

A REVISION  
OF THE FAMILY COLLETIDAE  
OF JAPAN  
(HYMENOPTERA: APOIDEA)<sup>1)</sup>

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Abstract

This is the first revision of the family Colletidae of Japan. Two subfamilies, Colletinae and Hylaeinae, are recognized, including each one genus, *Colletes* and *Hylaeus*, re-

spectively. In Japan, the genus *Colletes* Latreille includes 6 species, and the genus *Hylaeus* Fabricius does 23 species. All the species are described and illustrated.

Most of the species are assigned to the subgenus for the first time. The classification and phylogeny are discussed for the family, the genera and the subgenera. Keys are provided for the species of the genus *Colletes*, and for the subgenera and species of the genus *Hylaeus*.

The Japanese subgenera here recognized are *Colletes* Latreille, belonging to the genus *Colletes*, and *Hylaeus* Fabricius, *Nesohylaeus* (new subgenus), *Prosopis* Fabricius, *Nesoprosopis* Perkins, *Paraprosopis* Popov, *Lambdopsis* Popov and *Patagiata* Blüthgen, belonging to the genus *Hylaeus*. The 4 subgenera of *Hylaeus* except for *Nesoprosopis* and *Paraprosopis* are newly recorded from Japan.

The following species are assigned to the subgenus for the first time: *C. (Colletes) perforator* Smith, 1869, *C. (Colletes) eskii* Hirashima, 1958, *C. (Colletes) babai* Hirashima et Tadauchi, 1979, *H. (Hylaeus) perforatus* (Smith), 1873, *H. (Hylaeus) paulus* Bridwell, 1919, *H. (Nesohylaeus) niger* Bridwell, 1919, *H. (Prosopis) monticola* Bridwell, 1919, *H. (Paraprosopis) meridianus* Yasumatsu et Hirashima, 1965, *H. (Paraprosopis) incomitatus* Snelling, 1970, and *H. (Lambdopsis) nipponicus* Bridwell, 1919.

The species belonging to the subgenus *Colletes* are divided into four species groups, and those of *Nesoprosopis* are divided into two species groups.

Seven new species are described. They are: *C. (Colletes) yasumatsui* Hirashima et Ikudome, *H. (Prosopis) submonticola*, *H. (Paraprosopis) hirashimai*, *H. (Paraprosopis) thoracicus*, *H. (Patagiata) paradiformis*, *H. nanseiensis* and *H. macilentus*.

The males of the following five species and a subspecies are described for the first time: *C. (Colletes) esakii* Hirashima, *H. (Hylaeus) paulus* Bridwell, *H. (Hylaeus) perforatus* (Smith), *H. (Paraprosopis) meridianus* Yasumatsu et Hirashima, *H. (Paraprosopis) incomitatus* Snelling and *H. (Nesoprosopis) insularum iriomotensis* Yasumatsu et Hirashima.

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The subgeneric status of the following three species is unknown: *H. ikedai* (Yasumatsu), *H. nanseiensis*, n. sp. and *H. macilentus*, n. sp.

Three species removed from the Japanese fauna are as follows: *C. (Colletes) kudonis* Cockerell, *C. (Colletes) laevifrons* Morawitz and *H. bridwelli*, new name = *H. gnathylaeoides* Bridwell, 1919.

The terminalia which are characteristic of the species are figured. Variation (only in the species of *Hylaeus*), flight records, floral records and the distribution maps are presented. Flight and floral records are summarized in figures and tables.

The Japanese names for the family, subfamilies, genera, subgenera and species are wholly revised.

## I Introduction

The family Colletidae, which is known as a group of rather primitive bees, is widely distributed in the world, and is well represented in South America, Africa, and especially in Australia where it has become diversified into dozens of genera. This family in the Japanese bee fauna is comparatively small as in the other areas of the Holarctic Region, and includes only two genera, *Colletes* and *Hylaeus*.

The genus *Colletes* consists of moderate-sized and hairy bees which transport pollen externally on the scopa. This genus is not known from Australia, but its species is abundant in the Holarctic Region. The Palaearctic species are at least 130 in number (based on Noskiewicz, 1936). In the Nearctic Region, Stephen (1954) recorded about 100 species. The Japanese *Colletes* is composed of 6 species belonging to one subgenus, *Colletes*.

On the other hand, the genus *Hylaeus*, which consists of small-sized and relatively hairless bees is very similar to the sphecoid wasps. It is world-wide in distribution, abounds in the Australian Region (Michener, 1965 and Houston, 1981), and is represented by about 140 species belonging to

19 subgenera. In addition, the subgenus *Nesoprosopis* is famous for its adaptive radiation in the Hawaiian Islands, and consists of about 50 species there (Perkins, 1899). In the Old World, 62 species of *Hylaeus* belonging to 10 subgenera are reported from Europe (Dathe, 1980a), and 27 species belonging to 3 subgenera from Mongolia (Dathe, 1986b). In the New World, 52 species belonging to 7 subgenera are reported (Snelling, 1966c). In Japan, Hirashima (1977) reported 7 species of *Nesoprosopis*. In this paper, I recognized 23 species of *Hylaeus* from Japan, 20 of which are divided into 7 subgenera.

For the present study about 1,780 specimens of *Colletes* and about 7,280 ones of *Hylaeus* are examined. Most of these specimens were derived from the collection of the Entomological Laboratory, Faculty of Agriculture, Kyushu University (Prof. Y. Hirashima).

Most of the types were examined. The following museums were visited during one year from October 1983 to September 1984, being supported by a grant from Jissen-Gakuen: Bernice P. Bishop Museum (Honolulu), Los Angeles County Museum of Natural History (Los Angeles), United States National Museum of Natural History (Washington, D. C.), American Museum of Natural History (New York), British Museum of Natural History (London), Swedish Museum of Natural History (Stockholm) and Museum National d'Histoire Naturelle (Paris).

Classification and Phylogeny of the family Colletidae are primarily based on the following literature: of the family, Michener (1944 and 1965); of *Colletes*, Noskiewicz (1936) and Stephen (1954); and of *Hylaeus*, Popov (1939), Snelling (1966c), Hirashima (1977), Dathe (1980a) and Houston (1975 and 1981).

The scientific names of the flowering plants recorded in this paper were chiefly adopted from Ohwi and Kitagawa (1983). Those of the alien plants depended on Osada (1972), and the gardening plants on Asayama (1986).

The Japanese names for the family, subfamilies, genera, subgenera and species are wholly revised.

All the holotypes of new species described in this paper

are deposited in the collection of the Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka.

## II Historical review of the study of colletid bees in Japan

The study of the Japanese *Colletes* began with F. Smith's description of *C. perforator* in 1869. Since then, 2 species, *C. patellatus* and *C. vogti*, were described by Pérez in 1905.

In 1926 Cockerell described *C. kobensis* based on a specimen taken in Kobe. However, this was synonymized with *C. patellatus* by Noskiewicz (1936).

In the same paper Cockerell recorded *C. seitzii* Alfken, 1900 from Japan. This species was originally described from China (Tientsin), and has not been found in Japan so far as my study is concerned.

In 1927 Cockerell described 2 new species, *C. speculiferus* and *C. kudonis*, from N. Japan. *C. speculiferus* is a synonym of *C. laevifrons* Morawitz, 1894 (Noskiewicz, 1936). These species also has not been found in Japan so far as my investigation goes.

In 1936 Yasumatsu listed the species of Colletidae of China and Japan.

In the same year Noskiewicz (1936) studied the Palaearctic *Colletes* extensively. He recognized 123 species which were divided into 4 subgenera, *Colletes*, s. str., *Denticolletes*, new subgenus, *Puncticolletes*, new subgenus and *Rhinocolletes* Cockerell, 1910. However, Stephen (1954) remarked that the classification of Noskiewicz is unacceptable.

In 1950 Yasumatsu recorded *C. collaris* Dours, 1872 from Japan, which is a Eurasian species. Hirashima and Tadauchi (1979), however, reported that what is known as *C. collaris* in Japan should be treated as *C. perforator* Smith.

In 1958 Hirashima described an interesting species, *C. esakii*, from Amami-ohshima.

Very recently Hirashima and Tadauchi (1979) described a new species, *C. babai*, and suggested the occurrence of an-

other new species in Japan (which is described as *C. yasumatsui* Hirashima et Ikudome, new species, in this paper).

Thus, the present study is largely due to Noskiewicz (1936) and Hirashima and Tadauchi (1979). Consequently, 6 Japanese species including 1 new species are treated in this paper, and *C. seitzii* Alfken, *C. kudonis* Cockerell and *C. laevifrons* Morawitz (= *speculiferus* Cockerell) are excluded from the Japanese fauna.

The history of the study on the genus *Hylaeus* of Japan was opened by F. Smith's descriptions of 2 species, *Prosopis perforata* and *P. floralis*, in 1873.

Since then, 6 new species have been described in about half a century, that is, *Prosopis globula* described by Vachal in 1903 and *Hylaeus niger*, *H. paulus*, *H. nipponicus*, *H. matsumurai*, *H. monticola* and *H. gnathylaeoides* described by Bridwell in 1919. Meade-Waldo catalogued these species in 1923. He used *Hylaeus* instead of *Prosopis* which had been extensively used by European authors.

In 1936 Yasumatsu described 1 new species, *Prosopis ikedai*, from the Ogasawara-shotō (Bonin Islands), and further, in 1955 he described a new species, *H. boninensis*, from the same islands. The third report of the *Hylaeus* fauna of Ogasawara-shotō is that of Snelling (1970a). He recognized *H.* (subgenus ?) *ikedai* and *H.* (*Nesoprosopis*) *boninensis* in addition to 2 new species, *H.* (*Paraprosopis*) *yasumatsui* and *H.* (*Paraprosopis*) *incomitatus*.

On the other hand, Yasumatsu and Hirashima (1965) reported the bee fauna (excluding Halictidae) of the Ryukyu Islands based on the study under the Japan-U.S. Co-operative Science Program in 1963 and 1964. They described 2 new species and a new subspecies, that is, *H. insularum*, *H. insularum iriomotensis* and *H. meridianus*.

In 1977 Hirashima studied the subgenus *Nesoprosopis* of Japan. Before him, only one species of *Nesoprosopis*, *pectoralis*, has been known from Europe in the world except the Hawaiian Islands and the Bonin Islands. Interestingly, he reported 7 species including 2 new species, *H. nippon* and *H. noomen*. He recorded also the European species, *H.* (*Neso-*



*prosopis) pectoralis* from Japan. His work was stimulative to the study of Japanese bee fauna.

The present paper reports 23 Japanese species of *Hylaeus* including 6 new species.

### III Terminology and abbreviations

The morphological terminology employed here is largely that of Michener (1965) with some modifications. Some were cited from Stephen (1954) for the genus *Colletes*, and some from Houston (1975) and Snelling (1985) for the genus *Hylaeus*.

#### For the genus *Colletes*

**Mesurements** Relative measurements were made for HW, HL, IOD, DLO, OOD and OCD only for *Colletes*. See below for explanation.

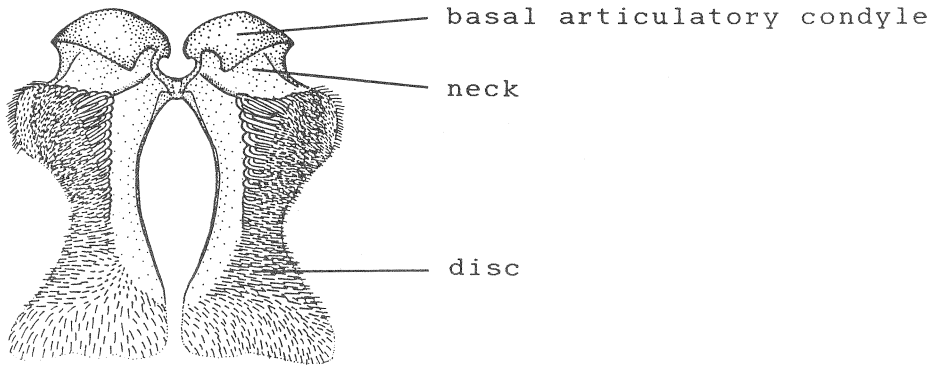
#### *Terms for the 7th and 8th metasomal sterna of males*

Those are shown in Figs. 1-2. Fig. 1 is modified from the original figure of Stephen (1954) and Fig. 2 that of Michener (1965).

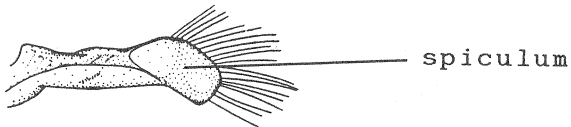
#### For the genus *Hylaeus*

**Relative dimensions** Figs. 3-6 illustrate certain head measurements. In the descriptions these measurements are given in graduations of eyepiece micrometers. The value 1 is equivalent to 250 micron. Fig. 3 shows the face for measurements from the front. Fig. 4 shows the vertex from above. Fig. 5 shows the lateral face indicating the malar space and the basal width of mandible. Fig. 6 shows measurements of the antennal segments. The following abbreviations are used in this paper:

AOD	Antennocular distance
ASD	Antennal socket diameter
BWM	Basal width of mandible
CAD	Clypeoantennal distance



1



2

Figs. 1-2. Male terminalia of the genus *Colletes*.  
1, 7th ventral plates in ventral view; 2, 8th sternum in lateral view.

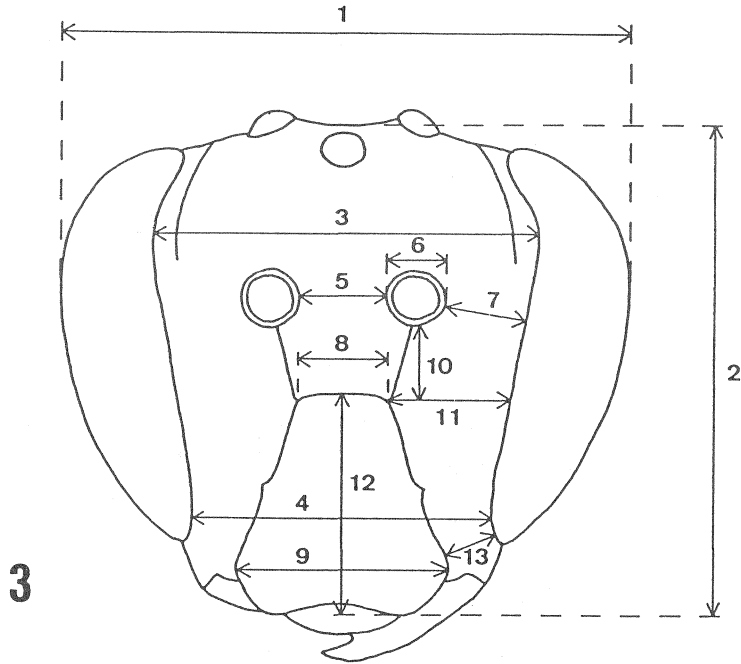


Fig. 3. Head capsule in anterior view showing method of measurement. 1, head width; 2, head length; 3, upper width of face; 4, lower width of face; 5, interantennal distance; 6, antennal socket diameter; 7, antennocular distance; 8, upper width of clypeus; 9, maximum clypeal width; 10, clypeoantennal distance; 11, paraocular width; 12, maximum clypeal length; 13, clypeocular distance.

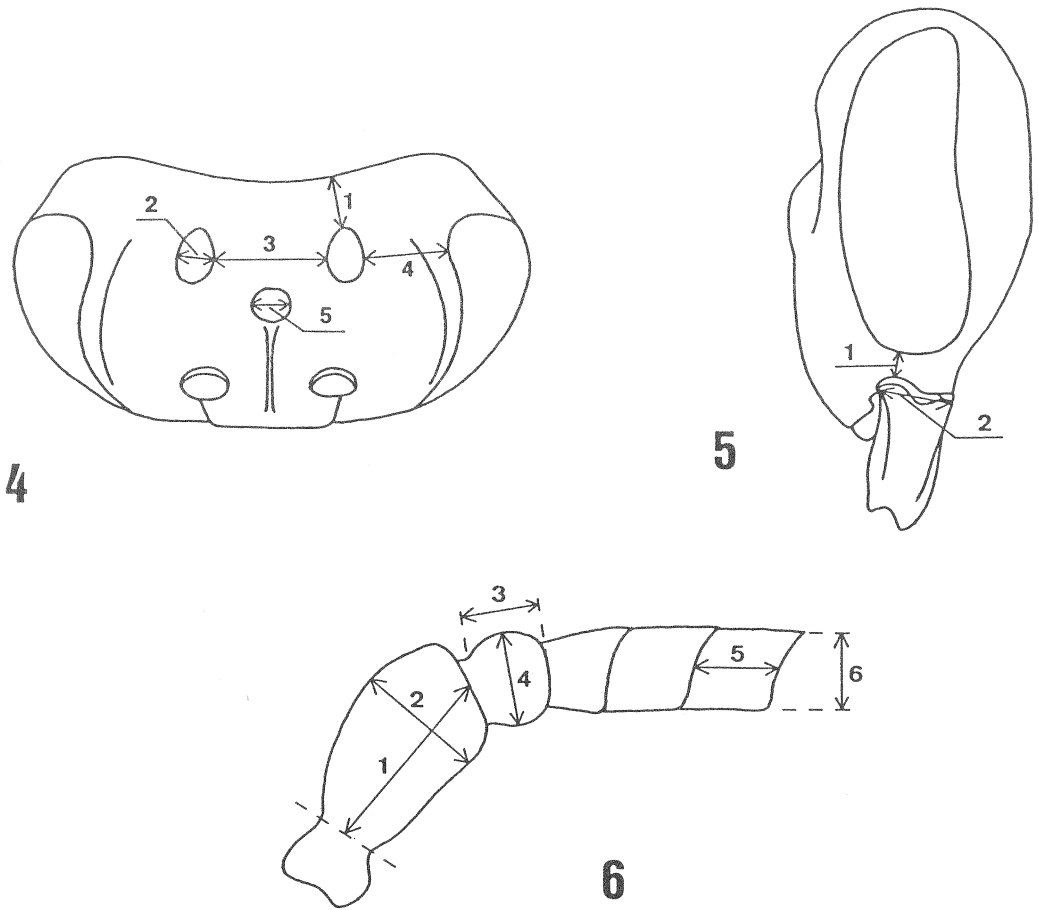


Fig. 4. Head capsule in dorsal view showing method of measurement. 1, ocellocapitulum distance; 2, diameter of lateral ocellus; 3, interocellar distance; 4, ocellocular distance; 5, ocellar diameter.

Fig. 5. Head capsule in lateral view showing method of measurement. 1, malar space length; 2, basal width of mandible.

Fig. 6. Antennal scape, pedicel and 1st to 3rd flagellar segments showing method of measurement. 1, scape length; 2, scape width; 3, pedicel length; 4, pedicel width; 5, flagellar length; 6, flagellar width.

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COD	Clypeocular distance
DLO	Diameter of lateral ocellus
FL	Flagellar length
(2FL)	means FL of the second flagellar segment.)
FW	Flagellar width
(2FW)	means FW of the second flagellar segment.)
HL	Head length
HW	Head width
IAD	Interantennal distance
IOD	Interocellar distance
LFW	Lower width of face
MCL	Maximum clypeal length
MCW	Maximum clypeal width
MSL	Malar space length
OCD	Ocelloccipital distance
OD	Ocellar diameter
OOD	Ocellocular distance
PL	Pedicel length
POW	Paraocular width
PW	Pedicel width
SL	Scape length
SW	Scape width
UCW	Upper width of clypeus
UFW	Upper width of face

*Propodeal terms and abbreviations* Terms for propodeal characters used in descriptions of the present paper are shown in Fig. 7 which is modified from Snelling (1985). The following abbreviations are used:

OBL	Oblique carina
TRN	Trabsverse carina

*Terms for the terminalia of males* In the subgeneric classification, terms for 7th and 8th metasomal sterna and male genitalia are cited from Popov (1939).

*Sculpture of the integument* Sculptures of integument of *Hylaeus* provide many useful taxonomic characters. However,

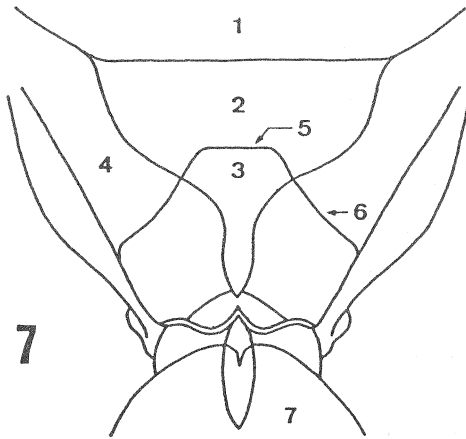


Fig. 7. Propodeum in postero-dorsal view. 1, metanotum; 2, anterior portion of propodeal enclosure; 3, posterior portion of propodeal enclosure; 4, stigmatal area; 5, transverse carina; 6, oblique carina; 7, 1st tergum.

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the differences are often subtle and to avoid confusion an explanation of the terms used is given below (Houston, 1975):

*Lineolate-reticulate* A pattern of fine impressed lines divides the surface into "cells" (Fig. 8).

*Transverse lineolate-reticulate* A pattern of the "cells" is transversely broader than long (Fig. 9).

*Pit-reticulate* A reticulate pattern of raised lines (Fig. 10). Distinguished from areolation by being far finer: each concave cell corresponds to a single epidermal cell.

*Striate* Pattern of parallel lines only (Fig. 11).

*Reticulate-striate* Pattern of parallel, often branching and anastomosing lines, with numerous transverse lines giving a ladder-like appearance (Fig. 12).

*The treatment of variations* Variations presented in the descriptions of species are not the variation of the type materials but of all the materials examined.

### Geographical abbreviations

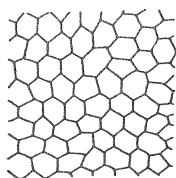
The names of Japanese islands are shown in Fig. 13 and is abbreviated as follows:

AM	Amami-ohshima	RB	Rebun-tô
HD	Hokkaido	RR	Rishiri-tô
HS	Honshu	SD	Sadoga-shima
KK	Koshiki-rettô	SK	Shikoku
KS	Kyushu	TK	Tokara-rettô
NS	Nansei-shotô	TS	Tsushima
OG	Ogasawara-shotô	YK	Yaku-shima
OK	Okinawa-jima		

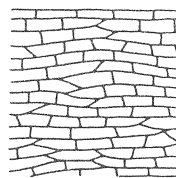
### Abbreviations for the number of bee individuals

In descriptions of Flight records of each species, the number of bee individuals is indicated by the grade and abbreviated as follows:

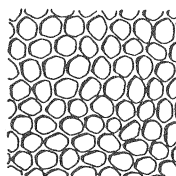
OX	1-9
X	10-19



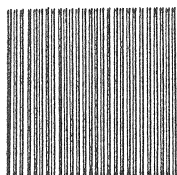
8



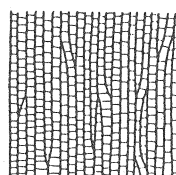
9



10



11



12

Figs. 8-12. Integumental sculptures of the genus *Hylaeus*. 8, lineolate-reticulation; 9, transverse lineolate-reticulation; 10, pit-reticulation; 11, striation; 12, reticulate-striation.



Colletidae of Japan

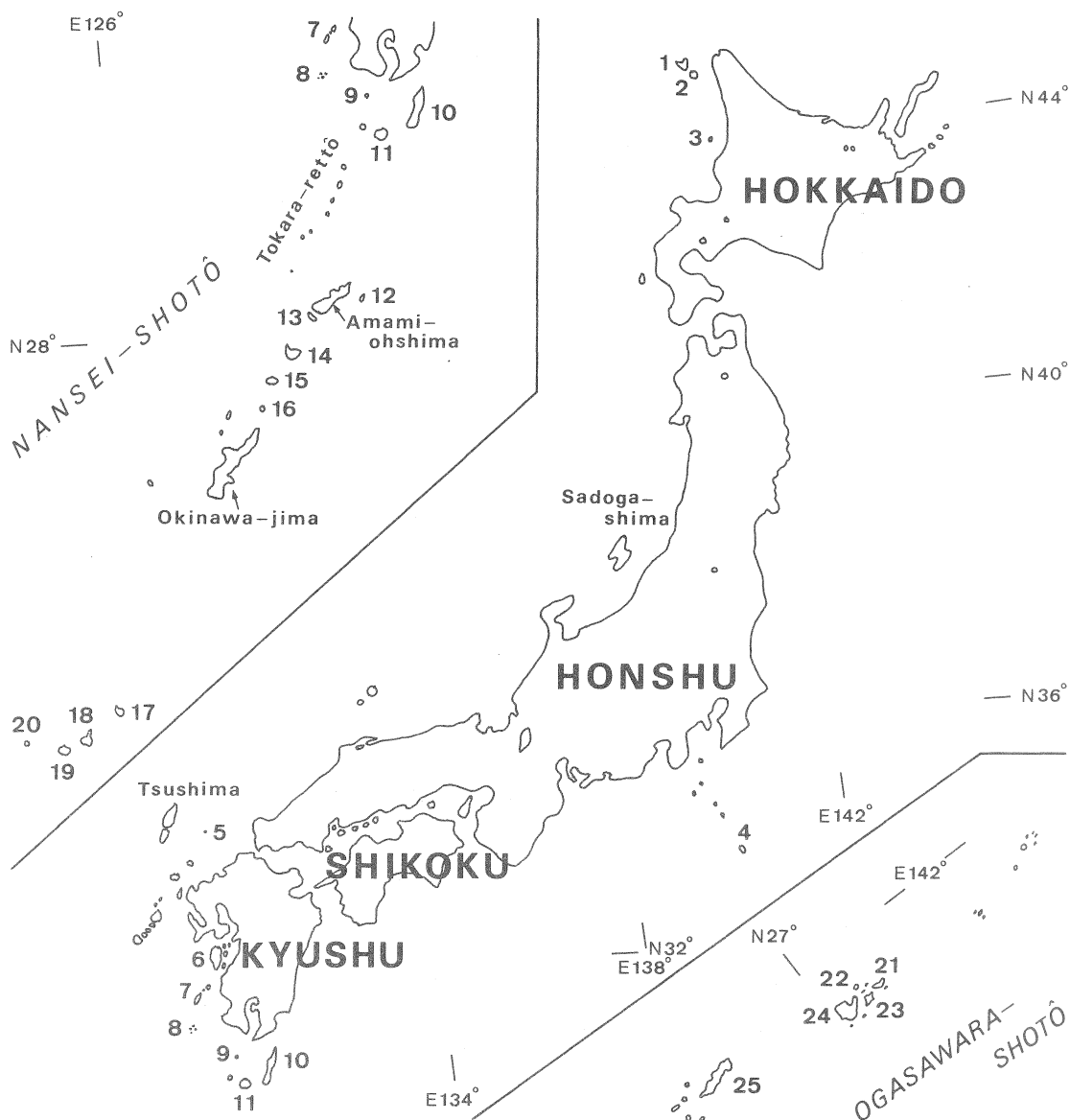


Fig. 13. A map of Japanese islands. 1, Rebun-tō; 2, Rishiri-tō; 3, Yagishiri-tō; 4, Hachijo-jima; 5, Okino-shima; 6, Amakusa; 7, Koshiki-rettō; 8, Uji-guntō; 9, Ioh-jima; 10, Tanega-shima; 11, Yaku-shima; 12, Kikai-jima; 13, Kakeroma-jima; 14, Tokuno-shima; 15, Okinoerabu-jima; 16, Yoron-tō; 17, Miyako-jima; 18, Ishigaki-jima; 19, Iriomote-jima; 20, Yonaguni-jima; 21, Otohto-jima; 22, Nishi-jima; 23, Anijima; 24, Chichi-jima; 25, Haha-jima.

Shuichi Ikudome

2X 20-29

3X 30-39

. . .  
. . .

Abbreviations of institutions

The names of institutions and collections concerned in the present study are abbreviated as follows:

- AM American Museum of Natural History, New York  
BC Bridwell Collection (in USNM)  
BM British Museum of Natural History, London  
BPBM B. P. Bishop Museum, Honolulu  
CAS California Academy of Sciences, San Francisco  
EU Ehime University, Matsuyama, Japan  
HKU Hokkaido University, Sapporo, Japan  
HSPA Hawaiian Sugar Planters' Association, Honolulu  
HU Hyogo University (= Kôbe University), Kôbe, Japan  
KC Laboratory of Biology, Kagoshima Women's Junior College, Kagoshima, Japan  
KU Entomological Laboratory, Faculty of Agriculture, Kyushu University, Fukuoka, Japan  
LACM Los Angeles County Museum of Natural History, Los Angeles  
LM Rijksmuseum van Natuurlijke Historie, Leiden  
PM Museum National d'Histoire Naturelle, Paris  
SESKU Scientific Expedition Society of Kyushu University, Fukuoka, Japan (in KU)  
USNM United States National Museum of Natural History, Smithsonian Institution, Washington, D. C.  
WM Wien Museum, Austria

## IV Classification of the family Colletidae and its phylogeny

### Family COLLETIDAE

[Jap. name: Mukashi-hanabachi-ka]

Characteristics are as follows: labrum broader than long; subantennal areas absent or at least reduced to small triangular spaces; lower sides of clypeus not bent, parallel to long axis of body; subantennal sutures directed toward inner margins of antennal sockets; facial foveae often present; stipites without combs; submentum broad and rather elongate, not V-shaped; mentum absent or rather broad; labial palpi short, segments similar or, rarely, the first somewhat elongated and broadened; glossa short, truncate or emarginate, very rarely rounded, acute only in males of a few Australasian genera; hypostoma free from tentorium; pre-episternal sutures usually complete; metanotum usually horizontal; middle coxae as seen from side much shorter than the distance from their summits to posterior wing bases; pygidial plate present or absent; volsellae present.

The most characteristic feature of this family is that the glossa is truncate or bifid. The glossa is like that of wasp in form and is responsible for the belief that the family Colletidae is most primitive in bees together with other features.

Many of the genera are also distinguished from other bees by having the second m-cu vein of the forewing which is arcuate at the posterior part toward the apex of the wing.

The Colletidae are unique among bees in that they line or construct their cells with a translucent or transparent cellophane-like material applied by the broad glossa of the female (Michener, 1944 and 1965).

The colletid bees widely distribute in the world, and this family is divided into the following 6 subfamilies: Colletinae, Stenotritinae, Diphaglossinae, Euryglossinae, Hylaeinae and Chilicolinae. The Colletinae and Hylaeinae are

world-wide, the Stenotritinae and Euryglossinae are restricted to the Australian Region, and the Diphaglossinae and Chilicolinae are to the Nearctic and Neotropical Regions. And this family is better represented in Australia than in any other continent. The phylogenetic tree suggesting relationships of the subfamilies of Colletidae is shown in Fig. 14.

The Japanese name of the Colletidae is newly proposed as "mukashi-hanabachi-ka", meaning "palaeo-*Apis*" instead of the former name "mitsubachi-modoki-ka" meaning "pseudo-*Apis*" which is unfavorable.

#### Subfamily Colletinae

[Jap. name: Mukashi-hanabachi-aka]

Characteristics are as follows: malar space short to moderate in length; jugal lobe of posterior wing reaching at least to middle of vannal lobe; scopa rather large.

This world-wide subfamily consists of moderate-sized, moderately to densely hairy bees which transport pollen externally on the scopa rather than internally in the crop as do the bees of the Hylaeinae and Euryglossinae, and is divided into the following 3 tribes: Colletini, Cauporicani and Paracolletini. The Colletini contain only the genus *Colletes*, and are widespread over the world, although absent in Australia. The Cauporicani contain only the primarily Neotropical genera *Caupolicana* and *Ptiloglossa*. Only the former reaches the United States, although the latter extends far into Mexico. The Paracolletini are Panaustral in distribution, its genera occurring in South America, Africa and Australia. Genera included are *Andrenopsis*, *Anthoglossa*, *Biglossa*, *Brachyglossula*, *Callomelitta*, *Cladocerapis*, *Dasycolletes*, *Euryglossidia*, *Goniocolletes*, *Lamprocolletes*, *Lonchopria*, *Nomiocolletes*, *Notocolletes*, *Paracolletes*, *Perditomorpha*, *Phenacolletes*, *Polyglossa*, *Scrapper*, and *Trichocolletes* (Michener, 1944 and 1965).

The Japanese subfamily consists of only the Colletini which include only a genus *Colletes*. Characteristics of the

Colletidae of Japan

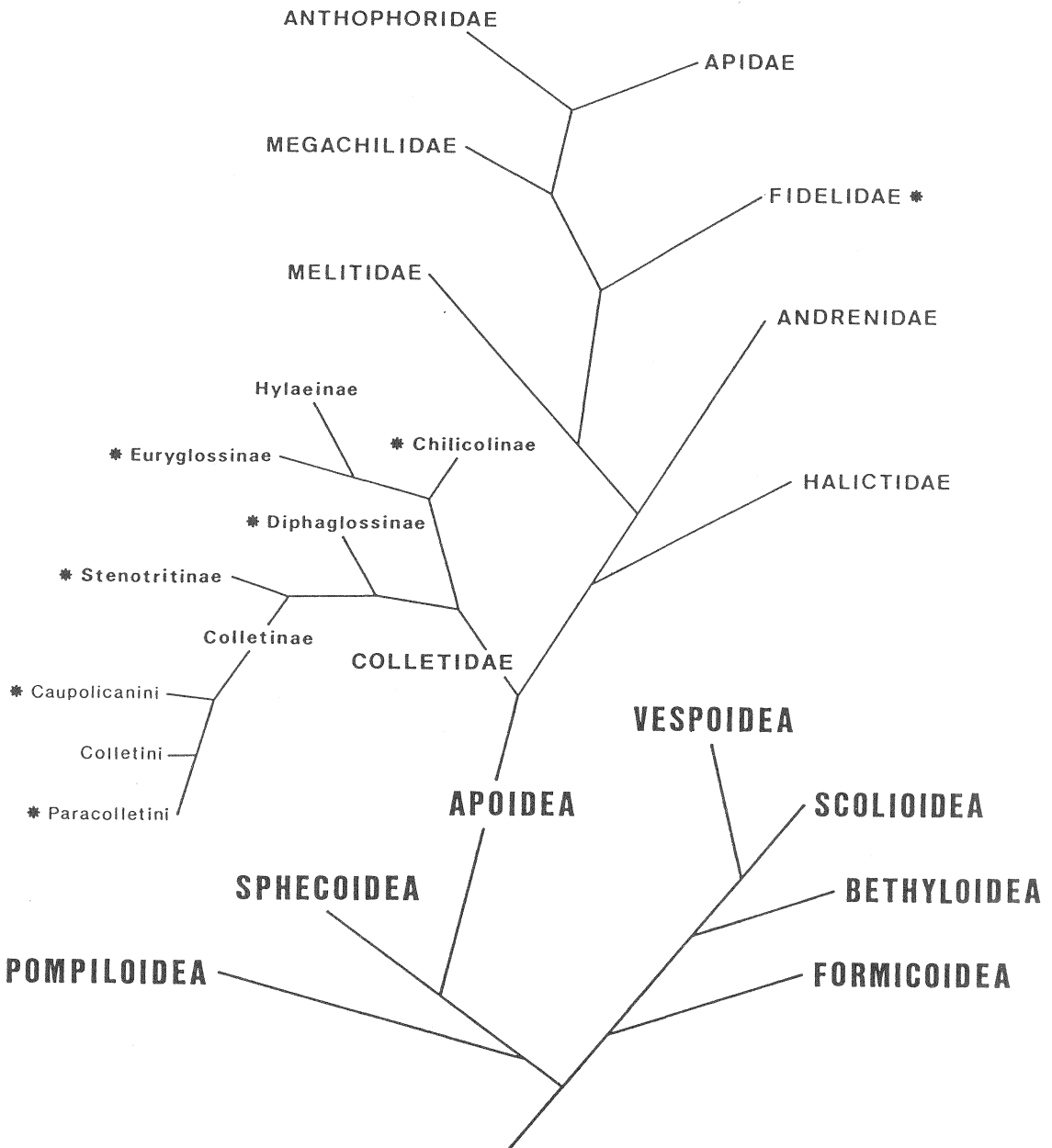


Fig. 14. Phylogenetic tree of the Hymenoptera Aculeata (modified from Michener, 1944 and Evans, 1962). \*: absent in the Japanese fauna.

Colletini are as follows: females without pygidial plate or strong prepygidial fimbria and basitibial plate; horizontal basal portion of propodeum short and provided with longitudinal carinae, often separating it into a series of pits (Michener, 1944).

#### Subfamily Hylaeinae

[Jap. name: Chibi-mukashi-hanabachi-aka]

Characteristics are as follows: glossa feebly bilobed or subtruncate; malar space short; clypeus elongated upward, often much longer than broad, anterior tentorial pits at or below middles of lateral sections of epistomal sutures; pre-episternal suture complete; anterior wings with two submarginal cells, the second much smaller than first and each receiving a recurrent vein except in *Hylaeoides*, which has a long second submarginal cell; jugal lobe of posterior wings but little exceeded by vannal lobe; wings hairy throughout, not papillate; scopa absent; pygidial plate absent.

The bees of this subfamily share with the Euryglossinae and most neotropical Chilicolinae the lack of a pollen-collecting scopa in the female. The pollen that is used in provisioning the cell is transported in the crop of the mother bee instead of on scopal hairs. Associated with this means of pollen carrying are the general sparsity and shortness of hairs of the Hylaeinae.

Although some species (e.g., *Hylaeoides*) reach a length of 15 mm or more, most representatives of this subfamily are small. Most are black with rather restricted yellow markings on the head, thorax, and legs (Michener, 1944 and 1965).

The Hylaeinae currently contain at least the following 13 genera in the world: *Hylaeus* from the world; *Amphylaeus*, *Gephyrohylaeus*, *Hemirhiza*, *Heterapoides*, *Hylaeorhiza*, *Hyleoides*, *Meroglossa*, *Palaeorhiza*, and *Pharohylaeus* from the Australian Region; *Calloprosopis*, *Nothylaeus* and *Psilylaeus* from the Ethiopian Region. Thus, the hylaeine bees are most diversified in the Australian Region. The Japanese Hylaeinae consist of only the genus *Hylaeus*.

## Colletidae of Japan

The Japanese name of the subfamily Hylaeinae has not been given, however, that of the genus *Hylaeus* has been called "Hara-tsuya-hanabachi-zoku" meaning the polished or shining metasoma. The new name, "Chibi-mukashi-hanabachi-zoku", for the genus *Hylaeus* which means "tiny and primitive bees" is proposed, because the old name is confusable with "Tsuya-hanabachi-zoku" for the genus *Ceratina*.

### V The genus *Colletes* Latreille of Japan

#### Genus *Colletes* Latreille

[Jap. name: Mukashi-hanabachi-zoku]

*Colletes* Latreille, 1802, Hist. Nat. Fourmis, p. 423.

Type-species: *Apis succincta* Linnaeus. Monotypic.

*Evodia* Panzer, 1806, Krit. Rev. Insektenf. Deutschlands, v. 2, p. 207.

Type-species: *Apis succincta* Linnaeus. Monotypic. (= *Apis calendarum* Panzer).

*Colletes* subg. *Rhinocolletes* Cockerell, 1910, Entomologist, 43: 242.

Type-species: *Colletes nasutus* Smith. Monotypic.

*Colletes* subg. *Ptilopoda* Friese, 1921, Stettin. Ent. Ztg., 82: 83.

Type-species: *Colletes spilopectera* Cockerell. Monotypic. (= *Colletes maculipennis* Friese).

*Colletes* subg. *Denticolletes* Noskiewicz, 1936, Prace Nauk. Wydawnictwo Towarzystwa Nauk. Lwowie, ser. 2. 3: 486.

Type-species: *Colletes graeffei* Alfken. Monotypic.

*Colletes* subg. *Puncticolletes* Noskiewicz, 1936, Prace Nauk. Wydawnictwo Towarzystwa Nauk. Lwowie, ser. 2, 3: 490.

Proposed without a type-species designation and therefore invalid under article 25C of International Rules of Zoological Nomenclature (Stephen, 1954).

Characteristics are as follows: head and thorax with pile long and dense; hind femora of female with long and dense

pollen brush; facial foveae present, most evident in female, of variable width, nonpilose and depressed; glossa short, broad, bifid, strongly emarginate medially; pre-episternal sutures complete; propodeum with narrow horizontal basal area, usually longitudinally carinate; wings hairy; fore wings with three submarginal cells, first nearly equal to second and third together in length, second and third subequal in length; pygidial and basitibial plates absent. (See Stephen, 1954 for details.)

The genus *Colletes* is widespread over the world, although absent from Australia. In the Palaearctic Region, Noskiewicz (1936) reported 123 species. Stephen (1954) recorded 108 species from America North of Mexico and suspected that only one species is common to the Palaearctic and Nearctic Regions. He says that "This species, *C. impunctatus* Nylander, is found across the northern portions of Asia and Europe, whereas its Nearctic counterpart, *C. impunctatus lacustris* Swenk, appears to be restricted to the Hudsonian and Canadian zones of America." Further, he suggested that the Palaearctic *Colletes* is less diversified in the basic form of the seventh ventral plate than the Nearctic species. On the other hand, Noskiewicz states: "According to our present knowledge it appears that the genus *Colletes* is much stronger in Asia than Europe or Africa. Of the 123 species worked by me, 54 are purely Asiatic, 20 European, 15 North African: 19 species are Eurasian, 6 Eurafrikan, 8 occur in Europe, Asia and Africa and only one species is found exclusively in Africa and Asia. If these numbers are totalled we have 82 species in Asia, 53 in Europe and 30 in North Africa."

#### 1. Subgeneric classification of the genus *Colletes* of Japan

Noskiewicz (1936) recognized 4 subgenera for the Old World species, namely, *Colletes*, *Rhinocolletes*, *Denticolletes* and *Puncticolletes*.

However, Stephen (1954) remarked that *Rhinocolletes*, *Denticolletes* and *Puncticolletes* may be synonymous with the



subgenus *Colletes*.

In Japan, only one subgenus *Colletes* is recognized.

(1) Subgenus *Colletes* Latreille

[Jap. name: Mukashi-hanabachi-azoku]

*Colletes* Latreille, 1802, Hist. Nat. Fourmis, p. 423.

Type-species: *Apis succincta* Linnaeus. Monotypic.

Subg. *Colletes*: Noskiewicz, 1936, Prace Nauk. Wydawnictwo Towarzystwa Nauk. Lwowie, ser. 2, 3: 23.

According to Noskiewicz (1936) the subgenus is characterized as follows: Hinterschildchen flach, der ganzen Länge nach im Niveau der oberen Thoraxwand liegend. Schildchen ungezähnt.

This large subgenus *Colletes* includes 118 species divided into the following 26 species groups: *squamosus* and *clypearis* (15 species each), *fodiens* (12 spp.), *nigricans* and *caspicus* (11 spp. each), *foveolatus* (7 spp.), *flavicornis* (6 spp.), *nanus* and *marginata* (5 spp. each), *carinatus* and *senilis* (4 spp. each), *mixtus* and *succinctus* (3 spp. each), *hylaeiformis*, *lacunatus*, *acutus* and *cunicularius* (2 spp. each), and *roborowskii*, *arenarius*, *uralensis*, *tardus*, *formosus*, *cariniger*, *meyeri*, *anchusae* and *conradti* (1 sp. each).

The Japanese species, *C. patellatus* Pérez and *C. vogti* Pérez were placed to the *fodiens*-group by Noskiewicz (1936). Hirashima (1959) assigned *C. esakii* Hirashima to the *caspicus*-group. In this paper the rest 3 species were recognized as belonging to the following species groups: *C. perforator* Smith to the *succinctus*-group; and *C. babai* Hirashima et Tadauchi and *C. yasumatsui* Hirashima et Ikudome, new species, to the *clypearis*-group.

North American species of *Colletes* were divided into 19 species groups by Stephen (1954).

(1-1) The species group of *Colletes fodiens*

Noskiewicz defines the group as follows:

♀ Die Enddepression des 1. Tergits in der Mitte sehr abgeflacht, die 1. Endbinde in der Mitte unterbrochen oder sehr verdünnt; das 1. Tergit auf der Scheibe nackt oder ± ausgedehnt, bei einer Art bis an die Endbinde, abstehend, lang behaart. Borstenkamm der mittleren Schenkel aus auffallend langen Borsten bestehend. Wangen sehr kurz.

♂ Hinterleib auf den Scheiben der Tergite abstehend, ± lang behaart. Endfransen des Bauches dünn, in der Mitte unterbrochen. Tarsen der Hinterbeine erweitert. Wangen kurz. Das 6. Sternit am Seitenrande jederseits mit ± starker, beuliger Verdickung oder mit Zähnchen.

Included Japanese species

*Colletes (Colletes) patellatus* Pérez, 1905

*Colletes (Colletes) vogti* Pérez, 1905

(1-2) The species group of *Colletes caspicus*

Noskiewicz defines the group as follows:

♀ Das 1. Hinterleibstergit am Ende eingedrückt, mit dichter, breiter, durchgehender, mitten nicht verschmälerter Endbinde, an der basalen Wölbung sehr dicht, angedrückt, ± borstig behaart. Punktierung des 2. Tergits auf der Scheibe sehr fein und meistens sehr flach.

♂ Endfranse des 5. Sternits mitten erweitert und aus längeren Haaren als an den Seiten bestehend; das 7. Tergit am Ende schmal abgerundet; die 7. Ventralplatte verhältnismäßig kurz, ihr Endteil sehr erweitert; die äußeren Zangen des Kopulationsapparates ungeteilt, mit kurzem, ± dreieckigem Endstück.

Included Japanese species

*Colletes (Colletes) esaki* Hirashima, 1958

Colletidae of Japan

(1-3) The species group of *Colletes succinctus*

Noskiewicz defines the group as follows:

♀ Das Hinterleibstergit am Ende nur an den Seiten etwas eingedrückt, sonst gewölbt, an der basalen Wölbung dicht, kurz, anliegend, borstig behaart; diese Behaarung mitten schmal unterbrochen; die 1. Endbinde in der Mitte sehr breit unterbrochen. Wangen gut entwickelt.

♂ Die 6. Bauchplatte jederseits am Rande, etwa in der Mitte der Länge, mit tiefer, ovaler Grube; das 7. Tergit am Ende beinahe zugespitzt; Wangen gut entwickelt; die 7. Ventralplatte sehr klein.

Included Japanese species

*Colletes (Colletes) perforator* Smith, 1869

(1-4) The species group of *Colletes clypearis*

Noskiewicz defines the group as follows:

♀ Das 1. Hinterleibstergit auf der Scheibe spärlich, abstehend, lang behaart, an der Wölbung ohne jegliche ange-drückte zarte Behaarung. Mesonotum grau behaart, mitten sehr zerstreut punktiert. Endbinden weiß, die 1. mitten nicht unterbrochen. Wangen wenigstens halb so lang als die Mandibelbasisbreite.

♂ Hinterleib auf den Scheiben der Tergite abstehend, lang behaart, am 1. an der Wölbung ohne jegliche, zarte, ange-drückte Behaarung. Mesonotum mitten sehr zerstreut punktiert. Endfransen des Bauches gut entwickelt. Wangen sichtlich länger als die Hälfte der Mandibelbasisbreite. Das 7. Tergit nicht verlängert, am Ende ± breit abgestutzt. Die 7. Ventralplatte stark verlängert, jede Hälfte, etwa in der Mitte der Länge, bauchig nach außen erweitert.

Included Japanese species

*Colletes (Colletes) babai* Hirashima et Tadauchi, 1979

*Colletes (Colletes) yasumatsui* Hirashima et Ikudome,

new species

2. Key to the Japanese species of *Colletes*

Females

1. First metasomal tergum with very coarse hairs forming patch or decoration ..... 2
- First metasomal tergum without such coarse hairs ..... 3
2. First metasomal tergum with a pair of patches of coarse, yellowish hairs basally; malar space distinct, about half of basal width of mandible; head and thorax intermixed with dark hairs ..... *perforator* Smith
- First metasomal tergum broadly covered with dense, coarse, yellowish hairs basally; head and thorax without dark hairs; malar space short, about one-fourth as long as basal width of mandible ..... *esakii* Hirashima
3. First metasomal tergum very weakly, sparsely punctate; malar space distinct, about half of basal width of mandible .....  
..... *yasumatsui* Hirashima et Ikudome, new species
- First metasomal tergum densely punctate, although punctures very small in certain species; malar space short, less than half of basal width of mandible ..... 4
4. Malar space about one-fourth as long as basal width of mandible; mesoscutum and scutellum with hairs sparse, coarse, fuscous .....  
..... *babai* Hirashima et Tadauchi
- Mesoscutum and scutellum without such coarse and fuscous hairs ..... 5
5. Malar space about one-third as long as basal width of mandible; interocellar distance shorter than ocellular distance; larger, about 11mm .... *patellatus* Pérez
- Malar space about one-fifth as long as basal width of mandible; 1st tergum finely punctate; interocellar distance as long as ocellular distance; smaller, about 10mm ..... *vogti* Pérez

Colletidae of Japan

Males

1. Hind legs with femora swollen, tibiae elongate and swollen, and basitarsi expanded; fore and middle legs also with femora slightly swollen; apex of 6th metasomal sternum with rather dense hairs, becoming distinctly longer toward the middle ..... *patellatus* Pérez
- Legs not modified, slender as usual; apex of 6th metasomal sternum without such dense hairs ..... 2
2. Sixth metasomal sternum with a pair of round and distinct excavations laterally; apical margins of 2nd to 5th metasomal sterna each with a sparse hair band .....  
..... *perforator* Smith
- Sixth metasomal sternum without such a pair of excavations ..... 3
3. Sixth metasomal sternum basally with a pair of transverse protuberance, its latero-posterior portions with clumps of hairs curled outward; apical margins of 2nd to 5th metasomal sterna subtriangularly membranous in the middle, especially distinct on 2nd and 3rd sterna ..... *vogti* Pérez
- Sixth metasomal sternum basally without such protuberance; apical margins of 2nd to 5th metasomal sterna each with a hair band ..... 4
4. Mesoscutum and scutellum intermixed with dark hairs; apical hair band of 5th metasomal sternum very sparse; 6th metasomal sternum with clumps of a few hairs curled outward latero-basally .....  
..... *babai* Hirashima et Tadauchi
- Mesoscutum and scutellum not intermixed with such hairs; 6th metasomal sternum without such clumps of hairs ..... 5
5. Second metasomal tergum basally with a transverse band of appressed, clear, pale fulvous hairs; hairs of apical band of 5th metasomal sternum distinctly elongate in the middle; medio-apical portion of 6th metasomal sternum with hairs not dense, moderately long ..... *esakii* Hirashima

- Second metasomal tergum basally without such a hair band; medio-apical portion of 6th metasomal sternum without such hairs; malar space long, about as long as basal width of mandible; hairs of apical bands of 2nd to 5th metasomal sterna short, appressed, not so dense, scale-like in the middle .....  
..... *yasumatsui* Hirashima et Ikudome, new species

3. Descriptions of the Japanese species of *Colletes*

The species group of *Colletes fodiens*

(1) *Colletes (Colletes) patellatus* Pérez

[Jap. name: Ashibuto-mukashi-hanabachi]

(Figs. 15-17)

*Colletes patellatus* Pérez, 1905, Bull. Mus. Hist. Nat., 1: 38, male.

*Colletes kobensis* Cockerell, 1926, Pan-pacific Ent., 3(2): 81, female; Noskiewicz, 1936, Prace Nauk. Wydawn. Tow. Nauk. Lwow. XII, 3: 316.

*Colletes patellatus*: Yasumatsu, 1936, Ent. & Phytopath., 4(12): 243 (Tsushima).

*Colletes (Colletes) patellatus*: Noskiewicz, 1936, Prace Nauk. Wydawn. Tow. Nauk. Lwow. XII, 3: 23-25 and 316-319

*Colletes patellatus*: Hirashima, 1965, Icon. Ins. Jap. Colore Nat., Edita, 3: 303, female and male (Honshu, Shikoku and Kyushu).

*Colletes patellatus*: Hirashima et Tadauchi, 1979, J. Fac. Agr., Kyushu Univ., 24(2/3): 114, female and male (Essa Province).

TYPE

Holotype: male, Tsushima, H. Fruhstorfer, in PM.

Type of *kobensis*: holotype; female, Kobe, Japan, Oct. 16, 1909, in CAS, No. 2387.

DIAGNOSIS

This species is characterized by having the 1st metasomal

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tergum with distinct and moderately strong punctures intermixed with larger ones, and the 1st to 5th metasomal terga each with a transverse band on the apical portion (the one on the 1st tergum is interrupted in the middle). The males are especially characterized by having the hind femora and tibiae swollen. Thus, this is easily separable from the other species.

### Female

Body length 10-12 mm.

**Coloration** Black except as follows: mandibles reddened apically; undersides of 3rd to 10th flagellar segments broadly and slightly brownish, that of 10th slightly reddened apically; wings slightly brownish subtransparent with stigma and veins brown; tegulae brown and subtransparent; legs piceous with apical segments of tarsus more brownish; tibial spurs ferruginous; posterior margins of terga slightly reddish brown, those of sterna pale yellowish brown.

**Structure** Head rather broader than long as seen in front (47:34); inner margins of eyes well convergent below except upper one-fifth portion which converges toward ocelli; malar space comparatively short, about one-third as long as basal width of mandible; clypeus shining and distinctly convex, with oblique striate-punctures strong and dense; facial fovea somewhat shining, not deeply impressed and broadened medially, with upper end narrowed and slightly curved inwards, and with lower end extending below beyond line running upper margins of antennal sockets; ocellocular spaces with punctures comparatively large and dense; ratio of IOD:DL0:OOD:OCD as about 10:4.3:11:6 as seen from above; antennal pedicel as long as broad; flagellum with 1st segment longer than broad (about 8:5), and with 2nd to 8th segments each as long as broad.

Prothoracic spine distinctly produced and sharp; mesoscutum smooth and shining with punctures strong and dense except submedian portion with sparse ones (which are slightly closer than in *perforator*); scutellum also strongly, densely punctate except anterior and median portion impunctate; mesepisternum shining, densely rugoso-punctate, and its

punctures strong; propodeum with basal area strongly, longitudinally carinate and foveolate; posterior face of propodeal enclosure abrupt, with carinae strong and irregular.

Legs with middle and hind basitarsi slightly tapering towards apex, and with hind tibiae slightly widened apically.

First metasomal tergum smooth, somewhat dull, broad and distinctly angulate as seen from above, with latero-basal portions well convex in profile; 2nd and following terga nearly smooth and somewhat dull, with punctures fine and dense; posterior margins of terga slightly depressed in the middle.

**Pilosity** Hairs on head moderately dense and fulvous (slightly darker than in *perforator*), those on vertex pale fulvous; hairs on thorax fulvous (becoming paler downward), long and dense, but not concealing surface; hairs on legs white to fulvous; 1st tergum with hairs moderately long, pale fulvous, and dense latero-basally; 2nd to 5th terga with hairs short, not dense and brown to fuscous; caudal fimbria dense and brownish; base of 2nd tergum without a band as in *perforator*, *easkii*, *babai* or *yasumatsui*; apical margin of 1st tergum with a narrow transverse band (interrupted in the middle) of appressed and pale fulvous hairs, those of 2nd to 5th terga each with a complete band (slightly broader than that of 1st tergum), becoming paler or whitish toward apical terga; hairs on venter of metasoma short, pale fuscous and moderately dense.

#### MALE

Body length 10-12 mm.

**Coloration** Legs with distitarsus brownish; tarsal claws with basal halves yellowish, and with apical halves reddened; posterior margins of terga and sterna pale brown.

**Structure** HW:HL = 41:31; inner margins of eyes and malar space similar to female; facial fovea dull and short; ocellar region well convex; ratio of IOD:DLO:OOD:OCD as about 10:3.5:10:7; antennae with 1st flagellar segment longer than broad (about 7:6), with next ten segments distinctly longer than broad, and with apical segment longest.

Prothoracic spine rather short and narrowly acute as seen



## Colletidae of Japan

from above; mesoscutum similar to female except just behind the median mesoscutal line with punctures moderately sparse; scutellum impunctate anteriorly and with punctures sparse on the median portion; propodeal enclosure strongly indicated, defined by a transverse carina posteriorly, and interior of enclosure longitudinally carinate and pitted; posterior face of enclosure abrupt.

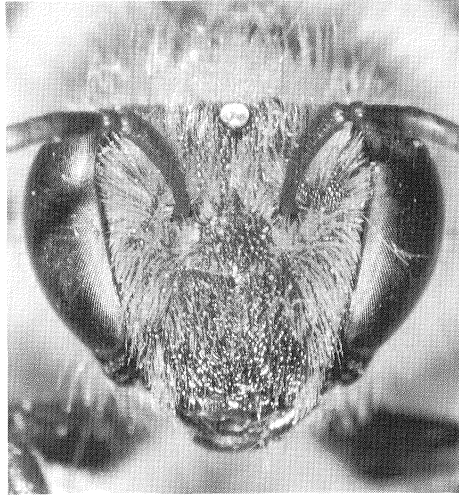
Legs as mentioned in key.

Metasomal terga shining; 1st tergum strongly and rather densely punctate; 2nd to 6th terga densely punctate, its punctures weaker and smaller than on 1st; posterior depressions of terga weakly, broadly indicated in the middle; 7th ventral plates (Fig. 16-A) with basal articulatory condyles moderately reflexed, with necks broadened, and with discs bisinuated apically; spiculum of 8th sternum nearly subtriangular (Fig. 16-B); genital capsule as illustrated (Fig. 16-C and D).

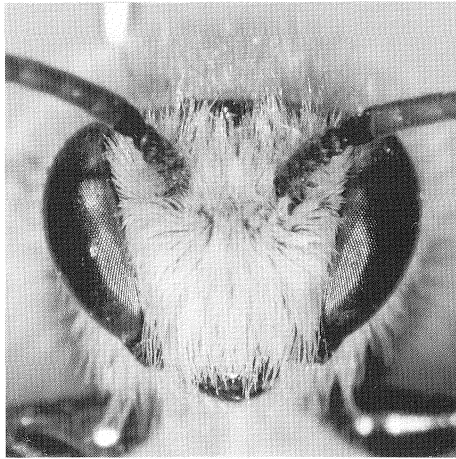
**Pilosity** Hairs on head paler than in female, those on clypeus completely concealing surface and its neighbouring regions; hairs on thorax long, moderately dense, light fulvous upward and pale fulvous to whitish downward; hairs on legs pale fulvous, those on the inside of basitarsus very dense; 1st tergum with hairs long, not dense, and pale or light fulvous; hairs on 2nd to 6th terga fulvous to brownish, becoming longer towards posterior terga, those on 7th tergum somewhat dense and fuscous; apical margins of 1st to 5th terga each with a whitish or pale fulvous fringe of dense and appressed hairs, that of 1st tergum narrowed and sparse in the middle, and those of 2nd and 3rd terga slightly narrowed in the middle; bands of apical margins of 2nd to 4th sterna not dense, with short and scale-like hairs.

**Distribution** (\* indicates the new locality) Honshu, Sado-ga-shima\*, Shikoku, Kyushu, Tsushima\*, Tanega-shima and Yaku-shima\* (Fig. 17).

**Specimens examined** HS: 1♀ and 1♂, Sep.14,1980 Rifu-cho, Miyagi Pref., K. Goukon; 1♀, Aug.15,1950 Kitasaku, Nagano Pref., 1♂, Aug.21,1950 same locality, R. Ishikawa; 1♀, Oct.



A



B

Fig. 15. Heads of *Colletes (Colletes) patellatus* Pérez in frontal view. A, female; B, male.

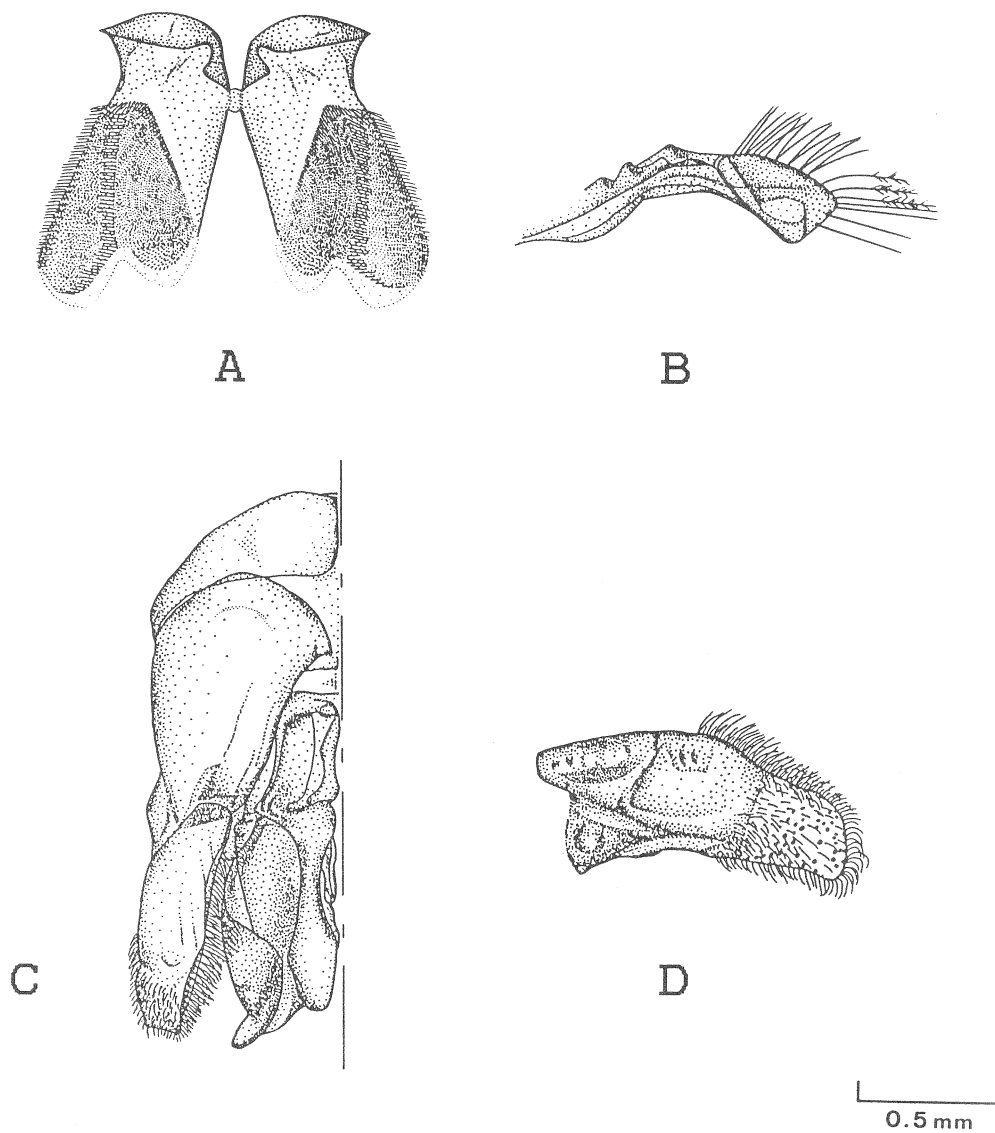


Fig. 16. Male terminalia of *Colletes (Colletes) patellatus* Pérez. A, 7th ventral plates in ventral view; B, the apex of 8th sternum in lateral view; C, genital capsule in dorsal view; D, gonostylus in lateral view.



Fig. 17. A map showing the distribution of *Colletes (Colletes) patellatus* Pérez.

## Colletidae of Japan

12, 1977 Syobara, Hiroshima Pref., K. Kojima. SD: 1♀ and 1♂, Sep. 20, 1962 Mt. Kinpoku, R. Ishikawa. SK: 1♀ and 1♂, Oct. 5, 1977 Higashitsuno, Kochi Pref., S. Ikudome. KS: 1♀ and 1♂, Oct. 1, 1959 Mt. Hikosan, Buzen, Y. Hirashima; 1♀ and 1♂, Oct. 20, 1978 Makizono, Kagoshima Pref., S. Ikudome. TS: 1♀, Oct. 10, 1959 Mt. Ariake, 1♂, Oct. 8, 1959 Sumo, Y. Maeta. YK: 1♀ and 1♂, Oct. 23, 1982 Onoaida, S. Ikudome. Besides the above-mentioned specimens, 298 females and 226 males were examined. **Flight records** Northern Japan: females and males, mid-Aug. to late Oct. Southern Japan: females and males, early Sep. to late Oct.

### Floral records

Amaranthaceae: *Achyranthes japonica* (Miq.) Nakai, HS OX.

Compositae: *Artemisia princeps* Pampan, HS OX, *Aster scaber* Thunb., SK OX, *A. ageratoides* Trucz. var. *ovatus* (Franch. et Savat.) Nakai, HS OX, var. *semiamplexicaulis* (Makino) Ohwi, SK OX, *A. glehnii* Fr. Schm. var. *hondoensis* Kitam., HS OX, *A. subulatus* Michx., SK OX, *A. tataricus* Linn., SK OX, *Bidens biternata* (Lour.) Merr. et Sherff, YK OX, *B. frondosa* Linn., SK OX, *Erigeron annuus* (Linn.) Pers., HS OX, *E. canadensis* Linn., HS OX, *E. sumatrensis* Retz., HS OX, *Hieracium japonicum* Franch. et Savat., HS OX, *H. umbellatum* Linn. var. *japonicum* Hara, HS OX, *Ixeris dentata* (Thunb.) Nakai forma *amplifolia* (Kitam.) Hiyama, HS 2X, *Kalimeris pinnatifida* (Maxim.) Kitam., HS 14X, *K. yomena* Kitam., HS 4X, SK X, KS 3X, *Lactuca indica* Linn. var. *laciniata* (O. Kuntze) Hara, HS OX, SK OX, KS OX, forma *indivisa* (Makino) Hara, SK OX, *Picris hieracioides* Linn. var. *glabrescens* (Regel) Ohwi, HS X, *Solidago virga-aurea* Linn. var. *asiatica* Nakai, HS OX, *S. altissima* Linn., KS OX, *S. gigantea* Ait. var. *leiophylla* Fern., HS OX, *Youngia denticulata* (Houtt.) Kitam., HS 2X, SK OX, KS OX.

Geraniaceae: *Geranium thunbergii* Sieb. et Zucc., HS OX.

Labiatae: *Salva nipponica* Miq., HS OX.

Leguminosae: *Lespedeza bicolor* Trucz, HS OX.

Polygonaceae: *Fagopyrum esculentum* Moench, TS OX, *Polygonum thunbergii* Sieb. et Zucc., HS OX, *P. maackianum* Regel, HS OX, *P. posumbu* Ham. var. *laxiflorum* (Meisn.) Ohwi, HS OX,

*P. perfoliatum* Linn., SK OX, TS OX, *P. lapathifolium* Linn., HS X.

Valerianaceae: *Patrinia villosa* (Thunb.) Juss., HS OX.

(2) *Colletes (Colletes) vogti* Pérez

[Jap. name: Ko-mukashi-hanabachi]

(Figs. 18-20)

*Colletes vogti* Pérez, 1905, Bull. Mus. Hist. Nat., 1: 39, female.

*Colletes vogti*: Cockerell, 1926, Pan-Pacific Ent., 3(2): 82, female (Tsushima).

*Colletes vogti*: Yasumatsu, 1936, Ent. & Phytopath., 4(12): 244, female (Tsushima).

*Colletes (Colletes) vogti*: Noskiewicz, 1936, Prace Nauk. Wydawn. Tow. Nauk. Lwow. XI, 3: 313-316, female and male.

*Colletes vogti*: Hirashima et Tadauchi, 1979, J. Fac. Agr., Kyushu Univ., 24(2/3): 114, female and male (Essa Province).

**TYPE**

Holotype: female, Oct., Tsushima, H. Fruhstorfer, in PM.

Allotype: male, in WM.

**DIAGNOSIS**

This species is the smallest in the Japanese species, and is easily separable from the other species by having the 1st tergum very finely punctate. In addition the female mesoscutum is provided with evidently weaker and smaller punctures than in any other Japanese species, and the male sixth sternum has a pair of transverse protuberance on the base.

**FEMALE**

Body length 9.5-10.5 mm.

Coloration Similar to *patellatus*.

Structure HW:HL = 41:31; inner margins of eyes well convergent below as in *patellatus*; malar space rather short, about one-fifth as long as basal width of mandible; clypeus shining, not distinctly convex, and with punctures longitudinally striated, dense and weak; facial fovea dull, not

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deeply impressed, not broadened medially, and with lower end as in *patellatus*; ocellocular space with punctures small and dense as in *perforator*; paraocular areas weakly rugoso-punctate; ratio of IOD:OLD:OOD:OCD as about 9.5:3.5:9.5:6; antennal pedicel slightly longer than broad (about 5:4); flagellum with 1st segment slightly longer than broad (about 3:2), and with 2nd to 8th segments nearly as long as broad.

Prothoracic spine distinctly produced, rather sharp; mesoscutum smooth, shining, and with distinct and dense punctures, but submedian portion rather sparsely punctate; scutellum with punctures strong and dense except anterior portion sparsely punctate; mesepisternum shining, with dense punctures which are rugose, weak, sparser than in *patellatus*; propodeum with basal area weakly, longitudinally carinate and pitted; posterior face of propodeal enclosure abrupt, with carinae very weak and irregular.

Legs with middle and hind basitarsi subparallel-sided, and with hind tibiae slightly widened (or nearly subparallel) apically.

First metasomal tergum with latero-basal portions well convex and angulate as seen from above; 1st tergum smooth, shining, and with punctures fine and dense; 2nd and following terga very minutely, densely punctate; posterior margins of terga slightly depressed in the middle.

**Pilosity** Hairs on head moderately dense, slightly dark fulvous except those on vertex pale fulvous; hairs on clypeus denser than in any other Japanese species; hairs on mesoscutum and scutellum comparatively short, dense (but not concealing surface), and fulvous; hairs on the rest of thorax long, dense (but not concealing surface), and fulvous to pale fulvous; hairs on legs white to pale fulvous; femoral fimbria and tibial scopa pale fulvous; 1st tergum with weak fringe of pale fulvous hairs on lateral edges, becoming shorter posteriorly, and basally with hairs long, sparse and pale fulvous; hairs on 2nd and following terga as in *patellatus*; apical margin of 1st tergum with a narrow transverse band of appressed and pale fulvous hairs, its band broadly interrupted in the middle (more broadly so than

in *perforator*); those of 2nd to 5th terga each with a complete band of similar hairs to 1st, but slightly narrowed medially; hairs on venter short, dense and pale fulvous (or whitish).

**MALE**

Body length 8.5-9.5 mm.

**Coloration** Similar to female except legs fuscous.

**Structure** HW:HL = 36:27; malar space short, about one-third as long as basal width of mandible; facial fovea short, broadened medially; ocellar region well convex; ocellocular spaces largely and densely rugoso-punctate; ratio of IOD:OLD:OOD:OCD as about 10:3:9:6; antennal pedicel and 1st flagellar segment about as long as broad, next ten segments distinctly longer than broad.

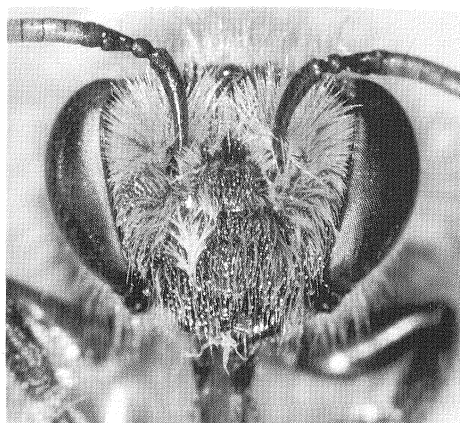
Prothoracic spine short and sharp (not so sharp as in *babai*); punctures on mesoscutum like in female except those on antero-median portion and just behind the mesoscutal line sparse; scutellum impunctate anteriorly, with median portion sparsely punctate; mesepisternum smooth, with punctures sparse and moderately weak; propodeal enclosure well indicated, but weaker than in *patellatus* or *babai*.

Legs slender, without special modification.

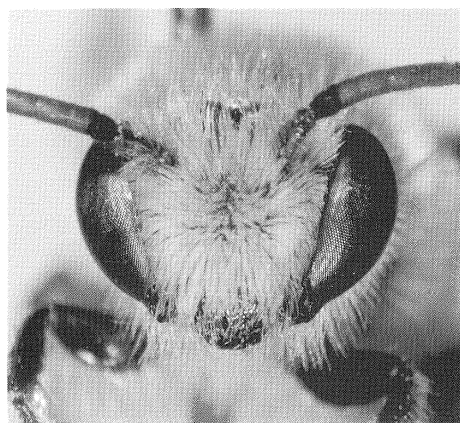
Metasomal terga smooth, nearly shining; 1st tergum strongly punctate (slightly weaker than in *patellatus*, evidently stronger than in *yasumatsui*), its punctures dense and fine; posterior depressions of terga weakly indicated; 7th ventral plates with basal articulatory condyles comparatively small and well reflexed, with necks short, with discs short and wide toward apex, and with apical portions truncate (Fig. 19-A); spiculum of 8th sternum like subtriangle (Fig. 19-B); genital capsule as illustrated (Fig. 19-C & D).

**Pilosity** Hairs on head similar to *patellatus*, but lower portion of genal area with hairs whitish; hairs on thorax light fulvous to pale fulvous, long, and moderately dense, but those on median portion of mesoscutum and anterior portion of scutellum sparse; 1st tergum with hairs long, not dense and fulvous; hairs on 2nd to 6th terga fulvous to brownish, becoming longer towards posterior terga; hairs on





A



B

Fig. 18. Heads of *Colletes (Colletes) vogti* Pérez in frontal view. A, female; B, male.

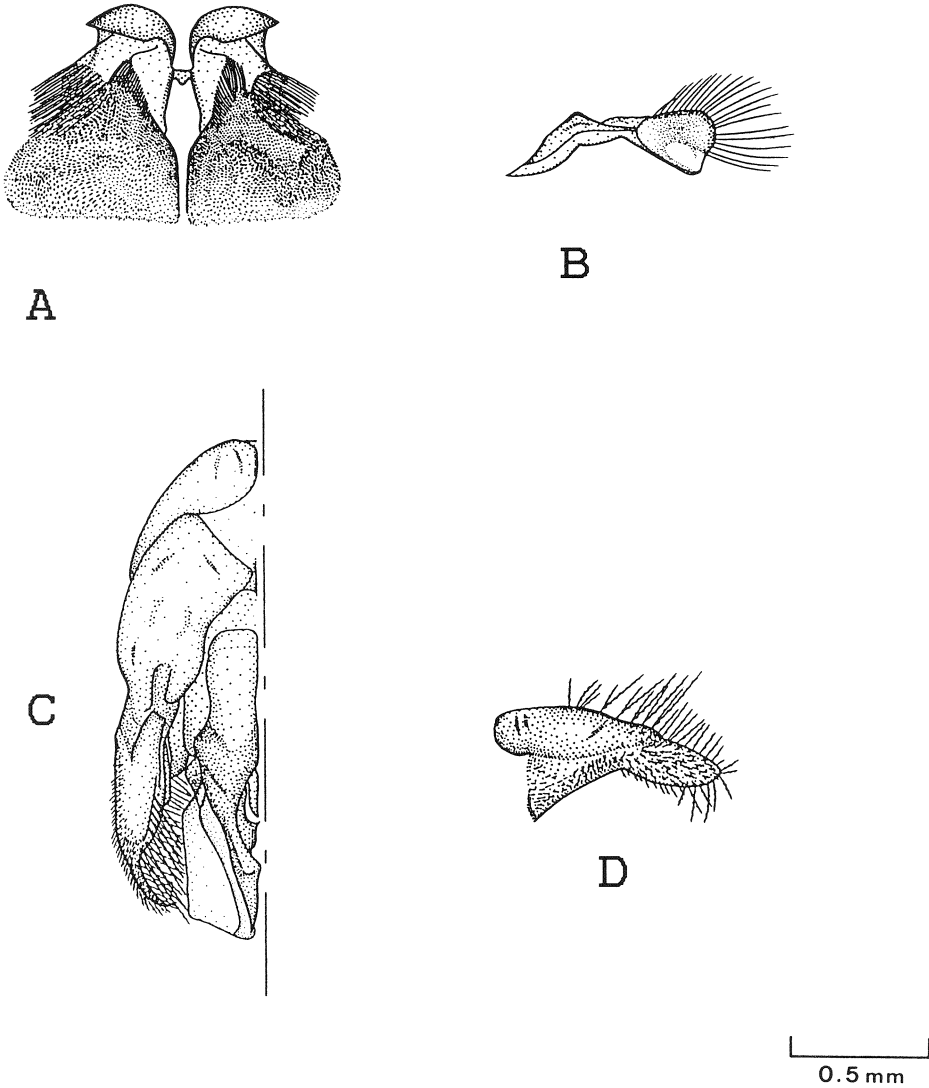


Fig. 19. Male terminalia of *Colletes (Colletes) vogti* Pérez. A, 7th ventral plates in ventral view; B, the apex of 8th sternum in lateral view; C, genital capsule in dorsal view; D, gonostylus in lateral view.

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Fig. 20. A map showing the distribution of *Colletes (Colletes) vogti* Pérez.

7th tergum somewhat dense and fuscous; apical margins of 1st to 5th terga each with a transverse band of pale fulvous hairs, bands on 1st and 2nd terga slightly narrow and sparse in the middle; apical margins of 1st to 5th sterna each with a band-like fringe of subappressed hairs, which are rather sparse and narrow (or interrupted) in the middle; 6th sternum with short, soft, rather sparse and pale fulvous hairs. Distribution Honshu (new record), Kyushu (new record) and Tsushima (Fig. 20).

**Specimens examined** HS: 1♀, Sep.12,1962 Habiro, Ina, Nagano Pref., 4♂♂, Sep.7,1962 same locality, Y. Maeta. KS: 1♀, and 1♂, Oct.5,1950 Funaishi-Okawachi, Hyuga Prov., Y. Hirashima; 1♀, Oct.10,1977 Daikanbo, Mt. Aso, Kumamoto Pref., S. Ikudome; 1♀ and 1♂, Nov.6,1979 Osumi-cho, Kagoshima Pref., H. Nagase. TS: 1♀ and 1♂, Oct.8,1959 Sumo, Y. Maeta; 1♀, Oct.10, 1959 Tsutsu, Y. Hirashima. Besides the above-mentioned specimens, 15 females and 13 males were examined.

**Flight records** Northern Japan: females, late Aug. to late Sep.; males, late Aug. to mid-Sep. Southern Japan: females and males, early Sep. to early Oct.

**Floral records**

Compositae: *Kalimeris pinnatifida* (Maxim.) Kitam., HS X, *K. yomena* Kitam. KS OX, *Youngia denticulata* (Houtt.) Kitam. HS OX.

The species group of *Colletes caspicus*

(3) *Colletes (Colletes) esakii* Hirashima

[Jap. name: Esaki-mukashi-hanabachi]

(Figs. 21-23)

*Colletes esakii* Hirashima, 1958, Mushi, 32(6): 69, female  
*Colletes esakii*: Hirashima, 1965, Icon. Ins. Jap. Color Nat.,  
Edita, 3: 303, female (Amami-ohshima).

**TYPE**

Holotype: female, Sep.22,1954 taken at the nesting site located between Yuwan and Shinmura, Amami-ohshima, S. Miya-

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moto and Y. Hirashima, in KU. Paratopotypes: 15 females, in KU.

### DIAGNOSIS

This species resembles *Colletes seitzii* Alfken, but differs from it by having more conspicuous prothoracic spines, weaker punctures on the 1st metasomal tergum and the color of hairs which is distinctly yellowish through the body. And this species is easily separable from the other Japanese species by having the basal portion of the 1st metasomal tergum which is densely and broadly covered with coarse yellowish hairs.

The male is described for the first time.

### FEMALE

Body length 11.5-13 mm.

**Coloration** Black except as follows: mandibles reddened apically; undersides of flagellum broadly brown except 1st segment; wings slightly brownish subtransparent with stigma and veins pale fulvous; tegulae ferruginous, subtransparent; legs piceous; tibial spurs ferruginous; apical margins of metasomal terga and sterna ferruginous.

**Structure** HW:HL = 48:35; inner margins of eyes comparatively weakly convergent below except upper one-sixth which converge toward ocelli; malar space short, about one-fourth as long as basal width of mandible; clypeus shining, distinctly convex, and with longitudinal striate-punctures dense and not so strong; facial fovea somewhat shining, deeply impressed, with upper part broadened, with upper end narrowed and curved inwards, and with lower end extending line running lower parts of antennal sockets; ocellocular spaces with punctures irregular; paraocular areas rather finely rugoso-punctate; ratio of IOD:DL0:OOD:OCD as about 11.5:4.2:9:7.5; antennal pedicel slightly shorter than broad (about 5:6); flagellum with 1st segment slightly longer than broad (about 7:5), 2nd to 8th segments also longer than broad.

Prothoracic spine distinctly produced, sharp (not so sharp as in *patellatus*) and large; mesoscutum smooth, nearly shining, and with punctures distinct and dense, but those on

submedian portion large and sparse (slightly closer than in *perforator*); scutellum strongly, largely punctate; mesepisternum shining, densely rugoso-punctate, its punctures strong as in *patellatus*; propodeum with basal area strongly, longitudinally carinate and foveolate; posterior area of propodeal enclosure with another carinae weak and longitudinal.

Legs with middle basitarsi slightly tapering towards apex, with hind basitarsi subparallel-sided, and with hind tibiae slightly widened in the middle.

First metasomal tergum with basal portions convex in profile, broad (broader than in *patellatus* or *babai*), and angulate as seen from above; 1st tergum smooth and nearly dull, with punctures strong and very dense, intermixed with scattered larger ones as in *patellatus*; 2nd and following terga dull and very minutely, closely punctate; apical margins of terga slightly depressed in the middle.

**Pilosity** Hairs on head moderately dense and pale to light fulvous, becoming deeper towards vertex; hairs on clypeus sparse; hairs on thorax short to long, rather dense (well concealing surface), light clear fulvous, becoming paler towards beneath; hairs on legs white to ochreous; basal portion of 1st tergum with hairs comparatively short, dense, erect to appressed, and light fulvous; apical margins of 1st to 5th terga each with a complete band of pale fulvous hairs; hairs on 2nd to 5th terga short, not dense and brown or fuscous; caudal fimbria brownish; hairs on venter of metasoma short, dense and pale fulvous.

**MALE**

Body length 9-10 mm.

**Coloration** Black except as follows: apical half of mandibles reddened; undersides of 2nd to 11th flagellar segments broadly brownish; wings slightly brownish subtransparent with veins and stigma brownish; tegulae yellowish brown, subtransparent; legs piceous; tibial spurs pale ferruginous; tarsal claws with basal halves yellowish, apical halves reddened; posterior margins of terga and sterna slightly yellowish pale brown.

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**Structure** HW:HL = 40:29; inner margins of eyes strongly concave above, distinctly convergent below; malar space short, about one-third as long as basal width of mandible; clypeus well convex, shining, and longitudinally striate-punctate; facial fovea shining, moderately long, shallowly impressed, and broadened upwards; ocellar region well convex; ocellocular spaces with punctures rugose, small and dense; ratio of IOD:OLD:OOD:OCD as about 10:4:8.5:7; antennae with pedicel slightly broader than long (about 6:5), with 1st flagellar segment about as long as broad, and with next ten segments each distinctly longer than broad.

Prothoracic spine distinct but not so large, sharp, and projected just laterally as seen from above; mesoscutum smooth, shining, and with punctures large and dense (denser than in *patellatus* or *perforator*), except anterior portion and just behind the mesoscutal line with punctures sparse; anterior portion also sparsely punctate; mesepisternum strongly, densely rugoso-punctate; propodeal enclosure strongly indicated and defined by a transverse carina posteriorly, its interior enclosure longitudinally carinate and pitted; posterior face of enclosure abrupt.

Legs slender, without special modification.

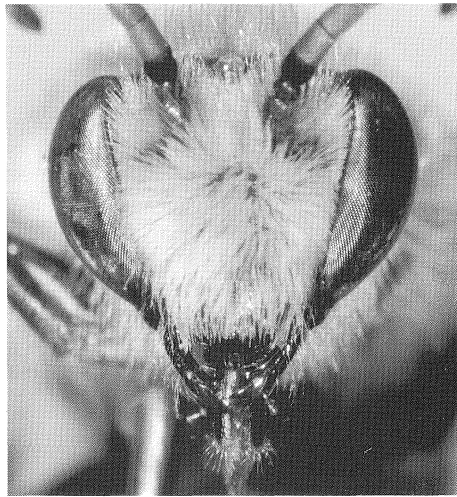
Metasomal terga smooth, nearly shining; 1st tergum rather densely, strongly punctate, intermixed with sparse and larger punctures; 2nd to 6th tergum closely, minutely punctate; posterior depressions of terga distinctly, broadly indicated; 7th ventral plates with basal articulatory condyles strongly reflexed, with necks well elongated, and with discs rather widened laterally (Fig. 22-A); spiculum of 8th sternum rather elongated (Fig. 22-B); genital capsule as illustrated (Fig. 22-C and D).

**Distribution** Honshu (new record) and Amami-ohshima (Fig. 29).

**Specimens examined** HS: 2♀♀, Aug.7, 1967 Mt. Aoba, Fukui Pref., A. Takayama; 1♀, Aug.8, 1975 Ohshima, Fukui Pref., H. Sasaji; 2♂♂, 1983 Fukui Pref., Y. Ito; 1♀, Aug.13, 1984 Tsurugi, Ishikawa Pref., I. Togashi; 1♀ and 3♂♂, July 25, 1985



A



B

Fig. 21. Heads of *Colletes (Colletes) esakii* Hirashima in frontal view. A, female; B, male.



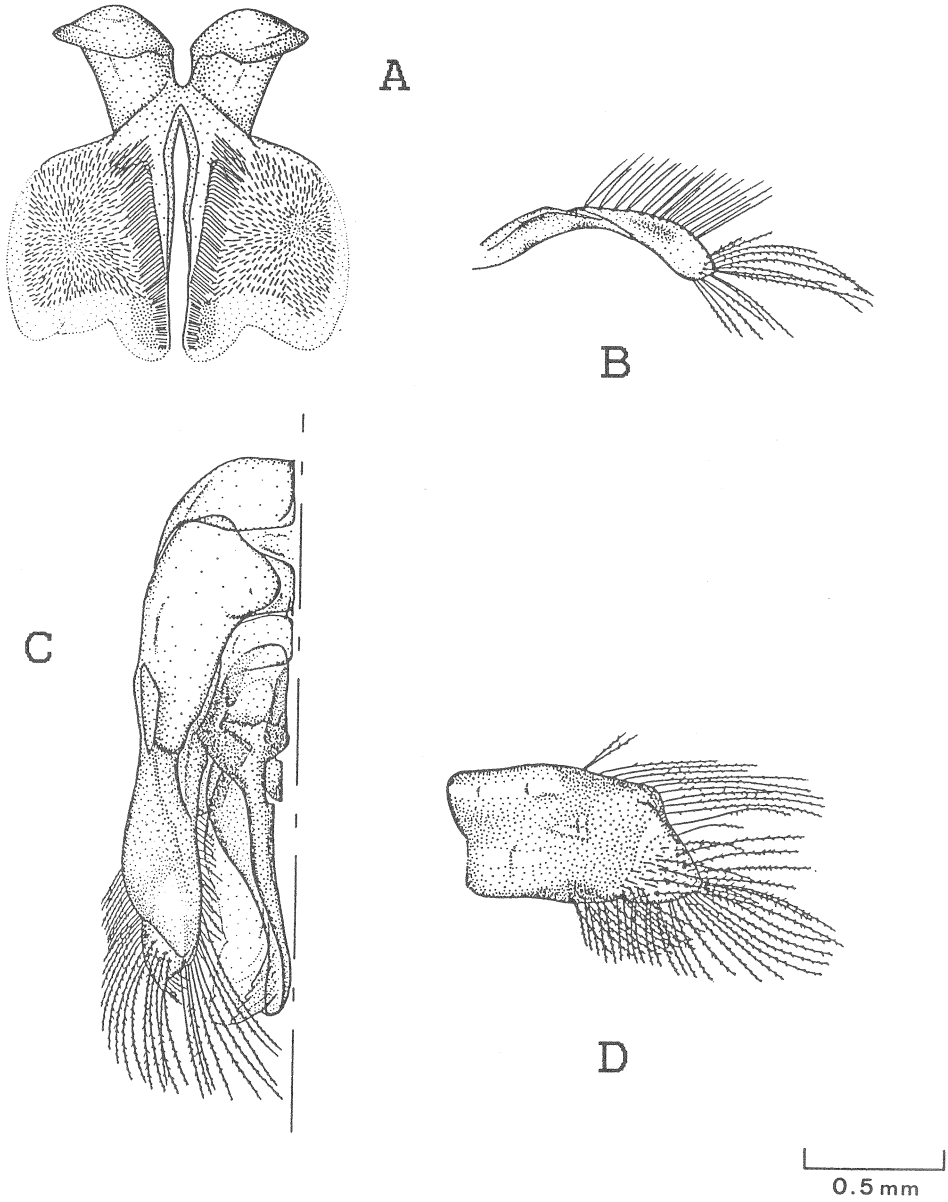


Fig. 22. Male terminalia of *Colletes (Colletes) esakii* Hirashima. A, 7th ventral plates in ventral view; B, the apex of 8th sternum in lateral view; C, genital capsule in dorsal view; D, gonostylus in lateral view.

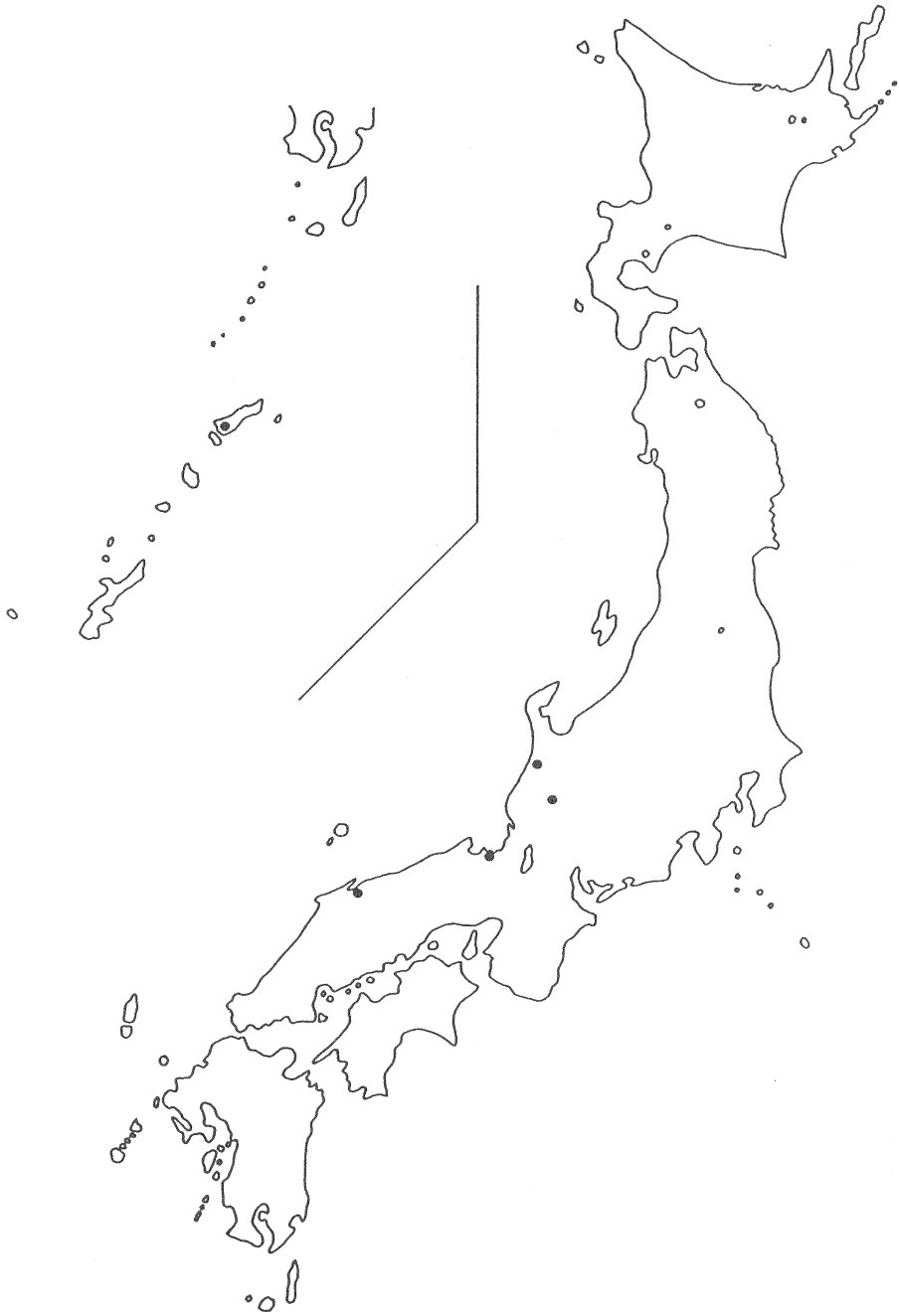


Fig. 23. A map showing the distribution of *Colletes (Colletes) esakii* Hirashima.

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Yonago, Tottori Pref., H. Negoro; 1♀ and 1♂, July 1988 Mt. Makuragi, Shimane Pref., Y. Maeta. AM: 8♀♀, July 22, 1954 Yuwan-Shinmura, S. Miyamoto and Y. Hirashima; 1♀ and 8♂♂, cocoons collected on Mar. 13, 1964 Nishinakama, T. Iida. Besides the above-mentioned specimens, 10 females and 12 males were examined.

Flight records Females: late July to early Aug. Males: late July.

Floral record Not available.

The species group of *Colletes succinctus*

(4) *Colletes (Colletes) perforator* Smith

[Jap. name: Oo-mukashi-hanabachi]

(Figs. 24-26)

*Colletes perforator* Smith, 1869, Entomologist, IV:205, female.

*Colletes perforator*: Matsumura, 1908, Nihon-ekichu-mokuroku, 1908: 142.

*Colletes perforator*: Matsumura, 1915, Kontyu-bunruigaku, Gekan, 1915: 294.

*Colletes perforatus*: Cockerell, 1926, Pan-Pacific Ent., 3(2): 82, female.

*Colletes perforator*: Tosawa, 1932, List Ins. Minoo Park, Osaka, Japan, 1932: 101.

*Colletes perforatus*: Yasumatsu, 1936, Ent. & Phytopath., 4(12): 243.

*Colletes perforator*: Noskiewicz, 1936, Prace Nauk. Wydawn. Tow. Nauk. Lwow. II, 3: 508.

*Colletes collaris*: Yasumatsu, 1950, Icon. Ins. Jap., 1950: 1481; nec Dours, 1872.

*Colletes perforator*: Hirashima et Tadauchi, 1979, J. Fac. Agr., Kyushu Univ., 24(2/3): 115, female and male.

TYPE

Holotype: female, in BM.

DIAGNOSIS

This species has been erroneously known as *Colletes*

*collaris* Dours, 1872 (Rev. Mag. Zool. 2, 23: 298) after the publication of the familiar "Nihon Kontyu Daizukan (Iconographia Insectorum Japonicorum)" in 1950.

This species is the largest one among the Japanese *Colletes*. The females are easily recognizable by the character of the 1st metasomal tergum which is densely covered with coarse yellowish hairs on the latero-basal portions. Although this sort of hair patches do not appear in the males, the males are also easily separable from the other Japanese species by having a pair of round, deep excavations on the lateral portions of the 6th metasomal sternum.

#### FEMALE

Body length 12 mm.

**Coloration** Although similar to *patellatus*, characteristics as follows: undersides of 2nd to 10th flagellar segments slightly brownish; tegulae brown; tarsi slightly piceous; tibial spurs pale ferruginous; posterior margins of terga brown, those of sterna slightly reddish brown.

**Structure** HW:HL = 47:37; inner margins of eyes comparatively weakly convergent below except upper one-fifth which converge towards ocelli; malar space distinct, about half as long as basal width of mandible; punctures on clypeus as in *patellatus* but longitudinal; facial fovea also similar to *patellatus* but not broadened medially; ocellocular spaces with punctures small and dense; ratio of IOD: DLO:OOD:OCD as about 9:4:10:5; paraocular areas strongly rugoso-punctate; antennal pedicel about as long as broad; flagellum with 1st segment slightly longer than broad (about 8:6), and with 2nd to 8th segments each also slightly longer than broad (about 7:6).

Prothoracic spine distinctly produced, sharp (not so sharp as in *patellatus*); mesoscutum smooth and shining, with punctures strong and dense except those on submedian portion sparse; median portion of scutellum also sparsely punctate; mesepisternum shining and rugoso-punctate, its punctures strong, sparser than in *patellatus* or *babai*; posterior face of propodeal enclosure with carinae strong and irregular.

Legs with middle basitarsi slightly tapering towards apex,

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with hind basitarsi subparallel-sided, and with hind tibiae widened apically.

First metasomal tergum with latero-basal portions not well convex in profile; 1st tergum smooth and shining, with punctures moderately strong and dense (weaker and sparser than in *patellatus* or *esakii*), but antero-median portion without puncture; 2nd and following terga also smooth and shining, but with punctures very fine and dense; posterior margins of terga not depressed in the middle.

**Pilosity** Hairs on head moderately dense and fulvous, but those on ocellar triangle intermixed with fuscous ones, and those on vertex pale fulvous; hairs on clypeus sparse; hairs on thorax fulvous to pale fulvous, but those on meso-scutum and scutellum intermixed with fuscous ones; hairs on thorax long and dense, but not concealing surface except anterior portion of scutellum bare; hairs on legs slightly yellowish white to dark brown; femoral fimbria fulvous and tibial scopa fulvous downward, dark brown upward; 1st metasomal tergum basally with hairs long, soft, and not dense, those on 2nd to 5th terga short, brown or fuscous; apical margin of 1st tergum with a narrow transverse band (broadly interrupted in the middle) of pale fulvous hairs, and those of 2nd to 5th terga each with a complete hair band slightly narrowed in the middle; basal portion of 2nd tergum with a broad transverse band of pale fulvous hairs; caudal fimbria brownish, dense; hairs on venter of metasoma short, dense and pale fuscous.

### MALE

Body length 10-12 mm.

**Coloration** Similar to female except as follows: apical flagellar segment not reddened; legs piceous with apical segments of tarsi gradually brownish; tarsal claws with basal halves yellowish, apical halves reddened; posterior margins of metasomal terga and sterna pale brown.

**Structure** HW:HL = 40:33; inner margins of eyes strongly concave above, distinctly convergent below; malar space very slightly shorter than basal width of mandible; facial fovea with upper end broadened and slightly curved outwards;

ocellar region well convex; ocellocular spaces strongly, densely rugoso-punctate; ratio of IOD:DLO:OOD:OCD as about 8.5:4:11:5; antennal pedicel slightly longer than broad (about 6:5), 1st flagellar segment also longer than broad (about 7:6), next ten segments each distinctly longer than broad and 2nd one longest among them.

Prothoracic spine dull, somewhat obtuse as seen from above; scutellum impunctate anteriorly; propodeal enclosure well indicated and defined by a transverse carina posteriorly; interior of enclosure longitudinally carinate and pitted; posterior face of enclosure weakly, longitudinally carinate.

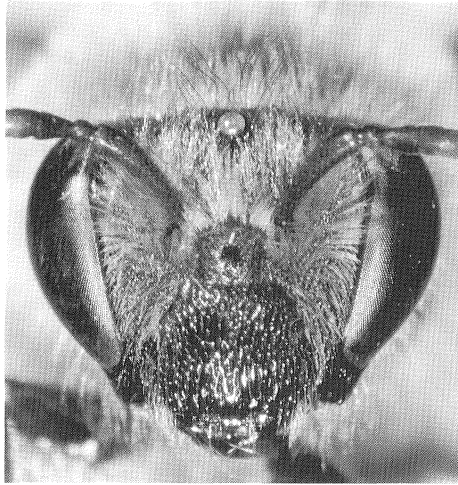
Legs slender, without special modification.

Metasomal terga nearly shining; punctures on 2nd to 6th terga weaker and smaller than those on 1st; posterior depressions of terga weakly, broadly indicated; 7th ventral plates with articulatory condyles weakly reflexed, with necks very shortened, and with discs rather shortened and projected laterally (Fig. 25-A); spiculum of 8th sternum elongated (Fig. 25-B); genital capsule as illustrated (Fig. 25-C and D).

**Pilosity** Hairs on head generally long, dense and pale fulvous except those on vertex fulvous, but paraocular areas, frons and vertex intermixed with dark hairs; hairs on thorax long and moderately dense except those on anterior and median portions of mesoscutum and anterior portion of scutellum sparse; hairs on legs pale fulvous; 1st tergum with hairs long, not dense and fulvous; hairs on 2nd tergum rather sparse, and those on 3rd to 6th terga brownish, becoming longer towards posterior terga; 7th tergum with hairs somewhat dense and fuscous; apical margins of 1st to 5th terga each with a pale fulvous fringe of dense and appressed hairs, that of 1st narrow, those of following terga slightly narrowed medially; apical margins of 2nd to 6th sterna each with a fringe of pale fulvous to whitish and sparse hairs, that of 6th sternum interrupted in the middle.

**Distribution** (\* indicates the new locality) Hokkaido, Honshu, Sadoga-shima\*, Shikoku, Kyushu, Tsushima\*, Tanega-

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A



B

Fig. 24. Heads of *Colletes (Colletes) perforator* Smith in frontal view. A, female; B, male.

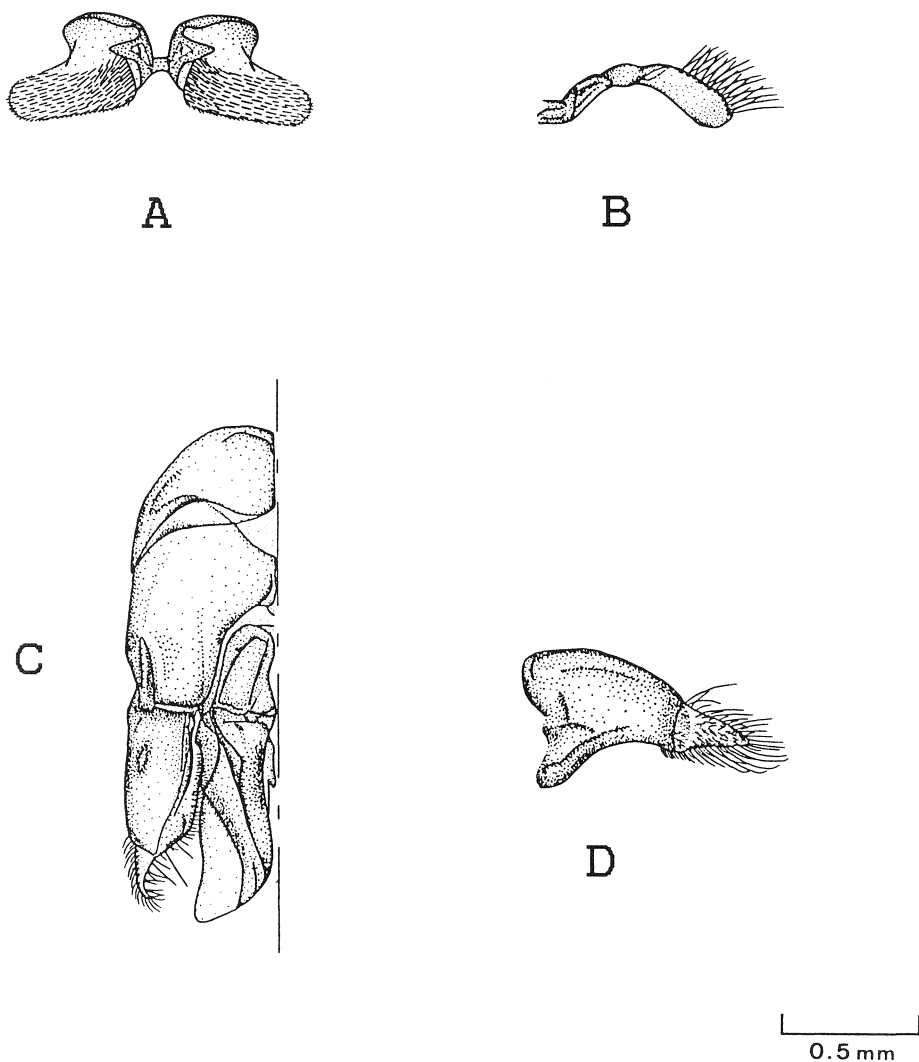


Fig. 25. Male terminalia of *Colletes (Colletes) perforator* Smith. A, 7th ventral plates in ventral view; B, the apex of 8th sternum in lateral view; C, genital capsule in dorsal view; D, gonostylus in lateral view.



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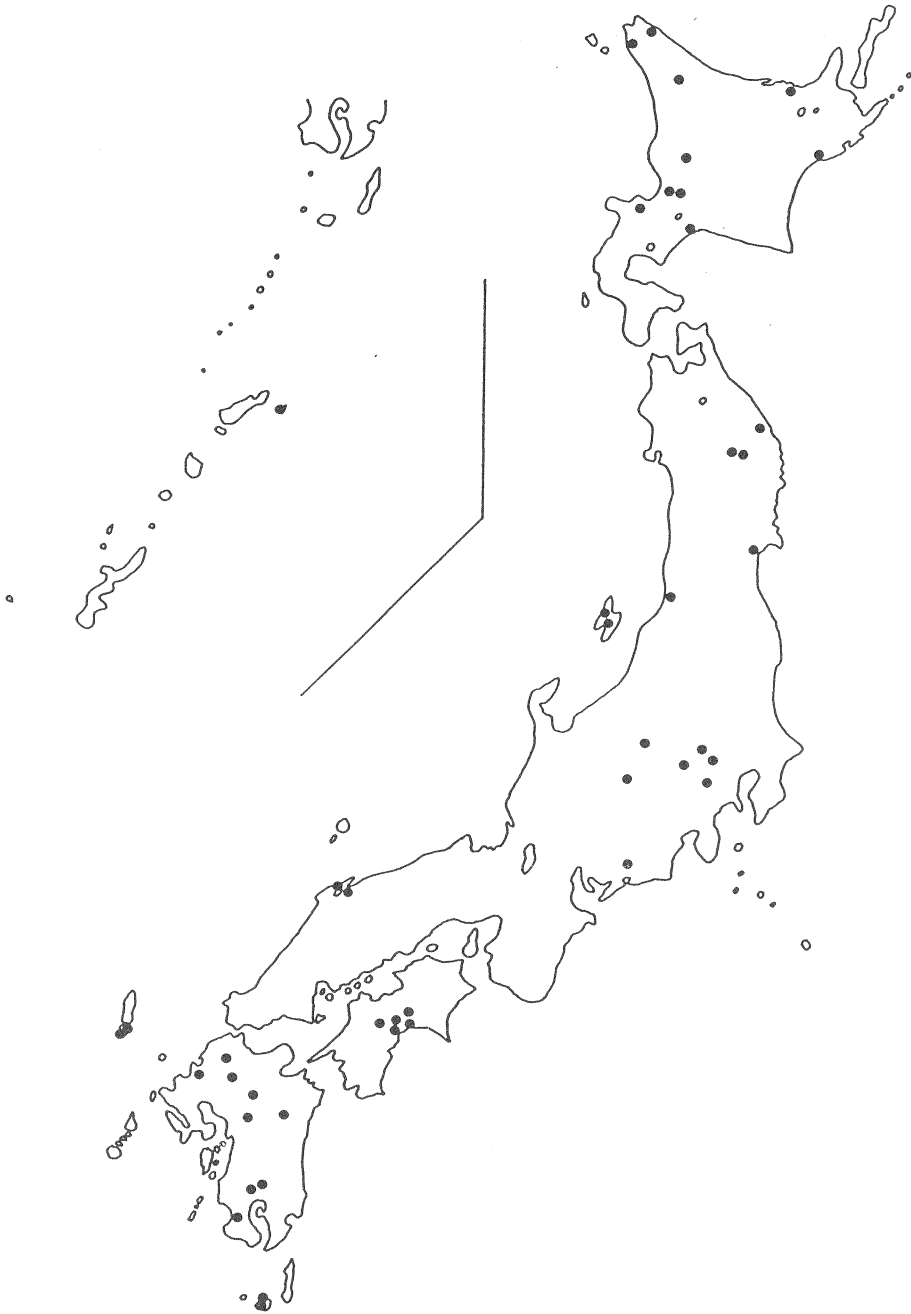


Fig. 26. A map showing the distribution of *Colletes (Colletes) perforator* Smith.

shima, Yaku-shima\* and Kikai-jima\* (Fig. 26).

**Specimens examined** HD: 2♀♀, Sep.24,1971 Nopporo, 1♂, Sep. 12,1974 Tomakomai, H. Fukuda. HS: 1♀, Sep.15,1969 Mt. Awagatake, Echigo prov., K. Baba; 1♂, Sep.16,1951 Mt. Mitake, Okutama, Tokyo, T. Shida and R. Ishikawa. SD: 2♂♂, Sep.20, 1962 Mt. Kinpoku, R. Ishikawa. SK: 1♀ and 1♂, Oct.21,1976 Mt. Kuishi, Kochi Pref., S. Ikudome. KS: 1♀ and 1♂, Oct.30, 1973 Tagawa, Fukuoka Pref., K. Takeno. TS: 1♀, Oct.9,1959 Sumo, Y. Maeta; 1♂, Sep.27,1959 Taterayama, T. Hidaka, K. Morimoto, H. Kamiya and T. Kawarabata. Tanega-shima 1♂, Sep. 21,1985 K. Ogata. YK: 1♀, Sep.13-15,1962 Hananoego, T.Hidaka; 2♂♂, Aug.24,1952 same locality, Takeya and Hirashima. Kikai-jima: 1♀ and 1♂, Oct.18,1987 Nakazato, S. Ikudome. Besides the above-mentioned specimens, 181 females and 178 males were examined.

**Flight records** Northern Japan: females, late Aug. to late Oct.; males, late July to mid-Oct. Southern Japan: females, late Aug. to mid-Nov.; males, late Aug, to late Nov.

**Floral records**

Amaranthaceae: *Achyranthes japonica* (Miq.) Nakai, HS 0X.

Compositae: *Achillea alpina* Linn. HS 0X; *Aster ageratoides* Turcz. var. *ovatus* (Franch. et Savat.) Nakai, HS 0X, *A. ageratoides* Turcz. forma *yezoensis* (Kitam. et Hara) Ohwi, HD 0X, *A. glehnii* Fr. Schm. var. *hondoensis* Kitam., HS 0X; *A. scaber* Thunb., SK 2X, KS 0X; *Anaphalis margaritacea* (Linn.) Benth. et Hook. var. *angustior* (Miq.) Nakai, HD 0X; *Aster ageratoides* Trucz. forma *hortensis* (Makino) Ohwi, HD 0X; *Bidens biternata* (Lour.) Merr. et Sherff, SK 0X, *B. frondosa* Linn., SK 0X; *Breea setosa* (Bieb.) Kitam., HD 0X; *Cirsium kamschaticum* Ledeb., HD 0X, *C. nipponicum* (Maxim.) Makino, HS 0X; *Cosmos bipinnatus* Cav., HS 0X; *Eupatorium chinense* Linn. var. *sachalinense* (Fr. Schm.) Kitam., HS 0X, var. *simplicifolium* (Makino) Kitam., Kikai-jima 0X; *Farfugium japonicum* (Linn.) Kitam., YK X; *Hieracium umbellatum* Linn. var. *japonicum* Hara, HD 0X, *H. japonicum* Franch. et Savat., HS 0X; *Ixeris dentaata* (Thunb.) Nakai forma *amplifolia* (Kitam.) Hiyama, HD 0X; *Kalimeris yomena* Kitam., SK 3X, KS 0X; *Lactuca indica* Linn. var. *laciniata* (O.Kuntze) Hara, HS

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OX, var. *dracoglossa* (Makino) Kitam., HS OX, forma *indivisa* (Makino) Hara, SK OX; *Picris hieracioides* Linn. var. *glabrescens* (Regel) Ohwi, HD OX, SK OX, KS OX; *Petasites japonicus* (Sieb. et Zucc.) Maxim. var. *giganteus* (Fr. Schm.) Hort., HS OX; *Prenanthes tanakae* (Franch. et Savat.) Koidz., HS OX; *Rudbeckia laciniata* Linn., HD X; *Salvia japonica* Thunb., KS OX; *Sonchus brachyotis* DC., HD OX; *Solidago virga-aurea* Linn. var. *leiocarpa* (Benth.) Miq., HD OX, var. *asiatica* Nakai, HD X, HS OX, SK OX, KS OX; *S. altissima* Linn., KS OX; *Taraxacum officinale* Weber, HD OX; *Youngia denticulata* (Houtt.) Kitam., HS 3X, SK 2X, KS 4X, YK OX; *Wedelia biflora* (Linn.) DC., Kikai-jima OX.

Crassulaceae: *Sedum kamtschaticum* Fischer, HD OX.

Gentianaceae: *Tripterospermum japonicum* (Sieb. et Zucc.) Maxim., YK OX.

Geraniaceae: *Geranium thunbergii* Sieb. et Zucc., HS OX.

Labiatae: *Elscholtzia ciliata* (Thunb.) Hylander, HS OX; *Plectranthus inflexus* (Thunb.) Vahl. et Benth., HS OX; *Salvia nipponica* Miq., HS OX.

Leguminosae: *Trifolium pratense* Linn., HD OX, *T. repens* Linn., HS OX.

Polygonaceae: *Fagopyrum esculentum* Moench, TS OX, *Polygonum lapathifolium* Linn., HS OX; *P. thunbergii* Sieb. et Zucc., HS OX.

Rosaceae: *Sanguisorba officinalis* Linn., HD OX.

The species group of *Colletes clypearis*

(5) *Colletes (Colletes) babai* Hirashima et Tadauchi

[Jap. name: Baba-mukashi-hanabachi]

(Figs. 27-29)

*Colletes babai* Hirashima et Tadauchi, 1979, J. Fac. Agr., Kyushu Univ., 24(2-3): 115-121, female and male.

TYPE

Holotype: female, cocoons collected on Feb.15,1958 and emerged in Sep.1958, Kurokawa, N. Echigo (Niigata Pref.), K.

Baba, in KU, 2173

Paratypes: 11 females and 46 males, in KU.

#### DIAGNOSIS

This species is characterized by the mesoscutum and scutellum very coarsely and strongly punctate, with fulvous hairs intermixed with dark ones, and hairs on the median and posterior portions of the mesoscutum sparse, coarse and fulvous. Adding to these characters, this is easily separable from the other Japanese species by the features given in the key (pp. 31, 33).

#### FEMALE

Body length 10-11 mm.

**Coloration** Similar to *patellatus* except the following characters: tegulae deep reddish brown; posterior margins of metasomal terga and sterna pale brownish.

**Structure** HW:HL = 41:32; inner margins of eyes distinctly convergent below except upper one-fourth converging toward ocelli; malar space short, about one-fourth as long as basal width of mandible; clypeus as in *patellatus*, but longitudinally striate-punctate; facial fovea somewhat shining, deeply impressed, broadened medially, and with lower end extending below line running upper parts of antennal sockets; ocellocular spaces coarsely punctate; paraocular areas strongly rugoso-punctate, its punctures stronger than in *patellatus*; ratio of IOD:DLO:OOD:OCD as about 9:3.5:9.5:6; antennal pedicel about as long as broad; flagellum with 1st segment slightly longer than broad (about 6:5), and with 2nd to 8th segments each slightly shorter than broad (about 5:6).

Prothoracic spine distinctly produced, sharp and large (larger than in *patellatus*); mesoscutum smooth and shining; mesepisternum as in *patellatus*, but with punctures slightly sparser; propodeum as in *patellatus*.

Legs similar to *perforator*.

Shape of 1st metasomal tergum similar to *patellatus*, its integument similar to *perforator* but with punctures stronger; posterior margins of terga not depressed in the middle; 2nd and following sterna smooth, shining, and very finely, densely punctate.

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**Pilosity** Hairs on ocellar triangle of head pale, intermixed with fuscous ones; hairs on thorax except meso-scutum and scutellum not dense, fulvous or paler; hairs on legs fulbid white to fulvous; 1st tergum with hairs pale fulvous laterally, becoming shorter posteriorly; hairs on 2nd and following terga similar to *perforator*; base of 2nd tergum with a transverse band of pale fulvous hairs; apical margins of 1st to 5th terga each with a complete band of pale fulvous hairs, that of 1st comparatively narrow, and those of following terga each slightly narrowed in the middle; hairs on venter of metasoma similar to *perforator*.

### MALE

Body length 8-9 mm.

**Coloration** Generally as in female, but undersides of 2nd to 11th flagellar segments broadly brownish.

**Structure** HW:HL = 37:27; inner margins of eyes strongly concave above, distinctly convergent below; malar space distinct, about two-thirds as long as basal width of mandible; facial fovea dull, short, not deeply impressed, and broadened medially; ocellar region well convex; ocellular spaces coarsely sculptured; ratio of IOD:DL0:OOD:OCD as about 8:3:9:4; antennal pedicel slightly broader than long (about 6:5), 1st flagellar segment as long as broad, next ten segments each distinctly longer than broad, and apical one longest.

Prothoracic spine distinct, very sharp and long; mesoscutum smooth, shining, and strongly, closely (closer than in *esakii*) punctate except medio-anterior and medio-posterior portions; anterior portion of scutellum sparsely punctate; mesepisternum strongly, densely rugoso-punctate; propodeum sculptured more or less as in *patellatus*.

Legs slender, without special modification.

Metasomal terga smooth, shining; 1st tergum strongly, densely punctate; 2nd to 6th terga each very closely punctate, its punctures weaker and smaller than those of 1st; posterior depression of terga weakly indicated in the middle; 7th ventral plates with basal articulately condyles well reflexed, with necks very shortened, and with discs rather

elongated and truncated at apex (Fig. 28-A); spiculum of 8th sternum nearly four-cornered (Fig. 28-B); genital capsule as illustrated (Fig. 28-C and D).

**Pilosity** Hairs on head long, very dense, light fulvous, and without darker ones; hairs on thorax also light fulvous, but those on mesoscutum and scutellum intermixed sparsely with darker ones; hairs on legs pale fulvous; hairs on 1st tergum long, not dense and pale fulvous, those on 2nd to 6th terga brownish, becoming longer towards posterior terga; 7th tergum with hairs somewhat dense, goldish; apical margins of 1st to 6th terga each with a pale fulvous fringe; apical margins of 2nd to 4th sterna each with a pale fulvous hair band, its hairs moderately long and scale-like in the middle; 6th sternum with hairs long, soft, sparse and fulvous.

**Distribution** (\* indicates the new locality) Hokkaido, Honshu, Sadoga-shima\*, Shikoku\*, Kyushu, Tanaga-shima and Yaku-shima\* (Fig. 29).

**Specimens examined** HD: 1♀ and 1♂, July 27, 1970 Okusawa, Otaru, Sh. F. Sakagami. HS: 1♀, Sep. 17, 1962 1♂, Sep. 11, 1962 Yokoyama, Ina, Nagano Pref., Y. Maeta. SD: 1♂, Sep. 20, 1962 Mt. Kinpoku, R. Ishikawa. SK: 1♀, Aug. 24, 1954 Omogokei, Ehime Pref., T. Edashige. KS: 1♀, May 23, 1952 Sata, Iza-shiki-Toyamazaki, T. Esaki and Y. Hirashima, 1♂, June 6, 1979 Ohsaki-cho, Kagoshima Pref., H. Nagase. Tanega-shima: 1♀ and 1♂, May 24, 1983 Nishinoomote, T. Aridome. YK: 1♀ and 1♂, May 27, 1982 Onoaida, S. Ikudome. Besides the above-mentioned specimens, 96 females and 92 males were examined.

**Flight records** Northern Japan: females and males, mid-July to early Oct. Southern Japan: females, late May to mid-Sep.; males, mid-May to early Sep.

**Floral records**

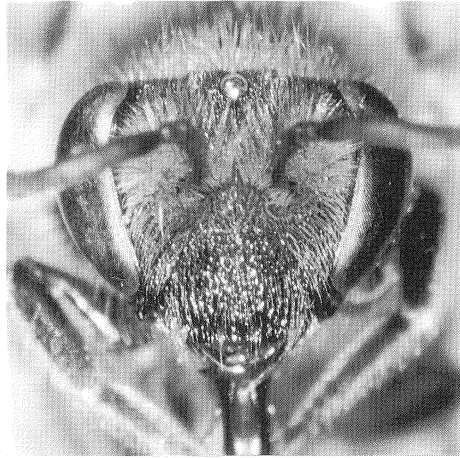
Amaranthaceae: *Achyranthes japonica* (Miq.) Nakai, HS OX.

Anacardiaceae: *Rhus javanica* Linn., HS X.

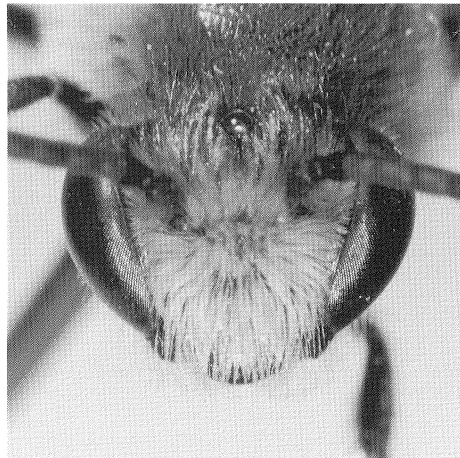
Araliaceae: *Aralia elata* (Miq.) Seemann, HS OX.

Compositae: *Aster ageratoides* Trucz. var. *ovatus* (Franch. et Savat.) Nakai, HD OX, *A. glehnii* Fr. Schm., HD OX; *Cirsium kamschaticum* Ledeb., HD OX; *Erigeron annuus* (Linn.)

Colletidae of Japan



A



B

Fig. 27. Heads of *Colletes (Colletes) babai* Hirashima et Tadauchi in frontal view. A, female; B, male.

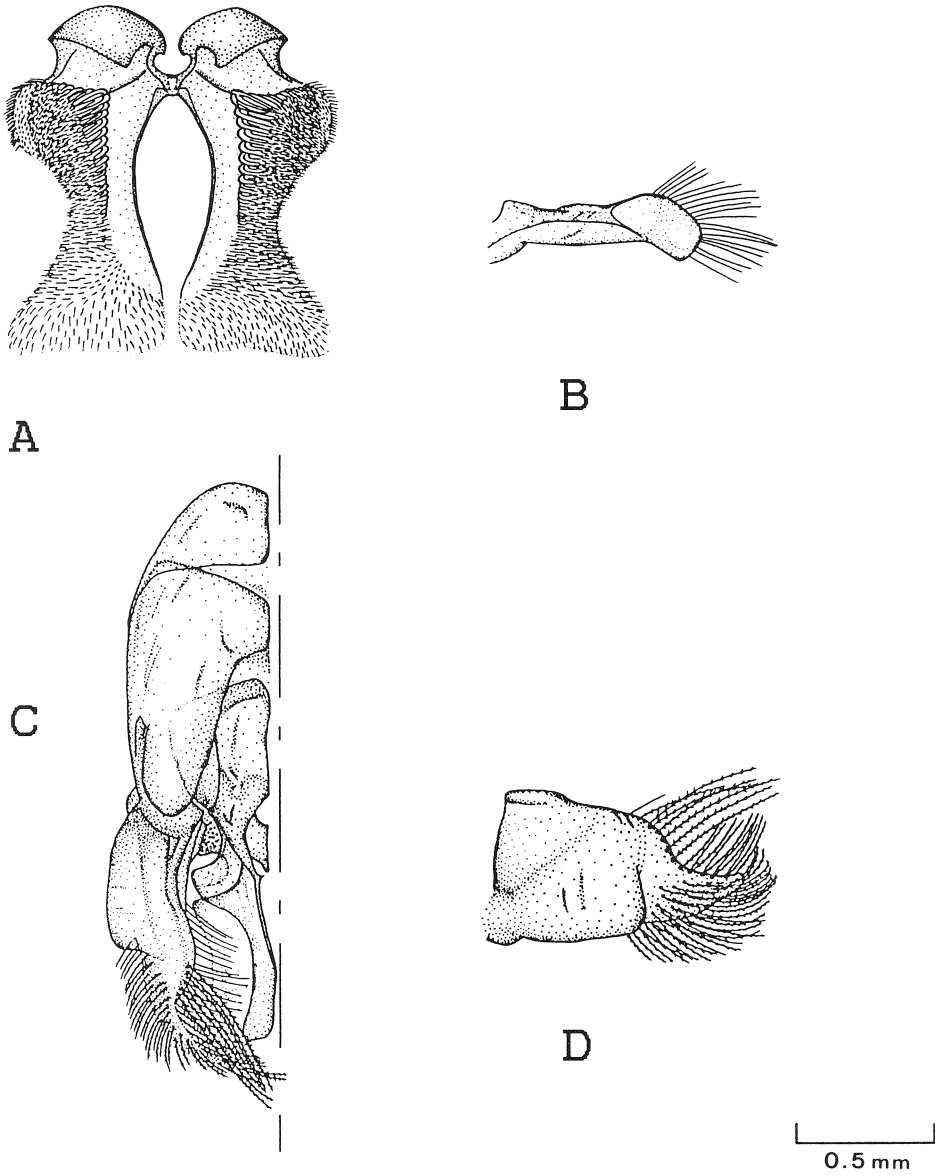


Fig. 28. Male terminalia of *Colletes (Colletes) babai* Hirashima et Tadauchi. A, 7th ventral plates in ventral view; B, the apex of 8th sternum in lateral view; C, genital capsule in dorsal view; D, gonostylus in lateral view.



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Fig. 29. A map showing the distribution of *Colletes (Colletes) babai* Hirashima et Tadauchi.

Pers., HD OX, HS OX, KS OX; *Hieracium umbellatum* Linn. var. *japonicum* Hara, HD OX; *Kalimeris yomena* Kitam., HS OX; *Rudbeckia laciniata* Linn., HD OX; *Senecio cannabifolius* Less., HS OX; *Solidago virga-aurea* Linn. var. *asiatica* Nakai, HD OX, HS OX; *Youngia denticulata* (Houtt.) Kitam., HS OX.

Euphorbiaceae: *Mallotus japonicus* (Thunb.) Muell. Arg., YK X.

Geraniaceae: *Geranium thunbergii* Sieb. et Zucc., HS OX.

Leguminosae: *Lespedeza bicolor* Trucz., HS OX, HD OX; *Trifolium pratense* Linn., HS OX, *T. repens* Linn., HD OX.

Polygonaceae: *Polygonum lapathifolium* Linn., HS OX, *P. sachalinense* Fr. Schm., HD OX, HS OX, *P. senticosum* (Meisner) Franch. et Savat., HS OX, *P. thunbergii* Sieb. et Zucc., HD OX, HS OX.

Rosaceae: *Spiraea salicifolia* Linn., HD OX.

Rutaceae: *Zanthoxylum ailanthoides* Sieb. et Zucc., KS OX.

Saxifragaceae: *Hydrangea paniculata* Sieb., HD OX.

Valerianaceae: *Patrinia villosa* (Thunb.) Juss., HS OX.

Vitaceae: *Ampelopsis brevipedunculata* (Maxim.) Trautv., HS OX.

Umbelliferae: *Angelica pubescens* Maxim., HS OX, *A. acutiloba* (Sieb. et Zucc.) Kitagawa, HD OX, *A. edulis* Miyabe, HS OX; *Coelopleurum lacidum* (Linn.) Fern. var. *gmelinii* (DC.) Hara, HD OX; *Daucus carota* Linn. var. *sativa* DC., KS OX, YK OX; *Osmorhiza aristata* (Thunb.) Rydberg, HS OX; *Torilis japonica* (Houtt.) DC., HD OX.

**Ecology** Goukon (1982) studied this species ecologically in Miyagi Prefecture. According to him, its tumulus is very peculiar to this species and resembles closely those of the sand wasps; the nest burrow is a stationary branched-type with lateral burrows radiated from one end of a short main burrow; fungi and larvae of a meloid beetle (undetermined) were found as associates of this species. Besides this, Togashi (1953) reported on the habits of this species.

(6) *Colletes (Colletes) yasumatsui* Hirashima et Ikudome,  
new species

[Jap. name: Yasumatsu-mukashi-hanabachi]

(Figs. 30-33)

*Colletes* sp. Hirashima et Tadauchi, 1979, J. Fac. Agr., Kyushu Univ., 24(2-3); 121.

**TYPE**

Holotype: female (Type No. 2709, Kyushu Univ.), July 2, 1968 Yanbetappu, Hokkaido, H. Fukuda. Paratopotypes: 2 females and 6 males, H. Fukuda, in KU. Paratypes: HD: 3 females and 2 males, July 20, 1974 Obako, Taisetsu, 2 females, July 20, 1974 Ryokuunbashi, Taisetsu, 3 females, Aug. 4, 1975 Hamatonbetsu, 4 males, July 2, 1976 Hamatonbetsu, 1 female, Aug. 8, 1976 Hamakoshimizu, 1 male, July 2, 1975 Hamakoshimizu, H. Fukuda; 1 female, July 26, 1966, Hamakoshimizu, 2 males, June 22, and July 6, 1967 Nokanan, Sh. F. Sakagami; 1 female, June 24, 1968 Okoppe, K. Yamauchi; 2 males, July 23, 1953 Horonobe, Teshio, R. Ishikawa. HS: 2 females and 1 male, Aug. 4, 1957 Kamikochi, Nagano Pref., R. Ishikawa; 1 female, July 27, 1950 Mt. Hakusan (2000 m high), Kaga Prov., 3 females and 1 male, July 31, 1986 Murodaira, Mt. Hakusan, Ishikawa Pref., 1 female, Aug. 7, 1986 same locality, I. Togashi.

**DIAGNOSIS**

This new species is characterized by having the meso-scutum sparsely punctate and very shining on the median portion, the malar space rather long, and the 1st metasomal tergum with hairs long, soft and white, basally and dorsally. Thus, *C. yasumatsui* is easily separable from the other Japanese species.

This species is comparatively common in Hokkaido, rare in Honshu, and not found in Shikoku and Kyushu.

**FEMALE**

Body length 9.5-11 mm.

**Coloration** Black except as follows: mandibles reddened apically; undersides of 3rd to 10th flagellar segments broadly brownish; wings slightly brownish subtransparent with stigma and veins ferruginous; tegulae deep ferruginous;

legs piceous, with apical segments of tarsi reddened, and with tibial spurs pale ferruginous; posterior margins of terga slightly reddish brown, those of sterna pale yellowish brown.

**Structure** Head much broader than long as seen in front (about 42:33); inner margins of eyes well convergent below except upper one-fifth converging toward ocelli; malar space distinct, about half as long as basal width of mandible; clypeus shining, well convex, and its integument rather coarsely, longitudinally striate-punctate; facial fovea somewhat shining, shallowly impressed, not broadened medially, and with lower end extending below beyond line running upper margins of antennal sockets; ocellocular spaces densely punctate; paraocular areas weakly rugoso-punctate, its punctures larger than in *vogti*; ratio of IOD:DLO:OOD:OCD as about 9.5:3.5:11:5 as seen from above; antennal pedicel slightly shorter than broad (about 4:5); flagellum with 1st segment slightly longer than broad (about 6:5), and with 2nd to 8th segments each slightly shorter than broad (about 10:11).

Prothoracic spine distinctly produced, sharp and large (larger than in *patellatus*); mesoscutum smooth, shining, and strongly, densely punctate, but submedian portion sparsely punctate (slightly closer than in *perforator*); median portion of scutellum also sparsely punctate except anterior portion which is broadly impunctate; mesepisternum shining, densely rugoso-punctate, its punctures weaker and sparser than in *patellatus* or *babai*; basal area of propodeum longitudinally carinate and pitted, but much less stronger than in *patellatus* or *babai*; posterior face of propodeal enclosure rough, and very weakly, irregularly carinate; lateral face of propodeum rugulose.

Legs with middle basitarsi subparallel-sided, with hind basitarsi slightly widening towards apex, and with hind tibiae slightly widened apically.

First metasomal tergum with latero-basal portions not well projected laterally as seen from above; 1st tergum smooth, shining, and with punctures very weak and sparse;

## Colletidae of Japan

2nd and following terga also smooth and shining, but with punctures fine and dense; posterior margins of terga not depressed in the middle.

**Pilosity** Hairs on head moderately dense and whitish except for those on vertex pale fulvous; hairs on clypeus sparse; hairs on thorax long and dense except those on median portion of mesoscutum and anterior portion of scutellum, fulvous or paler dorsally, and white on the rest; hairs on legs primarily whitish, but femoral fimbria and tibial scopa slightly yellowish; 1st tergum with hairs long, soft, not dense, and white; hairs on 2nd tergum short, white basally and brown apically; hairs on 3rd and following terga short, not dense, brown to fuscous; basal portion of 2nd tergum with a transverse band of white hairs, its band interrupted in the middle; apical margin of 1st tergum with a narrow transverse band of white hairs, its band nearly or completely interrupted in the middle; apical hair band on 2nd to 5th terga complete, but that of 2nd tergum slightly narrowed in the middle; hairs on venter of metasoma short, dense and whitish.

### MALE

Body length 8-9 mm.

**Coloration** Black except as follows: apical one-third of mandibles reddened; undersides of 2nd to 11th flagellar segments broadly brownish; wings slightly brownish subtransparent with veins and stigma brownish; tegulae deep brown; legs piceous, with apical segments of tarsi reddened, and with tibial spurs pale ferruginous; tarsal claws with basal halves yellowish and apical halves reddened; posterior margins of metasomal terga slightly reddish brown or piceous, those of sterna slightly reddish pale brown.

**Structure** HW:HL = 35:26; inner margins of eyes concave above, distinctly convergent below; malar space long, about as long as basal width of mandible; clypeus convex, shining, and densely, longitudinally striate-punctate; facial fovea short, rather narrow, and somewhat shining; ocellar region well convex; ocellocular spaces densely rugoso-punctate, its punctures moderately large; ratio of IOD:DLO:OOD:OCD as

about 9:2.3:3:11:6; antennal pedicel slightly longer than broader than long (about 5:4), 1st flagellar segment about as long as broad, and next ten segments distinctly longer than broad; length of 2nd segment about equal to that of 11th and longer than that of any other flagellar segments.

Prothoracic spine distinct, large, but not so sharp; mesoscutum smooth, shining, and densely punctate except antero-median portion and just behind the mesoscutal line, its punctures denser than in *patellatus* or *perforator*; scutellum sparsely punctate, but anterior portion impunctate; mesepisternum densely rugoso-punctate, its punctures weaker than in *patellatus* or *babai*; propodeal enclosure well indicated and strongly defined by a transverse carina posteriorly; interior of enclosure longitudinally, weakly carinate and pitted; posterior face of enclosure abrupt, with carinae weak and longitudinal as in *perforator*; lateral face of propodeum weakly rugose.

Legs slender, without special modification.

Metasomal terga smooth, shining; 1st tergum weakly, sparsely punctate; 2nd and following terga minutely punctate; posterior depressions of terga weak, and narrowed in the middle; 7th ventral plates with basal articulatory condyles comparatively small and moderately reflexed, with necks very short, and with discs rather elongated, projected outward basally, and widened and rounded apically (Fig. 32-A); spiculum of 8th sternum nearly four-cornered (Fig. 32-B); genital capsule as illustrated (Fig. 32-C and D).

#### REMARKS

Nakamura (1980) reported a colletid bee collected in Mt. Hakusan, Kaga Province by I. Togashi as *Colletes* (?) *pseudocinerascens* Noskiewicz, but it is probably *Colletes yasumatsui*.

**Distribution** Hokkaido and Honshu (Fig. 33).

**Specimens examined** Besides the type materials mentioned above, 104 females and 185 males were examined.

**Flight records** Females, late June to late Aug. Males, mid-June to mid-Aug.

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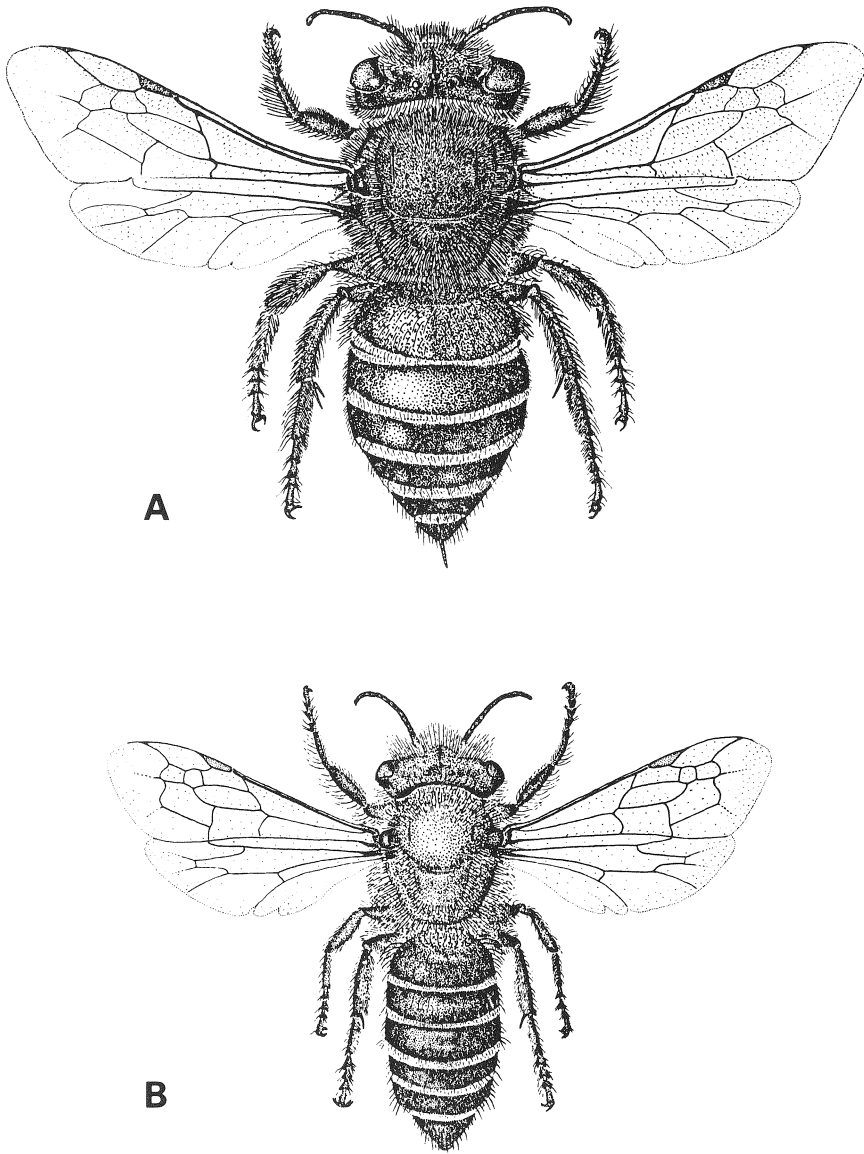
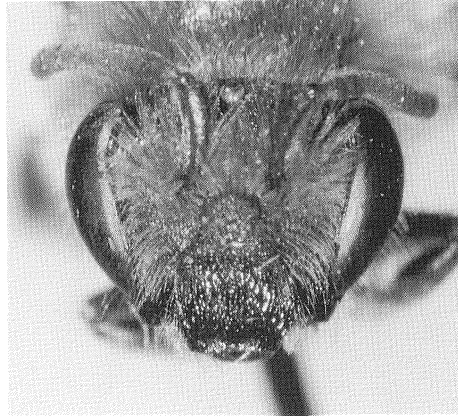
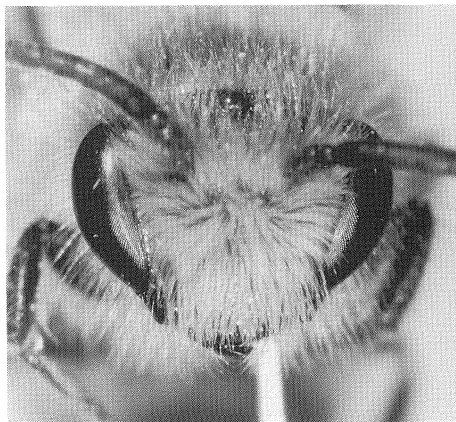


Fig. 30. *Colletes (Colletes) yasumatsui* Hirashima et Ikudome, new species. A, female; B, male.



A



B

Fig. 31. Heads of *Colletes (Colletes) yasumatsui* Hirashima et Ikudome, new species in frontal view. A, female; B, male.



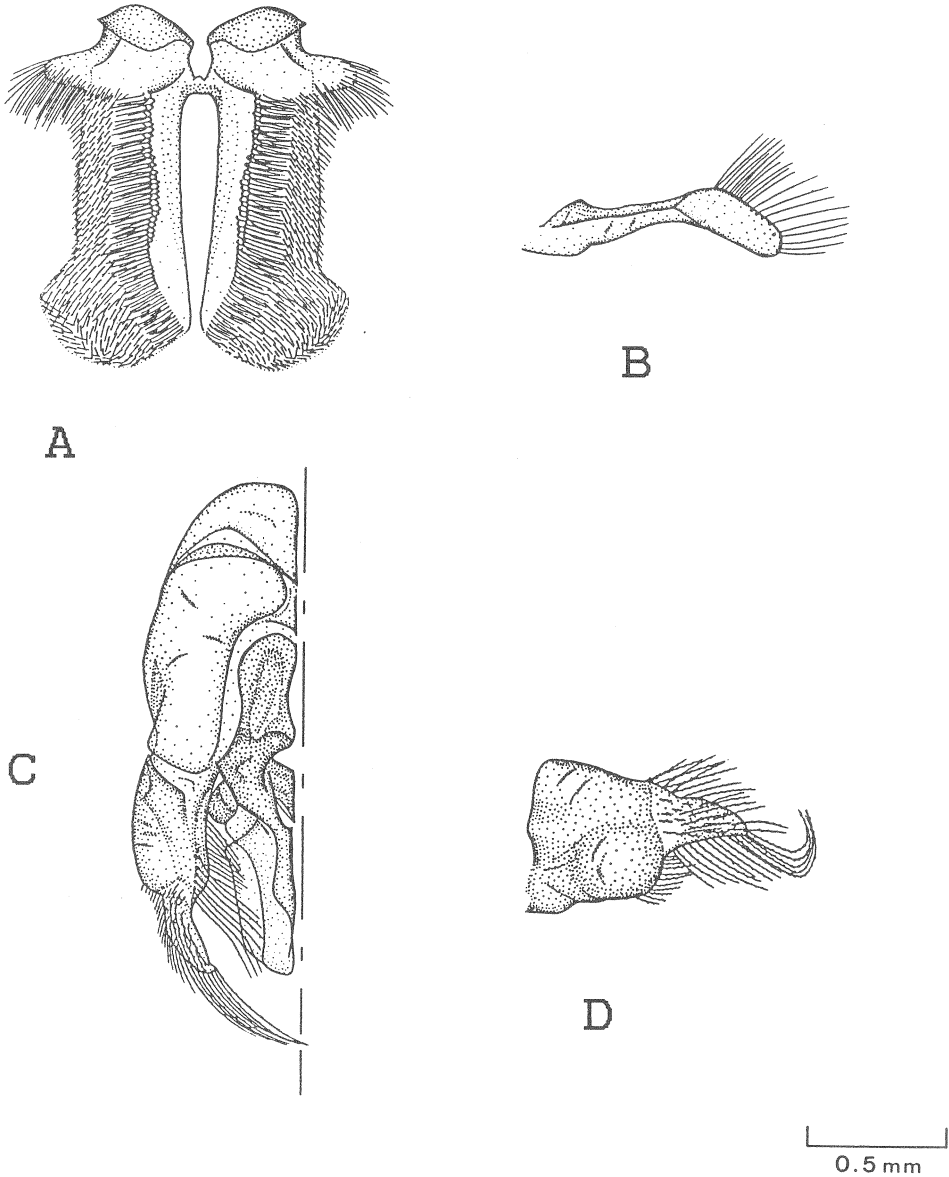


Fig. 32. Male terminalia of *Colletes (Colletes) yasumatsui* Hirashima et Ikudome, new species. A, 7th ventral plates in ventral view; B, the apex of 8th sternum in lateral view; C, genital capsule in dorsal view; D, gonostylus in lateral view.



Fig. 33. A map showing the distribution of *Colletes* (*Colletes*) *yasumatsui* Hirashima et Ikudome, new species.

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### Floral records

Compositae: *Achillea alpina* Linn., HD 0X; *Erigeron annuus* (Linn.) Pers., HD 0X; *Picris hieracioides* Linn. var. *glabrescens* (Regel) Ohwi, HD 0X; *Taraxacum officinale* Weber, HD 0X.

Geraniaceae: *Geranium yesoense* Franch. et Savat. var. *pseudo-palustre* Nakai, HD 5X.

Leguminosae: *Trifolium repens* Linn., HD X.

Liliaceae: *Allium splendens* Willd., HD 0X; *Veratrum grandiflorum* (Maxim.) Loes., HS 0X.

Polygonaceae: *Polygonum bistorta* Linn., HS 0X.

Rosaceae: *Aruncus dioicus* (Walt.) Fernald var. *tenuifolius* (Nakai) Hara, HD X; *Potentilla matsumurae* Th. Wolf, HS 0X; *Rosa rugosa* Thunb., HD 0X; *Rubus parvifolius* Linn., HD 0X.

Umbelliferae: *Angelica ursina* (Rupr.) Maxim., HD 4X; *Coelopleurum lucidum* (Linn.) Fern. var. *gmelinii* (DC.) Hara, HD X; *Heracleum dulce* Fisch., HD 2X; *Glehnia littoralis* Fr. Schm., HD 0X.

**Etymology** The specific name, *yasumatsui*, is named after the late Dr. Keizo Yasumatsu, who contributed very much forward the knowledge of the Japanese bee fauna.

### 4. Species removed from the Japanese fauna

So far as my investigations go, two species, *C. kudonis* and *C. laevifrons*, which were reported from "North Japan" have not been found from Japan proper up to the present. Therefore, it might with propriety be removed from the Japanese fauna.

#### (1) *Colletes kudonis* Cockerell

*Colletes kudonis* Cockerell, 1927, Am. Mus. Nov., 274: 16, male.

*Colletes kudonis*: Noskiewicz, 1936, Prace Nauk. Wydawn. Tow. Nauk. Lwow. II, 3: 512, male.

**TYPE**

Holotype: male, North Japan, Y. Kudo, in AM, No. Ac.3804.

**DIAGNOSIS**

This species is easily separable from the Japanese *colletes* by having the mesoscutum distinctly rugoso-punctate.

It is very possible that this species was collected on one of northern islands of Hokkaido. According to Miyabe (1932), Dr. Y. Kudo was a specialist of the flora of Hokkaido, Sakhalin and Chishima-rettō in particular. He conducted expeditions to Paramushir Is. from June to September 1921, to Sakhalin in summer of 1922, and to Sakhalin again in the summer of the next year. Probably the specimen of *C. kudonis* Cockerell might be collected during his visit to these islands.

**DESCRIPTION**

See Cockerell (1927) or Noskiewicz (1936).

**Specimen examined** I have examined the holotype of this species at AM and confirmed that this is not a Japanese species.

(2) *Colletes (Colletes) laevifrons* Morawitz

*Colletes laevifrons* Morawitz, 1894, Horae Soc. Ent. Ross., XXVIII: 81, female (Mongolia).

*Colletes speculiferus* Cockerell, 1927, Am. Mus. Nov., 274: 15-16, male and female (North Japan); Noskiewicz, 1936, Prace Nauk. Wydawn. Tow. Nauk. Lwow. II, 3: 341-345.

*Colletes (Colletes) laevifrons*: Noskiewicz, 1936, *ibid.*, pp. 341-345.

**TYPE**

Type of *laevifrons*: holotype; female, Glasunov leg., collection of Morawitz von Jagnob, in Mus. Ak. Wiss. Leningrad. Allotype; male, in Mus. Ak. Wiss. Leningrad.

Type materials of *speculiferus*: 1 female and 2 males, 1910, in AM.

DIAGNOSIS

Characteristics are as follows: 1st metasomal tergum shining, its margin not red; hairs on thorax yellow above.

This species belongs to the species group of *C. senilis* (Noskiewicz, 1936).

DESCRIPTION

See Morawitz (1894), Cockerell (1927) or Noskiewicz (1936).

Distribution Turkestan and Altaj.

Specimens examined I have examined the type materials (1♀ and 2♂♂) of *speculiferus* in AM, and confirmed that this is not a Japanese species.

## VI The genus *Hylaeus* Fabricius of Japan

### Genus *Hylaeus* Fabricius

[Jap. name: Chibi-mukashi-hanabachi-zoku]

*Hylaeus* Fabricius, 1793, Ent. Syst. Emen. Anc., p. 302.

Type-species: *Apis annulata* Linnaeus, 1758 (desig. of Latreille, 1810, p. 438).

Characteristics are as follows: mandibles of female bi-dentate or tridentate; preoccipital carina present or absent; stigma of moderate size to large and slender; marginal cell with free part usually longer than the rest; second submarginal cell two-thirds as long as first or less; ridge in front of mesocoxa weak or absent; malar space very short; triangular area of propodeum more than one-fourth on vertical surface, rarely largely horizontal or undefined, usually with subhorizontal basal zone, in some cases broad and undefined, in others well defined, often narrow, not steeply sloping and continuous with vertical surface; head, thorax, legs and often basal portion of wings with yellowish marks.

According to Michener (1965), the species of *Hylaeus* make cells of a transparent cellophane-like membrane in burrows

of stalks, twigs, or reeds, in pre-existing cavities such as beetle burrows in old wood, or (at least in some parts of the world) in the ground. So far as I know, nothing is known on the nesting habits of Japanese species.

This is a world-wide genus of commonly small bees, usually with limited pale integumental markings on the head, thorax and legs. In most parts of the world it constitutes a rather small percentage of the total bee fauna. In Australia, however, *Hylaeus* is one of the major genera of bees, and it shows great diversity. Of the various subgenera known in other parts of the world none is known from Australia, although *Prosopisteron* and *Pseudhylaeus* exhibit evidence of relationships with northern subgenera. The former is found in New Zealand also (Michener, 1965). The subgenus *Nesoprosopis* of the Palaearctic Region, which has developed a swarm of species in Hawaii, has no representatives in the South Pacific.

*Hylaeus* is one of the most difficult genera of the world in taxonomy because of a uniform appearance and structural similarities. In addition to this, the inherent difficulty of this genus has lain in the inadequacy of earlier descriptions and lacking of illustrations.

Japanese subgenera of *Hylaeus* have been poorly known except the work of Hirashima (1977) who recognized 7 species of *Nesoprosopis*. This occupies about one-third of *Hylaeus* of Japan so far as the number of species is concerned. In addition, Snelling (1970a) included *H. boninensis* to *Nesoprosopis*. He recorded also *Paraprosopis* from the Ogasawara-shotō.

Three species, which seem to have relationships with the Oriental species, remain unclassified subgenerically.

#### 1. Subgeneric classification of the genus *Hylaeus* of Japan

The subgeneric classification of the genus *Hylaeus* is principally based on the characters of the 7th and 8th metasomal sterna and the genitalia of the male. These terminalia are usually not exposed. This is one of the reasons why it

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is too difficult to determine the subgeneric status.

The genus *Hylaeus* contains at least 44 subgenera in the world (Table 1). They are:

Australian Region (19 subgenera): *Analastoroides*, *Edriohylaeus*, *Euprosopellus*, *Euprosopis*, *Euprosopoides*, *Gnathoprosopis*, *Gnathoprosopoides*, *Hylaeorhiza*, *Hylaeteron*, *Laccohylaeus*, *Macrohylaeus*, *Meghylaeus*, *Planihylaeus*, *Prosopisteroides*, *Prosopisteron*, *Pseudhylaeus*, *Rhodohylaeus*, *Sphaerhylaeus* and *Xenohylaeus*.

Palaeartic Region (12 subgenera): *Abrupta*, *Dentigera*, *Hylaeus*, *Koptogaster*, *Lambdopsis*, *Mehelyana*, *Nesohylaeus*, n. subg., *Nesoprosopis*, *Paraprosopis*, *Patagiata*, *Prosopis* and *Spatulariella*.

Nearctic Region (7 subgenera): *Cephalylaeus*, *Hylaeana*, *Hylaeus*, *Metziella*, *Paraprosopis*, *Prosopella* and *Prosopis*.

Holarctic Region (3 subgenera): *Hylaeus*, *Paraprosopis* and *Prosopis*.

Oriental Region (5 subgenera): *Gnathylaeus*, *Hoploprosopis*, *Nesoprosopis*, *Nesylaeus* and *Paraprosopis*.

Ethiopian Region (4 subgenera): *Alfkenylaeus*, *Cornylaeus*, *Deranchylaeus* and *Metylaeus*.

Neotropical Region (4 subgenera): *Gongyloprosopis*, *Hylaeana*, *Hylaeopsis* and *Prosopis*.

In the present paper, five more subgenera of *Hylaeus* were recognized from Japan (including a new subgenus). They are *Hylaeus* (2 spp.), *Lambdopsis* (1 sp.), *Nesohylaeus*, n. subg. (1 sp.), *Patagiata* (1 sp.) and *Prosopis* (2 spp.).

The Japanese species of *Hylaeus* may be divided into 7 subgenera as shown below.

### (1) Subgenus *Hylaeus* Fabricius

[Jap. name: Chibi-mukashi-hanabachi-azokul]

*Hylaeus* Fabricius, 1793, Ent. System., 2: 302. (syn. *Cressoni* division Metz, 1911; *Pectinata* Méhely, 1935; *Trichota* Méhely, 1935.)

Type-species: *Prosopis annulata* Fabricius = *Apis annu-*

Table 1. Distribution of subgenera of the genus *Hylaeus*. Pal: Palaearctic, Nea: Nearctic, Ori: Oriental, Aus: Australian, Eti: Ethiopian, Neo: Neotropical. \* indicates a new subgenus.

Subgenus	Region					
	Pal	Nea	Ori	Aus	Eti	Neo
<i>Abrupta</i>	o	-	-	-	-	-
<i>Alfkenylaeus</i>	-	-	-	-	o	-
<i>Analastoroides</i>	-	-	-	o	-	-
<i>Cephalylaeus</i>	-	o	-	-	-	-
<i>Cornylaeus</i>	-	-	-	-	o	-
<i>Dentigera</i>	o	-	-	-	-	-
<i>Deranchylaeus</i>	-	-	-	-	o	-
<i>Edriohylaeus</i>	-	-	-	o	-	-
<i>Euprosopellus</i>	-	-	-	o	-	-
<i>Euprosopis</i>	-	-	-	o	-	-
<i>Euprosopoides</i>	-	-	-	o	-	-
<i>Gnathoprosopis</i>	-	-	-	o	-	-
<i>Gnathoprosopoides</i>	-	-	-	o	-	-
<i>Gnathylaeus</i>	-	-	o	-	-	-
<i>Gongyloprosopis</i>	-	-	-	-	-	o
<i>Hoploprosopis</i>	-	-	o	-	-	-
<i>Hylaeana</i>	-	o	-	-	-	o
<i>Hylaeus</i>	o	o	-	-	-	-
<i>Hylaeopsis</i>	-	-	-	-	-	o
<i>Hylaeorhiza</i>	-	-	-	o	-	-
<i>Hylaeteron</i>	-	-	-	o	-	-



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Table 1. Continued.

Subgenus	Region					
	Pal	Nea	Ori	Aus	Eti	Neo
<i>Koptogaster</i>	o	-	-	-	-	-
<i>Laccohylaesus</i>	-	-	-	o	-	-
<i>Lambdopsis</i>	o	-	-	-	-	-
<i>Macrohylaesus</i>	-	-	-	o	-	-
<i>Meghylaesus</i>	-	-	-	o	-	-
<i>Mehelyana</i>	o	-	-	-	-	-
<i>Metylaesus</i>	-	-	-	-	o	-
<i>Metziella</i>	-	o	-	-	-	-
<i>Nesohylaesus</i> *	o	-	-	-	-	-
<i>Nesoprosopis</i>	o	-	o	-	-	-
<i>Nesylaesus</i>	-	-	o	-	-	-
<i>Paraprosopis</i>	o	o	o	-	-	-
<i>Patagiata</i>	o	-	-	-	-	-
<i>Planihylaesus</i>	-	-	-	o	-	-
<i>Prosopella</i>	-	o	-	-	-	-
<i>Prosopis</i>	o	o	-	-	-	o
<i>Prosopisteroides</i>	-	-	-	o	-	-
<i>Prosopisteron</i>	-	-	-	o	-	-
<i>Pseudhylaesus</i>	-	-	-	o	-	-
<i>Rhodohylaesus</i>	-	-	-	o	-	-
<i>Spatulariella</i>	o	-	-	-	-	-
<i>Sphaerhylaesus</i>	-	-	-	o	-	-
<i>Xenohylaesus</i>	-	-	-	o	-	-
Totals	12	7	5	19	4	4

*Iata* Linnaeus, 1758; designation of Latreille, 1810.

This is a rather large and diverse subgenus found in the Holarctic Region. This subgenus has been reported from various parts of the Palaearctic Region as follows: 1 sp. from Britain (Fitton *et al.*, 1978); 14 spp. from Europe, 4 spp. from Iran (Dathe, 1980a, b); 9 spp. from the Mediterranean Countries (Erlandsson, 1986); 8 spp. from Azerbaidjan and Caucasus, Soviet (Alief, 1986); and 25 spp. from Mongolia (Dathe, 1986b). From the Nearctic Region 12 spp. has been reported (Snelling, 1970b). In Japan, 2 species has been recognized, and they are different from the continental species.

#### DIAGNOSIS

The terminalia of the male are characterized as follows: Apical lobes of 7th sternum strongly developed, triangular, bearing along the margin either a number of ridge-like plates curved at the apex, or a number of large setae; accessory lobes strongly elongated, tongue-shaped, narrow, with hairs on apical portion. Eighth sternum short, with basal process short and broad, apical process short and bifid at the apex, its apical portion with hairs short and poor. Stipites quite short, broadened at the base; apical half rounded, partly clothed with feathered hairs. Sagittae broadened dorso-ventrally.

#### Included Japanese species

*Hylaeus (Hylaeus) paulus* Bridwell, 1919.

*Hylaeus (Hylaeus) perforatus* (Smith), 1873

#### (2) Subgenus *Lambdopsis* Popov

[Jap. name: Tsunobuto-chibi-mukashi-hanabachi-azokul]

*Lambdopsis* Popov, 1939, Compt. Rend. (Doklady) I'Acad. Sci. I'URSS., 25(2): 169.

Type-species: *Melitta annularis* Kirby, 1802; designation of Popov, 1939.

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This subgenus is known in the Palaearctic Region as follows: 2 spp. from Britain (Fitton *et al.*, 1978); 6 spp. from Europe, (Dathe, 1980a); 4 spp. from the Mediterranean Countries (Erlandsson, 1986); 4 spp. from Azerbaidjan and Caucasus, Soviet (Alief, 1986); 1 sp. from Iran (Dathe, 1980b); 1 sp., which is the same species with the European one, from Mongolia (Dathe, 1986b). In Japan, 1 sp. is recognized. Thus, *Lambdopsis* seems to be diversified in Europe.

### DIAGNOSIS

The terminalia of the male are characterized as follows: Apical lobes of 7th sternum strongly reduced, chitinized, transversely rectangular, with lateral margin inflated, directed backwards; no accessory lobes present. Eighth sternum short, broad with basal process narrow and long, exceeding the length of the body of the sternum, with apical process narrow, short, shorter than basal one, ventrally hooked, pointed at the apex, hairless. Stipites broad, elongated, with the apex slightly tapering, rounded, clothed with hairs branched in some places. Sagittae short, broad, with distal half lobe-shaped, broadened, sharply isolated angularly.

### Included Japanese species

*Hylaeus (Lambdopsis) nipponicus* Bridwell, 1919

### (3) Subgenus *Nesohylaeus*, new subgenus

[Jap. name: Chibi-mukashi-hanabachi-modoki-azoku]

Type-species: *Hylaeus niger* Bridwell, 1919.

This new subgenus is proposed for a single species, which is closely related to the subgenus *Hylaeus*, but is evidently different from that in the features of the male terminalia. Further, the maculation on the male face is very unique (see the key).

### DIAGNOSIS

The male terminalia are characterized as follows: Apical lobes of 7th sternum strongly developed, not triangular as

in *Hylaeus* but rather elongated, bearing a number of ridge-like and long plates along the outer margins; tongue-shaped accessory absent. Eighth sternum short, with basal process short, broadened and rounded at the apex, with apical process long, slender in lateral view and bifid at the apex, its apical portion with short hairs. Stipites large, very broadened at the base, distinctly constricted near the center; apical half widened, clothed with long, branched hairs. Sagittae broadened dorso-ventrally and laterally.

**Etymology** *Nesohylaeus* means *Hylaeus* which lives on an island.

Included Japanese species

*Hylaeus (Nesohylaeus) niger* Bridwell, 1919.

#### (4) Subgenus *Nesoprosopis* Perkins

[Jap. name: Tsuya-chibi-mukashi-hanabachi-azokul]

*Nesoprosopis* Perkins, 1899, Fauna Hawaiiensis, 1(1): 75.  
(syn. *Imperfecta* Mèhely, 1935.)

Type-species: *Prosopis facilis* Smith, 1879; designation of Popov, 1939.

*Nesoprosopis* was proposed by R. C. L. Perkins (1899) as an endemic genus of bees in the Hawaiian Islands including 52 species. Since then, Perkins (1911) reported a European species, *Prosopis kreichbaumeri* Förster (now known as *Hylaeus pectoralis*), as a species of *Nesoprosopis*. Further, he described *Nesoprosopis chinensis* from China. Bridwell (1919), however, placed *chinensis* in the subgenus *Nesylaeus* Bridwell, 1919 of the genus *Hylaeus*, which is restricted to tropical Asia in its distribution.

In Japan, this subgenus is composed of 8 species including *H. pectoralis* which has been known from Europe until Hirashima (1977). The subgenus is most predominant in Japan. According to Hirashima (1977), a number of species belonging to this subgenus may inhabit various parts of tropical Asia.

I agree with him. Thus, *Nesoprosopis* seems to be an element of tropical Asia.

DIAGNOSIS

The terminalia of the male are characterized as follows: Apical lobes of 7th sternum massive, elongated or lozenge-shaped, without ventrally curved plate, with short, poor hairs. Apical process of 8th sternum always extremely long, rised suberect on the ventral side from the body of the sternum; the process curved, slender, but usually expanded dorso-ventrally, bifurcated at the apex, fringed with long, pulmose hairs. Stipites stout but sometimes narrow, elongated. Sagittae feebly expanded dorso-ventrally, with the apex long, narrow, broadly rounded.

Included Japanese species

Hirashima (1977) proposed that the Japanese species of *Nesoprosopis* could be divided into 2 species groups in regard to the structure of the male 8th sternum, and each species group could further be divided into the species subgroups (for detail, see Hirashima, 1977, with the key). Adding *boninensis* to this, it may be summarized as follows:

1. The species group of *Hylaeus pectoralis*
  - 1-1. The species subgroup of *Hylaeus pectoralis*

*Hylaeus (Nesoprosopis) pectoralis* Förster, 1871
  - 1-2. The species subgroup of *Hylaeus nippon*

*Hylaeus (Nesoprosopis) nippon* Hirashima, 1977
2. The species group of *Hylaeus floralis*
  - 2-1. The species subgroup of *Hylaeus insularum*

*Hylaeus (Nesoprosopis) insularum* Yasumatsu et  
Hirashima, 1965  
subsp. *iriomotensis* Yasumatsu et Hirashima,  
1965
  - 2-2. The species subgroup of *Hylaeus matsumurai*

*Hylaeus (Nesoprosopis) matsumurai* Bridwell, 1919  
*Hylaeus (Nesoprosopis) noomen* Hirashima, 1977
  - 2-3. The species subgroup of *Hylaeus floralis*

*Hylaeus (Nesoprosopis) floralis* (Smith), 1873  
*Hylaeus (Nesoprosopis) globula* (Vachal), 1903

- 2-4. The species subgroup of *Hylaeus boninensis*  
*Hylaeus (Nesoprosopis) boninensis* Yasumatsu, 1955

(5) Subgenus *Patagiata* Blüthgen

[Jap. name: Futakobu-chibi-mukashi-hanabachi-azoku]

*Patagiata* Blüthgen, 1949, Beitr. tax. Zool., 1: 77.

Type-species: *Prosopis difformis* Eversmann, 1852; designation of Blüthgen, 1949.

Although *Prosopis difformis* Eversmann (now known as *Hylaeus difformis*) inhabiting Europe was assigned the subgenus *Hylaeus* by Popov (1939), Blüthgen (1949) divided *Hylaeus* into two subgenera in conformity with the structure of the male 8th metasomal sternum and genitalia of *difformis*. Since then, Warncke (1972) nominated the subspecies *hispanica* (Warncke), 1972 from Cacéres, Teruel, Spain. Another record in Spain of this subspecies was done from Almeria by Erlandsson (1986). The other records of the type species are as follows: from Azerbaidjan and Caucasus, Soviet (Alief, 1986); from Xizang and Sichuan, China (Wu, 1982). I examined a pair of *difformis* from Innsbruck, Austria at the USNM in 1984. Thus, *Patagiata* has consisted of only one species in the Palaearctic Region. However, a new species, *paradifformis*, is described from Japan in this paper.

This subgenus is a small group of the genus *Hylaeus*, but seems to extend its distribution across the southern part of the Palaearctic Region.

**DIAGNOSIS**

The male terminalia are characterized as follows: Seventh metasomal sternum similar to *Hylaeus*. Eighth sternum short, with basal process short, broadened, and with apical process short but strongly structured, bifurcated dorso-ventrally at the apex, its inner margins with a number of ridge-like plates curved seta-like at the apex, the apex curved ventrally in the middle, its extreme apex also bifurcated. Stipites short, quite broad, rather broadened at the base;

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apical half very short, but its apex with distinct process rolling inside. Sagittae stronger than in *Hylaeus*.

Included Japanese species

*Hylaeus (Patagiata) paradiformis*, new species

### (6) Subgenus *Paraprosopis* Popov

[Jap. name: Ko-chibi-mukashi-hanabachi-azoku]

*Paraprosopis* Popov, 1939, Compt. Rend. (Dokl.) I'Acad. Sci. I'URSS., 25(2): 169. (syn. *Asininus* division Metz, 1911; *Campanularia* M ehely, 1935, nec Lamarck, 1816.)

Type-species: *Prosopis pictipes* Nylander, 1852; designation of Popov, 1939.

This subgenus is of the Holarctic and Oriental distribution. In the Nearctic Region, Snelling (1966c) recorded 15 species. According to him, the species seem to extend from southwestern Canada to northcentral Mexico, and in North America the group seems to reach its greatest development in the Rocky Mountain area. On the other hand, the records in the Palaearctic and Oriental Regions are as follows: 1 sp. from Britain (Fitton, *et al.*, 1978); 7 spp. from Europe (Dathe, 1980a); 6 spp. from the Mediterranean Countries (Erlandsson, 1986); 4 spp. from Azerbaidjan, Soviet (Alief, 1986); 1 sp. from Iran (Dathe, 1980b); 1 sp. from Sri Lanka (Snelling, 1980). In Japan, 5 species including 2 new ones are recognized, and seem to distribute allopatrically. *Paraprosopis* is predominant next to *Nesoprosopis*.

#### DIAGNOSIS

The male terminalia are characterized as follows: Apical lobes of 7th sternum developed, outer margins with deep emarginations and hairs, without plate. Eighth sternum broad, with basal process triangular, with apical process bifid, hairs sparse and short at the apex. Stipites shortened and broadened at the base, narrowed and elongated at the apex, clothed with hairs. Sagittae nearly parallel-sided and long,

slightly broadened dorso-ventrally, narrowed apically.

Included Japanese species

- Hylaeus (Paraprosopis) thoracicus*, new species  
*Hylaeus (Paraprosopis) hirashimai*, new species  
*Hylaeus (Paraprosopis) incomitatus* Snelling, 1970  
*Hylaeus (Paraprosopis) meridianus* Yasumatsu et  
Hirashima, 1965  
*Hylaeus (Paraprosopis) yasumatsui* Snelling, 1970

(7) Subgenus *Prosopis* Fabricius

[Jap. name: Kiiro-chibi-mukashi-hanabachi-azoku]

*Prosopis* Fabricius, 1804, Systema Piezatorum, 293.

(syn. *Modestus* division Metz, 1911; *Auricularia* M ehely, 1935 nec H. Blainville, 1816; *Cingulata* M ehely, 1935; *Fascista* M ehely, 1935; *Navicularia* M ehely, 1935.)

Type-species: *Sphex signata* Panzer, 1798 (= *Mellinus bipunctatus* Fabricius, 1798); designation of Morice and Durrant, 1914.

This subgenus, like the preceding, is Holarctic in distribution. In the Nearctic Region, according to Snelling (1966), various species are found throughout U. S. A. and most widely distributed in North America, extending from Mexico City as far north as the Arctic Circle. He recorded 12 species from there. On the other hand, the records in the Palearctic Region are as follows: 4 spp. from Britain (Fittton, *et al.*, 1978); 12 spp. from Europe (Dathe, 1980a); 7 spp. from the Mediterranean Countries (Erlandsson, 1986); 10 spp. from Azerbaidjan, Soviet (Alief, 1986); 1 sp. from Iran (Dathe, 1980b); 2 spp. from Mongolia (Dathe, 1986). In Europe a number of the species of *Prosopis* are found together with *Dentigera* next to *Hylaeus*. In Japan, 2 species are recognized, one of which is a new species.

Thus, *Prosopis* is not rich in number of species in the eastern part of the Palearctic Region.



DIAGNOSIS

The male terminalia are characterized as follows: Apical lobes of 7th sternum well developed, with basal portion angulate, with apical portion acute triangularly, and with long, branched hairs. Eighth sternum with basal process short, broadened, with apical process rather short, somewhat broadened, its apex truncate or slightly emarginate. Sagittae broadened dorso-ventrally, with peculiar ear-like appendages in the middle.

Included Japanese species

*Hylaeus (Prosopis) monticola* Bridwell, 1919

*Hylaeus (Prosopis) submonticola*, new species

(8) Unassigned species

The subgeneric status of the following three species is uncertain.

*Hylaeus ikedai* (Yasumatsu), 1936

*Hylaeus macilentus*, new species

*Hylaeus nanseiensis*, new species

Bodies of these species are comparatively smaller or rather slender, and have some similarities each other in the structure. The male antennal scape is strongly expanded as in *Lambdopsis* but more or less lozenge-like. The 3rd metasomal sternum is provided with a protuberance.

These 3 species, however, seem to be divided into 2 groups. In the males of *H. nanseiensis* and *H. bridwelli* (= *H. gnathylaeoides*, which was removed from the Japanese fauna in this paper), the characters of the 8th sternum and the genitalia (which is comparatively slender in lateral view) are very similar. On the other hand, those of the male terminalia of *H. ikedai* and *H. macilentus* very resemble and it is characteristic that the genitalia is stout.

The distribution of these 4 species (including *H. bridwelli*) seems to be allopatric from Formosa to Hokkaido and

Ogasawara-shotô. These species may be the southern element. I would, however, leave the discussion on the evolution of these species for further studies.

2. Key to the Japanese subgenera and species of *Hylaeus*

Females

1. Head distinctly broader than long ..... 2
- Head distinctly narrower than long, or as broad as long ..... 14
2. Head nearly circular as seen in front; anterior portion of propodeal enclosure very weakly carinate or hardly carinate, and more or less circularly concave in the middle; body small or slender ..... 3
- ..... Subg. *Paraprosopis* Popov ... 3
- Head not circular as seen in front; anterior portion of propodeal enclosure more or less well carinate, and not concave in the middle ..... 5
3. Axillae yellow; metasoma ferruginous, apical margins broadly more yellowish, apical segments darker; legs more or less ferruginous except yellow maculae; genal areas as broad as eyes; body rather slender ..... 3
- ..... *incomitatus* Snelling
- Axillae black, metasoma blackish as usual; legs also blackish except small segments of all tarsi and yellow maculae; body not rather slender; mesoscutum distinctly punctate, its punctures small and dense especially on posterior portion, with distinctly erect to suberect hairs; propodeal enclosure well defined, anterior portion distinctly carinate, posterior portion nearly abrupt ..... *thoracicus*, new species
4. Genal areas narrower than eyes; mesoscutum with distinctly appressed hairs; lower width of face about half as broad as upper width of face; basal yellow marks on hind tibiae well developed; lateral margins of 1st to 4th metasomal terga each without fringe-

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- like hairs ..... *hirashimai*, new species
- Propodeal enclosure ill-defined, anterior portion rather weakly carinate, posterior portion nearly round; lower width of face distinctly broader than half of upper width of face .....  
..... *meridianus* Yasumatsu et Hirashima
- Mesoscutum rather weakly punctate, its punctures fine and moderately dense; hind tibiae with yellow spots basally; lateral margins of 1st to 4th metasomal terga each with fringe-like hairs somewhat glistening white; apical margins of 2nd to 4th sterna broadly membranous; metasoma stout ..... *yasumatsui* Snelling
5. Maculae on face, collar of pronotum, tubercles, tegulae and legs usually well developed; propodeal enclosure well round, more or less broadly irregularly anastomosing carinate or only basally weakly longitudinally carinate with carinaless shining area; wings usually subhyaline; body usually large size .....  
..... Subg. *Nesoprosopis* Perkins ... 6
- Maculae on face, tubercles and legs not well developed, those on collar of pronotum and tegulae very often absent; propodeal enclosure with anterior portion not irregularly anastomosing carinate but primarily longitudinally carinate; wings comparatively brownish subhyaline ..... 12
- Face and collar of pronotum entirely black; interantennal distance as broad as antennocular distance; supraclypeal area not strongly convex, upper portion distinctly dilated laterally; upper width of clypeus narrower than paraocular width; mandibles tridentate; propodeal enclosure well defined, anterior portion distinctly carinate and shining, posterior portion defined by TRN; propodeal OBL distinct .....  
..... Subg. *Lambdopsis* Popov  
..... *nipponicus* Bridwell
6. The sides of mesoscutum, mesopleura just below tegulae and axillae yellow; hairs on body all over yellowish; posterior margins of metasomal terga each

- with a band of grayish-golden hairs .....  
 ..... *boninensis* Yasumatsu
- The sides of mesoscutum, mesopleura just below tegulae and axillae black; hairs on body not yellowish; posterior margins of metasomal terga without a band of grayish-golden hairs ..... 7
7. Mesopleuron very strongly punctate and coarsely sculptured; mesoscutum with punctures well separate; upper portion of supraclypeal area not highly elevated (although well defined from neighbouring areas); collar of pronotum without yellow macula .....  
 ..... *pectoralis* Förster
- Mesopleuron rather coarsely sculptured, but punctures small; mesoscutum with punctures dense; upper portion of supraclypeal area highly elevated, dilated laterally (V-shaped) and sharply defined from the rest of lower frons; lateral portions of collar of pronotum transversely yellow ..... *nippon* Hirashima
8. Preoccipital carina distinctly keeled; mesoscutum very minutely and closely punctate, jet black, dull, with very short fuscous hairs; collar of pronotum low, median portion broadly linear-likely thin; apical margins of basal 4 terga with distinct fringes of snow-white or glistening white hairs (especially on lateral portions of 1st tergum) .....  
 ..... *insularum* Yasumatsu et Hirashima
- Preoccipital carina sharp but not keeled; apical margins of basal 4 terga without fringes ..... 9
9. Clypeus black; propodeal enclosure broadly and strongly wrinkled, its wrinkles distinct (although weakened) even on postero-vertical portion; mesopleuron coarsely sculptured; mesoscutum with whitish hairs predominantly; body large size ..... 10
- Clypeus broadly yellow or at least with median yellow stripe; propodeal enclosure wrinkled only at basal portion (postero-vertical portion broadly free of wrinkles); mesopleuron either smooth or roughened; mesoscutum with brownish hairs predominantly; body

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- medium size ..... 11
10. Paraocular keel distinct; collar of pronotum hardly thickened (only slightly thickened on lateral portions) and rounded, and clothed with white tomenta behind, lateral yellow marks hardly developed or absent; mesoscutum weakly shining, very densely punctate, its punctures fine especially on anterior portion; interantennal distance distinctly broader than antennocular distance ..... *matsumurai* Bridwell
- Paraocular keel not distinct; collar of pronotum thickened, convex and rounded especially on lateral portions, and broadly yellow; mesoscutum dull, densely punctate (its punctures coarser than in *matsumurai*); interantennal distance distinctly narrower than antennocular distance ..... *noomen* Hirashima
11. Supraclypeal area only slightly constricted from the sides in the middle as seen in front, upper portion distinctly elevated and sharply defined from neighbouring areas, but its height not abruptly reduced toward above; mesopleuron reticulate-punctate; malar space short but distinct; clypeus with yellow stripe usually (but variable in shape) in the middle ..... *floralis* (Smith)
- Supraclypeal area distinctly constricted from the sides in the middle as seen in front, upper portion highly elevated and distinctly dilated laterally with sharp edges (nearly V-shaped); malar space very short; mesopleuron smooth (although microscopically reticulate) with punctures small and well separate ..... *globula* (Vachal)
12. Clypeus black, but lower portion sometimes reddish or yellowish brown; supraclypeal area strongly convex; interantennal distance distinctly broader than antennocular distance; collar of pronotum well roundly convex and thickened especially antero-laterally; anterior portion of propodeal enclosure broadly longitudinally carinate; propodeal TRN and OBL absent ..... Subg. *Prosopis* Fabricius ... 13

- Interantennal distance as broad as antennocular distance; areas between eyes and antennal sockets strongly punctate, its punctures large and close; supra-clypeal area well constricted from the sides in the middle, upper portion highly elevated and distinctly dilated laterally; anterior portion of propodeal enclosure strongly carinate and shining, posterior portion defined by TRN and abrupt; propodeal OBL distinct ..... Subg. *Patagiata* Blüthgen ..... *paradiformis*, new species
- 13. Supraclypeal area not constricted from the sides in the middle, upper portion slightly dilated laterally; punctures on frons, mesoscutum and mesopleuron fine or minute, and well close ..... *monticola* Bridwell
- Supraclypeal area distinctly constricted from the sides in the middle, upper portion distinctly dilated laterally; punctures on face, mesoscutum and mesopleuron larger than those in *monticola* and well separate ... ..... *submonticola*, new species
- 14. First metasomal tergum scattered with acupunctures fine or minute; lateral margins of basal 4 terga without fringes of white hairs, or each with hairs somewhat glistening white and fringe-like in some light ..... 15
- First metasomal tergum highly polished, only with punctures rather fine in some places; lateral margins of basal 4 terga each with fringes of white hairs, especially distinct on 1st and 2nd terga ..... Subg. unassigned ... 17
- 15. Body entirely black (but the sides of anterior tentorial pits often with yellow spots small and obscure); supra-clypeal area strongly convex, upper portion distinctly dilated laterally; collar of pronotum well roundly thickened; propodeal enclosure ill-defined, only with carinae longitudinal and very weak on the base ..... Subg. *Nesohylaeus*, new subgenus ..... *niger* Bridwell
- Body with yellow maculae as usual; propodeal enclosure

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- sure more or less defined .....  
 ..... Subg. *Hylaeus*, Fabricius ... 16
16. Yellow marks on lateral face linear-like along margins of eyes, spots-like on lower portion or absent; supraclypeal area slightly convex, upper portion broad; collar of pronotum entirely black, roundly convex laterally; propodeal enclosure weakly defined, somewhat shining; body tiny ..... *paulus* Bridwell
- Yellow maculae on body well developed, but clypeus jet black or brownish on lower portion; supraclypeal area strongly convex, upper portion slightly dilated laterally; collar of pronotum very thickened, as high as mesoscutum; propodeal enclosure distinctly defined and wet-likely shining, anterior portion strongly longitudinally carinate and defined from abrupt posterior portion by somewhat raised TRN; propodeal OBL distinct ..... *perforatus* (Smith)
17. Supraclypeal area hardly convex but defined from neighbouring areas, upper portion more or less dilated laterally; collar of pronotum clothed with hairs rich, pulmose and dull white (nearly concealed surface as seen from above); propodeal enclosure rather ill-defined and horizontally elongated .....  
 ..... *ikedai* (Yasumatsu)
- Collar of pronotum with tomenta of white hairs behind; hairs on mesopleuron white, distinctly pulmose; head distinctly longer than broad; body rather slender .....  
 ..... *macilentus*, new species
- Collar of pronotum without such hairs or tomenta behind; hairs on mesopleuron slightly brownish, almost simple; propodeal enclosure well round; head as broad as long; body not rather slender .....  
 ..... *nanseiensis*, new species

Males

1. Antennal scape not greatly expanded, distinctly long-

Shuichi Ikudome

- er than broad; 3rd and 4th metasomal sterna without a protuberance on preapical portion ..... 2
- Antennal scape greatly expanded; 3rd and 4th metasomal sterna each with a protuberance on preapical portion (in certain species) ..... 16
2. Head nearly circular as seen in front; inner margins of eyes rather strongly convergent below; apical margin of 6th metasomal sterna salient in the middle; body generally small size .....  
 ..... Subg. *Paraprosopis* Popov ... 3
- Head not circular as seen in front; inner margins of eyes not rather strongly convergent below; apical margin of 6th metasomal sterna not salient in the middle; body small ..... 6
3. Propodeal enclosure rather ill-defined; propodeal TRN and OBL entirely absent or hardly noticeable; mid and hind tarsi not yellowish ..... 4
- Propodeal enclosure weakly defined; propodeal OBL weakly noticeable or distinct; mid and hind basitarsi yellow ..... 5
4. Axillae yellow; veins and stigma of wings fuscous; propodeal enclosure hardly carinate .....  
 ..... *incomitatus* Snelling
- Axillae black; veins and stigma of wings light brown; anterior area of propodeal enclosure weakly longitudinally carinate ..... *yasumatsui* Snelling
5. Propodeal enclosure with primarily longitudinal and weak carinae only on the base; propodeal TRN absent, OBL weakly visible; hairs on mesoscutum nearly appressed ..... *meridianus* Yasumatsu et Hirashima
- Propodeal enclosure with distinct carinae; propodeal TRN and OBL distinct; occiput steeply inclinate; 1st metasomal tergum distinctly transversely lineolate-reticulate ..... *hirashimai*, new species
- Hairs on mesoscutum nearly erect; occiput mildly inclinate; 1st metasomal tergum nearly polished .....  
 ..... *thoracicus*, new species
6. Apical margin of 6th metasomal sternum distinctly



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- emarginate in the middle, on which a part of process of 8th sternum resting; apical portion of 8th sternum always produced into extremely long process, its apex usually bifurcated, fringed with long hairs, and usually exposed beyond 6th sternum, but in two species its apex simple and curved slender rod ..... Subg. *Nesoprosopis* Perkins ... 7
- Apical margin of 6th metasomal sternum usually not emarginate in the middle; apical portion of 8th sternum not long, its apex not fringed with long hairs and usually not exposed beyond 6th sternum ..... 12
7. Axillae yellow; all tibiae and tarsi yellowish; apical margins of metasomal terga and sterna broadly yellowish-translucent; hairs on body wholly yellowish .. *boninensis* Yasumatsu
- Axillae black; all tibiae and tarsi not yellowish; apical margins of metasomal terga and sterna not yellowish; hairs on body not wholly yellowish ..... 8
8. Apical process of 8th metasomal sternum filiform or very slender rod-like, simple at apex, not fringed with long curled hairs; mesopleuron very strongly punctate, coarsely sculptured; upper portion of supra-clypeal area not highly elevated (although well defined from neighbouring areas); face broadly yellow; frons (just above antennal sockets) broadly impunctate ..... *pectoralis* Förster
- Supraclypeal area rather strongly convex, its upper portion narrowed but slightly dilated laterally, highly elevated, sharply defined from the rest of lower frons; yellow marks on face not broadly, that on clypeus spot-like or absent, those on lateral face not extending beyond antennal sockets above, supra-clypeal area black; frons without area impunctate ..... *nippon* Hirashima
9. Apical process of 8th metasomal sternum robust (dorso-ventrally expanded), bifid at the apex, fringed with hairs long and curled; preoccipital carina distinctly keeled; mesoscutum very finely and closely punctate,

- jet black and dull, with very short fuscous hairs; collar of pronotum low, median portion broadly linear-likely thin; clypeus (except in the case of unusual yellow spot) and supraclypeal area black; latero-apical margins of 1st tergum with distinct fringes of snow-white hairs .....  
 ..... *insularum* Yasumatsu et Hirashima
- Preoccipital carina sharp but not keeled; collar of pronotum convex in outline when seen in front; yellow marks on face well developed ..... 10
10. Propodeal enclosure broadly and strongly wrinkled, its wrinkles distinct (although weakened) even on postero-vertical portion; mesopleuron coarsely sculptured; mesoscutum with whitish hairs predominantly; paraocular keel distinct; collar of pronotum hardly thickened and rounded, clothed with white tomenta behind; mesoscutum weakly shining, very densely punctate (its punctures fine especially on anterior portion) ..... *matsumurai* Bridwell
- Paraocular keel not distinct; collar of pronotum thickened, convex and rounded laterally in especial, broadly yellow; mesoscutum dull, densely punctate (its punctures coarser than in *matsumurai*); face very broadly ivory ..... *noomen* Hirashima
11. Propodeal enclosure wrinkled only at basal portion (postero-vertical portion broadly free of wrinkle); mesoscutum with brownish hairs predominantly; supraclypeal area only slightly constricted from the sides in the middle as seen in front, upper portion distinctly elevated and sharply defined from neighbouring areas but not abruptly reducing its height toward above; mesopleuron strongly punctate; malar space short but distinct; 2nd flagellar segment much broader than long, only slightly longer than 1st which is ring-like ..... *floralis* (Smith)
- Supraclypeal area distinctly constricted from the sides in the middle as seen in front, upper portion highly elevated and distinctly dilated laterally with

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- sharp edges (nearly V-shaped); malar space very short; mesopleuron smooth (although microscopically lineoreticulate) with punctures small and well separated; 2nd flagellar segment distinctly longer than 1st segment which is ring-like ..... *globula* (Vachal)
12. Yellow marks on face well developed, usually entirely filling below the level of lower margins of antennal sockets; frons with weak sulcus in the middle; latero-apical margins of 1st to 3rd metasomal terga each with fringes of white or somewhat glistening whitish hairs; apical margins of 2nd to 4th sterna each with whitish fringe-like hairs .....  
 ..... Subg. *Prosopis* Fabricius ... 13
- Yellow marks on face not entirely filling below the level of lower margins of antennal sockets, otherwise filling above the level of upper margins of antennal sockets; 1st to 3rd terga and 2nd to 4th sterna without such white hairs ..... 14
13. Supraclypeal area well convex, upper portion very narrowed and hardly dilated laterally; mesoscutum and mesopleuron with punctures small, dense; 3rd and 4th metasomal sterna each with a transverse weak protuberance ..... *monticola* Bridwell
- Upper portion of supraclypeal area slightly but distinctly dilated laterally; lower portion of frons (just above each antennal sockets) broadly impunctate, somewhat shining; mesoscutum and mesopleuron with punctures stronger and sparser than those in *monticola*; 3rd and 4th sterna without protuberance .....  
 ..... *submonticola*, new species
14. Mesoscutum with erect to suberect hairs predominantly; 1st metasomal tergum scattered with acupunctures ..... 15
- Mesoscutum with appressed to subappressed hairs predominantly; 1st metasomal tergum highly polished, with punctures rather fine in some places; lower portion of supraclypeal area somewhat shining, triangularly long, mostly impunctate except both sides but

- microscopically striate; frons well concave mesad .....  
 ..... Subg. *Patagiata* Blüthgen  
 ..... *paradiformis*, new species
15. Primarily only clypeus whitish ivory, the rest of  
 body entirely without yellow macula; supraclypeal  
 area subtriangular, strongly convex; collar of pro-  
 notum roundish convex antero-laterally; body large  
 ..... Subg. *Nesohylaeus*, new subgenus  
 ..... *niger* Bridwell
- Yellow maculae well developed as usual; supraclypeal  
 area not subtriangular; body small .....  
 ..... Subg. *Hylaeus* Fabricius ... 16
16. Head distinctly broader than long, but face narrow;  
 yellow mark on face entirely filling above the level  
 of upper portion of antennal sockets; lower portion  
 of supraclypeal area narrow, elongated; collar of  
 pronotum rather thick, as high as mesoscutum; pro-  
 podeal enclosure strongly defined and shining, ante-  
 rior portion strongly longitudinally carinate and  
 defined from abrupt posterior portion by strong TRN  
 which is somewhat raised ..... *perforatus* (Smith)
- Head about as long as broad; yellow marks on clypeus  
 and paraocular areas entirely filling but not reach-  
 ing below the level of lower margins of antennal sock-  
 et; supraclypeal area not narrow, weakly convex;  
 collar of pronotum poorly indicated, rather lower  
 than mesoscutum in lateral view; propodeal enclosure  
 weakly defined, anterior portion irregularly anasto-  
 mosing carinate, posterior portion not abrupt .....  
 ..... *paulus* Bridwell
17. Head distinctly broader than long; propodeal enclo-  
 sure well defined, anterior portion longitudinally  
 carinate, posterior portion defined by TRN; propodeal  
 OBL distinct; antennal scape slightly broader than  
 long; 3rd and 4th metasomal sterna each with a weak  
 and transversely long protuberance on preapical por-  
 tion ..... Subg. *Lambdopsis* Popov  
 ..... *nipponicus* Bridwell

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- Head as long as broad (very slightly broader than long) or distinctly longer than broad; propodeum roundish, its enclosure ill-defined, TRN and OBL absent; lateral margins of 1st to 3rd metasomal terga each with distinct fringes of white hairs .....  
..... Subg. unassigned ... 18
- 18. Head as long as broad; antennal scape as long as broad or distinctly broader than long; 3rd metasomal sternum with strong tumescence ..... 19
  - Head distinctly longer than broad; antennal scape distinctly longer than broad; 3rd metasomal sternum with a pair of gibba-like protuberances close, rather weak; body rather slender ..... *macilentus*, new species
- 19. Third metasomal sternum with a glabrous semicircular protuberance large, ventrally flattened; collar of pronotum clothed with rich pullose hairs (nearly concealing surface as seen from above) .... *ikedai* Snelling
  - Third metasomal sternum with a pair of strong spine-like protuberance on latero-preapical portions; collar of pronotum not concealed by such hairs; malar space hardly noticeable; mesoscutum shining, with punctures sparse; body slender .....  
..... *nanseiensis*, new species

3. Description of the Japanese species of *Hylaeus*

(1) *Hylaeus (Hylaeus) paulus* Bridwell

[Jap. name: Hime-chibi-mukashi-hanabachi]

(Figs. 34-36)

*Hylaeus paulus* Bridwell, 1919, Proc. Hawaii. Ent. Soc., 4(1): 154-155, female.

*Hylaeus paulus*: Hirashima, 1965, Icon. Ins. Jap. Colore Nat., Edita, 3: 303, female.

TYPE

Holotype: female, Sep. 1913 Karuizawa, Japan, F. Muir., in BC., present in USNM, No. 50731.

**DIAGNOSIS**

*H. paulus* is easily separated from the other small Japanese species by its widened supraclypeal area in both sexes and other characters given in the key.

The male is described here for the first time.

**FEMALE**

Body length 4.5-5 mm.

**Relative dimensions** HL 51; HW 52; UFW 37; LFW 26; IAD 10; ASD 4; AOD 8; CAD 6; UCW 11.5; MCL 19; MCW 24; POW 8.5; COD 3.5; MSL 1; BWM 8.5; OD 4; IOD 9.5; OOD 9; OCD 5; SL 15; SW 5; PL 5.5; PW 4.5; 1FL 3.5; 1FW 4.5; 2FL 2.5; 2FW 4.5; 3FL 3.5; 3FW 4.5.

**Coloration** Black, with following maculations or portions yellow or ivory: lateral portions of face, apical spots on tubercles, anterior spots on tegulae, and basal marks on all tibiae; small segments of all tarsi brownish; undersides of flagellum yellowish brown; wings slightly subhyaline, veins and stigma brown.

**Structure** Inner margins of eyes weakly convergent below; clypeus slightly shining, nearly flat in outline in lateral view, obscurely wrinkled-punctate, its integument coarse, microscopically reticulate-striate; paraocular areas like clypeus but scattered with small, distinct punctures; integument of lower portion of supraclypeal area as in clypeus; upper portion of supraclypeal area slightly dilated laterally, with weak sulcus and punctures, gently merging into frons; frons somewhat shining, striate-punctate, its punctures close and becoming stronger toward facial foveae which extend below to the level of upper margins of antennal sockets; occiput narrow. Mesoscutum slightly shining, distinctly punctate (its punctures small, dense, shallow), microscopically lineolate-reticulate; scutellum more shining, with punctures slightly stronger than those on mesoscutum; mesopleuron nearly as in mesoscutum; propodeal enclosure well roundish, anterior portion irregularly anastomosingly carinate, its carinae evanescent toward posterior area; propodeal TRN and OBL absent. First metasomal tergum smooth, shining, scattered with fine punctures except posterior sub-

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marginal portion; 2nd and following terga microscopically transversely lineolate-reticulate, scattered with fine punctures.

**Pilosity** Hairs on mesoscutum fine, short, appressed, whitish; 2nd and following terga with hairs fine, short, light brown; hairs on lateral margins of 1st to 4th terga somewhat glistening white and fringe-like in some light.

### MALE

Body length 4-4.5 mm.

**Relative dimensions** HL 49; HW 50; UFW 34; LFW 21; IAD 8; ASD 4; AOD 7; CAD 8.5; UCW 9; MCL 19; MCW 20; POW 7.5; COD 2.5; MSL 1; BWM 8; OD 4.5; IOD 9.5; OOD 8.5; OCD 5; SL 15; SW 7; PL 5; PW 5; 1FL 3; 1FW 5.5; 2FL 4.5; 2FW 5; 3FL 5.5; 3FW 5.

**Coloration** Black, with following maculations or portions yellow: well developed lateral face marks, lower portion of supraclypeal area, apical spots on tubercles, apical small spots on all femora, basal marks on all tibiae, and all basitarsi; small segments of all tarsi yellowish brown or brown; lower margins of clypeus reddish brown; flagellum and wings as in female.

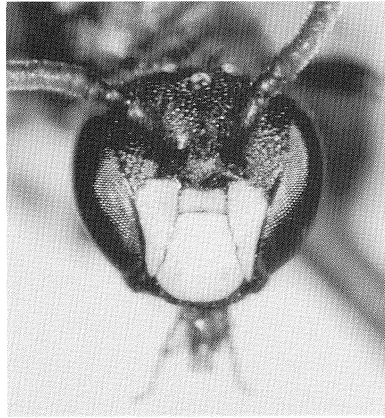
**Structure** Inner margins of eyes strongly convergent below; clypeus very slightly convex; paraocular areas nearly flat; supraclypeal area more convex and less broader than in female. Collar of pronotum weakly indicated; punctures on mesoscutum and scutellum slightly denser than those on female; mesopleuron rather densely punctate, its punctures larger than those on mesoscutum; propodeal enclosure as in female. First tergum shining, scattered with minute punctures, microscopically transversely lineolate-reticulate; 2nd and following terga less shining.

**Pilosity** Hairs on mesoscutum nearly erect, whitish; hairs on 1st tergum fine, rather short, brownish white; lateral margins of 1st tergum with whitish fringe-like hairs in some light; hairs on 2nd and following terga becoming longer and more brownish than those on 1st tergum.

**Terminalia** See Fig. 35.



A



B

Fig. 34. Heads of *Hylaeus (Hylaeus) paulus* Bridwell in frontal view. A, female; B, male.



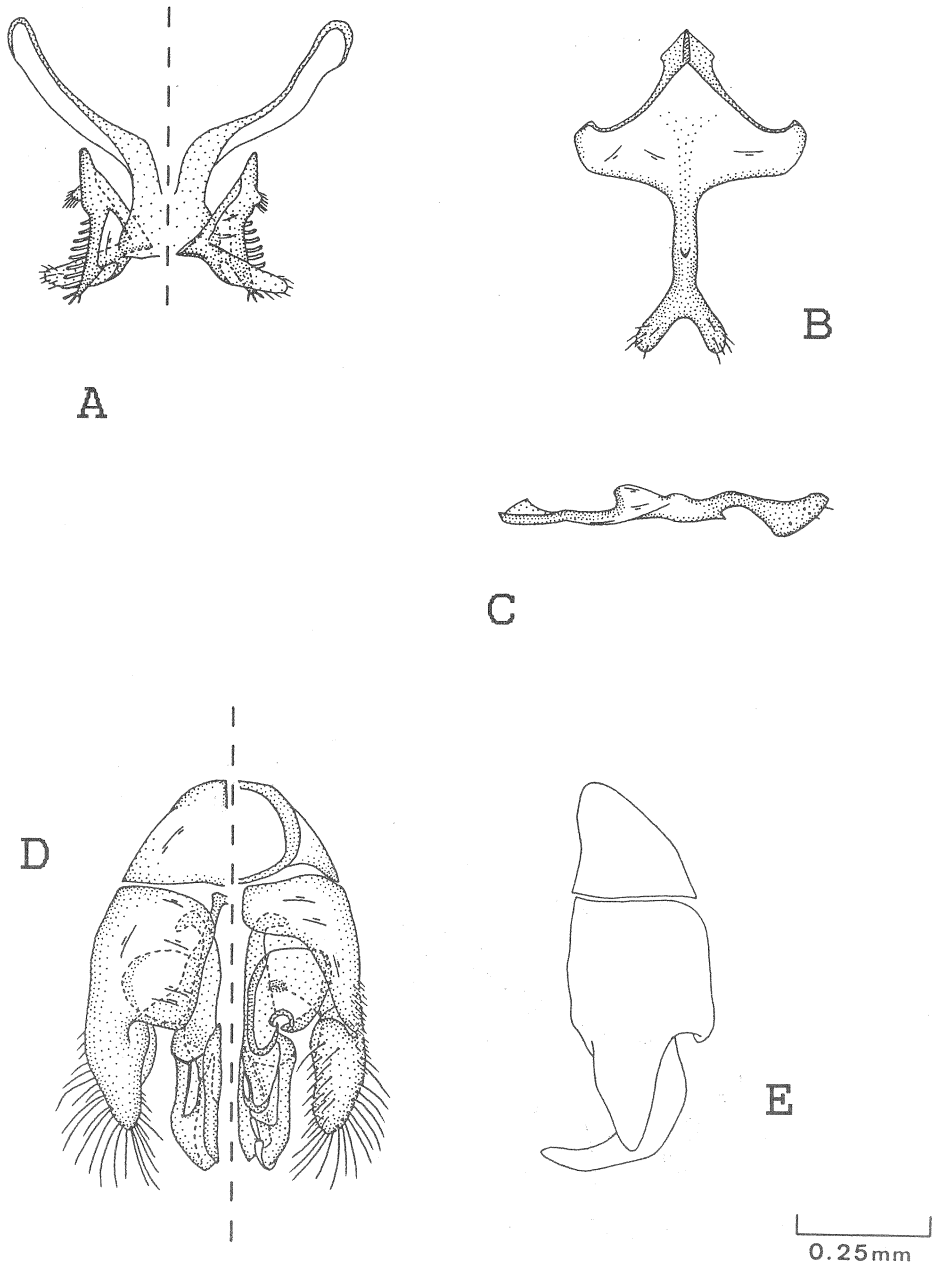


Fig. 35. Male terminalia of *Hylaeus (Hylaeus) paulus* Bridwell. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.



Fig. 36. A map showing the distribution of *Hylaeus (Hylaeus) paulus* Bridwell.

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**Variation** Females: lateral face marks often obscure or absent; spots on tubercles and tegulae often obscure or rarely absent. Males: lower portions of marks of lateral face and clypeus often reduced; mark on supraclypeal area often irregularly reduced; apical spots on tubercles rarely absent; anterior small spots on tegulae rarely present.

**Distribution** (\* indicates the new locality) Hokkaido, Rebun-tô\*, Rishiri-tô\*, Yagishiri-tô\*, Honshu and Kyushu\* (Fig. 36).

**Specimens examined** HD: 15♀♀ and 12♂♂, July 6, 1970 Okusawa, Otaru, Sh. F. Sakagami. RB: 1♀, Aug. 19, 1984 Kabuika, O. Tadauchi. RR: 9♀♀ and 4♂♂, Aug. 17, 1984 Oniwaki, O. Tadauchi. Yagishiri-tô: 1♀, Sep. 16, 1959 Sh. F. Sakagami. HS: 1♀, July 28, 1978 Ohtaki, Saitama Pref., T. Nambu; 1♂, Aug. 13, 1968 Kamiina, Nagano Pref., Y. Haneda. KS: 1♀, July 29, 1985 Mt. Sobo, Nishiusuki, Miyazaki Pref., K. Kusumoto. Besides the above-mentioned specimens, 263 females and 225 males were examined.

**Flight records** HD: females, early June to mid-Oct.; males, late May to late Sep. HS: females, late Apr. to early Sep.; males, early June to early Sep. KS: one data as indicated above.

### Floral records

Aceraceae: *Acer palmatum* Thunb., HD OX.

Araliaceae: *Aralia cordata* Thunb. HD X.

Caprifoliaceae: *Weigela hortensis* (Sieb. et Zucc.) K. Koch, HD OX.

Caryophyllaceae: *Cerastium fischerianum* Ser., HD OX.

Compositae: *Anaphalis margaritacea* (Linn.) Benth. et Hook. var. *angustior* (Miq.) Nakai, HD X; *Aster ageratoides* Turcz. var. *ovatus* (Franch. et Savat.) Nakai forma *yezoensis* (Kitam. et Hara) Ohwi, HD OX, *A. glehnii* Fr. Schm., HD OX, RB OX, *A. scaber* Thunb., HD OX; *Breca setosa* (Bieb.) Kitam., HD OX; *Chrysanthemum frutescens* Linn., HD OX, *C. leucanthemum* Linn., HD OX; *Cirsium pendulum* Fisch., HD OX; *Erigeron annuus* (Linn.) Pers., HD 4X; *Ixeris dentata* (Thunb.) Nakai, HD OX, *I. stolonifera* A. Gray, HD 2X; *Picris hieracioides* Linn. var. *glabrescens* (Regel) Ohwi, HD 2X; *Rudbeckia laciniata* Linn.,

HD 0X; *Sonchus brachyotus* DC. HD 0X; *Solidago altissima* Linn., HD 0X, *S. virga-aurea* Linn. var. *asiatica* Nakai, HD 0X; *Taraxacum officinale* Weber, HD 0X.

Cornaceae: *Cornus controversa* Hemsley, HD 0X.

Cruciferae: *Barbarea orthoceras* Ladeb., HD 0X; *Brassica campestris* Linn. var. *pekinensis* Makino, HD 4X, subsp. *rapa* Hook., HD 0X; *Rorippa indica* (Linn.) Hochr., HD 0X, *R. nikoensis* Hara, HD 0X.

Geraniaceae: *Geranium thunbergii* Sieb. et Zucc., HD 0X.

Leguminosae: *Cytisus scoparius* Link, HD X; *Melilotus suaveolens* Ledeb., HD 0X; *Trifolium repens* Linn., HD 3X.

Liliaceae: *Allium fistulosum* Linn. HD 2X, *A. tuberosum* Rottl. HD 0X, RR X; *Hosta pectifolia* Nakai, HD 0X.

Malvaceae: *Malva sylvestris* Linn. var. *mauritina* Boiss., HD 0X.

Oleaceae: *Syringa vulgaris* Linn., HD 0X.

Onagraceae: *Epilobium angustifolium* Linn., HD 0X; *Oenothera erythrosepala* Borbás, HD 0X.

Oxalidaceae: *Oxalis corniculata* Linn., HD 0X.

Ranunculaceae: *Ranunculus chinensis* Bunge, HD 0X, *R. silerifolius* Lév., HD 0X.

Rosaceae: *Aruncus dioicus* (Walt.) Fernald var. *tenuifolius* (Nakai) Hara, HD 2X; *Filipendula multijuga* Maxim., HD 0X; *Fragaria ananassa* Duchesne, HD X; *Potentilla fragarioides* Linn. var. *major* Maxim., HD 0X, *P. fruticosa* Linn., HD 0X, *P. norvegica* Linn., HD 0X; *Rosa multiflora* Thunb., HD 0X, *R. rugosa* Thunb., HD 0X; *Spiraea salicifolia* Linn., HD 0X; *Rubus idaeus* Linn. var. *aculeatissimus* C. A. Meyer forma *concolor* (Komar.) Ohwi, HD 0X, *R. phoenicolasium* Maxim., HD 0X.

Saxifragaceae: *Hydrangea paniculata* Sieb., HD 0X.

Scrophulariaceae: *Scrophularia alata* A. Gray, HD 0X; *Veronicastrum sibiricum* (Linn.) Pennell HD 0X.

Umbelliferae: *Angelica jaoinica* A. Gray, HD 0X, *A. ursina* (Rupr.) Maxim., HD 0X; *Coelopleurum lucidum* (Linn.) Fern. var. *gmelinii* (DC.) Hara, HD 0X; *Heracleum dulce* Fisch. HD X.

Colletidae of Japan

(2) *Hylaeus (Hylaeus) perforatus* (Smith)

[Jap. name: Omonaga-chibi-mukashi-hanabachi]

(Figs. 37-39)

*Prosopis perforata* Smith, 1873, Trans. Ent. Soc. Lond., 1873: 199, female.

*Hylaeus perforatus*: Meade-Waldo, 1923, Gen. Ins., 181: 24.

**TYPE**

Holotype: female, Hiogo, Japan ("Hakodadi" in the original paper), G. Lewis, in BM, No. HYM.17.a.9.

**DIAGNOSIS**

*H. perforatus* is similar to *H. submonticola* in the females, however, the former is easily separated from the latter by its propodeal structure which is strongly defined, and its longer face. It is characteristic of the males that the body wholly is rather shining than the other Japanese species, that the frons and the thorax are strongly densely punctate, and that the propodeal enclosure is distinctly defined by strong carinae as in the female.

The male is described here for the first time.

**FEMALE**

Body length 5.5-6 mm.

Relative dimensions HL 64; HW 62; UFW 43; LFW 29; IAD 9; ASD 5; AOD 9; CAD 8.5; UCW 13; MCL 28; MCW 23.5; POW 8.5; COD 3.5 MSL 2.5; BWM 9; OD 6; IOD 12.5; OOD 8.5; OCD 5.5; SL; 18.5; SW 5.5; PL 5; PW 5; 1FL 4.5; 1FW 5.5; 2FL 2.5; 2FW 5; 3FL 4.5; 3FW 5.

**Coloration** Black, with following maculations or portions yellow: well developed lateral face marks ending angulately at the level of the middle of antennal sockets, large lateral marks on pronotal collar, tubercles, spots on anterior halves of tegulae, basal spots on wings, and basal spots on all tibiae; all tarsi brown; undersides of flagellum yellowish brown or brownish; wings subhyaline, veins and stigma brown.

**Structure** Clypeus nearly flat, microscopically distinctly striate, upper portion weakly punctate, lower portion obscurely wrinkled-punctate; paraocular areas well in-

clinate mesad, integument as in lower portion of clypeus; upper portion of supraclypeal area strongly convex, its height roundly and rather steeply attenuated toward frons in lateral view, with weak sulcus; frons striate-punctate, its punctures strong and dense, becoming larger toward margins of eyes; vertex well convex; occiput very narrow, apical margin hardly rolling up inside; genal area narrow, about half as broad as eye. Collar of pronotum thick even in the middle; mesoscutum rather strongly punctate as in *submonticola* but more shining; scutellum with interspaces of punctures smooth; mesopleuron striate-punctate, its punctures like those on mesoscutum; propodeum narrow in lateral view.

First metasomal tergum minutely punctate except preapical portion; punctures on 2nd and following terga denser than those on 1st.

**Pilosity** Hairs on mesoscutum appressed, white; hairs on terga short, fine, whitish, but becoming longer and brownish toward posterior terga; hairs on 2nd to 4th sterna also short, fine, but whitish brown.

**MALE**

Body length 4-5 mm.

**Relative dimensions** HL 56; HW 58; UFW 39; LFW 22; IAD 7; ASD 5; AOD 8; CAD 11; UCW 9; MCL 21; MCW 19; POW 9; COD 3; MSL 1.8; BWM 9; OD 5.5; IOD 11; OOD 9; OCD 6; SL 18; SW 10; PL 4.5; PW 5; 1FL 3; 1FW 6.5; 2FL 4.5; 2FW 6.5; 3FL 6.5; 3FW 6.5.

**Coloration** Black, with following maculations or portions yellow: well developed lateral face marks ending beyond the level of upper margins of antennal sockets and surrounding antennal sockets, clypeus except lower margin, supraclypeal area extending to upper portion, latero-apical marks of antennal scapes, lateral marks on pronotal collar, tubercles, anterior spots on tegulae, basal spots on wings, apical small spots on all legs, anterior marks on fore tibiae, basal marks on mid and hind tibiae, and basitarsi of all legs; small segments of all tarsi yellowish or brownish; lower margin of clypeus brownish; undersides of flagellum

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brownish.

**Structure** Lower portion of clypeus well roundly convex; peripheral areas of antennal sockets convex, especially in lower portion; upper portion of supraclypeal area very narrow but slightly dilated laterally, its height and width steeply attenuated toward frons; punctures on frons closer than those in female; lower portions (just above antennal sockets) impunctate, smooth; antennal scapes well stout. Mesoscutum and scutellum with punctures smaller than those in female, its interspaces smooth.

**Pilosity** Hairs on mesoscutum suberect to subappressed, whitish; hairs on metasoma as in female.

**Terminalia** See Fig. 38.

**Variation** Females: yellow marks on lower portion of lateral face reduced; lower half of clypeus sometimes jet black. Males: apical small spots on all legs often obscure.

**Remark** This species seems to be rare.

**Distribution** Honshu (Niigata Pref. and Nagano Pref.) (Fig. 39).

**Specimens examined** 1♀ and 8♂♂, May 24, 1976 Kijimadaira, Nagano Pref., 1♀, May 24, 1976 Arai, Niigata Pref., O. Tadauchi; 1♂, May 30, 1985, 2♂♂, June 21, 1985, 1♀, June 23, 1985, 3♀♀ and 1♂, Aug. 22, 1985, 3♀♀ and 2♂♂, Aug. 23, 1985, 2♀♀ and 1♂, Sep. 5, 1985, 1♀, Sep. 10, 1985, Kurokawa and Senami, Niigata Pref., K. Baba.

**Flight records** All records are mentioned above.

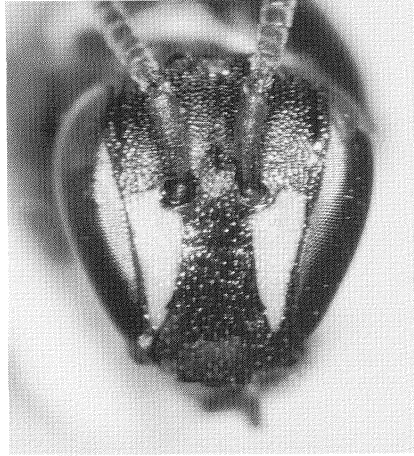
### Floral records

Buxaceae: *Buxus microphylla* Sieb. et Zucc., HS 0X.

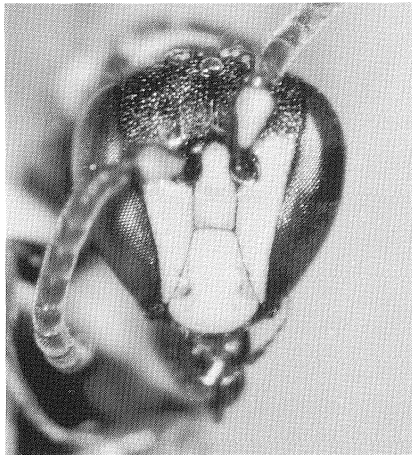
Compositae: *Erigeron philadelphicus* Linn., HS 0X; *Ixeris dentata* (Thunb.) Nakai, HS 0X; *Rudbeckia laciniata* Linn., HS 0X.

Cruciferae: *Brassica campestris* Linn. var. *pekinensis* Makino, HS X.

Liliaceae: *Allium schoenoprasum* Linn. var. *foliosum* Regel, HS 0X.



A



B

Fig. 37. Heads of *Hylaeus (Hylaeus) perforatus* (Smith) in frontal view. A, female; B, male.



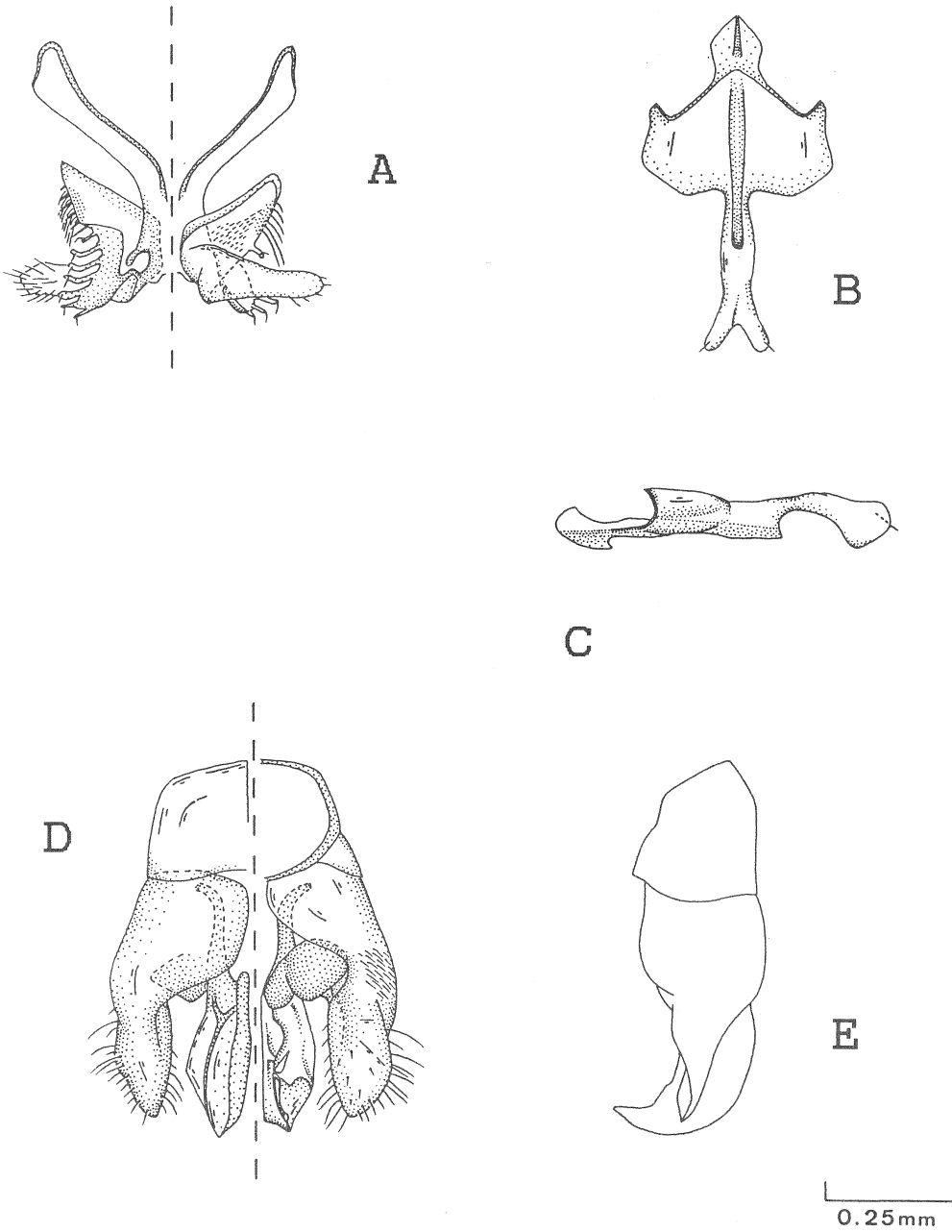


Fig. 38. Male terminalia of *Hylaeus (Hylaeus) perforatus* (Smith). A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.



Fig. 39. A map showing the distribution of *Hylaeus (Hylaeus) perforatus* (Smith).

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(3) *Hylaeus (Lambdopsis) nipponicus* Bridwell

[Jap. name: Tsunobuto-chibi-mukashi-hanabachi]

(Figs. 40-42)

*Hylaeus nipponicus* Bridwell, 1919, Proc. Hawaii. Ent. Soc.,  
4(1): 151-152, female and male.

**TYPE**

Allotype: male, Aug. 1913, Karuizawa, Japan, F. Muir., in BC, present in USNM, No. 50732. Paratypes: 9 females, in BC and PM, present, 2 females in USNM, the other paratypes unknown (so far as I know).

**DIAGNOSIS**

Characteristics are as follows: the collar of pronotum is not very developed laterally in especial, but its anterior portion is distinctly edged like a transverse carina from the tubercles, and is abrupt; the yellow maculation on the collar of pronotum is absent; the OBL is distinct.

This species is very easily separable from the other Japanese ones by the features given in the key.

**FEMALE**

Body length 6.5 mm.

Relative dimensions      HL 59; HW 66; UFW 47; LFW 33; IAD 11.5; ASD 4.5; AOD 12; CAD 6.5; UCW 11.5; MCL 24; MCW 29; POW 13; COD 5.8; MSL 1.7; BWM 11; OD 5; IOD 11.5; OOD 11.5; OCD 7.5; SL 18; SW 7; PL 5.8; PW 4.8; 1FL 5.3; 1FW 4.5; 2FL 4; 2FW 4.5; 3FL 4.5; 3FW 4.5.

**Coloration**      Black, with following maculations or portions yellow: spots on tubercles and tegulae, basal small marks on fore and mid tibiae, and basal halves of hind tibiae; undersides of flagellum reddish brown; wings brownish subhyaline, veins and stigma brown.

**Structure**      Clypeus microscopically oblique reticulate-striate, with obscure wrinkled-punctures especially on upper portion; apical margin of clypeus constricted and slightly reflected in profile; paraocular areas rugoso-punctate, distinctly transverse-likely lineolate-reticulate on lower portions of antennal sockets; supraclypeal area distinctly reticulate-striate, upper portion broad, gently merging into

frons, its surface nearly flat with distinct sulcus. Collar of pronotum acute in front, narrow or subinterrupted in the middle; mesoscutum nearly dull, microscopically lineolate-reticulate, with punctures coarse but small; scutellum slightly convex; mesopleuron densely, coarsely punctate. First metasomal tergum highly polished, nearly impunctate; 2nd and following terga microscopically transversely lineolate-reticulate, scattered with acupunctures.

**Pilosity** Hairs on mesoscutum appressed, not dense, brownish; hairs on 2nd to 5th terga short, fine, not dense, brownish.

**MALE**

Body length 5-6 mm.

**Relative dimensions** HL 55; HW 62; UFW 41; LFW 27; IAD 7.5; ASD 5; AOD 10.5; CAD 10; UCW 8.5; MCL 21; MCW 24; POW 11.5; COD 3.5; MSL 1; BWM 9.5; OD 5.5; IOD 10.5; OOD 11.5; OCD 6.5; SL 18; SW 20; PL 5; PW 5.3; 1FL 4.5; 1FW 5.5; 2FL 3.8; 2FW 5; 3FL 5; 3FW 5.3.

**Coloration** Black, with following maculations or portions yellow: clypeus, supraclypeal area, well developed lateral face marks ending roundly beyond antennal sockets, longitudinal stripe on the outer side of scape, spots on tegulae and tubercles, and rich marks on legs; small segments of tarsi yellowish brown.

**Structure** Paraocular areas slightly concave; clypeus weakly convex, but apical portion receding; supraclypeal area convex, lower portion narrow and long, upper portion short and triangular (but slightly dilated laterally) with distinct sulcus, its height nearly steeply reduced toward frons; occiput narrow, mildly slanting; mandibles bidentate. Thorax more or less as in female, but with denser punctures. First tergum somewhat dull, minutely punctate, microscopically transversely lineolate-reticulate; punctures on 2nd and following terga denser than those on 1st.

**Pilosity** Mesoscutum clothed with short, erect to sub-erect, whitish brown hairs; hairs on 1st tergum very short, whitish, those on 2nd and following terga becoming longer and brownish toward apical terga; hairs on latero-apical

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margins of 1st to 4th terga and apical margins of 2nd to 4th sterna fringe-like and glistening white in some light.

**Terminalia** See Fig. 41.

**Variation** Not especially.

**Distribution** (\* indicates the new locality) Hokkaido, Rebun-tô\*, Rishiri-tô\*, Yagishiri-tô\*, Honshu, Sadoga-shima\* and Kyushu\* (Fig. 42).

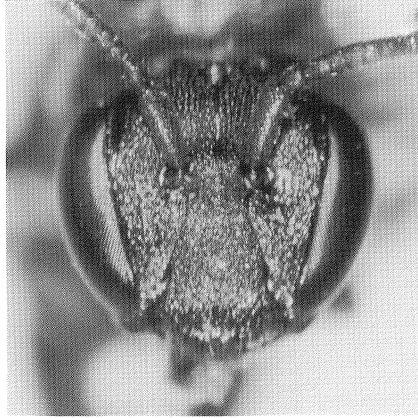
**Specimens examined** Besides the following materials, 254 females and 240 males were examined. RB: 4♀♀, Aug.19,1984 Kabuika, O. Tadauchi. RR: 1♀, Aug.9,1983 Oshidomari, K. Hoshikawa; 1♀, Aug.17,1984 Oshidomari, O. Tadauchi. **Yagishiri-tô**: 3♂♂, Sep.16,1969 Sh. F. Sakagami. SD: 1♂, May 28,1985 Ryotsu, K. Baba. HS: 1♀, July 27,1976 Hiwa, Hiroshima Pref., S. Ikudome. KS: 1♀, July 29,1985 Mt. Sobo, Nishiusuki, Miyazaki Pref., K. Kusumoto; 6♀♀ and 3♂♂, Aug.25,1983 Ajimu, Ohita Pref., S. Ikudome.

**Flight records** HD: females and males, early June to mid-Sep. HS: females, mid-May to early Oct.; males, mid-May to end Aug. KS: mentioned above.

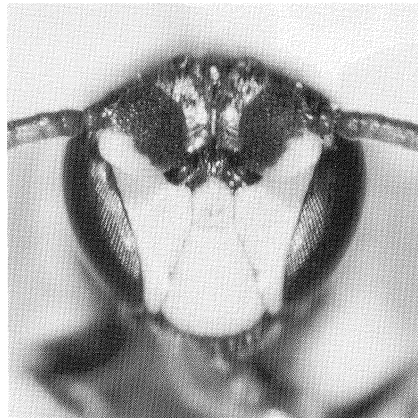
### Floral records

Araliaceae: *Aralia cordata* Thunb., HD 0X, RB 0X, HS 0X.

Compositae: *Achillea alpina* Linn., HD 0X, *A. ptarmica* Linn. var. *macrocephala* (Rupr.) Ohwi, HD 0X; *Adenocaulon himalaicum* Edgew., HD 0X; *Anaphalis margaritacea* (Linn.) Benth. et Hook. var. *angustior* (Miq.) Nakai, HD 0X; *Aster glehnii* Fr. Schm., HD 0X, RB 0X, *A. scaber* Thunb., HD 0X; *Breëa setosa* (Bieb.) Kitam., HD 0X; *Chrysanthemum leucanthemum* Linn. HD 0X, HS 0X, *C. nipponicum* (Franch.) Matsumura, HD 0X; *Erigeron annuus* (Linn.) Pers., HD 3X, HS 0X, *E. philadelphicus* Linn., HS 0X; *Ixeris debilis* (Thunb.) A. Gray, HS 0X, *I. dentata* (Thunb.) Nakai, HD 0X, HS 0X, *I. stolonifera* A. Gray, HD 0X; *Petasites japonicus* (Sieb. et Zucc.) Maxim. var. *giganteus* (Fr. Schm.) Hort., HD 0X; *Picris hieracioides* Linn. var. *glabrescens* (Regel) Ohwi, HD 3X, RB 0X, HS 0X; *Prenanthes tanakae* (Franch. et Savat.) Koidz., HD 0X; *Rudbeckia laciniata* Linn., HD 0X; *Senecio pseudoarnica* Less., RR 0X; *Solidago altissima* Linn., HD 0X, *S. virga-*



A



B

Fig. 40. Heads of *Hylaeus (Lambdopsis) nipponicus* Bridwell in frontal view. A, female; B, male.

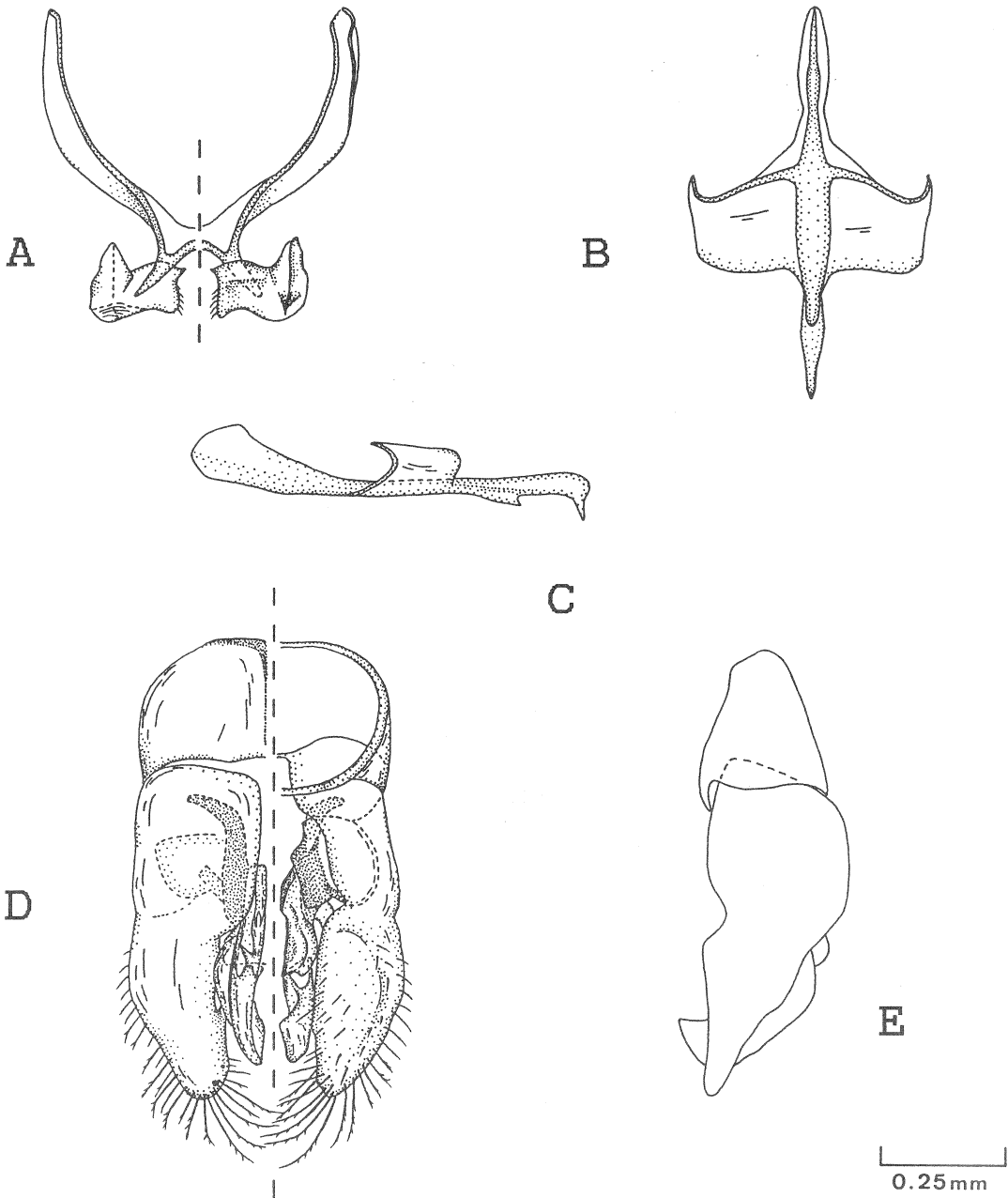


Fig. 41. Male terminalia of *Hylaeus (Lambdopsis) nipponicus* Bridwell. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.



Fig. 42. A map showing the distribution of *Hylaeus (Lambdopsis) nipponicus* Bridwell.



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*aurea* Linn. var. *asiatica* Nakai, HD OX; *Sonchus brachyotus* DC., HD OX; *Taraxacum hondoensis* Nakai, HD 2X, *T. officinale* Weber, HD X.

Crassulaceae: *Sedum erythrostictum* Miq., HD OX, *S. sarmmentosum* Bunge, HS OX, *S. kamschaticum* Fischer, HS X.

Cruciferae: *Barbarea orthoceras* Ledeb., HD OX; *Brassica campestris* Linn. subsp. *napus* Hook., HD OX, var. *pekinensis* Makino, HD 3X, HS OX, subsp. *rapa* Hook., HD OX, *B. oleracea* Linn. var. *capitata* Linn., HD OX; *Capsella bursa-pastoris* (Linn.) Medic., HS OX; *Rorippa indica* (Linn.) Hochr., HD OX, HS OX, *R. islandica* (Oeder) Borbás, HD OX.

Ericaceae: *Ledum palustre* Linn. var. *diversipilosum* Nakai, HD OX.

Geraniaceae: *Geranium thunbergii* Sieb. et Zucc., HD OX, HS OX, *G. yezoense* Franch. et Savat. var. *pseudo-palustre* Nakai, HD X.

Leguminosae: *Lotus corniculatus* Linn. var. *japonicus* Regel, HS OX; *Melilotus suaveolens* Ledeb., HD OX; *Trifolium repens* Linn., HD OX.

Polygonaceae: *Polygonum sachalinense* Fr. Schm., HD OX.

Ranunculaceae: *Ranunculus chinensis* Bunge, HD OX, *R. silerifolius* Lév., HD OX.

Rosaceae: *Agrimonia japonica* (Miq.) Koidz., HD OX; *Arun-cusdioicus* (Walt.) Fernald var. *tenuifolius* (Nakai) Hara, HD OX, HS OX; *Duchesnea chrysantha* (Zoll. et Mor.) Miq., HD OX; *Potentilla cryptotaeniae* Maxim. var. *insularis* Kitagawa, HD OX, *P. fragarioides* Linn. var. *major* Maxim., HD OX, HS OX, *P. stolonifera* Lehm., HD OX; *Rosa multiflora* Thunb., SD OX, *R. rugosa* Thunb. HD X; *Rubus phoenicolasium* Maxim., HD OX; *Spiraea salicifolia* Linn., HD OX.

Saururaceae: *Houttuynia cordata* Thunb., HS OX.

Saxifragaceae: *Deutzia crenata* Sieb. et Zucc., HS OX.

Simaroubaceae: *Ailanthus altissima* Swingle, HS OX.

Umbelliferae: *Angelica acutiloba* (Sieb. et Zucc.) Kitagawa subsp. *iwatensis* (Kitagawa) Kitagawa, HD OX, *A. acuti-loba* (Sieb. et Zucc.) Kitagawa, HD OX, *A. anomala* Lallemant, HD X, *A. cartilaginomarginata* (Makino) Nakai, KS OX, *A. ursina* (Rupr.) Maxim., HD X; *Coelopleurum lucidum* (Linn.)

Fern. var. *gmelinii* (DC.) Hara, HD X; *Daucus carota* Linn., HD 0X; *Glehnia littoralis* Fr. Schm., HD 0X; *Heracleum dulce* Fisch., HD 0X; *Oenanthe javanica* (Blume) DC., HD 0X; *Pleuro-spermum camtschaticum* Hoffm., HD 0X; *Torilis japonica* (Houtt.) DC., HD 0X.

(4) *Hylaeus (Nesohylaeus) niger* Bridwell

[Jap. name: Zuguro-chibi-mukashi-hanabachi]

(Figs. 43-45)

*Hylaeus niger* Bridwell, 1919, Proc. Hawaii. Ent. Soc., 4(1): 151, female.

*Hylaeus niger*: Hirashima, 1965, Icon. Ins. Jap. Color Nat. Edita, 3: 303, female and male.

**TYPE**

Holotype: female, July - Aug. 1913, Chuzenji (4000-5000 ft.) Japan, F. Muir., in BC., present, unknown. Paratype: 1 female, *ibid.*, present, in USNM, No. 56117 (head- and meta-somaless).

**DIAGNOSIS**

*H. niger* is very unique and easily separable from the other Japanese species. The female is characterized by the black and large body. On the other hand, in the male primarily only the clypeus is colored whitish ivory. It is characteristic of both sexes that the clypeus is strongly convex, that the collar of pronotum is roundly thickened, and that the propodeal enclosure is ill-defined.

**FEMALE**

Body length 6.5-7 mm.

Relative dimensions HL 73; HW 69; UFW 48; LFW 35; IAD 5.5; ASD 6; AOD 11.5; CAD 9.5; UCW 18; MCL 30; MCW 29; POW 10; COD 5.5; MSL 2.5; BWM 13; OD 5.5; IOD 10.5; OOD 11.5; OCD 9; SL 20; SW 6; PL 6; PW 5.5; 1FL 6.5; 1FW 5.5; 2FL 4; 2FW 6; 3FL 6; 3FW 6.

Coloration Black, except the following portions: 3rd flagellar segments and succeeding ones slightly brownish beneath; wings rather brownish subhyaline, veins and stigma

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brown.

**Structure** Clypeus longitudinally rugoso-punctate, its punctures dense, distinct but shallow, microscopically distinctly reticulate-striate, somewhat shining; paraocular areas as in clypeus, keels distinct; lower portion of supra-clypeal area broad, strongly punctate, upper portion of that well dilated laterally, indicated disc-like with dense punctures and strong sulcus, steeply narrowed above and gently merges into frons; frons somewhat shining, very closely punctate, its punctures strong but small, becoming slightly larger toward margins of eyes; occiput hardly slanting posteriorly, but its margin well rolling up inside; genal areas as broad as eyes. Thickness of collar of pronotum attenuated toward the middle but yet thick; mesoscutum slightly convex, rather densely punctate, its punctures small and deep; scutellum more shining, with punctures slightly larger and sparser than those on mesoscutum; mesopleuron shining, integument as in scutellum except upper portion transversely striate; propodeal enclosure well round, upper portion weakly rugose-like (nearly rough), lower portion only microscopically lineolate-reticulate; propodeal TRN and OBL absent. First metasomal tergum well polished, scattered with acupunctures; punctures on 2nd and following terga slightly larger than those on 1st.

**Pilosity** Hairs on mesoscutum whitish brown; hairs on lateral margins of 1st to 4th terga somewhat glistening white, fringe-like in some light; hairs on 1st tergum rather short, fine, whitish, those on 2nd and following terga becoming slightly longer and brownish toward posterior terga.

### MALE

Body length 6-6.5 mm.

**Relative dimensions** HL 60; HW 60; UFW 40; LFW 24; IAD 7; ASD 5; AOD 9; CAD 10; UCW 12.5; MCL 26; MCW 23; POW 8; COD 4; MSL 2.5; BWM 9.5; OD 5; IOD 9; OOD 10.5; OCD 6; SL 18; SW 8; PL 5.5; PW 5.8; 1FL 4.5; 1FW 6; 2FL 5.5; 2FW 6; 3FL 8; 3FW 6.

**Coloration** Black, except the following portions: clypeus broadly whitish ivory; undersides of flagellar segments

somewhat reddish brown; wings like in female.

**Structure** Lower portion of clypeus slightly roundly convex; paraocular area strongly punctate, lower portion convex; upper portion of supraclypeal area rather narrow, its height roundly steeply reduced toward frons; frons well concave along obscure sulcus; genal areas narrower than eyes. Thorax more or less as in female except mesopleuron with punctures denser than those in female, its interspaces highly polished. Metasomal terga also as in female, but only more distinctly punctate.

**Pilosity** Hairs on mesoscutum erect, brownish; hairs on metasomal terga more or less as in female.

**Terminalia** See Fig. 44.

**Variation** Both sexes: small whitish ivory spots sometimes appear beside anterior tentorial pits on lateral faces.

**Distribution** Hokkaido and Honshu (Fig. 45).

**Specimens examined** HD: 3♀♀, July 20, 1974 Obako, Mt. Taisetsu, 1♂, same date, Sounkyo, Mt. Taisetsu, H. Fukuda; 1♀, Sep. 8, 1976 Tokachi, 1♂, June 21, 1976 Mt. Upepesanke, Tokachi, M. Usui. HS: 1♀, Aug. 15, 1965 Suganuma, Gunma Pref., Y. Handeda; 1♀, July 13, 1978 Mt. Fuji, Yamanashi Pref., H. Suda; 3♂♂, July 29, 1976 Karisaku Pass, Saitama Pref., T. Nambu; 1♂, Aug. 9, 1954 Mt. Norikura, Nagano Pref., H. Nagase. Besides the above-mentioned specimens, 96 females and 136 males were examined.

**Flight records** HD: females, mid-June to mid-Sep.; males, mid-June to mid-Aug. HS: females, mid-July to early Sep.; males, mid-June to early Aug.

#### Floral Records

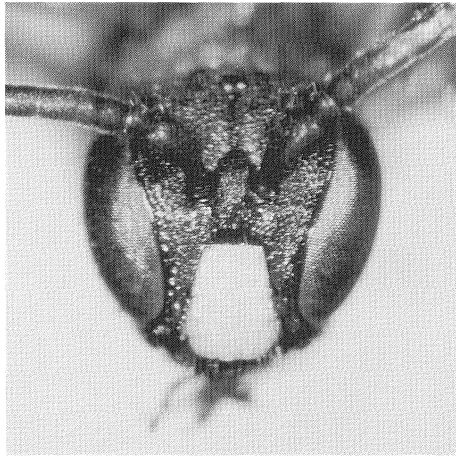
Araliaceae: *Aralia cordata* Thunb., HD 0X.

Commelinaceae: *Commelina communis* Linn., HD 0X.

Compositae: *Anaphalis margaritacea* (Linn.) Benth. et Hook. var. *angustior* (Miq.) Nakai, HD 0X; *Chrysanthemum leucanthemum* Linn., HD X; *Cirsium yezoense* (Maxim.) Makino, HD 0X; *Ixeris dentata* (Thunb.) Nakai var. *albiflora* (Makino) Nakai, HD 0X; *Lactuca raddeana* Maxim. var. *elata* (Hemsl.) Kitam., HD X; *Picris hieracioides* Linn. var. *glabrescens* (Regel)



A



B

Fig. 43. Heads of *Hylaeus (Nesohylaeus) niger* Bridwell in frontal view. A, female; B, male.

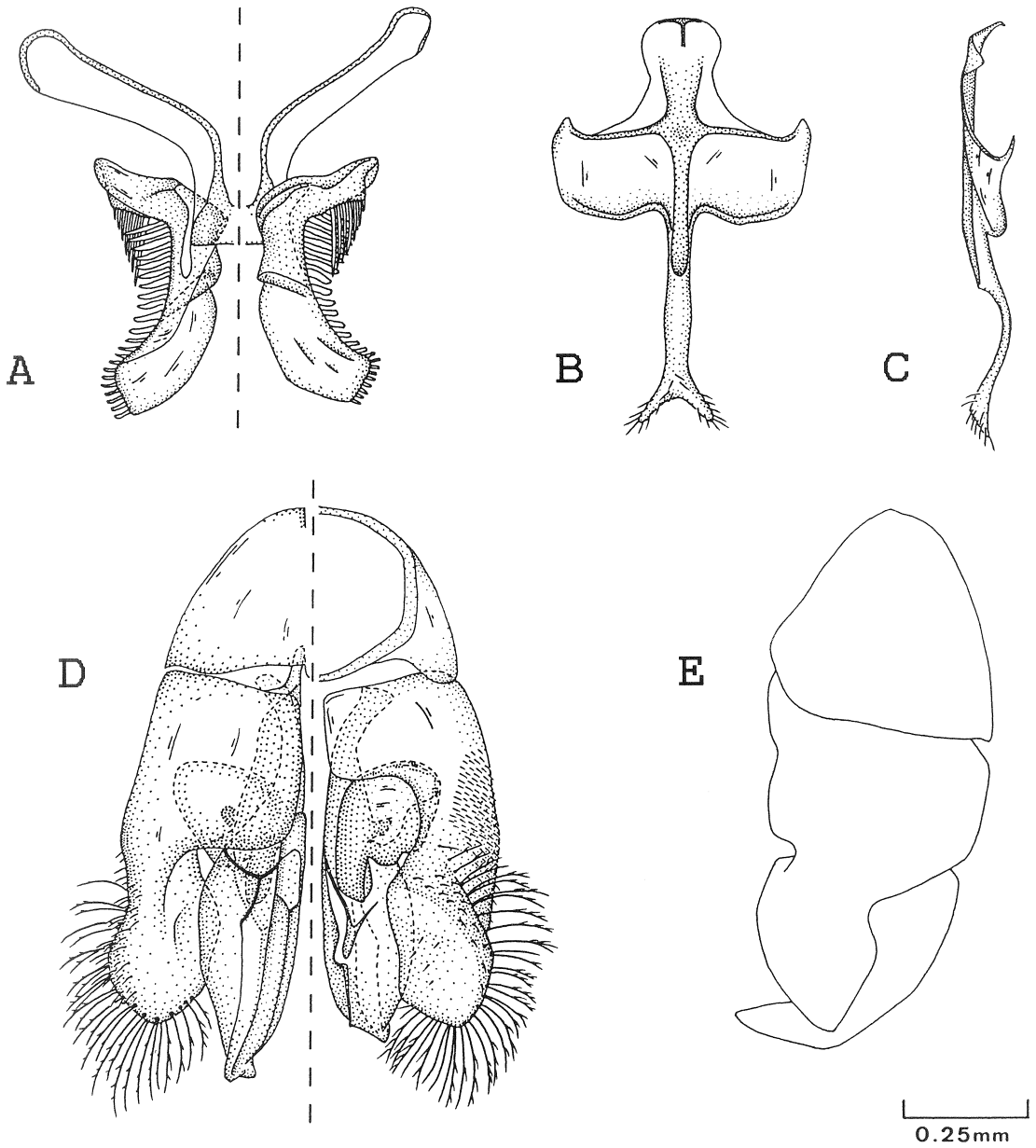


Fig. 44. Male terminalia of *Hylaeus (Nesohylaeus) niger* Bridwell. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.

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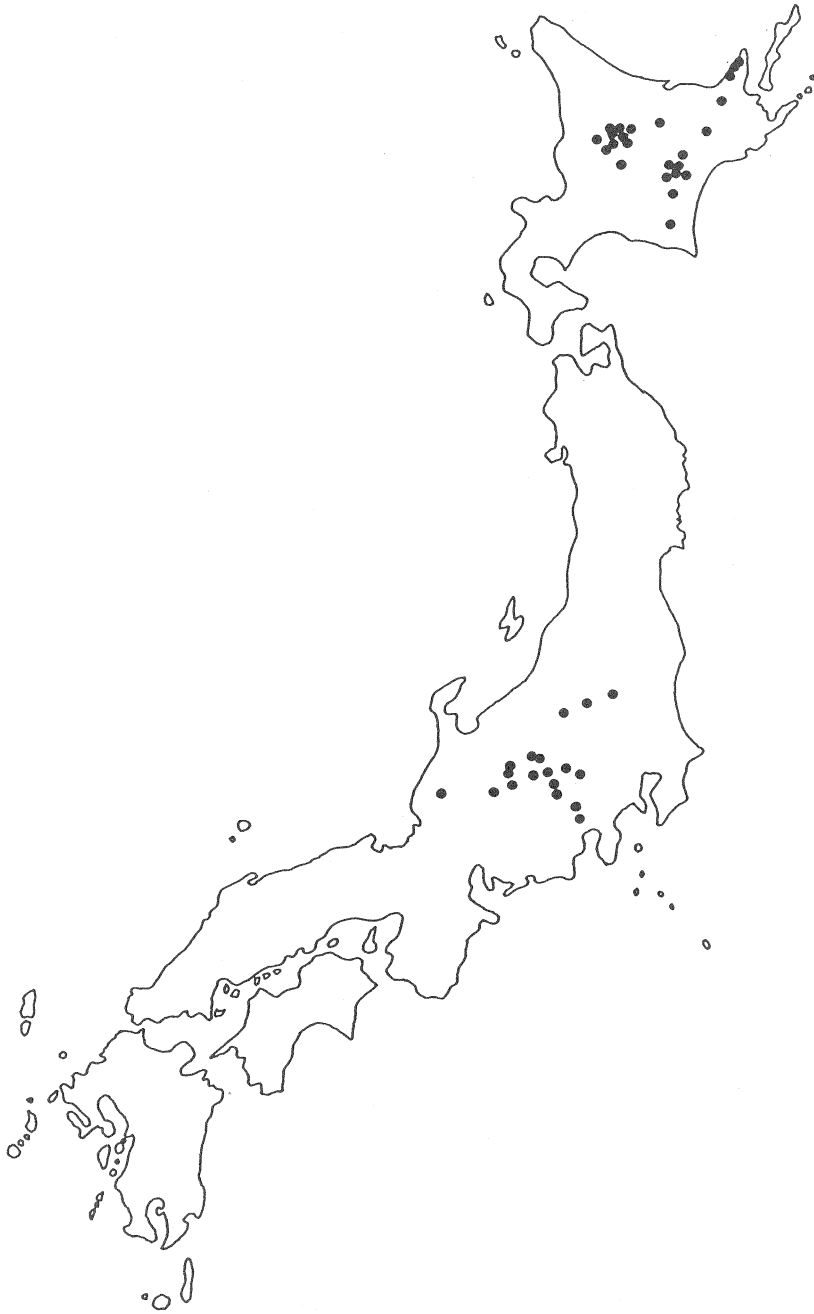


Fig. 45. A map showing the distribution of *Hylaeus (Nesohylaeus) niger* Bridwell.

Ohwi, HD X; *Prenanthes tanakae* (Franch. et Savat.) Koidz., HS OX; *Solidago virga-aurea* Linn. var. *leiocarpa* (Benth.) Miq., HD OX; *Sonchus brachyotus* DC., HD OX; *Taraxacum officinale* Weber, HD OX; *Youngia denticulata* (Houtt.) Kitam., HD OX.

Cruciferae: *Barbarea orthoceras* Linn., HD OX; *Rorippa islandica* (Oeder) Borbás HD OX.

Labiatae: *Prunella vulgaris* Linn. var. *lilacina* (Nakai) Nakai, HD OX.

Leguminosae: *Trifolium repens* Linn., HD OX.

Primulaceae: *Lysimachia clethroides* Duby, HD OX.

Rosaceae: *Aruncus dioicus* (Walt.) Fernald var. *tenuifolius* (Nakai) Hara, HD OX; *Rubus phoenicolasium* Maxim., HD OX.

Scrophulariaceae: *Veronicastrum sibiricum* (Linn.) Pennell, HD OX.

Umbelliferae: *Angelica ursina* (Rupr.) Maxim., HD OX.

(5) *Hylaeus (Nesoprosopis) pectoralis* Förster

[Jap. name: Yōroppa-chibi-mukashi-hanabachi]

(Figs. 46-48)

*Hylaeus pectoralis* Förster, 1871, Verh. Zool. -bot. Ges. Wien, 21: 972, female.

*Hylaeus krieckbaumeri* Förster, 1871, *ibid.*, 21: 973, female and male.

*Nesoprosopis krieckbaumeri*: Perkins, 1911, Trans. Ent. Soc. Lond., 1911: 719, female and male.

*Hylaeus (Nesoprosopis) pectoralis*: Hirashima, 1977, Esakia, 10: 25-28, female and male.

TYPE

*H. pectoralis* is a European species, and was recorded from Japan by Hirashima (1977) for the first time. His identification of the Japanese specimens was made in comparison with the European materials at the LM in 1967. This time, I examined a pair of materials labeled "*P. krieckbaumeri*" which are kept in the USNM, and reaffirmed that *P. krieck-*



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*baumeri* is a synonym of *H. pectoralis*.

### DIAGNOSIS

The character of this species is in the mesopleuron which is very strongly punctured in both sexes. The collar of pronotum is also distinctive in being not thickened and rounded, but thin and transversely almost carinate, although it is well convex in outline as seen in front. Another important character is in that apical margins of the male 2nd to 4th sterna are fringed with compact, downy, white hairs.

### FEMALE

Body length 7-7.5 mm.

Relative dimensions      HL 71; HW 76; UFW 52; LFW 37; IAD 12; ASD 7; AOD 12.5; CAD 8; UCW 18; MCL 28; MCW 33; POW 6; COD 13; MSL 1.8; BWM 13; OD 6.5; IOD 11.5; OOD 13; OCD 13; SL 21; SW 6; PL 6; PW 5; 1FL 5.5; 1FW 5.5; 2FL 3.5; 2FW 5.5; 3FL 4.5; 3FW 5.5.

Coloration      Black, with following maculations or portions yellow: lateral face marks not reaching bases of mandibles below and not beyond upper margins of antennal sockets above, tubercles, spots on tegulae, basal marks on fore and mid tibiae, and about basal halves of hind tibiae; wings slightly dusky, veins and stigma brownish.

Structure      Head thick in profile, with genal areas well developed; face broadly convex, but the outline of clypeus not distinctly arched in profile; supraclypeal area nearly triangular as seen in front, upper portion with a distinct median sulcus, its height not abruptly reduced toward above; apical margin of clypeus broadly constricted, slightly reflected; clypeus distinctly wrinkled-punctate, its punctures shallow; supraclypeal area weakly reticulate-striate; lower portion of frons broadly impunctate just above each antennal sockets. Collar of pronotum similar to that of *matsumurai*; mesoscutum microscopically lineolate-reticulate, nearly dull, rather densely punctate, its punctures sparser and stronger than those in *nippon*; scutellum nearly flat, coarsely strongly punctate; propodeal enclosure strongly irregularly wrinkled as in *nippon*, its wrinkles on apical portion (vertical) weak but well noticeable; the rest of propodeum

coarse (coarser than in *nippon*); propodeum without distinct TRN, but with weak OBL; mesopleuron slightly less coarse than in male or in male of *matsumurai*. First tergum polished, impunctate; 2nd and following terga weakly transverse lineolate-reticulate, with sparse acupunctures.

**Pilosity** Collar of pronotum fringed with short, white, not specially dense tomenta behind; mesoscutum clothed with short, appressed, white hairs; hairs on apical margins of 2nd to 4th or to 5th terga glistening white and fringe-like in some light; hairs on apical portion of abdomen fuscous.

**MALE**

Body length 5.5-6 mm.

**Relative dimensions** HL 67; HW 71; UFW 47; LFW 32; IAD 7; ASD 7; AOD 12; CAD 10; UCW 14; MCL 26; MCW 27; POW 6.5; COD 12; MSL 2.5; BWM 13; OD 6.5; IOD 11.5; OOD 12; OCD 10; SL 19; SW 11; PL 5; PW 6; 1FL 4; 1FW 6; 2FL 4.5; 2FW 5.5; 3FL 7.5; 3FW 5.5.

**Coloration** Black, with following maculations or portions yellow: clypeus except apical margin and portions along lateral sutures, supraclypeal area, well developed lateral face marks, anterior stripes on scapes, apical halves of tubercles, marks on tegulae, and margins on tibiae and tarsi; apices of basitarsi and small segments of tarsi of all legs pale yellowish brown; tegulae brownish or paler subtransparent.

**Structure** Head thickest among the Japanese species of *Nesoprosopis* in profile; face broadly nearly flat; supraclypeal area much longer than broad, upper portion triangular; occiput not strongly slanting. Collar of pronotum thin; mesoscutum feebly shining, microscopically lineolate-reticulate, densely punctate, its punctures small; scutellum nearly flat, with punctures much stronger than those on mesoscutum; propodeal enclosure strongly transversely carinate, the rest of propodeum coarsely sculptured; propodeal OBL incomplete. Abdomen similar to female.

**Pilosity** Collar of pronotum clothed with fringe of white hairs behind but not conspicuous; hairs on mesoscutum long, erect, sordid white; abdomen hairy, but its hairs

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short; hairs on apical margins of 3 or 4 basal terga obscurely fringe-like in some light; hairs on posterior segments of abdomen fuscous.

**Terminalia** See Fig. 47.

**Variation** Female: not especially. Male: lateral face marks are often extending beyond antennal sockets above and ending usually bluntly at eye margins but sometimes ending irregularly; anterior stripes on scapes sometimes absent; carinae on propodeal enclosure sometimes irregular.

**Distribution** Hokkaido and Honshu (new record) (Fig. 48).

**Specimens examined** The following European materials were examined: 1♀, Apr.28,1938 Noorden (in KU); 1♀ and 1♂, Ependf. (in USNM); 1♀, Provins Kiangsu, Cjina, Kollboff (det. S. Erlandsson); many specimens in BM.

Further, the following Japanese 47 females and 37 males were examined: HD: 1♀, July 10,1975, 1♀, Sep.3,1976 Nayoro, 1♀, Sep.26,1986 Atsubetsu, H. Fukuda; 2♂♂, July 23,1953 Horonobe, Teshio Prov., R. Ishikawa; 1♂, 1956 Horonobe, Teshio Prov., R. Ishikawa and K. Magaribuchi; 1♂, July 31, 1967 Otobetsu, Shiranuka-cho, T. Saigusa. HS: 1♀, July 16, 1977 Rifu-cho, Miyagi Pref., 1♀, Sep.7,1981 Mt. Zao, Miyagi Pref., K. Goukon; 1♂, July 7,1975 Shioya, Tochigi Pref., H. Kato. Besides these materials, 42 females and 32 males of the nest site from Miyagi Pref. by K. Goukon were examined.

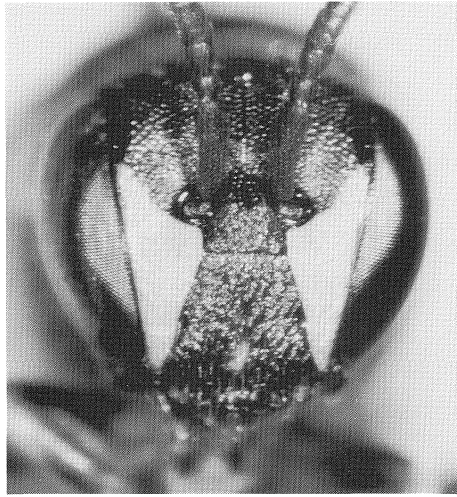
**Flight records** All records were mentioned above.

### Floral records

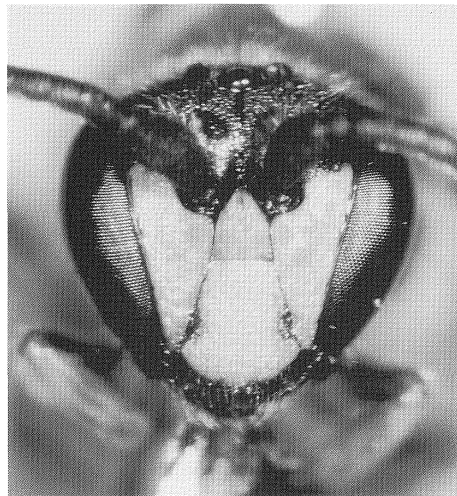
Compositae: *Anaphalis margaritacea* (Linn.) Benth. et Hook. var. *angustior* (Miq.) Nakai, HS OX; *Solidago altissima* Linn., HD OX.

Cruciferae: *Brassica campestris* Linn. var. *pekinensis* Makino, HD OX.

Rosaceae: *Sanguisorba officinalis* Linn., HD OX.



A



B

Fig. 46. Heads of *Hylaeus (Nesoprosopis) pectoralis* Förster in frontal view. A, female; B, male.

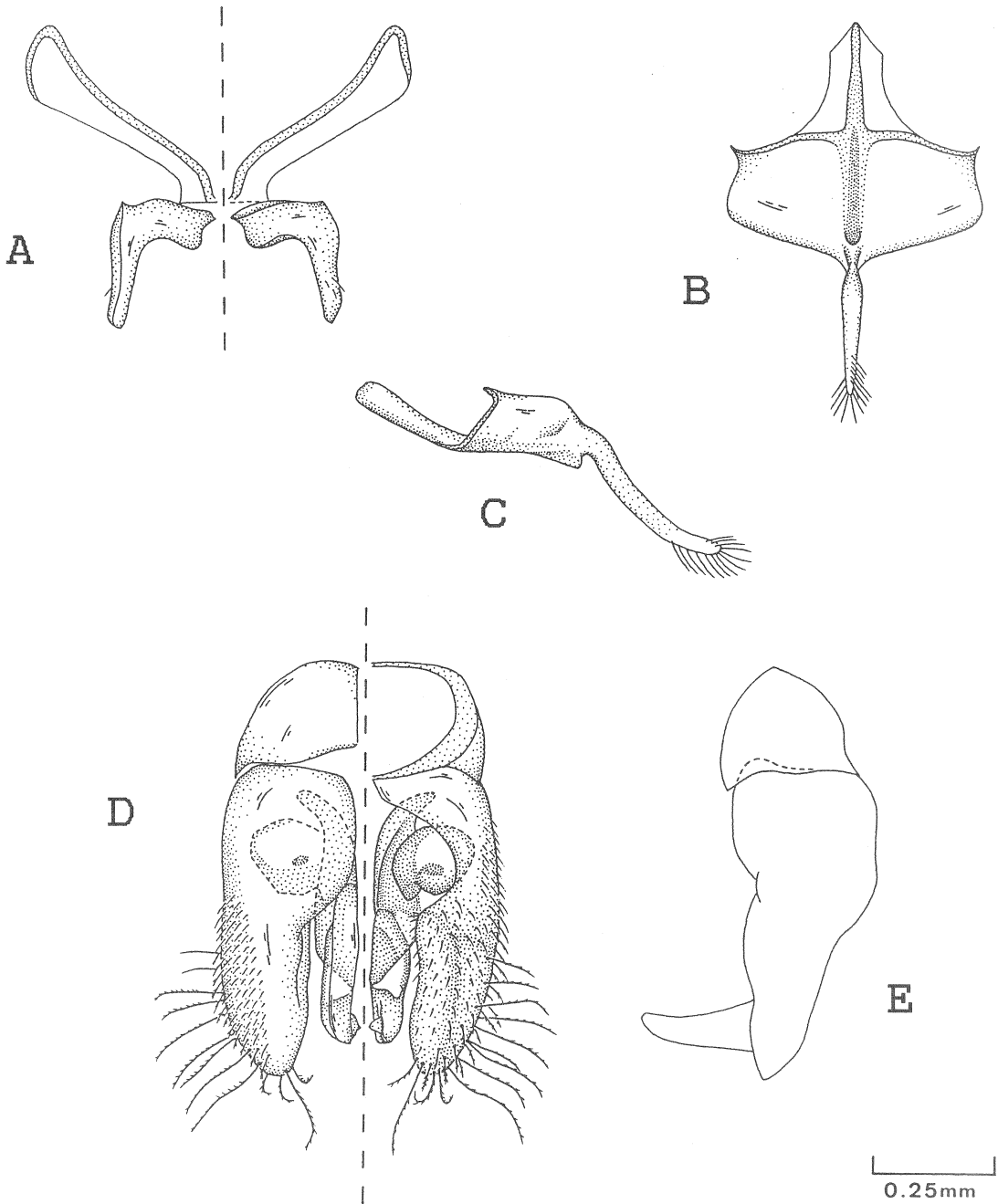


Fig. 47. Male terminalia of *Hylaeus (Nesoprosopis) pectoralis* Förster. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.

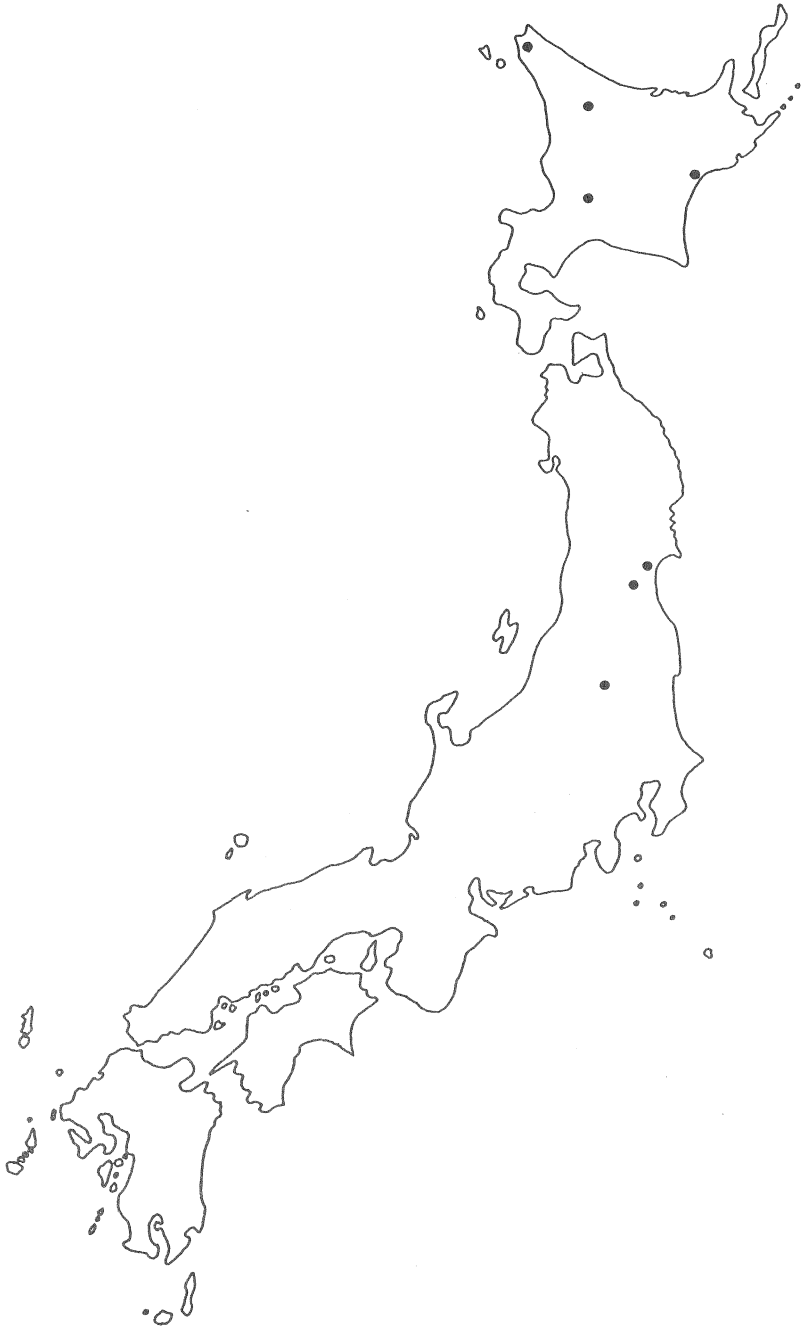


Fig. 48. A map showing the distribution of *Hylaeus (Nesoprosopis) pectoralis* Förster.

(6) *Hylaeus (Nesoprosopis) nippon* Hirashima

[Jap. name: Nippon-chibi-mukashi-hanabachi]

(Figs. 49-51)

*Hylaeus (Nesoprosopis) nippon* Hirashima, 1977, Esakia, 10: 29-32, female and male.

**TYPE**

Holotype: female, Oct. 8, 1959 Sumo, Tsushima, Y. Hirashima, in KU, No. 2062. Paratopotypes: 6 females and 2 males, in KU. Paratypes: 25 females and 29 males, in KU.

**DIAGNOSIS**

The anterior face of pronotum is broadly slantingly cut off, and the collar of that is highly convex and very thin in the middle where is slightly concave. These structures are more pronounced in the female than in the male. The mesoscutum is jet black, dull, very densely punctate, and clothed with hairs very short, nearly appressed, fuscous (slightly longer and downy in the male).

This species is separable from the other Japanese species of *Nesoprosopis* by these characters and other characters given in the key.

**FEMALE**

Body length 7-7.5 mm.

Relative dimensions HL 70; HW 77; UFW 50; LFW 37; IAD 13.5; ASD 7.5; AOD 10; CAD 6; UCW 17.5; MCL 32.5; MCW 31.5; POW 12; COD 6; MSL 3; BWM 12; OD 7; IOD 13.5; OOD 11.5; OCD 10.5; SL 21; SW 6.5; PL 6.5; PW 6; 1FL 5; 1FW 7; 2FL 4; 2FW 7; 3FL 5; 3FW 7.

**Coloration** Black, with following maculations or portions yellow: lateral face marks, band-like mark on lateral portions of collar of pronotum, apical halves of tubercles, spots on tegulae, small basal marks on fore and mid tibiae, and basal less than halves of hind tibiae; undersides of flagellum brownish; tegulae brown; wings slightly darkened, veins and stigma brown.

**Structure** Clypeus distinctly arched in outline in profile, and weakly wrinkled-punctate (weaker than in *pectoralis*, especially on upper portion); frons slightly convex,

strongly slanting backward. Collar of pronotum slightly thick, round on lateral portions; scutellum flat, distinctly more coarsely punctate than on mesoscutum; propodeum less strongly sculptured than in *pectoralis* except enclosure which is very strongly, irregularly carinate, but wrinkles on apical portion (vertical) almost obsolete; propodeal OBL absent; mesopleuron dull, coarsely sculptured, but punctures much weaker than in *pectoralis*. First metasomal tergum polished, highly shining; 2nd and following terga shining, weakly transverse lineolate-reticulate, with acupunctures.

**Pilosity** Collar of pronotum clothed with fringe-like hairs dull white to slightly brownish behind, distinctly shorter than in *matsumurai*; hairs on apical margins of 2nd to 4th terga glistening white and obscurely fringe-like in some light; hairs on apical portion of abdomen fuscous.

**MALE**

Body length 6-6.5 mm.

**Relative dimensions** HL 64; HW 68; UFW 44; LFW 30; IAD 10; ASD 6.5; AOD 9; CAD 8; UCW 12; MCL 25; MCW 23; POW 11; COD 5.5; MSL 3.5; BWM 10; OD 6.5; IOD 12; OOD 10; OCD 8.5; SL 15.5; SW 9; PL 5; PW 6; 1FL 4.5; 1FW 6; 2FL 4.5; 2FW 6.5; 3FL 5.5; 3FW 6.5.

**Coloration** Black, with following maculations or portions yellow: well developed lateral face marks, marks on clypeus, anterior stripes on scapes, linear band on lateral portions of collar of pronotum, apices or apical halves of tubercles, spots on tegulae, anterior stripes on fore tibiae, basal small marks on mid tibiae, basal less than halves of hind tibiae, and hind basitarsi except apices; undersides of flagellum reddish brown.

**Structure** Clypeus less convex than in female; upper portion of supraclypeal area narrower than in female; scape short, distinctly narrower than in *pectoralis*. Collar of pronotum very thin, not concave in the middle; propodeal enclosure shining, very strongly transversely carinate (wrinkle-like); propodeal OBL absent. First tergum as in female; 2nd and following terga sparsely acupunctate.

**Pilosity** Hairs behind collar of pronotum as in female;



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hairs on body fuscous except those on genal areas, mesopleura and propodeum paler; hairs on legs brownish to whitish.

**Terminalia** See Fig. 50.

**Variation** Females: lateral face marks usually ending acutely at eye margins and ending slightly above the level of upper margins of antennal sockets, but sometimes ending not acutely; clypeus sometimes with a yellow spot on subapical portion; spots on tegulae occasionally absent; yellow band on collar of pronotum sometimes linear. Males: lateral face marks sometimes somewhat reduced; mark on clypeus variable in size; anterior stripes on scapes, band on collar of pronotum and spots on tegulae often absent; fore and mid basitarsi sometimes pale yellow; transverse carinae on anterior portion of propodeal enclosure sometimes irregular.

**Distribution** (\* indicates the new locality) Hokkaido, Honshu, Sadoga-shima\*, Shikoku\*, Kyushu, Tsushima and Yakushima\* (Fig. 51).

**Specimens examined** Besides 321 females and 313 males, the following specimens from new localities were examined:

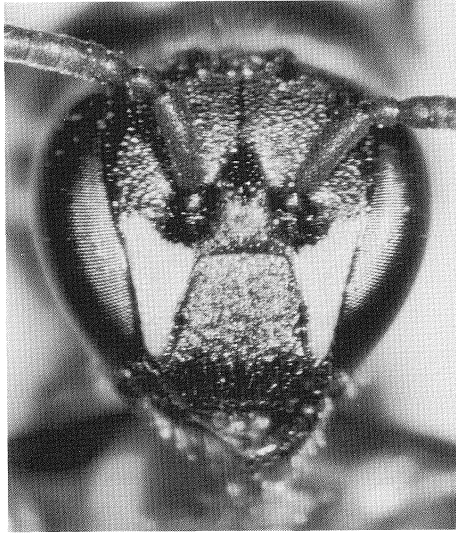
SD: 1♀ and 10♂♂, May 28, 1985 Umezu and Umanokubi, Ryotsu, 4♂♂, June 13, 1985 Ogura-tôge, Hatano, 1♀, Sep. 16, 1985 Suku-negi, 1♀, Oct. 2, 1985 Kanai, K. Baba. SK: 1♂, May 1, 1975 Ikeda, Tokushima Pref., O. Tadauchi; 1♂, May 14, 1976 1♂, June 3, 1976 Mt. Kuishi, Kochi Pref., S. Ikudome; 1♀, July 29, 1960 Kurosan, Kochi Pref., M. Miyatake; 1♀, Sep. 28, 1952 Omogo-kei, Ehime Pref., T. Yano. YK: 1♂, May 11, 1985 1♂, July 17, 1985 1♂, Sep. 16, 1985 Mt. Atago, Koseda, T. Yumoto.

**Flight records** HD: females, late May to mid-Oct.; males, late May to early Sep. HS: females, early May to mid-Oct.; males, late Apr. to late Sep. KS (including Tsushima): females, late May to mid-Oct.; males, early Apr. to early Oct. All records from SD, SK and YK were mentioned above.

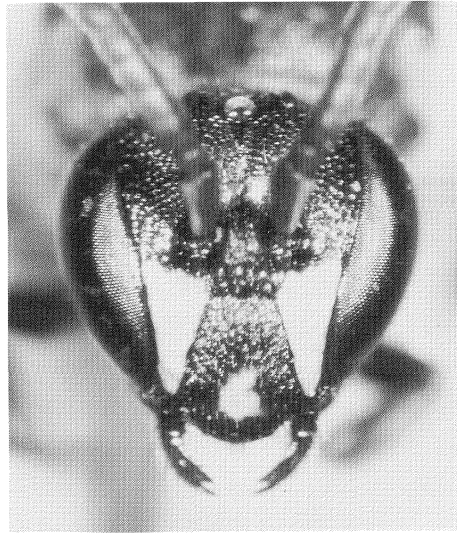
### Floral records

Aceraceae: *Acer aidzuense* (Franch.) Nakai, HD 0X.

Amaranthaceae: *Achyranthes fauriei* Lév. et Van., HS 0X, *A. japonica* (Miq.) Nakai, HS 0X, SD 0X.



A



B

Fig. 49. Heads of *Hylaeus (Nesoprosopis) nippon* Hirashima in frontal view. A, female; B, male.

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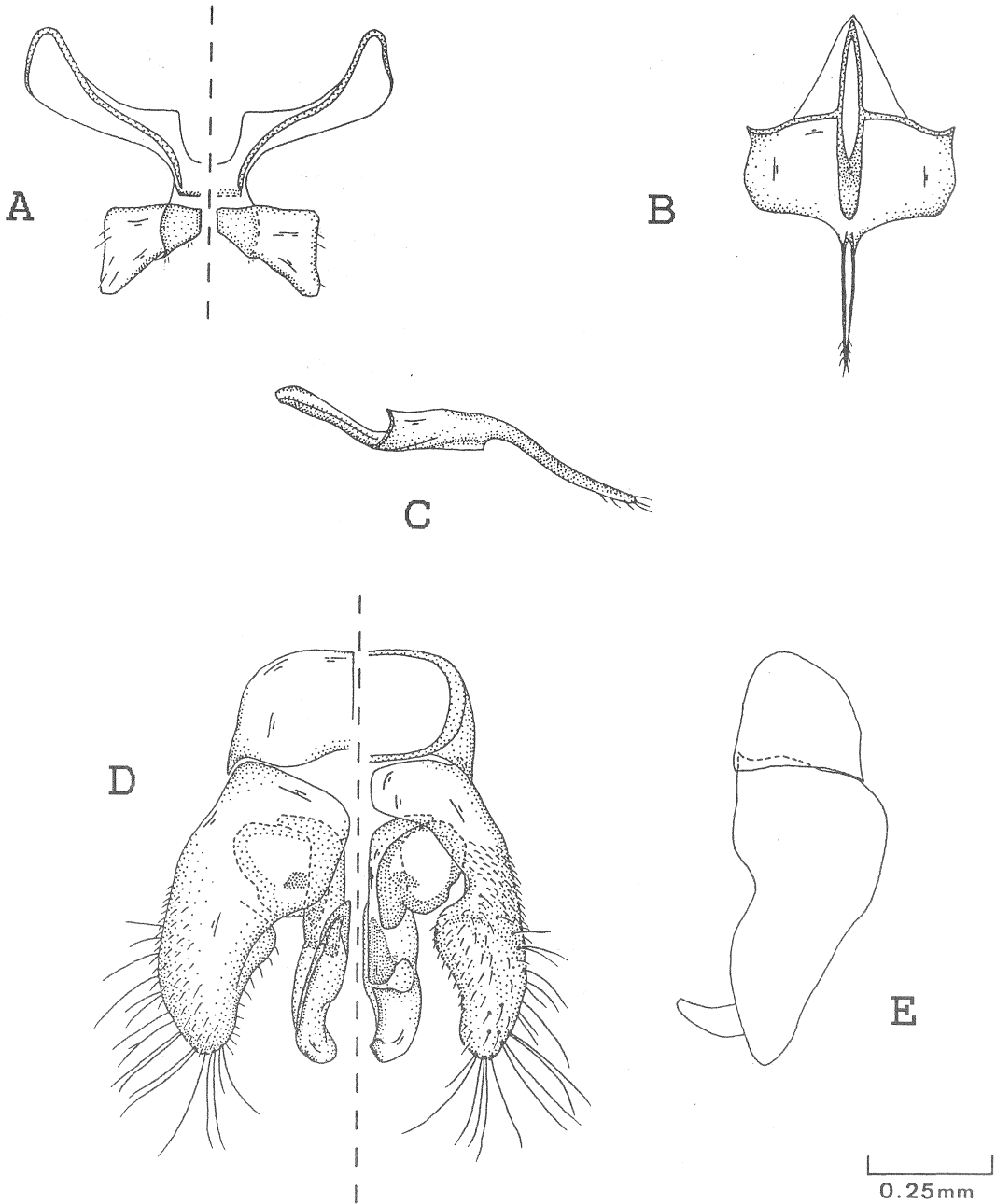


Fig. 50. Male terminalia of *Hylaeus (Nesoprosopis) nippon* Hirashima. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.



Fig. 51. A map showing the distribution of *Hylaeus (Nesoprosopis) nippon* Hirashima.

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Anacardiaceae: *Rhus javanica* Linn., HS X, SD X, KS OX.

Aquifoliaceae: *Ilex serrata* Thunb., HS OX.

Araliaceae: *Acanthopanax sieboldianus* Makino, HS OX, *A. spinosus* (Linn.) Miq., HS OX, SD OX; *Aralia cordata* Thunb., HD OX, HS X, *A. elata* (Miq.) Seemann, HS OX, SD OX, KS OX.

Bignoniaceae: *Catalpa ovata* G. Don, HS OX.

Caprifoliaceae: *Weigela coraeensis* Thunb., HS OX, *W. hortensis* (Sieb. et Zucc.) K. Koch, HS OX.

Caryophyllaceae: *Stellaria media* (Linn.) Villars, HS OX.

Celastraceae: *Euonymus fortunei* (Turcz.) Hand. -Mazz. var. *radicans* (Sieb. ex Miq.) Rehd., HS OX, *E. japonicus* Thunb., SD OX.

Compositae: *Achillea alpina* Linn., HD OX; *Aster ageratoides* Turcz. var. *ovatus* (Franch. et Savat.) HD OX, HS OX, *A. glehnii* Fr. Schm., HD OX; *Calendula arvensis* Linn., SD OX; *Chrysanthemum frutescens* Linn., HD OX, *C. leucanthemum* Linn., HS OX, SD OX; *Cirsium japonicum* DC., HS OX, *C. kamschaticum* Ledeb., HD OX; *Erigeron annuus* (Linn.) Pers. HD OX; *Ixeris dentata* (Thunb.) Nakai, HS OX, var. *albiflora* (Makino) Nakai, HS OX; *Kalimeris pinnatifida* (Maxim.) Kitam. HS OX; *Picris hieracioides* Linn. var. *glabrescens* (Regel) Ohwi, HD OX; *Solidago altissima* Linn., HD OX, HS OX, *S. virga-aurea* Linn., var. *asiatica* Nakai, HD OX.

Cornaceae: *Cornus controversa* Hemsley, HD OX; *Cynoxylon kousa* (Buerger) HD OX.

Crassulaceae: *Sedum erythrostictum* Miq., HD OX, *S. kamschaticum* Fischer, HS OX, SD OX.

Cruciferae: *Brassica campestris* Linn. subsp. *rapa* Hook., HD OX, var. *pekinensis* Makino, HS 5X, SD OX, SK OX; *Raphanus sativus* Linn. var. *acanthiformis* Makino, HS OX.

Fagaceae: *Castanea crenata* Sieb. et Zucc., HS OX, HD OX.

Geraniaceae: *Geranium thunbergii* Sieb. et Zucc., HS OX, SD OX.

Labiatae: *Leucosceptrum japonicum* (Miq.) Kitam. et Murata, HS OX; *Mentha arvensis* Linn. var. *piperascens* Malinvaud, TS OX; *Perilla frutescens* (Linn.) Britton var. *japonica* (Hassk.) Hara forma *viridis* (Makino) Makino, HS OX, SD OX.

Lauraceae: *Actinodaphne longifolia* (Blume) Nakai, YK OX.

Leguminosae: *Cytisus scoparius* Link, HS OX, SD OX;  
*Robinia pseudo-acacia* Linn., SD OX.

Liliaceae: *Allium fistulosum* Linn., HS OX, *A. tuberosum*  
Rottl., HS OX, SD OX.

Malvaceae: *Althaea rosea* Cav., HS OX.

Oleaceae: *Ligustrum japonicum* Thunb., KS OX, *L. obtusifolium* Sieb. et Zucc., HS OX.

Oxalidaceae: *Oxalis corniculata* Linn., HS OX.

Polygonaceae: *Fagopyrum esculentum* Moench, HS OX, KS OX;  
*Polygonum cuspidatum* Sieb. et Zucc., HS OX, KS OX, *P. japonicum* Meisn., HS OX, *P. sachalinense* Fr. Schm., HD OX, *P. senticosum* (Meisner) Franch. et Savat., HS OX.

Rhamnaceae: *Zizyphus jujuba* Mill. var. *inermis* (Bunge) Rehd., SD OX.

Rosaceae: *Aruncus dioicus* (Walt.) Fernald var. *tenuifolius* (Nakai) Hara, HD OX; *Rosa multiflora* Thunb., HS OX, *R. rugosa* Thunb., HS OX; *Rubus parvifolius* Linn., HS OX; *Spiraea cantoniensis* Lour., SK OX, *S. salicifolia* Linn., HD OX.

Rubiaceae: *Paederia scandens* (Lour.) Merrill var. *mairei* (Léveillé) Hara, HS OX.

Rutaceae: *Evodia meliaefolia* (Hance) Benth., HS OX;  
*Zanthoxylum ailanthoides* Sieb. et Zucc., YH OX.

Saxifragaceae: *Deuzia crenata* Sieb. et Zucc., HS OX, SD OX, SK OX.

Scrophulariaceae: *Veronicastrum sibiricum* (Linn.) Pennell, HS OX.

Simaroubaceae: *Ailanthus altissima* Swingle, HS OX.

Staphyleaceae: *Turpinia ternata* Nakai, YK OX.

Styracaceae: *Styrax japonica* Sieb. et Zucc., HS OX.

Theaceae: *Eurya japonica* Thunb., HS OX.

Umbelliferae: *Angelica anomala* Lallemand, HD OX, *A. edulis* Miyabe, HS OX, *A. pubescens* Maxim., HS OX, *A. ursica* (Rupr.) Maxim. HD OX; *Cicuta virosa* Linn., HD OX; *Daucus carota* Linn., HD OX, var. *sativa* DC., HS OX, KS OX; *Heracleum nipponicum* Kitag., HD OX, HS OX; *Oenanthe javanica* (Blume) DC., HD OX; *Ostericum sieboldii* (Miq.) Nakai, HS OX.

Valerianaceae: *Patrinia scabiosaefolia* Fisch., HS OX, *P.*

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*villosa* (Thunb.) Juss., HS 0X.

Vitaceae: *Ampelopsis brevipedunculata* (Maxim.) Trautv.,  
HD 0X, HS 0X.

(7) *Hylaeus (Nesoprosopis) insularum* Yasumatsu et Hirashima

[Jap. name: Shima-no-chibi-mukashi-hanabachi]

(Figs. 52-54)

*Hylaeus insularum* Yasumatsu et Hirashima, 1965, Kontyū, 33

(2): 247-251, female and male.

*Hylaeus (Nesoprosopis) insularum*: Hirashima, 1977, Esakia,  
10: 32-33, female and male.

**TYPE**

Holotype: male, July 29, 1963 Yuwan-dake, Amami-ohshima,  
Y. Hirashima, in KU. Paratopotypes: 13 females and 66 males,  
in KU; 6 females, in BPBM. Paratypes: 239 females and 35  
males, in KU; 35 females and 32 males, in BPBM; 5 females  
and 3 males, in EU; 6 females and 1 male, in HU; 9 females  
and 2 males, in SEKU.

**DIAGNOSIS**

The most interesting feature is that the preoccipital  
carina is sharp and distinctly keeled in both sexes. Further,  
apical portions of terga have distinct glistening fringes of  
white hairs in both sexes. This species is very easily sepa-  
rable from the other Japanese species by the features given  
in the key.

**FEMALE**

Body length 6.5-7 mm.

Relative dimensions HL 68; HW 76; UFW 50; LFW 35; IAD  
15; ASD 6; AOD 9.5; CAD 6; UCW 17.5; MCL 30.5; MCW 31; POW  
12.5; COD 7; MSL 3; BWM 10.4; OD 7; IOD 13.8; OOD 10.5; OCD  
9; SL 19; SW 6.3; PL 5.8; OW 6; 1FL 4.8; 1FW 5.5; 2FL 3.7;  
2FW 5.6; 3FL 4.8; 3FW 5.6.

**Coloration** Black, with following maculations or por-  
tions yellow: lateral face marks ending narrowly and rather  
acutely at eye margins beyond the level of upper margins of  
antennal sockets, a pair of large transverse marks on collar

of pronotum, large marks on tubercles, anterior halves of tegulae, and basal marks of all tibiae; undersides of flagellum brown; tegulae shiny brown posteriorly; wings subhyaline, stigma and veins brown.

**Structure** Clypeus distinctly arched in outline in profile; supraclypeal area well convex, broad below, narrow above, gently merging into frons, with a median sulcus distinct. Collar of pronotum considerably convex, rounded laterally; mesoscutum well convex, dull, densely nearly rugosopunctate, its punctures very small anteriorly; scutellum nearly flat, slightly more strongly punctate than in mesoscutum; propodeal enclosure well defined, extremely strongly coarsely wrinkled, becoming slightly weaker toward the apex; propodeal TRN and OBL absent; mesopleuron extremely densely coarsely punctate. First metasomal tergum highly polished, nearly impunctate; 2nd and following terga microscopically transversely lineolate-reticulate, with microscopical, sparse acupunctures.

**Pilosity** Collar of pronotum fringed with very short, white hairs; mesoscutum densely clothed with short, fine, appressed, brownish hairs; lateral portions of thorax with white hairs; 1st tergum with fringes of white hairs on latero-apical portions; apical hair band on 2nd to 4th terga obscure in the middle.

**MALE**

Body length 5.5-6.5 mm.

**Relative dimensions** HL 65; HW 70; UFW 46; LFW 29; IAD 11.5; ASD 6.2; AOD 8; CAD 8; UCW 26; MCL 28; MCW 26; POW 11.5; COD 6; MSL 3; BWM 10; OD 6.5; IOD 13; OOD 10; OCD 8.5; SL 15; SW 8.5; PL 4.8; PW 6; 1FL 3.5; 1FW 6.5; 2FL 4.5; 2FW 6.3; 3FL 6; 3FW 6.3.

**Coloration** Black, generally with yellow marks as in female, but face marks usually less developed than in female.

**Structure** Clypeus rugulose, slightly more coarsely sculptured than in female, upper portion flat, lower portion convex; supraclypeal area strongly convex, narrowed and slanting above, with sulcus weaker than in female. Collar of pronotum slightly rounded only laterally; propodeal enclo-



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sure well defined, strongly transversely carinate, very shining; propodeal TRN and OBL absent; mesopleuron densely nearly foveolate-punctate. First tergum nearly polished, shining, scattered with microscopical fine punctures, pre-apical portion transversely lineolate-reticulate; 2nd and following terga finely folliculate.

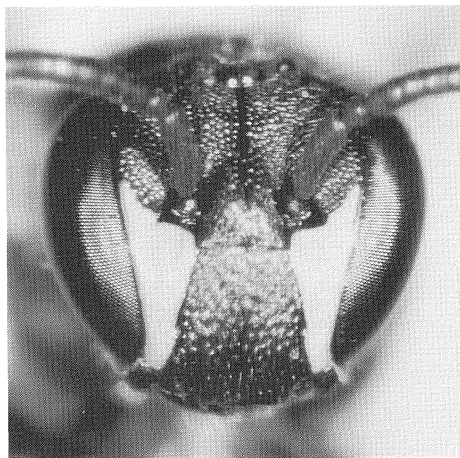
**Pilosity** Second and following terga densely clothed with short, fuscous hairs.

**Terminalia** See Fig. 53.

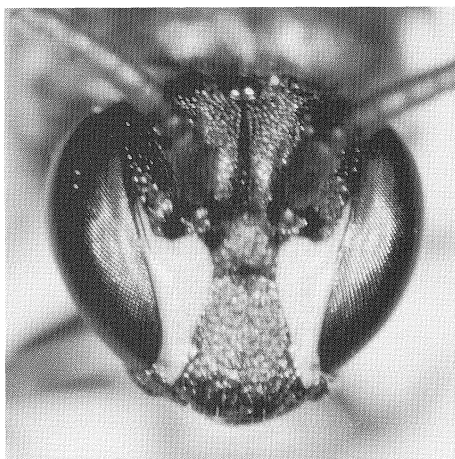
**Variation** Females: lateral face marks sometimes ending below the level of lower margins of antennal sockets and reduced at neighbouring area of anterior tentorial pits. Males: yellow spot on clypeus unusual; marks on pronotum sometimes reduced or rarely evanescent; wrinkles on propodeal enclosure rarely irregular (strongly pit-like).

**Distribution** (\* indicates the new locality) Honshu\*, Hachijo-jima, Shikoku, Kyushu, Okino-shima (Fukuoka Pref.), Shimo-koshiki-jima and Nansei-shotô (Uji-guntô\*, Ioh-jima\*, Kuro-shima\*, Tanega-shima\*, Yaku-shima, Kuchinoerabu-jima\*, Kuchino-shima\*, Nakano-shima\*, Suwanose-jima\*, Akuseki-jima\*, Takara-jima\*, Amami-ohshima, Kikai-jima\*, Kakeroma-jima\*, Tokuno-shima, Okinoerabu-jima, Yron-tô\*, Okinawa-jima and Miyako-jima\*) (Fig. 54).

**Specimens examined** Specimens examined are 852 females and 602 males. The specimens from new localities to be emphasized among them are as follows: HS: 1♀, May 27, 1973 Ohno, Fukui Pref., T. Tano; 1♀, July 14, 1967 Terai, Ishikawa Pref., T. Tano. NS: 6♀♀ and 4♂♂, Oct. 6-9, 1981 Iye-jima, Uji-guntô, Sk. Yamane; 18♂♂, June 1-3, 1982 Ioh-jima, Sk. Yamane; 8♂♂, Aug. 3-5, 1983 Kuro-shima, K. Tomiyama; 2♀♀, July 25, 1984 Iketo, Tanega-shima, K. Watahiki; 1♀, May 16-17, 1982 Kuchinoerabu-jima, Sk. Yamane; 2♀♀ and 1♂, July 28, 1981 Kuchino-shima, K. Tomiyama; 15♀♀ and 18♂♂, June 25, 1973 Nakano-shima, H. Makiyama; 11♀♀ and 7♂♂, July 30, 1985 Suwanose-jima, S. Ikudome; 38♀♀ and 142♂♂, Aug. 2, 1985 Akuseki-jima, S. Ikudome; 87♀♀ and 30♂♂, July 30, 1986 Takara-jima, S. Ikudome; 6♀♀ and 12♂♂, Oct. 18-19, 1987 Kikai-jima, S. Ikudome; 1♀, Sep. 23, 1984



A



B

Fig. 52. Heads of *Hylaeus (Nesoprosopis) insularum* Yasu-  
matsu et Hirashima in frontal view. A, female; B, male.

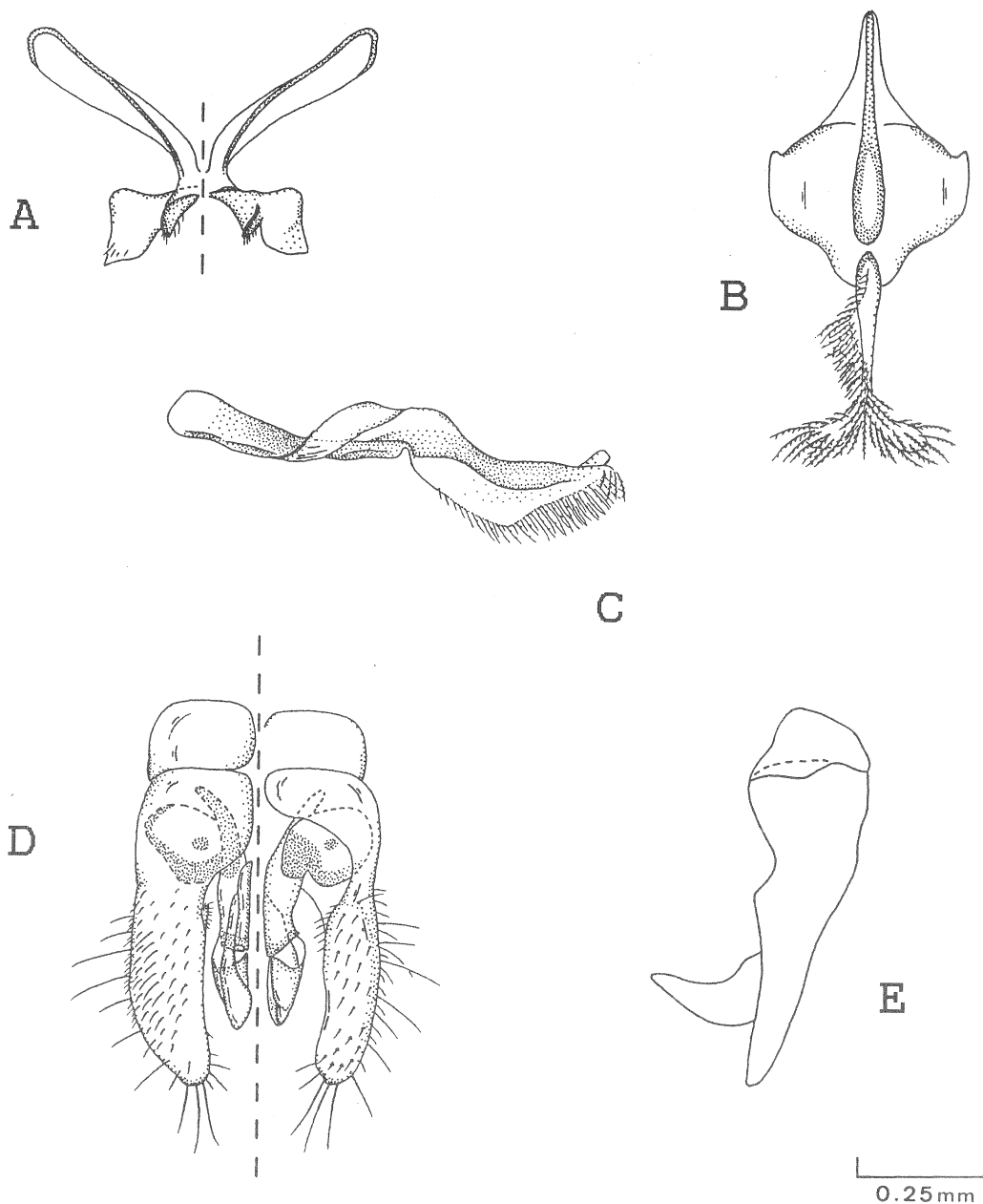


Fig. 53. Male terminalia of *Hylaeus (Nesoprosopis) insularum* Yasumatsu et Hirashima. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.

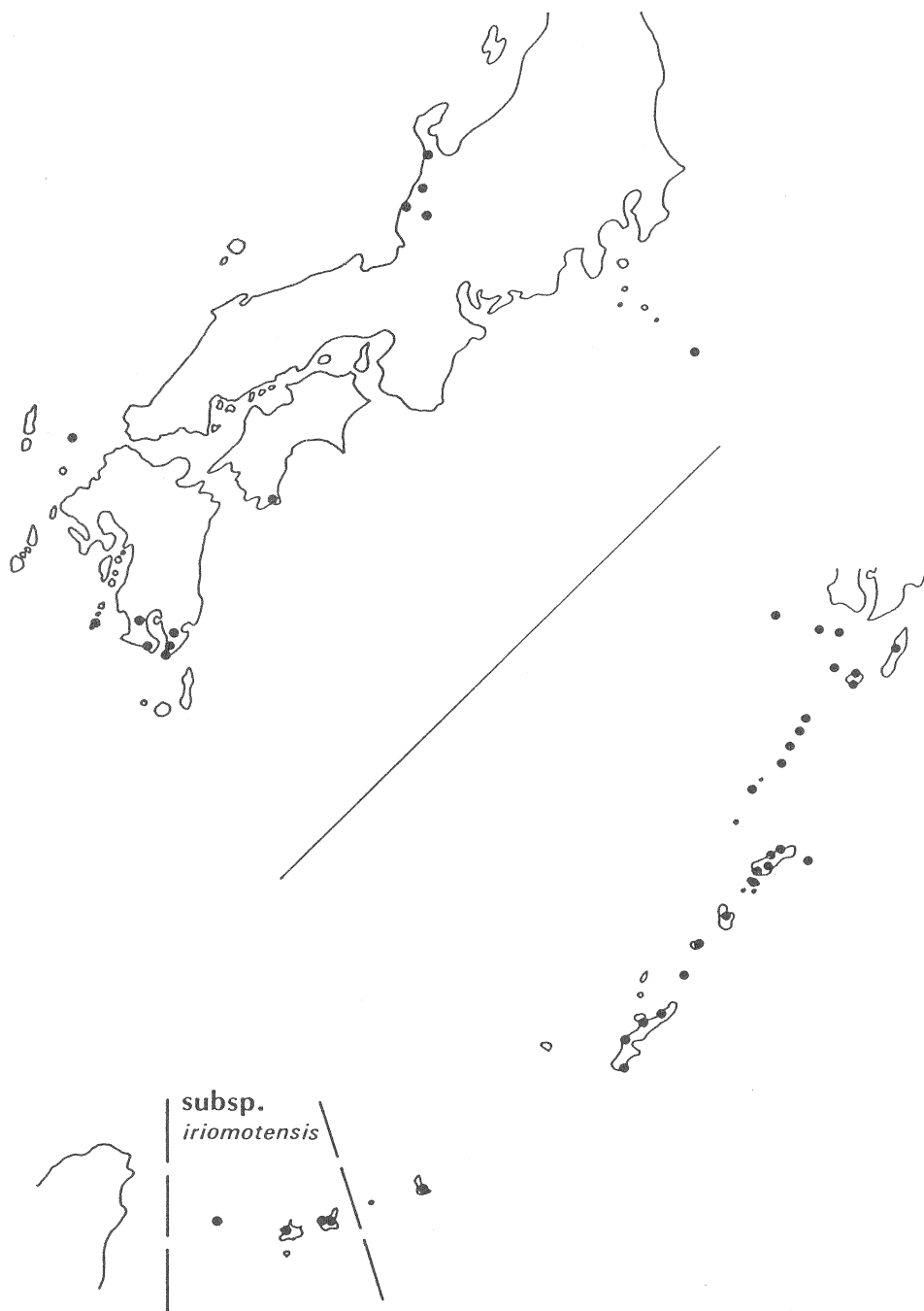


Fig. 54. A map showing the distribution of *Hylaeus (Nesoprosopis) insularum* Yasumatsu et Hirashima and subsp. *iriomotensis* Yasumatsu et Hirashima.

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Kakeroma-jima, A. Nagatomi; 11♀♀ and 12♂♂, Aug.5-6,1972  
Yoron-tô, T. Nambu; 1♀, July 6,1977 Miyako-jima, H. Makihara.  
Flight records HS: all records were indicated above.  
Hachijo-lima, Shikoku, Kyushu, Okino-shima and Shimo-koshi-  
ki-jima: females, late May to late Oct.; males, mid-May to  
mid-Oct. NS: females, early Apr. to late Oct.; males, late  
Mar. to late Oct.

Floral records

Araliaceae: *Acanthopanax sieboldianus* Makino, NS X;  
*Aralia elata* (Miq.) Seemann, NS 0X.

Caprifoliaceae: *Sambucus chinensis* Lindl., NS 3X.

Compositae: *Artemisia princeps* Pampan, NS 0X; *Crepidia-  
strum lanceolatum* (Houtt.) Nakai, NS 3X; *Erigeron sumatren-  
sis* Petz., NS X; *Sonchus oleraceus* Linn., NS 0X; *Youngia  
denticulata* (Houtt.) Kitam., NS 0X.

Euphorbiaceae: *Mallotus japonicus* (Thunb.) Muell. Arg.,  
KS 4X, NS 9X.

Fagaceae: *Pasania edulis* Makino, KS 0X.

Labiatae: *Mosla japonica* (Benth.) Maxim. var. *thymolifera*  
(Makino) Kitam., NS 6X.

Leguminosae: *Cassia nomame* (Sieb.) Honda, NS 0X; *Maackia  
tashiroi* (Yatabe) Makino, NS 0X; *Melilotus suaveolens* Ledeb.,  
NS 4X.

Myrsinaceae: *Ardisia sieboldii* Miq., NS 4X.

Pittosporaceae: *Pittosporum tobira* (Thunb.) Ait., NS 0X.

Polygonaceae: *Polygonum chinense* Linn. var. *thunbergianum*  
Meisn., NS 0X, *P. cuspidatum* Sieb. et Zucc., NS 14X.

Rosaceae: *pyracantha angustifolia* Schneid., NS 0X;  
*Phaphiolepis umbellata* (Thunb.) Makino, NS 0X.

Rubiaceae: *Paederia scandens* (Lour.) Merrill var. *mairai*  
(Léveillé) Hara, NS 0X; *Psychotria serpens* Linn., NS 0X.

Rutaceae: *Zanthoxylum ailanthoides* Sieb. et Zucc., KS 0X,  
NS 18X, *Z. schinifolium* Sieb. et Zucc., NS X.

Sterculiaceae: *Firmiana simplex* (Linn.) W. F. Wight, NS  
0X.

Umbelliferae: *Angelica japonica* A. Gray, NS 2X; *Daucus  
carota* Linn. var. *sativa* DC., KS 0X; *Glehnia littoralis* Fr.  
Schm., KS 0X.

Verbenaceae: *Vitex rotundifolia* Linn., KS 0X, *V. trifolia* Linn., NS X.

Vitidaceae: *Ampelopsis brevipedunculata* (Maxim.) Trautv., NS 13X.

Subsp. *iriomotensis* Yasumatsu et Hirashima  
[Jap. name: Iriomote-chibi-mukashi-hanabachi]  
(Fig. 54)

*Hylaeus insularum iriomotensis* Yasumatsu et Hirashima, 1965,  
Kontyû, 33(2): 251, female.

**TYPE**

Holotype: female, Mar. 10, 1964 Sonai, Iriomote-jima, T. Shirôzu, in KU. Paratypes: 2 females, in KU; 3 females in BPBM.

**DIAGNOSIS**

This subspecies differs from the nominate subspecies in the body coloration, the structures of the collar of pronotum and the mesopleuron, the pilosity of the mesoscutum and the metasoma, and the length of the 2nd flagellar segment.

The male is described here for the first time.

**FEMALE**

Body coloration paler, nearly ivory white; face marks more extending above in a narrow line; collar of pronotum thinner, less broadly convex laterally; mesopleuron more coarsely sculptured with larger punctures; metasoma with gray hairs on apical terga.

**MALE**

Generally as in female, but hairs on mesoscutum and metasoma evidently longer, conspicuously on mesoscutum.

**Distribution** Yayeyama-shotô (Iriomote-jima, Ishigaki-jima and Yonaguni-jima, the two latter are new localities) (Fig. 54). Yasumatsu and Hirashima (1965) treated the population of Ishigaki-jima as the type species, but it seems to be recognized as the subspecies.

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**Specimens examined** Specimens examined are 51 females and 31 males, and materials from new localities among them are as follows: **Ishigaki-jima**: 1♂, June 20, 1986 Banna-dake, 4♀♀, Nagura, S. Ikudome; 3♀♀, July 27, 1984 Omoto-dake, 1♀, July 28, 1984 Nosoko, 2♀♀, July 30, 1984 Hirakubo, T. Nozaka; 1♀, Apr. 5, 1968 Takeda, T. Kunou; 1♂, July 30, 1971 Omoto-dake, H. Yamada; 2♂♂, Sep. 3, 1971 Omoto-dake, S. Yamauchi. **Yonaguni-jima**: 9♀♀ and 1♂, July 23, 1984 Urabu-dake, 2♀♀ and 4♂♂, July 24, 1984 1♂, July 25, 1984 Hikawa, C. Nozaka.

**Flight records** **Yayeyama-shotō**: females, late Mar. to late Aug.; males, mid-Apr. to early Sep.

### Floral records

Euphorbiaceae: *Mallotus japonicus* (Thunb.) Muell. Arg., 3X.

Verbenaceae: *Callicarpa japonica* Thunb. var. *luxurians* Rehd., 0X.

Vitidaceae: *Ampelopsis brevipedunculata* (Maxim.) Trautv., 0X.

### (8) *Hylaeus (Nesoprosopis) matsumurai* Bridwell

[Jap. name: Matsumura-chibi-mukashi-hanabachi]

(Figs. 55-57)

*Hylaeus matsumurai* Bridwell, 1919, Proc. Hawaii. Ent. Soc., 4(1): 153, female.

*Hylaeus (Nesoprosopis) matsumurai*: Hirashima, 1977, Esakia, 10: 33-35, female and male.

### TYPE

According to Bridwell (1919), types and paratypes: 7 females, Sep. 1913 Karuizawa, 3 females, June 1913 Okitsu, in BC and the collection of the Hawaiian Sugar Planter's Association. Present, paratypes: 3 females, Sep. 1913 Karuizawa, F. Muir., in USNM, No. 50733 (all with the label of Bridwell Collection). Nonlabel for type: 1 female, June 1913 Okitsu, F. Muir., in USNM (with the label of Bridwell Collection).

### DIAGNOSIS

Characteristics are that the upper portion of supraclype-

al area is not abrupt (different from *H. nippon*), that the paraocular keels are distinct (very strong in the male), that the collar of pronotum is thin, often entirely black, and has a distinct fringe of short white hairs on the posterior margin, that the mesoscutum is clothed with whitish hairs, and that the propodeal enclosure is strongly wrinkled or carinate (even on the apical portion).

**FEMALE**

Body length 6-7 mm.

**Relative dimensions** HL 69; HW 77; UFW 52.5; LFW 36; IAD 14; ASD 6; AOD 11; CAD 6.5; UCW 18; MCL 30; MCW 31; POW 12.5; COD 6; MSL 2.5; BWM 11; OD 7; IOD 14; OOD 12.5; OCD 10; SL 20; SW 6.5; PL 5.5; PW 5.5; 1FL 5; 1FW 5.5; 2FL 3; 2FW 5.5; 3FL 4; 3FW 6.

**Coloration** Black, with following maculations or portions yellow: lateral face marks always filling paraocular areas and ending acutely along eye margins at the level of antennal sockets, a pair of evanescent marks on collar of pronotum, tubercles, anterior marks on tegulae, and basal marks on all tibiae; wings subhyaline, veins and stigma brown.

**Structure** Clypeus well convex, minutely lineolate-reticulate, more or less coarsely wrinkled-punctate especially on lower portion; supraclypeal area well convex, largely triangular as seen in front, upper portion with distinct median sulcus, its height gently reduced toward above; occiput strongly slanting. Collar of pronotum slightly thickened only laterally; mesoscutum weakly shining, very densely finely punctate, microscopically lineolate-reticulate; scutellum flat, coarsely punctate; propodeal enclosure well convex; propodeal TRN not especially indicated, OBL absent; mesopleuron coarse. First metasomal tergum highly polished, shining; 2nd and succeeding terga shining, very weakly transversely lineolate-reticulate, with sparse acupunctures.

**Pilosity** Hairs on apical margins of metasomal terga fringe-like, glistening in some light; hairs on apical meta-



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soma fuscous.

### MALE

Body length 5.5-6.5 mm.

**Relative dimensions** HL 66; HW 73; UFW 49; LFW 31; IAD 10; ASD 7; AOD 10; CAD 9.5; UCW 12; MCL 28; MCW 27.5; POW 12.5; COD 5.5; MSL 3; BWM 10; OD 6; IOD 14.5; OOD 12; OCD 9.5; SL 17; SW 11; PL 5; PW 6; 1FL 4.5; 1FW 6.5; 2FL 4.5; 2FW 6.5; 3FL 6; 3FW 6.

**Coloration** Black, with following maculations or portions yellow or pale yellow: clypeus, supraclypeal area, well developed lateral face marks extending beyond antennal sockets and ending acutely along eye margins, anterior stripes on scapes, tubercles, anterior marks on tegulae, and rich marks on legs; small segments of tarsi yellowish brown; flagellum reddish brown.

**Structure** clypeus weakly convex (nearly flat); supra-clypeal area as in female, but weakly convex, lower portion broadly flat. Collar of pronotum less developed than in female; propodeal enclosure very strongly wrinkled; propodeal OBL distinct; punctures on mesopleuron very strong, dense, larger than those in female. Metasomal terga generally as in female, but 1st tergum scattered rather fine acupunctures.

**Pilosity** More or less as in female.

**Terminalia** See Fig. 56.

**Variation** Females: a pair of evanescent marks on collar of pronotum sometimes absent. Males: not especially.

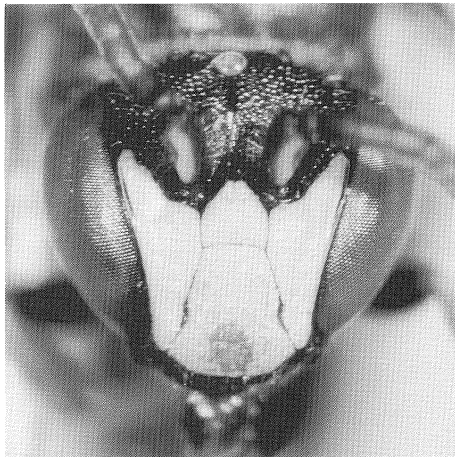
**Distribution** Hokkaido (new record), Honshu, Kyushu, Tsushima, and Amakusa (new record) (Fig. 57).

**Specimens examined** Specimens examined are 161 females and 102 males, and the materials from new localities to be emphasized among them are as follows: **HD**: 1♀, June 20, 1967 Hamakoshimizu, Sh. F. Sakagami; 1♀, July 31, 1967 Shiranuka, T. Saigusa; 1♀, Aug. 4, 1975 Hamakoshimizu, H. Fukuda. **Amakusa**: 1♀, June 16, 1931 Tomioka - Shiki, Esaki and Hori.

**Flight records** **HD**: all records are indicated above. **HS**: females, mid-May to early Oct.; males, early May to late Sep. **Southern Japan**: females, late May to early Oct.; males,



A



B

Fig. 55. Heads of *Hylaeus (Nesoprosopis) matsumurai* Bridwell in frontal view. A, female; B, male.

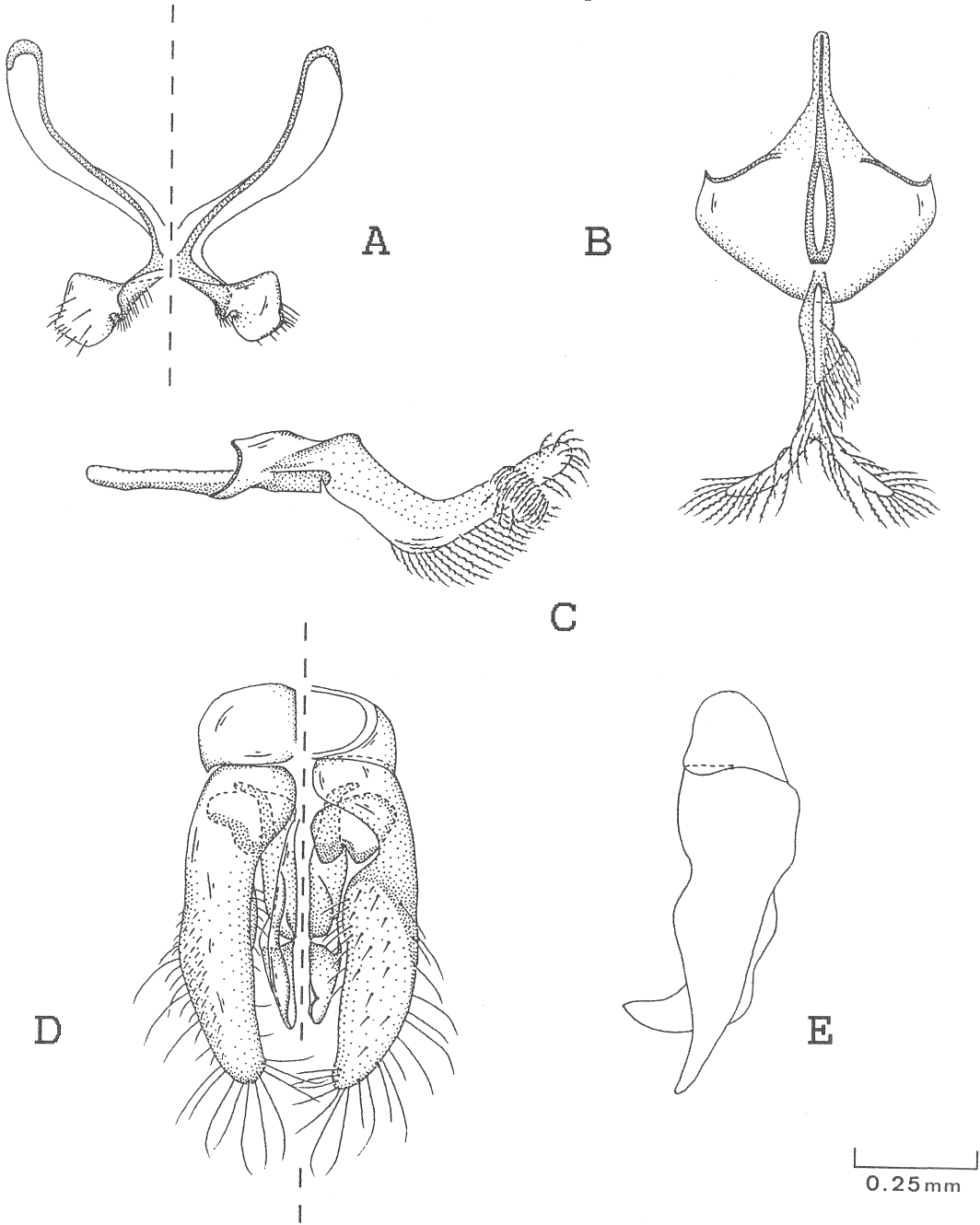


Fig. 56. Male terminalia of *Hylaeus (Nesoprosopis) matsumurai* Bridwell. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.



Fig. 57. A map showing the distribution of *Hylaeus (Nesoprosopis) matsumurai* Bridwell.

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mid-May to late Oct.

Floral records

Anacardiaceae: *Rhus javanica* Linn., KS OX, *R. succedanea* Linn., KS OX.

Araliaceae: *Aralia cordata* Thunb., HS OX.

Buxaceae: *Buxus microphylla* Sieb. et Zucc. var. *japonica* (Muell. Arg.) Rehd. et Wils., KS OX.

Compositae: *Erigeron annuus* (Linn.) Pers., HS OX, KS OX; *Taraxacum hondoensis* Nakai, HD OX.

Crassulaceae: *Sedum kantschaticum* Fischer, HS OX.

Cruciferae: *Brassica campestris* Linn. var. *pekinensis* Makino, HS OX.

Oleaceae: *Ligustrum japonicum* Thunb., KS OX.

Polygonaceae: *Fagopyrum esculentum* Moench, TS OX.

Rosaceae: *Potentilla fragarioides* Linn. var. *major* Maxim., KS OX; *Rosa multiflora* Thunb., HS OX, *R. rugosa* Thunb., HD OX, *R. wichuraiana* Crép., KS OX.

Rubiaceae: *Paederia scandens* (Lour.) Merrill var. *mairei* (Léveillé) Hara, HS OX.

Umbelliferae: *Daucus carota* Linn. var. *sativa* DC., KS X.

Vitidaceae: *Ampelopsis brevipedunculata* (Maxim.) Trautv., KS OX.

(9) *Hylaeus (Nesoprosopis) noomen* Hirashima

[Jap. name: Noumen-chibi-mukashi-hanabachi]

(Figs. 58-60)

*Hylaeus (Nesoprosopis) noomen* Hirashima, 1977, Esakia, 10: 35-38, female and male.

TYPE

Holotype: female, July 14, 1967 Terai, Ishikawa Pref., T. Tano, in KU, No. 2063. Paratopotypes: 7 females and 2 males, in KU. Paratypes: 11 males, in KU.

DIAGNOSIS

*H. noomen* and *H. matsumurai* resemble each other in the female, but the former is separated from the latter by the following characters and other characters given in the key:

Shuichi Ikudome

supraclypeal area slightly narrower, upper portion slightly constricted; clypeocular distance and malar space evidently longer. The male is notably characterized by having the broadly developed lateral face marks which are ivory and end squarely at the level of about halves of the distance between antennal sockets and mid ocelli, and by having long malar spaces.

**FEMALE**

Body length 6-7 mm.

**Relative dimensions** HL 69; HW 78; UFW 53; LFW 38; IAD 11.5; ASD 7; AOD 13; CAD 7; UCW 16; MCL 31; MCW 31; POW 15; COD 7.5; MSL 4.2; BWM 12; OD 6.5; IOD 13.5; OOD 13.5; OCD 9; SL 20.5; SW 7; PL 6; PW 6; 1FL 6; 1FW 6.5; 2FL 4.5; 2FW 6.5; 3FL 5.5; 3FW 6.5.

**Coloration** Black, with following maculations or portions yellow or ivory yellow: well developed lateral face marks, band interrupted in the middle on collar of pronotum, tubercles, anterior marks on tegulae, anterior stripes on fore tibiae, basal marks on mid tibiae, and basal halves of hind tibiae; undersides of flagellum and small segments of tarsi dark reddish brown; wings as in *matsumurai*.

**Structure** Clypeus slightly more distinctly wrinkled-punctate than in *matsumurai*.

**Pilosity** Fringes of white hairs on latero-apical portions of metasomal terga distinct, nearly as in *insularum*; hairs on 5th tergum and sternum fuscous (primarily white in *matsumurai*).

**MALE**

Body length 5.5-6.5 mm.

**Relative dimensions** HL 69; HW 72; UFW 49; LFW 34; IAD 7; ASD 6; AOD 12.5; CAD 11; UCW 10.5; MCL 28.5; MCW 28; POW 13.5; COD 7; MSL 4.5; BWM 10; OD 7; IOD 12.5; OOD 13; OCD 9; SL 18.5; SW 11.5; PL 5.5; PW 6; 1FL 4.5; 1FW 7; 2FL 4.5; 2FW 7; 3FL 6; 3FW 6.5.

**Coloration** Black, with following maculations or portions pale yellow or ivory: stripes on mandibles, supraclypeal area, anterior face of scapes, band interrupted in the middle on collar of pronotum, tubercles, anterior halves

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of tegulae, and rich marks on tibiae and tarsi.

**Structure** Face broadly nearly flat in profile; spaces on frons along frontal median line (which is weakly indicated) longitudinally impunctate, shining. Punctures on mesoscutum slightly stronger than those in female. First tergum well shining, sparsely and finely punctate especially on lateral portions.

**Pilosity** Apical fringes of short white hairs on basal four terga distinct especially in fresh specimens.

**Terminalia** See Fig. 59.

**Variation** Females: fringes on terga often disappear. Males: stripes on mandibles sometimes obscure; band on collar of pronotum sometimes not interrupted in the middle.

**Distribution** Hokkaido, Honshu, Hachijo-jima, Shikoku (new record), Kyushu (new record) and Koshiki-jima (Fig. 60).

**Specimens examined** Specimens examined are 41 females and 39 males, and the materials from new localities among them are as follows: SK: 1♂, Aug.8,1972 Muroto, Kochi Pref., T. Tano. KS: 1♂, July 18,1979 Sata, Kagoshima Pref., 1♂, Aug.3, 1978 Higashi-kushira, Kagoshima Pref., 1♂, Aug.12,1953 Aoshima, Miyazaki Pref., H. Nagase.

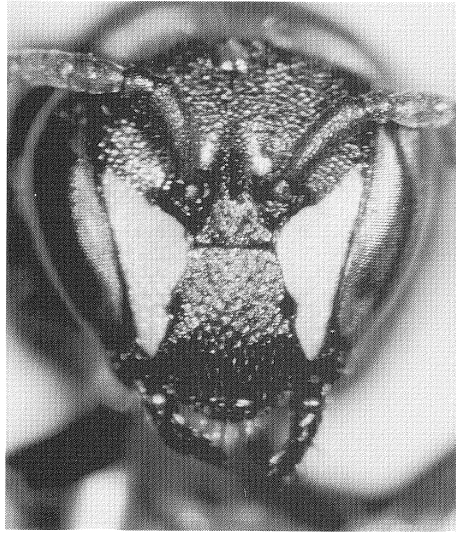
**Flight records** HD: females, mid-June to mid-Sep.; males, mid-June to early Aug. Hachijo-jima: females, late June to mid-Aug.; males, early June. SK and KS: all records are indicated above. Koshiki-jima: 6 males, Aug.23-25.

### Floral records

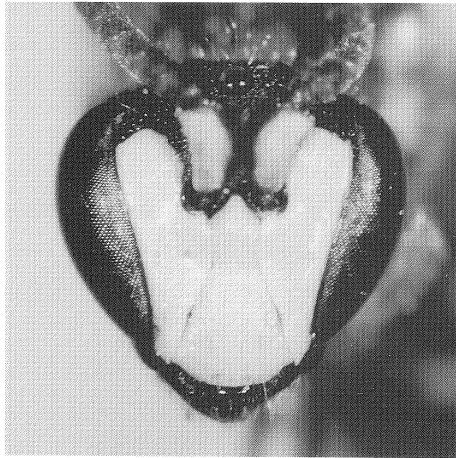
Compositae: *Anaphalis margaritacea* (Linn.) Benth. et Hook. var. *angustior* (Miq.) Nakai, HD 0X; *Picris hieracioides* Linn. var. *glabrescens* (Regel) Ohwi, HD 0X; *Solidago virga-aurea* Linn. var. *leiocarpa* (Benth.) Miq., HD 0X; *Taraxacum hondoensis* Nakai, HD 0X.

Rosaceae: *Rosa rugosa* Thunb., HD 0X.

Umbelliferae: *Angelica ursica* (Rupr.) Maxim., HD 0X; *Coelopleurum lucidum* (Linn.) Fern. var. *gmelinii* (DC.) Hara, HD 0X; *Glehnia littoralis* Fr. Schm., HD 0X, HS 0X, KS 0X.



A



B

Fig. 58. Heads of *Hylaeus (Nesoprosopis) noomen* Hirashima in frontal view. A, female; B, male.



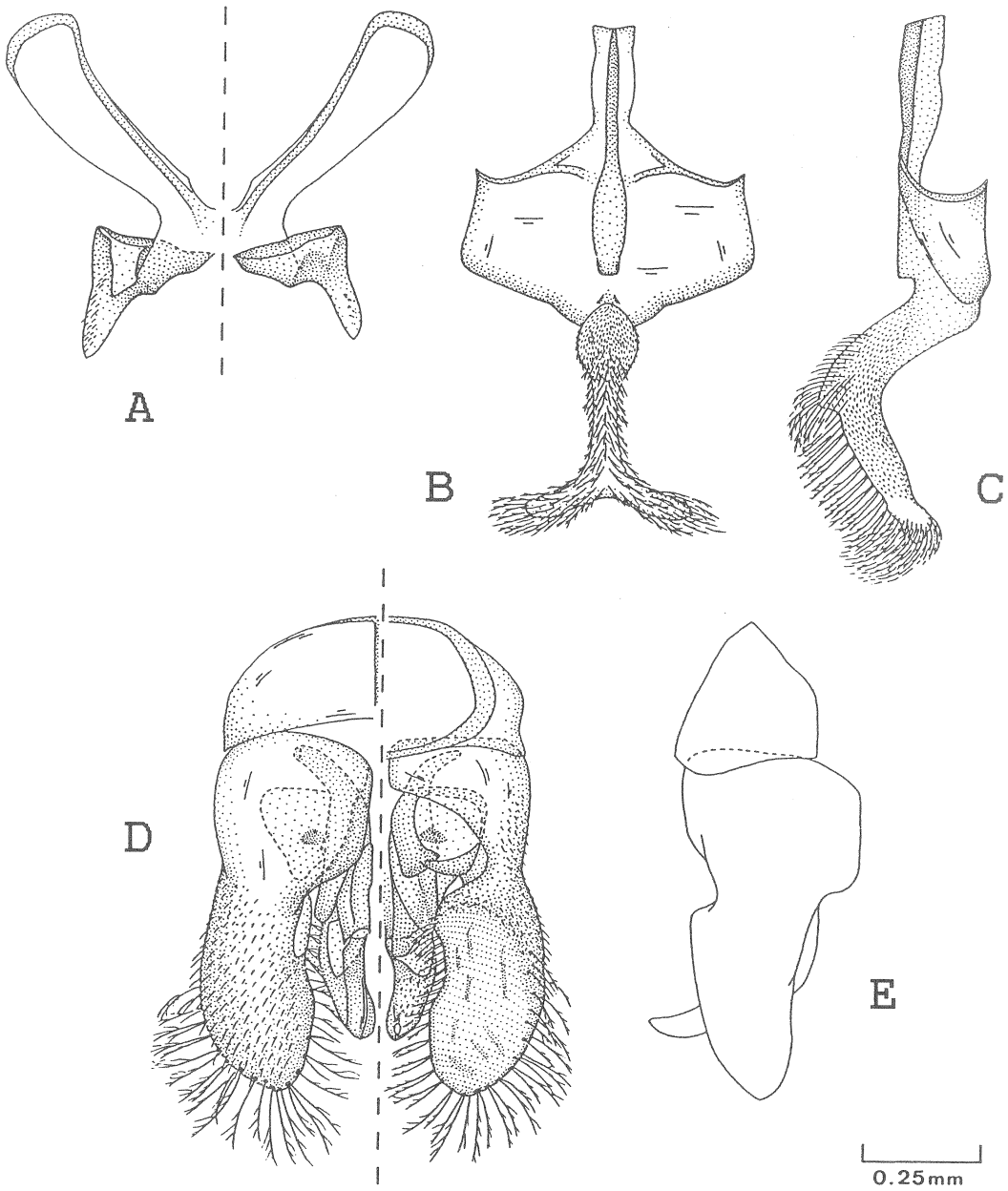


Fig. 59. Male terminalia of *Hylaeus (Nesoprosopis) noomen* Hirashima. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.

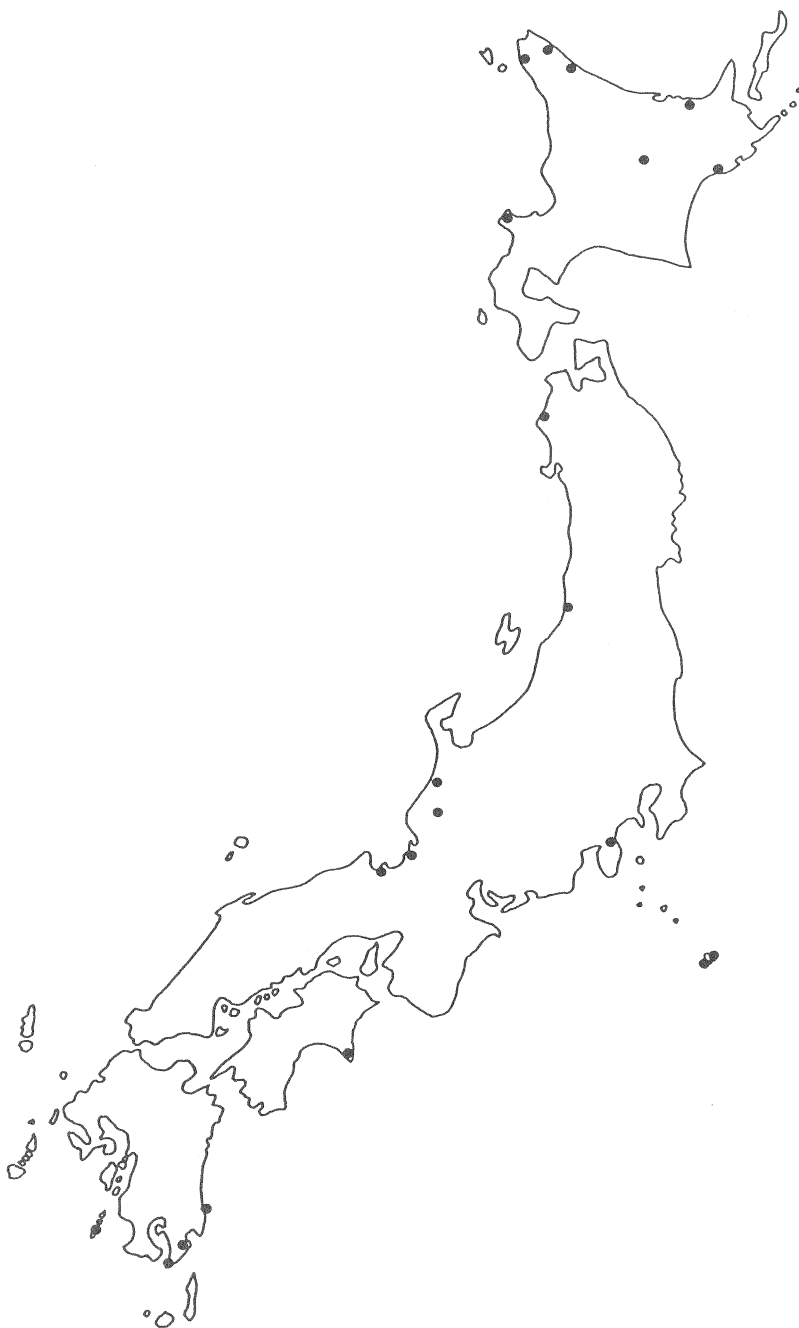


Fig. 60. A map showing the distribution of *Hylaeus (Nesoprosopis) noomen* Hirashima.

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(10) *Hylaeus (Nesoprosopis) floralis* (Smith)

[Jap. name: Sumisu-chibi-mukashi-hanabachi]

(Figs. 61-63)

*Prosopis floralis* Smith, 1873, Trans. Ent. Soc. Lond., 1873: 199, female and male.

*Hylaeus gnathylaeoides* Bridwell, 1919, Proc. Hawaii. Ent. Soc., 4(1): 152-153, female (not male); Hirashima, 1977, Esakia, 10: 38.

*Hylaeus floralis*: Meade-Waldo, 1923, Gen. Ins., 181: 23.

*Hylaeus (Nesoprosopis) floralis*: Hirashima, 1977, Esakia, 10: 38-41, female and male.

**TYPE**

Holotype: female, Hiogo, Japan, G. Lewis, in BM, No. HYM. 17.a.10.

Types of *gnathylaeoides*: Holotype: female, Sep. 1913 Karuizawa, Japan, F. Muir., in BC. Allotype: male, merely labeled Japan, F. Muir., in BC. Paratypes: 1 female and 1 male, in BC. Present, types, in USNM, No. 50730.

**DIAGNOSIS**

This species is very closely allied to *H. globula*, so that it is necessary for these two species to be carefully observed. But Hirashima (1977) clearly described the difference as follows. In this species, the mesopleuron is rather coarsely sculptured with very close punctures (although small) on the densely reticulate surface in the female, and coarsely sculptured with strong punctures in the male. In *H. globula* the mesopleuron is rather smooth and weakly shining, with small punctures in both sexes. The supraclypeal area is also delicately different. In the females, it is constricted in the middle and the upper portion distinctly dilated laterally with sharp edges in *H. globula*, but it is only slightly constricted, if ever, in the middle and the upper portion is not very abrupt in *H. floralis*.

Further, the female of this species is characterized by its more or less large sized body, its more or less rich yellow marks on face, pronotum, tubercles, tegulae and legs, its finely and densely punctured mesoscutum, and its apical

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pale brownish subtransparent margins of terga (especially in the middle). In the male of this species, the colored portions of paraocular areas are slightly concave longitudinally, and paraocular keels are more or less distinct.

**FEMALE**

Body length 6-6.5 mm.

**Relative dimensions** HL 64; HW 68; UFW 46; LFW 32; IAD 12; ASD 5.5; AOD 9; CAD 6; UCW 15; MCL 28; MCW 28; POW 11; COD 5.5; MSL 2.5; BWM 10.5; OD 5.5; IOD 12; OOD 10.5; OCD 9; SL 18; SW 5.7; PL 5.5; PW 5; 1FL 4.5; 1FW 5; 2FL 3; 2FW 5.5; 3FL 4.2; 3FW 5.5.

**Coloration** Black, with following maculations or portions yellow: well developed lateral face marks, mark on clypeus variable in shape, mark on supraclypeal area, band (interrupted in the middle) on collar of pronotum, tubercles, anterior marks on tegulae, front except apices of fore tibiae, basal marks on mid tibiae, and basal halves of hind tibiae; undersides of flagellum except basal segments brownish or more paler.

**Structure** Lateral portions of collar of pronotum slightly thickened, convex, rounded; mesoscutum well convex in lateral view; scutellum nearly flat, more strongly punctate than on mesoscutum; propodeal enclosure with irregular (but primarily longitudinal) wrinkles only on basal portion, posterior portion somewhat shining, well roundish, only microscopically lineolate-reticulate; propodeal TRN and OBL absent. First metasomal tergum polished; 2nd and following terga very weakly transversely lineolate-reticulate, with very fine acupunctures.

**Pilosity** Mesoscutum clothed with short, appressed, brownish hairs; hairs on latero-apical portions of 1st tergum fringe-like in some light; hairs on apical segments of metasoma primarily fuscous.

**MALE**

Body length 5.5-6 mm.

**Relative dimensions** HL 58; HW 61; UFW 41; LFW 26; IAD 10; ASD 5.3; AOD 8; CAD 7.5; UCW 10.5; MCL 24; MCW 24; POW 10; COD 4.5; MSL 2.5; BWM 9; OD 6; IOD 11; OOD 10; OCD 7.5;

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SL 14; SW 8; PL 4.5; PW 5.5; 1FL 3.7; 1FW 6; 2FL 3.3; 2FW 5.7; 3FL 5.2; 3FW 5.7.

**Coloration** Black, with following maculations or portions pale yellow: well developed lateral face marks, clypeus except lateral portions, lower half of supraclypeal area, anterior stripes on scapes, linear marks on lateral portions of collar of pronotum, apical halves of tubercles, spots on tegulae, and fore tibiae except apices; small segments of tarsi in addition to apices of basitarsi yellowish brown; undersides of flagellum yellowish brown or dark reddish brown.

**Structure** Punctures on scutellum much coarser than those on mesoscutum (more pronounced than in female); punctures on mesopleuron distinctly larger than those in female.

**Pilosity** Generally as in female.

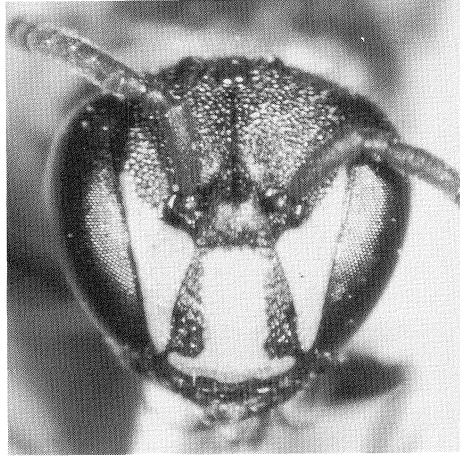
**Terminalia** See Fig. 62.

**Variation** Females: lateral face marks extending beyond antennal sockets above or often not beyond, the end acute along eye margins or often not acute; mark on clypeus rarely entirely yellow, often reverse T-shaped, sometimes only transverse bar of T reduced, sometimes spot-like subapically, or entirely absent; apical margin of clypeus sometimes piceous or more paler. Males: marks on lateral portions of collar of pronotum and spots on tegulae often absent; basal portion of propodeal enclosure often distinctly transversely carinate, its carinae one to three.

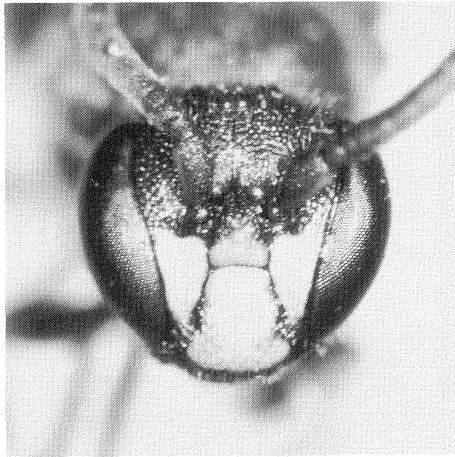
**Remarks** *Hylaeus gnathylaeoides* was synonymized with *H. floralis* by Hirashima (1977), and he suggested, "the male of *gnathylaeoides* described by Bridwell (1919) probably belongs to the different species." I confirmed his suggestion this time (see the section 4 of this chapter).

**Distribution** Hokkaido, Honshu, Sadoga-shima (new record), Shikoku (new record) and Kyushu (Fig. 63).

**Specimens examined** Specimens examined are 509 females and 253 males, and the materials from new localities among them are as follows: SD: 1♂, June 13, 1985 Ogura-tôge, Hatano, 1♀, Aug. 24, 1985 Mt. Myoken, K. Baba. SK: 1♂, May 1, 1975 Ikeda,



A



B

Fig. 61. Heads of *Hylaeus (Nesoprosopis) floralis* (Smith) in frontal view. A, female; B, male.

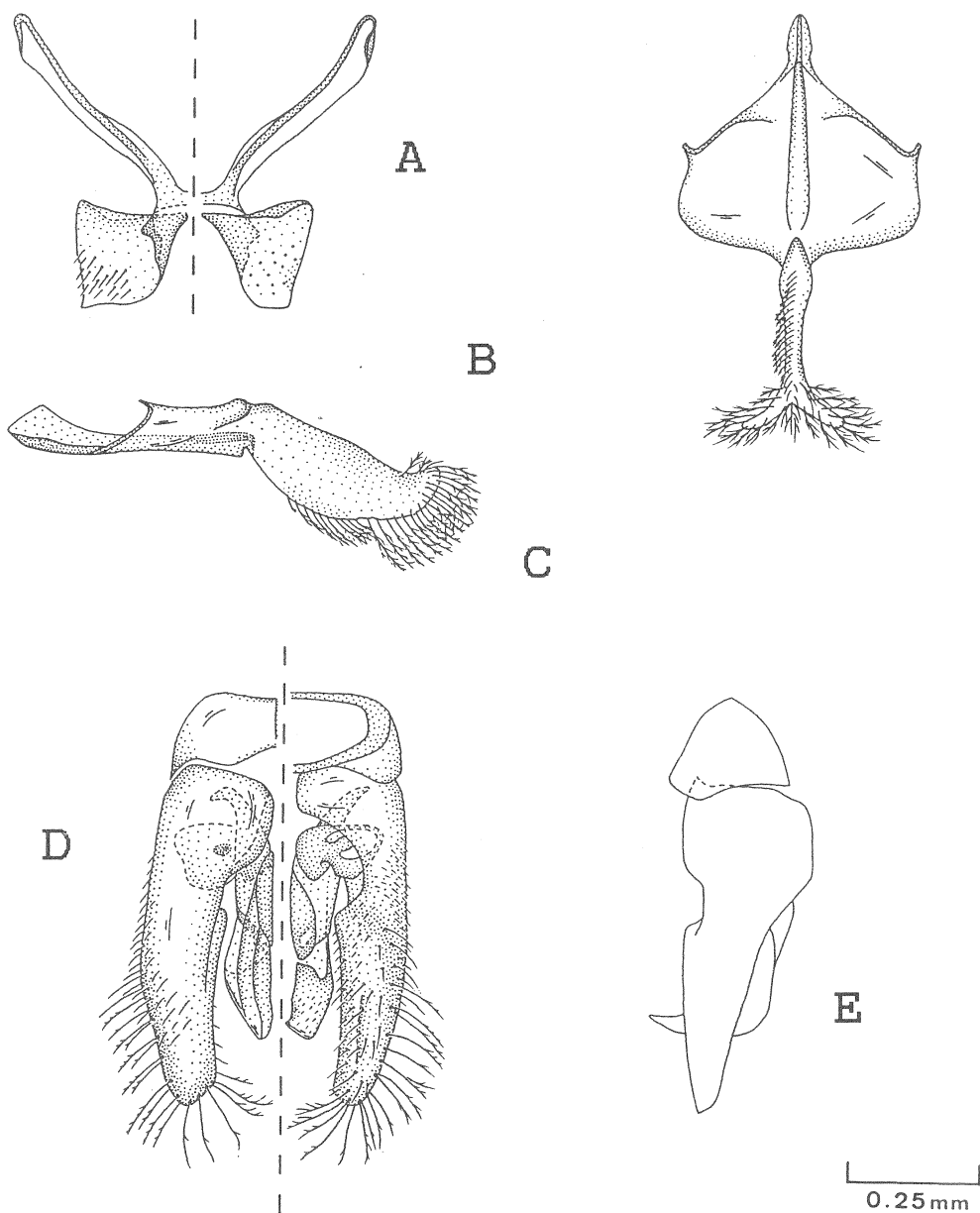


Fig. 62. Male terminalia of *Hylaeus (Nesoprosopis) floralis* (Smith). A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.



Fig. 63. A map showing the distribution of *Hylaeus (Nesoprosopis) floralis* (Smith).



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Tokushima Pref., O. Tadauchi; 1♀, July 23, 1978 Mt. Tsurugi, Tokushima Pref., T. Tano; 1♀, Oct. 2, 1977 Kajigamori, Kochi Pref., S. Ikudome; 1♀, Oct. 10, 1953 Sugitate nr. Matsuyama, Ehime Pref., T. Tano.

**Flight records** HD: females, late June to early Oct.; males, early Jun. to late Sep. HS and SD: females, early May to late Oct.; males, late Apr. to early Oct. SK: all records are mentioned above. KS: females, early May to early Oct.; males, late Apr. to early Oct.

**Floral records.**

Amaranthaceae: *Celosia cristata* Linn., HS OX.

Anacardiaceae: *Rhus javanica* Linn., HS 2X, KS X, *R. succedanea* Linn., KS OX.

Aquifoliaceae: *Ilex serrata* Thunb., HS OX.

Araliaceae: *Acanthopanax sieboldianus* Makino, HS X, *A. spinosus* (Linn.) Miq., HS OX; *Aralia cordata* Thunb., HD OX, SD OX, HS X, *A. elata* (Miq.) Seemann, HS OX, KS OX.

Caprifoliaceae: *Viburnum plicatum* Thunb. var. *tomentosum* (Thunb.) Miq., HS OX; *Weigela coraeensis* Thunb., HS OX, *W. hortensis* (Sieb. et Zucc.) K. Koch, HD OX.

Caryophyllaceae: *Stellaria media* (Linn.) Villars, HS OX.

Celastraceae: *Euonymus alatus* (Thunb.) Sieb. forma *ciliato-dentatus* (Franch. et Savat.) Hiyama, HS OX.

Commelinaceae: *Commelina communis* Linn., HS OX.

Compositae: *Ambrosia artemisiifolia* Linn. var. *elatior* (Linn.) Descourtils, HD OX; *Anaphalis margaritacea* (Linn.) Benth. et Hook. var. *angustior* (Miq.) Nakai, HD OX; *Aster glehnii* Fr. Schm., HD OX, *A. scaber* Thunb., HD OX; *Chrysanthemum leucanthemum* Linn., SD OX; *Erigeron annuus* (Linn.) Pers., HD X, *E. bonariensis* Linn., KS OX; *Ixeris dentata* (Thunb.) Nakai, HS X, *I. stolonifera* A. Gray, HD OX; *Kalimeris pinnatifida* (Maxim.) Kitam., HS OX, SD OX; *Lactuca indica* Linn. var. *laciniata* (O. Kuntze) Hara, SD OX, SK OX, KS OX; *Picris hieracioides* Linn. var. *glabrescens* (Regel) Ohwi, HD OX; *Rudbeckia laciniata* Linn., HD OX; *Solidago altissima* Linn., HD 2X, *S. virga-aurea* Linn. var. *leiocarpa* (Benth.) Miq., HD OX; *Sonchus brachyotus* DC., HD OX.

Crassulaceae: *Sedum kantschaticum* Fischer, HS X.

Cruciferae: *Brassica campestris* Linn. var. *pekinensis* Makino, HD OX, HS OX, SK OX, KS OX, *B. juncea* Czern. et Coss. var. *integrifolia* Sinsk., KS OX; *Rorippa indica* (Linn.) Hochr., HS OX, *R. nikkoensis* Hara, HD OX.

Ebenaceae: *Diospyros kaki* Thunb., KS OX.

Euphorbiaceae: *Mallotus japonicus* (Thunb.) Muell. Arg., KS OX.

Fagaceae: *Castanea crenata* Sieb. et Zucc., HS OX, KS OX.

Geraniaceae: *Geranium thunbergii* Sieb. et Zucc., HD OX, SD OX, HS OX.

Labiatae: *Perilla frutescens* (Linn.) Britton var. *japonica* (Hassk.) Hara forma *viridis* (Makino) Makino, HS OX, SD OX.

Liliaceae: *Allium tuberosum* Rottl., HS OX, SD OX.

Leguminosae: *Astragalus sinicus* Linn., KS OX; *Cytisus scoparius* Link., HD OX, SD OX; *Lespedeza bicolor* Turcz., HD OX, HS OX, KS OX; *Trifolium repens* Linn., HD OX.

Oleaceae: *Ligustrum japonicum* Thunb., KS OX.

Polygonaceae: *Fagopyrum esculentum* Moench, HS OX, SD OX, KS OX; *Polygonum cuspidatum* Sieb. et Zucc., HS OX, KS X, *P. sachalinense* Fr. Schm., HD OX, *P. senticosum* (Meisner) Franch. et Savat., HS OX, *P. thunbergii* Sieb. et Zucc., HD OX, HS OX.

Primulaceae: *Lysimachia clethroides* Duby, HD OX.

Ranunculaceae: *Clematis terniflora* DC., HS OX; *Ranunculus japonicus* Thunb., HD OX.

Rosaceae: *Aruncus dioicus* (Walt.) Fernald var. *tenuifolius* (Nakai) Hara, HD OX; *Fragaria ananassa* Duchesna, HD OX; *Prunus mume* Sieb. et Zucc., HS OX; *Rosa rugosa* Thunb., HD OX; *Rubus parvifolius* Linn., HS OX; *Spiraea salicifolia* Linn., HD OX; *Stephanandra incisa* (Thunb.) Zabel, HS OX.

Rubiaceae: *Paederia scandens* (Lour.) Merrill var. *mairei* (Léveillé) Hara, HS OX.

Rutaceae: *Evodia meliaefolia* (Kance) Benth., HS OX; *Zanthoxylum ailanthoides* Sieb. et Zucc., KS OX, *Z. schiniolium* Sieb. et Zucc., KS OX.

Saxifragaceae: *Deutzia crenata* Sieb. et Zucc., HS OX, SD OX, *D. maximowicziana* Makino, HS OX; *Saxifraga stolonifera*

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Curtis, KS OX.

Scrophulariaceae: *Veronicastrum sibiricum* (Linn.) Pennell, HS OX.

Solanaceae: *Capsicum annuum* Linn., SD OX.

Symplocaceae: *Symplocos coreana* (Léveillé) Ohwi, HS OX.

Theaceae: *Thea sinensis* Linn., HS OX.

Tiliaceae: *Tilia rufo-villosa* Hatus., HS OX.

Umbelliferae: *Angelica edulis* Miyabe, HS OX, *A. pubescens* Maxim., HS OX, *A. ursina* (Rupr.) Maxim., HD 2X; *Coelopleurum lucidum* (Linn.) Frn. var. *gmelinii* (DC.) Hara, HD OX; *Conioselinum filicinum* (Wolff) Hara, HD OX; *Daucus carota* Linn., HD OX, var. *sativa* DC., KS OX; *Foeniculum vulgare* Mill., HS OX; *Heracleum dulce* Fisch., HD OX, *H. nipponicum* Kitag., HD OX; *Ostericum sieboldii* (Miq.) Nakai, HS OX.

Valerianaceae: *Patrinia villosa* (Thunb.) Juss., HS OX.

Verbenaceae: *Callicarpa japonica* Thunb., HS OX.

(11) *Hylaeus (Nesoprosopis) globula* (Vachal)

[Jap. name: Sumisu-chibi-mukashi-hanabachi-modoki]

(Figs. 64-66)

*Prosopis globula* Vachal, 1903, Bull. Mus. d'Hist. Nat. Paris, 9: 132, female and male.

*Hylaeus globulus*: Meade-Waldo, 1923, Gen. Ins., 181: 23.

*Hylaeus (Nesoprosopis) globula*: Hirashima, 1977, Esakia, 10: 41, female and male.

TYPE

Holotype: female, 1901 Nippon, Moyen, Env. de Tokio Et Alpes de Nikko, J. Harmand, in PM. Paratype: 1 male, in PM.

DIAGNOSIS

This species is a close relative of the sympatric *Hylaeus floralis*.

Hirashima (1977) sufficiently indicated characters of this species as follows. The mesopleuron is not coarsely sculptured in both sexes (punctures small, well separated from each other, interspaces of punctures flat, weakly shining and only microscopically reticulate). The supraclypeal

area is also distinctive in being constricted in the middle as seen in front and the upper portion is highly elevated, dilated laterally and sharply defined from the neighbouring areas.

In addition to these characters, the posterior portion of propodeal enclosure is round and broadly unsculptured in both sexes as in *H. floralis*.

**FEMALE**

Body length 5.5-6 mm.

Relative dimensions HL 58; HW 64; UFW 45; LFW 45; IAD 11.5; ASD 5; AOD 10; CAD 6.5; UCW 15; MCL 25; MCW 27; POW 10; COD 5.5; MSL 1.6; BWM 10.5; OD 5.5; IOD 10.5; OOD 11; OCD 9; SL 17; SW 6; PL 5.6; PW 5; 1FL 4; 1FW 5; 2FL 3.2; 2FW 5; 3FL 5; 3FW 5.

Coloration Similar to *floralis*.

Structure Malar space shorter than in *floralis*; sculpture on mesopleuron less coarser than in *floralis*.

Pilosity Similar to *floralis*.

**MALE**

Body length 5-5.5 mm.

Relative dimensions HL 51; HW 57; UFW 37; LFW 23; IAD 8; ASD 5; AOD 8; CAD 7.5; UCW 9; MCL 21; MCW 22; POW 9.5; COD 3.8; MSL 1.5; BWM 8.2; OD 5; IOD 9.5; OOD 9.5; OCD 7; SL 14; SW 7.2; PL 4.8; PW 5.2; 1FL 3.8; 1FW 5.5; 2FL 4.8; 2FW 5; 3FL 6; 3FW 5.3.

Coloration Similar to *floralis*.

Structure Dilation of upper portion of supraclypeal area weaker than in female; malar space rather short, evidently shorter than in *floralis*.

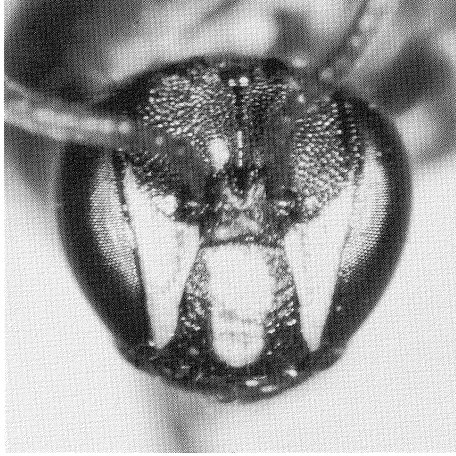
Pilosity Similar to *floralis*.

Terminalia See Fig. 65.

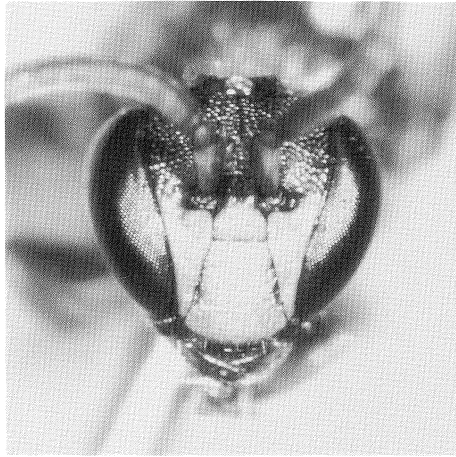
Variation Similar to *floralis*.

Distribution Hokkaido, Honshu, Sadoga-shima (new record), Shikoku, Kyushu and Tsushima (Fig. 66).

Specimens examined The specimens from a new locality among 351 females and 309 males examined are as follows: SD: 2♂♂, May 28, 1985 Ryotsu, K. Baba.



A



B

Fig. 64. Heads of *Hylaeus (Nesoprosopis) globula* (Vachal) in frontal view. A, female; B, male.

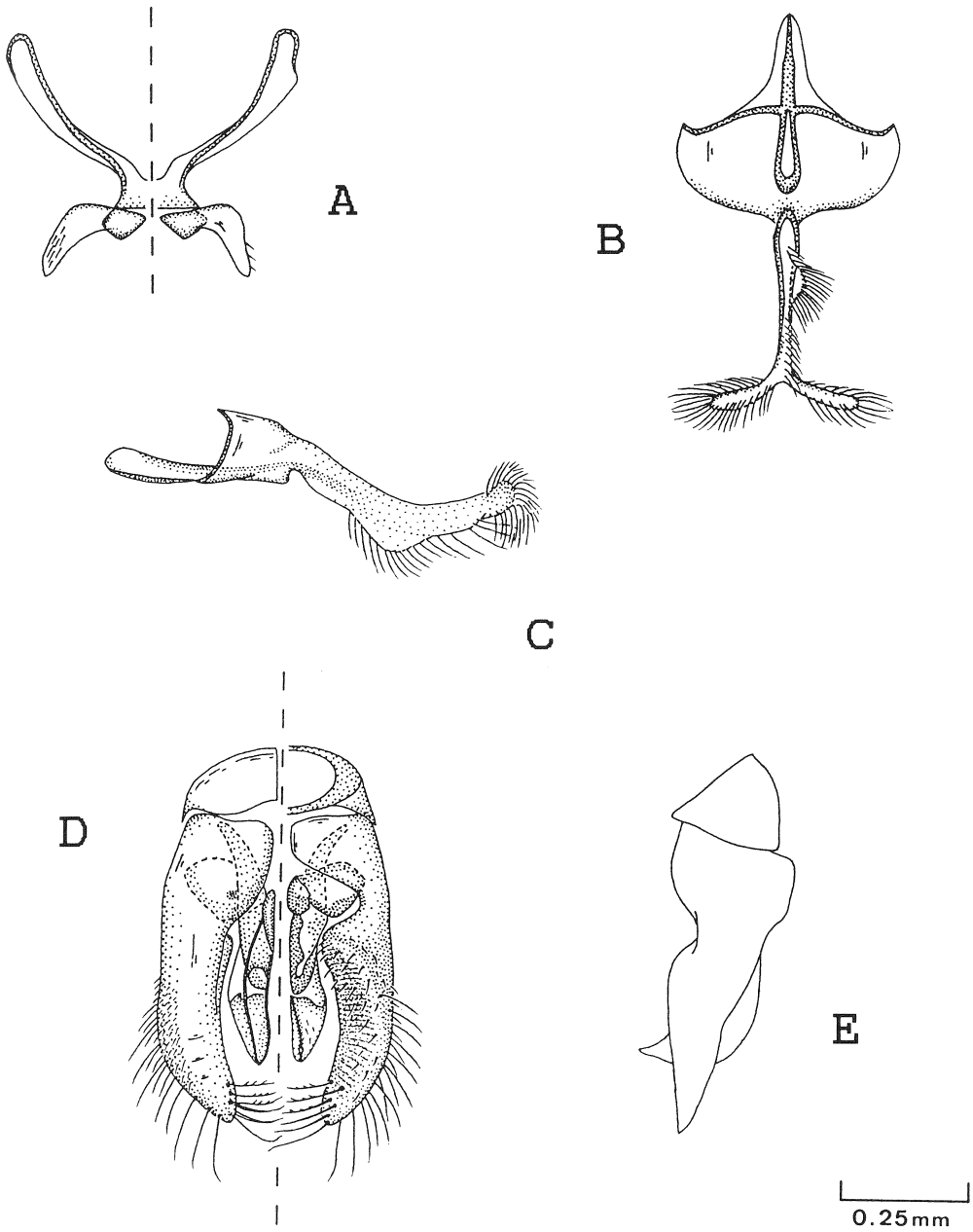


Fig. 65. Male terminalia of *Hylaeus (Nesoprosopis) globula* (Vachal). A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.

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Fig. 66. A map showing the distribution of *Hylaeus (Nesoprosopis) globula* (Vachal).

**Flight records** HD: females, early July to early Oct.; males, early June to early Oct. HS and SD: females and males, early May to early Oct. SK, KS and TS: females, late June to early Oct.; males, early June to early Oct.

**Floral records**

Anacardiaceae: *Rhus javanica* Linn., HS OX.

Araliaceae: *Acanthopanax spinosus* (Linn.) Miq., HS OX;  
*Aralia cordata* Thunb., HD X, HS X, KS OX.

Caprifoliaceae: *Viburnum furcatum* Blume, HS OX; *Weigela hortensis* (Sieb. et Zucc.) K. Koch, HD OX.

Celastraceae: *Euonymus sieboldianus* Blume, HS OX.

Compositae: *Achillea alpina* Linn., HD OX; *Anaphlis margaritacea* (Linn.) Benth. et Hook. var. *angustior* (Miq.) Nakai, HD OX; *Aster ageratoides* Turcz., HS OX, *A. glehnii* Fr. Schm., HD 3X; *Chrysanthemum leucanthemum* Linn., HD OX; *Eri-geron annuus* (Linn.) Pers., HD OX; *Ixeris dentata* (Thunb.) Nakai, HD OX, HS OX, *I. stolonifera* A. Gray, HS OX; *Kalimeris yomena* Kitam., HD OX, HS OX; *Picris hieracioides* Linn. var. *glabrescence* (Regel) Ohwi, HD OX; *Taraxacum officinale* Weber, HD OX; *Youngia denticulata* (Houtt.) Kitam., HD OX.

Cruciferae: *Brassica campestris* Linn. var. *pekinensis* Makino, HD OX, HS OX, SD OX.

Euphorbiaceae: *Mallotus japonicus* (Thunb.) Muell. Arg., KS OX.

Fagaceae: *Castanea crenata* Sieb. et Zucc., HS OX.

Leguminosae: *Cytisus scoparius* Link, SD OX.

Polygonaceae: *Fagopyrum esculentum* Moench, KS OX; *Polygonum cuspidatum* Sieb. et Zucc., HS OX, *P. sachalinense* Fr. Schm., HD X, *P. thunbergii* Sieb. et Zucc., HS OX.

Rosaceae: *Aruncus dioicus* (Walt.) Fernald var. *tenuifolius* (Nakai) Hara, HD OX, HS OX; *Geum aleppicum* Jacq., HD OX; *Sorbaria sorbifolia* (Linn.) A. Br. var. *stellipila* Maxim., HD OX; *Spiraea cantoniensis* Lour., HS OX, *S. japonica* Linn., HS OX, *S. salicifolia* Linn., HD OX.

Saxifragaceae: *Astilbe thunbergii* (Sieb. et Zucc.) Miq., HS OX; *Cardiandra alternifolia* Sieb. et Zucc., HS OX; *Deutzia crenata* Sieb. et Zucc., HS OX.

Styracaceae: *Styrax japonica* Sieb. et Zucc., HS OX.



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Symplocaceae: *Symplocos coreana* (Léveillé) Ohwi, HS 0X.

Umbelliferae: *Angelica edulis* Miyabe, HS 0X, *A. polymorpha* Maxim., HS 0X, *A. pubescens* Maxim., HS 5X, *A. ursina* (Rupr.) Maxim., HD 2X; *Anthriscus sylvestris* (Linn.) Hoffm., HS 0X; *Heracleum nipponicum* Kitag., HD 0X; *Ostericum sieboldii* (Miq.) Nakai, HS X; *Spuriopimpinella nikoensis* (Yabe ex Hisauti) Kitagawa, HS 0X; *Torilis japonica* (Houtt.) DC., HS 0X.

Valerianaceae: *Patrinia villosa* (Thunb.) Juss., HS 2X.

Vitidaceae: *Vitis coignetiae* Pulliat, HS 0X.

(12) *Hylaeus (Nesoprosopis) boninensis* Yasumatsu

[Jap. name: Ogasawara-chibi-mukashi-hanabachi]

(Figs. 67-69)

*Hylaeus boninensis* Yasumatsu, 1955, Bull. Biogeogr. Soc. Japan, 16-19: 220, female.

*Hylaeus (Nesoprosopis) boninensis*: Snelling, 1970, Bull. So. Calif. Acad. Sci., 69(1): 14-18, female and male.

**TYPE**

Holotype: female, July 11-16, 1933 Haha-jima, Bonin Islands, H. Ikeda, in KU. Paratopotypes: 2 females, in KU.

**DIAGNOSIS**

This species is endemic in the Ogasawara-shotô, and is easily separated from the other species of the Ogasawara-shotô by having the collar of pronotum and all legs wholly maculated yellow or light ferruginous, and axillae colored yellow in both sexes.

**FEMALE**

Body length 7 mm.

Relative dimensions HL 67; HW 76; UFW 50; LFW 36; IAD 12; ASD 6; AOD 12; CAD 6.5; UCW 15.5; MCL 27; MCW 29; POW 12; COD 6.5; MSL 2.5; BWM 14; OD 7; IOD 11.5; OOD 11.5; OCD 9.5; SL 21.5; SW 6.5; PL 6.5; PW 5.5; 1FL 5; 1FW 6; 2FL 4; 2FW 6; 3FL 5.5; 3FW 6.

Coloration Black, with following maculations or portions yellow or orange-yellow: lateral face marks extending

to the level of halves of the distance between antennal sockets and mid ocelli, supraclypeal area, clypeus except the sides, tubercles, and spots on tegulae; mandibles ferruginous; undersides of flagellum brownish; posterior margins of metasomal sterna membranous, pale brownish; wings transparent but very slightly clouded with brown, veins and stigma brownish-black.

**Structure** Clypeus distinctly arched in outline in profile; integuments of clypeus and supraclypeal area reticulate-striate, with distinctly wrinkled punctures; supraclypeal area broadened, triangular, well convex, upper portion gently merging into frons with distinct median sulcus; paraocular keels distinct. Collar of pronotum well convex, rounded laterally, linear in the middle; mesoscutum well convex in lateral view, somewhat shining, with rather dense, minute punctures; mesopleuron shining, with small, dense, obsolete punctures; propodeal enclosure shining, well defined, irregularly wrinkled, its wrinkles becoming weaker toward posterior area and evanescent; propodeal TRN and OBL absent. First metasomal tergum highly polished, very shining, scattered with very fine acupunctures on lateral portions; 2nd and following terga distinctly transversely lineolate-reticulate.

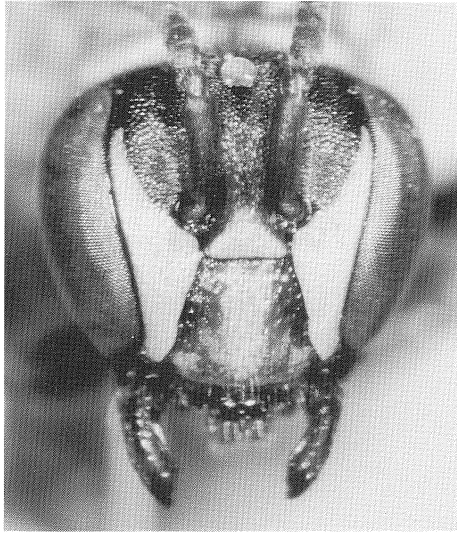
**Pilosity** Hairs on thorax and legs especially dense.

**MALE**

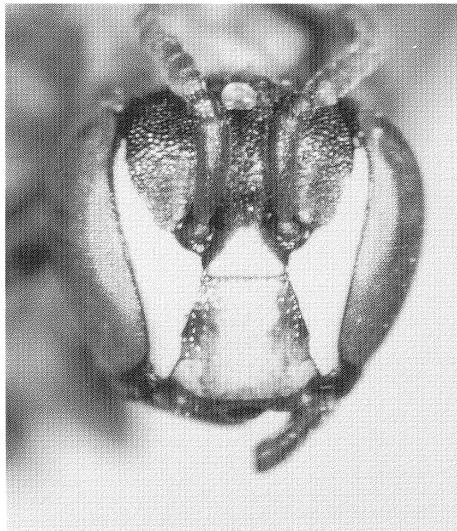
Body length 5.5 mm.

**Relative dimensions** HL 64; HW 69; UFW 54; LFW 27; IAD 6.5; ASD 6; AOD 10; CAD 11; UCW 8.5; MCL 25; MCW 24; POW 10.5; COD 4; MSL 2.5; BWM 14; OD 6.5; IOD 11; OOD 11; OCD 7; SL 16; SW 13; PL 5.5; PW 6; 1FL 4; 1FW 6.5; 2FL 7; 2FW 6; 3FL 8; 3FW 6.

**Coloration** Black, with following maculations or portions yellow or ivory: mandibles except apices ferruginous, small medio-basal spot on labrum, clypeus, well developed lateral face marks, supraclypeal area, ventral narrow stripes on scapes, anterior margin of pronotum, collar of pronotum confluent with maculae of pronotal lobes, large spots on antero-lateral portions of mesoscutum, and large



A



B

Fig. 67. Heads of *Hylaeus (Nesoprosopis) boninensis* Yasumatsu in frontal view. A, female; B, male.

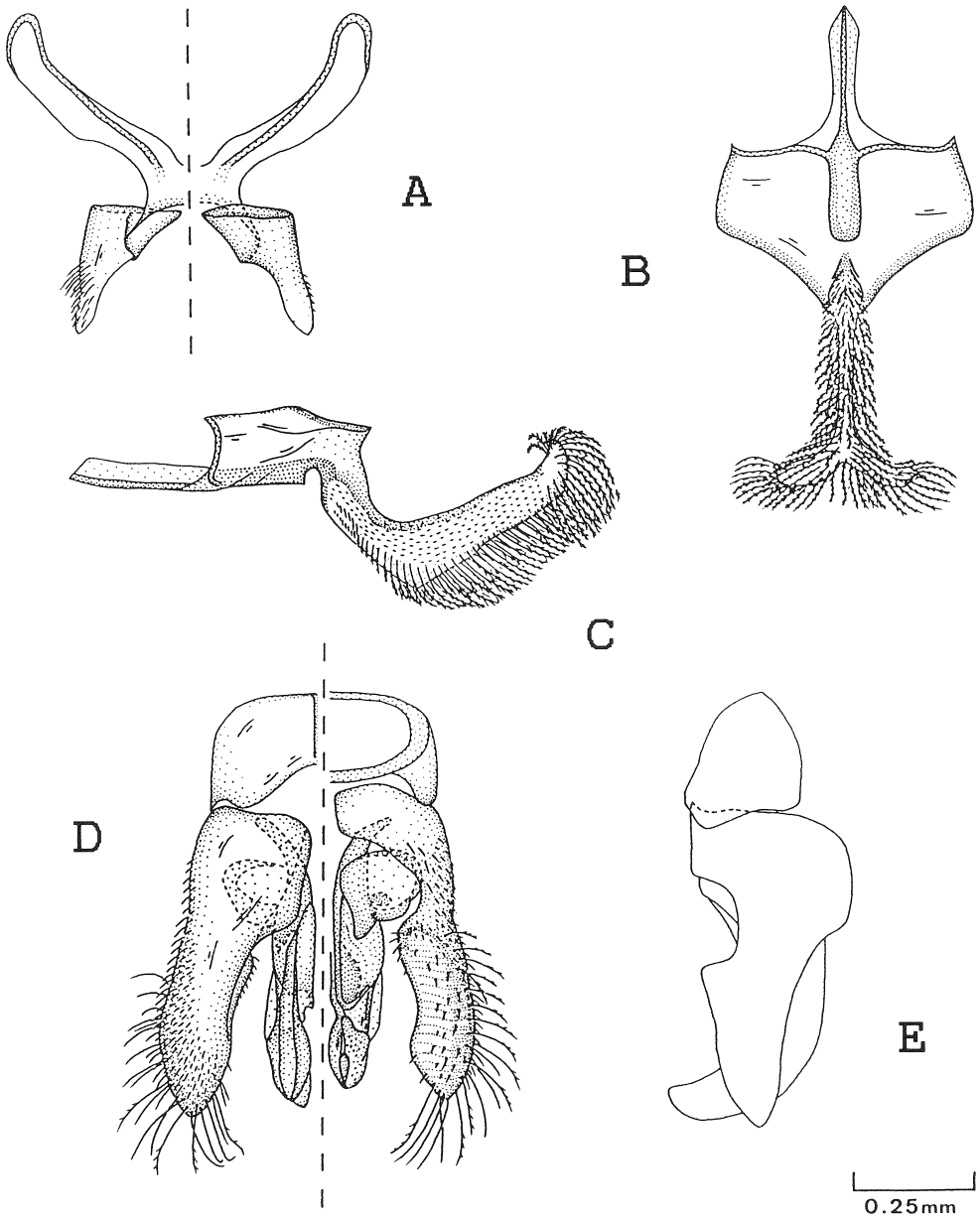


Fig. 68. Male terminalia of *Hylaeus (Nesoprosopis) boninensis* Yasumatsu. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.

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Fig. 69. A map showing the distribution of *Hylaeus (Nesoprosopis) boninensis* Yasumatsu.

spots on tegulae; undersides of flagellar segments ferruginous; metasoma blackish brown.

**Structure** Supraclypeal area narrow, elongateed, convex, finely reticulate-striate, upper portion almost undeveloped; areas between antennal sockets and inner orbits distinctly longitudinally depressed. Mesoscutum finely punctate, its punctures close each other; lateral portions of scutellum well convex as in female; punctures on mesopleuron as in scutellum but coarser.

**Pilosity** Hairs on head yellowish white; thoracic dorsum with short, erect, fulvous barbulate hairs; hairs on anterior and lateral portions of 1st tergum simple to moderately barbulate, short; hairs on 2nd and following terga long, fulvous.

**Terminalia** See Fig. 68.

**Variation** Females: yellow mark on clypeus irregular in extent. Males: large spots on antero-lateral portions of mesoscutum sometimes absent.

**Distribution** Ogasawara-shotō (Chichi-jima and Haha-jima) (Fig. 69).

**Specimens examined** The specimens recorded by Snelling (1970) and ones indicated below were examined: 2♀ and 1♂, Aug. 11, 1983 Okikō, Haha-jima, T. Nambu.

**Flight records** Females and males: May to Aug.

**Flower record** Not available.

(13) *Hylaeus (Patagiata) paradiformis*, new species

[Jap. name: Hyottoko-chibi-mukashi-hanabachi]

(Figs. 70-72)

**TYPE**

Holotype: female (Type No. 2710, Kyushu Univ.), Aug. 14, 1953 Ashoro, Hokkaido, Y. Maeta, Paratopotyps: 23 females and 1 male, in KU. Paratypes: 3 males, July 12, 1973 Otarunai, Hokkaido, H. Fukuda, 4 males, June 7, 1970 Ryōgami, Saitama Pref., T. Nambu, 2 males, July 2, 1978 Arashi, Fukui Pref., T.

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Tano, 2 males, June 27, 1976 Mt. Daisen, Tottori Pref., Y.  
Yoneda, 1 male, Aug. 1-2, 1977 Gokanosyo, Kumamoto Pref., T.  
Tano, in KU.

### DIAGNOSIS

This new species is very closely allied to *Hylaeus difformis* (Eversmann) which widely inhabits the southern part of the Eurasian Continent.

Characteristics are as follows: lower portion of supra-clypeal area broadly impunctate except both sides where are regularly punctured in single or double file, but microscopically distinctly striate in both sexes; mesopleuron rugoso-punctate in the female (not rugoso-punctate in *H. difformis*); lower portion of supraclypeal area elongated, shining, reverse arched-like in lateral view in the male.

Further, the male is characterized as follows: environs of antennal sockets impunctate, polished, shining (in *H. difformis*, those impunctated areas rather extend, even with obscure yellow spots on upper portions); lateral portions of frons not so especially convex as in *H. difformis*; antennal scapes not enlarged so strongly as in *H. difformis* (three-fourths times as long as, five-ninths times as wide as those in *H. difformis*).

Thus, this new species is distinctly different from *H. difformis*, and is easily separated from the other Japanese species.

### FEMALE

Body length 6.5 mm.

Relative dimensions HL 62; HW 67; UFW 45; LFW 29; IAD 10.5; ASD 10; CAD 5; UCW 14.5; MCL 27; MCW 27; POW 10.5; COD 4; MSL 1.5; BWM 11.5; OD 5.5; IOD 10.5; OOD 11; OCD 8; SL 18; SW 7; PL 5; PW 5; 1FL 4.8; 1FW 5.8; 2FL 3; 2FW 6; 3FL 5; 3FW 5.8.

Coloration Black, with following maculations or portions yellow: subtriangular lateral face marks not beyond the level of lower margins of antennal sockets above, apical halves of tubercles, anterior spots on tegulae, basal obscure small spots on fore and mid tibiae, and basal one-third of hind tibiae; apical portion of clypeus transversely

reddish or yellowish brown; undersides of flagellum reddish; wings subhyaline (brownish subhyaline in *difformis*), veins and stigma brown.

**Structure** Head slightly broader than long; inner margins of eyes convergent below; paraocular areas well convex; clypeus slightly arched in outline in lateral view, wrinkled-punctate as in *monticola*, but slightly more distinct, microscopically distinctly reticulate-striate as in supra-clypeal area; supraclypeal area strongly convex, upper portion strongly dilated laterally with distinct median sulcus as in *submonticola*; malar space rather short, shorter than in *monticola*; 2nd flagellar segments ring-like. Collar of pronotum strongly thick on lateral portions, its upper surface explanate-like, thin in the middle; mesoscutum dull, coarse, with punctures slightly smaller and denser than those in *submonticola*, slightly larger than those in *monticola*, microscopically lineolate-reticulate; punctures on scutellum stronger but less denser than those on mesoscutum; mesopleuron somewhat shining; propodeal enclosure shining, with very strong longitudinal carinae between basal very strong transverse carina and distinct TRN, posterior portion abrupt and distinctly rather densely minutely punctate-like; propodeal OBL distinct. First metasomal tergum highly polished, shining, with very fine acupunctures in some places, microscopically without transverse lineolate-reticulation (that in *monticola* or *submonticola* transversely lineolate-reticulate); 2nd and following terga microscopically transversely lineolate-reticulate, scattered with acupunctures; 2nd and following sterna sparsely minutely punctate posteriorly, but denser than those in *monticola* or *submonticola*.

**Pilosity** Collar of pronotum with hairs dull white fringe-like behind; mesoscutum clothed with hairs very short, appressed, whitish brown; hairs on 2nd and following terga rather short, fine, brownish, becoming longer toward apical terga; hairs on lateral margins of 1st to 4th terga and on margins of 2nd to 5th sterna somewhat glistening white and fringe-like in some light.



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### MALE

Body length 5.5 mm.

Relative dimensions      HL 57; HW 64; UFW 42; LFW 24; IAD 7.5; ASD 5; AOD 8; CAD 9.5; UCW 11; MCL 21; MCW 23; POW 8; COD 3.5; MSL 1; BWM 10; OD 5.5; IOD 9.5; OOD 9.5; OCD 8; SL 18; SW 10.5; PL 4.8; PW 6; 1FL 3.5; 1FW 6.5; 2FL 5.3; 2FW 6; 3FL 7.3; 3FW 6.5.

Coloration      Black, with following maculations or portions yellow: well developed lateral face marks ending along margins of antennal sockets, clypeus except apical margin, anterior slender stripes on scapes, transverse marks on lateral portions of collar of pronotum, apical spots on tubercles, anterior spots on tegulae, basal anterior marks on fore tibiae, basal spots on mid tibiae, basal one-third of hind tibiae, and rich marks on all basitarsi; small segments of all tarsi reddish or yellowish brown; undersides of flagellum reddish or brownish; wings slightly brownish subhyaline, veins and stigma brown.

Structure      Head distinctly broader than long; inner margins of eyes strongly convergent below; clypeus roundly strongly convex in the center, wrinkled-punctate, its punctures large but not strong, microscopically reticulate-striate (in *difformis*, nearly polished, upper portion broadly impunctate); paraocular areas linearly convex along margins of eyes, nearly regularly punctate in single file on both sides of its convex portions, microscopically weakly reticulate-striate; supraclypeal area strongly convex, lower portion subtriangularly elongated, somewhat shining, microscopically distinctly striate (highly polished, very shining in *difformis*), upper portion narrow, somewhat dilated laterally, steeply slanting toward frons, with strong median sulcus; lateral convex portions of frons as in *difformis* slightly recognizable or hardly so; malar space rather short; antennal scapes swollen inside, well expanded laterally; 1st flagellar segments ring-like as in *difformis*. Collar of pronotum as in female; mesoscutum, scutellum and mesopleuron more or less as in female (very shining in *difformis*); propodeum and metasoma also more or less as in female.

**Pilosity** Hairs on mesoscutum short, erect, brownish to fuscous; hairs on metasoma as in female.

**Terminalia** See Fig. 71.

**Variation** Females: lateral face marks sometimes reduced on upper portions or beside clypeus; small irregular yellow spot sometimes appear in the center of apical reddish or yellowish macula on clypeus; transverse yellow marks sometimes appear on lateral portions of collar of pronotum. Males: lateral face marks often not reaching the level of lower margins of antennal sockets; stripes on scapes sometimes shortened, obscure; marks on collar of pronotum often absent; spots on tegulae sometimes obscure or absent; obscure small yellow spot rarely appear on medio-lower portion of supraclypeal area.

**Distribution** Hokkaido, Rishiri-tô, Honshu and Kyushu (Fig. 72). The distribution pattern seems to be of mountainous regions toward the southern part of Japan.

**Specimens examined** Besides the above-mentioned type materials, 372 females and 416 males were examined.

**Flight records** HD and RR: females, early June to early Oct.; males, mid-June to mid-Sep. HS: early June to early Oct.; males, mid-May to late Sep. KS: the record is indicated in types.

#### Floral records

Araliaceae: *Aralia cordata* Thunb., HD X.

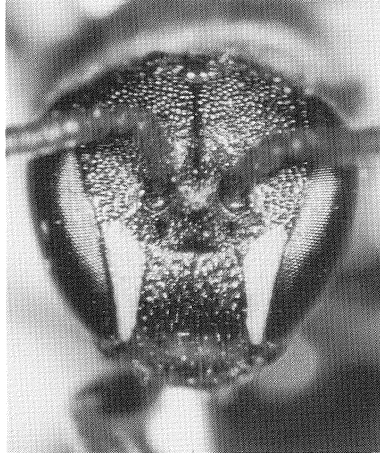
Asclepiadaceae: *Metaplexis jaonica* (Thunb.) Makino, HD OX.

Campanulaceae: *Adenophora triphylla* (Thunb.) A. DC. var. *japonica* (Regel) Hara, HD OX; *Campanula* sp., HD OX.

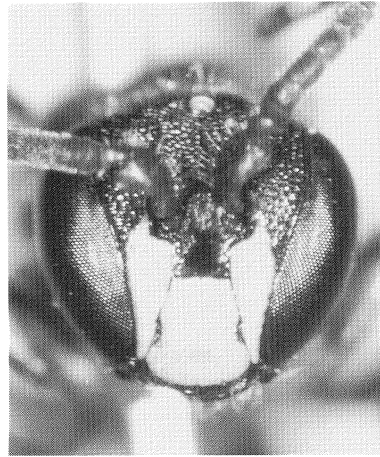
Commelinaceae: *Commelina communis* Linn., HD OX.

Compositae: *Achillea alpina* Linn., HD OX; *Adenocaulon himalaicum* Edgew., HD OX; *Anaphalis margaritacea* (Linn.) Benth. et Hook. var. *angustior* (Miq.) Nakai, HD X; *Aster glehnii* Fr. Schm., HD OX; *Centaurea cyanus* Linn., HD OX; *Chrysanthemum leucanthemum* Linn., HD OX; *Cirsium lyratum* Bunge, HD OX, *C. yezoense* (Maxim.) Makino, HD OX; *Erigeron annuus* (Linn.) Pers., HD 7X; *Ixeris dentata* (Thunb.) Nakai, HD OX, *I. stolonifera* A. Gray, HD OX; *Lactuca raddeana* Maxim.

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A



B

Fig. 70. Heads of *Hylaeus (Patagiata) paradiformis*, new species in frontal view. A, female; B, male.

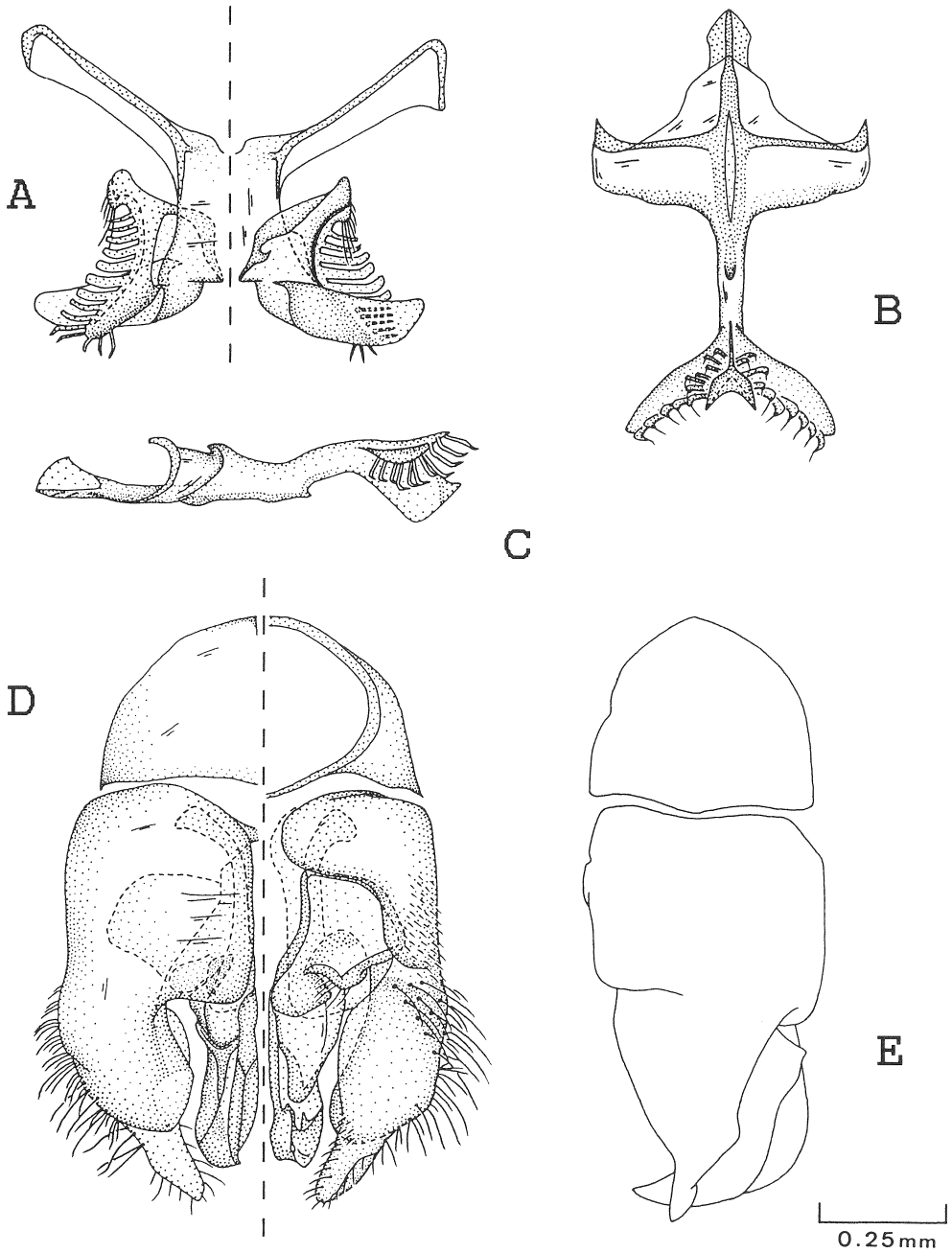


Fig. 71. Male terminalia of *Hylaeus (Patagiata) paradiformis*, new species. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.



Fig. 72. A map showing the distribution of *Hylaeus (Patagiata) paradiformis*, new species.

var. *elata* (Hemsl.) Kitam., HD 0X; *Picris hieracioides* Linn.  
var. *glabrescens* (Regel) Ohwi, HD 0X; *Rudbeckia laciniata*  
Linn., HD 0X; *Senecio cannabifolius* Less., HD 0X; *Solidago*  
*altissima* Linn., HD 0X, *S. virga-aurea* Linn. var. *asiatica*  
Nakai, HD 0X; *Taraxacum hondoensis* Nakai, HD 0X, *T. officinale*  
Weber, HD 0X.

Cruciferae: *Brassica campestris* Linn. var. *pekinensis*  
Makino, HD X, HS 0X, subsp. *rapa* Hook., HD 0X; *Rorippa ind-*  
*ica* (Linn.) Hochr., HD 0X, *R. islandica* (Oeder) Borbás, HD  
0X, *R. nikkoensis* Hara, HD 0X.

Cucurbitaceae: *Cucurbita moschata* Duch. var. *toonas* Maki-  
no, HD 0X.

Geraniaceae: *Geranium thunbergii* Sieb. et Zucc., HD 0X, *G.*  
*yezoense* Franch. et Savat. var. *pseudo-palustre* Nakai, HD 0X.

Guttiferae: *Hypericum erectum* Thunb., HD 0X.

Labiatae: *Elsholtzia ciliata* (Thunb.) Hylander, HD 0X;  
*Salvia officinalis* Linn., HD 0X.

Leguminosae: *Cytisus scoparius* Link, HD 0X; *Lespedeza bi-*  
*color* Turcz., HD X; *Melilotus suaveolens* Ledeb., HD 0X; *Tri-*  
*folium repens* Linn., HD X; *Vicia cracca* Linn., HD 0X.

Liliaceae: *Allium tuberosum* Rottl., HD 0X, RR 0X.

Malvaceae: *Althaea rosea* Cav., HD 0X.

Oleaceae: *Ligustrum obtusifolium* Sieb. et Zucc., HD 0X.

Onagraceae: *Oenothera erythrosepala* Borbás, HD 0X.

Oxalidaceae: *Oxalis corniculata* Linn., HD 0X.

Papaveraceae: *Chelidonium majus* Linn. var. *asiaticum*  
(Hara) Ohwi, HD 0X.

Polygonaceae: *Polygonum bistorta* Linn., HS 0X, *P. sacha-*  
*linense* Fr. Schm., HD 0X.

Primulaceae: *Lysimachia clethroides* Duby, HD X.

Ranunculaceae: *Ranunculus repens* Linn., HD 0X; *Thalictrum*  
*minus* Linn. var. *hypoleucum* (Sieb. et Zucc.) Miq., HD 0X.

Rosaceae: *Agrimonia japonica* (Miq.) Koidz., HD 0X; *Arunc-*  
*us dioicus* (Walt.) Fernald var. *tenuifolius* (Nakai) Hara, HD  
0X; *Potentilla fruticosa* Linn., HD 0X, *P. kleiniana* Wight et  
Arnott, HD 0X; *Rosa multiflora* Thunb., HD 0X, *R. rugosa*  
Thunb., HD 0X; *Rubus parvifolius* Linn., HD 0X, *R. phoeni-*  
*colasium* Maxim., HD 0X; *Sanguisorba japonensis* (Makino) Kudo,

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HD 0X; *Sorbaria sorbifolia* (Linn.) A. Br. var. *stellipila* Maxim., HD 0X; *Spiraea salicifolia* Linn., HD X.

Saxifragaceae: *Astilbe thunbergii* (Sieb. et Zucc.) Miq. var. *congesta* H. Boiss., HD 0X; *Deutzia crenata* Sieb. et Zucc., HD 0X; *Hydrangea macropgylla* (Thunb.) Ser., HD 0X, *H. paniculata* Sieb., HD 0X, HS 0X.

Scrophulariaceae: *Scrophularia alata* A. Gray, HD X; *Veronicastrum sibiricum* (Linn.) Pennell, HD 0X.

Umbelliferae: *Angelica pubescens* Maxim., HD 0X, *A. ursina* (Rupr.) Maxim., HD 0X; *Anthriscus sylvestris* (Linn.) Hoffm., HD 0X; *Coriandrum sativum* Linn., HD 0X; *Heracleum dulce* Fisch., HD 0X.

**Etymology** "Para" of the specific name is a Greek prefix meaning near, in reference to its relationship to *H. difformis*.

(14) *Hylaeus (Paraprosopis) thoracicus*, new species

[Jap. name: Munage-chibi-mukashi-hanabachi]

(Figs. 73-75)

**TYPE**

Holotype: female (Type No. 2711, Kyushu Univ.), July 21, 1952 Piuka, Teshio, Hokkaido, T. Shirôzu. Paratopotypes: 2 females, July 22, 1952 T. Shirôzu, in KU. Paratypes: 1 female and 3 males, Aug. 3, 1985, 3 females and 4 males, Aug. 4, 1985, 4 females and 4 males, Aug. 5, 1985, 1 male, Aug. 24, 1985 Senami, N-Echigo (Niigata Pref.), K. Baba, in KU.

**DIAGNOSIS**

*H. thoracicus* is very similar to *H. hirashimai*, but the erect hairs on the mesoscutum are noticeable in both sexes, the anterior portion of the propodeal enclosure is narrow and distinctly carinate, and its posterior portion is well defined from the anterior portion by the strong transverse carina and is nearly abrupt.

Thus, this new species is easily separable from the other species in the northern Japan by the combination with the small sized body.

**FEMALE**

Body length 4.5-5 mm.

**Relative dimensions** HL 50; HW 54; UFW 39; LFW 24; IAD 9; ASD 4; AOD 8.5; CAD 6.5; UCW 12.5; MCL 19; MCW 22; POW 8; COD 3; MSL 0.5; BWM 9; OD 4.5; IOD 10; OOD 9; OCD 6.5; SL 14.5; SW 5; PL 5; PW 4.5; 1FL 4; 1FW 4.5; 2FL 2.5; 2FW 4.5; 3FL 4.5; 3FW 4.5.

**Coloration** Black, with following maculations or portions yellow: well developed lateral face marks ending nearly acutely along margins of eyes slightly beyond the level of upper margins of antennal sockets above, stripe on lower portion of clypeus, lateral marks on collar of pronotum, tubercles, apical spots on tegulae, basal short linear marks on wings, apical small spots on all femora, and basal marks on all tibiae; all tarsi brownish; undersides of flagellum brownish; wings uligenous subhyaline, veins and stigma light brown.

**Structure** Head slightly broader than long; inner margins of eyes convergent below; paraocular keels weakly indicated; paraocular areas microscopically pit-reticulate, with punctures distinct, stronger and denser than those in *hirashimai*; clypeus also pit-reticulate, weakly wrinkled-punctate downward, its punctures large and not sparse; supra-clypeal area well convex, lower portion triangular and microscopically reticulate-striate with punctures like those on paraocular areas, upper portion dilated laterally with distinct median sulcus and small punctures, triangularly gently merging into frons; frons somewhat shining, obliquely striate-punctate, its punctures rather dense, becoming stronger toward eyes; lower portions of frons (just above antennal sockets) impunctate, shining; 2nd flagellar segments very short, ring-like; malar space nearly obsolescent. Collar of pronotum roundly convex at lateral portions, linear in the middle; mesoscutum less shining, sculptured as in *hirashimai* but distinctly more strongly punctate; scutellum somewhat shining, with punctures slightly sparser than those on mesoscutum; metanotum roundly well convex, with small punctures; mesopleuron shining, with punctures small and



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sparse but stronger than those in *hirashimai*, its interspaces microscopically weakly lineolate-reticulate; propodeal enclosure well defined. First metasomal tergum highly polished, scattered with very fine punctures on medio-lateral portions; 2nd and following terga microscopically weakly transversely lineolate-reticulate, scattered with fine punctures, somewhat shining.

**Pilosity** Hairs on mesoscutum whitish brown, well erect, longer than those in *hirashimai*; hairs on metasoma short, sparse, light brownish or whitish.

### MALE

Body length 3.5-4 mm.

**Relative dimensions** HL 47; HW 50; UFW 34; LFW 18; IAD 6; ASD 8; CAD 8.5; UCW 8; MCL 16.5; MCW 17; POW 7.5; COD 2; MSL 0.5; BWM 8; OD 4; IOD 9; OOD 8.5; OCD 5; SL 14; SW 7.5; PL 4.5; PW 5; 1FL 3; 1FW 5; 2FL 3.5; 2FW 5; 3FL 5.5; 3FW 5.

**Coloration** Black, with following maculations or portions yellow: well developed lateral face marks primarily ending angulately at the level of the middle of antennal sockets, clypeus except lower margin, irregular mark on lower portion of supraclypeal area, latero-apical small obscure spots on scapes, lateral narrow marks on collar of pronotum, tubercles, apical spots on tegulae, basal short strips on wings, apical small spots on all femora, anterior marks on fore tibiae, basal and apical spots on mid tibiae, basal halves of hind tibiae, and marks on all basitarsi; small segments of all tarsi yellowish brown or brownish; undersides of flagellum yellowish brown; lower margins of clypeus reddish brown; wings nearly uligenous subhyaline, veins and stigma brownish.

**Structure** Head well circular in outline as seen in front, but slightly broader than long; inner margins of eyes rather strongly convergent below; clypeus slightly convex, microscopically finely lineolate-reticulate, with sparse and not so strong punctures; paraocular areas distinctly concave, with punctures sparser than those on clypeus; supraclypeal area well convex, lower portion microscopically reticulate-striate, with punctures slightly sparser than those on cly-

peus, upper portion narrow and punctate, its height steeply (but roundly) reduced, merging into the level of upper margins of antennal sockets; frons more or less as in female; 1st flagellar segments ring-like. Collar of pronotum weakly indicated; mesoscutum as in female; scutellum with punctures slightly stronger and sparser than those on mesoscutum; mesopleuron somewhat shining, strongly densely punctate, its punctures larger than those on mesoscutum; metanotum, propodeum and metasoma more or less as in female.

**Pilosity** As in female.

**Terminalia** See Fig. 74.

**Variation** Females: lateral face marks often ending obtusely or irregularly, sometimes reduced up and down; stripe on clypeus sometimes extending to upper portion; spots on tegulae and basal short marks on wings sometimes absent. Males: lateral face marks often ending obtusely along margins of eyes beyond upper margins of antennal sockets above; spots on scape often absent; marks on collar of pronotum sometimes linear or absent; spots on tegulae and basal stripes on wings sometimes absent.

**Distribution** Hokkaido and (the central and northern) Honshu (Fig. 75).

**Specimens examined** Besides the above-mentioned type materials, 15 females and 35 males were examined.

**Flight records** Females, mid-June to late Sep.; males, early June to mid-Sep.

**Floral records**

Anacardiaceae: *Rhus javanica* Linn., HS 0X.

Araliaceae: *Acanthopanax spinosus* (Linn.) Miq., HS 0X; *Aralia cordata* Thunb., HS 2X, *A. elata* (Miq.) Seemann, HS 0X.

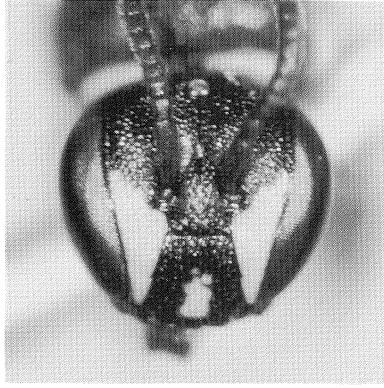
Compositae: *Erigeron annuus* (Linn.) Pers., HS 0X.

Cruciferae: *Brassica campestris* Linn. var. *pekinensis* Makino, HS 0X.

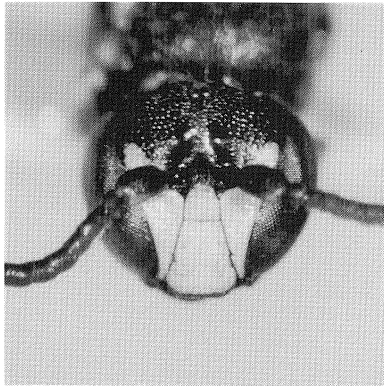
Fagaceae: *Castanea crenata* Sieb. et Zucc., HS 0X.

Rosaceae: *Aruncus dioicus* (Walt.) Fernald var. *tenuifolius* (Nakai) Hara, HD 0X; *Rosa multiflora* Thunb., HS 0X.

Umbelliferae: *Angelica ursina* (Rupr.) Maxim., HD 0X;



A



B

Fig. 73. Heads of *Hylaeus (Paraprosopis) thoracicus*, new species in frontal view. A, female; B, male.

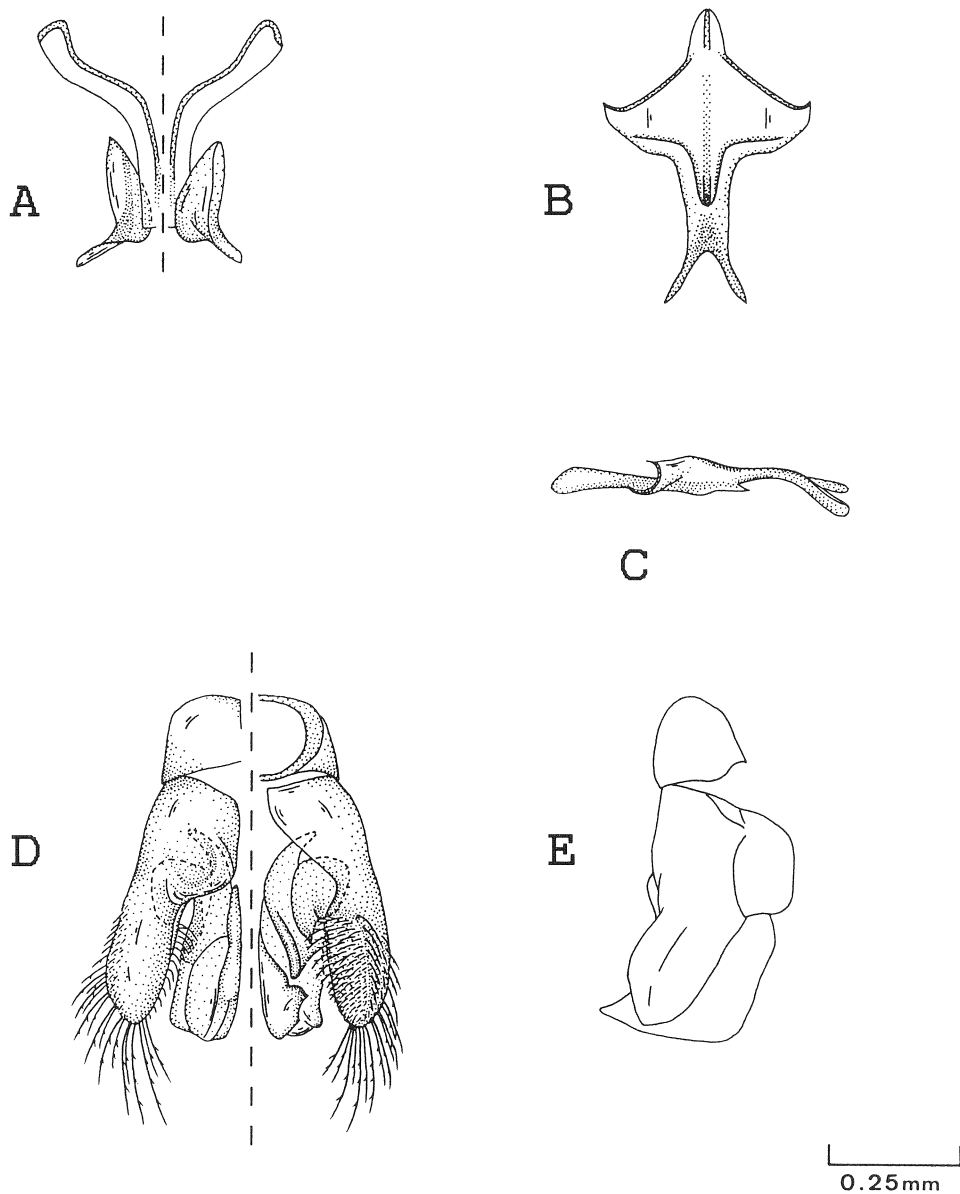


Fig. 74. Male terminalia of *Hylaeus (Paraprosopis) thoracicus*, new species. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.

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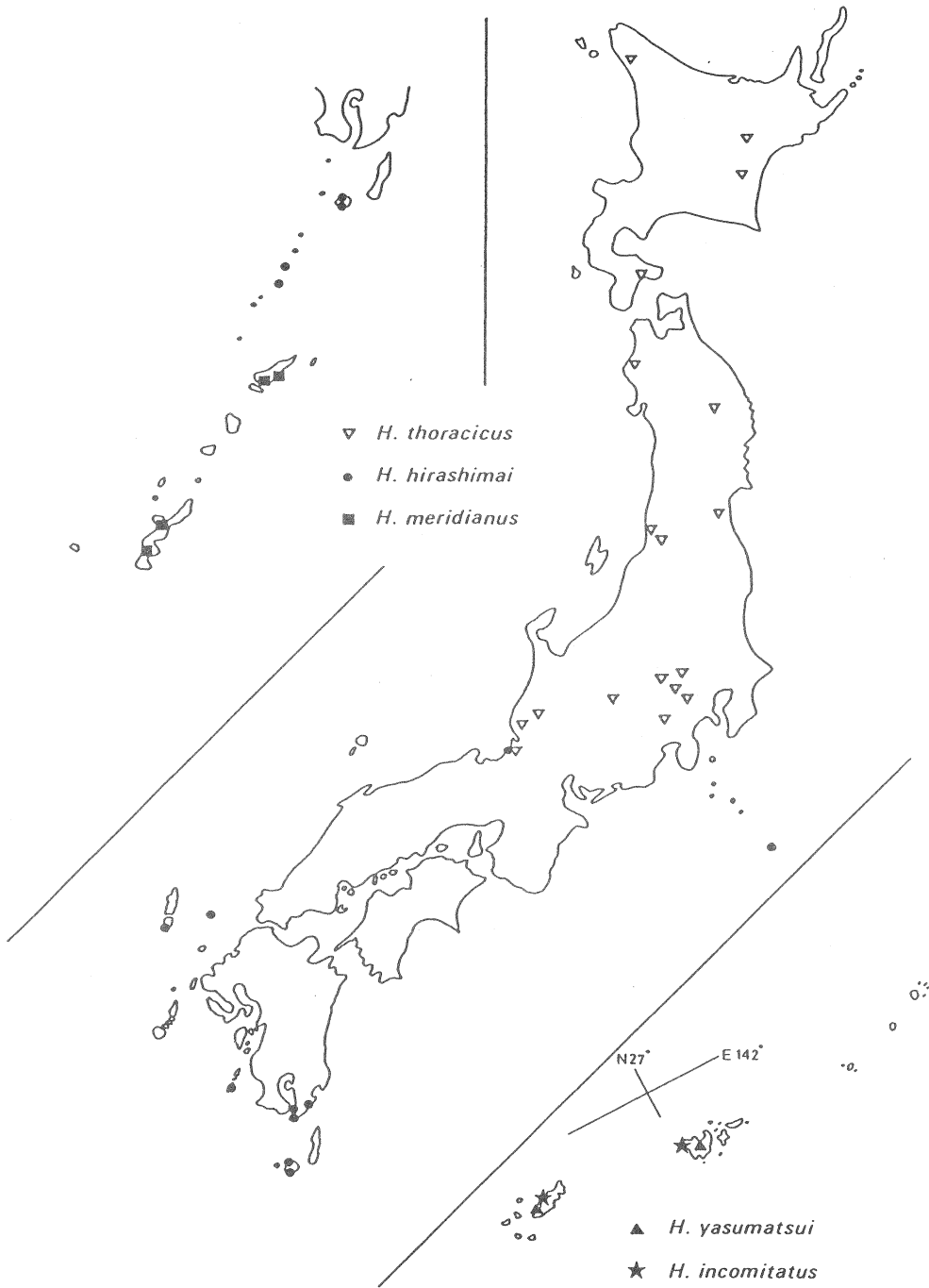


Fig. 75. A map showing the distribution of *Hylaeus* (*Paraprosopis*) *thoracicus*, n. sp., *hirashimai*, n. sp., *inomitatus* Snelling, *meridianus* Yasumatsu et Hira-shima and *yasumatsui* Snelling.

*Daucus carota* Linn. var. *sativa* DC., HS 0X.

**Etymology** The specific name, *thoracicus*, is a Greek word meaning a breast-plate, in reference to the mesoscutum with erect hairs in both sexes.

(15) *Hylaeus (Paraprosopis) hirashimai*, new species

[Jap. name: Hirashima-chibi-mukashi-hanabachi]

(Figs. 75-77)

**TYPE**

Holotype: female (Type No. 2712, Kyushu Univ.), May 27, 1952 Magome, Sata (Osumi), Kyushu, T. Esaki and Y. Hirashima. Paratopotypes: 9 females, in KU. Paratypes: 2 females, July 25-28, 1958 Okino-shima (Chikuzen), Kyushu, Y. Hirashima, Y. Murakami and Y. Miyatake; 1 female, Oct. 5, 1959 Asamo, Tsumishima, Y. Hirashima; 2 females, May 26, 1964 Okago-Fuji, Hachijo Island, Y. Hirashima and M. Shiga; 3 males, May 11, 1980 Izashiki, Sata, Kagoshima Pref., 3 males, May 14, 1978 Hetsuka, Sata, Kagoshima Pref., H. Nagase; 1 male, July 12, 1987 Eigo, Mitsune, Hachijo-jima, 1 male, Sep. 29, 1987 Ohkago, Hachijo-jima, H. Takahashi; in KU.

**DIAGNOSIS**

*H. hirashimai* is very closely allied to *H. meridianus*, but is separable from the latter by weak but distinct carinae on the anterior and lateral portions of the propodeal enclosure, defined posterior area of the propodeal enclosure by the transverse carina (TRN), and distinct oblique carinae (OBL).

**FEMALE**

Body length 4.5-5.5 mm.

**Relative dimensions** HL 51; HW 56; UFW 49; LFW 25; IAD 9.5; ASD 4.5; AOD 8.5; CAD 6.5; UCW 13.5; MCL 20; MCW 24; POW 9; COD 3.5; MSL 1; BWM 10; OD 5; IOD 10; OOD 9.5; OCD 7; SL 15; SW 5; PL 5; PW 4; 1FL 3.5; 1FW 4; 2FL 3; 2FW 4; 3FL 4; 3FW 4.5.

**Coloration** Black, with following maculations or portions yellow: lateral face marks ending irregularly at the

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level of the middle of antennal sockets and not filling lower portions of paraocular areas, lateral marks on collar of pronotum attenuating its width toward the middle, tubercles, anterior spots on tegulae, basal short linear stripes on wings, apical small obscure spots on all femora, and basal marks on all tibiae; small segments of all tarsi brown; undersides of flagellum brownish; wings uliginous subhyaline, veins and stigma brown.

**Structure** Head slightly broader than long; inner margins of eyes distinctly convergent below; lower portion of face strongly retreating in lateral view; lower portion from antennal sockets of face somewhat shining, microscopically lineolate-reticulate, scattered with very feeble punctures; supraclypeal area well convex, upper portion narrow, very slightly dilated laterally, with punctures and distinct median sulcus, triangularly merging into frons; lower portions of frons (just above antennal sockets) impunctate but not shining; frons coarsely sculptured, longitudinally densely striate-punctate; malar space very short but very slightly more distinct than in *meridianus*. Collar of pronotum roundly convex at lateral portions, linearly narrowed in the middle (except a case that lateral yellow marks jointed); mesoscutum dull, convex in lateral view, microscopically lineolate-reticulate, with punctures denser and slightly stronger than those in *meridianus*; integument of scutellum as in mesoscutum; metanotum roundly convex, more roughened than in *meridianus*; mesopleuron somewhat shining, microscopically distinctly lineolate-reticulate, with punctures weak and sparse but distinctly larger and denser than those in *meridianus*; propodeal enclosure somewhat shining, posterior portion steeply slanting. First metasomal tergum somewhat shining, microscopically distinctly transversely lineolate-reticulate, with punctures fine in some places; 2nd and following terga sculptured as in *meridianus*.

**Pilosity** Hairs on mesoscutum whitish brown, short, appressed; hairs on lateral face of propodeum usually dense; hairs on metasoma more or less as in *meridianus*.

Shuichi Ikudome

**MALE**

Body length 3.5-4.5 mm.

**Relative dimensions** HL 49; HW 58; UFW 37; LFW 19; IAD 7; ASD 4.5; AOD 9; CAD 9; UCW 9; MCL 19; MCW 18; POW 8.5; COD 2; MSL 0.5; BWM 8; OD 5; IOD 9.5; OOD 9; OCD 5.5; SL 14; SW 7; PL 5.5; PW 5; 1FL 4; 1FW 5; 2FL 4.5; 2FW 5; 3FL 5.5; 3FW 5.

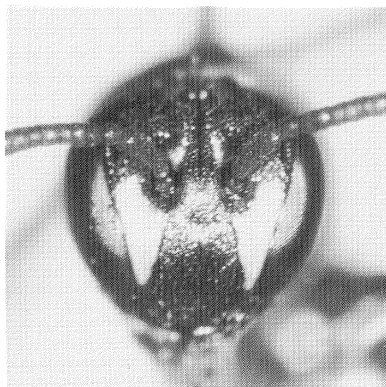
**Coloration** Black, with following maculations or portions yellow: well developed lateral face marks ending angularly at the level of the middle of antennal sockets and not filling lower portions, mark on clypeus not broadly filling preapical portion, irregular marks on lower portion of supraclypeal area, latero-apical obscure spots on scapes, narrow marks on lateral portions of collar of pronotum, tubercles, apical spots on tegulae, apical small obscure spots on all femora, anterior marks on fore tibiae, basal and apical spots on mid tibiae, and basal marks on hind tibiae and basitarsi; fore and mid tarsi and small segments of hind tarsi yellowish brown or light brown; wings very slightly brownish subhyaline, veins and stigma brown.

**Structure** Inner margins of eyes rather strongly convergent below; paraocular areas, clypeus and supraclypeal area more strongly punctate than in *meridianus*; supraclypeal area well convex, upper portion narrow and short, its height rather steeply reduced toward the level of upper margins of antennal sockets; lateral portions of frontal sulcus broadly impunctate, shining, microscopically finely lineolate-reticulate; the rest of frons longitudinally densely striate-punctate, its punctures stronger than those in female; malar space obsolescent; scapes stout. Collar of pronotum rather meagerer than in female; mesoscutum strongly convex in lateral view, dull, coarsely sculptured as in female; scutellum with punctures sparser and slightly larger than those on mesoscutum; punctures on mesopleuron stronger than those in female; propodeum and metasoma more or less as in female.

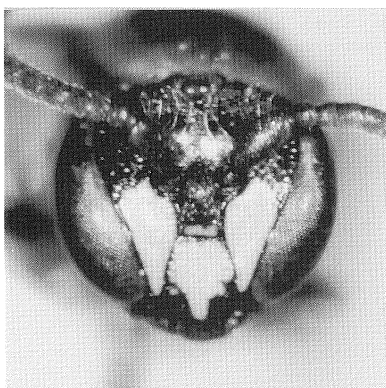
**Pilosity** Mostly as in female.

**Terminalia** See Fig. 77.





A



B

Fig. 76. Heads of *Hylaeus (Paraprosopis) hirashimai*, new species in frontal view. A, female; B, male.

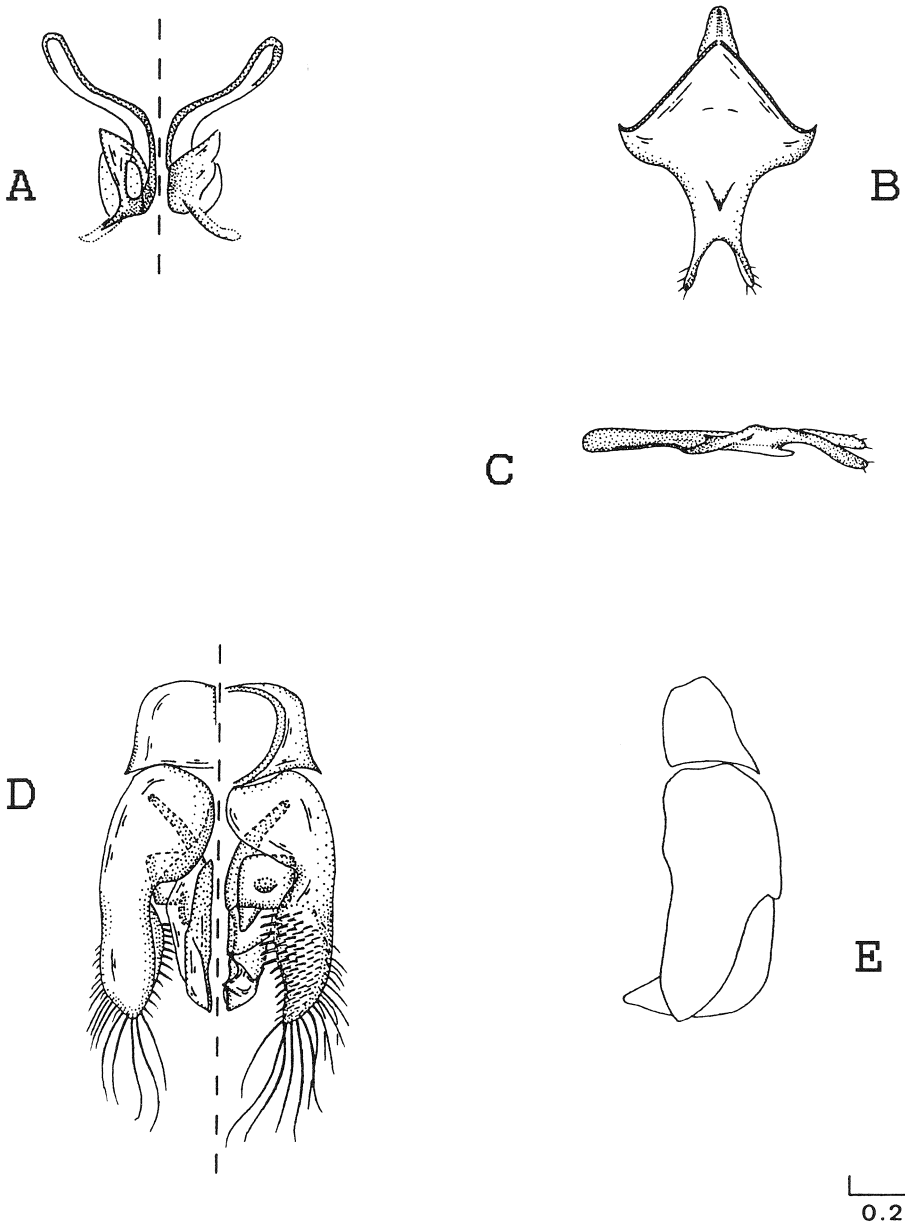


Fig. 77. Male terminalia of *Hylaeus (Paraprosopis) hirashimai*, new species. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.

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**Variation** Females: lateral face marks sometimes beyond the level of upper margins of antennal sockets above and well extending below; small yellow spot sometimes appears on lower portion of clypeus; mark on collar of pronotum sometimes not interrupted in the middle; basal stripes on fore wings often absent. Males: mark on clypeus sometimes spot-like mesially; mark on supraclypeal area sometimes absent; marks on scapes sometimes absent, and stripe-like in materials from Akuseki-jima, Suwanose-jima, Yaku-shima and Hachijo-jima; lateral marks on collar of pronotum sometimes linear, fragmentary or absent; spots on tegulae sometimes absent.

**Remarks** In the point of zoogeographical view, this new species seems to distribute along the Kuroshio (Black Current), and the distribution pattern at least among *H. incomitatus*, *H. meridianus* and *H. hirashimai* seems allopatric (Fig. 75).

**Distribution** Honshu (Fukui Pref.), Hachijo-jima, Okinoshima (Fukuoka Pref.), Tsushima, Kyushu (Kagoshima Pref.), Koshiki-rettō, Yaku-shima, Suwanose-jima and Akuseki-jima (Fig. 75).

**Specimens examined** Besides the above-mentioned type materials and the following materials, 53 females and 255 males were examined: HS: 2♀♀, June 15, 1980 Kamiko, Mikata, Fukui Pref., Y. Haneda. KK: 4♀♀ and 1♂, Aug. 5, 1986 Kashima, S. Ikudome. YK: 74♀♀ and 28♂♂, Aug. 24, 1982 Miyanoura, S. Ikudome. Suwanose-jima: 2♀♀ and 9♂♂, July 30, 1985 S. Ikudome. Akuseki-jima: 3♀♀ and 5♂♂, Aug. 2, 1985 S. Ikudome.

**Flight records** Females, late Apr. to mid-Sep.; males, late Apr. to mid-Oct.

### Floral records.

Araliaceae: *Aralia elata* (Miq.) Seemann, YK 3X.

Compositae: *Erigeron sumatrensis* Retz., TK 0X.

Caprifoliaceae: *Sambucus chinensis* Lindl., TK 0X.

Euphorbiaceae: *Mallotus japonicus* (Thunb.) Muell. Arg., KS 0X, YK 0X.

Myrsinaceae: *Ardisia sieboldii* Miq., YK 0X.

Polygonaceae: *Fagopyrum esculentum* Moench, TS 0X.

Rosaceae: *Pyracantha angustifolia* Schneid., YK 0X;

*Rhaphiolepis umbellata* (Thunb.) Makino, YK 2X.

Rubiaceae: *Psychotria serpens* Linn., TK 0X.

Rutaceae: *Zanthoxylum ailanthoides* Sieb. et Zucc., KK 0X,  
TK 0X.

Staphyleaceae: *Turpinia ternata* Nakai, YK 0X.

Umbelliferae: *Angelica japonica* A. Gray, YK 4X; *Daucus carota* Linn. var. *sativa* DC., KS X; *Glehnia littoralis* Fr. Schm., KS 0X; *Peucedanum japonicum* Thunb., YK 10X.

Vitidaceae: *Ampelopsis brevipedunculata* (Maxim.) Trautv.,  
KS 0X, TK 2X.

**Etymology** The specific name, *hirashimai*, is named after Prof. Y. Hirashima of Kyushu University who is one of the first collectors so far as I know.

(16) *Hylaeus (Paraprosopis) incomitatus* Snelling

[Jap. name: Ki-mune-chibi-mukashi-hanabachi]

(Figs. 75, 78, 79)

*Hylaeus incomitatus* Snelling, 1970, Bull. So. Calif. Acad. Sci., 69(1): 18-19, female.

**TYPE**

Holotype: female, May 17, 1958 Southwest Bay, Ani-jima, Chichi-jima Group, Bonin Islands, F. M. Snyder, in USNM, No. 70755.

**DIAGNOSIS**

*H. incomitatus* is immediately separated from the other Japanese species by having the smaller and slenderer body, yellow axillae, and the ferruginous metasoma.

The male is described here for the first time.

**FEMALE**

Body length 5 mm.

**Relative dimensions** HL 42; HW 46; UFW 32; LFW 23; IAD 8; ASD 4; AOD 6.5; CAD 5; UCW 12; MCL 17; MCW 21; POW 6.5; COD 3; MSL 0.5; BWM 8; OD 4; IOD 8; OOD 8; OCD 6; SL 12; SW 4.5; PL 4; PW 3; 1FL 3; 1FW 4; 2FL 2.5; 2FW 4; 3FL 3; 3FW 4.

**Coloration** Black, with following maculations or portions yellow: well developed lateral face marks terminating

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at lower end of facial foveae, irregular median stripe on lower portion of clypeus, basal spots on mandibles, lateral marks on collar of pronotum, marks on tubercles, anterior spots on tegulae, axillae, apical spots on all femora, and basal stripes on all tibiae; legs otherwise dull to light ferruginous; flagellum ferruginous; wings subhyaline, veins and stigma light brown.

**Structure** Vertex strongly retreating in lateral view; clypeus somewhat shining, scattered with obscure punctures; paraocular area well convex mesad; supraclypeal area well convex, subtriangular, upper portion not distinctly defined from frons, gently merging into frons; frons and vertex finely closely punctate, somewhat shining. Collar of pronotum roundly well convex at lateral portions, abrupt in the middle; mesoscutum and scutellum weakly shining, finely closely punctate; metanotum dull, not rough; mesopleuron shining, sparsely finely punctate but more distinctly lineolate-reticulate than its punctures; propodeum somewhat shining, without TRN and OBL, basal area essentially horizontal and longer than metanotum in the middle, with only a few short irregular rugulae on extreme basal portion, juncture of dorsal and posterior faces well round. Metasomal terga shining, microscopically transversely lineolate-reticulate, scattered with punctures very fine, piligerous.

**Pilosity** Everywhere more or less with sparse, whitish hairs.

### MALE

Body length 4 mm.

**Relative dimensions** HL 43; HW 49; UFW 32; LFW 18; IAD 7; ASD 4; AOD 6; CAD 7.5; UCW 8.5; MCL 16; MCW 17; POW 6.5; COD 2; MSL 0.5; BWM 7; OD 4; IOD 8; OOD 8; OCD 6; SL 12; SW 5.5; PL 4.5; PW 4.5; 1FL 3.5; 1FW 4; 2FL 5; 2FW 4; 3FL 5.5; 3FW 4.5.

**Coloration** Black, with following maculations or portions yellow: lateral face marks ending irregularly at the level of upper margins of antennal sockets, clypeus except preapical portion, transverse mark on lower portion of supraclypeal area, labrum, mandibles except basal and apical

portions, lateral marks on collar of pronotum, axillae, tubercles, apical spots on tegulae, lateral stripes on scapes, apical spots on all femora, anterior marks on fore tibiae, and basal marks on hind tibiae; legs otherwise dull to light ferruginous; flagellum ferruginous, undersides yellowish; apical margin of clypeus ferruginous; apical portions of mandibles glistening reddish.

**Structure** Inner margins of eyes strongly convergent below; genae well developed but narrower than eyes. Collar of pronotum only slightly thickened; anterior portion of mesoscutum more convex than in female; scutellum sparsely punctate; mesopleuron more distinctly punctate than in female; metasoma slender.

**Pilosity** As in female.

**Terminalia** See Fig. 79.

**Variation** Females: spots on mandibles sometimes absent; lateral marks on collar of pronotum sometimes nearly jointed in the middle. Males: lateral face marks sometimes ending beyond upper margins of antennal sockets; marks on mandibles sometimes irregular; spots on tegulae sometimes absent.

**Remarks** This species may be endemic to the Ogasawara-shotô.

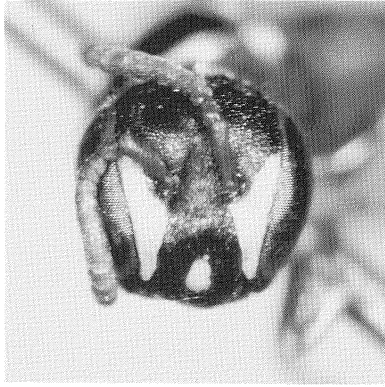
**Distribution** Ogasawara-shotô (Chichi-jima and Haha-jima). Haha-jima is a new locality (Fig. 75).

**Specimens examined** One female and 2 males were examined from the new locality. Haha-jima: Apr. 11, 1973 Sh. F. Sakagami.

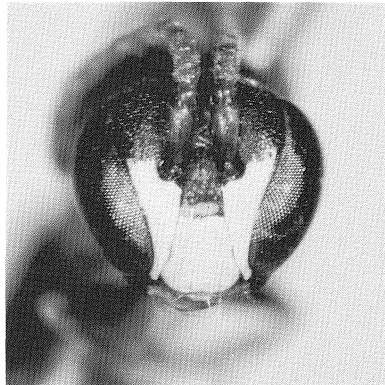
**Flight records** Females and males, Apr. to May.

**Floral records**

Compositae: *Cirsium* sp., Haha-jima 0X.



A



B

Fig. 78. Heads of *Hylaeus* (*Paraprosopis*) *inomitatus* Snelling in frontal view. A, female; B, male.

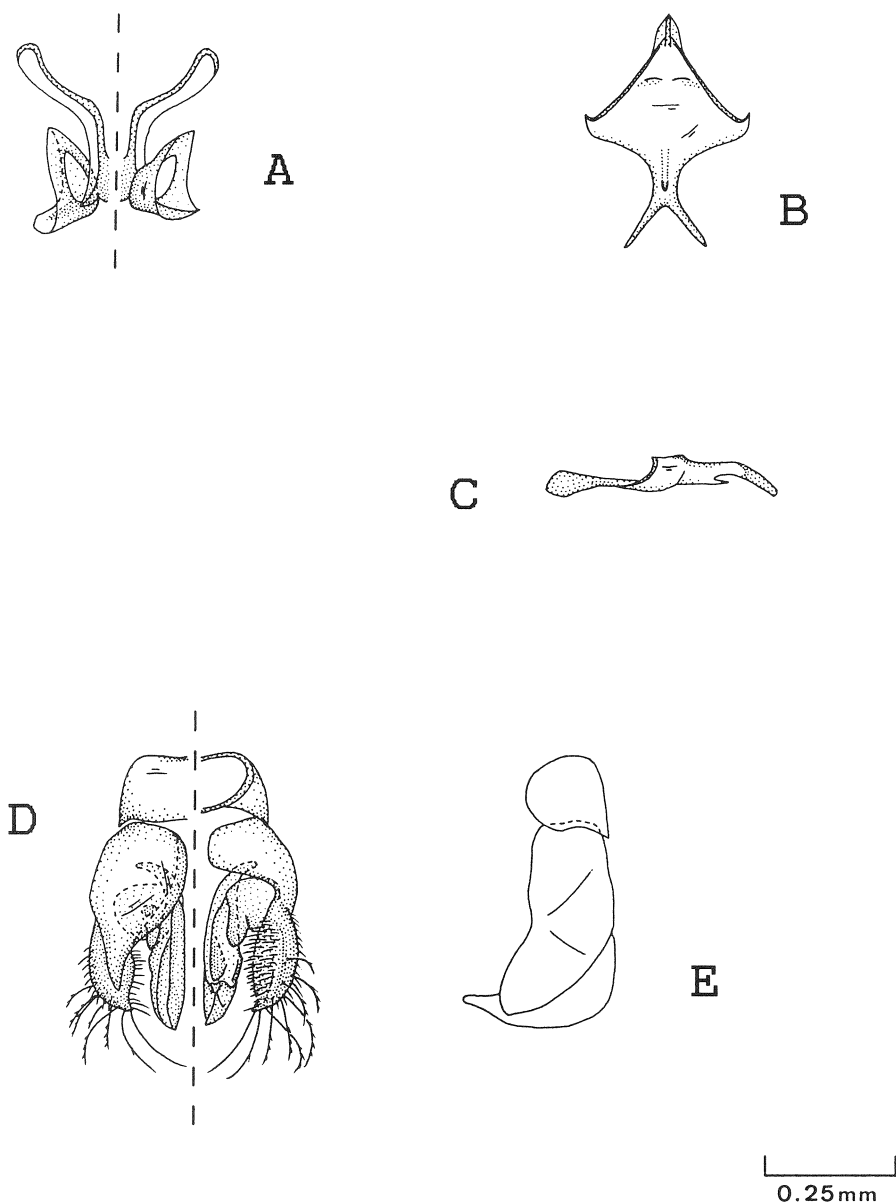


Fig. 79. Male terminalia of *Hylaeus (Paraprosopis) incomitatus* Snelling. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.



(17) *Hylaeus (Paraprosopis) meridianus*

Yasumatsu et Hirashima

[Jap. name: Minami-no-chibi-mukashi-hanabachi]

(Figs. 75, 80, 81)

*Hylaeus meridianus* Yasumatsu et Hirashima, 1965, Kontyû, 33  
(2): 251-252, female.

**TYPE**

Holotype: female, July 31, 1963 Yuwan, Amami-ohshima, Y.  
Hirashima, in KU. Paratopotype: 1 female, in KU.

**DIAGNOSIS**

*H. meridianus* is similar to *H. incomitatus*, but differs from the latter in always having black axillae. And this species is easily distinguished from the other Japanese species by its finely punctated mesopleuron, its ill-defined propodeal enclosure, and its small sized body.

The male is described here for the first time.

**FEMALE**

Body length 4.5-5 mm.

Relative dimensions HL 48; HW 53; UFW 36; LFW 23; IAD 8.5; ASD 4; AOD 8; CAD 5.5; UCW 12; MCL 20; MCW 21.5; POW 8.5; COD 3; MSL 0.5; BWM 9.5; OD 4; IOD 9.5; OOD 8; OCD 6; SL 14; SW 4.5; PL 5; PW 4; 1FL 3.5; 1FW 3.5; 2FL 3; 2FW 4; 3FL 3.5; 3FW 4.

**Coloration** Black, with following maculations or portions yellow: well developed lateral face marks ending obtusely beyond upper margins of antennal sockets above, small spot on lower portion of clypeus, collar of pronotum, tubercles, anterior halves of tegulae except hyaline lateral margins, and basal marks on all tibiae; undersides of flagellum pale brown; wings subhyaline, veins and stigma brown.

**Structure** Clypeus weakly shining, sparsely and very feebly punctate, microscopically lineolate-reticulate; supraclypeal area well convex, lower portion subtriangular, upper portion narrow, slightly dilated laterally, triangularly merging into frons, with distinct median sulcus; lower portions of frons (just above antennal sockets) longitudinally impunctate, shining; frons longitudinally striate-

punctate, its punctures becoming stronger toward eyes; genae narrower than eyes, weakly sparsely punctate. Collar of pronotum roundly convex at lateral portion but not so thick, not linear in the middle; mesoscutum dull, convex in lateral view; densely punctate, its punctures small; scutellum with punctures slightly weaker than those on mesoscutum; metanotum roundly convex, integument finegrained sandpaper-like; mesopleuron somewhat shining, finely lineolate-reticulate (nearly smooth), with punctures weak, rather sparse; propodeal TRN absent, OBL linear carina-like. First mesosomal tergum highly polished, impunctate, but microscopically transversely lineolate-reticulate; 2nd and following terga as in 1st but slightly less shining.

**Pilosity** Hairs on body inconspicuous; scale-like hairs on lateral face of propodeum not dense, whitish; hairs on apical terga of metasoma very short, sparse, brownish.

**MALE**

Body length 3.5-4 mm.

**Relative dimensions** HL 41; HW 47; UFW 32; LFW 15.5; IAD 6; ASD 4; AOD 7; CAD 7.5; UCW 6.5; MCL 16; MCW 15.5; POW 7.5; COD 1.5; MSL 0.5; BWM 6.5; OD 4.5; IOD 9; OOD 7; OCD 5.5; SL 12; SW 5.8; PL 4.8; PW 4.5; 1FL 3; 1FW 4; 2FL 3.5; 2FW 4; 3FL 5.5; 3FW 4.

**Coloration** Black, with following maculations or portions yellow: well developed lateral face marks ending angulately at the level of the middle of antennal sockets, clypeus except apical margin, transverse mark on lower portion of supraclypeal area, collar of pronotum, tubercles, apical spots on tegulae, basal short linear stripes on wings, apical spots on fore and mid femora, anterior marks on fore tibiae, basal halves or one-third of mid and hind tibiae, and marks on all basitarsi; small segments of all tarsi yellowish brown or light brown; flagellum brown, undersides yellowish brown; wings as in female.

**Structure** Upper portion of clypeus nearly flat; supraclypeal area convex, lower portion elongate, upper portion rather narrow, short, its height steeply reduced toward frons; frons dull, with small, rather dense punctures. Col-

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lar of pronotum weakly indicated; mesoscutum strongly convex in lateral view, with punctures very slightly denser than those in female; posterior portion of scutellum with punctures larger than those on mesoscutum; mesopleuron less shining, with punctures denser and slightly larger than those in female; propodeum more or less as in female. Metasoma slightly shining.

**Pilosity** Hairs on metasoma whitish or more light brown than those in female.

**Terminalia** See Fig. 81.

**Variation** Females: lateral face marks sometimes ending at the level of upper margins of antennal sockets; lower spot on clypeus sometimes obscure; marks on collar of pronotum sometimes interrupted in the middle. Males: lateral face marks sometimes beyond upper margins of antennal sockets above, rarely ending strongly acutely along margins of eyes, and lower portions rarely broadly reduced; mark on supra-clypeal area rarely absent or expanded broadly; marks on collar of pronotum sometimes interrupted in the middle; spots on tegulae sometimes absent; basal stripes on wings rarely absent.

**Distribution** Amami-ohshima and Okinawa-jima (new record) (Fig. 75).

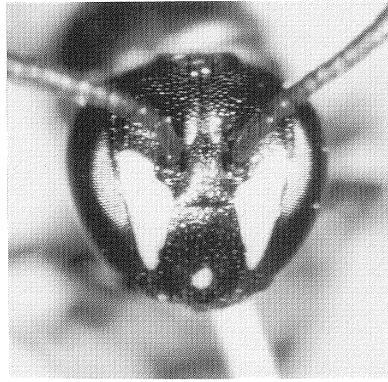
**Specimens examined** The following 10 females and 9 males were examined: AM: 1♀, July 3, 1963 Yuwan, Y. Hirashima; 1♂, Oct. 4, 1971 Shinmura, H. Fukuda. OK: 2♀♀ and 1♂, Mar. 22, 1972 Nakagusuku, ?. Teruya; 7♀♀ and 7♂♂, May 22, 1982 Izumi, Motobu, S. Ikudome.

**Flight records** All records were mentioned above.

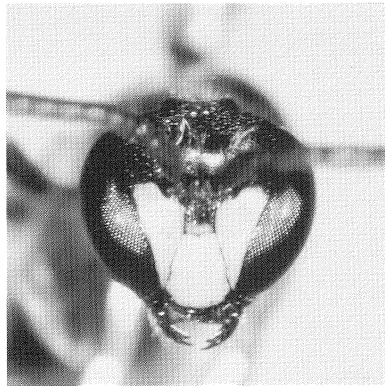
### Floral records

Euphorbiaceae: *Mallotus japonicus* (Thunb.) Muell. Arg. OK X.

Polygonaceae: *Polygonum cuspidatum* Sieb. et Zucc., AM OX.



A



B

Fig. 80. Heads of *Hylaeus (Paraprosopis) meridianus* Yasu-  
matsu et Hirashima in frontal view. A, female; B, male.

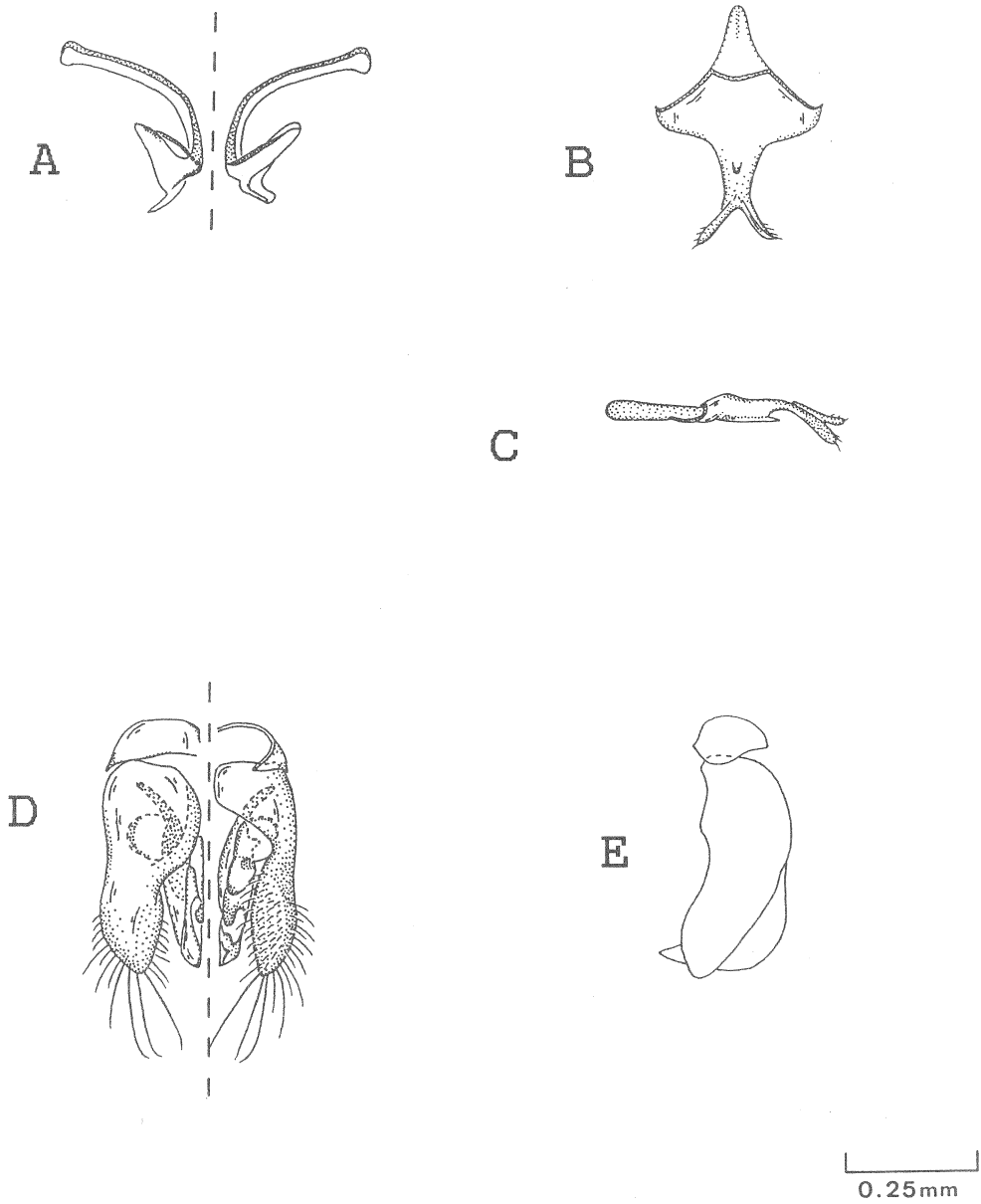


Fig. 81. Male terminalia of *Hylaeus (Paraprosopis) meridianus* Yasumatsu et Hirashima. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.

(18) *Hylaeus (Paraprosopis) yasumatsui* Snelling

[Jap. name: Yasumatsu-chibi-mukashi-hanabachi]

(Figs. 75, 82, 83)

*Hylaeus (Paraprosopis) yasumatsui* Snelling, 1970, Bull. So. Calif. Acad. Sci., 69(1): 5-10, female and male.

**TYPE**

Holotype: male, Apr.26-June 9, 1958 Haha-jima, Bonin Islands, F. M. Snyder, in USNM, No. 70756. Allotype: female, *ibid.*, in USNM, No. 70750. Paratypes: 15 females and 3 males, in BPBM, CAS, LACM and USNM.

**DIAGNOSIS**

Among the bees in the Ogasawara-shotō, *H. yasumatsui* is separable by the black integument with yellow maculae, the densely tessellated and finely closely punctated mesopleuron and the short basal area of the propodeum. The male is separated from *H. ikedai* by the unmodified antennal scapes.

**FEMALE**

Body length 6 mm.

Relative dimensions HL 59; HW 64; UFW 42; LFW 30; IAD 11; ASD 4.5; AOD 9; CAD 5.5; UCW 15; MCL 25; MCW 26; POW 9.5; COD 4; MSL 1.5; BWM 11; OD 5.5; IOD 11; OOD 9.5; OCD 8; SL 18; SW 5.5; PL 6; PW 5; 1FL 4; 1FW 5; 2FL 4; 2FW 5; 3FL 5; 3FW 5.

**Coloration** Black, with following maculations or portions yellow: short median stripe on clypeus, well developed lateral face marks ending acutely along margins of eyes at the level of upper margins of antennal sockets slightly above, marks on collar of pronotum attenuated toward the middle, marks on tubercles, anterior spots on tegulae, and basal spots on all tibiae; undersides of flagellar segments reddish brown; wings slightly brownish subhyaline, veins and stigma brown.

**Structure** Clypeus somewhat shining, slightly convex in profile, upper portion microscopically coarsely lineolate-reticulate, lower portion weakly wrinkled-punctate, microscopically reticulate-striate; apical margin of clypeus distinctly emarginate, its emargination weakly angulate; para-

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ocular areas well convex, keels distinct; supraclypeal area well convex, lower portion subtriangular, scattered with minute punctures, upper portion slightly dilated laterally, gently merging into frons, with distinct median sulcus; frons distinctly coarsely sculptured; lower portions of frons (just above antennal sockets) longitudinally impunctate, somewhat shining. Collar of pronotum similar to *incomitatus*; mesoscutum similar to *meridianus*; scutellum with punctures larger and sparser than those on mesoscutum, nearly flat; mesopleuron like in scutellum but punctures sparser; propodeal enclosure somewhat shining, basal area coarse, weakly carinate, its carinae anastomosing, posterior area not abrupt but precipitous; propodeal TRN and OBL absent or hardly visible. First metasomal tergum somewhat shining, almost impunctate, microscopically distinctly transversely lineolate-reticulate; 2nd and following terga as in 1st but scattered with very fine punctures; metasoma stout.

**Pilosity** Hairs on lateral margins on 1st to 4th terga somewhat glistening white and fringe-like in some light.

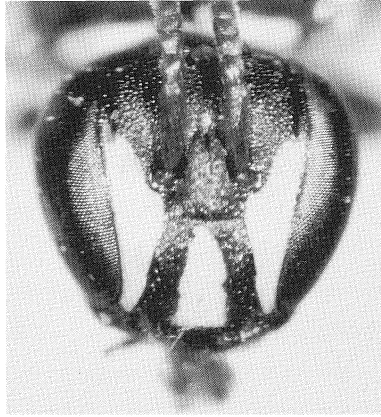
### MALE

Body length 5.5 mm.

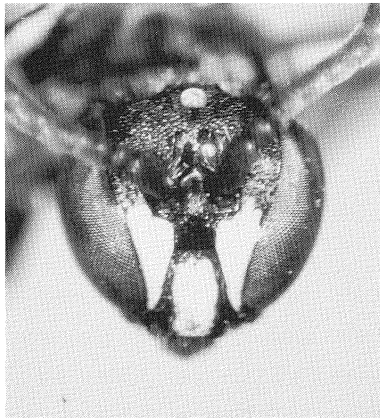
**Relative dimensions** HL 49; HW 53; UFW 34; LFW 19; IAD 6.5; ASD 5; AOD 6; CAD 7.5; UCW 8; MCL 19; MCW 19; POW 7; COD 2; MSL 0.5; BWM 8; OD 5; IOD 9.5; OOD 8; OCD 4.5; SL 14; SW 7; PL 5; PW 5.5; 1FL 4; 1FW 5.5; 2FL 4.5; 2FW 5; 3FL 7; 3FW 5.

**Coloration** Black, with following maculations or portions yellow: irregular median stripe on clypeus, paraocular area terminating irregularly at the level of the middle of antennal sockets, lateral linear marks on collar of pronotum, apical marks on tubercles, apical small spots on all femora, rich marks on fore tibiae, and basal marks on mid and hind tibiae; undersides of flagellum yellowish brown; wings slightly brownish subhyaline, veins and stigma fuscous.

**Structure** Inner margins of eyes strongly convergent below; clypeus well convex, obscurely wrinkled-punctate, its punctures large, not dense; paraocular areas hardly convex; supraclypeal area convex, lower portion subtriangularly



A



B

Fig. 82. Heads of *Hylaeus (Paraprosopis) yasumatsui* Snelling in frontal view. A, female; B, male.



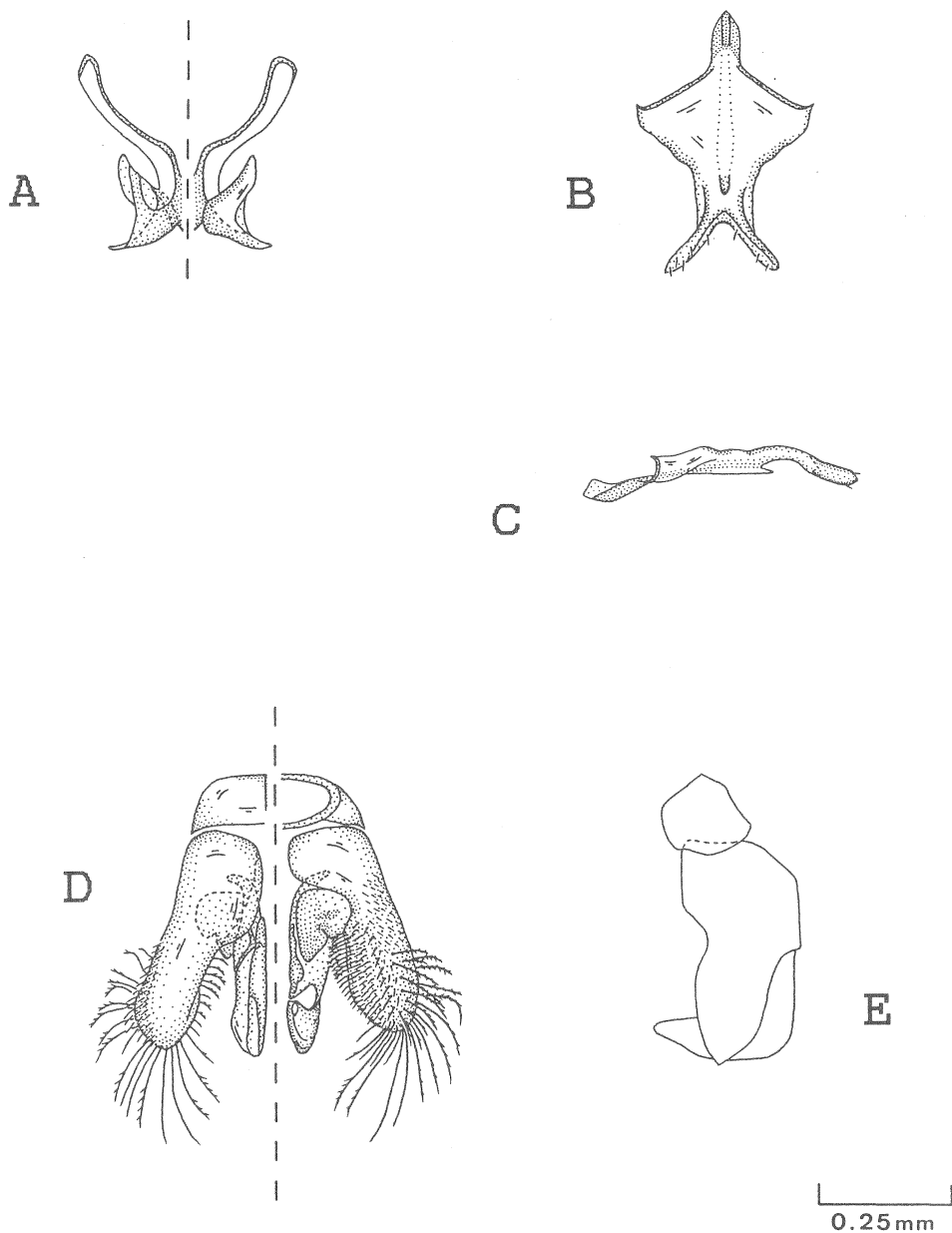


Fig. 83. Male terminalia of *Hylaeus (Paraprosopis) yasumatsui* Snelling. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.

elongate, upper portion rather narrow, its height rather steeply reduced; frons slightly convex on both sides of median sulcus, with areas impunctated as in female; vertex and occiput rather coarsely sculptured. Collar of pronotum only slightly thick at lateral portions; mesoscutum rather strongly convex in lateral view. First tergum broadly scattered with fine, piligerous punctures on lateral portions, its punctures more distinct than those in female.

**Pilosity** Hairs on mesoscutum rather short, fine, erect to subappressed.

**Terminalia** See Fig. 83.

**Variation** Females: lateral marks on collar of pronotum sometimes nearly jointed in the middle; spots on tegulae often absent. Males: marks on clypeus sometimes nearly filling its space; lateral face marks often reduced up and down; lateral marks on collar of pronotum often reduced or absent; marks on tubercles and basal marks on mid and hind tibiae sometimes small spot-like.

**Remarks** This species may be endemic in the Ogasawara-shotō.

**Distribution** Ogasawara-shotō (Chichi-jima and Haha-jima) (Fig. 75).

**Specimens examined** The following 3 females and 3 males were examined: Haha-jima: 3♀♀, Apr. 15, 1973 Kitakō, 1♂, Apr. 17, 1973 Kitakō, Sh. F. Sakagami; 2♂♂, Aug. 11, 1983 Kitakō, T. Nambu.

**Flight records** Females, Apr. to July; males, Apr. to Aug.

**Floral records**

Compositae: *Bidens* sp., OG 0X; *Cirsium* sp., OG 0X.

(19) *Hylaeus (Prosopis) monticola* Bridwell

[Jap. name: Yama-no-chibi-mukashi-hanabachi]

(Figs. 84-86)

*Hylaeus monticola* Bridwell, 1919, Proc. Hawaii. Ent. Soc., 4(1): 155-156, female and male.

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*Hylaeus monticola*: Hirashima, 1965, Icon. Ins. Jap. Colore Nat. Edita, 3: 303, female.

### TYPE

Allotype and paratypes: 2 females and 4 males, July - Aug. 1913 Chuzenji (4000-5000 ft.), F. Muir., in BC. Present: paratypes, 1 female and 2 males, in USNM, No. 50734; allotype and the other paratypes, unknown (so far as I know).

### DIAGNOSIS

*H. monticola* is very closely allied to *H. submonticola* as in the relationship between *H. floralis* and *H. globula*. *H. monticola* is separated from *H. submonticola* only by characters as mentioned in the key on the careful observation. The females in both species are characteristic of the well convex face at the lower portion and the nearly pit-reticulate clypeus.

### FEMALE

Body length 7 mm.

Relative dimensions HL 66; HW 69; UFW 48; LFW 32; IAD 11.5; ASD 5; AOD 10; CAD 7.5; UCW 13.5; MCL 27; MCW 29; POW 11; COD 5.5; MSL 2.3; BWM 11; OD 5.5; IOD 11; OOD 10; OCD 8.5; SL 21; SW 6.5; PL 6; PW 5.5; 1FL 5.8; 1FW 5.5; 2FL 3.5; 2FW 5.8; 3FL 5.8; 3FW 5.8.

Coloration Black, with following maculations or portions yellow: lateral marks on face reduced triangularly and along margins of eyes, apical spots on tubercles, basal spots on fore and mid tibiae, and basal one-fourth or -third of hind tibiae; undersides of flagellum reddish brown; veins and stigma brown.

Structure Clypeus obscurely wrinkled-punctate; the height of upper portion of supra-clypeal area somewhat roundly reduced toward frons. Mesoscutum and scutellum somewhat shining, mesopleuron more shining; propodeum well round; carinae on anterior portion of propodeal enclosure becoming irregular and evanescent toward posterior portion which is microscopically transversely lineolate-reticulate. First metasomal tergum polished, shining, with rather fine acupunctures in some places, but microscopically very weakly transversely lineolate-reticulate; 2nd and following terga

less shining.

**Pilosity** Collar of pronotum clothed with dull white, fringe-like hairs behind; hairs on mesoscutum short, appressed, brownish; hairs on lateral margins of 1st to 3rd terga somewhat glistening white and fringe-like in some light; hairs on 2nd tergum short, fine, brownish, becoming longer toward posterior terga.

**MALE**

Body length 6.5 mm.

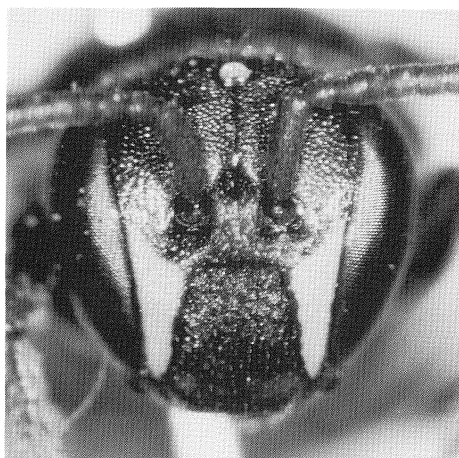
**Relative dimensions** HL 61; HW 64; UFW 42; LFW 29; IAD 8; ASD 5; AOD 10.5; CAD 8.5; UCW 11; MCL 25.5; MCW 24; POW 11; COD 4.8; MSL 2.5; BWM 10.5; OD 5.5; IOD 10; OOD 11.5; OCD 7.5; SL 18; SW 8.5; PL 5.8; PW 6; 1FL 5.5; 1FW 6; 2FL 4.5; 2FW 6; 3FL 7; 3FW 6.

**Coloration** Black, with following maculations or portions yellow: lower portion of the level of antennal sockets, clypeus except apical margin, anterior stripes on scapes, apical interior marks on fore femora, anterior marks on fore tibiae, basal spots on mid tibiae, basal marks on hind tibiae, and rich marks on mid and hind basitarsi; apical margin of clypeus brownish; undersides of flagellum reddish or brownish; wings evidently brownish subhyaline, veins and stigma brown.

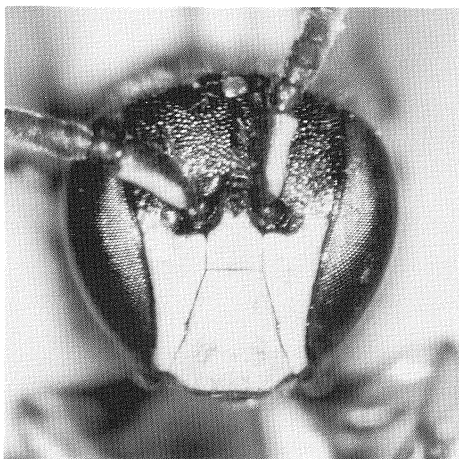
**Structure** Punctures on clypeus and paraocular areas small, not wrinkled; height of upper portion of supraclypeal area steeply reduced toward frons. Thorax more or less as in female. First metasomal tergum somewhat shining, scattered with very minute punctures; 3rd sternum with weak transverse protuberance on medio-apical portion which is concave in the middle, that on 4th sternum weaker.

**Pilosity** Hairs behind collar of pronotum as in female; hairs on mesoscutum short, erect, whitish brown; 1st tergum with whitish hairs, becoming darker toward following terga; lateral margins of 1st tergum with fringe of white hairs, those of 2nd to 3rd terga and 2nd to 4th sternum somewhat glistening white and fringe-like in some light.

**Terminalia** See Fig. 85.



A



B

Fig. 84. Heads of *Hylaeus (Prosopis) monticola* Bridwell in frontal view. A, female; B, male.

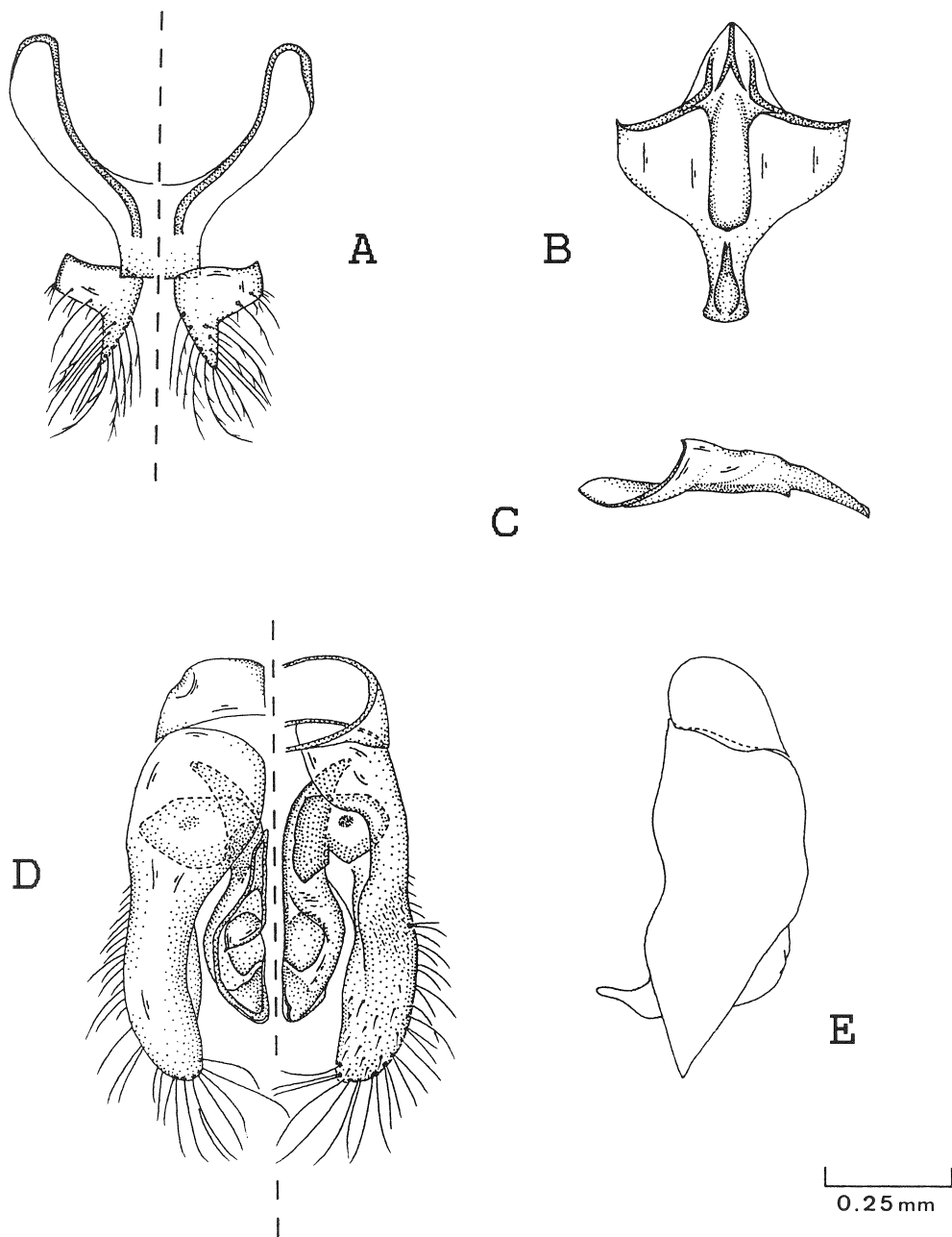


Fig. 85. Male terminalia of *Hylaeus (Prosopis) monticola* Bridwell. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.

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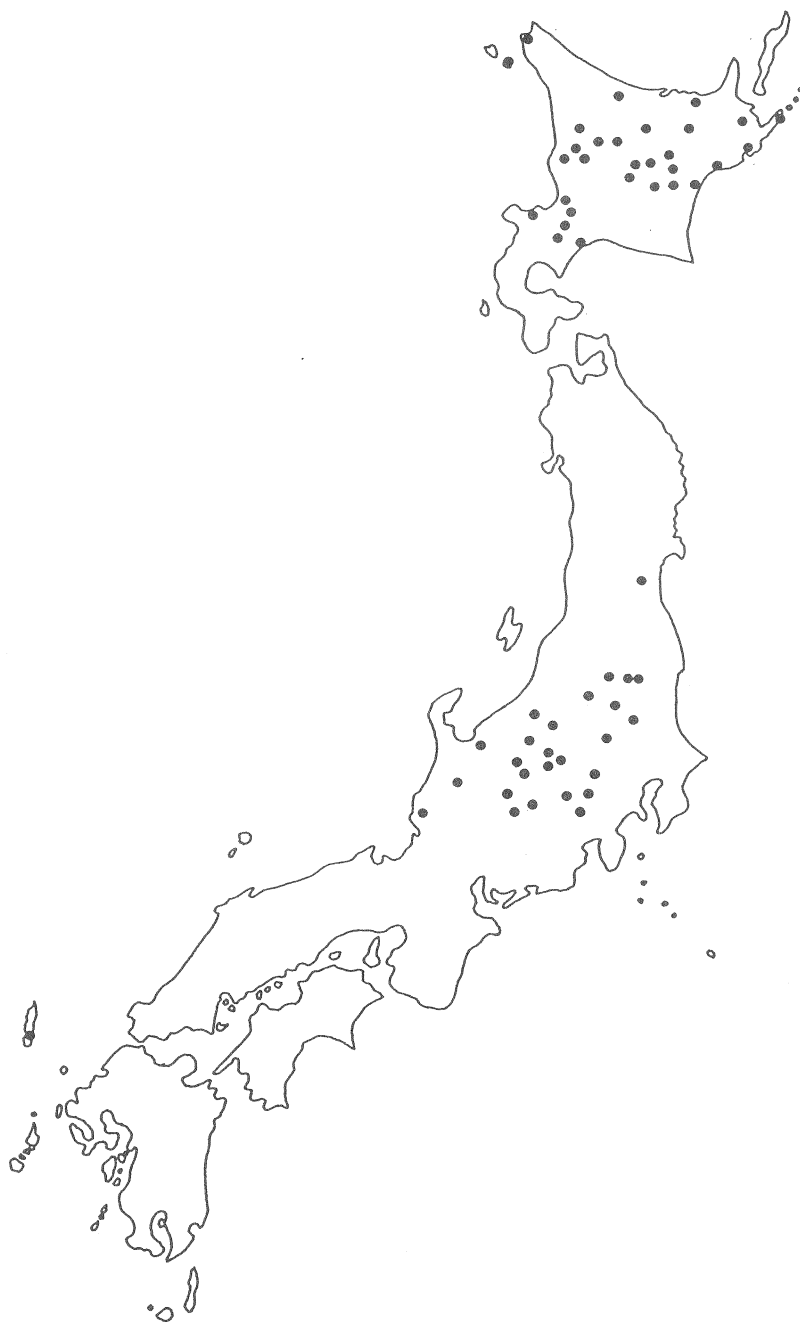


Fig. 86. A map showing the distribution of *Hylaeus (Prosopis) monticola* Bridwell.

**Variation** Females: lower portion of clypeus sometimes reddish or yellowish brown; apical spots on tubercles often absent. Males: apical spots on tubercles often nearly evanescent; transverse protuberance on 3rd sternum sometimes like a pair of gibba or obscure, that on 4th sternum sometimes obscure.

**Distribution** Hokkaido, Rishiri-tô (new record), Honshu (mountainous regions in the central Japan) and Tsushima (new record) (Fig. 86).

**Specimens examined** The specimens from new localities to be emphasized are as follows, and besides, 137 females and 88 males were examined: RR: 2♀ and 1♂, Aug.9, 1983 Oshidomari, K. Hoshikawa. TS: 1♂, June 19, 1975 J. Emoto.

**Flight records** HD: females, mid-June to mid-Sep.; males, mid-May to late Aug. HS: females, mid-June to mid-Sep.; males, mid-June to late Aug. RR and TS: all records are above-mentioned.

**Floral records**

Araliaceae: *Aralia cordata* Thunb., HD OX.

Compositae: *Achillea alpina* Linn., HD OX; *Anaphalis margaritacea* (Linn.) Benth. et Hook. var. *angustior* (Miq.) Nakai, HD OX; *Aster glehnii* Fr. Schm., HD OX; *Breca setosa* (Bieb.) Kitam., HD OX; *Chrysanthemum leucanthemum* Linn., HD OX; *Erigeron annuus* (Linn.) Pers., HD OX; *Picris hieracioides* Linn. var. *glabrescens* (Regel) Ohwi, HD OX, HS OX; *Solidago altissima* Linn., HD OX; *Taraxacum hondoense* Nakai ex H. Koidz., HD X, *T. officinale* Weber, HD OX.

Cruciferae: *Rorippa indica* (Linn.) Hochr., HD OX.

Geraniaceae: *Geranium erianthum* DC., HD OX, *G. thunbergii* Sieb. et Zucc., HD OX, *G. yezoense* Franch. et Savat. var. *pseudo-palustre* Nakai, HD OX.

Rosaceae: *Agrimonia japonica* (Miq.) Koidz., HD OX; *Aruncus dioicus* (Walt.) Fernald var. *tenuifolius* (Nakai) Hara, HD OX, HS OX; *Geum pentapetalum* (Linn.) Makino, HS OX; *Rosa davurica* Pallas, HD OX, *R. rugosa* Thunb., HD OX; *Rubus parvifolius* Linn., HD OX; *Sanguisorba albiflora* (Makino) Makino, HS OX; *Spiraea salicifolia* Linn., HD X.

Umbelliferae: *Angelica ursina* (Rupr.) Maxim., HD OX;



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*Anthriscus sylvestris* (Linn.) Hoffm., HD OX.

(20) *Hylaeus (Prosopis) submonticola*, new species  
[Jap. name: Yama-no-chibi-mukashi-hanabachi-modoki]  
(Figs. 87-89)

**TYPE**

Holotype: female (Type No. 2713, Kyushu Univ.), Aug. 6, 1975 Yagen-onsen, Aomori Pref., Honshu, T. Nambu. Paratopotypes: 5 females and 3 males, in KU. Paratypes: 3 females and 1 male, July 25, 1973 Otarunai, Hokkaido, H. Fukuda; 4 males July 17-27, 1953 Kawakami nr. Honbetsu, Hokkaido, Y. Hirashima; 1 male, July 3, 1960 Jozankei, Sapporo, Hokkaido, M. Shiokawa; 4 females, Aug. 12, 1979 Mt. Osorezan, Aomori Pref., Honshu, Y. Maeta; 5 males, July 13, 1956 Yunomata, Oohata-machi, Aomori Pref., Honshu, K. Morimoto; 1 male, June 22, 1952 Mt. Mitake, Tokyo, R. Ishikawa; 1 male, July 20, 1985 Mt. Rokuman, Ishikawa Pref., I. Togashi; 1 male, Sep. 7, 1951 Omogo, Iyo (Ehime Pref.), Shikoku, Y. Hirashima; 1 male, Aug. 4, 1951 Mt. Hikosan, Bungo, Kyushu, K. Yasumatsu; in KU.

**DIAGNOSIS**

This new species is a close relative of the sympatric *H. monticola*. Characteristics are that the supraclypeal area is distinctly constricted from the sides in the middle and its upper portion is distinctly dilated laterally even in the male, that lower portions of the frons (just above antennal sockets) are broadly impunctate in both sexes, and that the lower portion of face (from the antennal sockets below) is filled with yellow marks in the male.

**FEMALE**

Body length 7 mm.

Relative dimensions HL 66; HW 71; UFW 45; LFW 32; IAD 11.5; ASD 5.5; AOD 10; CAD 8; UCW 15.5; MCL 29; MCW 28; POW 10; COD 5; MSL 2; BWM 11.5; OD 6; IOD 11; OOD 9.5; OCD 8.5; SL 20; SW 6.5; PL 6; PW 5.5; 1FL 5.5; 1FW 6; 2FL 3.5; 2FW 6; 3FL 5.5; 3FW 5.8.

Coloration Black, with following maculations or por-

tions yellow: well developed lateral face marks not beyond the level of upper margins of antennal sockets above, marks on lateral portions of collar of pronotum, marks on tubercles, and basal spots on all tibiae (small in fore and mid tibiae); lower portion of clypeus broadly reddish or yellowish brown; undersides of flagellum reddish brown; wings evidently brownish subhyaline, veins and stigma brown.

**Structure** Lower face well convex in lateral view; clypeus and paraocular areas as in *monticola*; supraclypeal area broad, strongly convex, upper portion with distinct median sulcus and punctures, its height reduced slightly roundly toward frons. Collar of pronotum strongly thickened laterally, thined in the middle; mesoscutum dull, coarsely sculptured, with punctures slightly larger and more separated from each other than those in *monticola*; scutellum and mesopleuron as in mesoscutum; propodeal enclosure as in *monticola*, but posterior portion slightly abrupt; propodeal TRN and OBL absent. Metasoma also as in *monticola*.

**Pilosity** More or less as in *monticola*.

#### MALE

Body length 6.5 mm.

**Relative dimensions** HL 63; HW 67; UFW 42; LFW 29; IAD 10; ASD 5.5; AOD 8; CAD 10; UCW 12.5; MCL 26; MCW 26; POW 9; COD 4.5; MSL 2; BWM 10.5; OD 6; IOD 11; OOD 10; OCD 8; SL 18; SW 7; PL 6; PW 6; 1FL 4.8; 1FW 6.5; 2FL 5.5; 2FW 6; 3FL 7.5; 3FW 6.

**Coloration** Black, with following maculations or portions yellow or yellowish ivory: lower face, basal stripes on mandibles, linear marks on lateral portions of collar of pronotum, apical spots on tubercles, anterior spots on tegulae, apical interior marks on fore femora, rich marks on fore tibiae, basal spots on mid tibiae, basal marks on hind tibiae, and rich marks on all basitarsi; apical margin of clypeus reddish brown; undersides of flagellum reddish or brownish; wings as in female.

**Structure** Head slightly broader than long; inner margins of eyes distinctly convergent below; clypeus and paraocular areas as in *monticola*; supraclypeal area broader than

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in *monticola*, strongly convex, triangular, upper portion narrow, its height steeply reduced toward lower frons, with distinct median sulcus and punctures; antennal scapes slenderer than those in *monticola*. Thorax and metasoma more or less as in *monticola*.

**Pilosity** Hairs on mesoscutum short, subappressed, fuscous; hairs on metasoma as in *monticola*.

**Terminalia** See Fig. 88.

**Variation** Females: lateral face marks often reduced triangularly as in *monticola*, but even in this case well extending below; marks on collar of pronotum sometimes obscure spots-like or rarely absent; small yellow spots rarely appear on anterior portions of tegulae. Males: lateral face marks sometimes ending acutely along margins of eyes, and rarely beyond the level of upper portion of antennal sockets above; mark on clypeus rarely reduced on upper portion, in this case mark on supraclypeal area absent; linear marks on lateral portions of collar of pronotum often obscure or sometimes absent; apical spots on tubercles rarely absent; anterior spots on tegulae often absent.

**Distribution** Hokkaido, Honshu, Shikoku and Kyushu (Fig. 89).

**Specimens examined** Besides the above-mentioned type materials, 126 females and 72 males were examined.

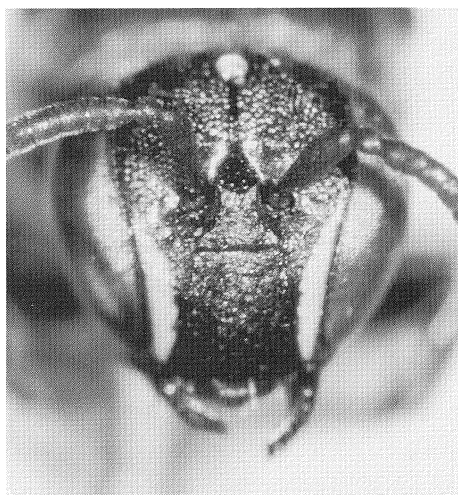
**Flight records** HD: females, late June to late Sep.; males, early July to mid-Aug. HS: females, late June to early Oct.; males, late May to mid-Sep. SK and KS: all records were mentioned above.

### Floral records

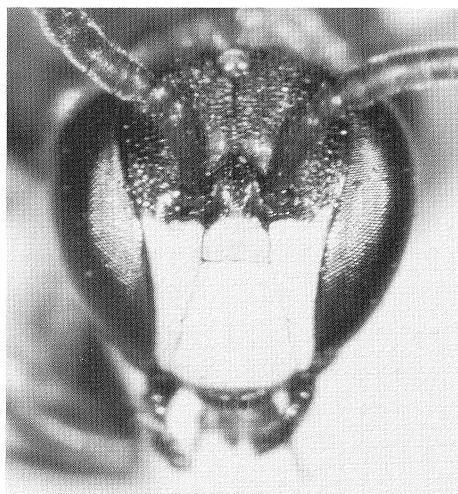
Anacardiaceae: *Rhus javanica* Linn., HS 0X.

Araliaceae: *Aralia cordata* Thunb., HD 0X, HS 0X; *A. elata* (Miq.) Seemann, HS 0X.

Compositae: *Achillea alpina* Linn., HD 0X; *Aster glehnii* Fr. Schm., HD 0X; *Erigeron annuus* (Linn.) Pers., HD 2X; *Picris hieracioides* Linn. var. *glabrescens* (Regel) Ohwi, HD 0X, HS 0X; *Taraxacum hondoense* Nakai HD 0X, *T. officinale* Weber, HD 0X.



A



B

Fig. 87. Heads of *Hylaeus (Prosopis) submonticola*, new species in frontal view. A, female; B, male.

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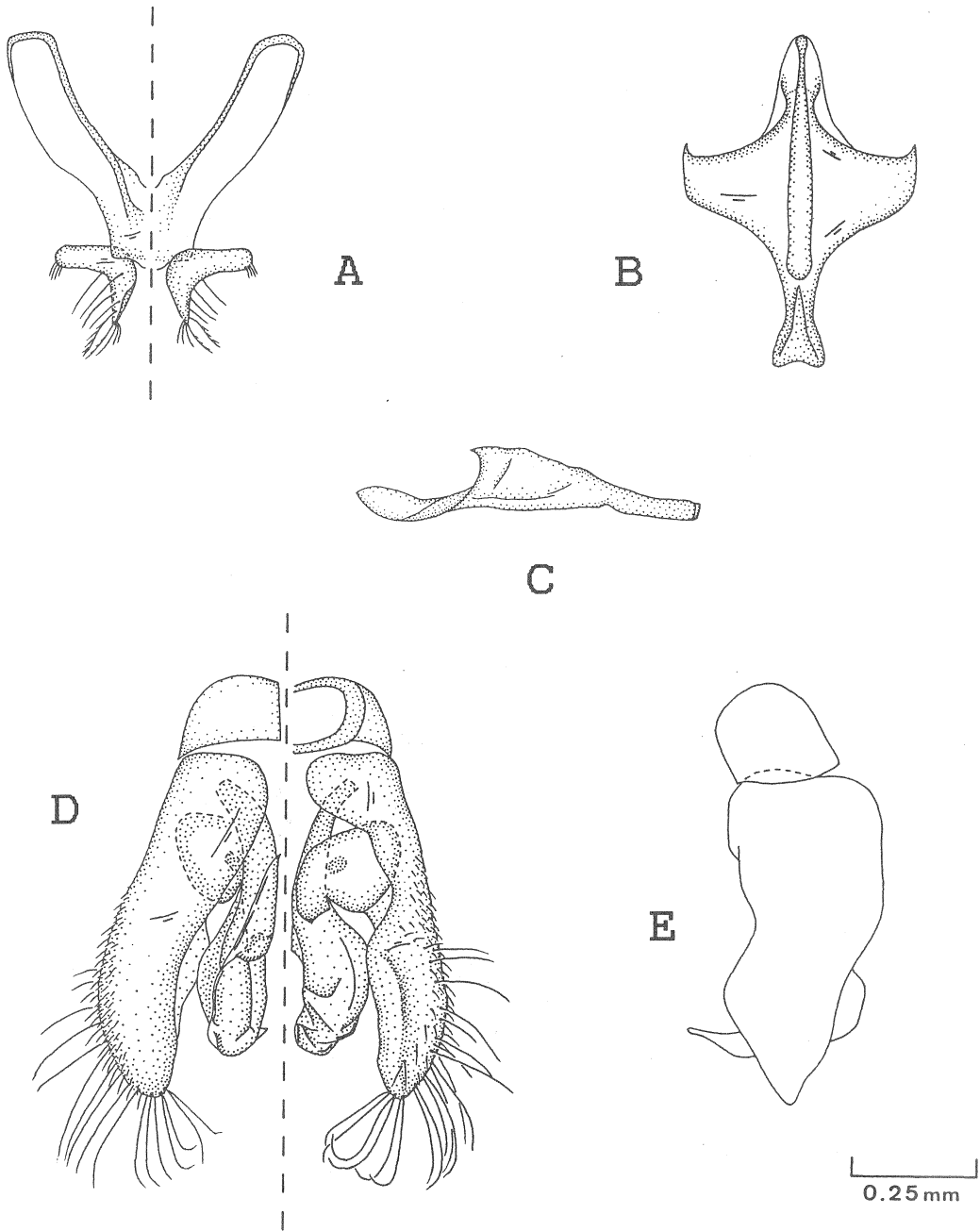


Fig. 88. Male terminalia of *Hylaeus (Prosopis) submonticola*, new species. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.



Fig. 89. A map showing the distribution of *Hylaeus (Prosopis) submonticola*, new species.

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Guttiferae: *Hypericum erectum* Thunb., HS OX.

Leguminosae: *Vicia cracca* Linn., HD OX.

Onagraceae: *Oenothera erythrosepala* Borbás, HD OX.

Oxalidaceae: *Oxalis stricta* Linn., HD OX.

Primulaceae: *Lysimachia clethroides* Duby, HD OX.

Rosaceae: *Agrimonia japonica* (Miq.) Koidz., HS OX; *Sorb-  
aria sorbifolia* (Linn.) A. Br. var. *stellipila* Maxim., HD OX;  
*Rosa multiflora* Thunb., HS OX, *R. rugosa* Thunb., HD OX;  
*Rubus phoenicolasium* Maxim., HD OX; *Spiraea japonica* Linn.,  
HS OX, *S. salicifolia* Linn., HD OX.

Saxifragaceae: *Deutzia crenata* Sieb. et Zucc., HS OX.

Scrophulariaceae: *Veronicastrum sibiricum* (Linn.) Pennell,  
HD OX.

Umbelliferae: *Angelica edulis* Miyabe, HS OX, *A. poly-  
morpha* Maxim., HS OX, *A. pubescens* Maxim., HS OX, *A. ursina*  
(Rupr.) Maxim., HD OX; *Glehnia littoralis* Fr. Schm., HD OX;  
*Torilis japonica* (Houtt.) DC., HD OX.

**Etymology** "Sub" of the specific name is a Latin prefix  
meaning near, in reference to its similarity to *H. monticola*.

(21) *Hylaeus ikedai* (Yasumatsu)

[Jap. name: Ikeda-chibi-mukashi-hanabachi]

(Figs. 90-92)

*Prosopis ikedai* Yasumatsu, 1936, Trans. Nat. Hist. Soc. For-  
mosa, 26: 356-358, female.

*Hylaeus ikedai*: Yasumatsu, 1955, Bull. Biogeogr. Soc. Japan,  
16-19: 220, female.

*Hylaeus ikedai*: Snelling, 1970, Bull. So. Calif. Acad. Sci.,  
69(1): 10-14, female and male.

**TYPE**

Holotype: female, Aug. 6, 1935 Fukurozawa, Chichi-jima,  
Bonin Islands, H. Ikeda, in KU.

**DIAGNOSIS**

It is characteristic of this species that the head is as  
long as broad, that the supraclypeal area is broad, and is  
well defined by the peripheral areas of antennal sockets

which are distinctly concave, that the preapical portions of the terga and sterna are membranous and brownish to yellowish, and that the posterior portion of propodeal enclosure is slightly but distinctly longitudinally concave in the middle in the male. This species is easily separable from the other Japanese species by the combination with the key. Further, the male is immediately separable from the other Ogasawara-shotô species by the expanded scapes which are much broader than long, and by the presence of a polished, glabrous swelling on the 3rd and 4th sternum. The female most closely resembles *H. yasumatsui*, but is distinguishable by the shiny, densely punctate mesopleuron, and by the long basal propodeal area.

#### FEMALE

Body length 5 mm.

Relative dimensions HL 58; HW 58; UFW 43; LFW 28; IAD 11; ASD 4; AOD 9.5; CAD 6.5; UCW 13; MCL 25; MCW 22; POW 10.5; COD 4; MSL 1.8; BWM 10; OD 5.3; IOD 9.5; OOD 9; OCD 6.5; SL 18; SW 6.5; PL 5; PW 5; 1FL 5; 1FW 5; 2FL 3.3; 2FW 5; 3FL 4; 3FW 5.

Coloration Black, with following maculations or portions yellow: well developed lateral face marks not beyond the level of upper margins of antennal sockets above, small spots on medio-apical portion of clypeus, apical halves of tubercles, anterior spots on tegulae, basal spots on fore wings, apical small and obscure spots on all femora, anterior marks on fore tibiae, basal marks on mid and hind tibiae, and basal spots on hind basitarsi; remaining tarsal segments brownish; undersides of flagellum yellowish brown; wings brownish subhyaline, veins and stigma fuscous.

Structure Clypeus distinctly wrinkled punctate, upper portion flat in profile; frons obliquely striate-punctate, its punctures small, rather dense; occiput narrow. Collar of pronotum roundly thickened latero-anteriorly, its thickness reduced toward the middle but still thick; mesoscutum slightly shining, with minute punctures; scutellum nearly flat; mesopleuron shining, with small, dense punctures. First metasomal tergum highly polished, with fine acupunc-



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tures in some places; 2nd and following terga microscopically transversely lineolate-reticulate, with acupunctures denser than those on 1st.

**Pilosity** Hairs on mesoscutum and mesopleuron somewhat goldish; hairs on metasomal terga fine, yellowish white, becoming longer toward apical terga; lateral margins of 1st to 4th terga each with white fringes; hairs on legs yellowish.

### **MALE**

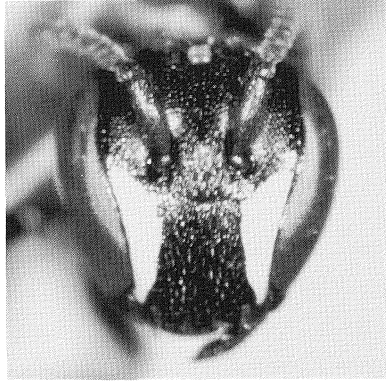
Body length 5 mm.

**Relative dimensions** HL 55; HW 56; UFW 38; LFW 22; IAD 8; ASD 4.5; AOD 9.5; CAD 9.5; UCW 8.5; MCL 23; MCW 17; POW 10; COD 4; MSL 1.5; BWM 9; OD 5; IOD 9; OOD 8.5; OCD 5; SL 16; SW 20; PL 5; PW 5.5; 1FL 4; 1FW 5.8; 2FL 4; 2FW 5.5; 3FL 6; 3FW 5.5.

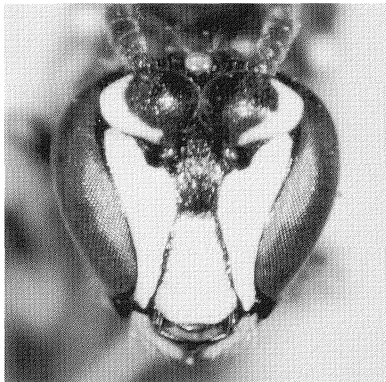
**Coloration** Black, with following maculations or portions pale yellow: broad mandibular stripes, labral tubercle, clypeus except margins, well developed lateral face marks ending bluntly at the level of antennal sockets slightly above, broad stripes on ventral margins of scapes and narrow stripes on dorsal ones, small spots on supraclypeal area, small spots on genae, tubercles, anterior spots on tegulae, basal spots on fore wings, apical small spots on all femora, outer stripes on fore tibiae, basal and apical marks on mid and hind tibiae, and all basitarsi; remaining tarsal segments ferruginous, becoming darker distally; undersides of flagellum light ferruginous beneath.

**Structure** Lower portion of face nearly flat in lateral view; upper portion of auproclypeal area less defined than in female. Collar of pronotum less indicated than in female; punctures on mesoscutum and scutellum slightly smaller and denser than those in female, those on mesopleuron slightly larger and denser than those in female, its interspaces well polished. Apical margin of second tergum strongly depressed.

**Pilosity** First to 5th terga each with lateral fringes of white hairs which are more rich or more distinct than those in female; 2nd and 4th sterna each with somewhat glistening fringe-like white hairs in some light on apical mar-



A



B

Fig. 90. Heads of *Hylaeus ikedai* (Yasumatsu) in frontal view. A, female; B, male.

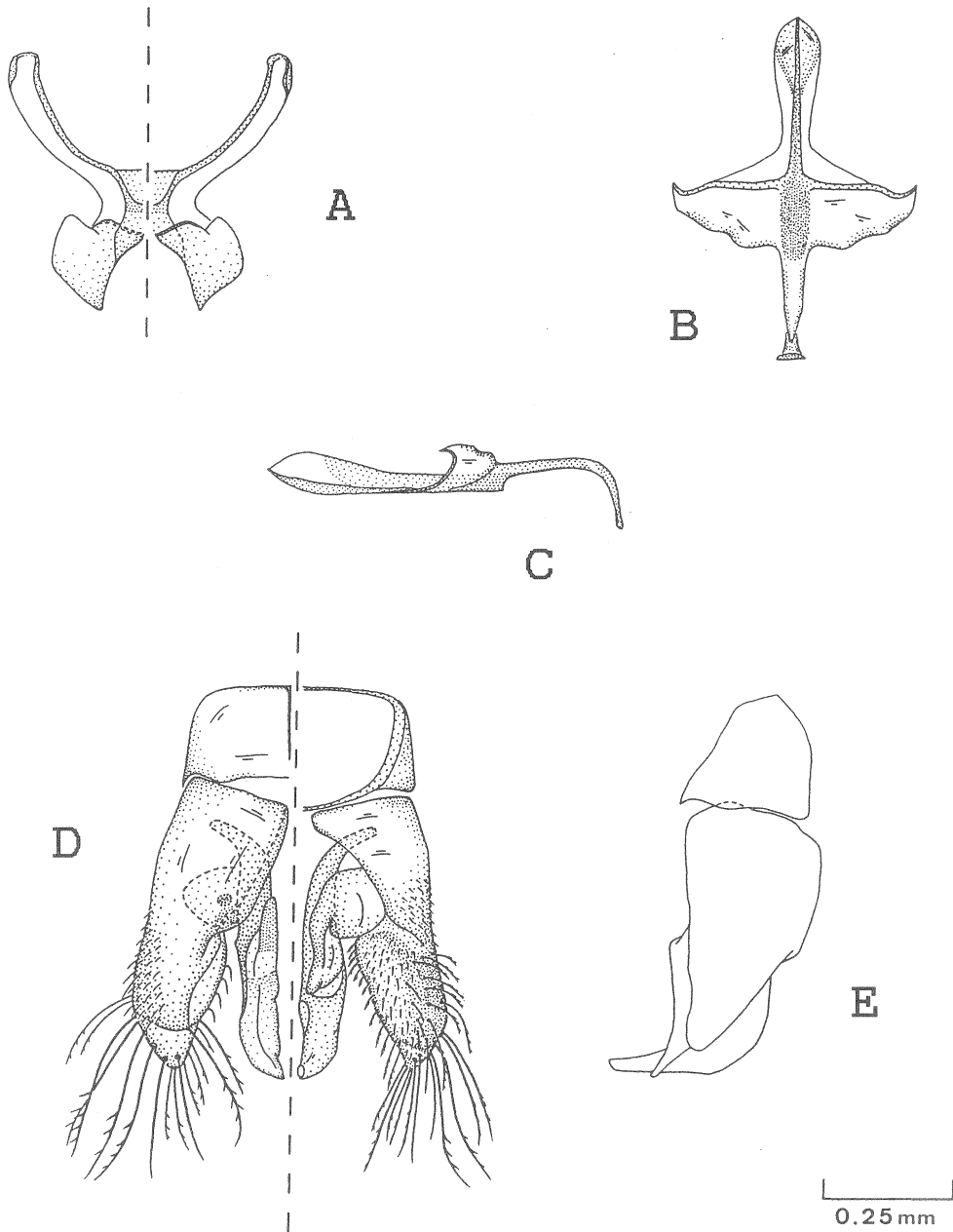


Fig. 91. Male terminalia of *Hylaeus ikedai* (Yasumatsu). A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.

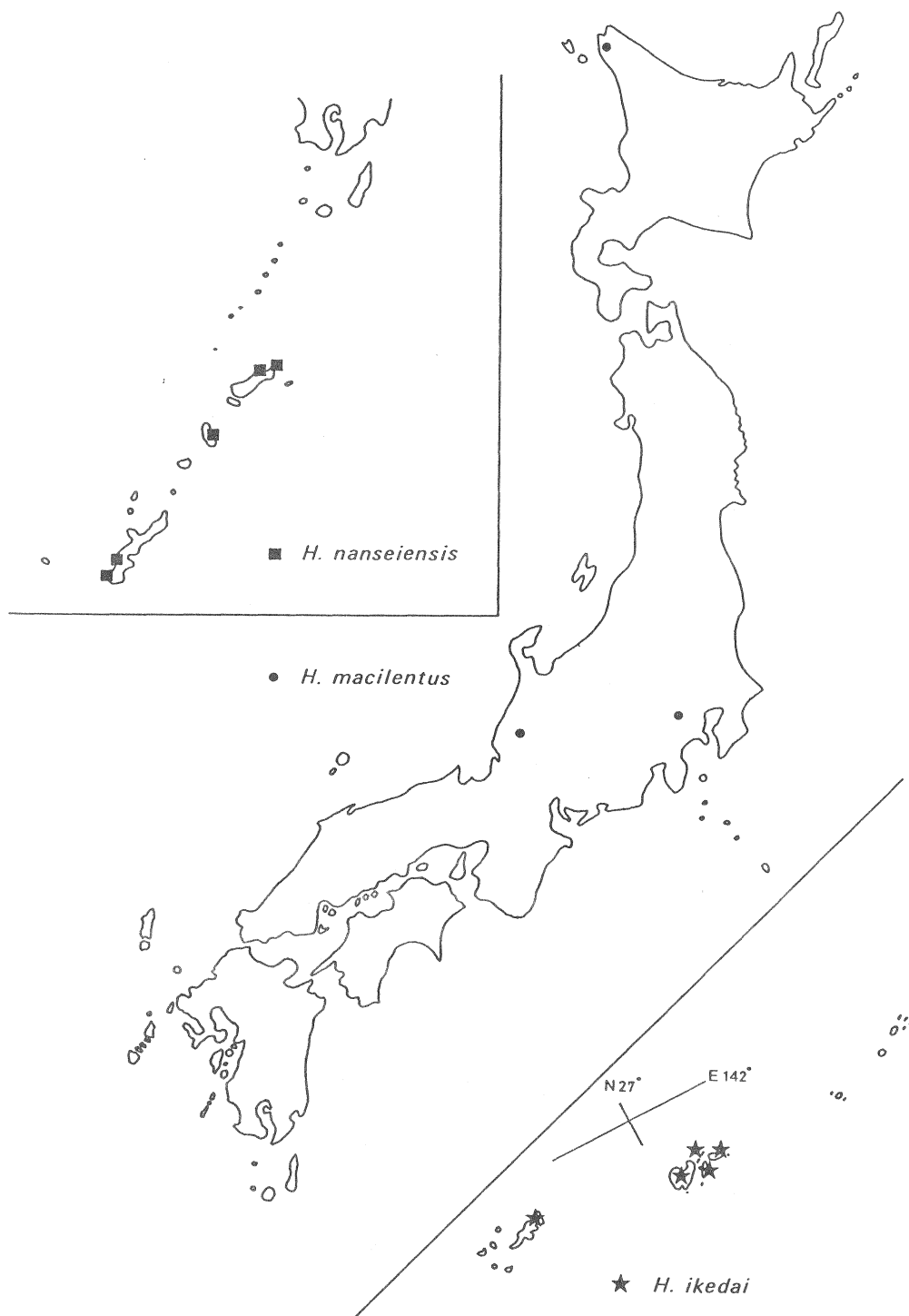


Fig. 92. A map showing the distribution of *Hylaeus ikedai*, (Yasumatsu), *nanseiensis*, n. sp. and *macilentus*, n. sp.

gin.

**Terminalia** See Fig. 91.

**Variation** Females: small spot on clypeus sometimes obscure or absent. Males: spots on supraclypeal area and genae often absent.

**Distribution** Ogasawara-shotō (Otōto-jima, Ani-jima, Nishi-jima, Chichi-jima and Haha-jima) (Fig. 92).

**Specimens examined** The following 24 females and 6 males were examined: Haha-jima: 21♀♀, Apr.15,1973 Kitakō, 3♂♂, Apr. 18,1973 Kitakō, Sh. F. Sakagami; 3♀♀ and 3♂♂, Aug.11,1983 Kitakō, T. Nambu.

**Flight records** Females and males: Apr. to Aug.

**Floral records**

Compositae: *Circium* sp., OG 2X.

(22) *Hylaeus nanseiensis*, new species

[Jap. name: Nansei-chibi-mukashi-hanabachi]

(Figs. 92-94)

**TYPE**

Holotype: female (Type No. 2714, Kyushu Univ.), Aug.8, 1972 Naha, Okinawa Is., T. Nambu. Paratopotypes: 1 female and 2 males, in KU. Paratypes: 1 female, July 26,1954 Nase, Amami-ohshima, S. Hisamatsu; 1 male, Mar.26,1973 Cape Ayamaru, Amami-ohshima, O. Tadauchi; in KU.

**DIAGNOSIS**

*H. nanseiensis* is closely allied to *H. bridwelli* (= *H. gnathylaeoides*, male), but the pronotal collar is entirely immaculate, the occiput is steeply inclinate, and the punctures on the mesoscutum is well separate. Further, *H. nanseiensis* is very similar to *H. ikedai*, which has the summit of the pronotal collar nearly concealed by rich hairs as seen from above, but the former has not such hairs. And besides, the mesoscutum and the frons of *H. nanseiensis* are more finely separately punctate and more shining than those in *H. ikedai*.

**FEMALE**

Body length 4.5-5 mm.

**Relative dimensions** HL 50; HW 50; UFW 36; LFW 23; IAD 10; ASD 4; AOD 7.5; CAD 4.5; UCW 12.5; MCL 20; MCW 21; POW 7.5; COD 2.5; MSL 0.5; BWM 8; OD 4.5; IOD 8; OOD 8; OCD 5; SL 14; SW 5; PL 5; PW 4.5; 1FL 4; 1FW 4.5; 2FL 2.5; 2FW 4.5; 3FL 3; 3FW 4.5.

**Coloration** Black, with following maculations or portions yellow: well developed lateral face marks not beyond the level of upper margins of antennal sockets above, tubercles, anterior spots on tegulae, apical obscure spots on all femora, outer marks on fore tibiae, and basal marks on mid and hind tibiae; all tarsi fuscous or brownish; undersides of flagellum yellowish brown; wings slightly brownish subhyaline, veins and stigma fuscous.

**Structure** Head nearly circular in outline as seen in front; inner margins of eyes distinctly convergent below; clypeus weakly wrinkled-punctate, microscopically reticulate-striate, slightly shining, the outline arched-like in profile; paraocular keels weak; supraclypeal area similar to *ikedai*; lower portions of frons (just above antennal sockets) longitudinally impunctate, microscopically lineolate-reticulate; frons minutely sparsely punctate, its interspaces smooth, shining; genal areas about two-thirds times as broad as eyes. Collar of pronotum slightly roundly thickened antero-laterally, its thickness reduced toward the middle; mesoscutum and scutellum nearly polished, with punctures fine, sparse; mesopleuron shining, with punctures denser and larger than those on mesoscutum, but evidently smaller than those in *ikedai*; propodeum well round, its enclosure hardly defined and slightly shining, anterior portion rather broad, with carinae very weak and longitudinal, subtriangle area of posterior portion very small. First metasomal tergum highly polished but microscopically weakly transversely lineolate-reticulate on preapical portion, with acupunctures in some places; 2nd and following terga microscopically weakly transversely lineolate-reticulate, with sparse acupunctures; preapical portions of 1st to 5th terga and sterna broadly

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membranous and subhyaline.

**Pilosity** Hairs on mesoscutum very fine, short, appressed, somewhat goldish brown; hairs on metasomal terga rather short, fine, brownish; lateral margins of 1st to 4th terga each with distinct fringes of white hairs, but those of 4th less rich; hairs on posterior sterna intermixed with distinctly branched ones.

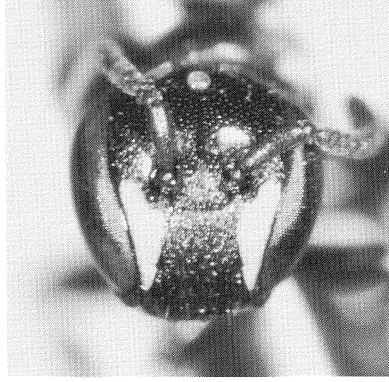
### MALE

Body length 4.5 mm.

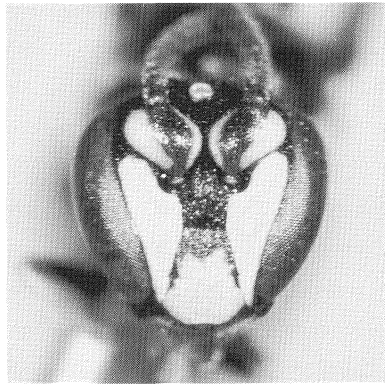
**Relative dimensions** HL 48; HW 49; UFW 34; LFW 20; IAD 6.5; ASD 4; AOD 8; CAD 7.5; UCW 8; MCL 19; MCW 17.5; POW 8; COD 2; MSL 0.5; BWM 8.5; OD 4.5; IOD 9; OOD 7; OCD 4; SL 14; SW 15; PL 4; PW 4; 1FL 3.5; 1FW 4; 2FL 2.5; 2FW 4; 3FL 4; 3FW 4.5.

**Coloration** Black, with following maculations or portions yellow or slightly brownish yellow: well developed lateral face marks ending roundly beyond the level of upper margins of antennal sockets above, clypeus except marginal areas, stripes on mandibles, labral tubercle, scapes except median stripes, tubercles, anterior spots on tegulae, apical small spots on all femora, outer stripes on fore and mid tarsi, basal halves of hind tibiae, and all basitarsi; small segments of all tarsi brownish; undersides of flagellum yellowish brown; apical margin of clypeus reddish brown; metasomal 5th to 7th terga and 5th to 6th sterna yellowish brown or reddish brown; wings similar to female.

**Structure** Clypeus less arched-like than in female in profile; paraocular areas concave, keels absent; upper portion of supraclypeal area very narrowed triangularly; scapes strongly expanded obliquely up and down. Collar of pronotum poorly indicated as in *ikedai*; punctures on mesoscutum and scutellum very slightly closer than those in female; posterior portion of propodeal enclosure longitudinally concave but weaker than in *ikedai*. Preapical portion of 1st to 3rd terga distinctly depressed; 3rd sternum with a pair of strong, spine-like protuberances on latero-median portions, its protuberances weakly connected in the middle; 4th sternum also with transverse protuberance but very weak and not



A



B

Fig. 93. Heads of *Hylaeus nanseiensis*, new species in frontal view. A, female; B, male.



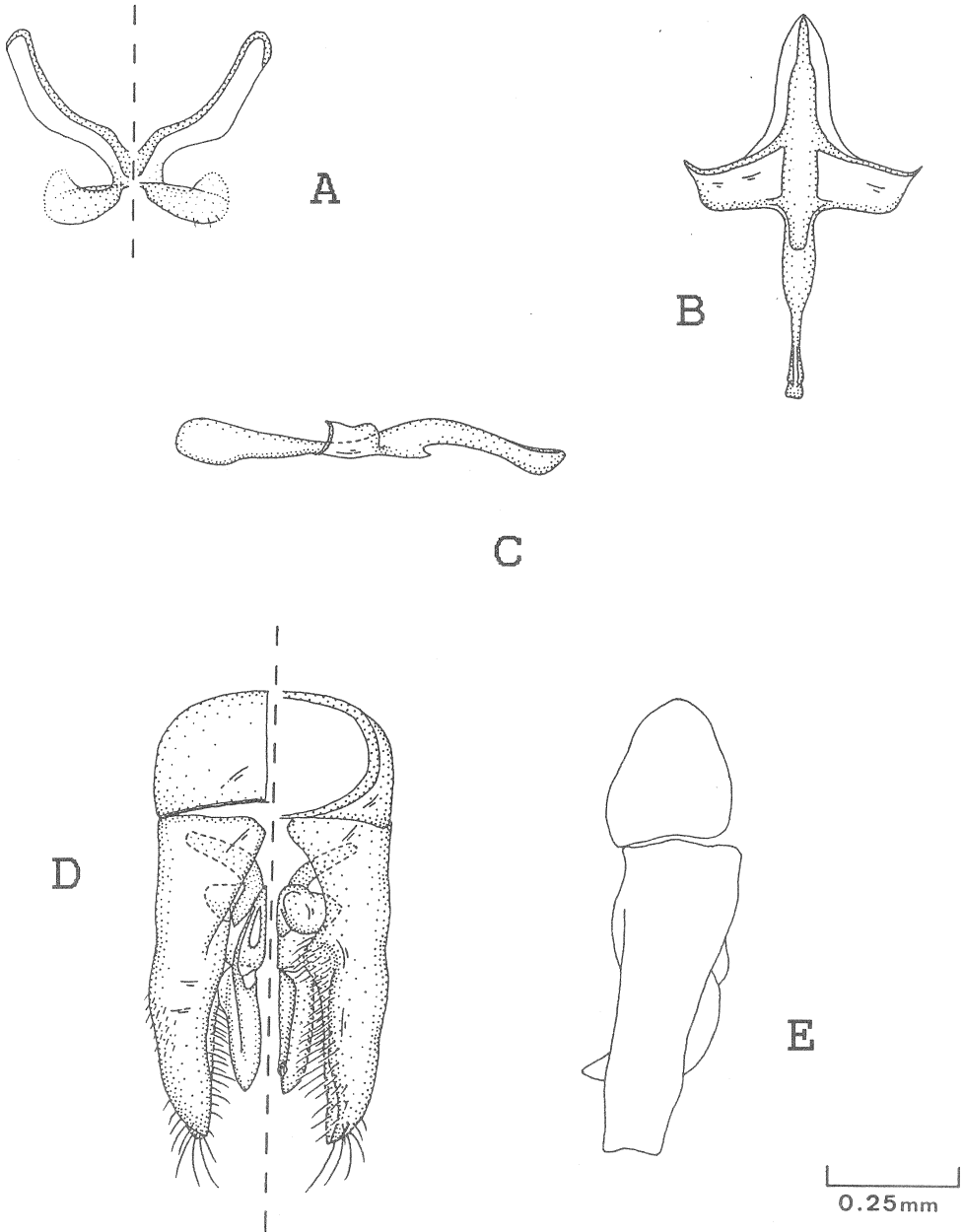


Fig. 94. Male terminalia of *Hylaeus nanseiensis*, new species. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.

long.

**Pilosity** Similar to female.

**Terminalia** See Fig.94.

**Variation** Females: in one material from Tokuno-shima: lateral face marks beyond the level of upper margins of antennal sockets above and ending acutely along margins of eyes; yellow spots appear on lower portion of clypeus and basal wings, in one material from Amami-ohshima: hairs on meso-scutum whitish; collar of pronotum with tomenta of white hairs behind.

**Distribution** Amami-ohshima, Tokuno-shima, Okinawa-jima and Miyako-jima (Fig. 92).

**Specimens examined** Besides the type materials mentioned above, the following 1 female and 5 males were examined: Tokuno-shima: 1♀, Aug.1,1972 San, T. Nambu. OK: 3♂♂, June 1958 Koza and Ikehara, N. L. H. Krauss; 1♂, Aug.8,1972 Naha, T. Nambu. Miyako-jima: 1♂, July 17,1987 Sk. Yamane.

**Flight records** All records were above-mentioned.

**Floral record** Not available.

**Etymology** The specific name refers to the locality, Nan-sei-shotō.

(23) *Hylaeus macilentus*, new species

[Jap. name: Hosochibi-mukashi-hanabachi]

(Figs. 92, 95, 96)

**TYPE**

Holotype: female (Type No. 2715, Kyushu Univ.), June 12, 1986 Fujimi-cho, Tachikawa-shi, Tokyo, H. Takahashi. Paratopotypes: 1 female and 1 male, in KU. Paratypes: 1 female and 2 males, July 23,1953 Horonobe, Teshio, Hokkaido, R. Ishikawa; 1 female and 1 male, Aug.26,1971 Ohno, Fukui Pref., Y. Haneda; 1 female, Sep.27,1965 Ohno, Fukui Pref., Y. Haneda; in KU.

**DIAGNOSIS**

*H. macilentus* is closely allied to *H. ikedai* or *H. nan-*

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*seiensis*, but the head is distinctly longer than broad, and the collar of pronotum is not completely concealed with hairs in both sexes. Further, the protuberance of the male 3rd sternum is very weak beyond comparison with *H. ikedai*, *H. nanseiensis* or *H. bridwelli* (= *H. gnathylaeoides*, male). And, this new species is easily separated from the other Japanese species by the rather slender body.

### FEMALE

Body length 5.5 mm.

Relative dimensions HL 49; HW 45; UFW 33; LFW 21; IAD 8; ASD 4; AOD 7.5; CAD 6; UCW 10; MCL 20; MCW 19; POW 8; COD 2.5; MSL 1; BWM 8; OD 4; IOD 9; OOD 8; OCD 4; SL 13; SW 4.8; PL 4.5; PW 4; 1FL 4.5; 1FW 4; 2FL 2.5; 2FW 4; 3FL 3.5; 3FW 4.

Coloration Black, with following maculations or portions yellow or yellowish ivory: lateral face marks not reaching the level of lower margins of antennal sockets and reduced along lateral margins of clypeus, apical spots on tubercles, anterior spots on tegulae, basal small spots on wings, outer marks on fore tibiae, basal marks on mid and hind tibiae, and basal marks on mid and hind basitarsi; remaining tarsal segments yellowish brown or brown; undersides of flagellum brownish; wings subhyaline, veins and stigma brown.

Structure Face rather slender as seen in front; inner margins of eyes weakly convergent below; clypeus somewhat shining, weakly wrinkled-punctate, microscopically distinctly pit-reticulate; paraocular keels very slightly indicated at lower portions; supraclypeal area well defined by peripheral areas of antennal sockets which is concave as in *ikedai* or *nanseiensis*, lower portion distinctly striate; frons shining, densely minutely punctate; occiput steeply inclinate below; genae slightly narrower than eyes. Collar of pronotum weakly indicated, antero-lateral portions slightly convex, middle portion linearly thin; mesoscutum somewhat shining, microscopically well lineolate-reticulate, weakly punctate, its punctures dense as in *ikedai* but smaller and denser than those in *nanseiensis*; scutellum roundish; punctures on mesopleuron dense, slightly larger than those on

mesoscutum; propodeal enclosure ill-defined, wet-likely shining, horizontally elongate, anterior portion nearly rough at basal portion, its surrounding area rather weakly radially carinate, posterior portion roundish but steeply inclinate below; propodeal TRN and OBL absent. First metasomal tergum highly polished, with fine acupunctures in some places; 2nd tergum also well polished but microscopically transversely lineolate-reticulate, scattered with punctures as in 1st; 3rd and following terga somewhat shining, with punctures more distinct than those on 2nd; preapical portion of 1st to 5th terga and 1st to 4th sterna membranous, subhyaline.

**Pilosity** Collar of pronotum clothed with dense, short, dull white, pulvose hairs, but not completely concealed surface; hairs on mesoscutum rather short, fine, appressed, whitish; hairs on 1st and 2nd terga hardly conspicuous, but lateral margins of 1st to 4th terga each with fringes of white hairs; hairs on 3rd and following terga fine, whitish, becoming brownish toward apical terga; posterior sterna intermixed with branched hairs.

**MALE**

Body length 5 mm.

**Relative dimensions** HL 46; HW 43; UFW 31; LFW 18.5; IAD 6; ASD 4; AOD 6; CAD 8; UCW 7; MCL 15; MCW 18; POW 8; COD 2.5; MSL 1; BWM 7; OD 3.5; IOD 7.5; OOD 7.5; OCD 3.5; SL 13; SW 11.5; PL 4; PW 4.5; 1FL 4; 1FW 4.5; 2FL 4; 2FW 4.5; 3FL 5; 3FW 4.

**Coloration** Black, with following maculations or portions yellow: well developed lateral face marks slightly beyond the level of upper margins of antennal sockets above and ending obtusely along margins of eyes, clypeus (except margins) reduced on upper portion, stripes on mandibles, apical spots on tubercles, outer marks on fore tibiae, basal marks on mid and hind tibiae, and mid and hind basitarsi; remaining segments of tarsi yellowish or brownish; scape slightly brownish on outer margins; flagellum brownish, its undersides slightly yellowish; wings similar to female.

**Structure** Paraocular areas slightly concave; upper

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portion of supraclypeal area very narrowed, subtriangularly gently merges into frons; antennal scapes strongly expanded at apical portion in especial, but slightly less broader than long. Thorax similar to female except mesopleuron which is nearly smooth, shining, and except posterior portion of propodeal enclosure concave. Metasoma clavate as seen from above; preapical margins of 1st to 4th terga weakly depressed, somewhat membranous, those of 1st to 5th sterna distinctly membranous; 3rd sternum with a pair of gibba-like protuberances rather weak, close each other in the middle.

**Pilosity** Hairs on head and thorax white; collar of pronotum clothed with hairs as in female; hairs on mesoscutum suberect; hairs on metasoma whitish, but brownish on posterior terga and sterna; 5th and following terga and posterior sterna intermixed with distinctly branched hairs; lateral margins of 1st to 4th terga each with fringes of white hairs; hairs on sterna long, nearly erect.

**Terminalia** See Fig. 96.

**Variation** Females: in one material, small yellow spot appears on lower portion of clypeus; in another material (from Hokkaido), lateral face marks small spot-like, marks on tubercles and tegulae absent. Males: yellow spots on tegulae often absent.

**Distribution** Hokkaido and Honshu (Fig. 92).

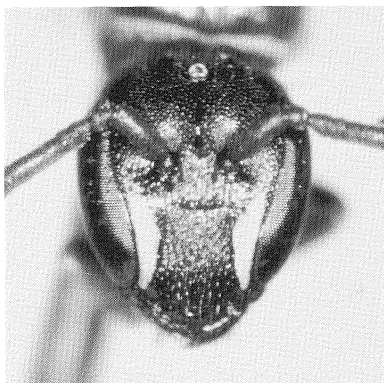
**Specimens examined** Besides the type materials mentioned above, 1 female and 1 male were examined: HS: 1♀, July 4, 1976 Fukui Pref., T. Nozaka; 1♂, same data as holotype.

**Flight records** Females, July to Sep.; males, July to Aug.

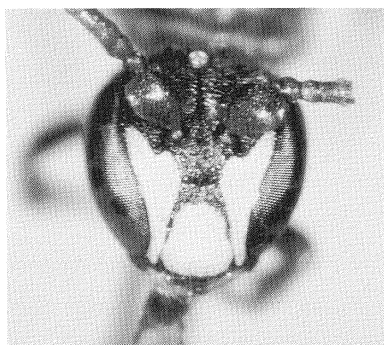
**Floral records**

Compositae: *Erigeron annuus* (Linn.) Pers., HS 0X.

**Etymology** The specific name, *macilentus*, is a Latin word meaning thin or lean, in reference to its slender body.



A



B

Fig. 95. Heads of *Hylaeus macilentus*, new species in frontal view. A, female; B, male.

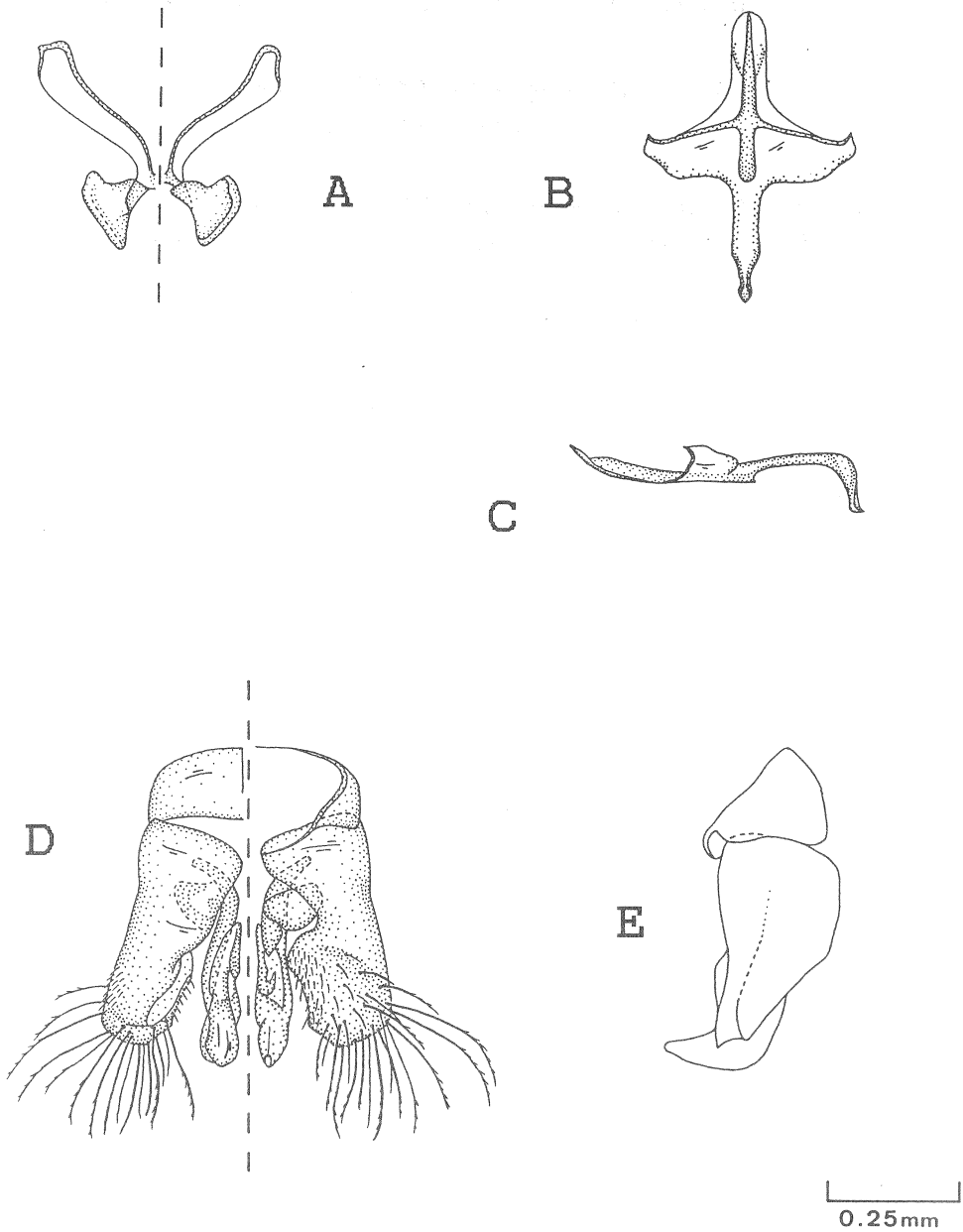


Fig. 96. Male terminalia of *Hylaeus macilentus*, new species. A, 7th sternum, left half in ventral view, right half in dorsal view; B, 8th sternum in ventral view; C, 8th sternum in lateral view; D, genital capsule, left half in dorsal view, right half in ventral view; E, genital capsule in lateral view.

4. Species removed from the Japanese fauna

(1) *Hylaeus bridwelli*, new name

(Figs. 97, 98)

*Hylaeus gnathylaeoides* Bridwell, 1919, Proc. Hawaii. Ent. Soc., 4(1): 152-153, female and male; Hirashima, 1977, Esakia, 10: 38, female (not male), syn. of *H. (Nesoprosopis) floralis*.

**TYPE**

Types of *H. gnathylaeoides*: holotype; female, Sep. 1913 Karuizawa, Japan, F. Muir., in BC, allotype; male, nonlabeled date, Japan, F. Muir., in BC, paratype; 1 female, in BC. Present, all types in USNM, No. 50730.

Type of *H. bridwelli*: male (allotype of *H. gnathylaeoides*).

**DIAGNOSIS**

Hirashima (1977) synonymized *H. gnathylaeoides* with *H. floralis*, the male (allotype) of *H. gnathylaeoides* was, however, recognized as belonging to the different species this time as he also had suggested. I found out this species in the Formosan fauna. *H. bridwelli* is very closely allied to *H. nanseiensis* of the Japanese fauna, but is separated from the latter by having the mesoscutum which is nearly dull and more densely punctate, the collar of pronotum colored yellow, and the terminalia as illustrated in Fig. 98. Further, *H. bridwelli* is similar to *H. ikedai* (within the variation of the maculation) in bearing genae which have yellow spots up and down.

**Description** See Bridwell (1919).

**Specimen examined** 1♂, Aug. 20, 1976 Nanshanchi, Nantou Pref., Formosa, T. Murota.

**Etymology** The new name is dedicated to the late Dr. J. C. Bridwell who is the author of *H. gnathylaeoides*.





Fig. 97. Male head of *Hylaeus bridwelli*,  
new name in frontal view.

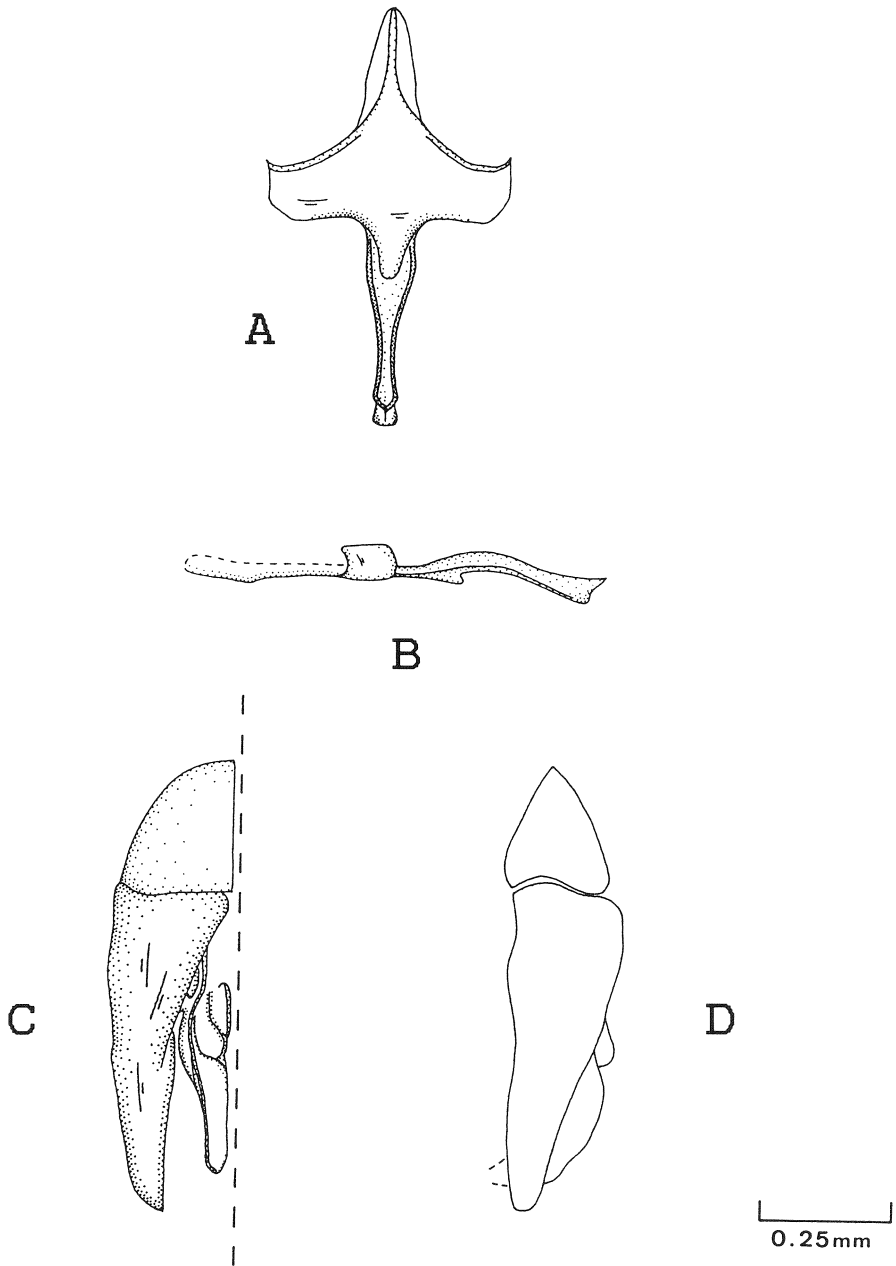


Fig. 98. Male terminalia of *Hylaeus bridwelli*, new name. A, 8th sternum in ventral view; B, 8th sternum in lateral view; C, genital capsule, left half in dorsal view; D, genital capsule in lateral view.

## VII Summary of flight and floral records

### 1. Flight records

Phenology of the Japanese species (except for *C. esakii*, because of its poor records) belonging to the genus *Colletes* is summarized in Fig. 99 based on the flight records. What is evident from the figure is that *C. patellatus*, *C. vogti* and *C. perforator* are autumnal species in the southern part of Japan, that *C. yasumatsui* is a summer species, and that *C. babai* seems to be a bivoltine species in Kyushu (Kagoshima Pref. including Tanega-shima and Yaku-shima).

On the other hand, the phenology of the Japanese species of the genus *Hylaeus* is shown in Fig. 100 (excluding *H. pectoralis*, *H. boninensis*, *H. meridianus*, *H. incomitatus*, *H. yasumatsui*, *H. ikedai*, *H. nanseiensis*, and *H. macilentus* by the same reason as in *C. esakii*). Most species are rather long-lived as is evident from the figure.

### 2. Floral records

Flowering plants recorded here contain 94 species belonging to 57 genera in 18 families for *Colletes*, and do 249 species belonging to 157 genera in 58 families for *Hylaeus*.

Flight records of *Colletes* and *Hylaeus* are summarized in Tables 2 and 3, respectively.

*Colletes* is overwhelmingly associated with the flower of the Compositae as is evident from the table. However, *C. yasumatsui* is conspicuously collected from the Umbelliferae and Geraniaceae.

*Hylaeus* also visits the Compositae predominantly, and is evidently related to the Umbelliferae, too. In general, species of *Hylaeus* are polytrophic.

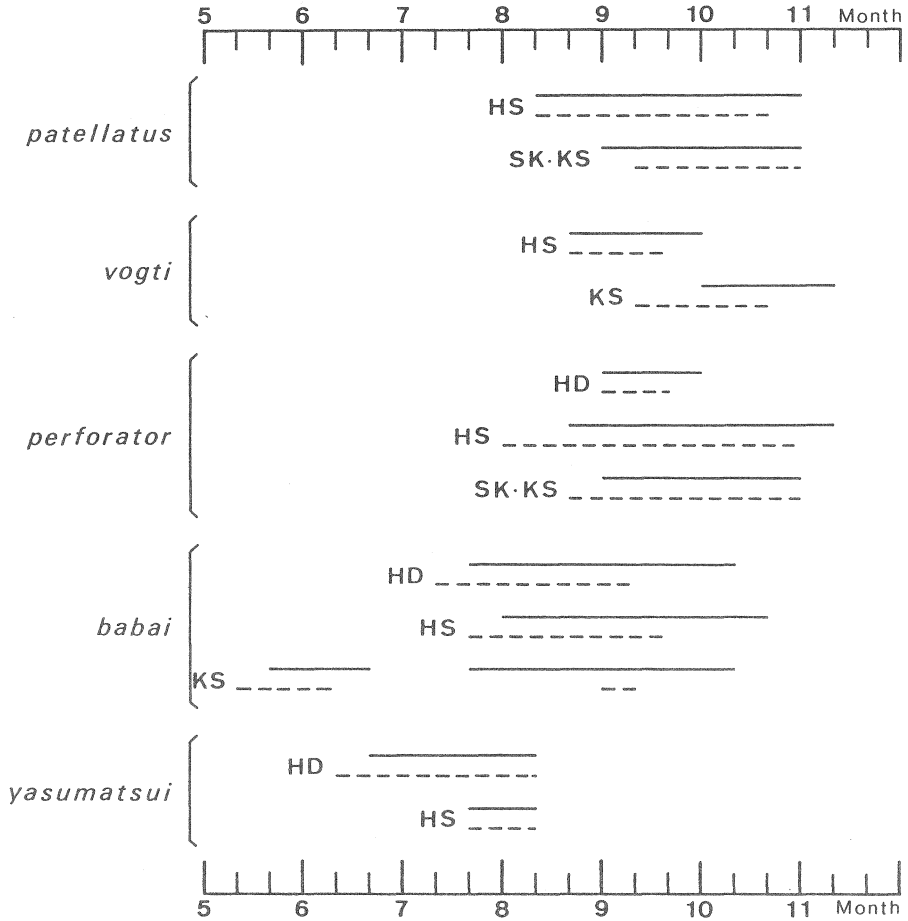


Fig. 99. Flight records for five species of the genus *Colletes*. A straight line for the female and a broken line for the male. HD, Hokkaido; HS, Honshu; SK, Shikoku; KS, Kyushu.

Colletidae of Japan

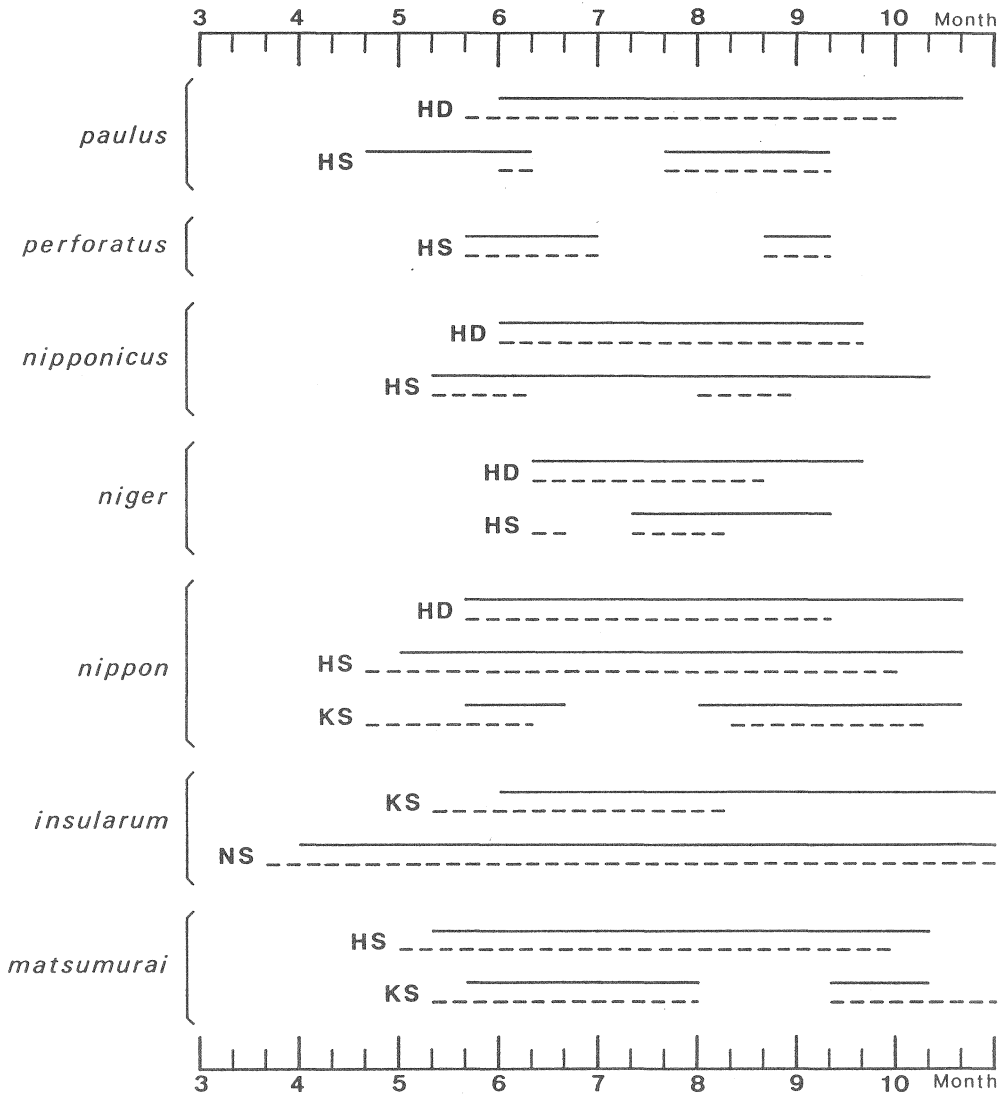


Fig. 100. Flight records for fifteen species of the genus *Hylaeus*. A straight line for the female and a broken line for the male. HD, Hokkaido; HS, Honshu; SK, Shikoku; KS, Kyushu.

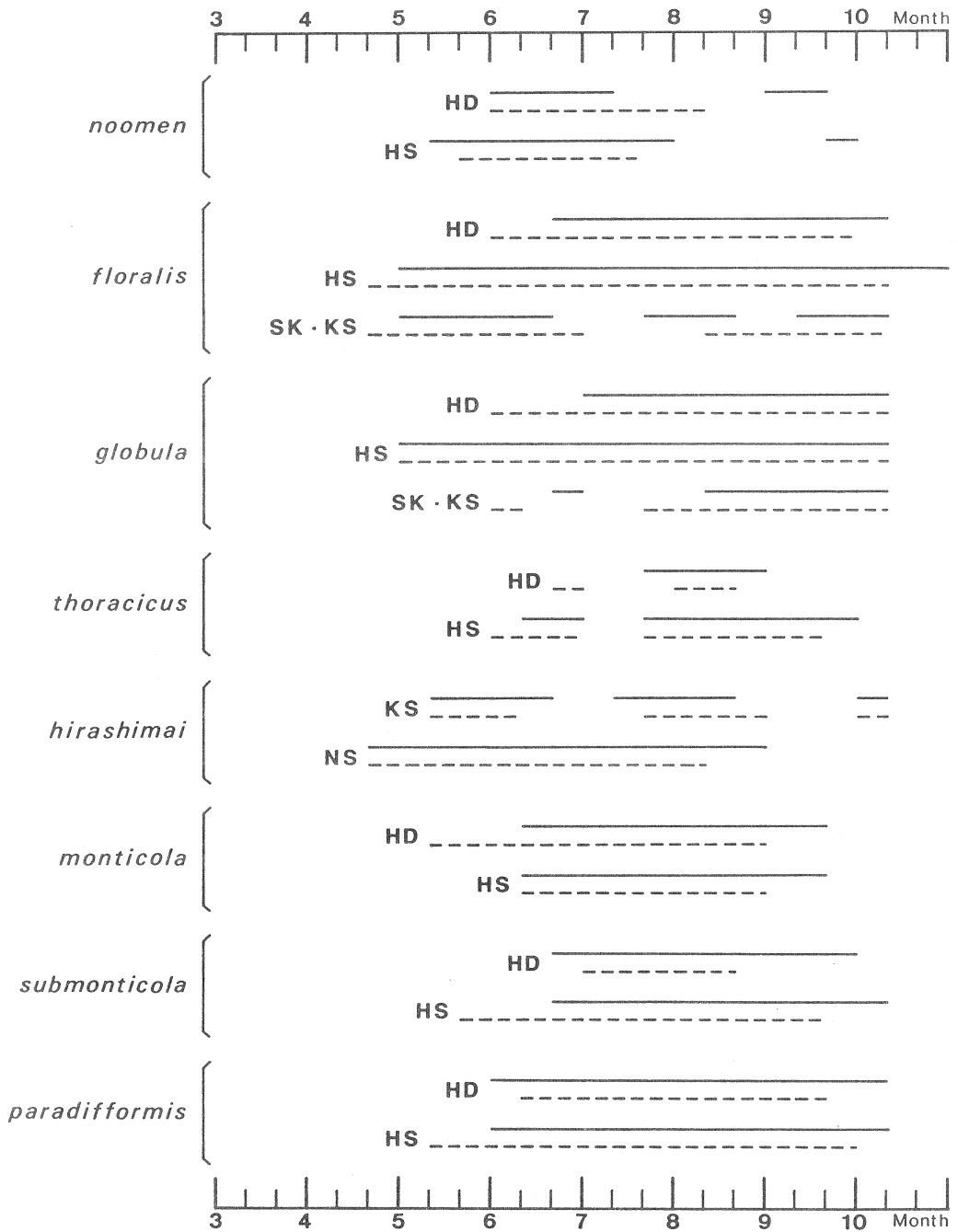


Fig. 100. Continued.

Colletidae of Japan

Table 2. Summary of floral records for the Japanese species of *Colletes*. The numerals indicate the number of plant species; those in the parenthesis indicate the number of individuals of *Colletes* collected.

Plant family	<i>Colletes</i> spp.					Totals
	<i>patellatus</i>	<i>perforator</i>	<i>yasumatsui</i>	<i>babai</i>	<i>vogti</i>	
Compositae	24 (383)	32 (269)	4 (5)	10 (21)	3 (17)	(695)
Umbelliferae			4 (81)	8 (13)		(94)
Geraniaceae		1 (1)	1 (56)	1 (6)		(63)
Polygonaceae	7 (34)	3 (6)	1 (1)	4 (12)		(53)
Leguminosae	1 (5)	2 (4)	1 (10)	4 (12)		(31)
Rosaceae		1 (2)	5 (18)	1 (1)		(21)
Euphorbiaceae				1 (19)		(19)
Anacardiaceae				1 (12)		(12)
Amaranthaceae	1 (1)	1 (7)		1 (2)		(10)
Liliaceae			2 (7)			(7)
Labiatae	1 (1)	3 (5)				(6)
Gentianaceae		1 (6)				(6)
Valerianaceae		1 (4)				(4)
Crassulaceae	1 (1)			1 (1)		(2)
Rutaceae				1 (2)		(2)
Saxifragaceae				1 (1)		(1)
Araliaceae				1 (1)		(1)
Vitidaceae				1 (1)		(1)
Totals	35 (425)	45 (304)	18 (178)	36 (104)	3 (17)	(1028)

Table 3-1. Summary of floral records for the Japanese species of *Hylaeus*. See Table 1 for explanation.

Plant family	<i>Hylaeus</i> spp.				
	<i>paulus</i>	<i>perforatus</i>	<i>nipponicus</i>	<i>niger</i>	<i>pectoralis</i>
Compositae	18 (139)	3 (5)	24 (158)	13 (64)	2 (2)
Umbelliferae	5 (24)		12 (67)	1 (1)	
Rosaceae	12 (56)		10 (37)	3 (7)	1 (1)
Polygonaceae			1 (1)		
Araliaceae	1 (18)		1 (5)	1 (1)	
Cruciferae	5 (63)	1 (10)	8 (41)	2 (2)	1 (1)
Leguminosae	3 (45)		3 (11)	1 (1)	
Labiatae			1 (1)		
Liliaceae	3 (44)	2 (10)			
Geraniaceae	1 (9)	2 (16)			
Caprifoliaceae	1 (3)				
Crassulaceae			3 (23)		
Saxifragaceae	1 (1)		1 (1)		
Scrophulariaceae	2 (2)			1 (2)	
Primulaceae				1 (1)	
Oleaceae	1 (1)				
Ranunculaceae	2 (7)		2 (3)		
Malvaceae	1 (1)				
Oxalidaceae	1 (1)				
Onagraceae	2 (2)				



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Table 3-1. Continued.

Plant family	<i>paulus</i>	<i>perforatus</i>	<i>nipponicus</i>	<i>niger</i>	<i>pectoralis</i>
Aceraceae	1 (1)				
Commelinaceae				1 (2)	
Caryophyllaceae	1 (1)				
Cornaceae	1 (1)				
Buxaceae		1 (2)			
Simaroubaceae			1 (1)		
Ericaceae			1 (1)		
Saururaceae			1 (1)		
Totals	62 (419)	7 (27)	48 (366)	25 (82)	4 (4)

Table 3-2. Continued from Table 3-1.

Plant family	<i>Hylaeus</i> spp.				
	<i>nippon</i>	<i>insularum</i>	<i>floralis</i>	<i>globula</i>	<i>matsumurai</i>
Compositae	15 (35)	5 (54)	16 (84)	12 (51)	2 (3)
Umbelliferae	10 (18)	3 (33)	11 (38)	9 (99)	2 (20)
Rosaceae	7 (12)	2 (6)	7 (11)	5 (16)	4 (4)
Polygonaceae	5 (17)	2 (147)	5 (41)	4 (23)	1 (2)
Araliaceae	4 (45)	2 (11)	4 (38)	2 (32)	1 (1)
Cruciferae	4 (60)		4 (17)	1 (6)	1 (3)
Rutaceae	1 (3)	2 (189)	2 (9)		
Euphorbiaceae		1 (180)	1 (2)	1 (1)	
Vitidaceae	1 (2)	2 (144)		1 (6)	1 (3)
Leguminosae	2 (8)	3 (52)	4 (9)	1 (1)	
Anacardiaceae	1 (30)		2 (43)	1 (8)	2 (2)
Labiatae	3 (5)	1 (68)	2 (3)		
Liliaceae	1 (8)		1 (6)		
Geraniaceae	1 (2)		1 (9)		
Caprifoliaceae	2 (8)	1 (31)	3 (3)	2 (2)	
Crassulaceae	2 (10)		1 (10)		1 (2)
Myrsinaceae		1 (43)			
Saxifragaceae	1 (8)		3 (9)	3 (4)	
Valerianaceae	2 (2)		1 (6)	1 (25)	
Scrophulariaceae	1 (1)		1 (1)		
Verbenaceae		2 (18)			

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Table 3-2. Continued.

Plant family	<i>nippon</i>	<i>insularum</i>	<i>floralis</i>	<i>globula</i>	<i>matsumurai</i>
Primulaceae			1 (1)		
Oleaceae	3 (4)		1 (2)		1 (6)
Ranunculaceae			2 (2)		
Fagaceae	1 (3)	1 (2)	1 (6)	1 (1)	
Rubiaceae	1 (1)	1 (5)	1 (2)		1 (2)
Staphyleaceae	1 (1)				
Celastraceae	2 (3)		1 (3)	1 (1)	
Pittosporaceae		1 (7)			
Malvaceae	1 (1)				
Aquifoliaceae	1 (1)		1 (3)		
Aceraceae	1 (3)				
Commelinaceae			1 (1)		
Caryophyllaceae	1 (2)		1 (1)		
Amaranthaceae	2 (4)				
Styracaceae	1 (3)			1 (1)	
Oxalidaceae	1 (1)				
Symplocaceae			1 (2)	1 (1)	
Cornaceae	2 (2)				
Theaceae	1 (1)		1 (2)		
Buxaceae					1 (1)
Solanaceae			1 (3)		
Simaroubaceae	1 (1)				
Ebenaceae			1 (1)		

Table 3-2. Continued.

Plant family	<i>nippon</i>	<i>insularum</i>	<i>floralis</i>	<i>globula</i>	<i>matsumurai</i>
Verbenaceae			1 (1)		
Tiliaceae			1 (1)		
Sterculiaceae		1 (1)			
Rhamnaceae	1 (1)				
Lauraceae	1 (1)				
Totals	85 (307)	32 (991)	85 (370)	47 (278)	18 (49)

Table 3-3. Continued from Table 3-2.

Plant family	<i>Hylaeus</i> spp.					
	<i>noomen</i>	<i>paradiiformis</i>	<i>monticola</i>	<i>submonticola</i>	<i>thoracicus</i>	<i>hirashimai</i>
Compositae	4 (13)	19 (134)	11 (45)	6 (37)	1 (1)	1 (2)
Umbelliferae	3 (10)	4 (11)	2 (4)	6 (17)	2 (4)	4 (165)
Rosaceae	1 (1)	10 (45)	8 (25)	7 (15)	2 (5)	2 (32)
Polygonaceae		2 (8)				1 (1)
Araliaceae		1 (13)	1 (2)	2 (8)	3 (27)	1 (32)
Cruciferae		5 (25)	1 (1)		1 (2)	
Rutaceae						1 (11)
Euphorbiaceae						1 (7)
Vitidaceae						1 (21)

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Table 3-3. Continued.

Plant family	<i>noomen</i>	<i>paradiiformis</i>	<i>monticola</i>	<i>submonticola</i>	<i>thoracicus</i>	<i>hirashimai</i>
Leguminosae		6 (32)	1 (1)	1 (1)		
Anacardiaceae				1 (3)	1 (3)	
Labiatae		2 (4)				
Liliaceae		1 (6)				
Geraniaceae		2 (10)	3 (14)			
Myrsinaceae						1 (2)
Saxifragaceae		4 (10)		1 (4)		
Scrophulariaceae		2 (22)		1 (2)		
Primulaceae		1 (10)		1 (5)		
Oleaceae		1 (2)				
Ranunculaceae		2 (2)				
Fagaceae					1 (1)	
Campanulaceae		2 (9)				
Staphyleaceae						1 (7)
Malvaceae		1 (3)				
Guttiferae		1 (3)		1 (1)		
Oxalidaceae		1 (1)		1 (1)		
Onagraceae		1 (1)		1 (1)		
Commelinaceae		1 (1)				
Asclepiadaceae		1 (4)				
Papaveraceae		1 (1)				
Cucurbitaceae		1 (1)				
Totals	8 (24)	72 (358)	27 (92)	29 (95)	11 (43)	14 (280)

Table 3-4. Continued from Table 3-3.

Plant family	Hyl.	Totals	
	Primulaceae	(17)	Saururaceae (1)
	Oleaceae	(15)	Ebenaceae (1)
	Ranunculaceae	(14)	Verbenaceae (1)
	Fagaceae	(13)	Tiliaceae (1)
	Rubiaceae	(10)	Sterculiaceae (1)
	Campanulaceae	(9)	Rhamnaceae (1)
Compositae	(827) Staphyleaceae	(8)	Lauraceae (1)
Umbelliferae	(511) Celastraceae	(7)	Papaveraceae (1)
Rosaceae	(273) Pittosporaceae	(7)	Cucurbitaceae (1)
Polygonaceae	(240) Malvaceae	(5)	Totals (3785)
Araliaceae	(233) Guttiferae	(4)	
Cruciferae	(231) Oxalidaceae	(4)	
Rutaceae	(212) Onagraceae	(4)	
Euphorbiaceae	(190) Aquifoliaceae	(4)	
Vitidaceae	(176) Aceraceae	(4)	
Leguminosae	(161) Commelinaceae	(4)	
Anacardiaceae	(89) Asclepiadaceae	(4)	
Labiatae	(81) Caryophyllaceae	(4)	
Liliaceae	(74) Amaranthaceae	(4)	
Geraniaceae	(60) Styracaceae	(4)	
Caprifoliaceae	(47) Symplocaceae	(3)	
Crassulaceae	(45) Cornaceae	(3)	
Myrsinaceae	(45) Theaceae	(3)	
Saxifragaceae	(47) Buxaceae	(3)	
Valerianaceae	(33) Solanaceae	(3)	
Scrophulariaceae	(30) Simaroubacea	(2)	
Verbenaceae	(18) Ericaceae	(1)	

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### 4. For the scientific names of plants

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## X Appendix

### Records of *Hylaeus* outside Japan

1. *Colletes (Colletes) patellatus* Pérez  
Korea (Kim, 1980)
2. *Hylaeus (Hylaeus) paulus* Bridwell  
Korea\*: 1♀, Aug.5, 1986 Gangwendo, Jin bu myeon, T.  
Tano.
3. *Hylaeus (Hylaeus) perforatus* (Smith)  
Korea (Kim, 1980)
4. *Hylaeus (Nesoprosopis) pectoralis* Förster  
Europe (Förster, 1871)
5. *Hylaeus (Nesoprosopis) nippon* Hirashima  
Korea\*: 1♂, Aug.2, 1974 Seoul, I. Kudo.
6. *Hylaeus (Lambdopsis) nipponicus* Bridwell  
Chishima-rettô\*: 1♀, July 30, 1910 Etorofu-tô, 1♂,  
Shikotan-tô, S. Kuwayama and Y. Sugihara.

(\* indicates the new locality.)