

## Systematic Position of the Genus *Kuschelidium* JOHNSON (Coleoptera, Ptiliidae), with Description of a New Species from Japan

Yoshihiro SAWADA and Toshiya HIROWATARI

Entomological Laboratory, Graduate School of Agriculture and Biological Sciences,  
Osaka Prefecture University, Sakai, 599–8531 Japan

**Abstract** The genus *Kuschelidium* JOHNSON, which is newly recorded from Japan, is considered to be most closely related to *Mikado* MATTHEWS judging from the anterior metasternal intercoxal process that is acute in apical portion. Redescriptions of *Kuschelidium* and *Mikado* are given. *Kuschelidium okinawense* sp. nov. is described from the Ryukyus, Japan.

### Introduction

The monotypic genus *Kuschelidium* was established by JOHNSON in 1982 on the basis of *K. maori* JOHNSON from New Zealand. JOHNSON (1982) characterized this genus by the pronotal sides bent onto the prosternal pleura in front half, and the mesosternum with a large, lanceolate plate overlying apically. As for the generic relationship, JOHNSON (1982) suggested that *Kuschelidium* would be closest to *Mikado* and some of the nanoselline genera on the basis of the almost contiguous metacoxae and entire elytra. However, HALL (1999) placed *Mikado* in the tribe Nanosellini in the subfamily Ptiliinae, while he assigned *Kuschelidium* to other group of the Ptiliinae. Thus, the relationships of these genera remained problematic.

In the present paper, systematic position of *Kuschelidium* will be discussed on the basis of a new *Kuschelidium* species discovered in the northern parts of Okinawa Island, south-western Japan. The genus *Mikado* and *Mikado japonicus* will also be re-described.

### Materials and Methods

Dry specimens were used for this study. Most specimens examined are preserved in the collection of the Entomological Laboratory, Osaka Prefecture University (OPU). For observation of the genitalia, the specimens were macerated in hot solution of 10% KOH for 2–3 minutes. The materials were transferred to water for about 10 minutes and dissected with micro-pins in glycerin under the binocular microscope. After the dissection, all parts of each individual including genitalia were mounted on a slide

with Canada Balsam. Microstructures on various parts of body were observed with scanning electron microscope. Concerning terminology, we followed JOHNSON (1982).

Genus *Kuschelidium* JOHNSON, 1982

[Japanese name: Yanbaru-mukugekinokomushi-Zoku]

*Kuschelidium* JOHNSON, 1982, 337.

Type species: *Kuschelidium maori* JOHNSON, 1982, monotypy.

Body oval, convex, densely pubescent. Head subtriangular with rounded apex, strongly deflexed (Fig. 2 B) and little visible from above. Eye present, moderate in size. Antenna (Fig. 2 C) short, dusky yellow; third segment subconical; fourth to eighth slightly stout; last three incrassate, pear-shaped. Pronotum wider than long, widest at the base. Scutellum triangular, wider than long. Mesosternum wider than long; humeral part rounded; mesosternal process absent; posterior margin oblique. Metasternum wider than long, with a lanceolate anterior process; posterior margin with a bifid intercoxal process. Elytron complete, narrowed posteriorly. Legs short; metacoxal plate broad. Ventrite I with anteriorly narrowed process at the middle. Aedeagus with acute apex. Spermatheca small with fine chord except incrassate part below the pump.

*Remarks.* *Kuschelidium* has been known from only one species *K. maori* JOHNSON, 1985 from New Zealand. In the present study, this genus is newly recorded from Japan. As JOHNSON (1982) noted, the conspicuous anterior process of the metasternum (=mesosternal plate) whose basal part is elevated and margined is considered to be a synapomorphy of *Kuschelidium*. Though JOHNSON (1982) also regarded the extensive arms of the mesosternal collar and strongly deflexed sides of the pronotum as generic characters of *Kuschelidium*, they seem to be the characteristics of *K. maori*.

*Kuschelidium okinawense* sp. nov.

[Japanese name: Yanbaru-mukugekinokomushi]

(Figs. 1 A, 2 A–K, 4 A–B)

Body length: 0.7 mm.

Body (Figs. 1 A, 2 A) blackish brown; the surface rough (Fig. 4 A). Pronotum widest at the base with the posterior angle slightly protruded. Mesosternum (Fig. 2 D) with transversal carina not connected to mesosternal process. Metendosternite with a basal stalk and a pair of anterior arms. Metepisternum (Fig. 2 E) widest before the middle, acute posteriorly. Metepimeron (Fig. 2 E) widest at the base, protruded posteriorly. Elytron with a row of setae on the ventral surface of side margin (Fig. 4 C). Legs (Figs. 2 F–H) dusky yellow, slender; protibia with a row of bristles in inner margin from base to apex; metacoxal plate broad triangular, protruded posteriorly. Tergites IX and X not fused. Pygidium (Fig. 2 I) with smooth side and round apex; a pair of long setae near the apex. Spermatheca (Fig. 2 K) proximally fine, incrassate below the

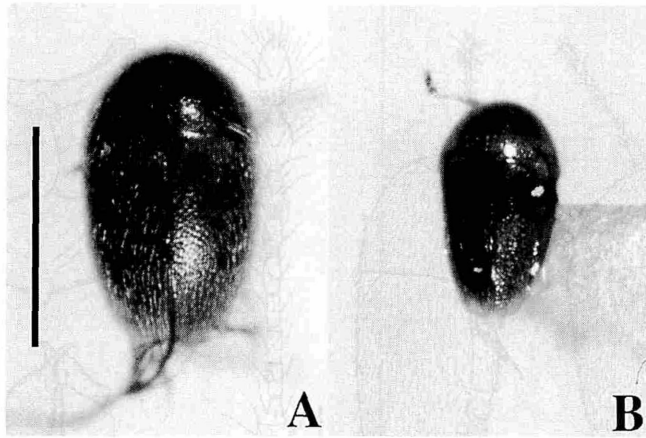


Fig. 1. Habitus of *Kuschelidium okinawense* sp. nov. and *Mikado japonicus* MATTHEWS. — A. *Kuschelidium okinawense* sp. nov. — B. *Mikado japonicus* MATTHEWS. Scale=0.5 mm.

pump, elongate distally.

Male unknown.

*Distribution.* Japan [the Ryukyus].

*Holotype.* [Ryukyus], ♀, Mt. Yonahadake, Kunigami-son, Okinawa Pref., 1–IV–1999, T. KAN leg., OPU.

*Paratypes.* [Ryukyus], 1 ♀, Mt. Yonahadake, Kunigami-son, Okinawa Pref., 1–IV–1999, T. KAN leg., OPU; 1 ♀, Tropical Botanical Garden, Miyako Is., Okinawa Pref., 2–XI–1999, T. ISHIKAWA leg., OPU.

*Remarks.* *Kuschelidium okinawense* sp. nov. is distinguished from *K. maori* JOHNSON by the triangular metacoxal plate that is protruded posteriorly, and the absence of the metasternal line. This species was collected in leaf-litters of subtropical evergreen forests in Okinawa Is. and Miyako Is., the Ryukyus, and seems to feed on fungi as in other ptiliids.

*Etymology.* The specific name “*okinawense*” refers to the type locality of this species.

#### Genus *Mikado* MATTHEWS, 1889

[Japanese name: Hijiri-mukugekinokomushi-Zoku]

*Mikado* MATTHEWS, 1889, 189.

*Phiragarica* DEANE, 1930, 477.

Type species: *Mikado japonicus* MATTHEWS, 1889, monotypy.

Body oval, narrowed posteriorly, convex. Eye present, rather large. Antenna short; third segment subconical; fourth to eighth longer than wide, slightly stout; last three incrassate. Pronotum wider than long, widest at the base. Scutellum triangular, wider

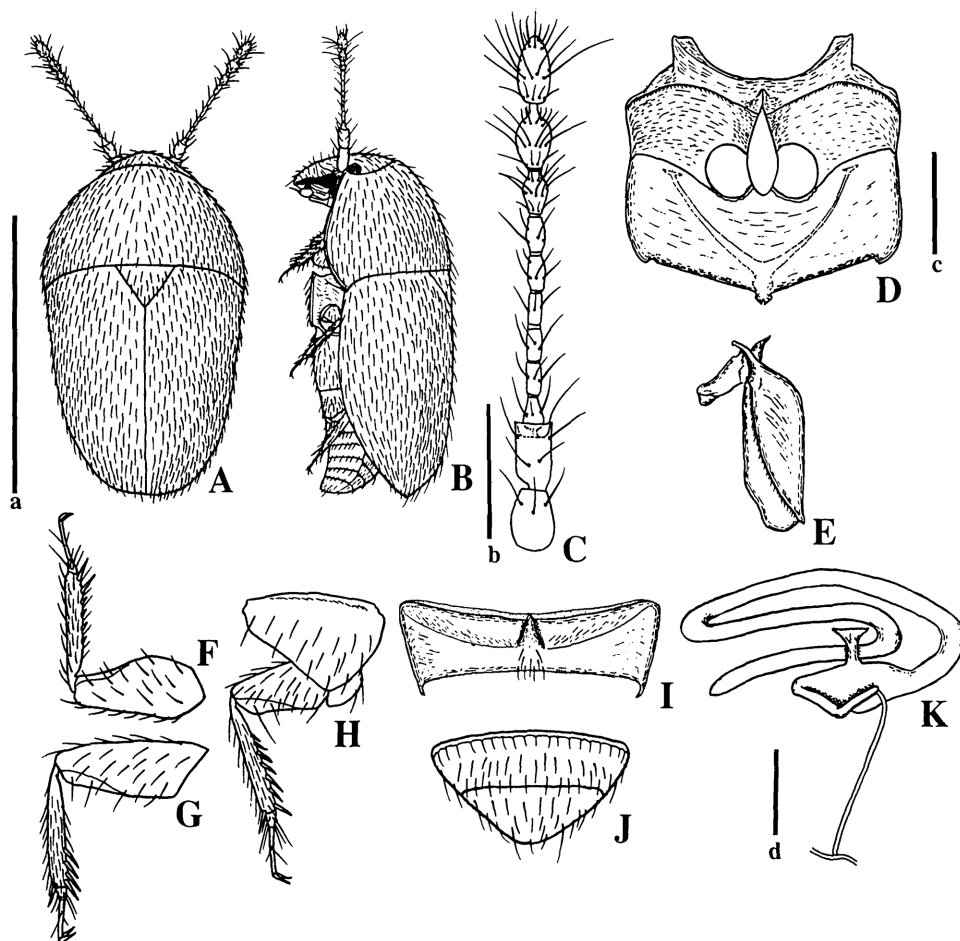


Fig. 2. *Kuschelidium okinawense* sp. nov., ♀ [Mt. Yonahadake, Okinawa Pref.].— A, Habitus in dorsal view; B, ditto, in lateral view; C, antenna; D, meso- and metasterna; E, metepisternum and metepimeron; F, proleg; G, mesoleg; H, metaleg; I, tergite IX and pygidium; J, ventrite I; K, spermatheca. Scales: a=0.5 mm for A–B, b=0.1 mm for C, c=0.1 mm for D–J, d=0.05 mm for K.

than long. Mesosternum wider than long, with transversal carina not connected to metasternal process; the mesosternal process absent; the posterior margin nearly straight. Metasternum wider than long, with a triangular anterior process; posterior margin with a bifid intercoxal process. Elytron narrowed posteriorly. Legs incrassate apically; metacoxal plate broad, protruded posteriorly. Tergites IX and X not fused. Tergite IX with a row of setae near the middle.

*Remarks.* The genus *Mikado* MATTHEWS includes a single Japanese and three Australian species. MATTHEWS characterized *Mikado* by the rostriform head. In *M. japonicus*, the posterior half of the elytron is ornamented with scale-like structures,

which may be one of apomorphic characters of the genus.

***Mikado japonicus* MATTHEWS, 1889**

[Japanese name: Yamato-hijiri-mukugekinokomushi]

(Figs. 1 B, 3 A–M, 4 C–D)

*Mikado japonicus* MATTHEWS, 1889, 189; 1900, 34. — HISAMATSU, 1985, 238, pl. 43, fig. 3. — HALL, 1999, 52.

Body length: 0.4–0.5 mm.

Body (Figs. 1 B, 3 A) pale yellow to reddish brown; the surface smooth (Fig. 4 B) except for apical halves of elytra, with scale-like structures. Pubescence present on apical half of elytron. Head strongly deflexed (Fig. 3 B) and hardly visible from above, rostriform (Fig. 3 C). Antenna (Fig. 3 D) dusky yellow. Metascutellum with the side margins serrate apically. Metendosternite with a basal stalk and a pair of anterior arms. Metepisternum (Fig. 3 F) widest before the middle, acute posteriorly. Metepimeron (Fig. 3 F) widest near the base. Elytron with a row of setae on the side margin of the ventral surface (Fig. 4 D). Legs (Figs. 3 G–I) dusky yellow, slender; protibia with a row of bristles in inner margin from base to apex. Pygidium (Fig. 3 J) with smooth side and round apex in male, slightly produced in female (Fig. 3 K); a pair of long setae near the apex; the apex rounded in male, slightly protruded in female. Aedeagus (Fig. 3 L) stout with acute apex; ventral hook absent. Spermatheca (Fig. 3 M) rather stout at the middle; pump rather long and fine.

*Distribution.* Japan [Hokkaido, Honshu, Shikoku, Kyushu, the Ryukyus].

*Materials examined.* [Hokkaido]. 23 ♀♀, Hitsujigaoka, Sapporo City, 13–XI–1997, K. MIZOTA leg., OPU. [Honshu]. 2 ♂♂, 6 ♀♀, Odawara City, Kanagawa Pref., 1–VI–1988, M. KUBOTA leg., OPU; 1 ♀, Ôtaki, Kawabe-chô, Wakayama Pref., 3–IV–1979, Y. NISHIKAWA leg., OPU; 1 ♂, 7 ♀♀, Esuzaki, Susami-chô, Wakayama Pref., 31–V–1999, N. HIRAI & A. ABE leg., OPU. [Shikoku]. 1 ♂, 7 ♀♀, Omogo-kei, Ehime Pref., 24–VI–1971, M. SAKAI leg., OPU. [Kyushu]. 3 ♀♀, Mt. Hoyoshidake, Kagoshima Pref., 25–VII–1995, F. KIMURA leg., OPU. [Ryukyu]. 2 ♂♂, 8 ♀♀, Trans-island road, near Ôtomi, Iriomote Is., Okinawa Pref., 11–X–1988, M. SAKAI leg., OPU; 2 ♀♀, same locality, 12–X–1988, M. SAKAI leg., OPU.

*Remarks.* MATTHEWS (1889) had an idea that this species is carnivorous, but there is no evidence to support this view. HALL (1999) reported a fungus *Trametes muelleri* BERK. as a host of *M. japonicus* MATTHEWS. This species is also found to aggregate on the under surface of polyporaceous fungi, *Fomes fomentarius* (L.).

**Systematic Position of *Kuschelidium***

JOHNSON (1982) suggested that “the almost contiguous metacoxae and entire elytra place *Kuschelidium* closest to *Mikado* MATTHEWS and some of the nanoselline genera, including *Throscidium* MATTHEWS.” On the other hand, HALL (1999) placed

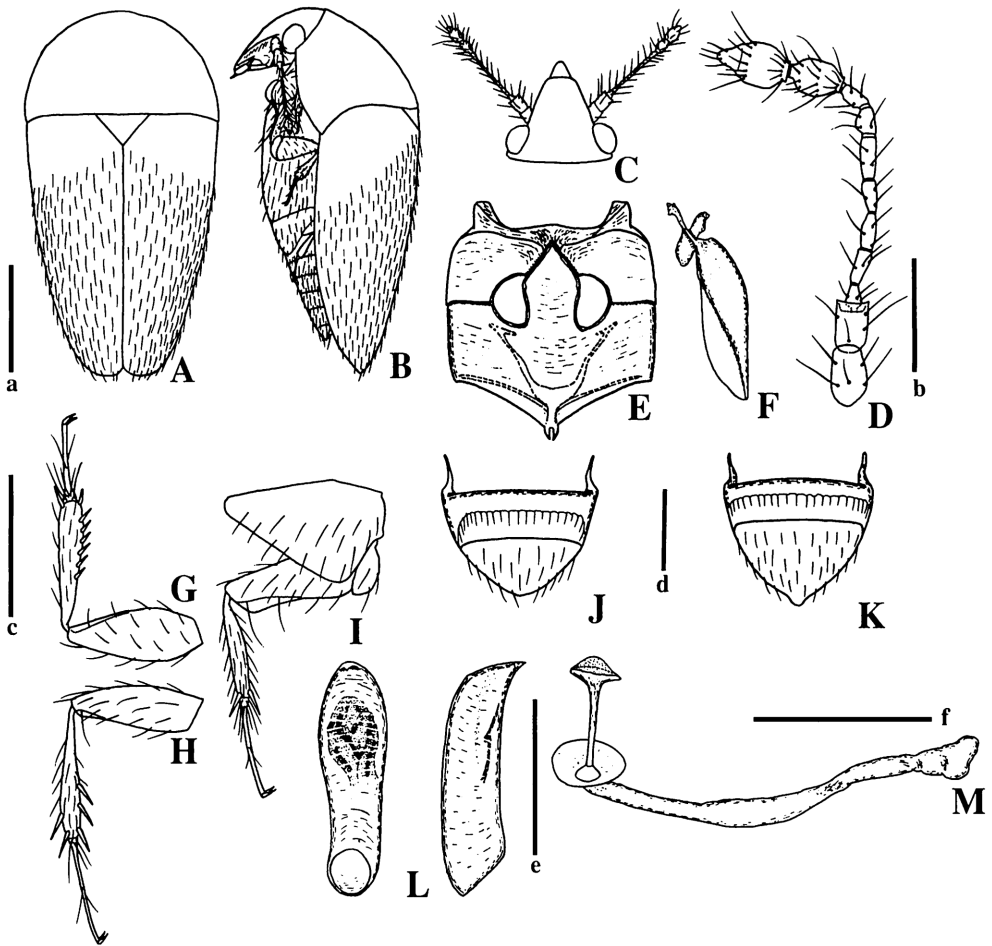


Fig. 3. *Mikado japonicus* MATTHEWS [Hitsujiogaoka, Hokkaido]. — A, Habitus in dorsal view; B, ditto, in lateral view; C, head; D, antenna; E, meso- and metasterna; F, metepisternum and metepimeron; G, proleg; H, mesoleg; I, metaleg; J, tergite IX and pygidium of male; K, tergite IX and pygidium of female; L, aedeagus; M, spermatheca. Scales: a=0.1 mm for A–C, b, c, d, e, f=0.05 mm; b for D, c for E–I, d= for J–K, e for L, f for M.

*Mikado* and *Throscidium* in the Nanosellini, while he assigned *Kuschelidium* and *Nosidium* to other group of the Ptiliinae. Though he noted that the characters of the mesosternal collar and posterior margin of the pygidium in *Kuschelidium* are unlike those found in Nanosellini, he seems to refer only to the characteristics of *K. maori*, not to the genus *Kuschelidium*. HALL (1999) also indicated that many characters are shared by *Mikado* and other members of the Nanosellini. Among them, however, “moderately reduced metendosternite” and “reduction of setae near femoral lines” are also seen in *Kuschelidium*.

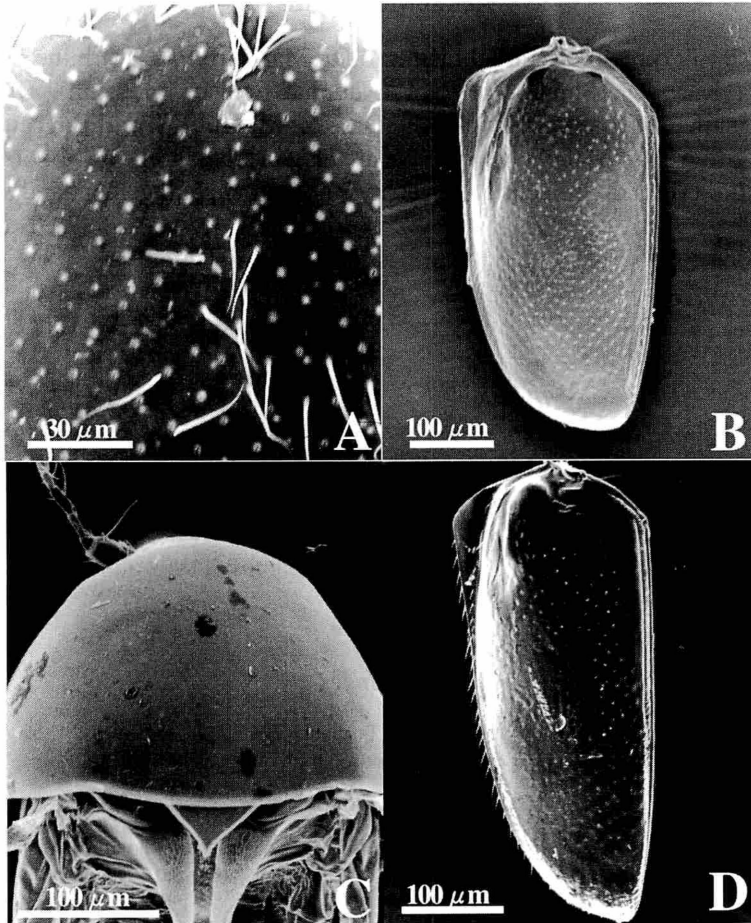


Fig. 4. Morphology of *Kuschelidium* and *Mikado*. — A, Surface of pronotum; B, ventral side of right elytron; C, surface of pronotum; D, ventral side of right elytron. A–B, *Kuschelidium okinawense* sp. nov.; C–D, *Mikado japonicus* MATTHEWS.

In the present study, we regarded *Kuschelidium* and *Mikado* as a sister group sharing two synapomorphies: 1) the head is strongly deflexed and little visible from dorsal, and 2) the anterior metasternal intercoxal process is acute in apical portion. They also possess a row of setae in outer margin of the ventral surface of elytron, which is considered to be one of the synapomorphies of the tribe Nanosellini. Thus, as JOHNSON (1982) suggested, the two genera seem to be most closely related and should be placed in the tribe Nanosellini.

### Acknowledgments

We wish to express our cordial thanks to Dr. Masahiro SAKAI (Ehime University), Mr. Tatsuya KAN, Dr. Shûhei NOMURA (National Science Museum), Dr. Fumiaki KIMURA (Kashihara City Insectarium), and Dr. Kôji MIZOTA (Miyagi Educational Center) for the gift or loan of the materials. We are also indebted to Prof. Minoru ISHII and Mr. Norio HIRAI (Osaka Prefecture University) for their encouragement and advice.

### 要 約

澤田義弘・広渡俊哉：ヤンバルムクゲキノコムシ属（甲虫目ムクゲキノコムシ科）の分類学的位置と日本産1新種の記載。——ヤンバルムクゲキノコムシ属（和名新称）*Kuschelidium*には、ニュージーランドから記載された1種*K. maori* JOHNSONのみがこれまでに知られていたが、今回、沖縄本島北部から得られた1未記載種を見出したので、*Kuschelidium okinawense*と命名・記載した。本属は日本新記録であり、後胸腹板基節間前方突起が槍状であることと、後端部が隆起することで特徴づけられる。また、本属の分類学的位置については語説があったが、頭部が強く下方に向き背側からほとんど見えないこと、後胸腹板基節間前方突起が先端で尖鋭化することというふたつの派生形質を共有することから、JOHNSON (1982)が指摘したように*Mikado*属に近縁であると考えられる。

### References

- DEANE, C., 1930. Trichopterygidae of Australia and Tasmania. *Proc. Linn. Soc. N. S. W.*, **55**: 477–487.
- HALL, E. W., 1999. Generic revision of the tribe Nanosellini (Coleoptera: Ptiliidae: Ptiliinae). *Trans. Am. ent. Soc.*, **125**: 39–126.
- HISAMATSU, S., 1985. Ptiliidae. In UÉNO, S.-I., Y. KUROSAWA & M. SATÔ (eds.), *The Coleoptera of Japan in Color*, **2**: 238–239 [incl. pl. 43, figs 1–7]. Hoikusha, Osaka. (In Japanese, with English book title.)
- JOHNSON, C., 1982. An introduction to the Ptiliidae (Coleoptera) of New Zealand. *N. Z. J. Zool.*, **9**: 333–376.
- MATTHEWS, A., 1889. New genera and species of Trichopterygidae. *Ann. Mag. nat. Hist.*, (6), **3**: 188–195.
- 1900. Trichopterygia illustrata et descripta. Supplementa. 112 pp. O. E. Janson, London.