô-tamakinokomushi)

(Figs. 75–76)

**Type locality.** Japan, Kyushu, Miyazaki Pref., Miyazaki City, Takaoka, Takafusa.

**Type material.** JAPAN: KYUSHU: HOLOTYPE, ♂, Miyazaki Pref., Miyazaki City, Takaoka, Takafusa, 6.vi.2007, K. Iwakiri leg. (FIT) (MNHAH).

**Diagnosis.** Body small, 2.4 mm long, ca. 1.7× as long as wide. Dorsum brown. Elytra almost straight from base to ca. midlength of lateral margins. Each elytron with nine distinct rows of

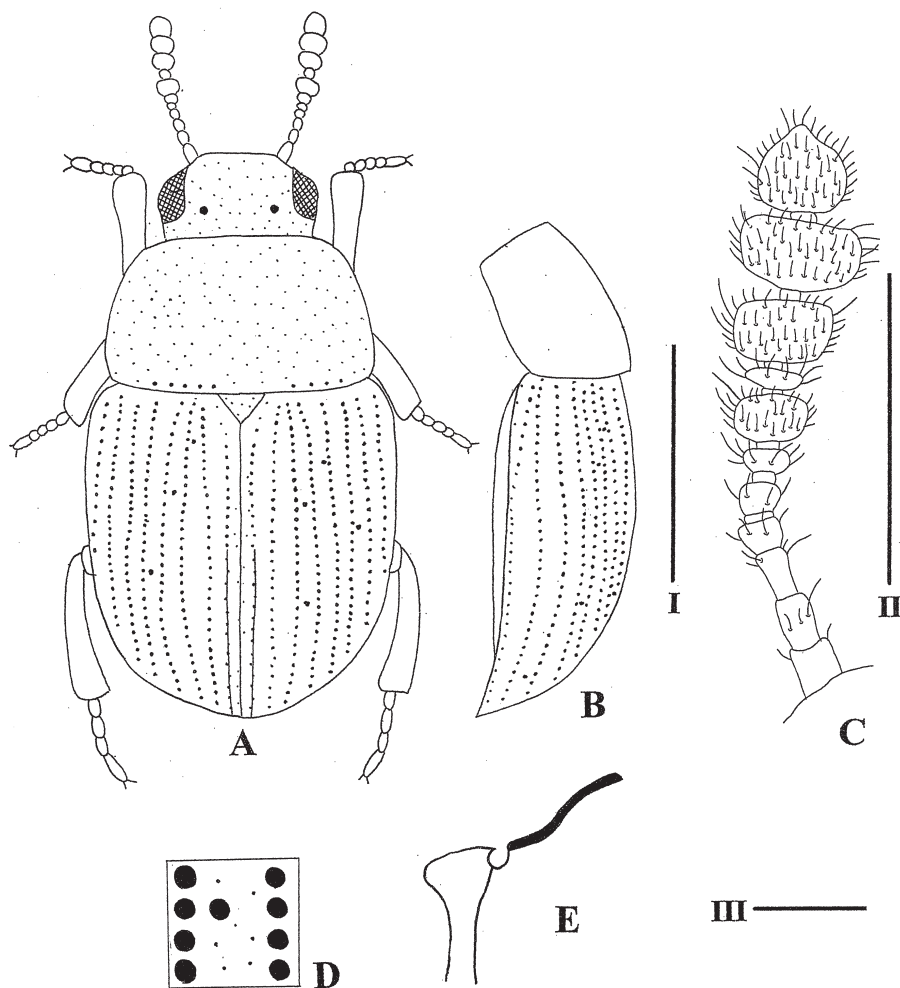


Fig. 75. *Leiodes iwakirii* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.2 mm for E.

punctures, subhumeral row as long as ca. 1/3 of elytral length. Mesoventrite with a distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Metatibiae almost straight. Parameres a little broadening at apex.

**Description.** Measurements of holotype: Body length 2.4 mm; head 0.42 mm in length and 0.65 mm in width; pronotum 0.70 mm in length and 1.1 mm in width; elytra 1.5 mm in length and 1.4 mm in width.

**Coloration.** Dorsum almost unicolor, brown; antennae almost unicolor, brown, except for slightly paler apical half of antennomere 11; legs brownish; all tarsi slightly paler



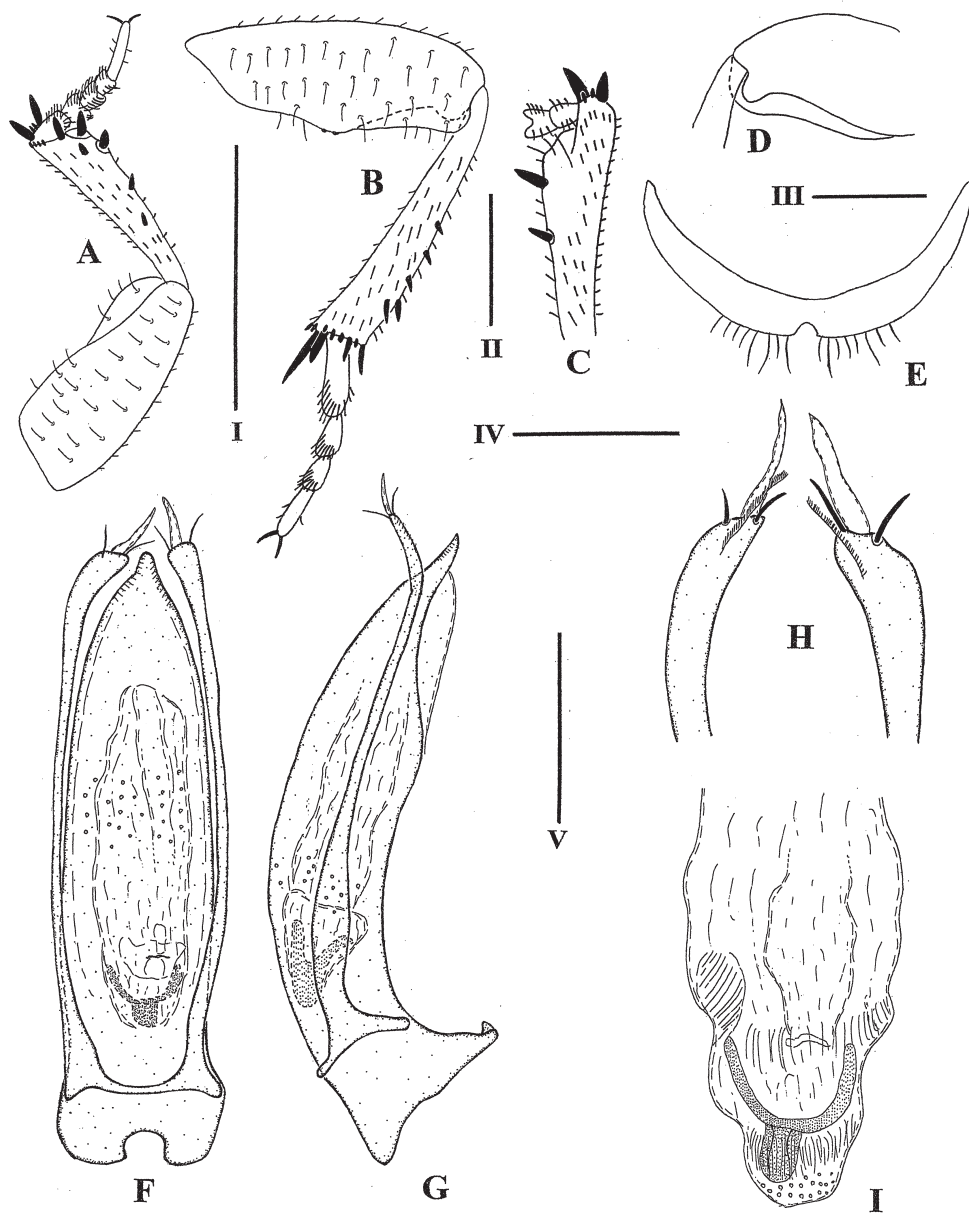


Fig. 76. *Leiodes iwakirii* sp. nov. A – male fore leg, ventral view; B – male hind leg, ventral view; C – male protibia, dorsal view; D – male metafemur, dorsal view; E – male abdominal sternite 8; F – aedeagus, dorsal view; G – ditto, lateral view; H – apices of parameres, dorsal view; I – inner sac, dorsal view. Scale I: 0.5 mm for A and B; II: 0.2 mm for C; III: 0.2 mm for D; IV: 0.2 mm for E; V: 0.2 mm for F and G, and 0.1 mm for H and I.

than remaining parts; mesoventrite and metaventrite brown; abdominal ventrites light brown.

Head distinctly and densely punctate, bearing some large punctures (Fig. 75A); antennomeres 1–3 each longer than wide; antennomere 11 about as long as wide; remaining antennomeres each wider than long; antennomere 11 oval and clearly narrower than antennomere 10 (Fig. 75C); relative lengths of antennomeres 2 to 11 – 2.9 : 2.6 : 1.6 : 2.1 : 1.3 : 2.7 : 1.0 : 3.3 : 3.9 : 4.6.

Pronotum widest near base, simply and very feebly curved at posterior margin, distinctly punctate, punctation similar to that on head (Fig. 75A).

Scutellum minutely punctate.

Elytra almost straight from base to ca. midlength of lateral margins (Fig. 75A), not transversely strigose; each elytron with nine rows of punctures, bearing small number of large punctures and moderate number of fine punctures between rows (Fig. 75D); row 9 invisible in dorsal view, subhumeral row as long as ca. 1/3 of elytral length (Fig. 75B); rows composed of punctures larger than those on pronotum (Fig. 75A); sutural stria fine, reaching from apex to ca. apical half of elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, and with one distinct excavation between median carina and transverse carina (Fig. 75E); median carina of mesoventrite low (Fig. 75E); metaventrite sparsely and finely pubescent, strongly microreticulate except for almost smooth middle portion.

Protibiae gradually widening from base towards apex (Fig. 76C); tarsomeres 2–4 of protarsi and mesotarsi a little expanded (Fig. 76A); metafemur a little triangularly protuberant at about midlength of posterior margin and feebly expanded posteroapically (Fig. 76B), bearing small dorsal projection posteroapically (Fig. 76D); metatibiae almost straight (Fig. 76B).

Abdominal sternite 8 strongly curved (Fig. 76E); aedeagus slender (Figs. 76F, 76G); median lobe a little protuberant apically in dorsal view (Fig. 76F), moderately curved in lateral view (Fig. 76G); each paramere a little broadened at apex and bearing a few apical setae and a transparent lobe (Fig. 76H); inner sac as shown in Fig. 76I.

**Female.** Unknown.

**Differential diagnosis.** *Leiodes iwakirii* sp. nov. is one of the smallest species of Japanese *Leiodes*. It is similar to the Chinese species *L. taipoensis* Cooter & Kilian, 2002 in the shape of the parameres of the aedeagus, but can be distinguished from it by having the aedeagus distinctly protuberant in the dorsal view (Fig. 76F). In contrast, *L. taipoensis* has the aedeagus simply triangular apically. *Leiodes iwakirii* sp. nov. also resembles *L. irregularis* in elytral shape, but can be separated from it by the mesoventrite with a distinct excavation between the median carina and transverse carina (Fig. 75E). In contrast, *L. irregularis* has the mesoventrite without an excavation (Fig. 93J).

**Etymology.** This species is dedicated to Mr. Koji Iwakiri who kindly donated many valuable specimens of *Leiodes* used in this study.

**Distribution.** Japan: Kyushu (Miyazaki Prefecture).

## 26. *Leiodes lucens* (Fairmaire, 1855)

Japanese name: Aka-ô-tamakinokomushi

(Figs. 6, 77–79)

*Anisotoma lucens* Fairmaire, 1855: 76.

*Liodes lucens*: REITTER (1885): 104.

*Leiodes lucens*: HATCH (1929): 22; DAFFNER (1983): 71 (redescription); ANGELINI & ŠVEC (1994): 22 (key to Chinese species of *Leiodes*); COOTER (1996): 247 (key to British species of *Leiodes*); ŠVEC (1998): 36 (new to Nepal); ŠVEC (2000): 98 (key to Chinese species of *Leiodes*); PERREAU (2004): 196 (catalogue); ŠVEC (2008): 254 (keys to Nepalese and Chinese species of *Leiodes*); ŠVEC & COOTER (2010): 103 (New to China: Hubei).

*Leiodes alpicola* Nakane, 1963: 41; DAFFNER (1983) (redescription): 108; PERREAU (2004): 194 (catalogue). **Syn. nov.**

*Leiodes cooteri* Park & Ahn, 2007: 30. **Syn. nov.**

See HATCH (1929) and DAFFNER (1983) for other synonymy and references.

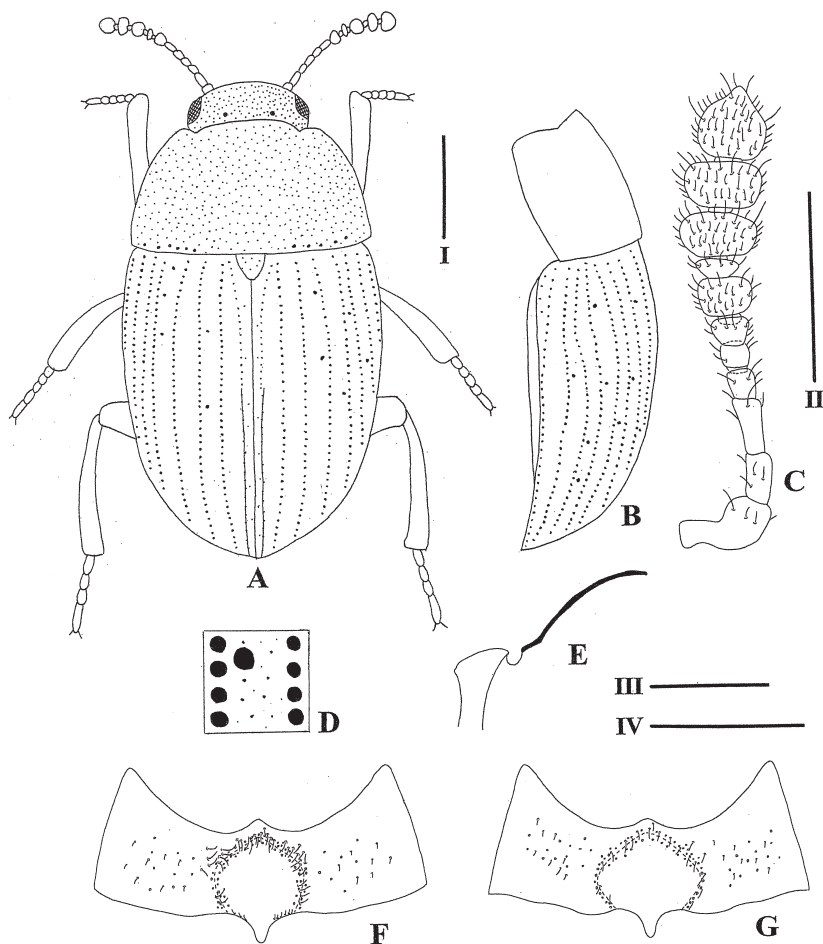


Fig. 77. *Leiodes lucens* (Fairmaire, 1855). A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view; F – male metaventrite; G – female metaventrite. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.2 mm for E; IV: 1 mm for F and G.

**Type locality.** France, Bondy.

**Type material examined.** *Anisotoma lucens* and *Leiodes cooteri*: not examined.

*Leiodes alpicola*: **JAPAN: HONSHU:** HOLOTYPE: 1 ♀, Nagano Pref., Kamikôchi, 13.viii.1950, T. Nakane leg. (HUMS).

**Additional specimens examined. JAPAN: SHIKOKU:** 1 ♂, Tokushima Pref., Yamakawa Town, Mt. Kôtsu, 2–10.viii.2003, K. Tanaka leg. (FIT) (FUFJ); 1 ♀, Tokushima Pref., Yamakawa Town, Okunoi, 2–10.viii.2003, K. Tanaka leg. (FIT) (FUFJ); 1 ♂, Tokushima Pref., Mima City, Koyadaira, Mt. Ichinomori, Fujinoikre-dani (alt. 1300 m), 17.vi.–1.viii.2007, K. Tanaka leg. (FIT) (FUFJ); 1 ♂, Tokushima Pref., Mima City, Anabuki-chô, Furumiya, Mt. Tsunatsuke-yama (alt. 1050 m), 5–12.viii.2007, K. Tanaka leg. (FIT) (FUFJ). **HONSHU:** 1 ♂, Okayama Pref., Chûka Village, Mt. Yamanorisen, 26.ix.2004, Y. Fujitani leg. (FIT) (FUFJ); 2 ♂♂, Fukui Pref., Ôno City, Heikedaira, 1.viii.1997, S. Inoue leg. (MT) (FUFJ); 1 ♂, 1 ♀, Gifu Pref., Shirakawa Village, Ô-shirakawa, 24.vii.2004, K. Toyoshima leg. (FIT) (FUFJ); 1 ♀, Nagano Pref., Tokugô Pass, 29.vii.1984, S. Tsuyuki leg. (NSMT); 1 ♂, Nagano Pref., Kijimadaira Village, Kayanodaira, 10.vi.1998, Y. Sawada leg. (PT) (FUFJ); 1 ♂, Yamanashi Pref., Nirasaki City, Hôd-goya, 29.vii.1991, K. Hosoda leg. (KM); 1 ♀, Yamanashi Pref., Nirasaki City, Hôd-goya, 28.viii.1993, M. Saitô leg.; 1 ♂, 1 ♀, Tokyo Pref., Hinohara Village, Mt. Mitôsan (alt. 1100m), 23.–30.vii.2008, H. Takano leg. (FIT) (FUFJ); 1 ♂, 1 ♀, Saitama Pref., Naguri Village, Mt. Arimayama (alt. 1200 m), 17.–24.ix.2004, K. Arai & S. Arai leg. (FIT) (FUFJ); 3 ♂♂, 1 ♀, Miyagi Pref., Sendai City, Mt. Izumigadake, Kuwanuma-rindô, 17.–29.ix.2009, M. Oikawa leg. (FIT) (FUFJ). **HOKKAIDO:** 1 ♂, 1 ♀, Ebetsu City, Nopporo Forest Park, 11.x.2000, S. Hori leg. (FIT) (FUFJ);

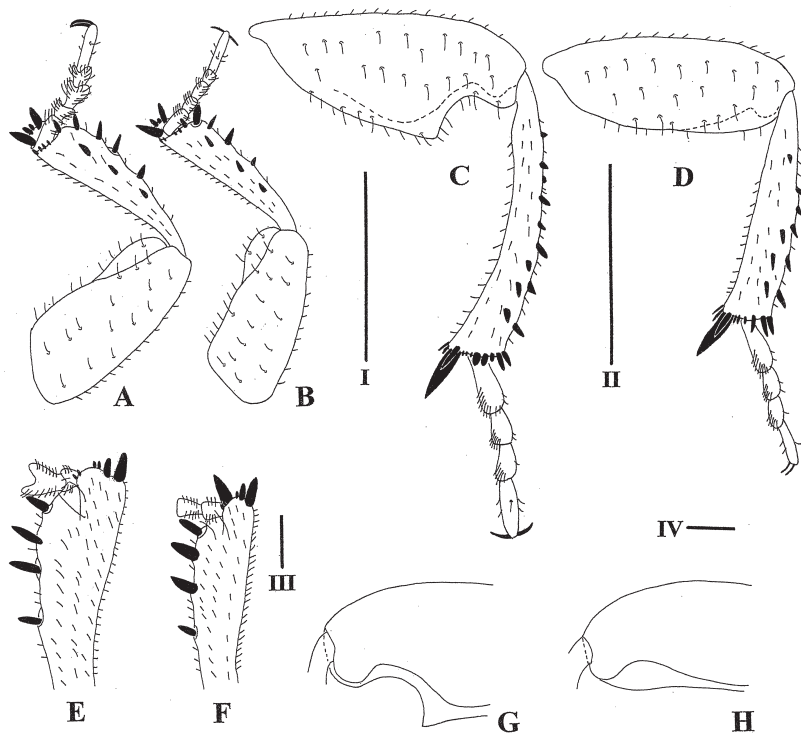


Fig. 78. *Leiodes lucens* (Fairmaire, 1855). A – male fore leg, ventral view; B – female fore leg, ventral view; C – male hind leg, ventral view; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 1 mm for A and B; II: 1 mm for C and D; III: 0.2 mm for E and F; IV: 0.2 mm for G and H.

1 ♀, Maruseppu Town, 15.x.2000, T. Katô leg. (FUFJ). **KOREA:** 1 ♂, Kangwon Prov., Jeongsun-gun, Gohan-up, Hambaksan, 13.vii.1999, U.-S. Hwang and H.-J. Kim leg. (FIT) (CNUIC); 1 ♂, 1 ♀, Kangwon Prov., Pochon-gun, Sanjong-ri, Mt. Myongsongsan, 4–6.ix.1999, H.-J. Kim & U.-S. Hwang leg. (FIT) (CNUIC). **CHINA:** SICHUAN: 1 ♀, W. Sichuan, Sabde, 12.vii.1998, A. Smetana leg. (FUFJ). **GERMANY:** 1 ♂, Thuringen, Gehlberg, Schmucker Graben, 26.viii.1997, J. Welpert leg. (FUFJ). **EUROPE:** 2 ♂♂, 2 ♀♀, without additional locality data (FUFJ).

**Diagnosis.** Coloration. Dorsum usually unicolor, brown, reddish brown or dark reddish brown; antennomeres 1–6 and 8 brown; antennomeres 7, 9, 10, and basal 3/5 of antennomere 11 dark brown; apical 2/5 of antennomere 11 light brown.

Body 3.2–5.0 mm long, ca. 1.8× as long as wide (Fig. 77A); head densely and minutely punctate, bearing some large punctures (Fig. 77A); antennomeres 1–4 each longer than wide; antennomeres 5 and 11 each about as long as wide; remaining antennomeres each wider than long; antennomere 11 oval (Fig. 77C). Pronotum very feebly sinuate at posterior margin and densely and minutely punctate (Fig. 77A). Elytra not transversely strigose; each elytron with nine rows of punctures, bearing small number of large punctures and dense very fine punctures between rows (Fig. 77D); row 9 invisible in dorsal view, subhumeral row as long as ca. 1/3 or 1/4 of elytral length (Fig. 77B); rows composed of relatively weak punctures (Fig. 77A); sutural stria fine, reaching from apex to ca. apical half of the elytral length. Metathoracic wings fully developed. Mesoventrite with one distinct excavation between median carina and transverse carina (Fig. 77E); median carina of mesoventrite low (Fig. 77E); metaventrite indistinctly sexually dimorphic. Legs showing sexual dimorphism on protarsi, protibiae, mesotarsi, metafemora, and metatibiae; metafemur with a small dorsal projection posteroapically (Figs. 78G, 78H).

**Male.** Metaventrite usually bearing relatively thick and dense pubescence at middle portion (Fig. 77F); tarsomeres 2–4 of protarsi and mesotarsi expanded (Fig. 78A); protibiae gradually and relatively distinctly widening from base towards apex at internal margins (Fig. 78E); metafemora characteristic and very sharply protuberant at about basal 1/4 of posterior margins (Fig. 78C); metatibiae relatively slender, weakly curved inwards (Fig. 78C); abdominal sternite 8 strongly curved (Fig. 79C); aedeagus as shown in Figs. 79A, 79B.

**Female.** Metaventrite usually bearing relatively thin and sparse pubescence at middle portion (Fig. 77G); protarsi and mesotarsi slender (Figs. 78B); protibiae gradually and feebly widening from base towards apex at internal margins (Fig. 78F); metafemora very feebly curved at posterior margins (Fig. 78D); metatibiae relatively robust and almost straight (Fig. 78D); abdominal sternite 8 with spiculum ventrale at central point of anterior margin (Fig. 79D); coxites and stylus as shown in Fig. 79E.

**Differential diagnosis.** *Leiodes lucens* is similar to *L. irregularis* in the long-oval body shape, but can be distinguished from the latter by having an almost unicolor dorsum and the mesoventrite with a distinct excavation (Fig. 77E). In contrast, *L. irregularis* usually has a bicolored dorsum (Figs. 93D–G) and the mesoventrite without distinct excavation (Fig. 93J).

**Taxonomic note.** I compared the European specimens of *L. lucens* with the Korean species *L. cooteri* Park & Ahn, 2007 and the Japanese species *L. alpicola* Nakane, 1963 and found that the latter species cannot be distinguished from the former by any morphological character. Males of *L. cooteri* and *L. alpicola* are unique in two characters, the male metafemur with a posterior projection (Fig. 78C) and the large trident sclerite of the inner sac of the aedeagus (Fig. 79A) in both these characters, they completely agree with the specimens of *L. lucens*.

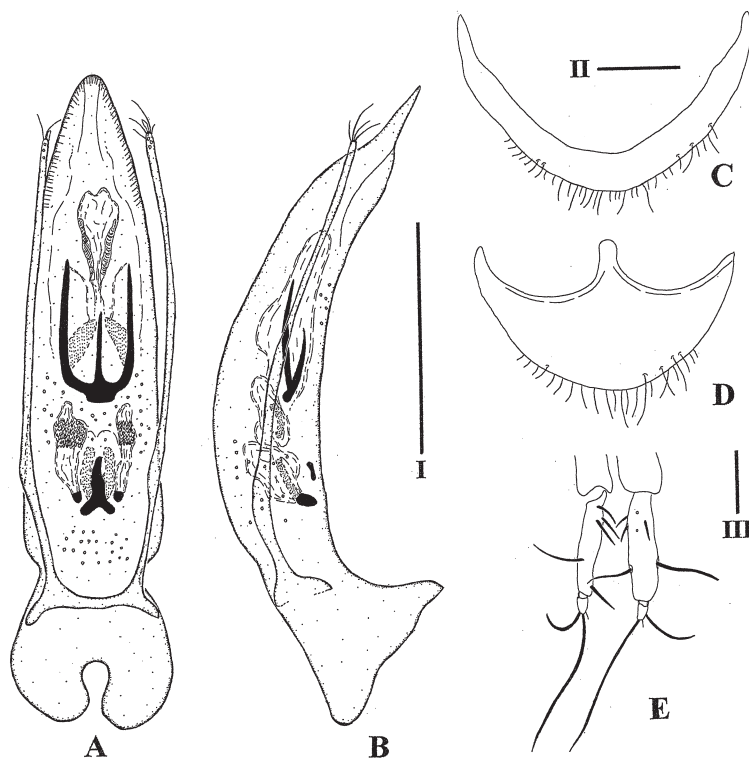


Fig. 79. *Leiodes lucens* (Fairmaire, 1855). A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 1 mm for A and B; II: 0.2 mm for C and D; III: 0.1 mm for E.

Therefore, it is concluded that *L. cooteri* and *L. alpicola* are junior synonyms of *L. lucens*.

**Distribution.** Europe, Russia, Nepal, China, Korea (DAFFNER 1983, ANGELINI & ŠVEC 1994, PARK & AHN 2007), and Japan (Honshu, Shikoku, Hokkaido).

### 27. *Leiodes nagayamai* sp. nov.

Japanese name: Nagayama-ô-tamakinokomushi  
(Figs. 80–81)

**Type material. JAPAN: HOKKAIDO:** HOLOTYPE, ♂, Sapporo City, Hyakumatsuzawa, 13.ix.2000, K. Uesugi leg. (MNHAH).

**Diagnosis.** Body 5 mm in length, ca. 1.9× as long as wide. Dorsum brown. Each elytron with nine distinct rows of punctures, subhumeral row as long as ca. 1/3 of elytral length. Mesoventrite without distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Metafemora triangularly protuberant at about midlength of posterior margins and feebly expanded posteroapically. Metatibiae distinctly curved inwards and with some small robust spines at internal margins. Parameres extremely short.

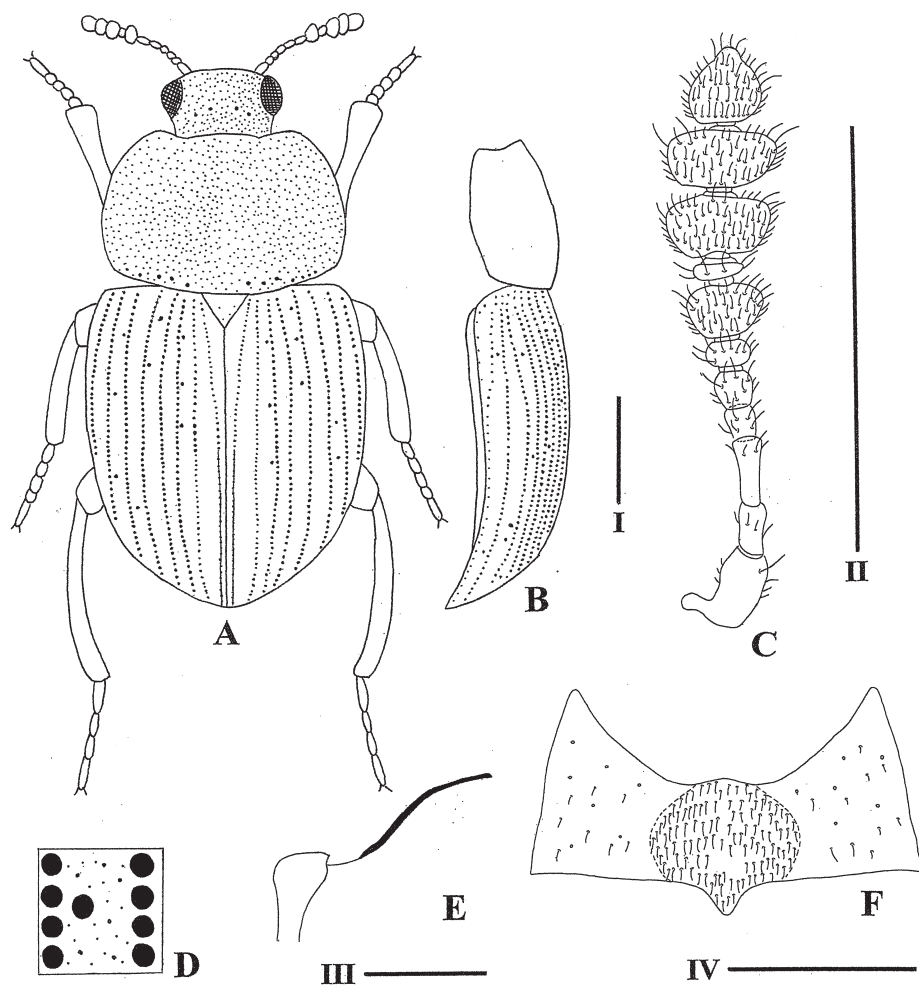


Fig. 80. *Leiodes nagayamai* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view; F – metaventrite. Scale I: 1 mm for A and B; II: 1 mm for C; III: 0.5 mm for E; IV: 1 mm for F.

**Description.** Measurements of holotype: Body length 5.0 mm; head 0.80 mm in length and 1.2 mm in width; pronotum 1.5 mm in length and 2.3 mm in width; elytra 3.0 mm in length and 2.6 mm in width.

**Coloration.** Dorsum almost unicolor, brown; antennomeres 1–6 and 8 brown; antennomeres 7, 9, 10, and basal half of antennomere 11 a little darkish brown; apical half of antennomere 11 light brown; legs brown; mesoventrite, metaventrite, and abdominal ventrites brown.

Head distinctly and densely punctate, bearing some large punctures (Fig. 80A); antennomeres 1–4 each longer than wide; antennomeres 5 and 11 each about as long as wide; remaining antennomeres each wider than long; antennomere 11 robust and clearly narrower



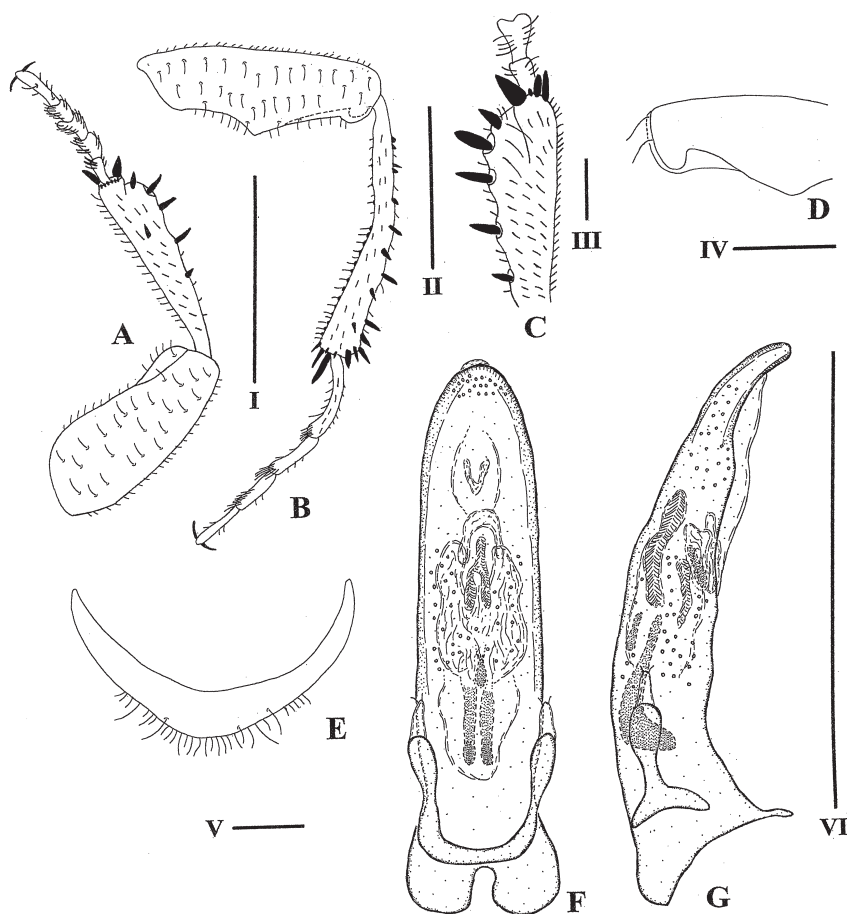


Fig. 81. *Leiodes nagayamai* sp. nov. A – male fore leg, ventral view; B – male hind leg, ventral view; C – male protibia, dorsal view; D – male metafemur, dorsal view; E – male abdominal sternite 8; F – aedeagus, dorsal view; G – ditto, lateral view. Scale I: 1 mm for A; II: 1 mm for B; III: 0.2 mm for C; IV: 0.5 mm for D; V: 0.2 mm for E; VI: 1 mm for F and G.

than antennomere 10 (Fig. 80C); relative lengths of antennomeres 2 to 11 – 3.2 : 3.7 : 1.9 : 2.1 : 1.4 : 2.8 : 1.0 : 3.4 : 3.0 : 4.0.

Pronotum widest at from basal half to base, feebly sinuate at posterior margin, distinctly punctate, punctation similar to that on head (Fig. 80A).

Scutellum minutely and sparsely punctate.

Elytra widest ca. at basal 1/3 (Fig. 80A), not transversely strigose; each elytron with nine rows of punctures, bearing small number of large punctures and dense very fine punctures between rows (Fig. 80D); row 9 invisible in dorsal view, subhumeral row as long as ca. 1/3 of elytral length (Fig. 80B); rows composed of larger punctures than those of pronotum (Fig. 80A); sutural stria fine, reaching from apex to ca. apical half of the elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, without distinct excavation between median carina and transverse carina (Fig. 80E); median carina of mesoventrite low (Fig. 80E); metaventrite sparsely and finely pubescent, strongly microreticulate except for almost smooth middle portion; middle portion of metaventrite decumbently and densely pubescent (Fig. 80F).

Protibiae gradually widening from base towards apex (Fig. 81C); tarsomeres 2–4 of protarsi and mesotarsi expanded (Fig. 81A); metafemora triangularly protuberant at about midlength of posterior margins, feebly expanded posteroapically (Fig. 81B), with moderately large dorsal projection posteroapically (Fig. 81D); metatibiae distinctly and curved inwards, with some small robust spines at internal margins (Fig. 81B).

Abdominal sternite 8 strongly curved (Fig. 81E); aedeagus slender (Figs. 81F, 81G); median lobe rounded at apex in dorsal view (Fig. 81F) and very feebly curved in lateral view (Fig. 81G); each paramere extremely short, club-shaped, and bearing two apical setae (Fig. 81F).

**Female.** Unknown.

**Differential diagnosis.** *Leiodes nagayamai* sp. nov. is similar to *L. fracta* (Seidlitz, 1875) inhabiting the Russian Far East and Japan, in elytral shape, but can be distinguished from it by each elytron bearing row 9, a distinct subhumeral row in the basal third of elytra (Fig. 80B) and the male metatibiae being relatively weakly curved (Fig. 81B). In contrast, *L. fracta* has each elytron with row 9 almost straight and not comprising a subhumeral row (Fig. 72B) and the male metatibiae being relatively strongly curved (Figs. 73C, 73D). *Leiodes nagayamai* sp. nov. also resembles the Russian species, *L. daffneri* Perkovsky, 1990 in the morphology of the aedeagus, but can be separated from it by having the male metafemur with a moderately large dorsal projection posteroapically (Fig. 81D), and the aedeagus being rounded apically in the dorsal view (Fig. 81F). In contrast, *L. daffneri* has a large dorsal projection and its aedeagus is triangular apically. *Leiodes nagayamai* sp. nov. is also similar to *L. rhaetica* (Erichson, 1845) inhabiting the Holarctic region in having short parameres, but can be distinguished from it by having antennomere 11 clearly narrower than 10 (Fig. 80C). In contrast, *L. rhaetica* has the antennomere 11 almost as wide as 10th (Fig. 96C).

**Etymology.** The species name is dedicated to a brave samurai Yaichirô Nagayama (1837–1877) who contributed to the reclamation of Hokkaido.

**Distribution.** Japan: Hokkaido.

## 28. *Leiodes obesa* (Schmidt, 1841)

Japanese name: Ezo-ô-tamakinokomushi  
(Figs. 82–84)

*Anisotoma obesa* Schmidt, 1841: 150.

*Liodes obesa*: REITTER (1885): 99.

*Leiodes obesa*: HATCH (1929): 30; DAFFNER (1983): 90 (redescription); COOTER (1996): 255 (key to British species of *Leiodes*); ŠVEC (1996): 74 (new to Uzbekistan, Turkmenia, Kirghizia); BOROWIEC & COOTER (1999): 55 (list of Polish species of *Leiodes*); PERREAU (2004): 197 (catalogue); PARK & AHN (2007): 41 (list of Korean species of *Leiodes*).

*Leiodes obesus*: LAFER (1989a): 323 (key to species of *Leiodes* in Russian Far East).

See HATCH (1929) and DAFFNER (1983) for additional synonymy and references.

**Type locality.** Germany.

**Type material.** Not examined.

**Additional material examined.** **JAPAN:** **HOKKAIDO:** 1 ♂, Rausu Town, Shiretoko Pass, 19.–25.vii.1997, S. Hori leg. (FUFJ); 1 ♀, Rausu Town, Shiretoko, 18.vii.–1.viii.2001, S. Hori leg. (FUFJ); 1 ♂, 1 ♀, Shari Town, Ikushina, 25.vi.2005, T. Katô leg. (they were collected near street lamps) (FUFJ); 1 ♂, Koshimizu Town, Nogami Pass, 27.vii.2005, M. Saitô leg. (FUFJ); 1 ♂, Mts. Daisetsu, Mt. Kurodake, 31.viii.1987, N. Yasuda leg. (FUFJ); 1 ♂, Muka-yama, 10.v.1975, T. Hattori leg. (FUFJ). **UNITED KINGDOM:** 1 ♂, Cassop Vale, Durham, 9.vii.1985, D. Shirt leg. (FUFJ). **SLOVAKIA:** 2 ♀♀, N. Tatry, Kráľova hola, L. Klíma leg. (FUFJ).

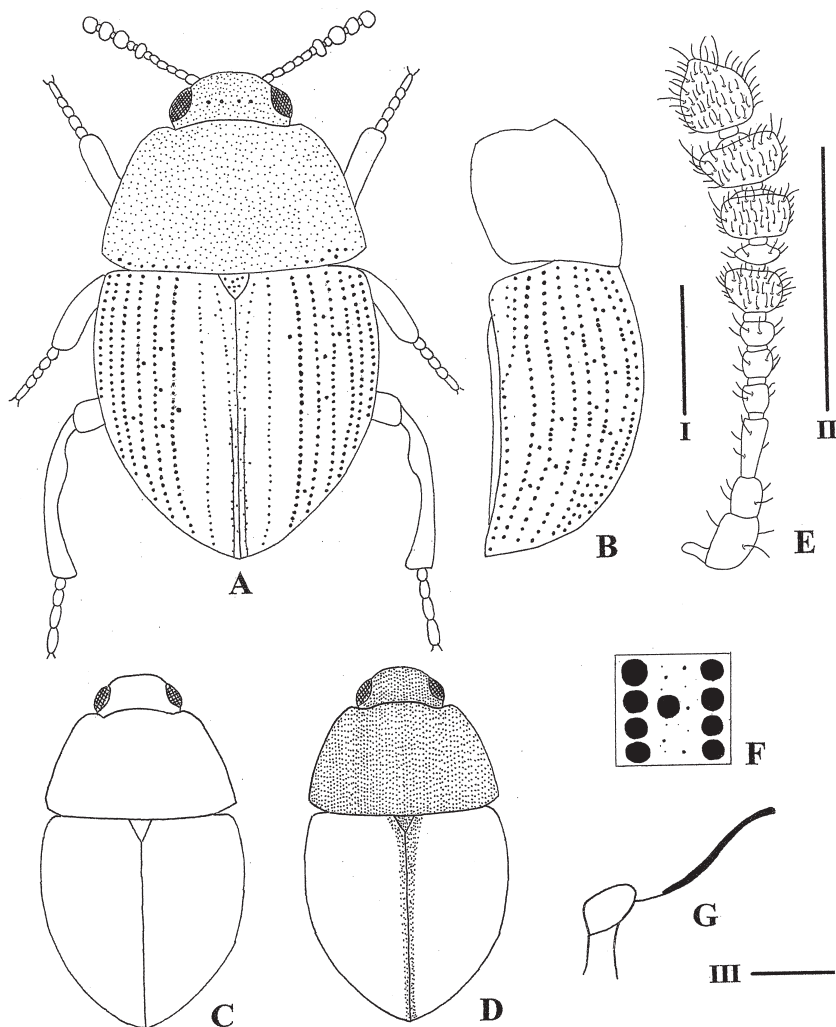


Fig. 82. *Leiodes obesa* (Seidlitz, 1841). A – body, dorsal view; B – ditto, lateral view; C and D – dorsal color; E – antenna; F – elytral punctures; G – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for E; III: 0.2 mm for G.

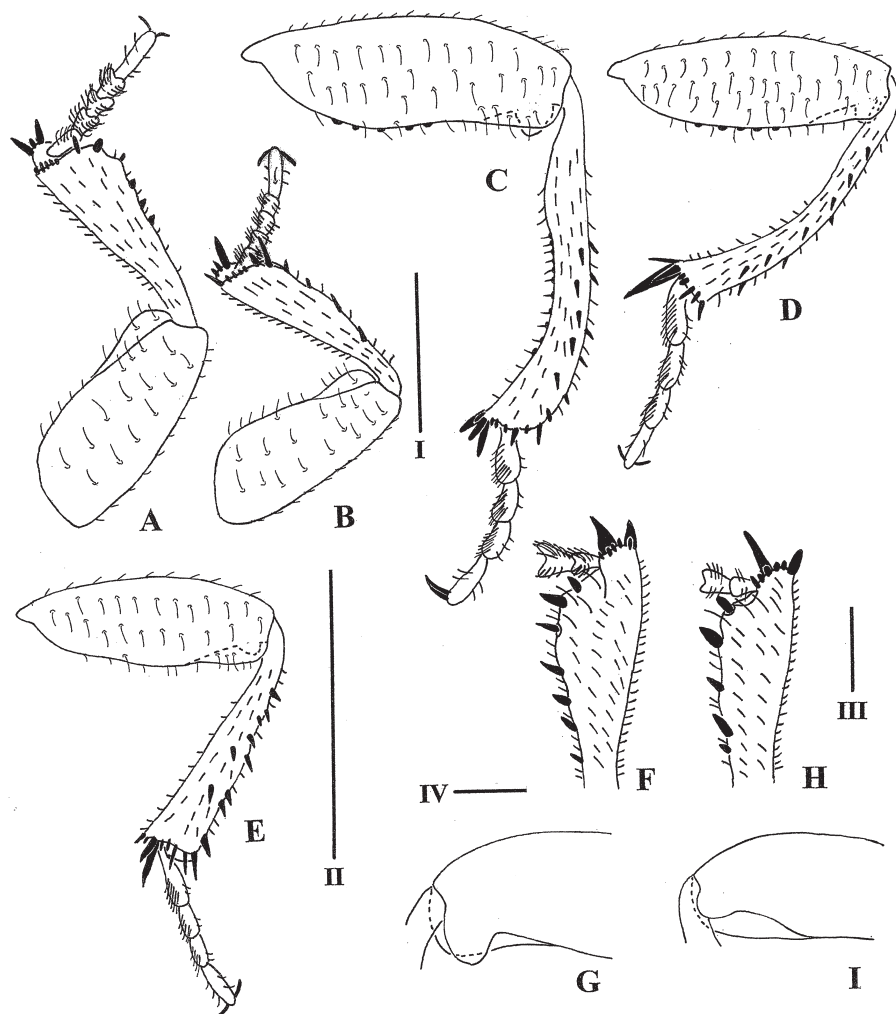


Fig. 83. *Leiodes obesa* (Seidlitz, 1841). A – male fore leg, ventral view; B – female fore leg, ventral view; C – hind leg of male specimen (body size: 3.6 mm), ventral view; D – ditto (body size: 3.2 mm); E – female hind leg, ventral view; F – male protibia, dorsal view; G – male metafemur, dorsal view; H – female protibia, dorsal view; I – female metafemur, dorsal view. Scale I: 0.5 mm for A and B; II: 1 mm for C, D, and E; III: 0.2 mm for F and G; IV: 0.2 mm for H and I.

**Diagnosis.** Coloration. Dorsum usually unicolor (Fig. 82C), rarely bicolored (Fig. 82D); head and pronotum usually brown or a little reddish brown or rarely dark brown; elytra brown or reddish brown, rarely with dark brown stripe near elytral suture (Fig. 82D); antennae brownish; antennomeres 1–6 and 8 brown, antennomeres 7, 9, 10, and basal 2/3 of antennomere 11 usually dark brown, apical 1/3 of antennomere 11 light brown.

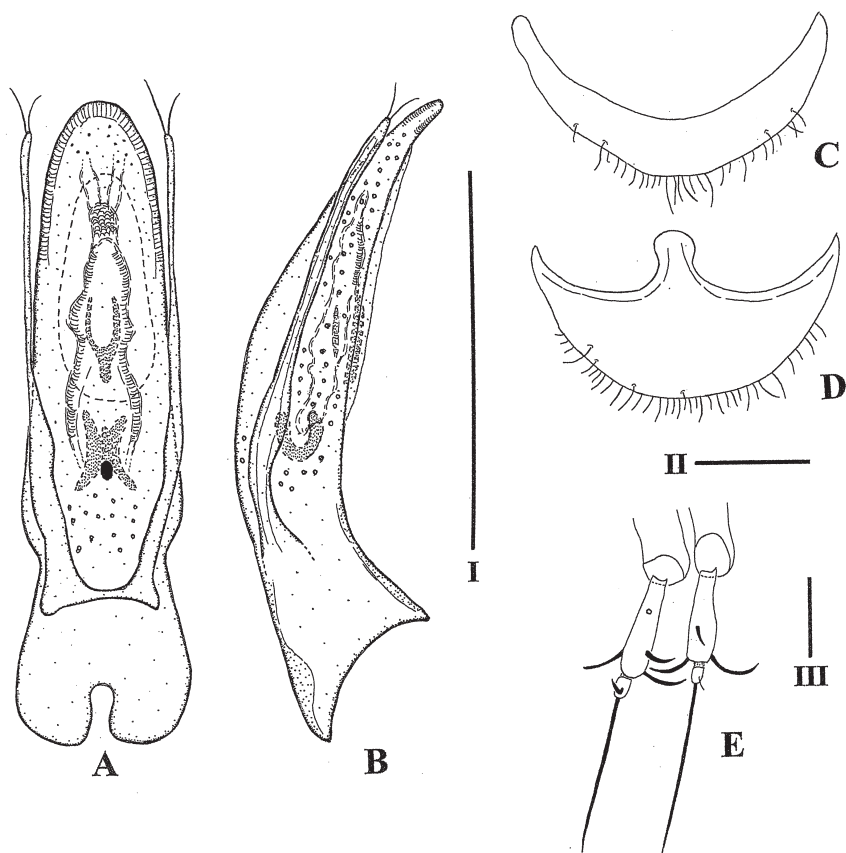


Fig. 84. *Leiodes obesa* (Seidlitz, 1841). A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D; III: 0.1 mm for E.

Body 3.0–4.0 mm long, ca. 1.7× as long as wide (Fig. 82A); head densely and minutely punctate, bearing some large punctures (Fig. 82A); antennomeres 1–4 each longer than wide; antennomeres 5 and 11 each about as long as wide; remaining antennomeres each wider than long; antennomere 11 oval (Fig. 82E). Pronotum feebly sinuate at posterior margin and densely and minutely punctate (Fig. 82A). Elytra not transversely strigose; each elytron with nine rows of punctures, bearing small number of large punctures and moderate number of very fine punctures between rows (Fig. 82F); row 9 invisible in dorsal view, subhumeral row as long as ca. 1/3 of elytral length (Fig. 82B); rows composed of punctures larger and deeper than those of pronotum (Fig. 82A); sutural stria fine, reaching from apex to ca. apical 2/5 of the elytral length. Metathoracic wings fully developed. Mesoventrite without distinct excavation between median carina and transverse carina (Fig. 82G); median carina of mesoventrite low (Fig. 82G); metaventrite without sexual dimorphism. Legs showing distinct

sexual dimorphism on protarsi, mesotarsi, metafemora, and metatibiae; protibiae showing indistinct sexual dimorphism.

**Male.** Protibiae distinctly widening from base towards apex at internal margins (Fig. 83F); tarsomeres 2–4 of protarsi and mesotarsi expanded (Fig. 83A); metafemur with some tiny humps at posterior margin (Figs. 83C, 83D), with large dorsal projection posteroapically (Fig. 83G); metatibiae distinctly curved (Figs. 83C, 83D), often expanded inwards at basal 1/4 of internal margins and with some small robust spines at about midlength of internal margins (Fig. 83C), sometimes simply curved at internal margins and without distinct tiny spines (Fig. 83D); abdominal sternite 8 strongly curved (Fig. 84C); aedeagus as shown in Figs. 84A, 84B.

**Female.** Protibiae bearing almost parallel-sided margins (Fig. 83H); protarsi and mesotarsi slender (Fig. 83B); metafemur with a moderately large dorsal projection posteroapically (Fig. 83I); metatibiae almost straight (Fig. 83E); abdominal sternite 8 with spiculum ventrale at central point of anterior margin (Fig. 84D); coxites and stylus as shown in Fig. 84E.

**Morphological variability.** Males vary morphologically in correlation to the body size. Large males have extremely well developed secondary sexual characters on the metatibiae which are expanded at the basal 1/4 of internal margins and bear some crenellated tiny spines at about the distal half of the internal margins (Fig. 83C). In contrast, small males have metatibiae that are simply curved and bearing no tiny spines (Fig. 83D). Figs. 83C and 83D are drawn based on specimens with the body size 3.2 mm and 3.6 mm, respectively.

**Differential diagnosis.** *Leiodes obesa* is similar to *L. okawai* in having the aedeagus rounded at the apex, but can be distinguished from the latter by having the mesoventrite without distinct excavation (Fig. 82G) and the subhumeral row as long as ca. 1/3 of the elytral length (Fig. 82B). In contrast, *L. okawai* has the mesoventrite with a distinct excavation (Fig. 64E) and no subhumeral row (Fig. 64B).

**Distribution.** Europe, Russia, Mongolia, Korea (DAFFNER 1983), and Japan: Hokkaido and South Chishima Islands (Kunashiri Island). New to Hokkaido.

### 29. *Leiodes ohtai* sp. nov.

Japanese name: Ōta-ō-tamakinokomushi  
(Figs. 85–86)

**Type locality.** Japan, Ryukyus, Okinawa Prefecture, Okinawa Island, Kunigami Village, Hentona, Forest Park.

**Type material. JAPAN: RYUKYUS:** HOLOTYPE: ♀, Okinawa Pref., Okinawa Is., Kunigami Village, Hentona, Forest Park, 8.iii.2003, H. Hoshina leg. (TA) (MNHAH).

**Examined specimens of related species.** *L. matthiasi* Švec, 1999: PARATYPES: 1 ♂, 1 ♀, Kazakhstan, Taldy-Kurgan-Geb., Lli-Tal, Altyn-Emel National park, 5.–13.v.1995, V. Lukhtanov leg. (FUFJ).

**Diagnosis.** Body 2.4 mm long, ca. 1.7× as long as wide, relatively convex. Dorsum brown. Antennae relatively slender and antennomere 11 sharply curved in lateral view. Each elytron with nine distinct rows of punctures, subhumeral row reduced. Mesoventrite without distinct excavations between median carina and transverse carina. Median carina of mesoventrite low. Female abdominal sternite 8 with a spiculum ventrale.

**Description.** Measurements of holotype: Body length 2.4 mm; head 0.30 mm in length and 0.60 mm in width; pronotum 0.70 mm in length and 1.2 mm in width; elytra 1.5 mm in length and 1.4 mm in width.

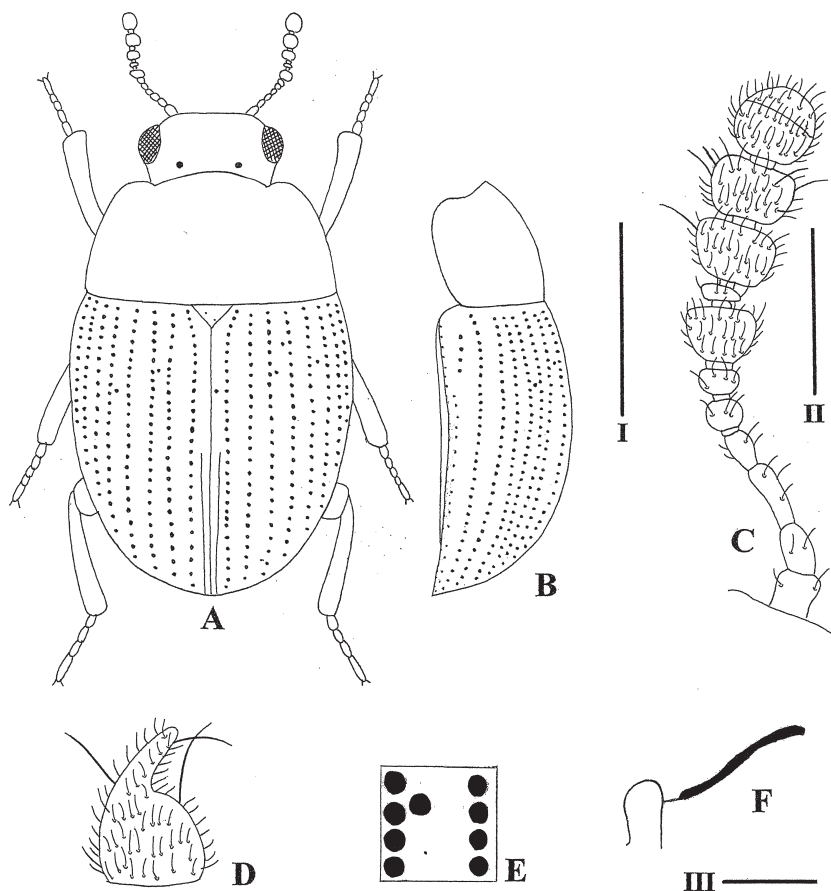


Fig. 85. *Leiodes ohtai* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – antennomere 11, lateral view; E – elytral punctures; F – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.2 mm for C, and 0.1 mm for D; III: 0.2 mm for F.

**Coloration.** Dorsum shining, almost unicolor, brown; antennae brownish; antennomeres 1–6, 8, and apical 2/5 of antennomere 11 light brown; remaining antennomeres brown; legs brownish; all femora and tarsi light brown; remaining parts of legs brown; mesoventrite and metaventrite brown; abdominal ventrites light brown.

Body relatively convex (Fig. 85B).

Head almost impunctate, bearing two unpaired large shallow punctures near vertex (Fig. 85A); antennae relatively slender (Fig. 85C); antennomeres 1–4 each longer than wide; antennomeres 5 and 11 each about as long as wide; remaining antennomeres each wider than long; antennomere 11 round in ventral or dorsal view (Fig. 85C) but distinctly curved dorsally ca. at apical 2/5 and narrowed from about apical 2/5 towards apex in lateral view (Fig. 85D); relative lengths of antennomeres 2 to 11 – 3.8 : 4.6 : 3.0 : 2.3 : 1.8 : 3.6 : 1.0 : 3.9 : 3.9 : 5.1.



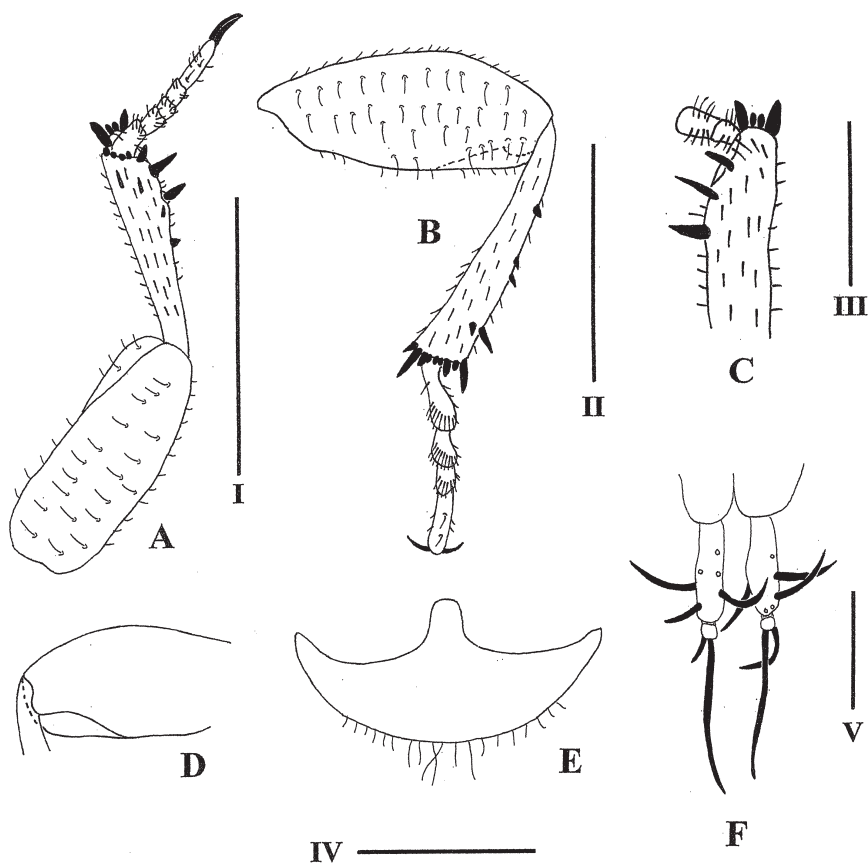


Fig. 86. *Leiodes ohtai* sp. nov. A – female fore leg, ventral view; B – female hind leg, ventral view; C – female protibia, dorsal view; D – female metafemur, dorsal view; E – female abdominal sternite 8; F – coxite and stylus. Scale I: 0.5 mm for A; II: 0.5 mm for B and D; III: 0.2 mm for C; IV: 0.5 mm for E; V: 0.1 mm for F.

Pronotum simply and very feebly curved at posterior margin, almost impunctate, widest at base.

Scutellum almost impunctate.

Elytra widest ca. at basal 1/4 (Fig. 85A), not transversely strigose, almost impunctate except for some additional discal punctures between rows of punctures (Fig. 85E); each elytron with nine rows of punctures, row 9 invisible in dorsal view, subhumeral row reduced (Fig. 85B); sutural stria fine, reaching from apex to ca. apical 2/5 of the elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, without distinct excavation between median carina and transverse carina (Fig. 85F); median carina of mesoventrite low (Fig. 85F); metaventrite impunctate, almost glabrous, microreticulate except for almost smooth middle portion.

All tarsi slender; protibiae almost parallel at both sides (Fig. 86C); metafemur robust, with small dorsal projection posteroapically (Fig. 86D); metatibiae almost straight (Fig. 86B).

Abdominal sternite 8 with a spiculum ventrale at central point of anterior margin (Fig. 86E); coxites and stylus as shown in Fig. 86F.

**Male.** Unknown.

**Differential diagnosis.** Although it is custom to base the description of *Leiodes* species on males, *L. ohtai* sp. nov. is based only on one female specimen as it is very characteristic, having antennomere 11 distinctly curved dorsally in the lateral view (Fig. 85D), unlike all other Japanese species of the genus. Among Asian *Leiodes* species, *L. matthiasi* Švec, 1999 inhabiting Kazakhstan and China has similar antennae (ŠVEC 1999, 2008). *Leiodes ohtai* sp. nov. can be distinguished from it by having a relatively slender and moderately convex body, almost impunctate pronotum, and relatively strong punctures comprising rows of the elytra. In contrast, *L. matthiasi* has a relatively robust and strongly convex body, sparsely punctate pronotum, and relatively fine punctures of the elytra. *Leiodes ohtai* sp. nov. also resembles *L. badia* (Sturm, 1807) in having a small body size, but can be separated from it by having a low median carina of the mesoventrite (Fig. 85F), whereas the median carina is highly raised in *L. badia*.

**Etymology.** This species is dedicated to Minoru Ôta (1891–1945) a famous admiral who acted in the Okinawa Island on which the type locality of this species is situated.

**Distribution.** Japan: Ryukyus (Okinawa Island).

### 30. *Leiodes osawai* Nakane, 1963

Japanese name: Ôsawa-ô-tamakinokomushi  
(Figs. 1, 6, 87–90, 108)

*Leiodes osawai* Nakane, 1963: 41; DAFFNER (1983): 71 (redescription); PERREAU (2004): 197 (catalogue).

**Type locality.** Japan, Honshu, Aichi Prefecture, Nagoya, Higashiyama.

**Type material examined.** JAPAN: HONSHU: HOLOTYPE: ♂, Aichi Pref., Nagoya City, Higashiyama, 1.iv.1947, S. Tabuchi leg. (HUMS). ALLOTYPE: ♀, same data as the holotype.

**Additional specimens examined.** JAPAN: HONSHU: 1 ♀, Mie Pref., Kise Town, Nako, 19.i.1997, K. Kannô leg. (FUFJ); 1 ♂, Mie Pref., Kameyama City, Mt. Nonoboriyama, 10.iii.2002, M. Inagaki leg. (FIT) (FUFJ); 1 ♂, Yamanashi Pref., Nirasaki City, Gozaishi-onsen, 26.iii.1991, K. Hosoda leg. (KM); 2 ♂♂, 1 ♀, Kanagawa Pref., Ninomiya Town, Mt. Adumayama, 17.xii.2000, Y. Hirano leg. (FUFJ); 1 ♂, Tokyo Pref., Okutama Town, Nippara, Ogawadani (alt. 1000m), 24.iii.2007, H. Kamezawa leg. (FUFJ); 1 ♀, Tochigi Pref., Ashikaga City, Ô-numata-chô, 23.–31.iii.2010, H. Ohkawa leg. (FIT) (FUFJ); 1 ♀, Tochigi Pref., Ashikaga City, Ô-numata-chô (alt. 100 m), 30.iii.–4.iv.2011, H. Ohkawa leg. (FIT) (FUFJ).

**Diagnosis.** Coloration. Dorsum almost bicolored (Figs. 87D, 87F) or tricolored (Figs. 87C, 87E); head brown or dark brown; pronotum brown; elytra bicolored, light brown or brown, with black stripes near elytral suture (Figs. 87C, 87D) and lateral margins (Figs. 87E, 87F); scutellum black; antennomeres 1–6 and 8 reddish brown; antennomeres 7, 9, 10, and basal 3/5 of antennomere 11 black; apical 2/5 of antennomere 11 light brown.

Body 3.8–5.1 mm long, ca. twice as long as wide, cylindrical (Fig. 87A). Head densely and minutely punctate, bearing some large punctures in some specimens (Fig. 87A); antennomeres 1–3 each longer than wide, remaining antennomeres each wider than long; antennomere 11 robust (Fig. 87G). Pronotum simply and very feebly curved at posterior margin and distinctly

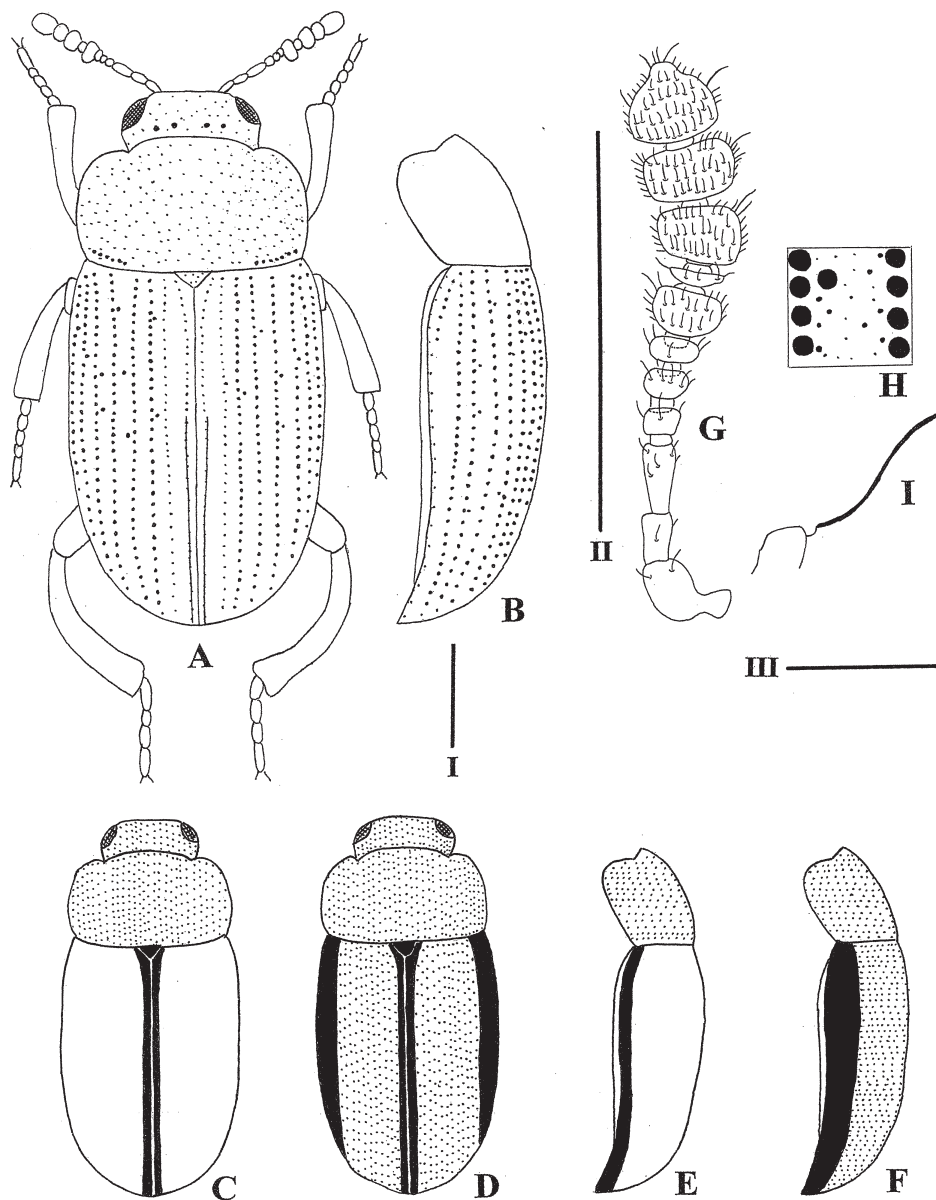


Fig. 87. *Leiodes osawai* Nakane, 1963. A – body, dorsal view; B – ditto, lateral view; C and D – dorsal color; E and F – lateral color; G – antenna; H – elytral punctures; I – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for G; III: 0.5 mm for I.

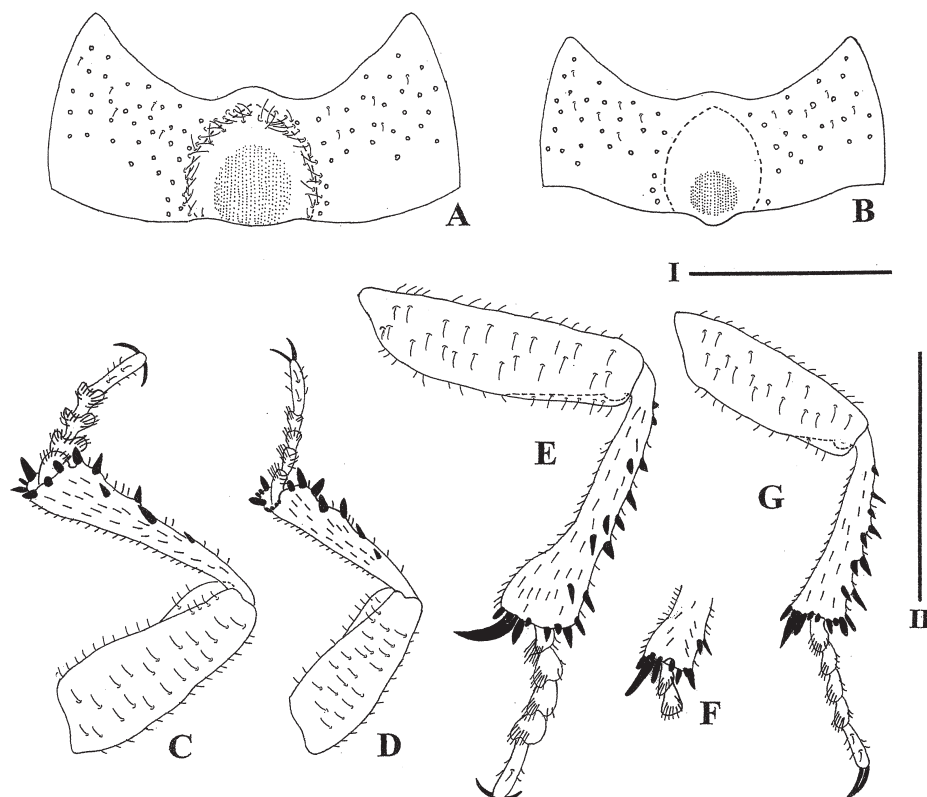


Fig. 88. *Leiodes osawai* Nakane, 1963. A – male metaventrite; B – female metaventrite; C – male fore leg, ventral view; D – female fore leg, ventral view; E – middle leg of a male specimen collected from Yamanashi Pref., ventral view; F – apex of middle leg of male specimen collected from Tokyo Pref., ventral view; G – female middle leg, ventral view. Scale I: 1 mm for A and B; II: 1 mm for C–G.

and densely punctate (Fig. 87A). Elytra not transversely strigose; each elytron with nine rows of punctures, bearing small number of large punctures and many very fine punctures between rows (Fig. 87H); row 9 invisible in dorsal view, subhumeral row as long as ca. 1/4 of elytral length (Fig. 87B); rows composed of punctures larger than those of pronotum (Fig. 87A); sutural stria fine, reaching from apex to ca. apical half of elytral length. Metathoracic wings fully developed. Mesoventrite with one distinct excavation between median carina and transverse carina (Fig. 87I); median carina of mesoventrite low (Fig. 87I); metaventrite sexually dimorphic. Legs showing sexual dimorphism on protarsi, mesotibiae, mesotarsi, metafemora, and metatibiae; protibiae gradually and very feebly widening from base towards apex (Figs. 89E, 89F); metafemur with a small dorsal projection posteroapically (Figs. 89G, 89H).

**Male.** Metaventrite pubescent on middle portion (Fig. 88A); tarsomeres 2–4 of protarsi and mesotarsi expanded (Figs. 88C, 88E); mesotibiae expanded at interoapical corner, longest

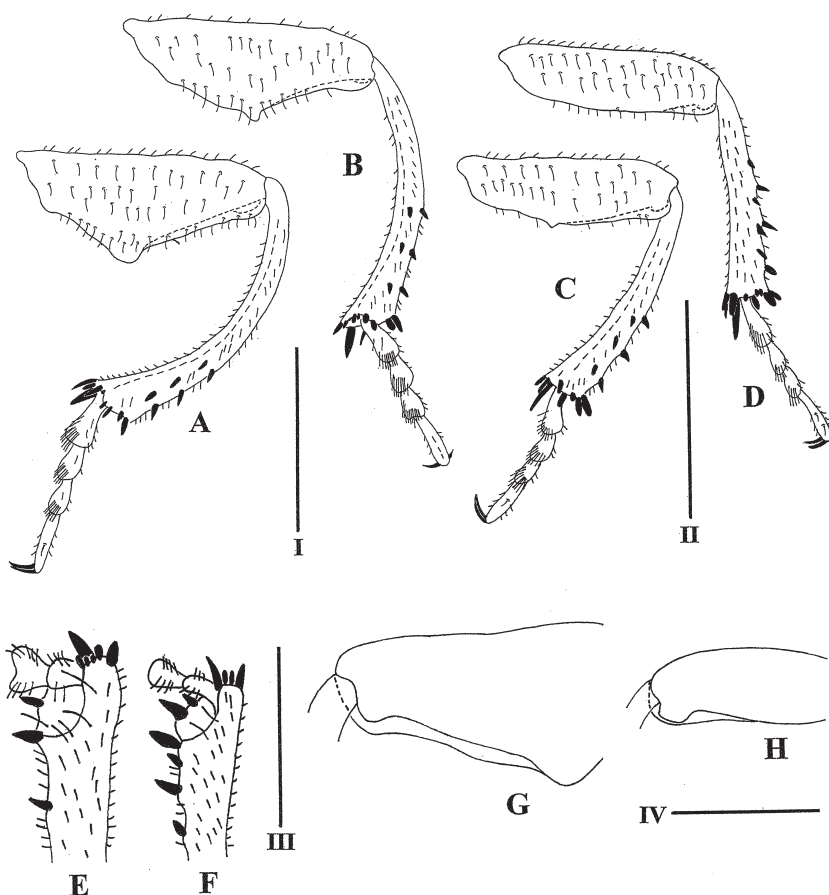


Fig. 89. *Leiodes osawai* Nakane, 1963. A – hind leg of male specimen collected from Mie Pref., ventral view; B – ditto, from Yamanashi Pref., C – ditto, from Tokyo Pref.; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 1 mm for A and B; II: 1 mm for C and D; III: 0.5 mm for E and F; IV: 0.5 mm for G and H.

spine at the corner almost straight or strongly curved inwards (Figs. 88E, 88F); metafemora feebly or strongly protuberant at about midlength of posterior margins (Figs. 89A, 89B, 89C); metatibiae almost straight or moderately to strongly curved (Figs. 89A, 89B, 89C); abdominal sternite 8 strongly curved (Fig. 90C); aedeagus as shown in Figs. 90A and 90B.

**Female.** Metaventre almost glabrous on middle portion (Fig. 88B); protarsi and mesotarsi slender (Figs. 88D, 88G); mesotibiae feebly and simply widening from base to apex, longest spine at interoapical corner almost straight (Fig. 88G); metafemora slender, almost straight at posterior margins (Fig. 89D); metatibiae almost straight (Fig. 89D); abdominal sternite 8 with a spiculum ventrale at central point of anterior margin (Fig. 90D); coxites and stylus as shown in Fig. 90E.

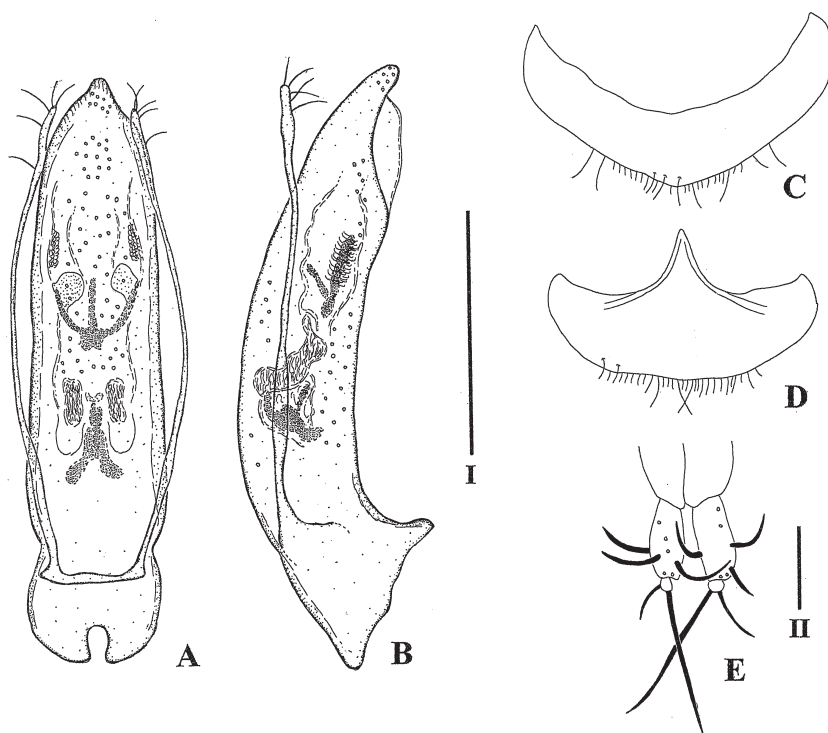


Fig. 90. *Leiodes osawai* Nakane, 1963. A – aedeagus, dorsal view; B – ditto, lateral view; C – male abdominal sternite 8; D – female abdominal sternite 8; E – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.2 mm for C and D, and 0.1 mm for E.

**Morphological variability.** The present species shows intraspecific variation in dorsal coloration and the shape of the male mesotibiae, metafemora, and metatibiae. In the specimens collected in the western region (Mie and Aichi Prefectures, see Fig. 108), the elytra are light brown with relatively slender black stripes near the elytral suture and along the lateral margins (Figs. 87C, 87E), and the male hind legs are conspicuously curved (i.e., secondary sexual characters are well-developed (Fig. 89A)). On the other hand, specimens from the eastern region (Yamanashi, Kanagawa, and Tokyo Prefectures, see Fig. 108) have the elytra brown with relatively broad black stripes (Figs. 87D, 87F) and the male hind legs have relatively indistinct secondary sexual characters (Figs. 89B, 89C). In contrast, the male genitalia do not show the regional variation in the specimens examined. For that reason, I do not establish any new species or subspecies and consider the observed differences as intraspecific regional variation. This needs to be confirmed by additional specimens in the future, as only nine specimens were examined for this study. One male specimen from the Tokyo Prefecture (Fig. 108) is the smallest (body length 3.8 mm) and has mesotibiae, metafemora and metatibiae similar to those of females (Fig. 89C). It is possible that those features are correlated to body size, and body size varies regionally.

**Differential diagnosis.** *Leiodes osawai* can be easily distinguished from all other Japanese species of *Leiodes* by having an elongate cylindrical body (Fig. 87A).

**Distribution.** Japan: Honshu.

**Taxonomic note.** DAFFNER (1983) mentioned that *L. osawai* is morphologically very similar to *L. lucens* (Fairmaire, 1855). However, this note was solely based on the original description of *L. osawai* by NAKANE (1963), not on the examination of type specimens. The original description of male legs of *L. osawai* may really resemble those of *L. lucens* and the original description does not include any figures. In addition, both *L. osawai* and *L. lucens* have a similar large trident sclerite in the inner sac of the aedeagus (Fig. 79A, 90A). However, *L. osawai* can be separated from *L. lucens* by having a cylindrical body (Fig. 87A), bicolored or tricolored dorsum (Figs. 87C, 87D, 87E, 87F), relatively slender metafemora (Figs. 89A, 89B, 89C, 89D), and the aedeagus feebly curved in lateral view (Fig. 90B). In contrast, *L. lucens* has a long oval body (Fig. 77A), unicolor dorsum, relatively robust metafemora (Figs. 78C, 78D), and the aedeagus relatively strongly curved in the lateral view (Fig. 79B).

### 31. *Leiodes ozakii* sp. nov.

Japanese name: Tsugaru-ô-tamakinokomushi  
(Figs. 91–92)

**Type locality.** Japan, Honshu, Aomori Pref., Hirakawa City, Ozakishiroiwa.

**Type material.** JAPAN: HONSHU: HOLOTYPE: ♂, Aomori Pref., Hirakawa City, Ozakishiroiwa, 31.v.1997, T. Ozaki leg. (MNHAH).

**Diagnosis.** Body 3.4 mm long, ca. 1.9× as long as wide. Dorsum brown. Each elytron with nine distinct rows of punctures, subhumeral row as long as ca. 1/3 of elytral length. Mesoventrite without distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Metafemora robust. Metatibiae distinctly curved inwards near apex.

**Description.** Measurements of holotype: Body length 3.4 mm; head 0.53 mm in length and 0.88 mm in width; pronotum 0.91 mm in length and 1.5 mm in width; elytra 2.2 mm in length and 1.8 mm in width.

Coloration. Dorsum almost unicolor, brown; antennomeres 1–6 and 8 brown; antennomeres 7, 9, 10, and basal half of antennomere 11 dark brown; apical half of antennomere 11 light brown; legs brown; mesoventrite, metaventrite, and abdominal ventrites brown.

Head distinctly and densely punctate, bearing some large punctures (Fig. 91A); antennomeres 1–3 each longer than wide; antennomere 4 about as long as wide; remaining antennomeres each wider than long; antennomere 11 robust (Fig. 91C); relative lengths of antennomeres 2 to 11 – 2.6 : 3.8 : 1.4 : 1.0 : 1.0 : 2.3 : 1.0 : 2.6 : 2.6 : 4.3.

Pronotum widest near base, simply and very feebly curved at posterior margin, distinctly punctate, punctation similar to that on head (Fig. 91A).

Scutellum minutely punctate.

Elytra widest ca. at basal 1/3 (Fig. 91A), not transversely strigose; each elytron with nine rows of punctures, bearing small number of large punctures and densely arranged very fine punctures between rows (Fig. 91D); row 9 invisible in dorsal view, subhumeral row as long as ca. 1/3 of elytral length (Fig. 91B); rows composed of punctures larger than those of pronotum (Fig. 91A); sutural stria fine, reaching from apex to ca. apical 2/5 of elytral length.



Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, without distinct excavation between median carina and transverse carina (Fig. 91E); median carina of mesoventrite low (Fig. 91E); metaventricle sparsely and finely pubescent, strongly microreticulate except for almost smooth middle portion.

Protibiae distinctly widening from base towards apex (Fig. 92C); tarsomeres 2–4 of protarsi and mesotarsi expanded (Fig. 92A); metafemur robust (Fig. 92B), with a small dorsal projection posteroapically (Fig. 92D); metatibiae feebly curved inwards near apex (Fig. 92B).

Abdominal sternite 8 weakly curved (Fig. 92E); aedeagus slender (Figs. 92F, 92G); median lobe simply and bluntly pointed at apex in dorsal view (Fig. 92F), sharply curved near base in lateral view (Fig. 92G); each paramere bearing two setae and one transparent small lobe at apex (Fig. 92F).

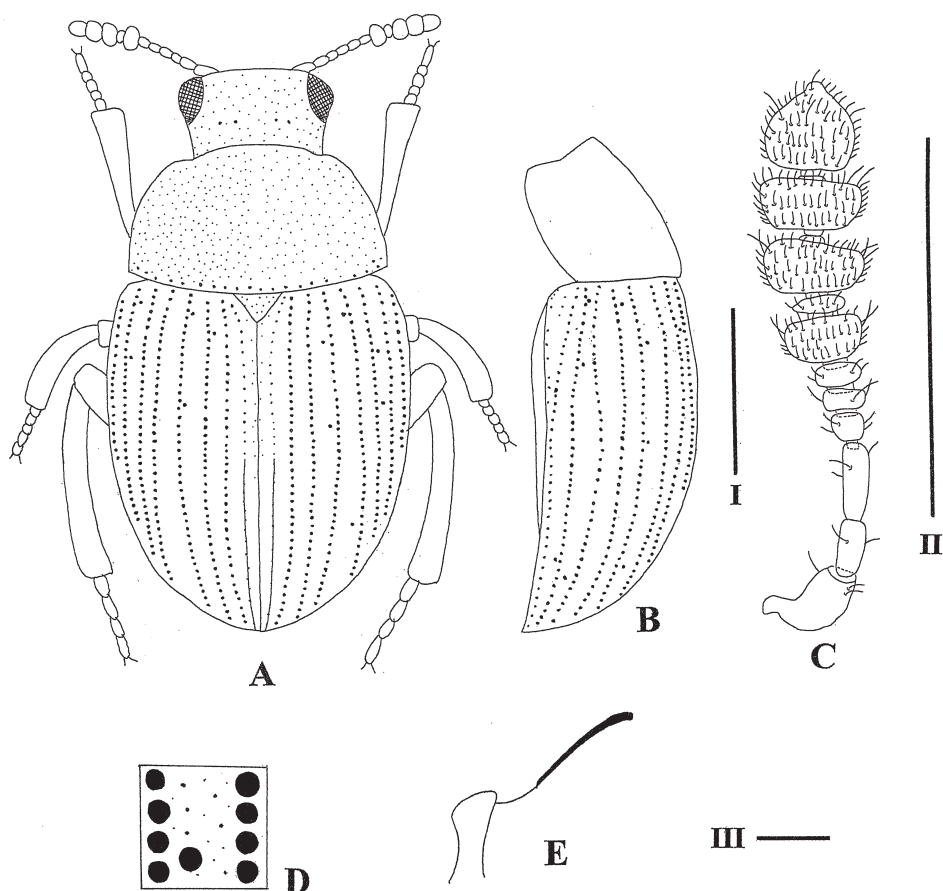


Fig. 91. *Leiodes ozakii* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.2 mm for E.

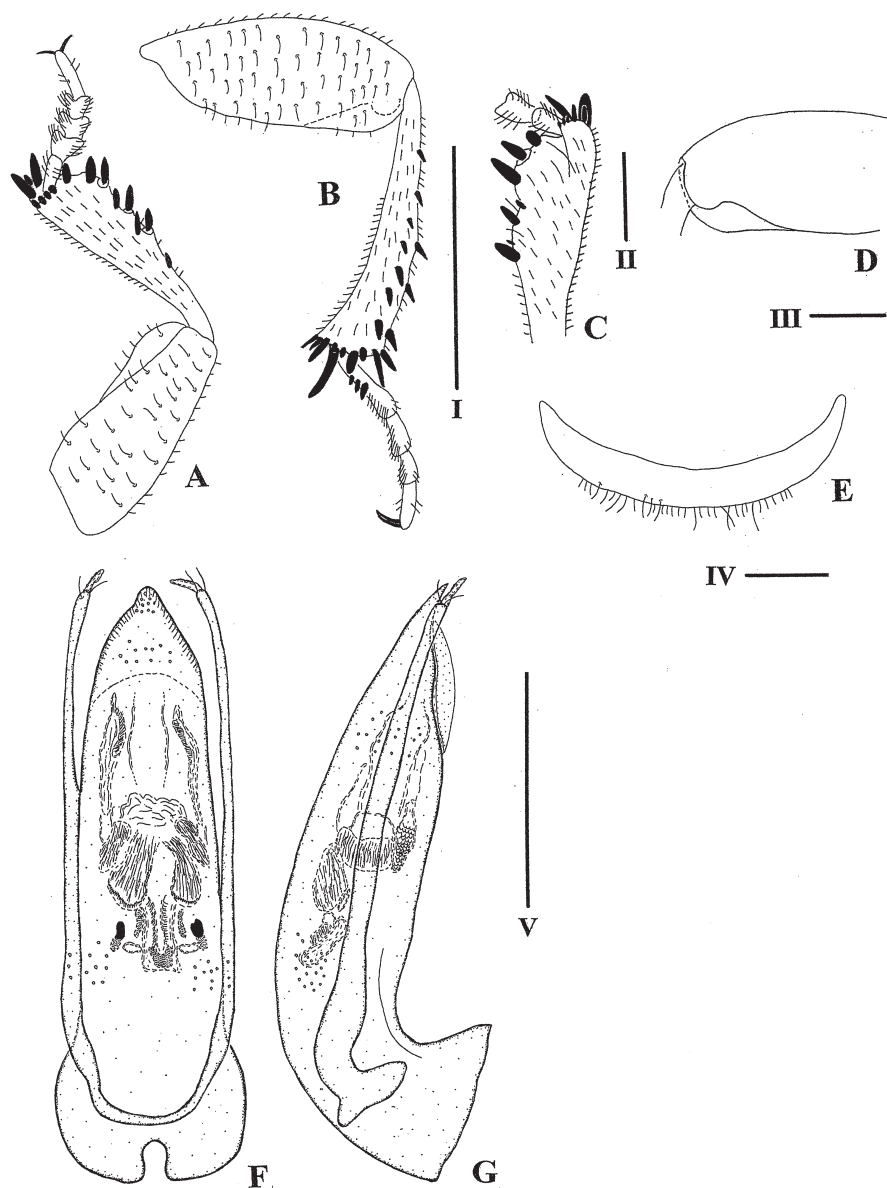


Fig. 92. *Leiodes ozakii* sp. nov. A – male fore leg, ventral view; B – male hind leg, ventral view; C – male protibia, dorsal view; D – male metafemur, dorsal view; E – male abdominal sternite 8; F – aedeagus, dorsal view; G – ditto, lateral view. Scale I: 1 mm for A and B; II: 0.2 mm for C; III: 0.2 mm for D; IV: 0.2 mm for E; V: 0.5 mm for F and G.

**Female.** Unknown.

**Differential diagnosis.** *Leiodes ozakii* sp. nov. is similar to *L. irregularis* in elytral appearance, but can be distinguished from it by having the male protibiae strongly widening basally towards the apex (Fig. 92C), the tarsomeres 2–4 of male protarsi and mesotarsi expanded (Fig. 92A), and the median lobe of the aedeagus sharply curved near the base in the lateral view (Fig. 92G). In contrast, *L. irregularis* has the male protibiae feebly widening basally towards the apex (Fig. 94F), tarsomeres 2–4 of male protarsi and mesotarsi a slightly expanded (Fig. 94A), and the median lobe weakly curved (Fig. 95B). *Leiodes ozakii* sp. nov. is also similar to *L. silesiaca* (Kraatz, 1852) inhabiting the Russian Far East in elytral shape but can be separated from it by having a relatively slender aedeagus in the dorsal view (Fig. 92F). In contrast, *L. silesiaca* has the aedeagus relatively robust.

**Etymology.** This species is dedicated to Dr. Toshihiro Ozaki who is the collector of the holotype.

**Distribution.** Japan: Honshu (Aomori Prefecture).

### 32. *Leiodes irregularis* Portevin, 1927

Japanese name: Etorofu-ô-tamakinokomushi  
(Figs. 6, 93–95, 109)

*Liodes suturalis* Portevin, 1927: 75.

*Liodes irregularis* Portevin, 1927: 76; HATCH (1929): 35; DAFFNER (1983): 87 (synonymized with *Leiodes portevinii*); Perreau (2004): 196 (catalogue).

*Liodes dichroa* Portevin, 1927: 76; HATCH (1929): 36; DAFFNER (1983): 87 (synonymized with *Leiodes portevinii*).

*Liodes Grouvellei* Portevin, 1927: 76; HATCH (1929): 36; DAFFNER (1983): 87 (synonymized with *Leiodes portevinii*).

*Liodes intermedia* Portevin, 1927: 77; HATCH (1929): 36; DAFFNER (1983): 87 (synonymized with *Leiodes portevinii*).

*Leiodes portevinii* Hatch, 1929: 35 (substitute name for *Liodes suturalis* Portevin, 1927 which became a homonym of *Leiodes suturalis* Stephens, 1832); DAFFNER (1983): 86 (redescription).

*Liodes elongate* Portevin, 1943: 168; DAFFNER (1983): 87 (synonymized with *Leiodes portevinii*).

**Type locality.** Japan, Hokkaido, Etorofu Is.

**Type material.** Not examined.

**Additional material examined.** **JAPAN: HOKKAIDO:** 1 ♀, Mt. Meakandake, 12.vii.1995, H. Hoshina leg.; 1 ♀, Mts. Daisetsu, Mt. Kurodake, 2.viii.1987, N. Yasuda leg.; 6 spec., Sapporo City, forests near Historical Museum of Hokkaido, 7.viii.2002, S. Hori leg. (FIT); 11 spec., 29.vi.2000, 6 spec., 19.vii.2000, 10 spec., same data as the former except for the date, 29.viii.2001; 1 spec., Ebetsu City, Noppo Forest Park, x-xi.2005, T. Lackner leg. (JCHE); 7 spec., Kotohira, 14–27.vii.1999, S. Hori leg. (PT); 10 spec., Shirataki Village, Hirayama, 5.viii.1993, S. Hori leg. 5 spec., Reibun Town, Shiretoko, 18.vii.–1.viii.2001, S. Hori leg. (FIT); 1 ♀, Rishiri Is., Mt. Rishiri, 2.ix.1991, N. Yasuda leg. **HONSHU:** 1 ♂, 1 ♀, Gunma Pref., Tsumagoi Village, Mt. Asashiki, 24.vii.1979, K. Itô leg. (EUMJ); 1 ♀, Yamanashi Pref., Nirasaki City, Hôd-goya, 25.viii.1997, K. Hosoda leg.; 1 ♂, same locality, 15.viii.2000. Specimens preserved in FUJ when not stated otherwise.

**Diagnosis.** Coloration. Dorsum almost unicolor or bicolored, showing multiple color variations (Figs. 93C, 93D, 93E, 93F, 93G); head, pronotum, and scutellum brown, dark brown or blackish brown; elytra brown, often with dark brown or blackish brown stripes near elytral suture (Figs. 93F, 93G); antennomeres 1–6 and 8 brown; antennomeres 7, 9, 10, and basal 3/5 of antennomere 11 dark brown; apical 2/5 of antennomere 11 light brown.

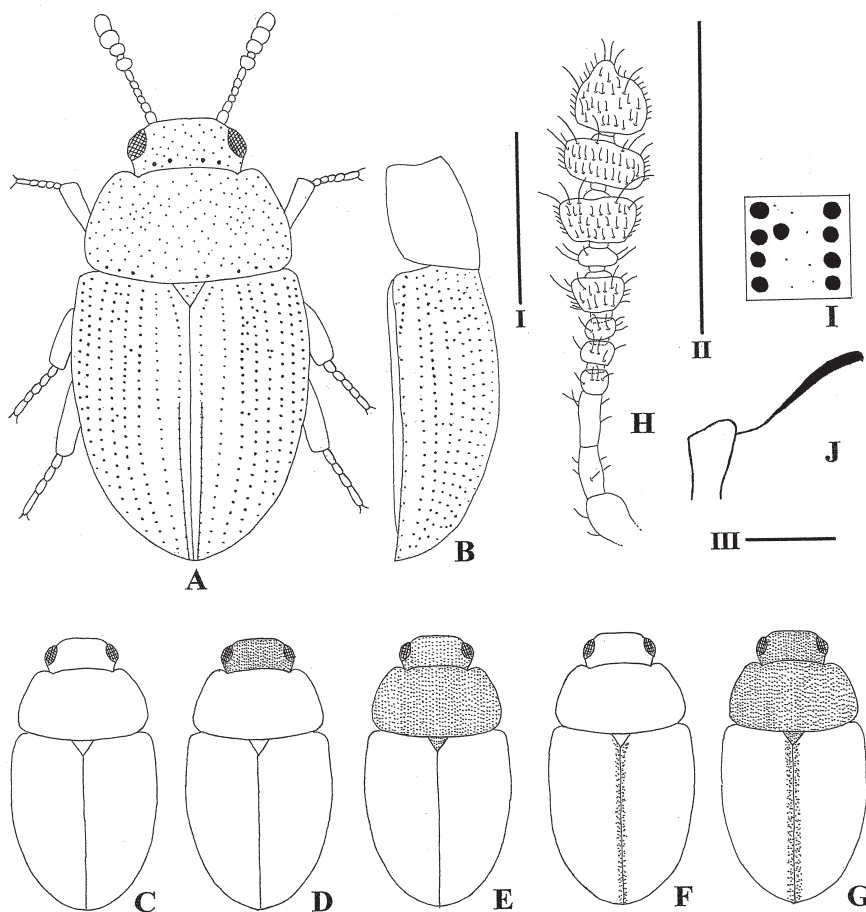


Fig. 93. *Leiodes irregularis* Portevin, 1927. A – body, dorsal view; B – ditto, lateral view; C, D, E, F, and G – dorsal color; H – antenna; I – elytral punctures; J – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for H; III: 0.2 mm for J.

Body 2.4–4.0 mm long, ca.  $1.8\times$  as long as wide (Fig. 93A). Head densely and minutely punctate, often bearing some large punctures (Fig. 93A); antennomeres 1–3 each longer than wide; antennomeres 4 about as long as wide; remaining antennomeres each wider than long; antennomere 11 oval (Fig. 93H). Pronotum simply and very feebly curved at posterior margin and densely and minutely punctate (Fig. 93A). Elytra not transversely strigose; each elytron with nine rows of punctures, bearing small number of large punctures and moderate number of very fine punctures between rows (Fig. 93I); row 9 invisible in dorsal view, subhumeral row as long as ca.  $1/5$  or  $1/4$  (Fig. 93B); rows composed of punctures larger than those of pronotum (Fig. 93A); sutural stria fine, reaching from apex to ca. apical half of the elytral length. Metathoracic wings fully developed. Mesoventrite without distinct excavation between

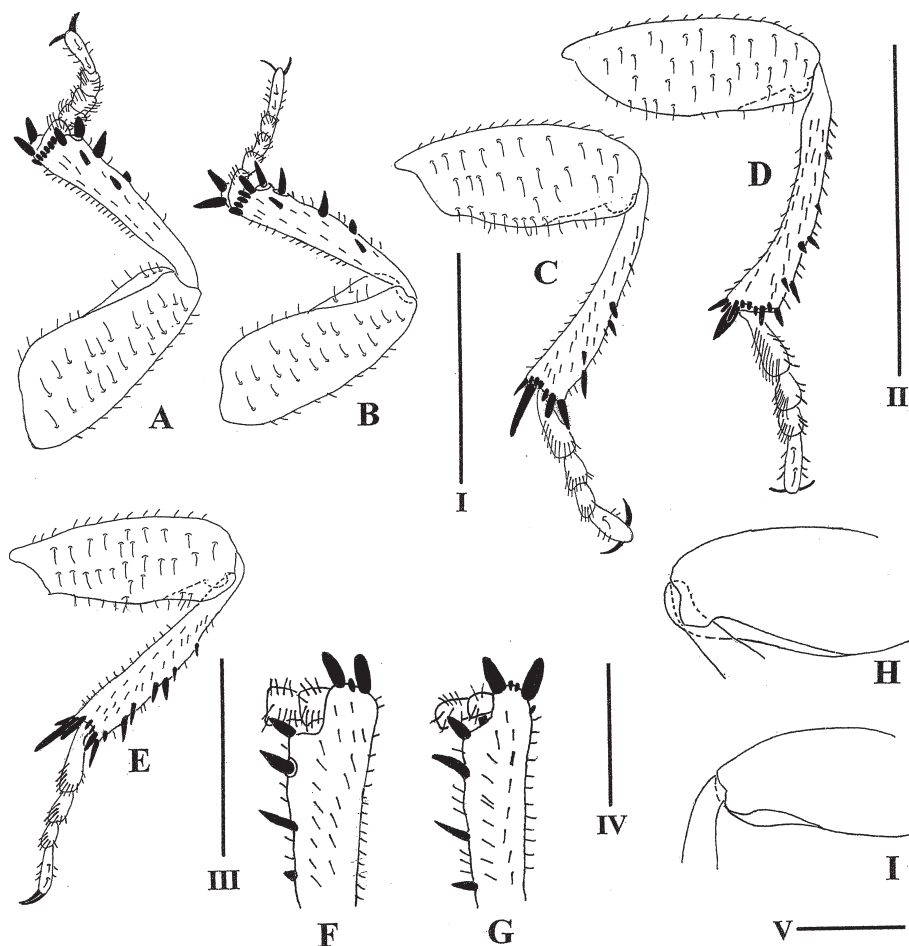


Fig. 94. *Leiodes irregularis* Portevin, 1927. A – male fore leg, ventral view; B – female fore leg, ventral view; C – hind leg of male specimen collected from Hokkaido, ventral view; D – ditto, from Honshu; E – female hind leg, ventral view; F – male protibia, dorsal view; G – female protibia, dorsal view; H – male metafemur, dorsal view; I – female metafemur, dorsal view. Scale I: 0.5 mm for A and B; II: 1 mm for D; III: 0.5 mm for C and E; IV: 0.2 mm for F and G; V: 0.2 mm for H and I.

median carina and transverse carina (Fig. 93J); median carina of mesoventrite low (Fig. 93J); metaventrite without sexual dimorphism. Legs indistinctly sexually dimorphic; protibiae gradually and very feebly widening from base towards apex (Figs. 94F, 94G); metafemur with a small dorsal projection posteroapically (Figs. 94H, 94I).

**Male.** Tarsomeres 2–4 of protarsi and mesotarsi feebly expanded (Fig. 94A); metatibiae very feebly curved inwards (Figs. 94C, 94D); abdominal sternite 8 weakly curved (Fig. 95D); aedeagus as shown in Figs. 95A, 95B; inner sac as shown in Fig. 95C.

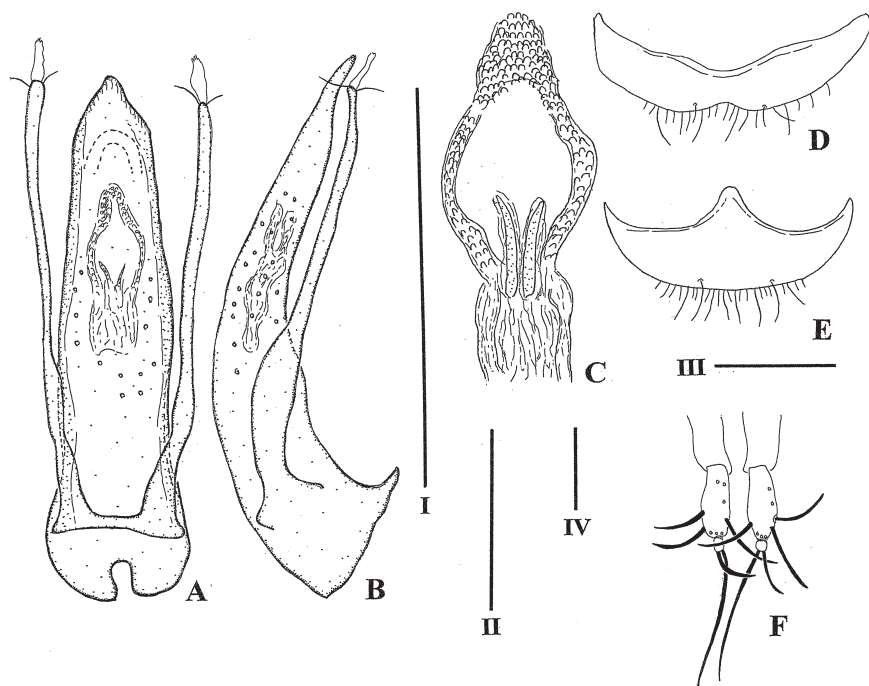


Fig. 95. *Leiodes irregularis* Hatch, 1929. A – aedeagus, dorsal view; B – ditto, lateral view; C – inner sac, dorsal view; D – male abdominal sternite 8; E – female abdominal sternite 8; F – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.1 mm for C; III: 0.2 mm for D and E; IV: 0.1 mm for F.

**Female.** Protarsi and mesotarsi slender (Fig. 94B); metatibiae almost straight (Fig. 94E); abdominal sternite 8 with spiculum ventrale at central point of anterior margin (Fig. 95E); coxites and stylus as shown in Fig. 95F.

**Morphological variability.** The present species is distributed in both Hokkaido and Honshu (Fig. 109) and shows some regional morphological differences. One of the intraspecific variations is the dorsal color (Figs. 93C, 93D, 93E, 93F, 93G), and this difference does not correlate to regional populations. In contrast, the body size and male metatibiae have regional morphological differences. Most of the specimens collected from Hokkaido are less than 3 mm in length and the male metatibiae are very feebly curved inwardly (Fig. 94). On the contrary, specimens from Honshu are more than 3.5 mm in length and the male metatibiae are weakly curved (Fig. 94D).

**Differential diagnosis.** *Leiodes irregularis* is similar to *L. iwakirii* sp. nov. in having a small body, but can be distinguished from the latter by the mesoventrite without a distinct excavation (Fig. 93J) and abdominal sternite 8 being weakly curved (Fig. 95D). In contrast, *L. iwakirii* sp. nov. has the mesoventrite with a distinct excavation (Fig. 75E) and abdominal sternite 8 strongly curved (Fig. 76E).

**Distribution.** Japan: Hokkaido, Rishiri Is., South Chishima Islands (Etorofu Is.), and Honshu (Gunma Prefecture and Yamanashi Prefecture). New to Hokkaido, Rishiri Is., and Honshu.

**33. *Leiodes rhaetica* (Erichson, 1845)**

Japanese name: Tairiku-ô-tamakinokomushi  
(Figs. 96–97)

*Anisotoma rhaetica* Erichson, 1845: 57.

*Liodes rhaetica*: REITTER (1885): 105.

*Leiodes rhaetica*: HATCH (1929): 19; DAFFNER (1983): 78 (redescription); BARANOWSKI (1993): 50 (redescription); PERREAU (2004): 198 (catalogue).

*Leiodes rhaeticus*: LAFER (1989a): 322 (key to species of *Leiodes* in Russian Far East).

See HATCH (1929) and DAFFNER (1983) for additional synonymy and references.

**Type locality.** Austria, Tirol.

**Specimens examined.** NORTH CHISHIMA ISLANDS: 1 ♂, Araidō Island, 21.vii.1931, K. Koba et al. leg. (NSMT). The name of the second collector is not readable because of the damage of label.

**Diagnosis of male** (based on the above examined specimen). Head dark brown; pronotum and elytra a little dark brown; antennomeres 1–6 and 8 brown; remaining antennomeres a little dark brown.

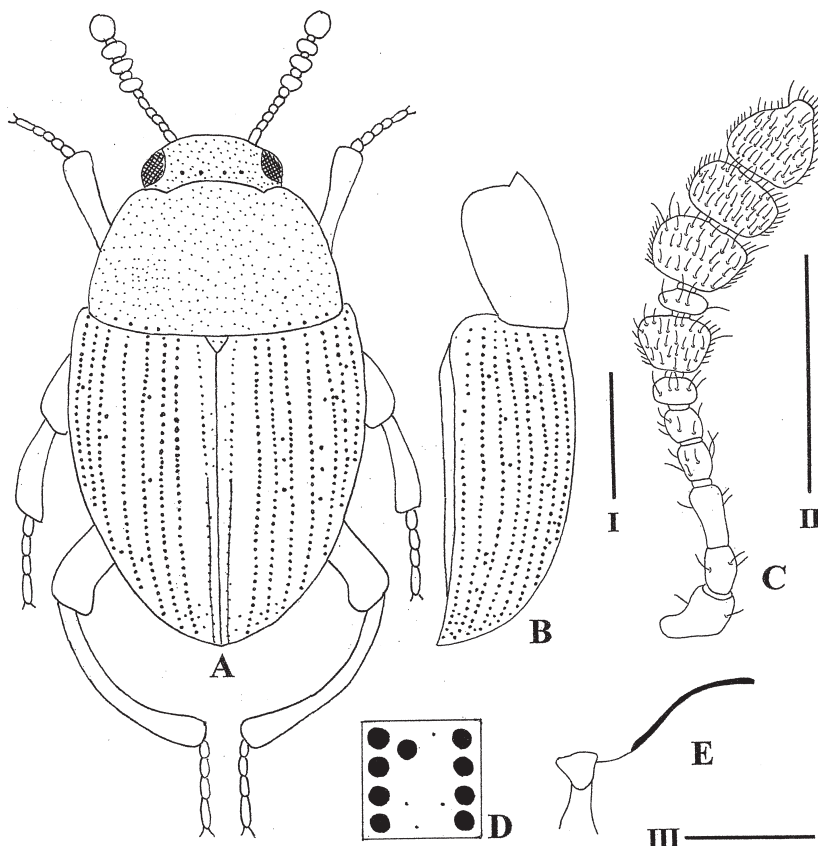


Fig. 96. *Leiodes rhaetica* (Erichson, 1845). A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.5 mm for E.



Body 2.5–4.0 mm long, ca. 1.9× as long as wide (Fig. 96A). Head distinctly and densely punctate, bearing some large punctures (Fig. 96A); antennomeres 1–4 each longer than wide; antennomeres 5 and 11 each about as long as wide; remaining antennomeres each wider than long; antennomere 11 oval (Fig. 96C). Pronotum simply and very feebly curved at posterior margin, distinctly punctate, punctation similar to that on head (Fig. 96A). Elytra not transversely strigose; each elytron with nine rows of punctures, bearing small number of large punctures and moderate number of very fine punctures between rows (Fig. 96D); row 9 invisible in dorsal view, subhumeral row as long as ca. 1/3 of elytra in length (Fig. 96B); rows composed of puncture larger than those of pronotum (Fig. 96A); sutural stria fine, reaching from apex to ca. apical half of elytral length. Metathoracic wings fully developed. Mesoventrite without

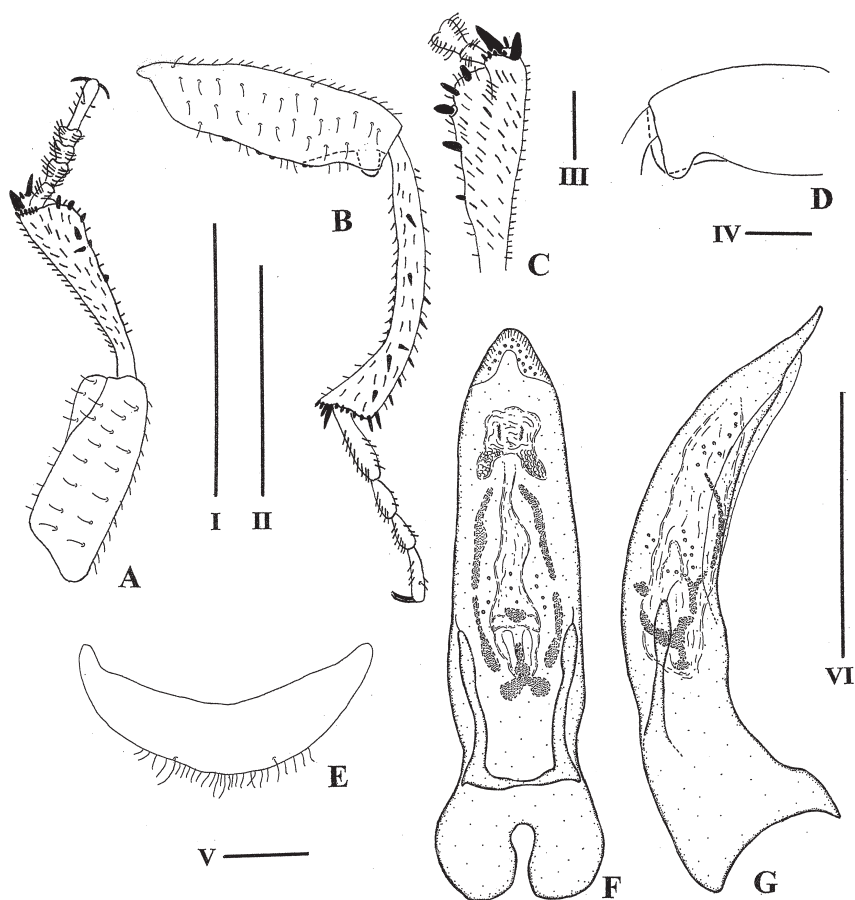


Fig. 97. *Leiodes rhaetica* (Erichson, 1845). A – male fore leg, ventral view; B – male hind leg, ventral view; C – male protibia, dorsal view; D – male metafemur, dorsal view; E – male abdominal sternite 8; F – aedeagus, dorsal view; G – ditto, lateral view. Scale I: 1 mm for A; II: 1 mm for B; III: 0.2 mm for C; IV: 0.2 mm for D; V: 0.2 mm for E; VI: 0.5 mm for F and G.

distinct excavation between median carina and transverse carina (Fig. 96E); median carina of mesoventrite low (Fig. 96E). Protibiae gradually widening from base towards apex (Fig. 97C); tarsomeres 2–4 of protarsi and mesotarsi expanded (Fig. 97A); metafemur bearing some tiny crenellations at posterior margin (Fig. 97B), with a large dorsal projection posteroapically (Fig. 97D); metatibiae distinctly curved inwards (Fig. 97B). Abdominal sternite 8 weakly curved (Fig. 97E); aedeagus as shown in Figs. 97F–G.

**Female.** Not examined.

**Differential diagnosis.** The present species is similar to *Leiodes furva* (Erichson, 1845) inhabiting Europe and Russia in having extremely short parameres of the aedeagus, but may be distinguished by the median lobe of the aedeagus which is rounded apically in the dorsal view (Fig. 97F). In contrast, the median lobe is protuberant apically in *L. furva*.

**Distribution.** Europe, Russia, Mongolia (DAFFNER 1983), North Chishima Islands (Araido Is.), and Alaska (BARANOVSKI 1993). New to North Chishima Islands.

### 34. *Leiodes shigehisai* sp. nov.

Japanese name: Ainu-ô-tamakinokomushi  
(Figs. 98–100)

**Type locality.** Japan, Hokkaido, Mts. Daisetsu, Mikura-zawa.

**Type material. JAPAN: HOKKAIDO:** HOLOTYPE: ♂, Mts. Daisetsu, Mikura-zawa, 7.–15.viii.1999, S. Hori leg. (PT) (MNHAH). PARATYPES: 3 ♀♀, same data as holotype (FUFJ); 1 ♂, Mts. Daisetsu, Mt. Kurodake, 8.ix.1981, N. Yasuda leg.; 1 ♀, 21.viii.1981, 1 ♀, 21.viii.1981, 1 ♂, 30.vii.1987, 1 ♀, 11.viii.1987, same data as the former except for the date (FUFJ); 1 ♀, Mts. Hidaka, Mt. Poroshiri, 23.vii.1988, N. Yasuda leg. (FUFJ); 1 ♀, Mt. Yôtei, 29.vii.1989, N. Yasuda leg. (FUFJ); 1 ♂, 1 ♀, Rishiri Is., Mt. Rishiridake, 17.–31.vii.2001, S. Hori & M. Maruyama leg. (PT) (FUFJ).

**Examined specimens of related species.** *Leiodes rugosa* Stephens, 1829. 2 ♂♂, 2 ♀♀, United Kingdom, Bedfordshire, 8.x.1994, I. Ashby leg. (FUFJ).

**Diagnosis.** Body 3.1–3.6 mm long, ca. 1.8× as long as wide. Dorsum almost unicolor or bicolored. Head and pronotum brown, dark brown or blackish brown. Elytra brown or dark brown, often with blackish brown stripe near elytral suture. Each elytron with nine distinct rows of punctures, subhumeral row reduced. Mesoventrite with a very shallow excavation between median carina and transverse carina. Median carina of mesoventrite low. Mesotibiae without distinct sexual dimorphism. Metatibiae almost straight in both sexes. Female abdominal sternite 8 with a spiculum ventrale.

**Description.** Measurements of holotype: Body length 3.3 mm; head 0.45 mm in length and 0.90 mm in width; pronotum 0.98 mm in length and 1.6 mm in width; elytra 2.2 mm in length and 2.0 mm in width.

**Coloration.** Dorsum relatively strongly shining, usually bicolored (Figs. 98D, 98E), rarely unicolor (Fig. 98C); head, pronotum and scutellum brown, dark brown or blackish brown; elytra almost unicolor (Figs. 98C, 98D) or bicolored (Fig. 98E), brown or dark brown, often with blackish brown stripes near elytral suture (Fig. 98E); antennomeres 1–6 and 8 brown; remaining antennomeres a little darker; legs light brown with all brown coxae; mesoventrite, metaventricle, and abdominal ventrites brown.

Body 3.1–3.6 mm in length, ca. 1.8× as long as wide.

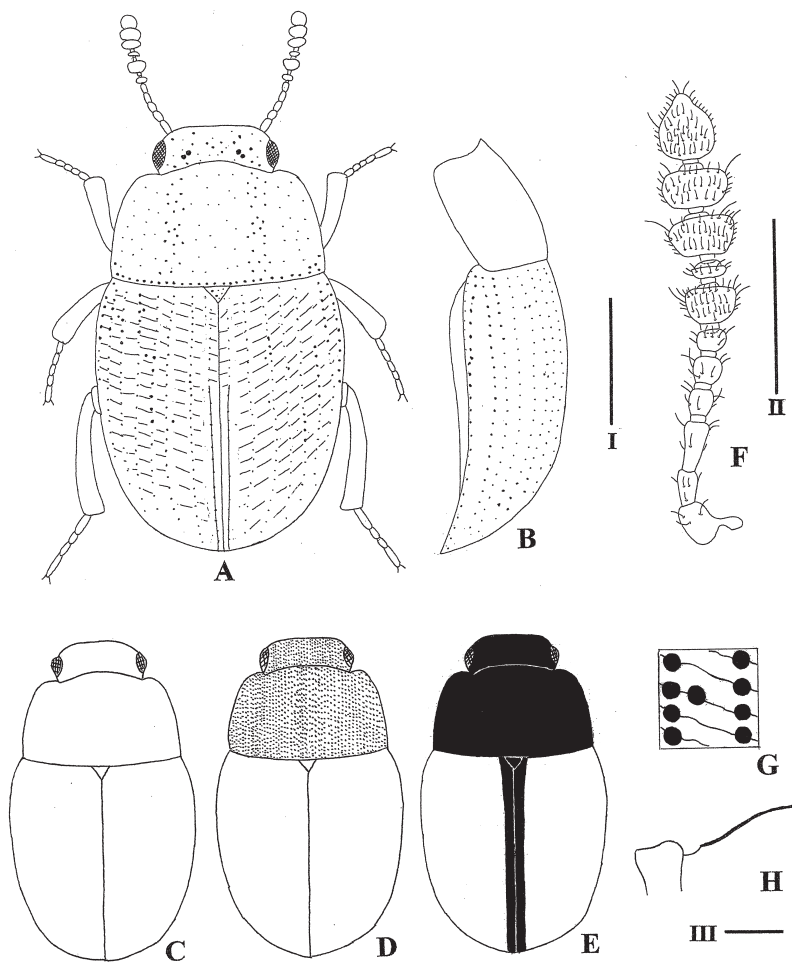


Fig. 98. *Leiodes shigehisai* sp. nov. A – body, dorsal view; B – ditto, lateral view; C, D, and E – dorsal color; F – antenna; G – elytral punctures; H – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for F; III: 0.2 mm for H.

Head ca. twice as wide as long, ca.  $0.48\times$  as long as and  $0.58\times$  as wide as pronotum, distinctly punctate (Fig. 98A), usually bearing some large punctures (Fig. 98A); antennomeres 1–4 each longer than wide; antennomeres 5 and 11 each about as long as wide; remaining antennomeres each wider than long; antennomere 11 oval (Fig. 98F); relative lengths of antennomeres 2 to 11 –  $2.9 : 4.3 : 2.3 : 2.3 : 1.9 : 3.1 : 1.0 : 3.3 : 3.3 : 5.4$ .

Pronotum ca.  $1.6\times$  as wide as long, ca.  $0.44\times$  as long as and  $0.83\times$  as wide as pronotum, widest at base, simply and very feebly curved at posterior margin, distinctly punctate as head (Fig. 98A).

Scutellum minutely or strongly punctate.

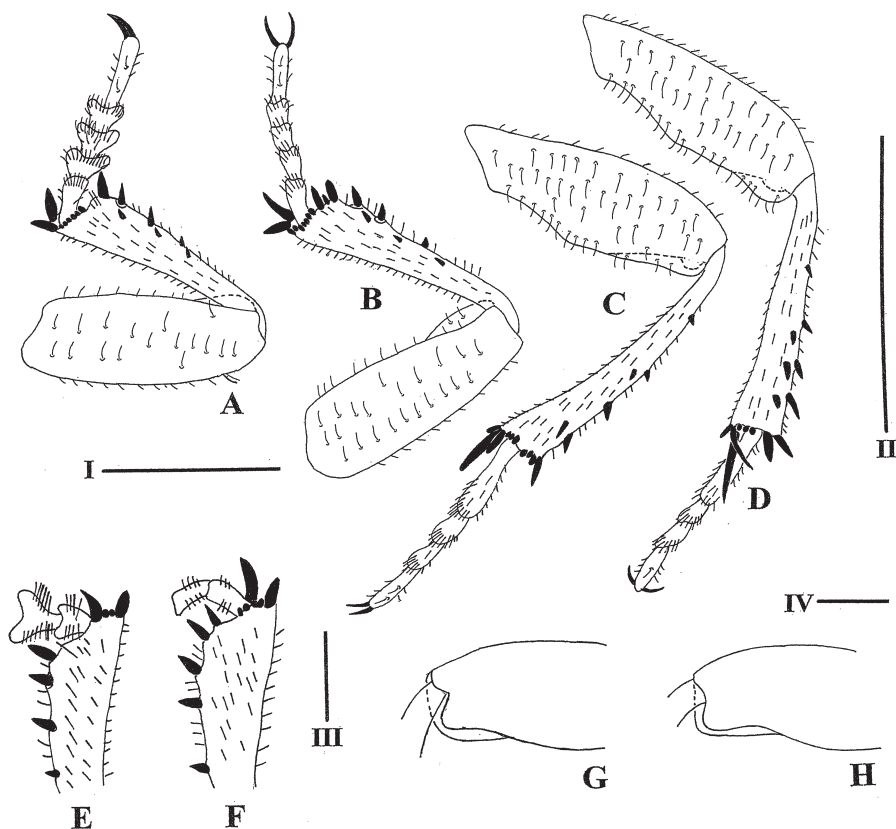


Fig. 99. *Leiodes shigehisai* sp. nov. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male hind leg, ventral view; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 0.5 mm for A and B; II: 1 mm for C and D; III: 0.2 mm for E and F; IV: 0.2 mm for G and H.

Elytra ca.  $1.1\times$  as long as wide in dorsal view, widest ca. at basal  $2/5$  (Fig. 98A), transversely strigose, almost impunctate except for small number of punctures between rows of punctures (Fig. 98G); each elytron with nine rows of punctures, row 9 invisible in dorsal view, subhumeral row as long as  $1/4$  of elytra in length (Fig. 98B); sutural stria fine, reaching from apex to ca. apical  $3/5$  of the elytral length.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, with one very shallow excavation between median carina and transverse carina (Fig. 98H); median carina of mesoventrite low (Fig. 98H); metaventrite sparsely and finely pubescent, weakly microreticulate except for almost smooth middle portion bearing minute but distinct punctures (setal sockets).

Legs showing sexual dimorphism on protarsi and metatarsi; protibiae gradually and feebly widening from base towards apex (Figs. 99E, 99F); metafemora slender, feebly expanded at

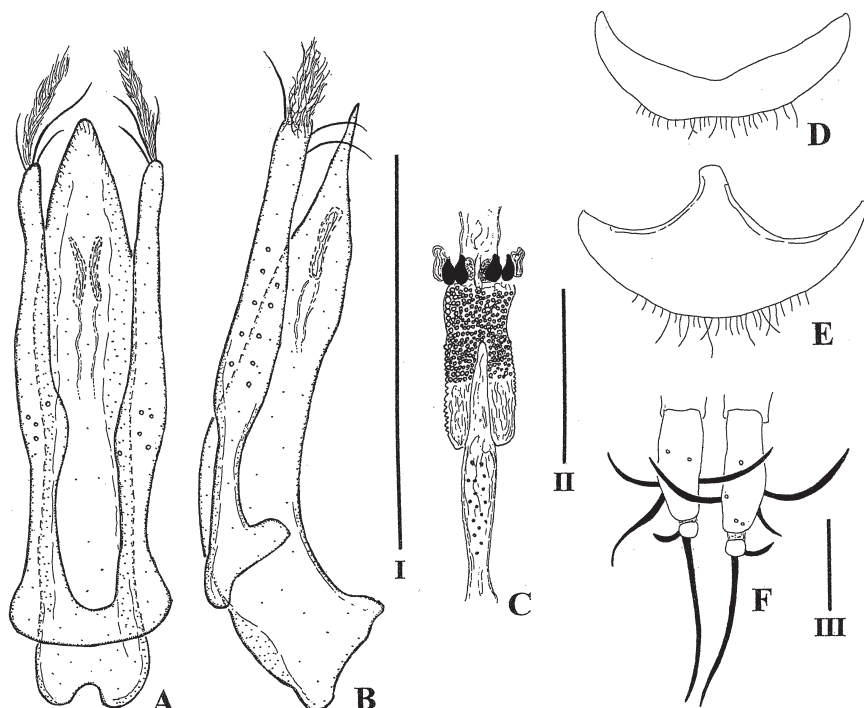


Fig. 100. *Leiodes shigehisai* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – inner sac, dorsal view; D – male abdominal sternite 8; E – female abdominal sternite 8; F – coxite and stylus. Scale I: 0.5 mm for A and B; II: 0.1 mm for C; III: 0.2 mm for D and E, and 0.1 mm for F.

about midlength of posterior margins (Figs. 99C, 99D), with small dorsal projection posteropically (Figs. 99G, 99H); metatibiae almost straight (Figs. 99C, 99D).

**Male.** Tarsomeres 2–4 of protarsi clearly expanded (Fig. 99A); tarsomeres 2–4 of mesotarsi a little expanded; abdominal sternite 8 moderately curved (Fig. 100D); aedeagus slender (Figs. 100A, 100B); median lobe bluntly, apically pointed in dorsal view (Fig. 100A), distinctly curved and apically pointed in lateral view (Fig. 100B); each paramere fringed at apex, bearing three apical setae, and clearly thickening from basal third towards apex in lateral view (Fig. 100B); inner sac as shown in Fig. 100C.

**Female.** Protarsi and mesotarsi slender (Fig. 99B); abdominal sternite 8 with a spiculum ventrale at central point of anterior margin (Fig. 100E); coxites and stylus as shown in Fig. 100F.

**Differential diagnosis.** *Leiodes shigehisai* sp. nov. is similar to *L. yoshitakei* sp. nov. in the usually bicolored dorsal coloration, but can be distinguished from it by having each elytron with nine distinct rows of punctures (Fig. 98A). In contrast, *L. yoshitakei* sp. nov. has the elytra densely and strongly punctate between striae, therefore the elytra superficially appear not to bear rows of punctures (Fig. 24A). *Leiodes shigehisai* sp. nov. also resembles *L. rugo-*

*sa* Stephens, 1829 occurring in the Russian Far East by having transversely strigose elytra, but can be separated from it by having the parameres feebly expanded at the lateral margins in the dorsal view (Fig. 100A). In contrast, *L. rugosa* has the parameres relatively strongly expanded at midlength.

**Etymology.** The species is dedicated to Mr. Shigehisa Hori who kindly gave me many valuable specimens of *Leiodes* used in this study.

**Distribution.** Japan: Hokkaido.

### 35. *Leiodes tanakai* sp. nov.

Japanese name: Miyama-ô-tamakinokomushi

(Figs. 6, 101–103)

**Type locality.** Japan, Shikoku, Tokushima Pref., Higashi-iyayama Village, Nagoro, Otome-dani Valley.

**Type material. JAPAN:** SHIKOKU: HOLOTYPE: ♂, Tokushima Pref., Higashi-iyayama Village, Nagoro, Otome-dani Valley, 5–12.viii.2006, K. Tanaka leg. (FIT) (MNHAH). PARATYPES, 1 ♂, Kôchi Pref., forest in Aki (33°36′08″N 134°05′33″E, alt. 550 m), 31.vii.2009, M. Makihara leg. (MT) (FUFJ); 3 ♂♂, 1 ♀, same data as the holotype (FUFJ); 1 ♂, same data as the former, except for the date, 28.vii.–5.viii.2006 (FUFJ); 1 ♂, same data as the former, except for the date, 12.–24.viii.2006 (FUFJ); 1 ♀, Tokushima Pref., Kisawa Village, Okuyarito, 23.ix.–5.x.2003, K. Tanaka leg. (FIT) (FUFJ); 1 ♂, same data as the former, except for the date, 8.–14.vii.2004 (FUFJ); 1 ♀, same data as the former, except for the date, 14–19.vii.2004 (FUFJ); 1 ♂, same data as the former, except for the date, 19.–24.vii.2004 (FUFJ); 1 ♂, Tokushima Pref., Mt. Tsurugii, Minokoshi (alt. 1340 m), 28.vii.–5.viii.2006, K. Tanaka leg. (FIT) (FUFJ); 1 ♂, Tokushima Pref., Mima City, Anabuki-chô, Furumiya, Mt. Tsunatsuke-yama (Alt. 1050 m), 21.–27.viii.2007, K. Tanaka leg. (FIT) (FUFJ); 1 ♀, Tokushima Pref., Mima City, Koyadaira, Kawakami, Mt. Maruzasa-yama (alt. 1380m), 18–22.vii.2007, K. Tanaka leg. (FIT) (FUFJ); 1 ♂, 1 ♀, same data as the former except for the date, 27.vii.–12.viii.2007 (FUFJ). HONSHU: 1 ♂, Nara Pref., Tenkawa Village, Mts. Ohmine, 14.ix.1973, K. Harusawa leg. (FUFJ); 1 ♀, Fukui Pref., Ôno City, Heikedaira, 31.viii.1997, S. Inoue leg. (MT) (FUFJ); 1 ♂, Fukui Pref., Ikeda Town, Hekosan, 1.viii.1998, S. Inoue leg. (MT) (FUFJ); 1 ♂, Ishikawa Pref., Mts. Hakusan, Sarukabe-entei, 22–29.viii.2002, H. Hoshina leg. (FIT) (FUFJ); 1 ♂, same data as the former except for the date, 4–14.ix.2002 (FUFJ); 1 ♀, Saitama Pref., Naguri Village, Mt. Arimayama (alt. 1200 m), 17.–24.vii.2004, K. Arai and S. Arai leg. (FIT) (FUFJ); 1 ♂, Saitama Pref., Ohtaki Village, Nakatsukawa-keikoku, Oku-Chichibu-rindô (alt. 1300m), 30.vii.–7.viii.2004, K. Arai & S. Arai leg. (FIT) (FUFJ); 1 ♂, Miyagi Pref., Sendai City, Mt. Izumigadake, Kuwanuma-rindô, 4.–17.ix.2009, M. Oikawa leg. (FIT) (FUFJ); 1 ♀, Yamagata Pref., Ôkura Village, Fujitasawa, 17.–25.vi.2006, M. Oikawa leg. (FUFJ); 1 ♂, Yamagata Pref., Ôkura Village, Yunodai, 30.viii.–10.ix.2006, M. Oikawa leg. (FUFJ); 1 ♂, Aomori Pref., Ajigasawa Town, Kôsei Rindô, 28.xi.1995, T. Ozaki leg. (FUFJ).

**Diagnosis.** Body 2.2–3.1 mm long, ca. 1.9× as long as wide. Dorsum brown. Elytra almost straight from base to ca. basal 1/3 of lateral margins. Each elytron with nine distinct rows of punctures, subhumeral row as long as ca. 1/3 of elytral length. Mesoventrite with one distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Mesotibiae without distinct sexual dimorphism. Metafemora usually bearing some tiny humps at posterior margins. Metatibiae usually distinctly curved inwards and with some small robust spines at internal margins. Parameres distinctly broadening and bearing many tiny spicular projections at apex. Female abdominal sternite 8 with a spiculum ventrale.

**Description.** Measurements of holotype: Body length 2.8 mm; head 0.42 mm in length and 0.79 mm in width; pronotum 0.90 mm in length and 1.4 mm in width; elytra 1.8 mm in length and 1.6 mm in width.

Coloration. Dorsum shining, almost unicolor, brown; antennomeres 1–6 and 8 brown; apical 2/5 of antennomere 11 light brown; remaining antennomeres brown or dark brown;

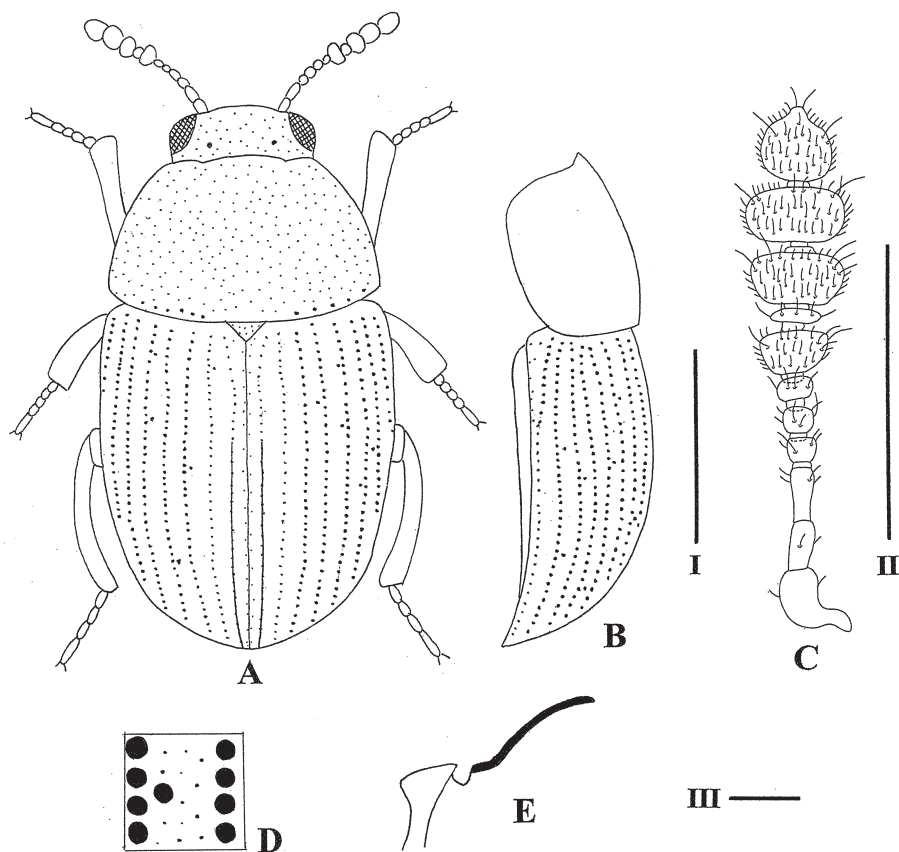


Fig. 101. *Leiodes tanakai* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.2 mm for E.

legs brownish; all tarsi slightly paler than remaining parts; mesoventrite, metaventrite, and abdominal ventrites brown.

Body 2.2–3.1 mm in length, ca. 1.9× as long as wide.

Head ca. 1.8× as wide as long, ca. 0.49× as long as and 0.56× as wide as pronotum, distinctly and densely punctate (Fig. 101A), often bearing some large punctures (Fig. 101A); antennomeres 1–3 each longer than wide; antennomeres 4, 5, and 11 each about as long as wide; remaining antennomeres each wider than long; antennomere 11 oval and clearly narrower than 10 (Fig. 101C); relative lengths of antennomeres 2 to 11 – 3.5 : 3.8 : 1.7 : 1.8 : 1.6 : 2.9 : 1.0 : 3.8 : 3.8 : 5.2.

Pronotum ca. 1.6× as wide as long, ca. 0.48× as long as and 0.90× as wide as elytra, widest at base, simply and very feebly curved at posterior margin, distinctly and densely punctate, punctuation similar to that on head (Fig. 101A).

Scutellum minutely punctate.



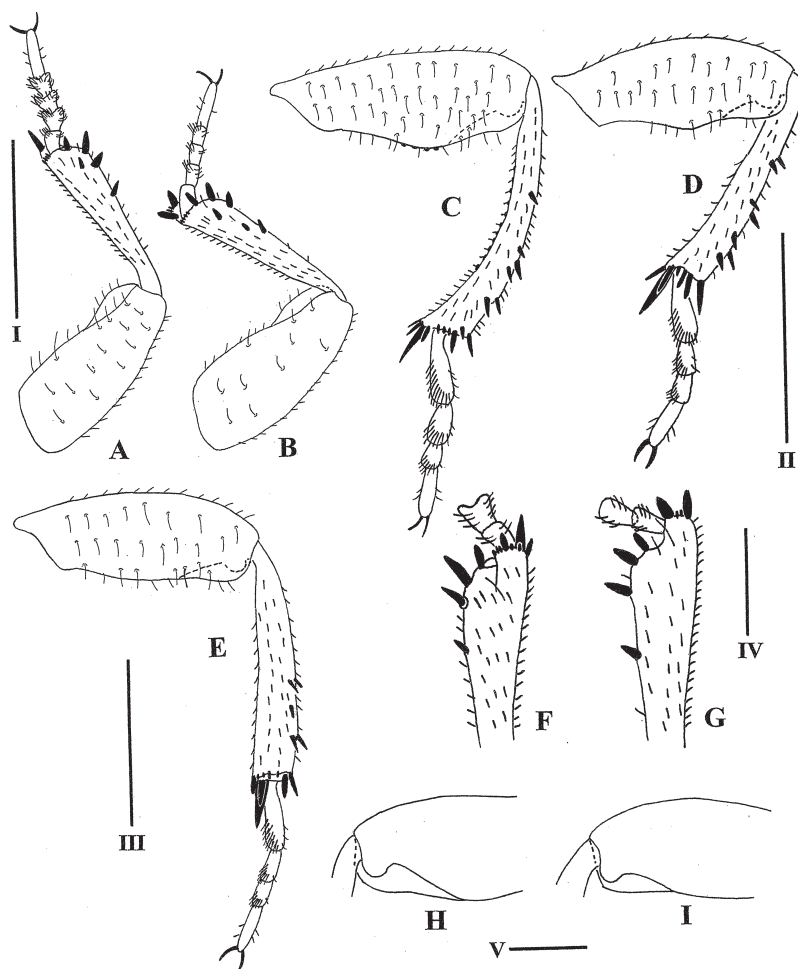


Fig. 102. *Leiodes tanakai* sp. nov. A – male fore leg, ventral view; B – female fore leg, ventral view; C – hind leg of male specimen (body size: 2.8 mm), ventral view; D – ditto (body size: 2.4 mm); E – female hind leg, ventral view; F – male protibia, dorsal view; G – female protibia, dorsal view; H – male metafemur, dorsal view; I – female metafemur, dorsal view. Scale I: 0.5 mm for A and B; II: 0.5 mm for D; III: 0.5 mm for C and E; IV: 0.2 mm for F and G; V: 0.2 mm for H and I.

Elytra ca.  $1.2\times$  as long as wide in dorsal view, almost straight from base to basal  $2/5$  of lateral margins (Fig. 101A), not transversely strigose; each elytron with nine rows of punctures, bearing with small number of large punctures and dense fine punctures between rows (Fig. 101D); row 9 invisible in dorsal view, subhumeral row as long as ca.  $1/3$  of elytral length (Fig. 101B); rows composed of punctures larger than those on pronotum (Fig. 101A); sutural stria fine, reaching from apex to ca. apical  $2/3$  of the elytral length.

Metathoracic wings fully developed.

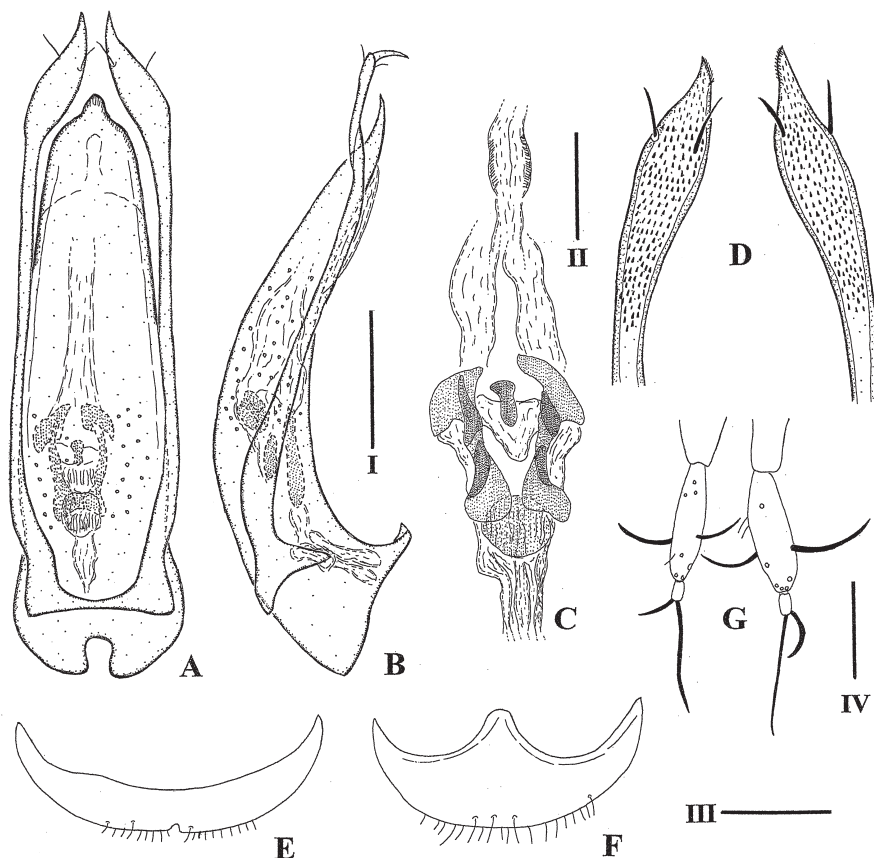


Fig. 103. *Leiodes tanakai* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – inner sac, dorsal view; D – apex of parameres, dorsal view; E – male abdominal sternite 8; F – female abdominal sternite 8; G – coxite and stylus. Scale I: 0.2 mm for A and B; II: 0.1 mm for C and D; III: 0.2 mm for E and F; IV: 0.1 mm for G.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, with one distinct excavation between median carina and transverse carina (Fig. 101E); median carina of mesoventrite low (Fig. 101E); metaventrite without sexual dimorphism, sparsely, finely pubescent, strongly microreticulate except for almost smooth middle portion.

Legs showing distinct sexual dimorphism on protarsi, mesotarsi, metafemora, and metatibiae; protibiae gradually and very feebly widening from base towards apex (Figs. 102F, 102G); metafemur with a small dorsal projection posteroapically (Figs. 102H, 102I).

**Male.** Tarsomeres 2–4 of protarsi and mesotarsi expanded (Fig. 102A); metafemora relatively strongly expanded at midlength of posterior margins, usually bearing some tiny humps at posterior margins (Fig. 102C), sometimes without humps (Fig. 102D); metatibiae distinctly curved inwards, with some small robust spines at internal margins (Fig. 102C) or almost stra-

light and without spines at internal margins (Fig. 102D); abdominal sternite 8 weakly curved (Fig. 103E); aedeagus slender (Figs. 103A, 103B); median lobe apically protuberant in dorsal view (Fig. 103A), moderately curved and pointed apically in lateral view (Fig. 103B); each paramere broadening and bearing many tiny spicular projections at apex (Fig. 103D); inner sac as shown in Fig. 103C.

**Female.** Protarsi and mesotarsi slender (Fig. 102B); metafemora feebly curved and bearing no tiny humps at posterior margins (Fig. 102E); metatibiae almost straight, without small robust spines at internal margins (Fig. 102E); abdominal sternite 8 with spiculum ventrale at central point of anterior margin (Fig. 103F); coxites and stylus as shown in Fig. 103G.

**Morphological variability.** Males of *L. tanakai* show individual variation of the metafemora and metatibiae. These morphological differences are not regional, but are correlated to body size. The secondary sexual characters are not distinctly developed in small males. The male hind leg on Fig. 102D, which resembles that of the female, was drawn from a male specimen whose body length was 2.4 mm. In contrast, the leg showing distinctly secondary sexual characters on Fig. 102C was drawn from a large male specimen (body length 2.8 mm).

**Differential diagnosis.** *Leiodes tanakai* sp. nov. is similar to *L. iwakirii* sp. nov. in the morphology of the median lobe of the aedeagus, but can be distinguished from it by having the parameres of the aedeagus strongly broadened apically (Fig. 103D). In contrast, *L. iwakirii* sp. nov. has parameres weakly broadened (Fig. 76H). *Leiodes tanakai* sp. nov. also resembles *L. irregularis* by having a long-oval body, but can be separated from it by the mesoventrite with a distinct excavation between the median carina and transverse carina (Fig. 101E). In contrast, *L. irregularis* has the mesoventrite without an excavation (Fig. 93J).

**Etymology.** The species is dedicated to Mr. Kôji Tanaka who is a collector of valuable specimens of *Leiodes* used in this study.

**Distribution.** Japan: Honshu and Shikoku.

### 36. *Leiodes yamauchii* sp. nov.

Japanese name: Oni-ô-tamakinokomushi

(Figs. 104–106)

**Type locality.** Japan, Shikoku, Tokushima Pref., Mima City, Anabuki-chô, Furumiya, Mt. Tsunatsuke-yama (alt. 1050 m).

**Type material.** JAPAN: SHIKOKU: HOLOTYPE: ♂, Tokushima Pref., Mima City, Anabuki-chô, Furumiya, Mt. Tsunatsuke-yama (alt. 1050 m), 20–26.vi.2007, K. Tanaka leg. (FIT) (MNHAH). PARATYPES: KYUSHU: 2 ♂♂, Yakushima Is., Mt. Aikodake (alt. 150 m), 30.x.–2.xi.2007, T. Yamauchi at al. leg. (collision traps) (FUFJ); 5 ♂♂, 3 ♀♀, same data as holotype (FUFJ); 3 ♂♂, 2 ♀♀, same data as the holotype except for the date, 26.vi.–1.vii.2007 (FUFJ). SHIKOKU: 1 ♂, Tokushima Pref., Nishi-iyayama Village, Mt. Keisokuzan, 6–29.vi.2003, K. Tanaka leg. (FIT) (FUFJ); 2 ♂♂, 1 ♀, Tokushima Pref., Mima City, Koyadaira, Mt. Ichinomori, Fujinoikedani (alt. 1350 m), 17.vi.–1.viii.2007, K. Tanaka leg. (FIT) (FUFJ).

**Diagnosis.** Body large, 4.7–5.0 mm long, ca. 1.8× as long as wide. Dorsum brown or light brown. Each elytron with nine distinct rows of punctures, subhumeral row as long as ca. 1/3 or 1/4 of elytral length. Mesoventrite with one distinct excavation between median carina and transverse carina. Median carina of mesoventrite low. Mesotibiae without distinct sexual dimorphism. Metafemora robust in both sexes. Male metatibiae very feebly curved inwards. Female abdominal sternite 8 with a thick spiculum ventrale.

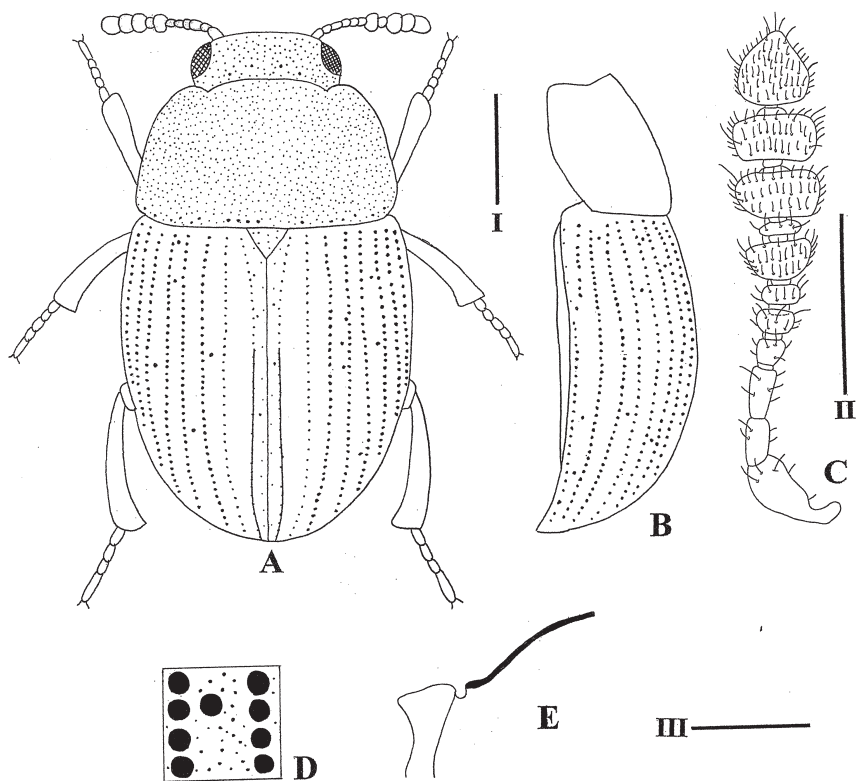


Fig. 104. *Leiodes yamauchii* sp. nov. A – body, dorsal view; B – ditto, lateral view; C – antenna; D – elytral punctures; E – mesoventrite, lateral view. Scale I: 1 mm for A and B; II: 0.5 mm for C; III: 0.2 mm for E.

**Description.** Measurements of holotype: Body length 4.8 mm; head 0.92 mm in length and 1.3 mm in width; pronotum 1.4 mm in length and 2.3 mm in width; elytra 3.1 mm in length and 2.6 mm in width.

**Coloration.** Dorsum shining, almost unicolor, brown or light brown; antennomere 1 and apical 2/5 of antennomere 11 light brown; antennomeres 2–6 brown; antennomeres 9, 10, and basal 3/5 of antennomere 11 dark brown; legs brownish; all tarsi usually slightly paler than other parts; mesoventrite, metaventrite, and abdominal ventrites brown.

Body 4.7–5.0 mm in length, about 1.8 times as long as wide.

Head ca.  $1.5\times$  as wide as long, ca.  $0.63\times$  as long as and  $0.56\times$  as wide as pronotum, distinctly and densely punctate (Fig. 104A), sometimes bearing some large punctures (Fig. 104A); antennomeres 1–3 each longer than wide; antennomeres 4 and 11 each as long as wide; remaining antennomeres each wider than long; antennomere 11 robust (Fig. 104C); relative lengths of antennomeres 2 to 11 – 3.6 : 3.8 : 1.8 : 1.7 : 1.3 : 2.6 : 1.0 : 3.2 : 3.1 : 5.2.

Pronotum ca.  $1.7\times$  as wide as long, ca.  $0.46\times$  as long as and  $0.92\times$  as wide as elytra, widest near base, simply and very feebly curved at posterior margin, distinctly and densely punctate, punctuation similar to that on head (Fig. 104A).

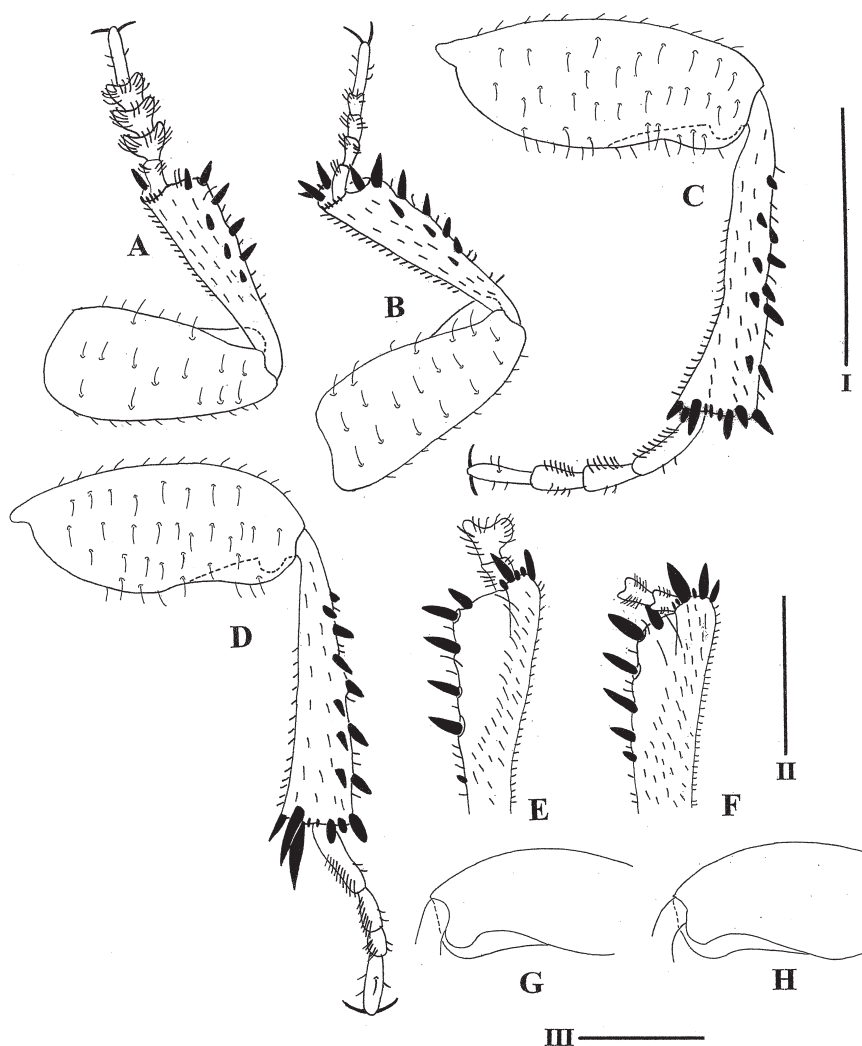


Fig. 105. *Leiodes yamauchii* sp. nov. A – male fore leg, ventral view; B – female fore leg, ventral view; C – male hind leg, ventral view; D – female hind leg, ventral view; E – male protibia, dorsal view; F – female protibia, dorsal view; G – male metafemur, dorsal view; H – female metafemur, dorsal view. Scale I: 1 mm for A–D; II: 0.5 mm for E and F; III: 0.5 mm for G and H.

Scutellum distinctly punctate.

Elytra ca.  $1.2\times$  as long as wide in dorsal view, widest ca. at basal  $1/3$  (Fig. 104A), not transversely strigose; each elytron with nine rows of punctures, bearing small number of large punctures and dense fine punctures between rows (Fig. 104D); row 9 invisible in dorsal view, subhumeral row as long as ca.  $1/3$  or  $1/4$  of elytral length (Fig. 104B); rows composed of punctures larger than those of pronotum (Fig. 104A); sutural stria fine, reaching from apex to ca. apical  $3/5$  of the elytral length.

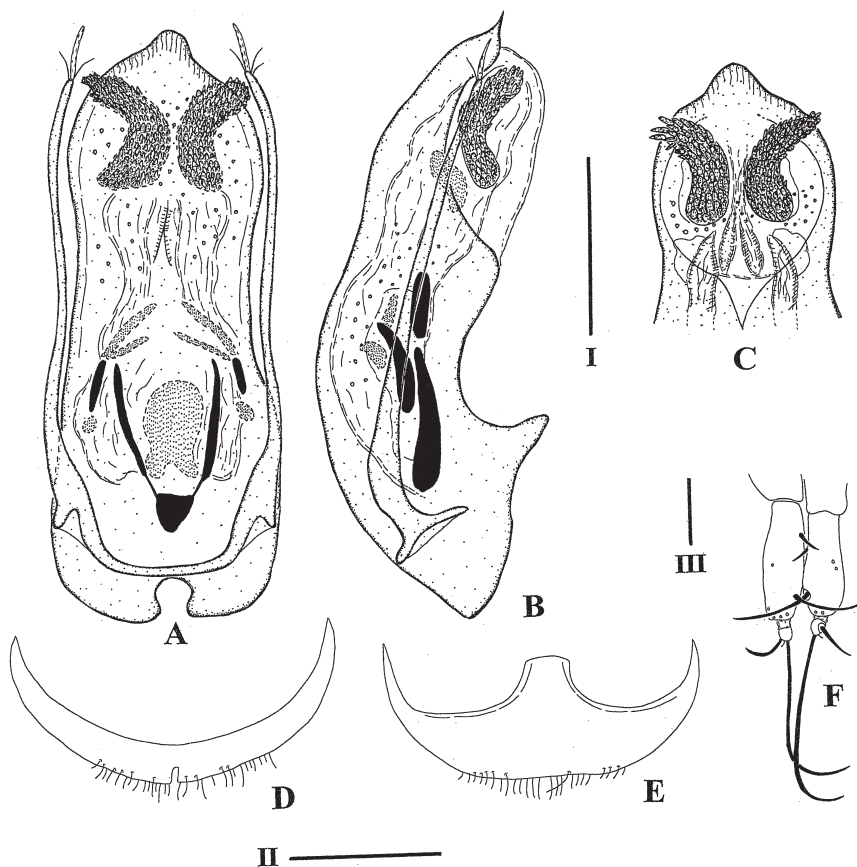


Fig. 106. *Leiodes yamauchii* sp. nov. A – aedeagus, dorsal view; B – ditto, lateral view; C – apex of aedeagus, ventral view; D – male abdominal sternite 8; E – female abdominal sternite 8; F – coxite and stylus. Scale I: 0.5 mm for A–C; II: 0.5 mm for D and E; III: 0.1 mm for F.

Metathoracic wings fully developed.

Mesoventrite strongly microreticulate, impunctate, almost glabrous, with one distinct excavation between median carina and transverse carina (Fig. 104E); median carina of mesoventrite low (Fig. 104E); metaventrite without sexual dimorphism, sparsely pubescent, distinctly microreticulate except for almost smooth middle portion.

Legs showing sexual dimorphism on protarsi, protibiae, mesotarsi, and metatibiae; meta-femora robust, with small dorsal projection posteroapically (Figs. 105G, 106H).

**Male.** Tarsomeres 2–4 of protarsi and mesotarsi strongly expanded (Fig. 105A); protibiae gradually and distinctly widening from base towards apex at internal margins (Fig. 105E); metatibiae slender and very feebly curved inwards (Fig. 105C); abdominal sternite 8 strongly curved (Fig. 106D); aedeagus robust (Figs. 106A, 106B); median lobe feebly sinuate along

both sides, and distinctly protuberant apically in dorsal view (Fig. 106A), sharply curved near base, pointed apically in lateral view (Fig. 106B); each paramere slender, bearing a few apical setae and transparent slender lobe (Fig. 106A); inner sac as shown in Figs. 106A, C.

**Female.** Protarsi and mesotarsi slender (Fig. 105B); protibiae gradually and very feebly widening from base towards apex at internal margins (Fig. 105F); metatibiae almost straight (Fig. 105D); abdominal sternite 8 with robust spiculum ventrale at central point of anterior margin (Fig. 106E); coxites and stylus as shown in Fig. 106F.

**Differential diagnosis.** *Leiodes yamauchii* sp. nov. is one of the largest species of the Japanese species of *Leiodes*. In this character, *L. yamauchii* sp. nov. is similar to *L. lucens* (Fairmaire, 1855) but can be distinguished from it by the elytral rows being composed of deep punctures (Fig. 104A) and the robust male metafemora (Fig. 105C). In contrast, *L. lucens* has elytral rows composed of relatively minute punctures (Fig. 77A) and characteristic male metafemora (Fig. 78C). *Leiodes yamauchii* sp. nov. is also similar to *L. koreana* Park & Ahn, 2007 in elytral shape, but can be separated from it by having a large body (4.7–5.0 mm long) and a robust aedeagus (Fig. 104A). In contrast, *L. koreana* has a relatively small body (3.2–4.4 mm long) and a slender aedeagus (Fig. 29A). *Leiodes yamauchii* sp. nov. also resembles *L. silesiaca* (Kratz, 1852) inhabiting Europe and the Russian Far East by the large body and robust aedeagus, but can be distinguished from it by the metaventrite with the distinct excavation between the median carina and transverse carina (Fig. 104E). In contrast, *L. silesiaca* has the metaventrite without the excavation.

**Etymology.** The species name is dedicated to Dr. Takeo Yamauchi, who kindly offered valuable specimens of *Leiodes* used in this study.

**Distribution.** Japan: Shikoku and Kyushu (Yakushima Island).

## Discussion

### Overview of the fauna of *Leiodes* in Japan and the North Chishima Islands

In this study, 35 species of the genus *Leiodes* are recorded from Japan and two species from the North Chishima Islands. However, there are still some unidentified specimens in the author's collection, and the number of species will likely increase in the future. Species for which only female specimens were available, were not included for identification or species records, with the exception of *L. akiyamai* sp. nov. and *L. ohtai* sp. nov., which are very easily distinguished from the remaining species' females.

Of the Japanese species, 30 of the 35 known species (i.e. 83 %) are endemic to Japan (Table 2). In contrast, the two species from the North Chishima Islands, *L. rhaetica* and *L. longitarsis*, are common in Europe or North America. Comparing the number of endemic taxa in Japan with the neighbouring areas: 3 of the 6 species are endemic to Korea, one of one species to Taiwan, and 21 of 31 species to China (DAFFNER 1983, PARK & AHN 2007, ŠVEC 2008, ŠVEC & COOTER 2010). This helps to illustrate that the proportion of endemic species of *Leiodes* is generally high in the regions of East Asia. However, most species recorded from the Russian Far East are also distributed in Europe, southern China and Mongolia, and only one species,



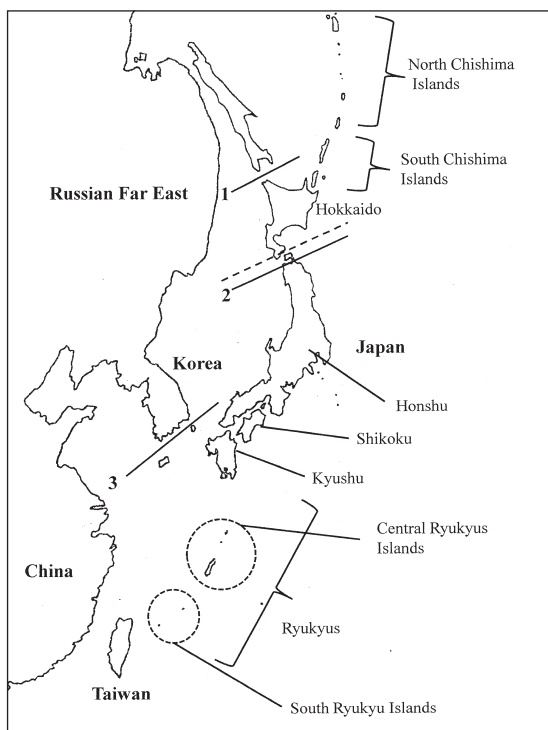


Fig. 107. Main islands and straits in Japan. Solid line 1 – Sōya Strait, 2 – Tsugaru Strait, 3 – Chōsen Strait. Broken line: Blakiston line.

*L. daffneri* Perkovsky 1990, is endemic to the Russian Far East (DAFFNER 1983; PERKOVSKY 1988, 1990; LAFER 1989a; ŠVEC, 2008).

The very high percentage of endemic species in Japan complicates the discussion regarding the zoogeography of the Japanese *Leiodes* at the specific level prior to a formal phylogenetic analyses, because the phylogenetic relationships between some species from Japan and the neighboring regions have not been elucidated. Moreover, the fauna of Korea and Taiwan has not been studied in detail until now. Therefore, it is difficult to discuss the differences of the faunal composition between Japan and those regions.

BARANOWSKI (1993) supposed it is very unlikely that *Leiodes* inhabiting North America spread from other continents by wind transport. He came to this conclusion by examining tens of thousands of beetles in seashore drifts in Sweden during a period of at least ten years without finding a single specimen of *Leiodes*. Moreover, of 72 species recorded from North and Central America, only five are also distributed in the Russian Far East (BARANOWSKI 1993). In contrast, 17 of 20 species recorded from the Russian Far East inhabit Europe (DAFFNER 1983, PERKOVSKY 1988, 1990; LAFER 1989a). Those distributional patterns indicate that species of *Leiodes* migrated on land rather than by crossing the sea. Therefore, the zoogeography of *Leiodes* in Japan and the North Chishima Islands is discussed based on the presumption that *Leiodes* migrated into/from those regions through land bridges.

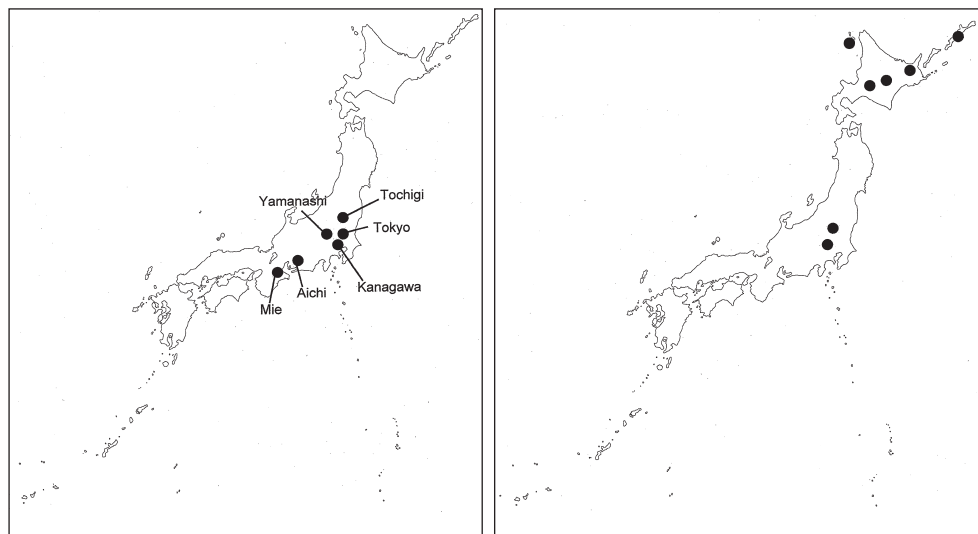
Table 2. Distribution of 36 species of *Leiodes* in Japan and North Chishima Islands.

	North Chishima	Hokkaido	Rishiri Is.	Honshu	Shikoku	Kyushu	Ryukyus	China	Korea	Russian Far East	Europe	North America
<b><i>L. babai</i> group</b>												
1. <i>L. babai</i>				•								
2. <i>L. kandai</i>				•								
3. <i>L. yoshidai</i>					•							
<b><i>L. circinipes</i> group</b>												
4. <i>L. circinipes</i>				•	•	•						
5. <i>L. juzoi</i>			•									
6. <i>L. yasudai</i>		•										
7. <i>L. yoshitakei</i>		•										
<b><i>L. koreana</i> group</b>												
8. <i>L. koreana</i>				•	•	•			•			
9. <i>L. masatsugui</i>				•								
10. <i>L. toyoshimai</i>				•	•							
<b><i>L. longitarsis</i> group</b>												
11. <i>L. longitarsis</i>	•		•									•
<b><i>L. multipunctata</i> group</b>												
12. <i>L. araii</i>				•								
13. <i>L. haradai</i>					•							
14. <i>L. hijikatai</i>				•								
15. <i>L. kiuchii</i>				•	•							
16. <i>L. multipunctata</i>				•	•							
17. <i>L. sakaii</i>					•							
<b><i>L. naraharai</i> group</b>												
18. <i>L. naraharai</i>							•					
19. <i>L. shuheii</i>							•					
<b><i>L. okawai</i> group</b>												
20. <i>L. kamezawai</i>							•					
21. <i>L. okawai</i>				•	•	•						
22. <i>L. yukihikoi</i>				•		•						
<b><i>Incertae sedis</i></b>												
23. <i>L. akiyamai</i>					•							
24. <i>L. fracta</i>				•						•	•	
25. <i>L. iwakirii</i>						•						
26. <i>L. lucens</i>		•		•	•			•	•	•	•	
27. <i>L. nagayamai</i>		•										
28. <i>L. obesa</i>		•							•	•	•	
29. <i>L. ohtai</i>							•					
30. <i>L. osawai</i>				•								
31. <i>L. ozakii</i>				•								
32. <i>L. irregularis</i>		•		•								
33. <i>L. rhaetica</i>	•										•	•
34. <i>L. shigehisai</i>		•										
35. <i>L. tanakai</i>				•	•							
36. <i>L. yamauchii</i>					•	•						

### Blakiston line and *Leiodes* in Hokkaido

The Blakiston line is one of the boundary lines of Japanese biogeography which was put forward by British naturalist Thomas Blakiston in 1883 (OSHIMA 1991). It is located in the Tsugaru Strait (Fig. 107) and it delimits the northern or southern limits for the distribution of many Japanese mammals and birds (MASUDA 1999). For example, the sable (*Martes zibellina* (Linnaeus, 1758) (Carnivora: Mustelidae)) and pika (*Ochotona hyperborea* (Palla, 1811) (Lagomorpha, Ochotonidae)), common species in both Japan and the Eurasian continent, are distributed only in Hokkaido in the Japanese territory, with the Tsugaru Strait being the southern limit of their distribution. In insects, ITO & MUNAKATA (1979) concluded that the segregation of Hokkaido and Honshu by the Tsugaru Strait functioned as an event causing the formation of subspecies of some Japanese *Bombus* Latreille, 1802 (Hymenoptera: Apidae). The Tsugaru Strait is thought to have developed about 100,000–150,000 years ago, separating Hokkaido from Honshu (OSHIMA 1980, 1990, 1991). In contrast, the Sôya Strait, dividing Hokkaido from Karafuto Island (= Sakhalin Is.) (Fig. 107), was perhaps formed about 12,000 years ago (OSHIMA 1990). In the last glacial period, many animals probably migrated to Hokkaido from continental Asia after the segregation of Hokkaido from Honshu, because Hokkaido was still connected to the continent by a land bridge (KAMEI et al. 1988). For example, one of three genetic groups of the brown bear (*Ursus arctos* Linnaeus, 1758 (Carnivora: Ursidae)) may have migrated to Hokkaido from the continent in the last glacial period (MASUDA 2002).

The fauna of Japanese *Leiodes* seems to be influenced by the Tsugaru Strait. In this study, seven species are recorded from Hokkaido, and only two of them, *L. irregularis* and *L. lucens*, occur both in Hokkaido and Honshu (Table 2). Most species occurring today in Hokkaido perhaps migrated there from the continent. *Leiodes shigehisai* sp. nov. is endemic to Hokkaido but



Figs. 108–109. Distribution of: 108 – *Leiodes osawai* Nakane, 1963; 109 – *L. irregularis* Portevin, 1927.

seems to be very close to *L. rugosa* Stephens, 1829 which is widely distributed from Europe to the Russian Far East. It is possible that *L. rugosa* or its related species invaded Hokkaido from northern regions through a land bridge at the position of today's Sôya Strait, and the later speciated to *L. shigehisai* sp. nov. in Hokkaido. Similarly, *L. nagayamai* sp. nov., which is also endemic to Hokkaido, may also have migrated to Hokkaido from the northern regions, judging from its extremely short parameres which are similar to other species distributed mainly in high latitudes (though some exceptions, e.g., *L. svihlai* Švec 2009, with short parameres are known from Turkey; ŠVEC 2009). The distributional pattern of *L. obesa* is similar to that of the sable inhabiting the Eurasian continent and Hokkaido (Table 2). However, at present it is not possible to assume when the species of *Leiodes* migrated to Hokkaido as multiple migrations may have taken place, as is the case for the brown bear: the brown bear population in Hokkaido can be divided into three genetic groups by molecular markers which represent three independent migrations to Hokkaido (MATSUHASHI et al. 1999, MASUDA 2002).

In the seven species group defined in this study, *L. koreana* group, *L. multipunctata* group, and *L. okawai* group, are not distributed in Hokkaido but they occur in northern Honshu, which is climatically similar to Hokkaido (Figs. 112, 114, 116). It is possible that they were not able to migrate to Hokkaido not due to unfavorable climatic conditions but due to the presence of the Tsugaru Strait.

### Biogeography of the *Leiodes* species groups

#### *Leiodes babai* species group

Three of the four species of this group are endemic to Japan (Fig. 110), and the remaining species, *L. odaesanensis* Park & Ahn, 2007, is known to occur only in Korea. Therefore, it is possible that the *L. babai* species group migrated to Japan from the continent through the Chôsen Strait as is the case of *L. multipunctata* group. Hence, the three Japanese species probably arose by allopatric speciation.

#### *Leiodes circinipes* species group

Three of the four species of this group, *L. yasudai* sp. nov., *L. juzoi* sp. nov., and *L. yoshitakei* sp. nov., are endemic to Hokkaido, Rishiri Is. and Hokkaido, respectively (Fig. 111). The remaining species, *L. circinipes*, has been recorded from both Honshu and the Russian Far East (PERKOVSKY 1988). However, I suspect that the Russian specimen recorded by PERKOVSKY (1988) may be misidentified (see p. 38, Taxonomic note of *L. circinipes*). The specimen mentioned by PERKOVSKY (1988) may in fact represent *L. yoshitakei* sp. nov. occurring in Hokkaido, or another related species. In contrast, no species related to this group have been collected from Korea (PARK & AHN 2007). Summarizing these data, following supposition can be drawn: the *L. circinipes* species group migrated to Hokkaido from the continent through the Sôya land bridge and, after that, possibly migrated to Honshu from Hokkaido through the Tsugaru land bridge. On the other hand, it may be assumed that *L. yasudai* sp. nov. and *L. juzoi* sp. nov. are closely related to each other (both species do not have transversely strigose elytra). It is possible that they arose by the local speciation in Daisetsu Mountains and Rishiri

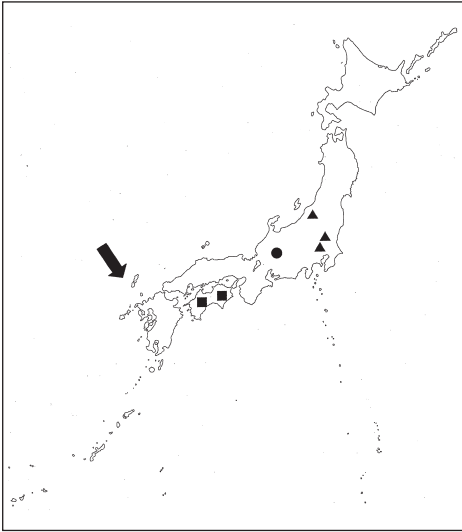


Fig. 110. Distribution of Japanese species of *Leiodes babai* group: (●) *L. kandai* sp. nov., (▲) *L. babai* Nakane, 1989, (■) *L. yoshidai* sp. nov.; arrow – suggested migration pathway of *L. babai* group from the continent to Japan.

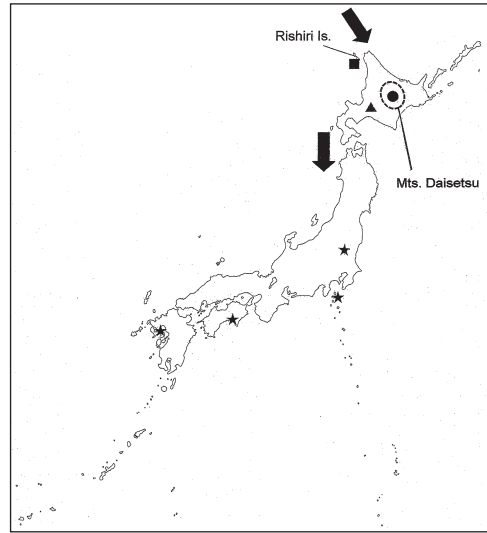


Fig. 111. Distribution of *Leiodes circinipes* species group: (●) *L. yasudai* sp. nov., (■) *L. juzoi* sp. nov., (▲) *L. yoshitakei* sp. nov., (★) *L. circinipes* (Rye, 1873); circle by broken line – Mts. Daisetsu; arrow – suggested migration pathway of *L. circinipes* group from the continent to Japan.

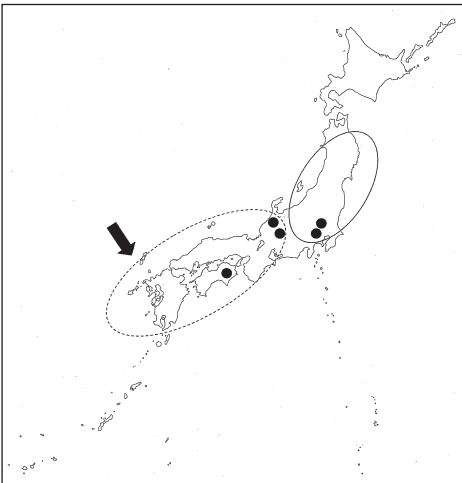


Fig. 112. Distribution of *Leiodes koreana* group in Japan. Solid line – *L. masatsugui* sp. nov.; broken line – *L. koreana* Park & Ahn, 2007; (●) *L. toyoshimai* sp. nov.; arrow – suggested migration pathway of *L. koreana* group from the continent to Japan.

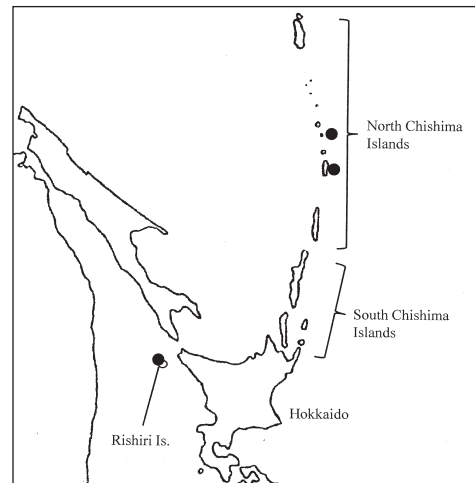


Fig. 113. Distribution of *Leiodes longitarsis* Baranowski, 1993 in the Palaeartic Region.

Is., respectively. Some endemic animal or plant species or subspecies are known to occur in Mts. Daisetsu and Rishiri Is. For example, *Oeneis melissa daisetsuzana* Matsumura, 1926 (Lepidoptera: Nymphalidae) is an endemic subspecies in Daisetsu Mountains. *Leiodes yasudai* sp. nov. is also one of endemic species in Mts. Daisetsu and Rishiri Is. For details on Rishiri Is., see comments on the *L. longitarsis* group below.

### ***Leiodes koreana* species group**

The *Leiodes koreana* group seems to be related to *L. yamauchii* sp. nov. because of the similarity of the inner sacs of the aedeagus between the group and *L. yamauchii* sp. nov.. Most of the Japanese of *Leiodes* are endemic to Japan, but *L. koreana* Park & Ahn, 2007 is one of exceptions as it is common in Korea as well as in Japan (Table 2). It is possible that they migrated to Japan from the continent through Chōsen Strait (Fig. 112) when Japan and the continent were connected by land.

### ***Leiodes longitarsis* species group and the fauna of *Leiodes* in Rishiri Islands**

*Leiodes longitarsis* Baranowski, 1993 inhabits North America, the North Chishima Islands, and Rishiri Island, but not Hokkaido (Fig. 113). Reasons for this distribution are unclear at present. It is possible that *L. longitarsis* will be found in Hokkaido in the future. In this part, focus will be on Rishiri Is.

The fauna of the oribatid mites, i.e. one of the major groups of edaphic invertebrates, of the Rishiri Island is similar to that of Hokkaido. All of the 48 species of oribatid mites recorded from the flatlands in Rishiri Island are also distributed in Hokkaido (HARADA & KARASAWA 2000, OHNISHI & SUMA 2010). In addition, HOJITO et al. (2010) performed a molecular phylogeographic analysis of *Aegialites stejneri* Linell, 1898 (Coleoptera: Salpingidae) sampled in the coastal areas of Hokkaido, and in Rishiri and Rebun Islands. They found that haplotypes of *A. stejneri* composed two distinct lineages not overlapping in distribution, of which those of group A inhabit Rishiri Island as well as northern Hokkaido. Both these studies illustrated that the fauna of coastal and lowland areas are similar in Rishiri Island and Hokkaido. In contrast, the fauna of the Carabidae inhabiting mountainous areas of Rishiri Island sometimes show differences from that of Hokkaido (UENO 1984). For example, *Hemicarabus macleayi* Dejean, 1826 is known to occur in Eurasia and in Rishiri Island (where it is represented by a separate subspecies), but not in Hokkaido. UENO (1984) concluded that the carabid fauna of Rishiri Is. seems to differ in some extent from that of Hokkaido, though the island is situated only 19 km from Hokkaido.

*Leiodes longitarsis* was also collected from the mountains in Rishiri Is. Two carabid beetles, *Miscodera arctica* (Paykull, 1798) and *Trechus* (*Trechus*) *apicalis* Motschusky, 1845, have similar distributional patterns. The former is distributed in Rishiri Is., Europe, Russian Far East, and North America, the latter in Rishiri Is., Russian Far East, the North Chishima Islands and North America. Similarly as in *Leiodes longitarsis*, both species are not distributed in Hokkaido (UENO 1966, 1984; HABU 1972; LINDROTH 1961, 1985; LAFER, 1989b). In contrast to *L. longitarsis*, the two carabid beetles inhabit Russian Far East and their distributional areas are more or less circumpolar.

NAKATANI et al. (2007) conducted molecular phylogenetic analyses of the *Erebia aethiops* group (Lepidoptera: Nymphalidae) and discovered that the population of the butterfly in Rishiri Is. had diverged from the Hokkaido population earlier than the population from the southern Karafuto Island (= Sakhalin Is.). The depth of the Sôya Strait, which separates Karafuto Is. and Hokkaido, is about 60 m (ONO 1990). On the other hand, the depth of Rishiri Channel which separates Rishiri Is. from Hokkaido is about 80–85 m. Therefore, NAKATANI et al. (2007) suggested that Rishiri Channel was possibly formed earlier than the Sôya Strait.

It cannot be concluded whether the hypothesis suggested by NAKATANI et al. (2007) is appropriate or not. However, it is sure that the fauna of the subfamily of Leiodinae in Rishiri Is. is different from that in Hokkaido. *Leiodes juzoi* sp. nov. is an endemic species in Rishiri Is. (see the part about *L. circumipes* group for details). Moreover, the only species of the genus *Agathidium* (tribe Agathidiini) occurring in Rishiri Island, *A. (Cyphocele) subcostatum* Portevin, 1905, shows regional morphological variations of the aedeagus (HOSHINA & MARUYAMA 2001).

### *Leiodes multipunctata* species group

All species of this group are endemic to Japan (Fig. 114) and Korea. The distribution of *L. haradai* sp. nov. and *L. sakaii* sp. nov. is unclear because both species are described from single specimens. On the other hand, it is possible that *L. araii* sp. nov. is endemic to central Honshu.

Only *L. indigesta* Park & Ahn, 2007 is known to occur in Korea (PARK & AHN 2007). At present, no species of this group has been recorded from Kyushu (Fig. 114). However, in the author's collection there are two female specimens from Kyushu which are very similar to *L. multipunctata*: although they cannot be identified with certainty at present, they indicate that the *L. multipunctata* group occurs in Kyushu. Therefore, the *L. multipunctata* species group probably migrated to Japan from the continent through the Chôsen land bridge (it seems that the Chôsen Strait was formed in the interglacial between Riss and Würm glacial periods; OSHIMA 1980, 1990, 1991)).

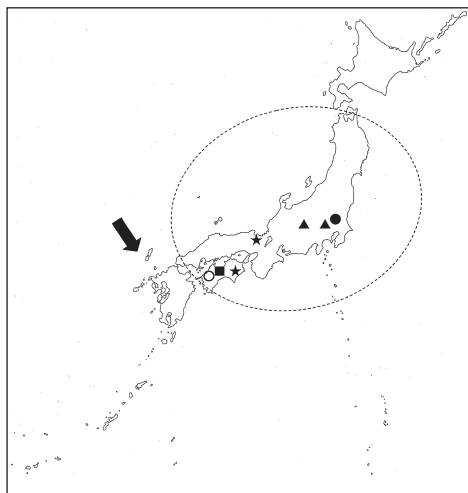


Fig. 114. Distribution of Japanese species of *Leiodes multipunctata* group: (●) *L. araii* sp. nov., (■) *L. haradai* sp. nov., (▲) *L. hijikatai* sp. nov., (○) *L. sakaii* sp. nov., (★) *L. kiuchii* sp. nov., broken line—*L. multipunctata* (Rye, 1873), arrow—suggested migration pathway of *L. multipunctata* group from the continent to Japan.



*Leiodes naraharai* species group

The *Leiodes naraharai* species group inhabits only the Ryukyus (Fig. 115). In general, the Ryukyus are divided into three islands groups, North Ryukyu Islands (= Tokara Islands), Central Ryukyu Islands (Amami-Ōshima Is., Tokunoshima Is., Okinawa Is., and many adjacent small islands), and South Ryukyu Islands (Miyako Is., Ishigaki Is., Iriomote Is., Yonaguni Is., and many adjacent small islands). In some cases, Ōsumi Islands (Yakushima Is., Tanegashima Is., and many adjacent small islands) north of Tokara Islands are also included in the Ryukyus, but they are not considered as part of the Ryukyus here.

As with many other beetles, the fauna of the family Leiodidae of the Ryukyus is unique. In the tribe Agathidiini (Leiodinae), ten of the fifteen recorded species are endemic for the Ryukyus (HISAMATSU 1985; HOSHINA 1996, 1998, 2002b, 2009a; HOSHINA & NARUKAWA 1998). Furthermore, all four species of the subfamily Coloninae known to occur in the Ryukyus are endemic (HOSHINA 2003, 2009b; HOSHINA & FUKUZAWA 2010), as also are all four species of *Leiodes* (Table 2). Two of these species, *L. naraharai* sp. nov. and *L. shuheii* sp. nov., are very close to each other based on external morphology and are therefore included into this species group.

*Leiodes naraharai* sp. nov. and *L. shuheii* sp. nov. are distributed only in Central and South Ryukyus, respectively (Fig. 115). There are various hypotheses about the time when the three island groups of the Ryukyus were geologically separated from each other (e.g., see KIZAKI & OSHIRO 1977, KIMURA 1996, OTA 1998). KIMURA (1996) hypothesized that the Central and South Ryukyus had been connected with the Eurasian continent until the late Pleistocene. However, in this study, the opinion of OTA (1998) who supposes that Central Ryukyus were

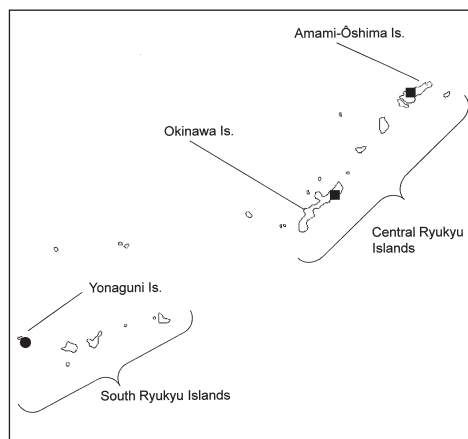


Fig. 115. Distribution of *Leiodes naraharai* group: (●) *L. shuheii* sp. nov. (■) *L. naraharai* sp. nov.

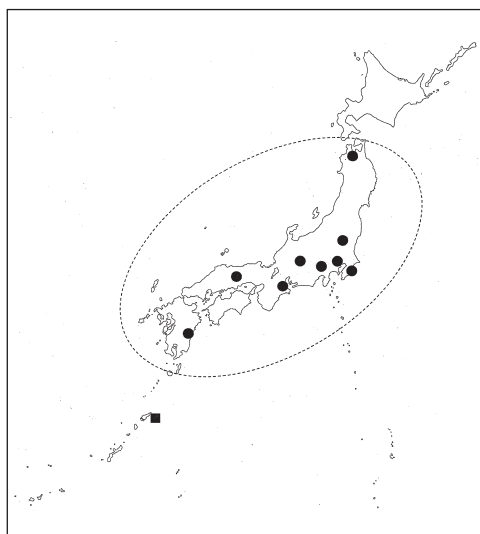


Fig. 116. Distribution of *Leiodes okawai* group: broken line – *L. okawai* Nakane, 1963, (●) *L. yukihihikoi* sp. nov., (■) *L. kamezawai* sp. nov.

already isolated from neighbouring lands before the Pleistocene, is followed. Hence, it is supposed that the ancestors of *L. naraharai* sp. nov. and *L. shuheii* sp. nov. migrated to the Ryukyus prior to the Pleistocene and underwent local speciation. However, it is not clear from where the ancestors of the *L. naraharai* species group could have migrated to the Ryukyus, as no species related to this group have been discovered in neighboring areas.

### *Leiodes okawai* species group

Three species of this group are endemic to Japan (Table 2) and the group is the only species group for which representatives are distributed in the three main islands of Japan (Honshu, Shikoku, and Kyushu, but not Hokkaido) and in the Ryukyus (Fig. 116). As mentioned earlier in the part concerning the *L. naraharai* species group, the Central Ryukyus were probably separated from Kyushu and South Ryukyus prior to the Pleistocene (OTA 1998). This would imply that representatives of the *L. okawai* group possibly migrated to the Ryukyus before the Pleistocene. However, I cannot presume from where the *L. okawai* species group migrated to Japan because the related species to this group have not been recorded from the Eurasian continent.

### Acknowledgements

I wish to express my sincere thanks to Dr. Kee-Jeong Ahn (Chungnam National University, Korea), Mr. Koji Arai (Saitama Pref.), Mr. Jonathan Cooter (Hereford, England), Dr. Giulio Cuccodoro (Muséum d'histoire naturelle, Genève), Mr. Hirobumi Fujimoto (Kagawa Pref.); Mr. Keitaro Harusawa (Osaka Pref.), Mr. Yukihiro Hirano (Kanagawa Pref.), Mr. Shigehisa Hori (Historical Museum of Hokkaido, Sapporo), Dr. Shôichi Imasaka (Fukuoka Pref.), Mr. Katsuya Kido (Fukuoka Pref.), Mr. Shigenori Inoue (Fukui Pref.), Mr. Koji Iwakiri (Miyazaki Pref.), Mr. Hiromu Kamezawa (Tokyo Pref.), Mr. Toshiyuki Katô (Hokkaido), Dr. Toshio Kishimoto (Japan Wildlife Research Center, Tokyo), Mr. Morisato Kiuchi (Tokushima Pref.), Mr. Hiroshi Makihara (Forestry and Forest Products Research Institute, Japan), Mr. Isao Matoba (Wakayama Pref.), Dr. Munetoshi Maruyama (The Kyushu University Museum), Dr. Koji Mizota (Miyagi University of Education), Mr. Kozo Mizuno (Kyoto Pref.), Mr. Nobuyuki Narukawa (Mie Pref.), Dr. Shun-Ichiro Naomi (Natural History Museum and Institute, Chiba), Dr. Shûhei Nomura (National Science Museum, Tokyo), Dr. Masahiro Ôhara (Hokkaido University Museum, Sapporo), Mr. Masatsugu Oikawa (Miyagi Pref.), Mr. Hideo Ohkawa (Tochigi Pref.), Dr. Toshihiro Ozaki (Aomori Pref.), Dr. Sun-Jae Park (National Institute of Biological Resources, Korea), Mr. Masahiro Saitô (Fukui Pref.), Dr. Masahiro Sakai (Ehime University), Dr. Yoshihiro Sawada (Minoo Park Insect Pavilion), Dr. Shigeru Suzuki (Okayama Pref.), Dr. Zdeněk Švec (Praha, Czech Republic), Mr. Kentarô Toyoshima (Gifu Pref.), Mr. Osamu Yamaji (Okayama Pref.), Dr. Takeo Yamauchi (Toyama Institute of Health), Dr. Nobunori Yasuda (Daisetsuzan National Park, Sounkyo Visitor Center, Hokkaido), Mr. Hideyuki Yokozeke (Mie Pref.), Mr. Masataka Yoshida (Tokushima Pref.), and Dr. Hiroyuki Yoshitomi (Ehime University) who kindly provided valuable specimens used in this study.

I am deeply indebted to Mr. Jonathan Cooter (Hereford, England) for his critical reading and comments on my early draft. I am grateful to Dr. Seiji Morita (Tokyo Pref.) and Dr. Naoki Takahashi (Kyushu University) who kindly provided me with the information about some references.

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