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STUDIES ON THE FORMOSAN SPHECIDAE (XIII)
A SUPPLEMENT TO THE SUBFAMILY PEMPHREDONINAE (HYM.)
WITH A KEY TO THE FORMOSAN SPECIES

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A SUPPLEMENT TO THE SUBFAMILY PEMPHREDONINAE (HYM.) WITH A KEY TO THE FORMOSAN SPECIES*

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The material dealt with in the present paper was collected by myself during June 10 and August 31, 1968. Some of the material of the previous report were, however, revised and the result was also included in this paper.

RECORDS AND DESCRIPTIONS

1. *Psen* (*Psen*) *lieftincki nigripennis* ssp. nov.

Psen (*Psen*) *lieftincki lieftincki:* Tsuneki, Etizenia, 24: 1, 1967 (1 ♀, valley of Pempuchi).

As was recorded in my previous paper the Formosan specimen well agreed in characters with *P. lieftincki lieftincki* van Lith, as far as the description was concerned, differing only in 3 points: (1) Body slightly smaller, (2) 2nd recurrent vein received by the 2nd cubital cell, and (3) wings dark fuscous, with a purplish irridescence.

The first two points are considered variable with the individual, but the 3rd must be based on the local variation. To the Formosan representative, therefore, the new subspecific name was given.

Holotype: Nantou Pref. (Pempuchi), 26. VIII. 1966, K. Tsuneki leg.

2. *Psen* (*Psen*) *alishanus* Tsuneki, 1967

Psen (*Psen*) *alishanus* Tsuneki, Etizenia, 24: 3, 1967 (5 ♀ 8 ♂).

Material: 6 ♀ 15 ♂, Chiai Pref. (Mt. Ali, 2400 m), 4. VIII.

Remarks. All the specimens were captured on the same tall tree as that which furnished a number of the members of *Psen* two years before, by using an insect net provided with a long glass fibre pole. The insects came from time to time on the foliage possibly during their leisure flight.

3. *Psen* (*Psen*) *nitidus takasago* Tsuneki, 1967

Psen (*Psen*) *nitidus takasago* Tsuneki, Etizenia, 24: 8, 1967 (1 ♀ 1 ♂).

Material: 1 ♀, Pingtung Pref. (Manchou), 14. VII.

4. *Psen* (*Psen*) *longicornis* Tsuneki, 1967

Psen (*Psen*) *longicornis* Tsuneki, Etizenia, 24: 5, 1967 (4 ♂).

Material: 1 ♂, Chiai Pref. (Mt. Ali, 2400 m), 4. VIII.

Remarks. On reexamining the specimens collected in the first journey I found that one of them had far more reddish legs than in others. In the usual specimens the tibiae are black and slightly brownish towards apex and the tarsi are brown with the underside ferruginous. In the specimen mentioned all the tibiae are reddish brown as well as the following tarsi. As the difference was so marked that I attempted a detailed comparative study with others including the newly collected one. I could not

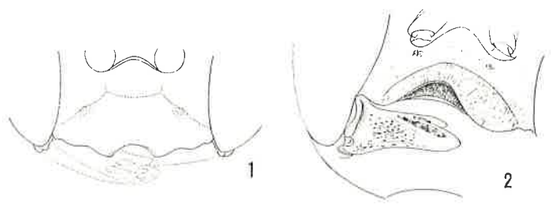
* *Contribution No. 162 from the Biological Laboratory, Fukui University, Japan.*

find, however, any structural distinction between them. The difference was, therefore, considered to be a mere individual variation within the species.

5. *Psen* (*Psen*) *bnun** sp. nov.

The new species is allied to *P.* (*P.*) *ussuriensis tsunekii* Lith, differs therefrom, however, in that the antennal joints are relatively longer, the transverse carina below the insertions of antennae is roundly highly raised and not toothed in the middle and the petiole is relatively somewhat longer.

♂. Length 7.5–9.0 mm. Black with aeneous shine on head and thorax above. Mandibles near apex reddish brown; palpi, tegulae (semitransparent), tibiae at apex and tarsi dark brown, tarsi apically paler; antennal flagellum slightly brownish; tibial spurs pale yellow; wings hyaline, veins and stigma almost black. Pilosity as usual, silver in colour, sternites 3 and 4 at apex in middle with a tuft of long hairs, but not so strong and marked as in *P. u. tsunekii*.



Figs. 1–2. *Psen* (*Psen*) *bnun* sp. nov., ♂.
1: Clypeus and subantennal carina seen in front. 2: Clypeus (and mandible) seen obliquely from beneath, showing the lunate undersurface.

Head seen from above with ocellar area medianly and posteriorly impressed as in *P. u. tsunekii*, with OOD : POD=11 : 9; IOD at vertex and at base of clypeus 36 : 29, transverse carina below antennae: Figs. 1 and 2, clypeus (ditto, in Fig. 2, seen obliquely from beneath) as in the compared species built, anterior margin roundly emarginate in middle and the emarginated part bears a lunate undersurface, mandibles comparatively broad and stout, at base on outer side nearly (only slightly less than) as broad as the length of clypeus in middle; head seen in profile with temple nearly oblong in form and nearly as broad as eye, with occipital carina reaching below the hypostomial carina. Antennal joints 3–6 slightly reducing in length towards apex, 6–13 subequal, joint 3 about 2.6 times as long as broad at apex, joints 1 and 2 glossy, the remaining mat and without tyloidea. Pro- and mesonotum and mesopleuron as in *P. u. tsunekii*, prescutal furrows on mesonotum reach posteriorly about middle of the scutum, propodeum also similar; petiole of abdomen subparallel, markedly constricted at base, about 6.5 times as long as wide towards middle, 5-carinated, one of the carinae strongly runs on the underside in middle, others weaker, forming the edges of the quadrangular (in cross section) petiole. Legs as in the compared species, with no modification and no particular hairing. In fore wing 2nd recurrent vein received by the 2nd cubital cell close to the 2nd transverse cubital vein (in *u. tsunekii* usually by the 3rd cubital cell close to

* *Bnun is one of the tribe names of aboriginates of Taiwan.*

the 2nd t. c. v.).

Punctures on upper frons medium-sized, fairly close, with intervals smaller than punctures, on vertex slightly grosser, very sparse, punctures on mesonotum anteriorly as large as on upper frons and posteriorly as on vertex, intervals always larger than punctures and posteriorly somewhat greater, punctures on posterior marginal area incompletely longitudinally confluent and appear to be somewhat rugoso-striate, scutellum anteriorly somewhat grossly and sparsely, posteriorly closely punctured, mesopleuron finely, very sparsely punctured, area dorsalis on propodeum longitudinally coarsely (sometimes fairly closely) striate, remaining dorsal side at base longitudinally, rather coarsely striate, the striae on posterior portion gradually turning into reticulation, posterior wall very coarsely reticulate, inside of the network uneven, sides of the segment posteriorly obliquely rugoso-striate, anteriorly (together with metapleuron) without sculpture, almost smooth and shining. Abdominal tergites finely and sparsely punctured, the punctures posteriorly somewhat larger.

♀. Unknown.

Holotype: ♂, Chiai Pref. (Mt. Ali, about 2400 m), 4. VIII. 1968, K. Tsuneki leg.
Paratypes: 3 ♂, the same place and time, K. Tsuneki leg.

6. *Psenulus formosicola* Strand, 1915

Psenulus formosicola: Tsuneki, Etizenia, 24: 9, 1967 (25 ♀ 4 ♂).
Psenulus (*Psenulus*) *formosicola:* Haneda, Life Study, 15: 31, 1971 (1 ♀).
Material: 12 ♀ 3 ♂, Chiai Pref. (Kuanghua, 1300 m), 1, 2, 6, 7. VIII.

7. *Psenulus ornatus pempuchiensis* ssp. nov.

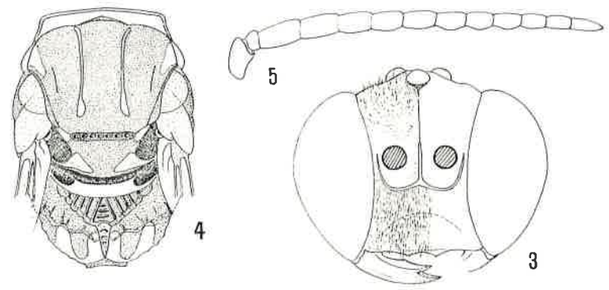
According to the descriptions of *Psenulus*-species of S. E. Asia the specimen before me is closest to *P. tristis* Lith and *P. elegans* Lith (the former is known from Palawan and the latter from West Java — differences between both of which are very slight — and my specimen also very slightly differs from either of them in maculation, as far as the descriptions go.

About 10 species (including several subspecies) of the so-called *interstitialis*-group of *Psenulus* have so far been described from S. E. Asia, with their difference lying mainly in maculation. Because of scanty of the material there has been no investigation on their variation in maculation. The same is also the case when the slight difference in structure or in punctuation has been taken into consideration. According to the standard of other groups of Sphecidae many of the *interstitialis*-group of *Psenulus*, if not all, as far as the descriptions go, seem to be conspecific. In the present paper I provisionally placed at least *P. tristis* and *elegans* under the specific category of *P. ornatus* Ritsema (the earliest name of the group) and allocated the Formosan form on the same level as theirs (as formerly done by Strand).

From Formosa a local race of this species of *Psenulus*, namely, *P. ornatus kankauensis* Strand, 1915, based on a male specimen from Kankau (=Koshun, = Hengchun) has been known, which, according to the original description, differs from *ornatus* s. str. in the form of the 3rd cubital cell (kostalwärts nur ganz wenig verschmälert und die dritte Kubitalquerader in Uebereinstimmung damit wenig gekümmt und wenig schräg) and in the colour of the legs (die Beine I–II sind gelb, nur die Hinterseite der Femoren II ist dunkel, am III. Paar ist die Basis der Coxen schwarz, letztere sonst gelb, diese

Beine sonst braungelblich mit dunklerer Vorderseite der Femora und dunkleren Tarsen).

My specimen from Central Formosa differs from *P. o. kankauensis* in the form of the 3rd cubital cell and in maculation. The yellow maculation of my specimen on the dorsal side of the thorax-complex is as given in Fig. 4 (mesonotum not with '4 gelbe Flecke') and on the lateral sides a small mark behind humeral tubercle and 3 contiguous small spots below base of hind wing only are present.



Figs. 3–5. *Psenulus ornatus pempuchiensis* ssp. nov., ♂.
3: Head seen in front. 4: Thorax-complex showing the maculation.
5: Antenna.

♂. Length 8.5 mm. Head wholly black as usual in the group, with appendages coloured as follows: Yellow are mandibles except the tip, antennal joint 1 wholly, 2–13 beneath (somewhat ferruginous and slightly darker towards apex) and palpi (very slightly ferruginous). Legs as given by Strand except that fore femora also with a lengthened brownish macula on posterior side. Petiole semitransparent ambur yellow, its sides on posterior half black and this black is widened posteriorly but not contiguous to each other, rest of the abdomen yellowish red, only the underside posteriorly somewhat darkened.

OOD : POD = 10 : 6, width of postocellus relatively 5, IOD at vertex (across postocelli) and at lower margins of antennal sockets (minimum IOD) relatively 33 : 22, frontal carina from anterior ocellus down to interantennal carina distinct, this carina very high, plate-like, not enlarged on top and at upper end suddenly perpendicularly declined, the transverse subantennal carina also strong and high (Fig. 3), clypeus and mandible: Fig. 3. Head seen in profile with temple 2/3 the width of eye, with occipital carina strong and high, accompanied by a coarsely crenated furrow, the carina on lower end meeting with the hypostomial carina at an angle of about 120°. Antenna: Fig. 5, joint 3 with underside gently curved and broadest before apex, seen from the narrowest black side 2.4 times, from the broadest side just twice, as long as wide at apex, subsequent joints beneath also roundly swollen, but not provided with tyloidea. On mesonotum prescutal furrows reach posteriorly almost a third of scutum, sculpture of propodeum as given in Fig. 4, petiole distinctly broadened posteriorly, approximately twice as broad at apex as at base and about as long as hind trochanter and femur combined, it seems to be a rounded triangle in cross section, with one of the arcs on top; the depression at base of sternite 2 markedly deep, but suddenly shallowed posteriorly with the posterior margin not distinctly outlined.

Punctunes on upper frons fine and close, on vertex slightly larger and sparse, on mesonotum medium-sized, mixed with somewhat smaller ones, puncture-intervals overall greater than punctures, scuto-scutellar furrow crenate; propodeum on posterior wall and sides coarsely reticulate, the sculpture on the sides slightly smaller; abdomen except petiole covered with very fine hair bearing-points, on sternite 2 the points somewhat large and distinct.

♀, unknown.

Holotype: ♂, Nantou Pref. (Pempuchi), 26. VIII. 1968, K. Tsuneki leg.

8. *Stigmus* (*Carinostigmus*) *formosanus* Tsuneki, 1954

Stigmus (*Carinostigmus*) *formosanus* Tsuneki, Mem. Fac. Lib. Arts, Fukui Univ. II, 3 (1): 19, 1954 (1 ♀ 1 ♂).
Stigmus (*Carinostigmus*) *taiwanensis* Tsuneki, Etizenia, 14: 15, 1966 (1 ♀) (SYN. NOV.).
Stigmus (*Carinostigmus*) *formosanus:* Tsuneki, Etizenia, 24: 9, 1967 (7 ♀ 2 ♂.)
Stigmus (*Carinostigmus*) *formosanus*: Haneda, Life Study, 15: 31, 1971 (3 ♀).

Material: 8 ♀ 1 ♂, Chiai Pref. (Kuanghua), 1, 2, 6, 7. VIII. 1968.

Remarks. As was pointed out when I described *S.* (*C.*) *taiwanensis* this species has the characters very close to the description of *S.* (*C.*) *formosanus* and now the former is considered to be a form of the latter. Because of the fact that there could be no specimen found that strictly agreed with *S. formosanus* among many of the material collected by me and by other entomologists since the publication of this species I carefully reexamined the specimens of *S. taiwanensis* at hand (the type of *formosanus* is at present in Hokkaido University) and arrived at the conclusion that *S. taiwanensis* was a synonym of *S. formosanus*. Because the characters of *taiwanensis* that were considered at the moment of writing to be sufficient enough to separate the two at the specific rank were discovered to be considerably variable and in some cases, though separately, markedly approached those of *S. formosanus*: (1) Frontal striation in degrees of strength considerably variable, in some specimens well-defined, (2) frontal carina sometimes defined just in front of anterior ocellus, though shortly interrupted before this, (3) ratio of OOD : POD also not strictly constant, sometimes 2.7 : 1, 2.5 : 1 and 2.3 : 1, therefore 3 : 1 and 2 : 1 were considered to represent both extremities, (4) 'petiole of abdomen without striae' was good, though not polished except the posterior portion, (5) sculpture of propodeum considerably varied, the detailed feature of the striation could not be used for the separation of the species (general trend only could be used).

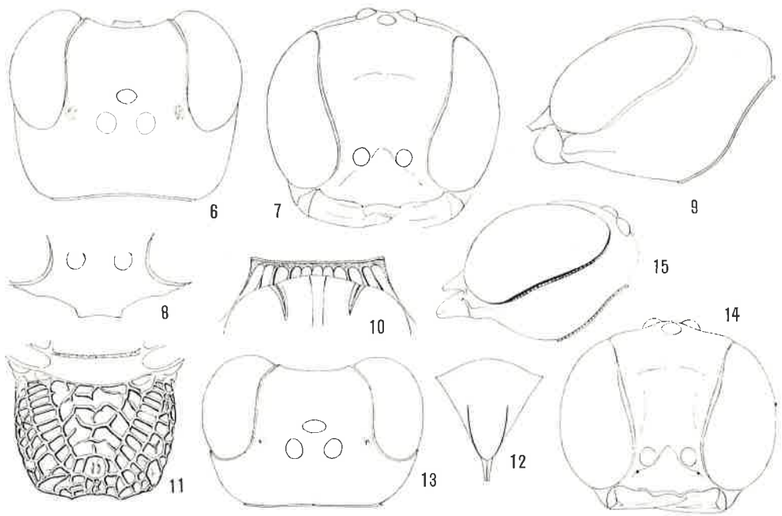
The specimens of my second journey were all collected at the half broken house at Kansitaku (Kuanghua), frequently spoken of in my previous papers.

9. *Stigmus* (*Stigmus*) *kansitakuanus* sp. nov.

In the body size and in the general appearance this species resembles *S. quadriceps* m. of Japan, differs from this, however, in that (1) mandibles not yellow, but ferruginous brown or ferruginous red, (2) temples less developed, (3) propodeum wholly mat as in many species of *Lestica* (Crabroninae), (4) antennal joints shorter, (5) mesopleural furrows much less robust and in ♀ clypeus more strongly produced in middle.

♀. Length 4.2–5.0 mm. Black and shining, but propodeum mat and mesonotum in some light with an aeneous or rather irridescent shine, palpi pale ferruginous, mandibles

except apex, antennae (above apically darker), tegulae of wings, greater part of trochanters, base and apex of femora, fore and middle tibiae, base of hind tibiae broadly and apex, and all tarsi wholly ferruginous red to ferruginous reddish brown; wings hyaline, stigma nearly black, veins pale brown, sometimes clypeus in middle apically slightly brownish. Lower frons and sides of clypeus moderately closely covered with very fine, pale yellowish pubescence, clypeus in middle sparsely covered with similar-coloured long hairs, a stripe of yellowish pubescence on inner margin of hind tibiae present, a similar but very narrow line of pubescence on fore tibiae also defined.



Figs. 6–15. *Stigmus* (*Stigmus*) *kansitakuanus* sp. nov., 6–12, ♀; 13–15, ♂. 6, 13: Head seen from above. 7, 14: Head seen in front. 8: Clypeus seen vertically. 9, 15: Head seen in profile. 10: Pronotum. 11: Propodeum. 12: Pygidial area.

Head seen from above subquadrate (Fig. 6), with eyes distinctly longer than temples, OOD : POD ≒ 2 : 1, POD equaling to the width of postocellus, opaque areas small, consisted of some short striae, located on oculocellar line close to the eyes, ocelli in a slightly low isosceles triangle, anterior ocellus smaller than the posterior, frontal furrow fine and weak on upper frons, anteriorly deeper, broader and distinct, but on lower frons completely lacking, frontal spine unobservable; head seen in front: Fig. 7, lower frontal area broadly concave and clypeus raised towards apex, clypeus as in Fig. 7, seen vertically: Fig. 8, labrum subrectangular (in Fig. 7, shown by dotted lines), mandibles tridentate at apex, OAD ≒ WAS < IAD; head seen in profile (Fig. 9) with temple broadened below and then roundly narrowed towards base of mandible, occipital carina attaining to the widest end of the temple, not to the hypostomial carina. Antennal joints 2–5 subequal in length, intersegmental area and at base beneath of the joints semitransparent membraneous and appear to be excavated, each joint slightly longer than

wide. Collar of pronotum (Fig. 10) with anterior margin strongly carinated and gently roundly curved backwards, with lateral margins nearly straight and also carinated, the carinae posteriorly finer and weaker, it is in middle less than as long as the width of median ocellus and longitudinally coarsely striate, on mesonotum prescutal furrows broad and deep, but promptly narrowed and shallowed posteriorly, disappearing before reaching a third of the scutum, parapsidal furrows distinct, the prescutellar furrows coarsely foveolate, postscutellar furrow not foveolate, narrowed in middle, on mesopleuron central area distinctly enclosed by three furrows (scrobal, epicnemial and the third furrows), each furrow coarsely foveolate, but narrower than in *S. quadriceps* and the enclosed area longitudinally longer than in this, posterior margin of the pleuron also narrowly and less deeply furrowed and crenulate; propodeum: Fig. 11, petiole with lateral margins divergent posteriorly, in lateral view curved upwards, slightly less than as long as hind metatarsus, pygidial area: Fig. 12; legs normal, hind tibia with two strong spines on outer side, equidistant from both ends and from each other; wing venation normal.

Lower frons in middle broadly, minutely coriaceous, half mat, its sides and lateral areas of clypeus also mat, due to dense fine pile pits, clypeus sparsely, upper frons and vertex finely and very sparsely punctured, mesonotum and scutellum very sparsely scattered with somewhat larger punctures, posterior portion of the former very weakly longitudinally striate, but the striation not distinct, the ground surface partly very weakly microstriate, on mesopleuron hypoepimeral area longitudinally closely striate, other portions of episternum finelly, sparsely punctured, but posteriorly longitudinally, closely, not strongly striate, metapleuron half mat, sculpture of propodeum: Fig. 11, sides obliquely and strongly striate, half mat, the striae anteriorly finer and closer, petiole on median, narrow, inverted-triangular area microgranulate, mat, remaining portions except the glittering underside longitudinally coarsely rugoso-striate; abdomen smooth and polished except opaque pygidial area which is under high power longitudinally striate-coriaceous.

♂. Length 4 mm or so, similar to the female. Mandibles blackish, only near apex ferruginous; clypeus covered with silvery hairs, the hairs not so dense as in allied species. Head seen from above: Fig. 13, seen in front: Fig, 14, seen in profile: Fig. 15, in form slightly different from ♀. Antennal joint 3 about 1.3 times, 4 about 1.5 times as long as wide at apex; petiole nearly as long as hind femur, longer than hind metatarsus, the microstriae on mesonotum and scutellum slightly more distinct and the sculpture on propodeum somewhat finer.

Holotype: ♀, Chiai Pref. (Kansitaku or Kuanghua), 6. VIII. 1968, K. Tsuneki leg.

Paratypes: 29 ♀ 12 ♂, the same place and time, K. Tsuneki leg.

Remarks. This curious species was nesting in the timbers and bamboo poles of the half broken house mentioned earlier and was abundantly captured.

10. *Stigmus* (*Stigmus*) *shirozui alishanus* ssp. nov.

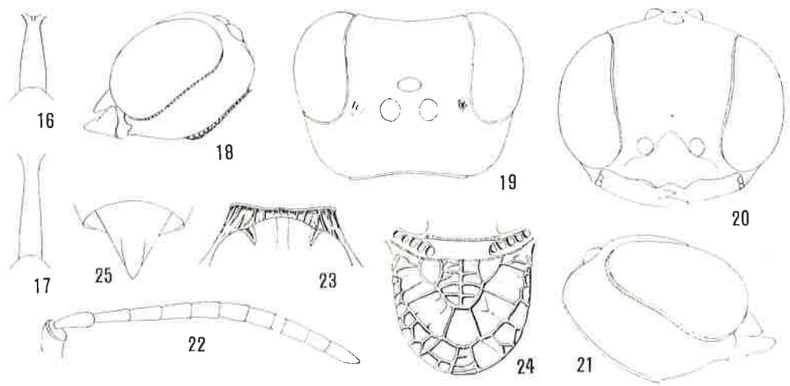
The male of the new species differs from the nominate race (♂) from the Ryukyus in that (1) legs (mainly tibiae) more broadly darker, (2) petiole slenderer and relatively much longer, (3) clypeus with medial part more strongly convex, and (4) antennal joint 3 shorter than joint 4 (in *shirozui* both the joints equal in length).

♂, Length 2.7–3.5 mm. Black and shining; posterior half of humeral tubercles

and a spot on wing tegulae yellow; ferruginous are palpi, mandibles except reddish brown apex, antennal joints 1–5 wholly, 6–13 beneath (apically slightly darkened, first pale brown, then gradually darker), tegulae (transparent), base of wings, fore and middle legs except base of coxae and outside of femora (dark brown), and hind legs except greater part of upper side of coxae, femora nearly wholly and apical 2/3 of tibiae (these parts glittering brownish black); wings hyaline, stigma brownish black, veins ferruginous. Petiole in most specimens as long as hind femur, sometimes even somewhat longer, slightly divergent towards apex, as a whole rather slender (in thickness nearly as in hind femur, 3.2–3.6 times as long as wide at apex; in *shirozui* s. str. rather robust, distinctly thicker than hind femur and 2.5 times as long as wide at apex, see Figs. 16 and 17) and longitudinally striate (sometimes regularly and coarsely, but sometimes irregularly, rugosely and closely). Antennal joints 4–13 relatively slightly longer than in the typical race and the flagellum not semitransparent (in *shirozui* s. str. semitransparent ambur yellow). Clypeus without silvery pile as in the typical race.

Some supplementary descriptions on S. (S.) shirozui *and its subspecies* (♂):

OOD : POD ≒ 2 : 1, width of postocellus greater than POD, opaque areas on OOL, formed of a few short, close and fine striae, smaller than fore ocellus, OAD > WAS, OAD ≒ 1/2 IAD; IOD at vertex and at base of clypeus ≒ 3 : 2; prescutal furrows broad but short, reaching posteriorly only a fourth of the scutum. Vertex impunctate, mesonotum with aeneous shine (in *shirozui alishanus* more weakly so), with feeble microstriae and impunctate, scutellum with a few distinct punctures scattered and medianly with a longitudinal impressed line, on mesopleuron hypoepimeral area longitudinally, finely and closely striate, the enclosed triangular area longer than high, anteriorly finely closely striate, remaining part and other episternal area polished, propodeum as in Fig. 24, sides of the segment on posterior half coarsely reticulate, anteriormost part polished and the intermediate part obliquely finely striate. Head seen



Figs. 16–25. 16: *Stigmus* (*Stigmus*) *shirozui shirozui* Tsuneki, ♂.
17–25: *Stigmus* (*Stigmus*) *shirozui alishanus* ssp. nov., 17–18, ♂; others ♀.
16, 17: Petiole of abdomen. 18, 21: Head seen in profile. 19: Head seen from above. 20: Head seen in front. 22: Antenna. 23: Collar of pronotum. 24: Propodeum. 25: Pygidial area.

in profile with eye markedly large, larger than in the other allied species (Fig. 18).

♀. Similar to ♂, but slightly larger, 3.2–4.0 mm; coloration also generally similar, but antennae above on apical portion much darker, humeral tubercles sometimes ferruginous (usually whitish yellow on posterior half), with a lunate yellow spot; femora of fore and middle legs more broadly dark brown.

Head seen from above (Fig. 19) with temples less strongly roundly convergent posteriorly, temple shorter than eye, opaque area on the oculocellar line, close to the eye, consisted of a few short, close and fine striae, nearly as large as median ocellus, OOD : POD = 6 : 2.5, POD as great in width as postocellus, IOD at vertex (across the median ocellus) and at base of clypeus relatively 17 : 14 (≒6 : 5), OAD : WAS : IAD = 2.5 : 2 : 5, clypeus as in Fig. 20, median part gently roundly raised and apical toothed area somewhat distinctly reflected, head in profile: Fig. 21, antenna: Fig. 22, joint 3 approximately 2.3 times, joint 4 twice as long as wide at apex, collar of pronotum: Fig. 23, anterior carina very distinct and high, on mesonotum prescutal furrows broad and short, hardly as long as a fourth of the scutum, mesopleuron with the enclosed area distinctly marked off by the crenate furrows, propodeum: Fig. 24, petiole as in ♂, pygidial area: Fig. 25; legs and wing venation normal, hind tibiae with two short spines, not so strong, but similarly located as in *S. kansitakuanus*.

Lower frons medianly broadly microsculptured, half mat, its sides and lateral areas of clypeus densely covered with pile-bearing fine points, middle part of clypeus sparsely scattered with distinct punctures, vertex practically impunctate, temples sparsely finely punctured, mesonotum and scutellum as in ♂, sometimes with very weak sparse punctures, prescutellar furrow closely foveolate, postscutellar furrow not crenate, on mesopleuron the enclosed triangular area more broadly, longitudinally striate than in ♂. Abdomen except petiole practically impunctate, pygidial area smooth and polished.

Holotype: ♀, Chiai Pref. (Kansitaku, now Kuanghua), 2. VIII. 1968, K. Tsuneki leg.

Paratypes: 50 ♀ 50 ♂, the same place, 1, 2, 6, 7. VIII. 1968, K. Tsuneki leg.

Other specimens: 38 ♀ 80 ♂, ditto.

Remarks. The form of the head seen from above is more or less varied in both sexes according to the size of the specimen. In general in the larger specimens the temples are well developed and the convergence towards the occiput is weaker than in the smaller. The form of the anterior margin of the clypeus in the male also somewhat varied with the individual. Colour of the antennae is considerably variable, usually the ground colour is opaque ferruginous, sometimes, however, semitransparent and the range of the blackish part is also changeable to a certain extent.

11. *Stigmus* (*Stigmus*) *convergens ami** ssp. nov.

The new subspecies differs from the typical race in Japan in the following points: (1) On an average head less strongly convergent backwards, (2) petiole relatively longer, (3) punctures on head and mesonotum in ♂ usually lacking and in ♀ on head lacking and on mesonotum very much sparser. This subspecies is also similar to the preceding subspecies of *T. shirozui*, but can easily be separable therefrom in the male by the presence of silvery pubescence on the clypeus and in the female by the sculpture of the mesopleuron and the pygidial area.

* One of the tribe names of the aboriginates of Taiwan.

♀. Length about 4 mm, mesonotum broadly with aeneous shine; mandibles except apex, palpi, humeral tubercles on posterior half, anterior and inner parts of wing-tegulae, basal portion of costa of fore wings and basal portion of subcosta of hind wings lemon yellow; antennal joints 1, 2 and 3 ferruginous, above brown to pale brown, remaining joints above brownish black, beneath deep brown and each joint apically slightly paler; blackish parts of legs less brownish than in the typical race, only the end joints of tarsi brownish.

As to the struckture and sculpture the difference from *S. shirozui alishanus* will mainly be described. Head seen from above with temples distincly longer, clypeus slightly more strongly produced anteriorly, head in profile with posterior lower angle less broad; antenna slightly more robustly built, joints 2 and 12 especially so, and generally more strongly glittering (with less abundant pile), joint 3 slightly shorter than 4, 4 shorter than 2, ocellar disposition and opaque areas similar. Collar of pronotum with the carina on anterior margin weaker, laterally curved backwards (in *shirozui* stronger and curved forwards), the enclosed area of mesopleuron slightly shorter, with surface almost wholly polished and enclosing furrows narrower, shallower and more finely and weakly crenulate; propodeum with sculpture coarser, with striae weaker, the sides posteriorly rugoso-reticulate and on central and anterior portions almost smooth and shining. Petiole as in the compared species, in the specimens longitudinally, finely, closely and regularly striate except along median line, end tergite including pygidial area longitudinally microcoriaceously striate.

♂. Length about 4 mm. Coloration simlar to ♀, except that humeral tubercles ivory white and a spot only on tegulae yellow. Antennae in one of the specimens from joint 3 apically slightly darker, but not black. Clypeus and sides of lower frons densely covered with silvery pubescence. Head seen from above slightly more strongly convergent than in *s. alishanus*, but on the average less so than in the typical race. POD = width of postocellus = 1/2 OOD, seen in front WAS > OAD = 1/2 IAD, length relation of antennal joints similar to ♀, but the joints more closely pubescent, collar of pronotum with anterior margin more strongly carinate than in ♀, enclosed area of mesopleuron in form, states of the furrows and surface as in ♀. Sculptnre of propodeum generally similar to that of ♀, but the striae slightly more distinct and abundant, but not so as in *S. s. alishanus*.

Holotype: ♀, Chiai Pref. (Kansitaku), 7. VIII. 1968, K. Tsuneki leg.

Paratypes: 2 ♀ 4 ♂, the same place, 1, 2, 6, 7. VIII. 1968, K. Tsuneki leg.

Remarks. Among the great number of the specimens of the previous species I could have found only the 7 examples of this species above listed. Possibly they are rare in Formosa.

The genus *Taialia**, gen. nov.

Belonging to Pemphredonini and most closely allied to the Australian genus *Harpactophilus* (F. Smith) Kohl, differs from it in the venation of fore and hind wings and in the presence of the distinct pygidial area in the female.

Genotype: *Taialia formosana* sp. nov.

Generic characters (based on the female only): Fore wing with two cubital and one discoidal cell, discoidal vein received by the 1st cubital cell near its end, 2nd cubital

* Taial is one of the tribe names of the aboriginates of Taiwan.

cell not petiolated, radial cell with apex pointed and without accessory cell, cubital cell of hind wing originated just at the apical corner of the anal (submedial) cell; abdomen sessile, with pygidial area in the female; sternite 2 with a transverse groove before middle; occipital carina lacking, eye not reaching below the base of mandible, palpi fine and markedly short, about half the length of mandible, antennal hollow half protruded into the lateral area of the clypeus, on mesopleuron epicnemial area present, distinctly marked off by the carina, no further furrow on episternum; middle coxae when in repose contiguous to each other, hind tibiae without spine, but covered with short, somewhat stiff hairs.

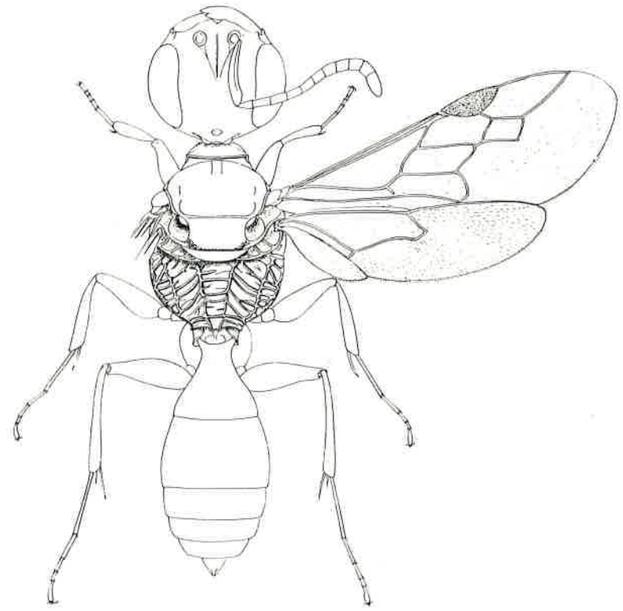


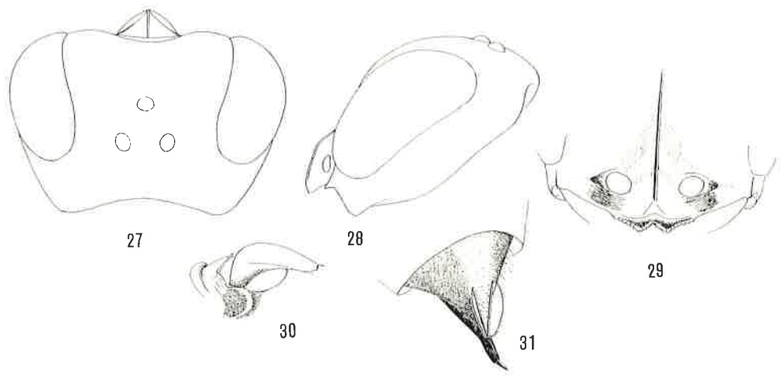
Fig. 26. *Taialia formosana*, sp. nov., ♀. General appearance.

12. *Taialia formosana* sp. nov.

♀. Length 4.0–5.0 mm. Black and fairly shining, head and thorax, however, not polished. Ferruginous yellow: Mandibles except reddish brown apex, palpi, antennae wholly except the dark brown apical half of the ultimate joint, wingtegulae and whole the legs except brownish tips of all tarsi. Humeral tubercles with posterior half ivory white and anterior half dark brown, tip of abdomen more or less brownish. Body sparsely covered with short pale brown hairs, ocellar area with a few long hairs and the medial part of clypeus anteriorly with a row of long hairs, end segment of abdomen and posterior margin of sternites with somewhat close and long hairs.

General appearance of the insect: Fig. 26. Head from above: Fig. 27, upper frons

gently roundly inclined anteriorly, without the angulated border between this and the lower frons, ocelli in an equilateral triangle, the anterior slightly smaller than the posterior, occiput suddenly perpendicularly inclined, forming a transverse obtuse edge at the posterior margin of vertex, OOD : POD : OCD = 12 : 7 : 14, width of postocellus relatively 4, frontal median furrow very weak and indistinct; head seen in front as in Fig. 26, inner orbits subparallel, very slightly divergent below, structure of lower part of face (Fig. 29) is considerably similar to that of the genus *Spilomena*, medial part of clypeus and interantennal area longitudinally raised as a mass, the former bluntly and the latter acutely and strongly carinated on top, the raised area reaches far above the base of antennae and gradually lowered, leaving the carina alone distinct which attains about half the length to the anterior ocellus, lateral areas of lower frons gently roundly elevated sideways, forming an oblique, upwards converging broad furrow between inner orbit and the medial elevation, the furrows are used to receive the scapes of antennae; mandibles bidentate at apex, anterior margin of the medial part of clypeus bluntly bidentate, the margin very minutely serrate (Fig. 29); head seen in profile: Fig. 28, with occipital margin parallel with outer orbit, with the temple far narrower than eye, without the occipital carina. Antennae simple, comparatively shoat, total length of flagellum (joints 2–12) about 1.8 times as long as joint 1, joint 1 approximately as long as mandible, joints 2 and 3 subequal in length, joint 3 about 1.5 times as long as wide at apex, from joint 3 till penultimate joint by degrees reducing in length, joint 9 as long as wide, ultimate joint twice as long as wide at base and rounded at apex (in Fig. 26). Pronotum (Fig. 26) far depressed below level of mesonotum (Fig. 30), collar very short, with the anterior carinated margin in middle almost in touch with the mesonotum, mesonotum anteriorly first roundly and then perpendicularly inclined (Fig. 30), with prescutal sutures in two fine paralleling weak carinae, posterior margin acutely carinate (not grooved as in *Stigmus*), owing to the transverse groove in front and prescutellar furrow behind, the furrow and postscutellar furrow not crenate, lateral impression of postscutellum very coarsely costate (as given in Fig. 26); meso-



Figs. 27–31. *Taialia formosana* sp. nov., ♀.
27: Head seen from above. 28: Head seen in profile. 29: Clypeus.
30: Pro- and mesonotum in lateral view. 31: End segment of abdomen, showing pygidial area.

pleuron markedly swollen, with only the coarsely crenated epicnemial furrow just behind epicnemial carina, epicnemium margined below by a fine groove which is connected with the acetabular suture deep inside of the obliquely inclined anterior aspect of mesosternum, episternal scrobe distinct, metapleuron obliquely depressed; on propodeum area dorsalis broad, occupying the greater part of the dorsal aspect, distinctly enclosed by a carina and at the medio-basal part with the other small enclosed area (in a view this small area is considered as area dorsalis) (Fig. 26), seen from the side the dorsal and posterior aspects forming respectively a straight line and making an angle of about 110° in between, the posterior line slightly longer; abdomen (in Fig. 26) not long, pyidgial area on caudal tergite seen obliquely from above: Fig. 31, posterior portion alone margined by the carinae and the carinae are accompanied with a transparent colourless lamella which is adorned by a fringe of short pubescence. Abdominal sternite 2 with a very marked transverse furrow slightly in front of the middle. The form of the legs as in the members of *Stigmus*, all tarsi slender and all metatarsi longer than the following joints united (in Fig. 26). Venation of wings as given in Fig. 26, it is marked that the wings are covered with short distinct hairs and the outer margin is fringed with short hairs, somewhat similar to the case of some Cynipoidea.

Head and thorax very delicately microcoriaceous and further finely, very sparsely punctured, on lower frons except the sides without puncture, median part of clypeus behind the anterior margin with a row of slightly larger punctures, mesonotum somewhat more distinctly microcoriaceous and less glossy than on vertex, punctules on the central area much sparser, on peripheral areas intervals 3–5 times as large as punctures, on mesopleuron the microsculpture much weaker and the punctules more remotely separated, with the surface more shining; dorsal aspect of propodeum as given in Fig. 26 sculptured, posterior aspect above longitudinally, somewhat arcuately, finely closely striate and partly reticulate, below transversely, somewhat coarsely striate, sides obliquely, not strongly, moderately closely and somewhat irregularly striate, the striae reach the posterior margin of metapleuron, without polished area in front; abdominal sternites smooth and polished, with very sparse fine punctules on posterior sternites, but sternite 2 posteriorly somewhat more closely, finely punctured, punctures on sternite 6 slightly larger and closer.

♂. Unknown.

Holotype: ♀, Chiai Pref. (Kansitaku), 1. VIII. 1968, K. Tsuneki leg.

Paratypes: 3 ♀, the same place, 2, 6 and 7. VIII. 1968, K. Tsuneki leg.

Remarks. The specimens were also the inhabitants of the half broken house at the roadside in the wood of Kansitaku or Kuanghua.

13. *Passaloecus formosus* Tsuneki, 1967

Passaloecus formosus Tsuneki, Etizenia, 24: 10, 1967 (1 ♀).

Material: 2 ♀, Chiai Pref. (Kansitaku), 6, 7. VIII.

Remarks. The specimens were captured on the leaves of a herbaceous plant of the Chrysanthemum growing by the side of the broken house, possibly when they came to hunt the aphides parasitic upon it. They were about 4.0 and 5.0 mm in length.

14. *Passaloecus alishanus* sp. nov.

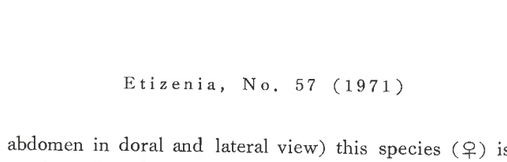
In the general appearance (with head seen from above and in front, with mesonotum,

scutellum and abdomen in doral and lateral view) this species (♀) is very similar to the preceding species. But the upper frons on each side of the medial furrow more strongly raised and the punctuation on upper frons and abdomen and the sculpture of propodeum are remarkably dissimilar and the legs are slightly darker in colour.

♀. Length about 3.5 mm. Black, head and abdomen more or less shining, thorax half opaque; antennal joint 1 in front and 2 beneath and fore tibiae in front yellow; humeral tubercles ivory white, mandibles at apex, flagellum beneath, posterior margin of wing tegulae, articulations of legs, fore tibiae on inner side, fore and middle tarsi (above dark) and hind tibiae at base dark brown. Wings hyaline, stigma dark- and veins light-brown.

Locations of ocelli and of antennal hollow similar to those of *formosus;* difference in structure of upper frons easily defined when seen obliquely from behind (Fig. 32, cf. Fig. 33) and seen in profile (Fig. 34, cf. Fig. 35).

Difference in sculpture of propodeum: In *formosus* medial region of dorsal aspect moderately closely and irregularly reticulate, lateral areas obliquely striate, density of the striae more or less varied with the specimen; in *alishanus* the same sculpture is observed only on anterior half, posterior half transversely, finely and closely striate; on posterior aspect in *formosus* greater part microcoriaceous and lateral and lower areas alone coarsely reticulate, while in *alishanus* greater part corasely reticulate and comparatively narrow upper medial area transversely, finely and closely rugoso-striate; on the sides in *formosus* posteriorly and upwards coarsely reticulate and remaining area obliquely, comparatively coarsely striate, in *alishanus* posteriorly and upwards rather longitudinally rugoso-striate, remaining area finely, closely striate, the striae finer forwards.



Figs. 32–35. 32 and 34: *Passaloecus alishanus* sp. nov., ♀. 33 and 35: *Passaloecus formosus* Tsuneki, ♀.
32, 33: Upper frons seen obliquely (from backward) from above.
34, 35: Head seen in profile, showing the difference on upper frons.

Punctuation on upper frons and vertex in *formosus* medianly closely and laterally somewhat sparsely, uniformly punctured, punctures connected with each other by very fine impressed lines, in *alishanus* the areas medianly very finely, laterally rather grossly, both closely punctured, with similar fine, connecting lines, but the lines are so short as to become indistinct, only in front of anterior ocellus punctures sparser, weaker and the reticulate sculpture by the fine impressed lines, though feebly, defined. On abdomen in *formosus* the surface practically impunctate, only covered with the hair-bearing fine points, in *alishanus* besides such hair points, very distinct medium-sized punctures on posterior half of each tergite defined, only on the roundly elevated area of tergite 1 puncture lacking, the surface very weakly microcoriaceous and shining.

Clypeus on anterior margin medianly straight and laterally with a stout semielliptic flattened tooth produced anteriorly as in *formosus* and similarly with a rectangular labrum; mandibles thick and robust as in this.

Holotype: ♀, Chiai Pref. (Kansitaku), 6. VIII. 1968, K. Tsuneki leg.

Remarks. The specimen was captured with the preceding species. Among the Japanese representatives *P. abnormis* Kohl is one of the close relatives of this species.

KEY TO THE FORMOSAN SPECIES OF PEMPHREDONINAE

1 Three cubital cells in fore wing, antennae inserted fairly high above the base of clypeus, abdomen always petiolated ..... tribe Psenini 2
– Two cubital cells in fore wing, antennae inserted at the upper margin of clypeus, abdomen petiolated or sessile ..... tribe Pemphredonini 22
2 Face with a tubercle between bases of antennae or a transverse carina connecting the lower margins of the antennal sockets, cubital vein of hind wing arises beyond the end of anal cell ..... genus *Psen* Latreille 3
– Face with a transverse carina some distance below antennal bases, interantennal carina present and high, usually with a lobiform enlargement on top, sometimes without, cubital cell of hind wing arises before the end of anal cell ..... genus *Psenulus* Kohl 18
3 Apical margin of abdominal tergites 3–6 at least with a fringe of long curved blackish hairs, wings strongly clouded (pygidial area very finely regularly coriaceous, with a row of gross punctures along lateral margins, body wholly black, pubescence on clypeus and lower frons silvery), 14–15 mm, ♂ unknown ***Psen* (*Psen*) *lieftincki nigripennis* Tsuneki, 1971**
– Abdominal tergites without fringes of long hairs, wings not so strongly clouded, less than 13 mm in length 4
4 Abdominal petiole above coarsely punctate or rugoso-punctate, ♂ with fore and mid metatarsi more or less modified, ♀ with petiole carinated on each side only, pygidial area smooth and polished with a row of medium-sized punctures along lateral margins, length about 10 mm
***Psen* (*Psen*)* *exaratus taiwanus* Tsuneki, 1966**
– Abdominal petiole above smooth and polished 5
5 ♀ (with pygidial area, antennae 12-jointed) 6
– ♂ (without pygidial area, but with a spine at apex of abdomen, antennae 13-jointed) 12
6 Mandibles markedly broad and stoutly built (pygidial area polished) 7
– Mandibles normal, not particularly broad 8
7 (Possibly the legs largely ferruginous)
***Psen* (*Psen*) *shirozui* Tsuneki, 1966**
– (Possibly the legs largely blackened, somewhat brownish
***Psen* (*Psen*) *bnun* Tsuneki, 1971**
8 Pygidial area wholly or largely smooth and polished, at least mesonotum

* Van Lith used (*Punctipsen*).

with plumbeous shine 9

– Pygidial area finely coriaceous, dull and opaque, with more or less punctures 10

9 Tarsi of legs ferruginous, antennae dark brown, joint 3 about 2.7 times as long as wide at apex (vertex and mesopleuron also with a plumbeous shine, large species — 13 mm —, mesonotum coarsely, moderately closely punctured, pygidial area nearly wholly polished, with a few large punctures along lateral margin) ***Psen* (*Psen*) *koreanus formosensis* Tsuneki, 1965**

– Tarsi of legs only on apical portion ferruginous, antennae black, joint 3 about 3.3 times as long as wide at apex (comparatively small species, 10 mm or so, vertex and mesopleuron almost without plumbeous shine, mesonotum more finely and more sparsely punctured, pygidial area on apical portion finely coriaceous, with a few punctures along lateral margin) ***Psen* (*Psen*) *hakusanus seminitidus* Van Lith, 1965**

10 Hairs on lower frons and clypeus silvery (mandibles largely, antennal joint 2, tegulae, fore tibiae, all tarsi and mid and hind tibiae on both ends ferruginous, antennal joint 3 about 2.5 times as long as wide at apex), about 10 mm ***Psen* (*Psen*) *nitidus takasago* Tsuneki 1967**

– Hairs on lower frons and clypeus golden 11

11 Tibiae and tarsi of all legs reddish ferruginous (anterior margin of clypeus bluntly quadridentate, lateral pair markedly reflected, antennal joint 3 about 4.2 times as long as wide at apex), 10–12 mm ***Psen* (*Psen*) *tanoi* Tsuneki, 1967**

– Tibiae and tarsi of all legs black, apically brownish (anterior margin of clypeus bidentate, antennal joint 3 about 3.3 times as long as wide at apex), about 10 mm ***Psen* (*Psen*) *alishanus* Tsuneki, 1967**

(In closely allied *P. longicornis* Tsuneki ♀ unknown)

12 Flagellar joints of antennae without tyloidea 13

– Flagellar joints of antennae with tyloidea 15

13 Subantennal transverse carina triangularly raised, with a tooth in middle, anterior margin of clypeus in middle without lunate undersurface (anterior margin bluntly quadridentate or -undulate, the median two stronger, tibiae and tarsi of all legs ferruginous, antennal joints from 3 apically slightly reducing in length, joint 3 approximately 3.4 times, joint 10 about 1.7 times as long as wide at apex), 8–9 mm, in high altitude ***Psen* (*Psen*) *tanoi* Tsuneki, 1967**

– Subantennal transverse carina almost roundly raised, sometimes with a weak undulation on top, without medial tooth, anterior margin of clypeus in middle with a lunate undersurface (anterior margin of clypeus in middle broadly emarginate, lateral angles of emargination toothed) 14

14 Legs largely ferruginous (antennal joints from 3 apically slightly reducing in length, joint 3 approximately 2.5 times, joint 10 about 1.5 times as long as wide at apex, from joint 5 apically slightly moniliform), 8–10 mm, in high altitude ***Psen* (*Psen*) *shirozui* Tsuneki, 1966**

– Legs largely black, tibiae and tarsi more or less brownish (antennal joints from 5 apically subequal in length, joint 3 about 2.6 times as long as wide

at apex, each joint of flagellum beneath very gently roundly swollen), 8–9 mm, in high altitude ***Psen* (*Psen*) *bnun* Tsuneki, 1971**

15 Abdominal sternites 3 and 4 with a fringe of markedly long hairs on apical margin in middle, the hairs more than half the length of hind metatarsus (antennal joints short, joint 3 approximately 2.5 times, joint 4 about 1.6 times as long as wide at apex, joint 10 only slightly longer than wide, vertex and mesonotum sparsely punctured and shining, all tarsi ferruginous, fore femora and all tibiae partly pale brown to ferruginous), length 8–9 mm, lowland inhabitant ***Psen* (*Psen*) *nitidus takasago* Tsuneki, 1967**

– Abdominal sternites 3 and 4 with a fringe of hairs on apical margin, but the hairs not so long, sometimes rather indistinct 16

16 Antennal joint 3 about thrice as long as wide at apex, from joint 5 apically subequal (very slightly reducing) in length, joint 10 in narrowest view more than twice as long as wide (tyloidea on joints 3–12, on 12 weak, each joint beneath gently swollen, vertex and mesonotum with aeneous shine, on mesonotum puncture intervals as large as punctures, punctures on mesopleuron fine and very sparse, tibiae and tarsi more or less brownish, sometimes fairly markedly so), 8–10 mm, in high altitude ***Psen* (*Psen*) *longicornis* Tsuneki, 1967**

– Antennal joint 3 less than thrice as long as wide at apex, joint 10 less than twice so (flagellar joints beneath gently roundly curved) 17

17 Tyloidea on antennal joints 3–10, on 10 very weak (punctuation as in *longicornis*, tibiae and tarsi black, tarsi on apical portion brownish), 8–10 mm, in high altitude ***Psen* (*Psen*) *alishanus* Tsuneki, 1967**

– Tyloidea on joints 3–12, very distinct and glittering, mesopleuron sparsely but more grossly punctured than in *alishanus*), 9–10 mm, in high altitude ***Psen* (*Psen*) *hakusanus seminitidus* Van Lith, 1965**

18 Body wholly black 19

– Abdomen largely ferruginous red (♂ only known) 20

19 (♀ only) Propodeum on both sides of medial furrow smooth and polished, petiole of abdomen as long as hind femur, or trochanter and apical half of coxa united (punctures on mesonotum very minute and almost unnoticeable, median furrow of propodeum reaches the apex of the segment, 2nd recurrent vein received by the 3rd cubital cell at the basal 4th), 7–8 mm ***Psenulus taihorinis* Strand, 1915***

– Propodeum on both sides of median furrow finely (in ♀ closely, in ♂ slightly sparsely) obliquely striate, the median furrow not reaching the end of the segment, petiole in ♀ shorter than, in ♂ as long as, hind femur (punctures on vertex and mesonotum distinct, temples transversely punctate rugoso-striate, in ♀ pygidial area elongate triangular, not long, with apex rounded, flagellum short, in ♀ somewhat clavate, in ♂ somewhat moniliform), ♀ 6–7 mm, ♂ 5–6 mm, in low mountain region (300–1300 m) ***Psenulus formosicola* Strand, 1915****

* Possibly close to Japanese *P. rubricus* Pérez, but at least the petiole slightly shorter.

** Close to *P. pallipes yamatonis* m., but petiole longer, antennal joints (♂) shorter and legs more broadly blackish, possibly in subspecific relationships with *P. p. yamatonis*.

20 Thorax-complex wholly black (greater part of mandibles and legs ferruginous red, antennal flagella moniliform, joints 3–6 with tyloidea, propodeum on both sides of medial furrow broadly polished, petiole reddish ambur yellow, tergite 1 somewhat blackish), 7–8 mm, in high altitude
***Psenulus quadridentatus formosanus* Tsuneki, 1966**

– Thorax-complex with yellow maculae (clypeus except apex, antennal joint 1 wholly, from 2 apically beneath, collar of pronotum, humeral tubercles, a spot behind them yellow; propodeum posteriorly with a U-shaped broad macula on each side of medial furrow and rather coarsely reticulate), 8.5 mm, in lowland and low mountain region 21

21 Mesonotum with four yellow spots, 3rd cubital cell only very slightly narrowed upwards, 3rd transverse cubital vein nearly straight and only slightly obliquely inclined, known from Hengchun, South Formosa
***Psenulus ornatus kankauensis* Strand, 1915**

– Mesonotum along prescutal sutures narrowly yellow, the stripes enlarged at apex, not reaching posterior margin, the notum further with a triangular yellow mark near antero-lateral corners (Fig. 4), axillae yellow, scutellum with a pair of large triangular maculae on posterior portion, postscutellum yellow, 3rd transverse cudital vein distinctly sinuate (antennnae gradually attenuate towards apex, from joint 4 apically subequal in length, each joint roundly swollen beneath, markedly so on joints 8–10), Cental Formosa
***Psenulus ornatus pempuchiensis* Tsuneki, 1971**

22 With one discoidal cell, stigma markedly large 23
– With two discoidal cell, stigma small 34

23 Abdomen long petiolated (inner orbits parallel or divergent upwards, on mesopleuron epicnemial area distinctly margined by the carinae, ♀ with pygidial area, ♂ with a spine at abdominal end) ··· genus *Stigmus* Panzer··· 24
– Abdomen sessile (middle coxae contiguous to each other) 32

24 Lower frons with a median carina accompanied by a simple or T-shaped spine, eyes and sides of mesonotum marginated by a strongly crenate furrow; pronotum, petiole and legs comparatively long, petiole longer than tergite 1, clypeus in both sexes not densely covered with pubescence, stigma thrice as long as its greatest breadth, humeral tubercle conical, ivory white ..... genus *stigmus* (*Carinostigmus*) 25
– Lower frons without the median carina accompanied by a spine, margins of eyes and sides of mesonotum simple or nearly, pronotum, petiole and legs comparatively short, petiole about as long as tergite 1, stigma twice as long as its greatest breadth, clypeus in males usually densely covered with silvery pubescence, sometimes not, humeral tubercles gently swollen, with varied coloration ..... genus *Stigmus* (*Stigmus*) 27

25 Mandibles largely and antennal scape in front ivory white (clypeus medianly produced with apex tridentate, medial tooth more strongly advanced, ♂ unknown), 5–6 mm ***Stigmus* (*C.*) *saigusai* Tsuneki, 1966**
– Mandibles ferruginous and black, antennal scape also ferruginous, clypeus not tridentate at apex in middle 26

26 Head behind eyes only gently roundly convergent posteriorly, clypeus on anterior margin in middle bidentate, ♀ 6.5–7.5, ♂ 6.0–7.0 mm
***Stigmus* (*C.*) *formosanus* Tsuneki, 1954**
(= *Stigmus* (*C.*) *taiwanensis* Tsuneki ,1966)

– Head behind eyes markedly roundly convergent posteriorly, clypeus on anterior margin in middle subtruncate, sometimes with a minute incision in middle, ♀ 5.5–6.5, ♂ 5.0–6.0 mm ***Stigmus* (*C.*) *iwatai* Tsuneki. 1954**

27 ♀ 28
– ♂ 30

28 Head from above subquadrate, humeral tubercle black or brownish black, propodeum with ground surface dull and opaque (clypeus produced in middle, with apex bidentate), 4.2–5.0 mm, Mt. Ali
***Stigmus* (*S.*) *kansitakuanus* Tsuneki, 1971**

– Head from above transverse, with temples roundly convergent posteriorly, humeral tubercles white posteriorly, propodeum with ground suface fairly shining 29

29 Antennal flagellum on basal half above ferruginous, collar of pronotum with anterior margin broadly emarginate, mesopleuron with hypoepimeral area finely closely striate and behind epicnemial carina longitudinally striate, pygidial area brownish black, with surface smooth and polished,
***Stigmus* (*S.*) *shirozui alishanus* Tsuneki, 1971**

– Antennal flagellum on two basal joints above ferruginous, collar of pronotum with anterior margin medially straight and laterally gently curved posteriorly, mesopleuron except crenate furrows smooth and polished, pygidial area ferruginous, with surface dull, finely coriaceous and punctured, 3.3–4.5 mm ***Stigmus* (*S.*) *convergens ami* Tsuneki, 1971**

30 Clypeus not covered with silvery hairs (mesopleuron on hypoepimeral area and behind epicnemial carina longitudinally striate), 3.0–4.0 mm
***Stigmus* (*S.*) *shirozui alishanus* Tsuneki, 1971**

– Clypeus covered with silvery hairs 31

31 Mesonotum sparsely punctured, hypoepimeral area finely longitudinally striate, propodeum with ground surface dull and opaque, covering hairs of clypeus not dense, 4.0–4.5 mm
***Stigmus* (*S.*) *kansitakuanus* Tsuneki, 1971**

– Mesonotum impunctate, mesopleuron except crenate furrows smooth and polished, propodeum with ground surface shining, clypeus densely covered with silvery hairs, 3.5–4.0 mm
***Stigmus* (*S.*) *convergens ami* Tsuneki, 1971**

32 Eyes reaching below the base of mandibles, mesopleuron without epicnemial area (cubital vein of hind wing originated distinctly beyond the end of anal cell, inner orbits more or less convergent towards clypeus, in ♀ pygidial area present, very narrow and rather indistinct, small species, 2–3 mm, not known from Formosa) ..... genus *Spilomena* Shuckard
– Eyes not reaching below the base of mandibles, with the distinct oculo-mandibular space, mesopleuron with epicnemial area (tibiae not spinose, but with short stiff hairs on outer margin) 33

33 End tergite of abdomen in ♀ without pygidial area, cubital vein of hind

wing originated distinctly before the end of anal cell, discoidal vein of fore wing received by the 2nd cubital cell or interstitial, 2nd cubital cell subtriangular and a third as large as the first, inner orbits slightly divergent upwards, 8–9 mm, Australian genus, not known from Formosa

genus *Harpactophilus* (Smith) Kohl

– End tergite of abdomen in ♀ with distinct pygidial area, cubital vein of hind wing originated from the apical corner of anal cell, discoidal vein of fore wing received always by the 1st cubital cell, 2nd cubital cell rectangular, 2/3 as large as the 1st, inner orbits subparallel, slightly divergent below genus *Taialia* Tsuneki, 1971

♀, general appearance: Fig. 26, head: Figs. 27 and 28, clypeus: Fig. 29, pro- and mesonotum in lateral view: Fig. 30, mandibles, palpi, antennae except tip, tegulae and legs wholly ferruginous, 4–5 mm, Mt. Ali

***Taialia formosana* Tsuneki, 1971**

34 Abdomen distinctly long petiolated, petiole always longer than wide genus *Pemphredon* Latreille

♂, the form of head in Etizenia, 14, Figs. 23 and 24, wholly black, radial cell of fore wing infuscated along anterior margin, abdominal sternites 3–6 each adorned with a row of long hairs across middle, antennal joints 6–12 with tyloidea, joint 3 about 2.7 times as long as wide at apex, petiole as long as hind femur, area dorsalis coarsely subreticulate, with posterior limb smooth and shining, 9 mm, in high altitude, ♀ unknown

***Pemphredon* (*Pemphredon*) *shirozui* Tsuneki, 1966**

– Abdomen very indistinctly shortly petiolated, petiole always shorter than wide (mesopleuron with one or two longitudinal punctured furrows) genus *Passaloecus* Shuckard 35

35 Face wider than high, mandibles largely ivory white (OAD≒IAD, clypeus medianly produced anteriorly, with apex truncate, antennal joint 3 about 1.5 times as long as wide at apex, mesopleuron besides the epicnemial furrow with only one longitudinal, coarsely crenate furrow on lower portion, propodeum above coarsely reticulate and obliquely striate, humeral tubercles wholly black, in ♂ antennae strikingly moniliform), 6–7 mm

***Passaloecus monilicornis taiwanus* Tsuneki, 1967**

– Face higher than wide, mandibles black with apex brownish (OAD < IAD, clypeus on anterior margin straight, with a semielliptic protuberance on each side, antennal joint 3 only very slightly longer than wide at apex, mesopleuron without the longitudinal crenate furrow on lower portion, only with a weak, smooth scrobal groove, propodeum above reticulate and striate) 36

36 Upper frons on each side of medial furrow markedly raised (Figs. 32 and 34), propodeum above anteriorly reticulate and posteriorly transversely closely striate, 4 mm, in high altitude (♂ unknown)

***Passaloecus alishanus* Tsuneki, 1971**

– Upper frons not so markedly raised on each side of medial furrow (Figs. 33 and 35), propodeum above medianly reticulate and laterally obliquely striate, 5–6 mm, in high altitude (♂ unknown)

***Passaloecus formosus* Tsuneki, 1967**

REFERENCES

Haneda, Y. 1971. Sphecidae collected in Formosa in 1970. Life Study, 15 (1–2): 29–33.

Lith, J. P. van. 1967. Contribution to the knowlege of the Bornean Psenini. Ent. Ber., 27: 15–20.

——— 1968. Contribution to the knowledge of Indo-Australian, South Pacific and East Asitic Psenini. Genus *Psen* Latreille (Hymenoptera, Sphecidae). Tijds. Ent., 111 (4): 89–135.

——— 1969. Description of some Indo-Austrailan *Psenulus* and revision of the group of *Psenulus pulcherrimus* (Bingham) (Hymenoptera, Sphecidae, Psenini). Ibid., 112 (7): 197–212.

Tsuneki, K. 1965. Quelques espèces des Cuêpes solitaires (Hyménoptères) récoltées en Formose par M. T. Shirozu. Spec. Bull. Lepid. Soc. Jap., 1: 167–172.

——— 1966. Contribution to the knowledge of the Pemphredoninae fauna of Formosa and the Ryukyus (Hymenoptera: Sphecidae). Etizenia, 14, 21 pp. (with a list of literature).

——— 1967. Studies on the Formosan Sphecidae (III). The subfamily Pemphredoninae (Hymenoptera). Etizenia, 24, 11 pp. (addition to the list of literature given in 1966, except above).

ADDENDUM

After the manuscript went to press I could have examined specimens of the following species which was to be added to the key of the present paper:

***Psen* (*Mimumesa*) *vanlithi* Tsuneki, 1959**

A number of the male and female specimens were collected by Mr. Y. haneda, Fukui, in the summer of 1971 in the suburbs of Ilan. The specimens belong distinctly to a subspecies different from the typical form of Japan and will be described in another occasion. Here the species is inserted into the key of the Formosan Pemphredoninae as follows:

3a Petiole of abdomen on posterior half distinctly carinate, subantennal transverse carina lacking, interantennal tubercle very weak, epicnemial carinae of both sides jointed together at the medio-anterior part of mesosternum, in males middle metatarsi always simple and no tuft of long hairs on posterior margin of 3rd and 4th sternites ..... genus *Psen* (*Mimumesa*)

Epicnemial area roundly inclined downwards and inwards, without the bordering carina below, punctures on vertex fine and sparse, antennal flagellum beneath in ♀ broadly ferruginous, in ♂ black, 8– 10 mm

***Psen* (*Mimumesa*) *vanlithi* Tsuneki, 1959**

– Petiole of abdomen above at most gently roundly raised, without distinct carina, subantennal transverse carina present and mostly strongly toothed in middle, epicnemial carinae of both sides not jointed together beneath thorax, in males middle metatarsi sometimes modified and either or both of 3rd and 4th sternites with a tuft of long hairs on posterior margin ..... genus *Psen* (*Psen*) 3