Contributions to the Knowledge of the Cleptinae and Pseninae Faunae of Japan and Korea (Hymenoptera, Chrysididae and Sphecidae)

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Contributions to the Knowledge of the Cleptinae and Pseninae Faunae of Japan and Korea (Hymenoptera, Chrysididae and Sphecidae)*

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The present treatise comprises three papers on the faunae of the genera *Cleptes*, *Psenulus* and *Psen* of Japan and Korea which were originally intended to publish independently.

I. Cleptinae of Japan and Korea (Chrysididae)

(Including one species from Manchuria)

Probably because of the smallness of the group and of the rareness of their occurrence as well as of their comparatively less economic importance the present day status of our taxonomic knowledge on the subfamily Cleptinae seems very imcomplete and apparently remains without any noteworthy progress at the unsatisfied state of the nineteeth century. The distinction of the species is done mainly by the colour of the specimens as ever without any detailed investigation of the range of variation. The structural clues, if employed, have been too scanty to characterize the species and, moreover, too roughly represented to designate the specific characters, hence in most cases they remain only as characters of a certain group or even of the genus. The study on the relative development between parts of the body, the use of the proportion of the length to the width of a certain structural unit, so often utilized in the modern classification of different groups of other families of Hymenoptera, can not be met with even in the recent descriptions of the members of this group. This is especially strongly impressed in the case when the specimens from an unexplored region are investigated by the aid of the literature only. Therefore, it is utterly impossible to identify a specimen concienciously with a certain species even when the characters of the specimen agrees with the description of the species. Especially as the keys to the species hitherto published are almost all confined to the colorific difference alone, if a specimen from abroad is different in colour from those designated in the keys, they are not only unable to help the student to take the specimen to its nearest relative, but also they are rather useful to mislead him to believe simply the specimen to be new, had he not been a good trained investigator. This can not make an exception even in the case of R. du Buysson who was probably the best of the old workers in this field. Very

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recently, however, trends of using new methods of classification seem to be gradually ripening. Thus, L. Móczár examined the external genital organs of males of the Hungarian species, J. Noskiewicz and W. Pulawski have introduced new morphological characters in the classification of the Polish species and K. V. Krombein has applied a completely modern methods of classification in his study of the allied Subfamiy, Amiseginae, of the New World.

In the psesent study I have used some specimens of the European species sent through the kindness of my colleagues for comparison. They have been of much use but I could not examine the specimens of all of the desired species. Fortunately or unfortunately, the specimens dealt with by me excepting one seem to differ from the exotic species known up to now as far as their descriptions are concerned. Therefore, I have classified them quite freely at my own standard. In the descriptions of the species which follows cares are taken to give definite clues to the future investigators to compare *the specific characters* when the ranges of colour variations of the known species will become clarified.

From the region covered by the present study no representative of the genera other than *Cleptes* have been discovered. As to the latter five species have been on record up to the present, namely *galloisi*, *semiauratus*, *femoralis* (?) from Korea and *japonicus* and *satoi* from Japan. Among them *semiauratus*, according to the description in Japanese of the reporter, is quite different from the true representative of the Linnean species and it seems rather doubtful on what basis he identified it as *semiauratus*. Judging by the description the species seems an interesting one belonging to the bisulcate group, but the description as well as the figures given was quite rough and inaccurate and can not be of use for the spcific identification. To my regret, however, the specimen is beyond my reach at present and can not be reexamined. Accordingly, both the species of the specimen and *semiauratus* were excluded from the list of the present paper. *C. galloisi* seems closely allied to *fudzi* m. descriaed in this paper. But the description was also the classic one relating the group- or generic characters only, excepting the punctuation on the mesonotum. This species, however, has been included in this paper based on the sole distinction above mentioned. *C. femoralis* (a synonym of *C. nitidulus* F. according to Mócsár) was reported at the same time with *galloisi* without giving description based on a female specimen lacking the abdomen (therefore with a querry). But I can not but be doubtful about the identification by the same reason as mentioned as to *semiauratus*. It may belong to *doii* m. described later in the present contribution, but there is no means left to reexamine the specimen. Therefore, *C. nitidulus* was also omitted from the Cleptine fauna of Korea. As for *C. japonicus* and *satoi*, fortunately through the courtesy of the original auther, I could have a chance of reexamination of the types of them and could avoid the confusion in the nomenclature that might otherwise have occurred.

I express here my sincere gratitude to Mr. Nobuyoshi Tosawa for the loan of the valuable specimens including the types of *japonicus* and *satoi* and for placing them at my disposal.

Remarks on some abbreviations and special terms

RWL ..... Relative width to length. OOD, POD, OCD : Oculocellar distance, postocellar distance and ocelloccipital distance respectively, consistent with oculocellar line (OOL), postocellar line (POL) and ocelloccipital line of most of the authors. *Supraoccipital furrow* ..... A short transverse (usually crenate) furrow just in front of the occipital margin. *Postocellar impression* ..... A more or less deep impression located just outside each of the postocelli. *Unisulcate pronotum* ..... The pronotum provided with the anterior transverse furrow only. *Bisulcate pronotum* ..... The pronotum provided not only with the anterior transverse furrow, but also with the posterior one in front of the posterior margin. Main part of pronotum ..... The portion behind the anterior transverse furrow excluding the posterior laterally expanded area.

Characters of Cleptinae

Small to middle-sized wasps, body slender, head transverse, with eyes sparsely covered with short, fine pubescence, antennae 13-jointed, upper front gradually inclining into lower front (face) without well-defined border, mandibles multidentate at apices, clypeus medianly produced anteriorly, labial palpi 3-jointed, maxillary palpi 5-jojnted; pronotum elongate and more or less narrowed anteriorly, provided with a transverse crenate furrow along the anterior border which is more or less rounded, mesonotum divided into three lobes by deep parapsidal furrows, lateral lobes of which also incompletely divided into two pieces by a weaker longitudinal groove, scutellum always well developed, propodeum with postero-lateral corners angulate or toothed, its stigmata located at the bottom of the comparatively large excavation behind the insertion of hind wing, the surface always reticulated with carinae; discoidal cell of fore wing very weakly configulated by faint nervures excepting the medial; tarsal claws of legs with a small tooth producing at a right angle toward middle (Fig. 4); abdomen convex not only on dorsal surface, but also on ventral surface; the 1st and 2nd segments united nearly as long as the 3rd and 4th put together. Antennae 13-jointed in both sexes.

The genus *Cleptes* Latreille, 1802 —— Generic characters

Head with vertex roundly raised, not flattened, eyes large occupying approximately half of the width of head, but not bulging out, vertex always with ocellar impressions outside each ocellus, lower front (face) mostly flattened and mostly canaliculate in middle, antennal socket not provided with a torus to joint the 1st segment, its front margin in touch with or close to the anterior margin of clypeus on each side of the medial protuberance, the latter not acutely carinate in middle, genae comparatively long, either convergent below or parallel, mandibles tri- or quadridentate, sometimes differing in dentation between the right and left, antennal joint 3 always the longest of flagellar joints, 4–12 subequal in length, 13 slightly longer, in ♀ joint 3 approximately as long as 4 and 5 united, 4–12 as long as wide or shoter than wide, in ♂ each joint longer than wide and gradually finer apically; pronotum always with an inverted V-shaped transverse crenate furrow a short distance behind anterior margin, the part in front of it laterally bulging out, the part behind it more or less elongate and on posterior portion expanded laterally along the anterior border of mesonotum, this portion in some group of species provided with another transverse, foveolated furrow again, main part usually subpentagonal, medianly grooved or not, scutellum always larger than postscutellum, each side of the two parts always strongly excavated by two large foveae, lateral surfaces of propodeum with a large excavation slightly before middle. Abdomen 4-segmented in ♀, 5-segmented in ♂, the 1st tergite at base

roundly depressed with the bottom lengthwise subcanaliculate, this segment impunctate or nearly so, rest of the segments finely closely punctured except apical margins; fore wing with costal, medial, radial, 1st discoidal and 1st and 2nd submedial cells, radial veins strong and distinct on its basal 2/3, weaker and faint apically, not completely closing the cell at apex; hind coxa always with an apophysis on upper face on top of the encircling carina, sometimes also on front one, hind femur highly roundly raised upwards.

Sexual distinctions

Abdomen 4-segmented in ♀ and 5-segmented in ♂; antennae short, thick and joints 4–12 as long as wide or wider than long in ♀, slender, long and joints always longer than wide in ♂; occipital margin much below the level of vertex in ♀ as compared with ♂; head seen in front in most species relatively longer (as compared with the width) in ♀ than in ♂

Specific characters

The distinction of the species in this genus can be made by some of the following characters, at times by a single one, but usually by a combination of several ones (most of which have been completely overlooked by the previous authors) :

(1) The form of head seen from above (RWL, convergency of temples), seen in frot (RWL, elevation of vertex, downward elongation of clypeal region) and sometimes seen in profile (convexity of frons against the outline of eye); (2) developmental degree of vertex behind postocelli, usually represented by the ratio of OCD to OOD; (3) Location of ocelli and ratio between OOD and POD; (4) length ratio between eye and temple; (5) the state of postocellar impression; (6) transverse impressed line just behind ocellar regin (sometimes varied within the same species); (7) presence or absence of the supraoccipital furrow and the state of its crenation; (8) degree of depression of occipital margin below the level of vertex and degree of lateral extension of occipital carina; (9) degree of convexity of upper and lower front; (10) state of frontal canal; (11) convergency and relative length of genae (to some antennal joint or width of medial protuberance of clypeus); (12) location of sockets of antennae against the anterior margin of clypeus; (13) the form of medial protuberance of clypeus, especially of the antero-lateral corners; (14) relative length between joints of antennae and RWL of certain joints (3rd and 11th were adopted in the present study); (15) whether pronotum unisulcate or bisulcate; (16) the form of main part of pronotum (relative length and convergency of the lateral margins) and the state of medial canal; (17) the form and convexity of scutellum and relative size of its axillae; (18) state of anterior and posterior excavation of postscutellum; (19) the form of propodeum seen from above (convergency, divergency or paralleling of the lateral margins, the form and state of protuberance of the postero-lateral teeth and RWL); (20) state of mesopleural furrows;(21) the form and

Table 1. Characters of the mandible in *Cleptes* spp.

Species	Sex	Apical teeth Right	Apical teeth Left	General feature	Specimens examined
nitidulus	♀	?	?	Slender	1
	♂	3 (?)	?	〃	1
doii	♀	–	–	Thick	1
	♂	3 (?)	?	〃	1
seoulensis	♀	3	?	Robust	1
	♂	–	–	–	–
fudzi	♀	4 (?)	?	Robust	1
	♂	4	?	〃	3
japonicus	♀	4	3	Thick	28
	♂	4	3	〃	15
satoi	♀	3	3	Slender	3
	♂	3	3	〃	4
crassiceps	♀	4	4	Thick	6
	♂	4	4	〃	3

RWL of radial cell of fore wing; (22) the form of discoidal cell (partly designated by the ratio of Cu_1 to M); (23) state of hind-coxal process on upper basal portion; (24) the form of abdomen (simply represented by RWL under normal condition); (25) sculpture and general punctuation; (27) coloration.

Among the characters above listed those represented by Nos. (6), (10), (19, concerning the postero-lateral teeth, especially of the form) and (22) show a certain degree of variation in some species. It is necessary, therefore, to confirm the range of variation in order to apply them as specific characters. Besides the above, the mandibles seem to show good specific distinctions in their general form and in the dentation at apices as shown in Table 1 as far as confirmed by me. It is regretted, however, that in most specimens excepting those particularly prepared, they are tightly closed and cannot well be observed. In future study it will be necessary to prepare the specimen in taking this point into account.

Key to the species

♀ ♀

1 Pronotum unisulcate (OOD slightly smaller than OCD, median facial furrow, genae, clypeus : Fig. 2, pronotum without median longitudinal furrow, on mesopleuron foveolate furrow absent, propodeal teeth elongate triangle, distinctly produced obliquely backwards, body black with abdomen broadly reddish yellow), length 6.0 mm, Korea

***doii* sp. nov.** (p. 7)

– Pronotum bisulcate 2

2 Mesonotum almost impunctate (Head seen in front wider than long, with a feeble facial furrow, head and thorax indigo-violet, partly greenish, abdomen blackish purple), length 6.5 mm, Korea

***galloisi* Uchida** (p. 12)

– Mesonotum more or less distinctly punctate 3

3 Oculocellar distance about half as large as ocelloccipital distance (Vertex behind ocelli markedly convex, head seen in front nearly as long as wide, medial protuberance of clypeus with antero-lateral corners pointed, pronotum with sides of main part subparallel, postscutellum with a rounded pit at base and excavated from backwards, propodeum with sides slightly divergent backwards, the teeth short, hardly produced laterad, violaceous blue, partly dark blue and partly greenish), length 6.5–7.5 mm, Japan

***crassiceps* sp. nov.** (p. 21)

– Oculocellar distance subequal to, at most 2/3 as large as ocelloccipital distance 4

4 Genae strongly convergent below, mesopleuron sparsely punctured, mesopleural furrows very distinct and foveolate, radial cell of fore wing more than thrice as long as wide, body indigo-blue or purple 5

– Genae parallel or only slightly convergent below, mesopleuron rugose-striate, mesopleural furrows rather indistinctly defined, radial cell of fore

wing less than thrice as long as wide, body black or aeneous black with abdomen partly ferruginous 6

5 Body robust, pronotum with sides of main part parallel, head from above with RWL nearly 2 : 1, 3rd joint of antenna about twice as long as wide at apex, clypeus with corners of medial protuberance rounded, mandibles black, length 10.2 mm, Korea

***seoulensis* sp. nov.** (p. 13)

– Body slender, pronotum with sides of main part roundly convergent anteriorly, head thicker, seen from above with RWL nearly 5 : 3, 3rd joint of antenna 2.7 times as long as wide at apex, clypeus with corners of medial protuberance shortly toothed, mandibles testaceous except greenish base, length 9.0 mm, Japan

***fudzi* sp. nov.** (p. 14)

6 Postero-lateral teeth of propodeum nearly rectangular, very slightly produced, pronotum short (Fig. 26) and simply punctured, femora of legs black (Head and thorax black, partly greenish, sometimes with aeneous effulgence, abdomen at base testaceous), length 5–7 mm, Japan

***japonicus* Tosawa** (p. 16)

– Postero-lateral teeth of propodeum slender and comparatively long, distinctly produced laterad, pronotum comparatively long (Eig. 20) and rugose striate, femora of mid and hind legs brown (Head and thorax black, rather lustreless, abdomen at base testaceous), length 6.0–6.8 mm, Japan

***satoi* Tosawa** (p. 20)

♂ ♂

1 Pronotum unisulcate 2

– Pronotum bisulcate 3

2 Antennal joint 11 one and half times as long as wide in middle, main part of pronotum subparallel, head and thorax golden green, propodeum violaceous, front tibia and tarsi ferruginous, abdomen black with sides violaceous purple (OOD : POD = 3 : 2, OOD = OCD, facial median groove fine, pronotum without median furrow, punctures on mesopleuron comparatively large and fairly close, subrugose below and in front), length 4.8 mm, Manchuria to Europe

***nitidulus* Fabricius**

– Antennal joint 11 more than twice as long as wide in middle, main part of pronotum shorter and distinctly convergent anteriorly, head and thorax including propodeum indigo-blue, abdomen purple except apical portion of each segment, front tibiae dark brown with purplish effulgence, front tarsi brown (Others similar to the above), length 5.0 mm, Korea

***doii* sp. nov.**

3 Ocelloccipital distance 1.5 times as large as oculocellar distance (Head and thorax bluish, abdomen black with sides blue, body slender,

main part of pronotum roundly convergent anteriorly, postero-lateral teeth of propodeum small, shortly produced), length 4.3–5.5 mm, Japan

***crassiceps* sp. nov.**

– Ocelloccipital distance nearly as large as oculocellar distance 4

4 Main part of pronotum with RWL nearly 2 : 1 (Fig. 7), medianly strongly longitudinally furrowed, head seen in profile with facial line distinctly convex, abdomen violaceous blue with apex of each segment discoloured and blackish, length 6.3–7.5 mm, Japan

***fudzi* sp. nov.**

– Main part of pronotum with RWL nearly 3 : 2, medianly without longitudinal furrow, head seen in profile with facial line nearly parallel to the curvature of eye, abdomen black with base ferruginous 5

5 Postero-lateral teeth of propodeum narrowly produced, head and thorax rugose-punctate, tibiae and tarsi of all legs light ferruginous (head and thorax chiefly bronzy green), length 5.5-6.5 mm, Japan

***satoi* Tosawa**

– Postero-lateral teeth of propodeum nearly rectangle at apex and hardly produced, head and thorax finely punctured, tibiae and tarsi of legs brown to dark brown (Head and thorax indigo blue), length 5.5–6.8 mm, Japan

***japonicus* Tosawa**

Remarks. C. seoulensis ♂, *galloisi* ♂ and *nitidulus* ♀ of the Machurian specimen still remain undiscovered. As for *nitidulus* ♀ a description was made basing on a specimen from Europe in order to furnish the Japanese students with some information about it.

Descriptions of the species

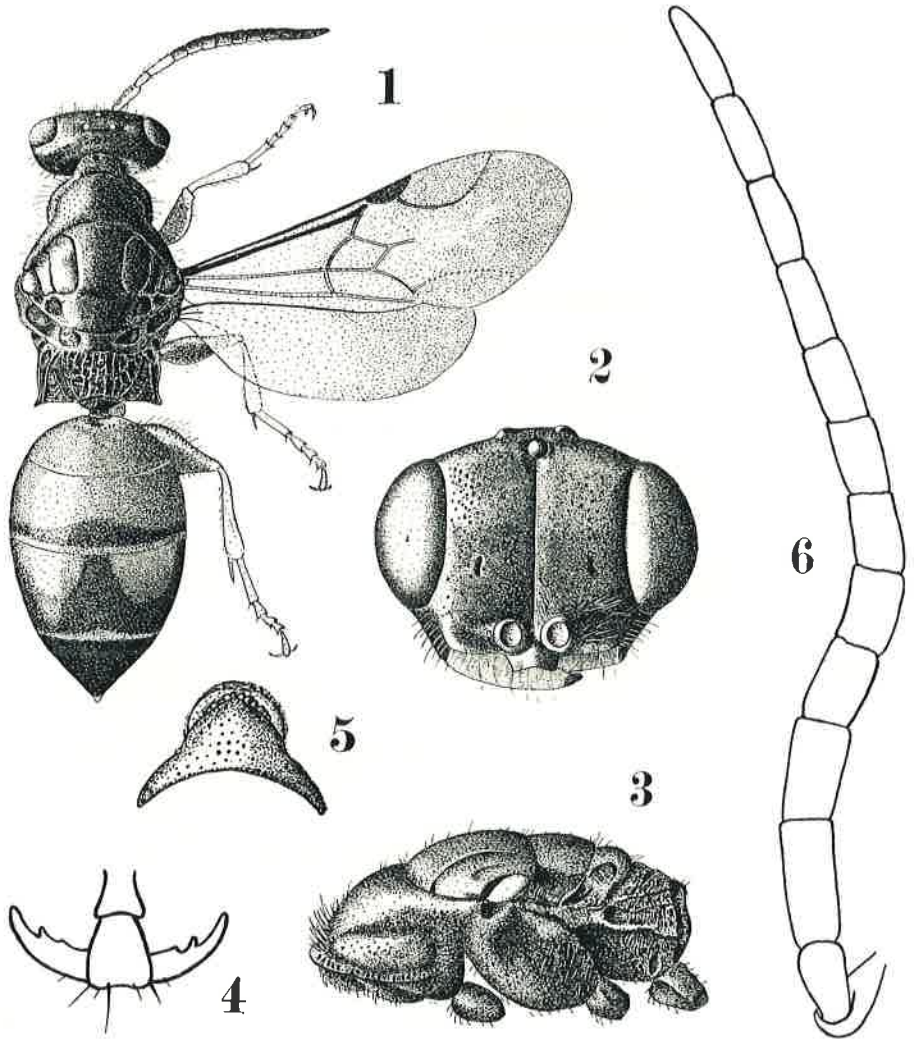
Amongst the following the description of *Cleptes doii* ♀ was made in 1943 during my residence in Korea and has been preserved until now. At the moment of preparing this M. S. I wanted to reexamine the specimen, if possible; but of course could not. Fortunately, however, fairly detailed figures had been made and some emendation of the description was attempted basing upon these figures. However, figures can not inform us the complete characters of the specimen, so that the specific characters of the female in this species remains unsatisfactory as compared with others.

In the following descriptions, in order to present comparative sizes among species, measurement of any part of the body of the types or the stardard specimens used for descriptions was all performed under the same scale and the proportions obtained were given without being reduced. The oculometer was employed for the scale and the value 30 corresponded to 1 mm.

1. *Cleptes doii* sp. nov.

♀. Length 6 mm. General feature : Fig. 1. Head seen from above transverse, wider

than pronotum. Vertex convex, ocelli in a nearly equilateral triangle, ocellar area elevated, with a small impression outside each of ocelli and with an impressed transverse line just behind the area. OOD slightly larger than POD and slightly smaller than OCD. Head seen in front : Fig. 2, with face nearly flattened and longitudinally finely grooved in middle, the groove runs from above the base of antennae to front ocellus. Clypeus strongly produced anteriorly in middle, subtrapezoid and gradually raised towards apex, with apical border gently emarginate. Antennae relatively thicker in middle, from about 7th joint tapering apically; joint 3 long, nearly as long as the following two united and 2.3 times as long as wide at apex. Thorax : Fig. 1. Pronotum



Figs. 1-6. *Cleptes doii* sp. nov. 1, Seen from above (♀). 2, Head seen in front (♀). 3, Thorax in the lateral view (♀). 4, Tarsal claws. 5, Pronotum seen from above (♂). 6, Antenna (♂).

with a crenate transverse furrow anteriorly but without such before posterior margin; main part with sides nearly parallel, disc roundly convex. Mesonotum convex, postscutellum at base without a hollow or a transverse excavation, also it is not hollowed at apex. Propodeum with central area raised, with sides subparallel, postero-lateral teeth triangular, distinctly produced, with apex pointed. Thorax in the lateral view : Fig. 3. Mesopleuron withuot epimeral and epicnemo-precoxal crenate furrows definable. Abdomen (Fig. 1) broadly roundly excavated at base. In forewing radial nervure very markedly roundly curved posteriorly (Fig. 1).

Head and thorax shining. Head above finely and fairly closely punctured; pronotum on anterior portion in front of anterior furrow closely and minutely, on posterior main part rather sparsely but somewhat strongly, mesonotum, scutellum and postscutellum more sparsely and rather feebly punctured. Punctures nearly even in size and on disc of pronotum partly longitudinally subrugosely confluent. Propodeum on central area coarsely subreticulate, with main striae run ning longitudinally, lateral areas longitudinally striate and transversely costate. Abdominal tergite 1 smooth and polished, with about a dozen fine points scattered on posterior portion in middle; tergites 2 and 3 microscopically minutely and densely punctured excepting each apical margin, tergite 4 at base more sparsely but somewhat more grossly punctured, with apical border smooth; sternites 2 and 3 moderately largely and sparsely punctured, with intervals scattered with finer points, sternite 4 impunctate. Head and thorax sparsely covered with blackish or blackish brown comparatively long pubescence. Under microscope some hairs mottled with black (or brown) and grey. On abdomen and legs pubescence is the same in colour as that of the sclerite.

Body ivory black, with a bronzy reflection on pronotum. Mandibles except apices, antennal joint 1 except dorsal brownish streak, 2 and 3 wholly, 4–8 beneath, abdominal tergite 1 wholly, 2 except apex, 3 on two basal large maculae, sternites 1 and 2 and legs with trochanters, both ends of femora and whole tibiae and tarsi ferruginous to reddish brown. Tips of mandibles, wing tegulae, rest of tergites 2 and 3 and of sternites of abdomen and legs with coxae and femora dark brown. Wings slightly fuscous, veins dark brown.

Measurement. Length : Head 0.6, thorax 2.6, abdomen 2.8, forewing 4.0. Width : Head 1.4, prothorax (posterior extremity) 1.4, mesothorax 1.6, abdomen 1.8 (mm).

♂. Length 5 mm. Head seen from above relatively wider than in ♀, with RWL 39 : 17, ocelli in a slightly depressed equilateral triangle, ocellar area gently elevated, ocellar impressions smaller, outside postocelli turning into a narrow groove distinctly outlined, OOD : POD : OCD = 8 : 5 : 7, no impressed transverse line behind ocellar area; also without supraoccipital furrow, occipital carina defined only on upper portion, without reaching beneath head. Upper front roundly inclined anteriorly. Head seen in front with RWL 39 : 25, face flattened, with median longitudinal groove fine and shallower below, clypeus in medial protuberance narrower and more highly raised apically, with lateral corners nearly angulate, genae convergent below and as long as 7th joint of antenna. Relative length between antennal joints from base to apex : 12, 6, 9, 7, 6, 6, 6, 6, 6, 6.5, 6.5, 6.5 and 7.5; joint 3 nearly twice as long as wide at apex, joint 11 slightly more than twice as long as wide (Fig. 6). Pronotum with main part roundly convergent anteriorly (Fig. 5), the portion of the sides not well distinguished from the anterior convergent portion, disc relatively shorter than in ♀, mesopleuron without any noticeable furrow at all; propodeum with lateral margins subparallel, at the teeth slightly divergent posteriorly, the teeth wider, shorter and less produced than in ♀, about 90° at apex. Abdomen with RWL 46 : 62. Hind-coxal apophysis : Fig. 39.

In punctuation similar in general to ♀, but the 1st tergite of abdomen posteriorly sparsely punctured over the whole surface excepting apical margin.

In colour markedly different from ♀: Head, thorax, 1st joint of antennae, 2nd joint above, coxae, trochanters above, femora excepting beneath and tibiae externally of all legs violaceous blue, with purplish lustre in certain light. Abdomen purple, with apical margin of each segment discoloured and testaceous. Antennae black, apical half of mandibles, tibiae internally and tarsi wholly brownish.

Holotype : ♀, Nanzan, Keijo (Seoule), Korea, 25. V. 1935, Hironobu Doi leg. (In the collection of the Keijo Science Museum. It was partly damaged accidentally after the study.)

Allotype : ♂, Keijo, Korea, 25. V. 1934, S. Eguchi leg. and in the private collection of N. Tosawa. At the moment of my study both hind legs have been missed from the specimen.)

Remarks. Among the members of the genus hitherto recorded this species seems most closely related to *Cl. femoralis* Mocsary (1890) known from Asia Minor by a single male. However, according to the recent paper by Móczár (1951) *femoralis* Mocsáry is nothing but a synonym of *nitidulus* Fabricius representing a colour variation. If so, the present species is no doubt different from *femoralis*, since it is quite distinct from *nitidulus* Fabricius as comparatively given below :

1. ♀. Pronotum much shorter than in *nitidulus* (and quite different in colour).

2. ♀. OCD relatively smaller as compared with OOD, that is to say, head behind eyes comparatively shorter than in *nitidulus*.

3. ♀ ♂. Antennae differently structured. In ♀ 3rd joint relatively longer, in ♂ joints in the apical portion are relatively distinctly longer, e. g. joint 11 more than twice as long as wide in this species, while in *nitidulus* only 1.5 times as long as wide (Fig. 6, cf. Fig. 25).

4. ♀. Postscutellum at base not transversely excavated (in ♂ the portion is damaged by the pin).

5. ♀ ♂. In fore wing radial cell wider and much more roundly curved posteriorly (RWL 25 : 9, in *nitidulus* 25 : 6) and discoidal cell also wider (ratio of Cu_1 : M, 10 : 9, in *nitidulus* 10 : 7 .... the latter of constant ?).

6. ♀ ♂. In colour fairly markedly different.

Cleptes femoralis Mocs. (sex unrecorded !) was once reported from Korea with a query, based upon a specimen without the abdomen. But apart from the absence of the abdomen, this identification is quite doubtful. However, at present we have no means to reexamine the specimen.

2. *Cleptes nitidulus* (Fabricius, 1793)

Ichneumon nitidulus Fabricius, Ent. Sys., II, p. 184, 1793, ♀.

Cleptes nitidulus Fabricius, Syst. Piez., p. 154, 1804, ♀; —— Shuckard, Ent. Mag., IV, p. 159, 1836, ♀ ♂; —— Mocsáry, Monogr. Chrysid., p. 42, 1889, ♀ ♂; —— Dalla Torre, Cat. Hym., VI, p. 3, 1892; —— Buysson, André Spec. Hym. Eur., VI, p. 86, 1897, ♀ ♂; —— Berland et Bernard, Faun. France, 34, Hym. Vespif., III, p. 20, 23, 1938; —— Móczár, Ann. hist. nat. Mus. Hung. (N.S.), I, p. 277, 1951.

Cleptes fallax Mocsáry, Monogr. Chrysid., p. 49, 1889 (After Buysson, 1897, *l. c.* and Móczsár, 1951, *l. c.*).

Cleptes femoralis Mocsáry, Term. Füzet., XIII, p. 47, 1896, ♂; —— Buysson, 1897, *l. c.*, p. 92, (only translation) (After Móczsár, 1951, *l. c.*).

♂. (Based on a specimen from Manchuria.) Length 4.5 mm. In general structure very similar to *Cl. doii* m. ♂. Head seen from above with RWL 36 : 17, OOD : POD : OCD = 6 : 5 : 7, ocelli in a slightly depressed equilateral triangle, postocellar impressions narrowly grooved along the ocellus but not so sharply marginate as in *doii* and shallowly extended a little laterad,

transverse impressed line just behind ocellar area absent, supraoccipital carina not observed, occipital carina defined only on upper medial region, not extending to the sides of head. Upper front gently roundly inclined forwards. Head seen in front with RWL 36 : 24, face very gently convex and medianly from between antennae to front ocellus finely grooved, clypeus subtrapezoid in middle, medianly raised and slightly roundly emarginate at apex. Antennae (Fig. 25), with relative length of each joint from base to apex, 14, 5.5, 8, 6, 5, 5, 4.5, 4.5, 4.5, 4.5, 4.5, 4.5, 5.5; 3rd joint 2.3 times as long as wide at apex, 11th joint 1.6 times as long as wide in middle. Genae convergent below, nearly as long as 7th joint of antennae. Pronotum : Fig. 23, with main part subparallel, comparatively longer than in *doii*. Postscutellum roundly inclined forwards and backwards, thus appearing transversely broadly excavated at base. On mesopleuron posterior half only of epimeral furrow defined. Propodeum with lateral borders slightly divergent posteriorly, with postero-lateral teeth triangular (apical angle about 60°) and produced obliquely backwards. Abdomen wider than thorax, with RWL 42 : 60. Hind-coxal apophysis : Fig. 24. In fore wing radial cell with RWL 23 : 7, radial nervure faint on apical half and obsolete at apex; discoidal cell comparatively slender, with ratio of $Cu_1 : M = 10 : 7$. Hairs on upper surface of head and thorax blackish, on other portions greyish white.

Upper front and face moderately closely punctured with middle-sized points, with intervals as wide as or slightly wider than points, near antennal insertions punctures closer; vertex more sparsely, pro- and mesonotums much more sparsely and somewhat more grossly punctured, punctuation on mesonotum posteriorly sparser, scutellum with median area almost impunctate; mesopleuron moderately closely punctured, with epicnemium rugose-punctate; propodeum coarsely, irregularly reticulate with a few well-defined longitudinal striae, on lateral portions the surface sectioned by a few longitudinal striae and transversely costate. Abdominal tergite 1 very finely, fairly closely punctuate across middle, tergites 2–4 finely and moderately closely punctured, punctures posteriorly and laterally slightly larger and sparser and on apical margin of each segment absent and surface polished, tergite 5 with a few scattered fine punctures; ventral plates more grossly and fairly closely punctured excepting posterior margins of the segments.

Head, thorax, 1st antennal joint, wingtegulae and legs except tibiae and tarsi metallic green, with bluish and golden (not reddish) effulgence in certain light. Propodeum above adorned with blue and violet. Abdomen black, with area around the basal impression testaceous and with sides violaceous purple. Antennal flagella lustreless black. Apical half of mandibles, front tibiae and all tarsi bright ferruginous yellow; mid and hind tibiae slightly darker with external sides having an effulgence of metallic blue.

Specimen examined : 1 ♀, Kaigen, Manchuria, 2. VI. 1936, I. Okada leg. (Coll. Hokkidido University, Ent. Inst.)

♀. The female of this species has not been collected from Asiatic region. According to my observation of a European psecimen, it has the characters as described below. It must be remembered, however, that it is quite uncertain whether the Asiatic specimen bears the same coloration as that of the specimen here studied, since coloration can considerably be varied from one region to another.

1. Colour : Black, with bronzy effulgence, partly greenish. Mandibles near apex, pronotum wholly, basal two segments, base of 3rd segment (medianly black), all tibiae and tarsi ferruginous, rest of legs, antennal flagella beneath and wingtegulae brown to dark brown. Greater part of scutellum, sides of postscutellum, mesopleuron above and sides of propodeum metallic green. Propodeum somewhat bluish.

2. Structure : Head from above thicker than in ♂, with RWL 38 : 22, OOD : POD : OCD = 6 : 5 : 10, postocellar impressions deeper and gradually shallowed laterad, no impressed transverse line just behind ocellar area, supraoccipital furrow defined, but fine and not strong, occipital margin more strongly depressed below the level of vertex, only upper region facing pronotum distinctly carinate; upper front roundly inclined anteriorly. Head seen in front with RWL 38 : 32, median facial groove as in ♂, clypeus also similar but shorter. Antennae with relative length between joints : 20, 7, 9, 5, 4, 4, 4, 4, 4, 4, 4, 4, 5; 3rd joint markedly incrassate towards apex, 1.3 times as wide at apex as wide at base and slightly more than twice as long as wide at apex, 11th joint slightly wider than long. Pronotum with main part parallel at sides and nearly as long as head from above, without crenate furrow just before posterior border; mesonotum on lateral lobes with longitudinal furrow very much less strong than parapsidal furrows, postscutellum broadly excavated at base and longitudinally closely striate like crenation; on mesopleuron state of furrows as in ♂. Propodeum formed as in ♂, with posterior margin seen from above nearly straight. Wing venation and hind-coxal apophysis also similar to those of ♂.

Punctuation : Generally similar to ♂, but somewhat larger and stronger. Propodeum similarly sculptured, but reticulation on median portion stronger and closer. Punctures on abdomen as in ♂, excepting that 1st tergite nearly completely smooth and 4th sparsely and strongly punctured.

(Based on a specimen from Bahberich, collected and determined by Mr. P. M. F. Verhoeff.)

3. *Cleptes galloisi* Uchida, 1926

Cleptes galloisi Uchida, Zool. Mag. (Tokyo), XXXV III, p. 183 (in Japanese), 185 (in German), 1926.

Original description : ♀. Kopf rundlich, von vorn gesehn breiter als hoch, durchaus fein punktiert und dicht fein behaart; Gesicht in der Mitte mit einer schwachen schmalen Längsfurche; Clypeus stark rundlich gewörbt; Mandibeln kräftig und mit zwei ungleichen Zähnen (probably incorrect !) besitzt, von denen der untere viel grösser ist; Maxillar-Palpen länger als die Labial-Palpen. Antennen so lang wie der Thorax, dick, mit 13 Gliedern, das erste Glied so lang wie das 2te, 3te und 4te zusammen, das 2te am kleinsten, das 3te viel länger als die übrigen. Thorax dicht fein behaart, lang gestreckt, zerstreut fein punktiert; Metathorax dicht grob gerunzert, beiderseits mit je einem Zahn; Area superomedia gross; Prothorax verhältnissmässig schlank und lang, vor dem Hinterrande mit einer Querreihe von einigen groben Punkten; Mesonotum kaum punktiert; Parapsidienfurchen sehr tief; Schildchen ganz flach. Hinterleib suboval, mit 4 deutlichen Rückensegmenten und dicht fein braun behaart; das erste Segment ganz glatt, stark glänzend, in der Mitte deutlich breit gedrückt, die übrigen mit Ausnahme jeder Hinterrand dicht fein punktiert; Bauchseite deutlich dicht fein punktiert als auf der Rückenseite, nicht konkav, sondern ein wenig gewölbt. Flügel subhyalin; Costal-, Medial-, Submedial- und Radialzell vollstandig ausgebildet, die übrigen undeutlich; Radialnerv hinter der Mitte verwischt; Stigma gross, dunkelbraun. Beine dick, besonders die sämtlichen Schenkel; Klauen in der Mitte mit einem kleinen Zahn.

Grundfarbe violettblau und stark glänzend; Gesicht, Clypeus, Mandibeln, Schildchen, Postschildchen, das erste und 2te Glied der Antennen, die ersten vier Beine ausgenommen der Schienen und Tarsen, die hintersten mit Ausnahme der Tarsen, grün; Antennen grösstenteils, beiden Palpen, alle Tarsen und die ersten vier Schienen, schwärzlich. Abdomen vollständig dunkelviolett. Länge ♀ 6.5 mm.

Remarks. This description, as was the case of the classical ones, concerns chiefly with the generic or group characters and gives little information as to the specific distinctions. Therefore,

when we compare this with the closely related species having a similar coloration, such as *seoulensis*, *fudzi* and *crassiceps* that will be described later, it becomes of little use and we can rely upon but one character — impunctate mesonotum —, a character that seems to vary to a certain extent within the specific category. To my regret, I could not have the chance of examining the specimen.

4. *Cleptes seoulensis* sp. nov.

♀. Length 10.2 mm. According to the literature this species seems somewhat resembling *Cleptes orientalis* Dahlbom in structure. but differing at least in the character of pronotum. In coloration *seoulensis* differs completely from *orientalis*, but colour can not be a final clue to distinguish the species.

Body robust and stoutly built. Head from above : Fig. 8, with RWL 77 : 40, temples well developed and rounded, at top more than half as long as eye, OOD : POD : OCD = 13 : 8 : 18, ocelli in a nearly equilateral triangle, ocellar region elevated, postocellar impressions very deep, in form elongate triangle with apex rounded and directing obliquely backwards[1], they are well outlined posteriorly but gradually shallowed latero-anteriorly; supraoccipital furrow very strong and distinctly foveolate (Fig. 8). Upper front comparatively short and roundly inclined forwards with median line very deeply grooved. Head seen in front with RWL 76 : 55, face nearly flattened, with median longitudinal deep groove running from between insertions of antennae to median ocellus. Clypeus : Fig. 9, with medial produced portion feebly tridentate at apex, sockets of antennae slightly behind the extreme margin of clypeus; genae convergent below, as long as 2nd joint of antenna. Antennae markedly stout, widest at 6th joint, relative length between basal 10 joints (apical 3 were lost) 36, 13, 17, 10, 9, 9, 9, 9, 9, 9; 3rd joint twice as long as wide at apex, 4th nearly as long as wde. Pronotum bisulcate, both furrows very strong and coarsely foveolate, along the front margin another foveolate furrow is present, main part with sides parallel, anteriorly roundly convergent and medianly deeply canaliculate, the canal not reaching on both ends the transverse furrow, but at the posterior end the area next to the canal shallowly depressed (of constant ?). Scutellum with axillae not particularly large, the disc subquadrate, slightly wider than long, the hollows on both sides of postscutellum semielliptic, its apex directing inwards; propodeum with lateral margins posteriorly gently divergent, with posterior margin bisinuate (Fig. 10), postero-lateral teeth stout, subtriangular, obliquely slightly produced, with apex rounded. On mesopleuron epicnemo-precoxal and epimeral furrows connected with each other in front, very deep and strongly crenate excepting posterior portion of epimeral furrow (Fig. 11). Abdomen as wide as the widest portion of thorax, with RWL 90 : 137 (nearly 2 : 3) base roundly impressed in middle, with bottom longitudinally subcanaliculate. In forewing radial cell long, with RWL 14 : 66, with apex not completely closed, ratio of Cu_1 : M = 24 : 19. Hind-coxal apophysis : Fig. 12.

Upper front and vertex closely strongly punctured with well-defined medium-sized punctures, with intervals slightly narrower than the punctures; lower front (face) similarly punctured, but on median portion punctures much sparser; clypeus closely punctured. Pronotum closely punctured, punctures as large as on head and somewhat sparser backwards; mesonotum and scutellum more sparsely punctured; propodeum medianly coarsely reticulte, laterally with 4 irregularly zigzagged striae with intervals transversely costate or subreticulate. Mesopleuron moderately closely punctured, sides of propodeum with anteriormost portion just in front of the

1) The impressions are so deep and large that several grains of sands are included at the bottom.

large excavation smooth and polished. Abdominal tergite 1 with scattered fine punctures behind middle, tergites 2 and 3 finely and closely punctured, on tergite 4 punctures uneven in size, but generally larger than on 2 and similarly close; on each segment punctures larger and sparser posteriorly with apex broadly impunctate. Sternite 2 moderately grossly and closely punctured, 3 more sparsely punctured with intervals scattered with finer points, 4 very grossly and sparsely punctured.

Dorsal surface of body sparsely covered with brownish black pubescence, hairs on occipital margin and beneath body and on legs greyish white. Body metallic purple, with sides of body throughout, vertex, 1st joint of antennae wholly, 2nd above, pronotum, scutellum, apical tergite of abdomen and legs except tarsi (front metatarsi externally green) greenish. Mandibles at apex brown, antennae black, beneath in part ferruginous.

Holotype : ♀, Keijo, Korea, 5. VII. 1934, S. Eguchi leg. (Coll. N. Tosawa).

Remarks. The specimen is damaged in the antennae (one of the flagella and the terminal three joints of the other have been lost) and the legs (one femur, two tibiae of middle legs, one tibia of hind legs and all tarsi of mid and hind legs have been lost). Moreover, the postscutellum has been completely injured by the pin.

5. *Cleptes fudzi* sp. nov.

♀. Closely resembling *seoulensis* m., differing chiefly in the form of head and pronotum, relative length of antennal joints and somewhat in characters of propodeum, radial cell and in colour.

Length 9.0 mm. Head from above : Fig. 13, with RWL 58 : 33, temples short, not well-developed, on top about one third the length of eye, OOD : POD : OCD = 9 : 7 : 14, with OCD relatively larger as compared with *seoulensis*. Ocelli in an equilateral triangle, only slightly wider at base, elevation of the area feeble; postocellar impressions located obliquely backward, broad and concave, having a deep pit at bottom, no transverse impressed line behind the ocellar region; supraoccipital furrow not well defind, only a transverse low of comparatively large punctures present, occipital margin only shortly carinate and only slightly below the level of vertex. Upper front roundly inclined anteriorly, without definable border, the impression in front of median ocellus broad and shallow, not pitted at bottom. Head seen in front with RWL 58 : 43, lower front gently convex, only near base of antennae flattened, with median furrow comparatively broad and moderately deep but not well outlined, reaching frontal pit at uppermost face and not distinctly continued to the impression of median ocellus. Clypeus (Fig. 14) with median protuberance narrower than in *seoulensis* and pointed into an acute tooth at the corners. Mandibles robust, broad, much broader near apex than in *seoulensis*. Oculomandibular space (gena) very long, longer than 2nd joint of antenna, genae convergent below. Relative length of antennal joints from base to apex : 26, 9, 17, 7, 6, 6, 6, 6, 6, 6, 6, 6, 7 (gena 11); 3rd joint 2.8 times as long as wide at apex, 10th as long as wide, 12th slightly longer than wide. Pronotum bisulcate, both sulci strongly feveolate, sides of main part gently convergent anteriorly (Fig. 15) and medianly deeply grooved up to anterior 2/3 of the disc; scutellum with axillae narrow and elongate on upper surface, postscutellum subcordiform, medianly at base broadly and deeply impressed, the impression gradually shallowed backwards. Propodeum parallel, latero-apical teeth comparatively robust, triangular and produced laterad, with posterior margins forming a nearly straight line with the posterior margin of the segment seen from above (Fig. 16). Mesopleuron with epicnemo-precoxal and epimeral furrows just as in *seoulensis* excavated and crenate (cf. Fig. 11). Abdomen comparatively slender and long, lanceolate, tapering towards apex, with

RWL 67 : 105 (nearly 3 : 5) and slightly less than as long as thorax at the widest portion. Radial cell of fore wing with RWL 13 : 45, with apex completely closed, radial nervure weakened on apical half but distinct, more distinct than in normal case; in discoidal cell Cu_1 : M = 17 : 11, nearly rectangular in form. Hind-coxal apophysis : Fig. 17.

Upper front and face closely punctate with middle-sized punctures, subreticulate, near base of antennae, on oculocellar area and on temples punctures sparser. Pro- and mesonotum more sparsely scattered with finer, weaker and rounded punctures, on mesonotum posteriorly much sparser and weaker; scutellum sparsely, postscutellum more finely punctured. Propodeum with supramedial region reticulate and lateral areas longitudinally striate and transversely costate, partly subreticulate. Mesopleuron moderately sparsely punctured with modium-sized points, supra-epimeral area with a few scattered points; sides of propodeum with anteriormost portion just in front of the large excavation smooth and polished, only in part finely, transversely striate, posterior portion coarsely rugoso-striate and punctured. Abdominal tergite 1 smooth and polished, almost impunctate, 2 and 3 finely closely, 4 finely sparsely punctured, punctures posteriorly larger and apical margin of each tergite broadly smooth and shining.

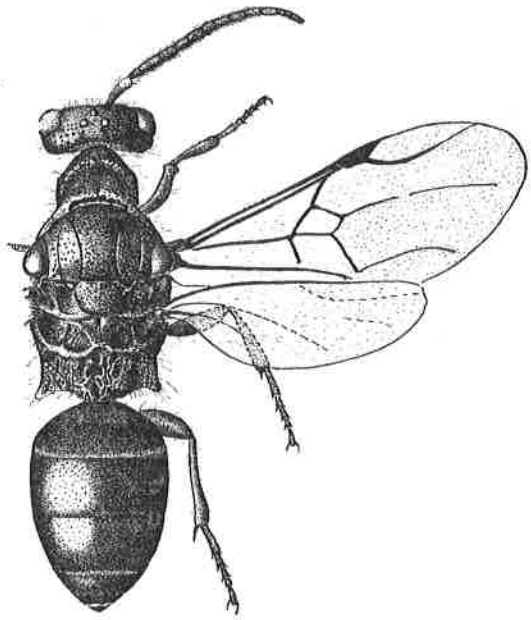


Fig. 7. *Cleptes fudzi* sp. nov. ♂.

Pubescence sparse, on dorsal surface brownish black, on posterior margins of head and pronotum and on underside of body greyish white.

Bronzy black. Head behind ocelli, genae, temples, pronotum and extreme lateral margins of mesonotum purple; face, sides of mesonotum, scutellum, postscutellum, propodeum, sides of abdomen, 1st joint of antennae wholly, 2nd above and legs except tarsi metallic green with a violaceous effulgence; mandibles except base, wingtegulae posteriorly, wingveins, apical margins of abdominal segments, and knees and tarsi of legs ferruginous to chestnut brown; antennae black, beneath in middle slightly testaceous.

♂. Length 6.7–7.5 mm. Very closely resembles ♀. Head from above with form and structure excepting distinct impressed transverse line just behind ocellar region very similar to ♀ (RWL 56 : 33, OOD : POD : OCD = 10 : 6 : 13). Head seen in front somewhat broader (RWL 56 : 37), with clypeus, genae, mandibles and elevation of face as in ♀, but the median facial groove narrow, well outlined and reaching the anterior ocellus. Relative length between antennal joints : 22, 9, 15, 9, 8, 8, 8, 7.5, 7.5, 7.5, 7.5, 7.5, 8.5; 3rd joint 2.5 times as long as wide at apex, 11th joint slightly less than twice as long as wide in middle; flagellum in general gradually tapering toward apex. Pronotum similar in structure to ♀, but comparatively shorter; scutellum with dorsal surface of axillae narrow and long as in ♀, postscutellum, propodeum, mesopleuron and hind-coxal apophysis also structured as in ♀. Abdomen with RWL 60 : 95. not so markedly

tapering posteriorly as in ♀. Pilosity on vertex blackish, on other portions of body greyish white. Punctuation and sculpture as in ♀ excepting punctures on pro- and mesonotum and scutellum slightly stronger.

Coloration : Metallic purple with a shade of green. Face, scutellum, postscutellum, propodeum, sides of thorax and of abdomen green. Mandibles except base, apical margin of each abdominal segment and tarsi of legs ferruginous to chestnut brown. Median lobe of mesonotum and each abdominal tergite in front of apical margin black, antennal flagella except pedicels lustreless black.

Holotype : ♀, Youga-cho, Japan, 24. V. 1933, A. Y. leg. in the writer's coll.)

Allotype : ♂, Ikeda, Osaka, 21. V. 1951, Y. Sakai leg. (Coll. K. Tsuneki).

Paratypes : 1 ♂, the same as in Allotype (Coll. K. Tsuneki): 1 ♂, the same place as above, 14. V. 1950, Y. Sakai leg. (Coll. N. Tosawa).

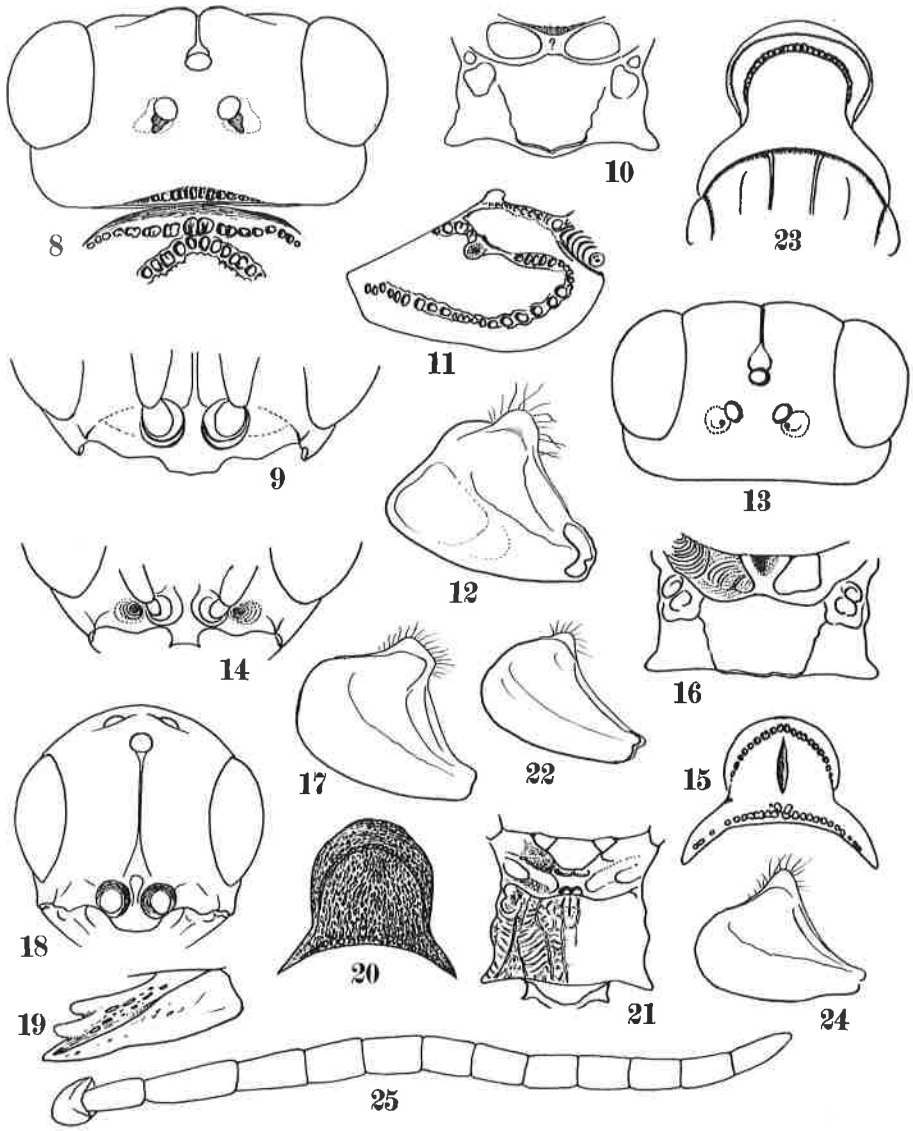
6. *Cleptes japonicus* Tosawa, 1940

Cleptes japonicus Tosawa, Trans. Kansai Entom. Soc., X, (2), p. 3, 1940.

♀. Length 5.0–6.8 mm. Head from above : Fig. 26, with RWL 49 : 23, temples fairly strongly convergent backwards, with margins feebly rounded, OOD : POD : OCD = 8 : 6 : 10, ocelli in an equilateral triangle, ocellar elevation not strong, ocellar impressions broad triangular, fairly deep but gradually shallowed apically, not excavated with a deep pit at bottom, transverse impressed line behind ocellar region in some specimens present and in others absent, occipital margin nearly level with vertex, distinctly carinate, but the carina gradually obscure laterally and completely disappeared beneath head, supraoccipital furrow absent. Head seen in front (Fig. 27) comparatively long, with RWL 49 : 44, lower front (face) flattened, with supraantennal area narrowly and shallowly depressed, median longitudinal canal shallow, fine and weak, sometimes partly becoming obsolete; clypeus with medial protuberance subquadrate, truncate at apex and shortly dentate at the corners (Fig. 27), sockets of antennae directly in touch with the apical margin of clypeus at the sides of the protuberance. Genae slightly convergent below, nearly as long as the apical width of clypeal protuberance, but much shorter than 2nd antennal joint which is exceptionally long in this species; mandibles fairly thick, tri- (left piece) and quadridentate (right piece) at apex. Antennae : Fig. 28, with relative length between joints : 27, 10, 11, 5, 5, 5, 5, 5, 5, 5, 5, 6.5 (gena 6), 3rd joint approximately twice as long as wide at apex, 6th joint widest and wider than long, thence gradually tapering towards apex. Pronotum (Fig. 26) bisulcate, with anterior sulcus comparatively fine, posterior one fairly broad and coarsely foveolate, main part with sides comparatively long and parallel, without median longitudinal groove; scutellum with axillae small, elongate triangle, disc subquadrate, slightly narrowed posteriorly; postscutellum with transverse crenate furrow at base and broadly and deeply excavated from behind; propodeum with lateral margins parallel, outer margins of postero-lateral teeth very slightly divergent backwards, the teeth broad triangular, with apex about 80° and narrowly rounded, posterior margins forming a nearly straight line with the posterior margin of the segment (Fig. 30). Mesopleuron with epicnemial furrow alone feebly defined, not well outlined, not foveolate. Abdomen with RWL 60 : 87, as wide as the widest portion of thorax. Hind-coxal apophysis : Fig. 31. In forewing radial cell comparatively broad, with RWL 12 : 33, with radial nervure roundly curved posteriorly (Fig. 29) and becoming weak and faint on apical 1/3, quite obsolete at the extremity, thus the cell not closed at apex; discoidal cell gently narrowed apically, with ratio of Cu_1 : M = 16 : 13.

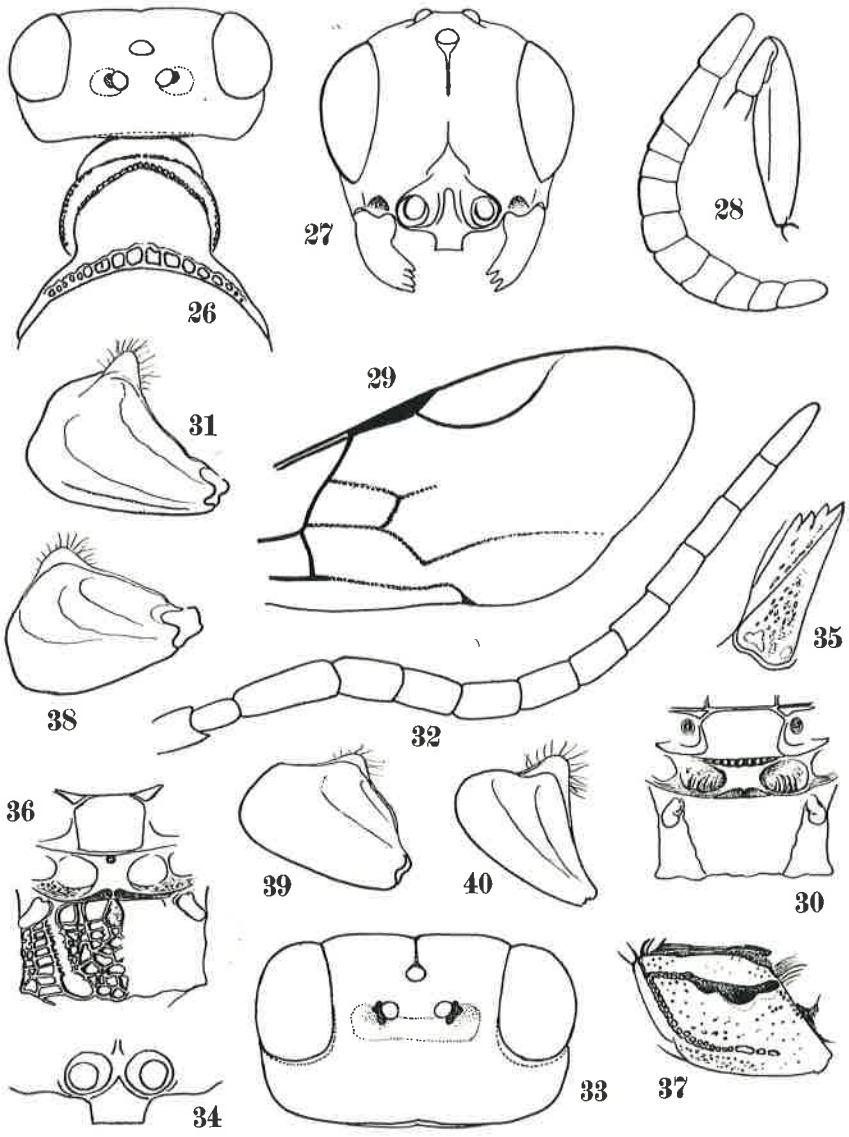
Vertex and front fairly closely, partly subrugosely punctate with moderate-sized punctures,

on lower front near antennal sockets and on vertex at oculocellar region and behind ocellar area punctures somewhat sparse. Pronotum on anterior part more finely punctured-subreticulate, on



Figs. 8–12. *Cleptes seoulensis* sp. nov. (♀). 8, Head seen from above. 9, Clypeus and genae. 10, Postscutellum and propodeum. 11, Mesopleuron (right side). 12, Hind-coxal apophysis. **Figs. 13–17.** *Cleptes fudzi* sp. nov. 13, Head (♀). 14, Clypeus and genae (♀). 15, Pronotum (♀). 16, Postscutellum and propodeum (♀). 17, Hind-coxal apophysis (♀ ♂). **Figs. 18–22.** *Cleptes satoi* Tosawa. 18, Head seen in front (♀). 19, Mandible (♀ ♂). 20, Pronotum(♀). 21, Scutellum, postscutellum and propodeum (♀). 22, Hind-coxal apophysis (♀ ♂). **Figs. 23–25.** *Cleptes nitidulus* Fabricius (♂). 23, Pronotum. 24, Hind-coxal apophysis. 25, Antenna.

posterior main part more sparsely and grossly punctured. Punctures on mesonotum and scutellum similar to main part of pronotum, postscutellum more finely and closely punctured. Propodeum



Figs. 26–32. *Cleptes japonicus* Tosawa. 26, Head and pronotum (♀). 27, Head seen in front (♀). 28, Antenna (♀) 29, Wing venation (♀ ♂). 30, Scutellum, postscutellum and propodeum (♀). 31, Hind-coxal apophysis (♀ ♂). 32, Antenna (♂). **Figs. 33–38.** *Cleptes crassiceps* sp. nov. 33, Head (♀). 34, Clypeus (♀ ♂). 35, Mandible (♀ ♂). 36, Scutellum, postscutellum and propodeum (♀). 37, Mesopleurn (left, ♀ ♂). 38, Hind-coxal apophysis (♀ ♂). **Fig. 39.** Hindcoxal apophysis of *Cleptes doii*. ♂. **Fig. 40.** Hind-coxal apophysis of *Cleptes semiauratus* Linné.

on supramedial area rather coarsely reticulate, the striae mainly consist of longitudinal and transverse, comparatively less rugose and fine carinae, on three costate longitudinal broad furrows on each of the lateral areas the striae similar. Mesopleuron on epicnemial area punctate-rugose, on main part longitudinally somewhat rugosely and very closely striate, striae on epicnemial furruw finer, closer and somewhat irregular. upper region just beneath insertion of wing finely, moderately closely punctured, with intervals smooth and shining. Sides of propodeum on anteriormost portion just in front of the large excavation longitudinally, finely and closely striate, the area behind the excavation irregularly reticulate. Abdominal tergite 1 smooth and polished, with very fine scattered punctules before apical margin, tergites 2 and 3 finely, closely, apically sparsely punctured, tergite 4 somewhat more largely and sparsely punctured with finer punctules acattered in between.

Pilosity fairly long but sparse, brownish black on dorsal surface and greyish white on sides and ventral surface, on abdomen ferruginous brown. Ground colour pitchy black. Vertex, upper front, pronotum, lateral lobes of mesonotum and scutellum partly with aeneous effulgence, in some specimens aeneous or greenish lustre more widely expanded. Mesopleuron on upper punctured area beneath the wing insertion always metallic green, Mandibles near apex, antennal joints 2, 3, 4 and 5 in part, trochanters, both ends of femora, tibiae and tarsi bright ferruginous; antennal flagellar joints beneath excepting apical two and abdominal tergite 1 wholly, lateral large maculae at base of tergite 2, similar small ones on 3 reddish yellow. Veins of wings dark brown to brown.

♂. Length 5.2–6.5 mm. Similar in structure and punctuation to ♀, differing only in the following points :

Head seen from above slightly thicker (RWL 48 : 27), seen in front less long (RWL 48 : 35), with lower front longitudinally roundly convex; clypeus similar in form to ♀ but more strongly raised apically, median groove similar, oculomandibular space slightly less than as long as the width of apical margin of the medial protuberance of clypeus. Antennal joints longer, with relative length from base to apex : 20, 7, 13, 8, 8, 8, 8, 8, 8, 8, 8, 8, 10, flagella gradually tapering towards apex, 3rd joint 2.5 times as long as wide at apex, 11th 2.7 times as long as wide in middle (Fig. 32). Pronotum with main part in front of posterior furrow wider than long, pentagonal widest at base; postscutellum with a lunate excavation at base but not feveolate, usually with a deep pit in the middle of the excavation. Postero-lateral teeth of propodeum slightly broader, nearly right angle at apex and not noticeably produced laterally, only rarely so. Mesopleuron with epicnemial furrow not sharply defined, irregularly represented and sometimes partly foveolate, epimeral furrow definable by mesopleural stigmata and the two shooting short furrows only.

In punctuation similar to ♀, but in general finer, shallower and less distinctly outlined. On mesopleuron excepting upper region beneath wing insertion rather coarsely longitudinally rugose-punctate. Head and thorax including mandibles, 1st joint of antenna, coxa, trochanters and femora of front and mid legs blue, adorned partly with green, violet and purple; in some specimens ground colour violaceous purple or aenenous green with propodeum wholly or on supramedial area black. Apices of mandibles, palpi, tibiae and tarsi of legs brown to dark brown.

Specimens examined : 28 ♀ ♀ 18 ♂ ♂, Ichinose, at the foot of Mt. Haku, Japan, 29–31. VII., 14. VIII. 1956, 57, K. Tsuneki leg.; 1 ♀, Nasu, Tochigi Pref., 24. VII. 1937, K. Tsuneki leg.; 4 ♀ ♀ 2 ♂ ♂ (types), Asama, 1. VIII. 1926, N. Tosawa leg. and in his coll.

Remarks. Most of the specimens in the female have a character in that there is a comparatively high tubercle-like process at the bottom of the large fovea located on both sides of

the scutellum. Rarely, however, this process takes the fotm of a hoof. But no other forms can be found among the specimens. Similar process, somewhat characteristic in form, we can observe in many species including the European *semiauratus* and *nitidulus*.

7. *Cleptes satoi* Tosawa, 1940

Cleptes satoi Tosawa, Trans. Kansai Entom. Soc., X, (2), p. 5, 1940.

♀. Length 6.0–6.8 mm. In colour resembling *Cl. japonicus*, but can be distinguished from it, at a glance, by the lustreless body owing to the rugose striae and greyish hairs. Head seen from above comparatively thick, with RWL 46 : 26, temple nearly half as long as eye and gently roundly convergent backwards (similar in degree to *japonicus* ♀). Ocelli in an equilateral triangle, OOD : POD : OCD = 8 : 6 : 10, ocellar region elevated, with a transverse broad impression behind the area; the portion behind the impression and in front of the occiput markedly incrassate and raised, supra-occipital furrow not defined, occipital carina somewhat below the level of vertex and continued to underside of head and gradually terminated. Postocellar impressions mediocre, gradually shallowed laterally. Upper front roundly inclined anteriorly with a distinct median groove running down from the impression of median ocellus. Head seen in front comparatively long, with RWL 46 : 40 (This is due to the well developed vertex, not to the elongation of the clypeal region as in *japonicus* ····· see Figs. 18 and 27.). Face flattened with the lateral areas slightly elevated, median longitudinal groove fine and weak, but continued to between sockets of antennae. Genae parallel, shorter than 2nd antennal joint and nearly as long as width of medial protuberance of clypeus, the latter transversely elongate rectangle, but with corners rounded. Mandibles : Fig. 19. Antennae similar to those of *japonicus*, with relative length of the joints from base to apex : 26, 9, 10, 5, 4, 3.5, 3.5, 3.5, 3.5, 3.5, 3.5, 3.5 and 5, 3rd joint twice as long as wide at apex, 11th much wider than long. Pronotum : Fig. 20, with posterior foveolate furrow indistinct (because of the continuation of the rugose-striae from in front) but the area is clearly transversely impressed. Main part with sides comparatively long and subparallel, sometimes a more or less distinct impression on median line at about 1/3 from the anterior furrow. Scutellum with axillae comparatively large (Fig. 21), sharply separated from the disc by a fine groove, the disc distinctly convergent straight posteriorly, thus turning into a nearly hexagonal plate, postscutellum small, deeply excavated from in front and from behind; propodeum (Fig. 21) with sides bisinuate and with teeth narrowly produced obliquely backwards. Mesopleuron with epimeral furrow defined only on posterior half, not foveolate, epicnemo-precoxal one indistinct (in some specimens faintly definable). Abdomen normal, as wide as the widest portion of thorax. Wingvenation as in *japonicus*, hind-coxal apophysis as shown in Figure 22.

Head all over and mesonotum closely, moderately grossly rugose-punctate, on mesonotum posteriorly the sculpture somewhat weak and sparse, pronotum closely rugose-striate, scutellum weakly and sparsely punctured, punctures partly rugosely confluent; propodeum coarsely longitudinally rugose-striate and transversely costate, in some parts irregularly reticulate. Mesopleuron rugose-punctate with supraepimeral region feebly punctured; sides of propodeum transversely closely striate. Abdominal tergite 1 smooth and polished, 2 and 3 finely closely punctured but posteriorly and laterally punctures sparser. 4 more grossly and more sparsely punctured, with intervals mixed with microscopical punctules; sternites punctured as on 4th tergite.

Body sparsely covered with brownish white pubescence. Head including antennae and thorax black or aeneous black, quite lustreless owing to the rugose sculpture and whitish pubescence; abdomen black. Base of antennal joint 1, joint 3 wholly, abdominal segment 1 wholly, 2 (broadly)

and 3 (narrowly) at base laterally and legs except front femora bright ferruginous; mandibles broadly, sometimes antennal jojnt 2 and 3 in part, flagella beneath in part, wingtegulae, in some specimens coxae and femora of legs dark brown or reddish brown. Wings light brownish, apically slightly darker.

♂. Length 5.0–6.3 mm. Closely resembling *japonicus* ♂, but head seen from above (RWL 42 : 22, OOD : POD : OCD = 6 : 6 : 9), with postocellar impressions narrower, definable only along the posterior lateral margin of ocelli; head seen in front (RWL 42 : 33) with clypeal median protuberance trapezoid and rounded at corners as in ♀; genae short, slightly convergent anteriorly; antennae slenderer with joint 2 relativey much longer (relative length of the joints : 18, 6, 9, 7, 6, 6, 6, 6, 6, 6, 6, 8.5, gena 2), both 3rd and 11th joints 2,4 times as long as wide; pronotum with main part longer, nearly semicircular, the sides thus roundly convergent anteriorly, posterior furrow comparatively finer and shallower, but more distinct than in ♀; scutellum, postscutellum and propodeum as in ♀; considerably different from *japonicus* accordingly, especially in the larger axillae and narrowly produced postero-lateral teeth. Supraoccipital furrow sometimes feebly defined.

Punctuation as in ♀, but mesonotum and scutellum sparsely punctured, mesopleuron anteriorly longitudinally rugose-striate, posteriorly smooth, only scattered with fine punctules; anteriormost area of propodeum smooth, its upper portion and rest of the sides chiefly transversely striate. Differing thus from *japonicus* ♂ in that head, pronotum and mesopleuron rugose-punctate.

Colour : Head and thorax excepting sides and propodeum aeneous blue, partly pure blue or violet, espeuially on head. Supraepimeral area of mesopleuron always bronzy blue. Antennae lustreless- and abdomen glossy black. Sides of thorax and propodeum also black; wingtegulae and legs with coxae and femora slightly brownish black. Mandibles apically, coxae at apex, trochanters and base of femora, tibiae and tarsi brown to ferruginous yellow.

Specimens examined : 1 ♀, Seryodani, Kyoto, 26. VII. 1940, T. Kimura leg.; 1 ♂, Fukase, Ishikawa Pref., 4. VIII. 1954, I. Togashi leg.; 1 ♂, Koike, Fukui Pref., 14. VII. 1956, K. Tsuneki leg. (in the writer's collection); 2 ♀ ♀ 3 ♂ ♂ (types), Osaka and Nara (in the collection of N. Tosawa, dates already given by him).

8. *Cleptes crassiceps* sp. nov.

This species is very characteristic in that the vertex behind ocelli is well developed and roundly convex, the pro- and mesonotums are also convex, the propodeum is peculiarly constructed and the abdomen is very slender.

♀. Length 6.5–7.5 mm. Body slender and long. Head seen from above : Fig. 33, markedly thick, with RWL 50 : 31, vertex behind ocelli incrassate and convex, occipital margin fairly below the level of vertex and carinate on dorsal region only; ocellar region elevated, thence the elevation continued to the lateral areas of upper front around anterior ocellus, while the area just behind ocellar region and in front of the vertical incrassation transversely depressed including postocellar impressions, the centers of which are deeply excavated just outside the postocelli, with the outline very clear-cut. Occipital carina not sharp, defined on upper portion only, supraoccipital furrow usually absent, but sometimes a fine feeble furrow present. OOD : POD : OCD ≒ 8 : 6 : 18, ocelli in a nearly equilateral triangle, length ratio between eye and temple nearly 2 : 1, eyes large, occupying about half the width of head; upper front convex, roundly inclined anteriorly, with a deep median canal running down from median ocellus. Head seen in front with RWL 50 : 45, upper front below median ocellus well developed and roundly

raised on both sides of the medial canal which is comparatively broad and not distinctly outlined, but reaches below between sockets of antennae, lower front (face) appears flattened, but at the inner orbits of eyes distinctly swollen and gently inclined towards midial canal; inner margins of eyes distinctly divergent below, relative distance between eyes at the middle front (at the frontal elevation) and at lower margins of eyes 27 : 42, genae slightly convergent below, at the shortest it is slightly less than as long as 2nd antennal joint; clypeus in the medial protuberance trapeziform, medianly raised and gradually elevated towards apex and angulated at the antero-lateral corners (Fig. 34). Mandible : Fig. 35. Antennae broadest at 7th joint, relative length of each joint from base to apex : 23, 8 (gena 7), 11, 6, 5, 4, 4, 4, 4, 4, 4, 4 and 6, 3rd joint 2.2 times as long as wide at apex. Pronotum transversely bisulcate, both sulci strongly foveolate, main part with sides comparatively short, extending to half of medial length and subparallel, with anterior portion roundly (semicircularly) convergent; from middle of posterior sulcus to middle of the median length a triangular depression, somewhat canal-like, on both sides of which the surface roundly raised. Mesonotum as a whole comparatively markedly convex, median lobe with two short, fine, subparallel grooves anteriorly; scutellum subquadrate, gently convex, with axillae comparatively large and strongly inclined posteriorly, with sides slightly convergent straight backwards; postscutellum (Fig. 36) strikingly convex, with a deep pit at base in middle and posteriorly deeply excavated by two lunate impressions; propodeum with supramedial region broadly flattened, laterally fairly strongly inclined, without subhorizontal area near middle of the inclination, thus the lateral border seen in profile, comes to be slightly below the middle of the height of the segment; lateral borders seen from above slightly convergent backwards, with apical teeth small, broad triangular and very shortly produced laterad (Fig. 36). Mesopleuron (Fig. 37) with destinct, feebly foveolate epimeral and epicnemo-precoxal furrows, both jointed to each other in front into an elongate V-shaped furrow. Hind-coxal apophysis : Fig. 38. Abdomen slender, with RWL 53 : 112, at base roundly depressed, with longitudinal subcanaliculate bottom which is exceptionally deep and distinct in this species. In fore wing radial cell with RWL 12 : 41, with radial nervure weak and faint on apical half, discoidal cell rhomboidal (ratio of Cu_1 : M = 16 : 16, but more or less varied with specimens).

Body shining, upper front and face moderately grossly and moderately closely punctured, with intervals nearly as large as the punctures; vertex, dorsal surface of thorax and mesopleurae somewhat more shallowly, more sparsely punctured. Temples and genae much more sparsely punctured; a large fovea on both sides of scutellum and postscutellum smooth and polished, the outer one outside postscutellum longitudinally arcuately, finely and closely striate. Propodeum on supramedial region coarsely, irregularly reticulate, lateral three areas bordered by longitudinal carinae mainly transversely striate excepting the outer half of the innermost area where the surface polished, in general intervals between striae smooth and polished. Abdominal tergite 1 smooth and shining, 2 and 3 finely closely but posteriorly sparsely, 4 more sparsely punctured. Sternites more largely and sparsely punctured.

Violaceous blue. Head in front, mesonotum, scutellum, postscutellum, mesopleuron, sides of propodeum, sides of abdomen and legs with coxae and tibiae externally green. Mandibles, antennae except 1st joint and 2nd above black; wing veins and tarsi of legs dark brown, nearly blackish.

Variation : (1) Colour. In two paratypes (from Nopporo and Koike) : Head and thorax aeneous green. Vertex, pronotum anteriorly aeneous black with a shade of purple in part; scutellum, postscutellum, greater part of mesopleuron, lateral areas of propodeum, sides of abdominal segments excepting apical margins, antennal scape above and legs with coxae, femora

and external surface of tibiae green-golden. Mandibles and abdomen black. Antennae, tegulae of wings, legs with trochanters and internal face of femora dark brown; 4th joint of antennae, flagella beneath, wing veins, rest of tibiae and tarsi ferruginous. In another paratypes (from Koike) : Head wholly, pronotum, propodeum, scape of antenna above, external face of femora of legs dark purple. Mesonotum black with a faint shade of purple. Scutellum in middle broadly, postscutellum, mesopleurae and sides of 2nd tergite of abdomen greenish; lateral areas of propodeum blue. Mandibles except apical testaceous area, antennae and abdomen black; antennal joint 2, tegulae of wings and rest of femora dark brown; flagella of antennae beneath, both ends of femora comparatively broadly and tibiae and tarsi of legs ferruginous. (2) Discoidal cell of fore wing : In the paratypes Cu_1 slightly longer than M. (3) Transverse impressed line just behind ocellar region sometimes very shallow and rarely utterly indistinct. (4) Median facial furrow : Very narrow and linear. (5) Post-medial impression of main part of pronotum : In two paratypes this is definable, though much narrower and shallower, but in another paratype it is not defined, only a median groove in the middle of the longitudinal line is observed.

♂. Length 4.7–6.0 mm. Similar to ♀ in general characters in structure and punctuation, but head seen from above wider, with RWL 44 : 25, posterior portion of vertex not particularly incrassate, without transverse impression just behind ocellar region, OOD : POD : OCD = 8 : 5 : 11; head seen in front much wider than high, with RWL 44 : 36, medial canal on face broader and shallower, but distinct (in one specimen rather indistinct), median protuberance of clypeus somewhat longer, both mandibles quadridentate at apex, antennae with relative length of each joint from base to apex : 17, 8, 10, 7, 7, 6, 6, 5.5, 5.5, 5.5, 5.5, 5.5, 7; 3rd joint nearly twice as long as wide at apex, 11th joint 1.5 times as long as wide in middle; postscutellum less strongly convex and somewhat longer owing to the smaller excavations from backwards; abdomen less strongly lanceolate, with RWL 46 : 75. Other characters similar to ♀.

Colour : Vertex, pro- and mesonotum beautiful purple. Abdomen black. Scutellum, postscutellum, propodeum, head in front, temples, mesopleuron, sides of abdomen except the apical margin of each segment and the glittering coloured portions of antennae and legs blue to bluish green. Mandibles at apex, antennae, inner face of femora of legs black, somewhat brownish. Tibiae dark brown. Mandibles near apex, antennal flagella beneath and tarsi ferruginous. In one paratype pronotum and lateral lobes of mesonotum more bluish. In another paratype thorax generally more bluish and base of abdomen testaceous.

Holotype : ♀, Towada, Japan, 5. VII. 1958, K. Shimoyama leg.

Allotype : ♂, Koike, Fukui Pref., 14. VII. 1956, K. Tsuneki leg.

Paratypes : 1 ♀, Nopporo, 11. VII. 1946 M. Munakata leg.; 2 ♀ ♀, Koike, 28. VII. 1954 and 6. IX. 1956, K. Tsuneki leg.; 1 ♂, Sapporo, 23. VII. 1952, K. Tsuneki leg.; 1 ♂, Koike, 14. VII. 1956, K. Tsuneki leg.; 2 ♀ ♀, Koike, 18. VII. 1959, K. Tsuneki leg.

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II. The Genus *Psenulus* Kohl of Japan and Korea (Sphecidae, Pseninae)

The meterial dealt with in the present study attained more than one thousand in number (Table 1) which was collected in various localies of Japan and Korea chiefly by the author himself. However, not a little number of specimens were sent to the author from several of his kind colleagues, namely Messrs K. Shimoyama (Towada), E. Tanaka (Mashiko), T. Nambu (Sapporo), R. Narumi (Kuroishi), K. Shirahata (Sakata), M. Munakata (Hakodate), Dr. K. Takeuchi (Kyoto) and Dr. K. Iwata (Sasayama), to whom he wishes to express here his warmest gratitude.

The binocular microscope used was the Leitz Greenough, with the UK IV stand, 32 times and 64 times enlargements were most usually employed. For measurent of special parts such as the distance between the eyes, the length of the antennal joints, the location of the ocelli (oculocellar distance, postocellar distance and ocelloccipital distance)etc., the ocular micrometer was used and in order to make easy the comparison

between the species through the relative values the same scale (32 X) was always put to use.

Table 1. Species found and number of specimens dealt with.

Name	Number of specimens
iwatai Gussakovskij	22
lubricus Pérez	51
fuscipes sp. nov.	21
maculipes sp. nov.	145
concolor Dahlbom	–
nipponensis Yasumatsu	–
mandibularis sp. nov.	284
fuscipennis japonicus ssp. nov.	43
nikkoensis sp. nov.	7
tanakai sp. nov.	3
pallipes puncticeps Gussakovskij	46
pallipes yamatonis ssp. nov.	514
Total	1136

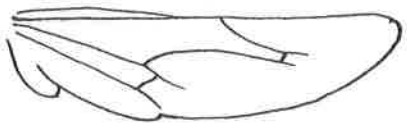
The species thus found were 11 in number (Table 1), among which only 3 species — *concolor*, *fuscipennis* and *pallipes* — were common to Europe, the latter two, however, being different subspecies. Among others 7 species are, so far known, endemic to Japan, one of which — *iwatai* — belongs to a different subgenus.

It seems interesting to note here that the species having a long petiole — *iwatai*, *lubricus*, *nikkoensis* — or a wholly glittering propodeum — *iwatai*, *lubricus*, *fuscipes*, *maculipes* — which are quite unknown to western countries are frequently found in Eastern Asia.

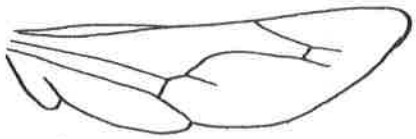
In the following a brief histrical review, the generic characters, sexual distinctions and characters for distinguishing species are described. But such is utterly unnecessary to the western entomologists who have a number of excellent papers on this genus. Accordingly most of these will be given in Japanese for easy use of the entomologists of this country.

この属の蜂は初め*Psen*属の中に包括されていたが，Shuckard (1837) の頃から異属として扱われるようになった。しかし現在 *Psen* といわれている属は *Mimesa* という名で現わされたことが多く，そのため，現在の *Psenulus* が *Psen* という属名で永らく通用してきた (L. Berland, 1925 は，なおこの称呼を用いている)。1896 年になって F. F. Kohl が属名，亜属名の整理を行い，*Psenulus* という属名を創設して，現在の *Psen* 属から区別したのである。現在多くの学者は Kohl の分類に従っているが (*Psen* 属中の亜属の名称については更に改変があるが)，ただ米国の学者だけは同国の Malloch の意見 (1933) に従って Psenulus 属の代りに *Diodontus* Curtis, 1834 を採用している。これは *Diodontus* の方が先取権ありと見るためである。しかし，実際は *Diodontus* Curtis のタイプとされた *Sphex pallipes* Panzer の標本は，真の *pallipes* Pz. でなく，現在 *Diodontus* と呼ばれる属の蜂であることが明らかになったので (もしも正しい *pallipes* Pz. だったら，当然 *Diodontus* が先取権をもつことになる)，この名称を用いるべきではないのである (Beaumont, 1937)。

属の特徴： *Psenulus* 属は *Psen* 属に似た小形の蜂であり，第1腹節の腹板は腹柄に変形している。また同様に前翅の肘室は3個である。しかし，（1） 後翅の臀室は肘脈の分岐前で終っていること (付図参照)，（2） 頭部前面の中央に逆T字状の稜線があり，これは触角間で広葉状に拡張している



The genus *Psen*



The genus *Psenulus*

こと，（3） 触角の根本は *Psen* に比べてはるかに高く，頭部前面のほぼ中央に挿入していること等によって，容易にPsen属から分けることができる。その他にも前脚第1跗節に櫛毛がないこと，触角や尾域の形状が違っている等の差異もある。

雌雄の区別 （1） 触角．♀では通常短大でやや棍棒状，♂では各節ほぼ同巾で珠数状をなし，しばしばその後面に短稜又はイボ状隆起を並列する．（2） 尾域．通常♀には三角状乃至溝状の尾域が腹部末端節背面にあり，稜で境されているが，♂にはこれがない．（3） 腹毛列．♀では第4，第5腹節の腹面の後縁に長い毛列があることがあるが，♂には常にこれがない（♀にもないことがある）。その他体の彫刻は♂は♀より疎大なことが多く，特に前仲腹節（中節）背面では雌雄で全く異なる状を呈することも稀ではない。また第2腹面節基部の陥凹部の後方に半楕円状に仲びた部分が，♀では明瞭に境され，♂では境されず不明瞭であるという場合もある。その他Aculeataの多くの属に通ずる規則——触角節が♀で12，♂13，可視腹節が♀で6，♂で7——も，もちろんここでも該当する。

種の識別点 （1） 腹柄と後腿節との長さの比，（2） 触角節間の長さの比，各節の長さと巾との比，（3） 頭頂，中胸背・側，特に前仲腹節の彫刻，（4） 前額の逆T字状稜線の形状，（5） 頭楯の形状（点刻），大顎の形（標本を作る時開いておくことが必要），（6） 両眼の下方への収斂度，中央から更に下方への発散度，（7） 眼と触角挿入孔との間の巾と，挿入孔の直径との大小関係，（8） 前翅の第1，第2反上脈と肘室との連接工合，第2，第3肘室の形状（この特徴は常に変異あり，しばしば全く役に立たぬことさえある），（9） 単眼の配置。

なお，♀では （1） 第2腹面節陥凹部の特長，（2） 第4，5腹面節後縁の毛列の有無，（3） 尾域の状態，の3つが非常に大事な手掛りであり，♂では （1） 触角後縁の短稜，イボ状隆起等の有無，数，形状，（2） 中胸腹面正中線にある縦稜両側の刻み目状彫刻の状態がよい種識別点となる。

米国の Malloch は腹柄の稜線の状態を種の区別に用いている。本邦産の種でも多少役に立つが，上記した諸点での区別の方が容易である。

Specific characters, some of which are not given by de Beaumont (1937).

(1) Length ratio between petiole and hind femur. (2) Length ratio between antennal joints and ratio of width to length of each joiot. (3) Sculpture on vertex, temples, mesonotum, mesopleuron and especially propodeum. (4) The form of frontal carina, clypeus (also punctuation) and *mandibles*. (5) Convergency of inner orbits of eyes towards middle of anterior aspect of head and divergency of them from there to anterior base of mandibles. (6) Ratio of the space between eye and one of sockets of antennae to the diameter of the socket. (7) Ocellar disposition. (8) Venation of fore wing, especially regarding cubital cells and recurrent nervures. (Always with more or less variations).

Besides the above, the following characters are important in females :

(1) Whether basal excavation of the 2nd sternite is distinctly outlined or not. When well outlined how far it reaches posteriorly. (2) Presence or absence of marginal fringe of long hairs on 4th and 5th sternites. (3) The state and the form of pygidial area. In males :

(1) Carinae or tubercles on posterior margin of flagellar joints. (2) Crenation on both sides of medial carina of mesosternum. (3) Sometimes the basal excavation of the 2nd sternite.

As to the male genital apparatus considerably good characters worthy of specific distinction can be observed in regard to the form of the paramere, the cuspis and sometimes of the penis. But the material is too scanty in the number of species to give any account concerning the phylogenetic comparison, so that they were only separately illustrated in the present paper. So far as is known, it seems characteristic of the genus that the penis is bent at a right angle behind the middle of its length, at least when at rest (Figs. 33–39).

Key to the species

♀ ♀

1 Greater part of front and mid legs bright yellow. anterior margin of clypeus not incised in middle, frontal carina simply ridged, petiole above not furrowed, Honshu

(***Eopsenulus***) ***iwatai*** **Gussakovskij** (p. 30)

– Front and mid legs without bright yellow coloration, anterior margin of clypeus incised in middle, frontal carina widened into an elliptic plate broadly excavated, petiole above longitudinally furrowed 2

2 Basal depression on 2nd sternite of abdomen distinctly outlined, 4th and 5th sternites provided with a fringe of long hairs on apical margin 3

– Basal depression on 2nd sternite of abdomen not distinctly outlined, 4th and 5th sternites without a fringe of long hairs 8

3 Lateral areas on dorsal surface of propodeum smooth and polished 4

– Lateral areas on dorsal surface of propodeum at most on upper portion only smooth and polished, usually more or less striated 5

4 Petiole of abdomen nearly as long as hind femur, 3rd joint of antenna amply twice as long as wide at apex (ratio 15 : 7), 4th 1.5 times as long as wide, clypeus deeply incised in middle, pygidial area distinct and narrow, Hokkaido and Honshu

lubricus **Pérez** (p. 31)

– Petiole of abdomen less than as long as hind femur, 3rd joint of antenna 1.5 times as long as wide at apex, 4th only slightly longer than wide, incision of clypeus not deep, pygidial area quite indistinct

fuscipes **sp. nov.** (p. 33)

5 Mesopleuron longitudinally striate, vertex also partly striate, 2nd recurrent nervure of forewing received by the 2nd cubital cell or interstitial (Lateral areas of propodeum distinctly obliquely striate, posteriorly reticulate, pygidial area broad but short, length 6.5–8.5 mm)

fuscipennis japonicus **subsp. nov.** (p. 38)

– Mesopleuron without striae, 2nd recurrent nervure of forewing received by 3rd cubital cell rarely interstitial 6

6 Third joint of antenna 1.5 times as long as wide at apex, 4th 1.3 times as long as broad, 5th and 6th also slightly longer than wide, clypeus bidentate with sinus triangular and shallow (Lateral areas of propodeum on upper portion obliquely, sometimes partly obsoletely striate, on posterior portion coarsely irregularly reticulate, length 6.5 mm.), Honshu

tanakai **sp. nov.** (p. 45)

– Third joint of antenna only slightly longer than wide, 4th as long as wide at apex 7

7 Lateral areas of propodeum wholly obliquely rather finely and fairly

closely striate (Vertex punctured or punctured-striate)
***pallipes puncticeps* Gussakovskij** (p. 41)

– Lateral areas of propodeum anteriorly obliquely and very finely, posteriorly arcuate-transversly and somewaht coarsely striae, striae on upper portion more often partly or wholly obsolete and nearly smooth and polished (Vertex simply finely punctured, rarely with weak striae)
***pallipes yamatonis* subsp. nov.** (p. 42)

8 Petiole of abdomen as long as hind femur, clypeus markedly porrect and very feebly incised in middle, lower transverse branches of frontal carina not completely carinated (3rd joint of antenna 1.3 times as long as broad at apex, lateral areas of propodeum obliquely finely and closely striate, pygidial area narrow), Honshu
***nikkoensis* sp. nov.** (p. 39)

– Petiole of abdomen less than as long as hind femur, clypeus distinctly incised in middle, transverse branches of frontal carina distinctly carinate ··· 9

9 Lateral areas of propodeum wholly smooth and polished, legs maculate with pale yellowish (Pygidial area narrow), Honshu
***maculipes* sp. nov.** (p. 34)

– Lateral areas of propodeum sculptured, legs brownish ····· 10

10 Lateral areas of propodeum finely reticulate (3rd and end joints of antenna twice as long as broad, basal depression of 2nd sternite vaguely outlined, pygidial area narrow), Korea and Honshu
***nipponensis* Yasumatsu** (p. 35)

– Lateral areas of propodeum not reticulate, but very finely and closely striate ····· 11

11 Mandibles with inner tooth stoutly subquadrately enlarged, with also a small rounded tooth on inner margin toward middle (Clypeus with anterior 1/3 nearly impunctate, 3rd joint of antenna twice as long as wide at apex, 4th only slightly longer than wide (ratio 7 : 6), end joint about 1.5 times as long as wide at base, lateral areas of propodeum obliquely very finely and closely striate, pygidial area narrow, nearly pointed at apex, length 8–9 mm.), Hokkaido and Honshu
***mandibularis* sp. nov.** (p. 36)

– Inner tooth of mandible normally triangular, not particularly enlarged, (Clypeus polished, 3rd joint of antenna about 1.7 times as long as wide at apex, 4th as long as wide, end joint 1.3 times as long as wide, lateral areas of propodeum obliquely finely and closely (but somewhat stronger than in *mandibularis*) striate, pygidial area somewhat more widely divergent anteriorly than in *mandibularis*, length 6–7 mm)
***concolor* Dahlbom** (p. 38)

♂ ♂

1 Frontal carina without upper plate, front and mid legs beautiful yellow
***iwatai* Gussakovskij** (p. 30)

– Frontal carina with upper plate, legs not adorned with beautiful yellow ··· 2

2 Petiole of abdomen nearly as long as hind femur ····· 3

– Petiole of abdomen less than as long as hind femur ····· 4

3 Lateral areas of propodeum wholly smooth and polished
***lubricus* Pérez** (p. 31)

– Lateral areas of propodeum with upper portion obliquely striate, posteriorly coarsely reticulate
***nikkoensis* sp. nov.** (p. 39)

4 Greater part of lateral areas of propodeum smooth and polished ····· 5

– At least greater part of lateral areas of propodeum sculptured ····· 6

5 Legs ambur-yellowish, posterior portion of propodeum finely reticulate, with two large foveae at apex (Antennae wholly ferrugenous . . . constant ?)
***maculipes* sp. nov.** (p. 34)

– Legs brownish, posterior portion of propodeum rather coarsely reticulate, Hokkaido and Honshu
***fuscipes* sp. nov.** (p. 33)

6 Posterior margin of mesonotum without well-defined longitudinal striae, if feeble ones present, then vertex practically impunctate ····· 7

– Posterior margin of mesonotum with well-defined longitudinal striae ··· 8

7 Upper plate of frontal carina narrower than median ocellus, 3rd joint of antenna viewed from the narrowest side slightly more than twice as long as wide at the widest part, length usually 7.5–8.3 mm. (Postocellar furrows always with a distinct interval between them)
***mandibularis* sp. nov.** (p. 36)

– Upper plate of frontal carina as wide as median ocellus, 3rd joint of antenna viewed from the narrowest side slightly less than twice as long as wide at the widest part, length 6–7 mm. (Postocellar furrows very frequently fused into a transverse furrow behind postocelli)
***concolor* Dahlbom** (p. 38)

8 Mesopleuron longitudinally distinctly striate (Vertex also strongly striate, length usually 6.5–7 mm, Korea, Hokkaido and Honshu
***fuscipennis japonicus* subsp. nov.** (p. 38)

– Mesopleuron without distinct striae (*pallipes* Panzer = *atratus* Fabricius) ····· 9

9 End joint of antenna twice as long as wide at base (Verex sometimes with distinct striae), Ussuri, Hokkaido and Honshu
***pallipes puncticeps* Gussakovskij** (p. 41)

– End joint of antenna 1.5 times as long as wide at base (Vertex always

without distinct striae), Honshu and Hokkaido

***pallipes yamatonis* subsp. nov.** (p. 42)

(The males of *nipponensis* and *tanakai* still remain unknown)

Descriptions of the species

1. *Psenulus* (*Eopsenulus*) *iwatai* Gussakovskij, 1934

Psenulus (*Eopsenulus*) *iwatai* Gussakovskij, Mushi **7**, 2, pp. 84-86, 1934 (♀).
Psenulus (*Eopsenulus*) *iwatai* Iwata, Ibid., **11**, 1, pp. 23-25, 1838 (Biology).
Psenulus (*Eopsenulus*) *iwatai* Tsunseki, Akitu, **5**, 1, p. 9, 1956 (♀ & ♂); Ibid., **7**, 3, p. 54, 1958. (♀ ♂).

♀. Length 6.5-7.5 mm. Appressed silvery piles covering lower front and clypeus long and dense, those on temples somewhat sparser and short, those on thorax beneath long and rather dense, other parts of head and thorax sparsely covered with long greyish white pubescence. A few comparatively long golden hairs near apex of clypeus. Body black and glittering. Scapes of antennae (above more or less fuscous), greater part of mandibles, front and mid legs except coxae, basal two thirds of hind legs bright cream yellow, palpi pale brownish yellow; distal joint of front tarsi and mid tarsi apically somewhat brownish; antennae beneath (basally paler), lubrum, tegulae ferruginous; humeral angles posteriorly and hind tarsi dark brownish, the latter on each joint at apex annulated with pale brown. Antennae above and wingveins dark brown.

Body slender and long. Head from above with ocelli in a slightly depressed equilateral triangle, with ratio of OOD : POD nearly 4 : 3, postocelli encircled on outer margins with distinct furrow. Head seen in front : Fig. 17, Frontal carina simply narrowly keeled high and abruptly termineted above, thenceforth it stretches up to the anterior ocellus as a linear carina, lower base of the carina roundly swollen, without transverse branches (see also Fig. 18). Clypeus medianly anteriorly porrect, with apex truncate or very gently emarginate; mandibles bidentate, with a distinct tooth on inner margin towards middle. Head seen in profile : Fig. 18. Antenna rather slender, gradually incrassate toward apex, relative length between joints 3, 4 and 5 is 11, 9 and 8, joint 3 nearly thrice as long as wide at apex, distal joint twice as long as wide at base. Pronotum from above with anterior margin gently arched and carinate, with antero-lateral corners angulate, posterior margin deeply grooved. Antero-ventral corner of propleuron (propleural projection) shortly dentate; scutellum just behind mesonotum transversely grooved and crenate. Petiole of abdomen slender and long (Fig. 22), slightly longer than hind femur but slightly shorter than hind tibia, without longitudinal furrow on upper surface; pygidial area : Fig. 23. Basal depression on 2nd sternite deep but short, without distinct outline; front and mid tibiae each with a single spur which is nearly as long as the following metatarsus, hind tibia with two also long spurs, front tarsi somewhat dilated. Cubital cells of forewing : Fig. 21.

Head and thorax smooth and polished; upper front with fine punctures moderately closely scattered, vertex very finely and sparsely punctured; the areas covered with silvery piles densely punctured, but apical 1/4 of clypeus without puncture and shining; mesonotum finely sparsely and feebly punctured, sculpture on propodeum : Fig. 20, lateral areas smooth and polished, with lateral extremities (and upper portions of the sides of segment) irregularly wrinkled, posterior portions of the sides transversely striate. Abdomen fairly closely covered with delicate hair punctures and somewhat lustreless. Apical margins of 4th and 5th sternites finely and fairly closely granulate having very short brownish hairs, without a normal fringe of long hairs

apically.

♂. 6.0–7.5 mm. Similar to female in colour, but antennae above including lst joint darker, from 3rd apically lustreless, basal half of front and mid femora light to dark brown. In structure differing from female in the following points :

1. Generally more slenderly built.
2. Antenna : Fig. 44, relative length between 13 joints : 6, 3.5, 10, 9.5, 9.5, 9, 9, 9, 9, 9, 9, 9 and 12; each joint roundly swollen and without carina or tubercle on posterior margin.
3. Frontal carina with a well-defined lower transverse carina (Fig. 19)
4. Petiole of abdomen relatively longer, slightly longer than hind tibia, the latter as long as hind trochanter and femur united.
5. Lateral areas of propodeum at base only smooth and polished but posteriorly very coarsely reticulate, inside the reticulation the surface uneven, irregularly wrinkled. The same sculpture extends to almost whole the sides of the segment.
6. Other sexual characters (Genitalia : Fig. 36, no pygidial area, no fringe of long hairs on posterior margins of 4th and 5th sternites).

Variation in colour : The portions designated as yellow in the above description is indeed whitish in the type as described by Gussakovskij. This was confirmed by reexamination of the type. In one of the female specimens the mandibles only are whitish. The degree of the extention of the brownish maculae on front and mid femora is considerably variable.

Specimens examined : 1 ♀, Ikeda, Osaka, K. Iwata leg. (The type) 1 ♀ 1 ♂, Sakata, 29. VIII. 1954, K. Shirahata leg.; 1 ♂, Fukuoka City, 21. VI, 1955, T. Kufune leg.; 5 ♀ ♀ 8 ♂ ♂, Toyama City, 28. VIII. 1958; 2 ♀ ♀ 1 ♂, Fukui City, 14. IX. 1958, 8. VI. 1959; 1 ♂, Ashizuri, Shikoku, 5. VIII. 1959; 1 ♂ Sata, Kyushu, 13, VIII. 1959, K. Tsuneki leg.

2. *Psenulus* (s. str.) *lubricus* (Pérez, 1905)

Psen lubricus Pérez, Bull. Mus. Paris, **11**, 3, p. 150, 1905 (♀)

Psenulus lubricus Beaumont, Mitt. Schweiz. Ent. Ges., **17**, 1 et 2, p. 84, 1937 (Reexamination of the type).

♀. Length 6.0–7.2 mm. Black and shining. Antennae beneath from 4th joint apically, insides of front tibiae and articulations of all legs ferruginous; tegulae of wings, tarsi of all legs, apical margins of abdominal segments from 2nd posteriorly brown to dark brown; other parts of legs more or less brownish.

Head seen from above : Fig. 7, OOD : POD : OOD*= 10 : 7 : 8, outer margins of postocelli lunately impressed, antenna : Fig. 45, relative length between basal 5 joints 13 : 5 : 8 : 6 : 6, joint 3 twice, joint 4 1.5 times as long as broad at apex; frontal carina, clypeus and mandibles : Fig. 6, clypeus gently roundly convex, mandible in the lateral view : Fig. 6, m; relative distances between eyes at upper margins, at transverse branches of frontal carina and at anterior base of mandibles 32 : 24 : 27, space between eye and socket of antenna as wide as the diameter of the socket. Pronotum on anterior margin roundly arched and carinate, with lateral corners angulate but not pointed; propodeum : Fig. 8, petiole long, slightly longer than hind femur (ratio 30 : 27), nearly as long as hind tibia and about 1.3 times as long as lst tergite, its dorfsal surface longitudinally widely furrowed. Pygidial area narrow and long, distinctly limited by carinae. Basal depression of 2nd sternite nearly semi-elliptic, fairly distinctly outlined and attaining about 3/5 of the segment, 4th and 5th sternites with apical fringe of long hairs. In forewing lst recurrent nervure received by 2nd cubital cell near base of lst transverse cubital nervure or

* Oculo-Ocellar Distance : Post-Ocellar Distance : Ocello-Occipital Distance.

more frequently interstitial, 2nd recurrent nervure by 3rd cubital cell at 1/4 from base of 2nd transverse cubital nervure. Pubescence of body normal. Vertex very finely and sparsely, mesonotum and scutellum somewhat more strongly but sparsely punctured, temples below on posterior portion transversely striate, upper plate of frontal carina finely transversely shagrinate; lateral areas of propodeum broadly smooth and polished, marginal portions only rather coarsely, subreticulately rugose. with a keel separating the dorsal surface from the side of the segment. Abdominal tergites practically impunctate.

♂. Length 5.3–6.5 mm. Very similar to female. But the ferruginous colour much brighter, antennal flagella wholly light brown, body somewhat slenderer, postocellar area more strikingly elevated, with outer lunate impressions deeper. OOD : POD : OCD = 7 : 7 : 7 (under the same scale as used in female). Antenna seen from above : Fig. 43, joints 3–12, sometimes 13 also, carrying respectively a short carina on posterior margin, the carinae on basal and apical portions much shorter, rather tuberculate. Upper plate of frontal carina somewhat narrower than in female, transverse branches more strongly raised; clypeus more markedly roundly convex, its anterior medial incision similarly shallow; space between eye and socket of antenna as wide as the socket. Structure and sculpture of propodeum as in female, but the longitudinal carina separating the dorsal surface from sides of the segment stronger and higher. Mesosternum longitudinally broadly excavated, with a median carina, accompanying a very feeble short crenation on both sides, but sometimes utterly without such. 3rd cubital cell of forewing usually subquadrate. Petiole of abdomen as in female, basal depression on 2nd sternite similar in form and outline, but smaller, hardly attaining middle of the segment. Sometimes the border of the depression very obscure and indistinct. Without marginal fringe of long hairs on 4th and 5th sternites. Punctuation on head and thorax somewnat closer and stronger than in female. Genitalia : Figs. 33 & 34.

Allotype : ♂. Mt. Haku, Middle Japan, 31. VII. 1957, K. Tsuneki leg.

Paratypes : 4 ♂♂, Sapporo, emerged from cocoons on 30. III. 1957, the larvae being collected at Mt. Moiwa by T. Nambu; 1 ♂, Mt. Yotei, Hokkaido, 14. VIII. 1954, M. Munakata leg.; 1 ♂, Sounkyo, Hokkaido, 8. VIII. 1958, K. Tsuneki leg.

Other specimens examined : 4 ♀♀, Jozankei, Hokkaido, VII–IX. (K. Tsuneki leg.); 2 ♀♀, Sounkyo, Hokkaido, VIII. (K. Tsuneki leg.); 1 ♀, Mt. Yotei, Hokkaido, VIII. (M. Munakata leg.); 1 ♀, Hakkoda, Aomori Pref., 10. VII. 1932, K. Takeuchi leg; 7 ♀♀, Towada, Aomori Pref., IX. (K. Shimoyama leg.); 5 ♀♀ Nikko. VIII. (K. Tsuneki, E. Tanaka leg.); 6 ♀♀, Mt. Haku, VII–VIII. (K. Tsuneki, I. Togashi leg.); 18 ♀♀, Koike, Fukui Pref. VII–VIII. (K. Teuneki leg.).

Remarks.

(1) The specimens examined here somewhat differ in characters from the original descriptions in the following points :

i) Third antennal joint (a peine plus long que 1e 4e) is about 1.5 times as long as 4th.

ii) Petiole of abdomen (près de deux fois plus long que l'arceau dorsal qui le suit) is only about 1.3 times as long as the following tergite.

However, according to the description of de Beaumont,

i) "2ème article du funicule est deux fois plus long que large à l'éxtrémité, le 3ème articule est 1 1/2 fois aussi long que large ....". This is just the state of the specimens under my examination.

ii) "Sa surface dorsale est à peu près aussi long que le tibia postérieur." This agrees well with the character of my specimens.

(2) *Psenulus lubricus* Gussakovskij (1934) and *Psenulus lubricus* Yasumatsu (1950, Icon. Ins. Jap.) are respectively a quite different species from the true *lubricus* Pérez (*Vide* p. 42).

3. *Psenulus* (s. str.) *fuscipes* sp. nov.

♀. Length 4.8–5.8 mm. Very closely resembles *P. lubricus* Pérez, but differing from it in the following characters :

1) Petiole of abdomen much shorter, 3/5–2/3 as long as hind femur.

2) Antennae shorter and more markedly incrassate towards apex (Fig. 40). Relative length between 5 basal joints : 10, 3.5, 5.3, 4.0, 4.0; 3rd joint about 1.7 times, 4th 1.3 times as long as broad at each apex.

3) Head seen from above (relative value of width to length 42 : 23) with eyes much larger (Fig. 4), OOD : POD : OCD = 7 : 6 : 6.

4) The angle formed by the lower transverse branches of frontal carina distinctly larger, much nearer to 180° accordingly.

5) Clypeal incision smaller, shallower but with a tooth-like protuberance on each side of it. (Labrum similar in form) (Fig. 5).

6) Pygidial area narrow but short, more shallowly and posteriorly only gutterwise excavated, marginal carinae feeble, sometimes very indistinct.

7) Eyes more strongly convergent toward middle and thence more markedly divergent below, relative distances between eyes at upper margins, at transverse branches of frontal carina and at anterior base of mandibles 26 : 15 : 20, space between eye and socket of antenna narrower than diameter of the socket (nearly 2/3)

8) Marginal fringe of long hairs on 4th and 5th sternites longer and denser, in colour brighter testaceous.

9) Punctuation on vertex and mesonotum slightly stronger and closer (but generally very fine). General body colour, structure and sculpture of mandibles, propodeum, petiole and basal depression of 2nd sternite are similar to those of *P. lubricus*.

Variation of wing venation : Second cubital cell is considerably variable in form. Its upper nervure varies from about none to about 1/3 of the lower nervure. In the former case the form of the cell turns into a triangle. 3rd cubital cell subrhomboidal, with 3rd transverse cubital nervure nearly straight, but sometimes this is distinctly sinuate and the lower nervure become much longer than the upper nervure (Figs. 25 & 26).

♂. Length 5.0 mm. Very similar to female. But frontal carina much narrower in form (Fig. 31) and more highly raised as a whole, space between eye and socket of antenna relatively narrower (about half the width of the socket); antenna otherwise formed (Fig. 46); marginal reticulation on the lateral areas of propodeum somewhat broader, much stronger and coarser; without distinct outline of the basal depression of 2nd sternite and of course lacking the marginal fringe of hairs on 4th and 5th sternites and pygidial area.

It resembles also the male of *P. lubricus* Pérez, but can be distinguished therefrom by the following points :

1) Each joint of antenna relatively shorter and the carina shorter and broader. In the middle portion of flagellum it is elliptical in form, at the basal and apical portions it is tuberculate, on 13th it is undetectable in the allotype.

2) Abdominal petiole much shorter.

3) Crenation on both sides of the medial carina on mesosternum stronger and longer, hence very well-defined.

4) Third cubital cell subquadrate in form.

Holotype : ♀. Sakatani, Fukui Pref., 18. VI. 1954, K. Tsuneki leg.

Allotype : ♂. Zatoishi, Aomori Pref., 30. V. 1954, (F.M. leg.).

Paratypes : 1 ♀, Sapporo, 27. VII. 1944; 2 ♀ ♀, Jozankei, Hokkaido, 30. VII. 1944, 25. VI. 1952; 1 ♀, Hakodate, Hokkaido, 13. VIII. 1958; 2 ♀ ♀, Towada, Aomori Pref., 7, 21. IX. 1957 (K. Shimoyama leg.); 1 ♀, Ichinose, Mt. Haku, 30. VII. 1955; 12 ♀ ♀, Sakatani, Fukui Pref., 12, 18. VI. 1954. (All except two particularly described were collected by K. Tsuneki).

4. *Psenulus* (s. str.) *maculipes* sp. nov.

♀. Length 5.7–7.0 mm. Very closely allied to *P. fuscipes* m. in the form of head seen from above, in the general feature of antennae, frontal carinae, clypeal incision, labrum and petiole of abdomen, but differing from it in the following points :

1) Coloration. Palpi, front tibiae, base and apex of mid and hind tibiae and all tarsi bright ferruginous to light orange yellow. (Antennae beneath ferruginous, above apically brownish, tegulae glittering brown, apically paler.)

2) Antenna. Each joint relatively longer, 3rd joint twice, 4th 1.6 times as long as broad at apex, 7th slightly longer than broad, 8–11 nearly as long as broad, relative length of basal 5 joints 14, 5, 7, 5.5, 5.5, joint 7–11 equal in length to each other.

3) Head seen from above with OOD : POD : OCD = 7 : 7 : 10; postocellus with a deeper and more clearly outlined lunate furrow on outer margin.

4) Head seen in front with inner orbits of eyes nearer to parallel, relative distance between eyes at upper margins, at transverse branches of frontal carina and at anterior base of mandibles 27 : 23 : 26, space between eye and socket slightly wider than the diameter of the socket.

5) Clypeus seen under counterlight or after denuding hairs off relatively broader, with medio-apical portion somewhat more produced (Fig. 10).

6) Mandibles quite oterwise formed, apically acutely tridentate, with a further small tooth on inner margin (Fig. 10).

7) Oculo-mandibular space present, nearly as long as diameter of ocellus.

8) Structure and sculpture of propodeum similar in general scheme, but sculpture on marginal portions of lateral areas weaker, separating carinae between dorsal and lateral aspects of the segment indistinct.

9) Mid tibia with a longitudinal row of short but strong spines, usually 5 in number, on outer margin near apex. (This is absent in *P. lubricus* and *fuscipes*.)

10) Basal depression on 2nd sternite without distinct border, the excavated area seems to attain only 1/3 of the segment.

11) No apical fringe of hairs on 4th and 5th sternites.

12) Pygidial area very distinctly enclosed by carinae, narrow and long, attaining more than half of the segment (Fig. 11).

13) Vertex and mesonotum much more finely and very sparsely punctured (practically impunctate), with a bronzy reflection in certain light. Temples without striae.

♂. Length 4.0 mm. Similar to females. but differing from it as follows :

1) Head from above with occiput less developed and with temples roundly convergent backward, OOD : POD : OCD = 5 : 5 : 5. (lunate impressions outside of postocelli similarly deep and distinct.)

2) Antennae as given in Fig. 41. Joints 4–12 each with a tubercle on outer margin which

is somewhat elongate on middle portion of flagellum.

3) Head seen in front with inner margins of eyes more strongly convergent towards middle and thence more markedly divergent below. Relative distances between eyes at vertex, middle of face and anterior base of mandibles 20 : 14 : 16.

4) Oculo-mandibular space absent.

5) Upper margin of clypeus more roundly arched and medio-apical incision weaker (Fig. 9).

6) Structure of propodeum similar, but the marginal sculpture of lateral areas stronger, coarsely reticulate and more broadly covering the space.

7) Third cubital cell of forewing subquadrate. (Constant ?)

8) Coloration (constant ?) : Front and mid trochanters and femora glossy brown, front tibiae externally and mid tibiae somewhat brownish, base of hind tibiae brown, tarsi orange yellow, semitransparent; antennae light brown, beneath ferruginous.

9) No pygidial area.

The male of this species is similar to that of *P. fuscipes* m., but easily separable therefrom in the following points :

1) Antennal joints are relatively longer and the colour is brighter.

2) Tarsi of legs yellow.

3) Crenation along the medial carina on mesosternum similarly well-defined, but much shorter in each notching.

Holotype : ♀. Koike, Fukui Pref., 2. VIII. 1957, K. Tsuneki leg.

Allotype : ♂. Kowashozu, Fukui Pref., 21. V. 1955, K. Tsuneki leg.

Paratypes : 40 ♀ ♀, Fukui Pref. (Koike, Hatogayu), 14. VII.–20. VIII. 1955–58, K. Tsuneki leg.; 1 ♀, Ichinose, Mt. Haku, 4. VIII. 1954, K. Tsuneki leg.; 1 ♀, Towada, Aomori Pref., 22. VIII. 1958, K. Shimoyama leg.; 2 ♀ ♀, Nikko, 22, 28. VIII. 1954, E. Tanaka leg.; 1 ♀, Sunmata, Shizuoka Pref., 21. VIII. 1956, J. Minamikawa leg.

Other specimens examined : 96 ♀ ♀, Fukui Pref.; 3 ♀ ♀, Ishikawa Pref.; 2 ♀ ♀, Nikko (Kuriyama); all collected by K. Tsuneki.

5. *Psenulus* (s. str.) *nipponensis* Yasumatsu, 1942

Psenuls nipponensis Yasumatsu, Mushi, **14**, 2, p. 96, 1942.

According to the original description (in French) the characters of this species are as follows :

♀. Length 6.9 mm. Black. Antennal flagellum beneath partly, terminal joint wholly and apex of end tergite of abdomen light brown; tibiae and tarsi of front and middle legs much paler. Wings slightly clouded, nervures brownish black, stigma black. Lower part of face and clypeus covered very sparsely with silvery piles. Clypeus glittering, distinctly incised on anterior border and generally punctured on all surface (intervals are wider than puncture). Face below transverse carinae very finely punctate, with a large but shallow excavation, longitudinal carinae separated in two till lower end bordering a narrow and elongate plate. Third and *end joints of antenna twice as long as* wide, the following 3 joints longer than wide, the following 6 as long as wide. Vertex and thorax very glittering, punctuation microscopic and sparse. Mesonotum and mesopleurons without striae anteriorly. *Lateral areas of propodeum finely retculate.* Semielliptic *impression on 2nd sternite reaching 1/3 of the segment*, feebly marked, without distinct border. 4th and 5th sternites without fringes of hairs at apex. Pygidial area clearly bordered, very narrow and gutterwise excavated. Base of front femur beneath distinctly

flattened, front trochanters and middle tibiae simple. Second recurrent nervure of forewing ending in 3rd cubital cell, the latter long and clearly longer at base than at above.

Habitat : Korea and Japan proper (Minoo, Osaka Pref.).

Remarks. This species was based upon 2 specimens, one of which was collected in Korea. I have not collected as yet the specimen referable to this species.

6. *Psenulus* (s. str.) *mandibularis* sp. nov.

This species seems to resemble very closely the foregoing *nipponensis*. Insofar as the description is concerned, however, the present species differs from it in such characters as given below :

1) Lateral areas of prodeum not finely reticulate, but obliquely very finely and very closely striate, just as in *P. concolor* of Europe. Sometimes on latero-posterior portions the striae confluent into an elongate network (observable only under a high enlargement), but even so the feature of striation is not lost.

2) Distal joint of antenna is less than twice as long as wide at base (only 1.5 times as long as wide).

3) Basal depression of 2nd sternite indistinctly outlined, it reaches about 2/3 of the segment.

4) Apical portion of clypeus without pilose and glittering, scattering a few comparatively large punctures near the extreme margin.

5) Generally distinctly larger, measuring usually 8–9 mm.

Besides the above, curvature of the sides of the medial protuberance of clypeus and the inclination of the lower transverse carinae of the frontal plate and the form of the pygidial area seem also somewhat different from the figures of *nipponensis*.

♀. Black. Antennae beneath apically, palpi, insides of front tibiae and all front tarsal joints ferruginous, distal joint of antennae, apex of abdomen, rest of front tibiae, mid and hind tarsi dark brown, legs generally somewhat brownish. Head from above with OOD : POD : OCD = 12 : 9 : 10, lunate impressions on outer margins of postocelli deep. Frontal plate seen from above : Fig. 29, seen in front : Fig. 14, the area of the carinae raised distinctly high above the facial surface, higher than in *concolor* or *pallipes*, its lower transverse branches comparatively short and the angle formed by them nearly 90°. Relatvie distances between eyes at vertex, at transverse branches of frontal carinae and at anterior base of mandibles 40, 30 and 33, space between eye and socket of antenna is slightly larger than the socket, medial rounded shallow excavation below the transverse carinae sometimes absent. Oculo-mandibular space almost none, clypeal border, labrum and mandibles : Fig. 14. Mandibles well developed, in form somewhat similar to those of *P. lubricus* and *fuscipes*, but bidentate at apex and much stronger and robuster. Pilosity on lower front abundant, on clypeus less so. Petiole nearly two thirds as long as hind femur, with a longitudinal furrow on upper surface. Pygidial area distinctly enclosed by carinae, narrow and long, always more or less divergent anteriorly, especially markedly so on upper portion (Fig. 16). Fourth and 5th sternites without a fringe of long hairs at each apex, but with a narrow band of very minute granulation on the extreme margins. Vertex practically impunctate, temples below finely and closely striate, mesonotum finely, moderately closely punctured. Lateral areas of propodeum very finely and closely striate, its outer margin with a series of very coarse, somewhat rugose oblique carinae, outside which a rugose longitudinal carina present, separating the dorsal surface from the side of the segment, the latter finely obliquely striate, posteriorly coarsely so and upwards subreticulate.

♂. Similar to female in general. Head seen from above roundly convergent posteriorly, with OOD : POD : OCD = 9 : 10 : 8, frontal carina with upper plate much narrower than in female (Fig. 28), the area of carinae more highly raised. Head seen in front with relative distances between eyes at vertex, at lower margin of frontal carinae and at anterior base of mandibles 35, 25 and 27. Space between eye and socket of antenna narrower than the socket, frontal impression in front of transverse branches of frontal carinae in most specimens absent. Clypeal incision, labrum and mandible : Fig. 15, mandibles bidentate with inner tooth broad but triangularly pointed at apex. Antenna : Fig. 42, all of the flagellar joints carrying an elliptic tubercle on posterior margin, only that of distal joint rounded. Propodetum with T-shaped furrow wider and more coarsely sriated by carinae than in female, with lateral areas only upward sparsely (sometimes fairly closely and finely) obliquely striate, with intervals feebly wrinkled, on posterior porions very coarsely reticulate with interior also wrinkled; lateral longitudinal carinae stronger than in female; sides of the segment coarsely obliquely striate, anteriorly finer and closer. Petiole about 2/3 as long as hind femur, somewhat broader towards apex and about 2.5 times as long as broad in middle. Basal excavation on 2nd sternite as in female, but the outline is more obscure. Without marginal fringes of long hairs as well as the apical narrow granulate band on 4th and 5th sternites. Genitalia : Fig. 39. In colour similar to female, but generally the brownish portions much paler, antennae beneath wholly ferruginous.

Variations in characters : 1) In both sexes the lower transverse branches of frontal carinae vary considerably in length, sometimes dissimilar between them. Occasionally the carinae sharply angulate near middle, symmetrically or singly. In one of the female specimens one of the branches showed an interesting aberration as given in Figure 27.

2) Sculpture of propodeum : Lateral areas medio-anteriorly or upper portion wholly sometims the striae disappear, with the surface matt or shining. Rarely there are females which have the areas nearly wholly without striae and considerably shining (3 out of 156 examples). In males the density of the striae is quite variable, but generally much finer and weaker than in *fuscipennis*.

3) Wingvenation : The lst recurrent nervure of forewing is most usually received directly or indirectly by the lst transvese cubital nervure, but fairly frequently it is received also either by the lst or by the 2nd cubital cell at a varying distance (usually not so far) from the lst transverse cubital nervure. The 2nd recurrent nervure is usually received by the 3rd cubital cell, but sometimes interstitial. The form of the 2nd and 3rd cubital cells is also variable, especially markedly so in the 3rd cubital cell of the male. This is caused by the variation of sinuation of the 3rd transverse cubital nervure. When it runs nearly straight the form of the cell becomes subquadrate or subrhombic, with upper nervure subequal in length to lower nervure accordingly, while when the sinuation is marked the cell becomes roundly expanded on lower half, with the result of having the longer nervure beneath as compared with the upper nervure.

Holotype : ♀. Katsuyama, Fukui Pref,. 28. V. 1954, K. Tsuneki leg.

Allotype : ♂. The same locality, 18. V. 1954, K. Tsuneki leg.

Paratypes : 40 ♀ ♀ 40 ♂ ♂, Fukui Pref. (Katsuyama, Ohno, Sakatani, Nishitani, Iwaya, Kowashozu, Koike), 4. V.-8. VI. 1954-56, K. Tsuneki leg.

Other specimens examined : 97 ♀ ♀ 85 ♂ ♂, Fukui Pref., 4. V.-18. VI. 1954-56, K. Tsuneki leg., 1 ♀, Koike, Fukui Pref., 1. VIII. 1957; 4 ♀ ♀, Mt. Haku, 31. VII. 1956, K. Tsuneki leg.; 3 ♀ ♀, Mt. Nishimine, Ishikawa Pref., 28. VI, 29. VII. 1948, 1954, I. Togahsi leg.; 10 ♀ ♀, Okorogawa, Tochigi Pref., 7. VI. 1936, K. Tsuneki leg.; 1 ♀, Hakodate,

Hokkaido, 13. VIII. 1958, K. Tsuneki leg.; 2 ♂♂, Zatoishi, Aomori Pref., 30. V. 1954, F.M. leg.

Habitat : Honshu (the middle and norther parts) and Hokkaido.

7. *Psenulus* (s. str.) *concolor* (Dahlbom, 1845)

Psenulus concolor Yasumatsu, Mushi, **14**, 2, p, 95, 1942 (Honshu and Hokkaido).

I have not as yet capture the specimen of this specis in Japan. According to the observation of the European specimens of this species, however, this is a species very close to our *P. mandibularis* m. in many characters, namely the general form of frontal carina and clypeus, relative width of antennal socket to the space between this and eye, ratio of OOD : POD, punctuation on vertex, sculpture of lateral areas of propodeum, length relation of abdominal petiole, structure or pilosity of 2nd, 4th and 5th sternites, structure of pygidial area and in general coloration. But it differs from *mandibularis* in the following points :

♀. 1) Antnnal joints relatively shorter, 3rd joint 1.7 times as long as wide, 4th nearly as long as wide.
2) Ocellar impressions deeper.
3) The area of frontal carinae not so highly raised as in the compared species and the upper plate is narrower.
4) Punctures on mesonotum somewhat larger and closer.
5) Petiole more strongly widened posteriorly.
6) Generally smaller.

♂. 1) Antennal joint relatively somewhat shorter.
2) The area of frontal carinae not so highly raised.

Habitat : Hokkaido (Sounkyo) and Honshu (Nagano. Pref.).

Specimens examined : 6 ♀♀ 3 ♂♂ (Europe)

8. *Psenulus* (s. str.) *fuscipennis* (Dahlbom, 1845)

Psenulus fuscipennis Gussakovskij, Ark. Zool, 24 A, 10, p. 6, 1933 (The Ussuri region)
Psenulus fuscipennis Beaumont, Mitt. Schweiz. Ent. Ges., XVII, 1 et 2, p. 88, 1937.

Subsp. ***japonicus* subsp. nov.**

The new subspecies differs from the original race in the sculpture constantly weaker :

The striae on vertex and temples are much feebler, the punctures on mesonotum, mesopleuron and scutellum finer and sparser and the striae on mesopleuron very weak, sometimes completely disappear. On propodeum also the striae are generally finer and closer.

(Antennae beneath in males wholly bright ferruginous, in four European specimens used for comparison the area is nearly wholly black. Whether this is a geographical variation or not, however, is quite undetermined to me.)

♀. Length 7.3–9.5 mm. Black. Palpi, antennae beneath apically narrowly, front tibiae inward, front and mid tibiae, articulations of legs brown to dark brown. Head from above with OOD : POD : OCD = 11 : 11 : 12, lunate impressions along outer margins of postocelli distinct and deep, upper plate of frontal carina (Fig. 30) broad, antennae thick, relative length (and width at apex) between joints 3, 4, 5, 10, 11 and 12 seen from above 8 (5.2), 6 (6.0), 6 (6.3), 6 (8.0 at base), 6 (7.5 at base) and 10 (7.0 at base). Relative distances between eyes at vertex, at lower part of frontal carinae and at frontal base of mandibles 40, 29, 31, space between eye and socket of antenna wider than the socket; lower transverse branches of frontal carinae distinctly keeled, forming an angle of about 135°; clypeus, labrum and mandible : Fig. 3.

Petiole of abdomen about 2/3 as long as hind femur; basal depression of 2nd sternite distinctly outlined, reaching 3/5 of the segment; apical fringes of long hairs on 4th and 5th sternites well-developed, longer than in any other Japanese species; pygidial area comparatively broad, in most specimens longitudinally obsoletely keeled in middle. Front trochanter and femur at base beneath flattened. Usually the lst and 2nd recurrent nervures received by the 2nd cubital cell, very rarely one or both of them interstitial.

Upper front longitudinally, vertex transversely and temples obliquely striate; mesonotum on anterior corners and posterior portion striate, but no striae on central area broadly, scutellum simply punctured. Lateral areas of propodeum obliquely fairly closely striate, on posterior and lateral portions coarsely irregularly reticulate; mesopleuron finely and rather closely longitudinally striate, the striae anteriorly weak and sometimes whole the area without striae; sides of propodeum obliquely closely striate.

♂. Length 6.3–7.8 mm. Similar to female. Vertex slightly roundly convergent posteriorly, inner orbits of eyes more strongly convergent towards middle of face. Antennae as usually the case somewhat moniliform, joint 3 and 13 twice as long as broad, joints 3–11 each with a carina on posterior margin which is gradually shorter towards apex, on joint 11 almost a tubercle, sometimes very obsure and sometimes completely disappearing.

Striae on head and thorax somewhat stronger than in female. Crenation on both sides of median longitudinal carina of mesosternum anteriorly long and well-defined, posteriorly gradually indistinct. Lateral areas of propodeum very coarsely reticulate. Genitalia : Fig. 35.

Specimens examined : 3 ♀ ♀, Korea (1 ♀, Keijo, 22. V. 1943, 2 ♀ ♀, Shoyozan, 30. V, 2. VII. 1943); 7 ♀ ♀ 1 ♂, Hokkaido (Jozankei, Sapporo, Nopporo), VI and IX. 1947–52; 1 ♀, Towada, Aomori Pref., 31. VII. 1956; 25 ♀ ♀ 6 ♂ ♂, Fukui Pref., VI, VII, VIII. 1954–57; 4 ♀ ♀, Ishikawa Pref. VII, VIII, 1954–56. All collected by the author himself.

9. *Psenulus* (s. str.) *nikkoensis* sp. nov.

This species is apparently somewhat similar to *P. mandibularis* in the large size of body, in the sculpture of propodeum and in the characters of antennae, abdominal sternites and pygidial area, but can easily be distinguished from it in the longer petiole and in the differently formed mandibles.

♀. Length 9.0–9.5 mm. Black. Palpi, antennal flagella beneath, tarsi of legs brown; labrum, front and mid tibiae and wing tegulae dark brown; tibial spurs yellowish.

Head seen from above : Fig. 13, lunate impressions outside postocelli deep and long, extending around the posterior margin and approaching closely to each other, median ocellus also enclosed by an impression excepting hind margin; OOD : POD : OCD = 12 : 9 : 12, upper plate of frontal carina comparatively small, nearly as wide as ocellus; antennae very similar to those of *mandibularis*, relative length between joints 3, 4, 5, 9, 10 and 12 is 9, 6, 6, 6, 6 and 9, joint 3 1.6 times as long as wide at apex, joint 4 as long as wide, joint 9 0.7 times as long as wide. Head seen in front with relative distances between eyes at vertex, at lower portion of frontal carinae and at anterior base of mandibles 38, 27 and 30; space between eye and socket of antenna slightly narrower than the socket. The area of frontal carinae highly raised and median carina distinct up to anterior end, but the transverse carinae absent, only with a pyramidal elevation on each side just at the point where otherwise the carina turns toward the antennal socket, with sometimes a short carina on the elevation (Fig. 32). Clypeus markedly porrect anteriorly in middle, with a very feeble median inciston; sides of labrum subparallel, mandibles bidentate at apex, with inner tooth not particularly widened, provided with a small additional

tooth on inner margin toward middle (Fig, 12). Head in profile with temple as wide as eye. Petiole of abdomen nearly as long as hind femur and on upper surface with a longitudinal furrow which is narrowed behind middle. Basal excavation on 2nd sternite vaguely outlined (defined in certain light only), reaching about 3/5 of the segment; 4th and 5th sternites without the fringe of long hairs at apex, but with a narrow band of granulation having short pubescence. Pygidial area distinct and narrow, with lateral carinae strongly keeled. The lst recurrent nervure of forewing received by the 2nd cubital cell near the base of the lst transverse cubital nervure or interstitial, the 2nd by the 3rd cubital cell.

Veretx sparsely punctured, punctures fine and aciculate, but on ocellar region somewhat gross, rounded and closely distributed; temples anteriorly sparsely, posteriorly finely and closely punctured, lower portions striate. Punctures on mesonotum somewhat larger and closer than on vertex, on posterior portion longitudinally punctate-rugose, scutellum coarsely sculptured with longitudinally elongated shallow excavations; propodeum with lateral areas obliquely, very finely and closely striate, on lateral margins rather coarsely reticulate; mesopleuron finely and sparsely punctured, on upper portion smooth, sides of propodeum anteriorly witout sculpture, posteriorly obliquely, rather strongly and closely striate.

♂. Length 8.7 mm. Similar in general characters to female. Black. Palpi and tarsal spurs brownish yellow; antennae and legs wholly, tegulae and veins of wings brown, antennae beneath much paler and apically strongly yellowish*. Head from above with temples roundly convergent posteriorly, with postocellar impressions similar to the case of female. OOD : POD : OCD = 10 : 8 : 8, dorsal plate of frontal carinae narrower than in female, narrower than median ocellus. Head seen in front, relative distances between eyes at vertex, at transverse carinae and at anterior base of mandibles are 34, 23 and 25; space between eye and socket of antenna about half the width of the socket; the area of carinae highly elevated, the lower transverse branches distinctly carinate; clypeus similarly constructed as in female. Mandibles bidentate at apex, without a tooth on inner margin. Antennae very similar to those of *P. fuscipennis*, somewhat rosary in form, joint 3 twice as long as wide at apex, joint 4 slightly shorter than 3, joints 5–12 nearly equal in length and width, distal joint slightly longer than joint 3 and more than twice as long as wide at base; joints 3–11 with a carina on each posterior margin, slightly obliquely located, which becomes gradually shorter toward apex, on distal portion rather tuberculate. Crenation along the median longitudinal carina of mesosternum only posteriorly defined, short. Petiole slightly shorter than hind femur (ratio 30 : 27), above longitudinally deeply excavated and bordered on both sides by carinae. In fore wing lst recurrent nervure received by lst cubital cell slightly before lst transverse cubital nervure, the 2nd received by 3rd cubital cell.

Punctuation generally as in female, but lateral areas of propodeum with upper portions rather coarsely obliquely striate, posteriorly and laterally broadly, very coarsely and irregularly reticulate; sides of the segment posteriorly very coarsely obliquely striate.

Holotype : ♀. Nikko (Shobugahama), Tochigi Pref., 20. VIII. 1953, E. Tanaka leg.

Allotype : ♂. Nasu, Tochigi Pref., 24. VII. 1937, K. Tsuneki leg.

Paratypes : 4 ♀ ♀, Nikko (Shobugahama, Chuzendzi), 16. VIII. 1952, 10. VIII. 1953, 23. VII. 1954, E. Tanaka leg; 1 ♀, Akakura, Nagano Pref., 15. VII. 1927, K. Takeuchi leg.

Remarks. The venation of fore wing of the male is different from that of the female. It is uncertain, however, whether this is the normal state of the species or not.

* It is doubtful whether the colour represents the normal state of the specimen or is changed so by fading, since the material is a single specimen and it has been long preserved.

10. *Psenulus* (s. str.) *pallipes* Panzer, 1798

Sphex pallipes Panzer, Faun. Ins. Germ., 52, pl. 22. 1798.
Trypoxylon atratus Fabricius, Syst. Piez., p. 182, 1804.
Psenulus atratus Richards, Trans. Entom. Soc. London, 83, p. 166, 1935.
Psenulus pallipes Beaumont, Mitt. Schweiz. Entom. Ges., 17, 1-2, p. 85, 1937.

With regard to the adoption of the specific trivial name, *pallipes*, I have followed the opinion of Prof. J. de Beaumont (1937).

10 (A) *Psenulus* (s. str.) *pallipes puncticeps* Gussakovskij, 1933

Psenulus puncticeps Gussakovskij, Ark. Zool., 24 A, No. 3, p. 6, 1933 (♀); Mushi, 7, 2, p. 84, 1934 (♀ ♂) (Saghalien). (Ussuri, European Russia)
Psenulus pallipes puncticeps Beaumont, loc. cit.

♀. 5.5-6.5 mm. Black. Palpi, antennae beneath, insides of front tibiae, tarsi of legs, tegulae and veins of wings brown to dark brown. Head seen from above with OOD : POD : OCD = 9 : 9 : 9 (comparatively large specimen) (In the European specimens of *P. p. pallipes* examined OOD < POD), upper plate of frontal carina wider than ocellus; head seen in front with relative distances between eyes at vertex, at transverse branches of frontal carina and at anterior base of mandibles 30, 22, 24; space between eye and antennal socket as wide as the socket (In the specimens from Holland the former is larger than the latter, while in those from Poland they are subequal in width — the Polish specimens, viewed from differerent characters in many respects, may represent a different subspecies from those of Western Europe). Lower transverse branches of frontal carinae distinctly keeled; clypeus (Fig. 1) gently convex, apical border bidentate, sinus very deep; labrum and mandible : Fig. 1. Antennae short and thick, 3rd joint slightly longer than wide at apex, 4th nearly as long as wide, end joint 1.5 times as long as wide at base. Petiole short, about 3/5 as long as hind femur, above longitudinally widely excavated, pygidial area elongate triangle, distinctly bordered on both sides by carinae. Basal excavation on 2nd sternite of abdomen distinctly outlined, reaching 2/3 of the segment, 4th and 5th sternites with a fringe of long hairs on each posterior margin.

Sculpture considerably variable. In the typical form of this subspecies vertex finely, fairly closely punctured; temples below obliquely striate, mesonotum finely, rather sparsely punctured, on posterior margin longitudinally striate. Mesopleuron finely, anteriorly somewhat closely punctured. Lateral areas of propodeum obliquely fairly finely and closely striate on all the surface. In the other form upper front longitudinally, vertex and occiput transversely striate with intervals punctured; temples obliquely, rather strongly striate, density of punctures on mesonotum varied with no correlation with the sculpture on head; lateral areas of propodeum obliquely, strongly but closely striate on all the areas, only on extreme lateral margins striae become coarse, outside which runs a longitudinal carina, separating the side of the segment from the dorsal surface. This form is closer to the original species. In one Korean example punctures on head and thorax somewhat larger and much closer, striae on propodeum posteriorly turned into subreticulation, just as in the nominate race.

♂. Length 5.2-6.5 mm. Similar to female. In colour antennae sometimes wholly brown with a few apical segments much yellowish, legs much paler, sometimes femora and tibiae brown. Ocellar disposition similar, upper plate of frontal carina narrower, inner orbits of eyes somewhat more strongly convergent towards middle of face, space between eye and socket of antenna narrower than the socket; clypeus, labrum and mandibles similar; antenna with each joint somewhat more elongate than in the nominate form, especially in terminal joint which is usually

amply twice as long as wide at base, but sometimes only 1.5 times as long as wide, with various intermediate forms, 3rd joint. viewed from the widest side 1.4 times as long as wide at the widest part, viewed from the narrowest side, 2 times as long as wide, a somewhat elongate tubercle usually found on posterior margin on joints 4–8, sometimes –9, –10 or –11, rarely it is quite indistinct and hardly detectable on all the joints. genitalia : Fig. 37.

Sculpture on head and mesothorax as in female. Sculpture on lateral areas of propodeum shows 3 types of variation : 1) Wholly coarsely irregularly reticulate as in the nominate race. 2) Upper portion obliquely, coarsely striate (considerable variation found in density and in strength), posterior portion rather coarsely reticulate. This is the commonest type. 3) Upper portion smooth and polished, posterior portion coarsely reticulate. Of course, there are various intermediate states between them.

Variations in the wing venation :

Usually the lst recurrent nervure is received by the 2nd cubital cell near the base of the lst transverse cibital nervure, but sometimes interstitial; the 2nd recurrent nervure is received by the 3rd cubital cell near the base of the 2nd transverse cubital nervure, rarely interstitial. The 2nd cubital cell is usually a quadrilateral with the upper nervure very much shorter than the lower nervure. The third cubital cell is usually subrhombic, with the outer nervure sinuate.

While, in the varied forms which are more frequent in males, (1) the lst recurrent nervure is received by the lst cubital cell at a varying distance from the base of the lst transverse cubital nervure, (2) the 2nd cubital cell becomes a complete triangle in form by the disappearance of the upper nervure, sometimes even provided with a short stalk on top; on the other hand, it sometimes becomes pentagonal by the angularity of the lower nervure at the receiving point of the lst recurrent nervure, (3) the form of the 3rd cubital cell is frequently nearly rectangular, higher than wide or it is widely expanded on the lower portion by the varied states of sinuation of the 3rd transverse cubital nervure.

Specimens examined : 1 ♀ 1 ♂, Korea (Hakugan, Keijo), 24. VIII. 1943, 28. V. 1942, K. Tsuenki leg.; 9 ♀ ♀ 34 ♂ ♂, Hokkaido (Jozankei, Sapporo, Atsubetsu), VI, VII. 1947–52, K. Tsuneki leg.; 1 ♀, Fukui Pref. (Koike), 6. IX. 1958, K. Tsuneki leg.

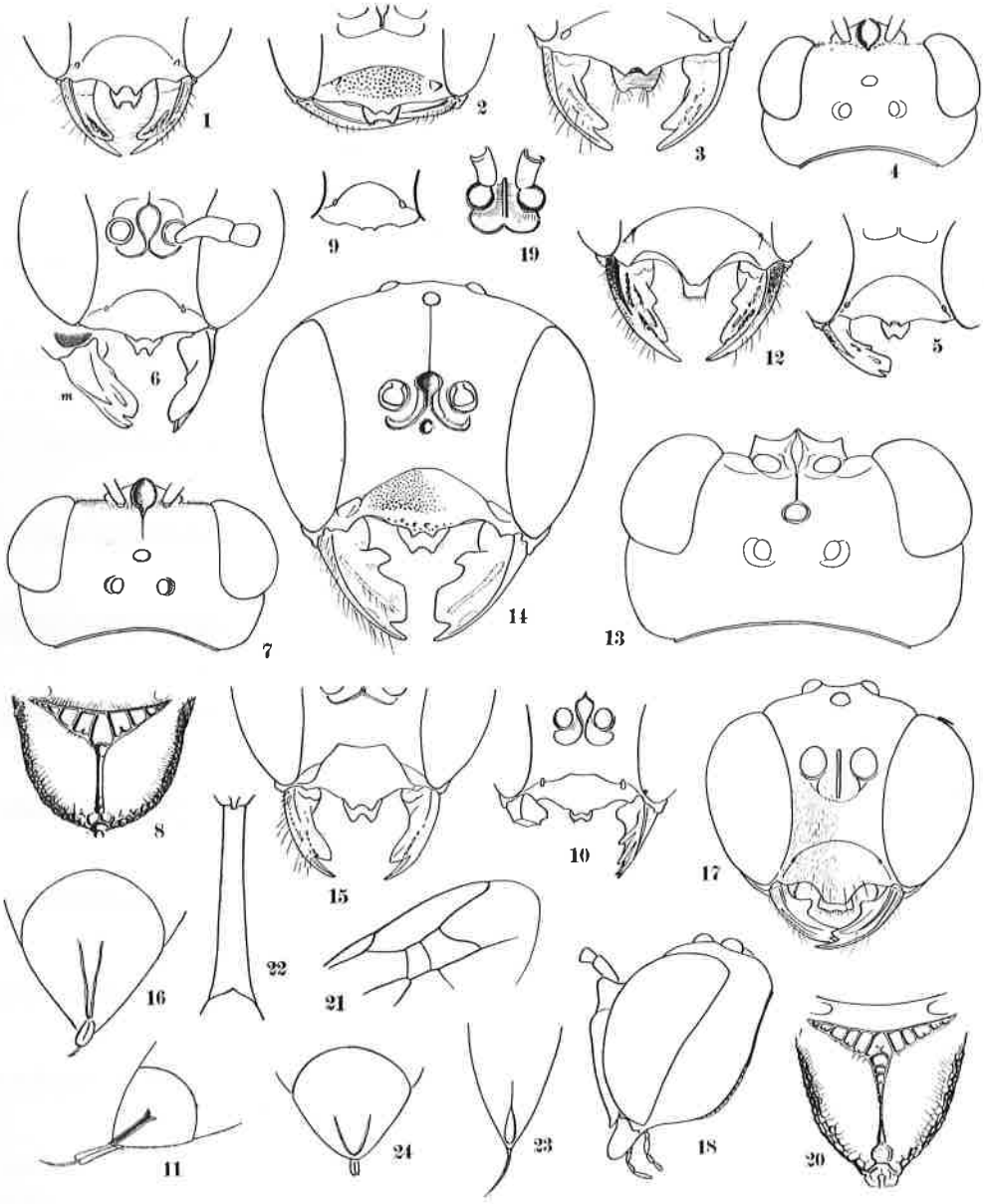
Remarks. The nominate race in Europe is known to be quite variable in characters and it is also true in the East-Asiatic subspecies. Therefore, the subspecific characters are rather difficult to be enumerated. However, the chief trend of characters of the antennae and propodeum in males as well as of the general punctuation on the head and thorax seem to make the point.

10 (B) *Psenulus* (s. str.) *pallipes* yamatonis subsp. nov.

Psenulus lubricus Gussakovskij (nec Pérez), Mushi, 7, 2, p. 80, 1934 (♀ ♂).
? *Psenulus lubricus* Yasumutsu, Mushi, 7, 1, p. 23, 1934 (Larva and pupa).
Psenulus lubricus Yasumatsu (nec Pérez), Icon. Ins. Jap., Rev. Ed., p. 1479, fig. 4271, 1950 (♀).

♀ ♂. Length 5.0–5.8 mm. Very similar to *P. pallipes puncticeps* Guss. (male genitalia also similar : Fig. 38). In the typical specimens of both subspecies, the following difference of characters can be observed in *yamatonis* :

♀. 1) Ferruginous portions are much brighter.
2) Punctures on head and thorax finer and sparser.
3) Lateral areas of propodeum with upper portion nearly smooth, posterior portion transversely, arcuately finely striate.
4) Petiole somewhat shorter, nearly half the length of hind femur.



Figs. 1-24. (1) Lower half of head of *P. pallipes puncticeps* Guss., ♀. (2) Ditto of *tanakai* n. sp., ♀. (3) Ditto *of fuscipennis japonicus* n. ssp., ♀. (4) Head of *fuscipes* n. sp., ♀. (5) Clypeus, labrum and mandible of ditto. (6) Head seen in front of *lubricus* Pérez, ♀, m, mandible in the lateral view. (7) Ditto seen from above of do. (8) Propodeum of do. (9) Clypeus of *maculipes* n. sp., ♂. (10) Lower half of head of do, ♀. (11) Pygidial area of do. (12) Lower half of head of *nikkoensis* n. sp., ♀. (13) Head of do. (14) Head seen in front of *mandibularis* n. sp., ♀. (15) Do, lower half of ♂. (16) Pygidial area of do, ♀. (17) Head of *iwatai* Guss., ♀. (18) Do in profile. (19) Frontal carina of do, ♂. (20) Propodeum of do, ♀. (21) Wing venation of do. (22) Petiole of do. (23) Pygidial area of do. (24) Do of *tanakai*, n. sp., ♀.

♂. 1) Antennal joints somewhat shorter, rather close to the character of the nominate race, 3rd joint, even seen from the narrowest side, 1.5 times as long as wide, end joint also 1.3–1.5 times as long as wide at base.

2) Posterior tubercles on flagellar joints almost always indistinct.

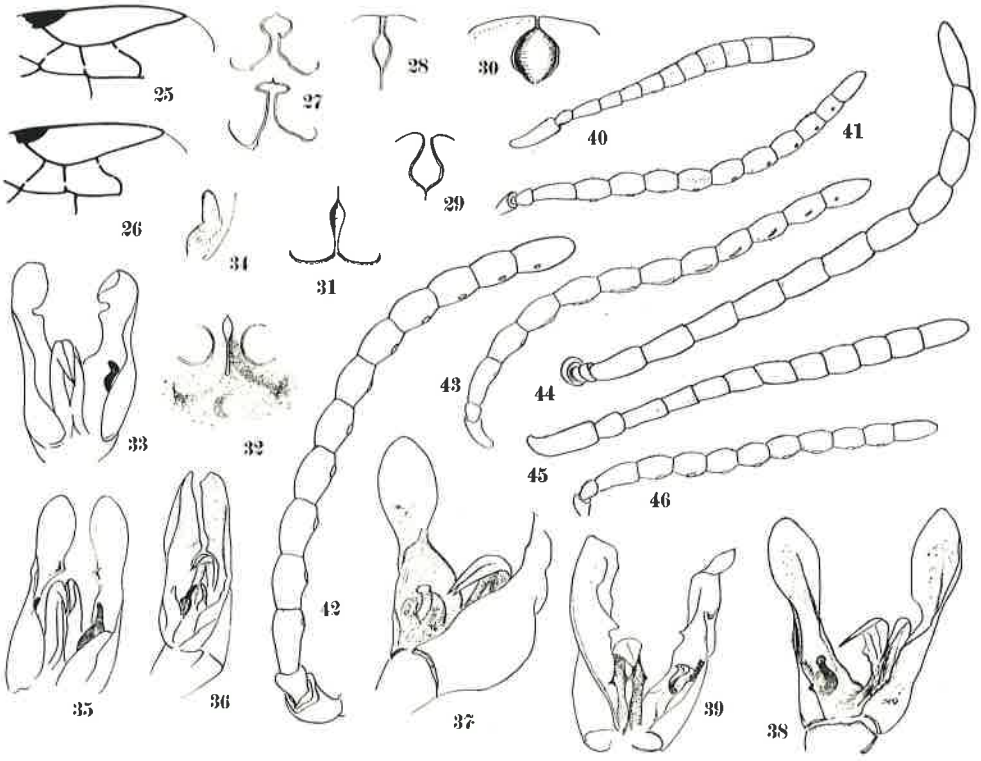
3) Lateral areas of propodeum finely or somewhat coarsely obliquely striate on upper portion, on posterior portion coarsely reticulate.

Variations in characters :

1) Punctures on head and thorax somewhat larger and closer, almost similar to the case of the typical specimens of *puncticeps*.

2) Sometimes punctures on vertex and frons accompany feeble striae, but always not so strong as in the similar case in *puncticeps*.

3) Lateral areas of propodeum, (a) with upper and middle portions broadly smooth and partly or wholly polished, but even in this case on the posterior portion a few



Figs. 25–46. (25) Usual wing venation of *fuscipes* n. sp., ♀. (26) A kind of variation of do. (27) Variations of frontal carinae in *mandibularis* n. sp., ♀. (28) Upper plate of frontal carina seen from above of do, ♂. (29) Do, ♀. (30) Do of *fuscipennis japonicus* n. ssp., ♀. (31) Do seen in front of *fuscipes* n. sp., ♂. (32) Do of *nikkoensis* n. sp., ♀. (33) male genitalia of *lubricus* Pérez. (34) Cuspis of do. (35) Male genitalia of *fuscipennis japonicus* n. ssp. (36) Do of *iwatai* Guss. (37) Do of *pallipes puncticeps* Guss. (38) Do of *pallipes yamatonis* n. ssp. (39) Do of *mandibularis* n. sp. (40) Antenna of *fuscipes* n. sp., ♀. (41) Do. of *maculipes* n. sp., ♂. (42) Do of *mandibularis* n. sp., ♂. (43) Do of *lubricus* Perez, ♂. (44) Do of *iwatai* Guss., ♂. (45) Do of *lubricus* Pérez, ♀. (46) Do of *fuscipes* n. sp., ♂.

feeble transverse and arcuate striae (♀) or some coarse reticulation (♂) are always observed; (b) with the surface wholly obliquely, finely and very closely striate, striae finer and closer than in the case of *puncticeps* (♀), in this case, too the striae turn into transverse and arcuate stream on posterior portion; (c) with the character intermediate between the above two, namely the upper portion partly (central region only) smooth and polished and partly (marginal regions) striate, the posterior portion transversely and arcuatcly striate (♀) or rather coarsely reticulate (♂). The case, (c) is most usually observed.

4) Wing venation : Usual feature is similar to the case of *puncticeps* and the variation (3) designated as to that subspecies is fairly commonly found in this subspecies also, but the variation (2) is very rare and (1) could not utterly be discovered among so many of the examples.

Holotype : ♀. Sakatani, Fukui Pref., 18. V. 1954, K. Tsuneki leg.

Allotype : ♂. Katsuyama, Fukui Pref., 29. V. 1954, K. Tsuneki leg.

Paratypes : 40 ♀ ♀ 40 ♂ ♂, Fukui Pref. V, VI, VII, VIII. 1953–1956, K. Tsuneki leg.

Other specimens : 192 ♀ ♀ 233 ♂ ♂, Honshu or Japan proper (Aomori, Ishikawa, Fukui, Tochigi and Kyoto Pref.); 6 ♀ ♀ 1 ♂, Hokkaido (Sapporo, Jozankei).

Remarks. Among the above listed specimens (♀ ♀) are included 17 type a, 65 type b and 191 type c.

P. pallipes yamatonis occurs very abundantly and commonly in Japan proper (= yamato), but rarely so in Hokkaido (= yezo). while *P. pallipes puncticeps* is common in Hokkaido (but not abundant), but very rare in Japan proper. Therefore, there can be admitted a considerably distinct habitat segregation between them. This is the chief reason for that the two populations were separated at the subspecific rank.

The fact that the mixed distribution of both the subspecies is somewhat distinct in Hokkaido seems to account for a part of the variations found in *P. p. puncticeps.* Indeed, some of which are considered to represent respectively an intermediate state between them.

This subspecies is apparently similar to the European *laevigatus* Schenck, but can be distinguished thereform by the clypeal incision very deep and by the pygidial area distinctly enclosed on both sides by carinae.

11. *Psenulus* (s. str.) *tanakai* sp. nov.

Length 6.5 mm. Black. Palpi, labrum, antennae beneath apically, tegulae of wings, front tibiae inwards, tibial spurs and tarsi of all legs ferruginous to dark brown. Head from above with OOD : POD : OCD = 8 : 8 : 8, lunate impressions outside postocelli deep, ending at the posterior margin of each ocellus, dorsal plate of frontal carina slightly wider than ocellus; 3rd antennal joint 1.5 times as long as wide at apex, 4th 1.3 times as long as wide, 5th and 6th slightly longer than wide. Head seen in front with relative distances between eyes at vertex, at transverse branches of frontal carinae and at anterior base of mandibles 30, 21, 25; space between eye and socket of antenna subequal in width to the socket or very slightly wider than the socket; transverse carinae distinctly keeled, clypeus : Fig. 2. Petiole about 2/3 as long as hind femur, about twice as long as wide at apex; pygidial area rather broad (Fig. 24), flattened, only apically feebly excavated; basal excavation on 2nd sternite of abdomen distinctly outlined with apex narrowly rounded and reaching only middle of the segment, 4th and 5th sternites with a fringe of long hairs at each posterior margin. First recurrent nervure received by 2nd cubital cell, 2nd by 3rd cubital cell or interstitial.

Punctures on vertex fine and sparse, those on mesonotum somewhat more distinct and somewhat closer, temples transversely striate, clypeus with anterior 1/3 and the sides impunctate and nearly polished; mesonotum on posterior margin crenate, mesopleuron without striae, practically impunctate; propodeum with lateral areas on upper portion obliquely striate, the striae fairly fine and close, sometimes medianly weaker, on posterior portion coarsely reticulate.

♂. Unknown.

Holotype : ♀. Kuriyama, Nikko, 3. VIII. 1956, E. Tanaka leg.

Paratypes : 2 ♀ ♀, Ibid.; 1 ♀, chuzendzi, Nikko, 11. VIII. 1954, K. Tsuneki leg.

Remarks. This species apparently similar to *P. pallipes yamatonis*, but slightly larger, with antennae, clypeus, basal depression of 2nd sternite differently formed and with propodeum differently sculptured.

This species is also similar to European *P. laevigatus* Schenck and in fact may be a subspecies. But so far as the descriptions of that species are concerned, it differs from that in the following points :

1) Clypeus except the sides with the basal 2/3 finely and closely punctured, the supraclypeal area also similarly punctured. The punctured areas are half mat. But the covering pubescence is very fine and the surface is fairly well visible.

2) Ratios of the length to the width of the antennal joints are somewhat different.

3) The basal depression of the 2nd sternite is less extended posteriorly, reaching only half of the segment.

4) Pygidial area is, though not long, distinctly bordered on both sides by carinae (Fig. 24).

5) Sculpture of propodeum is somewhat different.

On the basis of the above mentioned differences of characters *tanakai* was, rather provisionally, dealt with as a distinct species.

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III. The Genus Psen Latreille of Japan and Korea with Biological Notes on Some Species (Sphecidae, Pseninae)

In the taxonomical study the genus *Psen* Latreille (1796) had been one of the most difficult group of Aculeate Hymenoptera up to 1937 when the excellent monographic work on the members of this genus known to that time from the Palaearctic Region was published by Prof. J. de Beaumont. The reasons for such difficulty lie in the facts that the genus comprises several very closely allied congeners and that a number of the species published by previous authors remain quite obscure to the investigators of other regions because of their typically classic descriptions. de Beaumont clarified so many of the synonyms, gave a precise redescription to each species and presented the group of the Palaearctic Region in a very clear-cut form. Prior to the work of de Beaumont Malloch (1933) in a similar work on the group of North America had solved the entangled problem on the generic and subgeneric names and his result was followed by de Beaumont in the above-mentioned work. A short time after the appearance of Beaumont's work another of a similar sort was published by V. Gussakovskij which was independently planned and which included several Asiatic species that were not comprised in the monograph of the entomologist of Swizerland. About a decade later excellent papers concerning this genus were successively published by O. W. Richards (1947),, G. M. Spooner (1948) and J. P. van Lith (1949). Thanks to the works of these investigators we are now able to compare the species occurring in other regions of the world with those of Europe with a considerable confidence.

In the present paper the author dealt with the species of the genus found in Japan and Korea as one of his succesive works on the taxonomy of the Aculeate Hymenoptera of the Asiatic region, together with the biological observations on some species. The result obtained relating to the distribution of species interested him in that the representatives of the subgenus *Mimesa*, so abundant on the Continent are very scarce in our region, while those of the subgenus *Psen*, so rare in Europe are remarkably rich in these countries. With regard to *Mimumesa*, species known to be rare in western countries are fairly abundant in our region, of course in the forms which should be dealt with as geographical races or subspecies.

As regards the material, more than eight hundred specimens were examined in the present study, the greater part of which were collected by the author himself. Amongst the remainder, however, are included several important species which were kindly forwarded to him by Dr. K. Takeuchi, Dr. K. Iwata, Messrs K. Shimoyama, R. Narumi, M. Munakata, T. Kimura, J. Minamikawa, I. Togashi, E. Tanaka and K. Shirahata, to whom the anthor expresses his warmest thanks.

Key to the subgenera

1 Uppermost region of mesopleuron just below base of wing rugoso-

striate, opaque, epimeral suture separating the region not well-defined

***Mimesa* Shuckard, 1837**

– Uppermost region of mesopluron smooth and polished, epimeral suture well-defined 2

2 Petiole of abdomen with the apical half medianly carinate, outer carinae of both epicnemial areas jointed together on the medio-anterior line of mesosternum, without a tubercle or tooth between insertions of antennae (only a feeble carina running between insertions), in males mid metatarsi simple, no tuft of long hairs on posterior margins of 4th and 5th sternites

***Mimumesa* Malloch, 1933**

– Petiole without medial carina on apical half, outer carinae of both epicnemial areas not jointed together medianly beneath mesosternum, but turning posteriorly at a short distance from the medial line, always provided with a tubercle or a tooth between bases of antennae, in males mid metatarsi sometimes deformed and 3rd and 4th sternites with a tuft of long hairs on posterior margins

***Psen* Latreille, 1796**

Key to the species

Female

(With antennae 12-jointed, abdomen having 6 visible segments and well-defined pygidial area.)

1 Subgenus *Mimesa* 2

– Subgenus *Mimumesa* 3

– Subgenus *Psen* 8

2 Body entirely black, sometimes with a brownish shade on sides of 1st abdominal tergite, a well-defined transverse tubercle on clypeus medio-anteriorly, interantennal process tuberculate, petiole above flattened, feebly wrinkled

***shuckardi japonicus* Pérez** (p. 53)

– Abdomen with red maculae

(Including many species, yet undiscovered from Japan and Korea)

3 Pygidial area semielliptic, coriaceous and grossly and closely punctured ... 4

– Pygidial area elongate triangle, polished, sometimes with a few punctures 6

4 Petiole as long as hind tibia, much longer than 1st tergite, antennae wholly black (Epicnemial area nearly completely enclosed by carinae (Fig. 4), forming a distinct angle between this and anterior excavation of mesosternum

***atratinus sameshimai* Yasumatsu)** (p. 54)

– Petiole less than as long as hind tibia, antennae beneath at least apically

ferruginous (Epicnemial area without carinae on ventral side, no distinct angle between this and anterior excavation of mesosternum) 5

5 Vertex with punctures weak and sparsely scattered, intervals polished, antennae beneath from 3rd joint apically ferruginous, petiole slightly longer than 1st tergite, tibial spurs and greater part of tarsi of legs yellowish white

***littoralis* Bondroit** (= *fulvitarsis* Guss.) (p. 57)

– Vertex with punctures fairly close, not so glittering, antennae beneath with apical 2 or 3 joints dark brown, petiole nearly as long as 1st tergite, yet undiscovered from Japan and Korea

(*unicolor* Van der Linden)

6 Hairs on lower front and clypeus fine and very sparse, letting the surface easily visible, not silvery, pygidial area elongate triangle, about 30° at apex (Antennae wholly black, epicnemial area nearly completely enclosed by carinae — Fig. 13 —, anterior excavation of mesosternum not deep.)

***dahlbomi pacificus* subsp. nov.** (p. 59)

– Hairs on lower front and clypeus abundant and silvery, pygidial area narrower, about 20° or less at apex 7

7 Antennae beneath from joint 4 apically ferruginous, epicnemial area not forming an distinct angle with the anterior excavation of mesosternum, but gradually roundly turning into the excavation

***vanlithi* sp. nov.** (p. 61)

– Antennae beneath black, epicnemial area forming an obtuse angle with the anterior excavation of mesosternum, Europe

(*beaumonti* Lith)

8 Pygidial area polished, with a few punctures or without 9

– Pygidial area opaque, very minutely coriaceous and punctured 12

9 Petiole distinctly irregularly wrinkled (Punctures on head and thorax strong, pygidial area narrow with a few punctures along lateral margins — Fig. 29 —, pilosity on clypeus silvery)

***exaratus* Eversmann** (p. 69)

– Petiole smooth and polished or nearly 10

10 Clyepus and lower front covered with golden pubescence, antennae and greater part of legs pale brown, antennae beneath bright ferruginous (Pygidial area narrow, with few punctures or without — Fig. 44)

***richardsi* sp. nov.** (p. 71)

– Clypeus and lower front covered with silvery pubescence, sometimes with a brassy shade, greater part of antennae and legs black 11

11 Third joint of antennae 3.2 times as long as wide at apex (Pygidial area narrow, more than twice as long as wide at base, with surface very minutely and feebly coriaceous but well shining and with few small punctures scattered along lateral carinae, vertex and mesonotum finely punctured, Japan)

***hakusanus* sp. nov.** (p. 72)

– Third joint of antennae 2.7 times as long as wide at apex (Pygidial area about twice as long as wide at base, with surface completely polished and with a few large punctures arranged on periferal regions, punctures on vertex and mesonotum larger and stronger, Korea)

***koreanus* sp. nov.** (p. 73)

12 Abdominal tergites with a fringe of long stiff fuscous-golden hairs on each posterior margin, 1st tergite adorned with a large reddish macula on each side (3rd joint of antenna 3.5 times as long as wide at apex, pilosity on clypeus silvery with somewhat brassy effulgence, pygidial area coarsely rugoso-punctate)

***dzimm* sp. nov.** (p. 68)

– Abdominal tergites without a fringe of long hairs on each posterior margin, no reddish maculae on 1st tergite 13

13 Pilosity on clypeus golden or deep brassy (3rd joint of antennae 3.6 times as long as broad at apex)

***aurifrons* sp. nov.** (p. 63)

– Pilosity on clypeus silvery or with a somewhat brassy effulgence 14

14 Mandibles extraordinarily thick and broad, its width at base nearly equal to the length of clypeus in middle, with apical portion enlarged into a somewhat spoon-shape (Fig. 38), arcuate carina between insertions of antennae highly raised without a distinct tooth in middle (Antennal joint 3 viewed from the widest side less than thrice as long as wide at apex, clypeus with a lunate area on apical margin in middle, antennae beneath reddish brown, petiole slightly longer than hind tibia)

***mandibularis* nom. nov.** for *orientalis* Gussakovskij (nec Cameron) (p. 66)

– Mandibles narrow, its width at base much less than the length of clypeus in middle, with apical portion subparallel, frons provided with a tooth between antennae (No lunate area on anterior margin of clypeus in middle) 15

15 Pygidial area wholly coarsely somewhat rugosely punctured, 3rd joint of antenna about 2.5 times (in the widest view) or thrice (in the narrowest view) as long as wide at apex, much less than the length of clypeus in middle (Pilosity on clypeus very dense, with a silky lustre and somewhat brassy effulgence

***ater* Fabricius** (p. 62)

– Pygidial area finely coriaceous (but well shining) with a few punctures scattered along lateral margins, 3rd joint of antenna 3.5 times (in the narrowest view 4 times) as long as wide at apex, nearly equal in length to clypeus in middle)

***affinis* Gussakovskij** (p. 65)

Males

(With antennae 13-jointed, abdomen having 7 visible segments and without pygidial area)

1 Subgenus *Mimesa* 2
– Subgenus *Mimumesa* 3
– Subgenus *Psen* 7

2 Body wholly black (Petiole irregularly feebly wrinkled, antennal joints 3–8 with a week carina on each posterior margin)
***shuckardi japonicus* Pérez** (p. 53)

– Abdomen black and red ... (Including various continental species, undiscovered as yet in Japan and Korea)

3 Epicnemial area completely or nearly completely enclosed by carinae, anterior excavation of mesosternum forming a distinct angle posteriorly in middle (Figs. 4 and 13) 4

– Epicnemial area lacking a carina on ventral margin, anterior excavation of mesosternum not forming a distinct angle posteriorly in middle (Figs. 10 and 20) 5

4 Petiole longer than hind tibia (Antennal joints 4–11 with a carina on each posterior margin, those on 9–11 or 12 elliptic, epicnemial area with ventral carina partly incomplete and anterior excavation of mesosternum not deep)
***atratinus sameshimai* Yasumatsu** (p. 54)

– Petiole slightly shorter than hind tibia (Antennal joints 4–12 with a carina on each posterior margin, those on joints 6–12 oval, epicnemial area with ventral margin completely enclosed by carina, anterior excavation of mesosternum not so deep as in typical race)
***dahlbomi pacificus* subsp. nov.** (p. 59)

5 Anterior area of mesosternum not particularly deeply excavated, smoothly continued to the surface of epicnemial area 6

– Anterior area of mesosternum distinctly deeply excavated forming an obtuse angle with epicnemial area (Antennal joints beneath black, joint 4–12 with a carina, those on 7–11 oval), yet undiscovered from the Asiatic region
(***beaumonti* Lith**)

6 Antennal flagella beneath ferruginous, antennal joints 4–9 (or 10) with a carina (Punctures on vertex fine and very sparse)
***littoralis* Bondroit** (=*fulvitarsis* Guss.) (p. 57)

– Antennal flagella beneath black, joints 4–12 with a narrow carina (Punctures on vertex fine and sparse, genitalia : Fig. 18)
***vanlithi* sp. nov.** (p. 61)

7 Metatarsi of mid legs normal 8
– Metatarsi of mid legs deformed 11

8 Abdominal tergites with a fringe of long fuscous golden hairs on each

posterior margin (Front and mid femora and tarsi above pale brown, antennal flagellar joints progressively reducing in length towards apex, joints 6–13 with a large tubercle, joints 9–13 beneath excavated, tergite 1 with a reddish macula on each side, sternites 3 and 4 with a tuft of long hairs on apical margin in middle)

***dzimm* sp. nov.** (p. 68)

– Abdominal tergites without fringes of long hairs 9

9 Sternite 4 only with a tuft of long hairs, antennal joints 5 and 6 only with a carina (Antennal joint 3 longer than joint 1, nearly 2.6 times — in the widest view, in the narrowest 3.4 times — as long as wide at apex, joint 4 slightly shorter than joint 3, from 4 apically subequal in length, mandibles not particularly broadened, petiole longer than hind tibia)

***affinis* Gussakovskij** (p. 65)

– Sternites 3 and 4 with a tuft of long hairs on each posterior margin ... 10

10 Mandibles broad (Fig. 39), its width at base nearly as long as clypeus in middle, antennal joints without carinae, joint 3 as long as joint 1, joints 3–12 subequal in length, carinae between sockets of antennae highly elevated, with a short median process or without, clypeus with a lunate area on anterior margin in middle

***mandibularis* nom. nov.** for *orientalis* Gussakovskij (nec Cameron) (p. 66)

– Mandibles not particularly broadened, antennal joints 3–11 with a carina (those on 4–8 glittering oval), from joint 3 apically each progressively reducing in length, punctures on vertex and mesonotum strong and close

***hakusanus* sp. nov.** (p. 72)

11 Metatarsi of mid legs with a triangular protuberance toward middle, not forming a ring with that of apex (cf. Figs. 26, 32) 12

– Metatarsi of mid legs with a hook-shaped protuberance (lateral view) toward middle, nearly forming a ring with that of apex (cf. Fig. 35) 14

12 Antennal joint 1 excavated at apex into a cylinder enclosing joint 2 and base of joint 3, flagellar joints broadened and excavated and tuberculate beneath (Fig. 25), petiole smooth (Tarsal joints of mid leg : Fig. 26, clypeal pubescence with a somewhat brassy shade)

***ater* Fabricius** (p. 62)

– Antennal joint 1 not hollowed at apex, flagellar joints not broadened nor excavated beneath, petiole irregularly, not strongly wrinkled 13

13 Mandibles with a strong tooth on outer margin near apex (Fig. 30), front and mid metatarsi : Figs. 31 and 32 respectively (Oculo-antennal space nearly equal in width to the socket, clypeus only slightly more than as long as supraclypeal area, sternites without tubts of long hairs)

***exaratus* Eversmann** (p. 69)

– Mandibles without a tooth on outer margin (Front and mid metatarsi similar to the above, oculo-antennal space much less than as wide as the

socket, clypeus about twice as long as supraclypeal area)
***santaro* Yasumatsu** (p. 74)

14 Antennal joint simple, without tubercles and excavations
***yasumatsui* Gussakovskij** (p. 74)

– Antennal joints 6 (or 7)–12 (or 13) with a tubercle on each, joints 9–12 beneath gently excavated
***aurifrons* sp. nov.** (p. 63)

Descriptions of the species

1. *Psen* (*Mimesa*) *shuckardi japonicus* (Pérez, 1905)

Mimesa japonica Pérez, Bull. Mus. Paris, T. 11, p. 150, 1905.
Psen (*Aporia*) *japonicus* Gussakovskij, Mushi, Vol. 7, No. 2, p. 82, 1934.
Psen (*Aporina*) *japonicus* Gussakovskij, Trav. Inst. Zool. Acad. Sci. URSS, T. 4, Liv. 3-4, p. 693, 1937.
Psen (*Mimesa*) *shuckardi* Wesm. var. *japonica* Beaumont, Mitt. Schweiz. Ent. Ges., Bd. 17, H. 1 et 2, p. 65, 1937. — *Psen* (*Mimesa*) *shuckardi japonicus* Tsuneki, Mem. Fac. Lib. Arts, Fukui Univ., Ser. II, Nat. Sci., No. 4, Pt. 5, p. 52, 1954.

Subspecific characters : (1) Abdomen wholly black, only sometimes sides and apical margin of 1st tergite brownish. (2) Petiole longer as compared with the nominate race, usually nearly as long as 1st tergite. (3) Without medio-apical incision on clypeus in females. (4) Sculpture on dorsal surface of propodeum more regular and less rugose.

♀. Length 8.0–10.5 mm. Appressed hairs on lower front and clypeus silvery, sometimes with a feeble brassy effulgence. Black, with antennae beneath from end of 3rd joint apically ferruginous, sometimes sides and apical margin of 1st tergite, rarely also of 2nd reddish brown; wingveins, tibial spurs, ends of tibiae, of each joints of tarsi and claws dark brown.

Head from above with vertex behind ocelli narrow, broadly inclining towards occipital margin, OOD : POD : OCD = 11 : 11 : 9, seen in front ratio of width of head and interocular distance 62 : 30, oculo-antennal distance more than half as large as interantennal distance and as large as diameter of antennal socket, facial tubercle not high and obtuse st apex, clypeus (Fig. 1) with a transverse tubercle near apex. Antennal joints 3–7 with relative length 10.5, 8.2, 8, 8, 8, joint 3 nearly thrice as long as wide at apex, joint 4 nearly twice as long as wide, joint 9 slightly shorter than wide. Propodeum with area dorsalis broad triangular, depressed and bordered by a slightly incrassate limb, the hollow on posterior inclination deeper than in the nominate race. Petiole nearly as long as 1st tergite (comparatively longer than in the original race), distinctly widened posteriorly, its cross section at two-thirds from base : Fig. 2 (right side showing a variation), pygidial area semi-elliptic, distinctly marginated by carinae. In forewing 1st and 2nd recurrent nervures received by 2nd cubital cell, sometimes one or both interstitial. Vertex and upper front finely closely punctate, punctures near eyes sparser and posteriorly weaker; mesonotum similarly but somewhat more sparsely punctured, with intervals microscopically coriaceous, half mat; mesopleuron similarly punctured and coriaceous, but more finely and weakly so, with upper region longitudinally rugoso-striate. Area dorsalis longitudinally, very closely, posteriorly divergently rugoso-striate, sometimes partly irregularly reticulate, limb obliquely closely rugoso-striate, posterior inclination irregualrly coarsely reticulate, petiole feebly irregularly wrinkled, usually without distinct rugose carinae nor punctures.

♂. Length 7.0–8.5 mm. Similar to female, but with eyes slightly larger, ratio of width

of head to interocular distance 54 : 25; clypeus more convex with ante-apical transverse tubercle indistinct or completely absent, apical margin medianly distinctly incised, antennae less clavate, relative length between joints 3, 4, 13 : 9, 8, 11, joints 4–12 subequal, joints 4 and 5 in some specimens appearing somewhat shorter than the following, from joint 3 apically distinctly carinate on posterior margin, the carinae progressively shorter toward apex, 3rd joint twice, 4th 1.5 times as long as wide at apex. Vertex and upper front punctate-substriate, with intervals microscopically coriaceous, sculpture on mesonotum feebler, more shining, on area dorsalis stronger and coarser. Petiole usually slenderer than in female, slightly longer than 1st abdominal tergite. Genitalia : Fig. 3 (v volsella, p penis)

Variation in characters : (1) Anteapical tubercle on clypeus in females more or less varied in length. (2) Sculpture on area dorsalis usually divergently rugoso-striate, but the degree of rugosity considerably varied, also the length of the oblique striae on the limb. (3) Petiole in females considerably varied in form and in relative length to wide or to 1st tergite, usually nearly as long as the latter, but sometimes much shorter or distinctly longer. (4) Venation of forewing varied as given in the description.

Specimens examined : 43 ♀♀ 78 ♂♂, Hokkaido (Sounkyo, Sapporo, Jozankei, Hakodate) and Honshu (Nikko, Mt. Haku), VII–VIII. 1944–58, mostly K. Tsuneki leg.

Distribution : Hokkaido and Honshu.

Biology : K. Tsuneki, 1954.

2. *Psen* (*Mimumesa*) *atratinus sameshimai* (Yasumatsu, 1937)

? *Mimesa longula* Gussakovskij, Ark. Zool. 24 A, No. 10, p. 5 (♂), 1933.
? *Psen* (*Mimesa*) *longulus* Gussakovskij, 1937, loc. cit. p. 660.
Mimesa sameshimai Yasumatsu, Report on the Leaf-Hoppers inj. Rice Plant and their Nat. Enem., No. 8 (1936), pp. 19-23, 1937; —— Sameshima, Ibid., pp. 23–24 (Biology).
Psen (*Mimumesa*) *sameshimai* Sibuya, Mushi, Vol. 13, No. 1. pp. 43–52, 1940 (Biology).
Psen (*Mimumesa*) *atratinus* Tsuneki, Mem. Fac. Lib. Arts, Fukui Univ., Ser. II, No. 4, Pt. 5, p. 53, 1954.

In my previous report on *Mimumesa* of Japan (1954, l. c.) *sameshimai* Yasumatsu was omitted from the list, because the characters of the species could not adequately be supposed from the description only to compare with other species known to me. Later, however, I had a chance of examining the type specimen and could determine that it was nothing other than *atratinus* F. Mor. recorded by me. Close comparative study of the specimens of the species at hand with the European representatives revealed that they differ in some significant characters from the nominate race so that they should be assigned a subspecies. The subspecific characters :

♀ (The specimen compared : 1 ♀ from Holland, det. by J. P. van Lith) (1) Carina enclosing epicnemial area much less strong on the line bordering the anterior excavation of mesosternum, usually partly and sometimes nearly completely becoming indistinct (Fig. 4). (2) Anterior excavation of mesosternum differing in form (Fig. 4, cf. Fig. 5), shallower, smaller with marginal carina very much feebler. (3) Carinae on both sides of pygidial area more distinct and raised. (4) Abdominal petiole slenderer and relatively longer with sides parallel (Tsuneki, 1954) (5) Punctuation on head and mesonotum similar, but distinctly weaker in general, with punctures finer and sparrer, but crenation on posterior margin of mesonotum alone much stronger.

(♂) (The specimen compared : 1 ♂ from Poland, det. by W. J. Pulawski) (1) et (2) Carinae enclosing epicnemial area more distinct than in ♀ and complete, but much weaker still as compared with the nominate race, mesosternal excavation similar to that of ♀ with carinae

feebler. (3) Genitalia without difference (Fig. 8). (4) Petiole relatively longer. (5) Punctuation similar to the case in ♀. (6) Colour of front and mid tarsi much paler, rather whitish.

♀. Length 7.0–9.5 mm. Black. Mandibles near apex dark reddish brown; apex of abdomen and tarsi of legs brown to dark brown; tibial spurs dirty white. Appressed hairs on lower front and clypeus silvery white. Head seen from above with ocellar region slightly raised, with a distinct groove just behind the region which is shallowed in middle and deepened along postocelli, frontal lateral marks on the level of median ocellus, gently raised, smooth and polished, OOD : POD : OCD = 12 : 12 : 10. Head seen in front with ratio of width of head and interocular distance 71 : 33, frontal median carina rather feeble, clypeus and mandible : Fig. 6. Antenna with relative length between joints 3–6 : 17, 11, 11, 10, 3rd joint nearly 4 times as long as wide at apex, 4th slightly more than twice as long as wide. Area dorsalis broad triangular. Petiole with relative length to 1st tergite 45 : 37 and as long as hind tibia. Pygidial area : Fig. 7. In forewing 1st and 2nd recurrent nervures received by 2nd cubital cell. Head above finely closely punctured, on upper front longitudinally and on post-ocellar region transversely subrugose, mesonotum medianly longitudinally rugoso-punctate, laterally rather sparsely punctured and posteriorly distinctly crenate, mesopleuron very minutely, closely but very feebly punctate, on posterior margin longitudinally striate. Area dorsalis coarsely posteriorly divergently striate, remaining areas of propodeum coarsely irregularly reticulate, sides of the segment transversely striate; pygidial area moderately closely, fairly grossly punctured.

♂. Length 6.5–8.3 mm. Similar to female in general characters. But in colour front and mid tarsi much paler, whitish; antennal joints different in length and form, with relative length from 3rd apically 16, 11, 10.5, 10, 10, 10, 9, 9, 9, 9, 11; 3rd joint in the widest (dorsal) view nearly thrice as long as wide at apex, in the narrowest (posterior) view 4 times as long as wide, 4th twice and 2.5 times as long as wide respectively, joints 4–8 posteriorly carinated, carinae on joints 7 and 8 sometimes several times interrupted, joints 9–11 each provided with an elongate tubercle, on 11 very small and sometimes hardly visible, rarely on 12 also a very minute tubercle defined. Petiole somewhat varies in thickness, ratio of length to width in middle ranges from 5.9 to 4.3. Genitalia : Fig. 8 (a, with squama extended; b, under normal state; c, left half; p, penis; v, volcella). Punctuation on upper front fine and dense, not subrugosely continued, on vertex fine and very sparse, on occiput in small specimens similar, in large ones transversely finely feebly striate, on mesonotum finely moderately closely punctured but not punctate-striate.

Variation in the antennal tubercle: According to J. P. van Lith (1949) a ovale tubercle is found on joints 9 and 10 and a very small one on 11 in the European specimens. The single specimen available to me (from Poland), however, bears a very minute one even on joint 12. Therefore, this seems to vary somewhat in the original species also. In my specimens as given in the above description the character is similarly variable. Detailed results were shown in Table 1. Besides, the tubercle on joint 11, when present, is very variable in size, sometimes comparatively large and distinct, sometimes very minute and ill-defined. Still further, in some specimens the state is different between the right and left antennae, and rarely it is present in one of them and absent in the other.

Table 1. Variation in the antennal carinae

Group	Antennal joint				Number of specimens
	9	10	11	12	
1	+	+	+	+*	4*
2	+	+	+**	–	28**
3	+	+*	–	–	5*
Total	37	37*	32**	5*	37 ex.

*... Including one specimen in which in one of the antennae only present. **... Including two similar specimens

Specimens examined : 233 ♀♀ 87 ♂♂ (5 ♀♀ Sapporo; 1 ♀ Aomori Pref.—Aoni, R. Narumi leg.; 1 ♂ Sakata — K. Shirahata leg.; 127 ♀♀ 56 ♂♂ Fukui Pref. — Fukui and Katsuyama), VII, VIII, IX. 1945–59, all but 2 specially mentioned were collected by K. Tsuneki.

Distribution : Hokkaido, Honshu, Shikoku (after the communication of Dr. K. Iwata) and Kyushu (? The Ussuri region).

Biology. Nesting habits of this species have been published in Japanese by two observers (l. c.). What I investigated was much the like, but because of the nest being markedly complex the result seems worthy of description. On September 14, 1958 I found scores of wasps of this species (together with *littoralis*) nesting in a clay cliff facing west at the road-side near the City of Fukui. The wasps came flying carrying prey which were probably caught in the rice-field adjacent to the road. Upon observing by plugging a nest entrance it was confirmed that the prey — several species of Jassidae and Araeopidae — was held, venter to venter, with the mid legs of the wasp, with its head forwards. A week later the place was revisited and three among many of the nests were dug open. In the following one of them alone shall be described.

The entrance was left open even when the wasp was away. The tunnel, about 3 mm in diameter, went in by 2 cm vertical to the surface of the cliff and then turned downwards. At this point a wasp was found, but it escaped my fingers to fly off. Later, however, it came back with a prey and was caught. Of course it was a female. Strange to say, another female wasp was discovered and caught at a short distance from the first one. Whether they were associating to construct the nest or merely using the entrance in common I can not say, but it was certain that they were living in the same nest. The structure of the interior was as illustrated in Figure 49. In the Figure the cells represented by simple circlets lay near (about 4 cm below) the surface of the cliff, while those shaded were situated deeper (6–10 cm below). Cell 1 : Contained 3 victims all *Nephotettix apicalis* Motschulsky, no egg of the wasp. At the interior, cell 28 was found separated by a loose partition of soil, about 3 mm in thickness. The cells were ellipsoidal in shape and the interval (the place of partition) was narrowed into a normal tunnel. Such a duplicate cell group was frequently found not only in this nest (cells 17–18, 2–16, 7–8, 3–9, 11–12, 13–14), but also in others. Cells excepting 5, 9, 14, 18, 19, 22 and 23 all contained respectively a cocoon, wrapped by remains of victims. Cell 5 : On the uppermost prey was deposited an egg, the manner as given in Figure 50, "a" being the attaching point. Cell 9 : 8 prey, all rotten, but the freshness of the wing colour indicated that the cell was comparatively new, larval wasp, about 5 mm, was found died. Cell 14 : 9 prey, all rotten, dead larva about 4 mm. Cells 18, 19, 22 and 23 : prey heavily rotten and could not be counted.

Habits formula of this species, according to the above observation, can be represented as follows : B $(BH^nOC)^mC$, n being 6–9 and m in this instance, if made by a single wasp, 27. In the structure of the nest, frequent construction of two cells successively within a short tunnel seems to be characteristic, but similar habits are also observed with *Mimumesa littoralis*. Prey : Mostly *Nephotettix apicalis* Motschulsky (♀ and ♂), rarely *Thamnotettix cyclops* Mulsant et Rey, *Delphacodes striatella* Fallén in Fukui Pref., two victims obtained with the wasps in Hokkaido being *Euscelis striola* Fallén and *Sogata furcifera* Horváth.

3. *Psen* (*Mimumesa*) *littoralis* (Bondroit, 1933)

Mimesa littoralis Bondroit, Ann. Soc. Zool. Belg., 64, pp. 64–65, 1933; *Psen* (*Mimumesa*) *littolaris* Beaumont, Mitt. Schweiz. Ent. Ges., 17 (1–2), p. 53, 1937.

Psen (*Mimesa*) *fulvitarsis* Gussakovskij, Trav. Inst. Zool. Acad. Sci., URSS, 4 (3–4), p. 663, 1937; — (Without description) Mushi, 7 (2), p. 82, 1934.

Mimesa fulvitarsis Iwata, Mushi, 11 (1), p. 20, 1938 (Biology).

Psen (*Mimumesa*) *littoralis* Lith, Tijd. Ent. 91 (1948), p. 135–137, 145, 1949. (Including the following symonumy : *Mimesa borealis* Dhlb., ♂, 1942, 1943; ? *Mimesa unicolor* Saunders, 1896; *Psen* (*Mimesa, fulvitarsis* Guss., 1937 and *Mimesa* (*Mimumesa*) *celtica* Spooner, 1948)

Psen (*Mimumesa*) *littoralis* Tsuneki, Mem. Fac. Lib. Arts, Fukui Univ., Ser. II, 4 (5), p. 53, 1954 (♀, nec ♂).

♀. Length 6.7–8.0 mm. Black. Mandibles on apical third dark reddish brown; antennal joints beneath from apex of 3rd to end, tegulae of wings, apex of caudal segment and both ends of femora and tibiae of legs ferruginous; tarsi of legs yellowish white (hind tarsi with apical 3 joints darker) Dense appressed hairs on lower front and clypeus silvery white. General feature similar to the preceding species. On vertex OOD : POD : OCD = 9 : 8 : 9, no distinct transverse impressed line behind ocellar region, frontal lateral marks oval, slightly raised, impunctate and on the level of median ocellus. Head seen in front with ratio of width of head and interocular distance 58 : 25, clypeus : Fig. 9. Antenna with relative length of joints 3–6 : 15, 9, 8, 8; joint 3 nearly 4 times as long as wide at apex, joint 4 2.2 times as long as wide (in the widest or dorsal view). Epicnemial area not completely enclosed by carinae, at the medio-ventral border opening, gradually turning into the medio-anterior excavation of mesosternum, the latter not deep, hardly (only in a very minute triangle) produced posteriorly in middle (Fig. 10); the suture between metapleuron and propodeum linearly excavated, narrower than in *atratinus sameshimai*. Area dorsalis broad triangular, with apex truncate. Petiole slightly less than or as long as 1st tergite, the latter slightly shorter in middle than hind femur (= tibia in length), upper surface of petiole medianly longitudinally distinctly carinate, the carina broadened basally and gently gutterwise excavated. Pygidial area : Fig. 11, broadly gently convex on basal portion. Upper front finely very closely, vertex more sparsely and somewhat grossly, occiput finely and moderately closely punctured, mesonotum and scutellum much more sparsely and somewhat more grossly so, area dorsalis coarsely divergently striate, remaining dorsal area of propodeum coarsely irregularly reticulate, sides transversely striate on posterior portion. Pygidial area coarsely fairly closely punctured all over the surface, on posterior portion punctures smaller and covered closely with brownish hairs.

♂. Length 6.0–6.5 mm. Similar in general characters to female. Antenna : In four specimens flagellum beneath wholly ferruginous, in another ten underside of joint 3–5 and 13 and apex beneath of rest of joints ferruginous. Relative length between joints 3–13 : 13, 9.5, 9, 8.5, 8, 8, 8, 8, 8, 8, 10; joint 3 very slightly more than thrice as long as wide, joint 4 slightly more than twice as long as wide, carinae as in European representatives (cf. Lith, 1949), defined on joints 4–10, each gradually shorter apically and on 8–10 tuberculate, on 10 very small and indistinct (*vide* Remarks). Coloration : Besides the brownish area in females front and mid tibiae on inner aspect broadly testaceous, base of hind tibiae more broadly yellowish white. Dense appressed silvery hairs on lower front, clypeus and temples below having a fairly strong brassy effulegence in two specimens, in another one brassy also on front. Petiole as long as 1st tergite and somewhat shorter than hind femur or tibia. Genitalia : Fig. 12.

Remarks. (1) Antennal carina. In my previous paper (1954) I recorded that the carinae on antennal joints in males are defined as far as joint 11 and sometimes joint 12 also carries a small spot. According to the detailed study of the newly collected material, however, it was clarified that this description was an error due to mistaking closely resembling males of another species (*vanlithi* n. sp.) which were collected at the same time with a female of this species. In

reality the character is quite consistent with that of the European representatives described by van Lith (1949). (2) On this account, our specimens has come to lose characters to be separated as a geographical race. Therefore, I have suppressed *fulvitarsis* Guss. as a complete synonym of *littoralis* Bondr. (3) Aberration of antennae in female. A specimen collected at Katsuyama, Fukui Pref. showed an interesting aberration in the structure of the antennae. In the right antenna apical four joints fused together, thickened and abbreviated as given in Figure 17a, in the left piece apical three fused together (Fig. 17b), showing also articulation on external side only.

Specimens examined : 1 ♀, Hokkaido (Sapporo, 3. VII. 1944); 137 ♀ ♀ 14 ♂ ♂, Honshu (Fukui Pref. — Fukui, Katsuyama —, V, VI and IX. 1954–59), K. Tsuneki leg.

Distribution : Europe, Transcaucasus, Turkestan, Mongolia, Siberia including the Amur and the Ussuri regions, and Japan (Hokkaido and Honshu — Osaka and Fukui).

Biology. A single nest of this species has been recorded by Iwata (l. c.) which was made in the horizontal heavy soil of a garden and the cells were linearly arranged in the vertical tunnel having the same width throughout. Although similarly made in the earth, it is so different from the nests observed by me that I feel somewhat doubtful whether or not his specics is truly identical with mine. I have found a great number of the nests of this species, but all of which were made in the steep slope of clayey soil. The nests actually examined were only five. Unfortunately they were all during the early course of construction, containing only 2, 7, 2, 5 and 5 completed cells respecitively within. The important points obtained from these observations can be summarized as follows :

(1) The prey and the wasplings found in the brood-cells were as given in Table 2. (2) Transportation of the prey is made in the same fashion as in *P. atratinus*. (3) The burrow is always left open but the entrance to the brood-cell is always temporarily closed when the

Table 2. Nests of *Psen* (*Mimumesa*) *littoralis* Bondroit

Nest		Cell 1	2	3	4	5	6	7	Total
1	Prey	S 10	S 4						
	Larva	3 mm	none						
2	Prey	N 4+*x*	N 6, S 2	N 7, S 3	N 7, S 3	N 4, S 4	N 7, S 2	N 3, S 2	N 38, S16
	Larva	8 mm	6 mm	6 mm	5 mm	5 mm	3 mm	none	
3	Prey	N ?	N ?						N ?
	Larva	8 mm	5 mm						
4	Prey	N 5, S 4	N 4, S 6	N 2, S 5	N 5	?			N 16, S15
	Larva	?	? *	egg	mpf	mpf			
5	Prey	? **	N 5, S 1	N 5, S1	? **	N 2			N 12, S2
	Larva	?	6 mm	3 mm	?	none			
									N 66, S33

S .... *Sogata furcifera* Horváth
N.... *Nephotettix apicalis* Motschulsky
* .... Devoured by the ant, *Crematogaster sordidula osakensis* Forel
** ... Rotten. maf ---- maggot of parasitic fly.

wasp is away. (4) The nest belongs to the branched type, containing in each branch one or two linearly arranged cells. When two cells are present they lie closely together separated by a loose partition of soil, just as is the case in *atratinus*. The cell is always wider than the

tunnel, ellipsoidal in form, usually 10×7 (mm) in dimension, with the long axis alway placed horizontal or nearly so. When the work of a cell (or cells) is completed the branch tunnel leading to it is so compactly stuffed with earth that it is impossible to find out the exact way to it. Then the new branch tunnel is burrowed from the main tunnel. The main burrow of the nest is dug vertical to the surface of the cliff for about 3–5 cm and then turns downwards. It runs from several to some ten cm and is continued to the horizontal or gently sloped branch tunnel which ends usually within 5 cm. As a general tendency the branch tunnels are burrowed successively from the bottom of the main burrow upwards. Only when the ground is very hard, such as the inadequately weathered rock, the burrow goes in only 2 or 3 cm and directly continued to a horizontal cell or two cells. (5) The prey show complete immobility. Presumably they are stung to death. Frequent decomposition of the cell contents may be explained by such a state of the victims. (6) The egg is always found on a victim placed outermost in the fashion as shown in Figure 56, with the cepahlic pole attached to the sternum exterior to the base of the hind coxa, directing the caudal end toward the head of the prey. All the eggs and young larvae observed were always placed in this bodily orientation, never with the cepahlic end towards the head. (In this respect Iwata's record is different from mine.) In *atratinus* also the egg takes the same orientation. Probably this may be the rule of oviposition among the members of *Mimumesa*. (7) The habits formula : $B(BH^nOC)^mC$. Even when the 2nd cell is made before the end one the same formula will hold good, only B and C within parentheses become different in weight.

4. *Psen* (*Mimumesa*) *dahlbomi pacificus* subsp. nov.

? *Psen* (*Mimesa*) *dahlbomi* Gussakovskij, Ark. Zool., 24 A, No. 10, p. 5, 1933; Mushi, 7 (2), p. 82, 1934 (Saghalien).

Psen (*Mimumesa*) *dahlbomi* Tsuneki, Mem. Fac. Lib. Arts, Fukui Univ., Ser. II, Nat. Sci., No. 4, Pt. 5, p. 52, 1954. (Synonymy of the nominate race : van Lith, 1949.)

Subspecific characters : (1) Epicnemial area not completely enclosed by carinae, narrowly opening at the ventro-posterior portion just in front of mesosternal transverse carina (Fig. 13). Carinae lesss trong in general. (2) Medio-anterior excavation of mesosternum smaller, shallower, not so markedly produced posteriorly as in nominate race (Fig. 13), with carinae much weaker. (3) Punctures on head and thorax finer and much sparser, transverse striae on posterior inclination of vertex very much weaker, sometimes completely lacking such. (4) Head and thorax with a bronzy shimmer in certain light.

♀. Length 6.5–9.5 mm. Black including antennae. Tibial spurs yellowish white, tarsi dark brown. Clypeus and lower front not adorned with dense appressed silvery hairs as in other species, but only covered with sparse fine pale brownish pubescence (see Remarks), temples and mesopleurae also sparsely covered with weak fine hairs. Ocellar location as in preceding species. Frontal lateral marks along upper orbits of eyes not swollen. Ratio between width of head and interocullar distance 65 : 30, clypeus and mandibles : Fig. 14. Antennae with relative length of joints 3–6 : 14, 10, 9, 9, 3rd joint nearly thrice as long as wide at apex, 4th twice as long as wide (in the widest — dorsal — view). Petiole comparatively thick, about thrice as long as wide at apex, in length slightly shorter than, or as long as 1st tergite, but always shorter than hind tibia, medianly distinctly carinated, the carina broadened towards base and gutterwise excavated. Upper front finely and rather sparsely punctured, on vertex and occiput punctuation sparser, on mesonotum in most specimens more sparsely and somewhat more grossly punctured, in some specimens medianly fairly distinctly subrugose, on posterior margin always crenate,

mesopleuron impunctate and polished. On propodeum area dorsalis coarsely longitudinally divergently striate, the striae straight, other portions of dorsal and posterior surfaces of the segment coarsely irregularly reticulate, sides obliquely finely closely striate. Petiole on both sides of medial carina finely irregularly feebly rugulose; pygidial area polished, only along lateral carinae and on apex finely punctate (Fig. 15).

♂. Length 6.5–7.5 mm. Similar to female in general characters. But tarsi of legs paler, brownish; hairs on lower front and clypeus thicker, somewhat appressed and silvery, but sparser as compared with other species. Enclosure by carinae of epicnemial areas more complete, petiole usually slightly longer than 1st tergite. Antennae with relative length of joints 3–6 : 10, 8, 8, 8, subsequent joints progressively slightly shorter towards the penultimate; 3rd joint about thrice as long as wide at apex (in the narrowest view) 4th 2.3 times as long as wide, carina or tubercle defined on joints 6–11, elongate elliptic in form, sometimes even on joints 5 and 12 a minute one observable, carina on joint 8 the largest and progressively smaller towards base and apex. Genitalia as in European specimens : Fig. 16, p penis and v volsella.

Remarks. On the hairs on lower front and clypeus in ♀♀. Usually fine and brownish white, only partly silvery in certain light. In one specimen collected at Mt. Haku, however, hairs somewhat thick, appressed and brassy silvery, though sparse in distribution.

Holotype : ♂, Fukui Pref. (Nishitani-mura), 29. V. 1956, K. Tsuneki leg.

Allotype : ♀, Fukui Pref. (Koike), 28. VII. 1956, K. Tsuneki leg.

Paratypes : 7 ♀♀ 1 ♂, Hokkaido (Jozankei), 29. VI,–VII, VIII–24. IX. 1945, 46, K. Tsuneki leg.; 16 ♀♀ 8 ♂♂, Honshu (Aomori Pref.— Towada, Zatoishi; Nikko; Mt. Haku; Fukui Pref.— Koike, Nukumi), V. VII. VIII. 1952–59 (2 ♀♀ 1 ♂, Nikko, E. Tanaka leg., 2 ♂♂, Towada, K. Shimoyama leg., others K. T. leg.).

Distribution : Hokkaido and Honshu (Aomori, Tochigi, Ishikawa, Fukui) and the Ussuri region (?).

Biology. On June 29, 1949, at a valley in Jozankei, Hokkaido, I found several females of this wasp nesting in the deeply moistened wood of a dead tree, about 70 cm in diameter. The burrows were dug in from abandoned tunnels of beetle larvae, stuffed with saw dust and after vertically penetrating for about 1.2–1.7 cm from the orifice turned at a nearly right angle and ran parallel with the surface. Three nests were examined.

Nest 1. Included but one larval cell (Fig. 57), about 10×5 mm in dimension. Prey 15, including 1 imago and 14 nymphs, all belong to one species of Jassidae. They were all placed in the cell with their heads directing inwards and mostly on their backs. This seemed the rule in this species. The egg of the wasp was found on the largest imaginal prey located outermost, that is to say, the prey finally taken in, the mode of attachment was as in the preceding species, the only difference being that the cephalic pole was directed forwards. The egg was milky white in colour and about 1.2 mm in length. Eclosion took place on July 1 and it was photographed (Fig. 59, a).

Nest 2. Three larval cells were discovered inside (Fig. 58). Cell 1 : Included 13 victims belonging to three species of Jassidae, only two being nymphs. The egg was crushed during the process of excavation. Cell 2 : Prey, 9 in number, belonged to two species of Jassidae, including 4 nymphs. A larva was devouring the prey. Cell 3 : The cell was in the course of provisioning, including 12 prey, a half of which were imagoes. No egg.

Nest 3. Only one larval cell, with similar structure to Figure 57, the prey belonged to three species of Jassidae, comprising 6 imagoes and 4 nymphs. No egg.

Later in Honshu I have frequently observed this species carrying a victim to her burrow

which was made in decayed wood. Three victims collected with the wasps at Koike, Fukui Pref. belonged to a single unknown species of Jassidae. A prey pinned with the wasp collected at Nikko by Mr. E. Tanaka was *Cicadula masatonis* Mats. and he gave remarks that it nests in decayed wood.

5. *Psen* (*Mimumesa*) *vanlithi* sp. nov.

Psen (*Mimumesa*) *beaumonti* Tsuneki, Mem. Fac. Lib. Arts, Fukui Univ., Ser. II, Nat. Sci., No. 4, Pt. 5, p. 53, 1954.

This species is very close to *P. beaumonti* Lith (1949) and I once recorded it as such without actual comparison with the European examples. A female specimen sent by me to Mr. J. P. van Lith was identified by him, indeed as a subspecies of *beaumonti*. He kindly informed me in his personal communication that the difference of characters of the specimen from those of *beaumonti* lies in having the more pronounced carina of the pygidial area and less deepened excavation of the mesosternum. Later, however, when I confirmed the male of this species which had been mistaken up to that time for the male of *littoralis fluvitarsis* and examined the genital apparatus I found that the squamae (paramere, stipe — Richards, 1947 —; gonostipe — Spooner, 1948; valve — van Lith, 1949) in our specimens is markedly different in the apical form from the illustrations given by van Lith. The character seems to me sufficient to separate our specimens as a distinct species.

♀. Length 8.0–9.5 mm. Black. Mandibles near apices and antennal flagella beneath from joint 4 apically reddish ferruginous. Tibial spurs, front and mid tarsi excepting greater part of front metatarsi and apex of each joint of hind legs pale brownish yellow. Tegulae and veins of wings and above mentioned tarsal portions brown to dark brown. Dense appressed hairs on clypeus and lower front silvery white but a somewhat brassy effulgence seen in oblique light. Head from above not strongly emarginate on occipital margin, OOD : POD : OCD = 11 : 8 : 11, a transverse impressed line connecting posterior margins of postocelli distinct, frontal lateral marks along upper inner orbits of eyes slightly anterior to the level with median ocellus, very slightly convex and not well-defined, upper front just anterior to the front ocellus somewhat impressed and on both sides gently conically elevated. Head seen in front with median carina distinct, ratio of width of head and interocular distance about 60 : 30: clypeus : Fig. 19, antennal joints 3–6 with relative length : 15, 10, 9, 9, 3rd ioint (in the narrowest view) 4 times as long as wide at apex, 4th 2.2 times as long as wide. Epicnemial areas and medio-anterior excavation of mesosternum : Fig. 20, area dorsalis triangular, distinctly impressed and extending to the posterior inclination of the segment and narrowed into a groove. Petiole somewhat longer than 1st tergite and slightly shorter than hind tibia, usually about 3.5 times as long as wide at apex, medianly longitudinally carinated, the carina gradually broadened towards base and gutterwise excavated. Pygidial area : Fig. 21. Upper front finely and closely, vertex much more finely and very sparsely punctured, occiput practically impunctate; mesonotum and scutellum finely and sparsely punctate, mesopleuron practically impunctate, with a low of short longitudinal striae on front and hind margins. Propodeum with area dorsalis coarsely longitudinally, somewhat posteriorly divergently striate, rest of the segment coarsely irregularly reticulate. Petiole above along lateral margins finely irregularly wrinkled: pygidial area microscopically minutely coriaceous, with scattered large punctures on lateral margins.

♂. Length 6.3–7.0 mm. Similar in general characters to female. But hairs on clypeus and lower front with a somewhat stronger brassy shimmer, those on thorax-complex and femora of legs pale yellowish white and longer, longer also than in *littoralis* or in *atratinus*, tarsi of

all legs yellowish white. Antennal joints from 3 apically with relative length : 14, 10, 9.5, 9, 8, 8, 8, 8, 8, 8, 10, 3rd joint 3.5 times 4th 2.2 times as long as wide at each apex; joints 4–11 each with a carina on posterior margin, progressively reducing in length toward apex, sometimes joint 12 of one or both of the antennae also carries a small spot. Epicnemial area and medio-anterior excavation of mesosternum as in female. Petiole somewhat longer than 1st tergite and as long as hind femur or tibia (sometimes slightly shorter). Genitalia : Fig. 18, apical structure of squama is very characteristic and different from that of ***beaumonti*** (van Lith, 1949, p. 143)

Holotype : ♂, Fukui Pref. (Sabaé), 11. VI. 1954, K. Tsuneki leg.

Allotype : ♀, Fukui Pref. (Shimizuyama), 14. IX. 1958, K. Tsuneki leg.

Paratypes : 1 ♂, Fukui Pref. (Sabaé), 11. VI. 1954; 1 ♂, Hokkaido (Nopporo near Sapporo), 12. VII. 1952, M. Munakata leg.; 3 ♀ ♀, Hokkaido (Atsubetsu), 30. IX. 1947; 9 ♀ ♀ 8 ♂ ♂, Fukui Pref. (Shimizuyama, Yunoo), 14, 20. IX. 1958; 12. VII. 1959, all but one leg. K. Tsuneki. Other specimens : 2 ♀ ♀ (Hokkaido), 2 ♂ ♂ (Sabaé) in the collection of Mr. J. P. van Lith.

Distribution : Hokkaido and Honshu (Fukui Pref.)

Biology. Judging from the facts that the 8 female specimens collected at Shimizuyama, Fukui Pref. were captured with *littoralis* and *atratinus sameshimai* on the clay cliff where the two species were nesting and that some of the specimens were attached with dried clay paste on their legs, these wasps seem to have been nesting at the cliffs side by side with the species above stated. Since all the nesting females of these species were seen carrying back insects of Jassidae or Araeopidae, this species is considered to hunt also the similar groups of insects.

6. *Psen* (*Psen*) *ater* (Fabricius, 1794)

Psen (*Psen*) *ater* Beaumont, Mitt. Schweiz. Ent. Ges., VIII, 1–2, p. 42, 1937 (including the detailed list of synonyms); — Gussakovskij, Mushi, VII, 2, p. 80, 1934 (Gifu, Yamanashi, Hikosan, Takachihono-mine); Trav. Inst. Zool. Acad. Sci., URSS, IV, 3–4, p. 649, 1937; — Yasumatsu, Mushi, XIV, 2, p. 93, 1942 (Hokkaido-Sounkyo)

Psen ater Yasumatsu et Narisada, Mushi, VIII, 2, p. 73, 1935 (South Manchuria); —Yasumatsu, Icon. Ins. Jap. Ed. II, p. 1479, Fig. 4270, 1950; — Iwata, Mushi, XI, 2, p. 22, 1938 (Biology).

♀. Length 11.0–12.5 mm. Black. Mandibles on apical two-thirds, antennal joints from 4th apically, sometimes greater part of distal joint dark brownish; tegulae of wings, apex of caudal segment, greater part of tarsi of legs brown to dark brown. Appressed hairs on lower front and clypeus very dense and silvery, sometimes with brassy shimmer and always with silky lustre. Head seen from above (Fig. 22) markedly wider than long in middle (ratio 80 : 28) and comparatively deeply emarginate on occipital margin, with oceller region elevated, areas outside postocelli fairly broadly depressed and flattened, without puncture and nearly polished. OOD, POD and OCD subequal with one other, frontal marks along inner orbits of eyes gently swollen, comparatively large, elongate triangular, scattered with a few fine punctures, with the posterior portion level with median ocellus; post-ocellar region without transverse furrow. Head seen in front with ratio of width of head and interocular distance 80 : 36, oculo-antennal distance slightly less than half as large as interantennal distance; interantennal process acutely toothed, clypeus comparatively long, more than half as long as interocular distance (ratio 36 : 20), its apical margin : Fig 23, mandibles normal, antennal joints 3–6 with relative length : 14, 11.5, 11, 10, joint 3 nearly thrice as long as wide at apex, joint 4 nearly twice as long as wide. Area dorsalis on propodeum lunate, posterior area not raised into limb. Petiole with lateral

margins slightly divergent posteriorly, about 4 times as long as wide at apex (5 times in middle), longer than 1st tergite and as long as hind femur (but slightly shorter than hind tibia), upper surface in cross section convex; pygidial area : Fig. 24. In forewing 1st recurrent nervure received by 2nd cubital cell at a distance of 1/3 from base of 1st transverse cubital nervure, 2nd recur. n. at some distance from base of 2nd transv. cub. n.

Upper front finely somewhat closely, vertex sparsely punctured; mesonotum, scutellum and postscutellum slightly more grossly and sparsely punctured, posterior margin of mesonotum distinctly crenate, mesopleuron scattered with very minute punctules; area dorsalis coarsely longitudinally somewhat posteriorly divergently striate, with posterior margin enclosed by carinae, sides of the segment on upper hind margin feebly obliquely striate, rest of the segment very coarsely reticulate ; petiole smooth and polished, pygidial area grossly, moderately closely, in part subrugosely punctate, intervals of punctures microscopically coriaceous.

♂. Length 10–12 mm. Generally similar to female. Mandibles except apices, apical margin of clypeus, antennae, wingtegulae, front and mid legs except coxae, trochanters and femora beneath ferruginous. Apices of mandibles, antennal joints 1–5 and 10–13 posteriorly, caudal segment apically and greater part of hind tarsi dark brown. Appressed hairs on lower front and clypeus much denser, with stronger silky lustre and slightly deeper brassy shade. On upper front frontal lateral marks hardly swollen, quite obsolete, face slightly narrower, clypeus longer. Antenna very characteristic (Fig. 25), 1st joint (scape) very thick with apex somewhat reflected and deeply excavated into a cylinder in which 2nd joint wholly and base of 3rd are inserted, from joint 3 apically progressively dilated and broadened, joints 6–13 beneath strongly excavated, joints 8 and 9 each provided with a short transverse carina, joints 9–12 triangularly expanded below on anterior margin. Petiole slenderer and longer than in female, with sides parallel or slightly bulging towards middle, usually more than 5 times as long as wide at apex, distinctly longer than 1st tergite or hind femur, as long as hind tibia or hind trochanter and femur united. Sometimes apical two tergites of abdomen carrying a gentle longitudinal keel in middle. Sternites 3 and 4 with a tuft of long hairs at apex in middle and end sternite with a row of short spines on both margins. Mid metatarsi strikingly deformed (Fig. 26), apical half roundly excavated beneath, strongly produced on both edges of the excavation and provided with one (upper edge) and two spines at apex of each protuberance, subsequent joints more or less abnormal.

Specimens examined : 7 ♀♀ 11 ♂♂, Korea (Shoyozan and Temmasan), VIII, IX, 1942–43; 13 ♀♀ 12 ♂♂, Honshu (Nikko, Fukui Pref. — Koike), VII, VIII. 1936, 57.

Distribution : Europe, Siberia including the Ussuri region, Mongolia, Korea and Japan (Hokkaido, Honshu, Shikoku — Iwata, 1938 — and Kyushu)

Biology. K. Iwata, 1938 (l. c.). Nest in rotten wood, belonging to branched linear type; prey : *Aphorophora flavipes* Uhler, 2–5 per cell.

7. *Psen* (*Psen*) *aurifrons* sp. nov.

? *Psen* (*Psen*) *orientalis* Yasumatsu, Mushi, XIV, 2, p. 93, 1942 (♀ nec ♂).

♀. Length 10.0–14.5 mm. Black. Front and mid tarsi light brown, mandibles with apical portion, flagellar joints of antennae beneath (apically paler), tegulae and veins of wings, apex of abdomen, in some specimens bases of front and mid tarsi, apices of hind tarsal joints dark brown. Appressed hairs on lower front and clypeus very dense, golden or deep brassy, hairs on tibia and tarsi yellowish brown, on temples, thorax and abdomen whitish. Head from above similar in form to that of *P. ater*, markedly transverse, with ratio of width to length in middle

78 : 25, OOD ≒ POD, OCD slightly larger, transverse furrow on postocellar area medianly shallowed, areas outside postocelli depressed and flattened, frontal lateral marks oval, slightly raised, with posterior portions level with front ocellus. Head seen in front with face comparatively narrow, length ratio of width of head and interocular distance 78 : 31, oculo-antennal distance slightlly less than half as large as interantennal distance, interantennal process stout, triangular and pointed at apex. Clypeus and mandibles : Fig. 33. Antennal joints 3–6 with relative length 18, 13, 11, 11, 3rd joint about 4 times, 4th 2.5 times as long as wide at apex, On thorax base of postscutellum with deep lunate excavation, area dorsalis short, broad triangular and distinctly enclosed by carinae, with no incrassate distinct limb posteriorly. In forewing 1st recurrent nervure received by 2nd cubital cell at about one third from base of 1st transv. cub. nerv., 2nd by 3rd cub. cell. Petiole slightly widened backwards, about 5.5 times as long as wide in middle, in the lateral view roundly convex, not suddenly inclined below near base, in length it is as long as hind femur and slightly less than as long as hind tibia; pygidial area very similar to that of *P. ater* (cf. Fig. 24).

Head above opaque, punctures on upper front fine and sparse, on vertex somewhat larger and sparser, on mesonotum posteriorly larger, somewhat closer and subrugose, on scutellum much more sparser, mesopleuron almost impunctate. Area dorsalis divergently coarsely striate, sides of the segment on dorso-caudal regions alone obliquely striate, anteriorly smooth, rest of the segment coarsely reticulate, abdominal sternites scattered with fine punctures.

♂. Length 9.5–11.5 mm. Similar to female in general characters, differing chiefly in the structure of antennae, mid legs and pilosity on ventral segments of abdomen. Petiole slightly longer, slightly more than as long as hind femur, but slightly less than as long as hind tibia (ratio in length : 43, 40 and 45). Antennal joints 3–7 with relative length : 14, 12, 11, 10, 9.5, succeeding joints progressively reduced in length toward penultimate segment, 3rd joint about 2.3 times, 4th twice as long as wide at apex in the widest — dorsal — view (in the narrowest view 3rd joint 3.2 times, 4th 2.5 times as long as wide at apex), from 6th apically each joint slightly roundly produced below and provided with an oval tubercle on posterior margin, the tubercle on 10th the largest and progressively smaller apically and basally; joint 2 apparently movable, in the inserted state much like that of *P. ater*, in the exerted state normal, both states with other characters completely agreeing with each other are found among specimens.; Tibia of mid leg in lateral view : Fig. 34; metatarsi of the same leg : Fig. 35; abdominal sternites 3 and 4 with a tuft of long hairs on posterior margin in middle.

Holotype : ♀, Fukui Pref. (Sabaé), 25. IX. 1955, K. Tsuneki leg.

Allotype : ♂, Nikko (Shobugahama), 27, IX. 1953, E. Tanaka leg.

Paratypes : 3 ♀♀ 3 ♂♂, Hokkaido (Jozankei, Sapporo, Sounkyo), VII, VIII, IX. 1945–58, K. T. leg.; 26 ♀♀ 4 ♂♂, Honshu (11 ♀♀, Towada, K. Shimoyama and R. Narumi leg.; 1 ♀, Sakata, K. Shirahata leg.; 1 ♀, Mt. Haku, I. Togashi leg.; 1 ♂, Shizuoka, J. Minamikawa leg.; 3 ♀♀ 2 ♂♂, Kyoto, T. Kimura leg.; 1 ♂, Sasayama, Kazuko Iwata leg.; 1 ♂, Saitama, 1 ♀, Tokyo, 1 ♀, Nasu, K. Tsuneki leg.), VI, VII, VIII, IX. 1930–58.

Distritution : Hokkaido and Honshu.

Biology. I observed on September 27, 1955, a nest of this species made in the clay cliff in the suburbs of the City Fukui. The tunnel of the burrow went in vertical to the surface of the cliff as far as 50 cm and ended in the ellipsoidal pocket, 13×6 mm in dimension. In the chamber there were only two victims on none of which was found the egg of the wasp. The prey were a single species of Jassidae, *Nephotettix apicalis* Motschulsky, an important pest of the rice plant. On the other hand, a specimen collected at Towada by Mr. K. Shimoyama

was accompanied by an insect, probably the prey of the wasp. It was a large species (measuring 9 mm in length) belonging to the Cercopidae, Hemiptera.

8. *Psen* (*Psen*) *affinis* Gussakovskij, 1937

Psen (*s. str.*) *affinis* Gussakovskij, Trav. Inst. Zool. Acad. Sci., URSS, IV, 3-4, p. 652, 1937. (♀) (The Ussuri region)

A number of specimens at hand well agree in characters with the oirginal description of *P. affinis* Guss., excepting a slight differences in the sculpture of the area cordata and in the relative length of the abdominal petiole, but as the specimen studied by the original author was but one the specimens dealt with here were identified with this species.

♀. Length 9.5-12.0 mm. Black. Tarsi and rarely apical antennal joint beneath dark brownish. Hairs on lower front and clypeus silvery white, but sometimes with a slight brassy effulgence. Head from above fairly strongly transverse (ratio of width to length in middle 77 : 34), with occipital margin not so maskedly emarginate as in *P. ater*, ocellar and postocellar areas gently raised with a transverse feeble furrow in between, a more distinct longitudinal impression running from median ocellus to posterior margin of vertex across the postocellar elevation. Sometimes this ends in the transverse furrow and in some specimens the transverse furrow becomes indistinct; postocellar area very short, inclining soon into occiput, areas outside postocelli normally flattened, OOD : POD : OCD = 11 : 10 : 13, frontal lateral marks very indistinctly defined, not swollen but impunctate (in the oblique light only defined with difficulty). Head seen in front with ratio of width of head and interocular distance 77 : 33, inner orbital lines normally running, oculo-antennal distance more than half as large as interantennal distance (ratio 5 : 4), interantennal tubercle triangular, not long, fairly acutely pointed at apex; clypeus and mandibles : Fig. 36, anterior margin of clypeus more or less varied in form, mandibles normal, not enlarged apically. Antennal joints 3-9 with relative length 20, 12, 11, 11, 11, 10.5, 10, 3rd joint 4.4 times, 4th 2.2 times as long as wide at apex in the narrowest (posterior) view, in the widest view nearly 4 times and twice respectively. Area dorsalis on propodeum broad lunate, with apical margin roundly enclosed by carinae, posterior limb not raised. In forewing 1st recurrent nervure received by 2nd cubital cell at about 1/3 from base of 1st transverse cubital nervure, 2nd recurrent nervure interstitial with 2nd transverse cubital nervure, but sometimes received by the 2nd cubital cell. Petiole slightly widened backwards, with upper surface in cross section convex, in lateral view gently rounded upwards, it is 5 times as long as wide in middle and 1.5 times as long as 1st tergite and distinctly surpassing the apex of hind femur produced backward (Original description : apice femorum posticorum attingente), length ratio between petiole, hind femur and tibia : 55, 50 and 60; pygidial area : Fig. 37.

Upper front closely longitudinally rugoso-punctate or punctate-striate (in a Korean specimen rugosity feeble, the state closer to the original description), on lateral portions broadly polished with a few fine scattered points, vertex sparsely punctate, mesonotum slightly more finely and moderately closely so (but with intervals larger than the points), not crenate on posterior margin, mesopleuron with sparse fine hair pits only. Area dorsalis with coarse striae, slightly divergent backward, always with a large fovea in middle which is distinctly divergent backward, remaining portions of propodeum finely rugulose, on upper dorsal region rather feebly incompletely obliquely striate, on posterior inclination coarsely irregularrly reticulate; sides of the segment on dorso-posterior region shortly rugulose, on anterior region smooth and polished; petiole impunctate, glossy, pygidial area finely coriaceous, scattered laterally with a few punctures.

♂. Length 7.5–9.0 mm. Similar to female, but punctures on vertex denser and less markedly rugose or striate, clypeus similar, antennal joints 3, 4 and 5 with relative length 17, 13, 13 respectively, joint 5–12 identical in length, distal joint longer (16), 3rd joint thrice, 4th twice as long as wide at apex, joints 6–12, slightly roundly swollen, joints 5 and 6 only provided with a distinct carina on posterior margin, others simple; petiole longer and slenderer, about 6 times or more as long as wide in middle, nearly attaining to the apex of hind femur produced backward, relative length between petiole, hind femur and tibia : 50, 40, 47. Abdominal sternite 4 alone provided with a median marginal tuft of long hairs. Second recurrent nervure of forewing usually interstitial with 2nd transverse cubital nervure, but sometimes (more often than in female) ending slightly before it in 2nd cubital cell.

Variation in characters. Besides the variations given in the above description the following characters are found to vary more or less : (1) Punctuation on upper front. The specimens from Hokkaido excepting those from Hakodate tend to show the punctuation less strongly rugose or substriate than those from Honshu, while the examples collected at Hakodate (Mt. Yokote), the southernmost district of Hokkaido and closest to Honshu, are of the type of the latter region, despite that the region is separated from Honshu by the Straight of Tsugaru, usually being considered forming the Blackiston-line in the animal distribution in Japan. (2) Relative length of the antennal joints. A specimen from Hokkaido possesses relatively shorter antennal joints : Third joint in the dorsal view only thrice as long as wide at apex, other joints are also relatively shorter and thicker than usual.

Specimens examined : 1 ♂, Mt. Haku, 22. VIII. 1958 (*Allotype*); 1 ♀ 1 ♂, N. Korea (Daitaku, Nansetsu-rei), 22, 23. VII. 1943; 28 ♀ ♀ 9 ♂ ♂, Hokkaido (4 ♀ ♀ 1 ♂ Jozankei, 2 ♀ ♀ Sapporo, 14 ♀ ♀ 7 ♂ ♂ Sounkyo, 8 ♀ ♀ 1 ♂ Hakodate), VII, VIII, IX. 1944–58; 30 ♀ ♀ 52 ♂ ♂ Honshu (3 ♀ ♀ Towada, K. Shimoyama leg.; 1 ♀ Yamagata, K. Shirahata leg.; 1 ♂ Mt. Tsurugi, R. Narumi leg.; 1 ♀ 1 ♂ Mt. Norikura, J. Minamikawa leg.; 1 ♂ Mt. Fuji, J. Minamikawa leg.; 1 ♀ 2 ♂ ♂ Mt. Nasu, 9 ♀ ♀ 5 ♂ ♂ Nikko, 11 ♀ ♀ 42 ♂ ♂ Mt. Haku, 2 ♀ ♀ Mt. Chichibu (Kumotori), K. Tsuneki leg.), VII, VIII, IX. 1934–58. All the male specimens listed above are designated as paratypes.

Distribution : The Ussuri region, Korea and Japan (Hokkaido, Honshu).

Prey record. A specimen collected at Sounkyo, Hokkaido was carrying a victim under her body. It belonged to a species of Evacanthidae (Hemipt.). *Evacanthus interruptus* Linné.

9. *Psen* (*Psen*) *mandibularis* nom. nov.*

Mimesa orientalis Gussakovskij, Ark. Zool., 24 A No. 10, p. 5, 1933 (♂) (nec Cameron, 1890).
Psen (*Psen*) *orientalis* Beaumont, Mitt. Schweiz. Ent. Ges., XVII, 1–2, p. 43, 1937 (♂); —— Gussakovskij, Trav. Inst. Zool. Acad. Sci., URSS, IV, 3–4, p. 656, 1937 (♂).
? *Psen* (*Psen*) *orientalis* Yasumatsu, Mushi, XIV, 2, p. 93, 1942 (♀ ♂).

Psen orientalis is preoccupied by P. Cameron (Mem. Manch. L. Ph. Soc. IV, 3, p. 269, 1890). Descriptions given by previous authors on *P. orientalis* Cam. are all brief and insufficient. But according to the figure shown by C. T. Bingham (Faun. Brit. Ind., Hym., II, p. 263, 1897) the species is considered to belong undoubtedly to *Psen* and not *Psenulus* of the present day taxonomy. The female of this species was first described by K. Yasumatsu upon a specimen collected at Sounkyo, Hokkaido. But the distinctions described by him differ in some important characters from those of my specimens dealt with here, for instance in the colour of the clypeal pubescence, in the structure of the clypeus and in the character of the antennae, despite that

* This becomes a synonym of *P. ussuriensis* Lith, 1959. (See P. S., p. 78)

the type, when I took a glimps, is confirmed to have the well-developed mandibles characteristic of the species and distinctly silvery clypeal pubescence.

♀. Length 7.5–11.5 mm, usually about 10 mm. Black. Mandidles near apices broadly, antennal joints 3–12 beneath, fore tibiae in front, apices of all tibiae and tarsi of front and middle legs ferruginous; tegulae and hind tarsi dark brown. Hairs on lower front and clypeus slivery, with a faint brassy shimmer in some specimens, but never "doré". Head from above with ratio of width to length in middle 73 : 30, occipital margin roundly emarginate, anteriorly the arcuate ridge of interantennal carina well observed, OOD : POD : OCD = 10 : 10 : 14, interocellar space impressed into a broad longitudinal furrow connecting with postocellar transverse furrow and forming an anchor-shaped impression, not definite in outline, along outer margins of postocelli it is markedly deepened into a distinct groove, vertex outside postocelli feebly depressed, the area behind the postocellar transverse furrow distinctly raised, frontal lateral marks feebly defined along upper inner orbits of eyes, somewhat more anterior than usual, with the posterior portion level with front ocellus, comparatively large, elongate oval, not well swollen. Head seen in front with face comparatively narrow, ratio of width of head and interocular distance 78 : 28, interantennal distance nearly twice as large as oculo-antennal distance, interantennal carina roundly arched upwards, markedly high, with no tooth nor spine in middle; clypeus : Fig 38a, anteriorly porrect in middle and broadly roundly emarginate at apex, with the brim incrssate, forming a lunate area seen from beneath, as was pointed out by Beaumont in regard to ♂. Never "Le bord antérieur du clypeus est soulevé en une petite lamelle à bord mince, non echancrée". Mandibles very characteristic, extraordinarily thick and broad, apically somewhat spoon-shaped as shown in Fig. 38 a and b (external view). Antennal joints 3–12 with relative length : 15, 12, 11.5, 11, 11, 10, 9, 9, 9, 12; 3rd joint about 3.5 times, 4th 2.4 times as long as wide at apex in the narrowest (posterior) view, thrice and 2.2 times as long as wide in the broadest (dorsal) view, 10th 1.3 times as long as wide. On propodeum area dorsalis broad triangular, posteriorly markedly impressed, sometimes marginated by carinae sometimes not, areas posterior to the impressed line not particularly incrassate into limb, sculpture of the area quite variable. In forewing 2nd recurrent nervure received by 3rd cubital cell, slightly beyond base of 2nd transverse cubital nervure. Hind tibiae distinctly serrate. Petiole slender, parallell and long, approximately reaching with its end the apex of hind femur produced backward, usually more than 7 times as long as broad in middle, on dorsal surface usually convex in cross section, rarely a feeble longitudinal groove on top of the posterior portion, in the lateral view it is suddenly narrowed near base and suddenly inclined downward with its dorsal surface, relative length between petiole, hind femur and tibia in one specimen : 60 : 43 : 50. pygidial area very similar to that of *affinis* (cf. Fig. 37)

Upper front very minutely and remotely, vertex somewhat more strongly and also remotely punctate, considerably glossy, punctuation on mesonotum similar, posteriorly slightly stronger and on hind margin fairly close; scutelllum and postscutellum sparsely and somewhat more strongly punctured, mesopleuron practically impunctate, with only very minute punctures sparsely scattered. Area dorsalis comparatively closely longitudinally striate or rugoso-striate, the striae generally slightly convergent backward, intervals either rugulose or smooth, surface posterior to the area sometimes closely, sometimes sparsely obliquely striate or rugoso-striate, posterior inclination usually irregularly coarsely reticulate, but in some specimens distinctly very coarsely, posteriorly convergently striate, sides of the segment anteriorly polished, posteriorly and dorsally delicately wrinkled. Petiole smooth and shining; pygidial area minutely coriaceous, with distinct punctures scattered excepting medial portion.

♂. Length 7.5–10.0 mm. Similar to ♀. Head well agrees in characters to ♀, but OOD

slightly larger than POD, in one specimen interantennal arcuate carina provided with a short tooth in middle, mandibles similar in form, but less marked in degree (Fig. 39 a – external view –, b – frontal view); antennae with 3rd and distal joints slightly longer than others which are nearly equal in length to one other, joint 3 about 2.5 times as long as broad at apex in the narrowest (posterior) view, 2.2 times in the widest view, joints 4–12 each about twice as long as wide in the posterior view (in the dorsal view about 1.7 times), no carina nor tubercle on any of joints, only slightly rounded on posterior margin. Sculpture on propodeum somewhat more irregular and coarser, in forewing 2nd recurrent nervure, in half of the specimens examined, interstitial with 2nd transverse cubital nervure. Hind tibiae simple. Petiole similar in length relations to hind femur and tibia, but slightly broader, 5–6 times as long as wide in middle. Abdominal sternites 3 and 4 provided with a tuft of long hairs at each apex in middle.

Remarks. Amongst the characters shown by this species those of the mandible are most remarkable, although such characters have been received almost no particular attention by the previous authors. This is true also with *P. exaratus* Eversmann (♂) and *P. hakusanus* n. sp.

Specimens examined : 1 ♀ 3 ♂ ♂, Hokkaido (Akkeshi, Sounkyo, Jozankei), VIII. 1946, 48, 58; 8 ♀ ♀, Towada, VIII. 1950, 55, K. Shimoyama, R. Narumi and the author leg.; 2 ♀ ♀, Mt. Haku, VIII. 1955, 57; 1 ♂, Ishikawa Pref. (Kawachidani), 15. VIII. 1950, I. Togashi leg.; 1 ♀, Nikko, 9. VIII. 1955. (All but particularly mentioned leg. K. Tsuneki.)

Distribution : The Ussuri region, Hokkaido and Honshu (northern parts).

10. *Psen* (*Psen*) *dzimm* sp. nov.

This species is very characteristic in having a ring of erected long golden hairs on apical margin of each abdominal tergite and sternite excepting the caudal ones and can easily be distinguished from any of the species of the genus known so far.

♀. Length 13.0–14.0 mm. Black. Mandibles except apices and bases externally, tegulae of wings, front and mid legs (except coxae), trochanters and femora at base of hind legs ferruginous; antennal flagellum beneath, wing veins, femora and tibiae beneath of front and mid legs, greater part of hind femora and tibiae, greater part of all tarsi chestnut brown; lst tergite excepting vague dark macula at base in middle reddish brown. Hairs on clypeus and lower front brassy or pale golden, those on temples silvery white, long hairs on mesopleuron, propodeum and femora of legs beneath hoary white, sometimes with a shade of pale yellowish, those on posterior margins of pro- and mesonotums, on scutellum, postscutellum and posterior margins of abdominal segments deep brassy or golden. In general body and legs very hairy. Head seen from above with ratio of width to length in middle 85 : 34, OOD : POD : OCD = 12 : 10 : 15, transverse furrow behind postocelli not strong, vertex outside postocelli normally flattened and along their outer margins grooved, frontal lateral area fairly well marked, large, extending below to middle of face. Head seen in front with face less than half as broad as width of head (ratio 35 : 84), oculo-antennal distance slightly less than half as large as interantennal distance, interantennal process triangular, not high, laterally carinate, the carina not reflected at sides, inner orbital lines normally running, clypeus : Fig 40, mandibles normal, Antennal joints 3–6 with relative length 21, 14, 13.5, 13, subsequent joints progressively reducing in length and increading in width excepting the terminal one, 3rd joint about 4 times and 4th 2.5 times as long as wide at apex in the narrowest (posterior) view, in the widest (dorsal) view 3.5 times and 2.5 times respectively. Area dorsalis on propodeum broad triangular, distinctly impressed and posteriorly bordered by carinae; incrassate posterior limb absent, posterior inclination deeply grooved in miidle and broadly excavated on both its sides. In forewings 2nd recurrent nervure interstitial with 2nd transverse

cubital nervure or received slightly beyond its base. Hind tibiae with long serrate spines externally. Petiole as long as hind femur and slightly shorter than tibia, about 5.5 times as long as wide in middle, posteriorly slightly broadened and near base with dorsal surface suddenly inclined below. Pygidial area similar to that of *P. ater* (cf. Fig. 24), only slightly narrower at apex and gently raised at base.

Upper front finely closely and shallowly, vertex sparsely and shallowly, mesonotum more grossly strongly and fairly closely (but intervals larger than punctures) punctate; mesopleuron rather sparsely scattered with fine hair pits, well shining, with posterior margin strongly foveolated. Area dorsalis coarsely regularly striate, the striae slightly divergent backward, rest of the dorsal and posterior portions of the segment coarsely (but more finely than usual) and irregularly (but more regularly than usuall) reticulate, sides without sculpture, shining, posteriorly with extention of the dorsal reticulation. Abdominal tergite 1 with sparse fine punctules, 2 on basal and spical portions punctured, 3, 4 and 5 more grossly and more closely so, pygidial area with microscopically minute ground coriaceous sculpture and fairly closely punctured with large oval points from which stiff bristles shooting out. Sternite 1 at sides closely, in middle very sparsely punctured with comparatively large punctures, 2–5 more finely but distinctly fairly closely so, 6 very densely deeply sculptured with irregular punctures, mat.

♂. Length 11.5–12.0 mm. Very similar to ♀. Hairs on clypeus and lower front silvery white with sometimes a shade of yellowish, those on thorax greyish white, only those on posterior margins of abdominal tergites golden. lst joint of antennae similar in structure to that of *P. ater* ♂, but less reflected on top, receiving 2nd joint wholly within the apical cylinder, joints 3–6 with relative length 16, 12, 11, 11, subsequent joints very slightly reducing in length toward spex excepting the end one, 3rd joint 2.7 times, 4th twice as long as wide at apex in the narrowest (posterior) view, in the widest (dorsal) view 2.2 times and 1.7 times respectively, joints 6–13 each provided with a tubercle beneath near base and an excavation near apex, tubercles on joints 9 and 10 conical and those on joints 11–13 obliquely elongate, subcarinate, on tuberculating and excavated areas the surface smooth. Legs simple, hind tibiae without spines on outer margin. Abdominal sternites 3 and 4 provided with a tuft of long yellowish hairs respectively on posterior margin in middle.

Holotype : ♂, Nikko, 5. VIII. 1955, K. Tsuneki leg.

Allotype : ♀, Ishikawa pref. (Isurugi-yama), 5. IX. 1954, I. Torashi leg.

Paratypes : 1 ♂, Kyoto, 5. IX. 1922, K. Takeuchi leg. (in his collection); 1 ♂, Saitama Pref. (Yorii), VIII. 1929, K. Tsuneki leg.; 1 ♀, Hyogo Pref. (Sasayama), 12. VIII. 1956, Kazuko Iwata leg.

Distribution : Endemic to Japan.

11. *Psen* (*Psen*) *exaratus* (Eversmann, 1849)

Mimesa exarata Eversmann, Bull. Soc. Nat. Moscou, 22, p. 361, 1849

Psen (*Psen*) *exaratus* Beaumont, Mitt. Schweiz. Ent. Ges., XVII, 1–2, p. 44, 1937 (with a list of synonyms); — Gussakovskij, Mushi, VII, 2, p. 81, 1934; Trav. Inst. Zool. Acad. Sci., URSS, IV, 3–4, p. 654, 1937 (with synonyms); — Yasumatsu, Mushi, XIV, 2. p. 94, 1942 (Korea and Honshu)

♀. Length 10.5–12.5 mm. Black. Antennal joints 3–6 beneath, tegulae of wings, front tibiae in front and front and mid tarsi (sometimes mandibles near apices) brown to dark brown; tibial spurs pale yellowish white. Hairs on clypeus and lower front appressed, dense and silvery white. Head from above distinctly thicker than in P. ater (Fig. 27, cf. Fig. 22), OOD : POD :

OCD = 10 : 12 : 14, a distinct transverse impressed line connecting posterior margins of postocelli deepened into a narrow groove outside the ocellus, vertex just behind the transverse impressed line roundly raised, frontal marks distinct, large, oval, clearly raised, with posterior extremities level with anterior margins of postocelli. Head seen in front with face comparatively narrow, relative value of width of head and interocular distance 75 : 30, oculo-antennal distance subequal to half of interantennal distance, interantennal carina not reflected on both end, tuberculate in middle with apex rounded, clypeus (Fig. 28) 1.3 times as long as supra-clypeal area, mandibles normal. Antennal joints 3–6 with relative length : 17, 12, 11, 10, 3rd joint slightly more than thrice as long as wide at apex, 4th nearly twice as long as wide (in the broadest – dorsal – view; in the narrowest – posterior – view 3rd about 4 times, 4th 2.2 times as long as broad). Area dorsalis broad triangular, impressed and distinctly marginated by carinae. In fore wings lst and 2nd recurrent nervure received by 2nd cubital cell. Petiole slightly broadened posteriorly, about 5 times as long as wide im middle and longer than lst tergite or hind femur, nearly as long as hind tibia, on dorsal surface feebly raised in middle and suddenly inclined below at 1/3 from base; pygidial area : Fig. 29.

Upper front somewhat grossly, strongly and rather closely punctured, vertex more grossly and sparsely, occiput transversely subrugosely punctate; mesonotum much more grossly and moderately closely so, on posterior portion longitudinally punctate-subrugose, scutellum more sparsely, postscutellum more finely punctured; mesopleuron sparsely scattered with rather gross and rounded punctures, with intervals microscopically finely punctulated. Propodeum with area dorsalis coarsely divergently striate, regions posterior to the area obliquely distinctly striate, posterior inclination coarsely irregularly reticulate, sides of the segment obliquely fairly closely striate. Petiole rather grossly subrugoso-punctate, each tergite of abdomen fairly distinctly punctured on lateral portions. Pygidial area scattered with comparatively large punctures along lateral margins.

♂. Length 11 mm in a single specimen examined. Similar to female, but very characteristic in the structure of antennae, mandibles, front and mid tarsi and somewhat in colour. Face comparatively broader, ratio of width of head and interocular distance 63 : 29. Relative length of antennal joints from 3rd apically : 16, 12, 12, 11, 11, 11, 10.5, 10, 10, 10, 13, 3rd joint in the broadest view slightly less than thrice as long as wide at apex, 4th about twice as long as wide (in the narrowest view 3rd about 3.7 times, 4th 2.3 times respectively), joints 5–13 each roundly swollen beneath and besides from joint 7 apically roundly produced backward, no distinct carina on any of joints. Mandible bidentate at apex and provided beneath with a very conspicuous stout tooth at a distance of one-third from apex (Fig. 30). Metatarsi of front and mid legs : Figs. 31 and 32 respectively. Petiole relatively somewhat longer than in female, longer than hind tibia. Antennae above dark brown, beneath thoroughly ferruginous, front and mid lege except coxae, trochanters and femora beneath ferruginous, tibiae somewhat brownish.

Remarks. The male example here described agrees well with the description of V. Gussakovskij (1937), but differs from that of de Beaumont (1937) in that the mandible is provided beneath with a strong tooth and that the antennal joints from 6th apicarry no distinct carina at all.

Specimens examined : 1 ♀, Korea (Shoyozan), 30. V. 1943; 1 ♀, Hokkaido (Jozankei), 24. VII. 1946; 4 ♀ ♀ 1 ♂ Honshu (2 ♀ ♀, Fukui Pref — Koike —, 14. VII. 1956, 30. VIII. 1957; 1 ♀, Mt. Nasu, 30. VI. 1949. — S. Usuba leg.; 1 ♀, Aomori Pref. — Ikarigaseki —, 23. VII. 1954, M. Yamada leg.; 1 ♂, Aomori Pref. — Yamagata-mura —, 3. VIII. 1938, R. Narumi leg.). All but mentioned leg. K. Tsuneki.

Distribution : Europe, Caucasus, Siberia, Korea and Japan (Hokkaido and Honshu)

Prey record. A specimen captured at Koike, Fukui Pref. was carrying a prey. It was identified with *Cicadula fascifrons* Stål.

12. *Psen* (*Psen*) *richardsi* sp. nov.

This species is very distinct in having the very glossy body, bright coloured antennae and legs and the golden pubescence on clypeus and lower front, and can easily be distinguished from any species of the genus known so far. I dedicated this species to Dr. O. W. Richards.

♀. Length 8.5–10.0 mm. Black and shining. Mandibles except apices, clypeus behind anterior margin transsversely, scapes and pedicels of antennae and legs except coxae and arolia ambur-yellow, semitransparent, arolia black; flagella of antennae beneath ferruginous; apices of mandibles, tegulae and veins of wings, apical margin of each abdominal segment, front and mid femora beneath narrowly, greater part of hind femora and apical portions of hind tibiae externally lustrous dark brown; antennal flagella above lustreless yellowish brown. In some specimens sides of abdomen broadly and two large vague maculae on 2nd tergite lustrous testaceous. Dense appressed hairs on lower front and clypeus metallic golden, pubescence on other portions of body and legs not long and generally sparse; *eyes sparsely covered with very short golden pubescence observable under 30 times enlarging.*

Head from above : Fig. 41, with occipital margin not strongly emarginate, OOD : POD : OCD = 8 : 9 : 15, elevation of ocellar region feeble, postocellar transverse impressed line deep and distinct, extending to and encircling outer margins of postocelli, frontal lateral marks quite indistinct. Head seen in front with face characteristic in lateral outlines (Fig. 42), the shortest distance between inner orbital lines locating at base of clypeus, not at sockets of antennae as usual, interantennal process not long, but toothed with apex obtuse; clypeus (Fig. 42) raised apically, nearly bidentate, mandibles normal. Antennal joints 3–6 with relative length : 13, 9, 8, 7, 3rd joint thrice as long as wide at apex (narrowest view), 4th about twice as long as wide (do). Area dorsalis on propodeum (Fig. 43) semicircular, resembling in structure that of members of *Pemphredon*, very distinctly marginated by posterior limb which is raised and without sculpture, median longitudinal furrow on posterior inclination narrow and distinctly outlined by carinae. Petiole rather suddenly inclined below near base, with sides very slightly divergent backwards, 4.5–6 times as long as wide in middle, distinctly longer than lst tergite and as long as hind femur but always shorter than hind tibia (ratio 40 : 45–50). Pygidial area : Fig. 44, distinctly marginated by carinae and gently raised on basal half. In forewings lst recurrent nervure received by 2nd cubital cell close to base of lst transverse cubital nervure or interstitial, 2nd by 3rd cubital cell at some distance from base of 2nd transverse cubital nervure.

Upper front finely and closely punctured, vertex very sparsely and finely so, very glossy, mesonotum somewhat more grossly and moderately closely, on posterior portion much more closely and more finely punctate, scutellum and postscutellum very sparsely scattered with fine punctules and polished, mesopleuron practically impunctate, only with minute hair-pits very sparsely scattered. Area dorsalis on propodeum distinctly, comparatively closely striate, the striae somewhat convergent backwards, limb impunctate and shining, posteriorly not distinctly outined, areas adjacent to limb with sculpture feeble, usually obliquely rugoso-striate, posterior inclination coarsely irregularly, laterally progressively finely reticulate, with surface minutely weakly rugulose, sides of the segment without sculpture, polished. Petiole smooth and polished, abdomen practically without puncture, ultimate and penultimate segments with a few scattered punctures.

♂. Unknown.

Holotype : ♀, Nikko (Shobugahama), 10. VIII. 1954, K. Tsuneki leg.

Paratypes : 25 ♀ ♀, Nikko, 10–12. VIII. 1954, 9. VIII. 1955, K. Tsuneki leg.; 3 ♀ ♀, 15. VIII. 1954, E. Tanaka leg.

Biology. This species nests in decayed stamps of cut trees. At Shobugahama, Nikko, I was taken to such stamps by Mr. E. Tanaka to observe the habits of this species. The stamps, locating in dense wood, were about 1 meter high, 30–60 cm in diameter, considerably moistened and so well-rotten that it could easily be crambled with fingers. In each stamp from several to some ten wasps were nesting. They came back succssively carrying a prey beneath their body in the usual fashion as observed in other members of the group. The nsst belonged to multicellular type, with branched tunnels and end cells. In each cell were stored 4–6 prey, insects belonging to Tomaspidae (Hem.). They were kindly identified by Dr. T. Ishihara with *Eoscarta assimilis* (Uhler, 1896).

13. *Psen* (*Psen*) *hakusanus* sp. nov.

♀. Length 10.5–12.0 mm. Black. Antennal flagella beneath apically, tegulae and veins of wings and hind tarsi dark brown, front and mid tarsi pale brownish. Hairs on lower front and clypeus silvery white. Head from above with occipital margin gently roundly emarginate, OOD : POD : OCD = 11 : 11 : 15, ocellar and postocellar regions raised, with a ⊥-shaped impression in between, areas outside hind ocelli flattened and finely grooved along their outer margins, frontal lateral marks defined, not large, nearly elongate triangle in form, impunctate and width gently swollen, with apical margins level with front ocellus. Head seen in front with ratio between width of head and interocular distance 84 : 35, oculo-antennal distance approximately half as large as interantennal distance, interantennal carina ∧-shaped, well defined in full length, with both ends not reflected and shortly toothed in middle, apex pointed, clypeus comparatively narrowly produced, with anterior margin broadly incised in middle (Fig. 45), mandible at base very broad and slightly enlarged in middle (Fig. 46). Antennal joints 3–7 with ralativel length 20, 13, 12, 11, 10.5, 3rd joint in narrowest view 4 times as long as wide at apex, 4th 2.2 times as long as wide, in the broadest view 3rd 3.2 times, 4th slightly less than twice as long as wide. On propodeum area dorsalis with apical margin rounded, semicircular, posteriorly enclosed by limb which is narrow, incrassate and without sculpture and polished, but on lateral portions with outer borders not well-defined, posterior inclination medianly grooved and apically in middle carinate. In forewings 2nd recurrent nervure received by 3rd cubital cell slightly beyond base of 2nd transverse cubital nervure or interstitial. Hind tibiae strongly serrate. Petiole about 5 times as long as wide in middle, distinctly longer than lst tergite and nearly as long as hind femur but shorter than hind tibia (ratio nearly 50 : 60), in lateral view with upper surface suddenly inclined below near base. Pygidial area elongate triangle, with apex narrowly truncate and minutely incised in middle (Fig. 47), lateral carinae distinct and comparatively high, along median line basal portion gently roundly raised and apical portion furrowed.

Upper front finely very sparsely and partly subrugosely punctured, vertex and mesonotum finely and sparsely, scutellum and postscutellum much more sparsely so, temple and meso- pleuron practically impunctate, the latter with very minute scattered punctules. Area dorsalis coarsely longitudinally, somewhat backward convergently striate with a median large fovea which is provided in middle with a simple or branched carina, posterior limb smooth and polished, on area posterior to limb sculpture fairly variable, sometimes coarsely reticulate, sometimes coarsely, posteriorly convergently striate with intervals irregularly feebly wrinkled, with varied intermediate states. Pygidial area shining, with apical portions microscopically finely transversely

closely striate.

♂. Length 7.5–9.7 mm. Similar in general characters to female. Clypeus with anterior margin roundly emarginate. Antennal joints 3–6 with relative length 14, 13, 12.5, 12, subsequent joints progressively very slightly diminishing in length except the terminal one, 3rd joint slightly less than thrice, 4th 2.3 times as long as broad at apex in the narrowest view, in the broadest view they are 2.4 times and twice respectively, joints 4–12 slightly roundly swollen anteriorly and joints 3–10 (sometimes 11 also) posteriorly carinate, carina on joint 3 not strong, those on 4–7 slightly broadened towards apex, 8–10 (or 11) slender. Petiole typically longer than hind femur or tibia (ratio : 48, 40, 45 in the type), but in some specimens as long as hind tibia. Sternites 3 and 4 with an apical tuft of hairs respectively, not strongly developed as compared with allied species. Wing venation as in female, sometimes 2nd recurrent nervure received before base of 2nd transverse cubital nervure, usually interstitial.

Holotype : ♂, Mt. Haku, 22. VIII. 1956, K. Tsuneki leg.

Allotype : ♀, Mt. Haku, 15. VIII. 1956, K. Tsuneki leg.

Paratypes : 6 ♀♀ 6 ♂♂, Mt. Haku, 24. VII.–15. VIII. 1955–58; 5 ♀♀, Nikko, 10. VIII.–12. IX. 1953, 54, E. Tanaka and K. Tsuneki leg.; 1 ♀, Towada, 6. VIII. 1955, K. Shimoyama leg.; 1 ♀, Kyoto (Bunagadake), 10. VII. 1941, T. Kimura leg.; 1 ♀, Kyoto (Hirokawara), 20. VII. 1958, K. Iwata leg.; 3 ♂♂, Hokkaido (Jozankei, Sounkyo), 17. VII. 1946, 8. VIII. 1958, K. Tsuneki leg.

Distribution : Iapan (Hokkaido and Honshu).

Comparative note. This species seems closely allied to *P. kohli* Gussakovskij known from Tibet and Central China. So far as the description is concerned, however, it differs from *kohli* in the structure of vertex and of the interantennal process.

14. *Pen* (*Psen*) *koreanus* sp. nov.

This species seems closely related to *P. hakusanus* m., differing essentially in the following points :

Antennae thicker, viz. each joiut relatively shorter, general punctuation stronger and pygidial area broader. Moreover, area dorsalis, abdominal petiole and wing venation are also somewhat different. However, it is uncertain whether these belong truly to the specific characters or to the variation within a species, since specimens are too scanty.

♀. Length 12.0–13.0 mm. Black. Mandibles near apices, fore tibiae in front, tibial spurs and tarsi of legs ferruginous; antennal flagella beneath, tegulae and veins of wings chestnut brown; tibiae somewhat brownish. Hairs on lower front and clypeus silvery white. On vertex ocellar elevation, post- and inter-ocellar impressions and medio-posterior elevation as in *hakusanus*, frontal lateral marks large, distinctly raised, outward inclination of postocelli less strong. Punctures on upper front grosser and more remote, on vertex similarly sparse but much stronger. Ratio between width of head and interocular distance 88 ; 36, location of antennal sockets similar to that of *hakusanus*, interantennal tubercle nearly pyramidal in form, not normally plicato-carinate, with lower carinae slightly longer than the upper longitudinal one. Clypeus : Fig 48, mandibles somewhat widened from middle apically. Relative length of antennal joits 3–6 : 18, 13, 12, 11, 3rd joint in narrowest view thrice, 4th twice as as long as wide at apex, in broadest view 3rd 2.7 times, 4th 1.8 times as long as broad. Structure and sculpture of propodeum generally similar to those of *hakusanus*, striae longitudinal or somewhat divergent posteriorly, but the median large arveole of area dorsalis always transversely rugoso-striate. In forewings 2nd recurrent nervure received by 2nd cubital cell, slightly or considerably before base of 2nd transverse

cubital nervure. Petiole about 4.5–5 times as long as wide in middle, ratio between petiole, hind femur and tibia : 50, 57, 62 (in the paratype, 45, 53, 60), pygidial area resembling that of hakusanus. Punctures on mesonotum, scutellum and postscutellum sparse and stronger than in *hakusanus*. Abdominal tergites fairly distinctly, moderately closely punctured, areas external to pygidial area very coarsely, basal half of abdominal sternite 2 fairly strongly and closely so.

♂. Unknown.

Holotype : ♀ Korea (Keijo), 4. VIII. 1942, K. Tsuneki leg.

Paratype ; 1 ♀, Korea (Keijo), 23. VI. 1942, K. Tsuneki leg.

Remarks. This species may be a subspecies of *P. hakusanus* m., but the determination must be postponed until the characters of the male are examined.

15. *Psen* (*Psen*) *yasumatsui* Gussakovskij, 1937.

Psen (in sp.) *yasumatsui* Gussakovskij, Mushi, VII, 2, p. 80, 1934 (♂); Trav. Inst. Zool. Acad. Sci. URSS, IV, 3–4, p. 651, 1937 (♂); —— Yasumatsu, Ins. Jap. Ill. Icon., p. 375, 1939.

This species is recorded upon a single male specimen only. The description informs us of the characters which are very close to *P. aurifrons* m. ♂ including those of legs. The sole important difference between the species seems to lie in that the flagellar joints in this species are simple, not convex, not excavated beneath nor carinate (only the apical angle slightly prominent), while in *aurifrons* joints 6–13 each carries a dinstinct elongate tubercle. The validity of the description was confirmed by the present writer when he visited Kyushu University. It seems of intersst to see how far the female differs from that of *aurifrons* when it will be captured in future.

Distribution : Kyushu (Takachihonomine).

16. *Psen* (*Psen*) *santaro* Yasumatsu, 1942.

Psen (*Psen*) *santaro* Yasumatsu, Mushi, XIV, 2, p. 94, 1942.

The author missed the chance of examining the type of this species when he visited the Kyushu University. But according to the original description and figures which were given upon the basis of two male specimens collected in Amami-Oshima (the Ryukyus), the male of this species seems very closely resembling that of *P. exaratus* excepting that the mandible is not provided beneath with a tooth, the oculo-antennal distance less than as large as the antennal socket or half

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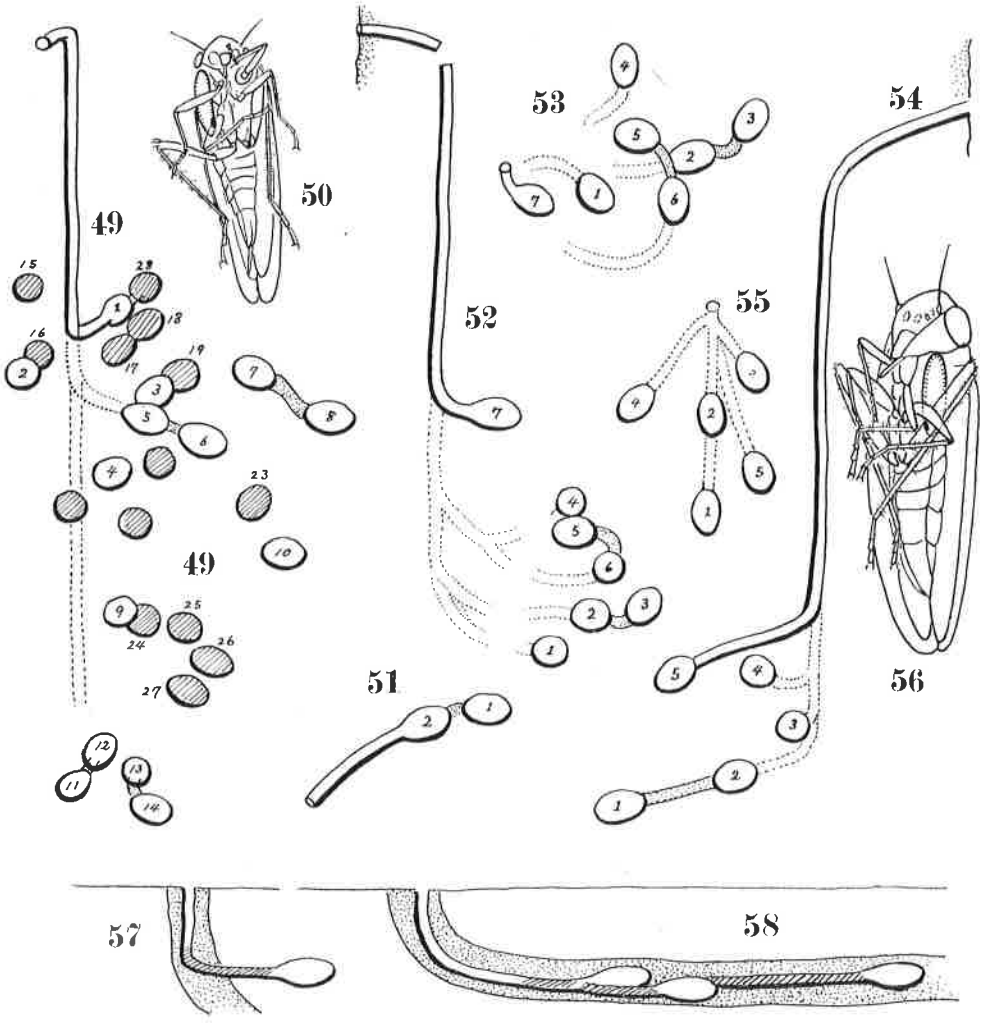
Explanation of Figures 1–48

Figs. 1–3, *Mimesa shuckardi japonicus* (1, clypeus ♀; 2, cross section of petiole ♀; 3, genitalia ♂). **Fig. 4**, epicnemial areas and medio-anterior excavation of mesosternum of *Mimumesa atratinus sameshimai* ♀. **Fig. 5**, do of *M. atratinus* s. str. **Figs. 6–8**, *Mimumesa a. sameshimai* (6, clypeus and mandible ♀; 7, pygidial area; 8a, squama of male genitalia with apex extended; 8b, do with apex folded; 8c, left piece of squama and volsella and right piece of penis). **Figs. 9–12, 17**, *Mimumesa littoralis* (9, clypeus ♀; 10, epicnemial areas and mesosternal excavation ♀; 11, pygidial area; 12, male genitalia; 17, abnormal female antennae). **Figs. 13–16**, *Mimumesa dahlbomi pacificus* (13, epicnemial areas and medio-anterior excavation of mesosternum ♀; 14, clypeus and mandibles ♀; 15, pygidial area; 16 male genitalia). **Figs 18–20**, *Mimumesa vanlithi* (18, male genitalia; 19, clypeus ♀; 20, epicnemial areas and mesosternal excavation ♀; 21, pygidial area). **Figs. 22–26**, *Psen ater* (22, head seen from above ♀; 23, clypeus ♀; 24, pygidial area; 25, antenna ♂; 26, middle tarsus ♂). **Figs. 27–32**, *Psen exaratus* (27, head ♀; 28, clypeus ♀; 29, pygidial area; 30, mandible ♂; 31, front metatarsus; 32, middle metatarsus). **Figs. 33–35**, *Psen. aurifrons* (33, clypeus and mandibles ♀; 34, mid tibia; 35, mid metatarsus). **Figs. 36, 37**, *Psen. affinis* (36, clypeus and mandibles ♀; 37, pygidial area). **Figs. 38, 39**, *Psen mandibularis* (38a, head seen in front ♀; 38b, mandible ♀ in the external view; 39a, mandible ♂ in the external view; 39b, do in the frontal view). **Fig. 40**, clypeus of *Psen. dzimm* ♀. **Figs. 41–44**, *Psen*

richardsi (41 and 42, head ♀; 43, propodeum ♀; 44, pygidial area). **Figs. 45-47,** *Psen hakusanus* (45 head seen in front ♀; 46, mandible in the external view ♀; 47, pygidial area). **Fig. 48,** *Psen koreanus* ♀, clypeus.



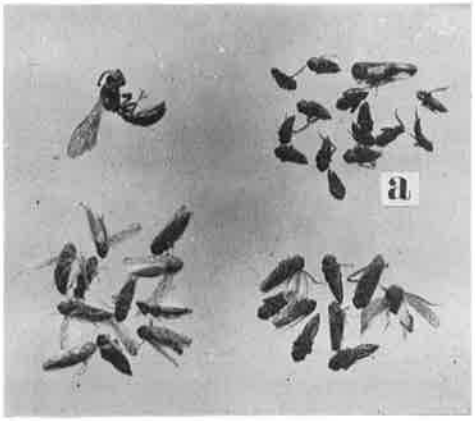


Fig 59.

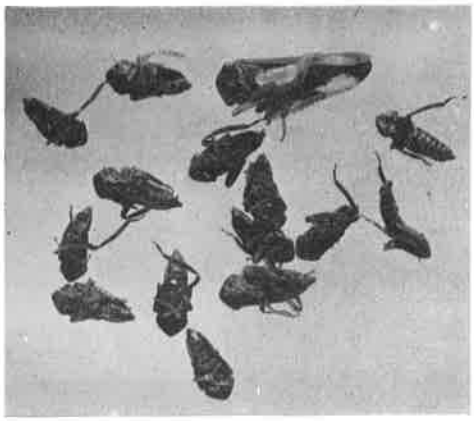


Fig 60.

as large as the interantennal distance, the eye seen in profile is very much thicker (les yeux deux fois plus longs que les tempes) and the flagellum of antenna is simple. The characters of the front and middle legs (according to Figures C and D of the original description) and of the petiole agree well with those of *P. exaratus*, although these are dealt with as different from those of the latter species in the comparative notes of the original description.

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Explanation of Figures 49–60

Figs. 49–58. 49, a nest of *Mimumesa atratinus sameshimai*. 50, the prey of do, attached with the wasp's egg. 51, a nest of *Mimumesa littoralis* when the ground is hard. 52, do, usually observed. 53, the same nest seen from above. 54, another nest of the same species. 55, the same seen from above. 56, the prey of *Mimumesa littoralis*, carrying the wasp's egg. 57–58, nests of *Mimumesa dahlbomi pacificus*. **Fig. 59**, *Mimumesa dahlbomi pacificus* and its prey. **Fig. 60**, enlargement of Fig. 59 a.

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P. S.

1. On *Psen ussuriensis* Lith

During proof-reading of M. S. of the present paper I received from Mr. J. P. van Lith, Rotterdam, a copy of his recent paper on the Indo-Australian Pseninae:

Contribution to the knowledge of the Indo-Australian Pseninae (Hymenoptera, Sphecidae). Zool. Verh. Rijksmus. Nat. Hist. Leiden, No. 39, 68 pp. (8 mei 1959).

In this paper he proposed a change of the specific trivial name of a species of Psenine wasp which has much to do with the present paper. It concerns with *Psen orientalis* Gussakovskij.

In connection with the species described by Cameron, Turner and Nurse from the Asiatic Continent and Ceylon he alluded to *Psen orientalis* Cameron and *Psen orientalis* Gussakovskij and in view of their homonomy he proposed to call the Gussakovskij's species "*Psen* (*Psen*) *ussuriensis*". In the present paper I have given to the species of Gussakovskij, basing upon the same reason, a new specific trivial name "*mandibularis*", but as a result of his earlier proposition this name has probably become a synonym of *ussuriensis* Lith.

"Probably" I said, because I have still some doubt as to whether my *mandibularis* is truly identical with the Gussakovskij's species, since no mention has ever been given in regard to the character of the mandibles of this species upon which a weight was placed as a specific distinction of my *mandibularis*. On this occasaion, therefore, I hope this problem will be solved soon by the entomologist who has a chance of examining the type of *orientalis* Gussakovskij.

2. On *Psen atratinus sameshimai* Yasumatsu

By the same reason above mentioned it is also desired to carry out the comparative study between *Psen longulus* Gussakovskij and *Psen atratinus sameshimai* Yasumatsu. Had it been confirmed that *longulus* has the same characters as those attributed in the present paper to *sameshimai* as subspecific it becomes, of course, that the Japanese subspecies should be called *Psen* (*Mimumesa*) *atratinus longulus* Gussakovskij.