Bull. Natl. Mus. Nat. Sci., Ser. A, 37(3), pp. 149–153, August 22, 2011

Notes on Bees of the Genus *Megachile* of Japan, with Description of a New Species (Hymenoptera, Megachilidae)

Hirohiko Nagase

81 Nikaido, Kamakura-shi, Kanagawa, 248–0002 Japan
E-mail: h-nagase@msa.biglobe.ne.jp

(Received 9 June 2011; accepted 21 June 2011)

Abstract *Megachile odziro* sp. nov. is described from Hokkaido. *Megachile sumizome* Hirashima and Maeta, 1974 is treated as a subspecies of *Megachile willughbiella* (Kirby, 1802), as *M. w. sumizome* Hirashima and Maeta stat. nov. *Megachile rotundata* (Fabricius, 1793) is recorded from Japan for the first time.

Key words: Hymenoptera, Megachilidae, *Megachile*, Japan, new species, new status, new record.

Introduction

Bees of the genus *Megachile* are commonly called "Leaf-cutter bees" because most of them use pieces of plant leaves as material of nests for their young. Their distribution is worldwide and 32 species are known from Japan (Terayama, 2004).

Since Hirashima and Maeta described several species and subspecies in their review of the genus of Japan in 1974 (Hirashima, 1974, Hirashima and Maeta, 1974), only one species has been added to the Japanese fauna (Ikudome, 1999). I had an opportunity to re-examine Japanese species and found one new species from Hokkaido. While many Japanese *Megachile* species are rather common, several species are known from very few specimens. This new species, being described here by single female, is an additional example of such rarely collected *Megachile* species. I also propose a new status within the genus, and record one species from Japan for the first time.

The following abbreviations are used in this paper. T1, T2, etc.: metasomal tergite 1, 2, etc. S1, S2, etc.: metasomal sternite 1, 2, etc. PD: puncture diameter. PIS: puncture interspace. POD: post-ocellar distance. OOD: oculo-ocellar distance. OCD: oculo-occipital distance. EVD: distance between posterior margin of compound eye and posterior margin of vertex.

The materials used in this study (except for a part of *M. w. willughbiella* and *M. sumizome* specimens) were deposited in the National Museum of Nature and Science, Tokyo.

Description of a new species.

Megachile odziro sp. nov.

[Japanese name: Ojiro-hakiribachi]

(Figs. 1, 2, 5)

Female. *Body length*: About 13 mm.

Color of integuments: Black, except flagellomeres very slightly dark brown beneath, apices of mandibles reddish brown, tegulae very dark brown, apical narrow semi-transparent areas of T2-T5 brown, all tibial spurs brown, a few apical tarsal segments dark reddish brown, basal half of claws yellowish brown, apical half of claws reddish brown. Wings very pale brownish transparent. Wing nerves reddish brown except subcosta slightly darker.

Pubescence: Clypeal hairs not long, erect, greyish white. Hairs of paraocular to supraclypeal area rather long, erect, greyish white. Frons to vertex and upper gena with long (most

of them as long as or longer than combined length of apical two segments of antenna), erect, brownish fuscous hairs. Genal hairs rather long, brownish fuscous near eye and yellowish white elsewhere. Thoracical hairs rather long and generally greyish white, except those on mesonotum laterally near tegula brownish fuscous. Median part of mesonotum without hairs (presumably worn-out). Basal area of coxae with some short brown hairs. T1-T2 entirely covered with long (as long as or longer than those on vertex), rather sparse, greyish white hairs. Discs of T3-T5 with long black erect hairs, denser posteriorly, and laterally continuous to similar hairs of lateral margins of S3-S5. Apical margins of T3-T5 with white bands of plumose hair, these bands medially widely interrupted in T3, and entire in T4-T5. T6 almost entirely covered with more or less appressed white hairs which are not very long and rather sparse so that not completely obscuring integument surface. In lateral view, no erect hairs observable at least on apical half of T6. Scopal hairs of S2-S4 dark yellowish brown, shorter and paler in S2 than the others, and laterally black in S3-S4. Hairs of S5-S6 entirely black and long. All femoral hairs white except in extreme basal areas mixed with short brown hairs. Fore tibial hairs white dorsally and posteriorly, brown elsewhere. Middle and hind tibial hairs white, except in middle tibia ventrally brown. Outer hairs of fore tarsi yellowish white and longer than, but less than two times as long as, tarsal width. Other hairs of fore tarsi much shorter and dark reddish brown. Hairs of middle tarsi brown and dense, a little paler outside. Outer hairs of hind tarsi white, those of other parts brown.

Structure: Mandible tridentate (including apex) as Fig. 5. Clypeus rather weakly convex, highest at slightly above middle of length. Clypeal surface coarsely, densely and more or less evenly punctate with PIS at most 0.5 PD and strongly shining. An obscure median impunctate line present on upper 1/3 of clypeal length. Malar space linear. Punctures of supraclypeal area sparser than those of clypeus, PIS medially about equal to PD and minutely coriaceous. Punctures of paraocular area and frons very dense, nearly contiguous. Frontal suture evident from anterior ocellus to level of upper margin of antennal sockets where it terminates as a very small raised point. Punctures of ocellar area to vertex much smaller and shallower than those of clypeus, but generally dense, with very sparsely punctate (PIS equal to or larger than PD) area in vertex posterior to oculo-ocellar area. POD : OOD : OCD : EVD = 15 : 16 : 12 : 17. Gena about 1.5 times wider than eye in lateral view. Punctures of gena very dense but shallow. Mesoscutal punctures shallow and very dense in lateral 1/3 but medially very sparse so that PIS about 2-3 times of PD. PIS microcoriaceous. Tegula with sparse distinct punctures but median lateral area broadly impunctate, densely tessellate and dull. Median part of scutellum strongly swollen, in lateral view surface of scutellum equal to or higher than surface of mesoscutum. All tibial spurs with blunt apices. Punctures of tergites all setigerous, small and shallow, laterally very dense but medially very sparse. In median part of T4 PIS twice of PD or more. Gladular ridges and grooves of T2 and T3 entire, those of T4 interrupted in middle. Lateral post-gladular transverse swellings obscure in T2, only moderate in T3 and T4, weak in T5. Surface of tergites almost without microsculpture and shining. Surface of T6 in lateral view straight.

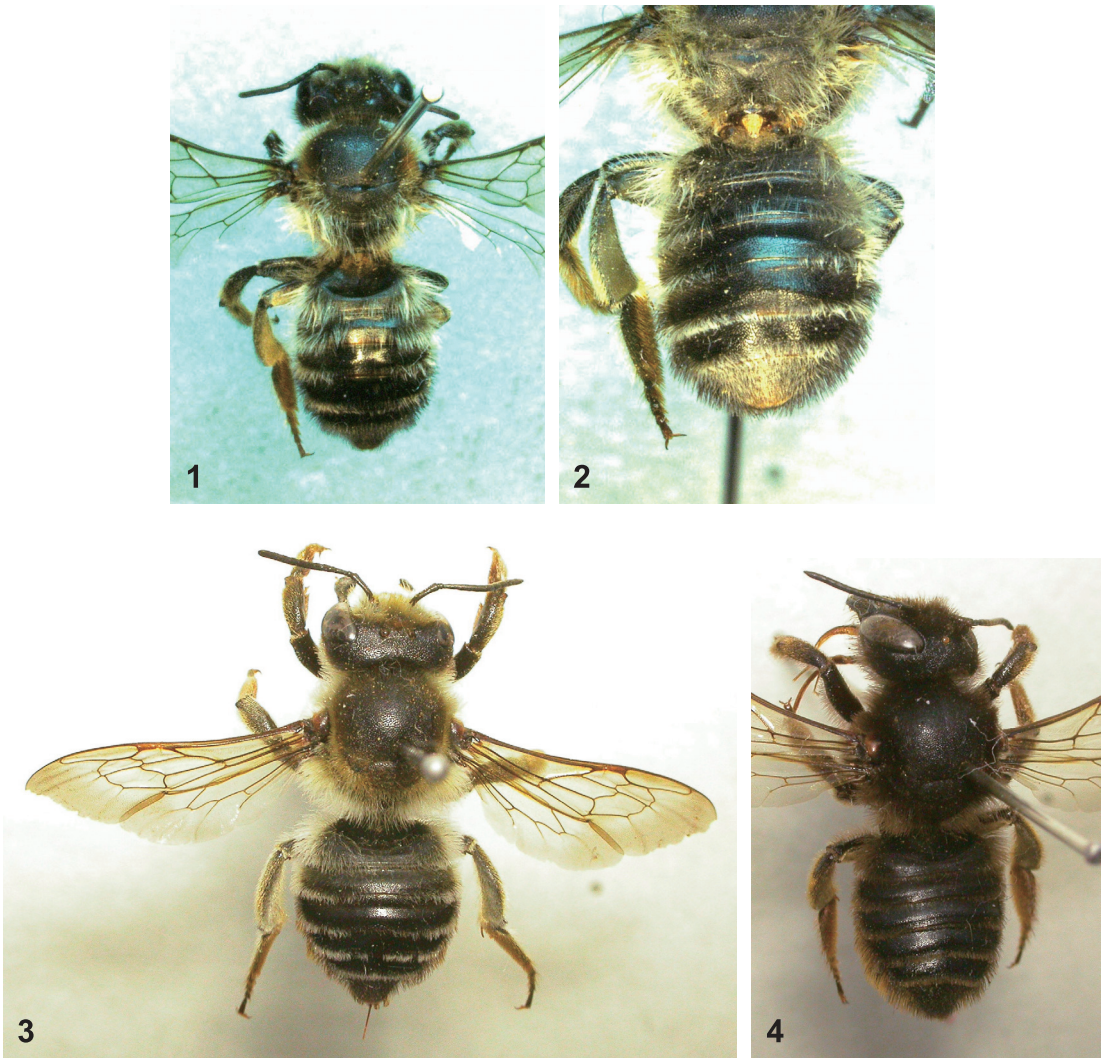
Male. Unknown.

Holotype. Female. Higashi-Mokoto, Ozora, Hokkaido, Japan. 30. vii. 2007. H. Nagase leg. (NSMT-I-HYM 56152). The holotype is a somewhat worn-out specimen, lacking the left fore tibia and tarsus.

Etymology: The specific name *'odziro'* means 'white tail' in Japanese, referring to white hairs of T6.

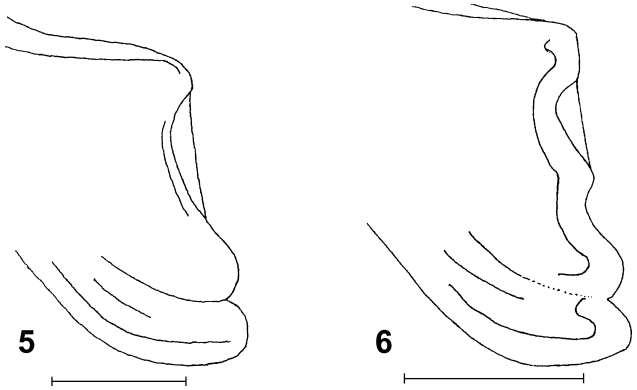
Flower record: *Lavandula* sp. (Lamiaceae)

Remarks. This species is superficially very similar to the Palaearctic *Megachile analis* Nylander, 1852, and in many keys (e.g. Romankova, 1995, Scheuchl, 2006, Wu, 2006) runs almost straight to *M. analis*. Distinguishing points from *M. analis* are as follows: 1) Mandibular dentition; the mandible of *M. odziro* (Fig. 5) is three-



Figs. 1–4. *Megachile* spp. — 1, *M. odziro* sp. nov. holotype, habitus; 2, same, metasoma, dorsal view; 3, *M. willughbiella munakatai* Hirashima and Maeta, 1974, habitus; 4, *M. w. sumizome* Hirashima and Maeta, 1974, habitus.

toothed and with a very long cutting edge between the second and third teeth (counting from the apex), while that of *M. analis* (Fig. 6) is clearly four-toothed, and with a much shorter cutting edge between the third and fourth teeth. 2) Clypeal punctures; in *M. odziro* punctures are relatively evenly distributed, while in *M. analis* punctures are smaller, denser and difference in density between peripheral area and median area is greater. 3) PIS of clypeus; smooth in *M. odziro,* micro-coriaceous in *M. analis*. 4) PIS of median mesoscutum; *M. odziro,* 1-2 PD, at most 0.5 PD in *M. analis*. 5) Hair color of clypeus and supraclypeal area; greyish white in *M. odziro,* fuscous in *M. analis*. 6) Scopal hairs; in *M. odziro,* S3-S4 laterally with abundant black hairs, and S5-S6 entirely black, while in *M. analis,* lateral black hairs of S3-S4 are very limited, and only S6 with primarily black hairs but with a few reddish hairs mixed. Because *M. odzigo* is known



Figs. 5–6. Right mandibles (moderately worn-out). — 5. *Megachile odziro* sp. nov. holotype; 6, *M. analis* Nylander, 1852. Scale lines 0.5 mm.

from only one specimen, range of individual variation is unknown, and the above mentioned points 2) to 6) may be subject to some variation. However, the difference in the mandibular dentition alone will be sufficient to separate these two species. Also, this new species is somewhat close to the Japanese *M. japonica* Alfken, 1903. However, white appressed hairs covering T6 easily separate *M. odziro* from *M. japonica* which has only black hairs. Additionally, *M. japonica* has similar type of the mandiblar dentition to *M. analis*.

Megachile willughbiella sumizome Hirashima and Maeta, stat. nov.

(Fig. 3)

Megachile willughbiella munakatai Hirashima and Maeta, 1974 (Fig. 4) and *M. Sumizome* Hirashima and Maeta, 1974 were both described in the same paper Hirashima and Maeta (1974).

Megachile w. munakatai was described based on the holotype female from Sapporo, Hokkaido, 18 (14 females and 4 males) paratopotypes and 21 (7 females and 14 males) paratypes from 3 localities in Hokkaido and 6 localities in Honshu. Although 9 localities and 7 collectors' names were mentioned in the description, no information to specify each paratype specimen was given. Distribution was shown as Hokkaido and northern and central Honshu. The characters which distinguish this subspecies from the nominate form are the differences in the hair color of certain parts of terga and sterna.

Megachile sumizome was described based on the holotype female from Fukuoka, Kyushu and 13 paratype females from 11 localities in Hokkaido (1), Honshu (9) and Shikoku (1). Although 11 localities and 10 collectors' names were mentioned in the description, no information to specify each paratype was given. No male was known at the time of description. The description mentions that *M. sumizome* is very closely related to *M. w. munakatai* but separable by almost entirely black pubescence.

I had an opportunity to examine a good number of specimens of these two forms (females; *M. w. munakatai* 53 and *M. sumizome* 78, males; 131 both forms combined). Also Mr. H. Suda (in litt.) provided me with information on these forms in his collection (females; *M. w. munakatai* 13, *M. sumizome* 58, males; 97). I came to the conclusion that they are conspecific and only subspecifically distinct, and I propose to treat *M. sumizome* as a subspecies of *M. willughbiella* (Kirby, 1802), i.e. *M. willughbiella sumizome* Hirashima and Maeta, stat. nov.

Females of the two subspecies can be readily distinguished but only by body hair color. *Megachile w. munakatai* has generally grey to

white hairs except for scopal hairs (Fig. 3), while *M. w. sumizome* has black to very dark brown hairs except for scopal hairs (Fig. 4), and practically no intermediately colored specimen is found. *Megachile w. munakatai* occurs in Hokkaido and *M. w. sumizome* occurs in Honshu, Shikoku and Kyushu. However, the males of the two subspecies, having greyish hairs, are indistinguishable and only geographically assignable to each subspecies. *Megachile willughbiella* is a species widely distributed in Palaearctic region and throughout its distribution range has predominantly greyish or yellowish grey hairs except for the unique black-haired *M. w. sumizome*.

Although geographical segregation of these two forms is evident, there are a few exceptional specimens that show opposite colors as follows. Three greyish females (similar to *M. w. munakatai*) were collected in Lake Tazawa area, Akita Prefecture, Honshu (T. Nambu leg. 8. viii. 1975. NSMT-I-HYM 57000, 57001 and 57002). One of the three females shows slightly darker hair color than the other two. But it is far paler than the color of *M. w. sumizome*. On the other hand, a black female (similar to *M. w. sumizome)* was collected in Hakodateyama, Hakodate, Hokkaido (M. Munakata leg. 29. vii. 1956: one of the paratypes of *M. sumizome*). Despite the above exceptional records, I believe it is safe to regard the two forms as different subspecies.

At the time of original description, all males of the two subspecies were apparently treated as the males of *M. w. munakatai*, because paratype males of *M. w. munaktai* were designated both from Hokkaido and Honshu. The paratype males of *M. w. munakatai* from outside of Hokkaido, although not specifically enumerated in the description, should be treated as the males of *M. w. sumizome*.

Megachile rotundata (Fabricius, 1793), a species new to Japanese fauna.

A female of *Megachile rotundata* (Fabricius, 1793) was collected in Hokkaido [Monami, Sapporo, Hokkaido. 11. ix. 2003. H. Nagase leg., (NSMT-I-HYM 59937)]. This is the first record of the species from Japan. *Megachile rotundata* is a small species, with distinct transverse mat marks by microscopic hairs on antero-lateral area of T2. This species is widely distributed in the Palaearctic region, and has been introduced into the Nearctic and Neotropical regions (Krombein *et al*., 1979, as *M. pacifica*).

Acknowledgement

I am much obliged to Dr. M. Schwarz (Ansfelden) for the loan of specimens of *Megachile analis* for study. My sincere thanks are also due to the following hymenopterists for their support in various ways including supply of specimens and information in the course of the study; Dr. A. Shinohara (NSMT), Dr. O. Tadauchi (Kyushu University), Dr. Y. Hirashima (Fukuoka), Dr. M. Munakata (Hakodate), Mr. Y. Haneda (Ohno), Mr. T. Nambu (Yorii) and Mr. H. Suda (Sakura).

Literature cited

Hirashima, Y. 1974. Annoted check list of the Japanese species of the genus *Megachile sensu lato*, with description of a new species. Kontyu, Tokyo, 42: 174–180.

Hirashima, Y. and Y. Maeta 1974. Bees of the genus *Megachile sensu lato* of Hokkaido and Tohoku District of Japan. Kontyu, Tokyo, 42: 157–173.

Ikudome, S. 1999. Notes on megachilid bees from the Ryukyu Islands, Japan, with description of a new species. The Japanese Journal of Systematic Entomology, 5: 1–7.

Krombein, K. V., et al. 1979. Catalog of Hymenoptera in America North of Mexico, p. 2057. Smithonian Institution Press, Washington D.C.

Romankova, T. G. 1995. Megachilidae. In Lehr, A. (ed.): Key to the Insects of Russian Far East, Vol. IV, Part 1, pp. 539–544. Nauka, St. Petersburg.

Scheuchl, E. 2006. Illustrierte Bestimmungstabellen der Wildbienen Deutschlands und Österreichs, Band II, pp. 1–126. Apollo Books, Stenstrup.

Terayama, M. 2004. A catalogue of Aculeata Hymenoptera of Japan. Memoir of the Myrmecological Society of Japan, 2: 1–123.

Wu. Y. 2006. Megachilidae, Insecta. Fauna Sinica, Vol. 44, pp. 1–473, 4 pls. Science Press, Beijing.