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STUDIES ON THE GENUS *SUSSABA* CAMERON OF JAPAN (Hymenoptera : Ichneumonidae)

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The genus *Sussaba* Cameron of the subfamily Diplazontinae is a small group comprising about 20 species in the world. Though having been erected by Cameron as early as in 1909, this genus had been neglected for more than a half century until Dasch treated it in his monograph of the Nearctic Diplazontinae in 1964. Until that time many of the species of *Sussaba* had been reported under the genus *Promethes* Foerster.

Dasch (1964) redescribed the genus in detail and gave such features to be characteristic to the genus *Sussaba* that a pair of submedian vertical depressions from the clypeus to the antennal fossae, one hamulus on the costellian fold of hind wing, the fore wing lacked areolet, the spiracles of second and third abdominal segments laid in the epipleura ventrad of the lateral sutures, male 9th and 10th terga fused as a syntergum, and some other characters.

Uchida (1957) recorded 7 species of the genus *Promethes* from Japan. Among them Dasch (1964) regarded 4 species to be included in the genus *Sussaba*. These four species are *cognata* (Holmgren), *elongata* (Provancher), *erigator* (Fabricius) and *sugiharai* (Uchida). Townes, Momoi & Townes (1965) followed him, and listed up these species in their catalogue.

In this study I record 7 species of the genus *Sussaba* from Japan, namely *cognata*, *elongata*, *sugiharai* and 4 new species described as follows. *S. erigator* which was recorded by Uchida as *festivus* from Kyushu is omitted in this study, because I could not find any specimen of the species in the collections including the collection of Hokkaido University in which the Uchida's specimen from Kyushu should be preserved. But for the sake of convenience I include this species in the key based on the European specimens.

The holotypes of new species are deposited in the collection of Biological Laboratory, College of General Education, Kyushu University, Fukuoka.

Before going further I wish to express my hearty thanks to Prof. T. Shirôzu. and Assoc. Prof. T. Saigusa of Kyushu University and to Assoc.

Prof. S. Momoi of Kobe University for their constant encouragements. My deep thanks are also due to Dr. C. E. Dasch of Muskingum College, New Concord, Ohio and Dr. E. Diller of Zoologische Sammlung des Bayerischen Staates, München for their kind suggestions and gifts of valuable specimens. Many thanks are also due to Prof. Y. Hirashima of Kyushu University for his kindness in allowing me to use valuable materials included in the collection of the Entomological Laboratory, to Dr. S. Momoi, Dr. K. Kusigemati, Mr. T. Saigusa, Mr. Y. Miyatake, Dr. T. Naito, Dr. F. Nakasuji, Mr. H. Shima, Mr. O. Yata, Mr. K. Kanmiya, Mrs. M. Yafuso, Mr. J. Emoto, Mr. K. Ueda, Mr. H. Yoshiyasu, Mr. M. Yamamoto, Mr. K. Ohara and Mr. T. Goto for their kindness in offering me precious materials.

Genus *Sussaba* Cameron

Sussaba Cameron, 1909. Jour. Bombay Nat. Hist. Soc. 19: 728.

Type-species: (*Sussaba bicarinata* Cameron, 1909) = *pulchella* Holmgren, 1856. Monobasic.

A detailed description of this genus is given by Dasch and need not to be repeated here, but some characters of external genitalia are added here as follows.

In male genitalia paramere and volsella completely separated from each other. Paramere bearing apically many long hairs that are somewhat flattened, and their apices bent downwards. Apex of ovipositor sheath pointed.

Key to the Japanese species of the genus *Sussaba*

Females

1. Hind coxa yellow or rufous, if marked with black then the black marking is restricted at most on basal half 2
Hind coxa black, blackish brown or brown 3
2. Hind coxa yellow, or yellow with black marking. Petiole and second abdominal tergum very long and slender, $1.8-2.1\times$ as long as wide and $1.8-2\times$ as long as wide respectively. Petiolar area of propodeum smooth..... *cognata* (Holmgren)
Hind coxa rufous. Petiole and second abdominal tergum moderately long and slender, $1.5-1.7\times$ as long as wide and $1.3-1.5\times$ as long as wide respectively. Petiolar area of propodeum rugulose.....
..... *sugiharai kamikochiensis* (Uchida)
3. Head evenly shiny shagreened. Nervulus distad of basal vein by about $0.5\times$ the former length *subplacita* sp. nov.
Head polished. Nervulus nearly opposite basal vein 4

4. Median lobe of mesonotum heavily shagreened. Petiole and second abdominal tergum long and slender, $1.5-1.8 \times$ as long as wide and $1.5-1.7 \times$ as long as wide respectively..... *daisetsuzana* sp. nov.
Median lobe of mesonotum polished. Petiole and second abdominal tergum stout, $1.1-1.6 \times$ as long as wide and $1.2-1.4 \times$ as long as wide respectively 5
5. Antenna with 14 flagellar segments; apical segment very long, $3.5-3.6 \times$ as long as penultimate segment. Face distinctly divergent ventrally. Inner orbit raised *erigator* (Fabricius)
Antenna with 18-22 flagellar segments; apical segment short, $1.7-2.3 \times$ as long as penultimate segment. Face parallel-sided. Inner orbit not raised..... 6
6. Abdominal terga entirely black. Fore and middle coxae blackish brown. Third abdominal tergum sculptured on basal $2/3$ *nigra* sp. nov.
Abdominal terga more or less marked with rufous. Fore and middle coxae broadly yellow. Third abdominal tergum unsculptured..... 7
7. Pronotum with vertical wrinkles along anterior rim. Hind ocellus large and elongated. OOL $1-1.1 \times$ HO. OOC $1.2-1.5 \times$ HO. Second and third abdominal terga black with rufous marking. Fore and middle femora extensively marked with brown on ventral surfaces *japonica* sp. nov.
Pronotum with longitudinal wrinkles along anterior rim. Hind ocellus small and circular. OOL $1.4-1.6 \times$ HO. OOC $1.7-1.9 \times$ HO. Second and third abdominal terga usually entirely rufous. Fore and middle femora usually not marked with brown, if marked with brown then the brown marking is restricted at base
..... *elongata watanabei* (Uchida)

Males. (The male of *subplacita* is unknown.)

1. Tyloids absent. Petiolar area of propodeum smooth.....
..... *cognata* (Holmgren)
Tyloids present. Petiolar area of propodeum variously sculptured..... 2
2. Antenna lacking a black crescentic area dorsad of each tyloid..... 3
Antenna with a black crescentic area dorsad of each tyloid 5
3. Abdominal terga entirely black. Fore and middle coxae black. Fore and middle femora broadly marked with brown on ventral surfaces *nigra* sp. nov.
Abdominal terga more or less marked with rufous. Fore and middle coxae yellow. Fore and middle femora not marked with brown... 4
4. Hind coxa rufous. Face parallel-sided. Inner orbit not raised
..... *sugiharai kamikochiensis* (Uchida)
Hind coxa black. Face distinctly divergent ventrally. Inner orbit raised *erigator* (Fabricius)

5. Median lobe of mesonotum heavily shagreened. Petiole and second abdominal tergum long and slender, $2-2.3 \times$ as long as wide and $1.7-2.3 \times$ as long as wide respectively..... *daisetsuzana* sp. nov.
Median lobe of mesonotum polished. Petiole and second abdominal tergum stout, $1.4-1.7 \times$ as long as wide and $1.2-1.7 \times$ as long as wide respectively 6
6. Pronotum with vertical wrinkles along anterior rim. Hind ocellus somewhat elongated. OOL $0.9-1.1 \times$ HO. OOC $1.1-1.5 \times$ HO. Fore and middle femora extensively marked with brown on ventral surfaces..... *japonica* sp. nov.
Pronotum with longitudinal wrinkles along anterior rim. Hind ocellus circular. OOL $1.2-1.5 \times$ HO. OOC $1.4-1.9 \times$ HO. Fore and middle femora usually not marked with brown
..... *elongata watanabei* (Uchida)

1. *Sussaba cognata cognata* (Holmgren, 1856)

- Bassus cognatus* Holmgren, 1856. Svenska Vetensk. Akad. Handl. (n.f.) 1: 366.
Promethes albicoxa Thomson, 1890. Opusc. Ent. 14: 1479.
Promethes cognatus, Dalla Torre, 1901. Catalogus hymenopterorum. 3: 242.
Promethes albicoxa, Dalla Torre, 1901. Catalogus hymenopterorum. 3: 242.
Promethes cognatus, Roman, 1931. Ark. Zool. 23 A (6): 32.
Promethes cognatus, Beirne, 1941. Trans. R. Ent. Soc. Lond. 91: 705.
Promethes albicoxa, Uchida, 1957. Jour. Fac. Agr. Hokkaido Univ. 50: 244.
Promethes cognatus, Uchida, 1957. Jour. Fac. Agr. Hokkaido Univ. 50: 246.
Sussaba cognata cognata, Dasch, 1964. Mem. Amer. Ent. Inst. 3: 265.
Sussaba cognata albicoxa, Dasch, 1964. Mem. Amer. Ent. Inst. 3: 265.
Sussaba cognata albicoxa, Townes, Momoi & Townes, 1965. Mem. Amer. Ent. Inst. 5: 414.
Sussaba cognata cognata, Townes, Momoi & Townes, 1965. Mem. Amer. Ent. Inst. 5: 414.

This is one of the most clearly defined species in the genus *Sussaba* and easily separated from other species in having the elongated and narrow petiole and second abdominal tergum, the smooth and polished petiolar area of propodeum, the absence of tyloids on the male antenna, and some other characters.

However, there are different views on the infraspecific classification of this species. Though *cognata* Holmgren and *albicoxa* Thomson were originally described as different species, Roman (1931) and Beirne (1940) regarded *albicoxa* as a variety of *cognata* on the one hand and recently Dasch (1964) and Townes, Momoi and Townes (1965) treated them as different two subspecies of the same species on the other hand. Adding to these "two subspecies" Dasch described the third subspecies, *faceta* from North America. Thus this species is considered to comprise three subspecies at present.

Table 1. Three "subspecies" of *Sussaba cognata* (Holmgren) and their ranges.*

	<i>c. cognata</i> (Holmgren)	<i>c. albicoxa</i> (Thomson)	<i>c. faceta</i> Dasch	spec. of east. N. Ame.
Female				
Hind coxa	black more or less on basal half	yellow	yellow	black at base
Humeral bar	absent	absent, or rarely present as small mark	large	small or absent
Facial patch	small	small to large	enlarged	not enlarged
Prepectus	usually black	usually black	often marked with yellow	often marked with yellow
Male				
Hind coxa	black basally	yellow	yellow	yellow
Humeral bar	absent	small or absent	usually present	usually present
Prepectus	usually black	frequently yellowish	yellow	yellow
Distribution	England, France, Germany, Ireland, Japan, Netherlands, Sweden	Austria, Czechoslovakia, Denmark, England, France, Germany, Italy, Japan, Kamchatka, Kuriles, Sweden	North America	North America

* This table is made based on the descriptions of Schmiedeknecht, Morley, Beirne, Uchida and Dasch.

They are thought to be separable by the color pattern shown in Table 1.

Of these three subspecies, two have been recorded from Japan. Uchida (1957) recorded *cognata* and *albicoxa* from Japan for the first time, although he treated them as different species. Later in 1964 Dasch recorded *cognata albicoxa*, and in 1965 Townes, Momoi and Townes listed up both of the two subspecies from Japan.

In the course of this study I examined 178 Japanese and several European and American specimens of *Sussaba cognata*. The Japanese specimens show no distinct structural variation, but they show lots of color patterns as discussed below.

Color variation

The variation of the color markings on four body parts in question is given in Table 2.

Hind coxa: In the female the black macula of hind coxa is usually developed in various degrees, varying from being limited at the extreme base to widened on the basal half. But there are some females which entirely lack the black marking. On the contrary most males have the entirely yellowed coxa, and only some have the black marking restricted at base.

Table 2. Variation of color markings on four body parts of *Sussaba cognata* (Holmgren) of Japan.

		Hind coxa			Humeral bar			Facial patch			Prepectus		
		A	B	C	A	B	C	A	B	C	A	B	C
Hokkaido	female	8	24	24	15	14	27	11	30	15	4	7	45
	male	42	10		36	11	5				46	5	1
Honshu	female	1	4	13	1	2	15	3	9	6			18
	male	18	4		14	5	3				22		
Shikoku	female		5	16		2	19		11	10			21
	male	4	1		4	1					5		
Kyushu													
	male	3			2	1					3		
		A: entirely yellow B: black at base C: black on basal 1/4 - 1/3 or more			A: large B: medium to small C: absent			A: enlarged B: medium C: small			A: broadly yellowish B: narrowly yellowish C: lacking yellowish mark		

Humeral bar: The humeral bar appears in half of the females from Hokkaido, and moreover in the half of such females it is well developed. On the other hand most of the females from districts other than Hokkaido entirely lack the humeral bar. In the males it is only few that lack the humeral bar, and usually males have large one.

Facial spot: In the females the development of the yellow marking on the face varies in considerable degree, ranging from small to enlarged. Many females, however, have medium-sized spot. In the male the face is entirely yellow in all the specimens.

Prepectus: The female usually lacks yellowish marking, but some specimens from Hokkaido show yellowish marking that is small or rarely enlarged.

As described above, color marking on each body part in question varies in considerable degree. There is a tendency that the ratio of the female extensively marked with yellow is more in the materials of Hokkaido, the northernmost district of Japan, than in the specimens of other districts. However, there is no noticeable geographic variation in Japan.

The combination of the state of maculation on each body part also varies successively from specimens to specimens, amounting twenty five kinds of pattern in the females and ten in the males. For example, some females show the combination AAAA (states of the maculation on the hind coxa, humeral bar, facial spot, and prepectus are all A), some show ABAB, others show ABBC, and so on.

Among the specimens examined, there do exist the individuals which should be referred to *c. cognata* and another ones to *c. albicoxa*. If we try to divide Japanese *cognata* based only on the maculation on the hind coxa as many authors do, most females are to be referred to *c. cognata* and on the contrary most males to *c. albicoxa*. On the other hand if classifying them based on the color pattern (combination of the states), most of the specimens could not be associated with either of the two.

Adding to such successive color variation the sympatric distribution of "*c. cognata*" and "*c. albicoxa*" classified based on the maculation on the hind coxa is observed commonly in every district of Japan.

So it seems better to leave the Japanese *cognata* a unit rather than to recognize plural subspecies.

As to the European *cognata*, though I could examine only a few specimens, I would prefer the standpoint of Roman and Beirne, namely treating *c. albicoxa* to be a variety of *c. cognata*, because the literatures show the presence of considerable variations in color and the occurrence of sympatric distribution of the two.

With respect to the Nearctic *c. faceta* I can not make reference to the validity of this subspecies. But so far as I am on the basis of Dasch's description, it seems difficult to recognize independent subspecies for the Nearctic *cognata*, at least for the eastern North American specimens.

According to him most females found in the eastern North America have small humeral bars and hind coxae more or less blackened on the base, and moreover a few females from Cold Harbor, Alaska, have the hind coxae that are more extensively blackened. This color pattern is not different from that of European *cognata cognata*, and is also found in some Japanese specimens.

Specimens examined. 96 ♀♀, 82 ♂♂, from **Hokkaido**: Souya Subpref. (Rishiri Is.); Abashiri Subpref. (Mt. Rausudake); Kushiro Subpref. (Akan); Tokachi Subpref. (Mt. Satsunaidake, Nukabira); Kamikawa Subpref. (Mts. Daisetsu; Yukomanbetsu, Aizankei, Sounkyo); Ishikari Subpref. (Mt. Soranumadake, Sapporo); Sorachi Subpref. (Mt. Yubaridake, Mt. Uryudake). **Honshu**: Aomori Pref. (Mt. Hakkoda); Iwate Pref. (Mt. Hayachine); Yamagata Pref. (Mt. Gassan, Mt. Chokai); Yamanashi Pref. (Kanayama, Daibosatsutoge); Nagano Pref. (Tobirakosen, Shigakogen, Mt. Nyugasa, Karasawa, Shimashimadani); Shizuoka Pref. (Amagi); Kyoto Pref. (Asyu); Nara Pref. (Mt. Kongo); Hyogo Pref. (Mt. Ohginosen); Tottori Pref. (Mt. Daisen). **Shikoku**: Ehime Pref. (Mt. Ishizuchi, Jyojyusha). **Kyushu**: Fukuoka Pref. (Mt. Hiko); Kumamoto Pref. (Mt. Ichifusa).

2. *Sussaba sugiharai kamikochiensis* (Uchida, 1957)

Promethes sugiharai kamikochiensis Uchida, 1957. Jour. Faculty Agr. Hokkaido Univ. 50 : 245.

Sussaba sugiharai kamikochiensis, Dasch, 1964. Mem. Amer. Ent. Inst. 3 : 242.

Sussaba sugiharai kamikochiensis, Townes, Momoi and Townes, 1965. Mem. Amer. Ent. Inst. 5 : 415.

Female. Body length 4.5–5.5 mm. Head evenly polished and impunctate. Vertex with a weak median longitudinal impression. Occipital carina rounded medially. OOC $1.1 \times HO$. Face slightly widened ventrally, $1.6-1.8 \times$ as wide as high. Clypeus $2.2 \times$ as wide as high, separated from face by a definite suture, apical margin weakly upturned, usually with a short median vertical shallow sulcus, apical lobes angulate. Malar space $1.2-1.5 \times$ basal width of mandible. Antenna with 20–22 flagellar segments; first segment $5.6 \times$ as long as wide.

Thorax polished. Pronotum impunctate, weakly rugulose along anterior margin on lower $1/3-1/2$. Mesonotum with fine punctures medially, almost impunctate laterally. Mesopleuron impunctate. Scutellum with strong lateral carinae, finely punctate apically. Metapleuron impunctate, usually rugose on lower $1/3$ and upper $1/3$. Propodeum with strong median and lateral longitudinal and basal transverse carinae; first lateral area polished with several coarse and shallow punctures, petiolar area with irregular carinulae.

Abdomen weakly narrowed from base of segment 3 to apex of abdomen, usually not so strongly compressed, polished. Petiole rectangular, $1.5-1.7 \times$ as long as wide at apex, margins usually parallel-sided, longitudinally

striate medially, more rugulose laterally. Second tergum $1.3-1.5 \times$ as long as wide at base, densely with fine longitudinal striation on basal $0.4-0.7$. Rest of abdomen mostly glabrous.

Black. Cream yellow to pale yellow on palpi, mandible except teeth, small median spot on face usually, pedicel ventrally, tip of pronotal lobe, tegula, subalar tubercle, base of wing, upper $1/5$ of mesepimeron. Clypeus dark brown, tinged with yellow, on the sides. Antenna brownish dorsally, light brown ventrally, darker on apical segments. Rufous on apical half of second tergum, third tergum entirely, and apex of petiole in some specimens. Fourth tergum usually rufous, but sometimes tinged with black or entirely black. Legs rufous. Fore and middle coxae entirely, hind coxa on apical $1/3$, and trochanters of all legs cream yellow to pale yellow. Apex of hind femur, base and apex of hind tibia, and ventral side of hind tarsus darkened.

Male. Resembling female, but differing in the following points: OOC $1.3 \times$ HO. Face $1.6-1.9 \times$ as wide as high, rather strongly widened ventrally. Clypeus $1.9-2.1 \times$ as wide as high. Malar space $1.2-1.6 \times$ basal width of mandible. Antenna with 21-23 flagellar segments covered with short inclined hairs dorsally, erect hairs ventrally; tyloids on flagellar segments 6-9, without black crescentic areas dorsad of tyloids; sense cones abundant. Punctures on mesonotum usually stronger and denser than those in female. Scutellum impunctate to rather coarsely punctate. Abdomen parallel-sided; petiole $1.6-1.9 \times$ as long as wide, second tergum $1.5-1.7 \times$ as long as wide, striation on second tergum usually on basal 0.7 .

Coloration differing from female as follows; face, lower half of inner orbit on frons, gena, and scape ventrally yellow; subalar tubercle dark brown; antenna much lighter than in female; third tergum usually rufous entirely, but in some specimens variably tinged with black at middle; fourth tergum variable, rufous to black.

Specimens examined. 163♀♀, 95♂♂, from **Hokkaido**: Souya Subpref. (Wakkasakanai); Rumoi Subpref. (Masike, Toikanbetsu); Abashiri Subpref. (Mt. Rausudake); Nemuro Subpref. (Bekkai); Tokachi Subpref. (Ashoro, Mt. Upepesanke, Mt. Satsunaidake, Kamiwasippu, Nukabira); Kushiro Subpref. (Onbetsu); Kamikawa Subpref. (Aizankei, Antaroma, Mts. Daisetsu); Hidaka Subpref. (Mt. Apoinupuri); Sorachi Subpref. (Mt. Yubaridake); Ishikari Subpref. (Maruyama, Sapporo, Shimamatsu); Iburi Subpref. (Touya); Hiyama Subpref. (Esasi). **Honshu**: Aomori Pref. (Ogawara); Akita Pref. (Ohdate); Tokyo Pref. (Mt. Takao); Nagano Pref. (Mt. Naeba, Sugadaira, Mt. Nyugasa, Mt. Senjyodake, Togakushi-kogen, Mt. Yatsugatake, Shiga-kogen); Yamanashi Pref. (Kanayama); Ishikawa Pref. (Mt. Hakusan); Shiga Pref. (Mt. Hirasano); Hyogo Pref. (Mt. Ohginosen). **Shikoku**: Ehime Pref. (Mominoki, Mt. Saragamine, Mt. Ishizuchi). **Kyushu**: Fukuoka Pref. (Mt. Korasan); Ohita Pref. (Mt. Sobo, Mt. Kuju); Kumamoto Pref. (Mt. Aso, Mt. Ichifusa, Mt. Kunimi); Miyazaki Pref. (Mitai); Kagoshima Pref. (Mt. Kirishima).

3. *Sussaba subplacita* Nakanishi, sp. nov.

Female. Body length 5.8 mm. Head shiny shagreened with temple and gena polished, impunctate, weakly scabrous behind hind ocelli. Occipital carina narrowly rounded medially. Vertex with a weak median longitudinal impression. OOC $1.5 \times$ HO. Face nearly parallel-sided, $1.8 \times$ as wide as high. Clypeus weakly elevated basally, $2.2 \times$ as wide as high, much shiny, apex weakly emerginated at middle, with apical lobes rounded. Malar space $0.9 \times$ basal width of mandible. Antenna with 20 flagellar segments, covered with short subdecumbent hairs; first segment $3.4 \times$ as long as wide at apex; sense cones abundant on first segment.

Thorax polished, finely punctate on mesonotum, scutellum, mesosternum and ventral $1/3$ of mesopleuron. Pronotum with very shallow punctures dorsally, finely rugulose in center, smooth ventrally. Punctures on posterior part of mesonotum becoming somewhat transversely confluent. Metapleuron with some very shallow and indistinct punctures on anterior half. Pleural carina distinct. Propodeum polished and impunctate, with distinct median longitudinal and basal transverse and weak lateral longitudinal carinae; basal and first lateral areas somewhat scabrous; petiolar area mostly glabrous. Posterior surface of hind coxa glabrous. Nervulus distad of basal vein by about $0.5 \times$ the former length (Fig. 1).

Abdomen progressively narrowed from base of third segment to apex of abdomen, polished. Petiole $1.4 \times$ as long as wide, slightly convergent behind spiracles, evenly scabrous with some coarse punctures in center, polished apico-medially. Second tergum $1.3 \times$ as long as wide at base, scabrous with apical 0.1 polished. Third tergum scabrous on basal 0.3 .

Black. Yellowish on upper part of epistoma, mandible except teeth, palpi, tip of pronotal lobe, and tegula. Legs tawny rufous. Fore coxa light brown with yellowish marking on anterior surface. Middle and hind coxae brown, the former tinged with yellow on outer surface. Trochanters of fore and middle legs yellowish, first trochanter of middle leg somewhat

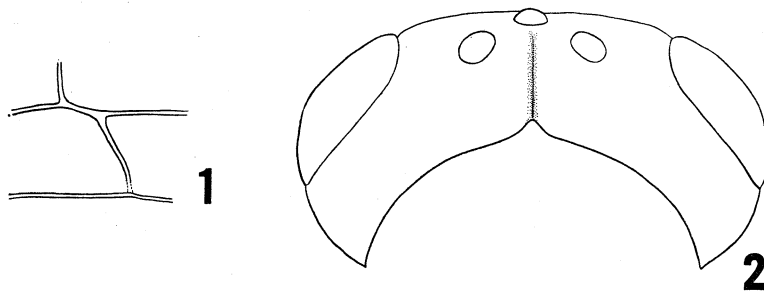


Fig. 1. *Sussaba subplacita* sp. nov., nervulus. Fig. 2. *Sussaba daisetsuzana* sp. nov., head, posterodorsal aspect.

infuscated. First trochanter of hind leg brown and second trochanter of hind leg light brown. Bases of middle and hind femora weakly infuscated ventrally. Hind tarsus also somewhat infuscated.

Male is unknown.

Distribution. Japan (Hokkaido).

Holotype. ♀, Mt. Yubaridake (above tree limit), Sorachi Subpref. Hokkaido, 16. vii. 1967, T. Saigusa leg.

This species very closely resembles *S. placita* Dasch, 1964 in every particular, but may be separated from the latter by the peculiar position of the nervulus, which is distad of the basal vein by about $0.5 \times$ its length.

4. *Sussaba daisetsuzana* Nakanishi, sp. nov.

Female. Body length 4.2–6.3 mm. Head polished and impunctate with slight shagreenings on epistoma and inner orbit. Occipital carina angularly directed upwards at middle (Fig. 2). OOC $1.2\text{--}1.7 \times$ HO. Vertex with a distinct median longitudinal impression. Face $1.6\text{--}1.9 \times$ as wide as high, with margins nearly parallel-sided. Clypeus $1.6\text{--}1.9 \times$ as wide as high, with a median vertical sulcus, apical lobes weakly angulate. Malar space $1\text{--}1.2 \times$ basal width of mandible. Antenna with 19–21 flagellar segments; first segment $4.4\text{--}5.2 \times$ as long as wide at apex; sense cones sparse and inconspicuous on first segment.

Thorax polished excluding median lobe of mesonotum, mostly impunctate. Pronotum rugulose on anterior half. Median lobe of mesonotum heavily shagreened, scattered with some punctures on anterior half, weakly longitudinally rugulose behind middle and sometimes reticulate rugulose posteriorly. Scutellum scattered with some fine punctures. Some longitudinal carinulae on scutal furrow. Mesosternum very finely punctate anteriorly, with shallow mesosternal suture. Metapleuron with vertical rugae on anterior ventral half. Pleural carina strong. Propodeum with distinct median and weak lateral longitudinal carinae, but the former one sometimes obsolete posteriorly and the latter one sometimes effaced anteriorly, mostly shiny shagreened; petiolar area narrow, polished and rugulose.

Abdomen slender, narrowed from base of third segment to apex of abdomen, apically compressed. Petiole long and slender, $1.5\text{--}1.8 \times$ as long as wide at apex, margins parallel-sided behind spiracles, shagreened, laterally somewhat rugulose, extreme apex smooth and polished. Second tergum $1.5\text{--}1.7 \times$ as long as wide at base, shiny shagreened, basally weakly striate. Rest of abdomen smooth and shiny.

Black. Yellow on upper part of epistoma, mandible except teeth, palpi, tip of pronotal lobe, tegula, and upper part of mesepimeron. Mesonotum with very weak yellowish tinge on shoulders. Apical 0.2 of second tergum and basal corners of third tergum weakly marked with dusky rufous.

Legs tawny with rufous tinge. Fore and middle coxae blackish brown, apices of anterior surfaces yellow. Hind coxa entirely black. First trochanter of fore leg yellow with brownish tinge on posterior surface. First trochanters of middle and hind legs blackish brown, but the former one yellow on anterior apical 1/3 and the latter one yellow apically. Femora of all legs extensively marked with brown on ventral surfaces, but brownish marking on hind femur restricted on basal 1/3.

Male. Body length 4.6–5.4 mm. Differs from female as follows: OOC $1.3\text{--}1.6 \times$ HO. Face slightly widened ventrally, $1.5\text{--}1.9 \times$ as wide as high. Clypeus $1.9\text{--}2 \times$ as wide as high, apical lobes rounded. Malar space $0.9\text{--}1 \times$ basal width of mandible. Antenna with 21–22 flagellar segments; first segment $4.5\text{--}5.2 \times$ as long as wide at apex; tyloids on 5–10, 11 flagellar segments, with black crescentic areas dorsad of tyloids. Lateral lobes of mesonotum with micropunctures. Median lobe of mesonotum more irregularly sculptured posteriorly than in female. Abdomen slender, nearly parallel-sided behind third segment. Petiole $2\text{--}2.3 \times$ as long as wide at widest point, more rugulose than in female. Second tergum $1.7\text{--}2.3 \times$ as long as wide at base, longitudinally rugulose on basal half or more, in some specimens rugae reached to apical 0.9.

Black. Cream yellow on face, gena, inner orbit, clypeus, mandible except teeth, palpi, pedicel and scape ventrally, tyloids, propleuron ventrally, tip of pronotal lobe, shoulder, tegula, prepectus, subalar tubercle, and mesepimeron. Flagellum blackish brown dorsally and tawny yellow ventrally. Apex of second tergum brownish. Third tergum with tawny yellow basolateral large spots or basal broad band, and apical narrow band. Fourth tergum sometimes coloured as on third tergum. Legs tawny, hind leg weakly tinged with rufous. Coxae and trochanters of all legs yellow, hind coxa marked with blackish brown on dorsal surface. Hind femur marked with brown at base ventrally.

Distribution. Japan (Hokkaido).

Holotype. ♀, Mt. Keigetsudake (1900 m), Mts. Daisetsu, Kamikawa Subpref., Hokkaido, 12. viii. 1967, A. Nakanishi leg.

Paratypes. 1♀, 1♂, same locality and data as holotype, A. Nakanishi leg. 1♀, 1♂, same locality and data as holotype, H. Shima leg. 1♂, same locality and data as holotype, T. Saigusa leg. 1♂, Murasamenotaki~ Ginmeisui, Aizankei, Mts. Daisetsu, Kamikawa Subpref. 7. viii. 1967, A. Nakanishi leg.; 2♀♀, 2♂♂, Takanegahara, Mts. Daisetsu, 26. vii. 1967, K. Kusigemati leg.; 1♀, the top of Mt. Upepesanke (1870 m), Tokachi Subpref., 20. vii. 1967, A. Nakanishi leg.

This species somewhat resembles *pulchella* (Holmgren) in the shagreened mesonotum and propodeum and less punctate thorax, but the former is easily separated from the latter by the elongated petiole and second abdominal segment.

5. *Sussaba nigra* Nakanishi, sp. nov.

Female. Body length 6.5 mm. Head polished, finely punctate below antennal sockets, slightly shagreened on frons and inner orbit. Clypeus $1.9 \times$ as wide as high, elevated subbasally and then flattened to apical margin which is slightly upturned, weakly sulcate medially, apical lobes weakly rounded with a shallow median emargination. Malar space $1.2 \times$ basal width of mandible. Face parallel-sided, $2 \times$ as wide as high. Occipital carina angularly rounded at middle. OOC $1 \times$ HO. Antenna with 23 flagellar segments; first segment $3.8 \times$ as long as wide at apex; sense cones inconspicuous on basal segments.

Thorax polished. Pronotum very finely punctate on pronotal lobe, rugulose along anterior margin. Mesonotum with dense and fine punctures, punctures finer and denser anteriorly and laterally. Scutellum without lateral carinae, sparsely punctate. Postscutellum impunctate. Mesopleuron mostly smooth, sparsely with indistinct punctures. Mesosternum densely punctate. Metapleuron smooth and almost impunctate except for lower posterior portion on which some fine rugae present. Pleural carina distinct and high. Propodeum with strong median longitudinal and weak lateral longitudinal carinae, polished. First lateral area with dense punctures. Petiolar area very broad, mostly smooth with weak and short rugae posteriorly with a medial line.

Abdomen polished, gradually narrowed from base of segment 3 to apex of abdomen, not compressed. Petiole $1.4 \times$ as long as wide, heavily rugose, rugae somewhat longitudinal on postpetiole which is parallel-sided. Second tergum $1.2 \times$ as long as wide at base, longitudinally strigose excluding glabrous apical $1/5$. Third tergum weakly rugo-punctate on basal $2/3$.

Black. Palpi tawny. Mandible yellowish with its teeth light brown and base brown. Antenna tinged with brown on apical segments. Tip of pronotal lobe and tegula brown. Legs testaceous. Fore and middle coxae blackish brown. Hind coxa black. First trochanters of all legs brown with their apices yellow. Second trochanters of all legs entirely yellow. Femora of all legs tinged with brown basally on ventral surfaces. Wings hyaline with slight brownish tinge. Stigma and veins brown.

Male. Body length 5.5 mm. Differing from female in structure as follows: Face widened ventrally, $1.8 \times$ as wide as high. Clypeus $2.2 \times$ as wide as high. Frons entirely smooth. Malar space $1.3 \times$ basal width of mandible. Occipital carina much broadly rounded at middle. OOC $1.1 \times$ HO. Antenna with 22 flagellar segments; sense cones distinct on each segment; tyloids on 6-8 segments, without black crescentic areas dorsad of tyloids. Scutellum carinated laterally on basal half. Petiolar area of propodeum lightly shagreened with weak rugae. Petiole $1.3 \times$ as long as wide, postpetiole slightly divergent posteriorly.

In coloration differs from female as follows: Face yellow with short

and narrow brownish bands below antennal sockets. Clypeus and gena yellow. Brownish tinge on base of mandible much reduced. Antenna blackish brown, ventral surface much lighter, with apex of pedicel and ventral surface of scape yellow. Coxae of all legs black. Fore and middle femora brown ventrally from base to apical 0.8. Hind femur much darkened.

Distribution. Japan (Hokkaido).

Holotype. ♀, the top of Mt. Upepesanke (1870 m), Tokachi Subpref., Hokkaido, 20. vii. 1967, A. Nakanishi leg.

Paratype. 1♂, same locality and data as holotype, T. Saigusa leg.

This species somewhat resembles *rugipleuris* Dasch, 1964, from which it may be distinguished by the narrower malar space, the smooth mesopleuron, and the less strongly compressed abdomen.

6. *Sussaba elongata watanabei* (Uchida, 1957)

Promethes laticarpus watanabei Uchida, 1957. Jour. Faculty Agr. Hokkaido Univ. 50 : 248.

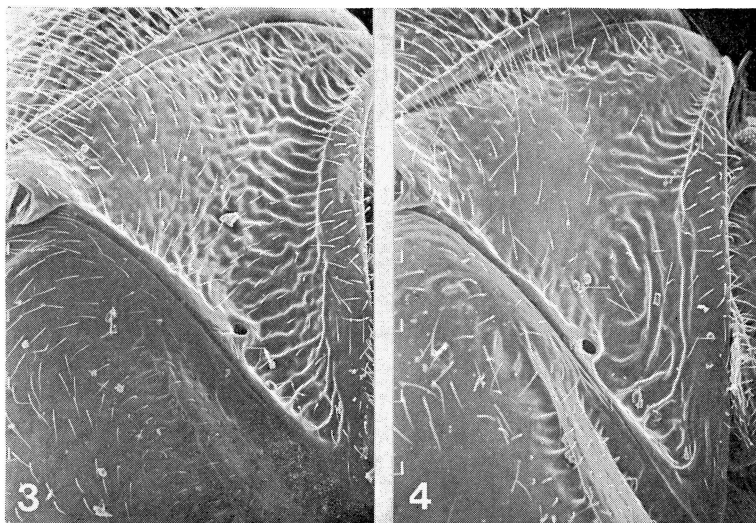
Sussaba elongata watanabei, Dasch, 1964. Mem. Amer. Ent. Inst. 3 : 242.

Sussaba elongata watanabei, Townes, Momoi and Townes, 1965. Mem. Amer. Ent. Inst. 5 : 414.

Both of the two subspecies of this species have been recorded from Japan, but I could not find any specimens of nominate subspecies *S. elongata elongata* (Provancher). And in this paper I recorded only the second subspecies *S. elongata watanabei* (Uchida).

Female. Body length 4–6 mm. Head smooth and polished, lightly shagreened on inner orbit and on epistoma, usually very finely punctate on frons, finely rugulose behind hind ocelli. Vertex with a weak median longitudinal impression. Occipital carina broadly rounded medially. Hind ocellus nearly circular and rather small, so ocell-ocular space (OOL) and ocell-occipital space (OOC) considerably wide. OOL 1.4–1.6 × HO. OOC 1.7–1.9 × HO. Face slightly widened ventrally, 1.8–1.9 × as wide as high. Clypeus 1.6–2.1 × as wide as high, separated from face by a distinct depression, medially longitudinally sulcated. Malar space 1.2–1.3 × basal width of mandible. Antenna with 19–20, very rarely 18 or 21, flagellar segments; first segment 3.8–4.8 × as long as wide; sense cones conspicuous.

Thorax polished. Pronotum with many short longitudinal wrinkles along anterior rim (Fig. 3). Mesonotum with notaulus indicated as rugulose line, microscopically scabrous anteriorly; median lobe distinctly with small punctures, sometimes rugopunctate in center, often finely rugulose posteriorly; lateral lobes evenly finely punctate. Many short longitudinal carinae on scutal furrow. Scutellum nearly impunctate. Mesopleuron almost impunctate. Mesosternum with small punctures. Metapleuron impunctate,



Figs. 3 & 4. Pronota of *Sussaba* spp. 3. *Sussaba elongata watanabei* (Uchida).
4. *Sussaba japonica* sp. nov.

strigose ventrally. Pleural carina strong and high. Propodeum polished, with strong median and lateral longitudinal and basal transverse carinae, but median longitudinal carina sometimes obsolete in center. Transverse carina between first and second lateral areas also present though low. First lateral area usually rugulose scattered with some coarse punctures. Petiolar area usually transversely rugose with median longitudinal carinulae, sometimes more irregularly sculptured.

Abdomen polished, gradually narrowed from base of third segment to apex of abdomen, weakly compressed apically. Petiole 1.2–1.3 $\times$ as long as wide, margins usually slightly divergent behind spiracles, rugulose except for apico-median portion which is polished and smooth. Second tergum 1.2–1.4 $\times$ as long as wide at base, usually very finely longitudinally striate on basal 3/4, sometimes strigose. Rest of abdominal terga smooth.

Black. Yellow on upper part of epistoma, mandible except for teeth, palpi, pedicell ventrally, apical part of scape often ventrally, tegula, tip of pronotal lobe, upper part of mesepimeron, and rarely on subalar tubercle. Yellow marking on epistoma occasionally much broadened. Mesonotum sometimes with small yellow shoulder markings. Flagellum ventrally dusky rufous and sometimes also with weak yellowish tinge. Wings infuscated with slight brownish tinge. Legs rufous, fore and middle legs weakly tinged with tawny in large part. Bases of fore and middle coxae, hind coxa except for apex, often first trochanter of middle leg ventrally, and first trochanter of hind leg excluding apex black to blackish brown. Remainder of coxae and trochanters yellow. Fore and middle femora rarely

somewhat infuscated on bases ventrally. Abdomen rufous on apico-median portion of petiole, second and third terga, and sometimes on base of fourth tergum. Basal half or so of second tergum and nearly apical half of third tergum sometimes darkened.

Male. Male shows greater variations in both structure and coloration than in female. Differing from female as follows: Occipital carina broadly rounded to weakly angulate medially. Hind ocellus a little larger than in female, nearly circular to somewhat elongated. OOL $1.2-1.5 \times$ HO. OOC $1.4-1.9 \times$ HO. Face distinctly widened ventrally, $1.6-2 \times$ as wide as high. Clypeus $1.7-2.1 \times$ as wide as high. Malar space $1.1-1.4 \times$ basal width of mandible. Antenna with 21 flagellar segments in most specimens, rarely with 20 or 22 segments; tyloids on 6-10 flagellar segments, very rarely on 5-9 segments, with black crescentic areas dorsad of tyloids; first flagellar segments $3.6-4.7 \times$ as long as wide at apex. Abdomen nearly parallel-sided behind second segment. Petiole a little longer than in female, $1.4-1.7 \times$ as long as wide. Second tergum $1.2-1.4 \times$ as long as wide at base.

In addition to the yellow parts shown in female the following parts also marked with yellow; face, inner orbit, gena, and antenna ventrally. Legs paler than in female. Fore and middle coxae nearly completely yellow. First trochanter of middle leg yellowish. Second tergum black with rufous marking restricted only on apical $1/4$, sometimes rufous marking more expanded and rarely almost entirely marked with rufous as in female. Third tergum rufous with broad black or blackish brown transverse band medially, sometimes with yellowish tinge at basal corners. Fourth tergum sometimes colored as third tergum.

Specimens examined. 54 ♀♀, 72 ♂♂, from **Hokkaido**: Souya Subpref. (Hamatonbetsu, Toyotomi, Wakkasakanai); Rumoi Subpref. (Horonobe); Abashiri Subpref. (Mt. Rausudake, Hamakoshimizu); Kusiro Subpref. (Onbetsu, Akan, Kayanuma); Tokachi Subpref. (Ashoro, top of Mt. Satsunaidake, Pirikapetanu, Obihiro, Kamiwashippu); Hidaka Subpref. (Mt. Apoinupuri); Kamikawa Subpref. (Mts. Daisetsu; Aizankei, Tomuraushi, Yukomanbetsu); Sorachi Subpref. (Mt. Yubaridake); Ishikari Subpref. (Sapporo, Mt. Soranuma, Jyozankei, Eniwa, Shimamatsu). **Honshu**: Iwate Pref. (Hachimantai-kogen, Mt. Hayachine); Yamagata Pref. (Mt. Iide); Tochigi Pref. (Nikko); Niigata Pref. (Mt. Naeba, Kurokawa); Yamanashi Pref. (Kanayama); Nagano Pref. (Sugataira-kogen, Karuizawa, Iizuna-kogen, Nagano city, Matsumoto city, Mt. Asama, Mt. Ontake); Osaka Pref. (Mt. Kongo, Mt. Katsuragi); Hiroshima Pref. (Sandankyo). **Shikoku**: Ehime Pref. (Mt. Ishizuchi). **Kyushu**: Ohita Pref. (Mt. Kuju).

7. *Sussaba japonica* Nakanishi, sp. nov.

This species is very similar to *elongata watanabei*, from which it

differs in the following points: Female. Frons without punctures. Vertex usually not impressed medially. Hind ocellus somewhat elongated and large, consequently OOL and OOC being relatively short. OOL $1-1.1 \times$ HO, OOC $1.2-1.5 \times$ HO. Occipital carina narrowly rounded or somewhat angulate medially. Face $1.7-1.9 \times$ as wide as high. Clypeus $1.5-2.0 \times$ as wide as high. Malar space $1.1-1.4 \times$ basal width of mandible. Antenna with 18-22 flagellar segments*; first segment $4.1-4.8 \times$ as long as wide; sense cones inconspicuous on first segment. Pronotum with vertical wrinkles along anterior rim instead of longitudinal ones on ventral half (Fig. 4). Mesonotum much variably sculptured than in *elongata watanabei*, from very finely and sparsely punctate to distinctly and very closely punctate, and sometimes lightly strigose with punctures posteriorly. First lateral area of propodeum usually polished with some punctures. Petiolar area of propodeum rugulose and without distinct median longitudinal carinulae. Petiole slender and nearly parallel-sided behind spiracles, $1.4-1.6 \times$ as long as wide. Second tergum $1.2-1.4 \times$ as long as wide at base, much finely striate on basal half or so, at most on basal $2/3$. Antenna nearly entirely blackish brown. Subalar tubercle black. Mesonotum nearly always with yellow shoulder marking. Wings almost colorless. Petiole without rufous marking apico-medially. Second tergum black with rufous band on apical $1/3$, this band sometimes a little more expanded, and in some case restricted on extreme apex. Third tergum with large rufous spots at basal corners, or rufous band on basal $1/3$. Ventral surfaces of fore and middle femora extensively marked with brown. Base ventrally on hind femur infuscated. First trochanter of fore leg also marked with brown ventrally. Tibia and tarsus of hind leg sometimes infuscated dorsally.

Male. OOL $0.9-1.1 \times$ HO. OOC $1.1-1.5 \times$ HO. Malar space $0.8-1.2 \times$ basal width of mandible. Antenna with 21-22, very rarely 23, flagellar segments in both specimens from Hokkaido and Honshu; tyloids on 5, 6-10, 11 segments, those on 5 and 11 segments small and vestigial; first segment $3.7-4.8 \times$ as long as wide. Petiole $1.5-1.7 \times$ as long as wide. Second tergum $1.3-1.7 \times$ as long as wide at base. Coloration as in male of *elongata watanabei* excepting following points: Prepectus usually and subalar tubercle often yellow. Mesepimeron usually more extensively colored with yellow. Ventral surfaces of fore and middle femora nearly completely marked with brown. Rufous marking on second tergum restricted only at apex. Third tergum yellow on basal corners. Fourth tergum rarely colored as on second tergum with narrow yellow basal band.

Sussaba japonica most closely resembles *elongata watanabei* as stated above. But these two species are different from each other in the sculpturing on pronotum and the shape and size of hind ocellus. In *japonica* pronotum bears vertical wrinkles and hind ocellus is somewhat elongated

* Most specimens from Hokkaido have 20 segments and very rarely 18, 19 or 21, on the contrary most specimens from Honshu have 21-22 and in rare case 20.

and large, on the other hand in *elongata watanabei* pronotum bears longitudinal wrinkles and hind ocellus is nearly circular and rather small. In coloration they are considerably different from each other, especially in the rufous maculation of abdominal segments 2-4 as described above. Adding to these morphological differences the fact that they are distributed sympatrically, namely they both fly in the same season in the same locality, also support the view that they are distinct species independent from each other.

Distribution. Japan (Hokkaido and Honshu)

Holotype. ♀, Ginmeisui (1800 m), Mt. Nagayamadake, Kamikawa Subpref., Hokkaido, 7. viii. 1967, A. Nakanishi leg.

Paratypes. 3♀♀, 1♂, same data and locality as holotype, 3♀♀, same locality as holotype, 11. viii. 1967, A. Nakanishi leg. 2♀♀, 2♂♂, same locality as holotype, 11. viii. 1967, 3♀♀, 1♂, same locality as holotype, 13. viii. 1967, T. Saigusa leg. 1♀, same locality as holotype, 7. viii. 1967, 1♀, same locality as holotype, 13. viii. 1967, H. Shima leg. 8♀♀, 4♂♂, Mt. Keigetsudake (1900 m), Mts. Daisetsu, Kamikawa Subpref., 12. viii. 1967, A. Nakanishi leg.; 6♀♀, 3♂♂, same data and locality, H. Shima leg.; 6♀♀, 6♂♂, same data and locality, T. Saigusa leg. 4♀♀, 4♂♂, the top of Mt. Upepesanke, Tokachi Subpref., Hokkaido, 20. vii. 1967, A. Nakanishi leg.; 4♀♀, 8♂♂, same data and locality, T. Saigusa leg. 3♀♀, 5♂♂, the top of Mt. Satsunaidake, Tokachi Subpref., 28. vii. 1967, A. Nakanishi leg.; 3♂♂, same data and locality, T. Saigusa leg.; 1♂, same data and locality, H. Shima leg. 1♀, 1♂, Mt. Rausudake, Shari, Abashiri Subpref., 4. viii. 1967, A. Nakanishi leg.; 5♂♂, same data and locality, T. Saigusa leg.; 1♂, same locality, 23. vi. 1967, T. Naito leg. 1♀, 1♂, Akanko, Akan, Kushiro Subpref., 20. vi. 1967, T. Saigusa leg. 1♂, Onbetsu, Shiranuka, Kushiro Subpref., Hokkaido, 31. vii. 1967, T. Saigusa leg. 3♀♀, 4♂♂, Mt. Yubaridake, Sorachi Subpref., Hokkaido, 16. vii. 1967, T. Saigusa leg.; 1♀, 1♂, same data and locality, H. Shima leg. 1♀, 4♂♂, Mt. Soranuma, Ishikari Subpref., Hokkaido, 29. viii. 1965, 2♀♀, same locality, 26. vii. 1966, 3♀♀, 3♂♂, same locality, 30. viii. 1967, K. Kusigemati leg. 11♀♀, 1♂, Kanayama, Masutomi, Yamanashi Pref., Honshu, 26. v. 1975, A. Nakanishi leg.; 3♀♀, same data and locality, J. Emoto leg. 1♀, Kawaragoya, Shiga-kogen, Nagano, Honshu, 30. v. 1975, A. Nakanishi leg.; 1♀, same data and locality, J. Emoto leg. 2♀♀, 2♂♂, Mt. Nyugasa, Nagano Pref., Honshu, Malaise-trap, A. Nakanishi and J. Emoto leg. 2♂♂, Mt. Chyogatake, Nagano Pref., Honshu, 5. vii. 1964, T. Naito leg. 3♂♂, Mt. Nishikomagatake, Nagano Pref., Honshu, 25. vii. 1966, A. Nakanishi leg. 1♂, Ohgisawa, Ômachi, Nagano Pref., Honshu, 9. vi. 1968, T. Naito leg. 1♀, Utsukushigahara, Nagano Pref., Honshu, 10. viii. 1969, O. Yata leg. 2♀♀, 1♂, Mt. Senjyodake, Nagano Pref., Honshu, 4. vii. 1963, 1♀, 1♂, same locality, 7. vii. 1963, T. Naito leg.; 1♀, same locality, 27. vii. 1959, Y. Miyatake leg.; 3♂♂, same locality, 23. vii. 1962, F. Nakasuji

leg.

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