

# *Etizenia*

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No. 17.

**CONTRIBUTION TO THE KNOWLEDGE OF THE LARRINAE FAUNA  
OF FORMOSA AND THE RYUKYUS  
(HYMENOPTERA, SPHECIDAE)**

**BY K. TSUNEKI**

**NOVEMBER 20, 1966**

**CONTRIBUTION TO THE KNOWLEDGE OF THE LARRINAE FAUNA  
OF FORMOSA AND THE RYUKYUS  
(HYMENOPTERA, SPHECIDAE)\***

By Katsuji TSUNEKI  
(Biological Laboratory, Fukui University)

This is the fourth contribution to the knowledge of the Sphecoidea fauna of Formosa and the Ryukyus based upon the collections of Kyushu University, Fukuoka\*\*, and Bernice P. Bishop Museum, Honolulu\*\*. All the Formosan specimens but two were collected particularly for me by Professor T. Shirôzu, Kyushu University, to whom I express my sincere thanks.

**1. *Liris (Liris) aurulenta* (Fabricius, 1787)**

*Liris aurata* : Williams, Bull. Exp. St. Hawaii. S.P.A., Ent. Ser., 19 : 82, 1928 (the Philippines).

*Liris aurata* : Yano, Icon. Ins. Jap., Ed. I, p. 276, 1932 (Formosa and the Ryukyus).

*Liris aurulenta* (F.) : Van der Vecht and Krombein, Idea, 10 : 34, 1955.

*Liris aurulenta* : Van der Vecht, Zool. Verh., 48 : 19, 1961.

*Liris (Liris) aurulenta* : Tsuneki, Kontyu, 32 : 219, 1964 (Amami-Oshima Is.).

*Apecimens examined* : 1 ♀, Formosa (Taipei Hsien : Yangmingshan), 1. VII. 1965, T. Shirozu leg.; 1 ♀ 2 ♂♂, the Ryukyus (Ishigaki Is.), X. 1951, R. M. Bohart leg.; 4 ♀♀, the Ryukyus (Ishigaki Is.), 20-30. XI., 10-20. XII. 1952, G. E. Bohart leg.; 6 ♀♀, the Ryukyus (Okinoerabu Is.), 8. VIII. 1963, K. Yasumatsu et K. Yano leg.

**2. *Liris (Notogonidea) docilis* (Smith, 1873)**

*Larrada docilis* Smith, Trans. Ent. Soc. Lond., II, : 192, 1873 (Japan).

*Notogonidea subtessellata* : Williams, Bull. Exp. St. Hawaii. S.P.A., Ent. Ser., 19 : 76, 1928 (the Philippines) (*ex parte*).

? *Notogonia laboriosa* : Matsumura et Uchida, Ins. Matsumurana, 1 (1) : 43, 1926

*Liris (Notogonidea) subtessellata docilis* : Tsuneki, Kontyu, 32 : 218, 221, 1964 (with other synonyms).

(Not *Notogonia* (of *Motes*) *docilis* of the Japanese authors which is, in reality, *Liris japonica* Kohl.)

*Specimens examined* : 1 ♀, Formosa (Nantou Hsien : Nanshanchi), 21. V. 1965, T. Shirozu leg.; 8 ♀♀ 3 ♂♂, Iriomote Is. (1 ♀ 2 ♂♂, Sonai, 1, 6. X. 1963, K. Morimoto leg.; 1 ♀, Sonai, 10. III. 1964, T. Shirozu leg.; 4 ♀♀ 1 ♂, Shirahama, Inaba, 9-12. III. 1964, C. M. Yoshimoto et J. Harrell leg.; 2 ♀♀, Shirahama, 5. XI. 1963, G. A. Samuelson leg.); 6 ♀♀ 3 ♂♂, Ishigaki Is. (2 ♀♀ 1 ♂, X. 1951, R. M. Bohart leg.; 3 ♀♀ 1 ♂, 25. XI. — 15. XII. 1952, G. E. Bohart leg.; 1 ♀ 1 ♂, Karayama, 14. III. 1963, C. M. Yoshimoto et J. Harrell leg.); 1 ♂ Miyako Is., XI-XIII. 1952, G. E. Bohart leg. (head lacking); 2 ♀♀ 4 ♂♂, Okinawa Is. (2 ♂♂, V. 1945, G. E. Bohart leg.; 1 ♂, Koza, VI. 1958, G. E. Bohart leg.; 1 ♂, Koza, VI. 1958, N. L. H. Krauss leg.; 1 ♂, Yona, 25. XI. 1963, K. Kaneko leg.; 1 ♀, Izumi, 22. III. 1964, C. M. Yoshimoto et J. C. Harrell leg.; 1 ♀, Yona, 24. IV. 1965, K. Ina leg.); 1 ♂, Okinoerabu Is. (Shinjo), 7. VIII. 1863, K. Yasumatsu leg.; 1 ♀ 3 ♂♂, Tokunoshima Is. (Mikyo), (1 ♀ 1 ♂, 27. VII. 1963, Y. Hirashima leg.; 1 ♂, 27. VII. 1963, J. L. Gressitt leg. (Malaise trap); 1 ♂\*, 24. VII. 1963, C. M. Yoshimoto leg.); 1 ♀, Amami-Oshima (Yuwandake), 16. VII. 1963, C. M. Yoshimoto leg. (Malaise trap).

\* *Contribution No. 97 from the Biological Laboratory, Fukui University, Japan*

\*\* The collections are based on Japan-U.S. Cooperative Science Program, but that of Bishop Museum includes also the specimens collected previously by Dr. R. M. Bohart and Dr. G. E. Bohart.

*Remarks.* Williams (1928) placed within the range of *Liris* (*Notogonidea*) *subtessellata* (Smith) two forms, one having the red hind femur and the other the black one. The latter is no other form than that which is known in Japan as *Liris docilis* (Smith). In my previous paper (1964) I dealt with this form as a subspecies of *L. subtessellata*, presuming that the southern population is represented by the typical race with the red hind femur and the northern population by *docilis* having the black hind femur and that the occurrence of both the forms in the Philippines is due to that the place is on the contact area of distribution of both the geographical races. However I have had some doubt about the concept, since the colour difference between both the forms are very distinct without any intermediate form. As I could have a chance of examining the examples of both the forms during the present study I attempted to make the close comparison between them. The result led me to conclude that they must be separated at the specific level, since they are different from each other not only in the colour of the legs, but also in some other important characters which are as follows :

- 1) Front femur seen from behind more strongly and more broadly excavated beneath in *docilis* than in *subtessellata* (Fig. 1, cf. Fig. 2).
- 2) Medio-anterior region of mesonotum more deeply impressed than in *subtessellata*.
- 3) Punctures on head and mesonotum much finer and closer.
- 4) Glittering pilose on lower front, clypeus and mesopleuron much shorter and closer.

Furthermore, the fact that they do not show any tendency of gene flow between them (since there is no intermediate form in the region where they are sympatric) can not be explained by the subspecific concept. Still further, if they are taken as mere variations within a species it is quite strange that the black form alone occurs in the northern countries.

All the facts above mentioned seem to support the view that they belong respectively to a distinct species.

One of the male specimens collected on the Island of Tokunoshima marked with an asterisk in the above list has the wings very strongly yellowish. But judging from the state of the specimen the colour is considered changed through some artificial treatment for preserving or for softening.

### 3. *Liris* (*Notogonidea*) *subtessellata* (Smith, 1856)

*Larrada subtessellata* Smith, Cat. Hym. Ins. Brit. Mus., IV : 277, 1856 (♀).

*Notogonia subtessellata* : Bingham, Faun. Brit. Ind., I : 202, 1897 (♀♂).

*Notogonidea luzonensis* Rohwer, Bull. Exp. St. Hawaii. S.P.A., Ent. Ser., 14 : 9, 1919.

*Notogonidea subtessellata* : Williams, Bull. Exp. St. Hawaii. S.P.A., Ent. Ser., 19 : 76, 1928 (*ex parte*) (Philippine).

*Liris* (*Notogonidea*) *subtessellata* : Tsuneki, Etizenia, 4 : 9, 1963 (Thailand).

*Specimens examined* : 1 ♀, Formosa (Pintung Hsien : Kenting), 4.IV.1965, T. Shirozu leg. 2 ♂♂, Ishigaki Is., 20-30. XI.1952, G.E. Bohart leg. (A large number of specimens collected by myself in Formosa were also examined).

*Remarks.* The relationship of this species to *L. (N.) docilis* was discussed in connection with the latter species.

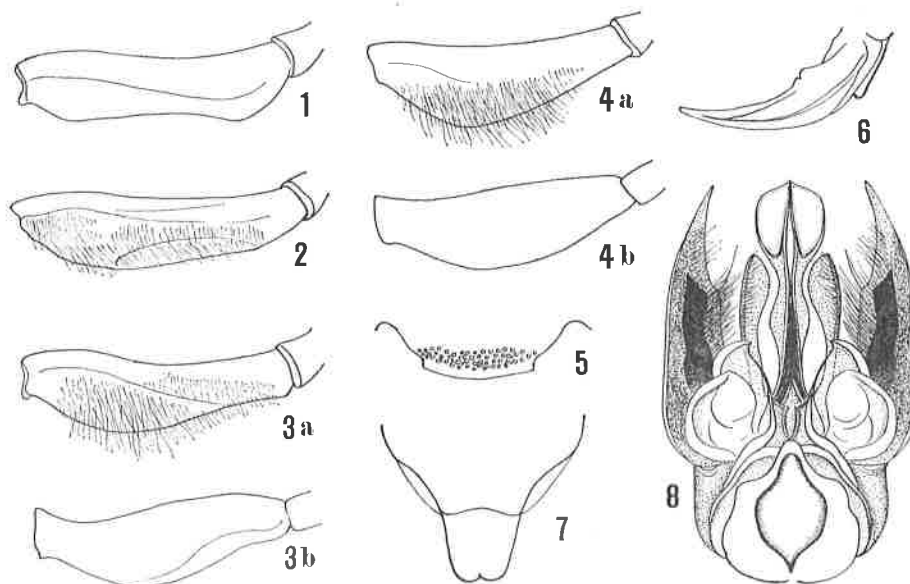
### 4. *Liris* (*Notogonidea*) *rohweri* (Williams, 1928)

*Notogonidea rohweri* Williams, Bull. Exp. St. Hawaii. S.P.A., Ent. Ser., 19 : 78, 1928 (Philippine).

*Specimens examined* : 1 ♀, Formosa (Pintung Hsien : Kenting), 3. IV. 1965, S. Ueno leg.; 4 ♀♀ 1 ♂, Iriomote Is. (1 ♀, Inaba, 10. III. 1964, J. C. Harrell leg.; 1 ♀, 11-12. III. 1964, C. M. Yoshimoto leg.; 1 ♀, Sonai, 15. XI. 1963, K. Kaneko leg.; 1 ♂, Ohara, 1. X. 1963, K.

Morimoto leg.; 1 ♀, Sonai, 10. III. 1964, T. Shirozu leg.); 3 ♀♀ 1 ♂, Ishigaki Is. (2 ♀♀, X. 1961, R. M. Bohart leg.; 1 ♀ 1 ♂, 20-30. XI. 1952, G. E. Bohart leg.); 1 ♂, Okinawa, VI. 1945, G. E. Bohart leg.

*Remarks.* The original description of this species is given in fair detail and there is no problem in distinguishing the species from the closely allied congeners. This species is, however, apparently very similar to *Liris docilis*, the commonest relative in Japan, so that it seems desired to give the differences between them in more detail than those shown by the original author.



Figs. 1-8. 1, *Liris docilis* Sm., front femur (posterior view). 2, *Liris subtessellata* Sm., ditto. 3, *Liris rohweri* Williams, ditto; a, posterior view, b, dorsal view. 4-8, *Liris rohweri* Williams, an aberratio (♂). 4, front femur; a, posterior view, b, dorsal view. 5, apical margin of clypeus. 6, mandible. 7, caudal sternite. 8, genitalia (ventral view).

♀ and ♂. (1) Interocular distance at vertex less than as great as antennal joint 4 (in *docilis* equal). (2) Punctures on vertex and posterior portion of mesonotum with interspaces as large as the width of punctures (in *docilis* closer, intervals smaller). (3) Clypeus with apical bevel (inclined glabrous area) fairly closely punctured except the extreme apical margin (in *docilis* punctures very sparse or nearly lacking). (4) Medio-posterior protuberance of pronotum with apical rounded angle acuter than in *docilis*. (5) Mesopleuron with scrobal furrow deeper and more distinctly crenate, with punctuation somewhat rugulose (in *dobilis* not rugoso-punctate). (6) Radial vein in fore wing with abscissa (numbers followed Williams, 1928) 5 equal to 2, or nearly (in *docilis* always  $5 > 2$ ). (7) Lateral carinae of posterior and dorsal aspects of propodeum strong and high (in *docilis* usually lacking, but sometimes appearing in part in a dotted state). (8) Posterior aspect of propodeum with lateral margins nearly straightly convergent apically (in *dobilis* markedly roundly convergent). (9) Front femur with the border between anterior and upper surface nearly edged throughout the length (in *docilis* only apically so). (10) Wings much more strongly infuscated. The difference very striking.

♀. A lunate transverse furrow on the nape region of pronotum medianly distinctly interrupted, sometimes only shallowly so (in *docilis* not interrupted, uniformly deeply furrowed).

♂. (1) Front femur beneath closely covered with long erect whitish pubescence (Fig. 3, a) (in *docilis* hairs velvety, short, appressed, silvery). (2) Front femur deformed in both species, but the form fairly different between them. This is most marked in the posterior view (Fig. 3, cf. Fig. 1). (3) Hind femur beneath more gently emarginate than in *docilis*. (4) Apical sternite of abdomen with apex much more feebly incised in middle (in *docilis* deeply subtriangularly incised).

This species has been known from the Philippines and Singapore. The present study showed that it is distributed as far northward as Okinawa Island through Formosa and the Yaeyama group of the Ryukyus.

In one female specimen from Formosa the lunate impression on the nape is rather imperfectly interrupted in the middle as in most of the males.

*Notes on an aberratio* Specimen: 1 ♂, Formosa (Tainan-Hsien: Kuantzuling), 6. IV. 1965, T. Shirozu leg. (Coll. Kyushu Univ.).

This specimen has the front femora somewhat different from those of the normal specimens, and the interocular space at the vertex is relatively slightly wider. The femur is comparatively thicker; in the posterior view it is much more weakly undulate on the dorsal margin and not hollowed beneath near the base (Fig. 4, a cf. Fig. 3, a), in the dorsal view with the anterior margin much less strongly sinuate (Fig. 4, b) than in the normal specimens (Fig. 3, b). The interocular distance at the vertex as compared with the length of antennal joint 3 is relatively 18 : 12, in the normal specimens 16 : 12 (while in *docilis* 19 : 12). Further, the superimposed punctures over the microscopic coriaceous sculpture of the mesopleuron are slightly larger, sparser and more distinct.

I at first considered it to represent another species, but as to the other characters shown in the above description including the form and the sculpture of the apical margin of the clypeus (Fig. 5), mandibular structure (Fig. 6) and the slight incision at the apex of the caudal sternite there could be observed no note-worthy difference from *rohweri*. Finally I examined the genital organs (Fig. 8) and confirmed that it was the same as that of *rohweri* illustrated by Williams (1928).

This example may represent one of the mutants that appear at times during the course of speciation.

##### 5. *Liris* (*Notogonidea*) *larriformis* (Williams 1928)

*Notogonidea larriformis* Williams, Bull. Exp. St. Hawaii, S.P.A., Ent. Ser., 19 : 73, 1928.

*Specimen examined* : 1 ♀, Formosa (Pintung Hsien : Kenting), 2. IV. 1965, T. Shirozu leg.

*Remarks*. This species has been known from the Philippines only and is new to the fauna of Formosa.

##### 6. *Liris* (*Notogonidea*) *surusumi*\* sp. nov.

By the large size (more than 17 mm) and wholly pitchy black body without whitish pile is the present species easily separable from the known congeners.

♀. Length 17.5 mm (paratype 16.7 mm). Black and opaque, only on mandibles, bevel of clypeus and wing tegulae externally smooth and polished, frons on supra-antennal area and humeral angles somewhat glossy and propodeum provided with strong aeneous shimmer. Mandibles in middle dark red, wing tegulae externally ferruginous. Abdominal sternite 2 on both sides of

\* The name of a fine horse, completely black in colour, famous in a story of the chivalry period of Japan. *Surusumi* means in the classic poetic Japanese pure black like the China ink.

medio-basal carina broadly reddish yellow (in paratype the areas wholly black); wings dark brown, posteriorly progressively paler and strongly iridescent. Pile on body and legs in the perpendicular view black, but under oblique light reddish brown, very short and close; pile bands on abdomen inconspicuous owing to their dark brown coloration.; clypeus just above the polished bevel with a line of sparse long hairs growing from large punctures, pygidial area densely covered with bristle-like hairs, with scattered strong bristles obliquely erected, abdominal sternites 2-5 each with an ante-apical line of sparse long hairs, all black in colour.

Interocular space at vertex  $2/3$  the length of antennal joint 3 (22 : 33), the latter as long as 4 (relatively 32) and twice as long as joint 2 (relatively 16), ratio of antenno-ocular distance, width of antennal socket and interantennal distance (under the same scale as above) 18 : 14 : 8; clypeus : Fig. 9, apical bevel broad, polished, with a puncture line across middle (slightly anterior to middle) where the bevel turning somewhat gentle toward the apical margin, disc medianly raised where very minutely coriaceous, somewhat glossy, without puncture. Pronotum with lunate impression on the nape medianly shallowly interrupted, median protuberance of its posterior margin with apex slightly emarginate; mesonotum with medio-anterior impression gentle, post-scutellum distinctly raised above the level of mesonotum and medianly with impressed line which is broadened posteriorly; postscutellum also raised and impressed in middle; mesopleuron with distinct scrobal furrow, reaching near the anterior margin of metapleuron. Propodeum with median longitudinal carina distinct, covering about anterior  $3/4$  of the dorsal aspect, posterior inclination medianly narrowly furrowed, posterior extension of the furrow varied more or less between the specimens. Pygidial area elongate triangular, with apex truncate, ratio of widths at base and at apex about 3 : 1, the sides gently rounded from base to about middle, thence convergent straight apically, apical margin provided with 7-8 spines. Legs normal (front tibia with a single spine on inner margin, claws with a tooth at base). In fore wing abscissae of radial vein (the method of Williams, 1928, followed) with the order of length (from long to short) : 4, 1, 3, 5, 2; 2 always very short, half the length of 3 or less, 4 and 1 sometimes subequal.

Frons and vertex very minutely and densely punctured, punctures on supra-antennal area weaker, finer, sparser, on clypeus dense and somewhat gross on median lobe, fine on lateral lobes; punctures on pro-, mesonotum, scutellum and postscutellum as minute and dense as on vertex, on antero-lateral inclined areas of mesonotum coarse but weakly rugoso-reticulate, on furrowed posterior margins of scutellum and postscutellum coarsely and strongly crenate, on mesopleuron somewhat sparse, partly rugoso-punctate, especially on subalar epimeral area, but punctures posteriorly finer and closer, scrobal and epicnemial furrows shining, the former sparsely and the latter closely crenate; metapleuron longitudinally closely striate. Propodeum coarsely but not strongly reticulate, with meshes incomplete and mainly subquadrate, but laterally and posteriorly becoming irregular (in paratype somewhat more irregular), posterior inclination transversely somewhat arcuately coarsely striate, fairly glossy, from upper end of medial furrow two roundly divergent carinae extending upward, crossing the transverse carinae, the degree of divergency markedly varied between the two specimens. Abdomen very minutely (under  $30\times$  enlargement visible with some difficulty) coriaceous, sternites 2-5 with a gross sparse puncture-line before apex, 6 grossly punctured, mixed with fine points, apically somewhat rugose.

Holotype : ♀, Ishigaki Is. (Yonebaru), 20. XI. 1963, K. Kaneko leg. (Coll Bishop Mus.).

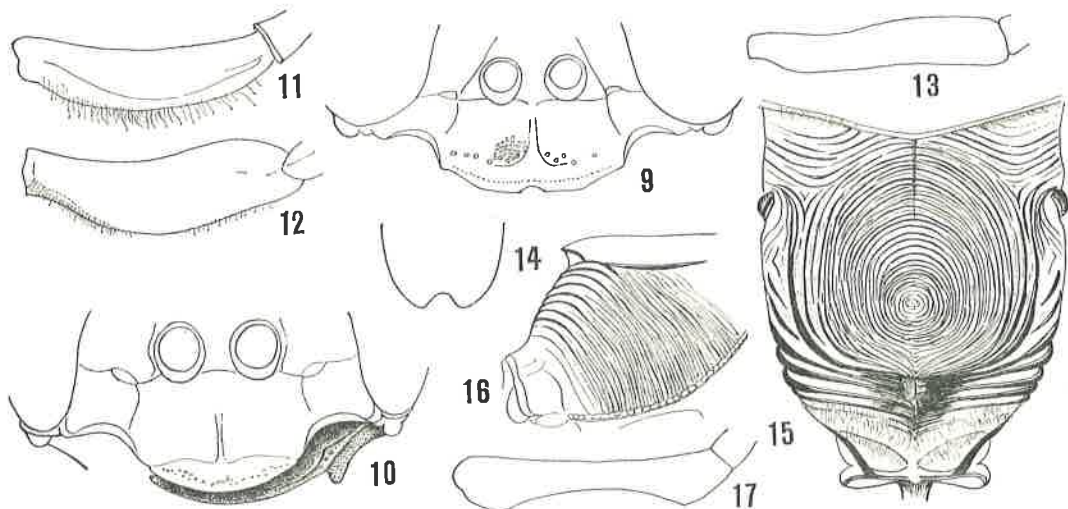
Paratype : 1 ♀, Ishigaki Is., X. 1951, R. M. Bohart leg. (Coll. Bishop Mus.).

#### 7. *Liris (Notogonidea) shirozui* sp. nov.

According to the key of *Notogonidea*-species of the Philippine Islands by F. X. Williams

(1928) this species (♂) runs straight to *N. subtessellata*. But it differs from *N. docilis* included by him within *N. subtessellata* in many characters as below described :

♂. Length about 7.0 mm. (1) Coloration: Except for the pubescence covering the body very similar to *docilis*. Mandibles wholly black (under permeate light slightly reddish), in *docilis* sometimes apical portion slightly dark reddish; tegulae of wings externally glossy ferruginous. Wings much darker, — dark brown, with apex more strongly darkened. (2) Pilosity: Pile on lower frons and clypeus somewhat longer than in *docilis*, less abundant, less appressed and with distinctly a brassy lustre; the same is true on thorax-complex, especially marked on the sides where the pile nearly erected, in colour grayish white with a tint of pale yellowish. On abdomen pile-bands on tergites 1-3 less marked, observable under oblique light only, also with a brassy tint, less shining; hairs on ultimate and penultimate tergites longer, more erected, pale brownish on the former, mixing some bristle-like ones. Hairs on legs also more brownish, on front femur beneath longer (but somewhat less than in *N. rohweri*). much less appressed and uniform from base to apex (Fig. 11).



Figs. 9-17. 9, *Liris surusumi* sp. nov., clypeus.  
10-14, *Liris shirozui* sp. nov., ♂. 10, clypeus. 11, front femur (posterior view).  
12, ditto (dorsal view). 13, hind femur (posterior view). 14, 8th sternite.  
15-17, *Liris vortex* sp. nov., ♂. 15, sculpture of propodeum (dorsal view).  
16, ditto (lateral view). 17, front femur (posterior view).

(3) Structure: Interocular distance at vertex slightly less than as long as antennal joints 2 and 3 combined (ratio 22 : 25, in *docilis* subequal, 20 : 21), clypeus with anterior margin of median lobe much more strongly roundly produced, without median incision, bevel broader, carrying sparse punctures near apical margin that tend to form a zone (Fig. 10). Front femur more broadly and strongly depressed above and hardly excavated beneath (Fig. 11, cf. Fig. 1). Hind femur beneath only very gently excavated (Fig. 13), the fact is most marked near base, seen from beneath no particular excavated surface observed. Lunate impression on nape of pronotum similar, medianly shallowly interrupted. On mesonotum median scutal lines reaching about third of scutum and end in a small tubercle, anterior scutal sutures in the glittering raised lines, much more uneven than in *docilis*. Propodeum on dorsal aspect with medio-anterior carina, reaching about middle of the aspect, medio-apical area slightly depressed and much more produced posteriorly than the latero-apical areas, with apical extremity subtruncate, posterior aspect with lateral margins less roundly and more acutely convergent posteriorly, with the surface on both sides of medial furrow gently

roundly raised, not nearly flattened as in *docilis*.

(4) Sculpture: Punctures on vertex, frons, clypeus, mesonotum, scutellum and postscutellum much larger, but close (well visible under  $20\times$ ), thus the surface less smooth; inner orbital swelling also punctate, but slightly more finely and more sparsely so, not shining; medial elevated line of clypeus very minutely coriaceous, more or less glossy. Mesonotum on antero-lateral inclined areas just above humeral angles slightly more coarsely rugoso-punctate. On mesopleuron subalar epimeral area longitudinally coarsely rugose, partly rugoso-subreticulate, intervals of rugae very minutely rugulose, not glossy, scrobal furrow broad, shallow, very indistinct in outline, defined only by its glossy surface which is anteriorly coarsely rugose or rugoso-reticulate, episternum somewhat sparsely punctured (with intervals as large as punctures and as glossy as mesonotum), but posteriorly finely and closely rugoso-punctate; metapleuron longitudinally coarsely rugoso-striate. The sculpture markedly different from that of *docilis*. Propodeum with surface obliquely rugoso-striate, the striae not strong, with intervals moderately broad and incompletely and irregularly sectioned with longitudinal rugulae, thus the surface in some direction appears irregularly reticulate, but the main trend of rugae oblique and the interspace completely dull, posterior aspect transversely rugulose, with surface more or less glossy, lateral carinae separating the area from the sides of the segment well defined, on posterior portion strong and high, on middle portion somewhat weak and on anterior portion becoming somewhat stronger again, reaching near the stigmata; sides of the segment obliquely striate, with intervals punctate, but the surface more glossy than in *docilis*. It is remarkable that the tyloidea (glabrous smoothed area) on antennal joints 3-13 sparsely but distinctly punctate with minute points. This is rather exception among the congeners.

(5) Some supplements. Scutellum and postscutellum roundly raised, somewhat above the level of mesonotum, front tibia without spine but a single short one on inner margin, hind tarsi approximately 1.5 times as long as preceding tibia, caudal sternite deeply incised at apex in middle, with the sinus rounded (Fig. 14).

Holotype: ♂, Formosa (Nantou-Hsien: Sungkang), 5. V. 1965, T. Shirozu leg. (Coll. Kyushu Univ.)

#### 8. *Liris (Notogonidea) vortex* sp. nov.

This species (♂) is more closely allied to *L. docilis* than the preceding species. Therefore, in the Williams' key it also smoothly reaches *L. subtessellata* (including *docilis*). But it differs from it mainly in the sculpture of propodeum and somewhat also in the structure of the front femur.

(1) Dorsal aspect of propodeum medianly feebly carinated on the basal third and the surface completely occupied by the close fine carinae drawing concentric circles having the centre about  $3/4$  from base on the median line (Fig. 15); in the lateral view (Fig. 16) apical margin of the medial region of the dorsal aspect produced into an overhang, the portion of the excavation below the protuberance is the upper hollow on the medial line of the posterior inclination.

(2) Front femur beneath more broadly and more strongly excavated than in *docilis* (Fig. 17, cf. Fig. 1)

Interocular space at vertex subequal to antennal joints 2+3, tyloidea on antennal joints 4-13, clypeus with anterior margin of median lobe roundly produced without the medial incision, bevel comparatively broad and with sparse punctures as in some specimens of *L. docilis*. Lunate impression on the nape of pronotum without medial interruption or elevation, thoroughly deep as in *L. docilis*; relative length of abscissae of radial vein of fore wing also as in *docilis* ( $4 > 1 > 3 > 5 > 2$ ), excavation beneath hind femur also similar.



Holotype : ♂, Formosa (Nantou-Hsien : Nanshanchi), 30. IV. 1965, T. Shirozu leg.

### 9. *Liris (Notogonidea) japonica* (Kohl, 1883)

*Larrada nigricans* Smith (nec Walker, 1871), Trans. Ent. Soc. Lond., 1873, II : 192, 1873.

*Larra (Notogonia) japonica* Kohl, Verh. zool.-bot. Ges. Wien, 33 : 357, 1883.

? *Notogonia manilae* Ashmead, Proc. U. S. Nat. Mus., 28 : 130, 1904.

*Liris (Notogonidea) japonica* : Tsuneki, Kontyu, 32 : 221, 1964.

(As to other synonyms see Tsuneki, 1964).

*Specimens examined* : 2 ♀♀, Formosa (1 ♀, Pintung Hsien : Kenting, 4. IV. 1965 ; 1 ♀, Chiayi Hsien : Chuchi, 13. IV. 1965, T. Shirozu leg.); 2 ♀♀, Iriomote Is. (1 ♀, 11-12. III. 1964, C. M. Yoshimoto et J. Harrell leg.; 1 ♀, 6. X. 1963, K. Morimoto leg.); 2 ♀♀ 1 ♂, Ishigaki Is., 25-30. XI. 1952, G. E. Bohart leg.; 2 ♀♀ 1 ♂, Okinawa Is., VI. 1945, G. E. Bohart leg.; 1 ♀, Yoron Is., 4. VIII. 1963, K. Yasumatsu et K. Yano leg.; 1 ♂, Okinoerabu Is., 28-30. VII. 1963, C. M. Yoshimoto leg.; 2 ♀♀ 1 ♂, Tokunoshima Is., (1 ♀ 1 ♂, 27. VII. 1963, Y. Hirashima leg.; 1 ♀, 27. VII. 1963, J. L. Gressitt leg. (Malaise trap)).

*Remarks.* This species has hitherto been known from Japan (except Hokkaido) as far south as Amami-Oshima Is., Korea and E. China (Piel, 1935). Southern Islands of the Ryukyus and Formosa are the new records of distribution of this species.

The female specimen from Yoron Is. has the body pile very sparse and in the general appearance highly polished. Silver pile bands on the abdomen nearly completely lacking.

Some supplementary description : Interocular distance at vertex in ♀ very slightly less than as long as antennal joints 2+3 (ratio 13 : 15), in ♂ subequal (14 : 15), antennal tyloidea (well outlined glabrous area) only on joints 6 and 7, elliptic in form. Median lobe of clypeus with anterior margin gently roundly produced, with or without the medial notch, bevel shining with sparse fine punctures, relative length between abscissae of radial vein :  $4 > 2 \geq 3 \geq 4 \div 5$ ; lunate impression on the nape complete, not interrupted or shallowed in middle. Front and hind femora (♂) normal, not flattened nor particularly excavated beneath, caudal sternite (♂) weakly emarginate or incised at apex. Punctures comparatively coarse and close on head and thorax above (quite marked as compared with *L. docilis*), on mesopleuron sparse, with intervals partly as large as punctures. Propodeum with lateral carinae separating the dorsal and posterior aspects from the sides of the segment distinct, dorsal aspect medianly carinate on basal 2/3-3/4, surface coarsely but not strongly transversely rugoso-striate, intervals irregularly, sometimes incompletely sectioned by longitudinal or oblique rugulae into incomplete meshes, thus appearing in some direction reticulate, with meshes mainly quadrate; sides obliquely closely striate. Length ♀ 6-10, ♂ 5-8 mm.

### 10. *Cratolarra fuscinerva* (Cameron, 1900)

*Cratolarra fuscinerva* (Cam.) : Tsuneki, Etizenia 4 : 9, 1963.

*Cratolarra pitamawa* Rohwer, Bull. Exp. St. Hawaii, S.P.A., Ent. Ser., 14 : 7, 1919. (SYN. NOV.)

*Notogonidea (Cratolarra) pitamawa* : Williams, Ibid., 19 : 80, 1928.

*Specimens examined* : 1 ♀ 1 ♂, Formosa (1 ♀, Taichung Hsien : Taichung, 26. IV. 1965, T. Shirozu leg.; 1 ♂, Pintung Hsien : Szuchunghsi, 4. IV. 1965, Y. Hirashima leg.).

*Remarks.* Besides the characters designated by Williams in relation to his *Notogonidea (Cratolarra)* the much less incrassated frontal swellings or callosities of both sexes as compared with those of *Larra* and *Liris* (s.l.) must be added as one of the generic characters of *Cratolarra*.

### 11. *Larra amplipennis sanguinea* Williams, 1928. (conj. nov.)

*Larra sanguinea* Williams, Bull. Exp. St. Hawaii, S.P.A., Ent. Ser., 19 : 67, 1928.

*Larra amplipennis* : Tsuneki, Kontyu, 32 : 221, 1964.

*Specimen examined* : 1 ♂, Iriomote Is., 1. X. 1963, Y. Hirashima leg.

*Remarks.* Close reexamination of the specimens of *L. amplipennis* (Sm.) captured in Japan (8 ♀♀ 1 ♂) and on the Island of Amami-Oshima (13 ♀♀ 1 ♂) in comparison with the description of *L. sanguinea* revealed the following differences among them :

(1) Honshu specimens : Wings deeply infuscated till base (♀♂); disc of propodeum with medial carina generally more distinct (but fairly varied, sometimes very faint), surface more broadly transversely punctate-striate, sometimes striae confined to medial and lateral areas leaving the intermediate areas simply punctured, posterior aspect largely transversely punctate-striate; interocular space at vertex (♀) generally slightly longer than antennal joints 3 and 4 combined (ratio 11-12 : 10).

(2) Amami specimens : Wing wholly deeply infuscated as in the Honshu specimens; disc of propodeum generally with transverse striae on medial and lateral areas only, leaving intervals simply punctured, posterior aspect clearly punctured, partly and weakly mixing striae; interocular space as in Honshu specimens.

The specimen from Iriomote Is. has the wings basally subhyaline and the propodeum sculptured as in *sanguinea*, namely, medial carina very feeble, transverse striae on disc very indistinctly defined on median region and posterior aspect simply punctate, with punctures closer on the medial region.

The specimen from Iriomote Is. (close to Formosa) is just *sanguinea* and basing upon such geographical differences, though very slight and unimportant, *sanguinea* was readopted as a subspecific category. The Amami specimens seem better to be included within *amplipennis* s. str.

As to the difference in the length relation between interocular distance at the vertex and the combined length of antennal joints 3 and 4 (in ♀) further study regarding *sanguinea* is needed.

It seems worth describing here that the male genital organ of *L. amplipennis* well agrees in structure with that of *L. sanguinea* illustrated by Williams.

## 12. *Larra carbonaria* (Smith, 1858).

*Larrada carbonaria* Smith, Jour. Proc. Linn. Soc. Lond., 2 : 102, 1858.

*Larra carbonaria* : Williams, Bull. Exp. St. Hawaii. S.P.A., Ent. Ser., 19 : 67, 1928. (the Philippines).

*Specimens examined* : 1 ♂, Formosa (Taipei), 15. IV. 1965, H. Sasakawa leg.; 1 ♂, Miyako Is., 27. X. 1952, G. E. Bohart leg.; 1 ♀, Okinawa Is., 27. X. 1963, K. Kaneko leg.; 1 ♀, Tokunoshima Is., 25. VII. 1963, C. M. Yoshimoto leg. (Malaise trap).

*Remarks.* The specimens of this species collected in the main islands of Japan (subsp. *erebus* Sm.) differs from the typical species in that the mandibles are wholly (in the nominate species only in part) red in colour (♀♂) and the median protuberance of clypeus (♂) much broader and less strongly produced anteriorly.

The specimen from Formosa has the red mandibles and the narrow and less produced median lobe of the clypeus. In the male specimen from Miyako Is. the mandibles comparatively more blackish towards the base and the clypeal protuberance narrow but rather short. The female specimen of Okinawa Is. has the mandibles wholly red, while that of Tokunoshima comparatively more blackish. Thus, the subspecific relation of the specimens is undetermined.

## 13. *Larra luzonensis* Rohwer, 1919.

*Larra luzonensis* Rohwer, Bull. Exp. St. Hawaii. S.P.A., Ent. Ser., 14 : 10, 1919.

*Larra luzonensis* : Williams, Ibid., 19 : 68, 1928.

*Specimens examined*: 2 ♂♂, Ishigaki Is., X.1951, R. M. Bohart leg.; 10-15. XII. 1952, G. E. Bohart leg.

*Remarks*. This species closely resembles *L. carbonaria*, but is easily separable therefrom by the yellowish red hind femur.

#### 14. *Tachytes sinensis* Smith, 1856, a form.

*Tachytes sinensis* Sm. a var. Bingham, Faun. Brit. Ind., I: 190, 1897 (not perfectly).

*Tachytes sinensis* var. *purpureipennis* Matsumura et Uchida, Ins. Mats., I (1): 42, 1926 (idem).

? *Tachytes fundatus* Rohwer, Proc. U. S. Nat. Mus., 39 (1794): 484, 1911. (Formosa.)

*Specimens examined*: 2 ♀♀ 2 ♂♂, Formosa (Taipei-Hsien: Yangmingshan), 1. VII. 1965, T. Shirozu leg.; 1 ♂, Ishigaki Is., 25. V. 1964, J. L. Gressitt leg. (Malaise trap).

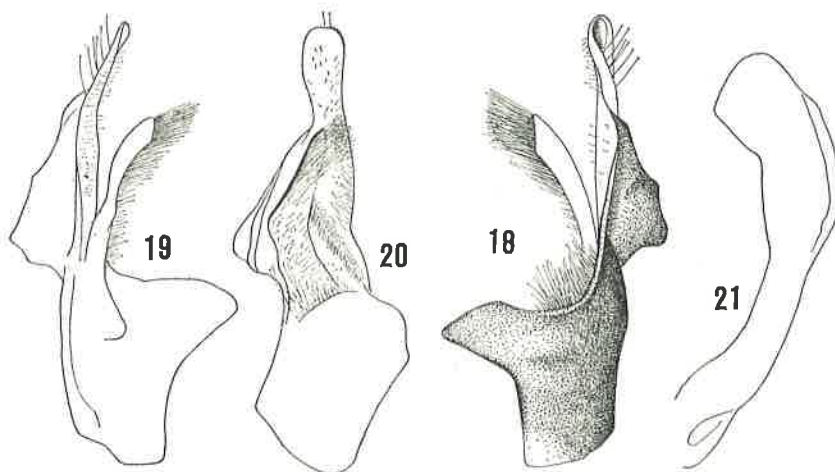
*Remarks*. The specimen from Ishigaki Is. represents a colour variation of the species: Ferruginous are first antennal joints, apical portion of mouth part and palpi, wing tegulae, all legs except all coxae and trochanters, and base inside of front femora. Wings markedly yellowish, veins pale brownish yellow. Silvery hair bands on abdomen defined on tergites 2 and 3 only, as in the Japanese main lands specimens. It agrees in colour (except for pubescence on some parts of body) to the variety described by C. T. Bingham (1897) from India. On the other hand, Matsumura and Uchida (1926) described the variety, *purpureipennis*, from Okinawa, Ishigaki (and Formosa) that has, besides the ferruginous legs, deep brownish-infuscated wings. As to the colour of the legs I recorded a specimen of *sinensis* captured in Korea which has the legs partly ferruginous (and 4 silvery abdominal bands).

On the other hand, in the 4 Formosan specimens listed above the ferruginous colour of the legs is much darker (rather close to castaneous brown) and much less in extent (apical portion only of femora, and tibiae and tarsi).

The close comparative study of the specimens with those collected in Honshu revealed that they are slightly different in some other characters also:

1) ♂ and ♀. Antennal joints on apical portion relatively slightly longer, while in ♂ joint 3 relatively slightly shorter.

2) ♂ and ♀. Golden of the pubescence on thorax is much more suffused and brighter in



Figs. 18-21. Genitalia of the ferruginous-legged form of *Tachytes sinensis* Sm.  
18, paramere and digitus, lateral (from outside) view. 19, ditto lateral (from inside) view. 20, ditto, seen from obliquely inside, vertical to the surface of paramere. 21, penis valve.

the Formosan specimens (in that of Okinawa near brassy as in the Honshu specimens).

3) ♂ and ♀. Wings somewhat more strongly yellowish.

4) ♀. Interocular space at vertex as long as antennal joint 3 (in the Honshu specimens slightly shorter than joint 3).

5) ♀. Distance between post-ocellar impression and the line connecting posterior margins of eyes as long as interocular space at vertex (in the other the former slightly longer).

However, the differences above mentioned other than the colour of the legs are very slight in degrees and, moreover, the male genital organs are quite identical in structure between them, (Figs. 18-21, Formosan specimen, cf. Tsuneki, 1964, Figs. 7-9). The facts seem to indicate that they can not be beyond the range of intraspecific variation.

The variety described by Bingham (1897) differs from any of the Formosan and Ryukyu varieties in the colour of the pubescence of the body. In order to determine, therefore, the range of variations in connection with each subspecies ample material from various locations must be studied.

#### 15. *Tachytes shirozui* sp. nov.

Closely resembles *T. sinensis*, but in the general appearance much slenderer, with pubescence on the thorax much more suffused golden (as in the Formosan form of this species). Close examination shows further that the vertex relatively much wider and shorter and the fore wing with radial nervure differently sectioned into abscissae in their relative length.

♀. Length about 18.0 mm. Black with dull aeneous tone on head, thorax, 1st abdominal segment and legs as in *T. sinensis*. Ferruginous to brown: Palpi, mandibles at apex narrowly, spines, calcaria and claws of legs, each tarsal joint beneath at apex and wing veins. Wings fairly strongly yellowish, apically slightly fuscous. Pubescence on lower frons and clypeus long, close and suffused golden, on temples below and thorax-complex long close, but finer and less suffused in golden, pronotum covered with short velvety hairs, brassy in colour, mesonotum on the disc with pubescence mixed with brownish hairs, on its lateral and posterior areas, posterior margin of scutellum and postscutellum wholly covered with suffused golden, close, short, appressed hairs, most marked in the oblique light; vestiture on legs as in *T. sinensis*, especially brilliant golden on hind tibiae. Propodeum on dorsal aspect and on upper area of posterior inclination also covered with short appressed brassy hairs which are so dense that the surface sculpture invisible (a character different from *sinensis*). Pygidial area densely covered with stiff dark brown hairs, with a copery shine in certain light.

Interocular space at vertex slightly greater in length than 3rd antennal joint (30 : 25), but slightly less than joints 2 and 3 taken together (33 : 30), length ratio between interocular space and the distance between post-ocellar impression and the line connecting posterior margins of eyes 30 : 18 (in *sinensis* the latter slightly longer), post-ocellar impression nearly semicircular in outline (subtriangular in *sinensis*), broader and shallower than in *sinensis*, with surface smooth and nearly flattened (in *sinensis* posterior corner deepened into a pit); vertex medially with a longitudinal impressed line, postocelli with the polished area narrower than in *sinensis* and median furrow anterior to front ocellus also narrower and less polished than in the compared species. Median lobe of clypeus roundly raised and medianly with a feeble carina, apical margin broadly roundly produced, showing a trace of medial incision (clypeus already worn away) and with 3 lateral teeth. Antennal joints with approximately a similar length relation to that of *sinensis*, but each joint relatively slightly longer, 3rd joint 3.2 times as long as broad at apex (in *sinensis* 2.7-2.9 times as long as broad). Propodeum with smooth area triangular, narrower than in

*sinensis* and roundly impressed. Pygidial area similar to that of *sinensis*, but the lateral carinate margins straight and the apex more narrowly rounded. Legs normal; in fore wing relative length between abscissae of radial vein :  $4 > 1 > 3 \approx 2 > 5$ , 2nd cubital cell with upper and lower veins relatively about 1 : 3 (in *sinensis* about 1 : 4).

Vertex covered throughout with minute points, mixing sparse larger hair-bearing punctures (minute punctures relatively much smaller than in *sinensis*), clypeus with apical inclined region of median lobe broadly glabrous, nearly polished, with sparse fine punctures which turn into a rough line of somewhat larger, closer and subrugose punctures on the apical border just posterior to apical margin which obscure in sculpture through digging work of the wasp, medial raised area of the disc also narrowly glabrous and sparsely scattered with larger punctures. Mesonotum, scutellum closely covered with fine rounded punctures (without giving appearance of reticulation), mesopleuron dublicately punctured with close fine and sparse large punctures (in *sinensis* uniformly sculptured as on mesonotum, except below). Posterior inclination of propodeum posteriorly finely closely rugoso-punctate, sides of the segment dorso-posteriorly longitudinally finely closely rugose, on ventral margin transversely rather sparsely striate or rugoso-striate; punctuation of abdominal sternite generally similar to that of *sinensis*, but the sparse punctures on sternites 3, 4 and 5 (on lateral portions) more rounded and shallower.

♂. Unknown.

Holotype : ♀, Formosa (Nantou-Hsien : Nanshanchi), 8. VI. 1965, T. Shirozu leg. (Coll. Kyushu Univ.)

*Remarks.* *T. banoensis* Rohwer known from the Philippines seems somewhat resembling the present species, especially in the length relation between the interocular distance at the vertex and the combined length of antennal joints 2 and 3. At least, however, in the colour of vestiture of the body, especially of the bristles on the pygidial area it differs markedly from the present species. Further in the length relation between the abscissae of the radial nervure of the fore wing also it is different from the species described here.

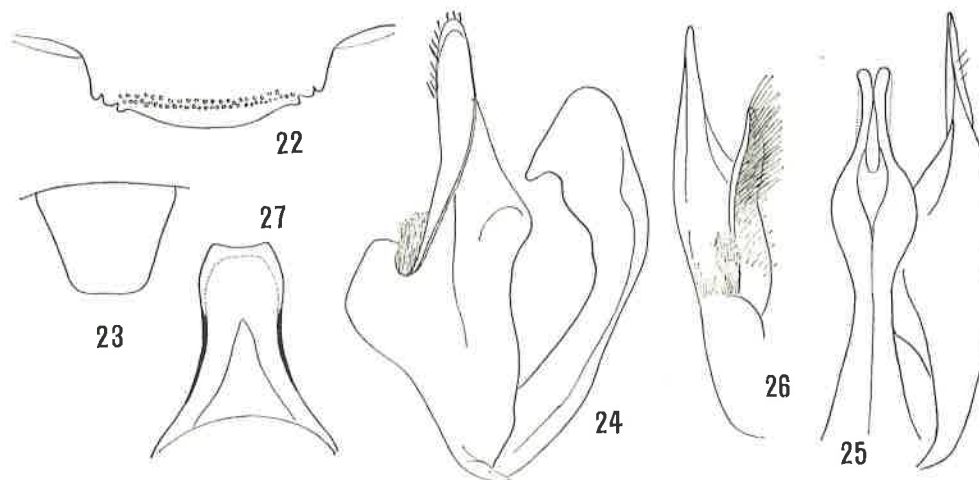
#### 16. *Tachytes formosanus* sp. nov.

This species (represented by ♂) is also quite close in the general appearance to the form of *T. sinensis* occurring in Japan that has the black legs. It differs, however, from the species in having the relatively shorter antennal joints and the differently formed anterior margin of the clypeus. Further, it is separable more easily from it by the presence of the four broader hair bands on the abdomen. Anatomically it has the quite differently formed penis in the genitalia.

♂. Length 14.5 mm. Black with aeneous shade on head and thorax. Mandibles with apex narrowly reddish, a vague spot on its medial area also somewhat reddish, palpi ferrugineous; spines, calcaria and claws in part of legs reddish brown. Wings fairly strongly yellowish, apically paler and slightly infuscated. Pile on lower frons and clypeus deep golden, long and appressed, on other parts of head and thorax-complex long and close, but finer, less suffused in golden, on the disc of mesonotum hairs somewhat short and blackish, on its lateral margins brassy hair bands appear in some light, without having appressed short hairs, propodeum also without the appressed short hairs, thus the sculpture on head and thorax except face and clypeus well visible along the hair direction. Hair bands on abdominal tergites 1-4 silvery, broader than in *sinensis*, narrowly interrupted in middle on tergites 2-4, broadly so on tergite 1; pygidial area covered with silvery short stiff hairs, in some light with pale brassy shine.

Interocular distance on vertex slightly more than half as long as antennal joint 3 (ratio 13 : 22), or as the distance between post-ocellar impression and the line connecting posterior margins

of eyes (13 : 24) (in *sinensis* usually much less, though varied more or less), post-ocellar impression broader, somewhat shallower and more flattened than in *sinensis*, postocelli also narrower than in this. Clypeus with median lobe simply broadly roundly produced at the apex, without the secondary trapeziform protuberance medially as in *sinensis*, with 3 lateral short teeth as usual (Fig. 22). Each antennal joint relatively slightly shorter than in *sinensis*, joint 3 (dorsal view) approximately twice as long as wide at apex, joint 10 just 1.5 times as long as wide, relative length between joints 3, 4 and 5 : 19, 17 and 16.5, subsequent joints progressively reducing in length up to penultimate joint. Scutellum and postscutellum with slight medial impression. Smooth area of propodeum roughly somewhat elongate triangular, in holotype bluntly pointed and in paratype with angles rounded, the surface anteriorly roundly impressed (in holotype smooth and fairly shining, in the other dull) and posteriorly raised and transversely rugulose (in both); posterior inclination longitudinally furrowed from just beneath the smooth area to apex of the segment, the furrow becoming narrower and shallower posteriorly. Pygidial area broad, with apex subtruncate (Fig. 23). Genitalia with penis (aediagus) characteristic in form (Figs. 24 and 25), with paramere externally grooved, the groove apically broadened, occupying whole the width of paramere (Fig. 24), digitus with inside of apical 2/3 closely covered with long pubescence, longer, slightly thicker towards apex (Fig. 26); caudal sternite : Fig. 27.



Figs. 22-27. *Tachytes formosanus* sp. nov., ♂.

22, anterior margin of clypeus. 23, pygidial area. 24-26, genitalia. 24, paramere and penis, lateral view (from outside). 25, ditto, dorsal view. 26, paramere and digitus, lateral view (from inside). 27. 8th sternite of abdomen.

Vertex finely closely covered with medium-sized ill-outlined punctures, intervals microscopically minutely coriaceous. Clypeus on apical inclination of the median lobe sparsely punctured up to the border to apical margin, with intervals as large as punctures, apical margin polished, but not completely smooth. Mesonotum, scutellum, propodeum and mesopleuron closely punctured with fine rounded shallow points, posterior inclination of propodeum obliquely rugoso-punctate on upper area, and obliquely (partly transversely) fairly strongly striate on lower area; sides of the segment duplipunctate with larger sparse and smaller close punctures on posterior half, extreme posterior portion obliquely, ventral margin transversely and shortly rugoso-striate, rest of the area very minutely coriaceous, nearly smooth but dull.

Holotype : ♂, Formosa (Taipei-Hsien : Yangmingshan), 1. VII. 1965, T. Shirozu leg. (Coll. Kyushu Univ.).

Paratype : 1 ♂, the same as the holotype (Coll. Kyushu Univ.).

### 17. *Tachytes modestus* Smith, 1856.

*Tachytes modesta* Smith, Cat. Hym. Ins. Brit. Mus., 4 : 299, 1856.

*Tachytes modesta* : Bingham, Faun. Brit. Ind., Hym. I : 190, 1897.

*Tachytes modesta* : Yano, Icon. Ins. Jap., Ed. I : 276, 1932.

*Tachytes modestus* : Yasumatsu, Mushi, 3 : 32, 1930; Ins. Jap. Ill. Icon., 375, 1939.

*Tachytes modestus* : Tsuneki, Etizenia, 5 : 5, 1965.

*Specimens examined* : 3 ♂♂, Formosa (2 ♂♂, Taipei-Hsien : Yangmingshan, 1. VII. 1965, T. Shirozu leg.; 1 ♂, Natou Hsien : Puli, 25. VI. 1965, T. Shirozu leg.)

*Remarks.* *T. surigensis* Williams (1928) known from the Philippines seems to resemble very closely *T. modestus* Sm. The general feature of the male genitalia is also similar, but according to the figure given by Williams it differs markedly from *modestus* in that the paramere (his clasper) is on the apical portion after bending point very robust and short, not slenderly lengthened as in *modestus*.

### 18. *Tachytes fruticis* Tsuneki, 1964.

*Tachytes fruticis* Tsuneki, Etizenia, 5 : 8, 1964 (♀♂).

*Specimen examined* : 1 ♂, Formosa (Taipei-Hsien : Yangmingshan), 1. VII. 1965, T. Shirozu leg.

*Remarks.* This species has been known from Japan (Honshu, Shikoku and Kyushu) and Korea and is new to the fauna of Formosa. In structure (incl. male genitalia) and coloration the specimen shows almost no difference at all from the Japanese and the Korean representatives.

### 19. ? *Tachysphex japonicus* Iwata, 1933.

*Tachysphex japonicus* Iwata, Trans. Kansai Ent. Soc., 4 : 27, 1933.

*Specimen examined* 1 ♀, Okinawa Is., VI. 1945, G. E. Bohart leg. (head is lacking).

*Remarks.* There is little doubt that the decapitated specimen belongs to the species of *Tachysphex* occurring commonly in Japan.

This species is very close to the two species of *Tachysphex*, *T. bengalensis* Cameron and *T. mindorensis* Williams, both recorded or described by Williams from the Philippines. Externally, however, it can be separated from either of the species by the lack of the small smooth impressed area at the medio-apical portion of the propodeum and internally by the penis valve of the male genitalia having the inner margin stoutly tridentate. The sculpture on the dorsal aspect of the propodeum varies considerably as pointed out in the original description, sometimes showing fine to rough irregular network, sometimes it is obliquely rugoso-striate with irregular cross-striae.

### Notes on *Tachytes auropilosus* Rohwer, 1911

This species described with *Tachytes fundatus* basing upon specimens collected in Nantou Hsien (Puli), Formosa, was a curious species. In the general colour it is quite identical with *Tachytes sinensis purpureipennis* Mats. et Uch. described from Okinawa Is. with a record of Formosa, having the dark brown wings and the reddish yellow antennal scapes and legs. According to the original description it is very curious in that 'the anterior margin of clypeus gently rounded, without teeth; mandibles with the exterior notch almost lacking, the broad basal part rounded off gradually.'

The species having the mandibles without the exterior notch and the clypeus without the lateral teeth on the anterior margin is quite exceptional among the East-Asiatic members of

this genus. Unfortunately no specimen having such characters could be found in the collection examined in the present investigation.

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