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(HYMENOPTERA)
WITH NOTES ON BEMBEGINUS OF THE RYUKYUS AND KOREA

BY K. TSUNEBI

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By Katsuji TSUNEKI
(Biological Laboratory, Fukui University)

The Nyssonine wasps are scarcely represented in the tropical and subtropical regions of Asia except for the members belonging to the tribe Bembicini.

We could collect during our two months journey in Formosa only one species of *Nysson* (*N. basalis taiwanus* subsp. nov.), one species of *Argogorytes* (*A. fuliginosus* sp. nov.) and one species of *Alysson* (*A. formosanus* sp. nov.). The first species was not always rare in the southern districts of the Island, but the other two species were very rare and the specimens we could capture were quite scanty in number. While, we could collect a fair number of two species of *Bembix* (*B. formosana* Bischoff and *B. taiwana* Bischoff, the latter was once erroneously identified with *B. niponica* Smith and the male of which was called *lutea* in the misidentification) and five species of *Bembecinus* (*B. hungaricus formosanus* (Sonan), *B. nigriclypeus* (Sonan), *B. posterus* (Sonan), *B. penpuchiensis* sp. nov., *B. pacificus* sp. nov.), with a single exception of *Bembecinus penpuchiensis*. Especially, *Bembecinus hungaricus formosanus* furnished us with so many specimens that I could attempt the comparative statistic study in relation to various characters of the local populations of the Island.

This investigation on *B. h. formosanus*, together with the direct observations of the ecological distribution of each of the allied species, enabled me to develop the specific concept of the group that was already acquired in part during my previous study with the Japanese representative.

The field observations in the habitat of each species and the direct comparative study of the specimens we collected made it possible to confirm the validity of *B. nigriclypeus* and *B. posterus* both of which could not be grasped as to their specific distinctions through the original descriptions only, and to find out two other species new to science.

On this occasion I tried to review the specimens of *Bembecinus* from the Ryukyus that were identified in my previous paper with *B. tridens* and could find that they belonged to another distinct species. I further extended my revision to the Korean specimens at hand and could find two species among them. It seems interesting that the two species of Korea are the same ones as occurring in Formosa and not those found in the northern half of the Ryukyus. The accounts concerning the species of the Ryukyus and Korea were given in the appendix of the present paper.

DESCRIPTIONS AND RECORDS OF THE SPECIES

1. *Nysson basalis* Smith, 1856

Nysson basalis Smith, Cat. Hym. Ins. Brit. Mus., 4: 355, 1856 (India).

Nysson basalis: Handlirsch, Sitz. Akad. Wiss. Wien, 1887, 95: 401 (translation of original description)

Nysson basalis: Cameron, Mem. Manchester Lit. Phil. Soc., (4) 3: 241, 1890.

Nysson basalis: Turner, Ann. Mag. Nat. Hist. 14 (8): 253 (keyed), 254 (redescribed), 1914.

Specimens collected: 14 ♀♀ 18 ♂♂, Pingtung Pref. (3 ♀♀ 1 ♂, Hengchun, 2. VIII.; 2 ♀♀ 1 ♂, Ssuchungchi, 6. VIII.; 2 ♂♂, Oluampi, 7. VIII.; 8 ♀♀ 12 ♂♂. Shatao, 9. VIII.

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1966, T. Tano leg.; 1 ♀ 2 ♂♂, Hengchun, 8. VIII. 1966, K. Tsuneki leg.).

According to the original description and especially to the redescription of Turner the specimens of Formosa well agree with *N. basalis* except that the coarse punctures on the head and thorax are not rugose, but distinctly separated by carinae or some space. Especially on the mesonotum anteriorly they are rather sparse. Thus the Formosan representative seems to form a geographic race:

Nysson basalis taiwanus subsp. nov.

Holotype: ♂, Hengchun, 8. VIII. 1966, K. Tsuneki leg. (Coll. Tsuneki).

Paratypes: All others listed above.

Remarks. Pilosity dense, appressed, more or less frizzled on head and thorax, brassy on dorsal side in general except propodeum and silvery on ventral side; on face, temples and mesopleurons they are largely silvery. The pilose areas: Clypeus, frons, temples, pronotum, mesopleurons, meso- and metasternum, cover of hind wings, postscutellum, latero-posterior areas of propodeum largely, basal half of tergite 1, sternite 2 wholly, coxae wholly and femora beneath. Hairs on vertex, mesonotum and scutellum rather sparse. Sternites 2, 3, 4 and 5 in ♂ fringed with long white silky hairs at each apex. Clypeal, antennal and abdominal characters as given by Turner. Mandibles largely, apices of all femora, base and apex of all tibiae and all tarsi largely, reddish ferruginous. Propodeal spines comparatively long, rounded at apex, ambur yellow in colour, except marginal areas and extreme apex. As a rule 5 pairs of maculae on abdomen considerably large.

2. *Argogorytes fuliginosus* sp. nov.

Twenty two species* of the genus *Gorytes* (s. l.) have been recorded from tropical and subtropical regions of Asia and New Guinea. Of these some species such as *stenopygus* Handlirsch (Malaya, Celebes, Luzon), *matangensis* Turner (Borneo), *caerulescens* Turner (Ceylon) are considered to belong to *Argogorytes* of the present day taxonomy. Of these the present species most closely resembles *matangensis* Turner described basing on a single female from Mt. Matan (about 300 m), Sarawak. It differs from it, however, in that the scuto-scutellar furrow is not foveolate, wings are very much more darkened, mesosternal median carina stronger and more distinct, posterior inclination of the propodeum flattened and distinctly margined with carinae and the surface radiately striate from the medio-apical centre. This species is characteristic in having the very broad and apically bidentate mandibles, coarsely punctate and rugose clypeus, the strong, coarse and peculiar sculpture of mesopleuron and propodeum, small and medianly stoutly carinated pygidial area. However, by the direct comparison of the specimens of the two species in future it may be sunk to a subspecies of the Bornean representative.

♀. Length 12 mm (paratype 9.5 mm). Wholly black. Mandibles with a reddish patch near apex, palpi, base of antennae, tibial spurs and claws of legs dark brown. Wings strongly darkened, with a purplish shine in certain light, posteriorly somewhat paler. Pubescence on head and thorax-complex greyish white, on abdomen short, dark brown, on apical margins of dorsal and ventral segments 2-4 yellowish. Head from above: Pl. I, Fig. 1, with vertex posterior to ocellar region slightly raised, front ocellus half sunken in a depression, no frontal furrow present. Head seen in front: Ditto, Fig. 2, interantennal area longitudinally raised, and shortly carinated above

* *ornatus* (Smith, 1856), *pictus* (Smith, 1856) (= *tricolor* Smith, 1875, = *orientalis* Cameron, 1890), *basalis* (Smith, 1860), *amatorius* (Smith, 1875), *faeae* (Handl., 1895), *jentinkii* (Handl., 1895), *stenopygus* (Handl., 1895), *greeni* (Bingham, 1896), *alipes* (Bingham, 1897), *impiger* (Bingh., 1897), *politus* (Bingh., 1897), *capitatus* (Nurse, 1902), *lenis* (Nurse, 1903), *intrudens* (Nurse, 1903), *impudens* (Nurse, 1903), *icariiformis* (Bingh., 1908), *caerulescens* (Turner, 1914), *matangensis* (Turner, 1914), *remotus* (Turner, 1917), *vividus* (Turner, 1917), *confusus* (Dutt, 1921), *tonkinensis* (Yasumatsu, 1947).

middle, antennal socket also sunken in a broad depression, clypeus with apical margin bisinuate and carinated, medial region raised and the carina thickened, on lateral areas slightly behind the apical margin the surface strongly obliquely raised and the area between this and the apical margin obliquely inclined and impressed; labrum and mandibles as in the Figure. Head in profile: Ditto, Fig. 3. Antennal joint 1 approximately as long as joint 3, 3 about 2.5 times (dorsal view) or 2.3 times (lateral view) as long as wide at apex, succeeding joints progressively slightly reducing in length till joint 7, thence again gradually increasing in length, in width as a whole slightly increasing toward penultimate joint; each joint of flagellum slightly bent, more marked on ultimate joint which is attenuate distally and rounded at apex. Collar of pronotum very narrow, transversely acutely carinated, median scutal furrow on mesonotum feeble, parapsidal sutures defined as short fine carinae, on mesopleuron epicnemial carina acute, continued to acetabular carina, anterior oblique furrow broad and deep, precoxal suture defined as a short carina. Propodeum obliquely from above: Pl. I, Fig. 6. Abdominal tergite 1 at base broadly roundly impressed and the area margined on both sides by carinae. Pygidial area: Ditto, Fig. 7. Sternite 1 medianly very strongly keeled, sternite 2 at base transversely deeply furrowed, the area next to the furrow medianly bluntly raised, subcarinated. Fore wing with abscissae of radial vein in the following length relation: $3 > 2 \cong 4 > 1$ (Pl. I, Fig. 8), in other respects as in *matangensis*. Fore tibiae and tarsi ciliated, but not spinose; mid tibiae with two long apical spurs, all metatarsi approximately as long as the following 4 joints combined. Claws with a small basal tooth on inner margin, as usually so in this genus.

Vertex closely punctate with medium-sized punctures, partly rugoso-punctate, punctures of frons finer and closer, clypeus at base finely closely, apically very coarsely, irregularly punctured, with intervallic carinae as well as the oblique raised areas at the sides smooth and polished, anterior lateral inclined areas also polished, with a few punctures scattered; punctures on temples fine and close. Mesonotum rugoso-punctate, punctures irregular in size, form and distribution, on posterior portion longitudinally rugoso-striate, scuto-scutellar furrow fine, not foveolate, scutellum longitudinally punctate-striate, the striae coarse, postscutellum longitudinally, very coarsely striate. Mesopleuron anteriorly coarsely, irregularly reticulate, with a coarsely foveolate epicnemial furrow along anterior margin, episternum from the anterior oblique furrow posteriorly very coarsely, but regularly longitudinally striate, with surface shining, metapleuron without striae, practically impunctate and polished. Propodeum sculptured as given in Fig. 6 of Pl. I, with intervals between the striae uneven, but considerably shining, sides of the segment longitudinally, partly obliquely very coarsely striate. Abdominal tergites uniformly finely punctured, on disc intervals larger than punctures, but laterally punctures much closer; tergite 5 sparsely, more coarsely punctured than on others, mixing a few fine points. Punctures on sternite 2 medianly medium-sized, posteriorly smaller, with intervallic space irregular in width, sternites 3 and 4 more finely and closely punctured, on 5 and 6 punctures coarser and sparser, except the lateral portions.

♂. Length about 9 mm. Similar to ♀ in general. Head from above with $OOD < POD$ (9 : 12), post-ocellar transverse furrow interrupted by the vertical elevation; head in front with clypeus relatively longer, more closely covered with whitish pubescence, with punctures and rugae finer, feature at anterior margin somewhat different (Pl. I, Fig. 4), mandibles broad, but less so than in ♀, similarly bidentate at apex. Antennal joint 1 shorter than joint 3, 3 shorter than 4, each joint more strongly bent (Ditto, Fig. 5). On anterior area of mesopleuron anterior inclination broader and the area longitudinally striate. Propodeum and abdomen similar to ♀, except the pygidial area. Claws of legs without basal tooth on inner margin.

Holotype: ♀, Nantou Pref (Penpuchi), 14. VII. 1966, K. Tsuneki leg. (Coll. Tsuneki).

Paratypes: 1 ♂, the same place, 29. IV. 1965, T. Shirôzu leg.; 1 ♀, ditto, 30. VIII. 1966, K. Tsuneki leg. (Coll. Tsuneki).

3. *Alysson formosanus* sp. nov.

♀. Length about 7 mm (paratype 6 mm). Black, with beautiful bluish and purplish iridescence on prothorax and propodeum and greenish and reddish one on the wings. Metapleurons and propodeum wholly, and basal half of abdominal segment 1 reddish ferruginous. Yellowish white or white: Mandibles except blackish apical third, clypeus largely, a line along inner orbits (Pl. I, Fig. 9), palpi, scape except dorsal side, basal 2/3 of scutellum (consisting of two maculae fused together), two large spots on tergite 2 and legs on the following portions: Fore legs, apical 2/3 of coxae in front, base, apex and front side of trochanters, both ends of femora, tibiae in front, tarsal joints except dorsal side of metatarsi and aloria; mid legs, coxae and trochanters in front, both ends of femora, base and narrow front side of tibiae; hind legs, coxae at apex, trochanters narrowly in front, base of femora and of tibiae. Apical margin of clypeus amber-yellow, antennae dark brownish, tegulae semitransparent brown, rest of trochanters and tarsi dark brown. Wings hyaline, crossed with slightly darkened fascia at radial cell, stigma and veins dark brown. Head and thorax sparsely covered with white pubescence, the hairs between antennal sockets and on anterior portion of episternum of mesopleuron dense, appressed and silvery, ring hairs on the apical margin of abdominal segments 3-5 and around pygidial area brassy, long and erected, pygidial area covered with short appressed silvery bristles, apically somewhat golden.

Head from above with impressions outside each ocellus rather feeble, median frontal furrow narrow and not deep, OOD : POD : OCD = 7 : 4.5 : 9, postocellus relatively 4. Head in front with frontal furrow reach supra-antennal small tooth, oculo-antennal distance, width of antennal socket and interantennal distance relatively 5 : 4 : 5.5; clypeus and mandibles: Pl. I, Fig. 9; occipital carina incomplete, not reaching hypostomal carina; antenna filiform, joint 3 slightly less than thrice as long as wide at apex, succeeding joints gradually very slightly reducing in length up to joint 7, joints 7-11 subequal. Pronotum from above: Ditto, Fig. 10, posterior marginal area semitransparent brown, accompanying medianly interrupted crenate furrow in front, pronotum seen in profile: Pl. I, Fig. 11. Scuto-scutellar furrow coarsely, regularly crenate, the furrow behind scutellum also crenate, mesopleuron with scrobal furrow fairly deep. Propodeum: Ditto, Fig. 12. Abdominal sternite 2 at base transversely furrowed, pygidial area: Ditto, Fig. 13; apical joint of fore tarsus particularly large.

Head and mesonotum finely, closely, uniformly punctured, pronotum slightly more coarsely, transversely rugoso-punctate, mesopleuron with very delicate hair points. Sculpture on propodeum: Ditto, Fig. 12, with the surface between striae minutely uneven; tergites 1 and 2 smooth and polished, 3-5 with hair-bearing puncture-band across middle, sternite 2 sparsely scattered with somewhat large punctures throughout, 3-5 with puncture-band before apex.

Holotype: ♀, Nantou Pref. (Puli), 8. VII. 1966, K. Tsuneki leg.

Paratype: 1 ♀, ditto.

Remarks. The specimens were captured on the leaves of the sweet potato, probably during their hunting activity of the Homopterous prey.

In Formosa one other species of *Alysson* bearing the black propodeum, *A. taiwanus* Sonan, has been known which we could not meet with during our journey.

Key to the species of *Alysson* in South and East Asia (♀♂)

- 1 Thorax (excluding propodeum) ferruginous red 2

- Thorax (excluding propodeum) black 3
- 2 Propleuron striate in middle, area dorsalis with two central carinae united at apex, hairs on frons and vertex silvery, length 4 mm, ♀, India (Simla)
erythrothorax Cameron, 1902
- Propleuron at base simply aciculate, not striate, area dorsalis with two central carinae not united at apex, hairs on frons and vertex black, length about 5 mm, ♂, Ceylon
ruficollis Cameron 1898
- 3 Propodeum more or less ferruginous red (base of abdomen also the same) 4
- Propodeum entirely black 6
- 4 Propodeum with area dorsalis black (clypeus tridentate at apex, area dorsalis with apex rounded, propodeal teeth very feeble, almost unnoticeable, wings with blackish fascia, legs reddish, variegated with yellow, length 5-7 mm, ♀ ♂, Europe and Japan
pertheesi Gorski, 1852
- Propodeum entirely ferruginous red 5
- 5 Abdominal segment 1 wholly and base of 2 ferruginous red, pronotum and humeral angles yellow maculated, legs ferruginous, variegated with yellow (medial transverse carina on posterior inclination of propodeum weak, indistinct towards middle, sides of the segment with oblique striae except centre very weak, thorax and propodeum without iridescent shine), length 6 mm, ♀, Manchuria (Harbin)
harbinensis Tsuneki, 1967
- Abdominal segment 1 on basal half only ferruginous red, thorax except scutellum black, legs black, variegated with yellow (medial transverse carina on posterior inclination of propodeum distinct, sides of the segment obliquely, fairly strongly carinated except central area, wings with fascia more deeply blackish, thorax especially prothorax and propodeum strongly iridescent), length 6-7 mm, ♀, Formosa
formosanus Tsuneki, 1968
- 6 Area dorsalis on propodeum triangularly pointed at apex (wing fascia pale, antennae beneath brighter, legs ferruginous to pale yellow, variegated with black, sometimes blackish areas larger, in ♀ scutellum with yellowish macula), length ♀ 7-9 mm, ♂ 5-7 mm, Europe and Japan
ratzeburgi Dahlbom, 1845
- Area dorsalis with apex rounded 7
- 7 Anterior margin of clypeus unidentate* (thorax wholly black, legs reddish brown, hind tibiae above and tarsus black, wings fasciated, posterior inclination above at each side with a blunt tooth), length 10 mm, ♀, Formosa (Shinchu, VII. 1919) *taiwanus* Sonan, 1940
- Anterior margin of clypeus tridentate 8
- 8 Head and thorax shining, almost impunctate 9
- Head and thorax distinctly punctured 10
- 9 Posterior slope of propodeum areolated (clypeus with extreme apex piceous, scutellum with two spots, mid and hind legs blackish and from coxae apically subannulately maculated with yellow, wings with a fascia), length 6 mm, ♀, India (Poona)
annulipes Cameron, 1897
- Posterior slope of propodeum on each side of the median furrow smooth (clypeus with apical margin not piceous, mid and hind legs black, with tarsi dark brown, wings with two fasciae), length 6 mm, ♀, India (Simula)
testaceitarsis Cameron, 1902

* This is exceptional in the genus *Alysson* s. str. and the reconfirmation with the type seems needed. But the specimen, according to the described characters of the structure of pronotum and propodeum, the presence of a pair of yellowish maculae on tergite 2 and to the general punctuation, belongs no doubt to this genus.

10 Apical teeth of the clypeus pointed, antennal joint 3 nearly 4-times as long as wide at apex, fore and mid coxae only in part whitish, length 7-12 mm (♀), Japan

cameroni Yasumatsu et Masuda, 1932

- Apical teeth of clypeus with apex rounded, antennal joint 3 shorter, only about thrice as long as wide at apex, fore and mid coxae wholly yellow, length 6 mm, ♀, Manchuria (Harbin)

verhoeffi Tsuneki, 1967.

4. *Bembix formosana* Bischoff, 1913

Bembix formosana Bischoff, Deuts. Ent. Zeitschr., 1913 (6): 714, 1913 (Formosa: Kau-Hsiung).

Bembix formosana: Parker, Proc. U. S. Nat. Mus., 75 (5): 128, 1929.

Bembix formosana: Strand (incl. var. *metamelanica*), Internat. Ent. Zeitschr., 21: 171, 1923.

Bembix formosana: Sonan, Trans. Nat. Hist. Soc. Formosa, 17 (93): 361 (redescription in Japanese), 368 (biology), 1927 (Fenliao, Taipei, Botel Tobago Is.).

Bembix formosana: Sonan, *ibid.*, 21 (112): 78, 1931 (Pescadores Is. Shintien, Shinchu).

Specimens collected: 34 ♀♀ 50 ♂♂, Taitung Pref. (34 ♀♀ 44 ♂♂, Taitung, 15. VIII.; 6 ♂♂, Taoyeh, 14. VIII.), K. Tsuneki et T. Tano leg.

Remarks. Strand (1923) described as a variety of this species, *metamelanica*, which lacks the lunate yellow band on the propodeum. But such is only a feature of fluctuative variations, with no taxonomic significance whatever.

This is the first record of the species from the eastern side of the Island.

5. *Bembix taiwana* Bischoff, 1913

Bembix taiwana Bischoff, Deuts. Ent. Zeitschr., 1913 (6): 712, 1913 (Formosa, ♂♀).

Bembix lutea Sonan, Trans. Nat. Hist. Soc. Formosa, 17 (93): 366, 1927 (♂). (SYN. NOV.)

Specimens collected: 12 ♀♀ 1 ♂, Pingtung Pref. (1 ♀, Kentin; 11 ♀♀ 1 ♂, Shatao, 7-9. VIII. 1966), K. Tsuneki et T. Tano leg.

Other specimens obtained: 15 ♂♂, Nantou Pref. (Puli), date unknown.

Remarks. Sonan (1927) dealt with *taiwana* as a synonym of *B. niponica* Smith, a common species in Japan. This is, however, quite incorrect. Indeed, his *lutea* itself is the male of *B. taiwana*.

He also mentioned that *B. niponica* occurred in Formosa and recorded 3 ♂♂ 4 ♀♀ collected in Puli (22. V. 1908, by Ineo Nitobe). However, we could not have a chance to see this species anywhere during our journey. On the other hand, the female specimen described by Strand (1923) as *B. taiwana* var. *kosemponis* seems to be close to *niponica*. This consideration is considered supported by his description that his specimen, according to the key of Bingham (1897) went near *B. hesione* Bingham, but differed from it. *Bembix hesione* has not U-shaped mark on the mesonotum, as in *niponica*. He also said that if followed Handlirsch his variety went straight to *B. buddha* which also has not the U-shaped macula on the mesonotum, but with the 6th tergite maculated with yellow. According to the description, though he did not touch upon the maculae in question, his specimen is considered immaculated on the mesonotum. Taking into consideration of the resemblance in other characters there seems to be possibility that *B. taiwana* var. *kosemponis* is identical with *B. niponica*.

6. *Bembecinus hungaricus formosanus* (Sonan, 1928)

Stizus formosanus Sonan, Trans. Nat. Hist. Soc. Formosa, 18 (97): 262, 1928 (Formosa: Taipei, Shintien, Chuchi, Kao-Hsiung, Fenliao, Hengchun, incl. varr. *5-maculatus* and *4-maculatus*).

Stizus formosanus var. *quadrimaculatus*: Iwata, *ibid.*, 29 (189): 171, 1930 (biol.).

Bembecinus hungaricus (a bright coloured form): Tsuneki, Etizenia, 8: 14, 1965; Kontyu, 35 (4): 385, 1967.

Specimens collected: 269 ♀♀ 117 ♂♂: Pingtung Pref. (166 ♀♀ 7 ♂♂, Hengchun, 1-8. VIII.; 1 ♀ 4 ♂♂, Shatau, 9. VIII.; 3 ♀♀, Ssuchungchi, 6. VIII.); Taitung Pref. (15 ♀♀ 28 ♂♂, Taitung, 11, 15. VIII.; 24 ♀♀ 14 ♂♂, Chihpen, 12. VIII.; 4 ♀♀ 13 ♂♂, Taoyeh, 14. VIII.); Chiayi Pref. (1 ♀, Chuchi, 21. VII.); Hualien Pref. (45 ♀♀ 14 ♂♂, Liyuchih, 16. VIII.; 19 ♂♂, Tienhsiang, 15. VIII.); Ilan Pref. (10 ♀♀ 28 ♂♂, Tsukeng, 20. VIII.); K. Tsuneki et T. Tano leg.

Notes on some characters.

(1) *Maculation*. Of all the specimens above listed the maculation was examined in relation to each part of the body as well as to each local population. The results, excluding the constant and non-variable ones were given in Table 1 and partly also in Table 2. There is no noticeable tendency of local variation among the specimens, but the individual variation on some body parts is considerably large as realized from the Tables.

The following are constantly yellow maculated: Clypeus wholly, supra-clypeal area occupying whole the space above the clypeus till the level of the antennal sockets, inner orbital streaks, scapes in front, flagellum beneath, a narrow transverse line on pronotum, humeral angles, a patch on tegulae and on wing base (both more or less varied in degrees of development), postero-lateral angles of mesonotum including the axillae, two large marks on tergite 1 (sometimes almost in touch with each other), laterally widened apical band on tergites 2 and 4 (in ♂ the band on 4 sometimes narrowly interrupted in middle).

While the following are the variable maculation:

(a) Labrum. In females almost always with a small black spot, either triangular or rounded, at base in middle. Of the 243 specimens only 6 were without the black spot. Therefore, it can be used almost certainly as one of the specific characters of this species. While in males it is quite uncertain. Out of the 128 specimens only 39 (about 30 %) carry the spot. Therefore, without the spot is rather the rule.

(b) Lateral streaks of mesonotum. Postero-lateral marks on mesonotum constantly present, but vary in development. In some specimens the marks extended upward. In this case, however, the areas are always discoloured, leaving only a fine streak or one or two small spots along the inner margin of the anterior portion. The occurrence is rather rare, being found in 27 out of 243 female specimens as given in Table 2, while in males very rare, only two specimens carrying the maculae and the character was omitted in the Table.

(c) Lateral spots on scutellum. In females 60/243 and in males 60/128 without the marks, in others fairly variable in development, but always not large (as in *pacificus* later described), at the largest not surpassing 1/5 the width of the scutellum. Details were given in Table 1.

(d) Postscutellum. Sometimes with a narrow short band, more frequently with two spots always very small. The occurrence is much rarer in males (Table 1).

(e) Postero-lateral marks of propodeum. Presence in female 158/243 (about 65 %) and in males 30/128 (about 23 %), variable in development. According to the general standard in *tridens*-group of our region they belong either to the middle or the small (Table 1).

(f) Markings on tergite 3. From the complete band as on tergite 2, changing through the medianly interrupted or laterally shortened band, two lateral marks with medial intermittent line, wholly intermittent band including three marks or four marks, two transverse marks that are usually abbreviated on the sides, reaching finally two small lateral spots, and in the extreme case the marks on the segment completely disappeared.

(g) Markings on tergite 5. General tendency of reduction in size is as on tergite 3, including various phases of variation. But on none of the specimens could I find the segment immaculated

Table 1. Variation in maculation of the local populations of *Bembecinus hungaricus formosanus*.

Loco (No.)	Scut.				P.-Scut.				Prop. p. 1.				Labr.		Maculation types of abdomen															
	L	M	S	N	L	M	S	N	L	M	S	N	A	B	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
恒春 (162)	-	56	58	48	-	5	22	135	-	10	86	66	161	1	73	38	20	2	1	-	-	-	-	-	10	10	5	3	-	-
台東 (14)	-	5	5	4	-	1	2	11	-	1	11	2	13	1	4	3	-	1	-	-	-	-	-	-	4	2	-	-	-	-
粗坑 (8)	-	5	3	-	-	3	3	2	-	1	6	1	8	-	6	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-
鯉魚池 (38)	-	21	12	5	-	3	3	32	1	2	24	11	36	2	11	10	2	2	1	-	2	-	-	-	6	1	2	-	1	-
知本 (21)	-	9	9	3	-	1	2	18	-	3	13	5	19	2	6	4	2	1	-	-	1	-	-	1	1	2	2	1	-	-
														♀																
恒春 (11)	-	2	1	8	-	-	-	11	-	-	2	9	5	6	1	1	1	3	3	1	-	-	1	-	-	-	-	-	-	-
台東 (27)	-	11	1	15	-	-	-	27	-	-	8	19	9	18	1	2	2	4	8	2	2	1	1	-	-	2	1	-	1	-
粗坑 (28)	-	15	8	5	-	-	5	23	1	1	11	15	9	19	1	1	8	7	6	-	-	-	1	2	-	2	-	-	-	-
鯉魚池 (14)	-	4	4	6	-	1	-	13	-	-	3	11	4	10	-	1	2	1	4	2	-	-	-	-	1	1	-	2	-	-
知本 (13)	-	1	4	8	-	-	2	11	-	-	1	12	3	10	1	1	4	1	2	-	1	-	-	1	1	-	-	-	1	-
稻葉 (17)	-	-	8	9	-	-	-	17	-	-	1	16	5	12	3	1	3	2	2	3	-	-	-	3	-	-	-	-	-	-
天祥 (18)	-	1	8	9	-	-	-	18	-	-	3	15	4	14	2	-	4	4	4	1	-	-	-	-	1	1	-	1	1	1
														♂																

Remarks. Loco: 恒春 (Hengchun), 台東 (Taitung), 粗坑 (Tsukeng), 鯉魚池 (Liyuchih), 知本 (Chihpen), 稻葉 (Taoyeh), 天祥 (Tienhsiang).

Body portion: Scut., Scutellum. P.-Scut., Postscutellum. Prop. p. 1., Propodeal postero-lateral maculae. Labr., Labrum.

Macula: L, Large. M, Middle. S, Small, N, None; A, Absent, B, Present.

Maculation type: ♀, Fig. 1, A to G. H to P are as follows: H-J, none. K, Type B+a median spot on seg. 5. L, Type A with median spot on seg. 5 lacking. M, Type A with band on seg. 3 interrupted in middle. N, Type C with more spots on seg. 3 and with median spot on seg. 5 lacking. O, Type A with band on seg. 3 finely intermittent. P, near Type N, with 3 spots on seg. 3 and 2 spots on seg. 5.

In ♂, Fig. 2, A to J. K to P are as follows: K, Type A with two lateral spots on seg. 6 lacking. L, Type B plus two spots on seg. 6. M, Type C plus two spots on seg. 6. N, Type D plus two spots on seg. 6. O, Type E plus two spots on seg. 6. P, Type F plus two spots on seg. 6.

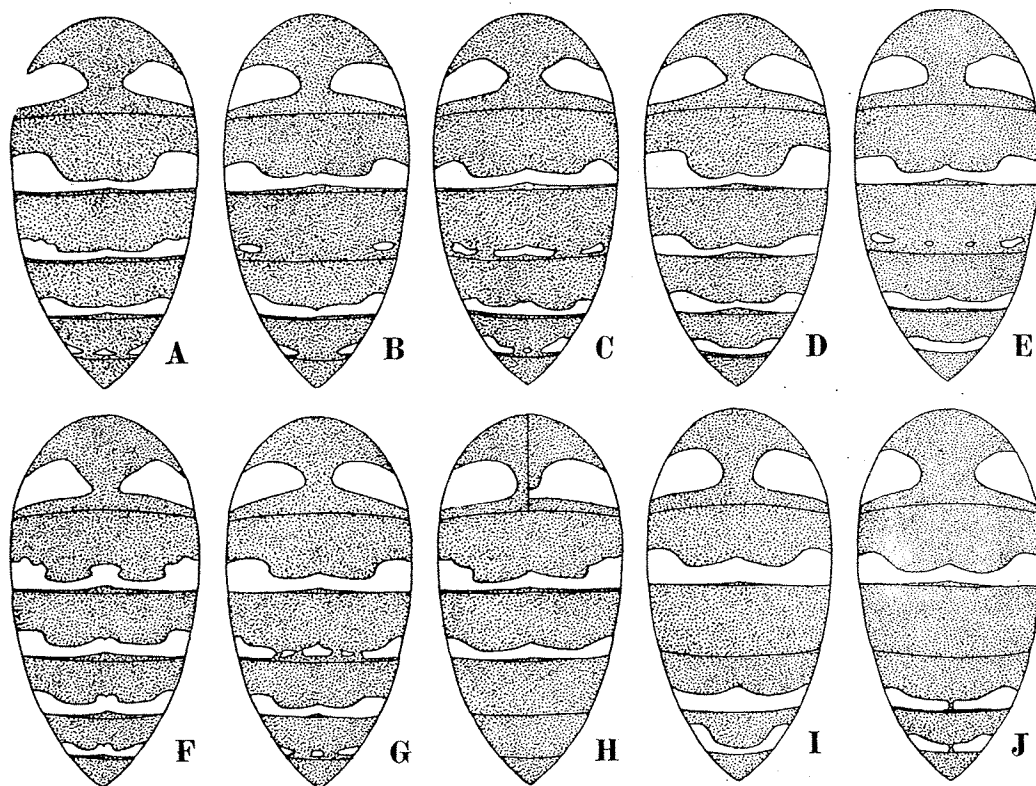


Fig. 1. Maculae on abdominal tergites of *Bembecinus* spp. ♀.

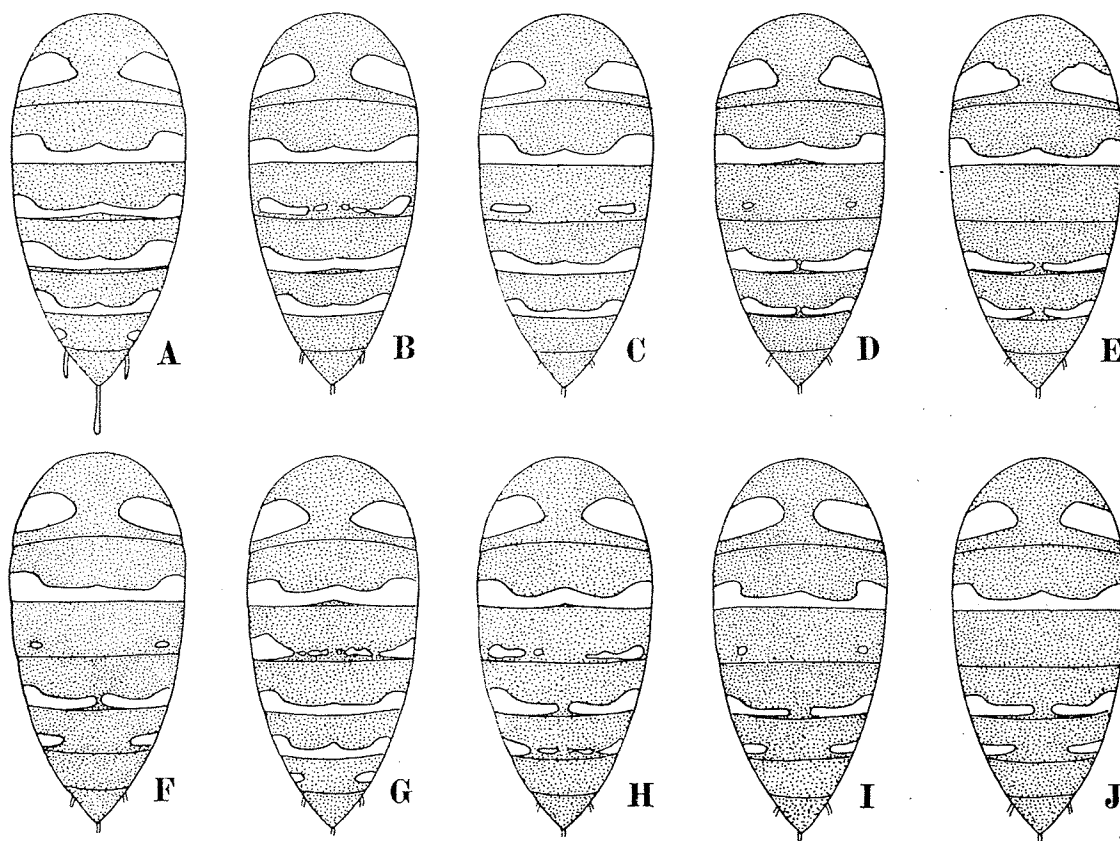
A-G, *Bembecinus hungaricus formosanus* (Sonan). H, *B. nigriclypeus* (Sonan). I, *B. posterus* (Sonan). J, *B. pacificus* sp. nov.

Table 2. Variation in maculation and structure of the local populations of *Bembecinus hungaricus formosanus*.

Locality	No.	Sex	M. a. l. p.				M. p. l. a.				Cub. cell 2			Post. lat. incision of propodeum																							
			L	M	S	N	L	M	S	N	P	T	Q	Type A			Type B					Type C															
														a	b	c	a	b	c	d	e	a	b	c													
Hengchun	162	♀	-	3	9	150							125	33	4	67	18	13	10	14	8	16	-	16	1	1											
Taitung	14	♀	-	-	-	14							9	5	-	9	1	-	1	1	-	2	-	-	-	-											
Tsukeng	8	♀	-	1	7	-							4	4	-	1	-	1	2	2	-	1	-	1	-	-											
Liyuchih	38	♀	-	-	3	35							25	13	-	12	-	1	5	10	1	3	1	3	2	-											
Chihpen	21	♀	-	2	1	18							15	6	-	5	1	1	7	4	6	1	1	1	-	1											
			A B C D																																		
Hengchun	11	♂	5	-	6	-	-	7	4	-			7	2	2	1	-	4	1	-	-	2	-	1	1	1											
Taitung	27	♂	8	1	18	-	-	26	1	-			20	6	1	6	1	3	2	2	3	6	-	2	1	1											
Tsukeng	28	♂	12	-	16	-	2	25	1	-			18	9	1	4	-	1	5	3	3	5	2	3	2	-											
Liyuchih	14	♂	2	-	12	-	-	13	1	-			6	7	1	3	2	-	-	1	1	4	-	2	1	-											
Chihpen	13	♂	4	-	8	1	-	11	2	-			9	1	3	3	1	-	2	2	2	1	2	-	-												
Taoyeh	17	♂	2	-	15	-	-	15	2	-			13	3	1	4	-	-	1	-	-	4	-	2	-	1											
Tienhsiang	18	♂	4	-	14	-	-	18	-	-			15	3	-	1	-	2	2	1	2	3	1	3	2	1											

Remarks. M. a. l. p. ... Macula on antero-lateral portion of mesonotum. M. p. l. a. ... Macula on postero-lateral angle of mesonotum. Cub. cell 2... Cubital cell 2 of fore wing (P, petiolated. T, triangular. Q, quadrangular). Post. lat. ... Postero-lateral. L, M, S, N... See Table 1. Types A, B, C... See Fig. 3.

A, B, C, D in the section of ♂ show the states of the middle of the three spines at the caudal end. A ... apically slightly enlarged, apex rounded. B ... apically considerably enlarged, apex rounded. C ... parallel-sided, apex rounded. D ... apically attenuate, spex pointed.

Fig. 2. Maculae on abdominal tergites of *Bembecinus hungaricus formosanus* (Sonan), ♂.

and, moreover, the maculae are not so small as to be called dots. Most frequently the maculation is represented by three maculae in both sexes.

(h) Markings on tergite 6 (♂). Sometimes observed as two lateral spots, more frequently

the segment is immaculated. In too many cases, however, they can not be observed through the retraction of the segment into the preceding one, so that it was impossible for me to compare the occurrence statistically.

(i) Abdominal maculation as a whole. As a whole the abdominal maculation was roughly classified into 16 types as given in Table 1 and partly given in Fig. 1 (♀) and Fig. 2 (♂). The types that were not given in the Figures were explained in the remarks of the Tables. In females types A and B are very frequent and type L is considerably so. While in males types C, D and E are comparatively frequent.

As an exceptional case I can give a male specimen captured near the seashore of Taitung which bears a pair of lateral maculae on tergites 1 and 2 only (Pl. II, Fig. 19). I thought it at first to belong to another species, but the careful studies on the maculation on other parts of the body, especially on the ventral side of the abdomen, as well as the structural distinctions including the genital organs did not allow me to place the specimen outside the scope of the present species. Finally I determined to deal with it as an extreme case of variation in maculation in this species.

(j) Ventral side of abdomen. Four pairs of lateral maculae (sternites 2-5) in females and five pairs (sternites 2-6) in males are the rule. Always largest on sternite 2 and progressively reducing in size posteriorly. Exceptional cases in which the posterior one (♀), or one or two (♂) pairs disappeared are rather rare.

(k) Legs. On legs the following yellow is the rule: Fore and mid coxae at apex, apical portions and beneath of fore and mid femora, fore and mid tibiae except inside, hind tibiae except outer apical mark, fore tarsi except a line on outer margin of metatarsus, mid tarsi wholly and hind tarsi except base and apex. The tarsi apically more or less ferruginous.

(2) *Structure*. Posterior lateral incisions of propodeum (♀♂), the form of the 2nd cubital cell of fore wing (♀♂) and the form of the middle of the apical teeth of the abdomen (♂) were statistically examined (Table 2), and some of other characters were also examined using 10 specimens as a rule to each local population that were sampled at random excepting that a consideration was paid to include two minimum and two maximum specimens:

(a) Second cubital cell. Classified into three categories, shortly petiolated, trigingular and

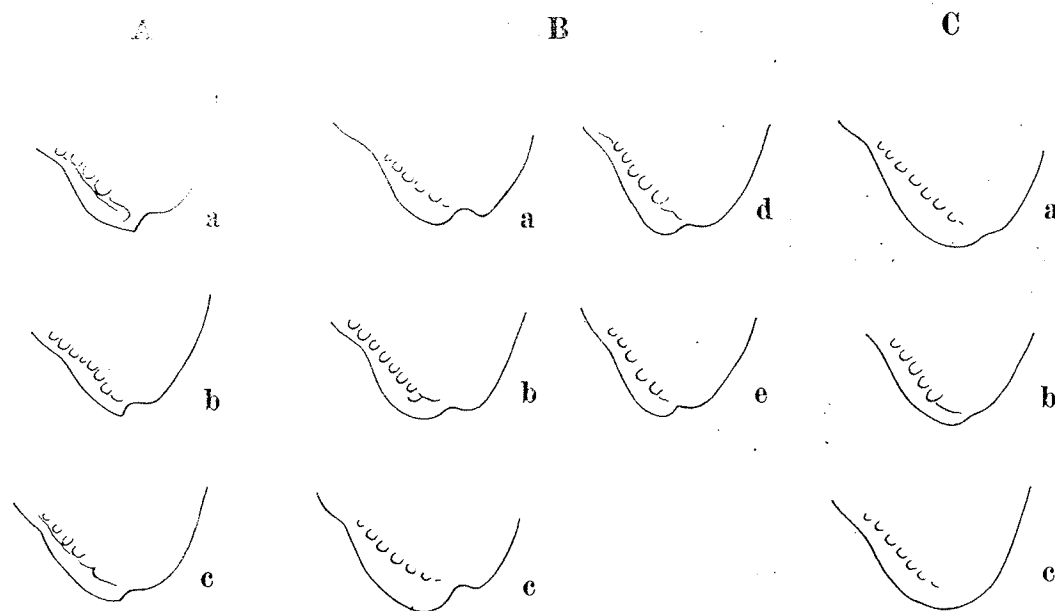


Fig. 3. Three types of postero-lateral incision of propodeum in *Bembecinus hungaricus formosanus* (Sonan) (♀♂), each showing variation (lateral view).

Table 3. Relative length of interocular distance at vertex (A), at base of clypeus (B) and length of clypeus in middle (C) of the local populations of *Bembecinus hungaricus formosanus* and of some other geographical races of the same species.

Locality	No.	Sex	A	B	C	A/B	B/C
Hengchun	10	♀	47.4 (39-52)	20.5 (17-24)	15.4 (12-18)	2.31 (2.2-2.4)	1.33 (1.2-1.4)
Chihpen	10	♀	48.4 (45-52)	20.7 (19-23)	16.2 (15-18)	2.34 (2.3-2.4)	1.29 (1.3-1.3)
Taitung	10	♀	47.4 (43-54)	20.4 (18-24)	15.8 (14-18)	2.32 (2.3-2.4)	1.29 (1.2-1.3)
Liyuchih	10	♀	47.6 (41-52)	20.6 (19-23)	16.1 (13-18)	2.31 (2.2-2.6)	1.28 (1.2-1.4)
Tsukeng	10	♀	48.1 (47-50)	21.3 (20-22)	16.6 (16-18)	2.26 (2.1-2.4)	1.28 (1.2-1.4)
Hengchun	7	♂	42.1 (40-44)	15.4 (15-16)	14.7 (13-16)	2.73 (2.6-2.9)	1.05 (1.0-1.2)
Chihpen	10	♂	42.9 (37-46)	15.3 (13-17)	15.3 (13-18)	2.80 (2.7-3.0)	0.97 (0.9-1.1)
Taitung	10	♂	43.5 (41-47)	15.6 (14-18)	15.5 (14-17)	2.75 (2.5-2.9)	1.01 (0.9-1.1)
Liyuchih	10	♂	43.2 (33-46)	15.2 (12-17)	14.9 (11-17)	2.84 (2.5-2.9)	1.02 (0.9-1.1)
Tsukeng	10	♂	45.5 (40-49)	16.3 (15-18)	16.7 (15-18)	2.81 (2.7-2.9)	0.98 (0.9-1.0)
Tienhsiang	10	♂	45.6 (43-48)	16.1 (15-17)	15.9 (14-17)	2.83 (2.7-3.0)	1.01 (1.0-1.1)
Japan	12	♀	52.9 (36-58)	25.6 (17-28)	17.9 (12-21)	2.07 (2.0-2.2)	1.43 (1.1-1.6)
Amami Is.	10	♀	54.1 (46-58)	24.0 (20-26)	18.1 (15-20)	2.26 (2.2-2.4)	1.33 (1.3-1.4)
Korea	3	♀	51.0 (49-52)	22.7 (22-23)	17.7 (17-18)	2.24 (2.2-2.3)	1.28 (1.3-1.3)
Spain	3	♀	51.3 (51-52)	24.0 (23-25)	16.0 (16-16)	2.14 (2.1-2.2)	1.50 (1.4-1.6)
Formosa	50	♀	47.8 (39-54)	20.7 (17-24)	16.0 (12-18)	2.31 (2.1-2.6)	1.29 (1.2-1.4)
Japan	12	♂	47.5 (43-51)	18.9 (17-20)	17.1 (15-19)	2.51 (2.5-2.6)	1.11 (1.1-1.2)
Amami Is.	10	♂	49.1 (38-53)	17.4 (13-19)	18.4 (14-20)	2.82 (2.7-2.9)	0.95 (0.9-1.0)
Korea	1	♂	48.0	17.0	18.0	2.80	0.90
Spain	2	♂	46.0 (46-46)	19.0 (19-19)	16.0 (16-16)	2.42	1.18
Formosa	57	♂	43.8 (33-49)	15.8 (12-18)	15.5 (13-18)	2.80 (2.5-3.0)	1.01 (0.9-1.2)

Remarks. A was measured at the anterior margin of the postocelli. B denotes the minimum interocular distance. In the relative values of A, B and C 7.0 corresponds 1 mm.

Measured specimens of each population consist of the largest 2, smallest 2 and the middle-sized of the rest, as far as possible. Numerals within parenthesis show the variation within one population.

quadangular. The last means that the two transverse cubital veins slightly apart from each other at the junctions with radial vein. Sometimes it is more or less different between the right and left wings and in such cases it was classified to one of them much closer as a whole. The results were given in Table 2. The shortly petiolated is overwhelmingly abundant in both sexes, but the triangular is not always rare. While the quadangular is rather exceptional.

(b) Postero-lateral incision of propodeum. This character has long been considered important by the taxonomists to separate the species of this genus. According to my study (1965), however, the character is also considerably variable within the species and the general tendency alone can be used as a specific distinction. The fact is also verified by the present investigation. The various forms observed were roughly classified into 3 types, types A, B and C, and each further subdivided into three or five minor types. Type A includes the forms having a more or less deep incision, with its lower corner angulated; type B similar, but the lower corner of the incision rounded, while type C is the form completely or nearly completely without the incision (Fig. 3). The area is flatly compressed and slightly bulged out. Therefore, to determine the type it was always observed perpendicularly to the surface, that is to say, obliquely in front, not from the side. The results were given in Table 2 which show clearly the wide range of variation in this character. Certainly, in some specimens the incisions on both sides considerably different, sometimes one belonging to type A, while the other to type C (!). As a general tendency we can say only that the majority of the individuals have a fairly deep incision (Table 2).

(c) Central one of the apical spines of the caudal sternite in ♂. The form was divided into 4 classes, A, B, C and D. A, slightly enlarged at apex, with apical margin rounded; B, considerably enlarged at apex, with apical margin rounded; C, parallel-sided, apex rounded; D, apically attenuate, with apex pointed. Most of the specimens belong either to A or C as given in Table 2 (in the section of ♂).

(d) Ocular index (van der Vecht, 1949; de Beaumont, 1954). The proportion of interocular

distance at vertex (in this case measured at the anterior margin of postocelli) and at clypeus (minimum distance).

This index, according to the results of de Beaumont, is not always important to separate the species, since the variations between local populations of the same species are considerably large. In my examples the individual variation within the same population is sometimes fairly large, but the averaged value of the population is comparatively less fluctuative from one local population to another (Table 3). The result indicates that the Formosan subspecies has not as yet differentiated, as far as the character is concerned, within the Island.

On the other hand, the indices obtained for comparison with populations of the same species from other regions of Asia and Europe are in some cases markedly different from each other (Table 3). This is the same as in the de Beaumont's result and shows together that the index is sometimes of use to separate subspecies.

(e) Clypeal index (de Beaumont, 1954). The proportion of upper width of clypeus (practically identical with the minimum interocular distance) to its length in middle. Very similar results were obtained as in the case of ocular index (Table 3).

(f) Supra-clypeal area. In length always slightly less than the width of antennal socket.

(g) Antennal joints. In the specimens of *hungaricus* antennal joints 3-7 progressively reducing in length. However, in comparison with the specimens of western Palaearctic Region the East-Asiatic specimens have each of these joints relatively slightly longer. Joint 3 in the typical form is 2.5 times as long as wide at apex in narrowest (dorsal) view, while in the East Asiatic forms it is 2.7 times so in the dorsal view, only in lateral (widest) view it is 2.5 times as long as wide. This is true not only with the Formosan population, but also with the population of Japan (*B. hungaricus japonicus*). Between populations of East Asia, however, there is no difference in this character.

(h) The furrow between and behind postocelli. As a rule there is no such a furrow, but occasionally in some specimens a feeble impressed line is observable. The character is, therefore, not constant at least in this subspecies.

(i) Impunctate area at base of area dorsalis always narrow.

(j) Sixth tergite. van der Vecht called attention to the presence and absence of the impunctate median line on this segment. In the Formosan subspecies no such a character could be found in any of the specimens.

(k) Fore metatarsus. About twice as long as wide at apex, with the spines on the outer margin markedly long and somewhat thickened toward middle (Pl. II, Fig. 14). This is one of the common characters of *B. hungaricus*.

(l) Male genitalia. Paramere comparatively narrow and the latero-apical area deeply infuscated, volsella with apical finger-shaped protuberance (which is movable) comparatively long. The characters are also common to the species (Pl. II, Figs. 1 and 2).

(m) Body size. On an average distinctly smaller than in the populations of Japan and the Ryukyus, usually 7-8 mm (♀♂).

The Formosan population distinctly differs from the Japanese population not only in the maculation and size of the body, but also in the ocular and clypeal indices. From the similarly maculated population of southwestern Palaearctic Region it is different in the ocular and clypeal indices as given in Table 3.

7. *Bembecinus nigriclypeus* (Sonan, 1928)

Stizus nigriclypeus Sonan, Trans. Nat. Hist. Soc. Formosa, 18 (97): 265, 1928 (Formosa: Taipei Pref.,

Nantou Pref. — Wushe).

Bembecinus tridens (a form): Tsuneki, *Etizenia*, 8: 14, 1965 (listed).

Specimens collected: 17 ♀♀ 8 ♂♂: 16 ♀♀ 8 ♂♂, Nantou Pref. (Penpuchi), 10–14. VII; 27–30. VIII. 1966, K. Tsuneki et T. Tano leg.; 1 ♀, Ilan Pref. (Tsukeng), 19. VIII. 1966, H. Sasaji leg.

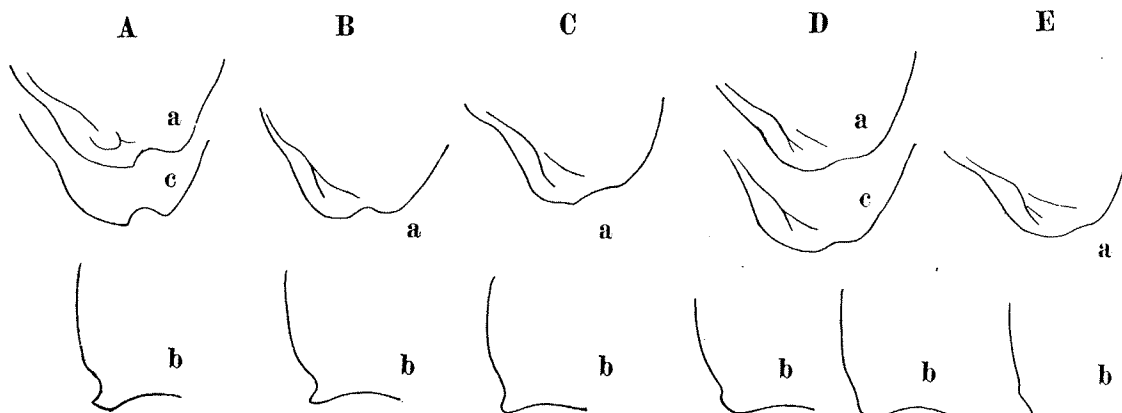


Fig. 4. Five types of postero-lateral incision of propodeum in *Bembecinus nigriclypeus* (Sonan) (♀♂) Upper, lateral view; lower, dorsal view.

Notes on some characters

This species belongs no doubt to the group of *tridens*, but as the original description is too simple some supplementary notes will be needed to grasp the true feature of the species.

(1) *Coloration* (♀♂). Head, antennae and thorax, wholly black, except the following: Short narrow inner orbital lines and a small spot on axillae of mesonotum yellow, the latter sometimes very obscurely so; palpi ferruginous; sometimes antero-lateral corners of clypeus and peripheral area of lubrum partly or wholly somewhat yellowish; scape apically and tegulae more or less brownish and in ♂ the two apical joints beneath of antennae narrowly ferruginous. On abdomen tergite 1 always carries two large lateral marks, they are medianly very close together and in 3 out of 15 females fused into a medianly narrowed band, tergites 2 and 3 always adorned with apical band, laterally markedly and medianly somewhat widened, the hue is deep orange or kaki-coloured and much more strongly so on the peripheral areas of the marks of tergite 1 and on the anterior margin of the two bands (Fig. I, H). On tergite 4 maculae variable: In 2 ♀ 3 ♂ medianly shortly banded, in 7 ♀ 1 ♂ medianly one or two spotted, and in 6 ♀ 6 ♂ without any mark. On legs (♀♂) cream yellow: A spot at apex of fore and mid femora, fore tibiae and tarsi broadly in front, a streak on anterior side of mid tibiae, varied more or less in development and in ♂ generally broader, and anterior margin of mid tarsi. Sometimes the fore tarsi in front orange brown and always the apical joint of fore tarsus largely ferruginous. Tibial spurs pale yellow in fore legs and in others whitish with apex black.

(2) *Pilosity* (♀♂). Clypeus covered with appressed silvery pubescence, glittering only in certain light, and mixed with less numeral, long, erect greyish white hairs; frons and vertex closely covered with short half decumbent brownish hairs, in oblique light bright-silverily glittering, on frons mixed with long erect pale brownish hairs. Mesonotum pilose as on vertex, but the appressed brownish pile not glittering, mesopleuron with similar pilosity, but the silver shine of the appressed hairs much weaker and the erect hairs greyish white. On abdomen pubescence on dorsal side brownish black in ♀, dark brown in ♂, on tergite 1 laterally greyish white in both and ventrally pale brown, on apical margin of each tergite the hairs rather becoming fringe-like, more or less stiff, tergite 6 in ♀ and 7 in ♂ covered with short half-erected bristles, mixed with

a few long erect ones. Hind femora beneath with sparse curved hairs.

(3) *Structure*. (a) Ocular index and (b) clypeal index stable among the specimens, variation small, the averaged values are given in Table 4. (c) Interocellar furrow usually present, but sometimes very feeble and rarely unobservable. (d) Antennal joints (♀♂) 3-7 as compared with those of *tridens* distinctly relatively longer, joint 3 in widest view 2.8 times, in narrowest view thrice as long as wide at apex, joint 4 in narrowest view twice as long as wide, structure of apical three joints also slightly different (Pl. II, Fig. 11), it also differs from that of *hungaricus formosanus* (Ditto, Fig. 10).

(e) Postero-lateral incisions of propodeum. Five types were roughly distinguished (Fig. 4). As in other species this character is considerably variable and improper to place much stress on this structure. The frequency: Type A ... 4 ♀ 1 ♂, type B ... 1 ♀ 1 ♂, type C ... 1 ♀ 1 ♂, type D ... 8 ♀ 3 ♂, type E ... 3 ♀ 3 ♂. (f) Lateral margins of posterior portion of propodeum fairly acutely edged, the edged area reaching upward more than half of the segment. The character is constant and more reliable than the incision. (g) While the curvature of the lateral margins seen from above considerably varied in accordance with the variation in the form of the postero-lateral incisions and can not be a specific distinction.

(h) Second cubital cell of fore wing. As a rule quadangular, taken cubital vein as straight. The upper ends of transverse cubital veins separated on radial vein by a distance which is usually less than as long as 3rd abscissa of cubital vein in 2nd cell, at the largest about half the length of antennal joint 3 (in this case as long as abscissa 3). Among the specimens 1 ♀ 1 ♂ have the cell very close to triangle in form and in other 3 ♂ next to it. (i) Impunctate median line on tergite 6 in ♀ could not be discovered on any of the specimens. (j) Fore metatarsus in ♀ twice as long as wide at apex as in *tridens*, wholly black, with the spines on outer margin except the apicalmost one not long, slightly less than as wide as the segment (Pl. II, Fig. 15). (k) The medial one of the caudal spines in ♂ mostly slender and parallel-sided on apical portion and with apex rounded, sometimes, however, slightly enlarged apically.

(1) The male genitalia (Pl. II, Fig. 3) in form resemble those of *hungaricus* but seem that

Table 4. Variation and comparison within and between species of representatives of *tridens*-group of *Bembecinus*.

Species Locality	No. Sex	A	B	C	A/B	B/C
<i>tridens</i>						
Cyprus	2 ♀	48.0 (46-50)	25.0 (24-26)	15.5 (15-16)	1.92 (1.9-1.9)	1.61 (1.6-1.6)
Poland	3 ♀	43.7 (43-44)	21.5 (21-23)	14.0 (14-14)	2.01 (1.9-2.1)	1.55 (1.5-1.6)
<i>nigricalyp.</i>						
Formosa	5 ♀	56.2 (54-59)	26.2 (25-27)	19.0 (19-19)	2.15 (2.1-2.2)	1.38 (1.3-1.4)
<i>posterus</i>						
Formosa	11 ♀	52.1 (50-54)	24.7 (23-27)	17.8 (17-19)	2.11 (2.0-2.2)	1.39 (1.3-1.5)
<i>pacificus</i>						
Formosa	17 ♀	51.6 (47-57)	22.9 (21-26)	18.8 (16-21)	2.25 (2.2-2.4)	1.25 (1.2-1.3)
<i>penpuchi.</i>						
Formosa	1 ♀	50.0 (—)	27.0 (—)	16.5 (—)	1.85 (—)	1.64 (—)
<i>tridens</i>						
Cyprus	2 ♂	45.5 (44-47)	21.0 (20-22)	16.0 (16-16)	2.21 (2.1-2.2)	1.31 (1.3-1.4)
Portugal	4 ♂	49.0 (44-53)	22.3 (20-24)	15.5 (15-16)	2.20 (2.1-2.3)	1.44 (1.3-1.5)
Poland	4 ♂	45.3 (41-47)	19.8 (18-21)	15.5 (14-16)	2.29 (2.2-2.4)	1.27 (1.3-1.3)
<i>nigricalyp.</i>						
Formosa	5 ♂	50.2 (45-52)	18.3 (17-19)	17.8 (16-19)	2.76 (2.7-2.7)	1.02 (1.0-1.1)
<i>posterus</i>						
Formosa	3 ♂	47.7 (47-48)	18.3 (18-19)	16.0 (15-17)	2.61 (2.6-2.7)	1.14 (1.1-1.2)
<i>pacificus</i>						
Formosa	26 ♂	46.3 (41-51)	16.0 (14-19)	17.4 (15-21)	2.84 (2.7-3.1)	0.95 (0.8-1.1)
Korea	3 ♂	51.3 (49-54)	18.7 (18-19)	20.3 (20-21)	2.71 (2.3-2.8)	0.92 (0.9-1.0)

Remarks. Measurement as in Table 3.

the paramere slightly wider, in colour distinctly different, much paler, semitransparent, without apicolateral blackish staining. (m) Tergite 8 also much paler in colour than in other sympatric species of Formosa.

Punctuation on mesonotum certainly duplipunctate as in *tridens*, but with the larger punctures much closer and the appearance of duplipunctuation is almost lost. Punctures on sternites 3-5 (♀) or 3-6 (♂) more distinctly outlined than in *tridens*, rounded and comparatively larger, on apical sternite similarly duplipunctate. Length ♀ 8-11 mm, ♂ 7-9 mm.

Remarks. Judging from the simple original description I thought that this is one of the subspecies of *B. tridens*. According to the direct study of the specimens above listed it seems that the differences in structural, colorific as well as punctual characters make it justify to separate the population as a distinct species. Among the known species *B. insularis* (Handlirsch) seems somewhat resembling the present species, but it differs in many characters.

8. *Bembecinus posterus* (Sonon, 1928)

Stizus posterus Sonon, Trans. Nat. Hist. Soc. Formosa, 18 (97): 264, 1928 (Taipei Pref.)

Bembecinus hungaricus: Tsuneki, Etizenia, 8: 14, 1965.

The original description dealt only with the colorific characters and the species was considerable to fall within the category of *B. hungaricus*. During our collecting journey we could capture some ten specimens that agree in the colorific characters with *posterus* and as a result of close examination it was made clear that they are rather close to *tridens*, but different from this in many structural distinctions and merit a valid species.

Specimens collected: 9 ♀♀ 1 ♂, Pingtung Pref. (Kuaru), 3, 7. VIII., K. Tsuneki et T. Tano leg.; 1 ♀, Chiai Pref. (Chuchi), 20. VII., K. Tsuneki leg.; 1 ♂, Pingtung Pref. (Mantchou, 4. VIII., K. Tsuneki leg.; 1 ♂, Nantou Pref. (Penpuchi), K. Tsuneki leg.

Remarks. In the following the specific characters that are almost lacking in the original description will be given:

(1) *Coloration.* ♀. Maculae distinctly with the hue of orange yellow. On body the following are constant: Clypeus except apical black band not clearly outlined upward, labrum except medio-basal transverse macula (sometimes split into two spots and brown or dark brown in colour, varied more or less in development), supra-clypeal area reaching sideways to inner orbital streaks which extend upward about 2/3 of anterior frons, antennae beneath thoroughly, a large macula at the nape partly covered by the head in the usual posture of the specimen, medianly shortly interrupted narrow band on pronotum, humeral angles, a small macula at postero-lateral corners of mesonotum including axillae, two comparatively large maculae on scutellum, a large elongate macula along posterior sides of propodeum, two large macula on tergite 1, laterally widened apical band on tergites 2 and 4, on 4 not reaching sides, and a pair of lateral maculae on sternites 2 and 3.

The following are inconstant and variable:

(a) A spot on tegula. In 3/11 without yellow spot.

(b) Tergite 3. As a rule wholly black, but in one specimen a narrow short transverse band present.

(c) Tergite 5. Most usually provided with a pair of comparatively large lateral transverse maculae. In one specimen, however, they turn into a well developed apical band and in another changed into a short narrow transverse macula in the middle.

Legs with the following yellow: Underside and apical spot of fore and mid femora; tibiae and basal 3 joints of tarsi of fore legs. Mid leg similar to fore leg in the pattern of maculation of tibia and tarsus, but on tibia and metatarsus basally broadly black. Rest of tarsal joints basally

black apically brown.

♂. Similar to ♀, but clypeus and labrum wholly yellow, lateral maculae on tergite 5 always turning into a distinct band, sternite 4 sometimes with similar lateral spots. Fore coxa with a large macula, yellow on fore and mid legs more developed, including trochanters beneath and a macula on mid coxa; hind tarsi beneath wholly yellow, sometimes except base, and sometimes the preceding tibia including a spot beneath.

(2) *Structure* ♀.

(a) Ocular index, (b) clypeal index. As given in Table 4, comparatively stable and close to those of *nigriclypeus*. (c) Supra-clypeal area. Even under eye measurement easily perceived that the area longitudinally distinctly shorter than in *hungaricus* and *nigriclypeus*, averaged ratio of the space to the width of antennal socket (the space measured by the distance between upper margin of clypeus and lower margin of antennal socket) 0.53, in *nigriclypeus* 0.66. (d) Interocellar furrow. Unobservable, though sometimes feebly impressed. (e) Antennal joint 3. Slightly shorter than in *nigriclypeus*, in dorsal view 2.5 times as long as wide (similar to that of *hungaricus*). (f) Lateral margin of propodeum. Fairly acutely edged up to above middle of whole the margin. (g) Latero-posterior incision of propodeum. Considerably varied in this species also, unreliable as a specific distinction. Among the specimens type A (Fig. 4), 4; type B, 1; type C, 3; type D, 1; type E 2. (h) Punctuation at base of area dorsalis. Generally with a comparatively broad impunctate area. (i) Median impunctate area on tergite 6. None. (j) Fore metatarsus. About 2.3 times as long as wide at apex, slightly different in form from *nigriclypeus*, with spines on outer margin short and markedly thick (Pl. II, Fig. 16, cf. Fig. 15) (k) Second cubital cell of fore wing. In 9 specimens quadangular, with space between upper ends of transverse cubital veins more or less varied in width. In 2 specimens rather triangular, the two ends lie so close as to contact with each other. In body length as large as *nigriclypeus*, 8-11 mm, distinctly larger than *hungaricus formosanus*. Length 9-11 mm.

♂. Inner orbits more strongly convergent below and clypeus much longer than in ♀, and the ocular index much larger and clypeal index much smaller accordingly (Table 4); supra-clypeal area comparatively short, ratio of it to the width of antennal socket 0.71 (in *nigriclypeus* ♂ 1.08); antennal joint 3 about 2.3 times as long as wide at apex, ultimate joint comparatively longer than in *hungaricus formosanus* or in *nigriclypeus* (Pl. II, Fig. 12, cf. Figs. 10 and 11). As to postero-lateral incision of propodeum type D (Fig. 4) 2 and type E 1. Apical sternite more bluntly convergent apically and punctures sparser than in *nigriclypeus*. Cubital cell 2 of fore wing quadrangular in 2 specimens and triangular in the remaining one. Fore metatarsus relatively longer than in *nigriclypeus*, approximately thrice as long as wide at apex. Genitalia: Pl. II, Figs. 5 and 6, with paramere very broad, not semitransparent, with volsella more robust, its latero-apical protuberances shorter, somewhat laterally compressed, more or less lobiform in lateral view (Pl. II, Fig. 7); in *nigriclypeus* volsella slenderer, with apical protuberances longer, simply attenuate (Ditto, Figs. 3 and 4). The middle of apical spines of end sternite apically slightly attenuate and slightly enlarged and rounded at apex. Punctuation at base of area dorsalis generally as in ♀, sometimes impunctate area somewhat narrower, but sometimes the middle area broadly impunctate. Length 7-9 mm.

Punctures on sternites in both sexes except those on apical one in ♂ generally similar to *nigriclypeus*.

9. *Bembecinus penpuchiensis* sp. nov.

Very similar to *B. posterus* in many characters. In some characters, however, distinctly

different:

♀. (1) Length 9.5 mm. In colour similar to *B. posterus* except the following:

Supra-clypeal area black, only with a median comparatively large triangular yellow macula, clypeus with disc broadly black, leaving the peripheral areas yellow, labrum at base broadly black, only apical marginal half yellow. Antennae beneath with apical 5 segments black. Postscutellum with two small spots, maculae on tergite 1 and basal margin of the band on 2 deep orange (on other portions orange tone rather weak). Other maculae including the nape region similar to *posterus*.

(2) In structure also similar to *B. posterus* (including short supra-clypeal area) except the following:

Convergency toward clypeus of inner orbits slightly smaller (Table 4), clypeus somewhat shorter (ditto) but the relative length of supra-clypeal area similar, antennal joint 3 slightly longer, but very slight in degree (2.6 times as long as wide at apex), punctuation at base of area dorsalis more closely approaching basal line, leaving narrower impunctate area. Median line on tergite 6 more sparsely punctured than on other area, on posterior portion forming an impunctate line. Punctuation generally similar, on upper frons fine and sparse, well outlined, on sternite 6 coarse and sparse, well outlined. Postero-lateral incision of propodeum almost none, belonging to type D in Fig. 4. Second cubital cell quadrangular. Fore metatarsus similar (Pl. II, Fig. 18).

Holotype: ♀, Nantou Pref. (Penpuchi), 10. VII. 1966, T. Tano leg. (Coll. Tsuneki).

Remarks. This species differs from *nigriclypeus* not only in maculation which is very marked, but also in the structural characters as follows: Supra-clypeal area narrower, in ocular and clypeal indices somewhat different (Table 4), in punctuation on tergite 6 and in the form as well as the relative width of fore metatarsus also different.

10. *Bembecinus pacificus* sp. nov.

This species is partly similar to *B. hungaricus formosanus* and partly resembles *B. posterus* and considered to have been confused with the first species, because they are sympatric.

The chief difference between this species and *B. h. formosanus* lies in the character of cubital cell 2 of fore wing. In this species it is quadrangular as a rule, sometimes triangular and never petiolated, while in the compared species as a rule petiolated, sometimes triangular and rarely quadrangular (in such a case with the upper line always very short). As the character is in some cases overlapped it can not be decisive to separate the species. In the female, however, differences in maculation and body size enable us to separate the two species easily. In this species the maculae on the scutellum much larger and the labrum always wholly yellow, while in the male the maculae on scutellum of no use to separate them and the coloration of the labrum also unapplicable, because labrum in this species always without blackish mark, but the same is sometimes the case in the compared species. In genitalia the difference is distinct. In this species paramere much broader, pale yellow in colour on apical portion, without the blackish staining on latero-apical area; further the form of volsella also somewhat different. Certainly the difference is definite, but this character is improper for practical use. On the other hand, the ventral maculae of the abdomen are of great use. In this species at most 3 pairs of lateral maculae (on sternites 2-4) present, while in *hungaricus formosanus* at least 4 pairs, most usually 5 pairs, present. In some cases, however, the maculae on posterior portion become invisible owing to the contraction of the segment. Therefore, to separate the two species in the male the combination of the characters of cubital cell 2, coloration of clypeus and the maculae on ventral side of abdomen is of practical use.

♀. Length 8-10 mm. *Colour* generally cream yellow, sometimes maculae on thorax and basal one or two tergites more or less orange. The following yellow is constant: Clypeus, labrum, palpi, supra-clypeal area wholly, inner orbital striae, antennae beneath including scape, posterior margin of pronotum (sometimes shortly interrupted in middle), a patch on nape (usually covered by head), humeral angles, a spot on tegulae (usually comparatively larger), a macula on postero-lateral corners of mesonotum, two *large* maculae on scutellum, a macula along lateral margin on posterior portion of propodeum (usually large, occasionally middle-sized), two large maculae on tergite 1, a band on tergites 2 and 4, apical macula on fore and mid coxae, fore and mid femora beneath and apex, tibiae except posterior margin and inside, tarsi except posterior margin of basal two segments, and in hind legs a macula on tibiae externally and similar but smaller macula on metatarsi. All tarsi apically pale brownish.

Maculae on the following portions variable: Base of wings: In 2/20 specimens the yellow spot lacking. Tergite 3: In 4 specimens laterally widened band present, in 5 intermittent band, in 2 abbreviated band, in 6 three spots and in 3 one spot present, in no specimen immaculated. Tergite 5: In 4 specimens a band is present, in 15 a transverse macula on each side and a macula in middle and in 1 two small lateral spots present. Sternite: In 3 specimens a pair of lateral maculae on sternites 2, 3 and 4; in 15 only on sternites 2 and 3; in 2 on sternite 2 only; and in 1 lacking.

Structure: Averaged ocular index 2.25, averaged clypeal index 1.25 (Table 4), interocellar furrow not strong, but well defined in 12/20, weakly so in 6/20, almost absent in 2/20; impunctate area at base of area dorsalis generally broad (only in one out of 20 specimens rather narrow), postero-lateral incision of propodeum rather consistent with the types of *B. hungaricus formosanus* (Fig. 3), namely, type Ac found in 13 specimens, type Aa in 6 and type Ca in 1 specimen. Antennal joint 3 slightly less than thrice as long as wide at apex (narrowest view 2.8-2.9 times, widest view 2.7 times so), cubital cell 2 in fore wing always quadrangular, upper abscissa between junctions of transverse cubital veins equal to, or less than, the length of abscissa 3 of cubital vein of the cell. Matatarsus of fore legs about 2.2-2.3 times as long as wide at apex (Pl. II, Fig. 17), hind femur regularly attenuate basally and apically, no impunctate median line on tergite 6. Punctuation generally sparser than in *nigriclypeus*, similar to *B. h. formosanus*.

♂. Length 7.5-9.5 mm. *Coloration*: Head as in ♀, but the antennal flagellum beneath in a considerable number not thoroughly yellow, sometimes basal third only or basal half only yellow and apically ferruginous, brownish or dark brownish, and sometimes medianly darkened and apically ferruginous. On thorax and abdomen only the following maculae constant: A patch of nape region, medianly interrupted narrow band on pronotum, humeral angles, two large maculae on tergite 1 and two lateral spots on sternite 2. The following are inconstant and variable (specimens examined 26 in number):

A spot on tegula: In 2 disappeared. A spot on wing base: In 4 absent. Maculae on postero-lateral corners (incl. axillae) of mesonotum: Usually present, but mostly small and in 2 specimens almost absent. Two spots on scutellum: In 14 present, of which in 3 large as in ♀, in the remainder mostly small, while in 12 completely vanished. Postero-lateral marks on propodeum: In 14 present and in 12 absent, of the former only rarely large as in ♀. Maculae on tergite 2: In 3 laterally broadened and medianly slightly triangularly produced band, in 7 medianly interrupted band, in 2 split into three spots (two lateral and one medial), in 15 a transverse macula on each side. Maculation on tergite 3: Always absent. Maculation on tergite 4: In 3 complete band, in 16 medianly interrupted band, in 1 a large transverse macula on each side and in 7 two small lateral spots. Maculation on tergite 5: In 7 complete band, in 16 medianly interrupted

band, in 3 transverse lateral maculae. Ventral maculation: In 6 two lateral spots on sternite 2 only, in 7 on sternites 2 and 3, and in 13 on sternites 2, 3 and 4, never with 5 pairs as in *B. h. formosanus*. On legs: Fore coxae always apically yellow, mid coxae in 10 specimens adorned apically with yellow; fore and mid femora beneath and apically in front yellow; fore and mid tibiae except inside and all tarsi except hind basitarsi in part yellow; end tarsal joints always ferruginous; hind tibiae externally and inside at apex yellow. Thus the most usual maculation in ♂ (thorax and abdomen only) as follows:

A patch on nape region, posterior margin of pronotum, humeral angles, a spot on tegulae and on wing bases, postero-lateral angles of mesonotum, two spots on scutellum, postero-lateral maculae on propodeum, two large maculae on tergite 1, two lateral transverse maculae on tergite 2, medianly interrupted band on tergites 4 and 5, and two lateral spots on sternites 2, 3 and 4.

Structure: Averaged ocular index 2.84, averaged clypeal index 0.95 (Table 4), intercellular furrow mostly (23/26) present, but always not strong, in 5 ill defined, almost lacking. Antennal joint 3 about 2.7 times (dorsal view) or 2.5 times (lateral view) as long as wide at apex. Postero-lateral incision of propodeum in the types of *B. h. formosanus* (Fig. 3) Aa ... 8, Ac ... 9, Bb ... 1, Ca ... 3 and Cb ... 5. In the central one of the caudal spines: Parallel with apex rounded ... 19, slightly attenuate and roundly enlarged at apex ... 7. Impunctate area at base of area dorsalis always broad. Punctuation on mesonotum can be said not duplicate, on posterior portion sparse as in ♀. Genitalia: In colour as in *B. posterus*, with parameres semitransparent yellow on apical half and not darkened on latero-apical portion. In general structure very similar to *B. h. formosanus* (Pl. II, Figs. 8 and 9).

Holotype: ♀, Taitung Pref. (Taitung), 8. VIII. 1966, K. Tsuneki leg.

Paratypes: 1 ♂, Pingtung Pref. (Hengchun), 11. VII. 1966, K. Tsuneki leg. 15 ♀♀ 4 ♂♂, Pingtung Pref. (Hengchun, Kuaru, Oluampi, Ssuchungchi), 2-10. VIII.; 1 ♀ 9 ♂♂. Taitung Pref. (Taitung), 11, 15. VIII.; 2 ♀♀ 9 ♂♂, Chiai Pref. (Chuchi), 21. VII.; 1 ♂, Nantou Pref. (Puli), 13. VII.; 1 ♀ 1 ♂, Ilan Pref. (Tsukeng), 22. VIII. 1966, K. Tsuneki et T. Tano leg.; 3 ♂♂, Taipei Pref. (Chinshan), 25. VIII. 1966, T. Tano leg.

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APPENDICES

I. REVISION OF SOME *BEMBECINUS* FROM THE RYUKYUS1. *Bembecinus ryukyuensis* sp. nov.

Bembecinus tridens: Tsuneki, Kontyu, 35 (4): 387, 1967 (Table 1 and Figs. 4-9).

As a result of the detailed study of the Formosan representatives of this genus it was clarified that the specimens which were in my previous paper referred to *B. tridens* must be dealt with as a valid species, although the species belongs no doubt to *tridens*-group.

♀. Length 9-11 mm. Black with the following portions pale greenish yellow: Lateral margins of clypeus (not reaching apex), labrum except basal large macula, palpi, supra-clypeal area (not reaching sides, cf. Fig. 5, e, h), inner-orbital streaks (not reaching clypeus), antennae beneath wholly, medianly interrupted band on pronotum, (without yellow patch on nape), humeral angles, axillae of mesonotum, two large maculae on scutellum, a large elongate macula on each side posteriorly of propodeum, a pair of large maculae on tergite 1, medianly interrupted band on tergites 2 and 4, two lateral spots on 5, fore and mid femora beneath, fore and mid tibiae in front and at base on outer side, a spot at base on outer side of hind tibiae and inner half of fore tarsi (apically ferruginous).

Ocular index 2.2, clypeal index 1.2-1.3, supra-clypeal area in length distinctly more than half the width of antennal socket, interocellar furrow mostly in an impression, sometimes in an impressed line, lateral margin of propodeum bluntly ridged, latero-posterior incision more or less deep, belonging to type A or B in Fig. 3, impunctate area at base of area dorsalis broad, cubital cell 2 of fore wing always quadrangular, metatarsi of fore legs approximately twice as long as broad at apex, with spines on outer margin as long as the width of the segment, or slightly longer (Fig. 5, L), Abdominal tergite 6 with an impunctate (or sparsely punctate) medial area on apical portion. Mesonotum distinctly duplipunctate, tergites sparsely punctured.

♂. Black, with the following portions yellow: Clypeus except basal broad black macula, labrum, palpi, a large mark on supra-clypeal area (not reaching the sides), inner orbital lines, two transverse narrow bands on pronotum, humeral angles, axillae of mesonotum, a small spot on latero-posterior area of propodeum, a pair of lateral marks on tergites 1, 2, 4 and 5, sternites without macula. Maculae on legs as in ♀, except that the mid tarsi in front yellow.

Ocular index 2.82, clypeal index 0.94, supra-clypeal area slightly more than the width of antennal socket (7 : 6), interocellar area impressed, propodeal structure and punctuation as in ♀ (incision belongs to type Ba in Fig. 3), second cubital cell of fore wing quadrangular, median of apical spines subparallel, with apex rounded, tergite 8 (hidden under tergite 7) with apex rounded, without a minute emargination as in some species, genitalia: Fig. 5, J and j, without dark staining on latero-apical area.

Holotype: ♀, Ryukyus: Iriomote Is. (Ushikumori), 11. X. 1963, S. Kuniyoshi leg. (Coll. Kyushu Univ.).

Paratypes: 1 ♂, Ryukyus: Ishigaki Is., 13. X. 1963, Y. Hirashima leg.; 2 ♀♀, Iriomote Is., 6-11. X. 1963, S. Uéno et S. Kuniyoshi leg.; 2 ♀♀, Ishigaki Is., 11. X. 1963, Y. Hirashima leg.

Remarks. Maculation on abdomen considerably varied as given in Fig. 5, E-I, but ventral side always immaculated, yellow striae on sides of clypeus (Fig. 5, e) sometimes reduced into minutes spots (Fig. 5, h); maculae on thorax in females, as far as examined, constant and the scutal maculae much larger in specimens from Ishigaki Is. than in those from Iriomote Is, while in ♂ scutal maculae lacking; as to its abdominal maculation (Fig. 5, D) probably there is a

considerable variation.

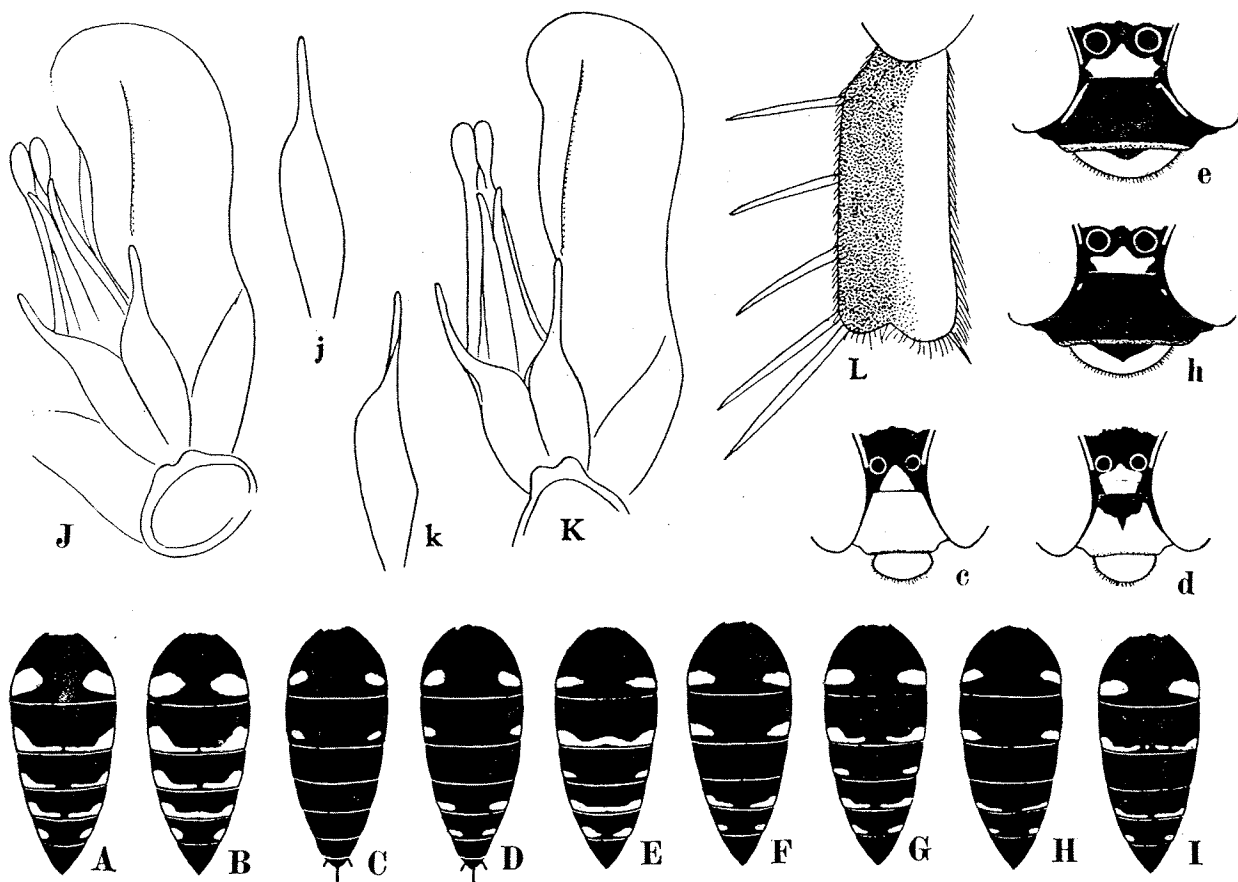


Fig. 5. J, j, L, e, h, d and D-I: *Bembecinus ryukyensis* sp. nov.
K, k, C and c: *Bembecinus okinawanus* (Sonan). A, B: *Bembecinus hungaricus formosanus* (Sonan). J, K: Male genitalia. j, k: Volsella. c, d: Clypeus and supra-clypeal area (♂). e, h: Ditto (♀). A-I: Abdominal maculation, A, B, E-I: ♀; C, D: ♂.

2. Notes on *Bembecinus okinawanus* (Sonan, 1928)

♂. In maculation (Fig. 5, C and c) as given in the original description except that a short line on each side of pronotum, a spot on axillae, fore femora beneath yellow and without yellow spot on apex of fore and mid femora. Abdominal sternites immaculated.

Ocular index 2.56, clypeal index 0.95, supra-clypeal area nearly as long as the width of antennal socket (7.0 : 6.8), intercellular furrow defined, impunctate area at base of area dorsalis broad, lateral margin of propodeum bluntly ridged, blunter than in *ryukyensis*, latero-posterior incision in a Ba type (Fig. 3), middle of caudal spines gently attenuate apically, apex subpointed, genitalia: Fig. 5, K, with paramere narrow, without latero-posterior dark staining, 8th tergites with a small emargination at apex. Cubital cell 2 distinctly quadangular.

Specimen examined: 1 ♂, Ryukyus: Yoron Is., 4. VIII. 1963, K. Yasumatsu et K. Yano leg.

Remarks. As to the variation in maculation and in other characters future studies with abundant material is needed.

3. Notes on *B. hungaricus formosanus* from the Ryukyus

As regards the population of this species occurring on the Island of Amami-Ohshima, *B. h. amamiensis*, a detailed study was already published (Tsuneki, K. 1965) and here two specimens

captured on the more southern Islands of the Ryukyus will be dealt with.

Specimens examined: 1 ♀, Yoron Island, 4. VIII. 1963, K. Yasumatsu leg.; 1 ♀, Okinawa, VI. 1945, G. E. Bohart leg.

♀. *Maculation*: Black, yellow are: Clypeus wholly, labrum except basal triangular black mark (varied in development between the specimens), inner-orbital lines, (supra-clypeal area wholly black), medianly broadly interrupted narrow band on pronotum, humeral angles, a large spot on tegulae, (base of wing without macula in one of the specimens, and scutellum and post-scutellum immaculated in both), postero-lateral corners of mesonotum. Abdomen as in Fig. 5, A and B, sternites 2, 3 and 4 with a pair of lateral maculae. Legs: Femora beneath, tibiae in front and tarsi on inner half of fore and mid legs, and basal 2/3 of outer side of tibiae and a spot on outer side of metatarsi of hind legs.

Structure: Ocular index 2.14, clypeal index 1.30, ratio of supra-clypeal area and width of antennal socket 5.3 : 6.0, without interocellar furrow or impression, lateral margin of propodeum bluntly ridged, blunter than in *okinawanus*, but acuter than in European *tridens* or *hungaricus* or Formosan *formosanus*, latero-posterior incision in types Bb or Bd (Fig. 3), impunctate area at base of area dorsalis narrow, without impunctate median line on tergite 6, wings with cubital cell 2 distinctly shortly petiolated. Punctuation generally as in *h. formosanus*.

II. KEY TO THE SPECIES OF *BEMBECINUS* OF FORMOSA AND THE SOUTHERN RYUKYUS

♀ ♀

- 1 Cubital cell 2 of fore wings shortly petiolated, if triangular or quadrangular labrum with a black marks at base and the outer spines of fore metatarsus longer than its width and medianly more or less widened (Pl. II, Fig. 14) (impunctate area at base of area dorsalis comparatively narrow, ocular index mostly 2.2-2.4, clypeal index 1.2-1.4, lateral margins of propodeum bluntly ridged, only apical portion acutely so, postero-lateral incision usually deeply emarginate, without impunctate median line on tergite 6, maculae on scutellum, if present, not large, each less than 1/4 as wide as the sclerite, abdominal maculation variable (Fig. 1, A-G), most usual types are A and B or their allied types), Length 6-9 mm, Formosa and the Ryukyus
hungaricus formosanus (Sonan, 1928)
- Cubital cell 2 of fore wing quadrangular, rarely triangular, in the latter case, outer spines of fore metatarsus except apical ones not so long as far surpassing the width of the segment 2
- 2 Supra-clypeal area markedly short, in length about half the width of antennal socket (maculae on scutellum large, without interocellar furrow, metatarsal spines of fore leg as long as the width of the segment, lateral margins of propodeum fairly acutely ridged up to above middle of the segment), length 9-11 mm 3.
- Supra-clypeal area longer, more than half the width of antennal socket 4
- 3 Clypeus basally yellow and apically black, tergite 6 without median impunctate line, impunctate area at base of area dorsalis broad (metatarsal spines attenuate apically, labrum yellow, maculae on abdomen similar to *h. formosanus*, but tergite 3 usually immaculated, postero-lateral incision of propodeum variable in form), Formosa
posterus (Sonan, 1928)

- Clypeus black, only marginal areas yellow, tergite 6 with a median impunctate line on apical portion, impunctate area at base of area dorsalis narrow (some of metatarsal spines of fore leg medianly somewhat widened, in maculation on abdomen similar to *posterus*), Formosa ***penpuchiensis* Tsuneki, sp. nov.**
- 4 Head and thorax nearly wholly black, lateral margins of propodeum fairly acutely ridged up to above middle of the segment (impunctate area at base of propodeum very narrow, its postero-lateral incision variable, interocellar furrow mostly defined, sometimes feeble, tergite 6 without median impunctate line, fore metatarsus wholly black, with outer spines in length slightly less than as wide as the segment, ocular index 2.1-2.2, clypeal index 1.3-1.4, at least tergites 1-3 maculated with orange), length 9-11 mm, Formosa ***nigriclepeus* (Sonan, 1928)**
- Head and thorax yellow-maculated, lateral margins of propodeum bluntly ridged (but more acute than in *hungaricus* or *tridens*) 5
- 5 Clypeus and labrum wholly yellow, tergite 6 without median impunctate line (interocellar furrow mostly defined, sometimes weak, impunctate area at base of propodeum wide, its latero-posterior incision variable in form, maculae on scutellum large, at least 1/3 the width of the sclerite, abdominal maculae as in *h. formosanus*, metatarsal spines shorter than the width of the segment, not widened medianly), length 8-10 mm, Formosa ***pacificus* Tsuneki, sp. nov.**
- Clypeus black, on lateral margin partly yellow, labrum yellow and at base with a large black macula — Fig. 5, e and h —, tergite 6 medianly on apical portion with an impunctate line (ocular index 2.2, clypeal index 1.2-1.3, interocellar area impressed, sometimes furrowed, impunctate area at base of propodeum broad, its postero-lateral incision roundly emarginate, metatarsal spines of fore leg as long as width of the segment or slightly longer, scutellar and propodeal maculae large, abdomen variably maculated as in Fig. 5, E-I), length 8-11 mm, Ryukyus ***ryukyuensis* Tsuneki, sp. nov.**

♂

♂

- 1 Second cubital cell of fore wing shortly petiolated, if doubtful, labrum yellow and with black macula at base, or ventral side of abdomen with 4 or 5 pairs of lateral maculae (interocellar furrow usually absent, impunctate area at base of area dorsalis narrow, abdomen with a rich yellow maculation, paramere of genitalia comparatively narrow, with latero-apical portion markedly darkened, apical protuberance of volsella long — Pl. II, Figs. 1 and 2), length 6-8 mm, Formosa and Ryukyus ***hungaricus formosanus* (Sonan, 1928)**
- Second cubital cell not petiolated, mostly quadrangular, labrum wholly yellow or wholly black, ventral side of abdomen at most with 3 pairs of lateral maculae, genitalial parameres not particularly darkened on apico-lateral portion 2
- 2 Supra-clypeal area less than as long as the width of antennal socket (interocellar furrow defined, impunctate area at base of area dorsalis wide, abdominal tergites 1, 2, 4 and 5 usually with a band, 3 usually immaculate, median of the apical spines subparallel, apically slightly attenuate, apex rounded, genitalia with paramere comparatively broad, apical protuberance of volsella short, somewhat dilated — Pl. II, Figs. 5, 6, 7), length 7-8 mm, Formosa ***posterus* (Sonan, 1928)**

(Undiscovered male of *penpuchiensis* will be included within this section)

- Supra-clypeal area long, approximately as great as the width of antennal socket 3

- 3 Head and thorax nearly wholly black, lateral margin of propodeum acutely ridged up to above middle of the segment (interocellar furrow defined, impunctate area at base of propodeum generally narrow, middle of apical spines of abdomen usually subparallel, with apex rounded, usually tergites 1, 2 and 3 maculated, genitalia with paramere comparatively narrow, Pl. II, Figs. 3 and 4), length 7-10 mm, Formosa *nigriclypeus* (Sonan, 1928)
- Head and thorax yellow-maculated, lateral margins of propodeum bluntly ridged 4
- 4 Clypeus at base black-maculated (Fig. 5, d), labrum yellow, interocellar furrow absent (impunctate area at base of area dorsalis only medianly broad, punctures on adjacent areas closer, genitalia with paramere broader than in the other species (Fig. 5, J), tergites 1, 2, 4, 5 with two lateral maculae (Fig. 5, D), sternites immaculated), length 8.3 mm, Ryukyus (Yaeyama group) *ryukyuensis* Tsuneki, sp. nov.
- Clypeus and labrum yellow, interocellar furrow usually defined (impunctate area at base of propodeum broad) 5
- 5 Tergites 4 and 5 with a band or spots, sternites at least with a pair of lateral maculae, supra-clypeal area wholly yellow (ultimate antennal joint in length equal to or slightly shorter than joint 11: Pl. II, Fig. 13, genitalia with paramere comparatively broader than in the following species: Pl. II, Fig. 8, cf. textfig. 5, J), length 7-10 mm, Formosa *pacificus* Tsuneki, sp. nov.
- Tergites 4 and 5 without maculae (Fig. 5, C), sternites immaculated, supra-clypeal area with a triangular macula, (Fig. 5, c) (ultimate antennal joint longer than joint 11, genitalia with paramere slenderer than in the preceding species: Fig. 5, K), length 9 mm, Ryukyus (Yoron Is.) *okinawanus* (Sonan, 1928)

III. ON TWO SPECIES OF *BEMBECINUS* OCCURRING IN KOREA

1. *Bembecinus hungaricus formosanus* (Sonan, 1928)

Specimens examined: 2 ♀♀ 1 ♂, river bed of Kanko, Seoul, 14. VI. 1941; 1 ♀, the same place, 20. VI. 1941, K. Tsuneki leg.

Remarks. Almost no difference in structural as well as the colorific distinctions from the specimens from Formosa can be observed. The male above listed belongs to type B of Fig. 2 in the abdominal maculation, with well developed 5 pairs of lateral maculae on ventral side. Labrum with a black spot at base, and scutellum and propodeum immaculated, propodeum bluntly ridged at the lateral margin, with postero-lateral incision belonging to type Ab in Fig. 3. Ocular and clypeal indices were given in Table 3. The median of the caudal spines fine, subparallel, with apex rounded. The three females all with basally spotted labrum, and scutellum and postscutellum minutely maculated at the usual places. Abdominal maculation belongs to type A, type C and near type E (the band on tergite 5 split into two spots), ventral maculae always 4 pairs in number. Propodeum with postero-lateral incision all type Aa; fore metatarsus with similar long spines on outer margin, only the black area at the inside very much narrower; impunctate area at base of propodeum narrow, cubital cell 2 always shortly petiolated.

2. *Bembecinus pacificus* Tsuneki, 1968

Specimens examined: 3 ♂♂, entrance area to the valley of Shoyozan, Central Korea 27, 31. VII. 1943, K. Tsuneki leg.

Remarks. No subspecific characters can be found in the specimens.

Clypeus, labrum and supra-clypeal area wholly yellow; inner orbits, medianly widely inter-

rupted narrow band on pronotum, tubercles, axillae of mesonotum yellow, but without maculae on scutellum and propodeum. On abdomen tergites 1 and 2 each with a pair of large lateral marks, 3 immaculated, 4 and 5 each with a medianly interrupted band at apex, ventral side of abdomen adorned with 2 (in one specimen) or 3 (in the others) pairs of lateral maculae. Ocular index 2.71, clypeal index 0.92 (Table 4). Postero-lateral incisions of propodeum types Ac, Bd and Ca. Punctures on area dorsalis sparse, basal impunctate area varied in width, in two specimens rather narrow and in one considerably wide, cubital cell 2 always quadrangular.

I can recollect that this species was very rare in their habitat. After my first catch I paid a special notice and could capture the two others in two visits. The habitat was a patch of bare area of the clayey soil in the midst of grassland.

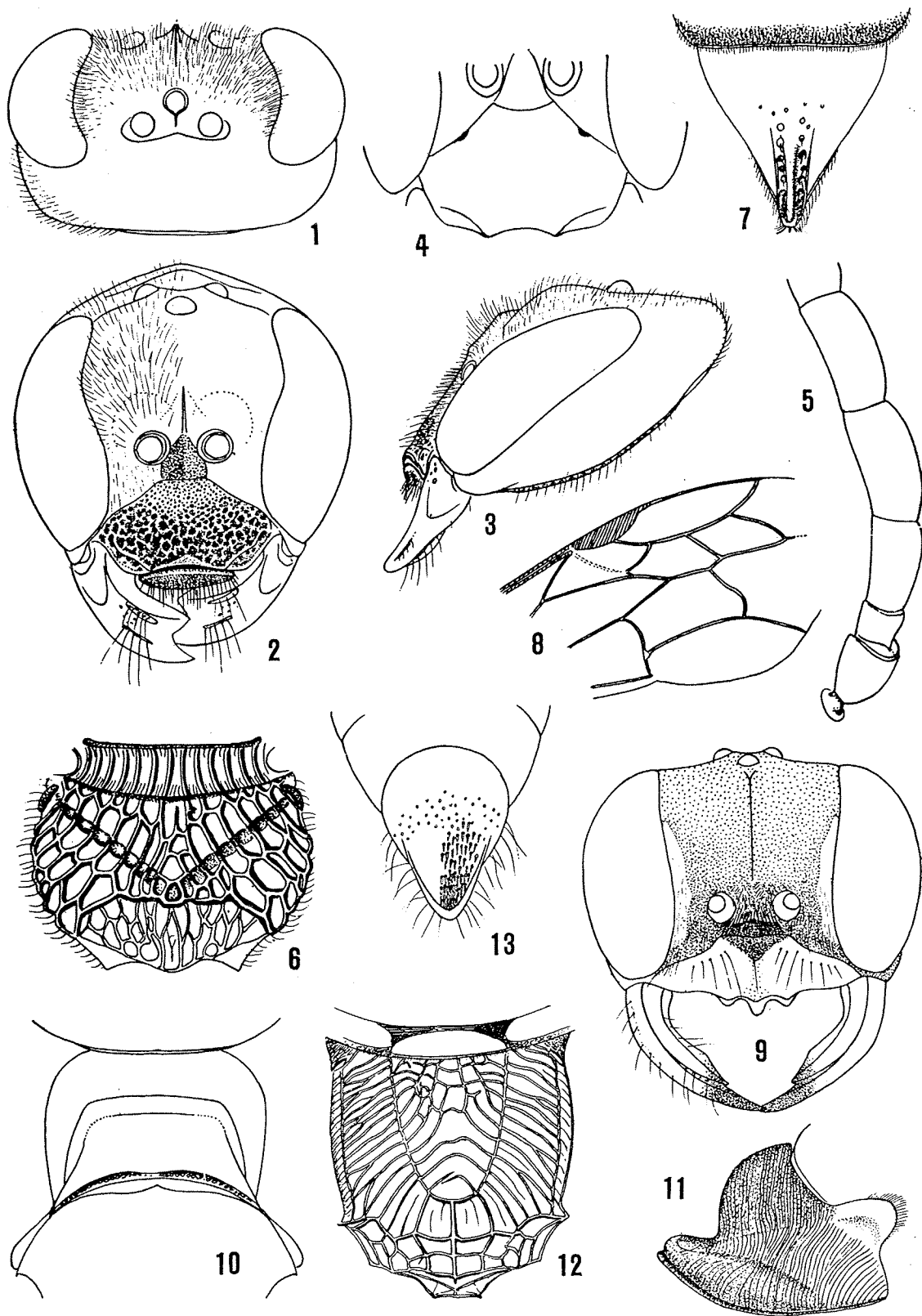
EXPLANATION OF PLATE I

Figs. 1-8. *Argogorytes fuliginosus* sp. nov.

1, 2, 3: Head (♀). 4: Clypeus (♂). 5: Antenna (♂). 6: Propodeum (♀).
7: Pygidial area (♀). 8: Fore wing venation.

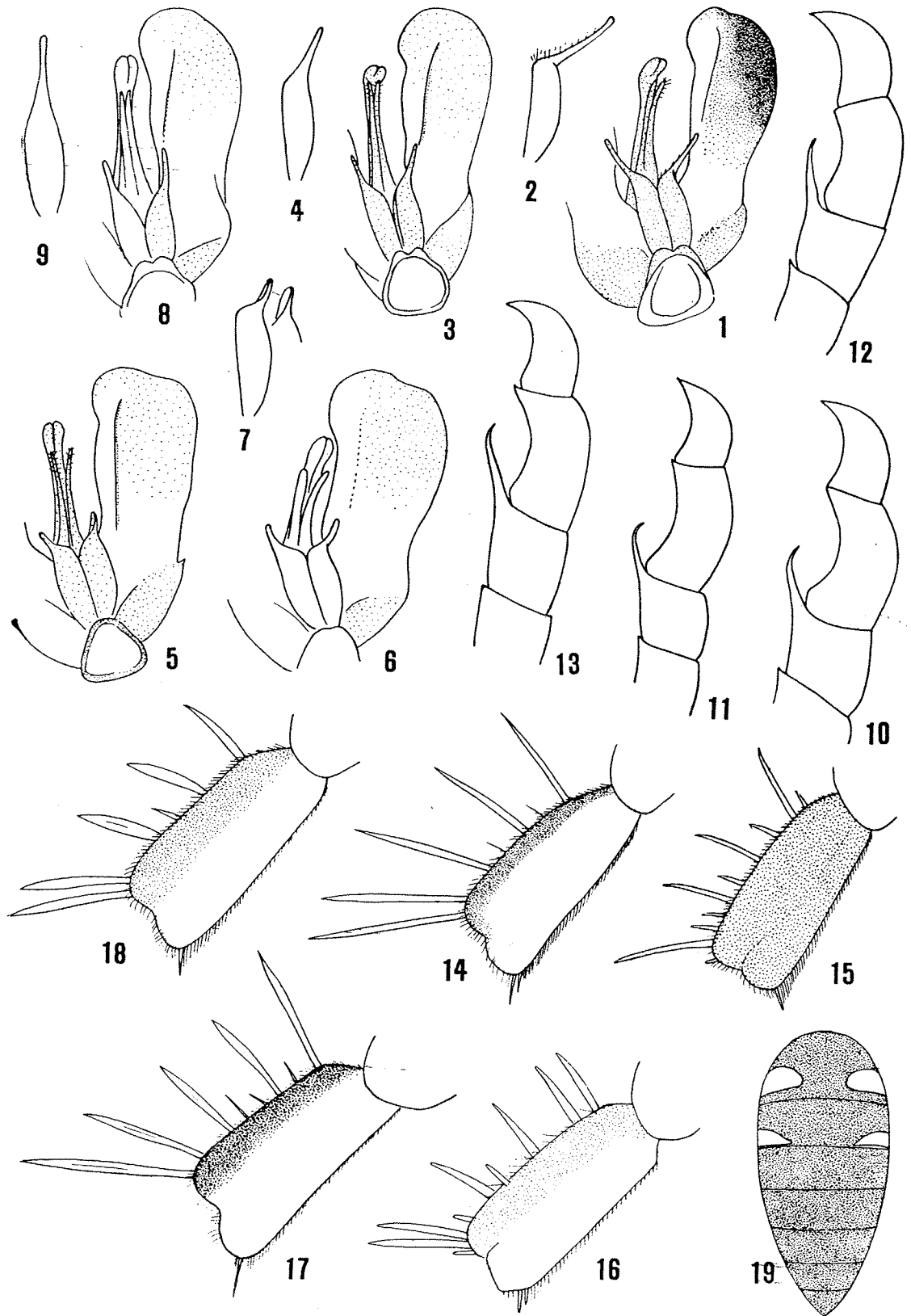
Figs. 9-13. *Alysson formosanus* sp. nov. (♀).

9: Head. 10: Pronotum. 11: Ditto, lateral view. 12: Propodeum.
13: Pygidial area.



EXPLANATION OF PLATE II

- Figs. 1, 2, 10, 14, 19. *Bembecinus hungaricus formosanus* (Sonan)
Figs. 3, 4, 11, 15. *B. nigriclypeus* (Sonan)
Figs. 5, 6, 7, 12, 16. *B. posterus* (Sonan)
Figs. 8, 9, 13, 17. *B. pacificus* sp. nov.
Figs. 18. *B. penpuchiensis* sp. nov.
Figs. 1, 3, 5, 6, 8. Genitalia (♂), ventral view.
Figs. 2, 4, 7, 9. Volsella of genitalia (apical slender portion movable)
Figs. 10, 11, 12, 13. Apical three joints of antenna (♂).
Figs. 14, 15, 16, 17, 18. Right fore metatarsus (♀).
Fig. 19. Exceptional maculation on abdominal tergites.



Tsuneki, K. Formosan Sphecidae (VI). Nyssoninae