

SPECIAL PUBLICATIONS
OF THE
JAPAN
HYMENOPTERISTS ASSOCIATION

NO. 32



M I S H I M A

APRIL 20, 1986

K. Tsuneki. New Species and Subspecies of the Aculeate Hymenoptera from East Asia, with some Synonyms, Specific Remarks and Distributional Data

C O N T E N T S

Chrysoidea

Genus <u>Omalus</u> (<u>Notozus</u>)	1
Genus <u>Cleptes</u>	2

Scolioidea

Genus <u>Tiphia</u>	2-22
---------------------------	------

Vespoidea

Genus <u>Symmorphus</u>	22-27
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Sphecoidea

Genus <u>Spilomena</u>	27
Genus <u>Psenulus</u>	28
Genus <u>Trypoxylon</u>	28-30
Genus <u>Crossocerus</u>	31
Genus <u>Rhopalum</u>	31

Apoidea

Genus <u>Nomada</u>	32-37
Genus <u>Sphecodes</u>	37-47

A D D E N D A

Scolioidea

Genus <u>Tiphia</u>	47-48, 58
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Apoidea

Genus <u>Nomada</u>	49-57
Genus <u>Pasites</u>	58-59

Remarks. The abbreviations are the same as those which are used in my previous papers (ref. Etizenis 66, SPJHA 26, 31).

NEW SPECIES AND SUBSPECIES OF THE ACULEATE HYMENOPTERA FROM EAST ASIA,
WITH SOME SYNONYMS, SPECIFIC REMARKS AND DISTRIBUTIONAL DATA

By K. TSUNEKI

Synopsis

- Chrysoidea: Omalus (Notozus) musashinus; Cleptes mishimaensis.
Scolioidea: Tiphia (Jaynesia) ogurai, Tiphia (Tiphia) mongolica, takeuchi, hasegawai, kaneiana, seoulensis, satsumensis, kawamurai, babai, kamakurae, nagasei, yoichii, juliana fuzanensis.
Synonyms: Tiphia teranishii Tsuneki, 1985 = T. isolata Parker, 1937
T. rufotibiata Ts., 1985 = humoncularis P., 1937; T. vulgata Ts., 1985 = sternata P., 1935; T. nipponica Ts., 1985 = burrelli P., 1937; T. kisukei Ts., 1985 = juliana P., 1937; T. castaneaevora P., 1937 = agilis Sm., 1873 (s. l.). ? T. popilliavora Rohwer, phyllophagae Allen et Jaynes, ovinigris A. et J. and mediocris P. are variations of T. smithi Hedicke, 1936 (= fuscipennis Sm., 1873 nec Klug, 1810). If so all should be called popilliavora R., 1924.
Vespoidea: Symmorphus sounkionis, hakutozanus, iiyamai, shiroyamai, piceanus, sassai, nansetsurei, seoulensis. New discovery of S. capitosus Sm., ♂.
Sphecoidea: Psenulus sudaorum; Spilomena djozankeiana; Trypoxylon mishimaensis, sonani; Crossocerus (Blepharipus) shirakii; Rhopalum (Rhopalum) sonani.
Apoidea: Sphecodes chichibuensis, chichibuus, izumindus, bipunctatus, gayaensis, coarctatus, taeguensis, temmasanus, chosensis (formae A, B and C), seoulensis, cristatus, pekingensis.
Nomada babai, yasha, koreana, temmasana, shoyozana, pekingensis and tiendang.

OMALUS (NOTOZUS) MUSASHINUS SP. NOV.

The present species closely resembles Omalus (Notozus) soror Mocsáry, but is different from it in that the facial basin is not transversely, but longitudinally striolated.

♂. Length 3.5 mm. Blue green; ocellar area strongly, disc of pronotum faintly purplish, gastral tergite 1 postero-laterally, 2 from sides to mid-lateral parts of posterior area golden green, 3 wholly, more weakly golden green, on ventral side, lateral marginal patch of sternite 1, a large semicircular mark occupying greater part of sternite 2 and a large rounded mark except marginal area of sternite 3 greenish blue; post-scutellar macro apically and apical plicae of gaster black; antennal joint 1 bluish green, 2 shining black, with a slight tint of blue, flagellum wholly black and opaque, marginal areas of clypeus dark brown, mandible medianly broadly ferruginous, basally green and apically dark brown, tarsi of legs sparrow brown, spurs paler, wings apically slightly clouded, stigma and veins dark brown, tegra shining bluish black.

Post-ocellar furrow distinct, preocellar area flattened, but not margined with carina, facial basin deep, longer than wide, clypeus trilobate apically, disc of median area longitudinally roundly raised, mandible tridentate, with two lateral teeth on inner margin, macro slightly longer than scutellum, longer than wide, with apex broadly rounded, postero-lateral teeth of propodeum elongated triangular, apex pointed, disc of gastral tergite 2 without medial carina, lateral margins of gastral tergite 3 sinuate, with post-medial produced areas margined with reflected narrow brownish membrane, apical plicae vertical to the length axis of gaster, seen from behind lunate in form, with length to wide in middle 10:3.5, from each side of plicae to marginal produced part surface abruptly inclined, forming a concave plane, gastral sternite 2 at apex in middle shortly longitudinally elevated, 3 medianly completely finely carinate. Fore femur angulate near base beneath as usual, claws 4-dentate, with 3 lateral teeth.

Ocellular area near ocellus without puncture, smooth and polished, thence to

temple sparsely covered with varied-sized comparatively deep punctures, ocellar area closely, irregularly punctured, frons closely covered with large, shallow, flat-bottomed, but not smooth-bottomed punctures, facial basin laterally longitudinally, somewhat arcuately (outcurved) striate, clypeus smooth and shining. Pronotum moderately closely, but irregularly covered with different-sized punctures, punctures rounded, shallow, flat-, but not smooth-bottomed, PIS mostly less than PD, generally punctures larger and closer towards sides; punctures on mesonotum and scutellum shallow and much larger than on pronotum in general, irregular in distribution, where close punctures angulated, on scutellum median line raised into a blunt ridge and blackened, mucro closely covered with large, rounded, concave punctures, about 20 in number, punctures on propodeum shallow and close, but very irregular in size and form. Gastral tergites 1 and 2 finely, fairly closely, mostly uniformly punctured, PIS mostly as large as PD, but punctures larger and more or less lengthened towards sides and partly longitudinally confluent, tergite 3 somewhat more largely punctured than on 1 and 2, but on central part of disc large and minute punctures mixed and on antero-lateral parts medium-sized ones very close. Coloured parts of sternites 2 and 3 very finely, on 2 rather sparsely and on 3 very closely punctured.

♀, unknown.

Holotype: ♂, City Toda, Saitama Pref., near Tokyo, 10. IX. 1985, T. Nambu leg.

Remarks. According to the personal communication of Mr. Nambu he collected six male specimens of the present species at a time on the leaves of Artemisia vulgaris parasitized by a host of a species of Aphis.

CLEPTES MISHIMAENSIS SP. NOV.

♀. Length 6.5 mm. Closely resembles fudzi Tsuneki, but differs from it in that pronotum without median longitudinal furrow, mesopleuron with epimeral area polished and sparsely punctured, while below there surface longitudinally, arcuately striate (in fudzi surface wholly strongly and sparsely punctured) and gastral tergite 1 at central part on front of apical impunctate area very minutely, somewhat closely punctured. Wings slightly darker than in the compared species, gaster completely black, only at extreme base somewhat brownish. Head and thorax metallic blue green, legs except pale brown fore tibia black or brownish black.

Mandible quadridentate at apex, rest of gastral tergite 1 impunctate.

♂. Unknown.

Holotype: ♀, Hatsune wood path, Mishima, Shizuoka Pref., Japan, 14. V. 1985, K. Tsuneki leg. (Coll. Tsuneki).

TIPHIA MONGOLICA SP. NOV.

♂. Length 7.5 mm. Closely resembles the sympatric males of T. femorata Fabricius, differing from it mainly in that fore tibia on outer side and mid tibia wholly black, puncture band on GT 1 distinctly furrowed, with blunt impressed edge line on anterior margin, including a line or two of irregular-sized punctures and GS 1 medianly, first acutely, then bluntly ridged till near apex and much more sparsely punctured on each side.

Main characters: GS 5 with lateral denticles, weak and rather indistinct, but the raised inner margin long, curved and subparallel with posterior margin of the segment, without orifice accompanied, radial cell of fore wing not exceeding cubital cell 2, mesopleuron bipunctate, minute punctures somewhat more numerous than the larger ones, spiracular hollow of propodeum larger than its posterior closed area, AOD=WAS, CAW > WAS, medio-apical margin gently emarginate and narrowly impunctate, with lateral angles reflected and shining, disc of clypeus gently raised, anteriorly coarsely and closely punctured and posteriorly bipunctate. Punctures on upper frons and pronotum similar in distribution pattern to those of femorata, but relatively slightly smaller, tegula and areola similar to those of the compared species, striae on propodeal sides also similar, but the punctures on GT 1 and 2 somewhat finer than in this species. GS 1 medianly distinctly carinate till about middle, with sides strongly, closely rugose-punctate, from apex of the carina a low blunt ridge continued (in femorata this is absent) till near apex where runs transversely a weak, obscurely foveolate furrow, lateral furrows distinct, curved inwards, closely approaching apex of medial carina, surface between medial ridge and lateral furrows finely and moderately closely (but much more sparsely than in femorata) punctured.

♀. Unknown.

Holotype: ♂, Inner Mongolia, Apaka, 20. VI. 1939, K. Tsuneki leg. (Coll. Tsuneki).

Remarks. In my 1985 key the present species runs to inconspicua Allen and Jaynes but is different from it in that the smaller punctures on mesopleuron are relatively much less numerous, inner margin of lateral denticle of GS 5 distinctly longer and areola with BAWL=10,6,12 and with lateral carinae incurved and median carina thicker towards base and reaching apex.

TIPHIA FEMORATA FABRICIUS, a new locality

Specimens examined: 5 ♀ 7 ♂, Inner Mongolia, Apaka; ♀, 15, 19, 27. VII; 5. VIII; and IX. 1939; ♂, 28. VI; 4, 5, 12, 16 and 19. VII. 1939, all leg. K. Tsuneki.

Remarks. In all the male specimens there is no transverse ridge on GT I and therefore they belong to ssp. biseculata Allen et Jaynes, occurring in Japan.

TIPHIA (JAYNESIA) OGURAI SP. NOV.

♀, closely related to T. (J.) ovidorsalis Allen et Jaynes, 1930, but can easily be separated from this species by the broadly reddish femora and tibiae except fore side of fore femur. In my 1985 key it can be inserted as follows:

- 4 GT 1 with a row of very minute punctures just behind its preapical fold 4A
- GT 1 without a well-defined row of minute punctures along posterior edge of preapical fold (.....), 11 mm koreana Rohwer, 1927
- 4A Femora and tibiae of legs broadly black or brownish black (pygidium not medianly carinate, scarcely wrinkled on apical half), 8 mm

— Femora and tibiae of legs broadly brownish red (ovidorsalis Allen et Jaynes, 1930 pygidium on medio-apical emargination of punctate part medianly ridged, apical smooth area laterally roughly but rather weakly wrinkled; upper frons with PIS comparatively uniform, mostly less than PD, without microsculpture, pronotum almost without well differentiated puncture band, punctures large and close, even on lateral disc PIS as large as PD, tegula dark brown, paler laterally, with a fine groove along posterior margin which is at its end at postero-outer corner roundly curled up, areola with BAWL=10,5,17, lateral carinae incurved, with apex rounded, median carina enlarged and flattened towards base, minute punctures and short, dense, brown pile on gastral tergites as in ovidorsalis), 8 mm, Korea ogurai sp. nov.

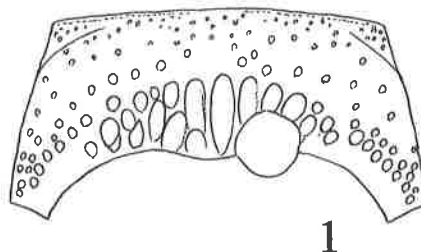
♂, unknown.

Holotype: ♀, Korea, Seoul, 16. VII. 1943, K. Tsuneki leg. (Coll. Tsuneki).

TIPHIA (TIPHIA) TAKEUCHII SP. NOV.

The present species (♀) runs in my English key (SPJIA 31) to couplet 30 and in my Japanese key (Hym. Comm., 21-22) to couplet 31 and in both runs out, because it differs either from phyllophagae or from corpulenta by having the very markedly longitudinally lengthened punctures at the median part of the puncture band of the punctate part of pronotum as given in Fig. 1.

Some other characters: Cubital cell 2 with AOPI=20,14,18,8, outer vein strongly sinuate, AOD:WAS:CL:CAW=18:10:10:12, on side of pronotum oblique furrow or carina indistinct, finely and closely striate and scattered with a few medium-sized punctures, on dorsum anterior carina present, but weak, tegula without marginal groove, areola with BAWL=10,8,18, with outer carinae gently sinuate, with latero-apical corners angulated and median carina reaching close to apex, G 1 wider than long, puncture band on dorsum with anterior impressed edge line laterally where punctures are in a single row and se-



parated from the impressed line, medianly in two irregular rows, without impressed line anteriorly, posterior area broad, in middle broader than band, on GT 2, 3 and 4 puncture band and impunctate central zone in front of each band distinct, pygidial area with rugosed punctures posteriorly larger, punctate part abruptly ended, with median emargination whence posteriorly impunctate area smooth and polished. Upper frons except lateral areas sparsely punctured, at mid-lateral areas PIS reaching 4 times PD. Length 8 mm.

♂, unknown.

Holotype: ♀, North Korea, Nanyo, 28. VII. 1935, K. Takeuchi leg. (Coll. Osaka Pref. Univ.).

TIPHIA (TIPHIA) HASEGAWAI SP. NOV.

In my previous keys the present species (♂) runs always to ishigakiensis of couplet 13, but disagrees with it. It can be separated from this species as follows:

- 13 Fore and mid tibiae broadly reddish brown 13A
 — Fore and mid tibiae broadly black or blackish brown 14
 13A Punctures on main part of mesopleuron large and close, angled and subreticulate, partly mixed with some fused punctures and a few minute ones, WAS:AOD:CL:CAW=10:8:17:11, clypeus with medio-apical margin roundly emarginate, on pronotum punctate part near its medio-apical emargination about twice the length of impunctate part, tegula without marginal groove anywhere, areola with BAWL=10, 6,13, median carina not reaching apex, puncture band of GT 1 shallowly depressed, somewhat broad, with punctures in a single irregular row, but partly doubled where punctures are smaller, with blunt impressed edge line anteriorly and punctures slightly apart from there, posterior area slightly narrower than band in middle. 6.5 mm, Ryukyus ishigakiensis Tsuneki, 1985
 — Punctures on mesopleuron medium-sized, largely sparse, rounded, PIS mostly 1-2 times, partly 0.5 times PD and in part mixed with some minute punctures, WAS:AOD:CL:CAW=10:9:15:12, apical margin triangularly incised, punctures on upper frons large and fairly sparse, especially sparser from median ocellus obliquely to antero-lateral areas where PIS reaching 2-4 times PD (punctuation of frons generally similar), anterior carina of pronotum high and distinct, punctures on disc large, uniform, sparse, on posterior margin of punctate part slightly closer, which is broadly emarginate in middle, by its sides punctate part about as long as impunctate part, sculpture on side generally similar (with oblique carina and fine furrow just above it, striae fine and close, without punctures scattered) tegula light castaneous brown, with a fine groove along posterior margin, areola with BAWL=10,7,17, median carina complete, with a deep groove on each side GT1 as long as wide at apex, puncture band broad, gently depressed, but without impressed edge line anteriorly, punctures in irregular 2-3 rows, posterior area broader than band in middle, GT 3-6 transversely microstriolate on PIS, radial cell not completely pointed at apex (similar), cubital cell 2 with AOPI=24,14,14, 8. 7.5 mm, N. Korea hasegawai sp. nov.

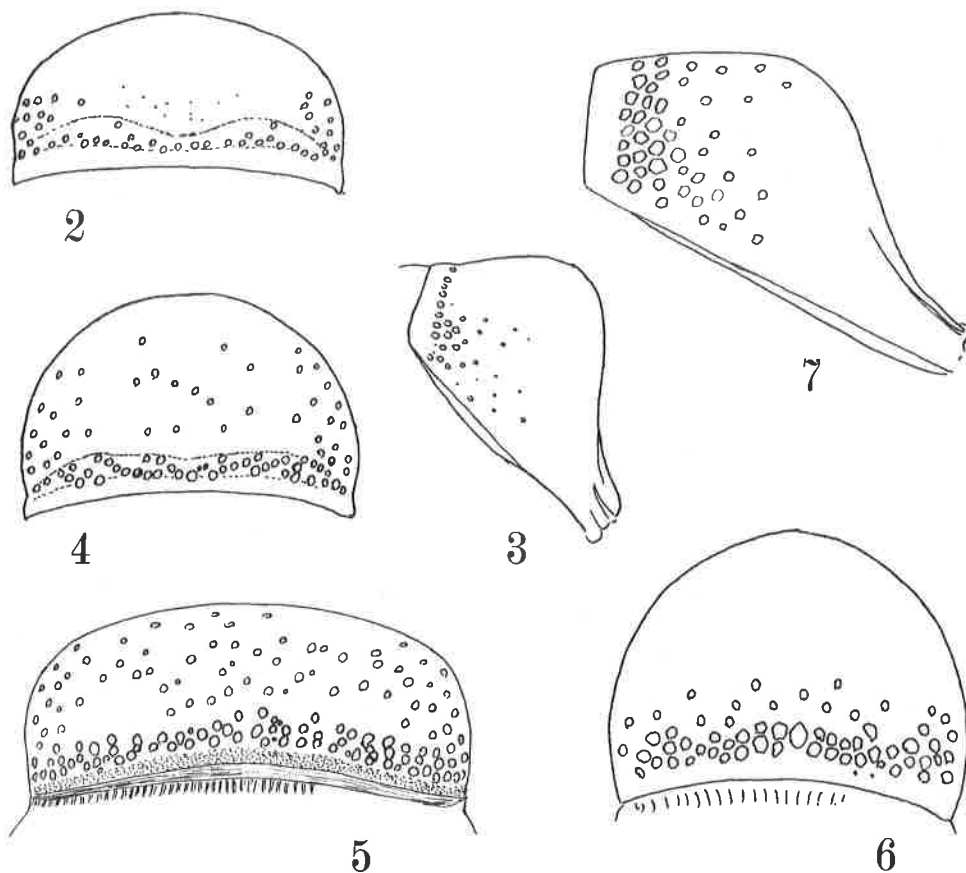
♀, unknown.

Holotype: ♂, North Korea, Mt. Kaya, M. IX. 1921, Hasegawa leg. (Coll. Osaka Pref. Univ. Fac. Agr.).

TIPHIA (TIPHIA) KAINIENANA SP. NOV.

In my previous keys the present species (♂) goes to couplet 11 and closer to yonguniensis Tsuneki, 1985, but is different from it as follows:

- 11 Main part of mesopleuron bipunctate with medium-sized and very minute punctures, the latter at least as numerous as the larger ones (all tibiae, fore and mid tarsi, apical part of hind tarsus, greater part of mandible and antennal flagellum beneath pale reddish ferruginous) 11A
 — Main part of mesopleuron unipunctate, if mixed with minute ones they are much less in number than large ones or only partly located 12
 11A Upper frons microcoriaceous on PIS, tegula dark brown, paler on marginal area, with surface distinctly microreticulate, areola subquadrate, only slightly narrowed posteriorly, with median carina reaching 7/10 from base, inner surface fairly smooth, GT 1 short, in dorsal view slightly more than twice as wide as long in



middle (Fig. 2, in lateral view: Fig. 3), with puncture band consisting of a single row of sparse punctures, bearing obtuse impressed edge line at anterior margin, punctures comparatively small and comparatively broadly separated from the anterior edge line, WAS:AOD:IAD:CL:CAW=10:12:6:16:10, radial cell of fore wing with apex not pointed, but minutely rounded), 5-6 mm, S. Ryukyus

yonaguniensis Tsuneki, 1985

- Upper frons smooth and shining on PIS, tegula pale ferruginous, surface without microsculpture, polished, without marginal groove, areola longer than wide, with BAWL=10,9,15, with postero-lateral corners angulated, inner surface irregularly, coarsely rugosed, GT 1 slightly longer than wide, in dorsal view less than twice as wide as long in middle (Fig. 4), with puncture band deeper, somewhat narrower, anterior impressed edge line stronger, punctures slightly larger and closer (Fig. 4), WAS:AOD:IAD:CL:CAW=10:10:5:18:11, radial cell with apex minutely rounded, bearing a short process at the curving angle), 6,3 mm, North Korea *kaineiana* sp. nov.

Some supplements: In *yonaguniensis* lateral angles of medio-apical margin of clypeus obtuse, punctures on disc rather uniform, only slightly larger anteriorly and very close, while in the present species lateral angles more acutely pointed, surface punctures more markedly stronger and larger anteriorly, with PIS wider and smooth and shining. In *yonaguniensis* punctures on dorsal part of pronotum large, close, subreticulate and slightly elongate just behind anterior carina, while in the present species punctures smaller, sparser and irregular in distribution, PIS mostly 0,5-2 times PD; on side in *yonaguniensis* oblique furrow consisting of a series of coarse punctures arisen from irregular enlargement of interstriae, while in the present species consisting of smooth edge line and fine furrow just above it, but this may be variable. Minute punctures on mesopleuron in the present species less numerous posteriorly than in

yonaguniensis, therefore posterior part of main part appears rather uniformly punctate. Further, in the present species punctures on disc of GT 2 much stronger and more numerous than in yonaguniensis and transverse microstriae on GT 3, 4 and 5 more distinct than in this.

♀, unknown.

Holotype: ♂, North Korea, Kainei, 1. VIII. 1935, K. Takeuchi leg. (Coll. Osaka Pref. Univ. Fac. Agr.).

Remarks. The specimen is already damaged by a noxious insect and the right eye is completely and the antennae are considerably eaten up.

TIPHIA (TIPHIA) SEOULENSIS SP. NOV.

The present species (♀) is closely allied to T. rufomandibulata Smith, 1873, but can be distinguished from it by the lack of marginal groove on the tegula. The relations with the related species can be shown by the following key (cf. SPJHA 31):

- 12 Each tibia distinctly pale brown, only on outer side of fore tibia slightly darkened (wings nearly transparent, tegula pale brown, surface microcoriaceous and along posterior margin alone finely grooved), 8.0 mm, Ryukyu
yonaguniensis Tsuneki, 1985
- Each tibia black or brownish black 12A
- 12A Length 7.5-12.0 mm, wings strongly clouded 12B
- Length 5.5-7.5 mm, wings only weakly clouded 13
- 12B Tegula dark brown, sometimes brown, from posterior to outer margin runs a fine groove which is frequently cut off at postero-lateral corner, with cut ends curled up like a hook (sometimes showing a patch of very minute punctures at centre of anterior aspect of GT 1)
rufomandibulata Smith, 1873
- Tegula brown, translucent, with marginal area broadly paler, without distinct groove along margin, but in some light posterior margin appears narrowly reflected (without a patch of very minute punctures on anterior aspect of GT 1), 8.3 mm, Korea
seoulensis sp. nov.

Some supplements: CAW=WAS, medio-apical margin of clypeus gently emarginate, with lateral corners rounded, not reflected, marginal area broadly smooth and bordered posteriorly with a line of gross punctures, remaining narrow posterior area filled with dense, very minute punctures; punctures on upper frons strong and sparse, in distribution similar to Fig. 29 of SPJHA 31, without microsculpture on PIS, on pronotum also large and strong, but here rather close, only on mid-lateral disc slightly sparse and PIS reaching 1.5 times PD, puncture band not well differentiated, side with a distinct oblique furrow, surface below it finely, closely striate, above it very delicately microstriolate (almost smooth and shining), with some strong punctures scattered anteriorly (but the sculpture may vary); on mesoscutum anterior furrow not completely connected with notauli; punctures on mesopleuron strong and close, angulate and subreticulate, PIS smooth. Areola with RAWL=10,8,20, outer carinae gently incurved, with postero-lateral corners angulated, median carina complete, each carina bordered on each side with a strong crenate furrow, lateral areas only on posterior fourth obliquely, strongly rugoso-striate, stigmatal hollow about twice as long as its posterior area side finely, closely striate, with antero-ventral part almost smooth and polished, posterior aspect with lateral elevations weak, median carina reaching near mid point, GT 1 as long as wide, in vertical view dorsal area very short, W:L=40:17, similar to Fig. 2, preapical puncture band bluntly depressed, consisting of a single row of large punctures on broad median area, only from mid-lateral area laterally enlarged to two rows and connected with the puncture group of the sides, the band without acute impressed edge line anteriorly, only at mid-lateral enlarged areas some punctures contiguous to the neighbouring ones, giving rise to acute edge line at their anterior margin; GT 2 comparatively closely covered with large and medium-sized punctures, bearing very distinct puncture band and impunctate zone in front of it, GT 3 with punctures largely uniform, without distinct impunctate central zone. Pygidial area with rugoso-punctate area bordered at posterior margin with some very large punctures, median emargination large, posterior impunctate area without wrinkle or rugae, but the surface not shining. GS 1 with lateral furrows distinct and long, reaching before middle, basal area including medial ridge strongly, closely punctured, rest of the surface smooth. Cubital cell 2 of fore wing with AOPI=20,17,25,8, with outer vein moderately sinuate.

♂, unknown.

Holotype: ♀, Korea, northern suburbs of Seoul, 20. VIII. 1942, K. Tsuneki leg.

TIPHIA (TIPHIA) JULIANA FUZANENSIS SSP. NOV.

Tiphia Juliana Parker, Jour. N. Y. Ent. Soc., 45: 275, 1937 (Japan, Honshu, Hokkaido).
Tiphia kisukei Tsuneki, SPJHA, 31: 57, 1985 (Japan, Honshu and Hokkaido).

The Korean specimen examined differs from the Japanese ones in that the legs and antennae are generally more brownish. Antennae blackish brown and ferruginous beneath; legs besides fore and mid tibiae and tarsi all knees broadly pale reddish brown.

♀, unknown.

Holotype: ♂, Korea, Fuzan, 4.VIII. 1985, T. Tano leg. (Coll. Tsuneki).

Paratypes: 2 ♂, same as above (Coll. Tano).

TIPHIA (TIPHIA) SATSUMENSIS SP. NOV.

The present species (♀) is closely related to T. magnoliae Tsuneki, 1985, differing from it (or its usual form - marked with asterisk) in the following characters:

1*. Mesopleuron and upper frons without microcoriaceous sculpture on PIS (in exceptional specimens of magnoliae similar).

2. Puncture band of GT 1 in irregular 2-3 rows, slightly depressed as a whole, but without impressed edge line at anterior margin.

3. Surface of main part of GS 1 flat, without median furrow, not polished, fairly closely covered with very minute hair points (as in sternata), lateral furrows distinct on posterior half (do.), at base on lateral marginal areas strongly and coarsely rugoso-punctate and apically on lateral broad areas sparsely scattered with medium-sized shallow punctures.

4. Side of pronotum with distinct oblique furrow or carina (but this may be variable).

5. Slightly larger than the usual Honshu specimens of magnoliae, measuring 11.5 mm in length.

Supplementary notes: In my key (SPJHA 31) the present species runs to couplet 35 and considerably close to magnoliae, but not completely agrees with it, especially as to the characters of GS 1. Mandible with a puncture line on outer side, medio-apical margin of clypeus moderately, roundly emarginate and emarginated part strongly depressed, disc except anterior and lateral marginal areas strongly, closely punctured, lateral margin somewhat incrassate but not roundly swollen out; punctures on upper frons and mesopleuron large, rounded, uniform and considerably close; anterior carina of pronotum weak, but distinct, can be seen as a fine black line in counter light, punctures on disc almost uniform in distribution, only at posterior margin of the punctate part somewhat closer and arranged in two rows. Emargination of the punctate part of pygidium longitudinally, finely and closely striate, showing that it is not the member of T. sternata Parker, though the characters of GS 1 is similar to that of this species. GT 1: Fig. 5, puncture band in irregular 2-3 rows, without impressed line anteriorly.

Holotype: ♀, Shimota, Kagoshima, Japan, 3. V. 1969, K. Kushigemati leg. (Coll. Kagoshima Univ., Fac. Agr.). ♂, unknown.

TIPHIA (TIPHIA) KAWAMURAI SP. NOV.

In my previous key the present species (♂) runs to couplet 11 and closer to yonaguniensis, but differs from it markedly in the structure of G 1 (Figs. 6 and 7, cf. Figs. 2 and 3 in yonaguniensis) and considerably in many other characters. It resembles more closely T. kaineiana described in foregoing pages, but can be separated from it by the following differences:

1. G 1 relatively much longer, in dorsal view W:L=60:45, in kaineiana 60:35 and in yonaguniensis 60:25 (Fig. 6, cf. Figs. 4 and 2, in lateral view: Fig. 7, in yonaguniensis: Fig. 3).

2. Legs, mandible basally and antennal flagellum beneath much less ferruginous.

3. Tegula black and shining.

4. Areola with BAWL=10,8,16, apex rounded, lateral carinae gently incurved, median carina complete, surface coarsely transversely striate and strongly inclined toward the depression in front of apical carina.

5. Puncture band of GT 1 without anterior impressed edge line, consisting of two irregular rows of close, large, angulated punctures, with posterior area very broad.

6. Puncture bands of GT 2-5 distinct, each consisting of a single row of close

punctures, bearing distinct impressed edge line anteriorly, with posterior area very broad, but without the line of minute punctures on it except lateral parts of GT 4 and 5.

Some supplements: WAS:AOD:IAD:CL:CAW=10:8:5:16:16, medio-apical margin of clypeus broad and deeply emarginate, with lateral corners comparatively large triangular but not reflected, disc closely punctured till apex, punctures anteriorly strong and large and gradually weaker and smaller posteriorly. Punctuation on frons and vertex generally similar in pattern to that of vernalis ♂ (SPJHA 31, Fig. 79); lower frons and sides of upper frons punctures close, subreticulate, on central area sparse, PIS 0.5-1 times PD, in front of fore ocellus and obliquely from it towards broad impunctate spaces present, ocellular areas also very sparsely punctured, each including about 10 punctures forming irregular rows. Punctures on disc of pronotum large and medium-sized mixed, fairly close, PIS mostly 0.5-1 times PD, puncture band not distinctly differentiated; on side (in this specimen) at about middle 3 strong carinae, about half as long as the length of the area present, below them striae stronger than above, the latter weaker upward and invaded by some large punctures from dorsal side. Mesopleuron bipunctate not only on main part, but also on posterior inclined part, minute punctures not very abundant, but more numerous than large ones (in this respect in yonaguniensis minute punctures partly less numerous than large ones, with possibility of being taken as simply punctured). Punctures on disc of GT 2 medium-sized and sparse, PIS 2-4 times PD and sparser and larger posteriorly, on 3 and 4 similar in pattern, but punctures generally comparatively closer; GS 1 with long lateral furrows, reaching near base, basal area and sides fairly closely covered with large punctures. Length 6.0 mm.

♀, unknown.

Holotype: ♂, Mt. Tebako, 1930 m near Mt. Tsurugi, Shikoku, Japan, 9. VIII. 1957, K. Kawamura leg. (in his Coll.).

TIPHIA (TIPHIA) BABAI SP. NOV.

♂, 7.5 mm. In my 1985 key the present species runs to couplet 13 and closer to T. ishigakiensis, but not agrees with it. The species can be separated from ishigakiensis by the following distinctions:

Body slightly larger, fore and mid tibiae on outer side considerably broadly black but fore and mid femora broadly reddish ferruginous, upper frons and pronotum distinctly microcoriaceous on PIS, with punctures much closer, at mid-lateral areas of upper frons PIS less than twice PD, side of pronotum not strongly striate, but very finely, closely, microcoriaceously striolate and scattered with some large punctures on marginal areas, oblique carina present below middle, accompanied just above with a series of obliquely elongate punctures, that runs up posteriorly to the hollow before tegula where it becomes weak, surface behind the carina along posterior margin without sculpture, well shining; microreticulation on PIS of mesoscutum stronger and more distinct than in ishigakiensis, punctures irregular in distribution, similar in pattern in this respect, but much closer; tegula black and thick, with surface microcoriaceous, without marginal groove along outer side, scutellum without broad PIS anteriorly as shown by ishigakiensis and more uniformly punctured; punctures on mesopleuron not so close as subreticulate and in form rounded, including some that are somewhat smaller than others and much closer anteriorly, on main part PIS mostly 0.5-1 times PD, areola with BAWL 10,7,15, with outer carinae incurved except extreme base and broadly rounded at apex, therefore it appears much less convergent apically and markedly different in form from that of ishigakiensis, with median carina finer and weaker on posterior 2/3 and surface more irregularly, coarsely transversely striate, lateral areas on inner half transversely and coarsely striate, side of propodeum at antero-ventral area very feebly microstriolate (in ishigakiensis striae only slightly finer and closer there), mixed irregularly with transverse impressions, posterior aspect similar in form and in state of median carina, but surface below dorsal carina very broadly smooth and polished. GT 1 as long as wide, with preapical band broader than in compared species, consisting of irregular two rows of punctures and more deeply depressed, posterior area also broader, in middle where the band produced posteriorly as broad as the band, punctures on disc relatively somewhat larger and closer, with PIS not polished, but microcoriaceous, although feebler than on other GT, GT 2 more largely and closely punctured than on GT 1, with PIS transversely, more distinctly microrugosostriate as on GT 3-7.

WAS:AOD:CL:CAW=10:7:18:10, cubital cell 2 with AOPI=20,15,13,7, inner and outer abscissae of its posterior vein relatively 7.5 : 6

The present species is also close to hasegawai described in foregoing page, but

is different from this in that fore and mid femora broadly reddish ferruginous, punctures on upper frons much closer, with PIS, together with that of pronotum, distinctly microcoriaceous, disc of GT 1 and 2 not polished, but microcoriaceous and preapical band of GT 1 medianly produced posteriorly where band as broad as posterior area.

The present species is also similar in appearance to magnoliae, but can be distinguished from it by the lack of microreticulate sculpture on mesopleuron, by the presence of microcoriaceous- or microstriolate sculpture on GT 1 and 2 and especially by the relatively broader AOD as against WAS (in magnoliae WAS:AOD=10:5).

♀, unknown.

Holotype: ♂, Niigata Pref., Ikenodaira, Japan, 14. IX. 1976, K. Baba leg. (Coll. Tsuneki).

Paratype: 1 ♂, Kyoto, Kibune, Japan, 14. VIII. 1938, K. Takeuchi leg. (Coll. Ent. Lab. Fac. Agr. Osaka Pref. Univ.).

Remarks. The paratype is already considerably damaged by the noxious insect and the right eye and the right pronotum are deeply eaten out. The areola in this specimen with BAWL=10,8,12, median carina thick and complete and with latero-apical corners angulated, surface sculpture of lateral areas more regular, obliquely closely striate, without disturbance at antero-outer areas.

TIPHIA (TIPHIA) KAMAKURAE SP. NOV.

♂, closely allied to T. sakurae Tsuneki and in my 1985 key runs to this species, but differs from this in the following characters:

1. Slightly smaller, 5.0 mm in length (sakurae 6.0 mm).
2. Punctures on pro- and mesonotum distinctly larger than those of upper frons and mesopleuron (in sakurae similar in size).
3. Upper frons, except lateral and anterior marginal areas, carrying much less numerous punctures, about 10 in number on one side (in sakurae about double the number).
4. Disc of clypeus bipunctate on posterior half (in sakurae subreticulate).
5. Punctures on gastral tergites finer and sparser and from GT 3 posteriorly surface feebly, transversely microstriolate (in sakurae punctures large and without microstrioles).
6. GS 1 with main part bearing 2 or 3 punctures near base (in sakurae sparsely scattered with punctures).
7. In fore wing stigma twice as long as broad (in sakurae 2.6 times so), cubital cell 2 with anterior vein distinctly longer than posterior vein (in sakurae A=P).
8. Dorsal aspect of propodeum with surface mainly microcoriaceous (in sakurae strongly rugosed and microstriated).
9. Mesopleuron much more finely and sparsely punctured.

♀, unknown.

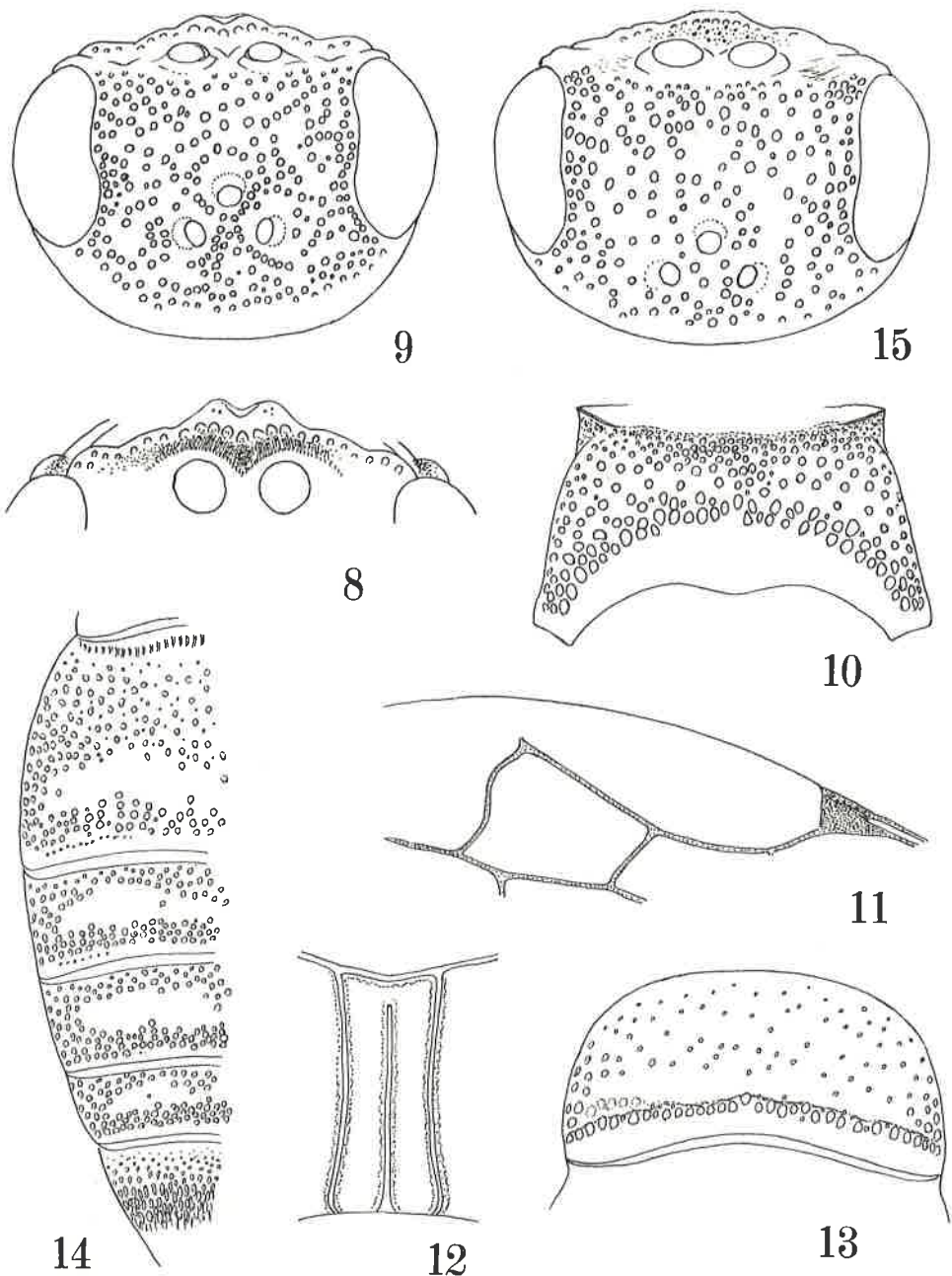
Holotype: ♂, Kamakura, Kanagawa Pref., Japan, 3. VII. 1954, H. Nagase leg. (Coll. Nagase).

Paratype: 1 ♂, same data (Coll. Nagase).

TIPHIA (TIPHIA) NAGASEI SP. NOV.

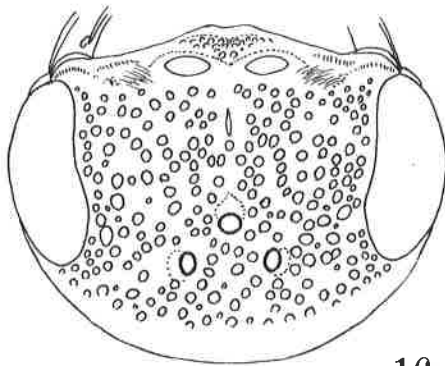
The present species in the Allen et Jaynes's 1930 key runs to couplet 33 and runs out and in my 1985 key runs to couplet 22 (dzickok) or to 44 (nipponica, a synonym of burrelli Parker), because under low magnification couplet 22 is uncertain, but at neither of them agrees with the species. However, the present species is considerably similar to dzickok and judging from the marked variation in this genus it may be considered a form of this species. But the following differences seem to exceed the usual range of variations of a species and it is treated as distinct:

Head seen in front with eye comparatively broader and frons comparatively narrower (Fig. 9 in nagasei, cf. Fig. 15 in dzickok). In nagasei ratio of HW to eye width is 60:10.5, while in dzickok 60:9 and minimum IOD at fore ocellus to HW is in nagasei 35:60, while in dzickok 40:60. Clypeus with medio-apical margin deeply emarginate and depressed, in dzickok apical margin truncate and not depressed, punctures on frons, pronotum, mesopleuron and gaster much closer (e.g. Fig. 9, cf. Fig. 15), a series of very minute punctures present on sides of apical smooth area of GT 2 and 3 (in dzickok on GT 2 only) and main part of GS 1 slightly longer than equilateral triangle (in dz. equilateral). Further slight differences observed in form of areola, colour of tegula,

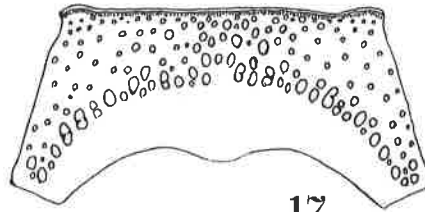


state of central impunctate zones of GT 2-5, in height of baso-medial ridge and in length of lateral furrows of GS 1 and body size are not important. These may be considered to be within the range of individual variations.

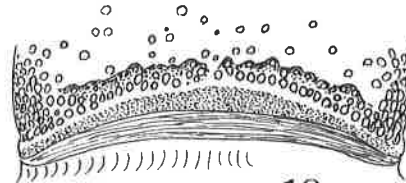
The present species considerably resembles *burrelli* certainly in structure, but *burrelli* is much larger (13-17 mm), punctures on disc of GT 1 and 2 much larger and closer and puncture band of GT 1 much broader, consisting of irregular 2-3 rows and enlarged towards sides. The present species is also similar in appearance to so-called *mediocris* Parker, since general punctation is very close to this (cf. Figs. 16, 17 and 18), but differs from it in the lack of medial furrow on outer side of mandible



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17



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Figs. 16, 17 and 18. One of the paratype females of *T. mediocris* Parker.

and the structure and punctation of clypeus.

♀, length 10 mm, mandible widely reddish brown medially, apically narrowly dark brown, outer side without medial furrow, but with a line of sparse, fine, elongate, shallow punctures, antennal flagellum slightly brownish beneath, tegula slightly longer than wide, dark brown, paler periphely, semitransparent, without marginal groove, but postero-inner area broadly depressed, carrying a few large piliferous punctures and numerous minute points, surface of outer part under 50× magnification feebly microcoriaceous, legs with apices of femora and of tibiae and spines castaneous brown, all spurs pale ferruginous, longer one of hind tibia widest at turning part slightly apart from base. Wings considerably brown, stigma with apical margin shorter than posterior margin, outer vein of cubital cell 2 distinctly sinuate, but not angulate at top of posterior curve (Fig. 11).

OOD:Od:POD=10:3.5 (pupil much smaller):6. WAS:AOD:IAD:CL:CAW=10:18:6:11:10. Clypeus: Fig. 8, medio-apical margin distinctly emarginate and emarginated part depressed, lateral margin medially gently, roundly produced anteriorly (in *mediocris* nearly straight), apical impunctate smooth area bordered posteriorly with a line of gross punctures, but disc medianly microreticulate and laterally longitudinally, somewhat radiately microstriolate (in *mediocris* apical impunctate area bordered with two rows of punctures, anterior row of gross, posterior of medium, thence posteriorly very minutely, closely punctured - but this may vary -, with surface fairly shining). Punctures on frons and vertex: Fig. 9, somewhat similar to that of *mediocris*, but punctures generally slightly finer (cf. Fig. 16); punctation on pronotum: Fig. 10, puncture band in 2-3 rows of punctures that are similar in size to those of disc (in *mediocris* in 1-2 rows of punctures that are larger than those of lateral disc - cf. Fig. 17), side of pronotum with oblique furrow thrice interrupted into 4 pieces, irregular in length and width (possibly variable); anterior impressed edge line of mesoscutum continuous to notauli through anterior margin of 4 contiguous punctures; punctures on postscutellum mainly on posterior margin present that are distinctly smaller than those on posterior half of scutellum; mesopleuron fairly closely covered with large angulated punctures forming transverse, close, but irregular rows, mixed with a few minute punctures, PIS on interpuncture series less than PD and feebly microcoriaceous under 50× magnification. On dorsal aspect of propodeum areola: Fig. 12, lateral areas transversely microstriolate and scattered with small punctures on inner half, sides normal, striae on dorsal and posterior parts fine and close; posterior aspect with dorsal carinae weakly raised, width between lateral corners to height above it in middle 30:4, this is due to that dorso-lateral carinae are downcurved, median carina reaching close to dorsal carina, without bordering grooves on both sides. GT 1 about as long as wide, without a patch of close, minute punctures on anterior aspect, seen from above puncture band in a fine furrow, consisting of a single irregular row of punctures (Fig. 13), but under anterior oblique light no anterior impressed edge line observable, each puncture distinctly separated from neighbouring ones (in this specimen on left lateral area a series of large shallow punctures attached in front of the band - Fig. 13 -, but none on the right hand), punctures on disc finer than those of the band and very sparse.

Punctuation on GT 2-5 very similar to that of *mediocris*, but punctures generally finer, puncture band on GT 2 much broader, impunctate central zones more distinct, posterior smooth areas broader and with a transverse series of very minute punctures on lateral areas of GT 2 and 3 (Fig. 14); GS 1 with main part slightly longer than equilateral triangle, medio-basal ridge broadly expanded and lowered in inverted Y-shape, without distinct lateral furrows on both sides of basal ridge, surface at base irregularly, coarsely rugosed and punctured, remaining area flat, with a weak rounded elevation medianly before apex and with an indistinct furrow from medial apex of basal ridge till there, surface fairly closely covered with very minute, short-hair-bearing points and scattered very sparsely with medium-sized punctures, lateral furrows very short at apex, but continued anteriorly by a series of several punctures till lateral apex of basal ridge.

Key:

- 22 Upper frons and pronotum without microcoriaceous sculpture, well shining (lateral margin of clypeus medianly gently roundly produced, puncture band of GT 1 narrow including a single row of punctures) 22A
- Upper frons, at least on antero-lateral areas, microcoriaceous, sometimes feebly so 23 44
- 22A Head seen in front with eye comparatively narrow, one seventh the width of head, with ratio of IOD at fore ocellus to HW 40:60, upper frons sparsely punctured (Fig. 15), disk of clypeus behind anterior line of gross punctures bipunctate (upper frons under 70× magnification feebly microcoriaceous, posterior area of GT 2 laterally without a series of minute punctures, main part of GS 1 equilateral triangular, with baso-medial ridge acutely, highly elevated), 7 mm
dzickok Tsuneki, 1985
- Head seen in front with eye broader, more than one sixth the width of head, with ratio of IOD at fore ocellus to HW 35:60, upper frons comparatively closely punctured (Fig. 9), disc of clypeus behind anterior row of gross punctures longitudinally, finely, closely striate (upper frons even under 70× magnification without microsculpture, posterior area of GT 2 with a line of minute punctures on lateral portions, main part of GS 1 slightly longer than equilateral triangular, with baso-medial ridge low and obtuse), about 10 mm
nagasei sp. nov.
- 44 Anterior aspect of GT 1 with a patch of dense minute punctures, 10-17 mm
latistriata Allen et Jaynes, 1930
- Anterior aspect of GT 1 without a patch of dense minute punctures 45
- 45 Large species, usually 13-17 mm (only rarely 10 mm), puncture band of GT 1 except median portion broad, consisting of 2-3 rows of punctures, on GT 2 posterior area completely lacking laterally (punctures on head and gaster comparatively larger and closer)
burrelli Parker, 1937 (= *nipponica* Tsuneki, 1985)
- Smaller, 10 mm, puncture band of GT 1 consisting of a single row of punctures throughout, not enlarged laterally, posterior area of GT 2 broad throughout, carrying a line of very minute punctures on lateral portions (punctures on head and gaster comparatively finer and sparser)
nagasei sp. nov.

♂, unknown.

Holotype: ♀, Tokyo (Komaba), 29. IV. 1953, H. Nagase leg. (Coll. Nagase).

TIPHIA (TIPHIA) YOICHI SP. NOV.

The present species (♂) can be inserted into my 1985 key by changing it as follows:

- 15 Tegula about twice as long as wide *iriomotensis* Tsuneki
- Tegula only slightly longer than wide 15A
- 15A Puncture band of GT 1 broad, consisting of irregular doubled rows of large uniform punctures and almost not impressed into a furrow (areola nearly as long as wide, more or less narrowed posteriorly, BAWL=10:8-9:10, punctures on upper frons and pronotum nearly as in *brevilineata*, on mid-lateral areas of upper frons maximum PIS about doubled PD, on pronotum punctate part remarkably emarginated in middle, by its sides punctate part more than twice as long as impunctate part, puncture band of GT 1 in median area broader than, but at mid-lateral areas narrower than posterior area, punctures on GT 3 as in *higoensis*, at base not particularly fine, almost without very sparsely punctate central zone, PIS on all GT shining, without microstriae), 8-9 mm, Tochigi Pref., Japan
yoichii sp. nov.
- Puncture band of GT 1 consisting of a single row of punctures and distinctly im-

♀, unknown.
 Holotype, ♂, Kurakake-Hill, at the suburbs of Utsunomiya, Tochigi Pref., Japan, 10. V. 1936, K. Tsuneki leg. (Coll. Tsuneki).
 Paratype: 1 ♂, Haguro-Hills, near Utsunomiya, Tochigi Pref., Japan, 3. V. 1936, K. Tsuneki leg. (Coll. Tsuneki).

ON THE RELATIONSHIPS AMONG POPILLIAVORA, PHYLLOPHAGAE,
OVINIGRIS, SMITHI AND MEDIOCRIS

The male:

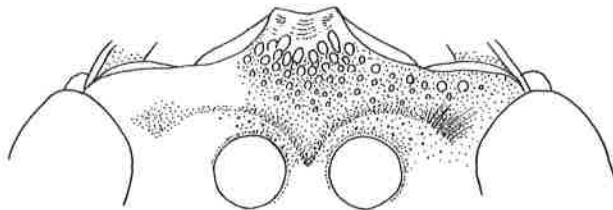
T. popilliavora Rohwer, 1924, is characterized by the frons laterally bipunctate, but among the specimens the developmental degrees of the minute punctures are considerably variable and in some cases it becomes quite doubtful whether the specimens belong to this species or not. Similarly, the form and relative width of median produced part of clypeus are variable and in the extreme case the width of medio-apical margin of clypeus (CAW) becomes almost equal to the width of antennal socket (WAS), with the lateral angles pointed and the clypeus as a whole strongly elongated and the distance between the clypeal apex and antennal socket rim (CL) becomes nearly twice as long as CAW, with the various intermediate grades of $CAW < WAS$ and $CAW > CL \times 1/2$. On the other hand, in this species the state of the puncture band of GT 1 is also variable, from 2-3 irregular rows of close punctures to a single irregular row of sparse punctures, with the band as a whole sometimes more or less depressed and sometimes undepressed and in the former case bearing partly or wholly the impressed edge line at the anterior margin. Therefore, in a combination a form is given rise to in which CAW nearly as great $CL \times 1/2$, upper frons almost or completely without minute punctures on the sides and puncture band of GT 1 shallowly depressed, with a single or doubled rows of punctures within it. This is certainly the form of phyllophagae Allen et Jaynes, 1930 and considered to correspond to the other sex of smithi Hedicke, 1936, ♀ (= fuscipennis Smith, 1873, nec Klug, 1810). T. medioeris Parker, 1937 is only a variety of this form in which clypeus is slightly shorter and preapical band of GT 1 consists of a single irregular row of sparse punctures located at its posterior margin of shallow furrow (cf. Figs. 25 and 37).

In the collection of the Entomology Laboratory of the Ministry of Agriculture and Forestry at Tsukuba, Ibaragi Prefecture there are 10 ♂♂ of T. popilliavora that were collected by N. Kumazawa on Sept. 23, 1937 at Akabane, Tokyo, in those days a grassland covered partly with forest trees. The specimens were possibly collected at the same place, because many species of this genus have a habit of forming a group in one place. Therefore, there is little doubt that they belong to the same species. While, in these specimens the lateral punctation of upper frons showed a considerable variation and similarly so the form of clypeus and the character of puncture band of GT 1 and two of them completely agree in characters (cf. Figs. 19 and 20, puncture band of GT 1) with medioeris Parker, a variety of phyllophagae.

Clypeus in typical popilliavora ♂: Fig. 21, in typical Japanese form of phyllophagae ♂: Figs. 22, 23, 24, but among the specimens many intermediate forms are present and frequently it is very difficult to determine to which form of the two they belong, and in one of the paratypes of medioeris ♂: Fig. 25 (compare with Fig. 22). Puncture band of GT 1 in typical popilliavora: Figs. 26-31, in typical Japanese form of phyllophagae: Figs. 32-36 and in one of the paratypes of medioeris: Fig. 37. In this character, even when the clypeus is typical to each species the separation is usually very difficult.

The female:

T. popilliavora was originally described with 15 ♀ 1 ♂ from Koiwai, Iwate Pref., Japan, 17 ♀ from Suigen, Korea and 3 ♀ 6 ♂ reared in U. S. A. from material imported from Japan. Later in 1930 when Allen and Jaynes described phyllophagae with many spe-



25

cimens from Korea and China and those reared from these in U. S. A., 9 females from Suigen, Korea, that were formerly paratypes of popilliavora Rohwer were separated from this species and placed under phyllophagae. The separation was made mainly upon the basis of the difference in punctuation on the pronotum in ♀ (and of the difference in form of the clypeus in ♂ as mentioned above).

According to Allen and Jaynes in phyllophagae ♀ punctuation on the pronotum is as in Fig. 38, puncture band consisting of markedly different-sized punctures, including some very large ones and punctures on lateral disc being very minute and sparse. They added to this character, as differences from popilliavora, the lack of the longitudinal series of very minute punctures on vertex behind ocellar area and the well defined oblique furrow on the side of pronotum. But both the characters are very variable in developmental degrees and not important, since the same cases are frequently observed in popilliavora also.

Through the courtesy of Dr. Krombein, Smithsonian Institution, I could observe the 416 paratype females of phyllophagae from Korea, China, including many that were reared from these and 2 from Koiwai, Japan. Certainly most of them belong to the typical form, but some, including 2 Japanese, are considerably close to popilliavora. In these specimens the difference in puncture-size of the pronotal band is less marked and the punctures on lateral disc are comparatively larger. The state is certainly that of the Japanese form of phyllophagae, namely smithi (Figs. 39-44) and can not be separated in some cases from that of popilliavora (Figs. 45-47) and of course from that of mediocris (Fig. 17, in one of paratypes).

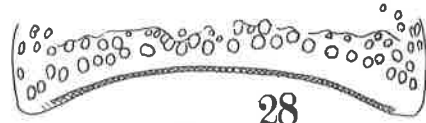
To add to the longitudinal series of very minute punctures on vertex behind ocelli it is sometimes present also in phyllophagae and in mediocris as mentioned by the respective authors and in some other species also as given by me in the keys of my previous papers. In popilliavora the series is usually present, but the number of the minute punctures is quite variable, sometimes only a few and sometimes completely lacking.

On the other hand, Allen and Jaynes (1930) described from Korea ovinigris in which the male is unknown and in which the punctures on the puncture band of pronotum are more uniform and those of lateral disc are much larger than in phyllophagae, but otherwise very similar to this species. As mentioned in my previous paper (SPJHA 31), however, there are many intermediate forms between the two and they are practically unseparable from each other (Ibid., Figs. 226-229). The presence of some intermediate forms between the two was already mentioned by Allen and Jaynes in their remarks to phyllophagae, but they placed such forms under this species, basing upon the presence of oblique groove on the side of pronotum, a variable and unreliable character. To me it seems, however, that the undiscovery of the male of ovinigris suggests that they are merely variation of the same species, although it is said that ovinigris is biologically distinct from phyllophagae, as is the case between popilliavora and phyllophagae, as shown by their respective specific trivial name. Among the hunting wasps, however, it is not an unusual fact that a species hunts several related species of the prey and it is rather exceptional that the prey is confined to a single species. The fact can easily be observed when the hunting activity is made over the ground, even when the wasp hunts a single individual of prey for her single offspring. But it is difficult to confirm the fact when the hunting is made under the ground and the prey is confined to a single individual, as is the case among the species of the present genus. Therefore, it is not always sure to determine the species of the hunters upon the basis of the prey species, unless it is experimentally confirmed under the conditions in which the wasp can choose her prey from among the several related species including the named one that the species hunts always the named species of prey exclusively under every condition. Allen and Jaynes did not compare ovinigris with popilliavora, but judging from their short comparative description of ovinigris with phyllophagae ovi. is very close to such form of pop. in which the minute punctures on the vertex are not differentiated, namely mediocris. The resemblance of med. to ovi. is already pointed out by Parker when he described mediocris (but he separated med. from ovi. basing mainly upon the difference in the relative length of lateral furrows of GS 1 - a variable and incredible character as specific distinction). The Korean specimens that were referred by me to ovinigris-type of phyllophagae in my previous paper (SPJHA, 31, p. 20, figs.) are certainly the same as mediocris or a form of popilliavora.

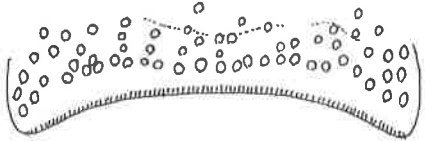
Rohwer (1924) in his description of popilliavora included in this species some specimens from Korea that were reared from grubs of Phyllophaga and that had an oblique groove on the side of pronotum. He considered the latter character quite variable and unimportant and did not take up as specific distinction, possibly also the punctuation on the dorsum of pronotum, though he did not allude to its variation. While,



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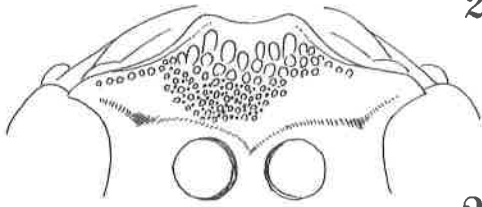
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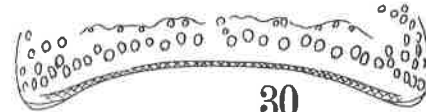
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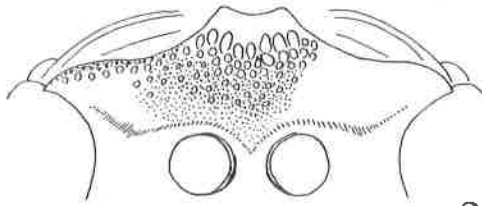
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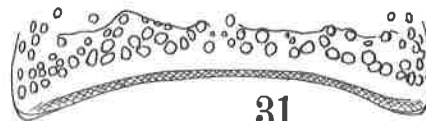
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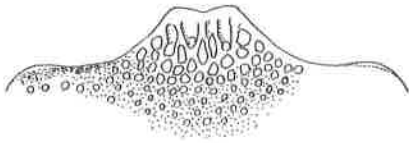
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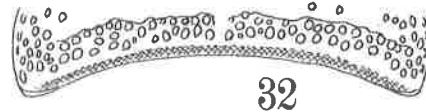
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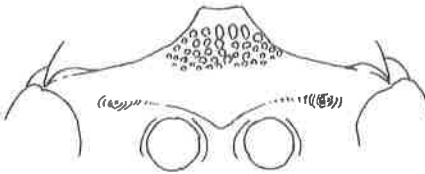
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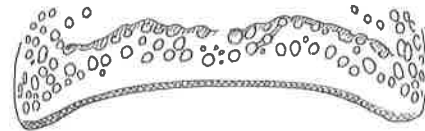
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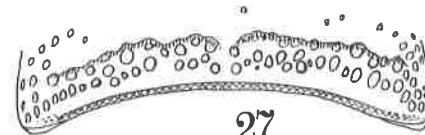
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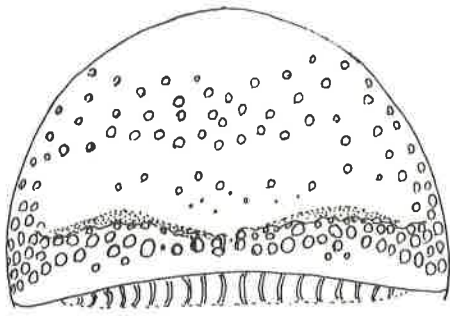
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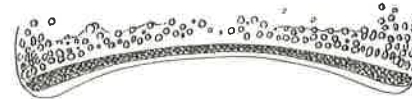
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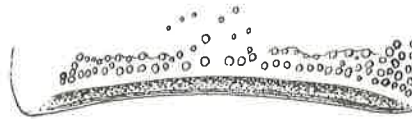
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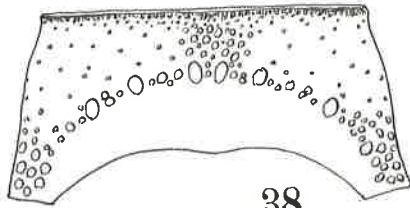
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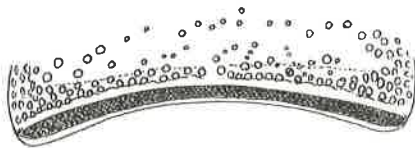
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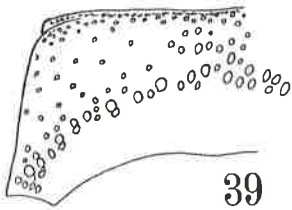
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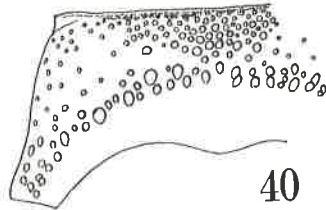
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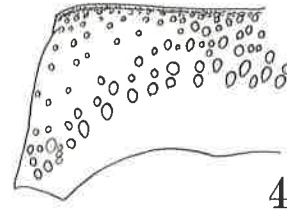
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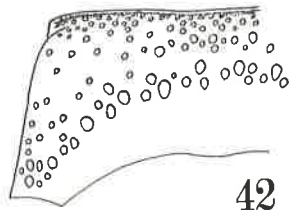
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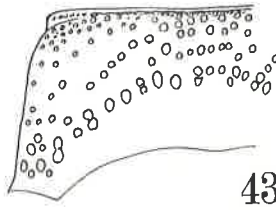
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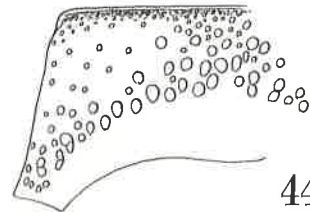
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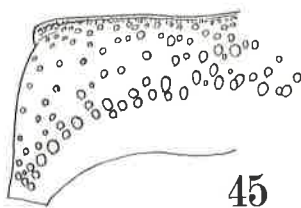
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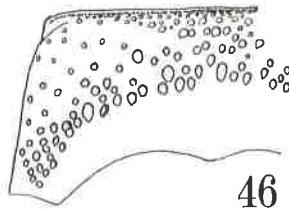
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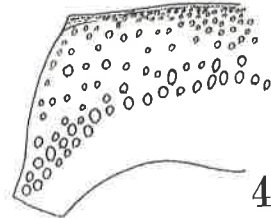
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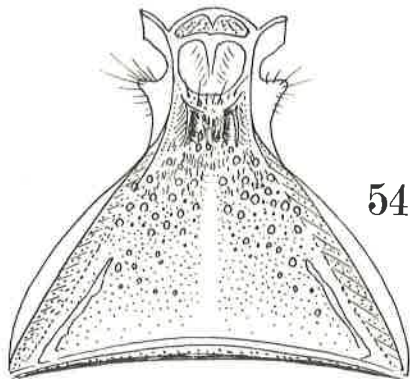
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Allen and Jaynes placed a stress on the oblique furrow in question and used this as one of the important distinctions to separate phyllophagae from ovinigris and also from popilliavora. (Based upon this character they separated also agilis Smith into agilis s. str. and asericae A. et J., but I did not follow their treatment because of its marked variation as mentioned by Rohwer).

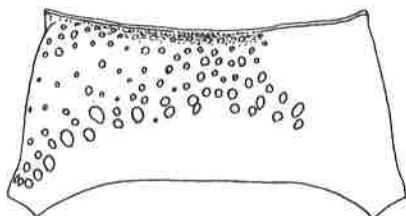
As to the puncture band of GT 1 in both popilliavora and phyllophagae, it also can not be separated from each other (cf. Figs. 48-50 in phyllophagae and Figs. 51-53 in popilliavora).

The sculpture on GS 1 in one of the paratype females of mediocris; Fig. 54; in one of the paratype males GS 1 slightly longer, baso-medial ridge weaker and densely covered with minute punctures, lateral furrows similar, but surface smooth and polished, only on basal half scattered with some large punctures. But among the specimens that are considered the same with this form the sculpture of the area is considerably variable in both sexes and can not characterize the species.

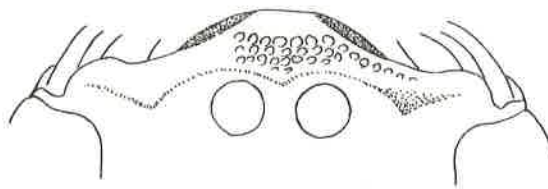
I can give here one instance of aberratio of the present group that can not be placed under either so-called Japanese form of phyllophagae or popilliavora. The specimen (♀) is captured in the suburbs of Kagoshima City on Nov. 1, 1963. It has a distinct median groove on outer side of mandible; punctures on dorsum of pronotum (Fig. 55) rather close to those of phyllophagae, but clypeus (Fig. 56) shorter than in this and truncate at median apex; punctures on frons and vertex (Fig. 57) sparser than in either of the compared species and without series of minute punctures behind ocellar area; side of pronotum (Fig. 58, right side, T: tegula) without the oblique furrow, instead with a line of elongated punctures; puncture band of GT 1 (Fig. 59) consisting of a single irregular row of



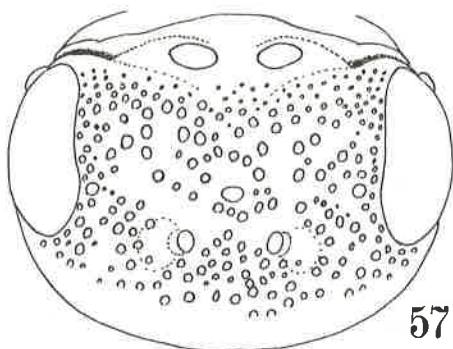
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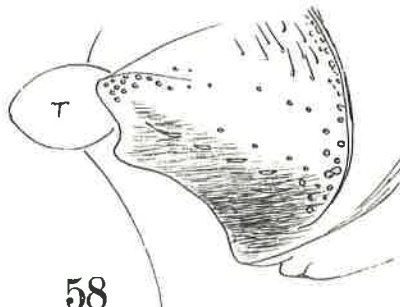
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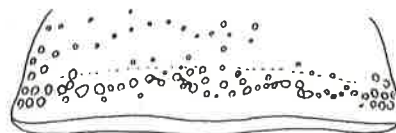
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punctures, with some additional punctures attached in front it on the median area and the posterior area markedly broad (cf. Figs. 48-53). If phyllophagae and popilliavora are separated from each other at the specific rank, the present specimen must also be treated as distinct.

Judging by my observations above mentioned I think that the Rohwer's treatment is correct and consider phyllophagae, ovinigris, smithi and mediocris respectively to be only a variation form of popilliavora.

However, the following facts could be confirmed:

1. All the specimens that belong to this group have a distinct median furrow on the outer side of the mandible.
2. The specimens collected in Japan are generally smaller than those from Korea and China. This is considered to be one of the characters of the Island specimens.
3. In Japan no specimen having pronotal punctation pattern of typical phyllophagae-form has been known, all including the two paratypes from Koiwai, Iwate Prefecture belong at most to the intermediate form above-mentioned which I called Japanese form of phyllophagae, namely smithi. This shows that the variation range of popilliavora is much broader on the Continent than in Japan.

S Y N O N Y M S

In my previous study (SPJHA 31) two papers (1935 and 37) by L. B. Parker were inadvertently overlooked. Through the courtesy of Dr. K. V. Krombein I could have examined the paratype specimens of his species. As a result the following synonyms could be confirmed:

- | | | |
|---|--------|---------------------------------------|
| <u>Tiphia</u> <u>teranishii</u> Tsuneki, 1985 | —————> | <u>T. isolata</u> Parker, 1937. |
| <u>T. rufotibiata</u> Tsuneki, 1985 | —————> | <u>T. humoncularis</u> Parker, 1937. |
| <u>T. vulgata</u> Tsuneki, 1985 | —————> | <u>T. sternata</u> Parker, 1935. |
| <u>T. nipponica</u> Tsuneki, 1985 | —————> | <u>T. burrelli</u> Parker, 1937. |
| <u>T. kisukei</u> Tsuneki, 1985 | —————> | <u>T. juliana</u> Parker, 1937. |
| <u>T. castaneaevora</u> Parker, 1937 | —————> | <u>T. agilis</u> Smith, 1873 (s. l.). |

NEW DISTRIBUTION RECORDS

(Names with asterisk belong to subgenus Jaynesia)

(1) From the Korean Peninsula.

Hitherto the following species have been known, all from South Korea, mostly from Suigen: T. autammalis* Roh., koreana* Roh., ovidorsalis* A. et J., fossata* A et J., ordinaria Sm. (= bicarinata Cam., = chosensis A.), totopunctata A. et J., vernalis Roh., rufomandibulata Sm. (= notopolita including ssp. intermedia A. et J.), brevilineata A. et J., agilis Sm. s. l. (including americae A. et J.), sternodentata A. et J., popilliavora Roh., with f. phyllophagae A. et J. and ovinigris A. et J., latistriata A. et J., malayana Cam., humoncularis Park., satoi Park.

1. T. ogurae* sp. nov., 1 ♀, Seoul, air port in those days, 16.VII.1943, K. Tsuneki.
2. T. takeuchii sp. nov., 1 ♀, N. Korea, Nanyo, 28.VII.1935, K. Takeuchi.
3. T. hasegawai sp. nov., 1 ♂, N. Korea, Mt. Kaya, M.IX.1921, Hasegawa.
4. T. kaineiana sp. nov., 1 ♂, N. Korea, Kainei, 1.VIII.1935, K. Takeuchi.
5. T. seoulensis sp. nov., 1 ♀, Seoul, northern suburbs, 20.VIII.1942, K. Tsuneki.
6. T. juliana fuzanensis ssp. nov., 2 ♂, S. Korea, Fuzan, 4.VIII.1985, T. Tano.
7. T. rufomandibulata Sm., 2 ♂, S. Korea, Mt. Gaya, Haeinsa Temple, 20-22.VIII.1985, T. Tano.
8. T. vernalis Roh., S. Korea, Valley of Mt. Shoyo, 30.V.1943, K. Tsuneki.
9. T. femorata biseculata A. et J., 1 ♀, Seoul, air port in those days, 20.VI.1941, K. Tsuneki.
10. T. latistriata A. et J., 1 ♀ 5 ♂, N. Korea, Mt. Kaya, M.IX.1926, Hasegawa; 1 ♀, Seoul, Mt. Hokkanzan, 21.VIII.1941, K. Tsuneki; 1 ♂, S. Korea, Mt. Gaya, Haeinsa Temple, 20-22.VIII.1985, T. Tano.
11. T. popilliavora Roh., 1 ♂, S. Korea, Mt. Gaya, Haeinsa Temple, 20-22.VIII.1985, T. Tano; 1 ♀, N. Korea, Nanyo, 28.VII.1935, Hasegawa; 1 ♀, S. Korea, valley of Mt. Shoyo, 27.VIII.1942, K. Tsuneki.

- f. *phyllophagae* A. et J., 2 ♀ 1 ♂, N. Korea, Mt. Kaya, M.IX.1926, Hasegawa; 1 ♂, N. Korea, Kainei, 1.VIII.1935, K.Takeuchi; 1 ♀, S. Korea, valley of Mt. Shoyo, 27.VIII.1942, K.Tsuneki.
- f. *ovinigris* A. et J., 2 ♀ 1 ♂, S. Korea, valley of Mt. Shoyo, 27.VIII.1942, K. Tsuneki; 1 ♀, same loco., 3.IX.1942, K.Tsuneki.
- Intermediate form, 2 ♀, Mt. Shoyo, 27.VIII.1942; 2 ♀, same loco, 3.IX.1942, K. Tsuneki; 1 ♀, same loco, 9.IX.1942, K.Tsuneki.
12. *T. satoi* Parker, 1 ♂, N. Korea, Mt. Kaya, M.IX.1926, Hasegawa.
13. *T. totopunctata* A. et J., 1 ♀, S. Korea, Mt. Gaya, Haeinsa Temple, 20-22.VIII.85, T.Tano.
14. *T. agilis* Sm. s.l., 3 ♀, S. Korea, Mt. Gaya, 20-22.VIII.1985, T.Tano.

(2) From the Ryukyus.

Hitherto the following species have been known:

T. ishigakiensis Ts. (Is. Ishigaki, 1♀1♂), *brevilineata* A. et J. (Is. Amami-Oshima and Tokunoshima, 1♀21♂), *popilliavora* Roh. (Is. Iriomote, 1♀), *iriomotensis* (Is. Iriomote, 1♂), *yonaguniensis* Ts. (Is. Yonaguni, 1♀4♂).

1. *T. punctata** Sm. (= *tegitiplaga* A. et J.), 5 ♂, Is. Yaku (2 ♂, Nagata, 9.VII.1973, 1 ♂, Onoaida, 11.X.1973, 2♂, Nagata, 15.X.1973, all leg. K.Kushigemati).
2. *T. rufomandibulata* Sm. (including *notopolita* A. et J.), 8 ♂, Is. Yaku (6 ♂, Nagata, 9.VII, 11.IX, 15.X.1973, 2 ♂, Onoaida, 15.X.1973, all leg. K.Kusigemati).
3. *T. ordinaria* Sm. (= *bicarinata* Cam., = *chosensis* A.), 1 ♀ 4 ♂, Is. Yaku (1 ♀, Onoaida, 6.V.1969, 4 ♂, Nagata, 9.VI.1973, K.Kusigemati).
4. *T. iriomotensis* Ts., 1 ♂, Is. Ishigaki, 27.VII.1983, Kodama.
5. *T. yonaguniensis* Ts., 2 ♂, Is. Yonaguni, 22-24.VII.1983, Kodama.
6. *T. burrelli* Park. (= *nipponica* Ts.), 1 ♀, Is. Tokara, Nakanoshima, Funakura, 18.VII.1982, Y.Takai.
7. *T. sternata* Park. (= *vulgata* Ts.), 1 ♀, Is. Iriomote, Otomi, 30.IV.1982, A.Nagatomi; Is. Ishigaki, Inada, 27.II.1953, T.Shiraki (3 ♀ 5 ♂); Ditto, Ohama, 6,7.II.1953, T.Shiraki (5 ♂); 1 ♀, Is. Iriomote, 9.I.1953, T.Shiraki.
8. *T. isolata* Park. (= *teranishii* Ts.), 1 ♀ 16 ♂, Is. Yaku (1 ♀, Koseta, 12.IX.1959; 14 ♂, Nagata, 9.VII.1973; 1 ♂, 11.IX.1973; 1 ♂, Nagata, 15.X.1973), K.Kusigemati.

(3) Little known species in Japan:

1. *T. (J.) oblongata* Ts. (hitherto known from Fukui Pref. only).
1 ♀, Tokyo, Komaba, 16.I.1950, T.Iida.
1 ♀, Ishikawa Pref., Mt. Haku, 23.VIII.1955, K.Tsuneki.
1 ♀, Kagoshima Pref., Kirishima-jingu, 10.X.1980, H. Nagase.

Remarks. In these specimens medio-apical margin of clypeus more or less distinctly emarginate and the Kagoshima specimen shows considerable variations in other characters also as given below:

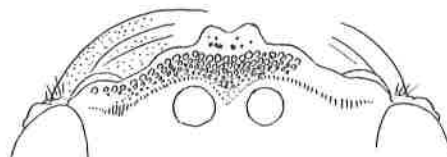
Clypeus: Fig. 60, disc except anterior smooth area uniformly reticulate with medium-sized punctures, without minute points mixed that are sparsely present on posterior depression in front of antennal fossae (in holotype apical margin truncate, disc irregularly subreticulate, with punctures posteriorly gradually finer and mixed with a number of minute punctures, thus bipunctate posteriorly).

Areola slenderer and longer, with BAWL=10:6:16, but postero-lateral corners similarly rounded and in the character of median carina and in surface sculpture also similar.

Outer vein of cubital cell 2 distinctly sinuate (cf. Fig. 156 of SPJHA 31).

Main part of GS 1 medianly broadly, fairly deeply furrowed from base of basal ridge till apical margin, with a short interruption before middle, large punctures on basal part very scarce, only 2 or 3 in number and the surface broadly covered with very minute piliferous punctules (otherwise similar to holotype).

2. *T. femorata biseculata* A. et J.
3 ♀, Miho, Shizuoka Pref., 10.X.1925, K.Takeuchi; 1 ♀, Shizuoka Pref., Kanaya, 24.VII.1950, J.Minamikawa.
3. *T. autumnalis* Roh.
1 ♂, Yunohira, 10.VIII.1928, K.Takeuchi; 2 ♀, Utsunomiya (Tomatsuri), 5.X.1935,



60

K. Tsuneki; 3 ♂, Nagano Pref., Mt. Kurohime, 24.VII.1954, H. Nagase.

4. *T. juliana* Park. (= *kisukei* Ts.).

1 ♂, Nagano Pref., Tateshina, 5.VIII.1957, K. Takeuchi; 1 ♂, Nagano Pref., Karui-zawa, 8.IX.1954, H. Nagase; 1 ♂, Saitama Pref., Chichibu, Tochimoto, 4.IX.1954, H. Nagase; 1 ♀, Tokyo, 9.VIII.1961, J. Minamikawa.

Remarks. Judging from the original description of this species I at first thought it to be included within the variation range of *T. agilis* Smith s. l. But the examination of paratypes of *juliana* ♀ and ♂ could confirm that the propodeal spiracular hollow at the lateral margin of the dorsum was almost as long as its posterior area which consisted of two parts, A and B, both partly enclosed with weak carina and B was more strongly inclined posteriorly. This is just the character of my *kisukei* and by it the species can more easily be separated from other closely allied species.

5. *T. ifri* Ts. Hitherto known from Prefs. Fukui and Saitama.

5 ♂, Kagoshima Pref., Mt. Takakuma, 28.VII, 27, 30.VIII.1980 K. Kusigemati.

6. *T. sudai* Ts. Hitherto known from Chiba Pref. only.

12 ♂, Kagoshima Pref., Uearata, 18.X.1973, K. Kusigemati.

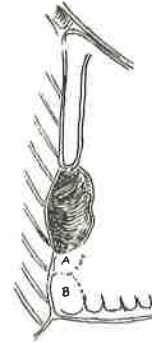
7. *T. corpulenta* Parker. It has been known from Ooita Pref. only and is not included in my key. It can be inserted in the key as follows:

- ♀. 30 Puncture band at posterior margin of punctate part of pronotum consisting of markedly large and minute punctures mixed, punctures on disc except median area very minute and sparse 31A

— Puncture band of pronotum not differentiated, if differentiated punctures nearly uniform in size and those on lateral disc comparatively large, sometimes not uniform and sometimes somewhat close

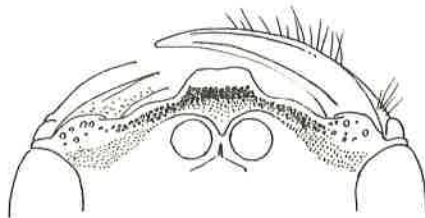
31A Length 10-13 mm, mandible on outer side in middle with a distinct longitudinal groove, lateral part of apical margin of clypeus straight, areola with lateral carinae not rounded out *popilliavora* Roh. f. *phyllophagae* A. et J.

— Length 14-15 mm, mandible without longitudinal groove on outer side in middle, but with a line of shallow punctures, lateral part of apical margin of clypeus on its median area roundly swollen out, areola with lateral and apical carinae rounded out (clypeus: Fig. 62, punctation of pronotum: Fig. 63, puncture band of GT 1 medianly narrow, consisting of a single row of punctures, then enlarged laterally to two rows, without impressed edge line anteriorly, but further laterally more



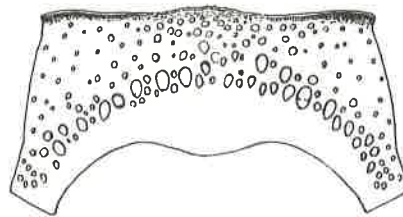
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Spiracular hollow and its posterior area (A + B) in *T. juliana* Park. (left side).



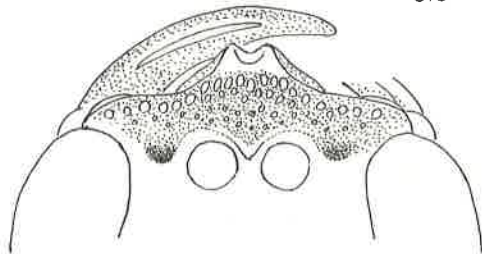
Paratype ♀

62



Paratype ♀

63



Paratype ♂

64

widened to irregular three rows and here with anterior impressed line, posterior area broad, about twice the length of puncture width of the band, sparsely punctate central zone distinct on GT 3 and 4, but on 5 only at mid-lateral area distinct, tegula black, shining, opaque, except brown narrow, slightly reflected membranous margin and scattered with some punctures on antero-outer and postero-inner areas, punctures on main part

of mesopleuron consisting of large and minute ones mixed, about equal in number, bearing distinct shining PIS, postscutellum medianly deeply furrowed, rugoso-punctate area of pygidium with medio-apical emargination narrow and shallow, strongly striate and rather indistinct; impunctate area broadly, longitudinally wrinkled and rugulosed except narrow smooth marginal area. GS 1 flat, medianly broadly and shallowly furrowed and in the middle of the furrow with a fine, weak, shining extension of baso-medial ridge till near middle, lateral furrows well defined on posterior half, surface very minutely and fairly closely punctured except median furrow where punctures very sparse and lateral marginal areas before lateral furrows where sparsely covered with medium-sized punctures, these punctures gradually larger anteriorly, but both sides of baso-medial ridge without puncture. Wings fairly strongly clouded, cubital cell 2 with outer vein sinuate and pointed at top of posterior incurve), Ohita Pref., Mt. Kudju corpulenta Parker, 1937

- ♂. 28 CL at least twice as great as CAW 29
 — CL less than twice as great as CAW 30
 29 Puncture band of GT 1 broad, almost not impressed, including irregular 2-3 rows of punctures A
 — Puncture band of GT 1 comparatively narrow, including irregular 1-2 rows of punctures B
 A Punctures of puncture band of GT 1 close (ref. SPJHA 31, Figs. 127,128), punctures on upper frons (ibid., Fig. 123), dorsal side of thorax and gaster comparatively strong and close), 9-10 mm, Korea and China
popilliavora Roh. f. phyllophagae A. et J.
 — Punctures of puncture band of GT 1 much sparser (ibid., Figs. 134,183), punctures on upper frons (ibid., Fig. 182), dorsal side of thorax and gaster finer and sparser), 6-6.5 mm, Japan (Honshu and Kyushu)
sudai Tsuneki, 1985
 B Usually 11-13 mm (exception 9 mm), medio-apical margin of clypeus deeply incised, almost bidentate (Fig. 64), antero-lateral parts of upper frons with PIS distinctly microcoriaceous, tegula smooth and polished, with outer margin completely reflected, appearing finely grooved along margin, areola with lateral and apical carinae usually rounded out, Kyushu and Honshu
corpulenta Parker, 1937
 — Usually 6.5-8.5 (exception 10 mm), medio-apical margin of clypeus not so deeply incised, sometimes truncate, upper frons not microcoriaceous anywhere, tegula usually microstriolate on outer side, with marginal reflection confined to anterior half of outer margin (but posterior margin depressed), areola usually with postero-lateral corners more or less angulated, Japan
popilliavora Roh. f. smithi Hedicke, 1936

New collection records:

- 1 ♂, Ooita Pref., Mt. Yufu, 7.VIII.1928, K. Takeuchi.
 5 ♂, Kagoshima Pref., Ohkuchi, 15.VIII.1980, H. Nagase.
 1 ♂ (var. 1), Tokyo, Fuchu, 6.IX.1955, A. Habu.
 1 ♂ (var. 2), Shizuoka Pref., Kanaya, 4.X.1952, J. Minamikawa.

Var. 1. Clypeus as in Fig. 64, upper frons strongly and pronotum weakly microcoriaceous, but mesopleuron without microreticulation on PIS, punctures on upper frons comparatively larger than in other allied species and broadly expanded upwards, mid-lateral area with some punctures, without broad impunctate PIS; areola with outer and posterior veins rounded out, median carina weak, ending slightly before apex; puncture band of GT 1 narrow and deeply impressed, with a median shining bridge and slightly enlarged laterally, including a single irregular row of medium-sized punctures, punctures close to each other, but not contiguous and near sides turned to two rows and continued to puncture group of the area; anterior impressed edge line of the band distinct, posterior area narrow, narrower than band; disc of each GT without transverse microstrioles, but not shining; GS 1 agrees well with the original description, namely baso-medial ridge weakly extended posteriorly till beyond mid point, lateral furrows distinct on posterior half, slightly incurved, punctures on both sides of basal ridge large and close, but sparser posteriorly along lateral margins.

Var. 2. Clypeus similar, upper frons and pronotum without microreticulation on PIS, punctures on upper frons smaller and sparser, with broad impunctate spaces on mid lateral areas; areola with apical vein rounded out, but outer veins incurved except base; puncture band of GT 1 broader, shallower, with blunt impressed edge line at anterior margin which is crossed medianly by a bridge, punctures comparatively larger, closely arranged on posterior margin of the furrow, but not con-

tiguous to each other, just behind anterior edge line several minute punctures scattered, laterally the large punctures becoming irregular in arrangement and continued with puncture group of the sides; GT 2-5 with punctures larger and closer than in Var. 1, but without microstrioles as in this; GS 1 considerably varied in structure from Var. 1, extension of baso-medial ridge ended at about 1/3 from base, thence posteriorly broadly, shallowly impressed into weak furrow, lateral margins of posterior third raised into blunt oblique ridges, inside of which depressed into indistinct lateral furrows tapering apically, on both sides of basal ridge some coarse punctures scattered.

SYMMORPHUS SOUNKIONIS SP. NOV.

♀. Closely related to S. captivus (Smith) and similarly a large-sized species, about 14 mm in length, but can be separated therefrom by the following differences:

1. Clypeus without yellow mark, GT 3 apically yellow banded, but 4 without the band, mark on pronotum pointed at antero-lateral corners and mandible with a yellow mark at base on outer side; further GS 2 broadly, thoroughly banded at apex (in captivus medianly narrowed and interrupted).
2. Antennal scape and flagellum ferruginous yellow beneath.
3. Apical margin of clypeus narrower, with emargination much weaker.
4. Longitudinal furrow of mesopleuron narrower, with lower margin more distinctly outlined and sectioned foveae more distinct.
5. Side of propodeum almost without distinct longitudinal striae, only very sparsely, obscurely striate, with intervals faintly microstriolate, outward expansion at dorsal and posterior margins stronger, with punctures much less marked.
6. Posterior aspect of propodeum obliquely, regularly, much more strongly and coarsely striate.
7. Punctures on GT 1 much finer.
8. Punctures at base and apex of mesoscutum much less different in size, surface very closely, subreticulately covered with large, uniform punctures, everywhere not bipunctate.
9. Clypeus not bipunctate, anteriorly longitudinally rugosely and closely, posteriorly sparsely punctured (Fig. 65).
10. Frons more distinctly and closely rugoso-reticulate-punctate.
11. Postscutellum and its posterior excavation somewhat different in structure from those of captivus.

♂, unknown.

Holotype: ♀, Hokkaido, Souunkyo, at the foot of Mt. Taisetsu, 16.VIII.1945, K. Tsuneki leg. (Coll. Tsuneki).

THE MALE OF SYMMORPHUS CAPTIVUS (SMITH)

The male of this species has remained unknown. The following specimens were kindly sent by Mr. H. Suda, a member of JHA, from his collection to me for description. They are certainly considered to be the males of this species.

Length 12.5 and 14.0 mm respectively. In maculation similar to ♀ except that clypeus almost completely yellow and the legs more broadly and more clearly yellow. A 3 about twice as long as broad at apex, A 4 about 1.3 times so, from A 3 to A 11 each slightly rounded out beneath, but without tyloidea. In punctation generally similar to ♀, but larger punctures of bipunctation of mesoscutum comparatively more numerous and as a result bipunctation becomes more distinct.

Specimens examined: 2 ♂, Yamanashi Pref., Enzan City, Marukawa Sakai, 18.VII.1978, H. Suda leg. (Coll. Tsuneki).

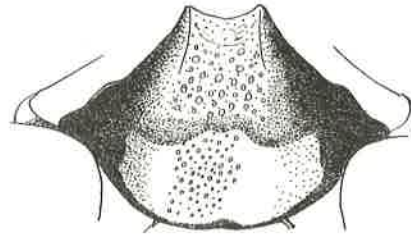
SYMMORPHUS SEULENSIS SP. NOV.

♀, about 8 mm. Can be separated from closely allied debilitatus Saussure, cliens and ishikawai Giordani-Soika by some of the following distinctions:

Front closely, distinctly bipunctate, almost without rugae, PIS of larger punctures less than PD. Clypeus: Fig. 66, at base with a large yellow mark, punctures on



65



66



67

on basal area fine and fairly close and larger and sparser anteriorly; vertical foveae about as large as (strictly somewhat smaller than) hind ocellus; pronotal carina at antero-lateral corners

very weakly produced, seen in front: Fig. 67, disc closely bipunctate, minute punctures much less in number than large ones that are uniform in size and slightly sparser posteriorly where PIS partly becoming as large as PD, surface without elevation along posterior margin, a pair of large yellow marks present, rounded at outer margin and nearly half the size of tegula, from medio-anterior part near to lateral corners of anterior carina. Mesoscutum bipunctate, minute punctures numerous and close, large ones much less in number and partly (along parapsidal sutures and on parts of anterior portion) collected and linearly arranged, but generally very sparse; mesopleuron smooth and fairly shining, under high magnification upper part feebly micropunctulate and lower part microrugulose, the former broadly yellow maculated (macula larger than pronotal tubercle) and carrying about 6-7 and the latter about 20 medium-sized rounded punctures; scutellum adorned with a pair of large yellow marks and medianly grooved, the groove not reaching base and apex and disturbed, especially on posterior part, by large, close punctures, disc very sparsely scattered with medium-sized punctures and PIS filled with close minute punctures; postscutellum transversely and roundly ridged anteriorly and flatly inclined posteriorly, with a large fovea at base in middle, surface strongly and coarsely punctured on anterior ridge and minutely and closely rugulosed on posterior inclination; side of propodeum almost dull and opaque, and longitudinally, very finely and very closely, rather microcoriaceously striolate and greater part of dorsal half (till antero-lateral part of dorsal aspect) moderately closely (sparser below) covered with large, deep, rounded punctures, the area between antero-dorsal fovea and base of hind coxa gently raised to obscure ridge where surface somewhat glossy and longitudinally, closely and more distinctly than on other area striate, posterior broad membranous expansion rounded at margin and highly and acutely produced on top, posterior aspect at base excavated and medianly carinated as usual, surface finely, closely and somewhat rugosely striate, with intervals microcoriaceous. GT 1 in dorsal view as long as wide at apex, with carina not produced in middle, punctures gross, grosser medianly than on sides, very close, with PIS much less than PD. GT 2 at extreme base with a series of large foveae and thence posteriorly till about one third from base moderately closely covered with medium-sized, not well out-lined punctures; yellow band at apex of GT 1 medianly incised from front side and at extreme sides shortly turned forwards, that on 2 broader than usual and much broader laterally, that on 3 also broader than usual, that on GS 2 medianly nearly interrupted.

Two contiguous large marks just above interantennal elevation, a spot on temple, knee and fore side largely of fore tibia, fore side broadly of mid tibia and base of hind tibia yellow.

♂, unknown.

Holotype: ♀, S. Korea, northern suburbs (outside of northern gate) of Seoul, 22. V.1943, K. Tsuneki leg. (Coll. Tsuneki).

SYMMORPHUS HAKUTOZANUS SP. NOV.

The present species is closely related to captivus (Smith), but can be separated

from it by the following distinctions:

- ♀.
1. Scutellum with a distinct longitudinal groove in middle, surface more finely, more sparsely, partly rugosely bipunctate.
 2. Longitudinal furrow of mesopleuron much less strong and more sparsely foveolate.
 3. Longitudinal striae on sides of propodeum finer, closer, with the striated area more broadly expanded upward and the punctate area confined to upper marginal area only and the punctures much smaller and weaker.
 4. Posterior part of postscutellum flattened, with surface longitudinally striate.
 5. Punctures on mesoscutum more uniform and generally finer.
 6. Punctures on clypeus anteriorly larger as in captivus, but sparser, with bipunctuation much less marked in addition.
 7. Punctures on dorsal part of gastral tergites much finer and weaker.
 8. Clypeus (Fig. 68) without yellow mark, but mesopleuron with a patch behind pronotal tubercle.

Length about 12 mm. GT 1, 2 and 4 each with an apical yellow band.

♂. (Characters are compared with those of the female):

1. Scutellum medianly distinctly longitudinally furrowed, though with surface somewhat more rounded and more strongly and coarsely (posteriorly rugoso-) punctate.
2. Mesopleuron more strongly, coarsely and closely rugoso-punctate, with longitudinal furrow more strongly (but sparsely) sectioned with carinae.
3. Longitudinal striae on sides of propodeum coarser than in ♀, with upper punctate part broader and the punctures stronger and larger.
4. Postscutellum similar in pattern of structure and sculpture to ♀, but striae on posterior part stronger and coarser.
5. Mesoscutum distinctly bipunctate, on anterior third large punctures close, almost without minute punctures, while on posterior two thirds punctures much sparser and PIS filled with minute punctures.
6. Clypeus relatively slightly longer (Fig. 69, cf. Fig. 68), in pattern of the punctuation generally similar to ♀, but punctures rounded, not elongated on anterior portion; labrum much better developed (do.).
7. Large punctures on dorsal part of gastral tergites stronger than in ♀, rather similar to those of captivus, but much sparser.
8. Clypeus except narrow marginal areas completely yellow (Fig. 69), interantennal elevation, pronotum and mesopleuron without yellow mark, GT 1, 2 and 4 distinctly yellow banded, while GT 3 and 5 narrowly so, outer side of mandible medianly broadly yellow, A 8-13 narrowly yellowish beneath, a minute yellow patch present on upper part of each temple.

Length about 9 mm.

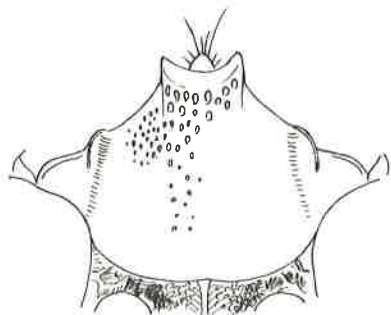
Holotype: ♀, N. Korea, Mt. Hakuto, Jimmudjô, 27.VII.1942, K. Tsuneki leg. (Coll. Tsuneki).

Paratype: 1 ♂, N. Korea, Mt. Hakuto, Sanchiyen, 4.VII.1942, K. Tsuneki leg. (Coll. Tsuneki).

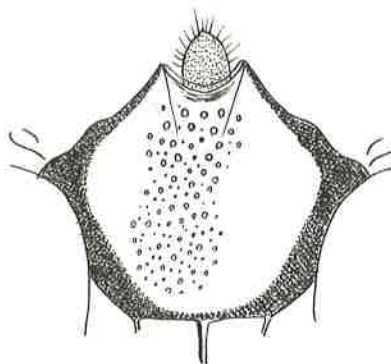
KEY TO THE SPECIES OF SYMMORPHUS FROM THE KOREAN PENINSULA (♂)

The six male specimens at my hand from North Korea can be distinctly separated into two groups (couplet of the following key) and there is no doubt that they belong at least to two different species. However, between each of each group more or less differences can be observed and I can not determine with confidence (because the material is too scanty) whether such differences show the specific characters or mere variations within a species. In the following, therefore, in order to show the distinctions of each specimen they are inserted into the key to the known species (♂) of the Korean Peninsula, giving each provisionally a specific name:

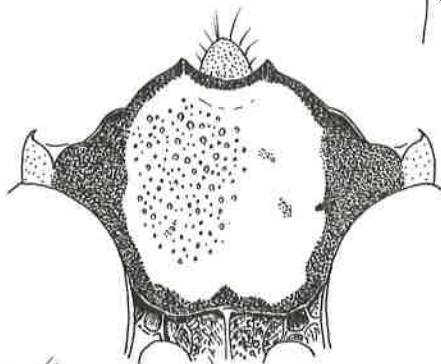
- 1 GT 1 in dorsal view longer than wide at apex, markedly enlarged on posterior half, dorsal area only one and one fourth times as wide at apex as long in middle
foveolatus Gussakovskij
- GT 1 in dorsal view not longer than wide at apex, dorsal area more than one and one fourth times as wide at apex as long in middle 2
- 2 Mesopleuron above longitudinal furrow and on posterior part below the furrow



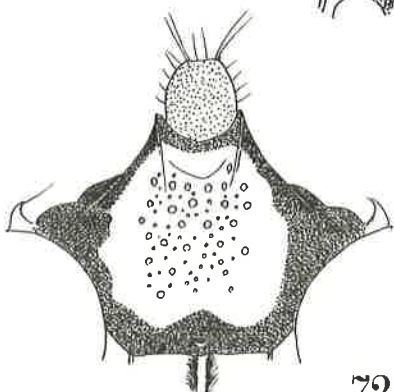
68



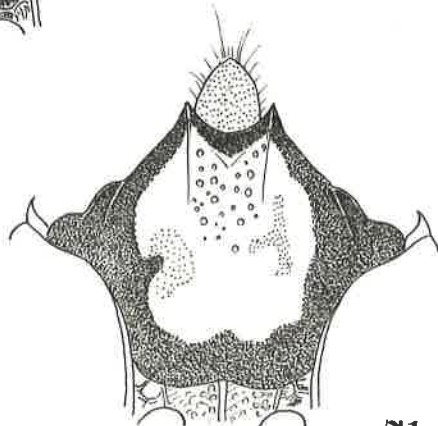
69



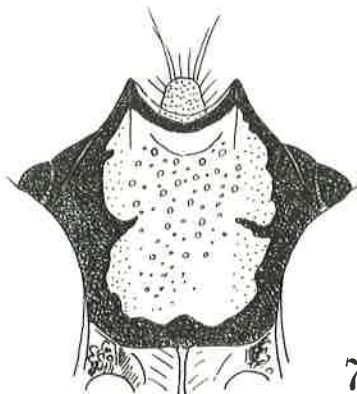
70



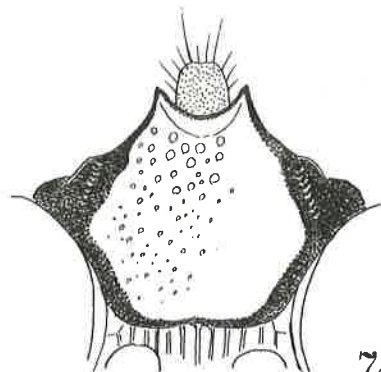
72



71



73



74

- broadly smooth, with few large punctures scattered (under high magnification feeble minute punctures defined on PIS; mesoscutum bipunctate, minute punctures regular in size and distribution, not rugosely arranged and much more numerous than larger ones, the latter very sparse posteriorly, sides of propodeum between dorso-anterior fovea and base of hind coxa markedly, thickly elevated, GT 1 and 2 alone with an apical yellow band; except fore tibia legs black or dark brown) 3
- Mesopleuron broadly punctured or rugoso-punctured, at least below longitudinal furrow (mesoscutum bipunctate, with minute punctures not uniform, somewhat larger and finer ones mixed and partly linearly arranged, large punctures irregular in form and mixed with rugae, sides of propodeum between dorso-anterior fovea and base of hind coxa only weakly elevated, GT 1, 2 and 4 each with an apical yellow band; legs from knees apically broadly yellow) 7
- 3 Propodeum on sides and posterior aspect not glossy, very finely and closely striate (greater part of clypeus, base on outer side of mandible, a mark on A 1 in front, a spot on temple above, apical band on GT 1 and 2, postero-lateral marks on GS 2, fore side of fore tibia, outer side of mid tibia and all T 1 and 2 constantly yellow; sometimes two or one small mark on frons, two marks on pronotum, a mark on mesopleuron, knees, base of hind femur and frequently interrupted band on GT 3 and 5 also yellow), 6-8 mm apiciornatus (Cameron)
- Propodeum at least on posterior aspect glossy, irregularly, weakly and superficially rugoso-striate (in dorsal view lateral ends of anterior carina of pronotum strongly produced and acutely pointed at apex, GT 1 and 2 yellow banded at apex) 4
- 4 Punctures on disc of GT 1 large and close, with PIS mostly as large as or less than PD (oblique elevation on side of propodeum medianly with a furrow, anterior part of elevation feebly and very closely, and posterior part strongly and somewhat rugosely striate, dorsal and posterior parts of side sparsely scattered with large, rounded punctures; clypeus and labrum: Fig. 70; antenna apically brownish beneath, A 13 wholly ferruginous. Other yellow: Two spots on supra-clypeal elevation, a spot on temple along eye above middle and fore side largely of fore tarsus), 7 mm iiyamai sp. nov.
- Punctures on disc of GT 1 medium-sized, sparse, with PIS larger than PD 5
- 5 Oblique elevation on side of propodeum medianly without furrow, clypeus and labrum: Fig. 71 (other yellow: two spots on interantennal elevation, a spot on outer orbit above middle, a patch on mesopleuron behind pronotal tubercle, fore knee, fore and mid tibiae partly in front; A 13 largely ferruginous), 7.5 mm shiroyamai sp. nov.
- Oblique elevation on side of propodeum medianly with a furrow 6
- 6 Clypeus and labrum: Fig. 72 (other yellow: two spots on interantennal elevation, a spot on temple above, a patch on mesopleuron behind pronotal tubercle, fore knee, fore tarsus largely in front; A 12 largely and A 13 wholly ferruginous), 6.5 mm piceanus sp. nov.
- Clypeus and labrum: Fig. 73 (other yellow: a spot on temple above, broad apical band on GS 2, fore tibia largely in front; A 12 largely and A 13 wholly ferruginous), 6 mm bassai sp. nov.
- 7 The gentle ridge on side of propodeum between dorso-anterior fovea and base of hind coxa bearing on its top a fine carina accompanied with a groove, the ridge not glossy, not shining, labrum pointed at apex: Fig. 69 (other yellow: a spot on temple above, a medianly interrupted apical band on GS 2, a line on A 8-13 beneath, knees, fore tibia except posterior side, fore side of mid tibia except median part, base and apex of hind tibia and all T 1-2), about 9 mm hakutozanus sp. nov.
- The gentle ridge on side of propodeum broader and more distinct, without carina and groove on top, with surface more closely and obscurely striate and shining, labrum slightly emarginate at apex: Fig. 74 (other yellow: two minute spots on supra-clypeal elevation, a spot on outer orbit above, two patches on pronotum, a medianly interrupted apical band on GS 2, a line on A 9-13 beneath), 8 mm nansetsurei sp. nov.
(may be a var. of hakutozanus)

SYMMORPHUS IIYAMAI SP. NOV.

Holotype: ♂, North Korea, Mt. Hakuto, Jimmudjō, 3.VIII.1942, K. Tsuneki leg.
(Coll. Tsuneki).
♀, unknown.

SYMMORPHUS SHIROYAMAI SP. NOV.

Holotype: ♂, North Korea, Kankyo-hokudo, Hakugan, Mt. Nansetsurei, 19.VII.1943, K. Tsuneki leg. (Coll. Tsuneki).
♀, unknown.

SYMMORPHUS PICEANUS SP. NOV.

Holotype: ♂, North Korea, Mt. Hakuto, Jimmudjô, 4.VII.1942, K. Tsuneki leg. (Coll. Tsuneki).
♀, unknown.

SYMMORPHUS SASSAI SP. NOV.

Holotype: ♂, North Korea, Mt. Hakuto, Jimmudjô, 3.VIII.1942, K. Tsuneki leg. (Coll. Tsuneki).
♀, unknown.

SYMMORPHUS NANSETSUREI SP. NOV.

Holotype: ♂, North Korea, Kankyo-hokudo, Hakugan, Mt. Nansetsurei, 24.VII.1943, K. Tsuneki leg. (Coll. Tsuneki).
♀, unknown.

COLLECTING RECORDS OF OTHER SPECIES IN KOREA

1. Symmorphus foveolatus Gussakovskij, 1932.
10 ♀ 3 ♂, Northern suburbs of Seoul, 20,22.V.1943; 13,28.V.1944, K. Tsuneki.
2. Symmorphus apiciornatus (Cameron, 1911)
1 ♀, Central Korea, Valley of Mt. Shoyo, 18.V.1941, K. Tsuneki.

SPILOMENA DJOZANKEIANUS SP. NOV.

Compared with the male of S. nikkoensis, the sole Japanese species in which the male is known, in the present species the head seen from above much broader and shorter, $W:L$ in middle 30:13, at sides 30:16; in nikkoensis the former 30:17 and the latter 30:23, head seen in front with vertex much less highly raised and more broadly flattened (cf. Figs. 6, 7 in the original description of S. nikkoensis), minimum IOD at vertex and clypeus 20:21, upward extension of median carina of interantennal tubercle much weaker, apical yellow mark of clypeus more distinctly outlined, pronotal carina medianly interrupted and the disc raised in middle, as a result the carinae appearing two-arched, mesoscutum broadly depressed anteriorly in middle and narrowly so along parapsidal sutures.

Head very minutely microcoriaceous, slightly stronger anteriorly and sparsely scattered with very minute punctures, mesoscutum more strongly and largely (about twice the width of that on vertex) microcoriaceous and posteriorly longitudinally and somewhat rugosely so, with sparse, fine punctures scattered, scutellum medianly finely grooved and minutely, fairly closely punctured, dorsal aspect of propodeum flat, medianly with coarse, rudder-shaped sculpture as in many of the allied species, mesopleuron longitudinally, finely, closely, somewhat coriaceously striate.

Length about 3 mm.

♀, unknown.

Holotype: ♂, Hokkaido, Sapporo, Djozankei, Hoheikyo, 30.VI.1958, M. Miyatake leg. (Coll. Tsuneki).

Ref. K. Tsuneki: Revision der Spilomena-Arten Japans, mit den Beschreibungen von drei neuen Arten (Hym., Sphecidae). Life Study (Fukui), 15(1-2): 8-16, 37 figs., 1971.

PSENUUS SUDAOHUM SP. NOV.

In my 1959 key to the Japanese species of the genus the present species (δ) runs to P. pallipes yamatonis, with more or less disagreement on the way, but it is not this species, differing in the following characters:

1. Fore tarsus bright yellow, mid tarsus slightly brownish in front and hind tarsus brown, but paler posteriorly.
2. Fore tibia brownish yellow, paler below, mid one castaneous in front, paler posteriorly and hind one more darkly so.
3. A 3 slightly more than twice as long as wide at apex, A 13 amply 1.5 times as long as wide at base. A 3-12 with distinct tyloidea beneath, each located from middle to apex.
4. Upper expansion of interantennal carina very slight, less than half the width of fore ocellus
5. Main part of mesopleuron simply closely punctate, but on posterior inclination longitudinally, closely striate.

Mesoscutum on posterior third longitudinally, closely punctate-striate, the sculpture stronger and more distinct posteriorly; dorsal aspect of propodeum with a transverse, narrow, crenate, triangular impression at base, from the top of triangle a crenate furrow runs posteriorly till near apex, enlarging posteriorly, at the end it is replaced with the median carina, disc on both sides of the furrow anteriorly obliquely, finely, closely striate and posteriorly coarsely, irregularly reticulate; sides of propodeum on anterior area finely, closely, on posterior area very coarsely, transversely and irregularly striate. In fore wing nervulus antefurcal, recurrent vein 1 interstitial with transverse cubital vein 1, recurrent vein 2 received by cubital cell 3 close to its base.

♀. Unknown.

Holotype: δ , Yamanashi Pref., Kitakoma-gun, Shikkawa Sumata, 27.V.1979, Y., T. and H. Suda leg. (Coll. Tsuneki).

TRYPOXYLON MISHIMAENSIS SP. NOV.

δ . Length 6.5 mm. Frons without shield-shaped enclosure, gastral segment 1 flask-shaped, 4.7 times as long as wide at apex, distinctly longer than two following segments united; mesoscutum without median furrow, not microcoriaceous, finely, fairly closely, but not strongly punctured, surface fairly shining; propodeum with lateral carinae, sides broadly smooth and polished, area dorsalis enclosed with furrow, surface medianly longitudinally, broadly depressed and obliquely, somewhat arcuately striate; gaster completely black; ultimate antennal joint as long as preceding three joints taken together, IOD at vertex, at median incisions and at base of clypeus relatively 20:45:17, OOD:Od:POD=3:4.5:4, supraantennal tubercle low nasiform, medianly weakly carinate, but at lower end broadly rounded and flatly produced antero-laterally, forming a transverse edge anteriorly, below this the surface excavated, becoming the triangular lower aspect of the tubercle between bases of antennae.

Clypeus transversely, broadly, roundly raised, with apical margin medianly gently produced, produced area as broad as the lateral non-produced areas. In fore wing costa very thick, completely reaching apex of the wing, beyond the apex of radial cell.

Black, pale yellowish white; posterior part largely of pronotal tubercle, a spot on tegula, apices of coxae, trochanters except a dorsal brown spot on each, fore femur broadly, mid femur partly, whole of fore and mid tibiae and base of hind tibia, fore tarsus except pulvillus and mid metatarsus.

♀, unknown.

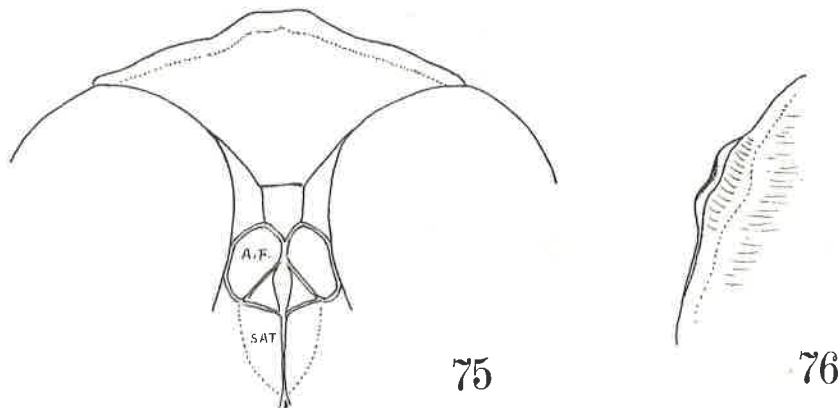
Holotype: δ , Shizuoka Pref., Mishima, on the path in a small wood of the northern suburbs, 12.V.1985, K. Tsuneki leg. (Coll. Tsuneki).

TRYPOXYLON SONANI SP. NOV.

♀. Similar to kodamanum Tsuneki, 1972, but is distinctly different from it in the structure of the clypeus (Figs. 75 and 76).

Length 8.0 mm. Black; yellowish white are mouth parts, apical margin of pronotum, marginal area broadly of humeral tubercle, tegula and basal plates of wings, sides of

G 1, apical margin, sides and underside of G 2, G 3 except a large dorsal mark, fore leg except black coxa and arolium and pale brownish patch on trochanter and on femur above, mid leg except black base of coxa and arolium and brownish patch on trochanter above, middle of femur, vague stripe on outer side of tibia and outer side of T 2, 3 and 4, and hind leg at apex of coxa, on trochanter except dorsal stripe, knee, base and apex of tibia, spurs and articulations of tarsus; as to hind leg rest of coxa, arolium and femur except brownish inside black, and rest of tibia and of tarsus dark brown. Antenna black, but A 1 and 2 in front pale brownish yellow, mandible pale reddish, apical margin of clypeus castaneous, but margin of median depression light ferruginous. Wings very faintly smoky, veins dark brown. Hair not long, normal.



Head in frontal view slightly wider than long (30:26), IOD at vertex, at eye incision and below antennal hollow relatively 10:18:4, OOD:Od:POD=2:5:5. SAT nasiform, moderately high, long carinated in middle, carina reaching upward slightly below middle of the space to median ocellus and at the top shortly bifurcate, SAT at anterior margin transversely carinate, carina at its ends connected with the tops of antennal fossae (Fig. 75, A.F.) and the median carina runs through the carina and on ventral aspect of SAT enlarged and swollen at its lower end (Fig. 75). Clypeus seen in front as in Fig. 75, seen obliquely in front: Fig. 76, medio-apical margin incrassate and narrow marginal area depressed. Head seen in profile with top of SAT almost on the same level of frons, each very slightly roundly elevated; pronotum anteriorly narrowly ridged and posteriorly broadly membranous and discoloured, the discoloured area in middle about thrice as long as anterior ridge; protuberance on pronotal side broadly rounded; on mesosternum on each side of median furrow a short longitudinal, not strong carina present. Propodeum with lateral carinae not strong, but distinct, accompanied just inside with a broad, shallow furrow, area dorsalis enclosed with furrow, the furrow broad and shallow, but acute at outer margin and weaker posteriorly, median furrow distinct, also broad and shallow, but at the top of posterior inclination very deep, turning into large wedge-shape. G 1 short, shorter than G 2+3, in dorsal view relative length of each: 50:30:30, relative width of G 1 at base and apex and G 2 and 3 at apex under same scale 10:23 and 30 and 35 respectively; further, under the same scale the parts in lateral view 9:25 and 30 and 36 respectively; GT 1 medianly furrowed at base, extending and attenuating till about middle of the segment. Antenna with relative length of A 3,4,5 10:7:6.5, A 3 thrice as long as wide at apex. In fore wing radial cell not reaching near apex, but radial vein fairly closely approaching the apex, cubital cell 2 and 3 and recurrent cells 2 and 3 faintly shown by obscure veins.

Vertex, frons, mesoscutum and scutellum strongly microcoriaceous and closely superimposed with fine punctures, on mesopleuron microsculpture weaker and punctures slightly larger, but subalar area almost without microsculpture and very minutely and sparsely punctured and the surface fairly shining. Dorsal aspect of propodeum at base irregularly foveolate and obliquely striate, median furrow distinctly and lateral furrows

indistinctly crenate, rest of the surface weakly microcoriaceous, with fine close punctures, sides at antero-dorsal area obliquely, finely and closely striate, with scattered punctures, striae weaker posteriorly and at dorso-posterior area only very faint punctures defined, antero-ventral area smooth and polished. Gaster closely covered with fine piliferous punctures.

♂, unknown.

Holotype: ♀, Miyazaki Pref., Koyu-gun, Kawaminami-cho, 21.VI.1963, J.Minamikawa (or J.Sonnan) leg. (Coll. Ent. Lab. Min. Agr. For. Jap. at Tsukuba).

TRYPOXYLON SPECIES OF THE RYUKYU ARCHIPELAGO

WITH NEW COLLECTING RECORDS

Through the investigations of S.Matsumura et T.Uchida (1926), K.Tsuneki (1962,66, 81,82), T.Tano (1964,72), T.Murota (1973), T.Nambu (1975,83), Y.Haneda (1982,83) and T.Tano, T.Murota, -C.Nozaka the occurrence and distribution of the following species in the Ryukyu Islands have been known up to the present (names of the Islands are from south to north and the species with asterisk have rarely been collected):

1. T. thaianum dubiosum Tsuneki, 1964
Is. Iriomote, Ishigaki, Okinawa, Okinoerabu and Amami.
2. T. schmiedeknechti Kohl, 1906*
Is. Iriomote, Ishigaki, Miyako.
3. T. petiolatum Smith, 1857 (= T. obsonator Smith, 1873)
Is. Yonaguni, Iriomote, Ishigaki, Okinawa, Okinoerabu, Tokunoshima, Amami.
- 4a. T. formosicola inornatum Matsumura et Uchida, 1926
Is. Iriomote, Ishigaki, Okinawa.
- 4b. T. formosicola amamiense Tsuneki, 1964
Is. Tokunoshima, Amami-Ohshima.
5. T. ryukyense Tsuneki, 1966
Is. Ishigaki, Okinawa, Tokunoshima, Amami.
6. T. petioloides ishigakiense Tsuneki, 1973*
Is. Iriomote, Ishigaki.
7. T. takasago kumaso Tsuneki, 1966*
Is. Ishigaki, Okinawa.
8. T. okinawanum Tsuneki, 1972*
Is. Iriomote, Ishigaki, Okinawa.
9. T. iriomotense Tsuneki, 1981*
Is. Iriomote.

The following specimens that were collected by Prof. T. Shiraki in 1953 were newly discovered in the Collection of the Entomological Laboratory, Ministry of Agriculture and Forestry at Tsukuba, Ibaragi Prefecture, through the examination of Mr. T.Nambu. They belong to the following species:

3. T. petiolatum Smith, 1857
1 ♂, Amami-Ohshima, Kinase, 20.V.
- 4b. T. formosicola amamiense Tsuneki, 1964
1 ♀, Amami-Ohshima, Shinokawa, 15.V.; 1 ♀, ditto, Kinase, 25.V., 3 ♂, ditto, Yawan.
5. T. ryukeuense Tsuneki, 1966
1 ♀, Amami-Ohshima, shinokawa, 15.V.; 1 ♀, ditto, Shinmura, 16.V.
7. T. takasago kumaso Tsuneki, 1966
7 ♀ 1 ♂, Amami-Ohshima, Misato, 21.IV.; 2 ♀ 1 ♂, Okinawa, Shuri, 16.IV.
10. T. varipes Pérez, 1905
1 ♀, Amami-Ohshima, Shinokawa, 15.V.; 1 ♀, ditto, Mt. Ywandake, 3.V.

The result shows that varipes is added to the fauna of the Ryukyus and that takasago kumaso is not so rare as has been considered.

References not included in my 1981 paper (SPJHA 17)

Tsuneki, K. 1982. Nonsocial wasps of the Ryukyu Archipelago and their distribution.

- Hymenopterists' Communication (Mishima, Japan), 14: 79-107 (in Japanese).
 Haneda, Y. 1983. Aculeate Hymenoptera collected on the Main Island of Okinawas in 1982. Ibid., 15: 23-26 (in Jap.).
 Haneda, Y. 1984. Aculeate Hymenoptera of the Yayayemas collected in 1983. Ibid., 19: 1-4 (in Jap.).
 Nambu, T. 1983. Wasp collecting records on the Yayeyamas in 1978. Ibid., 15: 19-23.
 Tano, T., T. Murota, C. Nozaka. 1985. List of the Aculeate Hymenoptera of the Sakishimas Collected in 1984. Ibid., 23: 27-34 (in Jap.).

CROSSOCENUS (BLEPHARIPUS) SHIRAKII SP. NOV.

I at first considered that the present species to be a variation of C. hirashimai m., 1966, because it is not only very close in characters to this, but also it is captured on the same mount as that where the holo- and paratypes of this species were collected. However, judging from the usual variation tendencies of the present genus the differences of the present specimen from hirashimai, though apparently not large, seem to exceed the variation range within a species and so it is dealt with as a distinct species. The differences:

1. All tibiae without basal whitish colouration, wholly black and all tarsi except slightly whitish basal half of fore metatarsus dark brown.
2. Pronotum anteriorly transversely bluntly ridged, the ridge at its median area gently raised and minutely incised in middle and at each end slightly raised again and produced into a rounded corner; posterior margin of the disc finely carinate and accompanied just in front with a weak furrow, the furrow at mid-lateral areas slightly enlarged and transversely, finely and closely striolated.
3. Parapsidal sutures similarly absent, but in the present specimen the place is represented by a short longitudinal carina which is raised into a minute tubercle at the anterior end.

Some additional notes:

Occipital carina suddenly ended beneath head, producing into a tooth at each end. Frontal marks similar in form and smoothness to those of hirashimai, but in the present specimen it is observed in certain light that the mark is gently raised and enclosed with a weak furrow which is acutely edged at the outer border.

Otherwise very similar in colour and structure to the compared species. Length about 6.0 mm (gaster curved downward at apical half).

♀, unknown.

Holotype: ♂, Is. Amami-Oshima, Ryukyus, Mt. Yuwandake, 4.V.1953, T. Shiraki leg. (Coll. Ent. Lab. Min. Agr. For., Jap.).

RHOPALUM (RHOPALUM) SONANI SP. NOV.

The present species (♀) is very similar to R. hakodatense m., 1960 and in my key (Life Study, 1960, in Jap.) runs certainly to this species (in the key it is represented by Rhopalum sp., though the annexed local name shows distinctly this species), but differs from this in the following characters:

1. Head from above with temples smoothly, roundly convergent posteriorly, almost without constriction between eyes and temples (in hakodatense temples roundly swollen out and then convergent posteriorly, showing a slight constriction between eyes and temples, the maximum width of head is located at the anterior part of temples as well as at posterior part of eyes, while in the present species maximum width is at posterior part of eyes only), with posterior margin slightly narrower (maximum and posterior width and length in middle in the present species relatively 60:34:35, while in hakodatense 60:40:35).
2. Clypeus generally similar in form and structure, but medio-apical margin narrower (distinctly narrower than the distance to neighbouring tooth, while in hakodatense both are similar in width).
3. Slightly smaller, 4.5 mm (hakodatense about 6.0 mm).

On some other characters. Colouration of legs, relative length to width of antennal segments, structure and punctation of pro- and mesonotum, area dorsalis of propodeum, gastral petiole and pygidial area very similar to those of hakodatense.

Mesoscutum microcoriaceous and very closely superimposed with minute punctures, surface not shining; vertex and upper frons without microsculpture, more sparsely than

on scutum covered with punctures that are as large as those on scutum. Strictly punctures sparser on upper frons than on vertex. The pattern of punctation is similar in both species, but the punctures on head much sparser in the present species than in hakodatense.

♂, unknown.

Holotype: ♀, Tokyo, Kodaira-City, 10.VI.1963, J. Sonan (or J. Minamikawa) leg. (Coll. Ent. Lab. Min. Agr. For. Japan, Ibaragi Pref., Tsukuba).

TWO NEW SPECIES OF NOMADA FROM PEKING, NORTH CHINA

NOMADA PEKINGENSIS SP. NOV.

The present species (♀) runs in the Schmiedeknecht's 1930 key to couplet 59 and runs out. It is characteristic in having four short, thick, not pointed and black spinules at the end of hind tibia, three of which are closely contiguous to each other and one distinctly apart from the others. In this character it resembles European guttulata Schenk which occurs also in Japan, but differs from this in that antennal joint 3 as long as (in some condition appears slightly longer than) joint 4, inner margins of eyes more strongly convergent below (IODv:IODc=40:32, in guttulata 40:36) and mandible relatively shorter, thicker and robust, with apex more broadly rounded. Further, it differs from guttulata markedly in vestiture and maculation.

♀. 7.3 mm. Black, inner orbits narrowly till level of antennal bases, short genae, apical margin of clypeus comparatively broadly, labrum, mandible except dark brown apical third, antenna wholly, tegula, legs except greater part of each coxa and ground colour of gaster ferruginous, but paraocular areas slightly yellowish; pronotum, tubercle, two large rounded marks on scutellum, a spot on postscutellum, two large lateral marks on gastral segments 2 and 3, laterally interrupted broad band on 4 and 5 yellow; basal half and postero-lateral spots of tergite 1 and apical margin of segments 4 and 5 black. Hair moderately long, about as long as antennal joint 7, but on propodeum slightly longer, fairly dense, all erected and evenly brilliant ferruginous.

Clypeus weakly raised, not strongly produced anteriorly, apical margin of median produced part slightly less than as long as subantennal area, labrum without median tooth, but apical margin gently, triangularly reflected, relative length of antennal joints 3, 4 and 5 about 5:5:4, joint 4 about 1.3 times as long as wide seen from beneath, joint 7 only slightly longer than wide; pronotum medianly emarginate, scutellum not strongly high, weakly furrowed in middle; in fore wing nervulus shortly postfurcal, subinterstitial.

♂, unknown.

Holotype: ♀, Peking, 23.IV.1939, K. Tsuneki leg. (Coll. Tsuneki).

Variety A. The specimen agrees completely in structure with the above described specimen, except that the pronotum is not emarginate in middle, but is markedly different in colour and maculae of the gaster:

Wholly dark brown, basal half of segment 1 black, basal sides of segment 2 slightly brighter, but without yellow mark anywhere.

Other slight differences: Inner orbits till top of eyes ferruginous, where the bands are slightly enlarged and becoming more yellowish, yellow on pronotal tubercle somewhat darkened and mesopleuron with a small, obscure, yellow mark anteriorly below.

Hair, except on mesopleuron, rather greyish white.

1 ♀, Peking, 20.V.1939, K. Tsuneki leg. (Coll. Tsuneki).

NOMADA TIENDANG SP. NOV.

In the Schmiedeknecht's key the present species (♀) runs to couplet 26 and runs out.

♀. Length 7.0 mm. Head and thorax-complex, especially propodeum almost completely bare. Ground colour of head and thorax-complex black and of gaster dark brown. Inner orbits of eyes narrowly till above level of antennal base dark brown, brighter below; genae, apical margin of clypeus narrowly, labrum wholly, mandible except dark brown apical third, antennal scape wholly, flagellum beneath (above dark brown to black), tegulae and legs except greater part of each coxa ferruginous; scutellum wholly reddish brown; pronotum, tubercle and a large, somewhat obscure mark on gastral tergite 5 yellow.

low; further, on gastral tergites and sternites obscure, irregular, somewhat bright brownish bands can be seen, but very indistinct.

Head seen in front with facial ratio 40:35:45, clypeus with width of apical margin of median produced part : length in middle, under the same scale, 22:15, it is not raised high, seen in profile about half the width of eye, not strongly produced anteriorly, with disc gently, roundly raised, genae short, labrum with a short tooth beyond middle, accompanied with a shorter, indistinct one on each side obliquely in front, mandible acutely pointed at apex, oculo-antennal distance nearly equal to interantennal distance, interantennal elevation with its median carina not high; pronotum acutely carinated on top, carina translucent and in some light appearing blackish and medianly markedly incised, scutellum broadly, roundly, fairly highly elevated and moderately deeply furrowed in middle, triangular area of dorsal aspect of propodeum distinctly outlined with fine groove, with surface irregularly, very closely microstriolate. In fore wing nervulus interstitial, hind tibial apical spinules are a series of five short, pointed and blackish ones, outermost one of which is distinctly apart from the others.

♂, unknown.

Holotype: ♀, North China, Peking, Tiendang, 26.VII.1938, K. Tsuneki leg. (Coll. Tsuneki).

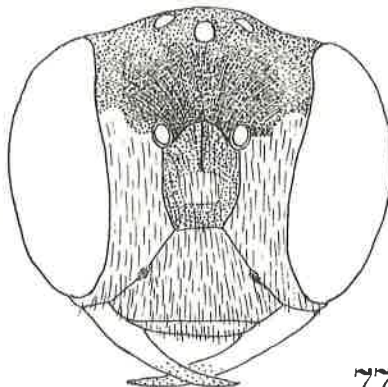
KOREAN SPECIES OF NOMADA

NOMADA KOREANA SP. NOV.

The present species (♂) in the Pittioni's key (1953) runs to couplet 120-121 and runs out, but apparently closer to jasnitskii Cockerell known from Irkutsk than to gyangensis Cockerell described from Himalaya, but it differs from the former at least in that face below antennae is completely yellow and densely covered with appressed silver pubescence, antennal scape yellow beneath, mesoscutum without lateral stripes, gastral tergites 1-3 not bare and band on 3 not interrupted in middle and legs more broadly yellow.

♂. Length 8.5-9.5 mm. Black; yellow are a large mark below middle of supraclypeal area (often absent), clypeus completely, labrum, mandible except apical third, paracular areas broadly till lateral margin of clypeus and supraclypeal area inward and slightly above level of antennal base upward, genae, labrum, pronotum, tubercles, tegulae, a spot on basal plate of each wing, a mark on mesopleuron anteriorly below, two distinctly separated round marks on scutellum, postscutellum, a small mark on each side of posterior aspect of propodeum (sometimes lacking), bands on tergites 1-6, of which those on 1 and 2 medianly interrupted and that of 2 further broadly emarginate from in front, bands on sternites 2-6, of which that of 2 very variable in form, fore femora in front broadly, apical part of mid and hind femora, outer sides of all tibiae and of tarsi. Ferruginous to pale brown: antennal flagellum beneath, rest of femora except black beneath and inner side broadly of tibiae, but hind tibia medianly broadly blackish. Wings subhyaline. Hair on face below antennal base and on labrum silky white, very dense and appressed, that on thorax beneath fairly dense, nearly appressed and rather greyish white, on other parts of thorax and propodeum sparser (on mesopleuron somewhat close), shorter and erected or half erected, on gaster very short and indistinct, without any particular one on posterior margins of sternites. Hair on fore femur beneath shorter than maximum width of the segment, that on hind femur beneath very much shorter than the segment width.

Head seen from above with ratio of OOD:Od:POD=10:6:10 (under eye measurement POD appears distinctly greater than OOD), seen in front (Fig. 77) with upper frons broadly and deeply depressed, surface of the depressed area flattened and inner orbital areas



strongly inclined toward the depression, from the lower middle of the depression the interantennal elevation suddenly raised, with medial carina acutely inclined to the depression, not long extended upward as in usual species, inner orbits distinctly convergent below, IODv:IODc=40:34, clypeus fairly strongly elevated anteriorly, seen in profile with apical part almost half as wide as eye, gena short, on posterior part almost lacking, labrum with a medial tooth before apex, appearing brownish in counter light; mandible with apex broadly rounded (in frontal view acutely pointed). Antennal joints 3, 4 and 5 with relative length (ventral view) =3.5 : 5 : 4, joint 4 1.4 times, 5 1.5 times as long as wide at apex, joints 5-12 similar in length, but from middle apically narrower. Pronotum acutely carinated on top, carina translucent and in some light appearing blackish and medianly shallowly emarginate, fore coxa without tooth, scutellum highly raised, medianly furrowed and disc distinctly, roundly bituberculate, on propodeum dorsal area high triangle in form, with apex reaching near the medio-apical rounded elevation covering the base of baso-dorsal muscle of the gaster. Gastral tergite 1 deeply impressed at base, with a longitudinal bottom line in middle, caudal segment broadly rounded at apex; in fore wing nervulus subinterstitial, slightly postfurcal, no distinct hind tibial apical spinule present, some short hairs similar to those of other parts of tibia slightly produced.

♀, unknown.

Holotype: ♂, Valley of Mt. Shoyo, Central Korea, 27.VIII.1943, K. Tsuneki leg. (in his Coll.).

Paratypes: 2 ♂, same as above.

NOMADA TEMMASANA SP. NOV.

♀. Closely resembles *N. galloisi* Yasumatsu et Hirashima occurring in Japan, but is different from this in that gastral tergite 4 bears a pair of lateral maculae that are, together with those on tergite 5, much broader, pronotal tubercles yellow maculated, antennal joint 4 relatively much longer and punctures on head, especially on clypeus much finer.

6.5 mm. Robustly built; black. Yellowish white; genae anteriorly, pronotal tubercles, two spots on scutellum, transversely elongate, large, lateral, elliptic marks on tergite 2, short lateral bands on tergites 3, 4 and 5 and on sternites 3 and 4, median marks on sternites 5 and 6, the latter becoming obscure by being covered with dense pubescence; antennae brownish black and castaneous beneath, clypeus at apical margin slightly brownish, mandibles and rest of genae brown, the former apically dark brown; basal 2/3 of labrum yellowish brown. Fore leg except coxa castaneous brown, paler on femur and tibia anteriorly and on tarsus; mid and hind tibiae castaneous, paler on the former anteriorly, tarsi slightly paler except outer sides of both metatarsi, especially on hind one. Wings subhyaline.

IODv:IODc=40:34, OOD:Od:POD=10:4.5:9, depression above antennal base moderate, interantennal elevation with median carina reaching near the fore ocellus, clypeus relatively longer than in *galloisi*, medio-apical margin: median length = 20:15 (in *galloisi* 20:12), disc gently rounded (in *galloisi* flattened) and more finely and more sparsely punctured (in *galloisi* punctation subreticulate, in the present species laterally and anteriorly much sparser, with impunctate apical marginal area broader), labrum with median tooth located before apical margin, accompanied with an oblique short carina anteriorly on each side that is toothed at apex (in *galloisi* apical margin medianly tridentate, with medial tooth longer). Pronotum much thicker, with anterior margin carinate and medianly deeply emarginate, disc constricted on both sides (in *galloisi* shorter, on median area almost without disc, only acute carina defined), scutellum highly raised, but almost without median furrow (only with a fine weak groove).

Dorsal area of propodeum triangular, with surface very closely microcoriaceous (in *galloisi* somewhat more strongly micro-rugoso-striolate), rest of posterior aspect strongly punctured, punctures sparser toward apex and toward median line and medio-apical area narrowly impunctate and polished (in *galloisi* antero-lateral parts alone strongly punctured and broad median area impunctate and polished). Punctation on gaster similar.

In fore wing nervulus subinterstitial as in the compared species.

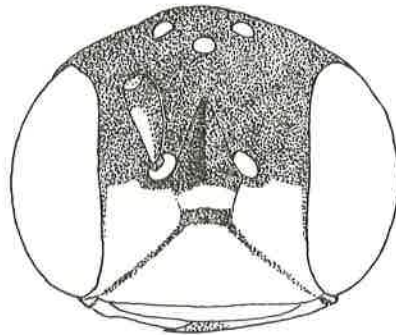
♂, unknown.

Holotype: ♀, Mt. Temma, S. Korea, 30.VIII.1942, K. Tsuneki leg. (Coll. Tsuneki).

NOMADA SHOYOZANA SP. NOV.

The present species (σ) closely resembles *N. hammar stroemi* Morawitz known from Siberia and in the Pittioni's key certainly runs to this species, but differs from it in that the flagellar joints of antennae are shorter and wholly black and fore coxa at apex strongly toothed. In the latter character as well as in the general distinctions it is somewhat similar to *flavopicta* commonly known, but can be distinguished from this by the much better developed yellowish white maculae and much less developed appressed hair on the face below antennae and by the presence of yellowish bands on GT5 and 6.

σ . 7.5 mm, robustly built. Black; pale yellowish white: face below antennae except narrow marginal lines of clypeus and supra-clypeal elevation (Fig. 78), labrum, genae, mandible except apical area, a mark beneath A 1, a small spot on lower part of temple along outer orbit, pronotum, tubercle, tegulae, postero-lateral corners of mesonotum, a spot on mesopleuron below, two distinctly separated large marks on scutellum, medianly finely interrupted short band on post-scutellum, lateral marks on GT 1-4 and on GS 2-4 and band on GT 5 and 6, two elongate marks on fore coxa, apices of mid and hind coxae, apices narrowly of all trochanters, knees, basal and apical mark on tibiae, in fore tibia connected with each other into a stripe, spurs, bases of all metatarsi; fore and mid tibiae on inner side and rest of tarsi brown, the latter apically paler.



78

Head seen in front (Fig. 78) with inner orbits parallel, eye emargination very feeble, interantennal elevation blunt, not acutely carinated on top, OOD:Od:POD=10:5:9.5, vertex with postocellar area distinctly raised, labrum broadly flattened on median area, without central tooth, apical margin(?) slightly brownish and fringed with short silky white hair, whether tridentate apex is present behind this or not is unknown. A 3, 4 and 5 subequal in length (strictly A 5 slightly longer and slightly narrower than A 4), each only slightly longer than wide, A 6-12 equal in length and very slightly shorter than A 3 or 4 and each very slightly longer than wide, A 13 1.7 times as long as broad at base, with apex obliquely rounded and shining, tyloidea not acute, narrowly, bluntly ridged. Pronotum comparatively broad, with anterior margin acutely carinate, carina broadly and deeply emarginate on median area, scutellum highly raised, with a moderately deep median furrow which is enlarged on posterior aspect, pygidium broadly rounded at apex and flat on disc. In fore wing nervulus distinctly anterfurcal, D=N; fore coxa strongly and long toothed at apex, apex of T 1 with tuft of long hair, hind tarsal apical spinules very short and indistinct (on the right leg lacking).

Clypeus and paraocular areas with comparatively large, shallow, subrugosed punctures, covered sparsely with not long, silky white hair, punctures on upper frons large, close, deep and subrugose, on mesonotum closer and slightly finer, on yellow areas large, shallow and slightly sparse.

η , unknown.

Holotype: σ , valley of Mt. Shoyo, Central Korea, 3.IX.1942, K. Tsuneki leg. (Coll. Tsuneki).

Other Korean species of *Nomada* collected by me:

1. *Nomada japonica* Smith
1 η , Seiryori, suburbs of Seoul, 18.V.1943.
2. *Nomada ginran* Tsuneki
1 η , Mt. Kodai, S. Korea, 2.V.1943.
3. *Nomada sabaensis* Tsuneki
1 η , Mt. Shoyo, Central Korea, 2.VII.1943.
4. *Nomada calloptera* Cockerell
1 σ , Mt. Hokkanzan, suburbs of Seoul, 19.IV.1942; 2 η , 2, 21.V.1942, same loco.
5. *Nomada esakii* Yasumatsu et Hirashima
1 η , Valley of Mt. Shoyo, 18.V.1941.
6. *Nomada maculifrons* Smith
1 η , valley of Mt. Shoyo, Central Korea, 19.IV.1942; 1 σ , Mt. Kodai, Central Korea, 29.IV.1943; 1 η , Mt. Hokkanzan, suburbs of Seoul, 21.V.1942.

JAPANESE NOMADA

NOMADA BABAI SP. NOV.

The present species (δ) is apparently similar to some form of N. nipponica Yas. et Hir., but can easily be separated from it by the almost bare fore and mid femora and by the very low scutellum.

δ . 6.7 mm. Black; yellow are paraocular areas shortly, apical half of clypeus (apical margin narrowly ferruginous, dorsal margin obscure, medianly above brownish and bordered from each paraocular area by an oblique blackish line), narrow genae, mandibles on basal half, labrum, a spot along top of eyes, A 1 broadly beneath (margined by ferruginous colour), lower part of mesopleural mark, two spots on scutellum (margined by ferruginous), lateral marks of GT 2 and 3, median interrupted band on 3 and apical bands on 4 and 5, central mark of GS 2-6. A 1 and 2 beneath and A 3-13 on outer side pale brown, A 1 broadly and 2, 3 and 4 narrowly black above, rest of flagellum dark brown. Ferruginous brown: apical part of mandibles (apex brownish black), medianly interrupted line on pronotum, tubercles, mesopleural marks at antero-lateral area, tegulae, basal plates of wings, broad apical band of GT 1 (apical half appears dark brown), broad central bands of GT 2 and 3 (both including lateral yellow marks), marginal areas of yellow bands of GT 4-6 and pygidial area, apex of coxae, fore femur except posterior streak not reaching apex, fore tibia except lengthened patch on posterior side, mid femur and tibia similarly maculated, but blackish area broader, hind femur on apical area alone and tibia except blackish streak on posterior side and all spurs and tarsi, but hind metatarsi dark brown on outer side. Wings nearly clear hyaline, radial cell and apical marginal area faintly clouded, veins dark brown, stigma slightly paler. Hair on head and thorax normal, similar to the allied species, but on fore and mid femora markedly short, fine and very scarce, that on hind femora beneath well resembles nipponica in that it is half appressed, seen from beneath obliquely located and slightly produced posteriorly, but the hair is comparatively sparse, not curved, not bundle-like as observed in ginran.

Head in frontal view with ratio of $W:L=60:48$, facial ratio= $40:36:45$, interantennal elevation not long, carina on top scarcely reaching middle of distance to fore ocellus, yellow part of clypeus distinctly inclined forward, labrum with median tooth behind apical margin, accompanied on each side, obliquely apart from it, with a serrate carina (on left side not serrate, but a simple carina), mandible comparatively short and thick, rather abruptly narrowed to minutely rounded apex, A 1 thick, as long as A 3 and 4 united, relative length of A 3, 4 and 5 approximately 3:5:4 (strictly 3:5=7:8.5), in ventral view A 4 1.7 times, A 5 1.2 times as long as wide at apex, A 7 very slightly longer than wide and in some condition appears completely as long as wide, 8-12 completely as long as wide. Pronotum much less depressed than usual, mesoscutum medianly from anterior margin finely carinate, carina reaching slightly beyond middle, elevation of scutellum very low, almost level with mesoscutum, only with a weak furrow between them. G 1 slightly longer than wide at apex, pygidium very weakly roundly raised at base, with lateral margins gently roundly convergent posteriorly, marginal areas narrowly castaneous brown, with inner margins straight, apical incision moderately deep and comparatively broad, with sinus rounded. In fore wing nervulus postfurcal, 3 cubital cells distinct.

♀, unknown.

Holotype: δ , Yamagata Pref., Oguni-machi, 13.VI.1977, K.Baba leg. (Coll. Baba).

NOMADA YASHA SP. NOV.

The present species (δ) closely resembles melanic form of ginran Tsuneki, 1973, but differs from this in that the basal excavation of hind femur beneath is much shorter (about a third, in ginran half), pronotum more deeply depressed below level of mesoscutum, scutellum more highly elevated and pygidium with lateral margins incurved and disc at base gently roundly elevated (in ginran lateral margins straightly narrowed posteriorly and disc flattened).

δ . 7-9 mm. Black; yellow are paraocular areas narrowly, not reaching level of antennal sockets, sides of apical margin of clypeus, base of mandibles, sometimes a part of labrum, a patch along top of eyes, a line at outer orbits, a narrow band on pronotum, two spots on scutellum (sometimes very small and brownish), narrow lateral marks across middle of GT 1, large lateral marks on GT 2-6, sometimes those on 1 and 5, 6

inconspicuous, sometimes a mark on 7 present, gastral marks frequently brownish or blackish and not well defined; castaneous brown are antennae beneath (often A 1 largely or nearly wholly black and A 13 broadly ferruginous above), mandibles apically widely, pronotal tubercles, tegulae, basal plates of wings, apices of coxae, trochanters, variable streaks on femora and tibiae and greater part of tarsi. Wings subhyaline, radial cell and apical margin distinctly darkened, veins dark brown to brown. Hair silky white, long and appressed on clypeus, on fore and mid femora about as long as maximum width of respective segment, on hind femur at base beneath forming a long, curved, dense vundle and produced posteriorly, as in ginran, the hair on hind trochanter beneath showing a somewhat similar tendency, but the hair much shorter, less numerous, not curved.

Head in frontal view with ratio of $W:L=6:5$, facial ratio $4:38:45$, eye emargination only gentle, the carina on top of interantennal elevation thin and acute, reaching beyond middle of the distance to fore ocellus, clypeus weakly roundly raised at basal and lateral marginal areas, with disc nearly flattened and weakly inclined anteriorly, medial tooth of labrum slightly beyond middle, sometimes very short and inconspicuous, lateral teeth of it indistinct. A 3, 4, 5 in ventral view with relative length 3:5:4, A 4 1.3 times as long as wide at apex, A 7 only slightly longer than wide, tyloidea not strong; mesoscutum medianly weakly furrowed, the furrow reaching beyond middle of scutum, parapsidal sutures each in a shining line, well defined for about one third of the scutum, scutellum highly raised, with median furrow weak, area dorsalis of propodeum with disc broadly flattened and at marginal areas shortly, roundly inclined; G 1 as long as wide at apex (when extended slightly longer than wide), GT 1 medianly at base deeply triangularly depressed, the depression reaching beyond mid point of the segment, carrying a fine distinct bottom line in middle, pygidium at base gently roundly elevated, apically narrowed and depressed, with lateral margins incurved and except extreme base distinctly reflected like a carina, apical incision deep. In fore wing nevelus postfurcal, sometimes subinterstitial, always 3 cubital cells present. HTS two, moderately long, pale brown, mixed with dense whitish hair of similar size and not conspicuous.

♀, unknown.

Holotype: ♂, Fukui Pref. Mt. Yashagatake, ??.1976, C.Nozaka leg. (Coll. Tsuneki).

Paratypes: 1 ♂, Mt. Akato, Fukui Pref., 5.IX.1976, C.Nozaka; 1 ♂, same mount, 1976, C.Nozaka (possibly same date).

Remarks. The present species is apparently an aberratio of N. ginran, but distinctly differs from this species in its ecological character, namely ginran appears always in spring-summer season, while the present species in early autumn.

SPHECODES CRISTATUS PEKINGENSIS SPP. NOV.

♀. N. Chinese subspecies differs from the nominate race mainly in the colour of the legs, namely all femora and tibiae red, besides the tarsi.

Punctures on mesoscutum comparatively large and strong, on lateral areas comparatively regular in distribution, PIS mostly 0.5-1 times PD, at medio-anterior area very close and on broad central area quite irregular and PIS 0.5-4 times PD.

GT 1 on disc finely, closely punctured, on posterior area similarly finely and more closely punctured, with impunctate narrow spaces between. Punctures on disc of GT 2 and 3 stronger than those on GT 1 and disappear in front of posterior area, posterior area depressed and bordered in front by a line of larger punctures, posterior area itself anteriorly very sparsely and finely punctured and posteriorly broadly impunctate. Hamuli of hind wing 8-10. From G1 to G4 red, in one of the paratypes strongly darkened on posterior areas of GT 1-3.

The remarkably highly raised longitudinal carina on vertex behind ocellar area as in the European form. Length 9.0 mm.

♂, unknown.

Holotype: ♀, N. China, Peking, 10.VII.1938, K.Tsuneki leg. (Coll. Tsuneki).

Paratypes: 2 ♀, same as above, 3.VI.1938 and 26.VII.1938, K.Tsuneki leg (Coll. Tsuneki).

Remarks. The Japanese species, similimus Smith (= esakii Strand et Yasumatsu), is as its name shows, very similar to the present species, especially in the presence of longitudinal carina on vertex, but it differs from it in that head in frontal view is relatively much shorter ($W:L=50:38$, in the present ssp. 50:42), space before antennal fossae shorter (relatively 13 under same scale, in the present ssp. relatively 18), rounded disc of mesoscutum more broadly developed antero-laterally and less strong-

ly overlapped the median part of posterior carina of pronotum, as a result lateral areas of dorsal aspect of pronotum are less broadly observed from above, while the posterior carina of pronotum can be seen in the same state. Punctures on head and thorax in simillimus much larger, stronger and closer and antennae and legs wholly black. Furthermore, in the delicate punctation on the gastral segments slight difference is observed between them, in simillimus all posterior areas completely without puncture and polished.

ON SPHECODES OF KOREA

SPHECODES CARINICEPS SP. NOV.

♂, 5.5-7.5 mm. Completely black, mandible except base reddish brown, sometimes apically somewhat darkened, fore tibia in front usually ferruginous, sometimes only slightly brownish, serrae on outer side of tibiae more or less brownish and spurs pale yellow, wings almost hyaline, tegula brownish black, with discoloured area on outer side, varied in space from marginal area to outer half; vestiture normal.

Vertex medianly strongly, longitudinally, shortly carinated, carina in lateral view highly raised in triangle, facial ratio 40:31-32:47-48, on clypeus median furrow usually shallowly defined, sometimes not; antennae from A 5 apically strongly moniliformed, though nearly smooth on dorsal side, A 4 more than as long as A 2+3 or A 5, A 5-12 similar in length, A 13 as long as A 4, though narrowed and pointed at apex, surface microcoriaceous and delicate pile band present at each base of A 5-13 which is gradually more strongly, roundly expanded on ventral side as the joint approaches apex and on A 13 reaches near middle of the joint. Except the state of the pile bands the characters are usually observed in most species, but in regard to the relative length of A 4 (in ventral view nearly rectangular) and surface microcoriaceous sculpture the present species is very interesting and suggestive in its variation. The specimens examined are 22 in number that are collected on the same day at the same locality (possibly at the same place), but that can be separated into two groups according to the characters above mentioned: In group A (9 specimens) A 4 is relatively longer, about 1.5 times as long as wide and microsculpture of A 4-13 weak, with surface considerably shining, while in group B (6 specimens) A 4 is slightly shorter, about 1.4 times as long as wide and microsculpture of flagellum is strong, with surface dull. We are tempted to divide them into two different species, but the remaining 7 specimens are exceptional, either showing the mixed characters or intermediate ones between the two. In two specimens A 4 is short, but flagellar microsculpture is weak, in other two A 4 is long, but flagellum is dull, in another two A 4 is intermediate in length and microsculpture is also intermediate and in the remaining one A 4 is long and considerably shining, but from A 6 apically flagellum is considerably dull and opaque. The presence of these intermediate characters seems to show that group A and group B are only within the variation range of a single species. Medio-anterior furrow of mesonotum very shallow, but always with a shining bottom line that reaches beyond middle of the scutum, notauli sometimes impressed, sometimes not, in group A usually impressed and in group B mostly not, but always exceptions are present, area dorsalis of propodeum usually marked off with a carina, lunate in form, but marginal carina sometimes not smooth, rather indistinct. Pygidial area very broad, roundly convergent apically, with apex either broadly or narrowly rounded, surface somewhat translucent brown. Wing venation considerably variable, as usual. Hind wing hamuli 5-6 in number.

Punctures on mesoscutum medium-sized, close, anteriorly subreticulate and somewhat sparser posteriorly, scutellum usually very coarsely, irregularly subreticulate, but sometimes the gross meshes are further minutely irregularly reticulate inside, becoming complicate sculpture and sometimes whole the surface finely, but irregularly reticulate. Disc of GT 1 very finely and very sparsely punctured, all the posterior areas impunctate and polished, discs of GT 2-5 more distinctly, fairly closely punctured, punctures larger than those scattered on disc of GT 1, but much smaller than those of mesoscutum and gradually somewhat smaller on posterior segments.

Holotype: ♂, Gaya, Haeinsa-Temple, 20-22.VIII.1985, T. Tano leg. (Coll. Tsuneki).
Paratypes: 21 ♂, same data (mostly Coll. Tano, partly Coll. Tsuneki).

SPHECODES BIPUNCTATUS SP. NOV.

♀, 9-9.5 mm. Allied to nippon Meyer, 1922, in having the temples in dorsal view roundly convergent posteriorly and pygidial area as wide as maximum width of antennal flagellum. In the present species, however, bipunctuation on disc of GT 1 is much closer and minute punctures on posterior area (intermediate in size between the large and minute ones on disc) are also much closer (larger ones on disc stronger and sparser towards sides and punctures on posterior area somewhat larger and closer laterally), punctuation on GT 2 similar to that of GT 1 generally, but punctures on lateral parts of posterior area confined to anterior portion alone, close to disc, on disc of GT 3 minute punctures very scarce and punctures on posterior area almost confined to its medio-anterior portion.

Black; G 1, 2, 3 and lateral parts of 4 red. Hind wing hamuli 10-11. Head in frontal view with inner orbits slightly convergent below, IODv:IODc=40:38, eye emargination above middle fairly strong, head in dorsal view with OOD:Od:POD=10:3:6.5, clypeus medianly distinctly furrowed, with punctures on both sides of the furrow large and comparatively sparse, with PIS half as large as PD, apical margin of labrum broadly rounded, without incision, A 3+4:5=10:8 (seen from beneath), A 5 as long as wide, pygidial area strictly slightly narrower than maximum width of flagellum, 5.5:6. Wings strongly infuscated, nervulus antefurcal.

Punctures on mesoscutum large, rounded, fairly close, PIS mostly less than PD, but partly several punctures contiguous to neighbouring ones, forming irregular punctures, but towards sides punctures becoming smaller, closer, angles and subreticulate.

♂, 7.5-8.5 mm. Black, with apical marginal area of G 1 and whole of G 2 and 3 red. Punctuation pattern of gastral tergites similar to that of ♀, but the larger punctures comparatively much larger and closer. A 5-13 distinctly constricted at base and markedly roundly swollen out beneath, with very short pile band confined to each narrow base only. A 4 about twice as long as wide, distinctly longer than A 2+3. Head in frontal view with inner orbits strongly convergent below, eye emargination above middle very small and shallow, IODv:IODc=40:31, lower frons and whole the area below antennae densely covered with silky white hair that is appressed below antennae. Head in dorsal view with temples roundly convergent posteriorly as in ♀.

Holotype: ♀, valley of Mt. Shoyo, Central Korea, 27.VIII.1942, K. Tsuneki leg. (Coll. Tsuneki).

Paratypes: 1 ♂, same as holotype; 1 ♂, same valley, 3.IX.1942; 1 ♀, Seoul (air port), 20.VI.1943; 1 ♂, Mt. Hokkanzan, suburbs of Seoul, 6.IX.1942, all leg. K. Tsuneki and in his Coll.

Remarks. The punctuation of the gaster of the present species (♀ ♂) is similar to that of S. gibbous Linné, but mesoscutum medio-anteriorly without furrow and with punctures much closer and can easily be separated from it.

SPIEICODES COARCTATUS SP. NOV.

♀, 9-10.5 mm. Closely resembles preceding species, but differs from it in the following respects:

Head in dorsal view with temples straightly convergent posteriorly. Punctures on disc of GT 1 fine and uniform as on its posterior area (anterior inclination smooth and polished), punctures on posterior area of GT 1 reaching apical margin and anteriorly slightly large and markedly finer and closer posteriorly, punctures on disc of GT 2 similar to disc of GT 1, but slightly larger and closer posteriorly, posterior area slightly depressed and marked off in front by a line of particularly large punctures scattered, with the area markedly broad and completely smooth and polished; punctures on GT 3 similar to that of GT 2. Mesoscutum very coarsely punctured, punctures large and deep, partly contiguous, partly somewhat broadly separated and deeply furrowed medio-anteriorly, scutellum also coarsely punctured, punctures as large and as deep as on scutum, with a closely punctured impressed line in middle and on both sides of the impressed line punctures sparse, bearing broad shining PIS, sculpture on dorsal aspect of propodeum also coarse, consisting of two transverse lines of strong punctures, the anterior of the close medium-sized punctures and the posterior of the large elongate foveae, both larger towards sides.

IODv:IODc=40:38, but eye emarginations broader and deeper than in bipunctatus, thus convergence of inner orbits appears much stronger than in this. Clypeus without median furrow; antennal structure and gastral coloration similar, with hind wing hamuli 9 in both wings which are fairly strongly infuscated as in compared species, nervulus similarly slightly antefurcal; maximum width of antennal flagellum; pygidial area = 5 : 5.5.

♂, unknown.

Holotype: ♀, valley of Mt. Shoyo, Central Korea, 27.VII.1943, K. Tsuneki leg. (in his Coll.).

Remarks. The present species is also close in characters to nipponicus Yasumatsu et Hirashima, but differing mainly from it in that the posterior area of GT 1 is more uniformly and more broadly punctured till near apex. Measurements: HW:HL(frontal view): IODv:Al=100:78:64:35, facial ratio = 40:38:40, PA:Am=10:10.7, Al:A2-6=20:22, Abscissae of radial vein from 1 to 4 = 5:4:9:23, OOD:Od:POD=10:3.5:7. Antero-median area of mesonotum shortly furrowed, scutellum medianly longitudinally furrowed, dorsal area of propodeum not distinctly margined with carina, clypeus without median furrow, apical margin of labrum unobservable. Punctures on disc of GT 1 slightly sparser than in taeguensis, later described, most usually PIS twice as great as PD, on posterior area also sparse, and finer and slightly closer posteriorly, reaching till near apex; punctures on GS 2,3,4 similar to this species. Pygidial area parallel-sided, with apex broadly rounded, not emarginate, surface with two longitudinal gentle ridges at mid-lateral areas and median impressed area very minutely, longitudinally punctate-striate and the ridges and lateral areas longitudinally finely striate.

SPHECODES TEMMASANUS SP. NOV.

♀, about 11 mm. Similar to coarctatus in general, differing therefrom in the following characters:

Punctures on GT 1 and on disc of GT 2 slightly stronger and closer, on 2 and 3 punctate area crossing over the border line and slightly expanded on to anterior part of impunctate posterior area, punctures on disc of GT 3 and 4 much more markedly finer and closer towards base, this is especially marked on GT 3. Pygidial area slightly rounded out on sides and at apex, surface at base in middle weakly ridged and sloped towards sides and apex, with marginal areas comparatively broadly smooth and shining, rest of the surface longitudinally or obliquely, not strongly, finely and closely striate.

♂, 8.5 mm. Similar in pattern of gastral punctation and temporal form seen from above to ♀, and in antennal structure to bipunctatus ♂. It is also very similar to S. japonicus Cockerell, but differs from each of them either in that punctures on posterior area of GT 1 are not smaller than those on disc or in that mesonotum medio-anteriorly shortly furrowed, IODv:IODc=40:30, eye emarginations broader and deeper than in bipunctatus ♂, but weaker than in its own ♀. Lower frons and area below antennae densely covered with silvery white hair. G 1 at apical area, G 2 wholly and G 3 at base red. Hamuli 7 in both wings.

Holotype: ♀, Mt. Temma, S. Korea, 30.VIII.1942, K. Tsuneki (Coll. Tsuneki).

Paratype: 1 ♂, collected on the same day at the same place, K. Tsuneki (do.).

SPHECODES SEOULENSIS SP. NOV.

♀, 7 mm. Similar in general characters to S. sulcifera Tsuneki, occurring in Japan, but differs from it in that punctures on mesoscutum are larger and more uniform in distribution and much closer than in this species and the three longitudinal furrows on the scutum are much shallower.

Red in G 1, 2 and 3, but posterior half of GT 3 appears blackish, since the area is translucent and black of GT 4 can be seen, tibial spurs pale brownish yellow, fore tibia on inner side and fore tarsus pale brownish, other tibiae and tarsi slightly brownish, tegula dark brown, paler on marginal area (in sulfifera nearly pale ferruginous and broadly translucent), wings apically very weakly clouded, stigma and veins brown, subcosta darker.

Head in frontal view with inner margins of eyes roundly convergent below, IODv: IODm:IODc=35:38:30, clypeus without distinct medial furrow, basal ridge of labrum lunate in form, without medial incision, mandible with a tooth on inner margin near apex, A 1 ≠ A 2-6, frontal furrow shallow but complete. Mesoscutum medio-anteriorly shallowly furrowed, with a smooth bottom line that reaches middle of the scutum, notauli finely impressed for about median third of the segment, but much shallower and finer than those of sulfifera, hind wing hamuli 5 in number in both wings, abscissae 1-4 of radial cell = 5,12,14,50, area dorsalis of propodeum lunate in form, smoothly margined posteriorly with carina, pygidial area at base slightly narrower than A 10 (about 9:10) and gently narrower toward apex, apex broadly rounded, disc medio-basally widely raised and weakly inclined toward marginal areas that are narrowly reflected at the apex.

Punctures on vertex and frons fine and close, subreticulate, on clypeus generally much larger, coarser, angled, but irregular in size and PIS, punctures on disc of mesoscutum larger than those on frons, nearly uniform in size and distribution, PIS mostly as large as or slightly less than PD (strictly 0.5-2 times so and largest at mid-lateral areas behind middle of the scutum), with a few minute points scattered, at antero-lateral areas much closer, each puncture shallowed posteriorly, without distinct posterior outline, punctures at posterior part of the scutum slightly smaller than on disc; scutellum medio-posteriorly with a weak median furrow, on both sides of it punctures larger and closer, but at anterior aspect as large as on disc of mesoscutum, area dorsalis of propodeum radiately, strongly, somewhat rugosely striate, but apical part very coarsely, irregularly reticulate. GT 1, 2, 3 practically impunctate, baso-lateral areas of GT 2 very finely and very sparsely punctured and just behind mid-lateral gentle swellings of border line between disc and posterior area of GT 2 and 3 (posterior area not depressed and disc and posterior area are not distinctly distinguished except the swollen parts) a few very minute piliferous points can be observed, on GT 4 these minute punctures extended inwards along border line and on GT 5 disc closely covered with comparatively large, shallow, piliferous punctures.

♂, unknown.

Holotype: ♀, Seoul, 20.IV.1942, K.Tsuneki leg. (Coll. Tsuneki).

SPIEICODES TAEGUENSIS SP. NOV.

♀. Amongst the Korean congeners the present species is most closely related to S. temmasanus described in foregoing page and may be a variation of this species, but based upon the differences in punctuation of GT 3 and 4 and in form of sculpture of pygidial area it is provisionally treated as distinct.

Length 10.3 mm. Hind wing hamuli 10 in number. Antenna completely black only the covering short pile yellowish white, mandible black, with apical fifth reddish brown, G 1, 2 and base of GT 3 (laterally broader) somewhat darkened red, GS 1-3 completely reddish ferruginous. Wings strongly infuscated.

Measurements: HW:HL:IODv:Al=100:74:60:36, facial ratio = 40:38:40, OOD:Od:POD=10:4:6, PA:Am=10:10.5, Al:A2-6=20:21, abscissae 1,2,3,4 of radial vein =5,5,9,26.

Clypeus without medial furrow, labrum nearly as long as wide at base, broadly rounded at apical margin and minutely incised in middle, mandible at apical third with inner margin abruptly narrowed and thence attenuate apically, leaving distinct angle (like a tooth) there; mesoscutum medio-anteriorly shortly furrowed, area dorsalis of propodeum not distinctly enclosed with carinae; pygidial area rounded and broadly truncate at apex, surface smooth but opaque.

Mesoscutum fairly closely covered with large, angulate punctures, subreticulate, punctures generally somewhat smaller posteriorly and partly contiguous, but PIS everywhere shining; scutellum much more coarsely punctured than on medio-anterior parts of scutum, without broad impunctate space at base, punctures partly contiguous and much grosser posteriorly. GT 1 except smooth anterior inclination finely, fairly closely, uniformly (both in size and distribution) punctured, with a few minute points scattered (that are completely lacking on median area and somewhat closer on sides), PIS mostly 1-2 times PD, punctures on posterior area as large as and as close as those on the close part of anterior disc and slightly finer and closer posteriorly, without minute points mixed, leaving narrow impunctate band in front of apical margin that attenuate laterally, becoming narrowest at mid-lateral areas and then enlarged again towards the sides, on the border line of the disc and posterior area punctures slightly larger and sparser, especially markedly so at mid-lateral swollen parts; punctuation on discs of GT 2, 3, 4 similar in pattern and puncture-size to that of GT 1, except that some punctures on border line are especially large, each segment with very narrow punctate area just behind border line (namely, punctures of the disc crossing over the line) but they are so narrow as compared with the posterior polished area that they can be said practically lacking; GS 2 on basal furrow except sides and on apical lunate area smooth and polished and on intervalic area very sparsely punctured, on GS 3 except apical lunate impunctate area more strongly and more closely punctured and on GS 4 apical smooth area much narrower.

♂, unknown.

Holotype: ♀, Korea, Taegu City, Apsangongwon, 23-24.VIII.1985, T.Tano (Coll. Tsuneki).

Remarks. The present species is also similar to nipponicus Yasumatsu et Hirashima or japonicus Cockerell of Japan in having the temples in dorsal view atraightly narrowed posteriorly, pygidial area approximately as wide as maximum width A 10 and hind

areas of GT 2-4 impunctate, but differing from them in that hind area of GT 1 is more uniformly and more closely punctured till near apical margin.

SPHECODES GAYAENSIS SP. NOV.

♀. The present species belongs to the group of coarctatus, temmasanus and taeguensis, but differs from any of them in that the punctures on disc and central part of posterior area of GT 1 are very much sparser, with PIS mostly 3-5 times PD and in some places appearing slightly less numerous than the scattered minute punctures, punctures on disc of GT 2 also comparatively sparser and posterior area of G 2 and whole of G 3 black (red is slightly darkened). Further, medio-anterior furrow of mesoscutum distinctly shallow and outer middle discoloured translucent area of tegula is much narrower.

Length 8.5 mm. Labrum trapeziform, about as long as wide at base, with apex medianly minutely incised, pygidial area not completely exposed in this specimen, but possibly quadrate in form, as wide as maximum width of A 10, with marginal areas slightly depressed and shining. Wings strongly infusate, hind wing hamuli 10 and 11, outer vein of cubital cell 2 more strongly sinuate than in any of the compared species, but this may be variable.

♂, unknown.

Holotype: ♀, Korea, Mt. Gaya, Maesinsa-temple, 20-22.VIII.1985, T.Tano (Coll. Tsuneki).

SPHECODES CHOSENSIS SP. NOV.

♂. 7.0-8.5 mm. Gaster sometimes completely black, sometimes on basal segments more or less red, hind wing hamuli usually 9, rarely 8 or 10, delicate pile on A 5-13 confined to narrow basal band only, with surface of A 4-13 sometimes strongly microcoriaceous and dull, but sometimes weakly so and fairly shining. Frontal carina indistinct, median furrow of clypeus very shallow and indistinct, transverse elevation of vertex behind ocellar area as usual, without longitudinal carina, medio-anterior furrow of mesoscutum reaching middle of the scutum, always with an impressed bottom line in middle tegula behind the line running from antero-outer third to postero-inner third discoloured and translucent, letting see the basal plate of wing, wing apically considerably infusate, nervulus slightly antefurcal, transverse cubital vein 2 simply rounded out, not sinuate. Scutellum flat above, not furrowed medianly, area dorsalis of propodeum not smoothly enclosed with carina.

Punctures on mesoscutum gross, angled and irregularly reticulate, those on both sides of median line from anterior third posteriorly larger, rounded and somewhat sparse with more or less shining PIS, most marked near apical margin, scutellum irregularly, grossly reticulate, large foveae on area dorsalis of propodeum very irregular, not in a single row, with carinae at their posterior margins strongly zig-zagged. Punctures on disc of GT 1 comparatively large, uniform and very close, PIS mostly less than PD and in some places contiguous to one other, punctures extended on to posterior area leaving narrow apical margin only which is slightly triangularly enlarged in middle, punctures on mid-lateral swollen parts of usual border line slightly sparse but not large, thus the difference between disc and posterior area of GT 1 is quite indistinct. Punctures on disc of GT 2, 3 and 4 generally as on disc of GT 1, only along median line they are slightly sparse, posterior areas of these tergites impressed and polished, but at base behind border lines of GT 2 and 3 narrowly punctured. Apical margin of pygidial area rounded out and narrowly translucent, surface at base medianly bluntly ridged and gently, radiately inclined, with on each side of basal ridge a group of some close, slightly lengthened punctures; GS 2, 3 and 4, except smooth apical areas, finely, moderately closely and rather weakly punctured, but at baso-lateral parts of GS 2 punctures somewhat larger and sparser. Measurements (with 6 specimens):

HW:FL:IOGv:A4=100:64,64,63,68,66,66:64,62,64,64,63,62:14,14,14,13,14,13. Facial ratio=40:31,32,33,32,31,32:41,42,40,42,42,43. OOD:Od:POD=10:4,4,4,4,5,5:8,8,7,8,8,8. Length:Basal width:Apical width of A4 =10:6.5,6.8,6.5,7,6.5,7.5:6,6,6,6,5,6,6.5. Maximum width of A 10 : Maximum width of pygidium = 10:17,18,17,16,16,13. Hamuli=9-9,9-10,9-9,9-9,8-9,9-9. Abcissae 1,2,3,4 of radial vein =5:4,4,5,3,3,3:9,6,7,7,7,9:21,22,21,20,20,19. A2+3+A4:A5+6=10:12,11.5,10.5,12,11.5,11.

Forma A. Apical third of G 1, whole of G 2 and disc and basal half of GS 3 are red, sides of GT 3 wholly and apical half of GS 3 in some light appear reddish. A4-13

strongly microcoriaceous, with surface dull. 1 specimen.

Forma B. G 1 completely black, disc of GT 2 (in some light lateral parts of its posterior area also), base of GT 3 laterally, basal half of GS 2 and in some light posterior part of GS 2, 3 and 4 red. Microsculpture of antennal flagellum weak, with surface fairly shining, outer posterior part of discoloured area of tegula narrower. 2 specimens.

Forma C. Gaster completely black, punctures on GT 1 generally somewhat stronger and closer than in two other forms, on its posterior area median sparsely punctate area narrower. Clypeus sometimes obscurely furrowed in middle, antennal flagellum in two specimens strongly microcoriaceous, with surface not shining, while in the remaining one microsculpture weak and surface fairly glossy. Discoloured part of tegula confined to the outer middle area only. 3 specimens.

♀, unknown.

Holotype: ♂, Korea, Mt. Gaya, Haeinsa Temple, 22. VIII. 1985, T. Tano (Coll. Tsuneki).

Paratypes: 5 ♂ same as holotype (Coll. Tano).

Remarks This species may be the male of the foregoing species.

SPHECODES CHRISTATUS PEKINGENSIS TSUNEKI

Sphecodes cristatus pekingensis Tsuneki, p. 37 of the present paper.

Specimen examined: 1 ♀, Seoul (air port in those days), 26.VI.1943, K. Tsuneki.

Remarks. The Korean specimen has the hind legs at base more distinctly reddish than in the specimens from Peking, coxae and trochanters seen from beneath bright red.

Key to the known Species of Korean Sphecodes

It is presumed that in Korea many species of Sphecodes are still left undiscovered and it is not as yet the time to arrange the known species in a key. The following is only for convenience to separate the species described in the present paper:

- 1 Hind wing hamuli 7 or more 2
- Hind wing hamuli 5 or 6 14
- 2 ♀ (antennal flagellum smooth, mandible with a tooth on inner margin near apex) 3
- ♂ (antennal flagellum nodular, mandible simple) 8
- 3 Head seen from above with temples roundly convergent posteriorly 4
- Head seen from above with temples straightly convergent posteriorly 5
- 4 Vertex with a strong longitudinal carina, in lateral view raised in triangle (G 1-3 and base of 4 red, legs from femora apically red, GT 1 finely, closely, uniformly punctured, punctures on posterior area finer, on border line almost impunctate), 8-9 mm cristatus pekingensis Tsuneki
- Vertex without longitudinal carina (GT 1 with disc distinctly bipunctate, minute punctures more numerous than large ones, with posterior area uniformly punctate, punctures intermediate in size between large and minute ones on disc and more uniformly expanded till near apical margin, posterior area of GT 2 anteriorly broadly, of GT 3 narrowly punctured, clypeus with median furrow, median carina of frons complete, reaching fore ocellus, medio-anterior furrow of mesoscutum lacking, only an impunctate line present there, area dorsalis of propodeum not margined with carina, pygidial area narrower than maximum width of A 10 (7:8), parallel-sided, with apex rounded, surface dull and opaque, weakly furrowed on both sides of blunt baso-medial ridge, G 1-3 red, GT 4 at base laterally, GS 4 at base completely red), about 9 mm bipunctatus Tsuneki
- 5 Punctures on disc of GT 1 uniform, fine and very sparse, PIS mostly 5-8 times PD, on posterior area slightly closer except median and marginal parts (clypeus without median furrow, mesoscutum with medio-anterior furrow, median carina of frons not reaching fore ocellus, area dorsalis of propodeum enclosed with carina, surface radiately, very coarsely rugoso-striate, posterior areas of GT 2, 3 and 4 impunctate and polished, G 1-2 and base laterally of 3 red, pygidium narrower than A 10 (6:7), parallel-sided, with apex truncate, surface weakly wrinkled but glossy), about 8.5 mm gayaensis Tsuneki
- Punctures on disc of GT 1 not so sparse (G 1-2 and basal half at least of 3

- red, area dorsalis on propodeum with marginal carina more irregular) 6
- 6 GT 3 completely red, posterior area translucent and in some condition appears blackish, posterior area of GT 2 completely without puncture (punctures on GT 1 and 2 slightly sparser than in the following species, pygidium subequal to maximum width of A 10 (8:7.5), parallel-sided, with apex rounded and surface half mat and bluntly ridged on each side of median shallow groove), 9 mm *coarctatus* Tsuneki
- GT 3 at base narrowly and on sides somewhat broadly red, rest black, posterior area of GT 2, especially on median part, more or less punctured behind border line to disc (punctures on GT 1 and 2 somewhat closer than in the preceding species) 7
- 7 Punctures on disc of GT 3 and 4 closer, partly contiguous transversely or obliquely and finer and closer toward base, this is especially marked on GT 4 (pygidial area subquadrate, with sides gently rounded out, subequal to A 10 (7.8:8), with apex gently rounded out, surface medianly at base broadly ridged and marginal areas somewhat broadly, smoothly depressed, rest longitudinally or obliquely, delicately striolate), 11 mm *temmasanus* Tsuneki
- Punctures on disc of GT 3 and 4 not so close and not so markedly closer and finer toward base (pygidial area somewhat narrower than A 10 (8:7), with apex broadly truncate and surface flat and opaque), 10.3 mm *taeguensis* Tsuneki
- 8 Head seen from above with temples roundly convergent posteriorly (posterior areas of GT 2 and 3 except marginal areas considerably punctured, GT 1 with disc distinctly bipunctate, minute punctures more numerous than large ones, A 3 seen from beneath twice as long as broad at apex, microsculpture on flagellum strong, with surface dull and opaque, pygidial area at base about twice as wide as maximum width of A 10, with sides strongly convergent apically and truncate at apex, apical marginal part of G 1, whole of G 2 and base of G 3 red), 8.5 mm *bipunctatus* Tsuneki
- Head seen from above with temples straightly convergent posteriorly (disc of GT 1 not markedly bipunctate, if minute punctures mixed, much less numerous than large ones, posterior areas of GT 2 and 3 smooth and polished, pile of flagellar joints of antenna confined to basal narrow bands only) 9
- 9 A 3 seen from beneath twice as long as broad at apex, pygidium broad triangular, at base much wider than A 10, with apex broadly rounded (clypeus with median furrow, microsculpture on flagellum moderately strong, surface somewhat shining, punctures on GT 1 slightly finer and sparser than in the following species, apical part of G 1, whole of G 2 and base of G 3 red), 8.5 mm *temmasanus* Tsuneki
- A 3 seen from beneath 1.6-1.7 times as long as broad at apex, pygidium parallel-sided, wider than A 10, with apex rounded out (clypeus without distinct medial furrow, punctures on disc of GT 1, 2, 3 comparatively stronger and closer than in preceding species, partly subreticulate), 8-8.5 mm *chosensis* Tsuneki ... 10
- 10 Gaster partly red 11
- Gaster completely black forma C 12
- 11 Apical part of G 1, whole of G 2 and base of G 3 red (microsculpture on antennal flagellum strong, surface dull) forma A
- Gaster red confined to basal half of G 2 and lateral areas of GT 2 and 3 (microsculpture on antennal flagellum weak, surface considerably shining) .. forma B
- 12 Microsculpture of antennal flagellum weak, surface fairly shining (A 4 about 1.7 times as long as broad at apex in ventral view) var. 1
- Microsculpture of antennal flagellum strong, surface dull 13
- 13 A 4 about 1.7 times as long as broad, other joints also relatively slightly longer as in preceding forms and varieties, width of A 10 : pygidium = 10:16-19 var. 2
- A 4 slightly shorter, about 1.6 times as long as broad at apex, other joints also relatively slightly shorter, width of A 10 : pygidium = 10:13 var. 3
- 14 ♀ 15
- ♂ 17
- 15 Gaster partly red 16
- Gaster completely black not as yet known
- 16 G 1-3 red, gaster practically impunctate except disc of GT 5 (clypeus without median furrow, mesoscutum finely, comparatively weakly trisulcate, with punctures comparatively large and close, PIS mostly as large as, partly 0.5-2 times PD, pygidial area parallel-sided, slightly narrower than A 10, apex rounded, marginal area slightly reflected, surface not completely smooth, but shining), 7 mm *seoulensis* Tsuneki
- Other species not as yet known

- 17 Gaster partly red not as yet known
 — Gaster completely black 18
 18 Vertex with a strong longitudinal carina in middle (facial ratio 25:20:30,
 A 4 longer than A 2+3 or 5, delicate pile band present at each base of A
 5-13, disc of GT 1 minutely and sparsely punctured, those of 2-5 more dis-
 tinctly and closely punctured, all posterior areas impunctate), 5.5-7.5 mm
cariniceps Tsuneki
 — Vertex without longitudinal carina not as yet known

JAPANESE SPHECODES

SPHECODES IZUMINDUS SP. NOV.

♀. Length 8.5 mm. Closely resembles S. coptis, with hind wing hamuli 6-6, but is different from it in the following respects: (1) punctures on mesonotum are more irregular in size (larger ones similar in relative size to those of coptis), mixed with a considerable number of smaller ones and generally closer and at anterior portion, except median broad shallow furrow, very much closer, weaker and longitudinally somewhat lengthened, almost without distinct PIS and surface not so shining as on posterior portion (in coptis punctures more regular in size and distribution all over the surface), (2) pygidial area (relative width to A 10 = 5:6, similar to coptis) with baso-median elevation flat above, inclined on lateral 4th toward sides, without marginal groove, at apical area elevation radiately inclined toward margin, leaving narrow lateral and comparatively broad apical depressed area, just as in coptis, but the surface completely dull and opaque, (3) disc of scutellum on both sides of medial weak furrow not convex, but nearly flat above and flattened area broadly expanded to latero-posterior marginal area (not smoothly inclined from the convex disc).

Some other characters: HW:HL:IODv:Al=100:80:65:38, facial ratio 40:38:41, Al: A2-6=20:20, OOD:Od:POD=10:4:8, abscissae 1,2,3,4 of radius = 4,4,5,25, G 1, 2 and base of 3 red, mandible apically slightly reddish, clypeus without medial furrow, comparatively finely, closely and evenly punctured, labrum with basal ridge medianly furrowed, main part narrowed in front of the ridge, thence weakly convergent apically and slightly rounded out at apex, leaving a very small, faint emargination in middle; notauli of mesoscutum in fine impressed lines, not deeply furrowed as in some examples of koikensis or coptis. Legs black, but tibial spurs, covering hairs and apical parts of tarsi pale brown.

♂, unknown.

Holotype: ♀, Fukui Pref., Izumi-mura, Maezaka, 12.VII.1984, Y.Haneda leg. (Coll. Tsuneki).

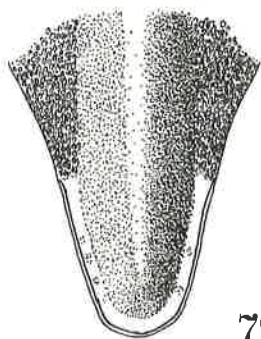
Remarks. Close resemblance of the mesoscutal punctation, scutellar structure and in general other characters seem to suggest that the present species may be the female of hanedai m., although markedly different in colour of the gaster.

SPHECODES CHICHIBUENSIS SP. NOV.

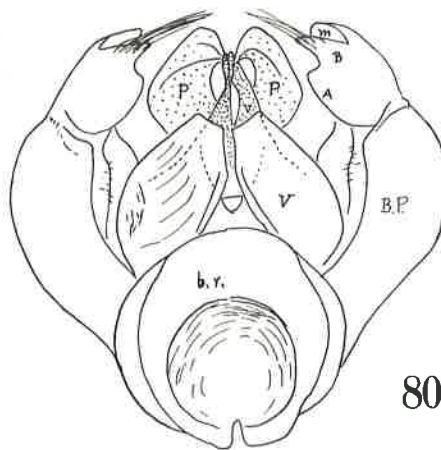
♀, length 6.5-7.5 mm. In my 1983 key runs to couplet 25 and runs out, but it is somewhat closer to okuyetsu (= etizenensis) than sulcifera or crassicornis, differs from the former in that A 1 relatively somewhat shorter, punctures on mesoscutum relatively slightly larger and pygidial area distinctly narrowed posteriorly.

G 1 and 2, basal half of GT 3 and whole of GS 3 red, apical half of mandible pale reddish brown, tegula dark brown, but translucent, tibial spurs and tarsi pale brown, but T 1 above slightly darkened, wings slightly brownish, stigma and veins dark brown. Hair greyish white, partly somewhat brownish.

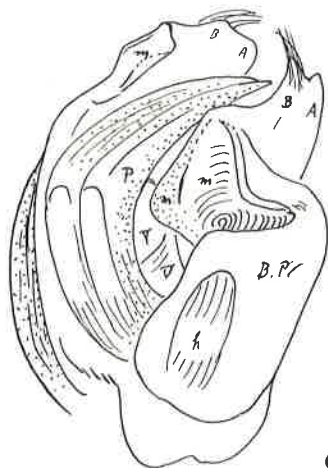
Hind wing hamuli 6 in both wings, IODv:IODc=30:27.5-28, then HW=47.5-48. OOD:Od:POD=10:4:8, Al:A2-6=20:18, when frontal length (distance between fore ocellus and antennal sockets) is relatively 15. Clypeus without medial furrow, BEL medially slightly incised, labrum subtrapeziform, with antero-lateral angles rounded, apical margin medianly minutely and weakly emarginate, frons medianly distinctly carinate from top of supraclypeal elevation to fore ocellus. Mesoscutum medianly on anterior half sometimes finely impressed, sometimes not, only with shining line, posterior half weakly grooved, parapsidal sutures weakly impressed. Pygidial area (Fig. 79) margined at sides and apex with lamellate carina and slightly narrowed toward apex, apex broadly rounded,



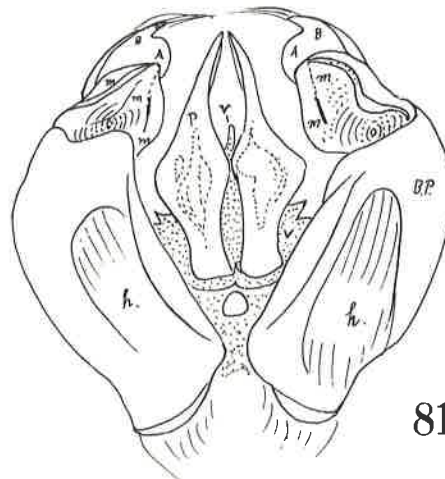
79



80



82



81

at base as wide as A 10, disc broadly roundly (in cross section) elevated, leaving narrow shining furrow (with indistinct punctures or crossing striae) along marginal carina, the elevation also shining, extended basally beyond base of marginal carina, sometimes with top slightly ridged, sometimes not.

Frons finely punctate-reticulate, punctures larger anteriorly and largest on clypeus and subreticulate, with PIS sometimes smooth, sometimes microstriolate. Punctures on mesoscutum nearly as large as those on clypeus, but distinctly separated, with PIS mostly 0.5-1 times PD, on central area reaching twice so or more. Disc of GT 1 very minutely and very sparsely punctured, of GT 2 and 3 slightly largely punctate, yet punctures very fine and very sparse, hind areas always smooth and polished.

♂, unknown.

Holotype: ♀, Saitama Pref., Chichibu, Tochimoto Village, 16.VII.1960, H.Nagase leg. (Coll. Nagase).

Paratype: 1 ♀, same data (Coll. Nagase).

SPHECODES CHICHIBUUS SP. NOV.

♂. 6.5 mm. Very closely allied to *fukuensis* m., differing from it in the following characters:

1. A 10 with pile band reaching not so long as $2/3$ from base, but only middle of the joint.

2. On mesoscutum punctures similarly large, but sparser, on anterior half transversely, very sparsely arranged, with somewhat rugosed edge line between the series of punctures, median line from anterior margin till beyond middle strongly carinated, the carina accompanied on each side with a narrow impunctate shining stripe and posteriorly replaced with a shallow furrow (in fukuensis medianly smoothly and shallowly furrowed).

3. In genitalia (Figs. 80, ventral; 81, dorsal; 82, ventro-lateral; cf. Figs. 66, 67 and 68 of SPJHA 26) apical structure of paramere similar in pattern to fukuensis, except that membranous appendage (m) of B is much smaller, with a weak carina near outer side. But the volsella (v) is markedly different. It consists of ventral hollowed lobe and dorsal triangular extension which is, seen from side, with apex truncate (Fig. 80, upper v, right side).

♀, unknown.

Holotype: ♂, Saitama Pref., Chichibu mountain region, Tochimoto village, 16.VII. 1960, H. Nagase leg. (Coll. Nagase).

Remarks. Similar to fukuensis in the colour of legs, in the general structure of antenna, in the facial ratio and in the punctuation and sculpture of body. In the venation of wings also similar to some form of fukuensis in which it is considerably variable. In the present specimen the second transverse cubital vein of left fore wing is largely lacking.

The holotype of the present species has the same collecting data with chichibensis (♀) and may be the other sex of this species. But there is no definite morphological reason to associate them together and so they are treated here as different species.

A D D E N D A

New species:

Tiphia kurokawana ♀.

Nomada uzenis ♀, tridentata ♀, nunobensis ♀, iwakiyamana ♀, kotomaria ♀,
kuro ♀, muinensis ♀, yasuteyamana ♂, mitsuensis ♂, yunokawana ♀♂,
etigonis ♂.

New discovery:

Tiphia juliana ♂, two aberratio.

Nomada towada ♂, hakodatensis ♀.

Revision:

Nomada osimana ♀.

TIPHIA KUROKAWANA SP. NOV.

The present species (♀) belongs to the group having the transverse carina at anterior margin of pronotum not well developed, but differs from vernalis and magnoliae in the sparser punctuation of frons and mesopleuron, from sternalis in the not flat and not smooth apical part of pygidial area, from etizenensis in the lack of small patch of minute points on the anterior aspect of GT 1 and from komoronis in the structure of median carina of lower frons; further, the present species is characteristic in that posterior area on GT 3, 4 and 5 is almost completely lacking.

♀. Length 9.5 mm. Mandible considerably reddish brown, apically paler, antenna basally ferruginous beneath, tegula castaneous brown, without marginal groove, anterior disc already rubbed and not smooth, wings moderately clouded, veins and stigma castaneous.

OOD:Od:POD=10:3.3:7, IODv:IODc=40:41, AOD:WAS:IAD=21:10:6, preantennal distance relatively 9, medio-apical margin about 11 and subtruncate (similar to etizenensis and

different from sternata), lateral margins gently roundly produced, lower frons without median carina, mandible (considerably rubbed down) without median furrow on outer side but with an indistinct row of shallow, minute punctules, upper frons medio-anteriorly with a short, fine impressed line, not distinct. Anterior marginal carina of pronotum not well developed, but in counter light appears as a fine black line, bearing a row of curved hairs along its posterior margin, even at the central area, punctate part without emargination in middle, where as long as impunctate part, side obliquely and strongly striate on lower half, without furrow or particular ridge, with some strong punctures scattered on anterior marginal area, striae weaker and delicate upward and uppermost area smooth and shining. Mesoscutum with a complete, anterior, impressed edge line, reaching notauli, disc medianly broadly depressed, scutellum with a shallow median furrow; on propodeum stigmal hollow distinctly longer than posterior area, areola with BAWL=10:7:23, outer carinae at extreme base and apex roundly incurved, in other part nearly straight, apical margin gently rounded out, medial carina reaching beyond middle, all carinae margined on both sides with fine furrows, posterior aspect with dorsal part not highly raised, width at lateral angles and height above the line relatively 40:8, weak median carina defined on apical half only. GT 1 in dorsal view (with anterior aspect vertical) bearing ratio of apical width to median length 50:20, posterior area in middle relatively 3, those of GT 2,3,4 relatively 2,1,1 (in sternata posterior areas very broad), Pygidial area with basal 3/5 raised and coarsely, somewhat longitudinally and rugosely reticulato-punctate, with distinct medio-apical emargination, posterior non-punctate area distinctly depressed and longitudinally, sparsely, thickly but weakly wrinkled, surface longitudinally, weakly microstriolate, partly microcoriaceous and not shining. GS 1 with medio-basal ridge short, main part medianly shortly and shallowly depressed, lateral furrows distinct on apical half, surface at base strongly, sparsely punctured and on the rest with indistinct minute points scattered. In fore wing nervulus slightly antefurcal, outer vein of cubital cell 2 moderately sinuate.

Punctuation on vertex and upper frons generally well resembles that of sternata (Fig. 22 in my 1985 paper, under vulgata), outside hind ocellus broad impunctate area present, on frons punctures medium-sized and except orbital areas sparse, on mid-lateral parts of upper frons PIS reaching more than 3 times PD, but downward mostly 0.5-1 times so, surface without microcoriaceous sculpture anywhere. On pronotum puncture-band differentiated, consisting of varied-sized, slightly elongate punctures, mostly in two irregular rows on median area and 3 to 4 obliquely arranged rows on lateral areas, punctures at central area close and longitudinally arranged and on mid-lateral disc sparse, including some larger and minute ones, PIS 1.5-2 times PD and everywhere smooth and shining; mesonotum strongly, medianly closely and laterally sparsely punctured, scutellum punctured on median furrow and marginal areas (at lateral margins especially coarsely), leaving mid-lateral discs impunctate, punctures on main part of mesopleuron slightly smaller than those of frons, generally sparse except those that are arranged in transverse or oblique rows where PIS 1-2 times PD, punctures anteriorly somewhat closer, including some larger, stronger ones and posteriorly smaller, sparser and PIS gradually occupied by minute points and on posterior aspect completely replaced by dense, minute points alone, main part without microcoriaceous sculpture anywhere. Sculpture of propodeum is possibly variable, but in the present specimen inside and outsides of areola delicately microcoriaceous or microstriolate, with surface more or less glossy and on the outer sides near areola very weakly and sparsely scattered with minute punctures; striae on sides strong and close, antero-ventral area almost smooth. Puncture band of GT 1 not impressed on broad median part, consisting of a single irregular row of medium-sized punctures, partly fused together and including some minute points attached in front, on lateral parts with impressed edge line anteriorly and punctures becoming 2-3 rows, but slightly apart from the edge line and connected with the puncture group of the sides, on disc punctures very sparse and on anterior aspect without a patch of minute punctules, smooth posterior area at median part about thrice as wide as the punctures of the band; on GT 2 basal furrow comparatively narrow and deep, preapical band distinct, consisting of irregular two rows of punctures on median part, with posterior area in middle slightly less than twice as long as PD of the band, disc uniformly, sparsely punctured, except almost impunctate posterior third in front of the band, on GT 3 and 4 impunctate areas in front of the puncture bands nearly half of each GT except sides, and bands are in irregular 2-3 rows, with posterior areas very narrow, about as long as PD and only on median part defined, on basal disc punctures closer and finer than on GT 2 and much so toward the base; on GT 5 punctures larger, slightly elongate and closer, only on lateral discs somewhat sparse, posterior area almost lacking.

♂, unknown.

Holotype: ♀, Kurokawa, northern part of Niigata Pref., 18.VIII.1954, K.Baba (Coll. Baba).

NOMADA UZENIS SP. NOV.

Except that the hair on postero-lateral parts of propodeum is much longer (as long as, or longer than hind ocellar diameter) and appressed hair on pygidial area is much sparser, the present species (♀) is very similar to kuro (= panzeri orientis f. kuro), but detailed comparative studies reveal further that in the present species face is slightly shorter, facial ratio = 40:38:44, microcoriaceous sculpture on PIS at paracocular areas much less striking and red is much less developed on thorax-complex and gaster.

♀, 9-10 mm. Black, reddish brown are inner orbits narrowly, but on tops of eyes slightly enlarged (outer orbits dark brown), paracocular areas, apical half of clypeus, labrum, mouth parts, antennae beneath (above dark brown to black), pronotum, tubercles, tegulae, two short vague evanescent (dark red) stripes on mesoscutum, scutellum, medium-sized marks on mesopleuron (propodeum completely black), band across middle of each GT and legs from about middle of femora apically, except parts of tarsi and areola. Comparatively small lateral marks on GT 2 and median mark on GT 5 yellow. Pubescence on postero-lateral parts of propodeum fairly close and somewhat tomentosa-like, but half erected and ground punctures at least partly can be seen. Clypeus scarcely covered with appressed whitish hair, but with sparse, half-erected dark brown bristles, labrum at base also with similar bristles, but apically they are replaced with closer, weaker, yellowish hair, medial tooth distinct, but surface punctation considerably different individually. Punctures on clypeus also fairly varied individually in uniformity, but on an average stronger and coarser than in kuro. A 4 in ventral view 1.7-1.8 times as long as broad at apex; tegula sparsely punctured, punctures finer and closer at anterior part, marginal area narrowly, slightly reflected, showing translucent shelf; elevation of scutellum not strong, median furrow also weak or moderate, lateral furrows of dorsal area of propodeum distinct, but not strong and deep. Wings considerably clouded, except pre-marginal window, veins and stigma brown to dark brown, nervulus postfurcal.

♂, unknown.

Holotype: ♀, Yamagata Pref., Oguni-machi, 4.VI.1977, K.Baba (Coll. Baba).

Paratypes: 4 ♀, Yamagata Pref., Iida-machi, 4.VI.1977, K.Baba (3 ♀ Coll. Baba and 1 ♀ Coll. Tsuneki).

NOMADA TRIDENTATA SP. NOV.

♀, 5.0 mm. Black; reddish brown are inner and outer orbits of eye, slightly enlarged on top and shortly interrupted below there to outer orbit, clypeus largely, paracocular area below, gena, mandible except darker apex, labrum (slightly darkened apically), antenna (A1-3 above dark to pale brownish), pronotum, tubercle, 4 stripes on mesoscutum (median two not reaching anterior margin), tegula, a large mark on mesopleuron below scrobal furrow, scutellum, postscutellum, a pair of obscure patches at postero-lateral parts of propodeum and legs except greater part of coxae and brown underside of femora. Gaster largely black, obscure band across middle of GT 1 and interspace of two yellow marks of GT 2 brown, the following GT except yellow GT 5 dark brown, slightly paler across middle of each. Wings almost hyaline, apical margin darkened, stigma and veins brownish black. Hair on clypeus whitish, sparse (rubbed off?), on labum somewhat yellowish, without bristle mixed (originally?), on mesopleuron and on postero-lateral parts of propodeum fairly long (amply as long as hind ocellar diameter) and dense (in the specimen partly glued together) and presumably tomentosa-like in the fresh specimens.

Head in frontal view with face strongly elongate and narrowed anteriorly, facial ratio 40:34:45, medio-apical margin of clypeus narrow, ratio to pre-antennal length 14:20, labrum strongly toothed at the centre, in lateral view obliquely produced anteriorly, with top rounded and more gently inclined (slightly down-curved) towards base and in vertical view, on each side of the tooth, apart from it slightly obliquely forwards similar but somewhat smaller tooth present (in the usual species median tooth only observed which is much less high than in this species and lateral teeth, if present, are much more obscure). A 4 in ventral view amply twice as long as broad at apex

A 5 1.5 times so, scutellum moderately highly raised, with median furrow weak, pygidial area unobservable, HTS short, thin, pale in colour, rather indistinct, 5-6 in number, shorter forwards as usual. In fore wing nervulus distinctly postfurcal.

PIS at grossly punctate paraocular areas not microcoriaceous, smooth and shining, punctures on scutellum almost uniform, though larger than those on scutum.

♂, unknown.

Holotype: ♀, along river Oirase, Towada, Aomori Pref., 14.VI.1975, K. Shimoyama leg. (Coll. Tsuneki).

NOMADA NUNOBENSIS SP. NOV.

♀, about 8 mm. Ground colour of head and thorax-complex slightly dusky red; black are antennal area, extending downward till half of lateral margins of clypeus, ocellar area, temple-occipital area, side of pronotum, three stripes on scutum, area around tubercle, subalar area, metapleuron, anterior half of side of propodeum, lateral fossa of scutellum and of postscutellum and median stripe of posterior aspect of propodeum. A 1 above black, flagellum above dark brown; legs red, with greater part of coxae and base and underside of femora black; gaster black, but each tergite with dark reddish band across middle; large lateral marks on GT 2, small ones on 4 and median one on 6 yellow. Wings slightly clouded, apically more strongly so, with paler rounded area before marginal area as usual, stigma and veins brown.

Head in frontal view wider than long, HW:HL=50:39, facial ratio = 40:38:43, medio-apical margin of clypeus : subantennal length = 20:18, antenna thick, A 4 1.5 times as long as broad at apex, A 5 about 1.3 times so, labrum with central tooth distinct, accompanied on each side with a very indistinct, obscure tooth; scutellum highly raised, with medial furrow moderately deep; lateral furrows of dorsal area of propodeum not deep; HTS long, 5-6 in number, pale brown, the inner longest one about as long as tarsal claw; pygidial area unobservable. Labrum at base with sparse, long, dark brown bristles and at apical part with close, shorter yellowish hair; long whitish hair on mesopleuron mostly dropped off and sparse short brownish bristles remained, posterior aspect of propodeum almost bare, some hairs left are less than as long as hind ocellar diameter.

Labrum weakly, sparsely punctured, with surface fairly shining, clypeus except impunctate narrow apical margin finely and closely punctured, tegula on posterior part strongly and sparsely punctured, on other parts of body without particular distinction.

♂, unknown.

Holotype: ♀, Niigata Pref., Nunobe, 3.VI.1977, K. Baba leg. (Coll. Tsuneki).

NOMADA IWAKIYAMANA SP. NOV.

♀, 5.5 mm. Characteristic in the structure and sculpture of scutellum. Black; red are inner orbits narrowly, not enlarged at top of eyes, outer orbits narrowly below (fairly darkened and not conspicuous), clypeus largely, genae, mandibles (apex slightly brownish), labrum, mouth parts, antennae beneath (black above and dark brown toward apex), pronotum (medianly darkened), tubercles, tegulae, two short obscure stripes on mesoscutum, scutellum, a small mark on antero-ventral part of mesopleuron, a patch at postero-lateral parts of propodeum, gaster except basal part of each GT and legs except greater part of coxae, trochanters beneath, bases beneath of fore and mid femora and greater part of sides and underside of hind femur. Wings slightly clouded as usual, stigma and veins dark brown.

Head in frontal view wider than long, 50:40, with ocellar area high raised as usual, facial ratio = 40:36:43, relative length of medio-apical margin of clypeus and preantennal length = 20:19 (under same scale as above), keel on top of interantennal elevation reaching middle of the space to fore ocellus; A 4 from beneath 1.8 times, A 5 1.5 times as long as wide at each apex, labrum with apical margin irregularly serrate and in middle slightly reflected, central tooth distinct, with a very indistinct lateral tooth on each side, slightly apart from and obliquely in front of it, surface fairly closely covered with irregular-sized punctures, from large ones long, thick and brown bristles and from small ones short, yellowish hairs arising; punctures on frons and clypeus stronger and larger than usual; elevation of scutellum weak, anterior aspect on the same level with scutum across prescutellar furrow, posterior aspect together with postscutellum, in lateral view, more steeply inclined than area dorsalis of propodeum; anterior aspect finely, sparsely and irregularly punctured with some broad

shining PIS and on top (or at the border line to posterior aspect) a transverse, irregular line of about 5 very large, rounded punctures present, posterior aspect closely and coarsely punctured, postscutellum very finely and closely striate; mesopleuron grossly, subreticulately punctured, punctures larger and stronger than usual; area dorsalis of propodeum at base longitudinally, coarsely rugoso-punctate. The hair at postero-lateral parts of propodeum longer than hind ocellar diameter, fairly close, but slightly erected and widely spread over upwards, letting see the ground punctures of the areas and not so close as to be called tomentosa. Pygidial area unobservable, tegula on posterior part sparsely punctured. HTS long, 5-6 in number, anteriorly shorter as usual, median ones as long as tarsal claw, pale brown in colour, strong and distinct, but the longest innermost one thin and pale. In fore wing nervulus postfurcal, subinterstitial, D:N=1:2, cubital cell 3 strongly narrowed upwards, abscissae 1,2,3 of radial vein relatively 4,5,2.

♂, unknown.

Holotype: ♀, Aomori Pref., Mt. Iwaki, on the eastern slope, 29.V.1975, K. Tsuneki leg. (Coll. Tsuneki).

NOMADA KOTOMARIA SP. NOV.

The present species (♀) is characteristic in the punctuation of clypeus.

♀, 8.5 mm. Head comparatively broadly red: clypeus, supraclypeal area extending till half of interantennal elevation, paraocular areas, genae, labrum, mandibles except brown apex, comparatively broad inner orbits extending shortly inwards before ocellar area and again long behind this area where the extensions of both sides jointed together, separating the ocellar mark from the large black band of occiput-temples, outer orbits (turned obscure upwards) and antennae that are brownish above and the brown turned dusky towards apex. Remarkable is that paraocular areas along eyes and basal area of labrum distinctly yellowish, but the yellow is not clearly outlined. Red on thorax-complex: pronotum, tubercles, tegulae, 4 stripes on mesoscutum, scutellum, a large mark below scrobal furrow of mesopleuron, a small one above it, large postero-lateral marks of propodeum, smaller ones on area dorsalis of it. Gaster ferruginous red except black band at base of each segment (these appear as obscure blackish bands on the preceding segments through permeation either across middle or at apical margin, according to the state of gastral extension), with yellow marks at sides of GT 2 and in middle of GT 5 (medio-apical part of GT 4 appears also slightly yellowish); large medial patches of GS 3 and 4 (emerged at apex in middle) and small one on 5 (up-turned U-shape) also yellow.

Head in frontal view with ratio of W:L=50:47, ocellar area raised as usual, facial ratio = 40:39:45, eye emarginations comparatively deep (relative IOD at the place 43), therefore, apparently inner orbits not parallel-sided as may be presumed from facial ratio, but considerably strongly convergent below, width of medio-apical margin of clypeus : preantennal length relatively 20:20; A 4 about 1.5 times as long as wide at apex in ventral view; labrum with apical margin medianly shortly, triangularly reflected, central tooth distinct, without lateral teeth. Elevation of scutellum not strong, but in lateral view anterior aspect forming a blunt angle with surface of mesoscutum, median furrow broad and shallow; pygidial area at apex broadly rounded, with disc comparatively sparsely covered with longitudinally appressed yellowish bristles, marginal area broadly smooth and shining, broader at apical margin where medianly widely furrowed and minutely, deeply, roundly incised in middle of the furrow. HTS 4-5 in number, mostly as long as tarsal claw, but slightly shorter outwards, strong and distinct, brown in colour; in fore wing nervulus postfurcal, D:N=3:4, cubital cell 3 very strongly narrowed upwards, abscissae 1,2,3 of radial vein relatively 5:5:2.

Punctures on labrum fine, close and comparatively weak, mixed with larger ones sparsely, from the former fine, weak, whitish hair and from the latter long, brownish bristles arising; punctures on clypeus markedly large and close, but shallow and somewhat longitudinally, irregularly rugosed and behind narrow, smooth apical margin an irregular transverse line of especially large, rounded punctures present; punctures on frons also larger than usual, about a third of fore ocellus in diameter and angled and reticulate; tegula on posterior part sparsely punctured. Punctures on anterior aspect of scutellum as large as and as close as those on scutum, but on top very broad shining PIS present, including 3-4 distinctly larger punctures on each side that are separated by the median furrow; posterior aspect more coarsely and irregularly reticulate-punctate; postscutellum densely covered with fine piliferous punctures. Area dorsalis of propodeum at base longitudinally rugose, but laterally the rugae are replaced by some

large, shallow, flat-bottomed punctures, on posterior triangular part finely coriaceous; hair on postero-lateral parts of propodeum mostly rubbed off or stained and glued together, but judging from the state and some left and erect ones they are amply as long as the hind ocellar diameter.

♂, unknown.

Holotype: ♀, Aomori Pref., Kotomari, 24.VI.1973, K. Shimoyama leg. (Coll. Tsuneki).

NOMADA KURO SP. NOV.

Nomada panzeri orientis Tsuneki, 1973, f. kuro (♀, nec ♂).

N. panzeri orientis: Tsuneki, Essa Konchu Dokokai-kaiho, 50: 19-28, No. 10 (♀ nec ♂)

♀. I have had a doubt about the allocation of this form within the category of panzeri orientis m., because there is no distinct intermediate form as to the maculation on the head between f. typica or aka and f. kuro and little so as to that of the propodeum, although all these forms appear in the same season of the year. Furthermore, accumulation of the specimens shows that the former is common in the southern districts and gradually scarce towards north, while the latter is vice versa. According to the measurements kuro has the face distinctly longer than in the others, namely, facial ratio in kuro 40:39:46-47, while in the others it is 40:38:42-43. Other structural differences are not marked, but based upon the above mentioned reasons this form is raised to the specific rank.

♂, unknown.

Holotype: ♀, Fukui Pref., Iwaya, 11.IV.1958, K. Tsuneki leg. (= a paratype of N. panzeri orientis, as f. kuro).

Paratypes: 1 ♀, Yamagata Pref., Mt. Chokai, 23.VI.1977; 4 ♀, Yamagata Pref., Oguni-machi, 4.VI.1977; 1 ♀, Akita Pref., Nokugo-machi, Kuromori Pass, 7.VI.1978, all leg. K. Baba (Coll. Baba); 2 ♀, Yamanashi Pref., Mitomi-machi, Nishizawa-keikoku, 28.V.1985, H. Suda leg. (Coll. Suda).

Remarks.

Yellow is confined to GT 2-5, often on 3 and 4 evanescent or absent, often a minute patch present on some of GS 2,3,4 and 5. Head and propodeum predominantly black. Red: apical half of clypeus, often a patch on supraclypeal area, gena, labrum, mandible (dark at apex), narrow band around eye (narrower on inner orbit), usually more or less broadened on top, but never extended inwards before and behind ocellar area, antenna except above which is dark brown to black, on propodeum at most 4 small patches on posterior aspect and spiracles. While on thorax red is considerably varied in development, usually pronotum, tubercle, 4 narrow stripes on scutum (often evanescent), tegula, scutellum, axilla, one or two marks on mesopleuron are red, the tone of red varies from dark red to bright red, in the former the red is not well developed (also on head), while in the latter vice versa, but never predominantly red. Legs in the specimens having thorax comparatively brightly maculated are largely ferruginous, only the bases of coxae and basal part of femora narrowly black, while in the melanic specimens all legs till beyond middle of femora black, broader above than beneath. Head in frontal view with inner orbital carina at its lowerst end very gently roundly (nearly straightly) curved before connecting with the anterior end of basal carina of mandible, the most important character to separate the present species from the closely resembling osimana group in which the part is minutely and strongly rounded. Relative length of A 3,4, 5 ÷ 3,5,4, A 3 1.5-1.6 times as long as wide at apex, A 13 appr. twice as long as wide at base; clypeus finely, closely punctured except apical margin, labrum not strongly, rather sparsely punctured, with a strong tooth slightly before middle, which is dark brownish coloured at apex; pygidial area with apical margin broadly rounded, with median incision fairly variable in width and depth, usually with impunctate marginal area considerably broad and the disc always densely covered with longitudinally appressed yellow hair. HTS in the complete condition 6-7 in number, posterior one or two long and slightly weak, others anteriorly shorter as usual, strong and blackish, moderate in length, often partly closed together.

The male of N. TOWADA and its difference from that of N. PANZERI ORIENTIS

In the female N. towada m. is very similar in appearance and in general other characters to N. panzeri orientis m. (f. typica and f. aka), differing from it only in the much less highly raised scutellum. This character shows, however, more or less variation within a species and, therefore, it has been doubted that towada may be a mere

variation or form of the latter. Recently I could find 4 ♀ of *N. towada* collected at the same locality with 7 ♂ that are very similar to *panzeri orientis* ♂ on nearly the same date and they are considered to be the both sexes of *N. towada*:

Mt. Yasute, Hiragacho, Aomori Pref., 23-25.IV.1975, leg. K. Shimoyama.

If these males differ certainly from *p. orientis*, ♂ it becomes finally determined that *towada* is a distinct species. This is certainly the case:

1. In *p.o.* tyloidea of antennal joints (oval in form and gently roundly swollen) slightly depressed at the ventral margin, forming an edge line there, while in *towada* (similar in form and swelling) ventral margin smoothly shifted to ventral surface without edge line there.

2. In *p.o.* apical 3 joints of antenna are completely black, while in *t.* ferruginous at least beneath.

3. In *p.o.* clypeus apically narrowly yellow, while in *t.* except narrow dorsal part wholly yellow.

4. In *p.o.* paraocular area triangularly yellow, extended along eye, while in *t.* completely black.

5. In *p.o.* punctures on mesopleuron larger than usual, in *t.* comparatively finer.

6. In *p.o.* hind femur comparatively narrower (ratio of dorsal length to maximum width 30:7.0-7.3), with excavation at base beneath marked, while in *t.* thicker (ratio 30:7.7-8.3), with baso-ventral excavation much less marked.

Some supplements: Scutellum always with two red marks, often fused together to one (in *p.o.* usually without mark, if present very evanescent), mesopleuron usually with one, often two red marks (in *p.o.* usually without it, if present very small), pronotum always maculated with two red spots. While the following characters are similar to the two species: Relative length to width of antennal joints, relative length of hair on thorax (appr. as long as A 4 at central disc of mesoscutum and longer than it at mesopleuron) and on legs, yellow colour of tubercle and general gastral maculation.

NOMADA MUTSUENSIS SP. NOV.

♂, 8.5-9.7 mm. Closely resembles *osimana* in that paraocular area is broadly yellow on its lowest part, but not triangularly extended upward along eye; differing from it, however, in the comparatively shorter hair on mesoscutum. It is also similar to *mamiyai* m., but can be distinguished therefrom mainly by the difference in the structure of antennal tyloidea.

Black; yellow are clypeus except upper marginal area narrowly, lower part of paraocular area broadly (continuous to narrowed lateral part of yellow of clypeus across oblique lateral carina, with upper margin rounded, but not extended triangularly upward along eye), gena, basal half of mandible, labrum, lateral marks on GT 2, 3 and 4 (often fused into a band), central bands on 5 and 6 and basal part of pygidium, on ventral side basal half of GS 2, lateral marks of GS 3 and 4, band on 5 and a large mark on 6; antenna beneath ferruginous; small lateral mark of pronotum, humeral tubercle and tegula yellowish ferruginous; two mesopleural marks and two large scutellar marks (often fused together) reddish ferruginous; band behind middle of GT 1, bands including yellow marks of GT 2-4, apical margins of GT 5 and 6 translucent ferruginous. Legs ferruginous except following black: coxae except each apex, fore and mid femora very narrowly at base beneath and basal two thirds of hind femur beneath. Wing normally clouded at apical area.

Facial ratio = 40:36:42, subantennal length : medio-apical width of clypeus = 20:18 (both values same in paratype also), lateral oblique carina of clypeus distinct, labral tooth at the centre, distinct, relative length of A 3,4,5 appr. 3,5,4, A 4 in ventral view 1.6 times as long as wide at apex, constricted at a third from base and gently rounded out thereafter till apex on outer margin, from A 5 to 9 tyloidea somewhat more distinctly rounded out (in *osimana* swelling of tyloidea much less strong), mandible long and acutely pointed at apex, mesoscutum with a fine median carina on anterior half, not strong, scutellum moderately highly raised, with broad and weak median furrow, pygidium with sides straightly convergent towards apex, disc at base gently elevated, apical margin medianly deeply incised, sinus slightly less than rectangle. In fore wing nervulus postfurcal, outer vein of cubital cell 2 strongly sinuate; hind femur in posterior view comparatively thin, ratio of dorsal length to maximum width = 30:7.0-7.3, very slightly roundly excavated on basal half beneath; HTS 4, well separated, anteriorly shorter as usual, posteriormost one long, even anteriormost one moderate in length and pointed, brown in colour, comparatively well defined.

Punctures on clypeus fine, close, but weak, sometimes with an impunctate blunt carina in middle, on scutellum fine, finer than on mesoscutum, lateral and apical margins of pygidium comparatively broadly impunctate. Hair on clypeus long, dense, appressed, silky white, on labrum long, erected and slightly yellowish, at central disc of mesonotum slightly shorter than A₄, on scutellum, mesopleuron and postscutellum longer, slightly yellowish in some light, on fore and mid femora as long as maximum width of respective segment, on hind femur beneath in posterior view except apical 3rd long, longer than half the maximum width of the segment and somewhat shining yellowish.

♀, unknown.

Holotype: ♂, Yasute-yama, Hiraka, Aomori Pref., 24.IV.1975, K.Shimoyama leg. (Coll. Tsuneki).

Paratype: 1 ♂, same locality, 25.IV.1975, K.Shimoyama leg.

NOMADA YASUTEYAMANA SP. NOV.

♂. 7.0-7.5 mm. Characteristic in that paraocular area is completely black, A₄ twice as long as wide at apex or nearly, hind femur markedly slender, hair on mesonotum (except central area), mesopleuron and fore and mid femora amply as long as A₄.

Black; yellow are clypeus except narrow dorsal area (slightly brownish upward), narrow gena (considerably brownish), labrum except two lateral translucent windows (in paratype lacking), antenna beneath (slightly darkened), a lateral spot of pronotum, humeral tubercle, lateral marks on GT 2, 3 and 4, short band on 5 and 6 and disc of pygidial area; usually the pairs of yellow marks are on the pale ferruginous bands and each appears like a yellowish band as a whole. Pale brown to brown: rest of mandible (apically darker), tegula (broadly translucent), scutellum wholly or two marks on top (reddish), preapical band on GT 1, narrow lateral margins of pygidium, central bands of GS 1-6 and whole of 7. Antenna brown above, paler apically (in the paratype black above). Legs ferruginous, in the holotype fore and mid femora very narrowly blackish at base beneath and hind femur dark brown except apex and apical two thirds beneath and tibiae without black streak; while in the paratypes fore and mid femora considerably broadly at base beneath and on posterior side and hind femur except apex wholly black, further all tibiae blackish or brownish streaked on posterior side. Hair on clypeus dense, appressed and silky white, on labrum long, erected and slightly yellowish, on mesoscutum at central part slightly shorter than ventral length of A₄, on other areas as long as this, greyish white, in some light slightly yellowish, on mesopleuron long and also slightly yellowish, on fore and mid femora amply as long as the maximum width of each segment, on hind femur beneath in fresh specimens similar in length till about middle, amply as long as half the maximum width of the segment in posterior view and also somewhat yellowish in colour.

Facial ratio = 40:34:41, subantennal length equal to medio-anterior margin of clypeus, labral tooth at about centre, in holotype strong and distinct, with top brownish, in paratypes slightly weaker, but distinct, wholly yellow. A_{3,4,5} with relative length 5:10:8, A₄ twice as long as wide at apex, weakly swollen at apical half, A₁₃ twice as long as at base, tyloidea not markedly swollen on A₅₋₁₃ seen from every direction. Scutellum moderately roundly raised and very weakly furrowed in middle, pygidial area with lateral margins straightly narrowed apically, disc nearly flat, very weakly elevated on basal portion, medio-apical incision with sinus rectangular or nearly; hind femur in posterior view very slender, weakly excavated at basal two fifths, ratio of dorsal length and maximum width = 30:7.0-7.4. In fore wing cubital cell 3 markedly narrowed upwards, with outer vein strongly sinuate, nervulus postfurcal, D=N.

♀, unknown.

Holotype: ♂, Yasute-yama, Hiraka-cho, Aomori Pref., 25.IV.1975, K.Shimoyama leg. (Coll. Tsuneki).

Paratypes: 2 ♂, same locality, 23.IV.1975, K.Shimoyama leg.

NOMADA YUNOKAWANA SP. NOV.

♂. 7.5 mm. Characteristic in that paraocular areas are completely black, hair on mesoscutum shorter than A₄ and greyish white and on fore and mid femora basally very long and gradually shorter apically and at median area shorter than maximum width of respective segment.

Black; apical half of clypeus yellow, narrowed laterally and margined by black along lateral oblique carinae, paraocular area and gena black, with only a yellow spot

at anterior part of gena, labrum and basal part of mandible yellow, also lateral marks on GT 2, 3 and 4, median band on 5 and 6, basal part of pygidium and central mark of GS 6; antenna ferruginous beneath, but A 1 black except apex. Pronotum, mesopleuron and scutellum immaculated (scutellum with a very faint spot on one summit), usual ferruginous bands on gastral tergites are in this specimen markedly darkened, also lateral yellow marks on GT 2-6 slightly dusky. Legs ferruginous except following black: coxae and trochanters except apices, fore and mid femora except apex and apical two thirds above, hind femur except apex and apical two fifths above and a streak on posterior side of fore and mid tibiae.

Facial ratio = 40:36:42, subantennal length to medio-anterior width of clypeus = 20:18, lateral oblique carina of clypeus strong, labral tooth slightly before middle, distinct but not high, relative length of A 3,4,5 appr. 3,5,4, A 4 1.65 times as long as wide at apex, tyloidea as in *mutsuensis*, elevation of scutellum moderate, median furrow broad and very shallow, pygidium comparatively broad, ratio of basal and apical widths and median length appr. 10:4:4, medio-apical incision comparatively narrow and deep, with sinus rounded; hind femur with ratio of dorsal length to maximum width = 30:8, with about basal half beneath weakly excavated. In fore wing nervulus postfurcal, D \neq N, outer vein of cubital cell 2 strongly sinuate.

Clypeus on narrow anterior margin impunctate, on the rest finely and closely punctured, punctures much finer and closer than on frons, labrum with punctures intermediate in size between those of frons and clypeus, fairly close but weak, punctures on scutellum distinctly finer than those on mesoscutum. Hair on mesoscutum even at anterior part as long as A 4, on disc distinctly shorter than this and sparse, on scutellum not longer and on mesopleuron distinctly shorter than A 4 (in ventral view) and sparse, on hind femur beneath in posterior view till about middle similar in length, as long as, or slightly shorter than half the maximum width of the segment.

♀. 9.0 mm. Very closely resembles typical form of *N. panzeri orientis* m., differing from it only in the much shorter HTS. HTS short as in *esakii* ♀, 4 in number, acutely pointed at apex, dark brown in colour. The present species is also similar in appearance to *N. towada* m. occurring in the same locality, but can be distinguished from this not only by the character of HTS above mentioned, but also much highly raised scutellum.

Facial ratio = 40:39:46, subantennal length to anterior margin of clypeus = 20:19 (both similar to *towada*), A 4 1.6 times as long as wide at apex. Propodeum, except narrow median stripe on posterior aspect completely red, with very short sparse hairs on postero-lateral parts. Yellow marks on sides of GT 2-5 present, but on 3 and 4 vestigial.

Holotype: ♂, Yunokawa, Izumisawa-guchi, Shimokita Peninsula, Aomori Pref., 3.VI.1975, K. Tsuneki leg. (Coll. Tsuneki).

Paratype: 1 ♀, same data (Coll. Tsuneki).

On the females of *N. OSIMANA* and *HAKODATENSIS*

Nomada osimana Tsuneki, Etizenia, 66 (II): 129, 1973 (♂).

Nomada osimana: Tsuneki, Kontyu, 43 (4): 470, 1975 (♀).

Nomada hakodatensis Tsuneki, Kontyu, 44 (1): 52, 1976 (♂).

From the northern part of Japan proper and Hokkaido the following female specimens have been collected that are very similar in characters to *N. kuro* that has been retreated in foregoing pages:

- 1 ♀, Yunokawa, Shimokita Penn., Aomori Pref., 13.V.1966, M. Ando.
- 1 ♀, Juniko, Nishitsugaru-gun, Aomori Pref., 22.VI.1970, K. Shimoyama.
- 2 ♀, Akagawa, near Hakodate, S. Hokkaido, 6.V.1960, K. Munakata.
- 1 ♀, Mt. Hakodate, S. Hokkaido, 25.VI.1972, I. Takahashi.
- 1 ♀, Mt. Hakodate, S. Hokkaido, 31.V.1973, K. Tsuneki.
- 1 ♀, Mt. Muine, near Sapporo, 9.V.1959, T. Nambu.
- 1 ♀, Raosu, Shiredoko Penn., N. Hokkaido, 28.VII.1970, K. Shimoyama.

These specimens except 1 ♀ listed last were placed under *osimana* in my 1975 paper rather roughly on the basis of sympatric occurrence only. They resemble so closely *kuro* that they can not be distinguished from it by any of the characters hitherto used to separate the species, except 1 ♀ from Mt. Muine. The sole difference between these specimens and *kuro* is present in the state of curvature of inner orbital carina at its lowest part, as mentioned earlier in connection with *kuro*. The carina at its lowest part becomes apart from eye margin and goes to the anterior end of basal carina of mandible, in *kuro* the carina very gently roundly outcurved (nearly straight), while in

the above listed specimens it is minutely, strongly, roundly outcurved before connecting with the mandibular carina.

Of these specimens those which are necessary to reexamine in detail in connection with the sex association are the ones from South Hokkaido, because from the same district four male species have been described, namely, osimana, hakodatensis, mamiyai and nanaensis (all from County Osima), especially in connection with osimana and hakodatensis, since 2 ♀ 1 ♂ are captured on Mt. Hakodate and 2 ♀ 2 ♂ in Akagawa, both are within City of Hakodate and the male of Mt. Hakodate is the holotype of hakodatensis and those of Akagawa are paratypes of osimana. The four females well agree in all important characters with each other and there is little problem to allocate them within a single species as done formerly by me, namely, the females of osimana. Detailed comparative studies reveal, however, that in 2 ♀ from Mt. Hakodate the median furrow of highly raised scutellum is distinctly deeper and the red areas on head and thorax are much less developed. In 2 ♀ from Akagawa scutellum similarly highly raised, but median furrow is very shallow, a red patch is present on supraclypeal area and behind ocellar area, orbital bands much longer extended inwards on top and red streaks on mesoscutum and red marks on mesopleuron are brighter in colour and much broader or longer. Apart from the developmental degrees of maculation, the difference in the depth of scutellar furrow seems to be taken up here to separate hakodatensis ♀ from osimana ♀, since they are distinctly different in male characters at the specific rank, in consideration of the delicate specific difference suggested by the instance of panzeri-towada ♀.

NOMADA MUJINENSIS SP. NOV.

♀. 11.5 mm. Belonging to the group of osimana having inner orbital carina strongly roundly outcurved at its lowest end, but in colouration rather intermediate between panzeri and kuro, namely, in the actual instance similar to kotomaria described earlier in the present paper, except that:

Yellowish tinge at lower part of inner orbit lacking, yellowish tinge at base of labrum less distinct, red of lower inner orbit narrower, clypeus on posterior third black and supraclypeal red patch is completely isolated, orbital red band only enlarged at top of eye, not extended inwards before and behind ocellar area and outer orbit more broadly and more brightly red. Maculae of thorax-complex also similar, but lower mark of mesopleuron slightly larger and marks on area dorsalis of propodeum larger than those of posterior area (in kotomaria the former smaller). On gaster black is much less distinct posteriorly and yellow marks much better developed; large lateral marks of GT 2, a spot on each side and narrow band across middle of GT 3, broader and thicker one on GT 4, greater part of GT 5, a pair of closely located comparatively large marks of GS 2, median broad band of GS 3 and narrow one on GS 4. Antenna slightly brownish above and somewhat darkened towards apex. Wings apically slightly clouded. Legs red and marked with black as in kotomaria.

Head in frontal view with ratio of $W:L=50:41$, facial ratio = $40:39:47$, medio-apical margin of clypeus to preantennal length = $21:20$ (under same scale), labrum with a short central tooth, without lateral ones, A 4 in ventral view about 1.7 times as long as broad at apex, A 3 when fully extended nearly equal in length to A 5, ultimate segment twice as long as wide at base; scutellum moderately highly raised, median furrow fairly deep from top to posterior aspect. Pygidium broadly rounded at apex and minutely incised at apex in middle.

Punctures on labrum at base sparse and shallow, irregular in size, including some large, rounded ones, on disc finer, close and uniform, but median line from central tooth basally impunctate and polished, surface covered with sparse, strong, brownish bristles and apically with shorter, yellowish hair, clypeus finely (much more finely than in kotomaria), closely, nearly uniformly punctured, but behind apical impunctate margin (comparatively broad) scattered with an irregular row of large shallow punctures punctures on frons much finer than in kotomaria, about a fourth of fore ocellus in diameter; punctures on scutellum similar to those of mesoscutum, without particular punctation and without broad PIS anywhere. Area dorsalis of propodeum till about $2/3$ from base flattened and at basal sides longitudinally and strongly striate and medianly till apical inclination strongly, coarsely foveolate or punctured, apical inclined triangular area medianly with a crenate line and on the rest microsculptured, rest of the posterior aspect finely reticulate-punctate, with scarce, fine, short hair latero-posteriorly, the hair distinctly shorter than hind ocellar diameter. Tegula anteriorly finely and closely, posteriorly grossly and sparsely punctured, but on postero-outer part broad impunctate areas present. Pygidial area at marginal area comparatively wide-

ly (but less widely than in *kotomaria*) smooth and polished, disc densely covered with longitudinally appressed, yellowish bristle-like hair, HTS 5-6 in number, gradually slightly shorter outwards, outer 3-4 thick, black, comparatively short (but longer than half the length of tarsal claw, not attenuate and acutely pointed at apex .. possibly abraded), inner 2 longer, thinner, pale brown in colour and innermost one amply as long as tarsal claw; in fore wing nervulus postfurcal, D=N, cubital cell 2 strongly narrowed anteriorly, abscissae 1,2,3 of radial vein relatively 2,2,1.

♂, unknown.

Holotype: ♀, Mt. Muine, near Sapporo, 9.V.1969, T.Nambu (Coll. Tsuneki).

NOMADA ETIGONIS SP. NOV.

♂. Belonging to *galloisi-arasiana* group, bearing appearance of some *Crabroninae* wasp, but appears late in spring, with mesopleural hair longer than A 4, A 3 slightly longer than A 4, slightly longer than its apical width and yellow maculation on head is much less developed.

Length 5.0-5.5 mm. Black; yellow are medianly narrowed apical half or third of clypeus, often interrupted in middle, narrow (elongate) triangular paraocular area, extending upward to level of clypeal base and including posteriorly greater part of gena, marginal area or basal part of labrum, basal two thirds of mandible, a spot along top of eye, sometimes two small patches on pronotum, tubercle (slightly brownish, with a large translucent window), two marks on scutellum, varied in size and often one of them completely lacking, (mesopleuron always immaculated), lateral marks on GT 1-5, sometimes on 3,4,5 interrupted in two on each side and band on 6; marks on GT 1,3,4 often evanescent or disappeared, rarely GS 5 and 6 apically somewhat yellowish; rest of mandible pale brown and apically darkened, rest of clypeus dark brown and apical margin of clypeus and gena narrowly ferruginous. A 1 with brownish stripe beneath, varied in size and shape and sometimes completely black except apex, flagellum castaneous or dark brown beneath, sometimes yellowish ferruginous so; tegula and pygidium apically brown, the latter sometimes largely yellow. Legs ferruginous, often broadly yellowish, with following black; coxae and trochanters except each narrow apex, a broad sinuate stripe from baso-posterior part to dorso-apical area of fore and mid femora, often on mid femur turns to extreme base and whole of posterior side, hind femur except dorso-apical area narrowly, fore and mid tibiae on posterior side largely and hind tibia except a fine stripe on dorsal side. Hair on frons, clypeus, labrum, mesopleuron, propodeum and legs silky white and on occiput and scutellum, together with mesoscutum slightly brownish.

Head in frontal view bearing inner margins of eyes vertical to the observer's eyes with H:L=50:40, bearing clypeal surface vertical so with H:l=50:42, thus clypeus not highly raised, facial ratio 40:32:47, OOD:WAS:IAD=10:5:7, OOD:Od:POD=10:4:8, A 3 somewhat longer than A 4, 4 slightly longer than 5, 5-12 equal in length, A 3 about 1.3 times, A 4 about 1.2 times, A 7 about 1.1 times as long as broad at apex, A 13 about twice as long as broad at base (in one of the paratypes that has the antennal flagellum yellowish beneath A 3 about 1.2 times, A 4 1.1 times, A 5-12 as long as broad and A 13 slightly less than twice as long as wide at base), mandible moderately long, except basal triangular area subparallel and at 3/4 from base strongly narrowed and pointed at apex, labral tooth strong (covered with whitish hair and not well defined), dark brownish at apex, located distinctly before middle, tyloidea of antenna gently roundly raised on A 3-12 at each apical area and slightly depressed at each base, with distinct bordering line at ventral margin which is well defined in certain direction. Scutellum moderately highly elevated, with median furrow not deep; pygidial area slightly longer than wide at base, disc gently raised and apical area weakly depressed, medio-apical incision generally narrow and deep, but with a more or less variation. Hind femur in posterior view comparatively thick, with ratio of dorsal length to maximum width 30:10, with basal half beneath very slightly excavated, hair on basal third beneath dense and comparatively long, about half the maximum width of the segment, slightly obliquely curved postero-apically, thence shorter towards apex and at mid point much less than half the maximum width; hair on fore and mid femora sparse, and shorter than maximum width of respective segment, this is more marked on fore femur. HTS usually 4, posteriormost one longer, others moderately long but slightly shorter anteriorly as usual, the median ones longer than half the length of tarsal claw. In fore wing nervulus distinctly postfurcal.

♀, unknown.

Holotype: ♂, Minchi-toge, Yuzawamachi, Niigata Pref., 26.VI.1982, K.Baba (Coll. Baba).

Paratypes: 1 ♂, Tsunagi, Mikawa, Niigata Pref., 24.V.1985, K.Baba (Coll. Baba).
1 ♂, Sochi-toge, Kashiwazaki, Niigata Pref., 2.VI.1985, K.Baba (Coll. Tsuneki).

Remarks. The present species is apparently the spring form of either galloisi or arasiana judging from the longer hair of mesopleuron, but if so the development of the yellow maculae on the head is reverse to such a case and, moreover, too rare and restricted in distribution against the abundant and common appearance of the two species above mentioned in the season of summer-autumn.

Two aberrant forms of TIPHIA JULIANA

Tiphia Juliana Parker, Jour. New York Ent. Soc., 45: 275, 1937 (♀ ♂).

Tiphia kisukei Tsuneki, SPJHA, 31: 57, 1985 (♂).

Tiphia juliana: Tsuneki, Hym. Comm., 21-22: 31, 41, 1985 (under agilis Sm. s. l.).

I thought at first that T. juliana could not be separated from agilis Sm. s. l. (including asericae) by the original description and placed it within this species and described kisukei with male specimens from different point of view, namely on the basis of the character of the stigmatal hollow of the propodeum. Later, however, when I examined the paratype specimens of juliana I could find out that juliana agreed well with kisukei in this character and the latter came to be the synonym of the former.

In this species the preapical band of GT 1 is usually a fine deep furrow including within an irregular row of medium-sized punctures mixed with more numerous minute ones, as in the case of agilis s. l. Larger punctures varied in size more or less within the range of medium and irregular in distribution and the minute ones are also similarly varied and usually located just below the anterior blunt margin of the furrow. Posterior area behind the band is very broad, distinctly broader than the furrow.

Recently Dr. K. Baba sent me a long series of Tiphia specimens collected by him in Niigata Prefecture for identification. Among them are included 9 male specimens of juliana captured on the same day and in the same locality (Senami), possibly at the same place, since it is frequently the case in this genus that several specimens of the same species are gregarious. They are easily identified with this species (= kisukei) according to my key, but among them the following two specimens are very aberrant in the puncture band of GT 1:

Aberratio 1. The furrow is fine and deep as usual; 2 or 3 very large punctures (very much larger than usual) are on mid-lateral part of each side present, with PIS \geq PD, mostly locating at the posterior margin of the furrow, almost filling the width of the furrow and between them dense minute punctures are arranged in an irregular row, locating just behind and below the anterior blunt edge line of the furrow; on a median third there is no large puncture, instead 3 very weak, smaller medium ones are scattered, with interspaces filled irregularly with very minute and indistinct punctures; on the extreme lateral part, outside the group of large punctures, a row of dense, medium-sized punctures present. Thus, in this specimen, 2 or 3 markedly large punctures at mid-lateral parts of the furrow alone are conspicuous.

Aberratio 2. The furrow is wider than usual, shallowed posteriorly and several markedly large punctures are scattered in two sparse, irregular rows within the furrow, with puncture-interspaces filled irregularly with minute punctures; some of the large punctures are deviated from the rows and located on the posterior shallowed part of the furrow. As a result posterior area becomes very narrow, distinctly narrower than the band. This is, together with the very large punctures, quite exceptional to this species.

Judging from the collecting data there is little doubt that these 9 specimens belong to the same species and the difference in size of the punctures of the band is only a variation. To use the relative size of punctures of the band of GT 1 to separate the species, as done by Parker, is, therefore, to be said incorrect. Thus, I place his castanaevora within the range of agilis Smith s. l. (including asericae H. et J.).

PASITES MACULATUS JURINE

1. Subspecies pekingensis ssp. nov. This subspecies (♀) differs from the nominate race in that gaster except brownish apical areas of GT 1 and 2 completely black and legs also black till apical part of femora and thence apically castaneous brown.

IODv:IODc (at the place where inner orbital carina separated from eye margin) = 40:32, eye emargination above level of antennal base narrow and moderately deep, interantennal carina extended on to clypeus as a fine shining raised line; A 3 slightly longer than 5, 5 slightly shorter than wide, 4 about 2/3 the length of 5 and very slightly more than half as long as wide; mesoscutum medio-anteriorly broadly subtriangularly excavated, scutellum distinctly bigibbous; fore tibia longitudinally carinated on outer side beneath, carina flatly, roundly produced at the end. Punctures on disc of GT 1 finer and sparser posteriorly, leaving narrow impunctate posterior area which is much narrower than that of GT 2. Head and thorax completely black, but in some light pronotal tubercle and tegula slightly brownish and tops of bigibbosities vaguely brown; wings distinctly clouded, with a bright mark before apical margin, nervulus slightly postfurcal. Pilosity as in typical race. Length 7.0 mm.

♂, unknown.

Holotype: ♀, North China, Peking, 1.VIII.1938, K. Tsuneki (Coll. Tsuneki).

2. Subspecies koreanus ssp. nov. Closer in colour of body to nominate race than pekingensis: Black, reddish ferruginous are inner orbit from middle to top of eye where slightly enlarged, pronotal tubercle, sometimes a vague stripe at parapsidal suture, tegula, rarely top of bigibbosities of scutellum, G 1,2,3 wholly and base of 4, clypeus anteriorly more or less brownish, sometimes considerably bright brown, labrum and mandible also bright castaneous, the latter apically darker, antennal flagellum distinctly brownish beneath. Legs from apical part of femora apically castaneous as in ssp. pekingensis, but darker on tibiae. IODv:IODc=40:32 (same in pekingensis), but eye emargination slightly broader and deeper than in this subspecies, hence the downward convergence of inner orbits appears much stronger than in this, medial carina on top of interantennal elevation not extended on to clypeus, relative length of flagellar joints generally similar to that of pekingensis, strictly, however, A 3 distinctly longer than wide at apex and longer than A 5 which is also slightly longer than wide at apex and A 4 relatively somewhat longer, distinctly more than half as long as wide. Medio-anterior depression of mesoscutum narrower, more furrow-like; outer-ventral carina of fore tibia not so strongly, flatly rounded out at its end as in pekingensis. Wings similar; punctation on gaster similar in pattern, but impunctate apical area of GT 1 much broader, as broad as that of 2. Pilosity similar. Length 7-8 mm.

♂. Differs from ♀ in that head, thorax and legs completely black, only gena and labrum both in part and mandible apically more or less brownish. G 1 and 2 apically black, but when gaster is extended ferruginous colour appears at base of GT 3 and 4. Clypeus on each side at apex at the junction with the baso-anterior carina of mandible bearing a tuft of long hair, usually separated in two. Antenna generally similar to that of ♀, but completely black and A 5 slightly shorter than wide.

Holotype: ♀, S. Korea, valley of Mt. Shoyo, 3.IX.1943, K. Tsuneki leg. (Coll. Tsuneki).

Paratypes: 1 ♀, same as holotype; 2 ♀, same locality, 27.VIII.1942; 2 ♂, same locality, 27.VIII., 3.IX.1942, all leg. K. Tsuneki (Coll. Tsuneki).

I N D E X

<i>agilis</i> (Tiphia)	58	<i>mongolica</i> (Tiphia)*	2
<i>apiciornatus</i> (Symmorphus)	26, 27	<i>muinensis</i> (Nomada)*	56
<i>babai</i> (Tiphia)*	8	<i>musashinus</i> (Omalus)*	1
<i>babai</i> (Nomada)*	36	<i>mitsuensis</i> (Nomada)*	53
<i>bipunctatus</i> (Sphecodes)*	38	<i>nagasei</i> (Tiphia)*	10
<i>burrelli</i> (Tiphia)	18	<i>nansetsurei</i> (Symmorphus)*	26, 27
<i>captivus</i> (Symmorphus)	22	<i>nunobensis</i> (Nomada)*	50
<i>cariniceps</i> (Sphecodes)*	38	<i>oblongata</i> (Tiphia)	19
<i>castanaevora</i> (Tiphia)	58	<i>ogurai</i> (Tiphia)*	3
<i>chichibuensis</i> (Sphecodes)*	45	<i>osimana</i> (Nomada)	55
<i>chichibuus</i> (Sphecodes)*	46	<i>ovinigris</i> (Tiphia)	13-18
<i>chosensis</i> (Sphecodes)*	42	<i>panzeri</i> (Nomada)	52
<i>coarctatus</i> (Sphecodes)*	39	<i>pekingensis</i> (Nomada)*	32
<i>corpulenta</i> (Tiphia)	20-23	<i>pekingensis</i> (Sphecodes)*	37, 43
<i>cristatus</i> (Sphecodes)	37, 43	<i>pekingensis</i> (Pasites)*	58
<i>djozankeianus</i> (Spilomena)*	27	<i>phyllophagae</i> (Tiphia)	13-18
<i>etigonis</i> (Nomada)*	57	<i>piceanus</i> (Symmorphus)*	26, 27
<i>femorata</i> (Tiphia)	3	<i>popilliavora</i> (Tiphia)	13-18
<i>foveolatus</i> (Symmorphus)	24	<i>sassai</i> (Symmorphus)*	26, 27
<i>fuzanensis</i> (Tiphia)*	7	<i>satsumensis</i> (Tiphia)*	7
<i>gayaensis</i> (Sphecodes)*	42	<i>seoulensis</i> (Tiphia)*	6
<i>hakodatensis</i> (Nomada)	55	<i>seoulensis</i> (Symmorphus)*	22
<i>hakotozanus</i> (Symmorphus)*	23	<i>seoulensis</i> (Sphecodes)*	40
<i>hasegawai</i> (Tiphia)*	4	<i>shirakii</i> (Crossocerus)*	31
<i>humoncularis</i> (Tiphia)	18	<i>shiroyamai</i> (Symmorphus)*	26, 27
<i>iiyamai</i> (Symmorphus)*	26	<i>shoyozana</i> (Nomada)*	34
<i>isolata</i> (Tiphia)	18	<i>smithi</i> (Tiphia)	13-18
<i>iwakiyamana</i> (Nomada)*	50	<i>sonani</i> (Trypoxylon)*	28
<i>izumindus</i> (Sphecodes)*	45	<i>sonani</i> (Rhopalum)*	31
<i>juliana</i> (Tiphia)	7, 20, 58	<i>sounkionis</i> (Symmorphus)*	22
<i>kaineiana</i> (Tiphia)*	4	<i>sternata</i> (Tiphia)	18
<i>kamakurae</i> (Tiphia)*	9	<i>sudaorum</i> (Psenulus)*	28
<i>kawamurai</i> (Tiphia)*	7	<i>taeguensis</i> (Sphecodes)*	41
<i>kisukei</i> (Tiphia)	18, 20, 58	<i>takeuchii</i> (Tiphia)*	3
<i>koreana</i> (Nomada)*	33	<i>temmasana</i> (Nomada)*	34
<i>koreanus</i> (Pasites)*	59	<i>temmasanus</i> (Sphecodes)*	32
<i>kotomaria</i> (Nomada)*	51	<i>tiendang</i> (Nomada)*	32
<i>kuro</i> (Nomada)*	52	<i>towada</i> (Nomada)	52
<i>kurokawana</i> (Tiphia)*	47	<i>tridentata</i> (Nomada)*	49
<i>maculatus</i> (Pasites)	58	<i>uzenis</i> (Nomada)*	49
<i>mediocris</i> (Tiphia)	13-18	<i>yasha</i> (Nomada)*	36
<i>mishimaensis</i> (Cleptes)*	2	<i>yoichii</i> (Tiphia)*	12
<i>mishimaensis</i> (Trypoxylon)*	28	<i>yunokawana</i> (Nomada)*	54

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SPECIAL PUBLICATIONS OF
THE JAPAN HYMENOPTERISTS ASSOCIATION

NO. 32

Published on April 20, 1986

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