

## Two New *Ptomaphagus* (Coleoptera, Leiodidae, Cholevinae) from Honshu and Shikoku, Japan, with a Supplemental Description of *Ptomaphagus takaosanus*

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**Abstract** The members of the genus *Ptomaphagus* are now known to have approached 100 species. Two new species from Japan are added to them, viz., *Ptomaphagus miyataorum* sp. nov. and *P. takashii* sp. nov. For update the morphological characteristics of *P. takaosanus* NAKANE, a supplemental description is made based on the type specimens and newly examined conspecific specimens. A distribution map is presented for these species.

### Introduction

The genus *Ptomaphagus* was established by PORTEVIN (1914) and its members have been known to occur in the Oriental and East Palaearctic Regions. To date, the members are increased to approaching 100 species: PERREAU (2000) compiled a world catalog of the subfamilies Cholevinae and Platypsyllinae (Leiodidae) and enumerated the members as seventy-two species, but four of them were transferred to the genus *Ptomaphaminus* PERREAU, 2000 in PERREAU (2002); HOSHINA and SUGAYA (2003) described two new species from the Ryukyus, southwestern Japan; SCHILTHUIZEN and PERREAU (2008) described twelve new species from the Sunda region of Southeast Asia, and gave one new synonym; WANG and ZHOU (2015) described eleven new species from China and Taiwan; and NISHIKAWA and HAYASHI (2016) described one new species from Honshu, Central Japan.

Seven species belonging to this genus have been recorded to date from the Japanese Archipelago (PERREAU, 2015; NISHIKAWA & HAYASHI, 2016), but the clarification of the species diversity of the genus is inadequate there; for example, there are lacking any records on the island of Kyushu and still remaining several undescribed species on the islands of Honshu and Shikoku.

The purpose of the present paper is to describe two new species discovered from Honshu and Shikoku and to show the morphological characteristics of *Ptomaphagus takaosanus* NAKANE, 1982 based on the type specimens and other examined specimens necessary for the classification of these species. Geographical distributions of the above three species are mapped based on the specimens examined.

### Material and methods

The specimens examined for this study are deposited in the following museums and collections:  
EUMJ — Ehime University Museum, Matsuyama, Japan (Hiroyuki YOSHITOMI);  
HUM — Hokkaido University Museum, Sapporo, Japan (Masahiro ÔHARA);  
NSMT — National Science Museum, Tsukuba, Japan (Shûhei NOMURA);  
MNHA — Museum of Nature and Human Activities, Hyogo, Sanda, Japan (Takeo YAMAUCHI);  
MNIC — private collection of Masaaki NISHIKAWA, Ebina, Japan;

YHAC — private collection of Yasuhiko HAYASHI, Kawanishi, Japan;

YHIC — private collection of Yukihiro HIRANO, Odawara, Japan.

Exact label data are cited only for type specimens examined. Author's remarks and additions are placed in square brackets, separate label lines are indicated by a slash (/) and separate labels by a double slash (//). Coordinates of localities were specified using GSI Maps (GEOSPATIAL INFORMATION AUTHORITY OF JAPAN, 2013; <http://maps.gsi.go.jp>).

Dry specimens were relaxed in hot water for ca. 10 minutes, then macerated in a hot 10% KOH solution for 3–4 minutes, and rinsed in purified water. These softened specimens were moved into a drop of a skin lotion (SOD Lotion creation type; <http://sodlifestyle.com>) on a slide glass and dissected there to observe morphological details. Specific body parts such as protibia, antenna and male genitalia were bleached if necessary in a hydrogen peroxide solution. After examination, their body parts were mounted on a micro slide (Matsunami Micro Cover Glass No. 3) with Euparal Mounting Medium for taking photographs and further studies; incidentally, this micro slide had already been glued onto a square hole punched in a small cardboard to be pinned under a main body of these specimens (modified from MARUYAMA, 2004).

Observations and measurements of morphological details were performed by using a Nikon SMZ-10 and an Olympus CH30 stereoscopic microscopes, each with an ocular micrometer; photographs were taken by using a SONY  $\alpha$ 5100 mounted on the latter microscope or directly a Panasonic Lumix DMC-FZ50 with a conversion lens. The final deep focus images were created with Adobe Photoshop CS4. Line drawings were each made a tracing of the deep focus image by using Adobe Illustrator CS4.

The following abbreviations are used for the measurements in millimeters: AL — length of the median lobe of male genitalia measured from the anterior edge of dorsal side to the apex; HL — length of head measured from the apical edge of clypeus to occipital end; HW — greatest width of head; PL — maximum length of pronotum; PW — greatest width of pronotum; EL — length of elytron measured from the shoulder to the apex; EW — greatest width of elytra. Body length of the specimen is the total of HL+PL+EL.

The presence of “a valve like structure” which is visible to spermatheca as a double circle was firstly mentioned by NISHIKAWA and HAYASHI (2016). Despite the repeated examination of this structure in some congeners, I have not yet confirmed whether it is actually the valve to prevent reflux of sperm or to aspirate preserved sperm from the spermatheca in a narrow sense. However, it seems to be general to the spermathecal apparatus of at least the genus *Ptomaphagus*, and to be a structure related to the transport of contents of the spermatheca, for these reasons, I provisionally consider it a landmark separating the spermatheca and spermathecal duct. Accordingly, I still call it “a valve like structure,” and proximal parts from it the spermathecal duct, in the ongoing study of the genus.

## Taxonomy

### *Ptomaphagus takaosanus* NAKANE, 1982

[Japanese name: Takao-oninise-chibishidemushi]

(Figs. 1–6 & 13–17)

*Ptomaphagus takaosanus* NAKANE, 1982: 103, fig. 2; type locality: Kamikôchi, Nagano Pref., Honshu, Japan (description).

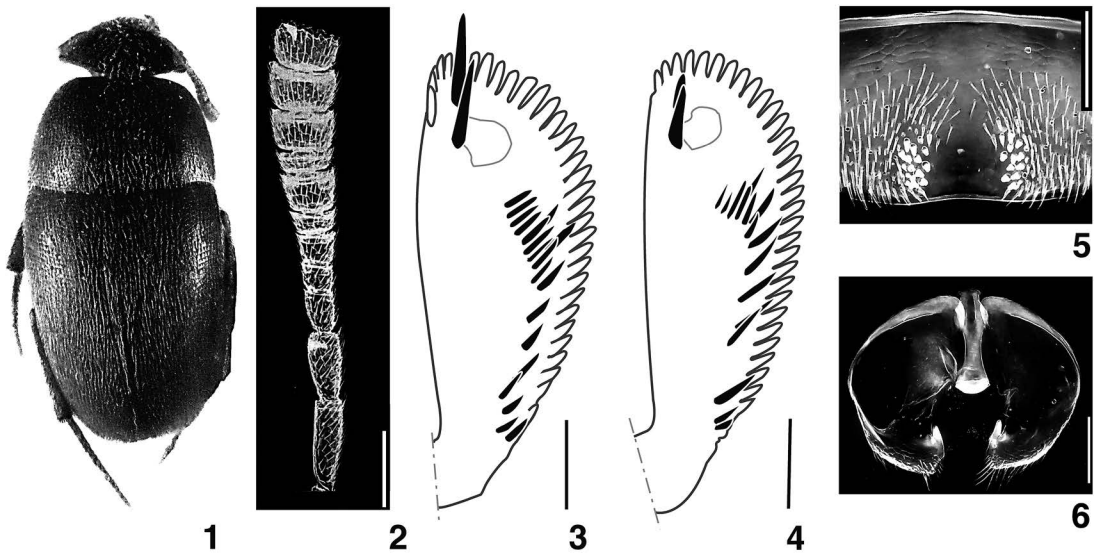
*Ptomaphagus takaosanus*: NISHIKAWA, 1983: 2 (check-list); HISAMATU & HAYASHI, 1985: 242, pl. 43, fig. 17 (diagnosis); HISAMATSU, 1989: 253 (check-list); PERREAU, 1996: 285, figs. 13, 18–19 (diagnostic notes, new localities); PERREAU, 2000: 376

(catalog); PERREAU, 2004: 179 (catalog); PERREAU, 2015: 251 (catalog).

*Type specimens examined.* Holotype (HUM) of *P. takaosanus* (Fig. 1): ♂, HOLOTYPE // KAMIKOCHI [ca. 36.2502°N 137.6713°E] / NAGANO / 20.VII.1959 / T[aichi]. Shibata // *Ptomaphagus takaosanus* Nak[ane]. / Det. T[akehiko]. Nakane // NAKANE Coll. / SEHU JAPAN / 1999 // 0000004412 / Sys Ent / Hokkaido Univ. / Japan [SEHU]. Paratype (HUM) of *P. takaosanus*: ♀, ♀ // PARATYPE // Takao / Tokyo / 9.VI.1968 / K[imio]. MASUMOTO [leg.] // *Ptomaphagus / takaosanus* Nak[ane]. / Det. T[akehiko]. Nakane.

*Notes on the type specimens.* Holotype: antennomeres III–XI of left antenna were missing and the antennomere XI of the right one had apically deformed. Aedeagus had been mounted on a small plastic plate, but remounted on a micro slide; genital segment and a part of abdominal segments dissected and mounted together with right mesotibia and tarsi on other micro slide under the permission. Paratype: the terminal antennomere of the left antenna of the female paratype was missing. Despite a pair of paratypes from Takao designated in the original description, I could not to find the male one in the collection of the HUM.

*Additional specimens examined.* [Honshu] 1 ♂, Mt. Atsumi-dake [ca. 38.6201°N 139.6307°E], Yamagata Pref., 12.VIII.1998, Yasuaki WATANABE leg. (MNIC); 1 ♂, Mt. Omoshiro-yama [ca. 38.330994°N 140.496147°E], Yamagata-shi, Yamagata Pref., 2.V.1979, Yukihiro HIRANO leg. (YHIC); 1 ♂, Akyu [ca. 38.2260°N 140.7184°E], Miyagi Pref., 15.XI.1981, S. GOSHIMA leg. (YHIC); 1 ♂, 1 ♀, Misumi [ca. 38.0709°N 140.5663°E], Fukuokafukaya, Shiroishi-shi, Miyagi Pref., 13.VIII.2007, Hiromu KAMEZAWA leg. (MNIC); 5 ♀♀, Hatori [ca. 37.2716°N 140.0823°E], Ten'ei-mura, Iwase-gun, Fukushima Pref., 29.IX.2002, Shozo MIZUNOYA leg. (under dead leaves) (MNIC); 1 ♂, 2 ♀♀, Lake side of Hatori-ko [ca. 37.2509°N 140.0781°E], Nishigô-mura, Nishishirakawa-gun, 14.V.2003, S. MIZUNOYA leg. (MNIC); 1 ♂, 1 ♀, Yuigahara [ca. 37.1787°N 140.0626°E], Nishigô-



Figs. 1–6. *Ptomaphagus takaosanus* NAKANE, 1982. — 1, Habitus, holotype, ♂ (from Kamikôchi, Nagano Pref.); 2, right antenna, same, (tone inverted); 3, left protibia, ♂ (from Miyanoshita, Kanagawa Pref.), showing spiral arrangement on ventral side; 4, same, ♀ (from Mt. Takao-san, Tokyo); 5, middle part of ventrite VIII (holotype); 6, genital segment (holotype). Scales: 0.1 mm. Fig. 1 is no-scale.

mura, Nishishirakawa-gun, Fukushima Pref., 7.IX.2003, S. MIZUNOYA leg. (MNIC); 1 ♂, Takashimizu, 600 m alt. [ca. 37.1703°N 140.0737°E], Nishigô-mura, Nishishirakawa-gun, Fukushima Pref., 18.IV.2003, S. MIZUNOYA leg. (MNIC); 1 ♀, Shimoorikuchi [ca. 37.1480°N 140.1279°E], Nishigô-mura, Nishishirakawa-gun, Fukushima Pref., 12.XII.2003, S. MIZUNOYA leg. (under dead leaves) (MNIC); 2 ♀♀, Karame [ca. 37.1154°N 140.2420°E], Shirakawa-shi, Fukushima Pref., 19.IX.2003, S. MIZUNOYA leg. (under dead leaves) (MNIC); 1 ♂, same data as previous except: 29.II.2004 (under dead leaves) (MNIC); 1 ♀, Mitôshizawa [ca. 37.0060°N 139.6968°E], Nakamiyori, Fujihara-machi, Tochigi Pref., 19.VI.2000, Hideo OHKAWA leg. (MNIC); 1 ♀, Mt. Yamizo-san [ca. 36.9302°N 140.2729°E], Ibaraki Pref., 15.V.1983, Shingo TANAKA leg. (YHIC); 1 ♂, Riv. Yokokawa (left bank; natural forest) [ca. 36.9270°N 140.6586°E], Shidokigawa-keikoku, Tabito-machi, Tabiuto, Iwaki-shi, Fukushima Pref., 23.V.1992, Kaoru HAGA leg. (beating a fallen tree) (MNIC); 1 ♂, 2 ♀♀, Usukubodaira [ca. 36.8756°N 139.4183°E], Kuriyama-mura, Tochigi Pref., 11.X.1997, Y. HIRANO leg. (YHIC); 1 ♀, Renge-onsen [ca. 36.8102°N 137.7987°E], Niigata Pref., 20.VIII.1986, Masataka SATÔ leg. (EUMJ); 1 ♀, Mt. Hotaka-san [ca. 36.7768°N 139.1732°E], Katashina-mura, Gunma Pref., 23.VI.2003, Takashi WATANABE leg. (MNIC); 2 ♂♂, Hôshi-onsen [ca. 36.7441°N 38.8300°E], Gunma Pref., 20.X.2001, Y. HIRANO leg. (YHIC); 1 ♀, Mt. Tatsuware-san [ca. 36.7108°N 140.5623°E], Ibaraki Pref., 14.V.1983, S. TANAKA leg. (YHIC); 2 ♀♀, Riv. Hinatami-gawa [ca. 36.6957°N 138.7743°E], Shima-onsen, Gunma Pref., 15–16.IX.1996, Shun-Ichiro NAOMI & Munetoshi MARUYAMA leg. (MNIC); 1 ♂, 1 ♀, Iriyama [ca. 36.6419°N 138.6574°E], Kuni-mura, Agatsuma-gun, Gunma Pref., 11.VII.2004, T. WATANABE leg. (MNIC); 1 ♂, Konaka [ca. 36.5353°N 139.3384°E], Azuma-mura, Setagun, Gunma Pref., 11.VIII.2004, T. WATANABE leg. (MNIC); 1 ♂, Kamiôto [ca. 36.5072°N 139.4938°E], Sakuhara, Tanuma-chô, Tochigi Pref., 9.V.1999, H. OHKAWA leg. (MNIC); 1 ♀, Mt. Haruna-san [ca. 36.4401°N 138.8367°E], Haruna-machi, Gunma Pref., 25.VI.2005, T. WATANABE leg. (MNIC); 1 ♀, upper Matsuda-gawa Riv. [ca. 36.4217°N 139.4311°E], Ashikaga-shi, Tochigi Pref., 22.X.1997, H. OHKAWA leg. (MNIC); 1 ♀, Ashimatsu [ca. 36.4093°N 139.4704°E], Nagusa, Ashikaga-shi, Tochigi Pref., 2.V.1999, H. OHKAWA leg. (MNIC); 1 ♂, 3 ♀♀, Kakeyu-onsen [ca. 36.2990°N 138.1315°E], Nagano Pref., 6.IV.1979, Y. HIRANO leg. (YHIC); 2 ♀♀, same data as previous except: 5.IV.1980 (YHIC); 2 ♀♀, Mt. Tsukuba-san [ca. 36.2260°N 140.1022°E], Ibaraki Pref., 9.V.1983, S. TANAKA leg. (YHIC); 2 ♂♂, 2 ♀♀, same locality as previous but 10.IX.1991, Tateo ITO leg. (YHAC); 3 ♂♂, 6 ♀♀, Tobira-kôsen [ca. 36.1842°N 138.0865°E], Nagano Pref., 13.IX.1995, T. ITO leg. (YHAC); 1 ♀, Mt. Hakusan (1,750 m) [ca. 36.1320°N 136.7557°E], Ishikawa Pref., 28.VIII.1993, K. NAKATA leg. (YHAC); 1 ♂, 4 ♀♀, Okamigô [ca. 36.0741°N 136.8929°E], Shokawa-mura, Gifu Pref., 5.VIII.1998, M. MARUYAMA leg. (MNIC); 2 ♀♀, Shigasaka-tôge [ca. 36.0592°N 138.8434°E], Oganomachi, Saitama Pref., 30.IV.2000, Shiho ARAI leg. (Tullg.: leaf litter) (MNIC); 1 ♂, Momonoki-daira [ca. 36.0385°N 138.9095°E], Oganomachi, Chichibu-gun, Saitama Pref., 30.IV.2000, S. ARAI leg. (from leaf litter) (MNIC); 1 ♂, Ôno [ca. 35.9799°N 136.4874°E], Fukui Pref., 16.V.1965, Yasuhiro HAYASHI leg. (YHAC); 1 ♀, Mt. Ôtake [ca. 35.9674°N 136.4580°E], Ôno, Fukui Pref., 16.V.1965, Y. HAYASHI leg. (YHAC); 1 ♂, same data as previous except: 3.X.1965 (YHAC); 4 ♀♀, nr. Higashizawa-bashi [35.9318°N 138.4134°E], SE foot of Mt. Aka-dake, Yatsugatake Mts., Kiyosato, Nagano Pref., 12.V.2002, M. NISHIKAWA leg. (sifted) (MNIC); 1 ♀, Kawauradani-keikoku [ca. 35.9200°N 139.0166°E], Arakawa-mura, Saitama Pref., 13.VI.1999, S. ARAI leg. (from leaf litter) (MNIC); 1 ♀, Ogawadani, 1,000 m in alt. [ca. 35.8771°N 139.0294°E], Nippara, Okutama-machi, Tokyo, 26.XI.2005, H. KAMEZAWA leg. (MNIC); 1 ♀, same data as previous except: 10.XII.2005 (MNIC); 4 ♂♂, 1 ♀, Gonbê-tôge [ca. 35.8723°N 137.8570°E], Ina-shi, Nagano Pref., 30.VIII.1997, Y. HAYASHI leg. (YHAC); 1 ♀, Hinata-rindô, 1,080 m in alt. [ca. 35.8561°N 138.5266°E], Sutama-machi, Yamanashi Pref., 13.V.2001, S. ARAI leg. (Tullg.) (MNIC); 2 ♂♂, 4 ♀♀, Sanjo-sawa [ca. 35.8317°N 138.9179°E],

Tabayama-mura, Yamanashi Pref., 15.IX.2000, S. ARAI leg. (Tullg.) (MNIC); 2 ♂♂, 6 ♀♀, Karei-kôgen [ca. 35.7995°N 138.1223°E], Inadani, Nagano Pref., 15.VIII.1995, Y. HAYASHI leg. (YHAC); 1 ♂, 1 ♀, Kanmuri-tôge [ca. 35.7809°N 136.4210°E], Ibi-gun, Ibigawa-chô, Gifu Pref., 27.VII.1995, M. SATÔ leg. (EUMJ); 2 ♂♂, Motoshuku [ca. 35.7279°N 139.1457°E], Hinohara-mura, Tokyo, 12.IV.2008, H. KAMEZAWA leg. (MNIC); 1 ♂, Gozaishi-kôsen [ca. 35.7234°N 138.350614°E], Yamanashi Pref., 12.VIII.1989, T. ITO leg. (YHAC); 1 ♂, same data as previous except: 16.VIII.1989 (YHAC); 1 ♂, same locality but 12.XII.1989, Koichi HOSODA leg. (YHAC); 1 ♀, Maki-Koganesawa rindô [ca. 35.7127°N 138.8744°E], along Kuzuno-gawa Riv., Ôtsuki-shi, Yamanashi Pref., 29.IV.2005, H. KAMEZAWA leg. (MNIC); 1 ♂, 2 ♀♀, Mt. Ôgi-yama [ca. 35.6372°N 139.0134°E], Yamanashi Pref., 15.VI.1984, H. SATO leg. (YHIC); 1 ♂, 1 ♀, same data as previous except: 14.VIII.1984 (YHIC); 1 ♂, same data as previous except: 12.IX.1984 (YHIC); 1 ♀, same data as previous except: 18.XII.1984 (YHIC); 1 ♀, Mt. Takao-san, ca. 500 m in alt. [ca. 35.6265°N 139.2493°E], Hachiôji-shi, Tokyo, 1.II.2004, H. KAMEZAWA leg. (MNIC); 1 ♀, same data as previous except: 14. II. 2004 (MNIC); 1 ♀, Mt. Mitsutôge-yama, 1,200 m in alt. [35.5560°N 138.7953°E], Kawaguchiko-machi, Yamanashi Pref., 19.VIII.1993, M. NISHIKAWA leg. (trap) (MNIC); 1 ♂, 1 ♀, Ômata-sawa [ca. 35.4383°N 139.0158°E], Nishitanzawa, Tanzawa Mts., Kanagawa Pref., 31.V.2006, T. WATANABE leg. (MNIC); 1 ♂, Abe-tôge [ca. 35.3158°N 138.3563°E], Shizuoka-shi, Shizuoka Pref., 1.VI.1997, Katsuo HIRAI leg. (MNIC); 3 ♂♂, 2 ♀♀, same data as previous except: 11.VIII.2000 (MNIC); 1 ♂, Marutanomori [ca. 35.3073°N 139.0734°E], Minamiashigara-shi, Kanagawa Pref., 1.XI.1997, Y. HIRANO leg. (YHIC); 1 ♀, Kamiyu, 700 m in alt. [ca. 35.2536°N 139.0199°E], Hakone-machi, Kanagawa Pref., 24.VIII.2000, Takashi SHIMADA leg. (MNIC); 1 ♂, 1 ♀, Miyanoshita [ca. 35.2422°N 139.0599°E], Hakone, 3.XI.1975, Y. HIRANO leg. (litter) (MNIC); 1 ♀, same data as previous except: 25.IV.1976 (YHIC); 1 ♂, Ôwakudani [ca. 35.2405°N 139.0202°E], Hakone, Kanagawa Pref., 9.IX.1978, Y. HIRANO leg. (YHIC); 1 ♂, same data as previous except: 6.X.2000 (YHIC); 1 ♀, Hatajuku [ca. 35.2131°N 139.0623°E], Hakone, Kanagawa Pref., 14.X.1978, Y. HIRANO leg. (YHIC); 1 ♂, Mennoki-tôge [ca. 35.1871°N 137.5781°E], Tsugu-mura, Kitashitara-gun, Aichi Pref., 5.V.1983, M. SATÔ leg. (EUMJ); 1 ♀, Kiyosumi [ca. 35.1610°N 140.1517°E], Chiba Pref., 17.V.1983, S. TANAKA leg. (YHIC); 1 ♂, Miyuki-rindô [ca. 34.8959°N 138.9317°E], Amagiyugashima-machi, Izu Peninsula, Shizuoka Pref., 16–19.VIII.1999, T. SHIMADA leg. (MNIC); 1 ♀, Amagi [ca. 34.8617°N 139.0113°E], Izu Peninsula, Shizuoka Pref., 23.XI.1981, H. KURAKAZU leg. (YHIC); 2 ♂♂, 1 ♀, Kantenbashi Bridge [ca. 34.8252°N 138.9391°E], Mt. Amagi-san, Izu Peninsula, Kawazu, Shizuoka Pref., 14.IV.1985, K. HAGA leg. (from fallen leaves in gutter) (MNIC).

*Supplemental description.* Dimensions of different body parts of the holotype: HL 0.3, HW 0.73, PL 0.63, PW 1.08, EL 1.43 and EW 1.1; antennomeres (length : width): I, 0.1 : 0.03; II, 0.07 : 0.04; III, 0.05 : 0.04; IV, 0.04 : 0.04; V, 0.04 : 0.06; VI, 0.03 : 0.07; VII, 0.05 : 0.08; VIII, 0.03 : 0.08; IX, 0.05 : 0.09; X, 0.06 : 0.09; XI, 0.06 : 0.09 (Fig. 2).

*Male.* Legs with protibia spatulate, widest at about apical 1/3. Spinal arrangement on ventral side of protibia as shown in Fig. 3. Protarsomeres expanded in basal three tarsomeres: the first tarsomere 0.8–0.9 times as wide as protibia.

Abdomen with ventrite VII simple. Ventrite VIII (Fig. 5) posteromedially with a shallow, semi-circular depression laterally arranged thick and short obtuse spines, the depressed area slightly emarginate posteriorly, the spines variable in shape. Genital segment (Fig. 6) wider than long, with genital plates rounded at anterior inner corners; spiculum gastrale thick, feebly flared at anterior end slightly prolonged beyond anterior margins of genital plates, flared at posterior end with round apex.

Aedeagus (Figs. 13–17) robust, ovoidal; AL/EL 0.29 in the holotype. Median lobe asymmetrical, dorsoapically emarginate deeply, in ventral view, rounded at outer apical corners, which are elongated

inward and forming apical expansions: the right expansion simple, the left expansion large, subrectangular, posteromedially with a small transverse pleat notched at middle; ligulae only divided in each apical part with crinkly apical margin; in lateral view, median lobe thick, bent ventrad at basal 1/3 and apical 1/4. Flagellum of endophallus twisted, thick and long, closely annulate, parallel with a longitudinal piece at middle of median lobe, and basally connected with a gourd-shaped chamber. Parameres long and broad, seemingly fused to median lobe, joining apicalmost parts to the apical expansions of median lobe, with a row of some fine setae along each innerapical part and a few short ones at a slight distance from it.

**F e m a l e.** Elytral apices comparatively rounded separately. Dimensions of different body parts of the single female paratype: HL 0.43, HW 0.73, PL 0.98, PW 1.13, EL 1.35 and EW 1.15. Spinal arrangement on ventral side of protibia as shown in Fig. 4. Spermatheca C-shaped, moderately bend, narrowed proximally; a valve like structure located at a slight elevation on inner side of spermatheca; spermathecal duct consists of three ducts: a distally straight and proximally coiled sclerotized duct, a straightly sclerotized duct separated from the former by a short membranous duct and the most proximal membranous duct followed vagina.

**Distribution.** Japan (Honshu: Tôhoku, Kantô and Chûbu Districts) (Fig. 34).

**Remarks.** The result of the direct examination of the holotype showed that antenomere III is feebly longer than its width. The apically deformed terminal antenomere mentioned in the notes is not unusual depending on the condition of the individual; a normal length of this antenomere is the range of 0.09–0.11 mm measured from conspecific specimens.

The variation of aedeagus was observed in the shape of the left apical expansion: the expansion is rounded (Fig. 16) or emarginate innerlaterally and posteriorly (Fig. 17) in a few specimens obtained between the Nasu and Bandai Volcanos. Actually, further examination is needed to determine the range of the variation, because the distributional range of this species seems to be more spreader than that of my present knowledge, thus their taxonomic status is provisional.

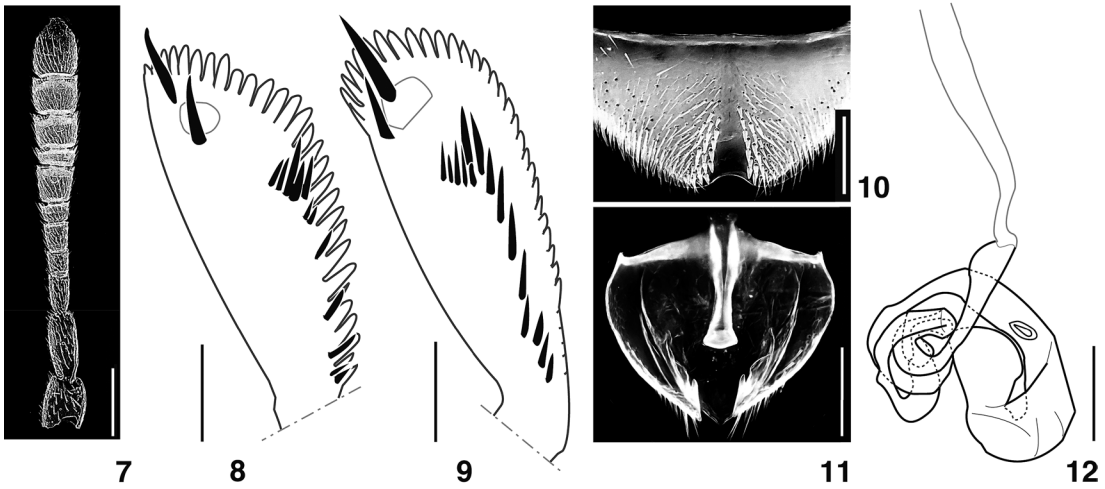
This species is widespread to the central part of Honshu extending from the southern Chûbu to southern Tôhoku Districts (Fig. 34) and to vertically in a range from the montane to subalpine zones. In contrast, *Ptomaphagus gonbe* NISHIKAWA et HAYASHI, 2016 and a new species described below have not been known to occur other than the montane zone lying in the Chûbu and Kantô Districts of Honshu.

***Ptomaphagus miyataorum* M. NISHIKAWA, sp. nov.**

[Japanese name: Shikoku-oninise-chibishidemushi]

(Figs. 7–12 & 18–22)

**Type series.** Holotype: ♂, [高知県 [Kôchi Pref., Shikoku]] 土壤 [soil] / 物部村 [Monobe-son] 杉熊溪谷 [Sugikuma-keikoku: ca. 33.7508°N 134.0311°E] / Mo-5033-5768 / 3.VII.2004 / 宮田隆輔 俊江 [Takasuke & Toshie MIYATA leg.] [genital apparatus, antennae, and left protibia and tarsus on micro slides] (EUMJ). Paratypes: [Honshu] 5 ♂♂, 3 ♀♀, Mummyôdani, ca. 350 m / 34.8922N 133.4639E / Tetta-chô Atetsu-gun / Okayama Pref. / W Honshu, W. Japan / 15-VI-2003 (from leaf litter) / Yoshifumi Fujitani leg. (MNIC). [Shikoku] 1 ♂, [高知県 [Kôchi Pref.]] 土壤 [soil] / 物部村 [Monobe-son] 三嶺 [Mt. Sanrei: ca. 33.8242°N 133.9728°E] – 堂床 [Dôtoko] / Mo-5033-5777 / 21.V.2005 / 宮田隆輔 俊江 [Takasuke & Toshie MIYATA leg.] (MNIC); 1 ♀, 2 ♀♀, [高知県 [Kôchi Pref.]] 土壤 [soil] / 物部村 [Monobe-son] 東笹林道 [Higashisasa-rindô (foot of Mt. Tsunatsukemori): ca. 33.7945°N 133.9027°E] / Mo-5033-5732 / 20.VII.2003 / 宮田隆輔 俊江 [Takasuke & Toshie MIYATA leg.] // No.1 (MNIC); 1 ♀, [高知県 [Kôchi Pref.]] 土壤 [soil] / 物部村 [Monobe-son] 別府溪谷 [Befu-keikoku: ca. 33.7753°N



Figs. 7–12. *Ptomaphagus miyataorum* M. NISHIKAWA, sp. nov. — 7, Right antenna (II–XI antennomeres), holotype, ♂ (from Sugikuma-keikoku, Kôchi Pref.), (tone inverted); 8, left protibia, holotype, showing spinal arrangement on ventral side; 9, same, ♀ (a paratype from Higashisasa-rindô, Kôchi Pref.); 10, middle part of ventrite VIII, ♂ (holotype); 11, genital segment (holotype); 12, spermathica and spermathical duct, ventral view (a paratype from Higashisasa-rindô, Kôchi Pref.). Scales: 0.1 mm.

134.0225°E] / Mo-5034-5022 / 10.IV.2005 / 宮田隆輔 俊江 [Takasuke & Toshie MIYATA leg.] (MNIC); 1 ♀, [EHIME [Pref.]: JAPAN] / Mt. Ishizuchi [ca. 33.7688°N 133.1138°E] / Saijô-city / 6.IX.2009 / Ryo Ogawa leg. (EUMJ); 1 ♀, 高知県 [Kôchi Pref.] 大豊町 [Ôtoyo-chô] / 大ボシ山 (標高 1350) [Mt. Ôboshi-yama, 1,350 m in alt.: ca. 33.7531°N 133.8192°E] / Mo-5033-4695 / 8.VII.2007 / 宮田隆輔 俊江 [Takasuke & Toshie MIYATA leg.] (MNIC); 2 ♂♂, 1 ♀, nr. Riv. Sumikuma-gawa / [ca. 33.7508N 134.0311E] / [= Sugikuma-gawa] / Monobe-son, Kôchi Pref. / Shikoku, SW Japan / 13. IV. 2002 / Seidai Nagashima leg. (MNIC); 1 ♂, same data as for the holotype except: Mo-5034-4063 / 30.V.2004 (MNIC); 1 ♂, OMOGO [ca. 33.7310°N 133.1073°E] / EHIME [Pref., Shikoku] / 26.V.1985 / S[hingo]. TANAKA [leg.] // Yukihiko. Hirano. / Collection (MNIC); 1 ♂, 2 ♀♀, EHIME [Pref.]: JAPAN / Mt. Saragamine [ca. 33.7175°N 132.8947°E] / 29.V.1993 / M[asahiro]. Sakai leg. / (in leaf litter) (EUMJ); 1 ♂, same locality but 22.IV.1999 / Tatsuya Kan leg. (EUMJ); 1 ♀, ODAMIYAMA [ca. 33.5481N 132.8895E] / EHIME Pref. / 6–7.VI.1993 / I. OKAMOTO [leg.] (YHIC); 1 ♀, same data as previous except: 1.VI.1995 // *Ptomaphagus* / sp. (YHIC); 1 ♀, Komi [ca. 33.5015°N 32.9537°E] / Yanadani, Ehime / 6–8.V.1994 / Ohbayashi / Nishino, Okada [leg.] / (by bait-trap) // No.2 (EUMJ); 1 ♀, EHIME [Pref.]: JAPAN / Yokono [ca. 33.4914°N 132.9475°E], (750m alt.) / Yanadani-mura / 7.V.1994, M[asahiro]. Sakai / (leaf litter) // No.8 / *Ptomaphagus* / *takaosanus* Nak. / M[asahiro]. Sakai det. 1994 (EUMJ); 1 ♀, [高知県 [Kôchi Pref.] 土壌 [soil] / 津野町 [Tsuno-chô] 不入山南側 [south slope on Mt. Irazu-yama: ca. 33.4403°N 133.0641°E] / Mo-5033-1004 / 20.V.2006 / 宮田隆輔 俊江 [Takasuke & Toshie MIYATA leg.] (MNIC).

*Description.* Length 2.16–2.38 mm, width 0.93–1.03 mm. Dimensions of different body parts in the holotype: HL 0.4, HW 0.65, PL 0.58, PW 0.98, EL 0.123 and EW 0.98. Habitus elongate-ovoidal, convex above. Color dorsally bicolorous: head and pronotum blackish brown and elytra reddish brown; mouth-parts, antennae and legs yellowish; tarsal combs of short spines black. Dorsal surface

of pronotum, scutellum, elytra, epipleura and femora with transverse or oblique strigations, almost clothed with moderately long, whitish yellow, adpressed hairs.

**M a l e.** Head evenly convex, gentry strigate on dorsal surface, with anterior margin gently rounded, widest just behind eyes, HW/HL 1.51–1.75. Labrum trapezoidal. Maxillary palpus with the ultimate palpomere very slender, conical, ca. 1.2 times as long as the penultimate one. Eyes normal. The first to III antennomeres distinctly longer than wide, IV–V feebly longer than wide, VI less than twice as wide as long, VII nearly as long as wide, VIII twice as wide as long, VIII–X transverse, and XI ovoidal, longer than wide, with apex obtuse. Dimensions (length : width) of antennomeres of the holotype: I, 0.11 : 0.06; II, 0.09 : 0.04; III, 0.06 : 0.03; IV, 0.04 : 0.03; V, 0.05 : 0.04; VI, 0.03 : 0.05; VII, 0.05 : 0.06; VIII, 0.03 : 0.06; IX, 0.05 : 0.07; X, 0.06 : 0.07; XI, 0.09 : 0.07 (Fig. 7).

Pronotum transverse, trapezoidal, moderately convex, widest in front of posterior corners, PW/PL 1.55–1.69; anterior margin almost straight; anterior angles obtuse; sides gently arcuate; posterior corners prolonged posteriad; base with posterolateral emarginations. Surface transversely strigate; interstices between strigae almost equal in width to those on elytra.

Elytra ovoidal, moderately convex, widest behind shoulders: EW/PW 1.0–1.03, EL/PL 1.95–2.14, EL/EW 1.22–1.31; sides arcuate, with obliquely truncate apices. Surface distinctly strigate, each striga obliquely running to sutural stria. Hind wings fully developed.

Legs with protibia spatulate, widest at about apical 1/3. Spinal arrangement on ventral side of protibia as shown in Fig. 8. Protarsomeres expanded in basal three tarsomeres: the first tarsomere 0.9 times as wide as protibia. Profemora wider than protibiae. Mesotibiae slightly arcuate outward. Metatibiae with two spurs in each inner side of apical end.

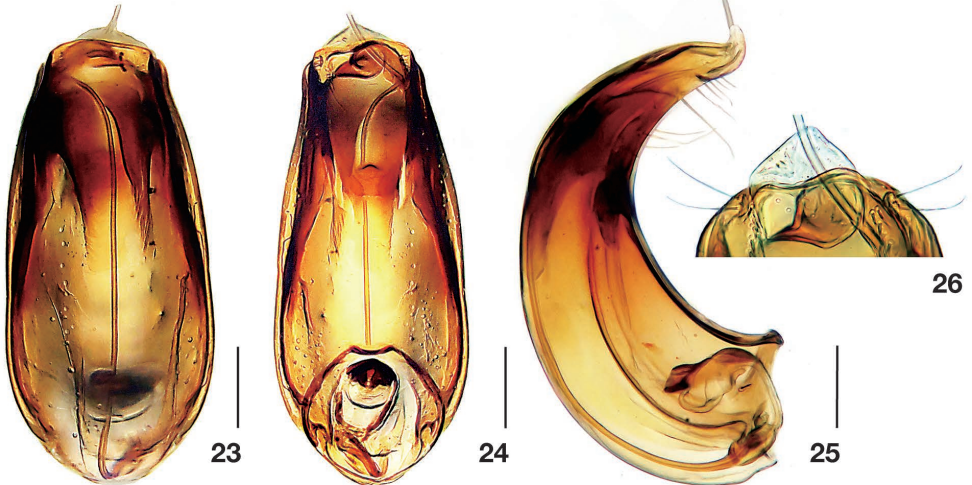
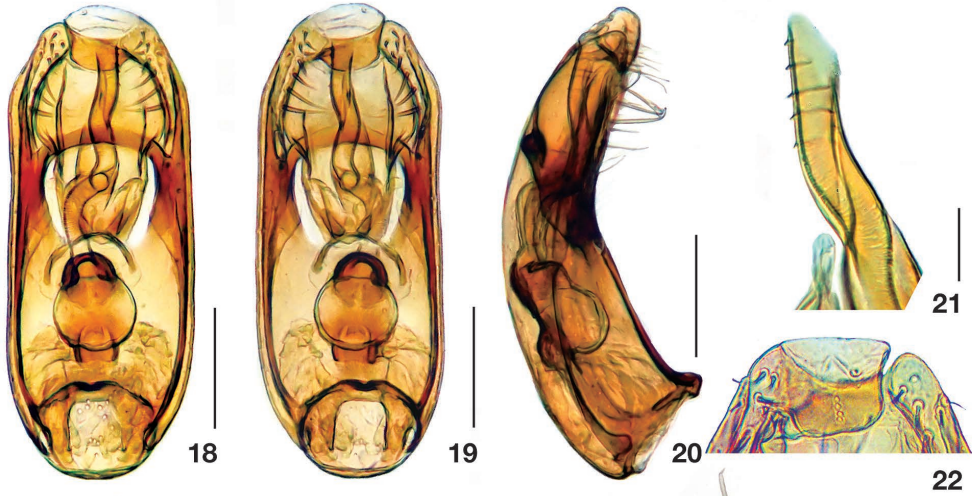
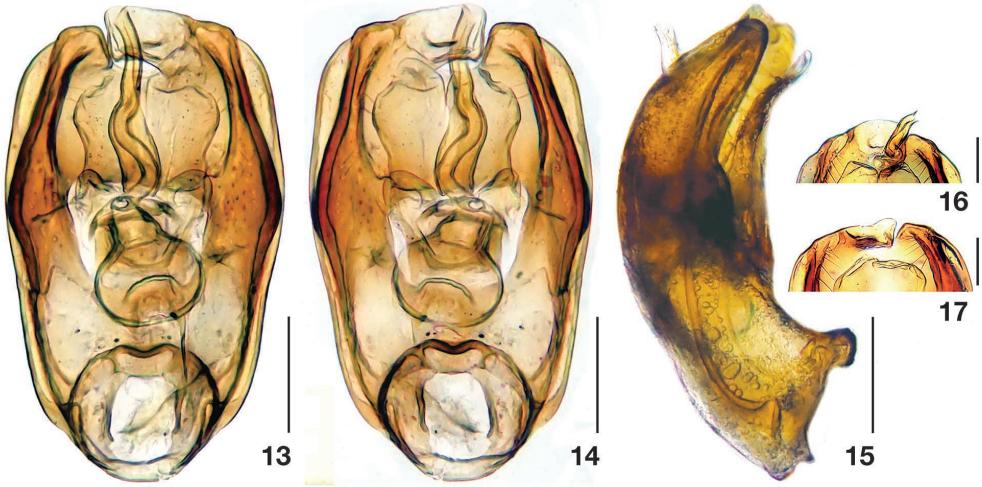
Abdomen with ventrite VII simple. Ventrite VIII (Fig. 10) posteromedially with a distinct subtriangular depression laterally arranged some subacute spines, the depressed area smooth and glabrous, well emarginate posteriorly. Genital segment (Fig. 11) wider than long, with genital plates angulate at anterior inner corners, protruded anteriorly at outer corners; spiculum gastrale relatively long and slender, slightly prolonged anteriorly beyond anterior inner corners of genital plates, with anterior end flared, posterior end also flared, gently rounded at apex; tergum gently sclerotized at apex.

Aedeagus (Figs. 18–22) elliptical, almost parallel-sided, AL/EL 0.32. Median lobe asymmetrical, deeply emarginate dorsoapically, rounded at outer apical corners, which are elongated inward and forming apical expansions: the right expansion simple, the left expansion roundly securiform in ventral view (Fig. 22); ligulae only divided in each apical part with arcuate apical margin; in lateral view, median lobe thick, dorsally arcuate, bent ventrad near middle of ventral margin. Flagellum of endophallus twisted, thick and long, gently annulate closely but formed annular barbs at regularly wide intervals in apical part (Fig. 21), parallel with a longitudinal piece at middle of median lobe, and basally connected with a gourd-shaped chamber. Parameres long and broad, seemingly fused to median lobe, joining apicalmost parts to the apical expansions of median lobe, prominently with a row of some thick and long setae along each innerapical part and a few short ones at a short distance from it.

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Figs. 13–26. Male genitalia of *Ptomaphagus* spp. from Honshu and Shikoku, Japan. — 13–17, *Ptomaphagus takaosanus* NAKANE, 1982; 18–22, *Ptomaphagus miyataorum* M. NISHIKAWA, sp. nov.; 23–26, *Ptomaphagus takashii* M. NISHIKAWA, sp. nov. — 13, 18 & 23, dorsal view (each holotype); 14, 19 & 24, ventral view (same); 15, 20 & 25, right lateral view (15: holotype; 20: a paratype from Mt. Saragamine, Ehime Pref.; 25: a paratype from Iden-zawa/Jizôdaira, Kanagawa Pref.); 16–17, apical part of aedeagus (16: from Hatori-ko, Fukushima Pref.; 17: from Hatori, Fukushima Pref.); 21, flagellum of endophallus, protruding out of the opening of genital orifice, lateral view, showing annular barbs (a paratype from nr. Sugikuma-gawa Riv.); 22 and 26, close-up of the apical part of aedeagus (22: a paratype from Mummyôdani, Okayama Pref.; 26: holotype). Scales: 0.1 mm for Figs. 13–21 and 23–26; 0.05 mm for Fig. 22.





**F e m a l e.** Similar to male in general appearance, except for protarsi and abdominal ventrite VIII simple, and elytral apices comparatively rounded separately. Dimensions of different body parts in a paratype: HL 0.4, HW 0.68, PL 0.58, PW 1.0, EL 1.38 and EW 1.0. Spinal arrangement on ventral side of protibia as shown in Fig. 9. Female genitalia with gonocoxites each longitudinally subrectangular, bearing four long setae at apex. Spermatheca C-shaped, swollen, strongly bend; a valve like structure located near the beginning of bend of spermatheca; spermathecal duct consists of three ducts: a distally straight and proximally coiled sclerotized duct, a proximally thicken sclerotized duct separated from the former by a short membranous duct and the most proximal short membranous duct followed vagina (Fig. 12).

**Etymology.** The specific epithet of this new species is named after Takasuke and Toshie MIYATA, who are collectors of a part of the type series.

**Distribution.** Japan (Honshu: Chûgoku District; Shikoku) (Fig. 34).

**Remarks.** The present new species is similar to *Ptomaphagus ishizuchiensis* PERREAU, 1996 and *P. nipponensis* PERREAU, 1996 both from Shikoku, Japan, and *P. pingtungensis* PERREAU, 1996 from Taiwan (PERREAU, 1996: figs. 6–12 & 15–17; WANG & ZHOU, 2015: figs. 7 & 8A–K). But the new species can be differentiated from them by having the following characteristics: The ventrite VIII of the abdomen is subtriangularly depressed posteromedially, the depressed area well emarginate posteriorly (Fig. 10); the genital plates of the genital segment are protruded anteriorly at their outer corners (Fig. 11); aedeagus is elliptical, but is almost parallel-sided, with the left expansion is enlarged anteriorly and the flagellum of endophallus is formed annular barbs in its apical part (Figs. 18–22); and the characteristic shape of spermathecal apparatus as described above (Fig. 12).

The new species is distributed to the Chûgoku District of western Honshu and Shikoku, western Japan (Fig. 34), and to vertically in a range of the montane zone. More detailed distribution patterns in the western Honshu and Shikoku will be revealed for the new species and the known two by the progress of faunal clarification in their unrecorded areas.

***Ptomaphagus takashii* M. NISHIKAWA, sp. nov.**

[Japanese name: Kanagawa-oninise-chibishidemushi]

(Figs. 23–33)

**Type series.** Holotype: ♂, Iden-zawa/Jizôdaira [ca. 35.4520°N 139.0131°E] / Nishi-tanzawa / Tanzawa Mts., Kanagawa / Pref., Central Honshu // Japan / 31.V–6.VI.2006; FIT / Takashi Watanabe leg. [genital apparatus, left antenna, and left protibia and tarsus on micro slide] (NSMT). Paratypes: 6 ♂♂, 17 ♀♀, same data as for the holotype (MNIC).

**Description.** Length 2.71–3.18 mm, width 1.18–1.48 mm. Dimensions of different body parts in the holotype: HL 0.48, HW 0.83, PL 0.75, PW 1.33, EL 1.6 and EW 1.35. Habitus elliptical, convex above. Color dorsally reddish brown; mouth-parts yellowish brown; antennae yellowish brown except IV–VIII antennomeres darker; legs reddish brown though tarsal combs of short spines are black and protarsomeres are yellowish. Dorsal surface of pronotum, scutellum, elytra, epipleura and femora with transverse or oblique strigations, almost clothed with moderately long, whitish yellow, adpressed hairs.

**M a l e.** Head evenly convex, gentry strigate on dorsal surface, with anterior margin arcuate, widest just behind eyes, HW/HL 1.6–1.76. Labrum trapezoidal. Maxillary palpus with the ultimate palpomere very slender, conical, ca. 1.3 times as long as the penultimate one. Eyes normal. The first to IV antennomeres distinctly longer than wide, V longer than wide, VI feebly wider than long, VII as long as wide, VIII–IX transverse, IX wider than X, which is as long as wide, and XI longer than wide,

ovoidal, with apex obtuse. Dimensions (length : width) of antennomeres of the holotype: I, 0.15 : 0.05; II, 0.13 : 0.05; III, 0.08 : 0.05; IV, 0.06 : 0.05; V, 0.06 : 0.06; VI, 0.06 : 0.07; VII, 0.08 : 0.09; VIII, 0.05 : 0.09; IX, 0.09 : 0.09; X, 0.08 : 0.09; XI, 0.13 : 0.09 (Fig. 27).

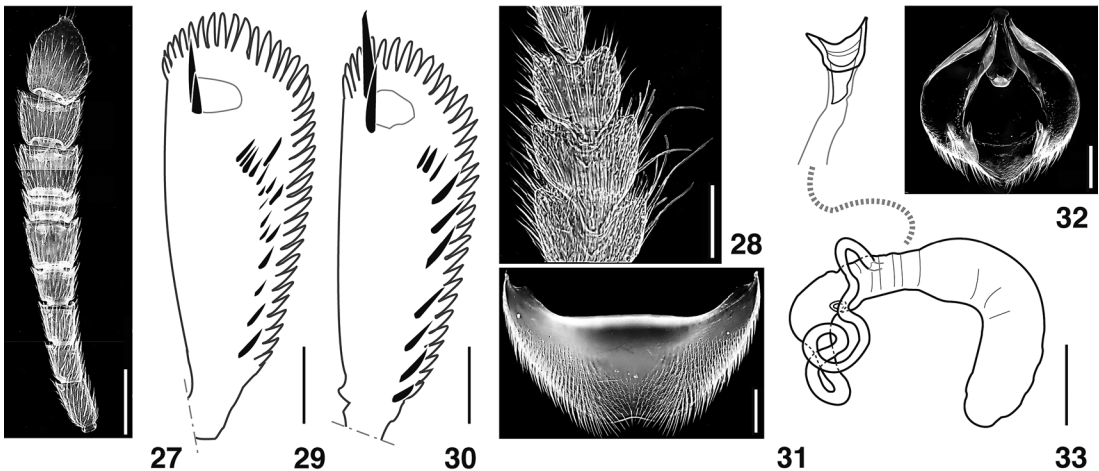
Pronotum transverse, trapezoidal, moderately convex, widest in front of posterior corners, PW/PL 1.63–1.77; anterior margin almost straight; anterior angles obtuse; sides gently arcuate; posterior corners well prolonged posteriad; base with gently posterolateral emarginations. Surface transversely strigate; interstices between strigae almost equal in width to those on elytra.

Elytra ovoidal, moderately convex, widest at about anterior 1/3: EW/PW 1.02–1.05, EL/PL 1.99–2.17, EL/EW 1.18–1.25; sides arcuate, with obliquely truncate apices. Surface distinctly strigate, each striga obliquely running to sutural stria. Hind wings fully developed.

Legs with protibia spatulate, widest at about apical 1/4. Protarsomeres with proximally flat, rather long hairs other than ordinary ones on inner side of venter in basal three tarsomeres, which are expanded: the first tarsomere 0.7 times as wide as protibia (Fig. 30). Spinal arrangement on venter of protibia as shown in Fig. 28. Profemora wider than protibiae. Mesotibiae slightly arcuate outward. Metatibiae with two spurs in inner side of each apical end.

Abdomen with ventrite VII gently emarginate posteriorly; ventrite VIII (Fig. 31) posteromedially with a weak depression without spines, the depressed area emarginate posteriorly; pygidium (tergite VIII) emarginate at apex. Genital segment (Fig. 32) wider than long, with genital plates prolonged anteriorly and pointed at apices of anterior inner corners, notched on outer margin of each posterior claw; spiculum gastrale short and thick, subrhomboidal, with anterior end flared or rounded, not prolonged beyond anterior inner corners of genital plates, and posterior end roundly protuberant; tergum gently sclerotized at apex.

Aedeagus (Figs. 23–26) thick, elongate-ovoidal in dorsal view, horn-shaped in lateral view; AL/EL



Figs. 27–33. *Ptomaphaginus takashii* M. NISHIKAWA, sp. nov. — 27, Left antenna (III–XI antennomeres), holotype, ♂ (from Iden-zawa/Jizōdaira, Kanagawa Pref.), (tone inverted); 28, left protarsi (from apical part of the first tarsomere to basal part of tarsomere IV), ♂ (a paratype), (tone inverted); 29, left protibia, ♂ (a paratype), showing spinal arrangement on ventral side; 30, same, ♀ (a paratype); 31, ventrite VIII, ♂ (holotype), (tone inverted); 32, genital segment (a paratype); 33, spermatica and spermatical duct, ventral view (a paratype). Scales: 0.1 mm.

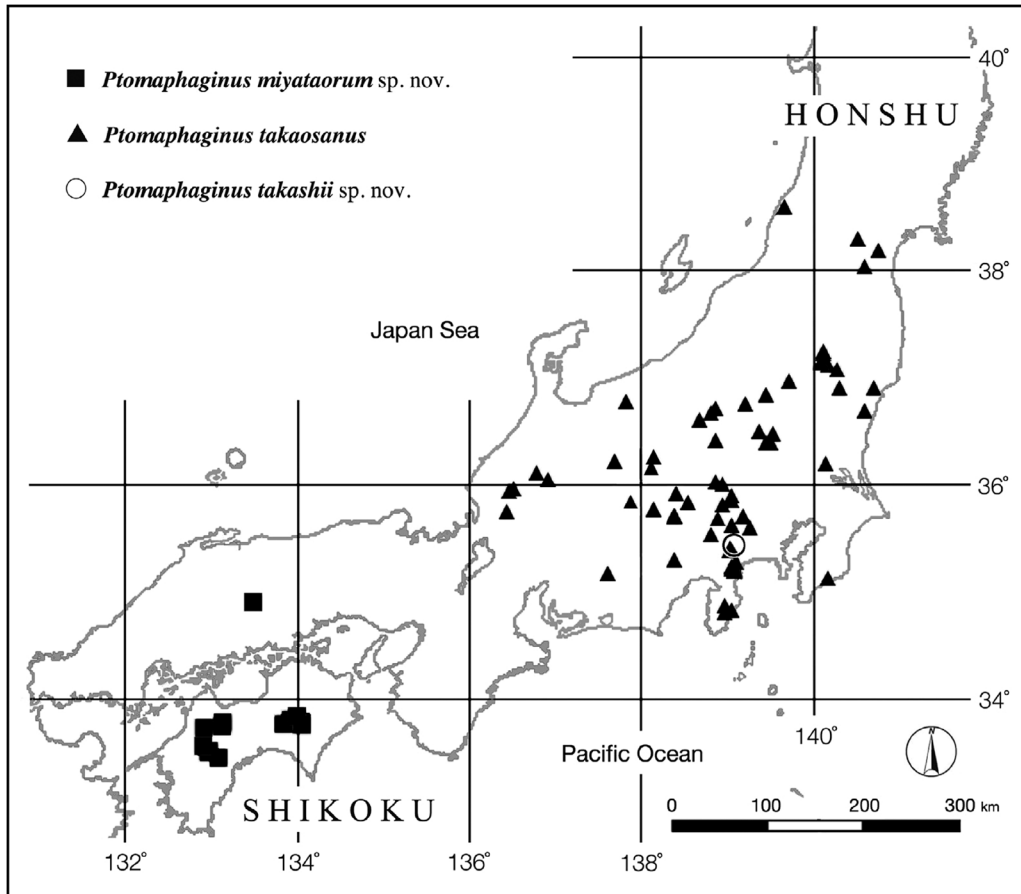


Fig. 34. Geographical distributions of the three species of *Ptomaphagus* in Honshu and Shikoku, Japan.

0.38 in the holotype. Median lobe asymmetrical, subrectangularly projected in apical part, obliquely rounded at apex, with a triangular lamella prolonged from ventral side beyond the apex in dorsal view, the lamella depigmented and internally porous; in ventral view, inner margins of outer apical corners expanded inward and forming a ring like frame with the triangular lamella in its ventral side (Fig. 26); ligulae short, each horn-shaped; in lateral view, median lobe thick in basal part, dorsoventrally arcuate, dorsally turned up in the apicalmost part. Flagellum of endophallus extremely long, connected with subround chamber at base of median lobe. Parameres long, seemingly fused to median lobe, slender in basal 2/3, with some long setae along each innerapical part.

**F e m a l e.** Similar to male in general appearance including apically emarginate pygidium (tergite VIII), except for protarsi and abdominal ventrites VII–VIII simple and elytral apices more or less rounded separately. Dimensions of different body parts of a paratype: HL 0.48, HW 0.78, PL 0.75, PW 1.15, EL 1.48 and EW 1.18. Spinal arrangement on ventral side of protibia as shown in Fig. 29. Female genitalia with gonocoxites each longitudinally subrectangular, feebly projected roundly at inner apical corner, bearing some long setae in apical part. Spermatheca J-shaped, swollen in bending part, almost parallel-sided and loosely annulate in proximal part; a valve like structure located at inner corner in which a funnel-shaped duct abruptly projected from a subspherical chamber connected with

spermatheca; spermathecal duct not separated by a short membranous duct, consists of three ducts: a subspherical chamber with the funnel-shaped duct, a spiral and sclerotized duct and the most proximal long membranous duct with a sclerotized orifice to vagina (Fig. 33a–b).

*Etymology.* The specific epithet of this new species is named after Takashi WATANABE, who is the collector of the type series.

*Distribution.* Japan (Honshu: Tanzawa Mountains) (Fig. 34).

*Remarks.* The present new species is similar to the following species as far as having aedeagus with an extremely long flagellum of endophallus is concerned: *P. newtoni* WANG et ZHOU and *P. wuzhishanicus* WANG et ZHOU from China (WANG & ZHOU, 2015), and *P. sabahensis* SCHILTHUIZEN et PERREAU from Borneo (SCHILTHUIZEN & PERREAU, 2008). Any *Ptomaphagus* species with this aedeagal characteristic had not been known to occur in Japan.

The new species is separable from them by the following features: Basal three protarsomeres have rather long hairs on each inner side of their venters (Fig. 30); ventrites VII and VIII of the abdomen each has a posterior emargination; the latter ventrite posteromedially has a weak depression without spines (Fig. 31); the pygidium (tergite VIII) has an emarginate apex in both the sexes; the aedeagus has a triangular lamella prolonged from the ventral side beyond the apex (Fig. 26); spermathecal duct with a sclerotized orifice at proximal end (Fig. 33a).

The new species is known only the type series obtained by a flight intercept trap set during a period of six days in a forested area of the Tanzawa Mountains, central Honshu (Fig. 34).

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### 要 約

西川正明：タカオオニセチビシデムシ (コウチュウ目タマキノコムシ科) の補足的記載を伴う、本州と四国産 *Ptomaphagus* 属の2新種。——ニセチビシデムシ属 (コウチュウ目タマキノコムシ科チビシデムシ亜科) は現在 100 に近づく種数を擁する。本論文では、本州から従来知られていたタカオオニセチビシデムシの補足的記載を行い、続いて、新種シコクオニセチビシデムシ *Ptomaphagus miyataorum* sp. nov. を本州の中国地方と四国の標本に基づいて命名・記載し、新種カナガワオニセチビシデムシ *Ptomaphagus takashii* sp. nov. を神奈川県丹沢山地産の標本に基づいて命名・記載した。

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