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STUDIES ON THE FORMOSAN SPHECIDAE (VIII)
A SUPPLEMENT TO THE SUBFAMILY CRABRONINAE
(HYMENOPTERA)

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STUDIES ON THE FORMOSAN SPHECIDAE (VIII)
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(HYMENOPTERA)*

By K. TSUNEKI

(Biological Laboratory, Fukui University)

In the summer of 1968 I revisited Formosa to collect a further material of the aculeate Hymenoptera and passed three months, from June to August, on the Island. This time I made the collecting tour from east side through the southern end to the west side, taking the course reverse to that of my previous expedition. In the east side the time seemed to be too early to meet with a good result and the booty was rather meagre as compared with that of the previous journey that was performed in August of two years before. The stations around which I attempted the collecting trips were Kuangyin (Taoyuan Pref.), Ilan (Ilan Pref.), Hualien, Kuangfu, Yuili (Hualien Pref.), Taitung, Chihpen (Taitung Pref.), Hengchun (Pingtung Pref.), Kuantzing (Tainan Pref.), Chuchi, Fenchifu, Alishan (Chiai Pref.) and Puli (Nantou Pref.), of which in the last mentioned place I stayed longest (3 weeks), in Hengchun next longest and in Taitung, Chuchi and fenchifu for a respectively considerable time (from 7 to 10 days).

The regions of high altitude were closed as before, except for a few special districts that were open for the sight seeing travellers and the inhabitants of such regions which were most interesting in the comparative faunistic investigation of the Island with those of the high regions of southern Asia, such as the Himalayas, could scarcely be captured. However, at the half way to Mt. Ali I happened to find a very good place of collection and as a result of the repeated visits I could collect abundant specimens of various species, including very curious and hitherto unknown ones, unknown not only to Formosa, but to the scientific world also. It was a half broken, comparatively large house, standing singly in an open area in the mixed woods of bamboos and deciduous trees. It was not a decayed house, but was in the course of breaking to convey to other place and at that time, fortunate enough, the work was stopped.

On the timbers and thick bamboo stems that constituted the frame work of the house innumerable number of small holes and tunnels of beetles and other insects were open into which various species of solitary wasps and bees were carrying the food for their young. Among them were found many species of Crabroninae, Trypoxyloninae, Pemphredoninae, but swarms of little *Stigmus* (*Stigmus*) spp. and *Crossocerus* (*Ablepharipus*) spp. were rather astonishing. Most of such inhabitants and their offsprings were destined to be destroyed or burnt up, so I collected as many specimens as possible, as far as the changeable mountain weather permitted me to do so.

As I could make the best use of my previous experiences in Formosa as well as in Japan the activity of my collection was far more effective and profitable than that of my first expedition. All the specimens were mounted at the respective station, in the state complete for the investigation (mandibles were opened and the genitalia were pulled out, as far as possible).

No financial support was (has been) given to my study and my journey was made solitarily. As a result I met with various difficulties during my journey. But I could cut through these by the kind aid of my friend in Formosa, Mr. B. S. Chang, who accompanied my journey from time to time, each for a considerable period, working as an assistant for my study, es-

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pecially for those regarding the bionomics of the solitary wasps. He further provided various conveniences for the plan of my journey (for instance, a journey to Botel Tobago Island that was, however, not realized on account of the unfavourable wind) and gave me valuable specimens of high altitude that he himself collected. On this occasion I express my heartiest thanks to him for his kindness. I am also indebted to Dr. K. Yasumatsu, then President of the Entomological Society of Japan, for giving me facilities to realize my journey. Finally I must mention that a species of *Rhopalum* that is described as new in this paper was collected by Mr. Y. Haneda, Fukui, and sent to me for identification.

DESCRIPTIONS AND RECORDS OF THE SPECIES

1. CRABRONINI

1. *Ectemnius (Metacrabro) chrysites* (Kohl, 1892)

Ectemnius (Metacrabro) chrysites: Tsuneki, Etizenia, 30: 1, 1968 (with references).

Specimens collected: 82 ♀♀ 52 ♂♂, Pempuchi, Nantou Pref., 10 (28 ♀ 15 ♂), 11 (29 ♀ 9 ♂), 17 (21 ♀ 16 ♂), 26 (4 ♀ 12 ♂). VIII. 1968.

Remarks. The wasps came to the bamboo leaves to lick the aphid dew. The length varies in ♀ from 13 to 18 and in ♂ from 10 to 14 mm. The maculation of both sexes is very stable.

2. *Ectemnius (Clytochrysus) nigrifrons taiwanus* Tsuneki, 1969

Ectemnius (Clytochrysus) nigrifrons taiwanus Tsuneki, Etizenia, 30: 2, 1968 (♀♂).

Specimen collected; 1 ♂, Mt. Ali (2400 m), Chia Pref., 4. VIII. 1968.

3. *Ectemnius (Hypocrabro) schlettereri sakaguchii* (Matsumura et Uchida, 1926)

Ectemnius (Hypocrabro) schlettereri sakaguchii: Tsuneki, Etizenia, 30: 3, 1968.

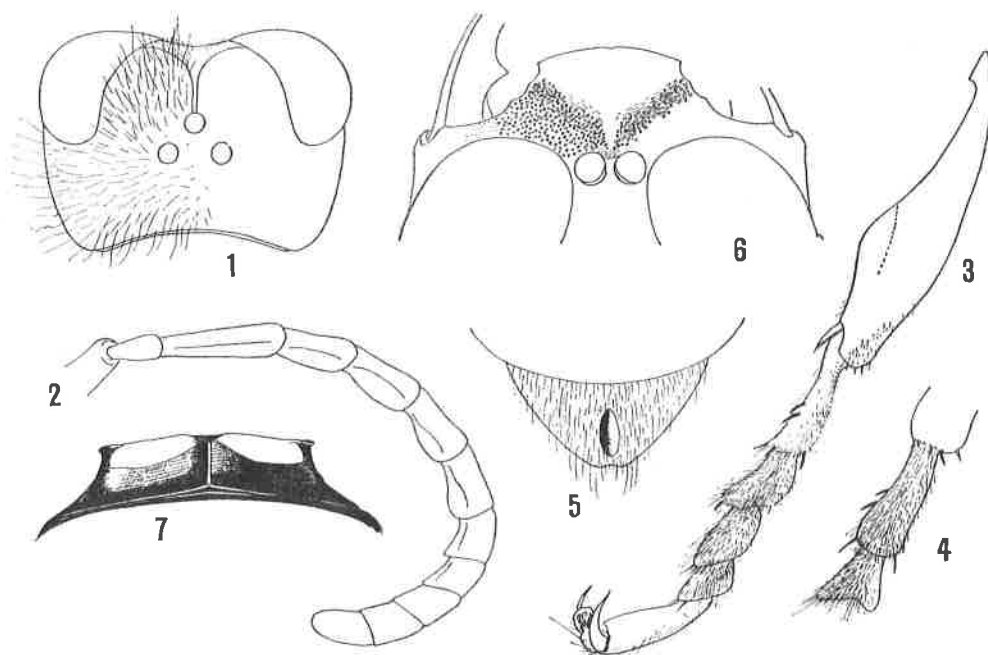
Specimens: 8 ♀♀ 5 ♂♂, Tahnan near Puli, Nantou Pref., 20, 23. VIII. 1968: 1 ♀, Pempuchi 11. VIII. 1968.

Remarks. This species is not rare in the lowland country of Formosa, but is not abundant.

4. *Ectemnius (Yanonius) arreptus insulicola* subsp. nov.

A single example before me agrees well in general structure and sculpture with the original description of *Crabro arreptus* Kohl, 1915, differs from it, however, mainly in the form of the head seen from above, in the structure of the middle legs and of the end tergite of the abdomen and somewhat also in coloration. The example is close in the last mentioned character to the specimen of this species reported by Gussakovskij (1933) from Kansu and also to *tibeticus* Leclercq (1950) which is now synonymized with *arrepsus*, but according to the description which must be a subspecies. The present race differs from *tibeticus* in the proportion of the length of the antennal scape to the minimum interocular distance and in the relative length of the longer tibial spur of the hind legs as against the related metatarsus, but apparently similar in the structure of the middle legs (but probably the modification is more marked in the Formosan race) and of the end tergite.

♂. Head from above: Fig. 1, with temples better developed (cf. Kohl, 1915, Pl. XI, Fig. 243), antennal joints 3-8 beneath slightly excavated at base and gently swollen at apex (Fig. 2), more markedly so than the figure given by Kohl (1915, Pl. XI, Fig. 246), middle tibia with the inside laterally compressed and markedly roundly produced below middle (Fig. 3),



Figs. 1-7. *Ectemnius (Yanonius) arreptus insulicola* ssp. nov., ♀.

1: Head seen from above. 2: Flagellum of antenna. 3: Tibia and tarsus of middle legs. 4: Two basal joints of middle tarsus (frontal view). 5: End tergite of abdomen. 6: Clypeus. 7: Collar of pronotum.

the following metatarsus in lateral and frontal view: Figs. 3 and 4, end tergite with a distinct, fairly deep impression in middle (Fig. 5), posterior inclination of propodeum without the lateral carinae, it is bordered from each side of the segment by a distinct furrow, but the furrow is not accompanied by a carina, the portion traversed by a series of horizontal striae, the striae at the outer bank of the furrow slightly raised, the bank is certainly raised in posterior view, but in the lateral view it is completely level with the surface of the adjacent area of the side.

Clypeus: Fig. 6, medianly low-conically raised, the lateral margins with an elliptic impression, pronotum: Fig. 7, precoxal carina of mesopleuron short, but very highly raised. Black, with the following portions yellow: Antennal scapes in front on apical portion (cream yellow), medianly interrupted band on collar of pronotum, a small spot on each side before apex of tergite 1, a broad band at base of tergite 2 and 6, lateral marks on tergites 3-5, those on 3 largest and on 5 smallest (orange yellow), underside of femora and a narrow line on front side of tibiae of fore legs and a line at apex of middle femora beneath (cream yellow). Femora except the black posterior margin, tibiae wholly and greater part of basal two tarsal joints of fore legs, femora above broadly, nearly whole of tibiae and a streak on front side of metatarsi of middle legs and apex of femora and greater part of tibiae of hind legs ferruginous, posterior half of tegulae semitransparent brown; wings considerably darkened. Sculpture as in *arreptus* s. str., but on mesopleuron, besides the microreticulation, some weak, irregular, raised rugae observable which are also microreticulated. Clypeus on anterior inclination glabrous and shining, remaining areas silverily pubescent, hairs on head and thorax markedly long, nearly as long as antennal joint 3, or much longer.

Measurement (relative): Length 9.5 mm. OOD : POD = 18.8, scape 33, interocular dis-

tance at base of antennae 19, length of antennal joints 2, 3 and 4 combined together 33, length of joint 3 from above 17, its width at apex from above 4.7, from the side 5.0, that is to say, joint 3 seen from above nearly 4 times, seen from the side 3.6 times as long as wide at apex.

♂, unknown.

Holotype: ♂, 17. V. 1968, Mt. Ali (about 2500 m), B. S. Chang leg.

Notes on the subgeneric characters of *Cameronitus* Leclercq, 1950

Cameronitus Leclercq was erected as a subgenus of *Ectemnius* on the basis of characters of *Crabro menyllus* Cameron, 1905. The characters listed as subgeneric at the time of its first publication seem to include considerably the specific of the species concerned. Later in 1954 in his monograph of the tribe Crabronini and in 1958 in his two papers regarding the Crabronini of S. E. Asia, the author progressively disposed, added and rearranged the characters of the subgenus and at present it becomes considerably changed from the original and 1954 definition. According to these *Cameronitus* seems to be characterized as follows:

(1) Mandibles at apex bidentate in ♂, tridentate in ♀, with a *strong* tooth on inner margin. (2) Antennae 12 jointed in both sexes, normal or very slightly modified (... without modification, or with one or two joints excavated beneath, never toothed ... 1954). (3) Inner orbits strongly convergent towards clypeus, contiguous to the sockets of antennae. (4) Without frontal transverse carina. (5) Frontal marks rather vaguely defined. (6) Mesonotum finely densely punctate, or shagreen-like punctate, not striate. (7) Mesopleuron distinctly punctate, sometimes somewhat rugosely punctate, but the punctures always distinctly separated from each other, never striate between them, *at least near the precoxal carina* (... ni striées, ni ridées, ni finement coriacées ... 1954). (8) Abdomen sessile, subsessile, or subpetiolate. (9) Tergite 7 in ♂ *sometimes* (none in 1954) differentiated into the pygidial area.

Of the characters listed above Nos. 1-6 are common with *Hypocrabro* (No. 6 is only a slight difference in degrees) and Nos. 8 and 9 also in a certain case common with this (in some cases the male of *Hypocrabro* possesses an incomplete pygidial area). Considering as such the sole essential quality left to *Cameronitus* comes to be the character of the mesopleuron. However, with respect to this there is also a question.

In a species later described (*Ectemnius tsuifenicus*) the mesopleuron in the male are on the hypoepimeral area longitudinally distinctly striate, on other episternal area sparsely punctured, sometimes accompanied with the longitudinal, but not strong, striae between the punctures; while in the female whole the space nearly mat and further, except the lower area longitudinally, fairly closely and distinctly striate, the lower area before the precoxal carina alone sparsely punctured. The sculpture is markedly different from the *typical* case of *Cameronitus*, but as far as the species has a merely punctured area in front of the precoxal carina it must be included within the altered category of *Cameronitus*. If such an assignment is accepted the character peculiar to this subgenus comes to confine to the punctuation on the lower part of the episternum only.

According to my observation in the species referable to *Cameronitus* the mesopleuron always have a more or less bronzy shine. However, this seems to be too weak to be taken up as a subgeneric character.

5. *Ectemnius* (*Cameronitus*) *flavohirtus* Tsuneki, 1954

Ectemnius (*Cameronitus*) *flavohirtus*: Tsuneki, Etizenia 15: 9, 1966 (with references).

Specimen collected: 1 ♀, Chiangnouliao (500 m), Chiai Pref., 29. VII. 1968.

Remarks. This species was first found at the foot of Mt. Haku, Central Japan, and later in Formosa (Kuantzuling, Tainan Pref.). This is a second record from Formosa. It was captured on the flowers of *Ampelopsis heterophylla* at the side of the railway near the Chiangnouliao Station. The specimen is much more brightly coloured than the Japanese ones.

6. *Ectemnius (Cameronitus) orius cetonicus* Leclercq, 1958

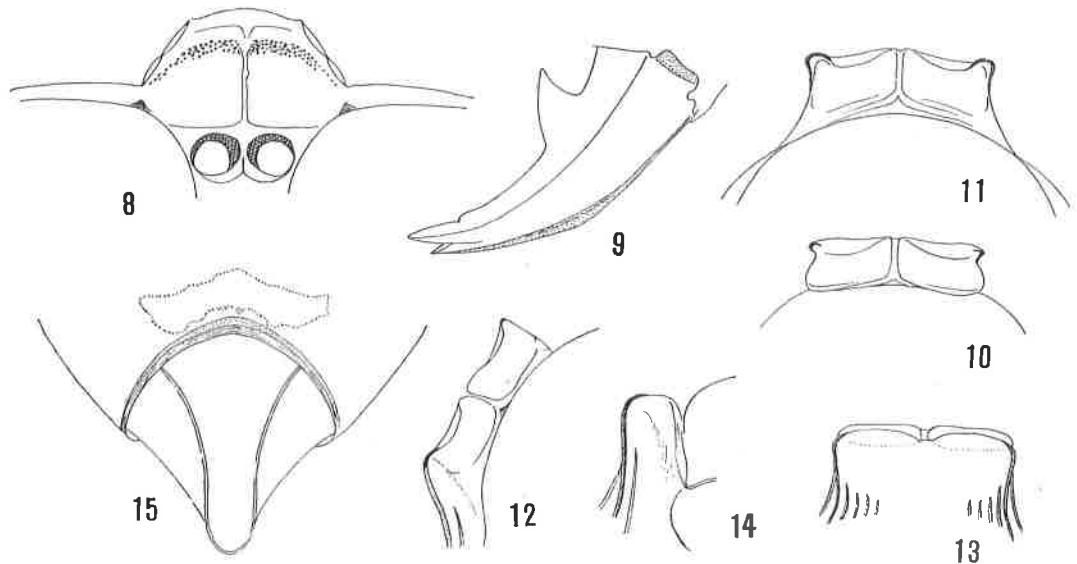
Ectemnius (Cameronitus) orius cetonicus: Tsuneki, Etizenia, 30: 3, 1968 (with references).

Specimens collected: 1 ♀, Kuanhua, Chiai Pref., 6. VIII. 1968; 28 ♀♀ 8 ♂♂, Pempuchi, Nantou Pref., 10, 11, 17, 26. VIII. 1968; 5 ♀♀ 7 ♂♂ Wushe (1200 m), Nantou Pref., 13, 14, 16, 19. VIII. 1968; 1 ♀, Chienching — Wushe (1500 m), Nantou Pref., 13. VIII. 1968.

7. *Ectemnius (Cameronitus) pempuchi* sp. nov.

In this species (♀) mandibles bidentate at apex, with a rudimentary accessory tooth (not formally tridentate as usual), on inner margin with a stout tooth, antennal scape unicarinate, collar in dorsal view strongly dentate at antero-lateral corners and medianly deeply furrowed, mesopleuron simply punctured, abdominal segment 1 wholly ferruginous, almost no yellow mark on the body and appendages, wings fairly strongly clouded. Above are the main characters of this species and make possible to separate it from other congeners.

♀. Length 13.0 mm. Black with the following portion ferruginous: Mandibles except apex and inner tooth, palpi, scapes of antennae, collar (raised part wholly) and anterior margin (including the nape area) of pronotum, tegulae, two spots on scutellum, abdominal segment 1 wholly, a narrow band on tergite 2 and 4, a lineary one on 5 and a broad one on 3, each before the apical pale brownish and semitransparent broad marginal zone, apex of tergite 6, knees, outer and under sides of fore femora, underside of mid femora, fore tibiae wholly, greater part of mid and hind tibiae and all tibial spurs. Humeral tubercles and greater part of



Figs. 8-15. *Ectemnius (Cameronitus) pempuchi* sp. nov., ♀.

8: Clypeus. 9: Mandible. 10: Collar of pronotum seen from above. 11: Ditto, somewhat from behind. 12: Ditto, obliquely from the side. 13: Ditto, seen in front. 14: Ditto, seen from the side. 15: Pygidial area.

rest of legs dark brown or brownish black, apical margin of each sternite transparent brown. A streak on outer face of antennal scapes, a narrow inconspicuous band on tergite 4 and 5, each before the ferruginous band yellow. Wings fairly strongly fuscous, near anterior margin somewhat yellowish, veins and stigma ferruginous, partly slightly darker. Sides of anterior frons and clypeus covered with silvery hairs, long pubescence on temples, sides of thorax, whole the propodeum except area dorsalis, tergite 1 and sides of the rest of abdomen greyish white, while the hairs on the dorsal side of head, thorax and abdomen ferruginous or reddish ferruginous, especially striking on head, scutellum and on brownish bands of abdomen.

Head from above with proportion of width to length approximately 5 : 3, temples roundly convergent posteriorly, OOD : POD : OCD = 22 : 13 : 33, frontal furrow broad, not deep, an impressed line between postocelli, frontal mark gently impressed, as long as antennal joints 4 and 5 taken together and as wide in middle as one of ocelli; clypeus: Fig. 8, medianly bluntly ridged and slightly raised in the middle of the ridge, mandible: Fig. 9, the structure at apex is abnormal to the subgenus, head in profile with temple broader than eye, occipital carina low, not toothed at apex, antennal scape unicarinate, joint 3 amply thrice, joint 4 twice as long as wide at each apex. Collar of pronotum seen from above: Fig. 10, seen somewhat from behind: Fig. 11, obliquely from the side and above: Fig. 12, seen in front: Fig. 13 and seen from the side: Fig. 14; antero-median line of mesonotum carinate, the portion somewhat depressed, area dorsalis on propodeum margined by a shallow impressed line, the line posteriorly slightly broad, narrowed forwards and turns obscure before reaching the base of the segment, the area medianly broadly shallowly furrowed, the furrow margined by fine carinae, posterior inclination without lateral carinae, but medianly broadly triangularly excavated, with a distinctly margined longitudinal furrow at the median bottom. Abdominal tergite 1 slightly longer than wide at apex (ratio 17: 15), pygidial area: Fig 15, in lateral view with the apical portion curved upwards. Legs and wing venation normal, fore metatarsus longer than the following joints taken together, provided with comb spines at outer margin, mid and hind tibiae strongly spined on outer side.

Vertex finely, very closely punctured, upper frons more finely, more densely and reticulately punctate, collar of pronotum finely (but slightly more grossly than on vertex) and moderately sparsely punctured, at base of the anterior perpendicular inclination longitudinally, shortly and strongly striate, mesonotum finely, densely reticulate-punctate, punctures appear on anterior portion transversely and on posterior portion longitudinally rugoso-punctate, scutellum finely and closely (somewhat more sparsely than on mesonotum) punctured, mesopleuron more grossly, comparatively more sparsely punctured, intervals mostly as great as the punctures and shining, with bronzy shimmer, metapleuron except upper gentle tubercle finely, closely and longitudinally striate, area dorsalis at base coarsely crenate and the disc finely, closely longitudinally striate, with scattered punctules on intervals, the striae continued through outside the area (where they run obliquely and then turn round and go forwards) to the sides of the segment where they become very fine and dense and run first longitudinally and then go obliquely downwards, occupying the upper and anterior portions of the sides, rest of the sides similar striate, but the striae originated from the lower part of the posterior inclination of the segment where they run transverse, upper part of the inclination sparsely punctured, with intervals shining. Abdominal tergites fairly closely covered with very fine hair-bearing points, pygidial area coarsely irregularly punctured, punctures deep, but with the outline indistinct.

♀. Unknown.

Holotype: ♀, Pempuchi, Nantou Pref., 10. VIII. 1968, K. Tsuneki leg.

Remarks. I captured the insect that came to a bamboo leaf sprinkled with nectar of the aphides. Apparently the species is rare and I could not get other specimen, despite my frequent visits and particular attention to the species.

8. *Ectemnius* (*Cameronitus-Hypocrabro*) *melanotarsis* (Cameron, 1902)

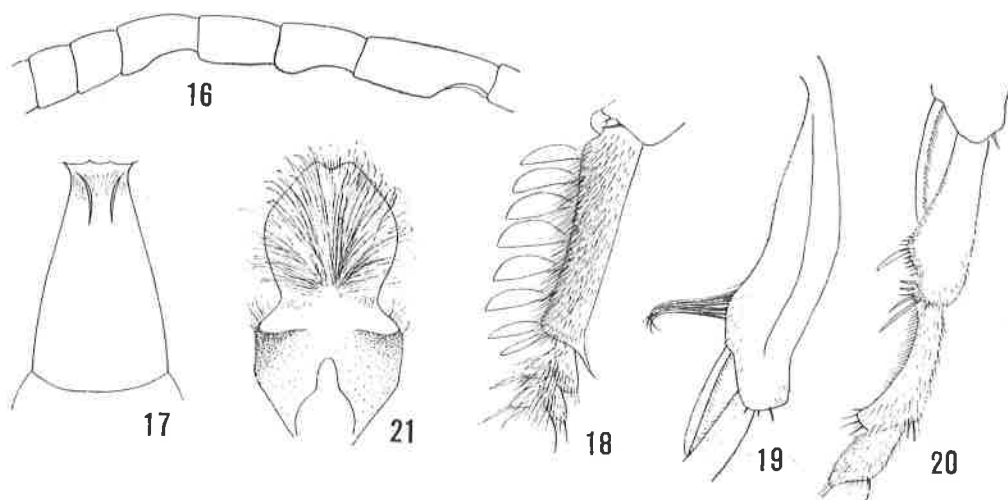
Crabro melanotarsis Cameron, Ann. Mag. Nat. Hist., Ser. 7, 10: 60, 1902 (Khasia Hills).

Ectemnius (*Cameronitus*) *melanotarsis*: Leclercq, Bull. Ann. Soc. R. Ent. Belg., 94 (4-5): 150, 1958 (with references and remarks on some characters, with four figures).

Subsp. *changii* subsp. nov.

The Formosan race is most close to var. *elvinus* Cameron (Himalaya), differs from it in the following characters:

- (1) Antennal joints 3-6 relatively somewhat longer (♂), with the excavation on under-side mostly much deeper (Fig. 16).
- (2) Area dorsalis on propodeum not margined with broad and deep furrow.
- (3) Mesopleuron on upper portion distinctly longitudinally striate, rest of the area sparsely, moderately grossly punctate, intervals with strong bronzy shimmer, but not 'microscopiquement alutacées'.



Figs. 16-21. *Ectemnius* (*Cameronitus-Hypocrabro*) *melanotarsis changii* ssp. nov., ♂ . 16: Antennal joints 3-8 (lateral view). 17: Abdominal tergite 1. 18: Fore metatarsus. 19: Middle tibia. 20: Middle tarsal joints 1-3. 21: Sternite 8.

- (4) Tergite 1 relatively longer (Fig. 17).
- (5) Structure of legs slightly different (see remarks).
- (6) More broadly orange yellow: Scape of antennae on the side, collar and humeral tubercles of pronotum, a spot on antero-lateral corners of mesonotum, on prepectus (not epicnemius) above and on lower part of episternum, axillae, scutellum, postscutellum, a curved broad band at base of tergite 2, two large spots on tergite 3, a mark from apical side broadly to underside of fore femora, a mark on middle femora beneath near apex, fore tibiae wholly, mid and hind tibiae on greater part, fore tarsi except the apical joint. Antennal joint 2, front and upper side of fore femora (except base), a broad streak at apex above of mid and hind femora ferruginous; tibiae also more or less with ferruginous tint. Length 8.5-11.0 mm.

♀. Unknown.

Holotype: ♂, Mt. Ali (Nimandaira), about 2000 m, 4. VIII. 1968, B. S. Chang leg.

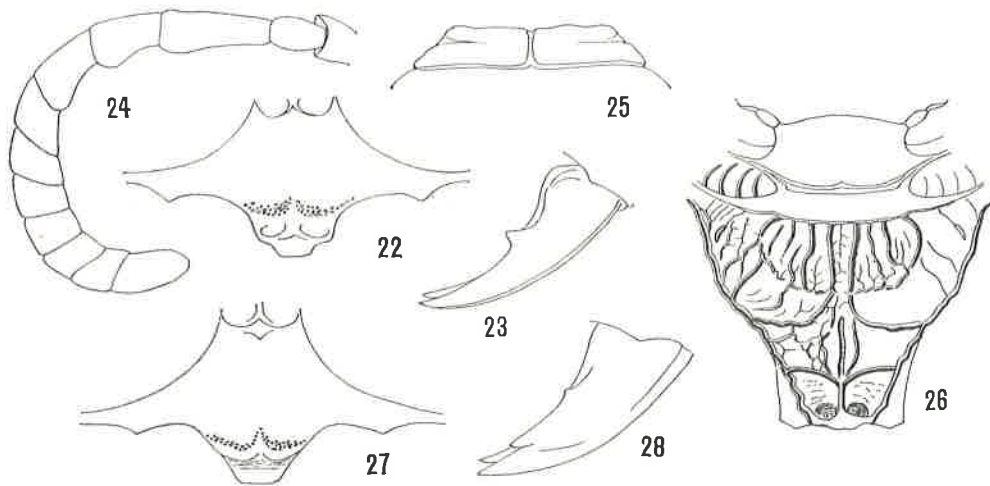
Paratypes: 3 ♂♂, ditto.

Remarks. Structure of the legs generally similar, but the lobately enlarged spines of fore metatarsus (7-8 in number) larger and longer (longer than the width of the joint — Fig. 18), middle tibia somewhat more strongly modified (Fig. 19) and the following metatarsus with the inner protuberance located much lower (Fig. 20). Scutellum medianly broadly distinctly furrowed, sternite 7 medianly from apex deeply, triangularly incised, with the surface covered with comparatively dense, ferruginous hairs that are produced over the posterior margin like a fringe. Sternite 8: Fig. 21.

9. *Ectemnius* (*Hypocrabro-Cameronitus*) *tsuifenicus* sp. nov.

Somewhat similar to *E. (C.-H.) melanotarsis* Cam., differs from it in pilosity, maculation of abdomen, sculpture of mesopleuron and propodeum and in the structure of the legs.

This species is characteristic in that the mandibles of the female almost lack the tooth on inner margin, sides of the thorax and whole of the propodeum are completely dull and opaque in the same sex and in the structure of the antennae in the male.



Figs. 22-28. *Ectemnius* (*Hypocrabro-Cameronitus*) *tsuifenicus* sp. nov. 22-26, ♂; 27-28, ♀. 22 and 27: Clypeus. 23 and 28: Mandible. 24: Flagellum of antenna. 25: Collar of pronotum. 26: Scutellum, postscutellum and propodeum.

♂. Length 8-9 mm. Black, mesopleuron with a more or less bronzy shine. Orange yellow are an elongate mark on mandibles, antennal scapes except apex, collar, humeral tubercles, scutellum and postscutellum, sometimes axillae and posterior margins of lateral areas of the two parts, a small spot on each side of tergites 1, 3 and 4, a band on 2, a medianly interrupted narrow band on 5, a mark from apex to underside of fore and middle femora, an elongate mark on underside of hind femora, a mark on outer side of fore and middle tibiae. Wings strongly clouded, stigma and veins dark brown. Pile on clypeus silvery, appressed, on sides of head and thorax greyish white, on dorsal side slightly brownish, fairly long, but not so much as in *melanotarsis* and less strong.

Head from above with temples fairly strongly roundly convergent posteriorly, OOD : POD:

S. Chang leg.

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26, ♂;
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Orange yellow
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OOD : POD;

OCD = 13 : 10 : 16, frontal mark as usual in the subgenera. Clypeus: Fig. 22, mandibles bi-dentate at apex, with a comparatively small tooth on inner margin (Fig. 23), antennal scape ecarinate, flagellum: Fig. 24, joint 3 seen from above about 2.5 times as long as wide at apex, head in profile with eye as wide as temple, temple parallel-sided, occipital carina at the region of temple becoming broad, reaching (or going very close to) the hypostomial carina. Pronotum: Fig. 25, of the anterior carinae of mesonotum the median long but weak, while the lateral short but strong, rather somewhat tuberculate, scutellum not impressed on the median line, on mesopleuron anterior oblique furrow broad and deep, strongly crenate, precoxal carina distinct, highly raised, mesosternum medianly distinctly carinate, area dorsalis occupies nearly whole the dorsal surface of propodeum, incompletely enclosed by a series of short carinae and medianly broadly furrowed, main carinae within and outside the area very strong and high (Fig. 26), lateral carinae represented by the parts of coarse carinae combined longitudinally together. Tergite 1 slightly longer than wide (roughly 5 : 4), end tergite without the distinct pygidial area, only the apical margin shining and slightly raised. Legs normal, fore metatarsus approximately as long as the following 4 joints put together.

Upper side of head, mesonotum and scutellum finely, densely punctured, rather granulately reticulate, antero-lateral portions transversely rugoso-punctate, on mesopleuron hypo-epimeron longitudinally, closely striate, prepectus sparsely, weakly and obliquely striate, with sparse, weak punctules scattered, rest of the episternum sparsely, moderately grossly punctured, with sparse indistinct striae on interspaces, metapleuron longitudinally strongly, coarsely striate. Sculpture of propodeum: Fig. 26, sides longitudinally, moderately coarsely striate, abdominal tergites closely covered with fine points carrying short pubescence.

♀. Length 9 mm. Coloration as in ♂, except that mandibles without yellow mark, tergites 3 and 4 without maculae and maculae of femora all much larger. Clypeus: Fig. 27, mandible: Fig. 28, the tooth on inner margin extraordinarily small, antennal joint 3 approximately 2.5 times, joint 4 about 1.3 times as long as wide at apex, head in profile with temple wider than eye, occipital carina reaching by the length of antennal joint 4 sideways from the postero-lateral corner of the buccal carina. Structure of pro- and mesonotum similar to that of ♂, propodeum with lateral carinae thoroughly distinct, area dorsalis on posterior portion vaguely bordered by shallow groove and medianly broadly furrowed. Tergite 1 of abdomen as long as wide at apex, pygidial area similar in form to that of *pempuchi*, in lateral view apical portion slightly curved up. Legs and wing venation normal. Punctuation of head and mesonotum as in ♂, mesopleuron except lower portion longitudinally coarsely striate, area dorsalis longitudinally, somewhat rugosely striate, on anterior portion coarsely and on posterior portion finely and closely so, posterior inclination obliquely sparsely and weakly striate, sides as in ♂, abdomen practically impunctate.

Holotype: ♂, Tsuifeng (2700 m), Nantou pref., 18. VIII. 1968, K. Tsuneki leg.

Paratypes: 1 ♀ 3 ♂♂, ditto.

10. *Leclercqia formosana* Tsuneki, 1968

Leclercqia formosana Tsuneki, Etizenia, 30: 15, 1968 (♀♂).

Specimens collected: 3 ♀♀ 3 ♂♂, Pempuchi, Nantou Pref., 17, 26. 1968.

Remarks. I could again collect the above listed specimens of this curious species in the valley of Pempuchi where they came to the bamboo leaves to lick the sweet dew sprinkled by the aphides.

11. *Crossocerus (Cuphopterus) surusumi** sp. nov.

Apparently similar to *Crossocerus (Apoides) alticola* m., known from Mt. Ali, Formosa, the same locality as in the present species, but it does not belong to *Apoides*, but to *Cuphopterus* and easily separable therefrom by the structure of the pygidial area and the upper side of the head. The present species is exceptional to the subgenus in that the body including the abdomen is wholly black, without the yellow or white maculae. In the structural distinctions it somewhat resembles *Crossocerus (Cuphopterus) yanoi* m., differs from it, however, in the absence of the lateral carinae of the propodeum and relatively much longer basal segment of the abdomen.

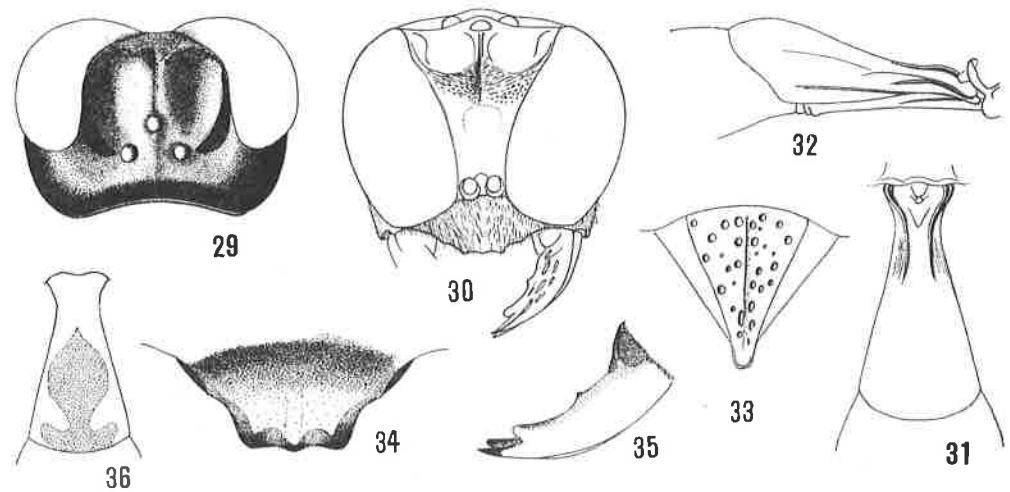
♀. Length 11.5 mm. wholly black, upper side of head and mesonotum with a bronzy shine, more or less mat, only the lateral surface of antennal scapes yellow. Mandibles at apex somewhat reddish, tibial spurs and spines of legs ferruginous, underside of hind tarsi reddish brown, wings hyaline, apically fulvous, stigma and veins brownish black. Pubescence on upper side of head, mesonotum and penultimate segment of abdomen fuscous, on clypeus silvery, on other portions hoary white, all fairly long, short pubescence covering the antennal flagellum ferruginous, giving it somewhat a ferruginous appearance.

Head from above: Fig. 29, median area longitudinally raised, with on it a distinct frontal furrow before the median ocellus, the areas of the frons between this medial elevation and the eyes broadly shallowly excavated, the excavation reaches the posterior blunt edge of vertex, frontal mark almost not impressed, but the areas of the marks alone without the aeneous shimmer, pitchy black and very conspicuous, anterior margin of each excavation rounded from above, with a deep triangular notch in between, not so acutely edged as in *yanoi*, because of the presence of the comparatively gross, slightly transversely lengthened and not distinctly outlined punctures, OOD : POD = 13 : 8 (postocellus relatively 6), ocelli not in a complete equilateral triangle, but somewhat low. Head seen in front: Fig. 30, with the upper margin of the frons apparently transversely carinate, because of the anterior edge of the dorsal excavation and in the middle broadly furrowed, clypeus medianly porrect and bluntly tridentate at apex, with a small angulated projection on each lateral margin; clypeus in lateral view with two elliptic hollows on the lateral margin, the intervallic carina forming the triangular projection when seen in front (in *yanoi* the structure similar, but the intervallic carina not produced into a tooth), mandible stout (Fig. 30), with a blunt tooth on inner margin toward the middle. Head in profile with eye somewhat wider than temple, occipital carina distinct, ending rather abruptly before reaching the hypostomial carina, but the end not toothed. Scape of antenna with the antero-lateral edge, but not acutely carinate, postero-lateral edge more obtuse, joint 3 slightly less than thrice as long as wide at apex, joint 4 $\frac{3}{4}$ the length of joint 3 and 1.8 times as long as wide at apex. Collar of pronotum laterally somewhat roundly swollen and medianly somewhat narrowed, with a deep transverse furrow before the posterior margin, mesonotum anteriorly tricarinate, the carinae together with the fine parapsidal furrows shining, the median carina longer. On mesopleuron epicnemial carina acutely raised, anterior oblique furrow broad and distinctly crenate, scrobal furrow indistinct, but the scrobe itself comparatively big and deep, precoxal tubercle vestigial, the part very slightly transversely raised. Area cordata on propodeum distinct by the difference of sculpture, but not margined by the furrow or carina, comparatively large and gently roundly raised, with in middle a broad furrow which is bordered on both sides by a carina and medianly at base distinctly carinate (constant ?), posterior inclination medianly longitudinally furrowed. Tergite 1 of abdomen: Fig. 1, 1.8 times as long as broad

* Classic and poetic Japanese, meaning black.

at apex, at base broadly and deeply excavated, on posterior portion slightly roundly swollen (Fig. 23), a feature somewhat approaching *Apoides*. Pygidial area: Fig. 33, only gently roundly raised, with a fine, weak, somewhat glittering, keel-like line in middle which is visible only in certain light, not conspicuous. In fore wing recurrent vein received by cubital cell slightly behind middle (at about $3/5$ from base) of the cubital vein and the transverse cubital vein jointed to radial vein somewhat before middle (at about $2/5$ from base), accessory cell distinct, with apex open. Legs normal, fore tibiae a little, mid and hind tibiae considerably armed with spines.

Vertex almost impunctate, dorsal depressed areas of upper frons with fine scattered hair-punctules, the punctures larger forwards, but not strong, indistinct on outline and somewhat transversely lengthened, at the verge they become stronger and distinct, with the intervals turning into blunt ridges, as a whole they appear to be transversely (slightly obliquely) grossly punctate-striated, the sculpture stronger and more distinct at the upper portion of the vertical frons including the medial furrow (Fig. 30) and some of the ridges at the verge of inclination appear to be the frontal transverse carina. Mesonotum finely, fairly closely, mesopleuron finely



Figs. 29-36. 29-33: *Crossocerus (Cuphopterus) surusumi* sp. nov., ♀.
34-36: *Crossocerus (Cuphopterus) flavopictus kansitakuanus* ssp. nov.
29: Head from above. 30: Head in front. 31: Abdominal segment 1. 32: Ditto, lateral view. 33: Pygidial area. 34: Clypeus. 35: Mandible. 36: Tergite 1 of abdomen.

and sparsely covered with hair-bearing punctules, the former aeneous mat and without crenellation on posterior margin, the latter well shining. Area dorsalis at base very coarsely, sparsely crenate, the surface shining, but under 30 times magnification already a fine reticulate micro-sculpture observable, outside the area together with the sides of the posterior inclination transversely striate, bearing scattered punctures in between, posterior inclination broadly shining, with scattered hair-bearing punctules, metapleuron and sides of the propodeum smooth and glossy, with trace of striae on upper part of the latter. Abdomen practically impunctate, on posterior part of tergite 5 only somewhat finely and closely punctulate. Pygidial area strongly shining, with scattered large punctures.

Holotype: ♀, Mt. Ali (2400 m), Chiai Pref., 4. VIII. 1968. K. Tsuneki leg.

Remarks. This species may represent an intermediate state between *Apoides* and *Cuphopterus*, though much closer to the latter group.

12. *Crossocerus (Cuphocterus) flavopictus* (Smith, 1856)

Crabro flavopictus Smith, Cat. Hym. Ins. Brit. Mus., IV: 391, 1856.

Crabro flavopictus: Cameron, Mem. Manch. Lit. Phil. Soc., IV (3): 270, 1890.

Crabro flavopictus: Bingham, Fauna Brit. Ind., Hym. I: 324, 1897.

Crabro (Cuphocterus) flavopictus: Yasumatsu, Mushi, 14: 87, 1942.

Crossocerus (Cuphocterus) flavopictus: Leclercq, Bull. Inst. R. Sci. nat. Belg., 26 (15): 16, 1950.

Crossocerus (Cuphocterus) flavopictus: Leclercq, Monogr. Crabro., p. 240, 1954.

Crossocerus (Cuphocterus) flavopictus: Leclercq, Bull. Ann. Soc. Ent. Belg., 99: 11, 1963.

Subsp. *kansitakuanus* subsp. nov.

The new race differs from the typical form, as far as the original and Bingham's descriptions (with the key) go, in the following points:

(1) Clypeus (Fig. 34) medianly porrect, with anterior margin not simply transverse, but bluntly tridentate, the dentate part distinctly incrassate and darkened, the lateral margin of the porrect portion with two elliptic hollows on its outer side, the intervallic carina of the hollows slightly produced into a tooth as in the case of the preceding species.

(2) Frontal marks are not in a state of impressed oblique channels (surely so in the type ?), but the large elongate pitchy black marks along the inner margins of eyes, very conspicuous in the aeneous mat surroundings, just as in the preceding species.

(3) Femora of legs not wholly yellow, only on the lower half of outside of the fore and middle femora yellow and hind femora wholly black; tibiae also more broadly blackish.

(4) Tergite 5 with a large yellow spot on each side and apical margin with only a trace of narrow, incomplete, intermittent band, pygidial area yellow, only at apex somewhat reddish (but the maculation will be variable).

♀. Length 9 mm. Black, dorsal part of head and mesonotum with a strong bronzy shimmer. Yellow are mandibles except brownish apex and inside, antennal scapes except a large dark brown mark covering apical half of the posterior side, medianly interrupted band on collar of pronotum, humeral tubercles, two spots on scutellum, postscutellum wholly, abdominal segment 1 except a black mark shown in Fig. 36, lateral marks on tergites 2-5, pygidial area, apex of coxae, trochanters wholly, marks on fore and middle femora as above given, fore and middle tibiae except dark brown inside and its extended mark on outer side, three marks at base and apex of hind tibiae and greater part of basitarsi. Rest of tarsi ferruginous, apically darker. Tegulae of wings ferruginous brown, sternites 2-5 at apex broadly membranous, translucent, amber-coloured, the anterior margin of the area medianly markedly produced into non-translucent part of the segment.

Clypeus: Fig. 34, apically by degrees ferruginous, extreme apex darkened as given in the figure. Mandible: Fig. 35, the tooth on inner margin very small, but distinctly present. Antennal joint 3 slightly less than twice as long as broad at apex. The first tergite of abdomen: Fig. 36.

♂. Unknown.

Holotype: ♀, Kansitaku, Chiai Pref., 1300 m., 6. VIII. 1968, K. Tsuneki leg.

Remarks. As to the typical race there are records from northern India (type locality — Smith, 1856 and Bingham — redescription), East China (Chekiang — Yasumatsu, 1942), Sumatra (Leclercq, 1950, 54) and India and Java (Leclercq, 1963). With respect to the detailed structure of the clypeus there is some doubt as to whether the form given by Bingham really informs the correct feature or not. Because, only roughly say, the state of my specimen falls within the bound of his expression. However, no mention has been made by the later inves-

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tigators regarding the clypeal structure of the specimens dealt with by them. I therefore took the Bingham's indication in his key as correct.

The wasp was nesting in the abandoned beetle burrow opened on the timber of a half broken house. When captured she was carrying a fly belonging to Rhagionidae.

13. *Crossocerus* (*Apocrabro*) *aeta loa* Pate, 1943

Crossocerus loa Pate, Lloydia, 6 (4): 287, 1943 (Formosa).

Crossocerus aeta: Tsuneki, Etizenia 15: 2, 1966 (with references).

Crossocerus aeta loa: Tsuneki, Ibid., 30: 31, 1968.

Specimens collected: 3 ♀♀ 7 ♂♂, Kuanhua, Chiai Pref., 1, 2, 6, 7. VIII. 1968; 2 ♂♂, Pempuchi, Nantou Pref., 11, 26. VIII. 1968.

Remarks. The form of the clypeus in the female (Fig. 37) described in the original paper (without figure) is considerably different from that of the male (Tsuneki, 1966, p. 3; 1968, Pl. IX, fig. 1). With respect to the acuteness of the teeth and the relative width of the parts of the apical margin there is a more or less variation among the specimens. Pygidial area: Fig. 38.

Crossocerus (*Fentis*), subgen. nov.

Type: *Crossocerus* (*Fentis*) *quinquedentatus* Tsuneki, sp. nov.

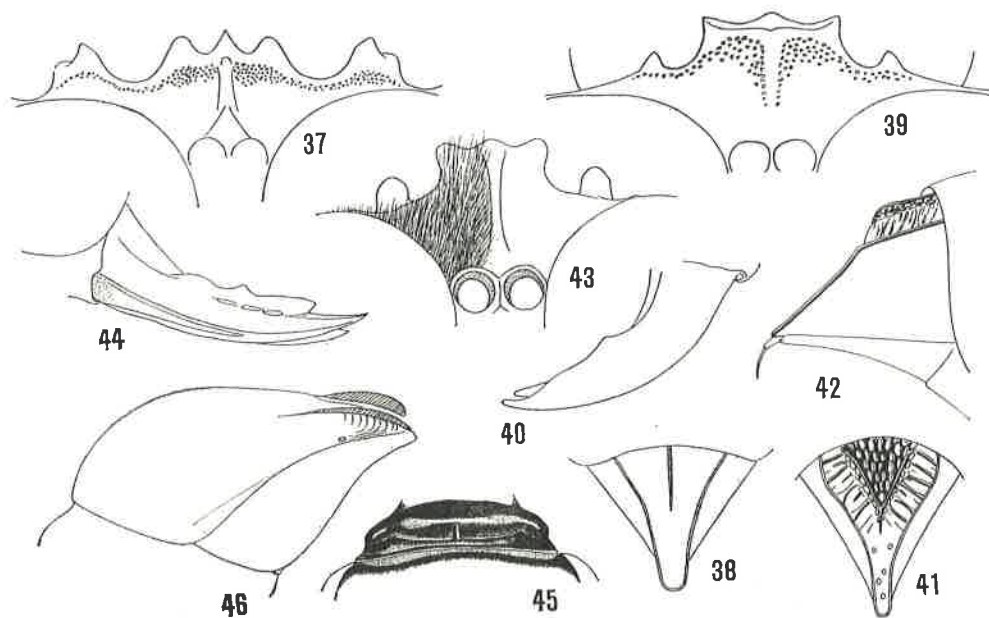
The new subgenus is based on the female characters alone. It has characters partly common with *Cuphopterus* (the elongated abdominal segment 1, yellow maculated abdomen, medianly weakly toothed mandible) and partly common with *Coelocrabro* (well-developed precoxal spine, posteriorly gutter-like excavated pygidial area), but differs from both of them in that the mandible is bidentate at the apex. Other characters: Scape of antennae ecarinate, ocelli in an equilateral triangle, frontal marks as in *Cuphopterus* or *Blepharipus*, occipital carina not reaching hypostomial carina, not acutely pointed at apex, pronotum in middle only half notched from behind, propodeum with well defined area dorsalis, without lateral carinae, abdominal segment I subpetiolate, pygidial area narrowed apically and grooved, in hind wing anal lobe slightly shorter than submedial cell.

14. *Crossocerus* (*Fentis*) *quinquedentatus* sp. nov.

♀. Length 6.0-7.0 mm. Black, dorsal side of head and mesonotum with a weak bronzy lustre. The following portions yellow: Scape of antennae except the brownish dorsal mark, collar of pronotum, humeral tubercles, a large mark on scutellum, postscutellum, comparatively large lateral maculae on tergites 2-4 (those on 3 largest and on 4 smallest), apex of mid and hind coxae, a large mark occupying apical 2/3 of outer side of fore and mid femora, outer and posterior aspects of fore and mid tibiae and base of hind tibiae. Mandibles black, apical half and inner area chestnut brown (extreme apex black), taster, end of apical segment of abdomen and tibial spurs ferruginous. Wings hyaline, slightly fuscous, veins and stigma dark brown.

Dorsal aspect of head not broadly depressed as in most species of *Cuphopterus*, but only the outer or front side of each ocellus depressed, frontal furrow deep and broad, the areas on both sides gently roundly swollen, frontal marks nearly elongated oviform, pure black, connected with the postocelli by a narrow line, OOD : POD : OCD = 7 : 5 : 11, the border between upper and fore frons roundly inclined, minimum interocular distance: length of antennal scape = 1 : 2.5, clypeus medianly carinate and on anterior margin quinquedentate (Fig. 39), mandible: Fig. 40, head in profile with temple well developed, almost parallel-sided, as wide as eye, occipital carina ending rather abruptly at the apex, but not toothed. Antennal joint 3 about

2.5 times as long as wide at apex. Collar of pronotum transverse, anterior margin carinated at the sides, lateral margins just behind the carina with a notch and the area behind the notch gently roundly raised (the structure somewhat resembling that of *C. amurensis* Kohl, but it is likely to be overlooked owing to the conspicuous yellow mark reaching the corner), on mesonotum medio-anterior carina and parapsidal furrows well defined, but the short carinae on each side of the medio-anterior carina very feeble and indistinct, on mesopleuron anterior oblique furrow broad and coarsely crenate, the scrobe deep and distinct, but the scrobal furrow almost lacking, precoxal spine strong and very conspicuous. Area dorsalis on propodeum broad, distinctly enclosed by a deep furrow and medianly longitudinally, broadly and shallowly grooved, posterior aspect also medianly with a broad furrow, but without the lateral carinae separating the area from the sides of the segment, only on extreme apex with a short vestigial carinae.

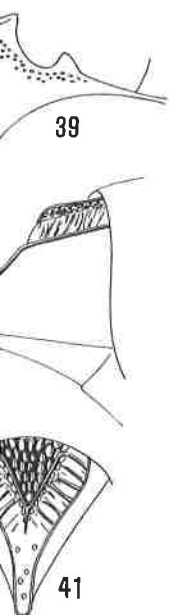


Figs. 37-46. 37-38: *Crossocerus* (*Apocrabro*) *acta loa* Pate, ♀. 39-42: *Crossocerus* (*Fentis*) *quinquedentatus* sp. nov., ♀. 43-46: *Crossocerus* (*Bnunius*) *domicola* sp. nov., ♀. 37, 39 and 43: Clypeus. 38, 41 and 42: Pygidial area, 42 lateral view of 41. 40 and 44: Mandible. 45: Pronotum. 46: Abdominal tergite 1, lateral view.

Abdominal segment 1 about 1.5 times as long as wide at apex, not nodose on posterior part and not constricted before tergite 2, pygidial area: Fig. 41, apical narrowed elongation markedly longer than usual in *Coelocrabro* and the basal triangular raised area very characteristic, it is enclosed by carinae and flattened on the surface and from the apex a short carina extended posteriorly. Hind tibiae more or less clavate, outer face with strong spines scattered, the following metatarsi not incrassate.

Vertex practically impunctate, frons from the level of median ocellus anteriorly finely, closely, but not strongly punctate, mesonotum similarly, but posteriorly somewhat sparsely punctured, mesopleuron rather sparsely covered with hair-bearing punctules, area dorsalis wholly smooth and shining, lateral portions of dorsal and posterior side finely, fairly closely, but not strongly punctured, rest of the posterior side finely, sparsely punctured, metapleuron smooth

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and polished, with bordering suture-lines strongly crenate, sides of propodeum anteriorly just behind the posterior suture of metapleuron, longitudinally strongly striate, rest of the sides longitudinally, closely and very delicately striate, the striae on central area obsolete and the surface shining. Abdomen impunctate, under 60 times magnification very finely, densely, transversely striate (as very frequently met with in the tropical species), not glossy, tergite 6 with fine punctures scattered, punctures on pygidial area: Fig. 41, sternites 2-5 with ante-apical line of hair-bearing punctures, end sternite posteriorly with fairly strong, close punctures.

♂. Unknown.

Holotype: ♀, Kuanhua (1200 m), Chiai Pref., 6, VIII. 1968, K. Tsuneki leg.

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

15. *Crossocerus* (*Coelocrabro*) *nitidicorpus* Tsuneki, 1968

Crossocerus (*Coelocrabro*) *nitidicorpus* Tsuneki, Etizenia, 30: 11, 1968.

Specimens collected: 23 ♀♀, Kuanhua (1200 m), Chiai Pref., 1, 2, 6, 7. VIII. 1968.

Crossocerus (*Bnunius*) subgen. nov.

Type: *Crossocerus* (*Bnunius*) *domicola* Tsuneki, sp. nov.

Except for the single character that the mandible bears a distinct tooth on the inner margin towards the middle the species (♀ alone) that is to be received within this group can betolerably allocated within the subgenus, *Coelocrabro*. Strictly, however, the species has, besides the above mentioned, the following characters which are considered subgeneric:

- (2) Ocelli in a right angled isosceles triangle.
- (3) Abdominal tergite 1 only slightly longer than wide, but it is somewhat nodose posteriorly.
- (4) Pygidial area as in the preceding species built.
- (5) Mesopleuron with a strong precoxal spine.

Some other characters: Pronotum not completely furrowed in middle, a notch from behind not reaching the anterior margin of the collar. Occipital carina rather abruptly ended before reaching the buccal carina, but not toothed at apex. Posterior aspect of propodeum not completely separated from the sides of the segment by a carina. Accessory cell of fore wing open at apex.

16. *Crossocerus* (*Bnunius*) *domicola* sp. nov.

In some structural characters resembles the preceding species, namely, in the form and structure of head, clypeus, thorax, propodeum and pygidial area, but the mandibles tridentate at apex, abdomen without yellow markings, flagellar joints of antennae and abdominal segment 1 shorter, the latter somewhat nodose and the legs more poorly yellow maculated.

♀. Length 5.0-6.5 mm. Black, upper side of head and mesonotum only in certain light with a weak bronzy shine. Yellow are the antennal scapes, base of all tibiae, tibial spurs, metatarsi of fore and middle legs, joint 2 of middle tarsi and basal half of hind tarsal joints 1 and 2. Mandibles on ante-apical area and inner half dark brown (apex and extreme inner margin black), sometimes greater part ferruginous brown, rest of tarsal joints ferruginous, apically dark brown to black. Wings hyaline, veins and stigma brownish black.

Head from above with the sides behind eyes roundly convergent posteriorly, vertex outside postocelli slightly impressed, frontal furrow broad, but not strikingly deep, verge of upper frons roundly inclined anteriorly, OOD : POD : OCD = 8 : 6 : 12, width of ocellus (uniform

in size) relatively 4.5, frontal marks very weakly impressed, only in oblique light defined, glittering, comparatively large, posterior end rounded (at this area slightly narrower than the width of postocellus), narrowed anteriorly and slightly curved, reaching far before anterior ocellus. Clypeus very similar in form to that of *C. quinquedentatus* m., only the lateral angles of the produced median lobe more broadly rounded and the lateral teeth bigger and more distinctly produced anteriorly (Fig. 43). Mandible: Fig. 44, the tooth on inner margin not large, but distinct. Head in profile with temple distinctly broader than eye, postorbital line and the occipital line almost parallel, occipital carina rather abruptly ended before reaching the hypostomial carina, the end not toothed. Antennal scape ecarinate, joint 3 approximately 2.3 times as long as broad at apex. Pronotum (Fig. 45) with antero-lateral corners rounded and obliquely keeled, the areas just behind the corners somewhat constricted, on mesopleuron precoxal spine very strong and conspicuous, with its apex directing latero-posteriorly. Area dorsalis on propodeum large, semicircular, gently roundly raised, distinctly enclosed by crenate furrow and medianly broadly but not deeply impressed, the impressed area barrel-shaped, on its anterior half or 2/3 bordered by fine carinae and medianly at base always with a longitudinal carina, this median furrow reaches posteriorly the area-enclosing-furrow, but is always separated from it by a thin and high carina (or wall), posterior inclination medianly broadly and deeply impressed, lateral carinae hardly reach half of the area, but the furrow that at first accompanies the carina extended upward independently and reaches near the base of the segment, that is to say, the dorsal and posterior aspects of propodeum are separated from the sides of the segment by the lateral furrows, but not by the carinae. Abdominal segment 1 slightly longer than wide (30 : 25), with the dorsal surface fairly strongly curved (Fig. 46, lateral view). Fore femora distinctly hollowed on the outer aspect, with its upper and lower margins acutely edged, rest of the legs normal.

Body appears smooth and highly polished, but under the microscope vertex with scattered, very delicate hair-bearing punctules, upper frons anteriorly finely and densely punctured, mesonotum finely, sparsely punctured, interspaces 2-3 times as great as the punctures, on posterior margin not crenate, scutellum with fairly gross punctures sparsely scattered, mesopleuron on upper portion sparsely and delicately punctured, but the punctures downwards slightly grosser, but not close, mesosternum finely and fairly closely punctured, metapleuron impunctate, shining. Area dorsalis smooth and polished, at base coarsely crenate, or rather shortly carinate. Some of the carinae sometimes extended and reach the lateral portion of the area-enclosing-furrow, posterior aspect medianly smooth and laterally along the longitudinal furrows transversely shortly striate or crenulate, sides of the segment smooth and shining, only ventro-anterior and ventro-posterior areas longitudinally coarsely striate. Abdominal tergites practically impunctate, only on posterior portion of tergite 5 finely punctured, pygidial area except the basal elevation smooth and polished.

♂, unknown.

Holotype: ♀, Kuanhua (1200 m), Chiai Pref., 6. VIII. 1968, K. Tsuneki leg.

Paratypes: 9 ♀♀, the same place, 1, 2, 6, 7. VIII. 1968, K. Tsuneki leg.

Remarks. The wasps of this species nested in a perpendicular mud wall of an abandoned house mentioned earlier. The place was too high, out of my reach and I could not examine the interior of the nests. But I could capture a female wasp carrying a prey which was a beautiful blue glittering fly of her body size.

It seems interesting that the base of the nests was the mud wall, and yet the place was high above the ground and perpendicular — in a sense having the conditions of the nest base of *Crossocerus* s. str. and *Coelocrabro* together.

17. *Crossocerus (Ablepharipus) taiwanus* Tsuneki, 1968

Crossocerus (Ablepharipus) taiwanus Tsuneki, Etizenia, 30: 10, 1968.

Specimens collected: 15 ♀♀ 48 ♂♂ Tsuifeng (2700 m), Nantou Pref., 18. VIII. 1968; 12 ♀♀ 18 ♂♂, the same place, 22. VIII. 1968.

Description of the hitherto unknown female.

Similar to the common palaeartic species, differs, however, from *assimilis* and *podagricus* in the sculpture of the mesopleuron and propodeum and is easily separable therefrom. Most closely allied to the Japanese subspecies (*fukuensis*) of *C. congener*, but differs from it in the following points:

Characters	<i>congener fukuensis</i>	<i>taiwanus</i>
Length	6.0-6.5 mm	5.5-5.8 mm
Coloration	Pronotum mostly black, fore and mid femora apically broadly yellow, hind tibia at base broadly yellow, hind metatarsi broadly ferruginous, vertex almost without bronzy shimmer.	Pronotum mostly with 2 spots, fore and mid femora apically very narrowly yellow, hind tibiae at base dark brown, hind metatarsi black, vertex with a bronzy shimmer.
Frontal marks	Distinctly curved, connected with posterior ocellus.	Almost not curved, not connected with posterior ocellus.
Eye : Temple	In profile eye distinctly wider than temple.	Subequal to each other.
Scuto-scutellar furrow	Distinctly crenate.	Not crenate.
Punctures on mesonotum	Very fine and sparse, anteriorly somewhat closer.	Fairly large and sparse.
Mesopleuron	Almost smooth and polished, with sparse fine punctures.	Microreticulate, not shining, with sparse fine punctures.
Propodeum	Area dorsalis posteriorly enclosed by fine weak furrow, outer areas fairly strongly punctured, sides broadly glittering.	Area dorsalis everywhere not enclosed by furrow, outer areas very finely sparsely punctured, sides microstriate.
Tergite 1	Almost as long as wide at apex.	Distinctly longer than wide.
Pygidial area	Apical excavation very weak.	Apical excavation much deeper.

♀. Length 5.5-5.8 mm. Black, dorsal aspect of head with aeneous shine, yellow are antennal scapes in front and outside, two spots on collar (rarely lacking), humeral tubercles, an elongated spot at basal wadding of wings, knees and tibiae in front, tibial spurs and whole tarsi except apical brownish joints of fore and middle legs. Mandibles at apex ferruginous red; palpi, two spots on transparent brown tegulae and end of abdomen ferruginous yellow or ferruginous red, base of hind tibiae dark brown. Wings hyaline, very faintly fuscous, veins and stigma dark brown.

Head from above subquadrate, with eye almost as wide as temple, the latter roundly convergent posteriorly, posterior margin roundly emarginate, ocelli in an equilateral triangle, OOD : POD : OCD = 7 : 4 : 10, a supposed line connecting the posterior margins of eyes contiguous to the front margin of postocelli (in *congener fukuensis* runs across the middle of postocelli), frontal mark not impressed, but well-defined by its pitchy black glittering surface, as long as antennal joints 4 and 5 taken together, posteriorly broader, frontal median line distinct, but not strong. Clypeus: Fig. 47, mandible: Fig. 48, of the apical two teeth the upper longer, antennal joint 3 approximately 1.3 times as long as broad at apex; head in profile with temple subequal in width to eye, or slightly wider, occipital carina not strong, ending rather

abruptly before reaching buccal carina, the end rounded. Collar of pronotum with sides rounded, scuto-scutellar furrow not crenate, mesopleuron with strong precoxal tooth, area dorsalis on propodeum not enclosed by the furrow, lateral carinae of posterior aspect only on posterior half defined, tergite 1 longer than wide at apex (27 : 20), pygidial area triangular, apical triangle narrower than in *congener fukuensis* and more deeply excavated. Legs as in *congener*, hind tibiae clavate, sparsely but strongly spinose on outer side (base of the spine tuberculate), the following metatarsus also incrassate. Venation normal.

Vertex and upper frons weakly microreticulate, with fine punctures sparsely scattered, punctures on upper portions of temples somewhat larger, mesonotum somewhat strongly, mesopleuron weakly microreticulate; further, the former moderately grossly, the latter finely, both sparsely punctured, metapleuron finely, not closely, but somewhat rugosely punctured, area dorsalis on propodeum closely, radiately microstriate, rest of the dorsal side and posterior aspect rather closely covered with hair-bearing fine punctures, sides of the segment longitudinally, somewhat arcuately and delicately microstriate, together with meso- and metapleuron fairly shining. Abdomen impunctate, but with transverse, very delicate and close striae and the surface not polished, tergite 5 and pygidial area half mat, owing to the fine punctures.

Remarks. According to the literature this species seems also allied to *C. (A.) indonesiae* Leclercq, 1961, but in the Formosan species the clypeus is not so markedly roundly raised as in this and, further, the mesothorax is, besides the microsculpture, distinctly punctate.

The male of this species is separable from that of *C. (A.) congener fukuensis*, beside by such characters as described with respect to the female, *i. e.* the structure of the head¹⁾, punctuation and coloration²⁾, by that (1) head beneath not adorned with tuft of long white pubescence, (2) paramere of genitalia with a fringe of long hairs on outer margin, (3) tarsal joints of the legs relatively shorter and somewhat dilated, metatarsus slightly shorter than half the length of the respective tibia (in *congener fukuensis* slightly longer).

Variation on the maculation of pronotum: of the 27 ♀♀ 66 ♂♂ examined 1 ♀ 11 ♂♂ without maculae, all the rest carry the maculae, though markedly varied in development. In general they are larger in ♀ than in ♂.

When I visited Tsuifeng on the 18th, August, 1968 I was favoured by the good weather (on the high mountain of Formosa such is very rare, every fine day the place becomes filled with cloud before noon) and could find this species very abundantly. They were crowded on the flowers of *Aralia cordata* Thunb. growing at the wayside, so abundant were they that I could not collect all of the specimens that were scooped in my insect net.

18. *Crossocerus (Ablepharipus) kamateensis* sp. nov.

This species is so similar to the preceding one that without the close examination by means of the microscope the differences can hardly be found out, which are:

♂. Head beneath covered sparsely with long, soft pubescence (sparser than in *congener fukuensis*), seen from above temples less developed, distinctly shorter than eyes, tarsal joints longer, amply as long as the preceding tibia, in colour the yellow marks on pronotum much larger and fore tarsi except the apical joint wholly yellow (this may be of use in identifying the specimens by the aid of the magnifying glass only) and paramere of genitalia without the fringe of hairs on outer margin.

♀. Punctures on mesonotum finer (the male has a similar tendency, but less marked),

1) Temples less developed than in ♀, in dorsal view slightly shorter than eye.

2) Fore tarsi not yellow, but ferruginous brown.

sculpture on area dorsalis somewhat coarser, not so glittering, occipital carina somewhat more distinct, pronotum more broadly yellow maculated and hind tibiae at base yellow.

As might be presumed this species is nearer to *C. (A.) congener fukuensis*, differs from it, however, at least in that the body smaller, tergite 1 longer than wide, scuto-scutellar furrow not crenate (♀♂), punctures on mesonotum coarser (♀) and pronotum always (so far examined) broadly yellow maculated.

♂. Length 3.3-3.5 mm. Black, with bronzy shimmer on head. Yellow: Scapes of antennae except the dorsal side, two broad marks on collar, humeral tubercles, knees (in fore femora especially broader), tibiae except inside and tarsi, except apical joints, of fore and middle legs and base broadly of hind tibiae. Mandibles at apex reddish brown, palpi, flagellum of antennae beneath and tegulae of wings (transparent) ferruginous, hind tarsi and veins and stima of wings dark brown or brownish black. Pubescence on clypeus silvery. Head beneath, pro- and mesosternum and basal portion of front legs beneath covered with long white pubescence, those on head beneath somewhat sparser (sparser than in *congener fukuensis*).

Head seen from above relatively somewhat wider than in *C. (A.) taiwanus*, with eyes distinctly longer than temples (13 : 8), the imaginal line connecting the posterior margins of eyes runs across postocelli, ocelli almost in an equilateral triangle (somewhat low, in *taiwanus* in a complete equilateral triangle), anterior ocellus smaller than the posterior, OOD : POD : OCD = 9 : 8 : 10, postocellus in width relatively 5, frontal marks defined by its glittering blackness, situated along inner margins of eyes, nearly as long as antennal joint 6, curved and on posterior margin somewhat raised, frontal median furrow fine but distinct, its lateral adjacent regions not roundly raised, head seen in front a little narrowed downwards, clypeus as in *taiwanus* formed, but the lateral teeth smaller and less produced anteriorly, mandibles also as in this, head in profile with eye wider than temple, occipital carina slightly more distinct, otherwise as in *taiwanus*. Antennal joint 3-12 almost equal in length, only slightly longer than wide at each apex, joints 3-13 beneath with tyloidea. Collar of pronotum seen from above and somewhat backward with antero-lateral corners bluntly angulated (in *taiwanus* simply rounded), scuto-scutellar furrow not crenate, on mesopleuron anterior oblique furrow distinct, crenulate, precoxal tooth also distinct, well developed, on propodeum area cordata not enclosed by the furrow, but is well defined by the slight rounded elevation and difference of sculpture, median groove distinct, narrow, posterior aspect medianly above in an elongated triangle impressed, medianly below longitudinally carinate, lateral carinae up to middle of the aspect well-defined, sides of the segment slightly obliquely excavated, but not so marked as in *C. (A.) shibuyai* Iwata. Tergite 1 longer than wide, Tergite 7 flattened on disc, but not emarginated by the carinae, legs normal, tarsal joints not so abbreviated and not so dilated as in *taiwanus*, hind tibia clavate, without spine on outer side, but with a trace of tubercles, subsequent metatarsus incrassate. Wing venation normal, paramere of genitalia not fringed with stiff hairs on outer margin.

Kopf delicately microreticulate and very sparsely scattered with fine punctules, fairly shining, mesonotum and scutellum more delicately, mesopleuron as on vertex delicately (but posteriorly fairly distinctly) microreticulate. mesonotum, further, with somewhat grosser punctures sparsely scattered, scutellum almost impunctate, mesopleuron with sparse fine punctules. Area dorsalis at base crenate, disc radiately, finely and densely striate, the striae somewhat stronger than in *taiwanus*; rest of the dorsal aspect obliquely, posterior aspect transversely, sides of the segment longitudinally finely and closely striate. Abdomen impunctate, but with transverse, dense and very delicate microstriae as in *taiwanus*.

♀. Length 4.0-5.5 mm. Coloration as in ♂, but antennal scapes more broadly yellow, collar of pronotum almost completely yellow, only narrowly interrupted in middle, also knees of fore and middle legs more broadly adorned with yellow. Pygidial area on the basal swelling and lateral carinae ferruginous brown. Punctuation also similar. Structure of clypeus and pygidial area almost without difference from that of *C. (A.) taiwanus*, but the difference between the length and the width of tergite 1 appears somewhat smaller. Tarsal joints relatively longer than in ♂, especially marked in hind metatarsus, hind tibia strongly clavate, with a few spines on outer surface, their bases tuberculated.

Holotype: ♂, Kamate (now Kuanhua), Chia Pref., 6. VIII. 1968, K. Tsuneki leg.

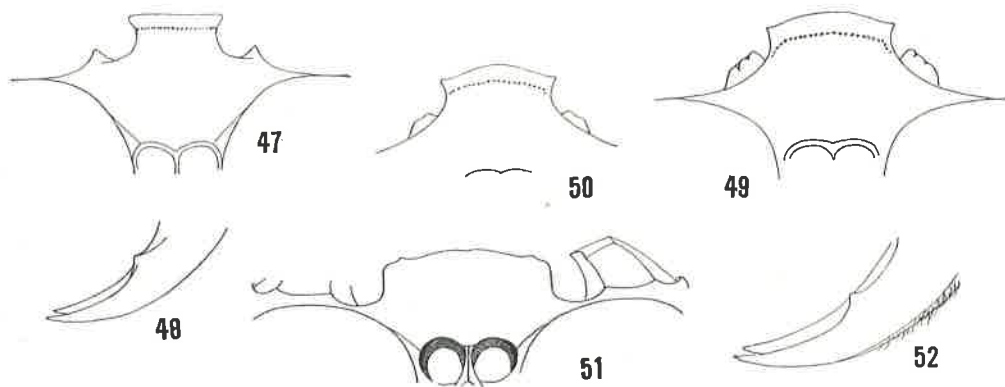
Paratypes: 18 ♀♀ 2 ♂♂, the same place, 1, 2, 6, 7. VIII. 1968, K. Tsuneki leg.

19. *Crossocerus (Ablepharipus) congener bambosicola* subsp. nov.

Length ♀ 5.0-6.5 mm, ♂ 5.0 mm. Most closely resembles the Japanese subspecies of *congener*, namely *fukuiensis*, differing from it in the following points:

♀♂. Sculpture on dorsal side of head much weaker and surface more strongly shining. Mesopleuron almost completely smooth and more broadly and highly polished, with very sparse fine punctules, area dorsalis on propodeum in most specimens enclosed by a line of fine punctures, sometimes very distinctly and completely so, collar of pronotum always adorned with a medianly interrupted band (in *congener fukuiensis* only occasionally so), in ♂ fore femora not broadly reddish yellow, but wholly black except apical narrow ring.

Clypeus: Figs. 49 (♀) and 50 (♂), similar to those of *fukuiensis*, mandibles also similar (♀♂), antennal flagellum beneath ferruginous and in ♂ joint 3-13 with tyloidea, OOD : POD \doteq 5 : 4. Precoxal tooth distinct, but not so long as in other Formosan congeners. Area dorsalis at apex in middle not closed, but extended narrowly backwards and reaches the middle of posterior inclination, involving the upper impression of the inclination, lateral carinae only reaching half of the area. Tergite 1 almost as long as broad at apex (♀♂), pygidial area in ♀ as in *fukuiensis*, broader than in other Formosan relatives and the excavation also shallower. Paramere of Genitalia (♂) without fringe of hairs on outer margin. Head beneath, pro- and mesosternum and basal half of fore femora beneath densely covered with long white pubescence as in *fukuiensis* (♂). Mesonotum distinctly mikroreticulate, with fairly close punctules, inter-



Figs. 47-52. 47-48: *Crossocerus (Ablepharipus) taiwanus* Tsuneki, ♀. 49-50: *Cr. (Ab.) congener bambosicola* ssp. nov., 49, ♀; 50, ♂. 51-52: *Cr. (Ab.) bnum* sp. nov. ♀. 47, 49, 50 and 51: Clypeus. 48 and 52: Mandible.

vals 1-2 times as great as the width of the punctures, scuto-scutellar furrow distinctly crenate, area dorsalis at base crenate, disc delicately, closely and radiately striate, rest of the dorsal aspect finely (but comparatively more grossly than on thorax), closely, somewhat rugosely punctured.

Holotype: ♂, Kuanhua, Chiai Pref., 6. VIII. 1968, K. Tsuneki leg.

Paratypes: 9 ♀♀ 2 ♂♂, the same place, 1, 2, 6, 7. VIII. 1968, K. Tsuneki leg.

Remarks. The wasps of this species were nesting in the abandoned small beetle burrows opening on the thick bamboo stems used as pillars of the house mentioned earlier. Two of the wasps collected carried a small midge that belonged to Empididae as in the Japanese congeners.

In one of the males tergite 1 exceptionally somewhat longer than wide and in two of them mesonotum and scutellum medianly longitudinally impressed. These are possibly the instances of individual variation, but the former instance seems to be worthy of notice.

20. *Crossocerus (Ablepharipus) bnun* sp. nov.

This species (♀) is very characteristic in the form of the clypeus (Fig. 51) and in the wholly black body and appendages and easily separable from other known species of the subgenus. From the same locality the male of *C. (Ab.) tsuifengensis* m. has been known without the corresponding female. But the present specimen can not be combined with it by reason of various differences in structure, coloration and punctuation.

♀. Length 6.7 mm. Black; mandibles before apex, basal tubercles of antennae, articulation of some parts of antennae and of legs and tip of abdomen brownish; tibial spurs dark brown, wings hyaline, veins and stigma dark brown. Pubescence of clypeus silvery, on other places greyish white.

Frontal marks on dorsal side of head comparatively distinct, long, only slightly shorter than antennal joints 3 and 4 combined, with side contiguous to the inner margins of eyes, not curved, with the inner margin distinctly outlined; OOD : POD : OCD = 8 : 6 : 15, while postocellus relatively 4, frontal groove weakly defined, the groove between postocelli fine, weak, but glittering and distinct; head seen in front with a slight interval between inner orbit of eyes and socket of antennae. Clypeus: Fig. 51, anterior margin in middle gently inclined downwards, of the two apical teeth of mandibles the anterior longer, the tooth on inner margin comparatively larger and stronger than in any other palaeartic species. Head in profile with temple far broader than eye, almost parallel-sided, with occipital carina ending far behind the buccal carina. Antennal joint 3 about 1.5 times, joint 4 about 1.3 times as long as broad at apex, joint 8 slightly longer than wide. Collar of pronotum transversely raised, anterior margin subcarinate, with a distinct medial incision, lateral angles seen from behind rounded, mesonotum anteriorly weakly tricarinate, medial carina thick, bordered on both sides by a fine impressed line, mesopleuron with anterior oblique furrow distinct, strongly crenate, scrobe also distinct and deep, precoxal spine robust, directing sideways, area dorsalis large, distinctly defined by the difference of sculpture and of pilosity, almost semicircular, margined by a fine, shallow groove, median longitudinal furrow, deep, only at base slightly enlarged and margined by the fine carinae, posterior aspect medianly above with a deep elongated triangular impression, the margins acutely edged, lateral carinae up to middle of the aspect defined, posteriorly high and distinct. Tergite 1 longer than wide at apex (35 : 24), pygidial area trilobate as usual, slightly longer than wide at apex. Fore femora almost flattened on external aspect, but not acutely edged on both margins, hind tibia strongly incrassate and clavate, with about 10 spines on external side, each spine with the base raised, following metatarsus also markedly incrassate.

Dorsal side of head and mesonotum microreticulate and half mat and, further, punctured,

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Tsuneki leg.

Tsuneki leg.

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52

4-50: *Cr.*

b.) *bnun*

punctures on upper frons fine, with intervals 1-2 times as great as punctures, on vertex finer and somewhat sparser, on mesonotum and scutellum as on upper frons, but closer, with intervals as great as punctures, anteriorly much closer and posteriorly somewhat sparser, scuto-scutellar furrow not crenate, on mesopleuron punctures sparser, intervals 2-3 times the size of punctures and similarly microsculptured, only the narrow area above the scrobe the sculpture weak and fairly shining, mesosternum more sparsely and somewhat more grossly punctured, metapleuron and sides of propodeum finely, closely and longitudinally striate, the striae on metapleuron somewhat stronger. Area dorsalis at base crenate, disc finely, closely and radiately striate, dorsal surface outside the area finely and closely punctured with hair-bearing punctures, posterior aspect transversely, closely striate and partly also punctured. Abdomen impunctate, but tergites 2-4, as in most of the Formosan species of the genus, transversely, very closely microstriate, not glittering, pygidial area mat, sternites shining, with a series of a few hair-bearing punctures before the apex of each segment.

♂. Unknown.

Holotype: ♀, Tsuifeng (2500 m), Nantou Pref., 18. VIII. 1968, K. Tsuneki leg.

Genus *Odontocrabro* gen. nov.

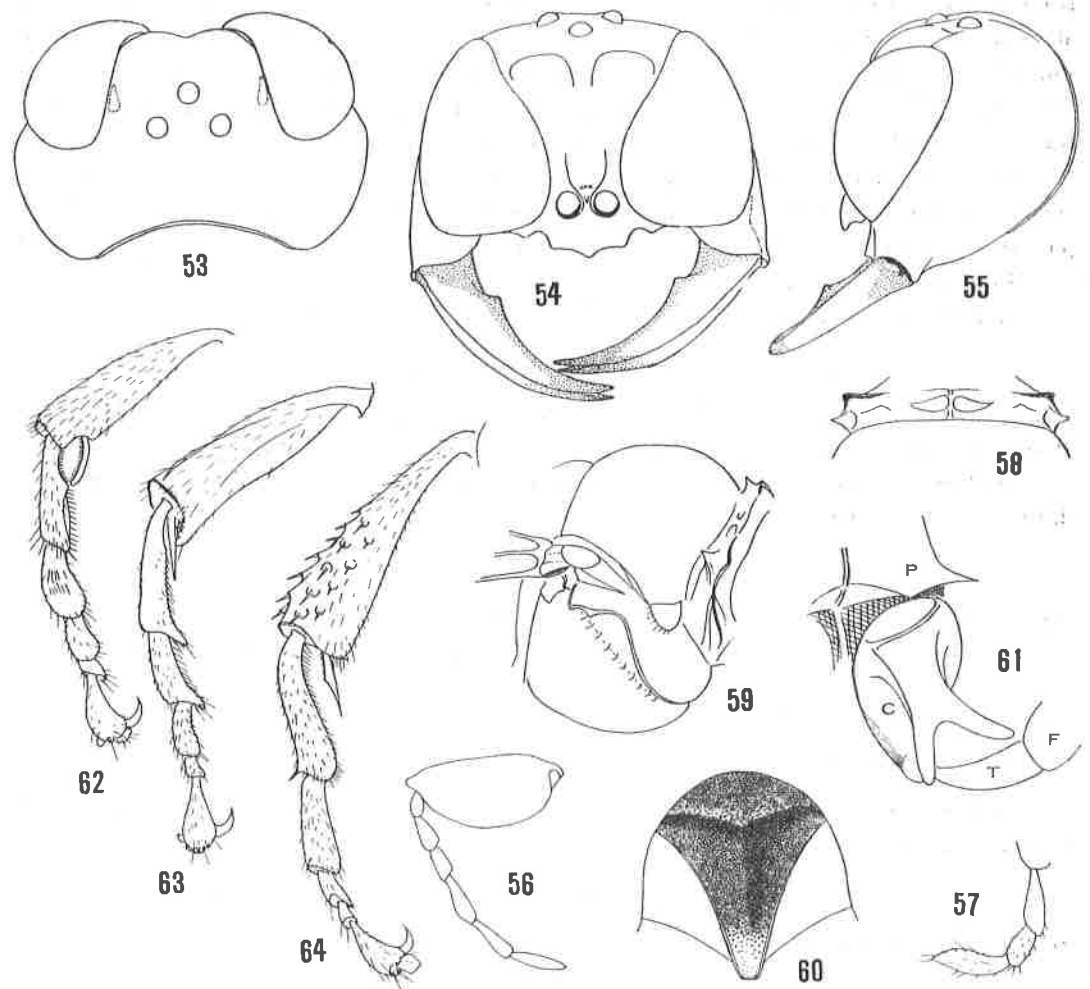
Genotype: *Odontocrabro abnormis* Tsuneki, sp. nov. (Based on female characters only.)

Maxillary palpi 6-jointed (Fig. 56) and labial palpi 3-jointed (Fig. 57) (as in the genus *Tracheliodes*), but inner orbits of eyes distinctly convergent towards the clypeus, but not contiguous to the sockets of antennae (Fig. 54), mandibles bidentate at apex, with a distinct tooth on inner margin (Fig. 54), ocelli in an isosceles triangle, widest at base, without frontal carina, antennal joint 2 longer than joint 3, mesopleuron with distinct epicnemial carina, but without precoxal carina or tooth, abdomen sessile, segment 1 as long as wide, pygidial area trilobate, mat, legs more or less modified. Wing venation as in the genus *Crossocerus*.

21. *Odontocrabro abnormis* sp. nov.

♀. Length 4.5-5.0 mm. Black and shining. Mandibles on about half of outer and fore sides (Fig. 54) and antennal scapes in front ivory white, on mandibles periferal area brownish; palpi, end of tibiae and all tarsi ferruginous brown. Wings hyaline, veins and stigma brown to dark brown. Clypeus except anterior margin covered with silvery pile, flagellum of antennae sparsely pilose.

Head seen from above: Fig. 53, outside postocelli somewhat impressed, frontal furrow distinct, extending backwards through between postocelli to verge of occiput, upper frons between frontal furrow and eyes gently roundly raised, along the postero-lateral margins of the raised areas located frontal marks which are slightly impressed and connected with postocelli by a fine, weakly impressed line, OOD : POD : OCD = 6.5 : 6 : 12, postocellus in width relatively 3; head seen in front: Fig. 54, temples below widely expanded sideways, oculo-mandibular space as long as antennal joint 2 + half 3, OAD : WAS : IAD = 1 : 3 : 2, clypeus as given in Figure 54, mandibles ditto, extraordinarily long, the tooth on inner margin distinct, antennal joint 1 (scape) ecarinate, longer than minimum width between eye (14 : 10), joint 2 slightly longer and much thicker than joint 3, the latter as long as joint 4 and approximately 1.7 times as long as broad at apex, joint 8 almost as long as wide. Head seen in profile: Fig. 55, occipital carina not highly raised, rather abruptly ended far before reaching hypostomial carina, the end not toothed. Collar of pronotum (Fig. 58) flattened above, tuberculate on both side of medial furrow and at the sides strongly toothed (also Fig. 59, seen obliquely from the side), prosternal

Figs. 53-64. *Odontocrabro abnormis* gen. et sp. nov., ♀

53: Head seen from above. 54: Head in front. 55: Head in profile. 56: Maxillary palpus. 57: Labial palpus. 58: Collar of pronotum. 59: Thorax seen obliquely from above (right side). 60: Pygidial area. 61: Prosternum (P), Procoxa (C), -trochanter (T) and femur (F) of the left side seen from beneath. 62, 63 and 64: Fore, middle and hind tibia and tarsus.

tubercle acutely pointed (Fig. 61, P), mesonotum anteriorly feebly trisulcate, scutellum raised and scutro-scutellar furrow strongly crenate, on mesopleuron postspiracular sclerite 2 (sens. Richards) markedly broad, not separated from the epicnemial area by a carina and provided on outer margin with a short triangular protuberance (Fig. 59, seen obliquely from the side), anterior oblique furrow broad and deep, strongly crenate, without precoxal carina or tooth, mesosternum with a deep elliptic hollow on posterior portion in middle which is filled with comparatively long hairs, metapleuron roundly swollen along its length axis, on propodeum without the enclosed area dorsalis, posterior inclination medianly above with an oviform, shallow, flattened impression, on lateral margin with an incomplete longitudinal carina which is up to about middle of the area defined, tergite 1 as long as wide, pygidial area: Fig. 60. Fore coxa provided with a strange, long bifurcate, large appendage in front (Fig. 61, left legs seen

from beneath), fore tibia and tarsus: Fig. 62, tarsal joints 2 and 3 somewhat incrassate and abnormal, mid and hind tibiae and tarsi: Figs. 63 and 64, tarsal joints more or less modified, joints 1-3 on inner margin at apex markedly produced. In fore wing abscissa 1 and 2 of cubital vein equal in length, abscissa 1 of radial vein about half the length of abscissa 2 and equal to transverse radial vein, accessory cell open at apex, with the vein very weak.

Body smooth and highly polished, only on clypeus except apex, sides of prothorax, epinomial area and propodeum not shining, propodeum delicately microreticulate, the sculpture posteriorly weaker and there the surface fairly shining.

Holotype: ♀, Kuanhua, Chiai Pref. (1200 m), 6. VIII. 1968, K. Tsuneki leg.
Paratype: 1 ♀, the same place, 1-2. VIII. 1968, K. Tsuneki leg.

22. *Piyuma prosopoides iwatai* (Yasumatsu, 1942)

Crabro (*Crossocerus*) *iwatai* Yasumatsu, Mushi, 14 (2): 88, 1942.

Piyuma prosopoides iwatai: Tsuneki, Etizenia, 30: 14, 1968 (with detailed references).
Specimens newly collected: 2 ♂♂, Kuanhua, Chiai Pref. (1200 m), 1, 2. VIII. 1968; 1 ♀, ditto, 7, 8. VIII. 1968.

23. *Dasyproctus buddha* (Cameron, 1889)

Dasyproctus buddha: Tsuneki, Etizenia, 30: 18, 1968 (with references).
Specimens newly collected: 2 ♀♀, Manchou, Pingtung Pref., 13, 14. VII. 1968.

24. *Dasyproctus formosanus* Tsuneki, 1968

Dasyproctus formosanus Tsuneki, Etizenia, 30: 19, 1968.

Specimens newly collected: 5 ♂♂, Manchou, Pingtung Pref., 13, 14. VII. 1968.; 1 ♂, Chuchi, Chiai Pref., 26. VII. 1968.

25. *Dasyproctus ceylonicus impetuus* (Cameron, 1901)

Dasyproctus ceylonicus impetuus: Tsuneki, Etizenia, 30: 18, 1968 (with references).
Specimens newly collected: 3 ♀♀ 5 ♂♂, Kuangyin, Taoyuan Pref., 14. VI.; 10 ♀♀ 5 ♂♂, Chuchi, Chiai Pref., 26. VII.; 4 ♀♀ 3 ♂♂, Manchou, Pingtung Pref., 13, 14. VII.; 3 ♀♀ 2 ♂♂, Chiangnouliao, Chiai Pref., 27, 28. VII.; 5 ♀♀, Pempuchi, Nantou Pref., 10, 11, 17. VIII.; 1 ♀ 4 ♂♂, Puli, Nantou Pref., 12, 15, 23, 25. VIII.; 2 ♀♀, Chiengching — Wushe (1700 m), 13, 24. VIII. 1968.

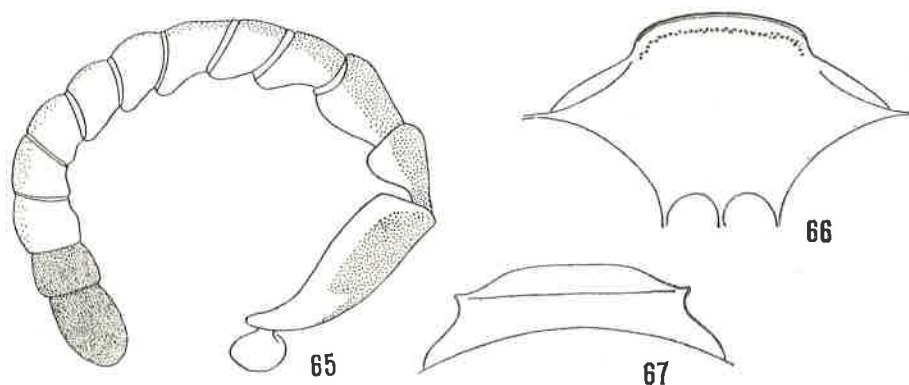
26. *Rhopalum* (*Latrorhopalum*) *erraticum* Tsuneki, 1968

Rhopalum (*Latrorhopalum*) *shirozui*: Tsuneki, Etizenia, 15: 12, 1966 (♀, nec ♂, 1965).
Rhopalum (*Latrorhopalum*) *erraticum* Tsuneki, Etizenia, 30: 20, 1968 (♀).
Specimens collected: 3 ♀♀ 2 ♂♂, Tsuifeng (2500 m), Nantou Pref., 18, 22. VIII. 1968, K. Tsuneki leg.

Description of hitherto unknown male: Length 6.0 mm. Palpi and humeral tubercles whitish yellow. Antennal scape in front, flagellum beneath except two apical joints, knees, inside and a streak on outer face of fore tibiae, tibial spurs of fore and mid legs and fore and mid tarsi except brownish apical portion ferruginous. Mandibles at apex reddish brown, wings slightly fuscous, veins and stigma dark brown. Remaining portions black.

Frontal marks narrow and curved, relatively somewhat shorter and somewhat more anteriorly located than in ♀ (posterior margins together with that of median ocellus located on the

same transverse line), OOD : POD : OCD = 7 : 5 : 9 (postocellus relatively 3, each ocellus possesses at the periphery a smooth and obliquely inclined area, under low magnification the part including the area appears to be the ocellus, in the present treatise the inner iris-like part alone is measured as ocellus). Antenna: Fig. 65 (lateral view, but the apical portion distorted and the last three joints are in the condition seen from above), clypeus: Fig. 66, head in profile with eye broader than temple, pronotum: Fig. 67, scutellum nearly quadrate, with a deep rounded pit inside each antero-lateral corner, postscutellum at base with a lunate impression, area dorsalis not enclosed by the furrow, at base crenulate and in middle with a narrow distinct groove that is extended up to the medio-posterior carina of the posterior inclination and slightly enlarged. Punctuation as in ♀.



Figs. 65-67. *Rhopalum (Latrorhopalum) erraticum* Tsuneki, ♂.
65: Antenna. 66: Clypeus. 67: Collar of pronotum.

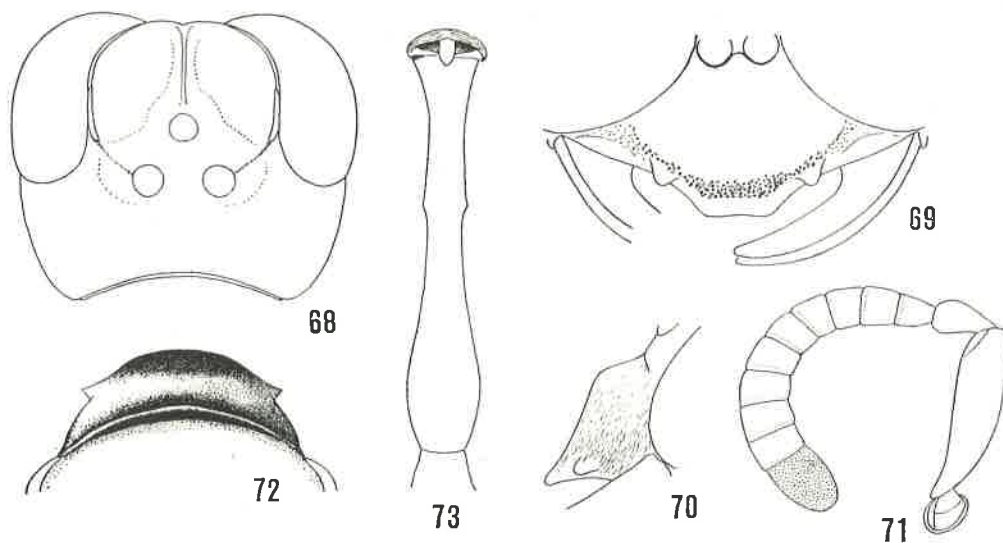
27. *Rhopalum (Latrorhopalum) angustipetiolatum* sp. nov.

This species (♀) is apparently very close to *R. (L.) erraticum* m., but in the new species the head is nearer to quadrate (dorsal view), clypeus otherwise conformed, hind tibia at base not excavated, punctures coarser and closer, legs fairly broadly yellow maculated and body slenderer and more delicately built.

♀. Length 5.2 mm. Black and dull, only the abdomen and legs more or less glossy. Yellow: Antennal scapes in front, humeral tubercles, fore femora from apex to middle of outer side, fore tibiae except inside and following tarsi, knees, greater part of tibiae and tarsi, except the brownish apical joints, of middle legs. Mandibles brown, flagellum beneath ferruginous yellow, above dark brown and narrow apical ring of each joint paler, ultimate joint black; tegulae of wings semitransparent brown, hind tibiae at base pale brownish white, somewhat semitransparent, hind tibiae and tarsi fairly distinctly brownish. Wings feebly clouded, stigma and veins dark brown. Clypeus covered with silvery pile as usual, hairs on other parts very short, sparse and greyish, the short pile on femora of legs very sparse, hind femora almost glabrous. This is one of the distinguishing characters of this species when compared with *erraticum* in which all femora beneath are densely pubescent.

Head seen from above: Fig. 68, dorsal part of frons more gently roundly inclined than in *erraticum*, frontal median furrow moderately deep, frontal marks narrow (narrower than in *erraticum*), with anterior part linearly extended forwards along inner orbit, reaching near the level of antennal base, posterior part somewhat curved and connected by a narrow impressed

line with the postocellus, the parts that are enclosed by the frontal furrow and the extensions of the frontal marks gently roundly raised, ocelli in an an isosceles triangle, slightly lower than the equilateral one, anterior ocellus smaller than the posterior, $OOD : POD : OCD = 3 : 4 : 6$. Clypeus: Fig. 69, with the lateral teeth somewhat from behind the anterior margin sprung up, seen in profile: Fig. 70. Head in lateral view with eye much broader than temple, occipital carina not toothed at the end. Antenna: Fig. 71, joint 3 seen from above a little longer than wide at apex. Collar of pronotum: Fig. 72, with lateral margins roundly convergent forwards, at the antero-lateral corners with a short tooth produced just as in *erraticum*, scutellum nearly square, postscutellum lunately impressed at base; on mesopleuron anterior oblique furrow distinct, coarsely crenate, propodeum almost from base gently roundly inclined posteriorly, without the dorsal side, the inclination medianly narrowly, but distinctly grooved. Petiole of abdomen (Fig. 73) slender and long, as long as the 2 succeeding tergites combined, much longer than hind trochanter and femur taken together ($34 : 27$), pygidial area as usual, laterally and medianly at base carinated. Legs normal, hind tibiae strongly clavate, with a few short weak spines on outer side.



Figs. 68-73. *Rhopalum (Latorhopalum) angustipetiolatum* sp. nov., ♀.
68: Head seen from above. 69: Clypeus. 70: Clypeus in lateral view. 71: Antenna. 72: Collar of pronotum. 73: Petiole of abdomen.

Vertex and upper frons finely and closely punctured, interspaces delicately microreticulate, not glossy, thorax and propodeum under 60 times enlargement without puncture, the surface finely but distinctly coriaceous, dull and opaque, the sculpture on mesonotum stronger, with somewhat granulate appearance, on propodeum partly regularly obliquely arranged, with somewhat striated appearance (in *erraticum* parts of thorax punctured and coriaceous as on head, only propodeum microcoriaceous without punctules). Abdomen transversely, densely microstriate, not polished.

♂. Unknown.

Holotype: ♀, Pempuchi, Nantou Pref., 25. VII. 1970, Y. Haneda leg.

28. *Rhopalum* (*Calceorhopalum*) *spinicollum* Tsuneki, 1968

Rhopalum (*Calceorhopalum*) *spinicollum* Tsuneki, Etizenia, 30: 24, 1968.

Specimen collected: 1 ♀, Chiengching-Wushe, Nantou Pref. (1800 m), 24. VIII. 1968.

29. *Rhopalum* (*Rhopalum*) *succineicollare taiwanum* subsp. nov.

Reference: *Rhopalum* (*Rhopalum*) *succineicollare* Tsuneki, Jour. Fac. Sci. Hokkaido Univ., VI, Zool., 11 (1): 120, 1952.

♀. Differs from the Japanese typical race mainly in colour, but the difference is so great that it appears to be another species.

Black, yellowish white: Mandibles except blackish apex and brownish inner margin, antennal joint 1 wholly, 2 beneath, nape region of pronotum, humeral tubercles (with a discoloured window), a vague hoof-shaped mark on tegulae, fore and middle legs wholly and base broadly of hind legs. Collar of pronotum cream yellow (not ambur coloured); tegulae transparent light brown, basal half of abdominal petiole and coxae and trochanters of hind legs ambur-coloured; clypeus on anterior portion, palpi, antennal joint 2 above, basal plates of wings and apex of tibiae and underside of tarsi of hind legs ferruginous. Abdomen except the apical half of petiole and base of tergite 2 wholly ferruginous red, rest of antennae dark brown, beneath ferruginous and apically blackish. ♂. Unknown.

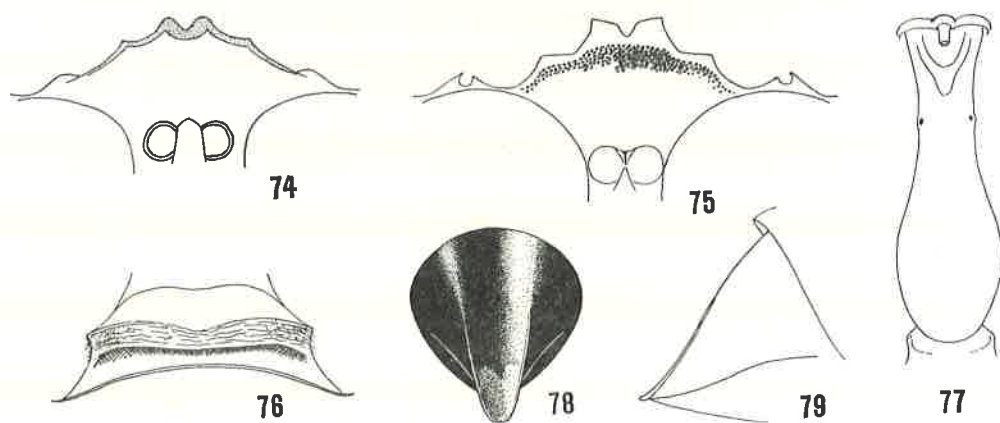
Remarks. This species seems to be close also to *R. domestica* Williams, 1928 (and Lecercq, 1963), but is much larger, with clypeus somewhat different in form (Fig. 74, the same as in typical race) and with markedly different coloration. In comparison with the Japanese specimens of this species the colour of pronotum strikingly different. However, in one of my specimens (1 ♀ from Koike, Fukui Pref.) the colour of the pronotum turns in part yellow and, further, the axillae of scutellum wholly yellow. In general in the Japanese specimens legs are more broadly brown to dark brown.

30. *Rhopalum* (*Rhopalum*) *mushaense* sp. nov.

This species (♀) is characteristic in the form of the clypeus, pronotum and pygidial area and by the combination of these characters it can easily be separated from other known species of the subgenus. Furthermore, the colour and punctuation of the mesonotum are of use to characterize the species.

♀. Length 4.0 mm. Black without the reddish yellow portion. Antennal scapes wholly, and pedicel beneath ambur-yellow or opaque yellow, humeral tubercles, fore tibiae wholly, mid tibiae except inside and the apical spurs, hind tibiae at base, fore and mid tarsi except the dark brown end joint of the latter yellow. Mandibles black, with apex and median streak reddish brown; palpi and apex of pygidial area ferruginous brown. Tegulae transparent light brown, base of wings and stigma and veins dark brown.

Head seen from above wider than long (34 : 20), with temples shorter than eyes and gently roundly, not strongly convergent posteriorly, ocelli in an equilateral triangle, anterior ocellus distinctly smaller than the posterior, OOD : POD : OCD = 6 : 3 : 8, postocellus in width relatively 3, frontal furrow distinct, frontal marks small, as long as antennal joint 2, but much narrower, impressed. Clypeus: Fig. 75, of the apical teeth of mandibles the upper one larger, collar of pronotum: Fig. 76, anterior margin bluntly carinate, mesonotum with medio-anterior carina reaching middle of the segment, often the portion including the carina longitudinally impressed, area dorsalis not margined by the furrow, but with a narrow median furrow that reaches the broad impression on posterior inclination, lateral carinae of the



Figs. 74-79. 74: *Rhopalum (Rhopalum) succineicollare taiwanum* ssp. nov., ♀.
75-79: *Rhopalum (Rhopalum) mushaense* sp. nov., ♀.
74 and 75: Clypeus. 76: Collar of pronotum. 77: Petiole of abdomen. 78: Pygidial area. 79: Ditto in the lateral view.

inclination attaining amply the middle of the area. Petiole (Fig. 77) almost as long as hind femur (24 : 22, while hind tibia 26), distinctly longer than tergite 2, pygidial area in an elongated triangle, longitudinally distinctly excavated and lateral carinae raised at the apical portion (Fig. 78 and 79, the latter in the lateral view). Legs normal, each metatarsus long, nearly half the length of each preceding tibia, hind tibia clavate, with several spines on outer side, the following metatarsus somewhat thickened.

Dorsal side of head almost impunctate, smooth and shining (with only imperceptible points of pubescence scattered), pronotum on anterior inclination very finely reticulate, almost granulate, on anterior portion of collar transversely finely and closely regoso-reticulate, posterior portion fairly deeply depressed (or rather furrowed), with surface fairly shining, mesonotum finely, rather closely punctured, intervals 1-2 times as great as the punctures, but anteriorly punctures closer, under 60 times magnification the punctures are connected with each other by very fine impressed lines (not in a formal microreticulation), mesopleuron and metapleuron smooth and highly polished, propodeum also polished, but the lateral areas of posterior inclination finely sculptured, not shining, sides of the segment on lower portion with weak, short, transverse striae. Petiole and tergite 2 smooth and polished, tergites 3-5, with very fine, sparse hair-bearing points, tergite 6 including pygidial area microreticulate and half mat.

♂. Unknown.

Holotype: ♀, Musha (= Wushe), Nantou Pref. (1300 m), 13. VIII. 1968, K. Tsuneki leg.
Paratypes: 2 ♀♀, Kuanhua, Chia Pref. (1200 m), 1, 2. VIII. 1968, K. Tsuneki leg.

II. TRIBE OXYBELINI

1. *Oxybelus lamellatus bicolorisquama* Strand, 1923

Oxybelus lamellatus bicolorisquama: Tsuneki, Etizenia, 30: 25, 1968 (with references).

Specimens collected: 3 ♂♂, Hengchun, Pingtung Pref., 8. VII. 1968; 1 ♀, Kentin, Pingtung Pref., 19. VII. 1968.

2. *Oxybelus nipponicus formosus* Tsuneki, 1968

Oxybelus nipponicus formosus Tsuneki, Etizenia, 30: 26, 1968.

Specimens collected: 10 ♀♀ 24 ♂♂, Kuangyin, Taoyuan Pref., 14. VI. 1968; 7 ♀♀ 21 ♂♂, Erhchieh, Ilan Pref., 18. VI. 1968; 1 ♀ 2 ♂♂, Hengchun, Pingtung Pref., 8. VII. 1968; 1 ♀ 1 ♂, Oluampi, Pingtung Pref., 18. VII. 1968; 1 ♂, Kentin, Pingtung Pref., 18. VII. 1968; 1 ♀, Checheng, Pingtung Pref., 15. VII. 1968; 6 ♀♀ 15 ♂♂, Paoli, Pingtung Pref., 19. VII. 1968; 4 ♂♂, Chuchi, Chiai Pref., 24. VII. 1968.

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- (Concerning others see Tsuneki, 1966).



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