

**H. Sauter's Formosa-Collection: *Xanthopimpla* (*Ichneum.*: *Hym.*).**

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Included in a lot of *Ichneumonidae* received from the „Deutsches Entomologisches Institut der Kaiser-Wilhelm-Gesellschaft“ at Berlin-Dahlem and collected in Formosa by Hans Sauter is a considerable number of specimens representing sixteen species of the conspicuous genus *Xanthopimpla*. All the species have been run through the keys of Krieger<sup>1)</sup> Morley<sup>2)</sup>, and Roman<sup>3)</sup>. A study of the genus based on these keys, the original and other descriptions of all described species, and a very large number of specimens received mainly from Prof. C. F. Baker of the University of the Philippines at Los Banos, Luzon, indicates that although a few species are very widespread in their distribution the great majority are restricted in habitat. This is particularly true of the island species, many of which apparently occur on only a single island.

The following key will serve to distinguish the species included in the Sauter collection.

## Key to species.

1. Face distinctly scutate; scutellum from subconical to very high pulvinate; propodeum with a distinct rounded or subconical elevation before the spiracle; large species . . . . . 2
- Face evenly convex or only slightly and indistinctly elevated near lateral margins, rarely distinctly so; scutellum pulvinate to convex, rarely conical; propodeum not elevated before spiracles; small to medium sized species . . . . . 3
2. Areola about as long as wide, hexagonal, costulae near middle; tergites 1—5, (6 obsoletely), 7, and usually 8 in female, all in male maculated, propodeum distinctly so; hind trochanters black basally; ovipositor sheath nearly half as long as abdomen . . . . .  
*grandis*, new species.
- Areola much wider than long, subquadrangular, costulae near apex; tergites 1, 3—5, and 7 in female maculated, propodeum obsoletely so; hind trochanters entirely yellow; sheath about as long as first tergite . . . . . *brachyparea* Krieger.
3. Areolet incomplete, the second intercubitus wanting . . . . .  
*imperfecta* Krieger

1) Ber. Naturf. Ges. Leipzig, 1899, pp. 65—68; Arch. f. Naturg., Jahrg. 80, Abt. A., Heft 6, pp. 1—148; Heft 7, pp. 1—152, 1914.

2) Faun. Brit. Ind., Hym., vol. 4, part 1, 1913, pp. 111—112.

3) Ark. for Zool., Band 3, No. 15, 1913, pp. 16—17.

- Areolet complete . . . . . 4
- 4. Scutellum conical; abdominal markings obscure reddish piceous transverse fasciae; stemmaticum concolorous with rest of head . . . . .  
*conica*, new species.
- Scutellum pulvinate or convex; abdomen immaculate or with distinct paired black spots, sometimes confluent; stemmaticum black . . . . . 5
- 5. Stemmaticum and sheath black, antennae brown, darker above and paler beneath toward base, otherwise immaculate . . . . .  
*emaculata* Szepilgeti.
- Thorax and abdomen conspicuously black or piceous maculated . . . . . 6
- 6. Areola complete . . . . . 7
- Areola open laterally behind costulae; basal carina obsolete, median wanting, tergites 1-7 maculated, the spots on 1-3 and 7 confluent; mesopleurum with a black spot . . . . . *pleuralis*, new species.
- Areola open behind . . . . . 13
- 7. Scutellum merely convex, not distinctly pulvinate; antennae much shorter than body . . . . . 8
- Scutellum distinctly pulvinate; antennae nearly or quite as long as body . . . . . 9
- 8. Mesoscutum and posterior surface of head bimaculate, former rarely immaculate . . . . . *stemmaator* (Thunberg) Roman.
- Mesoscutum transversely black marked; head with a broad black mark extending from base of antennae to occipital carina and touching the eyes on vertex . . . . . *kuchingensis* Cameron.
- 9. Areola distinctly hexagonal . . . . . 10.
- Areola quadrangular or nearly so . . . . . 12.
- 10. Face evenly convex, very weakly punctate; areola distinctly wider than long; occiput and legs, except base of hind tibia, immaculate; mesoscutal spots confluent or nearly, the median one very short; tergites 1-5, and 7 bimaculate; ovipositor about length of first tergite . . . . . *clavata* Krieger.
- Face with a slight longitudinal welt on each side, distinctly punctate; areola about as wide as long; hind legs conspicuously black marked; mesoscutal spots distinct, elongate, the median one anteriorly emarginate; tergites 1-7 bimaculate . . . . . 11.
- 11. All tibiae with black markings in middle, that of hind tibia a nearly complete annulus; ovipositor as long as first two tergites . . . . .  
*annulata* new species.
- All tibiae immaculate in middle; face coarsely and densely punctate; ovipositor hardly exerted . . . . . *detruncata* Krieger.
- 12. Median mesoscutal spot smaller than lateral spots; areola not twice as wide as long, usually subquadrangular; propodeum and tergites

- 1, 3, 5, and 7 bimaculate, in male sometimes also 4 and very rarely 2 more or less distinctly so; ovipositor nearly or quite half as long as abdomen . . . . . *punctata* (Fabricius).
- Median mesoscutal spot larger than lateral spots; areola more than twice as wide as long, distinctly quadrangular; propodeum immaculate; tergites 1, 3—5, and 7 in female bimaculate; ovipositor barely exerted . . . . . *brevicauda*, new species.
13. Mesoscutal spots widely separated, median one deeply emarginate anteriorly; ovipositor barely as long as first tergite . . . . . *sauteri* Krieger.
- Mesoscutal spots confluent or nearly; at least second tergite immaculate . . . . . 14.
14. Tergites 1, 3, 5, and 7 in both sexes bimaculate; hind femur more or less blackish at apex; apical carina distinct laterally; ovipositor nearly as long as basal two tergites . . . *erythroceros* Krieger
- Tergites 1, 3, 5, and 7 in female, 1 and 3—7 in male, bimaculate; hind femur immaculate at apex; apical carina entirely wanting; ovipositor barely as long as first tergite . . . . . *aequabilis* Krieger.

*Xanthopimpla grandis*, new species.

Runs in Krieger's 1914 key best to *macrodactyla* Krieger but does not fit the description satisfactorily, differing in many details, such as considerably larger size, face nearly as broad as head, antennae with 51 joints, sixth tergite immaculate, etc.

Female. — Length 20 mm.; antennae 19 mm.; ovipositor 6 mm.

Face wider than long, with a distinct, curved, carina-like ridge on each side setting off a median shield-like area which is more densely and coarsely punctate than the lateral areas; clypeus weakly separated from face, weakly and sparsely punctate, the transverse suture strongly concavely curved; malar space about one-third basal width of mandible; head posteriorly and vertex polished, cheeks sparsely punctate. Thorax dorsally and laterally smooth, impunctate, mesosternum closely punctate, the punctuation extending sparsely on to the lower pleura; mesosternal lamella narrow; notauli very short; scutellum strongly pulvinate, more elevated medially; propodeum smooth, carinae very strong, areola widest slightly behind middle, petiolar area somewhat longitudinally rugose basally, a high rounded elevation before spiracle; areolet complete, petiolate. Abdomen widest near apex; median areas of middle tergites strongly defined, coarsely, sparsely punctate, the furrows striate; second tergite medially impunctate, with a median longitudinal impression; first tergite slightly longer than wide at apex, smooth, apical furrow foveolate, ca-

rinae extending two-thirds its length; ovipositor not quite half as long as abdomen.

Yellow; frontal, ocellar, and occipital black spots confluent; antennae black, scape yellow beneath, flagellum at base beneath and apically brownish; mesoscutum with a median prescutellar black spot and three elongate spots in a transverse row, the median one deeply emarginate in front, rounded behind, lateral ones subtriangular; tegula black at apex; propodeum bimaculate basally; wings hyaline, slightly infumate at apex, venation black, costa basally and radix luteous; middle tibia and basitarsus basally and fifth tarsal joint both basally and apically blackish; bases of hind trochanter, tibia, and basitarsus, a large inner and a smaller outer spot on femur near apex, and the entire fifth tarsal joint black; tergites 1—5 (6 very obscurely) and 7 bimaculate, combined eighth and ninth with four spots arranged in the manner of a four-parted leaf; ovipositor sheath black, yellowish at base above.

Male. — Length 18 mm.; antennae 18 mm.

Essentially like female, but with the petiolar area entirely smooth, the spots on the sixth tergite much larger and those on the eighth and ninth smaller, and the hind tibia frequently with a dark streak on the outer side (one of the three males lacks this).

Type-locality. — Kosempo, Formosa.

Allotype and paratypes. — Cat. No. 27146, United States National Museum. Three females and three males, the type female and a paratype female collected in 1911 at the type locality by H. Sauter; one male reared from pupa of *Saturnia pyretorum* Westwood at Taihorin, Formosa, by T. Shiraki; and a series of one female and two males, including the allotype, reared from pupae of a butterfly at Canton, China, by C. W. Howard. The Chinese specimens have the petiolar area of the propodeum less distinctly foveolate than the Formosan specimens, but I doubt if this is of the specific significance that Krieger ascribes to it.

The type is in the Deutsches Entomologisches Institut and the remainder are in the United States National Museum.

#### *Xanthopimpla brachyparea* Krieger.

One specimen which I take to be of this species differs somewhat from the original description as follows: lateral spots of mesoscutum not extended laterally to margins of sclerite; black spots of propodeum very weak; second tergite with very small brownish spots; spots of tergites 3—5 narrower than space between them; those of seventh nearly confluent; eighth immaculate; flagellum dark brown above, lighter beneath; middle tibia immaculate basally, and basitarsus only faintly brown at

extreme base; hind trochanter immaculate; hind femur with a distinct inner and a faint outer black spot between middle and apex; apical joint of hind tarsus entirely black except reddish apex (Krieger states that the smallest of his three specimens is more strongly marked and possesses the inner femoral mark and entirely black apical tarsal joint); areola only about one-third total length of propodeum, convergent anteriorly; middle lateral areas much longer on outer side than on inner; dorsal carinae of first tergite terminating much before oblique grooves; sixth tergite without coarse punctures medially; flagellum 43-jointed; sheath as long as first three hind tarsal joints.

This specimen was taken at Taihorin, July 7, 1911.

*Xanthopimpla imperfecta* Krieger.

A female and a male, both from Anping, which run to and agree with Krieger's description.

*Xanthopimpla conica*, new species.

Quite distinct in general appearance from any of the other Formosan species, largely because of the fact that its darker markings are in the form of elongate, poorly defined piceous fasciae on a testaceous ground rather than distinct black spots on yellow. In the concolorous ocellar space and the sharply conical scutellum, unaccompanied by scutate face and prominent prespiracular tubercles, it also differs from any of the others.

Although it will not run to any of the species or groups in Krieger's 1914 key, it is apparently very closely related to *hispidula* Krieger but the stemmaticum is not black, the propodeum and all tergites are transversely piceous fasciate, the hind tarsi are entirely red, the face is parallel-sided for most its length and very obscurely punctate, the pronotum is punctate above and not striate below, the mesoscutum is impunctate with notauli deep but not especially long and without an elevated median line, and the areola is much broader than long.

Female. — Length 11 mm.; antennae (flagellum missing).

Head in front view broader than long; face slightly longer than head, not convergent below, evenly convex, obsoletely punctate; clypeus scarcely separated, minutely, sparsely punctate; malar space shorter than basal width of mandible; frons medially elevated; frons, vertex, temples, and cheeks polished and impunctate. Thorax practically impunctate except mesosternum and pleurum below; notauli deep and sharply convergent, about a third the length of mesoscutum; scutellum conical, lateral carinae very high and thin and suddenly terminating at apex; propodeal carinae very strong, those bounding the areola laterally

weaker, junctions of transverse carinae with lateral dentate, areola hexagonal, nearly twice as broad as long. First tergite a third longer than broad, polished, carinae reaching beyond spiracles but not to apical furrow; others with median areas less elevated than usual; second rather coarsely, others more finely punctate medially; ovipositor barely visible from above.

Pale ferruginous, head and sides of thorax flavous, with the following piceous markings; occipital spot, an obscure Y-shaped spot medially on mesoscutum and a narrow curved line on each side confluent with the preapical spot, a spot in subalar impression, apex of tegula, a spot on each side of postscutellum, one on each side of propodeum just above spiracle connected by an obsolete transverse fascia, one on each side of petiolar area, a transverse fascia on each of first seven tergites, a small spot more or less nearly encircling each abdominal spiracle, and a small spot ventrally at apex of hind femur; legs testaceous and flavous, the darker color basally on coxae and trochanters, dorsally on femur, and basally medially on tibiae, and the entire tarsi; wings hyaline, barely infumate at apex, venation black, costa pale.

Male. — Length 11 mm; antennae 11 mm.

Antennae entirely ferruginous. Face more distinctly, abdomen less distinctly, punctate.

Type-locality. — Kankai (Koshun), Formosa.

Allotype. — Cat. No. 27148, United States National Museum.

The type female is in the Deutsches Entomologisches Institut, the allotype male is in the United States National Museum.

#### *Xanthopimpla emaculata* Szepligetii.

Synonym. — *Xanthopimpla immaculata* Morley.

Six specimens, three females and two males from Taihorin and one female from Hokuto. These agree perfectly with Krieger's description of the species based partly on specimens from Szepligetii's collection. They also agree with Morley's description of his *immaculata*, the most striking feature of which is the very strongly curved radial vein.

Inasmuch as I have before me several entirely conspecific specimens from the Philippine Islands, indicating a wide range, there seems no reason to doubt that the Indian *immaculata* Morley is synonymous with the Javan *emaculata*.

#### *Xanthopimpla stemmator* (Thunberg) Roman.

There is in the Formosan material a considerable series of this species from several localities; The maculation of this species is subject

to some variation. As pointed out by Roman, the sixth tergite in the female may or may not have the two spots, while one male before me lacks entirely the mesonotal spots and in others the paired spots of the postvertex are obsolescent.

In describing his *doleschali* as distinct from *stemmaator* Krieger has ascribed too much importance to the form of the areola and the ground color and, in fact, to all of the characters used in his key to distinguish these two species. Many specimens of *stemmaator* have the areola broader than long, and one large specimen before me agrees very well with the description of *doleschali*. I have very little doubt that the latter species will prove to be synonymous with *stemmaator*.

*Xanthopimpla kuchingensis* Cameron.

Synonym. — *Xanthopimpla dohrni* Krieger.

This is a very widespread and variable species that will probably be found to have several synonyms. Cotypes in the United States National Museum and a considerable series from various parts of the Oriental and Australian Regions collected by C. F. Baker have been studied together with a single sparsely maculated male from the Santer collection. In the series before me the variation in the extent of abdominal maculation and in the form of the propodeal areas is too gradual to make recognition of the varieties proposed by Krieger possible.

I doubt very much if *kuchingensis* is distinct from *lateballeata* Cameron, described a few years earlier also from Borneo.

*Xanthopimpla clavata* Krieger.

Three females and three males, all but one male from Kankau Koshun, that from Sokutsu, Banshoryo District. Krieger knew only the male. The female has the antennae darker and less distinctly thickened apically than in the male; the fascia of the seventh tergite broader and more distinct; the abdomen broadest at apex of sixth tergite; and the ovipositor sheath as long as the basal four joints of hind tarsus. In one of the males the mesoscutal spots are not confluent and in another the sixth tergite has a pair of faint brownish spots.

*Xanthopimpla annulata*, new species. ✓

Runs in Krieger's 1899 key to *brullei* Krieger but differs as follows: scutiform elevation of face barely indicated; scutellum not at all subconic; no distinct elevation before propodeal spiracle; lower longitudinal impression of mesopleurum barely indicated; hind tarsi black only on apical joint and at base of first joint; hind tibia with a nearly

complete black annulus in middle; tergites densely punctate; flagellum entirely black except at extreme base beneath, where it is yellowish.

In Krieger's 1914 key it runs to Group K and there to couplet 18 but agrees with neither alternate.

Female. — Length 11 mm.; antennae 10 mm.

Head in front view distinctly broader than long; face slightly broader than long, slightly elevated laterally, rather densely, finely punctate; clypeus practically impunctate, not separated; malar space nearly two-thirds as long as basal width of mandible. Mesoscutum obsoletely punctate; mesosternum and lower pleurum distinctly so; notauli weak, short; scutellum pulvinate; propodeum smooth, carinae strong, areola hexagonal, as long as broad, costulae in middle; basal pleural area not elevated; areolet irregular, petiolate. Abdomen narrow fusiform; first tergite much longer than wide at apex, carinae obsolete beyond middle; second nearly as long as broad, densely and coarsely punctate laterally, more sparsely so medially; third to sixth coarsely, longitudinally rugoso-punctate; ovipositor sheath slender cylindrical, nearly as long as first two tergites.

Yellow with the following black markings: ocellar spot, extending to base of antennae and confluent with the large occipital spot; the usual three mesoscutal spots, the median one elongate, rounded behind and deeply notched anteriorly, the latter ones ovate with a projection to the lateral margin; apices of tegulae; prescutellar spot; paired spots on propodeum and tergites 1—7, those on 7 confluent; ovipositor sheath; spots in middle of front and middle tibiae; bases of hind trochanter tibia, and basitarsus; two large spots on hind femur; nearly complete annulus on hind tibia; and apical joints of middle and hind tarsi; antennae black, scape and pedicel yellow below; wings hyaline, scarcely infumate at apex, venation black, costa pale.

Type-locality. — Kankau (Koshun), Formosa.

Type. — Deutsches Entomologisches Institut. One female.

#### *Xanthopimpla detruncata* Krieger.

Five females and one male all collected at Kankau, Koshun.

#### *Xanthopimpla punctata* (Fab.).

Krieger (1914) gives a long list of synonyms.

This is a very widely distributed species, being recorded from many portions of India, Celebes, Borneo, Sumatra, Key Island, Ceylon, Mauritius, Amboina, Java, Singapore, China, Formosa, and the Philippines. As indicated by the present collection it is by far the most abundant species of the genus in Formosa, specimens being included from Kankau



(Koshun), Anping, Tainan, Takao, Taihorin, and Kosempo. It is quite variable, especially in size and in length of ovipositor. The latter may be from distinctly more to distinctly less than half as long as the abdomen.

*Xanthopimpla brevicauda*, new species. ✓

Runs in Krieger's 1914 key to either Group H or Group J depending upon whether or not it is considered to have a median longitudinal welt on the frons. In neither group, however, does it run satisfactorily to any species.

Female. — Length 9,5 mm.; antennae 8,6 mm.

Head in front view much broader than long; face longer than broad, evenly convex, rather densely, distinctly punctate; clypeus separated by a broad, rather deep groove, minutely punctate; malar space somewhat less than half as long as basal width of mandible. Thorax smooth, impunctate except mesosternum and lower pleurum, the former densely punctate; notauli short; scutellum pulvinate; propodeum smooth, areola nearly three times as broad at apex as long, quadrangular, the middle lateral areas not quite acute medially, basal pleural area not elevated; areolet irregular, petiolate, the second recurrent in middle of posterior margin. Abdomen broad fusiform; first tergite slightly longer than broad at apex, carinae not quite reaching apical furrows; second much broader at base than long, elevated area smooth medially, sparsely punctate laterally; others more densely punctate, successively less distinctly so; ovipositor sheath, scarcely half as long as first tergite.

Yellow with the following black markings: ocellar spot; the usual three spots on mesoscutum, the middle one large, rounded, transverse, concavely truncate anteriorly, the lateral ones smaller and subtriangular; paired spots on tergites 1, 3 to 5, and 7; ovipositor sheath; and bases of hind tibia and basitarsus; prescutellar and propodeal spots lacking; antennae ferruginous, darker above, scape yellow beneath.

Type-locality. — Kosempo, Formosa.

Type. — Deutsches Entomologisches Institut. One female.

*Xanthopimpla pleuralis*, new species. ✓

Runs in Krieger's 1914 key to Group D and there to complet 10 but agrees with neither of the two Sumatran species falling there

Male. — Length 11 mm.; antennae 11 m.

Head slightly broader than long; face longer than broad, distinctly scutate, rather densely and finely punctate; clypeus weakly separated, very finely punctate; malar space about half as long as basal width of mandible. Thorax polished, impunctate except below; notauli short; scutellum pulvinate, higher medially; propodeum polished, basal carina

obsolete, all others basad of apical carina entirely wanting, apical strong; areolet petiolate, recurrent vein just behind middle. Abdomen narrow fusiform; first tergite slightly longer than broad at apex; second nearly as long as broad at base, elevated area polished, with a few scattered punctures laterally; third sculptured like second; others smooth.

Yellow with the following black markings: ocellar spot; occipital fascia; three distinct spots on disk of mesoscutum, the median subcircular, the others subtriangular and confluent with the prescutellar spot; a large ovate spot on mesopleurum; a pair of medially confluent spots at base of propodeum; paired spots on tergites 1—7, those on 1—3 and 7 confluent; and hind trochanter and tibia basally; antennae ferruginous, yellow beneath at base; wings hyaline, faintly infumate at apex, venation black, costa pale; tegulae testaceous apically.

Type-locality. — Kankau (Koshun), Formosa.

Paratype. — Cat. No. 27151, United States National Museum.

Two males. The paratype is somewhat smaller than the type and has the spots on the sixth tergite much smaller than those on fifth and seventh. The type is in the Deutsches Entomologisches Institut; the paratype in the United States National Museum.

#### *Xanthopimpla sauteri* Krieger.

One female from Kankau (Koshun), Sept., 1912, agrees in every way with Krieger's description.

#### *Xanthopimpla erythroceros* Krieger.

Nine females and two males of this species are among the Sauter material from Kankau (Koshun), Taihorin, and Kosempo. It differs very little if any from *cera* Cameron, described from the Himalayas. *Xanthopimpla alternans* Krieger, described just before *erythroceros* apparently differs only in the separation of the mesoscutal spots, a character certainly not of specific significance.

#### *Xanthopimpla aequabilis* Krieger.

Eight females and six males from Kankau (Koshun), Sokutsu (Banshoryo District), and Paroe (nördl. Palwan District) agree with Krieger's description though the first tergite varies considerably in relative length and breadth. I doubt its distinctness from *nanu* Schulz.