

Some Anomalinae of Formosa (Hymenoptera : Ichneumonidae)

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Abstract

Descriptions of three new species of Ichneumonidae of the subfamily Anomalinae, with notes on some other ichneumonflies from Formosa, are given. The Formosan species of *Anomalon* is revised. A key to the species of *Anomalon* is also given.

The present article examines material from Formosa collected by Messrs. K. Ôhara and H. Takemoto, and preserved material of the Formosan *Anomalon* in the collection of the Entomological Institute, Hokkaido University. It includes descriptions of three new species, viz. *Aphanistes taiwanensis*, *Trichionotus turgidulus* and *Anomalon ohharai*, and notes on some other species. Furthermore, in this investigation an attempt is made to revise the Formosan species of *Anomalon*, with descriptions and a key to the species.

All specimens, except for the specimens belonging to the collection of Hokkaido University, treated in this paper, including type specimens of the new species described herein, are preserved in the collection of the Entomological Laboratory, Kagoshima University, Kagoshima.

Subfamily Anomalinae

1. *Heteropelma perlongum* Cushman (Fig. 1)

Heteropelma fulvitarse Morley, Revision of the Ichneumonidae...in the British Museum... 2: 70, 1913. (in part).

Heteropelma fulvitarse Morley, Fauna British India...Hymenoptera 3: 407, 1913. (in part).

Heteropelma fulvitarse: Uchida, Jour. Fac. Agr. Hokkaido Imp. Univ. 21: 238. Misdetermination of *fulvitarse* Cameron.

Heteropelma perlongum Cushman, Arb. über Morph. u. Taxonom. Ent. 4: 297, 1937.

Heteropelma perlongum: Uchida, Ins. Mats. 21: 94, 1958.

Heteropelma perlongum: Townes, Townes and Gupta, Mem. Amer. Ent. Inst. 1: 321, 1961.

Specimens examined: 1♂, Mt. Lalashan, 1300-1500 m, Taoyuan Hsien, 17-iv-1981, K. Ôhara leg.; 2♂♂, Hsitsu - Chihtuan, 1000-1200 m, Taoyuan Hsien, 18-iv-

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1981, K. Ôhara leg.

Host: Unknown.

Distribution: Formosa.

The present specimens agree well with the original description of *perlongum* Cushman, 1937, except for the apex of propodeum near middle of hind coxa, the basitarsus of hind leg 1.6-1.8 times as long as the 2nd hind tarsal segment and the longitudinal sunken area of 2nd hind tarsal segment present on about basal 5/6 (Fig. 1).

2. *Aphanistes taiwanensis*, sp. nov. (Figs. 2-5)

♂. Face about 1.4 times as wide as high, strongly and sparsely punctate, with several vertical striae; clypeus weakly convex, with large, irregularly spaced punctures, the apex pointed at center; inner margins of eyes rather strongly convergent ventrad; eye without hairs; malar space very narrow, about 2/9 as long as basal width of mandible; mandible stout, moderately strongly tapering towards apex, with large and sparse punctures, the upper tooth stout, 2.0 times as long as the lower one; distance between lateral ocelli and eyes equal the diameter of an ocellus; temple narrow, about 5/9 as long as eye in lateral view, weakly swollen (Fig. 4) with strong dense punctures, the punctures weaker and denser towards occipital carina; frons weakly concave, strongly and longitudinally rugoso-punctate, with a high median longitudinal carina; vertex strongly and longitudinally rugoso-punctate; occipital carina strong and complete, the lower end joining base of mandible. Antennae filiform, long, with 39 segments; 1st flagellar segment 4.8 times as long as wide at apex; 2nd flagellar segment 1/2 as long as 1st flagellar segment and about 1.1 times as long as 3rd flagellar one. Generally pronotum weakly and longitudinally rugoso-punctate, strongly and rather densely punctate dorsally; epomia weak; mesoscutum in profile with a distinct concavity just before its front end, strongly and densely punctate, the punctures becoming weaker and denser posteriorly; notauli weak, reaching to behind the center of mesoscutum; scutellum weakly convex, strongly and densely punctate, with a shallow longitudinal sulcus, without lateral carinae; mesopleurum strongly and densely punctate, with rather weak oblique and transverse striae; generally speculum strongly punctate; prepectal carina ending at lower corner of pronotum; postpectal carina very weak, widely interrupted in front of each middle coxa; lower corner of propleurum strongly bending backward; metapleurum coarsely reticulate-rugose. Generally propodeum weakly and densely reticulate-rugose, strongly and coarsely reticulate-rugose on postlateral area; apex of propodeum near basal 1/3 of hind coxa; propodeal spiracle subcircular. Wings (Figs. 2 and 3) with nervulus postfurcal by 1/2 of its own length; intercubitus basad of 2nd recurrent vein; portion of cubitus between intercubitus and 2nd recurrent vein about 2/7 as long as intercubitus; nervellus vertical, intercepted at its lower 1/3; postnervulus intercepted at its lower 2/5; discoidella distinct, rather strongly curved backward, reaching nearly to hind edge of hind wing; brachiella long, present on basal 5/7; 2nd recurrent vein weakly reclivous. Legs with hind femur slender, weakly clavate, about 2.8 times as long as wide in lateral view; hind tibia 7.4 times as long as wide at apex including hairs; inner spur of hind tibia about 1.4 times as long as outer spur of hind tibia; basal 3 segments of hind tarsus stout (Fig. 5); basitarsus of hind leg 5.9 times as long as wide at apex, about 2.8 times as long as 2nd hind tarsal segment and about

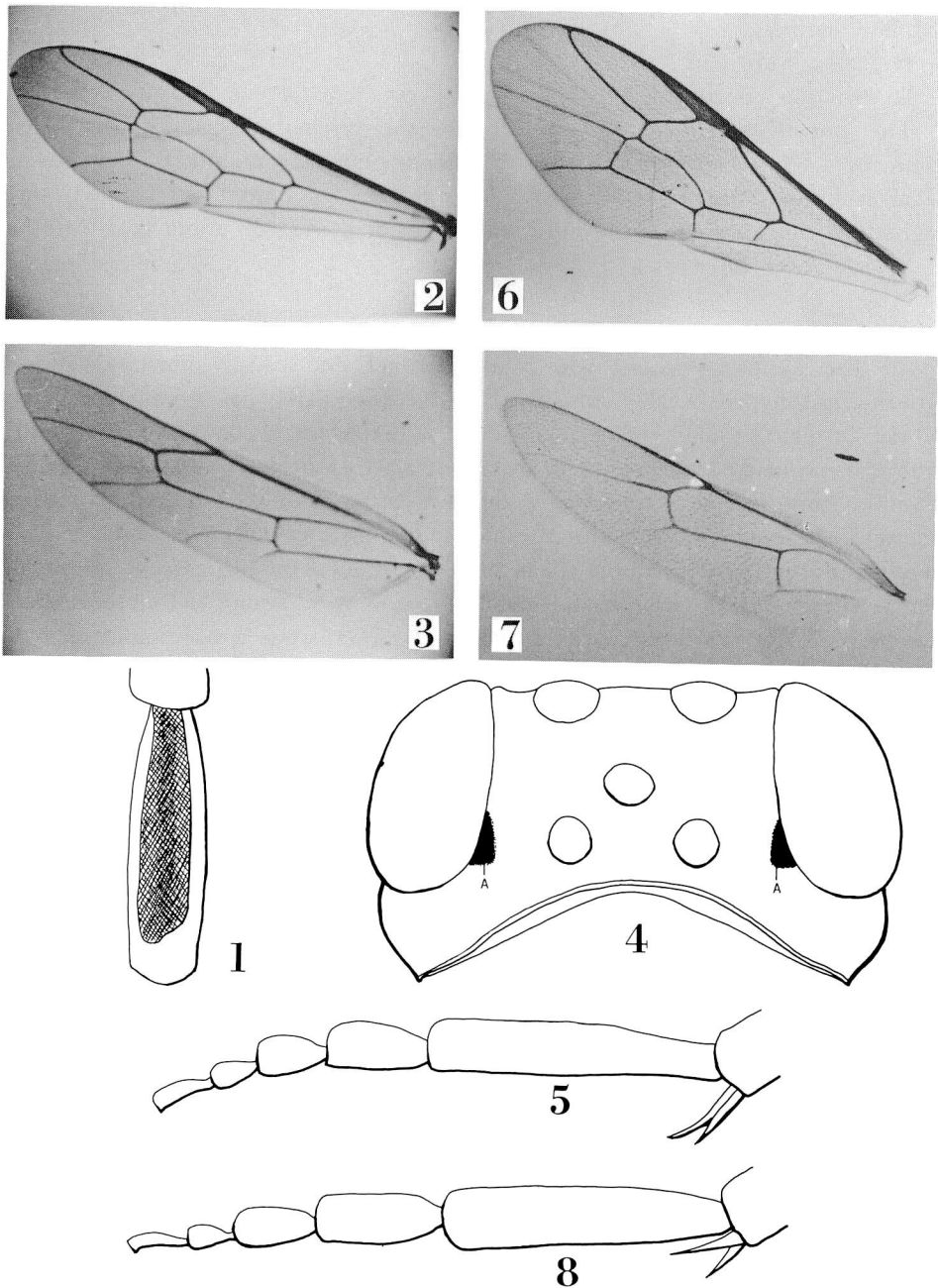


Fig. 1. Sunken area of 2nd tarsal segment in ventral view, ♂; *Heteropelma perlongum* Cushman.

Figs. 2 and 6. Left fore wings, ♂: 2, *Aphanistes taiwanensis*, sp. nov.; 6, *Trichionotus turgidulus*, sp. nov.

Fig. 4. Head in dorsal view, ♂: *A. taiwanensis*, sp. nov. (A, yellow spot at top of eye).

Figs. 3 and 7. Left hind wings, ♂: 3, *A. taiwanensis*, sp. nov.; 7, *T. turgidulus*, sp. nov.

Figs. 5 and 8. Hind tarsus in lateral view, ♂: 5, *A. taiwanensis*, sp. nov.; 8, *T. turgidulus*, sp. nov.

as long as the remaining segments together except claw; 2nd hind tarsal segment 2.3 times as long as wide at apex (Fig. 5); front coxa weakly punctate and unspecialized; all tarsal claws strongly pectinate. Abdomen with 1st tergite about 7.2 times as long as wide at apex; 2nd tergite about 1.1 times as long as 1st tergite and about 2.2 times as long as 3rd one; epipleurum of 2nd tergite narrow and separated by a crease.

Black, with legs and abdomen largely reddish brown. Face, clypeus, mouth parts except for mandibular teeth, malar space, lower corner of frontal orbit, lower parts of temporal orbit, pale-yellow to yellow; apical teeth of mandible dark brown to black; scape yellowish brown ventrally, blackish dorsally; pedicel blackish, dark brown ventrally; flagellum dark brown to infusate, darker apically. Yellow spots at top of eyes distinct, triangular, touching margin of eye (Fig. 4). Tegula yellowish brown, a little darker basally. Lower corner of propleurum pale-yellow. Mesepimeron, posterior margin of metapleurum and apical part of propodeum stained with yellowish brown. Front leg with coxa and trochanter pale-yellow; femur, tibia and tarsus light yellowish brown. Middle leg with coxa pale-yellow, a little darker basally; trochanter pale-yellow; femur, tibia and tarsus light yellowish brown. Hind leg with coxa black, pale-yellow to yellowish brown at apex and on ventroapical 1/3; trochanter pale-yellow ventrally, dark brown dorsally; femur reddish brown, a little darker dorsally, with infusate dense hairs; tibia light reddish brown on about basal 2/3, blackish on about apical 1/3, with dense black hairs, the hairs becoming sparser and paler basally; tibial spurs yellowish brown; tarsus pale-yellow to yellowish brown; base of basitarsus, last segment and tarsal claws dark brown. Abdomen dark reddish brown; dorsoapical half of 1st tergite and dorsal side of 2nd tergite blackish; 4th to 6th tergites on dorsal side, and clasper dark brown. Wings yellowish hyaline.

Length: Body 17.3 mm., fore wing ca. 9.5 mm.

♀. Unknown.

Holotype (♂): Meifeng - Tsuifeng, 2200-2300 m, Nantou Hsien, 27-iv-1981, K. Ôhara leg.

Host: Unknown

Distribution: Formosa.

This species is very closely related to the Formosan species, *Aphanistes kankonis* Uchida, 1928. (I have examined the type of *A. kankonis*). It differs from the latter in having a stouter hind tarsus, a curved discoidella and almost entirely black temple and hind coxa.

3. *Trichionotus turgidulus*, sp. nov. (Figs. 6-8)

♂. Face about 1.3 times as wide as high, very finely and sparsely punctate; clypeus weakly convex, with very sparse punctures, with an apical median point; inner margins of eyes rather strongly convergent ventrad; eyes without hairs; malar space narrow, about 1/2 as long as basal width of mandible; mandible moderately stout, weakly tapering towards apex, with sparse long hairs, the upper tooth about 1.6 times as long as the lower one; distance between lateral ocelli and eyes about 1.3 times as long as diameter of an ocellus; temple weakly swollen, 8/9 as long as eye in lateral view, rather weakly and sparsely punctate, the punctures becoming sparser and larger towards eye; frons finely convex, irregularly rugose, with a weak longitudinal carina; vertex strongly

punctate; occipital carina strong and complete, weakly arched above, the lower end joining base of mandible. Antennae filiform, with 35 segments; 1st flagellar segment 7.5 times as long as wide at apex; 2nd flagellar segment about $1/2$ as long as 1st flagellar segment and about 1.2 times as long as the 3rd. Pronotum almost entirely rugose; epomia distinct, the upper end curved forward; mesoscutum strongly and densely punctate; notauli weak, reaching beyond center of mesoscutum; scutellum weakly convex, strongly and densely punctate, with a shallow, median longitudinal sulcus and with weak lateral carinae, the extreme base marginate with a weak carina; lower corner of propleurum strongly bending backward and separated by a weak transverse carina; mesopleurum strongly punctate, with short striae along posterior margin, and with several longitudinal striae below subtegular ridge; speculum polished, with a few punctures; upper end of prepectal carina close to anterior margin of mesopleurum, and ending at lower $3/8$ of hind edge of pronotum; postpectal carina distinct, interrupted in front of each middle coxa; metapleurum moderately strongly reticulate-rugose. Propodeum moderately strongly reticulate-rugose, with distinct median longitudinal striae; propodeal spiracle small and circular; apex of propodeum basal $1/2$ of hind coxa; prolongation of propodeum coarsely rugose. Wings (Figs. 6 and 7) with nervulus postfurcal by $5/9$ of its own length; portion of cubitus between intercubitus and 2nd recurrent vein about $2/3$ as long as intercubitus; postnervulus intercepted at its upper $1/3$; intercubitus basal of 2nd recurrent vein; 2nd recurrent vein weakly inclivous; nervellus not intercepted, vertical; discoidella absent; brachiella very short, present on basal $1/4$. Legs with hind femur about 5.8 times as long as wide in lateral view; hind tibia 5.2 times as long as wide at apex including hairs; inner spur of hind tibia about 1.3 times as long as outer spur of hind tibia; 1st to 3rd hind tarsal segments stout (Fig. 8); basitarsus of hind leg 5.1 times as long as wide at apex, 2.4 times as long as 2nd hind tarsal segment and a little shorter than the remaining segments together except claws (Fig. 8); 2nd tarsal segment of hind leg 2.5 times as long as wide at apex (Fig. 8); front coxa weakly convex below, its under side completely marginate by a sharp carina; all tarsal claws weakly pectinate. Abdomen with 1st tergite 10.0 times as long as wide at apex; 2nd tergite 1.2 times as long as 1st tergite and 2.0 times as long as 3rd tergite; epipleurum of 2nd tergite narrow, and separated by a crease.

Black, with legs and abdomen largely reddish brown. Face, clypeus, mouth parts except for mandibular teeth, malar space, lower corner of frons and lower $2/9$ of temple, yellow; scape blackish, with a ventral yellow stripe; pedicel and basal half of 1st flagellar segment blackish; flagellum except for basal half of 1st flagellar segment, dark brown to infusate, darker apically; yellow spots at top of eyes distinct, circular, touching margin of eye. Tegula yellowish brown, a little darker basally. Front leg with coxa and trochanter pale-yellow; femur, tibia and tarsus light yellowish brown. Middle leg with coxa pale-yellow apically, yellowish brown basally; trochanter pale-yellow; femur, tibia and tarsus light yellowish brown. Hind leg with coxa reddish brown, blackish on apicodorsal part; trochanter blackish brown dorsally, yellowish brown ventrally; femur reddish brown, a little darker dorsally; tibia yellowish brown to dark brown, darker apically, with dense, infusate hairs, the hairs becoming paler basally; tarsus yellowish brown, the last segment infusate. Abdomen reddish brown; dorsal sides of tergites and clasper blackish brown. Wings hyaline.

Length: Body 10.7 mm., fore wing 5.3 mm.

♀. Unknown.

Holotype (♂): Mt. Lalashan, 1300-1500 m, Taoyuan Hsien, 17-iv-1981, K. Ôhara leg.

Host: Unknown.

Distribution: Formosa.

This species is very closely related to the Formosan species, *T. sulcosus* (Uchida, 1937) which I have also examined. It differs from *T. sulcosus* by the short prolongation of the propodeum, incomplete postpectal carina, short and stout hind basitarsus, almost smooth speculum and small yellow spots above eyes.

Genus *Anomalon* Panzer

Anomalon Panzer, Faunae insectorum germanicae..., Heft 94: p1. 15, 1804. [Type-species: *Anomalon cruentatus* Panzer (= *Anomalon foliator* Fabricius)].

Trachynotus Gravenhorst, Ichneumonologia europaea 3: 713, 1829. Name preoccupied by Latreille, 1829 (April). [Type-species: *Ophion foliator* Fabricius].

Ochlerus Gistel, Naturgeschichte des Thierreichs für höhere Schulen, p. xi, 1848. New name for *Trachynotus*. *Ochlerus* is preoccupied by Spinola, 1837.

Nototrachys Marshall, Trans. Ent. Soc. London 1872: 259, 1872. New name for *Trachynotus*.

Ophiononeura Cameron, Rec. Albany Mus. 1: 174, 1904. [Type-species: *Ophiononeura flavo-maculata* Cameron].

Stictophion Cameron, Ann. South African Mus. 5: 85, 1906. [Type-species: *Stictophion rufipes* Cameron].

Erythrophion Cameron, Ann. South African Mus. 5: 87, 1906. [Type-species: *Erythrophion ferrugineus* Cameron (= *Stictophion rufipes* Cameron)].

Anomalum Schulz, Spolia hymenopterologica, p. 96, 1906. Emendation.

Trachyocterus Morley, Revision of the Ichneumonidae... in the British Museum ... 1: 67, 1912. [Type-species: *Trachyocterus primus* Morley].

Pseudonototrachys Meyer, Konowia 9: 221, 1930. [Type-species: *Pseudonototrachys pallidus* Meyer (= *Notorachis* (!) *kozlovi* Kokujev)].

?*Microcremastus* Hedwing, Beitr. Naturk. Forsch. SW-Deutschland 19: 292, 1961. [Type-species: *Microcremastus amseli* Hedwing].

This genus is characterized by the following aspects: —

Leg with middle tibia with one spur. Head with dorsal part of occipital carina present or absent, when present well below the hind ocelli; female flagellum with no white band. Notaulus indistinct, represented by a rugose area; propodeum not areolated by regular carina and usually coarsely reticulate-rugose. Fore wing (Figs. 13-16) with areolet absent; intercubitus about as long as the portion of cubitus between 2nd recurrent vein and intercubitus. Abdomen with epipleurum of 3rd tergite separated by a crease just below the spiracle; ovipositor sheath comparatively short, about 3 times as long as apical depth of abdomen.

This genus is a relatively large group of the subfamily Anomalinae, probably of worldwide distribution. Only three species, *A. formosanum* (Uchida), *A. frontale* Cushman and *A. nigribase* Cushman, occur in Formosa. In the present paper a previ-

ously unknown species is added to the fauna of Formosa. Insofar as their habits are known, the species of *Anomalon* are parasites of the soil-dwelling larvae of Coleoptera belonging to Tenebrionidae and Elateridae. No host record is, however, given in the Formosan species.

The Formosan species of this genus can be distinguished by the following key: —

Key to the Formosan species of *Anomalon* (♀♀)

1. Clypeus with a pair of small, distinct apico-median tubercles (Fig. 10). Apical margin of front tibia with a distinct tooth on the outer side (Fig. 11). Frontal orbit yellow (Fig. 10); scutellum more or less stained with yellowish brown. 2. *frontale* Cushman.
- Clypeus without apico-median tubercles (Fig. 9). Apical margin of front tibia without a tooth on the outer side (Fig. 12). Frons and scutellum black. 2
2. Hind coxa strongly punctate on dorsal side; basitarsus of hind leg 2.1 times as long as 2nd hind tarsal segment. Mesopleurum generally with strong longitudinal striae. Nervellus weakly reclivous (Fig. 17). 1. *formosanum* (Uchida)
- Hind coxa more or less longitudinally rugulose on dorsal side; basitarsus of hind leg 1.7-1.8 times as long as 2nd hind tarsal segment. Mesopleurum generally reticulate-rugose. Nervellus vertical (Figs. 19 and 20). 3
3. Face narrow, about 1.1 times as wide as high; occipital carina incomplete above. Portion of cubitus between intercubitus and 2nd recurrent vein about 1.3 times as long as intercubitus (Fig. 15). Ovipositor sheath comparatively short, 1.1 times as long as 1st tergite. First tergite entirely black. 3. *nigribase* Cushman
- Face wide, about 1.3 times as wide as high; occipital carina complete above. Portion of cubitus between intercubitus and 2nd recurrent vein 1.5-1.8 times as long as intercubitus (Fig. 16). Ovipositor sheath comparatively long, 1.5-1.7 times as long as 1st tergite. First tergite yellowish brown basally, with an apical yellow band. 4. *ohharai*, sp. nov.

1. *Anomalon formosanum* (Uchida) (Figs. 9, 13 & 17)

Notorachys folicator(!) var. *formosanus* Uchida, Jour. Fac. Agr. Hokkaido Imp. Univ. 21: 232, 1928.

Anomalon folicator(!) f. *formosanus*: Uchida, Jour. Fac. Agr. Hokkaido Imp. Univ. 33: 140, 1932.

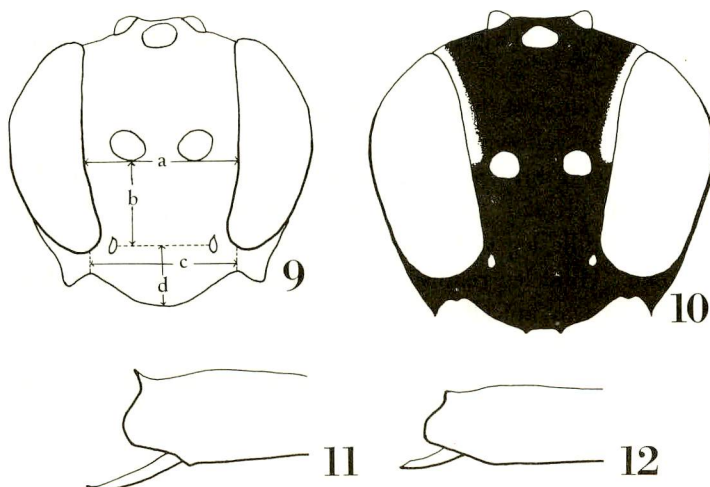
Anomalon formosanum: Cushman, Arb. über Morph. u. Taxonom. Ent. 4: 295, 1937.

Anomalon formosanus: Uchida, Ins. Mats. 21: 87, 1958.

Anomalo formosanum: Townes, Townes and Gupta, Mem. Amer. Ent. Inst. 1: 309, 1961

As a supplement to the original description the following aspects may be added: —

♀. Face wide, about 1.5 times as wide as high (Fig. 9), with very fine, sparse punctures; clypeus 2.5 times as wide as high, finely and sparsely punctate dorsally, largely and sparsely punctate apically, the apical margin being broadly rounded and thin, without apico-median tubercles (Fig. 9); malar space about 1/3 as long as basal width of



Figs. 9 and 10. Head in frontal view, ♀: 9, *Anomalon formosanum* (Uchida) (a, width of face; b, height of face; c, width of clypeus; d, height of clypeus); 10, *A. frontale* Cushman.

Figs. 11 and 12. Apical part of front tibia, ♀: 11, *A. frontale* Cushman; 12, *A. ohharai*, sp. nov.

mandible; temple weakly swollen, about $1/2$ as long as eye in lateral view; occipital carina distinct, with a narrow interruption dorsally, the lower part almost straight, and roundly bending inward near base of mandible; distance between lateral ocelli and eyes equal the diameter of ocellus; frons subpolished, distinctly and rather densely punctate, with a median longitudinal carina, short and weak trans-striae beside the median carina; yellow spots at top of eyes small, indistinct, and not touching margin of eye. Antennae filiform, with 27 segments; 2nd flagellar segment $3/4$ as long as the 1st flagellar one and about 1.1 times as long as the 3rd flagellar one. Pronotum with 5 longitudinal striae on lower half, short striations along the posterodorsal margin, with a large impunctate area just behind epomia, and rather dense hairs on humeral angle; mesoscutum rather strongly reticulate-rugose on median area, weakly and densely punctate on lateral areas and almost impunctate posteriorly; scutellum strongly reticulate-rugose, with complete lateral carinae; mesopleurum usually with strong and longitudinal striae, reticulate-rugose along the lower margin; speculum polished and smooth; mesosternum very finely and rather sparsely punctate; metapleurum and propodeum strongly reticulate-rugose; 1st lateral areas of propodeum distinct and densely haired; propodeal spiracle elongate, 4.1 times as long as wide. Wings (Figs. 13 and 17) with nervulus postfurcal by about $2/9$ of its own length; portion of cubitus between intercubitus and 2nd recurrent vein about 1.1 times as long as intercubitus; postnervulus intercepted at its upper about $3/8$; nervellus weakly reclivous; portion of cubitella between nervellus and intercubitella about 2.0 times as long as nervellus; brachiella present on about basal $2/3$. Abdomen with postpetiole comparatively slender, 2.1 times as long as basal width of postpetiole; 2nd tergite polished, rather sparsely haired, about 1.3 times as long as 1st tergite and about 1.9 times as long as 3rd tergite; 3rd tergite densely haired; ovipositor sheath about 1.3 times as long as 1st tergite. Legs with hind femur 5.4 times

as long as wide in lateral view; basitarsus of hind leg about 1.5 times as long as 2nd hind tarsal segment; apical margin of front tibia without distinct tooth on the outer side.

Black. Mandible yellowish brown; palpi pale-yellow; scape, pedicel and basal 2 or 3 segments of flagellum yellowish brown; flagellum except for basal 2 or 3 segments, infusate; collar yellowish brown. Tegula dark brown, darker basally. Propleurum stained with yellowish brown. Front leg pale-yellow to yellowish brown, femur and tibia a little paler. Middle leg yellowish brown, 5th segment of tarsus and coxa except at apex, dark brown. Hind leg reddish brown to dark brown; coxa almost dark brown to black, yellowish brown apically; trochanter, base of tibia and extreme base of 1st to 4th tarsal segments, yellowish brown. Abdomen blackish; 1st tergite yellowish brown on about basal 1/2, dark brown on about apical 1/2, and with an apical yellowish brown band; 2nd tergite with an apical yellowish brown band; 4th tergite dark brown laterally. Wings hyaline.

Length: Body 10.7 mm., fore wing 5.3 mm.

♂. Unknown.

Specimen examined: 1♀ (holotype of *formosanum*), Naihonpo, 15-vii-1925, T. Uchida leg.

Host: Unknown.

Distribution: Formosa.

This species is closely allied to the Formosan species, *A. frontale* Cushman, in having its punctate hind coxa, longer intercubitus and yellowish brown 1st tergite on the basal half. The present species is distinct from the latter in having the clypeus with a pair of distinct apico-median tubercles, reclivous nervellus, yellow frontal orbit, etc. as in the key mentioned above. Further, this species is similar to *A. kusigematii* Momoi, 1968, as Momoi points out (1968), but it can be distinguished by the entirely punctate hind coxa, the widely yellowish brown 1st tergite and the comparatively short intercubitus.

2. *Anomalon frontale* Cushman (Figs. 10, 11, 14 & 18)

Anomalon frontalis Cushman, Arb. über Morph. u. Taxonom. Ent. 4: 293, 1937.

Anomalon frontalis: Uchida, Ins. Mats. 21: 87, 1958.

Anomalon frontale: Townes, Townes and Gupta, Mem. Amer. Ent. Inst. 1: 309, 1961.

On the basis of the present specimens a redescription is given below: —

♀. Face wide, about 1.4 times as wide as high, with weak but distinct and rather dense punctures (Fig. 10); clypeus wide, 2.5-2.6 times as wide as high, distinctly and rather densely punctate dorsally, with large, sparse, irregularly spaced punctures on apical half, and a pair of distinct apico-median tubercles, the median apical margin being almost truncate (Fig. 10); malar space about 1/4 as long as basal width of mandible; temple slightly swollen, about 5/9 as long as eye in lateral view; occipital carina complete, very weak dorsally, the lower part not sinuate and roundly bending inward near base of mandible; distance between lateral ocelli and eyes as long as diameter of an ocellus; frons polished, strongly and densely punctate, with a weak median longitudinal carina, with short and distinct trans-striae beside the median carina. Antennae with 24 or 25 segments; 2nd flagellar segment about 3/4 as long as the 1st flagellar

one and about 1.1 times as long as the 3rd flagellar one. Pronotum with 6 strong striae on lower half, and with a large impunctate area just behind epomia, sparsely haired on humeral angle; epomia almost straight; mesoscutum strongly reticulate-rugose on median area, finely and densely punctate on postlateral areas, very finely punctate on posterior area, and transversely rugulose on anterior area; scutellum finely and sparsely punctate, with weak lateral carinae; mesopleurum generally with strong longitudinal striae, and reticulate-rugose along the lower margin; speculum shining and smooth; metapleurum and propodeum strongly reticulate-rugose; median basal area of propodeum distinct and impunctate; 1st lateral areas of propodeum distinct and finely and densely punctate; propodeal spiracle elongate, 4.5-6.7 times as long as wide. Wings (Figs. 14 and 18) with nervulus postfurcal by about 1/5 of its own length; portion of cubitus between intercubitus and 2nd recurrent vein 1.1-1.3 times as long as intercubitus; postnervulus intercepted about at its upper 2/7; nervellus vertical; portion of cubitella between nervellus and intercubitella about 2.1 times as long as nervellus; brachiella long, reaching nearly to hind edge of hind wing (Fig. 18). Legs with hind femur 5.6-6.0 times as long as wide in lateral view; hind coxa finely and densely punctate on dorsal side; basitarsus of hind leg about 1.8 times as long as 2nd hind tarsal segment; apical margin of front tibia with a small tooth on the outer side (Fig. 11). Abdomen with postpetiole comparatively stout, 1.6-1.9 times as long as basal width of postpetiole; 2nd tergite with indistinct longitudinal striae, with dense hairs, about 1.5-1.6 times as long as 3rd tergite; 3rd tergite striate as in 2nd tergite; ovipositor sheath 1.2-1.3 times as long as 1st tergite.

Black. Frontal orbit pale-yellow (Fig. 10); mandible pale-yellow except for reddish brown apical teeth; palpi pale-yellow; malar space weakly stained with yellowish brown; scape pale-yellow; pedicel pale-yellow, with a blackish spot dorsally; clypeus black, weakly stained with dark brown on apical part; collar pale-yellow to yellowish brown. Tegula yellowish brown apically, dark brown basally. Front leg pale-yellow to yellowish brown, coxa pale-yellow apically, dark brown basally. Middle leg yellowish brown to infusate, femur, dorsal side of trochanter and tarsus a little darker; coxa blackish basally, pale-yellow to yellowish brown apically. Hind leg blackish brown to black; apex of coxa, trochanter and femur at both ends, tibia at base, base of each tarsal segment and tibial spurs, yellowish brown. Abdomen black; 1st tergite yellowish brown on about basal 1/2, blackish on about apical 1/2, with an apical yellowish band; 2nd tergite black, with an apical yellowish band; 4th tergite weakly stained with yellowish brown laterally; 5th and following tergites pale-yellow at extreme apex. Wings hyaline.

Length: Body 8.4-10.2 mm., fore wing 4.4-5.7 mm.

♂. Unknown.

Specimens examined: 1♀, Kankau (Koshun), v-1912, H. Sauter leg.; 1♀, Nanshanchi, 6500-700 m, Nantou Hsien, 23-iv-1981, H. Takemoto leg.

Host: Unknown.

Distribution: Formosa.

This species is very closely related to the Japanese species, *A. japonicum* (Uchida, 1928), in that its clypeus has a pair of apico-median tubercles and the front margin of the front tibia has a distinct apical tooth, but it distinguished at once from that species by the mostly longitudinally striate mesopleurum, the complete occipital carina, the yellow frontal orbit, the yellowish brown 1st tergite on basal half and the 1st and 2nd tergites with a apical yellow band, respectively.

3. *Anomalon nigribase* Cushman (Figs. 15 & 19)

Anomalon nigribasis Cushman, Arb. über Morph. u. Taxonom. Ent. 4: 294, 1937.

Anomalon nigribasis: Uchida, Ins. Mats. 21: 87, 1958.

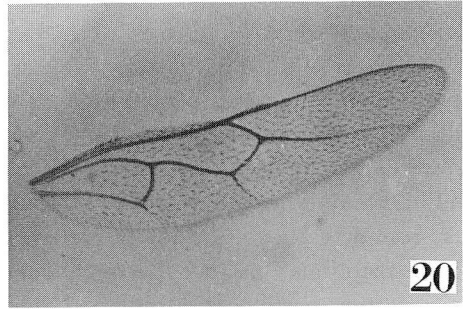
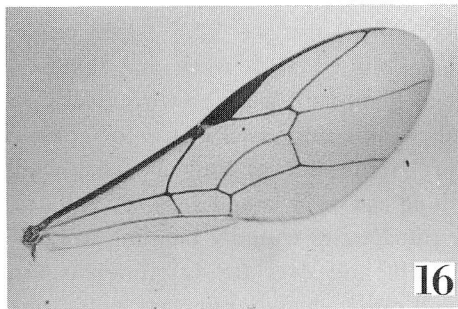
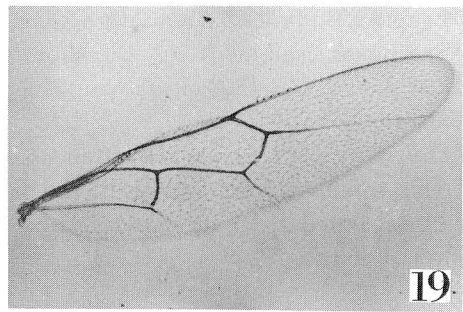
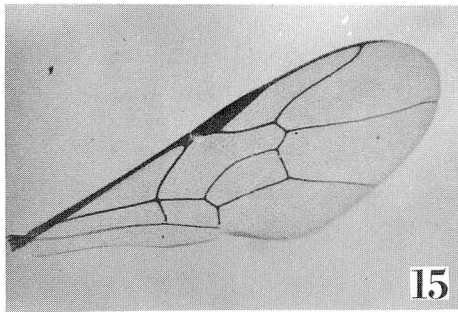
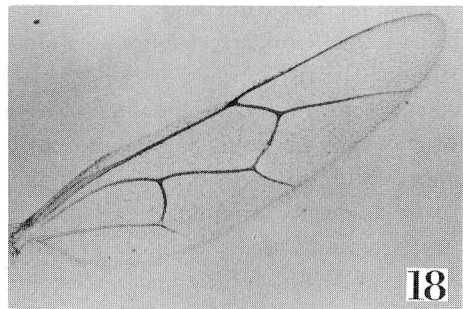
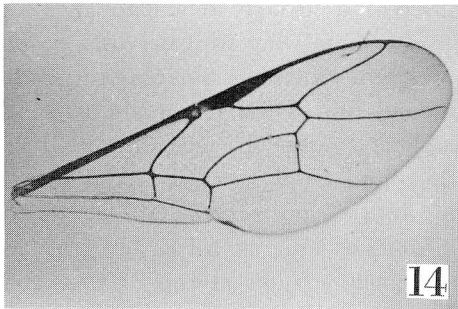
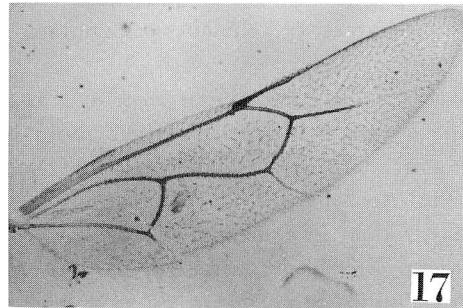
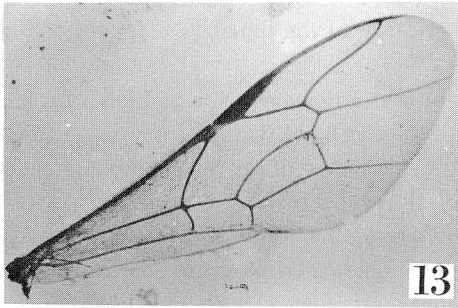
Anomalon nigribase: Townes, Townes and Gupta, Mem. Amer. Ent. Inst. 1: 309, 1961.

Anomalon nigribase: Momoi, Mushi, 42: 66, 1968.

From the present material a redescription of the species is given: —

♀. Face about as wide as high, polished, with fine and rather sparse punctures; clypeus narrow, about 1.7 times as wide as high, finely and sparsely punctate apically, almost impunctate dorsally, the apical margin being broadly rounded, weakly impressed just before apex, without apico-median tubercles; malar space about $\frac{2}{7}$ as long as basal width of mandible; temple weakly swollen, $\frac{3}{5}$ as long as eye in lateral view; occipital carina incomplete above, the lower part slightly sinuate and roundly bending inward near base of mandible; distance between lateral ocelli and eyes $\frac{5}{6}$ of diameter of an ocellus; frons polished with a median longitudinal weak carina, very fine and rather dense punctures, short and distinct trans-striae beside the median carina; yellow spots at top of eyes absent. Antennae slender, with 24 segments; 2nd flagellar segment a little shorter than 1st flagellar segment and a little longer than the 3rd flagellar one. Pronotum with 9 strong longitudinal striae on lower half, and with a large impunctate area just behind epomia; epomia distinct, gently curved forward; mesoscutum strongly reticulate-rugose on median area, with rather strong and dense punctures on anterior and lateral areas, and very finely punctate on posterior area; scutellum reticulate-rugose, with complete lateral carinae; mesopleurum moderately coarsely reticulate-rugose on lower half and longitudinally striate on upper half; speculum polished and smooth; mesosternum finely, distinctly and densely punctate as in *ohharai*; metapleurum and propodeum coarsely reticulate-rugose; propodeal spiracle elongate, 5.4 times as long as wide. Wings (Figs. 15 and 19) with nervulus postfurcal by about $\frac{1}{4}$ of its own length; portion of cubitus between intercubitus and 2nd recurrent vein about 1.3 times as long as intercubitus; postnervulus intercepted at its upper $\frac{4}{9}$; nervellus vertical; brachiella present on about basal $\frac{1}{2}$ (Fig. 19); portion of cubitella between nervellus and intercubitella about 2.3 times as long as nervellus. Legs with hind femur about 5.2 times as long as wide in lateral view; hind coxa granulate or finely rugulose on dorsal side; basitarsus of hind leg about 1.7 times as long as 2nd hind tarsal segment; apical margin of front tibia without a tooth on the outer side. Abdomen with postpetiole about 1.8 times as long as basal width of postpetiole; 2nd tergite polished, rather densely haired, about as long as 1st tergite and about 1.6 times as long as the 3rd one; ovipositor sheath comparatively short, about 1.1 times as long as 1st tergite.

Black. Mandible yellowish brown apically, dark brown basally, the apical teeth reddish brown; palpi dark yellowish brown; scape and pedicel yellowish brown to dark brown, paler ventrally; flagellum blackish, a little paler basally; malar space weakly stained with yellowish brown. Tegula blackish brown. Front leg light yellowish brown to yellowish brown, coxa except at apex blackish brown. Middle leg yellowish brown to dark brown, coxa blackish except for yellowish brown apex. Hind leg infusate, trochanter, base of tibia, tibial spurs, a little paler; coxa except for yellowish brown apex, blackish. Abdomen black; 4th tergite weakly stained with yellowish brown laterally; dorsal margins of 5th and following tergites pale yellow. Wings hyaline.



Figs. 13-16. Right fore wings, ♀: 13, *Anomalon formosanum* (Uchida); 14, *A. frontale* Cushman; 15, *A. nigribase* Cushman; 16, *A. ohharai*, sp. nov.

Figs. 17-20. Right hind wings, ♀: 17, *A. formosanum* (Uchida); 18, *A. frontale* Cushman; 19, *A. nigribase* Cushman; 20, *A. ohharai*, sp. nov.

Length: Body ca. 8.0 mm., fore wing 4.9 mm.

♂. Agrees with the above-mentioned description of the female, except for following aspects: —

Head with face wider than in female, about 1.3 times as wide as high; clypeus 2.4 times as wide as high; malar space about 1/5 as long as basal width of mandible; distance between lateral ocelli and eyes about as long as diameter of an ocellus; occipital carina incomplete, with a wide interruption on dorsal part; trans-striae of frons longer and stronger than in female; 2nd flagellar segment about 1.2 times as long as 3rd flagellar segment. Pronotum more strongly striate than in female; mesopleurum coarsely reticulate-rugose; mesoscutum more coarsely and strongly reticulate-rugose and punctate than in female; metapleurum and propodeum coarsely and strongly reticulate-rugose; propodeal spiracle elongate, 4.7 times as long as wide. Fore wing with nervulus postfurcal by about 3/8 of its own length; portion of cubitus between intercubitus and 2nd recurrent vein about 1.7 times as long as intercubitus. Hind femur about 5.5 times as long as wide in lateral view; hind coxa weakly and rather sparsely punctate dorsally; basitarsus of hind leg 2.0 times as long as 2nd hind tarsal segment. Abdomen with postpetiole about 2.3 times as long as basal width of postpetiole; 2nd tergite about 1.3 times as long as 1st tergite and about 1.6 times as long as 3rd tergite. Antennae, mandible and legs a little paler than in female; yellow spots at top of eyes distinct, touching margin of eye.

Length: Body ca. 9.0 mm., fore wing 4.3 mm.

Specimens examined: 1 ♂, Koshun, 25-iv - 25-v-1918, J. Sonan et al. leg.; 1 ♀, Mt. Lalashan 1300 - 1500 m, Taoyun Hsien, 17-iv-1981, H. Takemoto leg.

Host: Unknown.

Distribution: Formosa, Japan and Korea.

This species is very similar to the Japanese species, *A. victorovi* Momoi, 1968. It can be separated from the latter by the incomplete occipital carina and by the small propodeal spiracle.

4. *Anomalon ohharai*, sp. nov. (Figs. 12, 16 & 20)

♀. Face about 1.3 times as wide as high, polished, with weak and rather sparse punctures; clypeus wide, 2.8-3.0 times as wide as high, with weak and irregularly spaced punctures, the apical margin broadly rounded, weakly impressed just before apex, without apico-median tubercles; malar space short, about 2/7 as long as basal width of mandible; temple weakly swollen, 4/7-2/3 as long as eye in lateral view; occipital carina weak, complete above, the lower part weakly sinuate and roundly bending inward near base of mandible; distance between lateral ocelli and eyes 0.8-1.0 times as long as diameter of an ocellus; frons polished, finely and rather densely punctate, with a median longitudinal carina, with short and distinct trans-striae beside the median carina; yellow spots at top of eyes small, indistinct, touching or not touching margin of eye. Antennae slender, filiform, with 23 or 24 segments; 2nd flagellar segment 5/7-7/9 as long as 1st flagellar segment and 1.0-1.1 times as long as the 3rd flagellar one. Pronotum with 7 or 8 longitudinal striae on lower half, and a large impunctate area just behind epomia; epomia angularly or roundly curved forward; mesoscutum weakly reticulate-rugose on median area, weakly and densely punctate on lateral areas and almost impunctate on

posterior area; scutellum coarsely reticulate-rugose, with complete lateral carinae; mesopleurum moderately strongly reticulate-rugose on about lower half, longitudinally striate on about dorsal half; speculum polished and smooth; mesosternum with weak but distinct and dense punctures; metapleurum and propodeum reticulate-rugose; propodeal spiracle elongate, 4.6-5.0 times as long as wide. Wings (Figs. 16 and 20) with nervulus postfurcal by $1/4-3/8$ of its own length; portion of cubitus between intercubitus and 2nd recurrent vein 1.5-1.8 times as long as intercubitus; postnervulus intercepted at its about upper $1/2$; nervellus vertical; brachiella long, present on basal $5/7$ (Fig. 20). Legs with hind femur 5.1-5.4 times as long as wide in lateral view; apical margin of front tibia without tooth on the outer side (Fig. 12); basitarsus of hind leg 1.7-1.9 times as long as 2nd hind tarsal segment. Abdomen with postpetiole comparatively slender, 1.9-2.0 times as long as basal width of postpetiole; 2nd tergite polished, rather densely haired, 1.1-1.3 times as long as 1st tergite and 1.7-1.8 times as long as 3rd tergite; 3rd tergite polished and densely haired; ovipositor sheath 1.5-1.7 times as long as 1st tergite.

Black. Mandible, palpi, scape and pedicel yellowish brown; flagellum yellowish brown to infusate, darker apically. Tegula dark brown. Front leg pale-yellow to yellowish brown; coxa yellowish brown to dark brown, darker basally. Middle leg dark brown; trochanter a little paler; coxa blackish brown, paler apically. Hind leg infusate, apex of coxa, trochanter, tibial spurs, apicoventral side of femur and base of basitarsus a little paler. First tergite blackish, yellowish brown on basal $1/3-2/5$ and apical part; 2nd tergite black, with an apical yellow band; 3rd to 5th tergite black; 4th tergite dark brown laterally; extreme apices of 5th and following tergites pale yellow. Wings hyaline.

Length: Body 6.2-7.7 mm., fore wing 3.7-4.3 mm.

♂. Unknown

Holotype (♀): Lienhuachin, 500 - 550 m, Nantou Hsien, 28-iv-1981, K. Ôhara leg.; Paratypes: 1♀, data same as the holotype; 1♀, Nanshanchi, 650 - 700 m, Nantou Hsien, 23-iv-1981, H. Takemoto leg.

Host: Unknown.

Distribution: Formosa.

This species is very closely allied to the Japanese species, *A. kusigematii* Momoi, 1968, but is at once distinguishable from the latter by the complete occipital carina, the long brachiella, and the comparatively wide face. It is similar to *A. nigribase* Cushman, 1937, from which it is distinguishable by the complete occipital carina, and the long ovipositor sheath, etc. as mentioned in the key.

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