Taxonomic Revision of the Subgenus Ctenonomia of the Genus Lasioglossum (Hymenoptera, Halictidae) in Japan

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Taxonomic Revision of the Subgenus *Ctenonomia* of the Genus *Lasioglossum* (Hymenoptera, Halictidae) in Japan

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Abstract. Japanese species of the subgenus *Ctenonomia* Cameron, 1903 of the genus *Lasioglossum* Curtis, 1833 are revised, and three species are recognized: *Lasioglossum kumejimense* (Matsumura et Uchida, 1926), *L. blakistoni* (Sakagami et Munakata, 1990), and *L. yakushimense* sp. nov. *Lasioglossum* (*Ctenonomia*) *vagans* (Smith, 1857) is removed from the Japanese fauna, and *L.* (*Evylaeus*) *miyanoi* Tadauchi, 1994 is synonymized with *L. kumejimense*. A key to the Japanese species of *Ctenonomia* is presented. The distribution map, flight and flower records of each species are provided.

Key words: taxonomy, Hymenoptera, Halictidae, *Lasioglossum*, *Ctenonomia*, revision, Japan.

Intruduction

The subgenus *Ctenonomia* Cameron, 1903, of the genus *Lasioglossum* Curtis, 1833, belongs to the family Halictidae, and is characterized morphologically by having the second submarginal crossvein in the forewing of the female as strong as the first, and the inner hind tibial spur pectinate in the female (Fig. 1). This subgenus is mainly distributed from Africa to tropical Asia, and 196 species have been recorded from these regions (Michener, 2007).

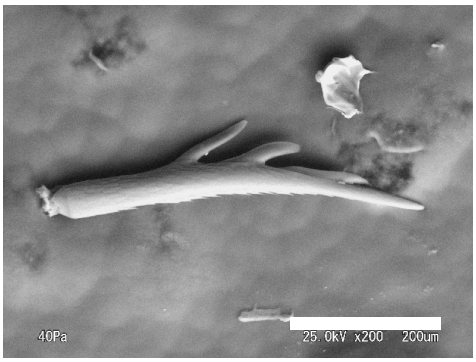

Fig. 1. Inner hind tibial spur of female. *Lasioglossum* (*Ctenonomia*) *kumejimense* (Matsumura et Uchida). Scale: 0.2mm.

With respect to the Japanese *Ctenonomia*, Blüthgen (1926) recorded *L. vagans* (Smith) as *Halictus micado* Strand from Okinawa-jima, Matsumura & Uchida (1926) described *L. kumejimense* as *H. kumejimensis* and *H. yayeyamensis* from the Ryukyus, Yasumatsu (1935) recorded *L. vagans* as *H. vagans* from Sado-ga-shima, Sonan (1940) recorded *L. vagans* as *H. statialis* Cockerell from Minamidaito-jima, and Sakagami & Munakata (1990) described *L. blakistoni* from Aomori Pref., the northern part of Honshu. Three species have been fragmentarily described and recorded from Japan.

In the course of a collaborative study of Japanese *Lasioglossum*, we have examined extensive materials mainly collected from eastern Asia. In the present study, the Japanese species of the subgenus *Ctenonomia* are revised, with description of a new species and redescriptions of *L. kumejimense* and *L. blakistoni*. In addition, *L. vagans* is removed from the Japanese fauna, and *L.* (*Evylaeus*) *miyanoi* Tadauchi from the Mariana Islands is synonymized with *L. kumejimense*. A key to Japanese

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species is provided. In addition, we present data on the distribution, flight and flower records of each species in Japan.

Materials and methods

This study is based on the examination of about 1000 specimens from Japan and adjacent countries. Some specimens examined in this study were borrowed from the following institutions and personal collections, which are referred to in the text by the following abbreviations: **ALTU**= Applied Entomological Laboratory, Tokai University, Kumamoto Pref., Japan; **ELKU**= Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka Pref., Japan; **MCDS**= Dr. Yasuo Maeta's Collection, Division of Environmental Biology, Faculty of Life and Environmental Science, Shimane University, Shimane Pref., Japan; **OLML**= Oberösterreichischen Landesmuseums, Linz, Austria; **SCMH**= the late Dr. Shôichi F. Sakagami's Collection, Museum of Nature and Human Activities, Hyogo Pref., Japan. Other specimens without abbreviations belongs to the private collection of Ryuki Murao, which are kept temporarily at the ELKU.

The terminology and the style of description follows Sakagami (1989) and Murao & Tadauchi (2007). The terms and their abbreviations used are as follows: Fn= nth flagellar segment; IS= interspaces between punctures; PP= punctures; Tn, Sn= nth metasomal tergum or sternum. The distributional range and flight record of each species is mainly based on specimens label data examined in this study. Data collected by previous authors (Ikudome, 1999; Goubara & Maeta, 2002; Negoro, 2003; Kato *et al*., 2007; Tanaka, 2008) are also referred to in this study. Flower records visited by *Ctenonomia* species are based on field surveys and specimen label data. The scientific names of flowering plants were cited from Yonekura & Kajita (2003-).

The subgenus *Ctenonomia* Cameron, 1903

See Michener (2007) for synonymy and diagnosis.

Key to species of the subgenus *Ctenonomia* in Japan

1. Smaller species (body length about 4-6mm) in both sexes; mesoscutum medially with dense granular PP in both sexes (Fig. 11. C, E); basitibial plate of hind leg carinate marginally in male; T_1 basolaterally with a pair of appressed hair tuft in both sexes (Fig. 10. A, B); S_{3-4} posterior margin with dense and moderately long hair tufts in male (Fig. 3. B); gonostylus of male genitalia bud-shaped, with long membranous lobe posteriorly (Figs. 3. C, D; 11. G) [distribution: central and southern Ryukyus]

……***Lasioglossum* (*Ctenonomia*) *kumejimense* (Matsumura et Uchida)**

- Relatively large species (body length about 7-9mm) in both sexes; mesoscutum medially with sparse granular or dense reticulate PP in both sexes (Figs. 4. C, D; 6. C, D); basitibial plate of hind leg without carina marginally in male; T_1 basolaterally without appressed hair tuft in both sexes; S_{3-4} with sparse and moderately long hairs over whole surface in male (Fig. 5. B); gonostylus slender, without lobe or with short membranous lobe posteriorly (Figs. 5. D; 7. B) [distribution: Honshu, Shikoku, northern Ryukyus] ……2

2. IS of supraclypeal area nearly smooth in female; postgena nearly smooth in female; mesoscutum with enamel-like luster, medially with sparse granular PP in both sexes (Fig. 4. C, D, J, K); IS of mesoscutum nearly smooth in both sexes; mesoscutellum with granular PP over whole surface in both sexes (Fig. 4. E, L); lateral slope of propodeal dorsum nearly smooth in female; all tibiae black in male; metasomal terga with enamel-like luster in male; T_1 without striation on disc in both sexes (Fig. 10. C, D); gonostylus without lobe (Fig. 5. D); ventral retrorse lobe of male genitalia slender (Fig. 5. F) [distribution: Honshu, Shikoku]……

……***L.* (*C.*) *blakistoni* Sakagami et Munakata**

- IS of supraclypeal area with distinct reticulation in female (Fig. 6. B); postgena with distinct longitudinal striation in female; mesoscutum dimly shiny, with dense reticulate PP in both sexes (Fig. 6. C, D, J, K); IS of mesoscutum with distinct reticulation in both sexes; mesoscutellum with dense reticulate PP in female, that of male with coarse rugulae (Fig. 6. E, L); lateral slope of propodeal dorsum with coarse rugulae in female; all tibiae basally and apically yellow in male; metasomal terga with oily-dull luster in male; T_1 with distinct striation on disc in both sexes (Fig. 10. E, F); gonostylus with short membranous lobe posteriorly (Fig. 7. B); ventral retrorse lobe broad (Fig. 7. D) [distribution: northern Ryukyus (Yaku-shima)] ……

……***L.* (*C.*) *yakushimense* Murao, Yamauchi et Tadauchi, sp. nov.**

1. *Lasioglossum* (*Ctenonomia*) *kumejimense* (Matsumura et Uchida, 1926)

[Japanese name: Kumejima-kushi-ko-hanabachi]
(Figs. 1; 2. A-L; 3. A-E; 8. A, B; 9. C; 10. A, B; 11. A, C, E, G; 12. C)

Halictus kumejimensis Matsumura et Uchida, 1926, Ins. Mats., 1: 68 [female & male, Japan: Ryukyus (Kumejima)]; Hirashima, 1957, Sci. Bull. Fac. Agr., Kyushu Univ., 16 (1): 10.

Halictus yaeyamensis Matsumura et Uchida, 1926, Ins. Mats., 1: 68 [female, Japan: Ryukyus (Yaeyama Islands)]; Hirashima, 1957, Sci. Bull. Fac. Agr., Kyushu Univ., 16 (1): 24.

Lasioglossum (*Ctenonomia*) *kumejimense*: Sakagami, 1989, Jour. Kansas Entomol. Soc., 62 (4): 509 [key to species-group, female]; Ikudome, 1999, Ident. Guide Aculeata Nansei Is., Jap.: 591-592.

Lasioglossum (*Ctenonomia*) *vagans kumejimense*: Ebmer, 1998, Linzer boil. Beitr., 30 (1): 377.

Lasioglossum (*Evylaeus*) *miyanoi* Tadauchi, 1994, Esakia, (34): 216-218 [female, Mariana Islands: Rota Island] **syn. nov.**

Redescription.

Female. Body length 4.6-6.5mm, wing length 4.0-

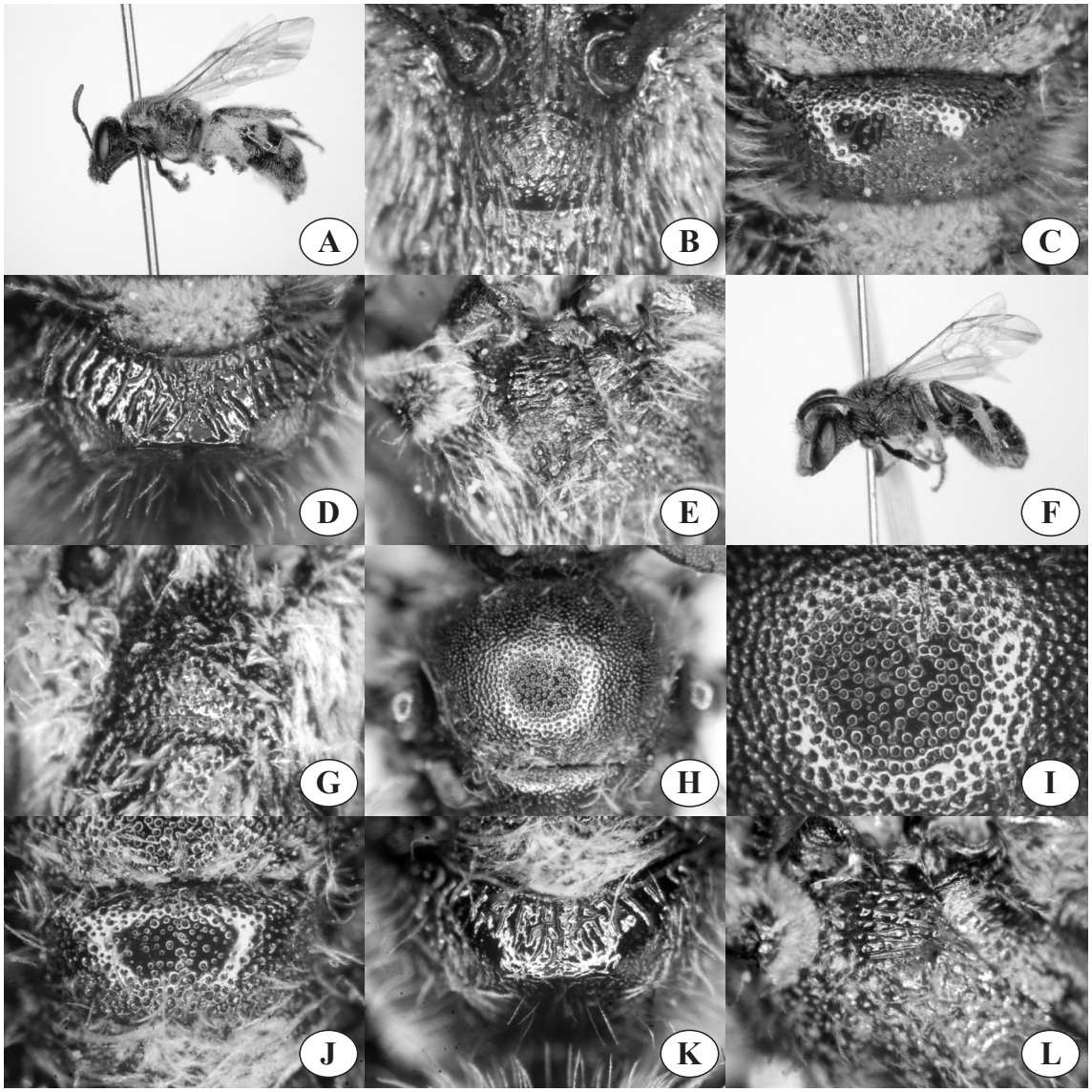

Fig. 2. *Lasioglossum* (*Ctenonomia*) *kumejimense* (Matsumura et Uchida). A-E: female. F-L: male. A, F: general habitus. B, G: supraclypeal area. H: mesoscutum. I: sculpture of mesoscutum. C, J: mesoscutellum. D, K: propodeal dorsum. E, L: mesepisternum.

5.5mm (n= 5).

Color. Body black except on the follwing parts: apical half of mandible reddish brown; flagellum beneath brown, blackish or yellowish brown; tegula yellowish brown, semi-transparent; tibial spur yellow; posterior margin of metasomal terga broadly yellowish brown, semi-transparent. Wings nearly transparent; veins and pterostigma yellowish brown.

Pilosity. Body hairs whitish. Hairs on head and mesosoma with moderately dense fine branched except on the

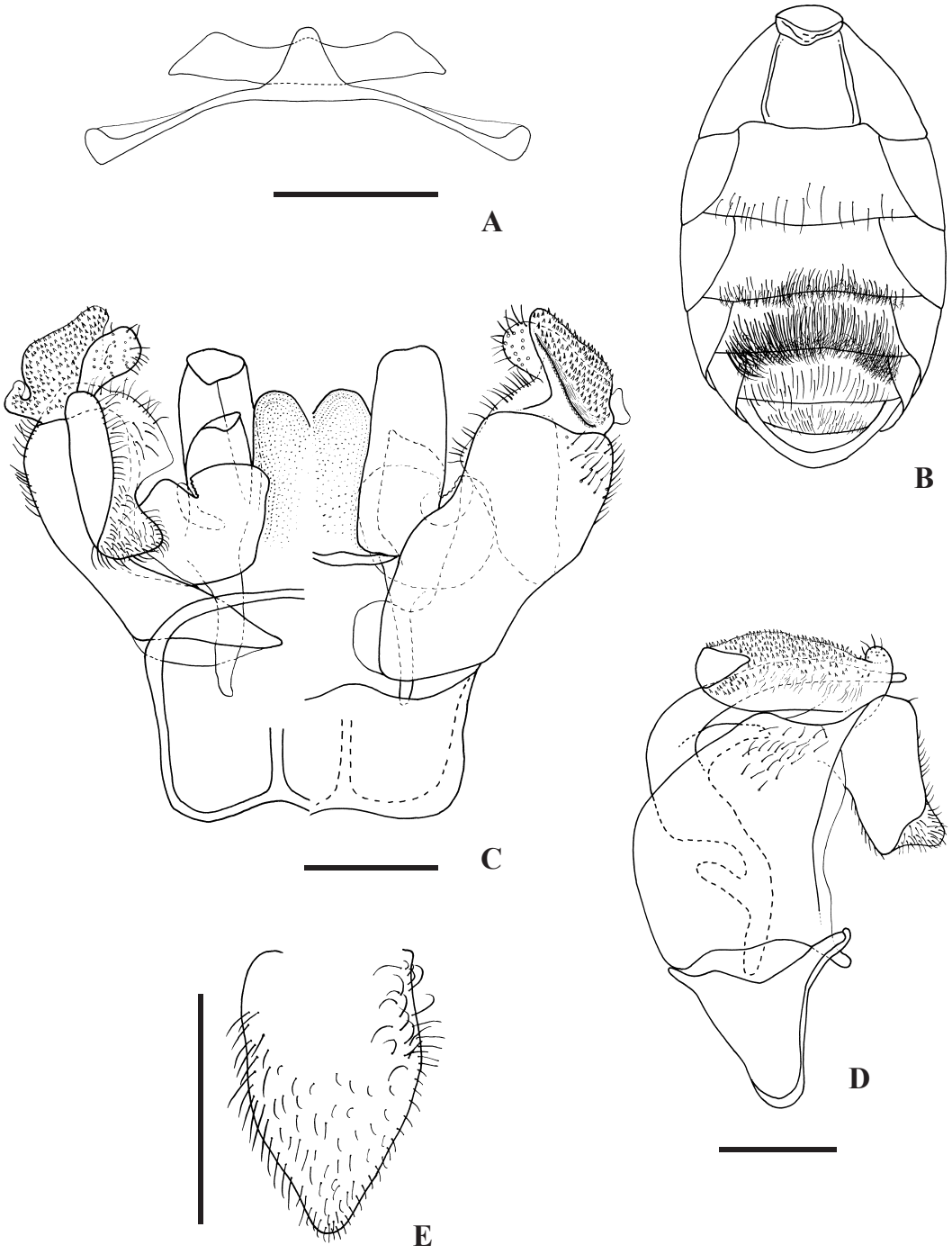

Fig. 3. *Lasioglossum* (*Ctenonomia*) *kumejimense* (Matsumura et Uchida). A-E: male. A: S_{7-8}. B: metasomal sterna. C-E: genitalia. C: left, ventral view; right, dorsal view. D: lateral view. E: ventral retrorse lobe. Scale: A, E, 0.25mm; C, D, 0.2mm.

following parts: lower paraocular area, genal area, dorsal surface of pronotum, and metanotum mixed with dense tomentum; hind trochanter and femur with plumose hairs, forming scopa. T_1 (Fig. 10. A) basolaterally with a pair of appressed hair tuft; medially and posteriorly with sparse short and simple hairs. T_{2-4} with moderately dense short and simple hairs over whole surface. Basal hair bands present on T_{2-4}; bands of T_{3-4} sometimes covering from basal to medial areas on disc. Apical fimbriae on metasomal terga absent.

Structure. Head broader than long (head length/width ratio 0.90-0.94, n= 5). Vertex behind ocelli with weak rugulae. Distance between lateral ocelli about 1.3 times that between lateral ocellus and compound eye. Frons and paraocular area dimly shiny, with reticulate PP. Supraclypeal area (Fig. 2. B) slightly convex in lateral view, weakly shiny, with dense granular PP; IS with distinct reticulation. Clypeus about 1.2 times distance between lower rim of antennal socket and upper margin of clypeus; nearly flat, weakly shiny, with dense granular PP over whole surface; IS without reticulation. Labrum (Fig. 11. A): basal elevation weakly developed; lateral projection on distal process absent; labral fimbriae acutely pointed at apex. Mandible bidentate. Hypostomal carina distinctly developed; its anterior angle obtuse. Occiput not carinate. Postgena with distinct reticulation. Scape length 0.6-0.7mm, F_1 as long as F_2 (n= 5).

Pronotum with dorsolateral angle obtuse; lateral sulcus shallow. Mesoscutum (Fig. 11. C, E) moderately shiny, with dense granular PP over whole surface; IS anteriorly and medially with weak reticulation, posteriorly without reticulation. Mesoscutellum (Fig. 2. C) moderately shiny, marginally and longitudinally with dense granular PP; IS without reticulation. Metanotum and mesepisternum (Fig. 2. E) with coarse rugulae over whole surface. Metepisternum with transverse ridges. Propodeum: propodeal dorsum (Fig. 2. D) about 0.7 times mesoscutellum, and about 1.2 times as long as metanotum, dorsomedially with irregular sinuate ridges that attaining to posterior margin, and dorsolaterally with longitudinal ridges; transverse carina developed only on posterior margin of dorsomedial surface, and delimit between dorsal surface and shield; oblique and lateral carinae clearly present; propodeal side, lateral slope, and shield with weak rugulae. Basitibial plate of hind leg with carina marginally. Inner hind tibial spur (Fig. 1.) with 2-3 teeth (n= 10).

Metasomal terga weakly shiny. T_1 (Fig. 10. A) medially with moderately dense pores, posteriorly with weak striation. T_2 with dense pores over whole surface, medially and posteriorly with weak striation; T_{3-4} with weak striation and dense pores over whole surface.

Male. Body length 4.0-5.5mm, wing length 3.8-4.3mm (n= 5).

Color. Flagellum brown or yellowish brown beneath; lower half of clypeus yellow; pronotal lobe brown or blackish brown; all tibiae basally and apically yellow; all tarsi yellow. Otherwise, as in female.

Pilosity. Supraclypeal area and clypeus with dense tomentum over whole surface; hind trochanter and femur with sparse fine branched hairs. Basal hair bands of T_{3-4} present only on basal area. S_{3-4} (Fig. 3. B) posterior margin with dense and moderately long fine branched hairs. Otherwise, as in female.

Structure. Male differing from female as follows. Head broader than or as broad as long (head length/width ratio 0.96-1.0, n= 5). Distance between lateral ocelli about 1.5 times that between lateral ocellus and compound eye. Supraclypeal area (Fig. 2. G) with reticulate PP. Basal elevation and distal process of labrum absent. Mandible edentate. Postgena with weak reticulation. Scape length 0.3-0.5mm, F_2 about 1.2 times F_1 (n= 5).

Propodeum: propodeal dorsum (Fig. 2. K) about 0.8 times mesoscutellum, and about 1.6 times as long as metanotum, dorsomedially with longitudinal ridges that not attaining to posterior margin, and posterior surface nearly smooth in dorsomedial area; transverse carina weakly developed; shield nearly smooth. Inner hind tibial spur without distinct teeth.

T_{2-3} only posterior margin with very weak striation. S_{7-8} (Fig. 3. A): S_7 with moderately broad, apically rounded median process; S_8 without median process.

Male genitalia (Fig. 3. C-E). Gonobasal ventral arm ring-shaped, connected with each other at upper ends in ventral view; bottom slightly depressed. Gonocoxite apically with sparse short hairs. Gonostylus bud-shaped, with sparse short hairs and pores, posteriorly with long membranous lobe; gonostylus membranous lobe with dense fine setae nearly over whole surface. Ventral retrorse lobe broad and moderately long, with dense short hairs on inner whole surface.

Variation. Color of mandible medially black or yellow in male. Labrum generally black, but sometimes yellow in male.

Remarks. *Lasioglossum* (*Ctenonomia*) *kumejimense* has been often ranked as a subspecies of *L*. (*C*.) *vagans* (Smith) from northern Africa to southeastern Asia. However, it can be clearly separated from *L*. (*C*.) *vagans* by the following morphological characters: distal process of female labrum basally straight (Fig. 11. A); mesoscutum moderately shiny (Fig. 11. C, E) in female; IS of mesoscutum posteriorly without reticulation in female

(Fig. 11. E); gonostylus membranous lobe of male genitalia longer than *L*. (*C*.) *vagans* (Fig. 11. G). In *L*. (*C*.) *vagans*, distal process of female labrum basally contract (Fig. 11. B); mesoscutum dimly shiny (Fig. 11. D, F) in female; IS of mesoscutum posteriorly with distinct reticulation in female (Fig. 11. F); gonostylus membranous lobe shorter than *L*. (*C*.) *kumejimense* (Fig. 11. H).

Distribution. Japan (cental and southern Ryukyus: Takara-jima, Amami-Ôshima, Kikai-jima, Tokuno-shima, Okinoerabu-jima, Izena-jima, Okinawa-jima, Aguni-jima, Kume-jima, Miyako-jima, Tarama-jima, Ishigaki-jima, Taketomi-jima, Iriomote-jima, Yonaguni-jima. Daito Islands: Minamidaito-jima), Taiwan, Mariana Islands. (Rota Island).

Flight record. Both sexes: January to December.

Biology. See Miyanaga & Maeta (1998).

Specimens examined. [**JAPAN**] [**Ryukyus**] Takara-jima, Kagoshima Pref.: 1 male, 4. vi. 2005 (T. Mita). Amami-Ôshima, Kagoshima Pref.: 4 females, Shin village-Nishinakama, 12. iv. 1970 (S. F. Sakagami & H. Fukuda, SCMH), 3. x. 1971 (H. Fukuda, SCMH); 2 females, Mt. Yui-dake, Setouchi town, Ôshima county, 8. iv. 2005 (K. Mitai); 1 female, Shin village, 2. iv. 1958 (M. Takahashi, ELKU); 15 females, Cape Ayamaru, 14. iv. 1970 (S. F. Sakagami & H. Fukuda, SCMH), 26. iii. 1973 (O. Tadauchi, ELKU); 4 females, Ushuku, 26. iii. 1973 (O. Tadauchi, ELKU); 2 females and 1 male, Koniya, 2. iv. 1954 (R. Ishikawa, ELKU), 13. v. 1954 (S. Taniguchi, ELKU); 1 female and 1 male, Kasarizaki, Kasari town, 22. ix. 2006 (R. Murao); 6 females, Naze, 27. vii. 1954 (S. Miyamoto & Y. Hirashima, ELKU), 9. iv. 1970 (S. F. Sakagami & H. Fukuda, SCMH); 2 females and 2 males, Shin village, 22. v. 1954 (S. Taniguchi, ELKU), 4-5. iv. 1956 (S. Miyamoto, ELKU), 9. xi. 1962 (A. Azim, ELKU), 9. xi. 1962 (Y. Miyatake, ELKU); 1 female, Yuwan, 29. iv. 1953 (T. Shiraki, ELKU); 1 female, Mt. Yuwan-dake, 29. vii. 1963 (Y. Hirashima, ELKU); 1 male, 10. iii. 1958 (M. Takahashi, ELKU). Kikai-jima, Kagoshima Pref.: 1 female, Hyakunodai, 20. ix. 2006 (R. Murao). Tokuno-shima, Kagoshima Pref.: 13 females and 7 males, Hiradono, 7. x. 1971 (H. Fukuda, SCMH); 1 female, Kametsu, 13. iv. 1954 (R. Ishikawa, ELKU); 5 females, Kedoku-Inokawa, 16. v. 1954 (S. Taniguchi, ELKU); 1 female, Shikaura, 18. v. 1954 (S. Taniguchi, ELKU); 10 females, Mikyo, 27. vii. 1963 (Y. Hirashima, ELKU); 1 male, Sikaura, 18. v. 1954 (S. Taniguchi, ELKU). Okinoerabu-jima, Kagoshima Pref.: 1 female, Oyama, 6. vii. 1974 (H. Makihara, ELKU). Okinawa-jima, Okinawa Pref.: 2 females and 1 male, Shuri, 18-19. viii. 1958 (T. Hidaka, ELKU), 8. v. 1970 (SCMH); 1 female, Tsunami, 4. v. 1970 (SCMH); 2 females, vi. 1945 (G. E. Bohart, ELKU); 2 females and 1 male, Kudeken, 11. vii. 1971 (S. Yamauchi, ELKU), 22. v. 1974 (H. Makihara, ELKU), 22. v. 1978 (H. Makihara, ELKU); 3 females, Hedo, 5. iv. 1979 (K. Ôhara, ELKU); 11 females and 3 males, Kamishinkawa, Kunigami town, 22. v. 2003 (R. Murao); 4 females and 1 male, Izumi, 22. iii. 1964 (S. Kimoto, ELKU), 22. iii. 1964 (T. Shirôzu, ELKU), 21. x. 1963 (S. Miyamoto, ELKU), 21. x. 1963 (Y. Hirashima, ELKU); 2 females, Shoshi, 23. iii. 1964 (S. Kimoto, ELKU); 36 females and 15 males, Kayauchi-banta, Hentona, 20. x. 1963 (S. Miyamoto, ELKU), 20. x. 1963 (Y. Hirashima, ELKU), 28. iv. 1965 (Y. Hirashima, ELKU); 1 female, Yabu, 13. iv. 1969 (S. Yamauchi, ELKU); 2 females, Katsuyama, 19. iii. 1953 (T. Shiraki, ELKU), 23. v. 1953 (T. Shiraki, ELKU), 23. vi. 1953 (T. Shiraki, ELKU); 1 female, Misato, 21. iv. 1953 (T. Shiraki, ELKU); 5 females, Yona, 25. iv. 1965 (Y. Hirashima, ELKU); 3 females, Ada, Kunigami village, Kunigami county, 22. viii. 2007 (Y. Nishimura); 2 females, Motobu town, Kunigami county, 22. viii. 2007 (Y. Nishimura); 1 male, Ôna town, Naha city, 2. v. 1978 (Okazaki, SCMH); 1 male, Nakagusuku, 17. iii. 1953 (T. Shiraki, ELKU). Kume-jima, Okinawa Pref.: 1 female and 3 males, Gima, 26-27. v. 2003 (R. Murao); 40 females and 37 males, Nakadomari, 26. v. 2003 (R. Murao). Miyako-jima, Okinawa Pref.: 2 females and 2 males, 23. x. 1952 (G. E. Bohart, ELKU); 2 females, 27. x. 1952 (G. E. Bohart, ELKU); 2 females, Karimata, 2. ix. 1958 (T. Hidaka, ELKU); 1 female, Hirara, 9. iii. 1953 (T. Shiraki, ELKU); 1 female and 1 male, Shimoji, 7. iii. 1953 (T. Shiraki, ELKU), 5. ix. 1958 (T. Hidaka, ELKU). Tarama-jima, Okinawa Pref.: 3 females and 7 males, 22. v. 1974 (H. Makihara, ELKU), 27. v. 1974 (H. Makihara, ELKU). Ishigaki-jima, Okinawa Pref.: 9 females and 2 males, Ishigaki-shi, 23. i. 1953 (T. Shiraki, ELKU), 30. i. 1953 (T. Shiraki, ELKU), 17. ii. 1953 (T. Shiraki, ELKU), 27. iv. 1970 (SCMH), 3. v. 1970 (SCMH); 5 females, Yoshihara, 16. x. 1963 (K. Morimoto, ELKU), 3. vi. 2003 (T. Mita); 1 female, Ishigaki-Nagura, 24. vi. 1960 (K. Yasumatsu, ELKU); 1 female, 23. vi. 1972 (O. Tadauchi, ELKU); 2 females and 3 males, Mt. Omoto-dake, 27. vi. 1972 (O. Tadauchi, ELKU); 1 female, Barabido, 25. iii. 1995 (T. Matsumura, SCMH); 3 females, Tonojiro, 7-9. v. 2004 (T. Mita); 3 females, Ishigaki Air Port, 30. x. 1963 (Y. Hirashima, ELKU); 3 females, Kabira, 13. x. 1963 (Y. Hirashima, ELKU); 1 male, Yoshino-Kabira, 23. xi. 1960 (K. Yasumatsu, ELKU). Taketomi-jima, Okinawa Pref.: 14 females and 6 males, 24. i. 1953 (T. Shiraki, ELKU), 22. vi. 1972 (O. Tadauchi, ELKU), 13. xi. 1995 (M. T. Chûjyô, ELKU). Iriomote-jima, Okinawa Pref.: 2 females, 29. iv. 1970 (SCMH), 1 female, 22-27. vii. 2007 (Y. Maeta, MCDS); 18 females

and 4 male, Ôhara, 13. iii. 1964 (T. Shirôzu, ELKU), 22. xi. 1960 (K. Yasumatsu, ELKU), 13. iii. 1964 (S. Kimoto, ELKU), 25. iv. 1969 (S. Yamauchi, ELKU), 28. iv. 1970 (SCMH), 23. vii. 2005 (O. Tadauchi, ELKU); 64 females, Funaura, 15. iii. 2005 (R. Murao), 17. iii. 2005 (R. Murao), 26. vii. 2005 (O. Tadauchi, ELKU), 5. ii. 2008 (K. Mitai); 8 females and 1 male, Ôhara temple, Haemi-Ôhara, Taketomi town, 4. ii. 2008 (K. Mitai); 4 females, Uehara, 9. iii. 1984 (K. Yamauchi, SCMH); 38 females and 5 males, Ôtomi, 21. xi. 1960 (K. Yasumatsu, ELKU), 9. vii. 2004 (R. Murao), 16. iii. 2005 (R. Murao); 8 females, Amitori, 22. iii. 1985 (M. Iwata, ALKK); 7 females and 2 males, Nakama road, 23. vii. 2005 (O. Tadauchi, ELKU); 17 females and 4 males, Sumiyoshi, 24. vii. 2005 (O. Tadauchi, ELKU); 31 females and 7 males, Sumiyoshi beach, 24. vii. 2005 (O. Tadauchi, ELKU); 2 females, Urauchi-Hoshidate, 27. vii. 2005 (O. Tadauchi, ELKU); 1 female, Yabu pass, 24. vi. 1972 (O. Tadauchi, ELKU); 6 females, Haemida, 9. vii. 2004 (R, Murao); 7 females, Mihara, 10. vii. 2004 (R. Murao); 4 females and 2 males, Nakano, 10-11. vii. 2004 (R. Murao); 12 females and 5 males, near Urauchi river, 18. v. 2007 (R. Murao); 1 female, Shirahama, 11. vii. 2004 (R. Murao); 8 females, Sonai, 15. iii. 2005 (R. Murao); 1 female and 1 male, Komi pond, 27. xii. 2006 (T. Ishizaki); 1 female, Urauchi, 23. iii. 1995 (T. Matsumura, SCMH); 1 female, Funauki, 7. i. 1953 (T. Shiraki, ELKU); 9 females, 20-21. i. 1953 (T. Shiraki, ELKU); 1 male, Haemi-Ôhara, Taketomi town, 6. ii. 2008 (K. Mitai); 2 males, Haemida beach, 23. vii. 2005 (O. Tadauchi, ELKU); 2 males, Ôtomi road, 9. vii. 2004 (R. Murao); 1 male, Hoshidate, 25. v. 2003 (T. Mita). Yonaguni-jima, Okinawa Pref.: 4 females, Mantabaru, 20-21. iii. 2005 (R. Murao); 3 females, 20-21. iii. 2005 (R. Murao); 1 female, Mt. Urabu-dake, 21. iii. 2005 (R. Murao); 3 females, near Mt. Inbi-dake, 20-21. iii. 2005 (R. Murao); 6 females, near Mt. Urabu-dake, 20-21. iii. 2005 (R. Murao); 4 females, near Yonaguni Air Port, 9. ix. 2004 (S. & K. Arai), 20. iii. 2005 (R. Murao); 21 females and 20 males, Sonai, 27. v. 1983 (Y. Haneda, SCMH), 25. v. 2003 (T. Mita), 31. v. 2003 (T. Mita), 7. vi. 2003 (T. Mita), 29. iv.-5. v. 2004 (T. Mita), 30. vi. 2004 (T. Mita), 20. iii. 2005 (R. Murao); 1 female and 9 males, 9-11. iii. 1995 (T. Matsumura, SCMH), 30. v. 2003 (T. Mita); 35 females and 5 males, Mt. Kurabu-dake, 28. iv.-5. v. 2004 (T. Mita); 6 females, 30. v. 2003 (T. Mita); 3 males, Kabura, 7. vi. 2003 (T. Mita); 1 male, Tarumi, 30. iv. 2004 (T. Mita). [**JAPAN**][**Daito Islands**] Minamidaito-jima, Okinawa Pref.: 1 female, Kita, 9. viii. 2007 (R. Murao); 30 females, Kyutou, 8-9. viii. 2007 (R. Murao), 11. viii. 2007 (R. Murao); 4 females, Shioya seashore, Zaisho, 8. viii. 2007 (R. Murao); 7 females, Zaisho, 7-8. viii. 2007 (R. Murao). [**TAIWAN**] 2 females and 1 male, Hengchun 18. v., 19. v. 1971 (K. Kanmiya, ELKU); 1 female, Taihoku, 7. vii. 1932 (T. Esaki, ELKU); 1 male, Fenshuiting, 25. iii. 2004 (T. Mita). [**Mariana Islands**] 1 female, Rota Island, southern Mariana Islands, 13. vi. 1992 (S. Miyano, ELKU: paratype of *Lasioglossum miyanoi*).

2. *Lasioglossum* (*Ctenonomia*) *blakistoni* Sakagami et Munakata, 1990

[Japanese name: Burakiston-kushi-ko-hanabachi]
(Figs. 4. A-N; 5. A-F; 8. C, D; 9. A, B; 10. C, D; 12. A)

Lasioglossum (*Ctenonomia*) *blakistoni* Sakagami et Munakata, 1990, Zool. Sci., 7: 985-986 [female & male, Japan: Aomori Pref.]; Tadauchi et al., 1998, Nat. Hist. Bull. Ibaraki Univ., 2: 231; Ebmer, 1998, Linzer boil. Beitr., 30 (1): 376.

Redescription.

Female. Body length 7.2-8.1mm, wing length 6.7-7.1mm (n= 5).

Color. Body black except on the following parts: apical half of mandible reddish brown; flagellum beneath blackish brown or brown; tegula brown or blackish brown, semi-transparent; tibial spur yellow; posterior margin of metasomal terga narrowly yellowish brown, semi-transparent. Wings nearly transparent; veins yellowish brown; pterostigma brown or blackish brown.

Pilosity. Generally, body hairs whitish to pale brown; mesoscutellum with sparse admixture of dark hairs. Hairs on head and mesosoma with moderately dense fine branched except on the following parts: dorsal surface of pronotum, metanotum mixed with dense tomentum; hind trochanter and femur with plumose hairs, forming scopa. T_1 (Fig. 10. C) basally and laterally with sparse fine branched hairs. T_2 laterally and posteriorly with sparse simple and short hairs. T_{3-4} with moderately dense simple and short hairs over whole surface. Basal hair bands present on T_{2-4}. Apical fimbriae on metasomal terga absent.

Structure. Head broader than or as broad as long (head length/width ratio 0.93-1.0, n= 5). Vertex behind ocelli with weak rugulae. Distance between lateral ocelli about 1.1 times that between lateral ocellus and compound eye. Frons and paraocular area weakly shiny, with reticulate PP. Supraclypeal area (Fig. 4. B) slightly convex in lateral view, weakly shiny, with sparse or moderately dense granular PP; IS without reticulation. Clypeus as long as distance between lower rim of antennal socket

and upper margin of clypeus; nearly flat, weakly shiny, with moderately dense granular PP over whole surface; IS without reticulation. Labrum (Fig. 9. A): basal elevation weakly developed; lateral projection of distal process small; labral fimbriae acutely pointed at apex. Mandible bidentate. Hypostomal carina distinctly developed; its anterior angle obtuse. Occiput not carinate. Postgena nearly smooth. Scape length 1.0 mm, F_1 as long as F_2 (n= 5).

Pronotum with dorsolateral angle obtuse; lateral

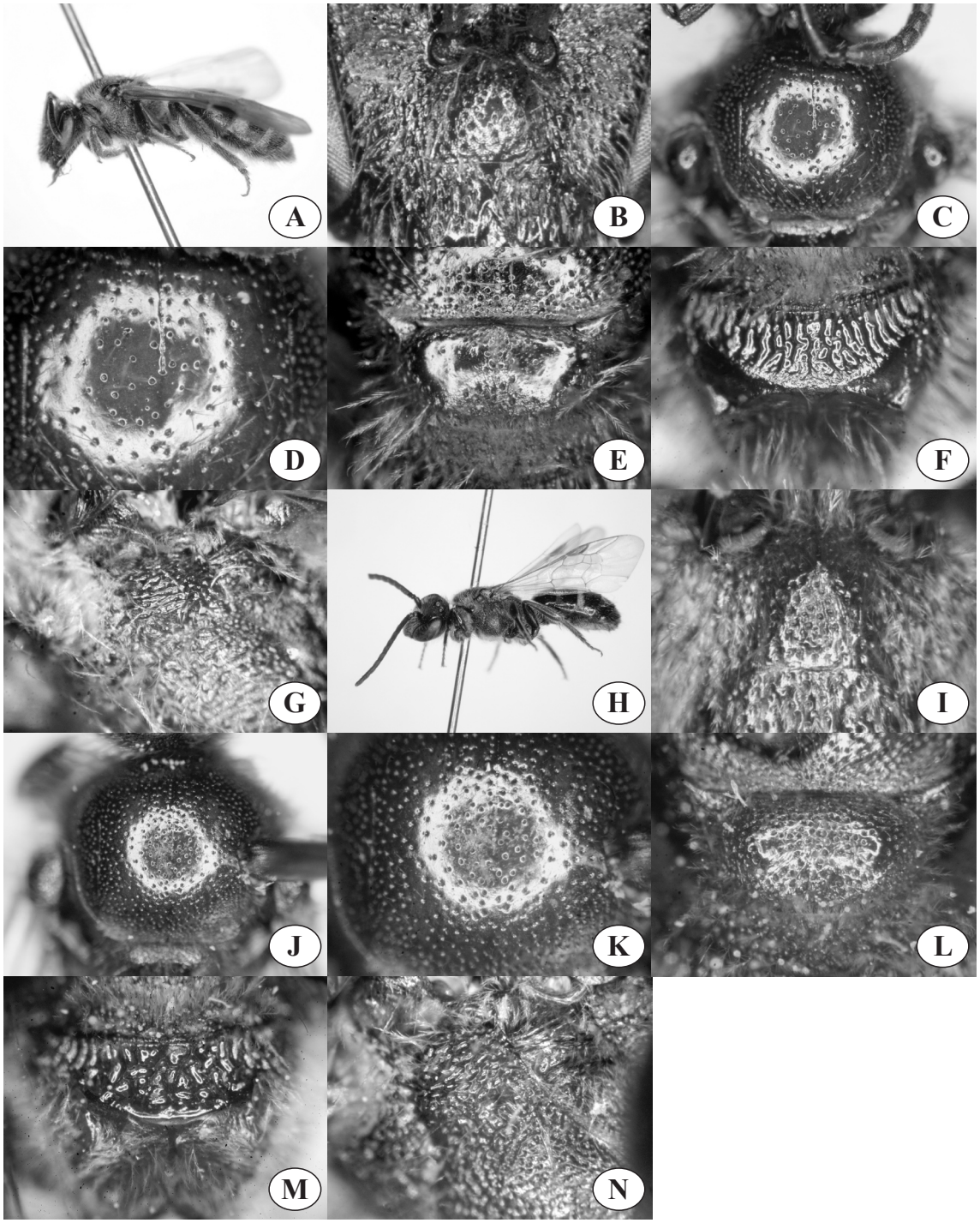

Fig. 4. *Lasioglossum* (*Ctenonomia*) *blakistoni* Sakagami et Munakata. A-G: female, paratype. H-N: male, paratype. A, H: general habitus. B, I: supraclypeal area. C, J: mesoscutum. D, K: sculpture of mesoscutum. E, L: mesoscutellum. F, M: propodeal dorsum. G, N: mesepisternum.

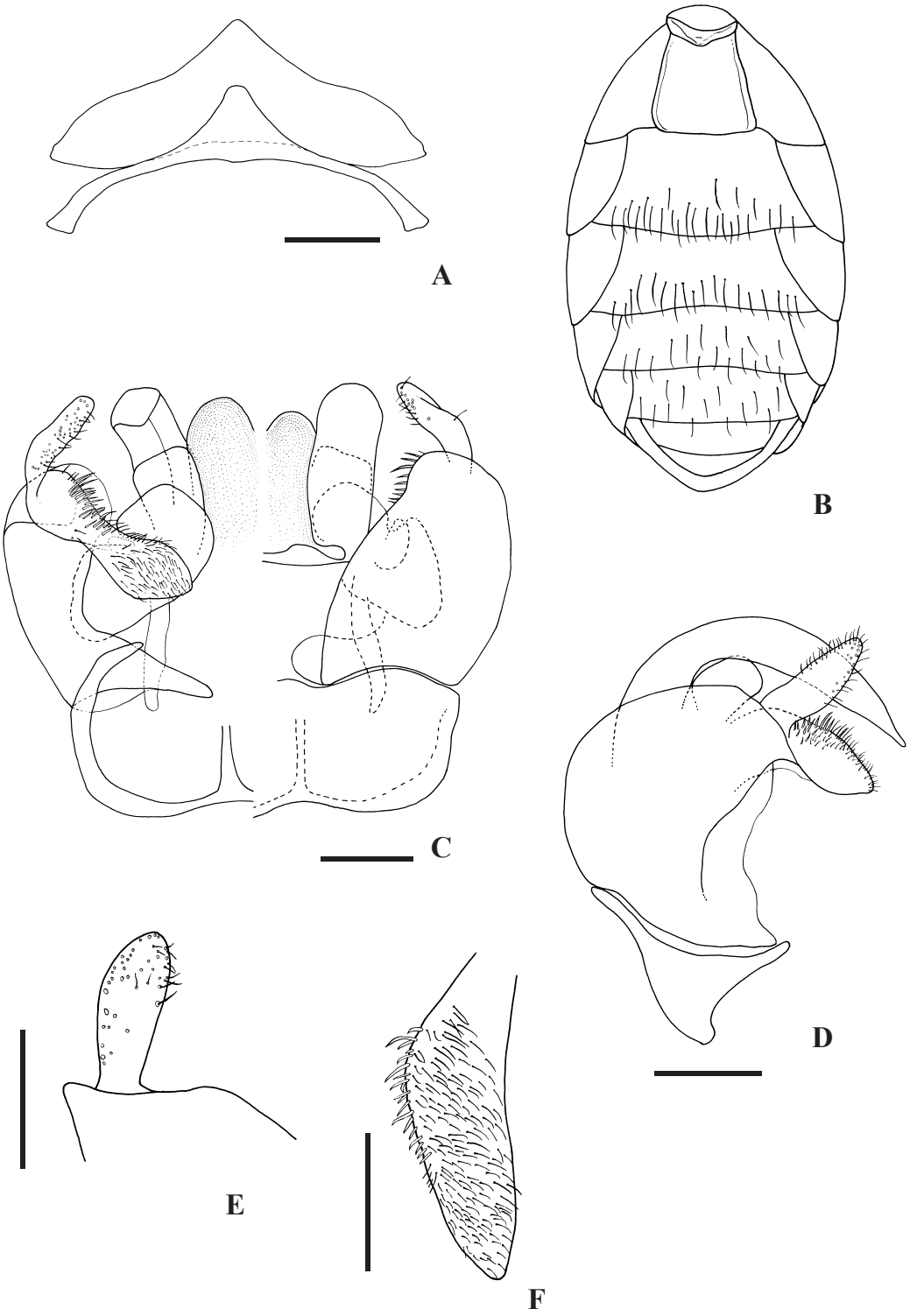

Fig. 5. *Lasioglossum* (*Ctenonomia*) *blakistoni* Sakagami et Munakata. A-F: male, paratype. A: S_{7-8}. B: metasomal sterna. C-F: genitalia. C: left, ventral view; right, dorsal view. D: lateral view. E: gonostylus in upper view. F: ventral retrorse lobe. Scale: 0.2mm.

sulcus shallow. Mesoscutum (Fig. 4. C, D) moderately shiny, medially with sparse granular PP, marginally with moderately dense granular PP; IS without reticulation over whole surface. Mesoscutellum (Fig. 4. E) moderately shiny, marginally and longitudinally with sparse granular PP; IS without reticulation. Metanotum, mesepisternum (Fig. 4. G), and metepisternum with coarse rugulae over whole surface. Propodeum: propodeal dorsum (Fig. 4. F) about 0.9 times mesoscutellum, and about 1.4 times as long as metanotum; dorsomedially with irregular sinuate ridges that attaining to posterior margin, dorsolaterally with longitudinal ridges; transverse carina absent; oblique and lateral carinae clearly present; propodeal side with coarse rugulae; shield and lateral slope nearly smooth. Basitibial plate of hind leg present carina marginally. Inner hind tibial spur with 2-4 teeth (n= 10).

Metasomal terga weakly shiny. T_1 (Fig. 10. C) without striation over whole surface, medially and posteriorly with moderately dense granular PP. T_{2-4} with distinct striation and moderately dense pores over whole surface.

Male. Body length 6.6-8.0mm, wing length 6.5-7.0mm (n= 5).

Color. Mandible medially and lower half of clypeus yellow. Otherwise, as in female.

Pilosity. Lower paraocular area with moderately dense tomentum; mesoscutellum without dark hairs; metanotum with sparse tomentum; hind trochanter and femur with sparse fine branched hairs; T_{3-4} with sparse simple and short hairs over whole surface. Basal hair bands present on T_{2-3} or sometimes T_{2-4}. otherwise, as in female.

Structure. Male differing from female as follows. Head as broad as long (head length/width ratio 1.0, n= 5). Distance between lateral ocelli about 1.3 times that between lateral ocellus and compound eye. Clypeus about 1.5 times distance between lower rim of antennal socket and upper margin of clypeus; with sparse granular PP over whole surface. Basal elevation and distal process of labrum absent. Mandible edentate. Scape length 0.4-0.5mm, F_2 2.0-2.4 times F_1 (n= 5).

Mesoscutellum (Fig. 4. L) marginally and longitudinally with moderately dense granular PP. Propodeum: propodeal dorsum (Fig. 4. M) about 0.8 times mesoscutellum, and about 1.5 times as long as metanotum, with coarse ridges over whole surface; transverse carina present; oblique carina absent; shield and lateral slope with coarse rugulae. Basitibial plate of hind leg without carina marginally. Inner hind tibial spur without distinct teeth.

T_{2-4} without striation over whole surface. S_{7-8} (Fig. 5. A) with short and moderately broad, apically rounded median process.

Male genitalia (Fig. 5. C-F). Gonobasal ventral arm ring-shaped, not connected with each other at upper ends in ventral view; bottom slightly depressed. The surface of gonocoxite smooth. Gonostylus slender, with sparse short hairs and pores. Ventral retrorse lobe slender, with dense short hairs over inner whole surface.

Variation. T_1 generally without striation over whole surface, but sometimes posteriorly with weak striation in female.

Remarks. See Sakagami & Munakata (1990).

Distribution. Japan (Honshu, Shikoku).

Flight record. Female: middle May to early October. Male: late August to October.

Biology. Unknown.

Specimens examined. Paratypes: 2 females, Zaimoku, Shimokita Peninsula, Aomori Pref., Honshu, **JAPAN**, 20. ix. 1967, 27. ix. 1967 (Y. Nakamura, SCMH); 3 males, Akagawa, Shimokita Peninsula, 18. ix. 1968, 28. ix. 1968, 5. x. 1968 (Y. Harada, SCMH). *Other materials* [**JAPAN**] [**Honshu**] Aomori Pref.: 2 females, Kogawara, Kamikita town, 30. v. 1976 (O. Tadauchi, ELKU); 4 females, Moya, Aomori city, 30-31. v. 1975 (O. Tadauchi, ELKU); 2 females, Nishihiranai, Hiranai town, 30. v. 1976 (O. Tadauchi, ELKU); 1 male, Shimokita Peninsula, 20. ix. 1967 (Y. Nakamura, SCMH). Fukushima Pref.: 2 females, Nakayama, Kôriyama, 23. v. 1975 (O. Tadauchi, ELKU). Niigata Pref.: 1 female, Akakura spa., southern Echigo, 22. ix. 1984 (K. Baba, ELKU); 1 female, Gatsugi, Sanpoku, northern Echigo (K. Baba, ELKU); 1 female, Hanadate, Arakawa, northern Echigo (K. Baba, ELKU); 4 females, Kurokawa, northern Echigo (K. Baba, ELKU); 1 female, and 1 male, Nunobe, northern Echigo, 27. ix. 1987 (K. Baba, ELKU); 2 females, Sarusawa, northern Echigo, 26. ix. 1985 (K. Baba, ELKU); 1 female, Sasagawa, Nishimikawa, Sado-ga-shima, 12. v. 1985 (K. Baba, ELKU); 1 female and 1 male, Seki spa., southern Echigo, 22. ix. 1984 (K. Baba, ELKU); 1 female, Senami, northern Echigo (K. Baba, ELKU); 2 females, Tsunagi, Mikawa, northern Echigo, 24. v. 1985 (K. Baba, ELKU); 1 male, Mt. Kurohime, Takayanagi, southern Echigo, 17. ix. 1980 (K. Baba, ELKU). Tochigi Pref.: 1 male, Nikko, 10. ix. 1984 (O. Pellmyr, SCMH). Nagano Pref.: 1 female, Ôyanohara, Mt. Shirouma-dake, 15. v. 1976 (O. Tadauchi, ELKU). Fukui Pref.: 1 female, Kamikoike, Ôno city, 14. v. 2002 (K. Mitai); 1 female, Koike, Ôno city, 14. v. 2002 (K. Mitai); 1 female, Taniyama, 15. ix. 1977 (T. Tano, ELKU); 2 females, Yashagaike, 7. vi. 1970 (T. Tano, ELKU); 2 males, Kamiuchiha, Ôno city, 28. viii. 2004 (T. Sugimoto); 1 male, Mt. Akausagi-yama, Ôno city, 25. ix. 2002 (K. Mitai); 1 male, Mt. Daicho, Katsuyama city, 27.

viii. 2004 (T. Sugimoto); 1 male, Nôgô-Hakusan, Ôno city, 14. ix. 1982 (Y. Haneda, SCMH); 4 males, Shimokoike, Ôno city, 26. viii. 2004 (T. Sugimoto); 1 male, Arashi, 2. x. 1977 (T. Tano, ELKU). Gifu Pref.: 1 female, Hirugano, Takasu village, 7. x. 1974 (K. Yamauchi, SCMH); 1 male, Tokuyama, 10. x. 1976 (K. Yamauchi, SCMH). Kyoto Pref.: 1 female, Ashuu, 8. vi. 1986 (T. Kakutani, SCMH); 1 male, Asoga, Kibune, 8. x. 1986 (M. Kato, SCMH).

3. *Lasioglossum* (*Ctenonomia*) *yakushimense* Murao, Yamauchi et Tadauchi sp. nov.

[Japanese name: Yakushima-kushi-ko-hanabachi]
(Figs. 6. A-N; 7. A-E; 8. E, F; 10. E, F; 12. B)

Description.

Female. Body length 9.5mm, wing length 6.0mm (n= 1).

Color. Body black except on the following parts: apical half of mandible reddish brown; flagellum beneath blackish brown; tegula yellowish brown, semi-transparent; tibial spur yellowish brown; posterior margin of metasomal terga narrowly yellowish brown, semi-transparent. Wings nearly transparent; veins and pterostigma blackish brown.

Pilosity. Body hairs whitish. Hairs on head and mesosoma with moderately dense fine branched except on the following parts: lateral surface of pronotum mixed with dense tomentum; hind trochanter and femur with plumose hairs, forming scopa. T_1 (Fig. 10. E) basally and laterally with moderately dense fine branched hairs. T_{2-4} with moderately dense simple and short hairs over whole surface. Basal hair bands slightly present on T_2. Apical fimbriae on metasomal terga absent.

Structure. Head broader than long (head length/width ratio 0.94, n= 1). Vertex behind ocelli with weak rugulae. Distance between lateral ocelli about 1.2 times that between lateral ocellus and compound eye. Frons and paraocular area weakly shiny, with reticulate PP. Supraclypeal area (Fig. 6. B) slightly convex in lateral view, dimly shiny, with moderately dense granular PP; IS with distinct reticulation. Clypeus about 1.1 times distance between lower rim of antennal socket and upper margin of clypeus; nearly flat, weakly shiny, with moderately dense granular PP over whole surface; IS without reticulation. Labrum not examined. Mandible bidentate. Hypostomal carina distinctly developed; its anterior angle obtuse. Occiput not carinate. Postgena with distinct striation. Scape length 1.0mm, F_1 as long as F_2 (n= 1).

Pronotum with dorsolateral angle obtuse; lateral sulcus shallow. Mesoscutum (Fig. 6. C, D) dimly shiny, with reticulate PP over whole surface; IS with distinct reticulation over whole surface. Mesoscutellum (Fig. 6. E) weakly shiny, sculpture similar to mesoscutum. Metanotum, mesepisternum (Fig. 6. G), and metepisternum with coarse rugulae over whole surface. Propodeum: propodeal dorsum (Fig. 6. F) about 0.8 times mesoscutellum, and about 1.3 times as long as metanotum, with coarse irregular sinuate ridges that attaining to posterior margin over whole surface; transverse carina absent; oblique and lateral carinae clearly present, former carina delimit between dorsal surface and sheild; propodeal side, shield, and lateral slope with coarse rugulae. Basitibial plate of hind leg present carina marginally. Inner hind tibial spur with 3 teeth (n= 1).

Metasomal terga weakly shiny. T_1 (Fig. 10. E) medially and posteriorly with moderately dense fine PP and distinct striation. T_{2-4} with distinct striation and moderately dense pores over whole surface.

Male. Body length 7.1mm, wing length 6.1mm (n= 1).

Color. Mandible medially and labrum yellow; all tibiae basally and apically yellow; all tarsi yellowish brown. Otherwise, as in female.

Pilosity. Body hairs pale yellowish brown; supraclypeal and lower paraocular areas, metepisternum, and propodeal side with dense tomentum; hind trochanter and femur with sparse fine branched hairs; basal hair bands on metasomal terga present on T_{2-4}. Otherwise, as in female.

Structure. Male differing from female as follows. Head broader than or as broad as long (head length/width ratio 0.96-1.0, n= 2). Distance between lateral ocelli about 1.2 times that between lateral ocellus and compound eye. Frons and paraocular area dimly shiny. Supraclypeal area (Fig. 6. I) with reticulate PP. Clypeus about 1.6 times distance between lower rim of antennal socket and upper margin of clypeus. Labrum not examined. Mandible edentate. Postgena nearly smooth. Scape length 0.4mm, F_2 about 1.3 times F_1 (n= 2).

Mesoscutellum (Fig. 6. L) with coarse rugulae. Propodeal dorsum (Fig. 6. M) about 0.8 times mesoscutellum, and about 1.5 times as long as metanotum. Basitibial plate of hind leg without carina marginally. Inner hind tibial spur without distinct teeth.

Metasomal terga with oily-dull luster. S_7 not examined. S_8 (Fig. 7. E) with small, apically rounded median process.

Male genitalia (Fig. 7. A-D). Gonobasal ventral arm ring-shaped, connected with each other at upper ends in ventral view; bottom slightly depressed. The surface of gonocoxite smooth. Gonostylus slender, with sparse short

hairs and pores, posteriorly with short membranous lobe that with dense short hairs marginally. Ventral retrorse lobe long and broad, with dense short bristles and sparse hairs.

Remarks. Similar species is not found from eastern Asia in the present study. It is characteristic in having the mesoscutum dimly shiny, with dense reticulate PP in both sexes; IS of mesoscutum with distinct reticulation in both sexes; T_1 with distinct striation on disc in both sexes; and gonostylus of male genitalia slender, with short mem-

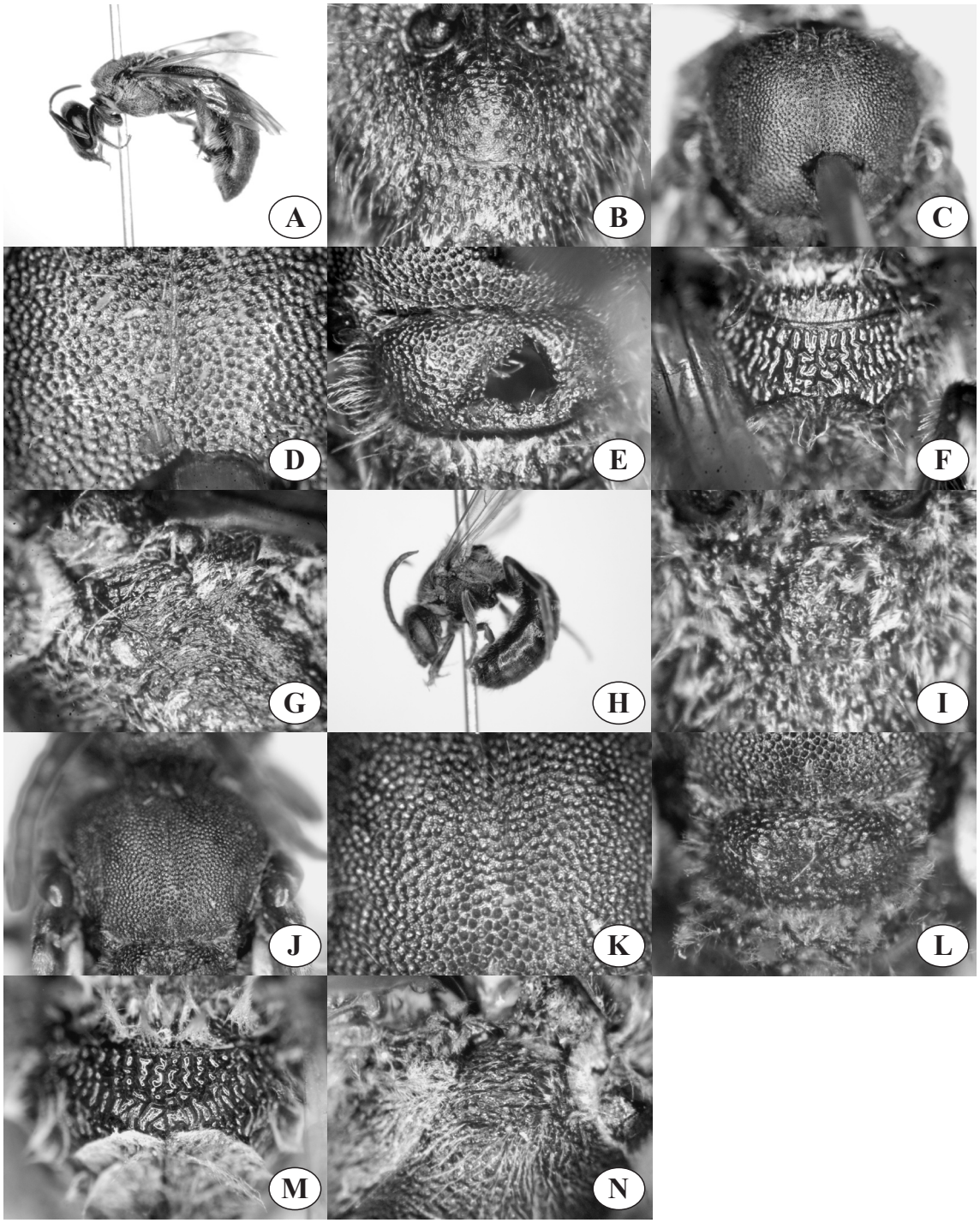

Fig. 6. *Lasioglossum* (*Ctenonomia*) *yakushimense* Murao, Yamauchi et Tadauchi, sp. nov. A-G: female, holotype. H-N: male, paratype. A, H: general habitus. B, I: supraclypeal area. C, J: mesoscutum. D, K: sculpture of mesoscutum. E, L: mesoscutellum. F, M: propodeal dorsum. G, N: mesepisternum.

branous lobe posteriorly.

Etymology. The specific name is derived from the type locality, Yaku-shima, northern Ryukyus, Japan.

Distribution. Japan (northern Ryukyus: Yaku-shima).

Flight record. Female: late July to late August. Male: late June to late August.

Biology. Unknown.

Type material. Holotype: female, Mt. Aiko-dake, Yaku-shima, Kagoshima Pref., Ryukyus, **JAPAN**, collected by Malaise trap (AN3, 170m alt.), 22. vii.-22.viii. 2006 (T. Yamauchi et al.) (Type. No. 3300). Paratypes. [**JAPAN**] [**Ryukyus**] 1 male, Kankake, Yaku-shima, Kagoshima Pref., collected by Malaise trap (K2, 220m alt.) 22. vii.-22.viii. 2006 (T. Yamauchi et al.); 1 male, same locality as the holotype, 28. vi.-29. vii. 2007 (T. Yamauchi et al.).

Type depository. The holotype and two paratypes are deposited in the ELKU.

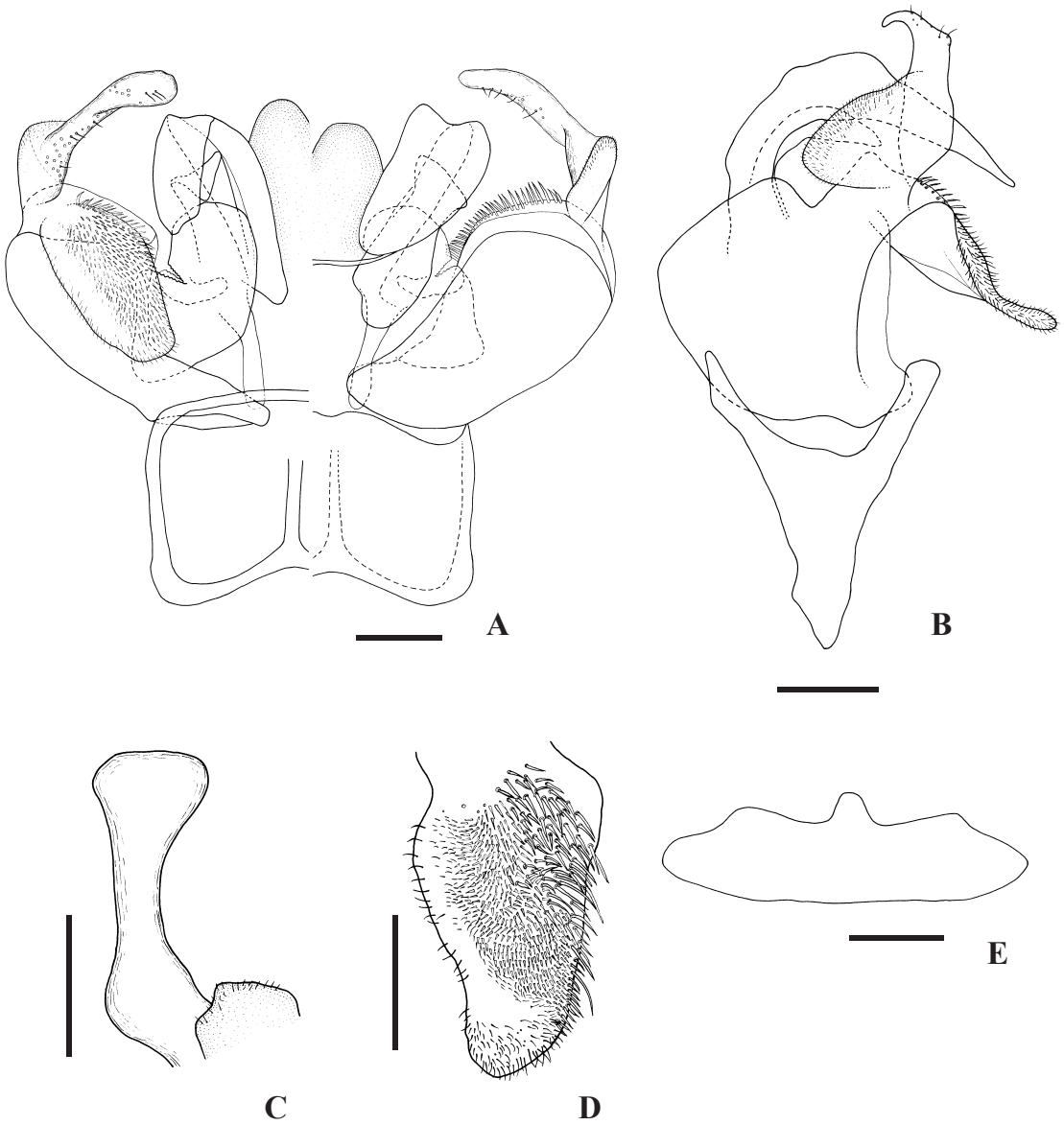

Fig. 7. *Lasioglossum* (*Ctenonomia*) *yakushimense* Murao, Yamauchi et Tadauchi, sp. nov. A-E: male, paratype. A-D: genitalia. E: S_8. A: left, ventral view; right, dorsal view. B: lateral view. C: gonostylus in upper view. D: ventral retrorse lobe. Scale: 0.2mm.

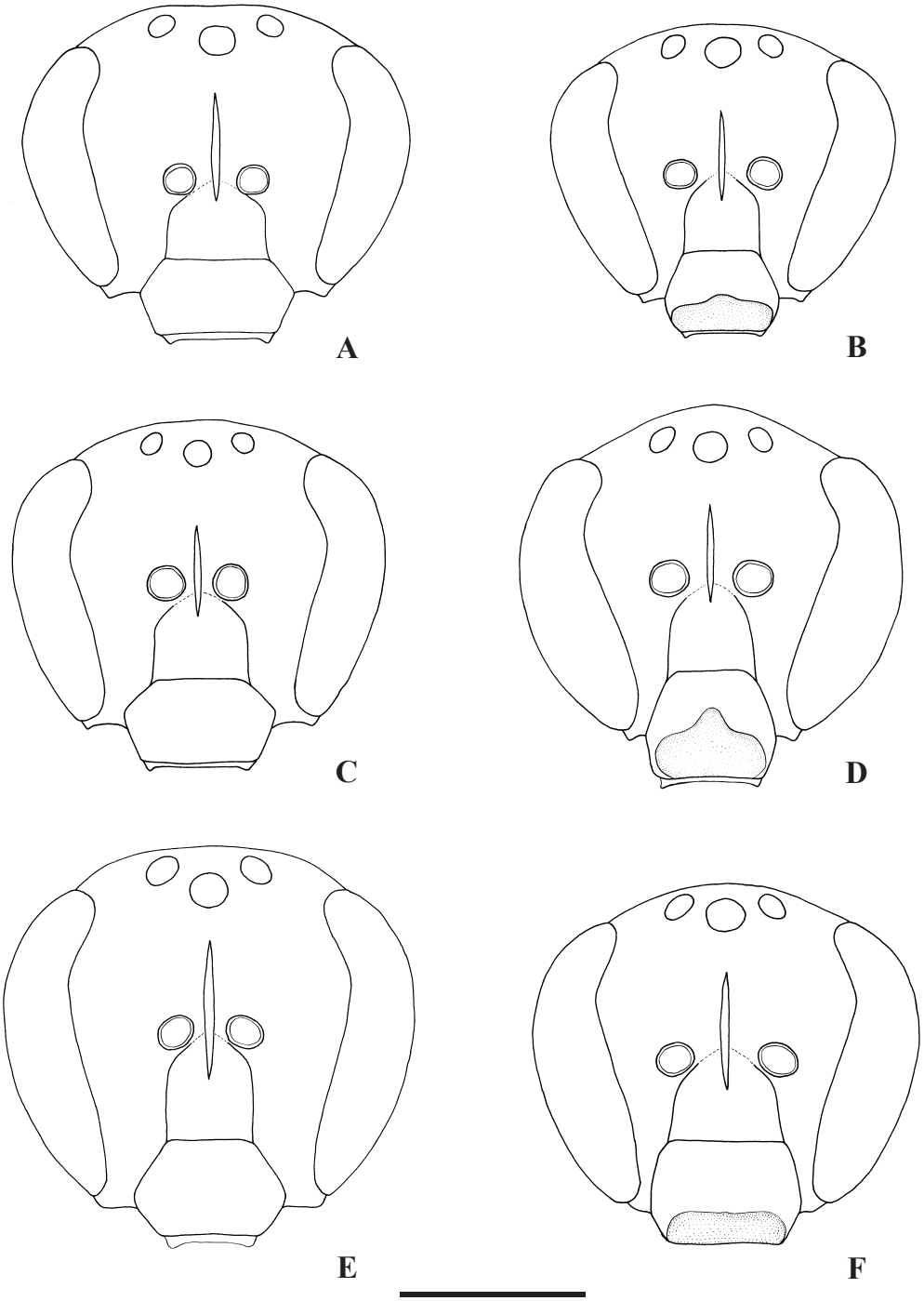

Fig. 8. Head in frontal view (dotted area indicates yellow coloration). A, B: *Lasioglossum* (*Ctenonomia*) *kumejimense* (Matsumura et Uchida). C, D: *Lasioglossum* (*Ctenonomia*) *blakistoni* Sakagami et Munakata. E, F: *Lasioglossum* (*Ctenonomia*) *yakushimense* Murao, Yamauchi et Tadauchi, sp. nov. A, C, E: female. B, D, F: male. E: holotype. C, D, F: paratypes. Scale: 1mm.

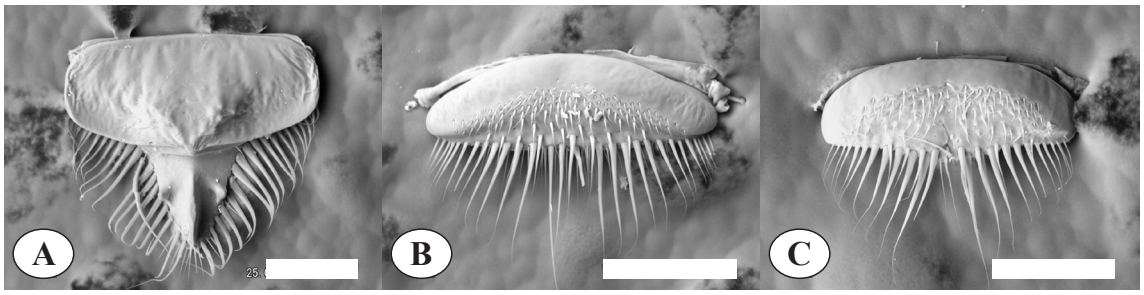

Fig. 9. Labrum. A, B: *Lasioglossum* (*Ctenonomia*) *blakistoni* Sakagami et Munakata. C: *Lasioglossum* (*Ctenonomia*) *kumejimense* (Matsumura et Uchida). A: female. B, C: male. Scale: A, C, 0.2mm; B, 0.25mm.

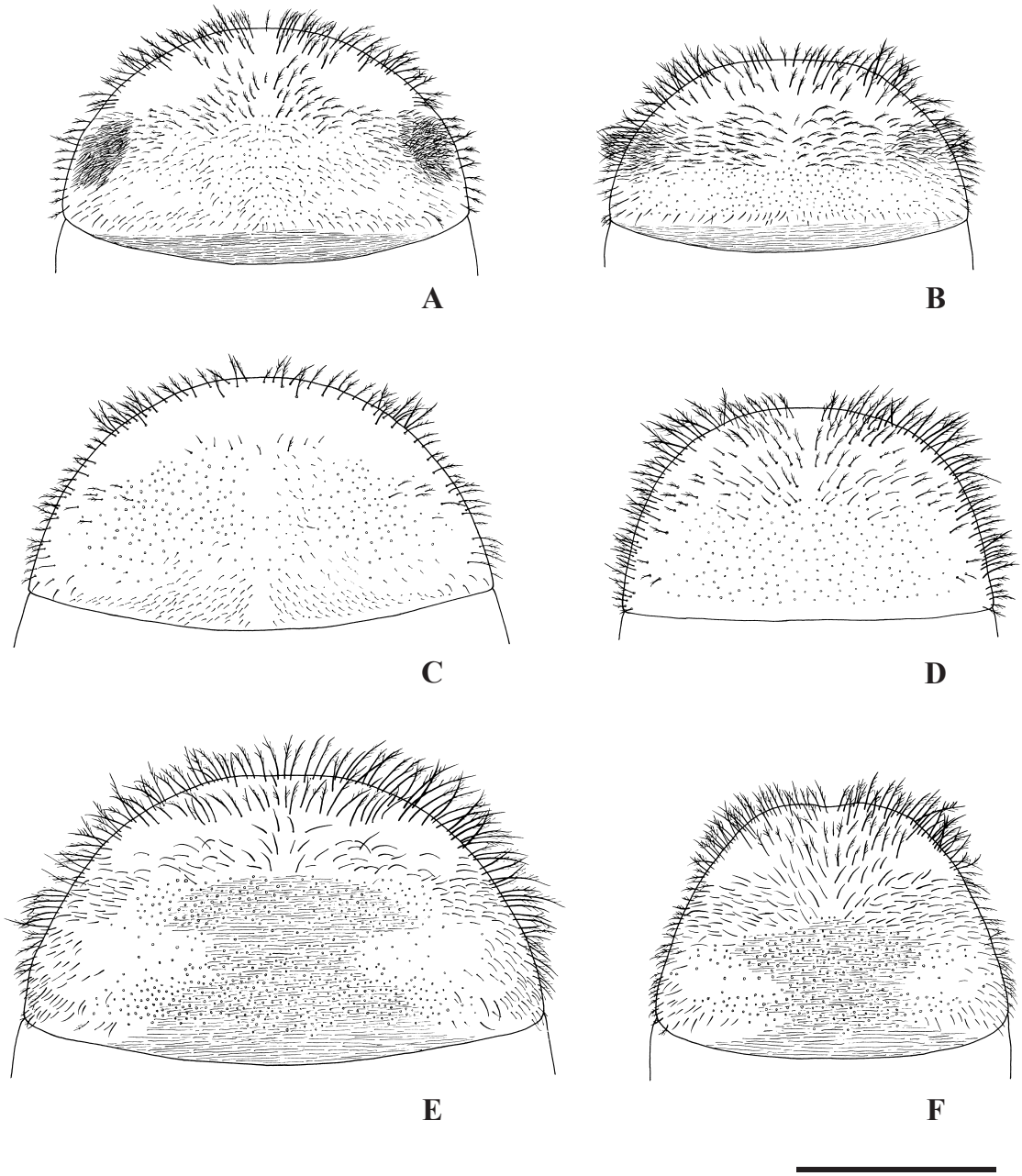

Fig. 10. 1st metasomal tergum. A, B: *Lasioglossum* (*Ctenonomia*) *kumejimense* (Matsumura et Uchida). C, D: *Lasioglossum* (*Ctenonomia*) *blakistoni* Sakagami et Munakata. E, F: *Lasioglossum* (*Ctenonomia*) *yakushimense* Murao, Yamauchi et Tadauchi, sp. nov. A, C, E: female. B, D, F: male. E: holotype. C, D, F: paratypes. Scale: 1mm.

Species removed from the Japanese fauna

Lasioglossum (*Ctenonomia*) *vagans* (Smith, 1857)

(Fig. 11. B, D, F, H)

Halictus vagans Smith, 1857, Jour. Proc. Linn. Soc. Zool., 2: 42 [female, Indonesia: Sarawaku, Borneo Is.]; Dalla Torre, 1896, Cat. Hym., 10: 89; Blüthgen, 1931, Zool. Jahrb., Abt. Syst., 61: 327 [in list]; Yasumatsu, 1935, Fukuoka Hakubutsugaku Zasshi, 1: 385 [in list]; Baltazar, 1966, Pac. Ins. Mon., 8: 367-368.

Halictus cattulus Vachal, 1894, Ann. Mus. Civ. Genova, 34: 437 [female, Myanmar]; Dalla Torre, 1896, Cat. Hym., 10: 57; Blüthgen, 1926, Deutsch. Entmol. Zeitschr., 1925: 393 [Notes]; Blüthgen, 1926, Zool. Jahrb., Abt. Syst., 51: 652, 670, 672; Blüthgen, 1930, Mitt. Deutsch. Entmol. Gesell., 1: 72.

Halictus cattulus var. *peguanus* Vachal, 1894, Ann. Mus. Civ. Genova, 34: 437 [female, Myanmar].

Halictus vishnu Cameron, 1897, Mem. Manch. L. Ph. Soc., xli: 106 [male, India]; Blüthgen, 1930, Mitt. Deutsch. Entmol. Gesell., 1: 74.

Halictus buddha Cameron, 1897, Mem. Manch. L. Ph. Soc., xli: 107 [male, India]; Blüthgen, 1930, Mitt. Deutsch. Entmol. Gesell., 1: 74.

Halictus philiipinensis Ashmead, 1905, Proc. U. S. Nat. Mus., 28: 128-129 [female, Philippines: Manila]; Blüthgen, 1926, Deutsch. Entmol. Zeitschr., 1925: 416.

Halictus matheranensis Cameron, 1907, Journ. Bombay Nat. Hist. Soc., 17: 100 [female, India]; Blüthgen, 1930, Mitt. Deutsch. Entmol. Gesell., 1: 77.

Halictus emergendus Cameron, 1908, Journ. Bombay Nat. Hist. Soc., 18: 311 [female, India].

Halictus micado Strand, 1910, Berl. Entmol. Zeitschr., 54: 204 [female & male, Taiwan]; Blüthgen, 1922, Deutsch. Entmol. Zeitschr., 1922: 54; Blüthgen, 1926, Deutsc. Entmol. Zeitschr., 1925: 386, 397.

Halictus luteitarsellus Strand, 1910, Berl. Entmol. Zeitschr., 54: 206 [male, Taiwan].

Halictus statialis Cockerell, 1911, Ann. Mag. Nat. Hist., 8 (8): 667 [female, Taiwan]; Strand, 1913, Suppl. Entmol., 2: 29 [Notes]; Blüthgen, 1922, Deutsch. Entmol. Zeitschr., 1922: 63; Blüthgen, 1926, Deutsch. Entmol. Zeitschr., 1925: 386 [Notes]; Sonan, 1940, Trans. Nat. Hist. Soc. Formosa, 30 (204): 375 [in list].

Halictus nasicensis Cockerell, 1911, Ann. Mag. Nat. Hist., (8), 8: 191 [female, India].

Halictus perhumilis Cockerell, 1911, Ann. Mag. Nat. Hist., (8), 8: 192 [female, India].

Halictus blepharophorus Strand, 1913, Suppl. Entmol., 2: 28 [female, nec male, Taiwan]; Blüthgen, 1923, Deutsch. Entmol. Zeitschr., 1925: 242.

Halictus nalandicus Strand, 1913, Arch. Naturg., 79: 140 [female, Sri Lanka: Ceylon Is.]; Blüthgen, 1926, Deutsch. Entmol. Zeitschr., 1925: 399.

Halictus centrophorus Strand, 1913, Arch. Naturg., 79: 140-141 [male, Sri Lanka: Ceylon Is.]; Blüthgen, 1926, Deutsch. Entmol. Zeitschr., 1925: 399.

Halictus javanicus Friese, 1914, Tijdschr. Entmol., 57: 23 [male nec female, Indonesia: Java Is.].

Halictus schmiedeknechti Friese, 1914, Tijdschr. Entmol., 57: 24 [female, Indonesia: Java Is.]; Blüthgen, 1922, Deutsch. Entmol. Zeitschr., 1922: 56.

Halictus philippinensis var. *nigritarsellus* Cockerell, 1919, Philip. Journ. Sci., 15: 274 [male, Philippines]; Blüthgen, 1926, Deutsch. Entmol. Zeitschr., 1925: 407.

Halictus chaldaeorum Morice, 1921, Journ. Bombay Nat. Hist. Soc., 27: 826 [male, Irak]; Blüthgen, 1922, Deutsch. Entmol. Zeitschr., 1922: 319; Cockerell, 1924, Ann. Mag. Nat. Hist., 14 (9): 585 [Notes]; Blüthgen, 1926, Deutsch. Entmol. Zeitschr., 1925: 386 [Notes].

Halictus semivagans Cockerell, 1937, Amer, Mus. Nov., 929: 5.

Lasioglossum (*Ctenonomia*) *vagans*: Pesenko, 1986, Trudy zool. Inst. Leningr., 159: 121-122; Sakagami, 1989, Jour. Kansas Entmol. Soc., 62 (4): 509 [key to species-group in female]; Ebmer, 1998, Linzer boil. Beitr., 30 (1): 377; Ebmer, 2004, Veröff. Naturkundemus. Erfurt, 23: 140.

Remarks. In Japan, this species has been recorded from Sado-ga-shima, Okinawa-jima, and Minamidaito-jima by some researchers (Blüthgen, 1926; Yasumatsu, 1935; Sonan, 1940). The specimens recorded by these researchers could not be examined in the present study. However, we examined extensive materials of Japanese *Ctenonomia* specimens including those from Sado-ga-shima, Okinawa-jima, and Minamidaito-jima. As a result, this species has not been found in Japan up to the present. We think that the previous records of *L*. (*C*.) *vagans* from Japan may be based on misidentification. Therefore, it might be prudent to remove the species from the Japanese fauna.

Distribution. This species is widely distributed from northern Africa to southeastern Asia.

Specimens examined. We have examined 145 females and 25 males from the following localities: Taiwan, China, Thailand, Myanmar, Malaysia, Philippines,

Indonesia, Nepal, Sri Lanka, India, Iran. Some of the specimens examined are listed as follows: [**TAIWAN**] 2 females, Sun Moon Lake, Nantou country, 24. iv. 1980 (Sk. Yamane, SCMH); 1 female, Pinglin, 4. v. 1974 (M. Shiokawa, SCMH). [**CHINA**] 1 female, Shaowu, Fukien Prov., 500m, 27. xi. 1937 (J. Klapperich, SCMH). [**THAILAND**] 1 female, Chiengdow, 17. iii. 1961 (K. Iwata, SCMH); 1 female, NongHoi, Samoeng Dist., Chiang Mai, 12. i. 2004 (A. Matsunaga). [**MYANMAR**] 1 female, Myamyo, 29. xii. 1981 (M. Toda, SCMH). [**SRI LANKA**] 2 females, Kan. Dist., Kandy, 1800ft., Peak view Motel, Ceyron Is., 15-24. i. 1970 (Davis & Rowe, SCMH); 1 female, Kan. Dist., Peradeniya, Botanical Garden, Ceyron Is., i. 1971 (Piyadasa & Somapala,

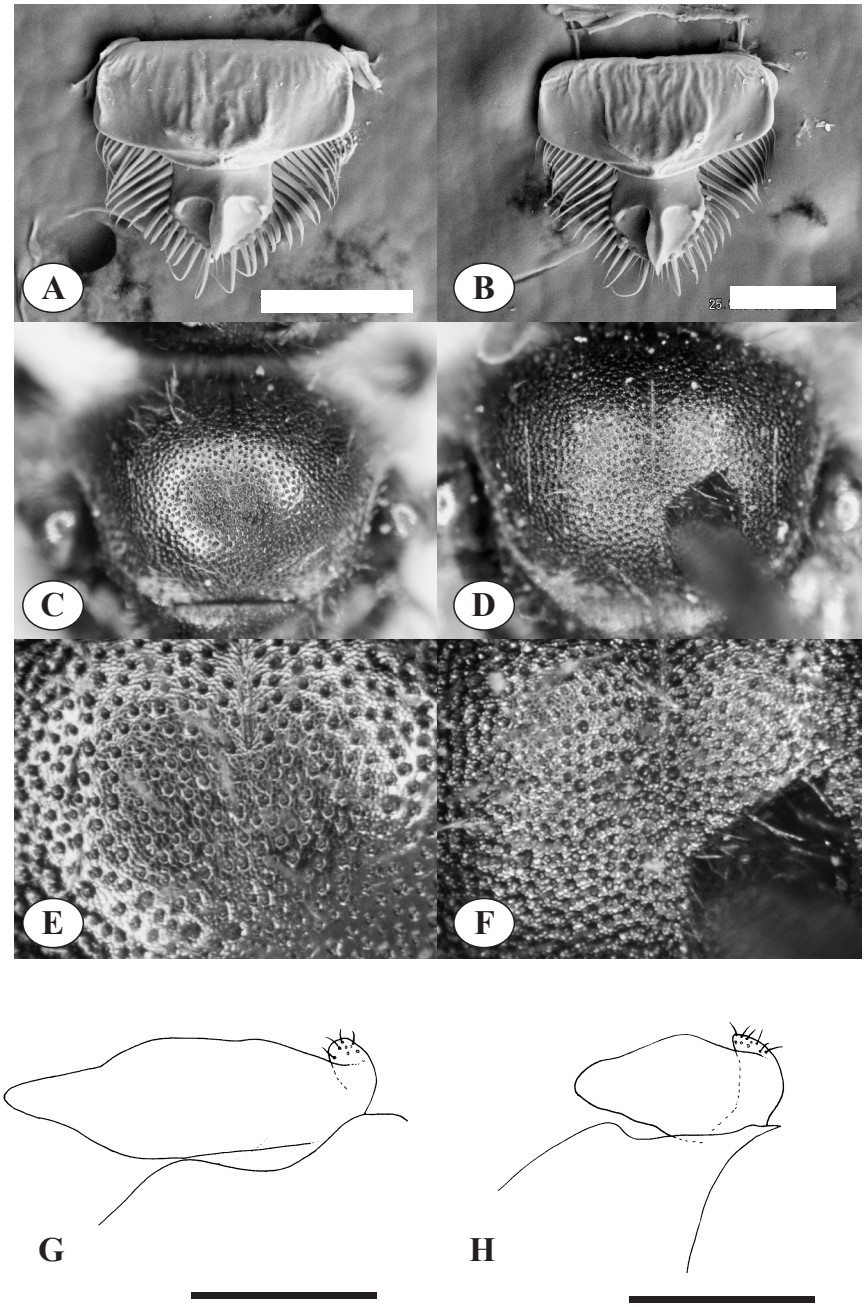

Fig. 11. A, C, E, G: *Lasioglossum* (*Ctenonomia*) *kumejimense* (Matsumura et Uchida). B, D, F, H: *Lasioglossum* (*Ctenonomia*) *vagans* (Smith). A, B: female labrum. C, D: female mesoscutum. E, F: sculpture of mesoscutum in female. G, H: gonostylus of male genitalia in lateral view. Scale: A, 0.25mm; B, 0.2mm.

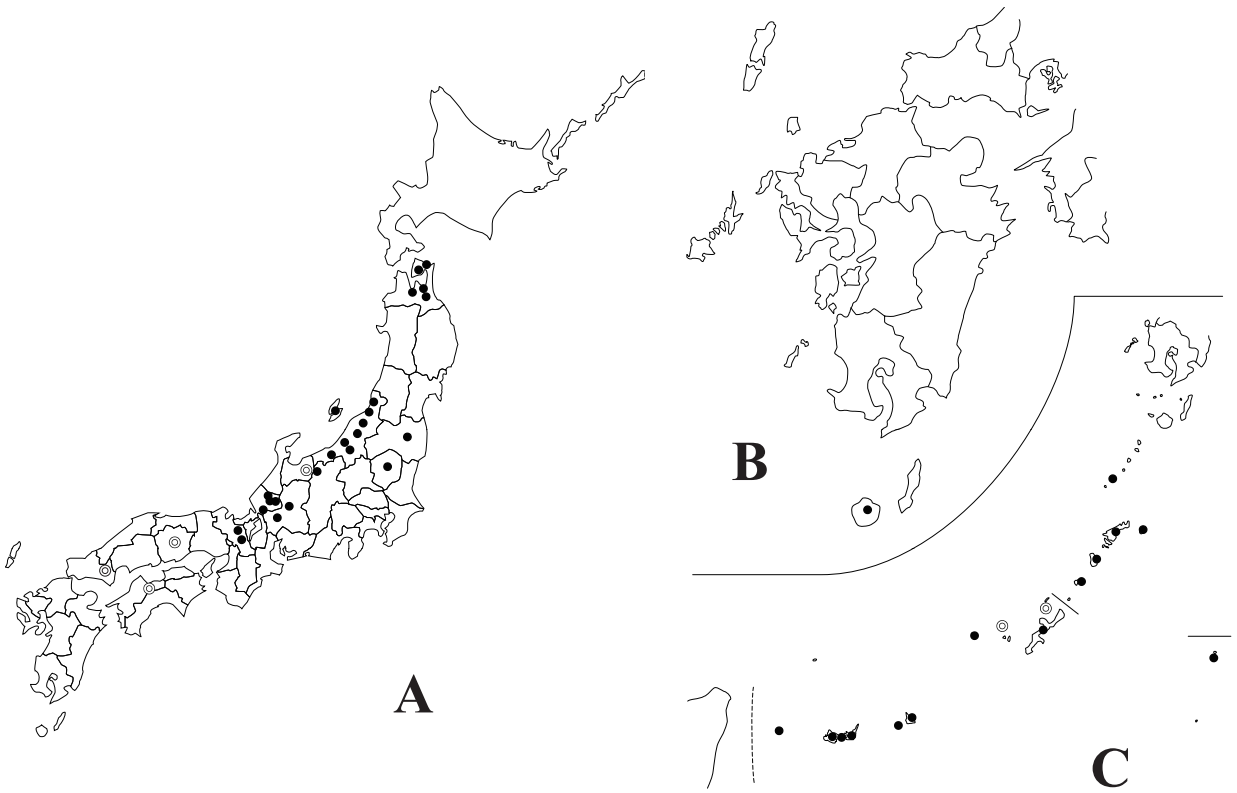

Fig. 12. Distribution map of each species in Japan. A: *Lasioglossum* (*Ctenonomia*) *blakistoni* Sakagami et Munakata. B: *Lasioglossum* (*Ctenonomia*) *yakushimense* Murao, Yamauchi et Tadauchi, sp. nov. C: *Lasioglossum* (*Ctenonomia*) *kumejimense* (Matsumura et Uchida). ●: the record in the present study. ◎: the record in literature only.

SCMH). [**MALAYSIA**] 1 male, Gerik env., 26-28. ii. 2000 (K. Denes jun, OLML); 1 female, Bukit Berapit, 21-22. ii. 2000 (K. Denes sen, OLML). [**PHILIPPINES**] 4 males, 21. ii., 25. ii., 29. ii. 1974 (I. Kudo, SCMH); 15 females, Sau Pablo city, 20. ii., 21. ii., 25. ii. 1974 (I. Kudo, SCMH). [**INDONESIA**] 1 female, Mengwi, Bali Is., 5. x. 2000 (D. Yamaguchi, ELKU); 5 males, Bedugul, Bali Is., 3. x. 2000 (O. Tadauchi & D. Yamaguchi, ELKU); 6 males, Plau Sipora, Mentawai Is., 27. vii. 1985 (Sk. & S. Yamane, SCMH); 1 male, Riverside, Forest, Sungai Dareh, 11. x. 1983 (T. Inoue, SCMH); 2 males, Sungai Dareh, 5. i. 1981 (S. Yamane, SCMH); 4 females, Albang Panjang, 1500m, Sumatra Is. (S. F. Sakagami & T. Inoue, SCMH). [**NEPAL**] 1 male (I. Yoneta, SCMH); 1 male, Bhanjang, 31. i. 1968 (T. Kawamichi, SCMH); 1 male, Kharchok, 29. i. 1968 (T. Kawamichi, SCMH); 1 male, Sanupaka, 17. vii. 1968 (T. Matsumura, SCMH); 1 male, Sherabesi, 16. vii. 1968 (T. Matsumura, SCMH); 2 females, Godavari, Napal valley, 18. iv., 20. iv. 1968 (T. Matsumura, SCMH). [**INDIA**] 1 female, Dehra Dun, Mohaud Raugl, 500m, 20. i. 1978 (SCMH); 1 female, Kalimpong, 7. ii. 1978 (SCMH); 2 females, Lonavla, west Ghats, 18. ii. 1964 (Wain, SCMH), 2. v. 1968 (Wain, SCMH); 1 female, Walayar, Kerala, 29. i. 1978 (SCMH). [**IRAN**] 1 male, southern Iran, S slope, Kuh-e Genu, 26. v. 1973 (SCMH).

Flower records

The flower records for each species are summarized in Table 1. Flowering plants recorded here contain 44 species belonging to 37 genera in 19 families for Japanese *Ctenonomia* species. The Japanese species are evidently polylectic, except for *L*. (*C*.) *yakushimense* which has no flower records. The flowering plants visited by each species are listed below.

Lasioglossum (*Ctenonomia*) *kumejimense*.

Amaranthaceae: *Celosia argentea*. Apiaceae: gen. et sp.; *Torilis japonica*. Asteraceae: *Aster* sp.; *Bidens pilosa* var. *pilosa*; *B. pilosa* var. *minor*; *B. tripartita*; *Ixeris japonica*; *Ix. stolonifera*; *Prenanthes tanakae*; *Youngia japonica*; *Y.* sp.; *Ixeridium dentatum*; *Sonchus oleraceus*; *Wedelia prostrata* var. *robusta*. Boraginaceae: *Mertensia maritima* subsp. *asiatica*; *Heliotropium foertherianum*.

Table 1. Summary of flower records for the Japanese *Ctenonomia* species. The numerous indicate the number of plant genera, and those in the parenthesis indicate the number of plant species visited by each species.

Plant family	*blakistoni*	*kumejimense*	*yakushimense*
Amaranthaceae		1(1)	
Apiaceae	1(1)	1(2)	
Asteraceae	4(4)	8(12)	
Boraginaceae		2(2)	
Brassicaceae	1(1)	1(2)	
Caprifoliaceae	1(1)		
Commelinaceae		1(1)	
Euphorbiaceae		1(1)	
Fabaceae		1(2)	
Hippocastanaceae	1(1)		
Lamiaceae		1(1)	
Oxalidaceae		1(1)	
Polygonaceae	2(2)		
Ranunculaceae	1(1)		
Rosaceae		4(5)	
Rubiaceae		1(1)	
Rutaceae		1(1)	
Solanaceae		1(1)	
Verbenaceae		1(1)	
Total	11(11)	27(34)	0

Brassicaceae: gen. et sp.; *Brassica rapa* var. *oleifera*. Commelinaceae: *Tradescantia ohiensis*. Euphorbiaceae: *Mallotus japonicus*. Fabaceae: *Melilotus officinalis* subsp. *suaveolens*; *Trifolium repens*. Lamiaceae: *Clinopodium chinense* subsp. *grandiflorum* var. *urticifolium*. Oxalidaceae: *Oxalis corniculata*. Rosaceae: *Rubus* sp.; *R. parvifolius*; *Rhaphiolepis indica* var. *umbellata*; *Rosa multiflora*; *Duchesnea chrysantha*. Rubiaceae: *Paederia scandens*. Rutaceae: *Murraya paniculata*. Solanaceae: *Solanum nigrum*. Verbenaceae: *Vitex rotundifolia*.

Lasioglossum (*Ctenonomia*) *blakistoni*.

Apiaceae: *Ostericum sieboldii*. Asteraceae: *Cosmos bipinnatus*; *Ostericum sieboldii*; *Picris hieracioides* subsp. *japonica*; *Senecio cannabifolius*; *Solidago virgaurea* subsp. *asiatica*. Brassicaceae: *Brassica rapa* var. *oleifera*. Caprifoliaceae: *Weigela hortensis*. Hippocastanaceae: *Aesculus turbinata*. Polygonaceae: *Fagopyrum esculentum*; *Persicaria thunbergii*. Ranunculaceae: *Ranunculus silerifolius* var. *glaber*.

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