

Endophallic Structure of the Genus *Platycerus* (Coleoptera,
Lucanidae) of Japan, with Descriptions of
Two New Species

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Abstract Endophallic structures of all the known species of the lucanid genus *Platycerus* from Japan are illustrated and described for the first time. Mainly based on the morphological differences in the same organ, two new species are described under the names *P. urushiyamai* and *P. akitaorum*.

It is generally agreed that the genus *Platycerus* of Japan is composed of four species, namely, *P. delicatulus*, *P. acuticollis*, *P. kawadai* and *P. sugitai*. Of these, the former two are classified respectively into two and four subspecies, and the latter two are considered monotypical. Identification of these species has been made based on the external features and, if any, on the sclerotized part of the genital organ, though practically no attention has been paid to the morphology of the membraneous part of the male genitalia. This part, called internal sac or endophallus (LINDROTH, 1957), is now widely known to be useful for identification and classification in many groups of the Coleoptera, above all in the group of Adepnaga.

In the genus *Platycerus*, distal portion of the aedeagus is not tubular but is usually bifurcated into a pair of sclerotized plates with various shapes. The endophallus is recognized as semitransparent membraneous organ which is, when collapsed, almost enclosed by the distal pair of aedeagal plates (cf., HOLLOWAY, 1969), and when fully inflated is plumped up dorsally as a large membraneous pouch. On the membraneous wall of the endophallus are observed accessory inflations or projections with various sizes and shapes. Although this organ has attracted little attention as a taxonomic character mainly because of the difficulty of making it up into fully inflated state, its structure is astonishingly variable according to each taxon, and is often more useful to detect the species or subspecies than using external morphology alone. I am convinced that the conformation of endophallus could be regarded as one of the most reliable characters for morphological classification of the genus *Platycerus*.

In the present paper, I at first give illustrations and descriptions of the detailed structure of completely inflated endophallus of all the four known species of the Japanese *Platycerus*. On later pages, two new species will be described under the names

P. urushiyamai and *P. akitaorum* mainly based on the morphological differences in the male genital organ. These new taxa have been regarded as belonging to *P. sugitai*, and either overlooked or remain undescribed by previous authors.

The abbreviations of collector's names used in the text are as follows: YI – Yûki IMURA, SU – Seiichi URUSHIYAMA, KA – Katsumi AKITA.

Before going further, I wish to express my sincere gratitude to Messrs. Katsumi AKITA (Tsu, Mie), Yoshiyuki NAGAHATA (Yamagata) and Seiichi URUSHIYAMA (Tokyo) for their kind cooperation in supplying specimens and useful information to me for study. Special thanks are due to Mr. Norihide OHKUBO of Mie Plant Protection Office for giving me valuable advice concerning the interpretation of the International Code of Zoological Nomenclature, and Dr. Kunio ARAYA of Kyushu University for providing necessary literature. Also I thank Dr. Shun-Ichi UÉNO (National Museum of Nature and Science, Tokyo) for reading the entire text in its original form.

1. *Platycerus delicatulus* LEWIS, 1883

[Japanese name: Ô-ruri-kuwagata (changed from Ruri-kuwagata)]

(Figs. 1 a-e)

Platycerus delicatulus LEWIS, 1883, Trans. ent. Soc. Lond., 1883, p. 338, pl. 14, fig. 3; localities designated in the original description: Oyayama, Odaigahara, Chiuzenji and Ontake.

Male genitalia. Distal portion of aedeagus remarkably bifurcated into a pair of sclerotized plates; each plate suboval in shape, with a strongly sclerotized oblique keel near the middle; the right keel larger, subtriangularly protruded with the tip obtusely rounded in ventral view, while the left one is smaller and more weakly protruded laterad; when fully inflated, endophallus large, robust, and strongly expanded, though slightly constricted bilaterad before flagellum in ventral view, with a pair of small membraneous projections on both sides of flagellum and a pair of horn-like large projections at the apex; areas between these projections on extended side are wrinkled to form pleats-like uneven surface; flagellum rather vestigial, indicated by longitudinally set linear sclerite completely attached to the membraneous wall of endophallus, almost as long as distal plate of aedeagus, and moderately pigmented.

Notes. This species is most widely distributed of all the species of the Japanese *Platycerus* and is classified into two subspecies. The nominotypical subspecies occupies the greater part of the distributional range of the species, and is distributed from northeastern tip of Honshu in the north to the central part of Kyushu in the south. The other subspecies, named *P. d. unzendakensis* FUJITA et ICHIKAWA, 1982, is narrowly restricted to the Shimabara Peninsula of northwestern Kyushu. As to the endophallic structure of the nominotypical subspecies, geographical variation appears to be unremarkable, so far as I have examined. For example, the basic structure of the endophallus is almost the same even between the specimens from Lake Towada-ko of Aomori Prefecture, the northernmost locality, and those from Mt. Hiko-san of Fukuoka

Prefecture, one of the southernmost localities. Unfortunately, I was unable to see fully inflated endophallus of subsp. *unzendakensis* by using fresh specimens.

2. *Platycerus kawadai* FUJITA et ICHIKAWA, 1982

[Japanese name: Hosotsuya-ruri-kuwagata]

(Figs. 2 a-e)

Platycerus kawadai FUJITA et ICHIKAWA, 1982, Elytra, Tokyo, 10, p. 1, figs. 1 b, b', figs. 2 b-1-5; type locality: Kamihikawa-rindo, Daibosatsu, Yamanashi Pref. (1,300-1,400 m in altitude).

Male genitalia. Basically similar to those of *P. delicatulus*, but somewhat different in details as follows: aedeagus with the distal pair of sclerotized plates more rounded in profile, keel on the right aedeagal plate less strongly protruded with the tip more gently rounded; endophallus less strongly expanded, with the membranous constriction before flagellum more prominently recognized, a pair of horn-like large projections at the apex robust and more remarkably inflated bilaterad; flagellum shorter and less strongly developed.

Notes. Viewed from the external features, geographical variation of *P. kawadai* is unremarkable, and there is little disagreement to regard the species as monotypical, though the coloration is considerably variable according to individuals or localities. Also from the endophallic structure, the species appears to show little geographical variation, so far as I have examined.

3. *Platycerus acuticollis* Y. KUROSAWA, 1969

[Japanese name: Ko-ruri-kuwagata]

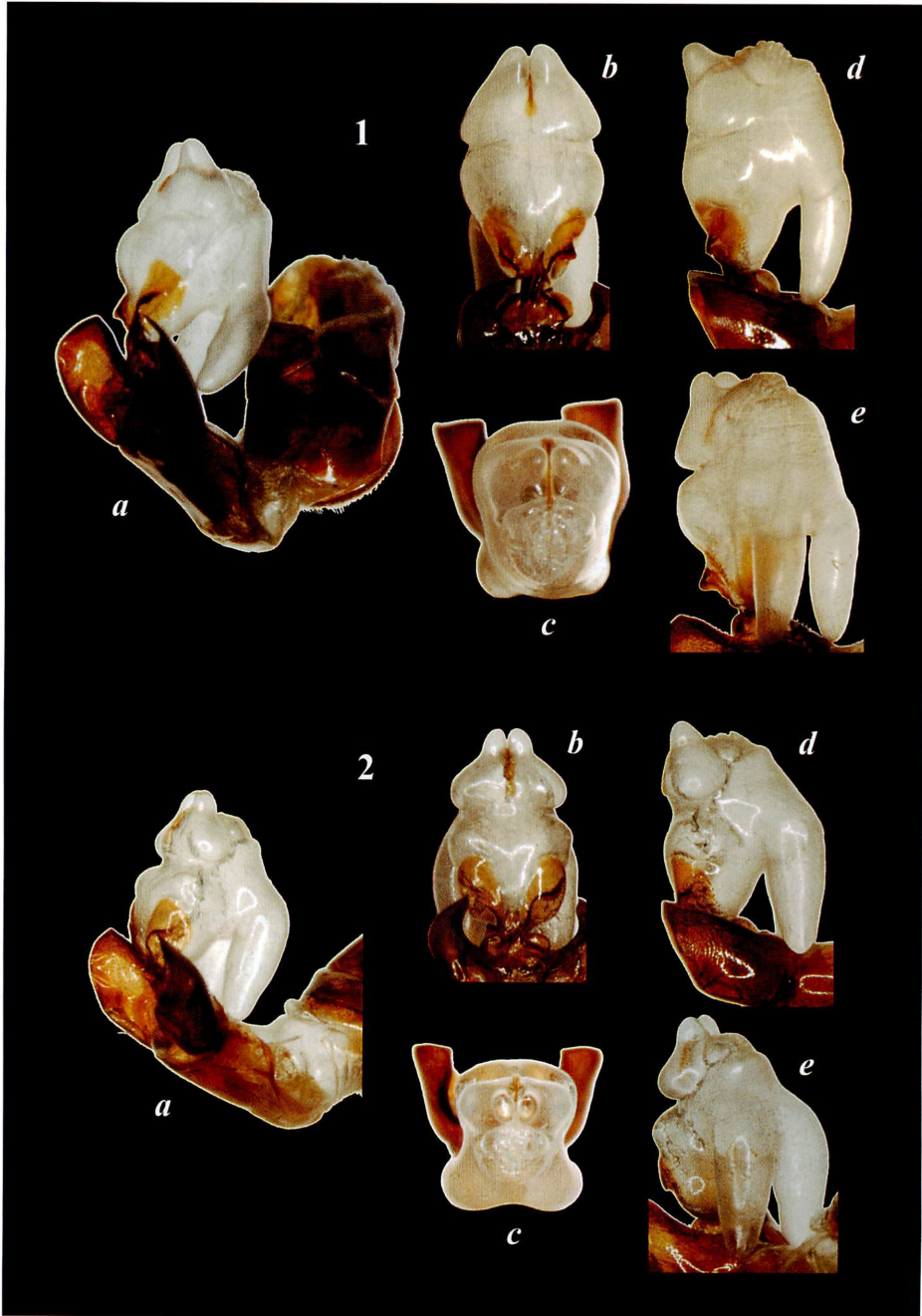
(Figs. 3-6)

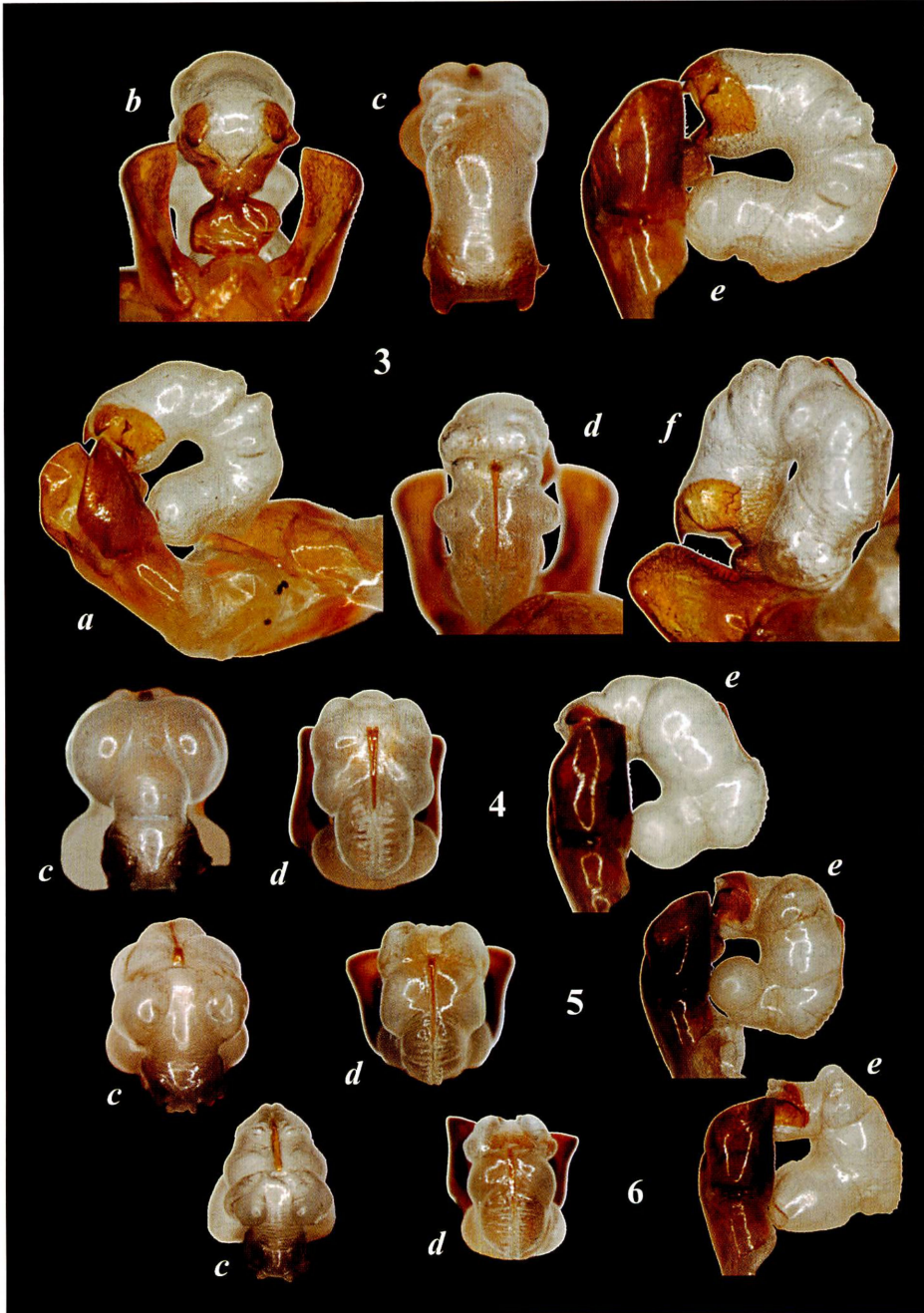
Platycerus acuticollis Y. KUROSAWA, 1969, Bull. natn. Sci. Mus., Tokyo, 12, p. 478, figs. 1 b (p. 477), figs. 2 d-f (p. 479), pl. 1 (p. 485), figs. 2-3, 5-6, 8-9; type locality: Hôshi Spa, Gumma Pref., Japan.

Male genitalia. Distal part of aedeagus remarkably bifurcated into a pair of sclerotized plates; each plate subsquare in shape, bearing an oblique keel near the middle and a dog ear-like semicircular protrusion at the apex; the right keel larger than

Figs. 1-2 (on p. 474). Male genital organ of *Platycerus* spp. — 1, *P. delicatulus* from Ôdaigahara in Nara Pref.; 2, *P. kawadai* from Mt. Imakura-yama in Yamanashi Pref. — a, Aedeagus with fully inflated endophallus in right sublateral view; b, ditto in posterior view; c, ditto in dorsal view; d, ditto in right lateral view; e, ditto in right subdorsal view.

Figs. 3-6 (on p. 475). Male genital organ of *Platycerus acuticollis* subsp. — 3, Subsp. *acuticollis* from Hôshi-onsen Spa (type locality of the species) in Gumma Pref.; 4, subsp. *takakuwai* from Mt. Manjirô-daké on the Amagi-san Mts. in Shizuoka Pref.; 5, subsp. *akitai* from Mt. Nihon-daké on the Ohminé Mts. in Nara Pref.; 6, subsp. *namedai* from Mt. Fukuchi-yama (=Fukuchi-san) in Fukuoka Pref. — a, Aedeagus with fully inflated endophallus in right sublateral view; b, ditto in ventral view; c, ditto in posterior view; d, ditto in dorsal view; e, ditto in right lateral view; f, ditto in right subdorsal view.





the left, subtriangularly shaped and blunt at the tip in ventral view, and weakly bent towards aedeagal base; left keel much smaller, less strongly produced laterad and hardly bent towards aedeagal base; endophallus tubular, strongly inflexed in median portion and horseshoe-shaped in lateral view; basal portion relatively narrow, with the membranous area between distal pair of aedeagal plates either smooth or with a pair of small membranous projections; median portion robuster, with two to three pairs of accessory inflations on both sides of flagellum; flagellum most strongly developed of all the *Platycerus* species occurring in Japan, completely attached to membranous wall of endophallus, and indicated by longitudinally set linear sclerite which is widest at the base and gradually tapered towards the distal end; distal portion more or less inflated on both sides; the area between flagellum and distal inflation is decorated by pleats-like transverse wrinkles.

Notes. It is well known that *P. acuticollis* is polytypical, and the species is classified into four subspecies based on external morphology. Up to the present, however, no contribution has been made to the comparative morphology of the genital organ in these subspecies. I have examined fully inflated endophallus of all the four subspecies, and obtained some noticeable findings as shown in Figs. 3–6 and described in the following lines:

1) *Platycerus acuticollis acuticollis* Y. KUROSAWA, 1969 (Fig. 3). — Endophallus is the longest of all the subspecies, typically horseshoe-shaped in lateral view; basal portion tubular and elongated, smooth on the surface, lacking a pair of accessory projection on the membranous area between distal pair of aedeagal plates; bilateral inflations on median portion not so large; flagellum long and narrow; apical portion elongated and not so remarkably inflated at the apex.

2) *P. a. takakuwai* FUJITA, 1987 (Fig. 4). — Endophallus is shorter and robuster than in the nominotypical subspecies; basal portion much shorter, with a pair of small membranous projections in the area between distal pair of aedeagal plates; median portion more remarkably inflated bilaterad in dorsal view; flagellum stouter and a little shorter; apical portion much shorter and strongly inflated bilaterad at the apex.

3) *P. a. akitai* FUJITA, 1987 (Fig. 5). — General features of endophallus as in subsp. *takakuwai*; basal portion the shortest of all the four subspecies, with a pair of small membranous projections in the area between distal plates of aedeagus; median portion a little less strongly inflated than in subsp. *takakuwai*; flagellum a little longer and slenderer, showing an intermediate state between the nominotypical subspecies and subsp. *takakuwai*; apical portion more acutely inflexed, with the apex strongly inflated as in subsp. *takakuwai*.

4) *P. a. namedai* FUJITA, 1987 (Fig. 6). — Similar to the preceding subspecies, with the basal portion very short, and a pair of small membranous projections are also visible between distal plates of aedeagus; a pair of membranous inflation on median portion more prominently produced with the tips more sharply pointed; flagellum a little wider than in subsp. *akitai*; apical portion in lateral view widest of all the four subspecies, with the apex strongly inflated.

Viewed from the endophallic structure, *P. acuticollis* appears to be divided into two major lineages to be called the *acuticollis* and the *takakuwai* groups: the former is represented by the nominotypical subspecies alone and the latter is composed of three other subspecies. The morphological gap between these two seems to be fairly large, and there is yet room for consideration whether the gap reflects the difference at the subspecies level or even at the specific. Since it is not a purpose of the present paper to discuss on the geographical variation and classification of *P. acuticollis*, this subject will be taken up again in other papers of mine to be published in near future.

4. *Platycerus sugitai* OKUDA et FUJITA, 1987

[Japanese name: Shikoku-ruri-kuwagata (changed from Nisé-ko-ruri-kuwagata)]

(Figs. 7, 9)

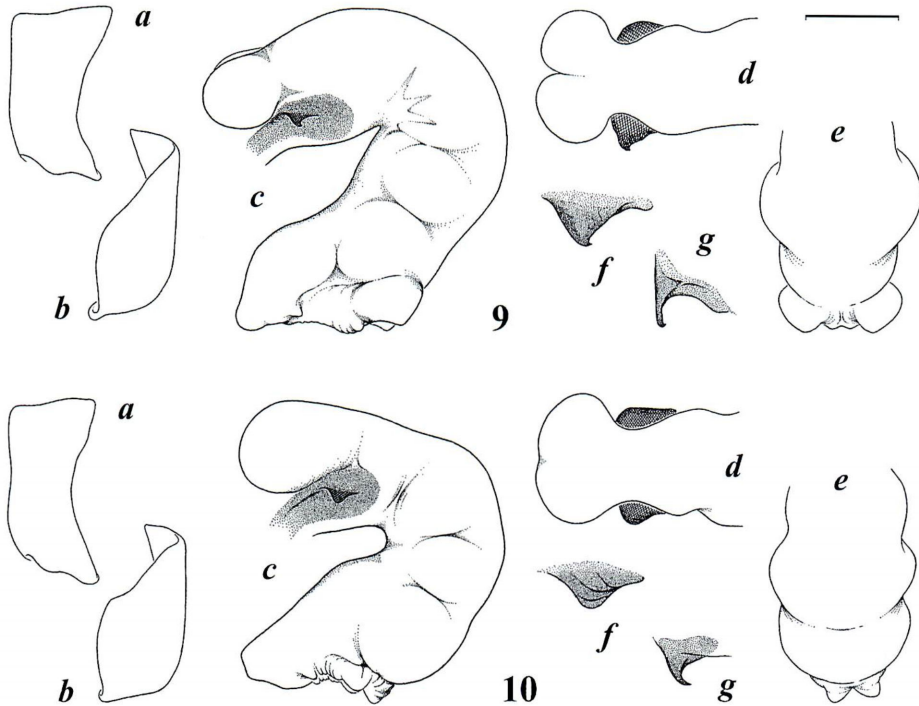
Platycerus sugitai OKUDA et FUJITA, 1987, Gekkan-Mushi, Tokyo, (192), p. 11, figs. 1-5, 11-13 (on p. 3, pl. 2), figs. 1 a, a', b, b', (on p. 5), figs. 2 b-1-5 (on p. 6); type locality: Tsurugisan (Minokoshi), Tokushima Pref.

Male genitalia. Distal part of aedeagus distinctly bifurcated into a pair of sclerotized plates; each plate subovate in shape, bearing an oblique keel near the middle, though a dog ear-like accessory sclerite at the apex is invisible; the right keel larger than the left, triangularly shaped, and hooked at the apex which is sharply pointed in posterior view, hardly bent towards aedeagal base in lateral view; the left keel much less strongly protruded, hardly bent towards aedeagal base, with the outer margin gently rounded in posterior view; endophallus narrow and tubular, abruptly inflexed at the basal third and weakly bent ventrad at apical third in lateral view; basal portion strongly protruded beyond distal pair of aedeagal plates, strongly inflated and re-entrant at middle to form a pair of hemispherical membraneous humps at the basal tip; basal part of these humps are remarkably constricted in posterior view; median portion rather simple and symmetrically inflated on both sides; flagellum completely degenerated; apical portion with a pair of large, a little deformed hemispherical inflations on the extended side before apex; areas between these inflations and apex are decorated by pleats-like membraneous wrinkles.

Notes. This taxon was described by OKUDA and FUJITA (1987) from Mt. Tsurugisan of Tokushima Prefecture in the Island of Shikoku, southwestern Japan, and as well as the specimens from several other localities in Shikoku, those from Kyushu and the Kii Peninsula of Honshu were designated as the paratypes. This means that *P. sugitai* was regarded as an inhabitant extending over these discontinuous landmasses called the

Figs. 7-8 (on p. 478). Male genital organ of *Platycerus* spp. — 7, *P. sugitai* from Mt. Tsurugisan in Tokushima Pref.; 8, *P. urushiyamai* sp. nov. from the Pass Makinoto-tôgê in Ôita Pref. — a, Aedeagus with fully inflated endophallus in right sublateral view; b, ditto in ventral view; c, keel on the right distal plate of aedeagus in posterior view; d, endophallus in posterior view; e, ditto in dorsal view; f, ditto in right lateral view; g, ditto in right subdorsal view.





Figs. 9-10. Male genital organ of *Platycerus* spp. — 9, *P. sugitai* from Mt. Tsurugi-san in Tokushima Pref.; 10, *P. urushiyamai* sp. nov. from the Pass Makinoto-tôgê in Ôita Pref. — a, Right paramere in dorsal view; b, ditto in ventral view; c, fully inflated endophallus in right lateral view; d, ditto (basal portion) in posterior view; e, ditto (median portion) in dorsal view; f, keel on the right distal plate of aedeagus in posterior view; g, ditto in lateral view. Scale: 0.5 mm for a-e; 0.4 mm for f-g.

Sohayaki Area. However, examination of detailed structure of the male genital organ recently made by myself revealed that *P. sugitai* in the sense of OKUDA and FUJITA is not uniform but can be divided into at least three different categories, since each population from the three major distributional ranges is decisively different from one another in structure of the same organ. In my view, *P. sugitai* is the species autochthonous to Shikoku, and the populations from Kyushu and the Kii Peninsula should be regarded as two different species, respectively, as described in the following sections.

Geographical variation of *P. sugitai* in the present sense appears to be unremarkable, so far as I have examined the specimens from Tokushima, Ehime and Kôchi Prefectures.

5. *Platycerus urushiyamai* IMURA, sp. nov.

[Japanese name: Kyûshû-ruri-kuwagata]

(Figs. 8, 10)

Platycerus sugitai: OKUDA & FUJITA, 1987, Gekkan-Mushi, Tokyo, (192), p. 3, pl. 2, figs. 4–5 [*partim*].*Platycerus sugitai*: URUSHIYAMA *et al.*, 2004, Gekkan-Mushi, Tokyo, (402), p. 43, figs. 21–30 [*partim*].

Description. Length (including mandibles): 8.8–12.2 mm (male), 8.6–11.3 mm (female). Body above in male usually bluish green or greenish blue, rarely with a yellowish, coppery or dark greenish tinge; that in female brassy more or less bearing a greenish tinge in most specimens, sometimes with strong greenish, red purplish or dark purplish tinge. Small- to medium-sized species for a member of the genus, with the external features closely resemble those of *P. sugitai*. Head as in the other members of the genus, with the dorsal surface scattered with relatively large punctures, more coarsely so in female than in male; mandibles in male short and stout, with the dorsal wall not concave above in basal portions, inner margins slightly ridged longitudinally, outer margins strongly arcuate throughout or somewhat angulate at apical third above all in larger individuals, and the apical tips sharply pointed; retinacula short, with the inner margins tri- to quinquedentate on each side; mandibles in female as in the other members of the genus. Pronotum as in *P. sugitai*, though the disc is usually a little more strongly convex above in male, and the lateral sides usually a little more acutely narrowed towards apex in female. Elytra also as in *P. sugitai*.

Male genitalia as shown in Figs. 8 and 10, with the basic structure similar to that of *P. sugitai*: viewed ventrally (Figs. 8 b & 10 b), lateral side of each paramere faintly inflated outwards in basal portion, its apico-inner angle on ventral side rather distinctly angulate with the apical margin before the same angle slightly but evidently emarginate; apical margin of basal piece subtrapezoidally protruded posteriad; viewed dorsally (Figs. 8 e & 10 a), inner margin of paramere on dorsal side widely emarginate throughout, with the apico-inner angle not so strongly protruded inwards, the baso-inner angle obliquely elongated; aedeagus with the basal portion as in the other members of the genus, apical portion remarkably bifurcated into a pair of sclerotized plates; each plate oblong-ovate in shape, with a distinct oblique keel near the middle; the right keel subtriangularly shaped with the apex obtusely rounded in posterior view (Figs. 8 c & 10 f), strongly bent towards aedeagal base and thorn-shaped in lateral view (Fig. 10 g); the left keel flatter, less strongly protuberant laterad with the lateral side nearly straight in apical two-thirds in posterior view (Figs. 8 d, 10 d); endophallus tubular, abruptly inflexed at about the middle to form a C-shaped arcuate sac in lateral view (Figs. 8 f & 10 c); its basal portion strongly produced beyond the apical part of aedeagus, strikingly enlarged to form a mushroom-shaped inflation with the apical tip faintly re-entrant at middle in posterior view (Figs. 8 d & 10 d); median portion with two pairs of moderately sized membraneous inflations on both sides; flagellum completely degenerated; apical portion elongated, gradually narrowed towards the apex, nearly flat or at most weakly inflated on the inflexed side, with a pair of small, subtriangularly shaped membraneous

projections on the extended side (Figs. 8 e-g & 10 c, e). Gonocoxite of female genitalia remarkably bent outwards with the inner margin distinctly angulate in ventral view.

Type series. Holotype: ♂, Pass Makinoto-tôgê [牧ノ戸峠], 1,300–1,350 m in altitude, Kokonoé-machi of Kusu-gun in Ôita Pref., Kyushu, Southwest Japan, 11–III–2007, YI leg., to be preserved in the Department of Zoology, National Museum of Nature and Science, Tokyo. Paratypes (156 ♂♂, 152 ♀♀, all from Kyushu in Southwest Japan): 1 ♂, 2 ♀♀, same data as for the holotype, in coll. YI; 13 ♂♂, 26 ♀♀, same locality, larvae collected in the field on 11–III–2007 by YI and emerged in the laboratory in VIII~IX–2007, in coll. YI; 27 ♂♂, 23 ♀♀ (11 ♂♂, 12 ♀♀, on 12–XI–1991; 10 ♂♂, 9 ♀♀, on 8–IV–1992; 6 ♂♂, 2 ♀♀, on 1–IV–1993), same locality, SU leg., in coll. SU & YI; 8 ♂♂, 4 ♀♀, Buzenbô [豊前坊], 800–900 m, on the northern slope of Mt. Hiko-san [英彦山], Soeda-machi of Tagawa-gun in Fukuoka Pref., larvae collected in the field on 25–XII–2006 by YI and emerged in the laboratory in VII~VIII–2007, in coll. YI; 33 ♂♂, 29 ♀♀ (2 ♂♂, 3 ♀♀, on 4–IV–1988; 5 ♂♂, 5 ♀♀, on 4–XI–1988; 5 ♂♂, 4 ♀♀, on 21–XI–1988; 5 ♂♂, 1 ♀, on 27–I–1991; 4 ♂♂, 4 ♀♀, on 10–X–1991; 6 ♂♂, 10 ♀♀, on 10–X–1993; 4 ♂♂, 1 ♀, on 8–V–1994; 2 ♂♂, 1 ♀, on 31–XII–1997), “Mt. Hiko-san” (Buzenbô – Minami-daké), SU leg., in coll. SU & YI; 5 ♂♂, 1 ♀ (3 ♂♂, on 24–XII–1990; 2 ♂♂, 1 ♀, on 24–XII–1991), Mt. Shakaga-také [釈迦ヶ岳], Nakatsué-mura (= a part of Hita-shi at present) in Ôita Pref., SU leg., in coll. SU; 11 ♂♂, 9 ♀♀ (2 ♂♂, on 4–XII–1988; 2 ♂♂, 1 ♀, on 21–X–1990; 7 ♂♂, 8 ♀♀, on 12–XII–1993), Mt. Hanaguroyama [ハナグロ山], 1,000 m, Nakatsué-mura (= a part of Hita-shi at present) in Ôita Pref., SU leg., in coll. SU & YI; 6 ♂♂, 6 ♀♀ (1 ♂, 1 ♀, on 24–IX–1991; 5 ♂♂, 5 ♀♀, on 7–IV–1992), Mt. Kuro-daké [黒岳], Shônai-chô (= a part of Yufu-shi at present) in Ôita Pref., SU leg., in coll. SU; 1 ♂, 1 ♀, “Shojiwa” [障子岩?], 1,100 m, Ogata-machi (= a part of Bungo-ôno-shi at present) in Ôita Pref., 12–XII–1997, Takaki MORI leg., in coll. KA; 1 ♂, Mt. Oyaji-yama [親父山], 1,200 m, Takachiho-chô of Nishiusuki-gun in Miyazaki Pref., 18–X–2006, Takaki MORI leg., in coll. SU; 5 ♂♂, 2 ♀♀, Mt. Goyô-daké [五葉岳], 1,450 m, Hinokagé-chô of Nishiusuki-gun in Miyazaki Pref., 8–X–1994, SU leg., in coll. SU; 2 ♀♀, Mt. Kanô-yama [鹿納山], Hinokagé-chô of Nishiusuki-gun in Miyazaki Pref., 9–X–1994, SU leg., in coll. SU; 3 ♂♂, 2 ♀♀, Mt. Ôyano-daké [大矢野岳], 1,100 m, Minamiaso-mura of Aso-gun in Kumamoto Pref., 19–XI–1995, SU leg., in coll. SU; 5 ♂♂, 7 ♀♀, Mt. Shiraiwa-yama [白岩山], 1,500 m, Gokasé-chô of Nishiusuki-gun in Miyazaki Pref., 10–X–1995, SU leg., in coll. SU & YI; 1 ♂ (paratype of *Platycerus sugitai*), same locality, 15–V–1977, Kazuo ADACHI leg., in coll. KA; 1 ♂, Momiki [樅木], Izumi-mura (= a part of Yatsushiro-shi at present) in Kumamoto Pref., 12–X–1986, Fuminori HIROKAWA leg., in coll. KA; 18 ♂♂, 14 ♀♀ (4 ♂♂, 6 ♀♀, on 10–X–1990; 14 ♂♂, 8 ♀♀, on 2–X–1994), Mt. Shiratori-yama [白鳥山], 1,450 m, Izumi-mura (= a part of Yatsushiro-shi at present) in Kumamoto Pref., SU leg., in coll. SU & YI; 2 ♂♂, 1 ♀, same area, 1,500 m, 5–IV–1987, R. NODA leg., in coll. KA; 15 ♂♂, 23 ♀♀ (1 ♂, 4 ♀♀, on 20–XII–1993; 14 ♂♂, 19 ♀♀, on 22~23–X–1994), between Inokobushi [猪子伏] and Mt. Shiraga-daké [白髪岳], 1,200–1,300 m, Ué-mura (= a part of Asagiri-chô at present) in Kumamoto Pref., SU leg., in coll. SU,

KA & YI.

Distribution. High altitudinal area on the Kyushu Mountains in Kyushu, South-west Japan, from the Hiko-san Mountain Range in the north to the Shiraga-daké Mountain Range in the south, usually above 850 m in altitude (in northern area) to 1,100 m (in southern area).

Notes. This new species has been misidentified as *P. sugitai* for about twenty years, because of close similarity in external features. In *P. urushiyamai*, the pronotal disc is a little more strongly convex above in the male and the lateral sides of pronotum are a little more acutely narrowed towards the apex in the female, as compared with those of *P. sugitai*. These differences are, however, not always definitive and it is often difficult to discriminate these two species from each other by the external morphology alone. The most reliable diagnostic point of *P. urushiyamai* is found in peculiarly featured male genital organ, and the new species is discriminated from *P. sugitai* in the following respects: 1) paramere with the apico-inner angle on dorsal side less strongly produced inwards, that on ventral side more distinctly angulate, with the apical margin before the apico-inner angle slightly but evidently emarginate; 2) keel on the right distal plate of aedeagus neither hooked nor sharply pointed at the apex, but obtusely rounded in ventral view; 3) viewed laterally, the keel much more strongly bent towards aedeagal base, while it is nearly straightly produced laterad and abruptly hooked at the apex in *P. sugitai*; 4) endophallus a little shorter, robuster, and a little less abruptly inflexed at the basal third in lateral view; 5) basal portion of endophallus more largely inflated, with the basal end hardly re-entrant at middle but simply enlarged to form a mushroom-shaped inflation in posterior view; 6) median portion of endophallus shorter and a little less strongly inflated bilaterad; 7) a pair of membraneous inflations on the extended side of endophallus before the apex much smaller, reduced to a pair of subtriangularly shaped small projections; 8) apical portion of endophallus a little different in shape, with the margin on inflexed side nearly straight in lateral view. These differences are quite stable in all the specimens examined, and I am convinced that the peculiarities observed in the present taxon are of specific importance. As to the female genitalia, the gonocoxite of the new species is usually more remarkably bent outwards with the inner margin more sharply angulate than in *P. sugitai*. This could be regarded as one of the diagnostic characters.

According to Yoshiyuki NAGAHATA of Yamagata University [pers. comm.], the Kyushu specimens fall into a single, highly independent cluster in the molecular genealogical trees constructed by analyzing mitochondrial 16S and nuclear ITS gene sequences of the genus *Platycerus*, and it is inferred that they belong to a unique lineage phylogenetically independent from the other congeners. This could be another positive proof that the present taxon should be regarded as a full species.

Etymology. This new species is named after Mr. Seiichi URUSHIYAMA [漆山誠—], in honour of his devotion to clarification of the platycerine fauna of Kyushu (URUSHIYAMA *et al.*, 2004 a & b).

6. *Platycerus akitaorum* IMURA, sp. nov.

[Japanese name: Kii-ruri-kuwagata]

(Figs. 11–13)

Platycerus acuticollis akimotoi nom. nud.: MATSUO, Y., A. SHINOHARA, K. KISHIMOTO, T. OBUCHI & F. MIZUNO, 1986, Noctiluca, Osaka, (386-A): 48.

Platycerus sugitai: OKUDA & FUJITA, 1987, Gekkan-Mushi, Tokyo, (192), p. 3, pl. 2, figs. 11–13 [*partim*].

Description. Length (including mandibles): 8.7–11.8 mm (male), 7.4–11.7 mm (female). Body above in male metallic blue, more or less bearing a greenish tinge above all in head, pronotum and frontal part of elytra; that in female brassy often with a faint greenish tinge, though strongly greenish or purplish as a whole in some individuals. Small- to medium-sized species for a member of the genus, with the external features closely resembling those of *P. sugitai* and *P. urushiyamai*. Head as in the other members of the genus, with the dorsal surface punctate, more coarsely so and partly confluent with one another in female; mandibles in male rather small though stout, usually hooked inwards at about apical quarter, with the dorsal wall apparently concave above in basal to median portions, and the inner margins conspicuously ridged; retinacula variable in size according to individuals, their inner margins remarkably and irregularly serrated with two to five teeth on each side; mandibles in female as in the other members of the genus. Pronotum in male as in *P. sugitai* and *P. urushiyamai*, though the front angles usually a little more prominently produced anteriorly with the tips more sharply pointed, and the lateral sides a little more remarkably angulate at the basal third and more straightly narrowed therefrom towards the base. Pronotum in female also as in *P. sugitai* and *P. urushiyamai*, though the widest part is situated a little more forwards and more acutely narrowed therefrom towards the base. Elytra also as in *P. sugitai*, though usually more widely and conspicuously rugoso-striate in female.

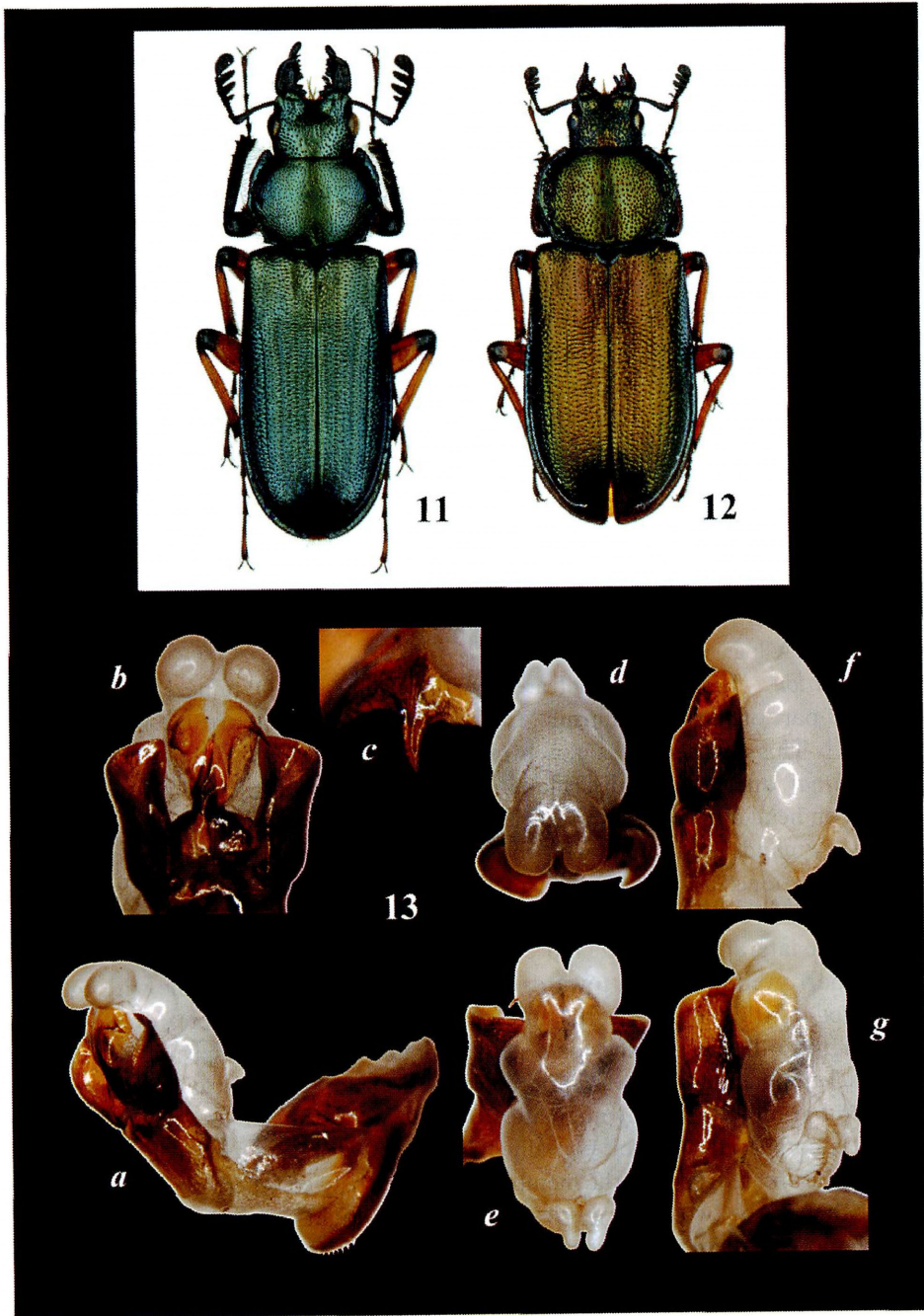
Male genital organ as shown in Figs. 13 a–g; viewed ventrally (Fig. 13 b), lateral side of each paramere slightly inflated in basal portion, its inner margin on ventral side faintly bisinuate, apico-inner angle obtusely rounded with the apical margin near the same angle hardly emarginate; apical margin of basal piece roundly or subtrapezoidally protruded posteriorly; viewed dorsally, inner margin of paramere on dorsal side weakly emarginate throughout, with the apico-inner angle not strongly protruded inwards; aedeagus with the basal portion as in the other members of the genus; apical portion of aedeagus constructed by a pair of sclerotized plates, though each plate is adhered in the basal half and not completely bifurcated, so that the membranous area between these plates appears narrower as compared with that in the other species mentioned above; each plate subquadrate in shape, with a distinct oblique keel near the middle; the right keel strikingly developed to form a thorn-shaped long spine prominently produced laterad (Fig. 13 c), which is more or less bent towards aedeagal base in lateral view; the left keel much smaller, subtriangularly shaped in posterior view, and much less strongly protruded laterad; endophallus rather plump, about 2.5 times as long as paramere, feebly arcuate in lateral view, with the inflexed side closely adhered to the dorsal wall of

parameres under fully inflated state (Fig. 13 f); basal portion bilobed to form a pair of hemispherical membranous humps which are produced posteriad beyond the distal end of aedeagus, though not invading the membranous area between the distal pair of aedeagal plates (Figs. 13 a, b, d, e); median portion with two pairs of large inflations on both sides; flagellum completely lost; apical portion not so elongated, with a short horn-like projection at the apex; on the extended side of apical portion are recognized a pair of strawberry-shaped accessory projections prominently protuberant dorsad before the apex (Figs. 13 d-g); areas between these projections and apex are transversely wrinkled to form pleats-like uneven surface. Gonocoxite of female genitalia rhombiform or subtriangularly shaped, relatively shorter and robuster, widest near the base and gradually narrowed towards apex in ventral view.

Type series. Holotype: ♂, Ôdaigahara [大台ヶ原], 1,400–1,500 m in altitude, Kamikitayama-mura of Yoshino-gun in Nara Pref., Central Japan, 30-IV-2007, YI leg. (collected outside the boundary of special protection zone), to be preserved in the Department of Zoology, National Museum of Nature and Science, Tokyo. Paratypes (237 ♂♂, 207 ♀♀, all from the Kii Peninsula in Central Japan): 2 ♂♂, 3 ♀♀, same data as for the holotype, in coll. YI; 36 ♂♂, 52 ♀♀, same locality, larvae collected in the field on 30-IV-2007 & 1-VII-2007 by YI and emerged in the laboratory in VIII~IX-2007, in coll. YI; 1 ♂, 3 ♀♀, same locality, 11-X-2004, YI leg., in coll. YI; 11 ♂♂, 8 ♀♀, same locality, larvae collected in the field on 11-X-2004 by YI and emerged in the laboratory in IX~X-2005, in coll. YI; 1 ♂, 3 ♀♀, same locality, 1-VII-2007, YI leg., in coll. YI; 61 ♂♂, 12 ♀♀ (paratypes of *P. sugitai*) (32 ♂♂, 2 ♀♀, on 18-V-1986; 16 ♂♂, 4 ♀♀, on 25-V-1986; 1 ♂, 4 ♀♀, on 1-VI-1986; 4 ♂♂, on 30-X-1983; 1 ♂, 2 ♀♀, larvae collected in the field on 30-X-1983 and emerged in the laboratory in IX-1984), “Ôdaigahara (1,500 m), Kamikitayama Vill., Nara Pref.”, KA leg., in coll. KA; 7 ♂♂, same locality (paratypes of *P. sugitai*), 18-V-1986, Tetsuji AKITA leg., in coll. KA; 49 ♂♂, 28 ♀♀* (1 ♂, 10 ♀♀, on 11-VI-1995; 1 ♂, 1 ♀, on 29-IX-1997; 1 ♀, on 8-VI-2002; 1 ♀, on 25~26-VI-2005; 3 ♂♂, 3 ♀♀, on 11-X-2004; 2 ♂♂, 3 ♀♀, on 30-IV-2007; 38 ♂♂, 3 ♀♀, on 27-V-2007; 4 ♂♂, 6 ♀♀, on 2-VI-2007), same area (1,400–1,540 m), KA leg., in coll. KA; 4 ♂♂, 2 ♀♀, Mt. Myôjin-daké [明神岳], 1,340–1,430 m, Iitaka-chô (= a part of Matsusaka-shi at present) in Mie Pref., 2-IV-1989, KA leg., in coll. KA; 2 ♂♂, 10 ♀♀ (paratypes of *P. sugitai*), Pass Tanuki-tôgé [狸峠], Miyagawa-mura (= a part of

*Greater part of these specimens were collected outside the boundary of the special protection zone of Yoshino-Kumano National Park, but a part of them were collected inside the same zone under the permission of the Kinki Regional Environment Office, Ministry of Environment (permission Nos. 711 & 060427001).

Figs. 11–13. *Platyercus akitaorum* sp. nov. from Ôdaigahara in Nara Pref. — 11–12, Habitus in dorsal view (11, male, holotype; 12, female, paratype); 13, male genital organ. — a, Aedeagus with fully inflated endophallus in right sublateral view; b, ditto in ventral view; c, keel on the right distal plate of aedeagus in posterior view; d, endophallus in posterior view; e, ditto in dorsal view; f, ditto in right lateral view; g, ditto in right subdorsal view.



Ôdai-chô at present) in Mie Pref., 13-IV-1986, KA leg., in coll. KA; 2 ♂♂, 2 ♀♀, Pass Kobushi-tôgê [コブシ峠], Miyagawa-mura (= a part of Ôdai-chô at present) in Mie Pref., 31-V-1987, KA leg., in coll. KA; 4 ♂♂, 5 ♀♀ (paratypes of *P. sugitai*), Mt. Sanzukôchi-yama [三津河落山], Miyagawa-mura (= a part of Ôdai-chô at present) in Mie Pref., 4-V-1985, KA leg., in coll. KA; 1 ♀, same locality, 30-IV-2007, YI leg., in coll. YI; 7 ♂♂, 14 ♀♀, same locality, larvae collected in the field on 30-IV-2007 by YI and emerged in the laboratory in VIII~IX-2007, in coll. YI; 12 ♂♂, 17 ♀♀, Mt. Sanjô-ga-také [山上ヶ岳], (NE slope, 1,500 m), Tenkawa-mura of Yoshino-gun in Nara Pref., 10-V-1987, KA leg., in coll. KA & YI; 8 ♂♂, 14 ♀♀ (larvae collected in the field on 19-XI-1987 and emerged in the laboratory in X-1988), Amida-ga-mori [阿弥陀ヶ森], 1,500 m, on ESE shoulder of Mt. Ryû-ga-také [竜ヶ岳], Tenkawa-mura of Yoshino-gun in Nara Pref., Masa. TABANA leg., in coll. KA & YI; 1 ♂, northeastern slope of Mt. Nihon-daké [日本岳], 1,300-1,500 m, on ESE shoulder of Mt. Daifugen-daké [大普賢岳], Kawakami-mura of Yoshino-gun in Nara Pref., 29-IV-2007, YI leg., in coll. YI; 16 ♂♂, 20 ♀♀ (10 ♂♂, 10 ♀♀, on 5-V-1987; 6 ♂♂, 10 ♀♀, on 12-XI-1990), same locality, KA leg., in coll. KA & YI; 13 ♂♂, 13 ♀♀ (2 ♂♂, 6 ♀♀, on 4-V-1987; 8 ♂♂, 6 ♀♀, larvae collected in the field on 4-V-1987 and emerged in the laboratory in IX-1987; 1 ♂, on 16-V-1987; 2 ♂♂, 1 ♀, on 24-V-1987), Benten-no-mori [弁天ノ森], on E shoulder of Mt. Mi-sen [弥山], Tenkawa-mura of Yoshino-gun in Nara Pref., KA leg., in coll. KA.

Distribution. High altitudinal area on the Daikô and Ohminé Mountains in the east-central part of the Kii Peninsula, Central Japan, usually above 1,200 m in altitude.

Notes. This new species is closely similar in the external features to *P. sugitai* and *P. urushiyamai*, and is barely discriminated from these two in the following respects: 1) punctures on head a little larger in size and more frequently confluent with one another in female; 2) mandibles in male with the dorsal wall apparently concave above in basal to median portions; 3) pronotum in male with the front angles usually a little more prominently protruded anteriorly and more sharply pointed at the tips; 4) pronotum in male with the lateral sides a little more remarkably angulate at the basal third and more straightly narrowed therefrom towards the base; 5) pronotum in female with the widest part situated a little more forwards and more acutely narrowed therefrom towards the base. On the other hand, the male genital organ of the new species exhibits more peculiar development as follows: 1) paramere with the apico-inner angle on ventral side not effaced but more distinctly angulate, and that on dorsal side less strongly produced inwards, as compared with the two allied species; 2) distal pair of aedeagal plates not completely bifurcated, so that the membranous area between these plates appears much narrower than in the two allied species; 3) keel on the right distal plate narrower, longer and much more prominently protruded laterad to form a thorn-shaped spine; 4) left keel not roundly protruded as in the two allied species but triangularly produced laterad; 5) endophallus with the basal part much less strongly protruded ventrad, with a pair of hemispherical humps at the basal end not invading the membranous area between distal pair of aedeagal plates; 6) median portion of endophallus not strongly inflexed as in the

two allied species but nearly straightly attached to dorsal wall of paramere; 7) a pair of membranous projections on the extended side before apex much narrower and more remarkably protruded dorsad than in *P. sugitai*, though a little larger than in *P. urushiyamai*. Gonocoxite of the female genitalia is usually much shorter and robuster than in *P. sugitai* and *P. urushiyamai*. These peculiarities are evidently of specific importance, not subspecific, even if the external appearance of the beetle is closely similar to that of *P. sugitai* or *P. urushiyamai*.

Remarks. The present new taxon was first considered to be a subspecies of *Platycerus acuticollis* by MATSUO *et al.* (1986, p. 48). They proposed a new subspecific name “*akimotoi*” for the taxon. However, the work appeared in “Noctiluca,” Journal of Osaka University Biological Society, which was issued by xerographic reproduction. Such a work produced between 1985 and 2000 must not be accepted as published for the purpose of the International Code of Zoological Nomenclature (4th edition, 1999), unless the criteria of Article 8.5 are met. Since the criteria of Articles 8.5.2 and 8.5.3 are not satisfied, namely, it does not contain any statement by the authors that the new name was intended for public and permanent scientific record, nor any statement in words in the work itself that it was produced in an edition containing simultaneously obtainable copies, the work cannot be regarded as published. The species-group name “*akimotoi*” proposed by MATSUO *et al.* is therefore unavailable.

Etymology. This new species is named after Mr. Katsumi AKITA [秋田勝己] and his wife, Chihiro [ちひろ]. Katsumi AKITA is an eminent amateur coleopterist whose main field is Mie and Nara Prefectures on the borders of which lies the Daikō Mountain Range.

要 約

井村有希: 日本産ルリクワガタ属の雄交尾器内袋構造と2新種の記載。—— わが国からこれまでに知られているルリクワガタ属 *Platycerus* 全4種について、完全に膨隆させた♂交尾器内袋の形態を初めて図示・記載し、本形質が各分類単位の識別にきわめて有用であることを示した。そのうえで、これまで1種とみなされてきた *P. sugitai* のなかには、内袋と陰茎の形態からみて、少なくともみっつの異なるカテゴリーが含まれていることを指摘し、九州のものにキュウシュウリクワガタ *P. urushiyamai*, 紀伊半島のものにキイルクワガタ *P. akitaorum* という名を与え、ともに新種として記載した(この結果、*P. sugitai* は四国の特産種ということになる)。前者はいっけん、*P. sugitai* と識別が困難なほどよく似ているが、♂交尾器形態には複数の安定した形態学的相違がみられる。また、未発表ながら、ミトコンドリアおよび核遺伝子の解析により得られた分子系統樹上でも独自のクラスターを形成することが判明しており、このことも系統的にみた本分類単位の独立性の高さを示唆する有力な根拠となるだろう。後者は、♂交尾器内袋の基本的な形態がおおきく異なるうえ、陰茎右側の棘状突起にも顕著な形態学的差異がみられるので、識別は容易である。ちなみに、キイルクワガタの基準産地である大台ヶ原山は、その中心部が吉野熊野国立公園の特別保護地区に指定されているが、本研究に用いた標本は、環境省の認可の下に同

地区内で得られた数頭を除き、すべて地区外において採集されたものである。本誌上に掲載されている拙著他論文において記載されるタカネルリクワガタを含めると、日本産リクワガタ属は少なくとも7種および4亜種に分類されることになり、これまで考えられてきた以上にいちじるしい種分化を示すグループであることが明らかになった。

なお、混乱を避けるため、本論文では一部の種について和名の改称を提案した。まず、*Platycerus delicatulus* の和名をリクワガタからオオルリクワガタへと改称した。リクワガタという名称は、*Platycerus* 属の総称としてもしばしば用いられるため、これだけではその意味するところが種名か属名かの判断に迷う場合が少なくない。特定の種に対する名称としては、同属に属するすべての種の語尾となっているこの語を単独で用いるより、他の種とどうよう、なんらかの接頭辞を付して識別するほうが、わかりやすく実地的である。種 *P. delicatulus* は *Platycerus* 属の基準種ではないことから、これは妥当な処置といえよう。また、今でこそ邦産のリクワガタ属は複数の種（今号の *Elytra* において記載される3種を含めると計7種）からなることが判明しているが、黒澤 (1969) により第2の種、コルリクワガタが記載されるまでは、すべての種がリクワガタという和名で呼ばれていた。すなわち、1969年以前の文献に記されている“リクワガタ”は、かならずしも *P. delicatulus* を指しているとは限らず、最大ななつの異なる種が単一の和名の下に混同されていたことになる。このように、曖昧かつ時代によって意味する種の異なる和名は今後、使用を避けるべきであろう。同様の理由により、*P. sugitai* の和名も従来のニセコルリクワガタからシコルリクワガタへと改称した。

今回の和名改称案をとりいれると、日本産リクワガタ属の名称は下記のように整理される。

1. オオルリクワガタ *Platycerus delicatulus* LEWIS, 1883
 - 1) オオルリクワガタ基亜種 *Platycerus delicatulus delicatulus* LEWIS, 1883 (本州・四国・九州)
 - 2) ウンゼンオオルリクワガタ *Platycerus delicatulus unzendakensis* FUJITA et ICHIKAWA, 1982 (九州北西部: 島原半島)
2. ホソツヤリクワガタ *Platycerus kawadai* FUJITA et ICHIKAWA, 1982 (本州中部)
3. コルリクワガタ *Platycerus acuticollis* Y. KUROSAWA, 1969
 - 1) コルリクワガタ基亜種 *Platycerus acuticollis acuticollis* Y. KUROSAWA, 1969 (本州北東部)
 - 2) トウカイコルリクワガタ *Platycerus acuticollis takakuwai* FUJITA, 1987 (本州中部)
 - 3) キンキコルリクワガタ *Platycerus acuticollis akitai* FUJITA, 1987 (本州中西部・隠岐島後)
 - 4) ミナミコルリクワガタ *Platycerus acuticollis namedai* FUJITA, 1987 (四国東部・九州北部)
4. タカネルリクワガタ (本誌掲載の拙著他論文参照)
5. キイルリクワガタ *Platycerus akitaorum* IMURA, sp. nov. (本州: 紀伊半島)
6. シコルリクワガタ *Platycerus sugitai* OKUDA et FUJITA, 1987 (四国)
7. キュウシュウルリクワガタ *Platycerus urushiyamai* IMURA, sp. nov. (九州)

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