

Catalogue of the Hymenopterous Insects collected at Sarawak, Borneo; Mount Ophir, Malacca; and at Singapore, by A. R. WALLACE. By FREDERICK SMITH, Assistant in the Zoological Department in the British Museum. Communicated by W. W. SAUNDERS, Esq., F.R.S., F.L.S.

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Fam. ANDRENIDÆ, *Leach*.

Gen. HALICTUS, *Latr*.

1. HALICTUS CERATINUS. *H. niger*; alis hyalinis; abdomine clavato.

*Male*. Length  $3\frac{1}{2}$  lines. Black: the head closely and finely punctured; antennæ as long as the thorax, the flagellum obscurely testaceous beneath; the face covered with griseous pubescence; the mandibles ferruginous at their apex. Thorax closely punctured; the wings hyaline and iridescent, their apex slightly clouded; the nervures and tegulæ testaceous; the legs rufo-testaceous, the tarsi paler, and covered with pale glittering pubescence. Abdomen clavate; the apical margins of the segments with fasciæ of short white pubescence, frequently more or less obliterated; shining and delicately punctured; beneath, the apex of the third segment, and the fourth, entirely clothed with very short whitish pubescence; the abdomen is of a dark rufo-testaceous hue, palest beneath, varying in different individuals.

*Hab.* Borneo (Sarawak).

This remarkable form of *Halictus* occurs at Sierra Leone. I have described a species from that locality, the "*H. clavatus*;" it is a smaller and very distinct species from *H. ceratinus*; in this species the first recurrent nervure is received in the middle of the second submarginal cell.

2. HALICTUS VAGANS. *H. ater*, cinereo-pubescent; abdomine nitido, segmentis intermediis basi fascia albis.

*Female*. Length  $4\frac{1}{2}$  lines. Black: the clypeus produced, the face covered with cinereous pubescence. Thorax closely punctured above; the mesothorax thinly covered with short erect pale pubescence; the post-scutellum with a dense short downy pubescence; the metathorax truncated, and having some irregular coarse striæ at the base above; the wings hyaline and iridescent, the nervures and tegulæ testaceous; the legs with a short yellowish-white downy pubescence. Abdomen delicately punctured, the basal margin of the second and two following segments with a fascia of short yellowish-white pubescence, the apical segment covered with similar pubescence.

This species bears a very striking resemblance to the *Halictus leucozonius* of Europe.

*Hab.* Borneo (Sarawak).

3. *HALICTUS BASALIS*. *H. niger*; alis hyalinis; abdomine clavato, basi ferrugineo.

*Male*. Length 3 lines. Black: the antennæ nearly as long as the thorax, the flagellum fulvous beneath; the face covered with a dense griseous pubescence; the mandibles rufo-piceous. Thorax thinly clothed with pale pubescence; the wings hyaline and iridescent, the nervures pale testaceous; the tibiæ and tarsi pale rufo-testaceous, the latter palest. Abdomen clavate, shining and finely punctured; the first segment and the apical margin of the second, ferruginous; the second and following segments with fasciæ of pale pubescence.

*Hab*. Singapore.

This conspicuous insect might be mistaken at first sight for a variety of "*H. ceratinus*," but in that species the apical margin of the fifth segment of the abdomen, beneath, is straight, or very slightly emarginate at the sides; in the present species it is *deeply emarginate its entire width*.

#### Gen. *NOMIA*, *Latr.*

1. *NOMIA APICALIS*. *N. nigra*, punctata; abdomine nitido, scutello bituberculato; alis apice nigris.

*Male*. Length 5 lines. Black: the head with scattered cinereous pubescence, dense and short on the sides of the face; the clypeus with a longitudinal impression; somewhat swollen on each side; the flagellum testaceous beneath. Thorax closely punctured, subopaque; a line of pale pubescence beneath the scutellum, which is bituberculate; the tegulæ yellowish; the wings hyaline, the nervures testaceous, the costal nervure dark brown; the apex of the anterior wings with a large dark fuscous cloud; the legs with a glittering cinereous pubescence; the posterior tibiæ curved, and dilated at their apex. Abdomen shining and punctured, the apical margins of the segments depressed, the apical half of the depressions impunctate.

*Hab*. Singapore.

2. *NOMIA IRIDESCENS*, *Westw. MS.* *N. nigra*; capite thoraceque punctatis subopacis; faciei pube grisea; pedibus nigris; abdomine fasciis tribus cæruleis; alis hyalinis.

*Female*. Length 4 lines. Black: very closely and finely punctured; the head and thorax with a griseous pubescence, most dense on the face and sides of the metathorax; the clypeus with a central longitudinal carina; the mandibles obscurely ferruginous at the apex; a white line on the posterior margin of the prothorax, which passes on to and surrounds the tubercles; the scutellum bordered with a line of very short white pubescence; the tegulæ pale testaceous; the wings fulvo-hyaline, with the nervures pale ferruginous; the legs clothed with a mixture of dark brown and griseous pubescence, that on the posterior tibiæ within, and on all the tarsi beneath, fulvous; the claw-

joint of the tarsi ferruginous. Abdomen shining, with an obscure violet tinge in certain lights; the apical margins of the second, third and fourth segments with a fascia of bright green or blue-green; beneath, thickly and coarsely punctured.

*Hab.* Malacca, India.

3. *NOMIA ELEGANS*. *N. nigra*; capite thoraceque punctatis subopacis; alis hyalinis; pedibus subferrugineis; abdomine fasciis cæruleo-viridibus pulchriter ornatus.

*Female.* Length 5 lines. Black: the head closely and finely punctured, the clypeus coarsely so, with a central longitudinal depression, subtuberculate on each side; the labrum and mandibles ferruginous, the latter black at their tips; the scape in front, and the apical joints of the flagellum beneath, yellowish. Thorax: shining, with very delicate shallow punctures; a transverse band of pale pubescence at the apical margin of the scutellum; the base of the metathorax with a deep depression which is crossed by a series of short striæ; the sides of the metathorax with a dense pale fulvous pubescence; the legs pale rufo-testaceous, and covered with short glittering pale pubescence; wings subhyaline and iridescent; the nervures testaceous, the costal nervure and the stigma dark fuscous; the apex of the anterior wings slightly clouded. Abdomen smooth and shining, the apical margins of the segments with narrow, vivid blue-green fasciæ.

*Hab.* Malacca.

Most closely resembling the "*Nomia crassipes* ♀," but that insect has the abdomen punctured, and the fasciæ broad, particularly at the apex of the abdomen.

#### Subfam. ANDRENOIDES.

##### Gen. CTENOPLECTRA, *Smith*.

*Head* transverse: *antennæ* inserted in the middle of the face, short, not reaching to the middle of the thorax; the basal joint of the flagellum not narrowed at the base; the second joint of the same length as the first, much narrowed at the base; the three following joints transverse and of equal length, the five apical ones rather longer, of equal length, the apex of the apical joint pointed; the *labrum* transverse, the anterior margin rounded; the *mentum* rather longer than the labium, the former acute at its apex, the latter blunt or rounded; the *labial palpi* 4-jointed, the two basal joints stout and of equal length, the two apical ones shorter and much more slender; the *paraglossæ* about the same length as the palpi; the *maxillary palpi* 6-jointed, the three basal joints stout and of equal length, the three apical joints much more slender, and each in succession shorter than the preceding; the *ocelli* placed in a curve on the vertex. *Thorax*: large and ovate; the *anterior wings* with one marginal and two sub-

marginal cells, the second receiving both the recurrent nervures; *legs* with the femora broad and compressed; the calcaria at the apex of the intermediate tibiæ stout, acute, and bent at the apex, its hinder margin toothed like a fine comb; the inner spine of the posterior calcaria toothed in a similar manner, the teeth much longer, those at the base of the spine longest, decreasing in length to the apex; the posterior tibiæ and basal joint of the tarsi densely covered with long hair; the claws of the tarsi bifid. *Abdomen* subovate, truncated at the base.

This is a very remarkable genus of Bees: it appears to be most nearly allied to the genus *Macropis*; the neuration of the anterior wings is very similar, and the labial and maxillary palpi consist of the same number of joints; the ocelli are placed in a curve, and the posterior legs have a dense clothing or pollen-brush as in that genus.

The beautiful comb with which the posterior tibiæ are furnished is doubtless for the purpose of removing the grains of pollen collected on the hairs which clothe the shanks. (Plate I. details.)

1. *CTENOPLECTRA CHALYBEA*. *C. capite thoraceque nigris, abdomineque chalybeo, pedibus posterioribus dense pilosis.*

*Female*. Length 6 lines. Head and thorax black: the head closely punctured; the clypeus shining, the punctures more scattered, and with a slight carina in the middle of its base; the scape in front, and the flagellum beneath, rufo-piceous; the mandibles ferruginous at their apex. Thorax opaque-black: the metathorax smooth and shining in the middle of its base, the sides covered with sooty-black pubescence; wings fuscous, palest at their apical margins; the posterior tibiæ and basal joint of the tarsi densely covered with long black pubescence, the inner pectinated calcar pale testaceous-yellow. Abdomen: steel-blue above, black beneath.

*Hab.* Malacca (Mount Ophir).

#### Subfam. DASYGASTRÆ.

##### Gen. MEGACHILE, *Latr.*

1. *Megachile atrata*, *Smith, Cat. Hym.* pt. 1. p. 182.

*Hab.* Borneo (Sarawak); Philippine Islands.

2. *Megachile ornata*, *Smith, Cat. Hym.* 1. p. 183.

*Hab.* Borneo (Sarawak); India.

3. *Megachile umbripennis*, *Smith, Cat. Hym.* pt. 1. p. 175.

*Hab.* Borneo (Sarawak) and Nepal.

4. *MEGACHILE AMPUTATA*. *M. nigra; capite thoraceque pube fulva vestitis; abdominis segmentis apicalibus fulvo marginatis; pedibus rufis.*

*Female*. Length 7 lines. Black: the head and thorax clothed above with fulvous pubescence, on the cheeks and thorax beneath it is

slightly griseous; the clypeus shining and punctured, with a longitudinal carina in the middle, thinly covered with pubescence; the flagellum fulvous beneath. Thorax: the tegulae and legs ferruginous; the wings fusco-hyaline, the nervures fusco-ferruginous, brightest towards the base of the wings. Abdomen: the two basal segments clothed with fulvous pubescence, the four apical segments with black; all the segments with a fascia of short fulvous pubescence on their apical margins; beneath, the three basal segments thinly clothed with pale fulvous pubescence, the three apical ones with black.

Allied to, but very distinct from, the *Anthophora rufipes* of Fabricius.

*Hab.* Borneo (Sarawak).

5. *MEGACHILE TUBERCULATA*. *M. nigra*; capite thoraceque punctatis, mandibulis fortibus et porrectis; clypeo tuberculato; alis fulvo-hyalinis; abdomine totius nigro.

*Female*. Length 10 lines. Black: clothed with black pubescence on the vertex and disk of the thorax, on the abdomen above it is sparing; the clypeus produced in the middle, forming a large prominent tubercle; the mandibles long, very stout and prominent, with a stout bluntish tooth on their inner margin near their base, and having three large teeth at their apex, the apical one acute. The outer margin of the tegulae ferruginous; the wings fulvo-hyaline, the nervures ferruginous, their apical margins with a fuscous border. Abdomen: the basal segment densely clothed with sooty-black pubescence; beneath, densely clothed with black pubescence.

*Hab.* Borneo (Sarawak).

6. *MEGACHILE ARCHITECTA*. *M. nigra, nitida et punctata*; abdomine pube laete fulva subtus vestito; alis subhyalinis apice nebulosis.

*Female*. Length 6 lines. Black, shining and punctured: the face, cheeks and thorax beneath, thinly clothed with griseous pubescence, the sides of the metathorax densely so; the wings subhyaline, with a fuscous cloud at the apex of the superior pair; the posterior femora and tibiae with a short fine cinereous pubescence, that on all the tarsi beneath, fulvous. Abdomen subovate and curving upwards, each segment with a deeply impressed transverse line; beneath, densely clothed with long bright fulvous pubescence.

*Hab.* Borneo (Sarawak).

7. *MEGACHILE LUCTUOSA*. *M. nigra opaca*; alis hyalinis; abdomine subtus fulvo; apice pube grisea vestito.

*Female*. Length 6 lines. Opaque-black: very closely punctured; the wings hyaline and iridescent, the nervures black; the base of the metathorax with fuscous pubescence, the sides as well as the thorax beneath with griseous; the apical margins of the second, third and fourth segments with narrow fasciae of whitish pubescence, the two former widely interrupted; the fifth and sixth densely covered

with short, whitish pubescence; beneath, clothed with fulvous pubescence.

*Hab.* Singapore.

8. *MEGACHILE ROTUNDICEPS*. *M. nigra opaca*; alis fulvo-hyalinis, nervuris ferrugineis; abdomine subtus fulgido-argentato vestito.

*Female*. Length 6 lines. Opaque-black: very closely and rather finely punctured; the labrum fringed with ferruginous pubescence; the head nearly orbicular. Thorax: the metathorax clothed with pale fulvous pubescence; the wings fulvo-hyaline, the nervures and tegulæ pale ferruginous. Abdomen with a little fulvous pubescence at the base; beneath, clothed with glittering silvery pubescence.

*Hab.* Malacca (Mount Ophir).

#### Subfam. SCOPULIPEDES.

##### Gen. CERATINA, Latr.

1. *Ceratina hieroglyphica*, *Smith, Cat. Hym.* pt. 2. p. 226.

*Hab.* Borneo (Sarawak).

2. *CERATINA FLAVOPICTA*. *C. atra*; capite thoraceque flavo-pictis; abdomine fasciisque flavis.

*Male*. Length 4 lines. Black: the face, inner orbits of the eyes, clypeus, labrum, mandibles, cheeks, scape, and a minute spot above the eyes, yellow. Thorax: the prothorax, two longitudinal lines on the disk of the mesothorax, an epaulet over the tegulæ, a line on each side of the metathorax, a spot beneath the wings, the tubercles and legs, yellow; the coxæ and base of the femora slightly rufo-piceous; the wings subhyaline, the nervures ferruginous. Abdomen: the basal and apical segments, and the apical margins of the other segments, yellow; the entire insect is shining and the abdomen delicately punctured.

*Hab.* Borneo (Sarawak).

This species is closely allied to the *Ceratina hieroglyphica* from India, but is abundantly distinct.

##### Gen. XYLOCOPA, Latr.

1. *Xylocopa latipes*.

*Apis latipes*, *Drury, Ill. Exot. Ins.* ii. p. 98.

*Hab.* Borneo (Sarawak), India, Singapore, Ceylon, Philippine Islands, China.

2. *Xylocopa collaris*, *St. Farg. Hym.* ii. p. 189.

*Hab.* Borneo (Sarawak), India, Sumatra, Bengal, Malacca.

3. *XYLOCOPA ÆSTUANS*.

*Apis æstuans*, *Linn. Syst. Nat.* i. p. 961 ♀.

*Hab.* Singapore, India.

4. *Xylocopa verticalis*, *St. Farg. Hym.* ii. p. 195 ♂.

This species I believe to be the male of *X. æstuans*.

*Hab.* Singapore, India.

5. *Xylocopa cærulea*, *Fabr. Syst. Piez.* p. 345.

*Hab.* Singapore, Java, East India, China.

6. *Xylocopa Dejeanii*, *St. Farg. Hym.* ii. p. 209.

*Hab.* Borneo, Java.

This I have little doubt is the male of *X. collaris*: I have on several occasions observed that they have been captured at the same time and place.

7. *Xylocopa dissimilis*, *St. Farg. Hym.* ii. p. 180 ♀.

*Hab.* Borneo (Sarawak), China, Madras.

8. *XYLOCOPA INSULARIS*. *X. nigra*; capite thoraceque pube rufo-fusca tectis; alis nigro-fuscis iridescentibus, apice acuminatis; oculis magnis, vertice fere connexis.

*Male.* Length 11 lines. Black: the head and thorax densely clothed with short rufo-fulvous pubescence; the eyes very large and approximating at the vertex; the anterior legs fringed with long black pubescence behind; the intermediate and posterior legs with black pubescence, very long on the posterior tarsi; the disk of the thorax very smooth and shining; the anterior wings pointed at their apex; the wings brown, with a violet and coppery iridescence; the posterior margins palest; the transverse nervure which separates the first and second submarginal cells, obliterated. Abdomen punctured; the basal and lateral margins with a thick fringe of black pubescence, the apical margins of the segments depressed and slightly rufo-piceous.

*Hab.* Borneo (Sarawak).

#### Gen. ANTHOPHORA, *Latr.*

1. *Anthophora zonata*.

*Apis zonata*, *Linn. Syst. Nat.* i. p. 955.

*Hab.* Borneo (Sarawak).

2. *ANTHOPHORA INSULARIS*. *A. nigra*, pube fulva vestita, faciei pube grisea.

*Female.* Length 7 lines. Black: the face, cheeks and thorax beneath clothed with griseous pubescence, that on the thorax above and on the abdomen is fulvous; the fifth segment of the abdomen with a mixture of black hairs; the legs have a fulvous pubescence outside; within it is black, it is also black at the apex of the plantæ of the posterior legs. The mandibles, labrum, anterior margin of the clypeus and a narrow central longitudinal line, a minute spot above the clypeus,

and the flagellum beneath, yellow; the tegulæ yellow, the wings fulvo-hyaline.

*Hab.* Borneo (Sarawak).

This species closely resembles both the *A. vestita* and the *A. concinna*, but is on comparison very distinct.

### Subfam. SOCIALES.

#### Gen. APIS, Linn.

1. *Apis dorsata*, *Fabr. Syst. Piez.* p. 370.

*Hab.* India, Borneo (Sarawak), Malacca.

2. *Apis Indica*, *Fabr. Syst. Piez.* p. 370.

*Hab.* India, Malacca, Borneo.

3. *Apis Perrottetii*, *Guér. Icon. Règ. Anim. Ins.* p. 461.

*Hab.* Borneo (Sarawak). India.

The specimens from Sarawak are of a paler colour than those described by Guérin, but they agree in all the essential specific characteristics, and have the bands of pale pubescence at the base of the segments, as in *A. Perrottetii*; these bands, if the abdomen retracts after death, are hidden beneath the apical margins of the preceding segments.

4. *APIS ANDRENIFORMIS*. *A. nigra lævis nitida; alis hyalinis; abdomine fasciis albis pubescentibus ornato.*

*Worker.* Length 4 lines. Black: smooth and shining, slightly pilose; the face with a short cinereous pubescence; the metathorax, the coxæ and femora beneath with whitish pubescence; the wings hyaline and iridescent; the basal margin of the second segment of the abdomen slightly rufo-piceous; the basal margins of the third, fourth, fifth and sixth segments with bands of white pubescence; beneath, the three basal segments of the abdomen pale testaceous in the middle.

*Hab.* Borneo (Sarawak).

This remarkable Honey-Bee has exactly the appearance of an *Andrena*; it does not appear to be a worn specimen; the wings are not torn, and the abdominal bands entire; the eyes are pubescent, but less conspicuously so than in any species I have previously seen.

5. *APIS TESTACEA*. *A. capite thoraceque nigris, abdomine pedibusque pallide testaceis, alis hyalinis.*

*Worker.* Length 8 lines. Head dark fuscous; the ocelli shining, yellow; the extreme base of the scape and the tips of the mandibles, as well as the tongue, of a reddish-yellow; the head covered with rufo-fuscous pubescence, that on the cheeks palest. Thorax fuscous anteriorly, the metathorax, tegulæ and legs pale rufo-testaceous; the thorax and legs with a pale yellowish-white pubescence, intermixed



with a few fuscous hairs on the disk of the mesothorax; the wings hyaline, with the nervures pale testaceous. Abdomen: pale testaceous and densely clothed with short yellowish-white pubescence.

*Hab.* Borneo.

A very distinct species from any hitherto described: its densely pubescent body is a distinguishing characteristic.

### GENUS TRIGONA, *Jurine*.

1. *TRIGONA VENTRALIS*. *T. nigra*; abdomine nigro-piceo; segmento basali supra, abdomine subtus albis.

*Worker*. Length  $1\frac{3}{8}$  line. Head and thorax black; the extreme base of the scape, and the flagellum rufo-fuscous; the tips of the mandibles ferruginous; the clypeus and lower part of the face with a cinereous pile. Thorax: narrower than the head; the mesothorax margined with short whitish pubescence, the outer margin of the tegulae rufo-piceous; the wings hyaline and iridescent, the nervures dark ferruginous; the apical joints of the tarsi pale; the posterior tibiae broadly expanded towards their apex, their upper margin thinly fringed with pale hairs, the basal joint of the tarsi clothed with golden pubescence within. Abdomen dark rufo-piceous; the basal segment white, beneath entirely so.

*Hab.* Borneo (Sarawak). Malacca (Mount Ophir).

2. *TRIGONA ATRIPES*. *T. flavescenti-rufa*; alis dimidio basali fuscis, apicali lacteis, tibiis tarsisque intermediis et posticis nigris.

*Worker*. Length  $2\frac{1}{4}$  lines. Pale reddish-yellow; the flagellum fuscous above; wings reddish-brown, with their apex beyond the stigma milky-white; the intermediate and posterior tibiae and tarsi black, the apical joints of their tarsi ferruginous; the anterior legs entirely reddish-yellow; the scutellum fringed with fuscous hairs.

*Hab.* Malacca (Mount Ophir).

3. *TRIGONA THORACICA*. *T. nigra*; thorace obscure ferrugineo, alis flavo-hyalinis, abdomine basi pallide testaceo.

*Worker*. Length  $3\frac{1}{4}$  lines. Black: the scape of the antennae at the base, the clypeus and mandibles at their base, ferruginous. Thorax: obscurely ferruginous, the legs more or less ferruginous towards their base; the wings flavo-hyaline. Abdomen smooth and shining, pale testaceous at the base.

*Hab.* Singapore.

4. *TRIGONA NITIDIVENTRIS*. *T. nigra*; alis subhyalinis, coxis et unguibus pallide ferrugineis; abdomine supra nitido, nigro, subtus pallide testaceo.

*Worker*. Length  $3\frac{1}{4}$  lines. Black: the extreme base of the scape ferruginous; the wings subhyaline and iridescent, slightly fuscous towards their base, the nervures testaceous; the margins of the thorax

and the scutellum with ochraceous pubescence; the coxæ and claw-joint of the tarsi rufo-testaceous. Abdomen shining black, its extreme base, and beneath entirely, pale testaceous.

*Hab.* Malacca (Mount Ophir).

5. *TRIGONA LÆVICEPS*. *T. nigra*; capite lævi et nitido, antice pube cinerea tecto; thorace nitido, alis subhyalinis, abdomine castaneo-rufo.

*Worker.* Length  $1\frac{1}{4}$  line. Head and thorax black: the face, above the insertion of the antennæ, smooth and shining; the antennæ rufo-testaceous; the clypeus with a hoary pubescence; its anterior margin, and also the mandibles, ferruginous. Thorax smooth and shining, the metathorax highly polished; the wings subhyaline and iridescent, the stigma and nervures ferruginous. Abdomen ferruginous, smooth and shining.

*Hab.* Singapore.

6. *TRIGONA APICALIS*. *T. nigra*; clypeo antennisque ferrugineis, parte dimidia basali alarum fusca, apice hyalino.

*Worker.* Length  $2\frac{1}{4}$  lines. Head and thorax black; the abdomen nigro-piceous; the clypeus, and lower parts of the face, testaceous-yellow; the mandibles ferruginous; antennæ pale ferruginous; the head covered with cinereous pile. Thorax: the tegulæ testaceous; the wings from the base to the stigma brown, beyond which they are hyaline; the scutellum covered with short stiff black hairs; the sides, and beneath, with scattered black pubescence; the legs dark rufo-piceous; the posterior tibiæ pale, flattened and widened towards their apex; the outer margin thickly fringed with black pubescence; the disk of the thorax with a cinereous pile; the apex of the abdomen pale rufo-testaceous.

*Hab.* Borneo (Sarawak).

7. *TRIGONA CANIFRONS*. *T. nigra*; facie pube cinerea vestita; alis hyalinis.

*Worker.* Length  $2\frac{1}{4}$  lines. Black: the face covered with cinereous pile. The thorax thickly covered above with sooty-black pubescence, which is long and tufted on the scutellum; the tegulæ black and shining; the wings hyaline, the nervures testaceous; the posterior tibiæ, with their upper margin, thickly fringed with black hairs. Abdomen shining black.

*Hab.* Borneo (Sarawak).

8. *TRIGONA COLLINA*. *T. nigra*; antennis basi ferrugineis; alis basi fuscis apice albis.

*Worker.* Length  $2\frac{1}{4}$  lines. Black: the scape, flagellum beneath, and its apex, as well as the mandibles, ferruginous; the clypeus with a pale testaceous spot in the middle; the wings brown at their base as

far as the stigma, beyond which they are milky-white ; the abdomen obscurely rufo-piceous at the base.

*Hab.* Malacca (Mount Ophir).

9. *TRIGONA FIMBRIATA*. *T. capite thoraceque femoribus et abdomine basi testaceo-rufis ; tibiis tarsisque intermediis et posticis nigris.*

*Worker.* Length  $3\frac{1}{2}$  lines. Head rufo-testaceous, the face covered with very short ochraceous pubescence, and sprinkled with longer stiff black hairs ; the colour and pubescence of the thorax are similar to that of the head, but the disk is of a rather darker colour, and the black hairs are longer and more rigid ; the intermediate and posterior tibiæ, and the basal joints of their tarsi, black, the former densely covered with black pubescence, and the latter thickly fringed with the same, the posterior tibiæ being very broadly dilated towards their apex ; the wings hyaline, their nervures bright ferruginous. Abdomen : the two basal segments rufo-testaceous, their apical margins, as well as the whole of the following segments, nigro-fuscous.

*Hab.* Singapore.

#### Fam. FORMICIDÆ.

Before entering upon the descriptions of the highly interesting collection of Ants made by Mr. Wallace in Borneo, Malacca, and Singapore, a few observations may not be out of place. I am perfectly aware, that in treating upon this family, I can only achieve a very partial success ; our present knowledge, scanty as it is, convinces me that it is simply an impossibility to assimilate the sexes of the exotic Ants correctly, without positive observation of their œconomy. The sexes of some species, there can be little doubt, at present form the types of apparently very distinct genera ; such indeed are the eccentricities of form in the exotic species, as to outstrip even the widest bounds hitherto conceived to be necessary to allow, for varieties in form, size and colour. A single instance will amply confirm this observation. In the third volume of the 'Transactions of the Entomological Society,' I described eleven species of the genus *Pseudomyrma* ; of one of these I had the opportunity of describing the three sexes, taken in their formicarium by Mr. H. W. Bates, in Brazil. This species, *Pseudomyrma cephalica*, exhibits such a remarkable difference of form in the male, female and worker, that, had they not been obtained in the manner stated, I should unhesitatingly have removed the sexes into two distinct genera. In the male and worker the head is of the ordinary form and proportion, but that of the female is as long as the thorax, with the sides parallel ; it is in fact, if I may use the term, so disproportionate, that no one, I imagine, could have

possibly supposed any relationship to have existed between the female and the other sex.

It is to the *Formicidæ* that Mr. Wallace has made the most valuable additions: the number of new species added to the genus *Polyrhachis* is very important, and that of eight to the *Cryptoceridæ* makes a grand addition to that curious and highly interesting family. The new genus, *Echinopla*, being founded on the examination of workers only, will no doubt hereafter require a revision of the characters laid down, but in describing a collection containing so many novelties such occurrences are almost inevitable.

1. *Formica gigas*, *Latr. Hist. Nat. Fourm.* 105. pl. 2. f. 6 ♂.

*Hab.* Borneo, Malacca, Singapore.

2. *Formica compressa*, *Fabr. Syst. Piez.* p. 396.

*Hab.* Sarawak.

Specimens from Borneo have the legs more or less red, and in some examples the vertex is more or less so.

3. *Formica stricta*, *Jerdon, Madr. Journ. Lit. & Sci.* (1851) p. 123.

*Hab.* Borneo (Sarawak).

4. *Formica smaragdina*, *Fabr. Spec. Ins.* 488 ♀.

*Formica longipes*, *Jerdon, Madr. Journ. Nat. Hist.* 2nd ser. xiii. 104 ♂.

*Formica viridis*, *Kirby, Trans. Linn. Soc.* xii. 477 ♀.

*Hab.* Borneo (Sarawak), Malacca, Sumatra, Celebes, Philippine Islands.

5. **FORMICA FESTINA.** *F. nigra*, nitida; flagello fulvo; thorace subtus, metathorace pedibusque et petiolo pallide ferrugineis; abdomine subtus piceo.

*Female.* Length 9–10 lines. Black and shining: head oblong-quadrate; the mandibles and anterior margin of the face rufo-piceous; the flagellum fulvous. Thorax: beneath, the sides, the metathorax and the legs, pale ferruginous; wings subhyaline, their nervures ferruginous; scale of the abdomen pale ferruginous, ovate and slightly emarginate above; the posterior margins of the segments of the abdomen, above, pale rufo-testaceous; beneath, entirely pale.

*Hab.* Borneo (Sarawak).

This species closely resembles the European species *F. ligniperda*—in fact appears to be the exotic form of that insect.

6. **FORMICA MISTURA.** *F. nigro-picea*, ferrugineo variegata, pubescens; capite opaco, thorace abdomineque nitidis.

*Female.* Length 7 lines. Head black, the vertex and cheeks more or less ferruginous; the head opake, with the mandibles shining nigro-piceous; the scape attenuated, rufo-testaceous; the clypeus delicately punctured, slightly emarginate in front. Thorax elongate-ovate,

smooth and shining, with ferruginous stains in front and on the sides; the metathorax truncate, with ferruginous spots at its base above; the legs ferruginous, the tibiae and basal joint of the tarsi darkest; the wings flavo-hyaline, the nervures pale rufo-testaceous. Abdomen elongate-ovate, with the margins of the segments and the apex rufo-piceous; the scale ferruginous, with its superior margin very slightly emarginate; the head with a thin fulvous pubescence; the abdomen with a few scattered pale hairs.

*Hab.* Borneo (Sarawak).

7. *FORMICA PILOSA*. *F. nigra*, dense sericea pilosa; squama ovata.

*Worker*. Length 3 lines. Black, covered with a fine cinereous pile; the head large, much wider than the thorax; eyes ovate, placed laterally rather high on the head; the anterior part of the face truncate, the sides produced beyond the anterior margin of the clypeus; a faintly impressed line above the base of the clypeus, which terminates in a shallow fovea on the front. Thorax compressed posteriorly. Abdomen ovate, with a short pale pubescence; the scale narrow, incrassate, and terminating above in a blunt point.

*Hab.* Borneo (Sarawak).

8. *FORMICA RUFICEPS*. *F. nigra*; capite thoraceque antice ferrugineis.

*Worker*. Length 4 lines. Head ferruginous, smooth, shining, and much wider than the thorax; the mandibles and scape black, the apex of the former obscurely ferruginous; the flagellum pale rufo-testaceous. Thorax black, more or less ferruginous anteriorly, much compressed towards the metathorax; the tips of the joints of the legs ferruginous, as well as the tarsi. Abdomen black, smooth and shining; the scale ovate, acuminate at its apex above; the legs and apex of the abdomen with a scattered short pale pubescence.

*Worker minor*, about one-third smaller; only differs otherwise in having the mandibles ferruginous.

*Hab.* Borneo (Sarawak).

This species bears a strong resemblance to the *F. erratica* of Europe.

9. *FORMICA BADIA*. *F. castaneo-fusca*; thorace postice attenuato, abdominis squamula incrassata, abdomine ovato.

*Worker*. Length  $2\frac{1}{2}$ – $3\frac{1}{2}$  lines. Chestnut-brown; head subovate; the eyes ovate, lateral, placed high on the head towards the vertex. Thorax rounded in front, compressed behind; the metathorax obliquely truncated; the scale of the abdomen subconical, incrassate, slightly rounded in front and truncate behind. Abdomen oblong-ovate, the apex fuscous.

*Hab.* Singapore; Borneo (Sarawak).

This species has much the appearance of a species of *Polyergus*; but the mandibles are toothed at the apex: the palpi I have not examined.

10. *FORMICA DILIGENS*. *F.* obscure rufo-picea; antennis, mandibulis, thorace subtus et lateribus, metathorace pedibusque læte rufis; abdomine subtus pallide rufo-testaceo.

*Female*. Length 9 lines. Head shining, dark rufo-piceous; the carinæ at the insertion of the antennæ, the antennæ, the anterior margin of the face and clypeus, and the mandibles, ferruginous. The thorax and legs ferruginous, with the mesothorax above and the scutellum dark rufo-piceous; wings subhyaline, the nervures and tegulæ pale ferruginous. Abdomen shining dark rufo-piceous, beneath pale rufo-testaceous; scale subquadrate, its superior margin slightly emarginate its entire width.

*Hab.* Malacca.

This insect closely resembles the *F. ligniperda*.

11. *FORMICA IRRITANS*. *F.* capite abdomineque nigro-fuscis; antennis, thorace, abdomine, squamula pedibusque ferrugineis.

*Worker*. Length 6 lines. Elongate and slender; head ovate; dark fuscous; the apex of the scape and the flagellum ferruginous; the clypeus and mandibles dark rufo-piceous. The thorax, scale of the abdomen and the legs, ferruginous; the thorax elongate, compressed, with the prothorax very slightly dilated at the sides. The scale of the abdomen incassate, rounded anteriorly and truncate behind. Abdomen ovate, nigro-fuscous; the entire insect sprinkled with erect pale hairs.

*Worker minor*. Length 3 lines. Only differs in having the antennæ entirely pale ferruginous and the anterior legs stouter.

*Hab.* Malacca; Borneo (Sarawak).

This is probably the worker of *F. diligens*.

12. *FORMICA FERVENS*. *F.* capite abdomineque obscure rufo-piceis, thorace pedibusque pallide ferrugineis.

*Worker*. Length 4 lines. Head nigro-piceous, thorax and legs pale ferruginous; head subopake, with the mandibles and clypeus slightly shining, the latter with scattered punctures; the flagellum pale ferruginous; the anterior margin of the clypeus slightly emarginate. Thorax more or less fuscous in front, compressed behind. Abdomen black and shining, with the apical margins of the segments narrowly testaceous; thinly sprinkled with pale hairs; the scale ovate and ferruginous.

*Hab.* Borneo (Sarawak).

13. *FORMICA GRACILIPES*. *F.* ferruginea, abdomine (basi excepto) obscure rufo-piceo.

*Worker*. Length 2 lines. Pale ferruginous, abdomen dark rufo-piceous; antennæ longer than the body; head ovate, and wider than the thorax, narrowed behind; the eyes black and prominent. Thorax elongate and compressed; the prothorax narrowed into a slender neck;

legs very much elongated, the posterior pair one-third longer than the insect, the tibiæ and tarsi pale testaceous; the abdominal scale incrasate, rounded in front and truncate behind; the abdomen dark rufo-piceous, short and ovate; the base more or less pale ferruginous.

*Hab.* Singapore.

14. *FORMICA IRRITABILIS*. *F. capite, thorace et squama sanguineis; pedibusque rufo-fuscis; abdomine fusco-nigra.*

*Worker.* Length 4 lines. Head, thorax, and scale of the abdomen ferruginous, the abdomen black; the scape black, its extreme base and apex, and the flagellum, ferruginous, the latter more or less fuscous above; the vertex with sometimes a fuscous stain; the mandibles nigro-piceous, their apex ferruginous; the thorax compressed behind, and thinly covered, as well as the head, with erect reddish hairs; legs nigro-fuscous, with the base and apex of the joints, or with sometimes the coxæ and base of the femora, and also the apical joints of the tarsi, ferruginous. The scale of the abdomen ovate, terminating in a point above; the apical margins of the segments with a thin fringe of pale reddish-yellow hairs.

*Hab.* Borneo (Sarawak).

15. *FORMICA SEDULA*. *F. capite thorace pedibusque opacis nigris, abdomine castaneo.*

*Worker.* Length 5 lines. Head and thorax opaque-black, the mandibles and legs shining black; the abdomen chestnut-red. The mandibles smooth at their base, and striated at their apex, with five stout teeth, the flagellum fusco-ferruginous; the head deeply emarginate behind; much wider than the thorax; the thorax compressed; the trochanters and apical joints of the tarsi ferruginous. Abdomen ovate and thinly sprinkled with reddish pubescence; the scale subquadrate; emarginate above, and slightly ferruginous; the head and thorax with a few erect black hairs.

*Hab.* Borneo (Sarawak).

Resembles *F. compressa*, but differs in having much stouter legs, in being pubescent, in having the posterior angles of the head more rounded, and in being pubescent.

16. *FORMICA EXASPERATA*. *F. capite thorace abdominisque squama sanguineis; tarsorum unguibus abdominisque basi rufis; thorace compresso.*

*Worker.* Length 5½ lines. Head and thorax blood-red; sometimes blackish before the insertion of the antennæ, and also a little in front of the anterior stemma; in some examples entirely red; the mandibles black, stout, strongly toothed and punctured; the head deeply emarginate posteriorly, and much wider than the thorax. Thorax: compressed, sometimes with fuscous stains at the sides, with the tibiæ and tarsi more or less fuscous; the head, thorax and legs with a thin scattered pale reddish pubescence. Abdomen: black, subopaque,

with the apical margins of the segments usually more or less rufopiceous; the scale erect, ovate and entire.

*Hab.* Borneo (Sarawak).

The general form of this species is that of *F. compressa*; the antennæ are shorter, with shorter joints, and the legs are considerably stouter.

*Hab.* Borneo (Sarawak).

17. *FORMICA TENUIPES*. *F. castaneo-rufa* lævis nitida; thorace ovato; alis hyalinis; squama quadrata supra emarginata.

*Female*. Length 4 lines. Reddish-brown: mandibles stout, and armed with five stout black teeth; antennæ pale rufo-testaceous. Thorax ovate, smooth and shining; wings hyaline, the nervures pale testaceous; legs pale rufo-testaceous, with the femora much compressed, flattened; the scale of the abdomen quadrate, emarginate above. Abdomen ovate, smooth and shining.

*Hab.* Borneo (Sarawak).

18. *FORMICA CAMELINA*. *F. nigra*, elongata et gracilis; capite postice in collum angustato; thorace medio compresso; metathorace supra rotundato; pedibus elongatis; abdominis nodo globoso.

*Worker*. Length 5 lines. Black: elongate and slender; covered with a fine silky pile, which has a golden tinge on the thorax and abdomen; the antennæ nearly as long as the body; the head oblong, much narrowed behind the eyes, the latter nearly round, and placed rather forwards on the face a little higher than the insertion of the antennæ; the carinæ above the clypeus with a less elevated one between them, the antennæ inserted at the sides of the carinæ. Thorax: much narrowed in front, forming a sort of neck, widened and rounded behind, broader than the meso- and meta-thorax, the latter somewhat swollen above and elevated above the anterior part of the thorax; legs very long and sprinkled with fine whitish hairs. The scale of the abdomen, viewed above, pear-shaped, broadest at the base; abdomen ovate, pointed at the apex, and sprinkled with pale glittering hairs.

*Hab.* Singapore.

19. *FORMICA PALLIDA*. *F. pallide testacea* lævis nitida sparse pilosa; squamula elongato-ovata.

*Worker*. Length 2½–3 lines. Pale rufo-testaceous, smooth and shining: the head much wider than the thorax, the vertex widely and deeply emarginate; the mandibles dark rufo-piceous; the flagellum and the legs paler than the rest of the body; the thorax compressed behind; the scale narrow and ovate; abdomen subglobose, and thinly sprinkled with long pale hairs; the head and thorax also slightly pubescent.

*Hab.* Borneo (Sarawak).

Some individuals of this species differ from the form described, in having the head and abdomen of a deeper hue; the prothorax is sometimes



dark, but all have the scale of the same elongate-ovate form, without any notch above.

20. *FORMICA IRRITANS*. *F. nigra*; antennis, thorace pedunculisque squama ferrugineis.

*Worker*. Length 6 lines. Head and abdomen nigro-fuscous; antennæ, thorax, and scale of the abdomen, as well as the legs, ferruginous. Elongate and slender, the head ovate; the apex of the scape ferruginous; the clypeus and mandibles dark rufo-piceous. The thorax elongate, compressed, with the prothorax slightly dilated at the sides. Abdomen ovate: the scale incrassate, rounded anteriorly, and truncate behind; the entire insect thinly sprinkled with erect, long, pale pubescence.

*Worker* (minor). Length 3 lines. This only differs in having the antennæ entirely pale ferruginous.

*Hab.* Borneo (Sarawak).

This is probably the worker of *Formica diligens*.

Genus *TAPINOMA*, *Foerster*.

1. *TAPINOMA GLABRATA*. *T. nigra*, subnitida, glabra, angustior; antennis, mandibulis tarsisque rufo-pallidis; squama oblonga depressa; abdomine oblongo-ovato.

*Worker*. Length  $1\frac{1}{2}$  line. Black: the clypeus obscurely testaceous; the mandibles and flagellum rufo-testaceous, the apex of the latter slightly fuscous; the head, prothorax, and coxæ beneath, rufo-testaceous; the thorax declining above to the base of the metathorax, the latter convex; the tarsi pale rufo-testaceous. Abdomen ovate; the scale inclining forwards in a line with the oblique truncation of the metathorax; the insect entirely destitute of pubescence.

*Hab.* Malacca.

Genus *POLYRHACHIS*.

*Body* more or less armed with spines. *Antennæ* elongate, usually nearly as long as the body; *labial palpi* 4-jointed, the basal joint shortest, the three following, each in succession, longer than the preceding; the apical joint three times the length of the basal one. *Maxillary palpi* 6-jointed, elongate, the basal joint short, about half the length of the second joint, each of the following joints more than twice the length of the second joint. *Thorax*: subovate in the females; compressed and frequently flattened above in the workers; *wings* as in *Formica ligniperda*. *Abdomen* globose. (Details, Plate I.)

This genus of Ants, of which the *Formica bihamata* may be regarded as the type, forms a very distinct section of the *Formicidæ*: the males I am not acquainted with. The habit of these insects is arboreal, as we learn from Mr. Jerdon, who, in his paper on Ants, in the Madras Journal, describes two species; of

one, *P. nidificans*, he says, "This Ant makes a small nest about half an inch or rather more in diameter, of some papyraceous material, which it fixes on a leaf; I have opened two, each of which contained one female and eight or ten workers. It is very rare; I have only seen it in Malabar." What can be the use of the formidable spines and hooks with which these creatures are armed, it is impossible to determine; on examination we find, as might be expected in species living on trees, and probably all have the same habit, that the legs are destitute of spines, and usually of pubescence also; the calcaria at the apex of the tibiae are very short, and the tips of the tarsal joints have very short spines and hairs.

The *Polyrhachis textor*, described in these papers, was captured with its nest, and was sent from Malacca by Mr. Wallace; the nest is nearly oval, not quite an inch in length, its shortest diameter being a little over half an inch; this nest is not of a papyraceous texture, but fibrous, formed, as it were, of a coarse network; the colonies must consequently be very small, as Mr. Jerdon says, consisting of only eight or ten individuals; but probably at the height of the season, when the males appear, the nests may be somewhat enlarged, as we know to be the case amongst the social Wasps.

Although these insects are usually rare, or at least seldom met with in collections, Mr. Wallace has captured no less than nineteen species in the East: from the New World I have only seen one or two, about four from Africa, and the same number from Australia.

1. *POLYRHACHIS BIHAMATUS*, *Drury, Ins. ii. pl. 38. f. 8 ♀.*

*P. thorace quadrispinoso, squama petiolari spinis duabus arcuatis.*

*Hab.* Borneo. India. Sumatra.

2. *Polyrhachis relucens.*

*Formica relucens, Latr. Hist. Nat. Fourm. p. 131.*

*Hab.* Borneo (Sarawak). India.

3. *Polyrhachis carinatus.*

*Formica carinata, Fabr. Syst. Piez. 413. 71; St. Farg. Hym. i. 220. 28;*

*Jerdon, Madras Journ. Lit. & Sc. (1851).*

*Hab.* Malacca. Singapore.

4. *POLYRHACHIS DEFENSUS.* *P. niger*; capite thoraceque minute verrucatis, thorace spinis duabus longis antice, duabus postice, armato; abdomine opaco ferrugineo-rufo.

*Worker.* Length 3½ lines. Head and thorax black, and coarsely sha-

greened; the thorax armed with two long stout spines at the angles of the prothorax, and two similar ones at the posterior angles of the metathorax; the scale of the abdomen with two long stout spines diverging and curved backwards. Abdomen globose, of a dull opaque rusty-red.

*Hab.* Singapore. Java.

Specimens from Java, in the British Museum, have the abdomen black.

5. *POLYRHACHIS CONSTRUCTOR*. *P. niger*; thorace ovato, spinis duabus minutis antice armato; abdominis squamula spinis duabus armata.

*Female*. Length  $3\frac{1}{4}$  lines. Black: finely rugose; the palpi pale testaceous; the mandibles obscurely rufo-piceous; the apex of the antennæ pale rufo-testaceous. Thorax: the anterior angles of the prothorax acute; the metathorax not toothed; the apex truncate, the truncation finely rugose; wings subhyaline, faintly yellow; the nervures pale testaceous. Abdomen globose; the scale quadrate, with two very stout, short, curved spines above; the insect is very thinly covered with a fine short silky ashy pile, most apparent on the abdomen.

*Hab.* Borneo (Sarawak).

6. *POLYRHACHIS RUFICORNIS*. *P. niger*; antennis mandibulis pedibusque ferrugineis, abdominis squamula spinis duabus longis armata.

*Female*. Length 4 lines. Black: the antennæ and mandibles ferruginous. Thorax elongate-ovate; wings subhyaline and iridescent, the nervures testaceous; the legs ferruginous, the coxæ black. Abdomen: the base more or less ferruginous; the scale with two stout divergent spines above, which curve slightly backwards.

*Hab.* Borneo (Sarawak).

7. *POLYRHACHIS CARBONARIUS*. *P. aterrimus*, nitidus; capite thoraceque supra aciculatis, abdominis squamula supra fornicata.

*Worker*. Length 2 lines. Jet-black, shining: the head and the thorax above, longitudinally aciculate, the thorax most finely so. Thorax: the anterior margin of the thorax with a short acute spine at the lateral angles; the truncation of the metathorax smooth and shining; the legs elongate, with acute spines or hairs; the calcaria pale testaceous; the anterior tibiæ obscurely ferruginous in front. Abdomen ovate, smooth and shining; the scale incrassate, narrowed to a sharp edge above, the superior margin wide and arched, not spined.

*Hab.* Malacca.

8. *POLYRHACHIS TEXTOR*. *P. niger*; thorace elongato, supra planato, dentibus duobus parvis antice et postice armato; abdominis pedunculo unispinoso.

*Worker*. Length  $3\frac{1}{2}$  lines. Black; delicately rugulose; the eyes ovate, lateral, placed high on the sides of the head; the front with two raised carinæ, at the sides of which the antennæ are inserted; the

clypeus and the space between the antennæ, rufo-piceous; the clypeus with a slight longitudinal carina; the mandibles obscurely rufo-piceous at their apex; the apical joint of the antennæ ferruginous. Thorax elongate, compressed at the sides, and flattened above; the anterior portion longitudinally aciculate; the meso- and meta-thorax delicately rugulose; a short blunt tooth or spine on each side of the prothorax, and a similar, but more acute tooth at the superior angles of the metathorax; the legs elongate, without spines or hairs; the tips of the claw-joint of the tarsi ferruginous. Abdomen smooth and shining; the peduncle with a single acute spine above, and a minute tooth on each side at its base.

*Hab.* Malacca.

9. *POLYRHACHIS CHALYBEUS*. *P. capite thoraceque nigris, pedibus abdomineque chalybeis.*

*Worker.* Length 4 lines. Black: the metathorax, legs and abdomen steel-blue; the head delicately rugulose; eyes ovate, lateral, placed high on the head; the antennæ inserted opposite the lower orbit of the eyes, each at the side of an elevated bent carina; the clypeus emarginate anteriorly; the mandibles large and stout, their apex denticulate. Thorax elongate, delicately transversely rugulose, with two stout acute spines in front, diverging outwardly, and two shorter erect parallel ones on the metathorax; the femora and tibiæ compressed. Abdomen smooth and shining; the peduncle armed with two long stout divergent bent spines which curve backwards.

*Hab.* Singapore. Malacca.

10. *POLYRHACHIS NITIDUS*. *P. nigerrimus, lævis, nitidus; thorace ovato, metathorace spinis duabus longis acutis, pedunculo quadrato, spinis duabus curvatis acutis armato.*

*Female.* Length 4 lines. Jet-black, smooth and shining; the thorax rounded anteriorly; the metathorax armed with two long acute spines at its base; the truncation delicately transversely rugulose and shining; the peduncle quadrate, armed above at its posterior angles with two short curved acute spines; the anterior tibiæ rufo-piceous in front; wings subhyaline, faintly tinted with yellow; the nervures ferruginous; the stigma brown. Abdomen subglobose, very smooth and shining.

*Hab.* Borneo (Sarawak).

11. *POLYRHACHIS VILLIPES*. *P. niger; thorace spinis duabus elongatis acutis antice armato; abdominis squamula spinis duabus longis acutis, singulis basi minute unispinosis, pedibus pubescentibus.*

*Worker.* Length  $3\frac{1}{2}$ –4 lines. Black; the head and thorax longitudinally delicately aciculate; eyes ovate, very prominent, situated high on the sides of the head, the head narrowed posteriorly; the carinæ on the face much elevated; the palpi pale rufo-testaceous. Thorax: armed in front with two long acute divergent spines; posteriorly unarmed; the superior surface flattened, distinctly divided by two trans-

verse sutures, and having a curved decline to the verge of the truncation of the metathorax; legs elongate, with a thin clothing of erect pubescence. Abdomen smooth, shining, and sprinkled with erect black hairs; the surface of the peduncle in front subquadrate, narrowed at the base, the superior angles with long acute divergent spines, which have a minute spine at their base outside.

*Hab.* Borneo (Sarawak).

12. *POLYRHACHIS MODESTUS*. *P. niger*; thorace ovato, metathorace spinis duabus brevibus obtusis, squama spinis duabus acutis retrorsum curvatis armata.

*Female*. Length 3 lines. Black: head and thorax very delicately rugose; the flagellum rufo-piceous beneath towards the apex. Thorax ovate; the metathorax with two short blunt spines; wings hyaline, faintly yellow; the nervures pale testaceous; the apical joints of the tarsi obscurely ferruginous. Abdomen globose, smooth and shining; the scale quadrate, armed above at the lateral angles with two acute spines which curve backwards.

*Hab.* Singapore.

13. *POLYRHACHIS PANDARUS*. *P. opacus niger*; capite thoraceque subverrucatis, thorace antice posticeque abdominisque squama spinis duabus longis crassis acutis armatis.

*Worker*. Length 4 lines. Black: head and thorax coarsely shagreened; the palpi pale testaceous; head below the antennæ finely shagreened; the head with a sharp recurved margin posteriorly. Thorax: not flattened above; two long, stout, acute, divergent spines in front, and two similar ones posteriorly; the scale quadrate, with two long acute divergent spines, directed backwards; legs without spines or hairs; the calcaria, at the apex of the anterior tibiæ, pale testaceous, those on the intermediate and posterior pairs black. Abdomen smooth, opaque-black.

Examples of this species from Singapore have the abdomen rusty-red.

*Hab.* Borneo (Sarawak). Philippine Islands. Java.

14. *POLYRHACHIS HECTOR*. *P. opacus niger*; thorace spinis duabus longis acutis antice et postice armato; squama quadrata spinis duabus longis curvatis; abdomine obscure ferrugineo.

*Worker*. Length 4 lines. Opaque-black: delicately shagreened; the head narrowed posteriorly; the thorax armed with two long acute divergent spines in front, and two slightly divergent ones behind; the scale quadrate, with two long divergent spines above which curve backwards; the legs without spines or pubescence, the calcaria black. Abdomen with an obscure ferruginous tinge. Thorax not flattened above.

*Hab.* Singapore.

15. *POLYRHACHIS LÆVIGATUS*. *P. niger*, lævis, nitidus; metathorace

spinis duabus longis acutis retrorsum directis; abdominis squama spinis duabus curvatis armata; coxis femorumque basi rufis.

*Worker.* Length  $2\frac{1}{4}$  lines. Black, smooth and shining: the flagellum thickened towards the apex. Thorax: the anterior angles acute; the disk not flattened; the metathorax with two long, acute, divergent spines, directed backwards; the scale with a long curved spine on each side, directed to the curve of the abdomen; the coxæ and femora ferruginous, the anterior pair obscure. Abdomen globose, smooth and shining.

*Hab.* Malacca.

I have only seen a single specimen of this species: the clavate antennæ appear to indicate its belonging to a different genus.

16. *POLYRHACHIS CUSPIDATUS.* *P. niger*; prothorace metathoraceque medio elevatis et bispinosis; femoribus abdominisque basi ferrugineis.

*Worker.* Length  $2\frac{1}{4}$  lines. Black: head subovate, not narrowed behind; the base of the scape, the apex of the flagellum, and the tips of the mandibles, ferruginous. Thorax slightly compressed; the prothorax with an elevation in the middle which terminates above in two divergent spines; there is also a similar elevation, spined above on each side, on the metathorax; the coxæ, femora, and apical joints of the tarsi, ferruginous. Abdomen ferruginous at the base; the scale quadrate, deeply notched above.

*Hab.* Borneo (Sarawak).

17. *POLYRHACHIS FLAVICORNIS.* *P. niger*; capite thoraceque subopacis, abdomine nitido; flagello femorumque basi flavo-testaceis.

*Female.* Length 3 lines. Black: the head subopake, the flagellum and mandibles reddish-yellow; the basal joint of the flagellum, except its extreme apex, black; the scape rufo-piceous. Thorax subopake; ovate, without spines; legs rufo-piceous, the femora pale reddish-yellow; wings subhyaline, nervures pale testaceous, stigma brown. Abdomen fuscous; the scale quadrate, armed with two short, curved subacute spines.

*Worker.* Length 2 lines. Very like the female, but with the antennæ and legs of a deeper tint; the first joint of the flagellum black, except its apex; the thorax flattened at the sides, the superior surface slightly convex, divided by two transverse sutures, the margins acute. Abdomen globose, black and shining; the scale as in the female.

*Hab.* Singapore.

18. *POLYRHACHIS EQUINUS.* *P. niger nitidus*; thorace supra depplanato, metathorace et pedunculo bispinosis, pedibus pallide ferrugineis.

*Worker.* Length 3 lines. Black; head shining and delicately rugulose; the palpi pale rufo-testaceous. Thorax: flattened above, the margins acutely edged; the sides longitudinally delicately striated; the pro-

thorax, above, slightly concave, and shaped like a horse-shoe; the metathorax is also slightly concave, with the posterior angles acute and elevated; the metathorax smooth and shining behind; the legs rufo-testaceous. Abdomen: smooth, shining and subglobose; the scale elevated, with two short teeth above, the sides oblique; the scale narrowing to its base.

*Hab.* Sarawak.

19. *POLYRHACHIS DIVES*. *P. niger*, aureo-sericeo vestitus; thorace spinis acutis antice et postice armatis; squama quadrata spinis duabus longis curvatis.

*Worker*. Length  $2\frac{1}{2}$  lines. Black: clothed with pale golden pubescence; the thorax with two short curved spines in front, and two of about the same length at its posterior margin; the scale of the abdomen compressed, square in front, and having two long spines which curve backwards; the pubescence on the head and thorax with an obscure golden tinge; the legs without spines or pubescence; the calcaria pale testaceous.

*Hab.* Singapore.

20. *POLYRHACHIS VINDEX*. *P. niger*, subnitidus; thorace supra depilato, spinis duabus anterioribus; squama integra; pedibus ferrugineis; tibiis et femoribus apice tarsisque fuscis.

*Worker*. Length  $2\frac{1}{2}$  lines. Black: the head and thorax with a shining hoary pile; the head longitudinally striated; the apex of the flagellum beneath, and the palpi, pale rufo-testaceous. Thorax flattened above, delicately striated longitudinally; the divisions of the thorax distinctly marked by two transverse sutures; the lateral margins raised and acute; the anterior angles produced into acute spines; the tibiae and femora ferruginous, and more or less fuscous at their apex. The scale of the peduncle incrassate, compressed to a sharp edge above, which is rounded, and terminates in a minute tooth laterally. Abdomen smooth, shining and subglobose.

*Hab.* Borneo (Sarawak).

#### Subfam. PONERIDÆ.

##### Gen. ODONTOMACHUS, *Latr.*

1. *ODONTOMACHUS RIXOSUS*. *O. rufo-fuscus*, femoribus pallide testaceis; margine interna mandibulorum subserrata, thorace transversim striato.

*Worker*. Length  $4\frac{1}{2}$  lines. Reddish-brown: the coxæ, trochanters and femora pale testaceous, the extreme base, and apex of the latter, darker; the mandibles with two blunt teeth at their apex, the outer tooth notched on one side, forming a second tooth; the inner edge slightly serrated, having only four or five minute teeth; the prominence between the sulcations on the anterior part of the head,

obliquely striated; the striations crossing the sulcations, but terminating opposite the hinder margin of the eyes; the depression on the sides of the head striated, the striation becoming obsolete at the sides of the head. The thorax transversely striated, the metathorax most strongly so. The scale of the abdomen conical, terminating above in an acute spine; the abdomen very smooth and shining, the apex pale testaceous.

*Hab.* Singapore.

This species bears a strong resemblance to the type of the genus, *O. kœmatodes*, a South American insect; but that species has the head shorter, and the vertex delicately striated; the antennæ are shorter, the joints shorter: specimens which I consider to be identical with the present species, are in the collection at the British Museum, from Birmah and Singapore.

2. *ODONTOMACHUS RUGOSUS*. *O. rufescenti-fuscus*; capite supra longitudinaliter striato, lateribus lævibus nitidis, thorace pedunculoque rude rugosis.

*Worker.* Length 3 lines. Head of a red-brown, the mandibles and scape rather paler, the flagellum pale testaceous; the mandibles much narrowed at their base, their inner edge finely serrated, terminating in two long blunt teeth which are abruptly curved at right angles with the jaws; the head a little longer than broad, deeply emarginate behind, longitudinally striated above, the sides smooth and shining. Thorax darker than the head, and coarsely rugose; the legs ferruginous. The node of the abdomen conical and rugose; abdomen smooth and shining and of a dark rufo-piceous colour, the apex pale.

*Hab.* Singapore.

This is a very remarkable and distinct species, both in sculpture and form.

#### Gen. *PONERA*, *Latr.*

1. *PONERA VERSICOLOR*. *P. purpureo et violaceo variegata* seu obscure cerata; capite, thorace abdominisque basi profunde striatis; nodo spinis duabus parvis armato.

*Worker.* Length 4½ lines. Black, with purple, violet and green tints in different lights: the head deeply striated longitudinally, the striæ terminating at the base of the clypeus, the anterior margin of which is subangular; the mandibles obscure ferruginous, their inner edge toothed, the teeth being alternately one large and one small; the mandibles finely striated; the eyes ovate, of moderate size, placed laterally about the middle. Thorax: in front with deep circular striæ, behind which are a few longitudinal ones on the disk; the sides and posterior portion obliquely striated, the apex transversely so; the calcaria and apical joints of the tarsi ferruginous. The node of the abdomen incrassate, rounded in front and above, and truncate behind,



with two short sharp spines on the verge of the truncation, pointing backwards; the first segment with transverse curved striae.

*Hab.* Borneo (Sarawak). Philippine Islands.

Some specimens of this species are entirely of a bronze-green, and some have the legs more or less red.

2. *PONERA RUBRA.* *P. castaneo-rubra*, lævis et impunctata; abdomine elongato-ovato, nodo elevato antice rotundato, postice truncato.

*Female.* Length  $3\frac{1}{2}$  lines. Bright chestnut-red; the head smooth and impunctate; the head dusky before the ocelli; the mandibles serrated on their inner margin; the antennæ about the length of the thorax, slightly thickened towards their apex. Thorax: the disk slightly fuscous; narrowed towards the metathorax, which is obliquely truncate, the truncation smooth and shining; the anterior margin of the prothorax rounded. The peduncle of the abdomen, viewed sideways, is wedge-shaped, its front margin slightly rounded, behind truncate; the abdomen elongate-ovate, pointed, and slightly pubescent at the apex.

*Hab.* Singapore.

3. *PONERA APICALIS.* *P. nigra*; antennis mandibulis pedibus abdominisque apice ferrugineis.

*Female.* Length  $3\frac{1}{2}$  lines. Black: the antennæ, mandibles, legs and apex of the abdomen ferruginous; the head finely shagreened. Thorax oblong-ovate, finely longitudinally rugulose; the sides of the metathorax coarsely rugose, the truncation transversely striated; the scale of the abdomen incrassate, rounded above, transversely striated in front and behind; the abdomen smooth and shining, with a thin fine grey pubescence.

*Hab.* Borneo (Sarawak).

4. *PONERA IRIDESCENS.* *P. rufo-fusca*, lævis, nitida, chalybeo-iridescens; antennis pedibusque ferrugineis.

*Worker.* Length  $2\frac{1}{2}$  lines. Dark rufo-fuscous, with changeable tints of blue on the head and thorax, in different lights; the apex of the metathorax, the legs, antennæ, and apical margins of the segments of the abdomen, ferruginous; the head with an abbreviated impressed line above the insertion of the antennæ; the mandibles with their inner margin serrated and three teeth at their apex; the scale of the abdomen compressed, elevated, and rounded above. Abdomen oblong; the apical margin of the first segment slightly constricted.

*Hab.* Borneo (Sarawak).

5. *PONERA RUGOSA.* *P. ferruginea* rude rugosa; capite thoraceque profunde punctatis; abdomine rude sulcato et punctato.

*Female.* Length  $3\frac{1}{2}$  lines. Ferruginous; the head covered with coarse deep punctures, the punctures semi-confluent; the antennæ short and thick; the flagellum clavate and pubescent; the mandibles longitudinally

grooved. Thorax oblong, widest in front, the anterior margin curved, the lateral angles acute; the metathorax truncate; the prothorax with large deep confluent punctures; the mesothorax longitudinally grooved; the scutellum and metathorax ruggedly punctured. The abdomen longitudinally grooved, the grooves on the basal segment punctured; the node rugged and subglobose, beneath, furnished with a remarkable flattened semitransparent appendage.

*Hab.* Borneo (Sarawak).

6. *PONERA RUFIPES*, *Jerdon*. *P. atro-fusca*; capite thorace nodoque rugosis; abdomine longitudinaliter rude sulcato, pedibus abdominisque apice ferrugineis.

*Worker.* Length 5 lines. Obscure fuscous, scarcely black; the mandibles, the apex of the scape and of the flagellum, the legs and apex of the abdomen, obscurely ferruginous; the head, thorax, and node of the abdomen, rugose; the eyes small, placed forwards on the sides of the head; the antennæ short and thick, the flagellum clavate; two parallel longitudinal carinæ running backwards from the insertion of the antennæ to within about one-third of the posterior margin of the head. The thorax obliquely truncated behind, the truncation smooth and slightly shining; the truncation of the abdominal node smooth and shining, its margin denticulated; the abdomen coarsely grooved longitudinally.

*Hab.* Singapore. Malabar.

Specimens of this species from Borneo have the legs nearly or quite black.

7. *PONERA INTRICATA*. *P. nitida nigra*; capite, thorace abdominisque basi profunde et æqualiter striatis; nodo spinis duabus acutis armato; pedibus ferrugineis.

*Worker.* Length 5 lines. Black and shining; the mandibles, legs, and apex of the abdomen, ferruginous; the flagellum obscurely ferruginous; the head evenly and deeply grooved, longitudinally on the face, and transversely on the vertex; the antennæ as long as the insect. Thorax: the dilated portion with transverse grooves on the disk which are enclosed by curved ones; the thorax is much compressed, with a longitudinal groove above, the sides obliquely striated; the oblique truncation at the apex transversely striated. The node of the abdomen compressed, rounded above and in front, and obliquely grooved; the margin of the truncation with two acute spines above directed backwards; the basal segment of the abdomen with curved striæ, slightly impressed or obliterated at the sides; the apical margins of the segments rufo-piceous.

*Hab.* Borneo (Sarawak).

8. *PONERA GEOMETRICA*. *P. nigro-ænea*; capite, thorace abdominisque basi profunde striatis, nodo spinis duabus acutis armato.

*Worker.* Length 5 lines. Black, with more or less of a bronze tint: the head longitudinally striated; the clypeus angulated in front; the

mandibles ferruginous. Thorax: rounded anteriorly; the disk in front transversely striated, these striæ encircled by others which pass round the sides and front; the thorax beyond with a striation, which runs in an elongated oval direction, the sides obliquely striated; the legs very obscurely ferruginous. Abdomen: the node incrassate, rounded in front and above, truncated behind; the margin of the truncation deeply emarginate, the lateral angles of the emargination produced into long stout acute spines; the node with a curved striation, the curve being forwards; the first segment with a beautiful even curved striation; the apical segments smooth and shining, covered with a cinereous silky pubescence.

*Hab.* Singapore.

This species resembles the *P. versicolor*, but is much more regularly and evenly striated; the striation on *P. versicolor* is coarse and uneven, and directed differently on the thorax; the joints of the antennæ in this species are also longer and more slender. T. C. Jerdon has described a striated species of *Ponera*, but he says, "abdominal pedicle raised, pointing forwards with two small spines"—which does not agree with any of the insects here described.

9. *PONERA TRANSVERSA*. *P.* obscure rufo-fusca; thorace supra transverse rugoso; pedunculo margine supra emarginato.

*Worker.* Length 4 lines. Black: the head deeply striated, the striæ on the vertex diverging from the centre; the antennæ scarcely as long as the thorax, inserted at the side of two ridges at the base of the clypeus; the elevations, extreme base of the scape, and the mandibles, obscurely ferruginous. Thorax elongate, the sides straight, slightly narrowed from the front towards the abdomen; the margin of the thorax, in front, rounded, the lateral angles furnished with a short obtuse spine; the thorax is transversely striated its entire length; the verge of the oblique truncation at the apex with two very short obtuse spines; the legs ferruginous. Abdomen obscurely rufo-piceous, covered with a fine cinereous pile, and sprinkled with long pale hairs; the scale, when viewed sideways, is wedge-shaped, the upper edge deeply notched, and the scale transversely striated behind.

*Hab.* Singapore.

10. *PONERA VIDUA*. *P.* rufescenti-fusca; antennis elongatis; thorace ovato, postice truncato; alis hyalinis; abdominis nodo incrassato, subtus spinis duabus parvis armato.

*Male.* Length 4 lines. Red-brown: antennæ elongate, fusco-ferruginous, the base, and apex of the joints, pale testaceous; the eyes large and ovate, the ocelli large and of glassy brightness. Thorax ovate, with a thin loose downy pubescence; the metathorax truncate, the sides rugose; wings hyaline, the nervures pale yellow, with the

stigma brown; the legs pale testaceous. Abdomen smooth and shining, with thin scattered long pale pubescence, most dense towards the apex; a deep strangulation between the first and second segments; the node incrassate, coarsely rugose, rounded in front and above, truncate behind; beneath furnished with two short teeth.

*Hab.* Borneo (Sarawak).

11. *PONERA DIMINUTA*. *P. nigra*; vertexe delicatule curvato-striato; pedibus rufo-piceis; abdomine lævigato nitido squama quadrata.

*Worker*. Length 3 lines. Black: the mandibles, and the extreme base of the scape, ferruginous; the flagellum fusco-ferruginous; the head elongate, narrowed behind, delicately striated; the striæ curved transversely on the vertex. Thorax elongate, produced into a neck anteriorly; swollen in front, compressed in the middle, and again widened to the apex, which is obliquely truncated; the truncation with a few deep transverse striæ; the thorax above with short irregular scratches or abbreviated striæ; the legs elongate, rufo-piceous, the tarsi pale. Abdomen: the scale, viewed laterally, is quadrate; above slightly narrowed in front, and truncated before and behind; the first segment rounded at the base and constricted at the apex, the second segment narrowed at the base; the abdomen smooth and shining, with the apical margins of the segments, and the apex, rufo-piceous.

*Hab.* Borneo (Sarawak).

This species is nearly an exact representative in form, on a reduced scale, of the *P. tarsata*.

12. *PONERA POMPILOIDES*. *P. nigra*, *Pompilum simulans*; thorace elongato-ovato; abdomine elongato nodo conico.

*Male*. Length 3 lines. Black: antennæ elongate, and finely pubescent. Thorax in front and behind obscurely ferruginous; the wings subhyaline, the nervures pale testaceous, the stigma brown; the apex of the coxæ, and the base of the femora, rufo-piceous; the apical joints of the tarsi pale ferruginous. Abdomen elongate, with a scattered pale downy pubescence; the apical margin of the first segment slightly constricted; the node conical and rufo-piceous.

*Hab.* Borneo (Sarawak).

13. *PONERA LÆVICEPS*. *P. nigra*; capite elongato lævi nitido; thorace abdomineque lævigatis nitidis; tarsis pallidis ferrugineis.

*Worker*. Length 3 lines. Black, smooth and shining: a few striæ on the face on each side of the clypeus; the latter triangular, with a central raised longitudinal carina; a longitudinal impressed line runs from the insertion of the antennæ half-way towards the posterior margin of the vertex. Thorax: in front forming a short neck, behind which it is swollen; from thence it is much narrowed and compressed; the apex oblique and transversely rugose; the tarsi pale

rufo-testaceous; the abdomen with a deep strangulation between the first and second segment; the node elevated and rounded above.

*Hab.* Borneo (Sarawak).

Gen. *TYPHLOPONE*, *Westw.*

1. *TYPHLOPONE LÆVIGATA*. *T. castanea nitida lævigata*, capite in medio sulcato.

*Worker.* Length 4 lines. Chestnut-red: smooth and shining, longitudinally channeled, slightly interrupted, in some examples, near the margin of the vertex; the inner margin, and apex of the mandibles, black. Thorax: a slightly impressed channel in front; the peduncle narrowed and rounded in front; the abdomen and legs rather paler than the head, the margins of the segments slightly constricted.

*Worker* (minor). About half the size, pale testaceous, and more abruptly truncated on the thorax.

*Hab.* Borneo (Sarawak).

Gen. *TETRAPONERA*, *Smith.*

1. *Tetraponera atrata*, *Smith, Ann. & Mag. Nat. Hist.* 2 ser. ix. p. 45 ♀.

*Hab.* Sarawak.

Subfam. MYRMICIDÆ.

Gen. *MYRMICA*, *Latr.*

1. *MYRMICA LONGIPES*. *M. fusco-pallida, gracilescens*; capite in colum angustato; thorace compresso, metathorace bispinoso; pedibus elongatis; abdominis nodis duobus globosis.

*Worker.* Length  $2\frac{1}{4}$  lines. Dark brown: the legs testaceous, the tarsi and tips of the antennæ pale testaceous; antennæ longer than the body, very slender, the scape, and also the flagellum, slightly thickened towards their apex; head much wider than the thorax, narrowed behind the eyes, and prolonged into a short neck; the mandibles rufo-testaceous. Thorax: the prothorax elongate, narrowed anteriorly into a short neck, slightly swollen posteriorly; the division between the meso- and meta-thorax deeply impressed; the metathorax with two short acute upright spines. Abdomen ovate, pedunculate, the peduncle formed of two nodes, the first smaller and less elevated than the second, each having a short footstalk.

*Hab.* Singapore. Borneo.

Notwithstanding the remarkable form of this species, its long slender antennæ and legs, the prolongation of the prothorax into a neck, &c., all of which appear to warrant the formation of a new genus for its reception, yet, not being acquainted with either of the perfect sexes, I do not feel justified in removing it from the genus *Myrmica*.

2. *MYRMICA PELLUCIDA*. *M. fusco-testacea*; *antennis pedibusque pallide testaceis, abdomine pellucido*.

*Worker*. Length  $1\frac{1}{4}$  line. Head and thorax dark fusco-testaceous; antennæ and legs pale testaceous, nearly white; the divisions of the thorax distinctly marked, that between the meso- and meta-thorax rather deeply impressed; the abdomen of a transparent pale testaceous colour; the metathorax not spined.

*Hab.* Singapore.

Mr. Wallace, on a ticket attached to specimens of this insect, says, "House-ant: transparent abdomen: very active, but not destructive."

3. *MYRMICA VASTATOR*. *M. pallide flavo-testacea, lævis*; *abdomine nitido, apice fusciscenti*.

*Worker*. Length  $1\frac{1}{4}$  line. The head, thorax, antennæ, legs, and petiole of the abdomen, pale yellow-testaceous; the head oblong quadrate; the eyes small, placed forwards on the side of the head; antennæ clavate, the club formed of three joints; the thorax deeply strangulated between the meso- and meta-thorax; the latter without spines; the abdomen pale at its base, fuscous at its apex.

*Hab.* Singapore.

Mr. Wallace attaches a ticket to this species, "House-ant: very destructive."

4. *MYRMICA AGILIS*. *M. pallide ferruginea*; *abdomine nigro, basi pallido, lævissimo et politissimo*.

*Worker*. Length 1 line. Head, antennæ, thorax and legs pale rufo-testaceous; head and thorax very smooth and shining; the flagellum clavate, the club consisting of three joints, the basal joint of the flagellum as long as the three following. Thorax swollen anteriorly, the metathorax with two minute spines. Abdomen ovate, the first node of the peduncle elongate, the second subglobose.

*Hab.* Malacca.

#### Gen. HEPTACONDYLUS, *Smith*.

*Head* suborbiculate, wider than the thorax; *eyes* lateral and ovate; *stemmata* placed in a triangle on the vertex; *antennæ* geniculated, filiform, the scape nearly as long as the flagellum, placed forwards on the head at the base of the clypeus; the *flagellum* 6-jointed, the joints clavate, except the apical one, which is cylindrical; the *labial palpi* 3-jointed; the *maxillary palpi* 3-jointed. *Thorax* ovate, gibbous; the *scutellum* very prominent; the *metathorax* armed with two acute spines (in the females), compressed and strangulated (in the workers). The *superior wings* with one marginal and one complete submarginal cell, the submarginal cell receiving the recurrent nervure; the superior angle of the discoidal cell touching the costal nervure. *Abdomen* ovate; the *peduncle* consisting of two nodes.

This is perhaps the most remarkable genus hitherto characterized amongst the *Formicidæ*; it presents one of those anomalies which perplex the naturalist. In the aculeate division of the Hymenoptera, we have felt that there existed in every species certain undeviating and tangible characters, whereby the sex at least might always be discriminated; namely, an additional segment to the abdomen, whereby to distinguish the males, as well as an additional joint to the antennæ; the number of joints in the male being thirteen, and twelve in the female. It is true that one or two exceptions have been recorded: thus, the male of *Crabro vagus*, amongst the fossorial group, has only twelve perceptible joints to the antennæ; and amongst the *Apidæ*, the males of the genus *Celiorys* have apparently only six segments in the abdomen; in the latter case, however, a seventh segment is concealed, or retracted, within the sixth segment; and in all probability, in the fossorial insect, a joint is concealed within the apex of the scape. In the present genus we find, however, so wide a departure from the normal condition, that it stands almost alone, as an exception to the general rule. In the 'Transactions of the Entomological Society,' vol. ii. of the 2nd series, I established a genus (*Orectognathus*) on characters exhibited in a neuter Ant, the insect having only five joints in the antennæ; but as a neuter cannot be fairly considered the perfect condition of a species, I have thought it possible that the discovery of the other sexes might prove that I had been premature in establishing a genus on the imperfect condition of the species. This cannot be urged in the present instance, as both the female and worker are described, and neither of them has more than six joints in the flagellum.

1. **HEPTACONDYLUS ARACHNOIDES.** *H. capite thoraceque lævissimis nitidis rufo-testaceis ferrugineo-subnebulosis; abdomine obscure rufo-piceo nitido; pedibus elongatis gracilibus pubescentibus.*

*Female.* Length  $4\frac{1}{2}$  lines. Head and thorax rufo-piceous, with dark ferruginous stains on the vertex, scutellum, and metathorax posteriorly; also two longitudinal lines of the same colour on the disk of the mesothorax; the abdomen very dark rufo-piceous, with the three apical segments pale rufo-testaceous; the entire insect very smooth and shining. The mandibles produced, with three black teeth at the apex, and one on the inner margin towards the apex; the antennæ pubescent; the thorax with scattered pale pubescence; the wings flavo-hyaline, the nervures pale testaceous; the legs elongate, with the apex of the joints and the tarsi pale rufo-testaceous; thickly covered with erect pale pubescence. Abdomen covered with pale

pubescence, the nodes of the abdomen dark rufo-piceous, globose, and each having a distinct petiole; the petioles pale rufo-testaceous.

*Worker.* Length  $2\frac{1}{2}$  lines. Dark rufo-fuscous: the antennæ, head beneath, mandibles and lower part of the face pale rufo-testaceous; antennæ slender and elongate; head smooth and shining, not carinated. Thorax shining, the lateral margins traversed by a sharp carina; the metathorax elevated and armed with two acute spines; the legs elongate and slender, the coxæ beneath, the base and apex of the femora and tibiæ, and the tarsi, pale ferruginous. Abdomen smooth and shining, the apex pale ferruginous.

*Hab.* Borneo (Sarawak).

2. *HEPTACONDYLUS SUBCARINATUS*. *H.* capite thoraceque ferrugineis; abdomine rufo-fusco; capite thoraceque carinulis irregularibus abbreviatis; metathorace spinis duabus acutis armato.

*Worker.* Length  $2\frac{1}{2}$  lines. Head, antennæ, thorax and legs, ferruginous, sometimes pale ferruginous; abdomen fuscous, or rufo-fuscous, the petiole of the basal node pale; head shining, and having a number of irregular delicate carinæ on the front and vertex; in front of the eyes are a number of irregular striæ. Thorax: the sides compressed, widest anteriorly; the superior surface slightly convex, and having a number of longitudinal abbreviated elevated carinæ; the lateral margins traversed by a slight carina; the metathorax with two stout acute spines. Abdomen smooth and shining; the insect sprinkled with a number of pale erect hairs, most numerous on the scape and legs.

*Hab.* Borneo (Sarawak).

3. *HEPTACONDYLUS CARINATUS*. *H.* obscure fusco-ferrugineus; capite thoraceque carinis irregularibus abbreviatis; metathorace spinis duabus longis armato.

*Worker.* Length  $2\frac{1}{2}$  lines. Dark fusco-ferruginous, closely resembling *H. subcarinatus*, but with thicker antennæ, and the joints shorter, the scape distinctly shorter and not so slender at the base; the head proportionably larger and much more strongly carinated; the thorax roughly carinated, and having longer and stouter spines; in other respects agreeing with *H. subcarinatus*.

*Hab.* Borneo (Sarawak).

This may possibly be a form of *H. subcarinatus*, but the various differences pointed out appear to characterize a distinct species.

The insect which I am about to describe, although evidently belonging to the *Poneridæ*, is of such a different and remarkable form, to any insect belonging to any of the sections of the genus *Ponera*, or any of the subgenera, that I propose to constitute a new genus for its reception; the abdomen of this singular species



is formed, as it were, of three nodes, each being a little longer and wider than the preceding.

#### Gen. CERAPACHYS.

*Body* elongate; *head* narrowed before and behind the eyes; *eyes* ovate, lateral, placed about the middle of the head; *antennæ* short, incrassate; *mandibles* triangular, obsolete toothed within. *Thorax* oblong-quadrate, strangled in the middle. *Abdomen*: oblong, with a deep strangulation between the first and second segments.

1. CERAPACHYS ANTENNATUS. *C. aterrimus*, nitidus; *antennis* brevibus, crassis; *thorace* oblongo-quadrate; *abdomine* elongato, nodo quadrate; *abdominis* segmentis primo et secundo incisura separatis.

*Worker*. Length  $3\frac{1}{2}$  lines. Jet-black, smooth and shining; *antennæ* one-third longer than the head; the scape short and incrassate, clavate; the flagellum incrassate, the joints short and transverse, except the apical one, which is as long as the four preceding joints; the head depressed on each side in front of the eyes; the antennæ inserted at the anterior margin of the head, each at the side of an elevated carina; the mandibles, flagellum and apex of the scape obscurely ferruginous; the posterior margin of the vertex slightly emarginate its entire width, a few scattered minute punctures on the vertex, and a small fossulet in the middle between the eyes. *Thorax*: oblong-quadrate, with a few scattered punctures above, and a few short erect hairs; the tips of the femora and tarsi, and the apical joints of the latter, pale rufo-testaceous; the basal joint of the anterior tarsi bent; the calcaria white. *Abdomen* elongate; the peduncle quadrate, a little narrower than the first segment of the abdomen, which has the sides slightly rounded; a deep strangulation between the first and second segments; the apex obliquely truncated, the margins of the truncation finely denticulated.

*Hab.* Borneo (Sarawak).

2. CERAPACHYS OCULATUS. *C. pallide fuscus*; *oculis* magnis, atris; *antennis* pedibusque pallide testaceis; *alis* hyalinis; *petiolo* bi-articulato, binodi.

*Male*. Length  $2\frac{1}{2}$  lines. Pale-brown, with dark stains on the sides of the thorax; head oblong-quadrate, the mandibles forming a triangular projection; the eyes large and prominent, situated anteriorly on the sides of the head; the ocelli large, placed in a dark stain on the vertex; the mandibles, antennæ, and legs, pale testaceous. The thorax oblong-ovate; the wings hyaline and iridescent, the nervures pale testaceous; the basal node of the petiole narrow at the base, widened to the middle, and again narrowed to the apex, the widest part with a sharp edge, or carina; the second node ovate;

the abdomen subovate, widest towards the extremity, the apex pointed.

It is quite possible that this may prove to be the male of *C. antennatus*, but I do not feel authorized in placing them together.

### Gen. CREMATOGASTER, Lund.

1. CREMATOGASTER ANTHRACINUS. *C. aterrimus*, lævis et nitidus; tarsi rufo-piceis.

*Worker.* Length  $1\frac{1}{2}$  line. Jet-black, smooth and shining; the face with a few delicate striæ; the extreme base of the scape, and the apex of the flagellum, pale testaceous. Thorax: flattened above, opaque and finely rugose; the metathorax armed on each side with an acute spine; the tarsi pale testaceous, with the claw-joint darker. Abdomen: heart-shaped, smooth, shining and impunctate.

*Hab.* Singapore.

2. CREMATOGASTER BRUNNEUS. *C. pallide castaneo-rufus*, lævis nitidusque; thorace spinis duabus acutis armato.

*Worker.* Length 2 lines. Reddish-brown, or castaneous, varying a little in colour; head smooth and shining, wider than the thorax, about the same width as the abdomen, slightly emarginate at the vertex, and more deeply coloured. Thorax: the disk concave and finely striated longitudinally; the metathorax deeply concave and furnished on each side with a stout acute spine; the legs, with the tips of the joints and the tarsi, pale testaceous. Abdomen: heart-shaped, smooth and shining; the first node heart-shaped, flattened above; the second node globose, with two tubercles above.

*Worker minor.* About one-third smaller, and of a pale testaceous colour; the abdomen darker at the apex.

*Hab.* Borneo (Sarawak).

3. CREMATOGASTER CEPHALOTES. *C. testaceus*; capite thorace duplo latiore; spinis metathoracis brevibus et acutis.

*Worker.* Length  $1-1\frac{1}{2}$  line. Testaceous; head very large, smooth and shining; the antennæ, clypeus and mandibles, pale testaceous. Thorax: rounded anteriorly, deeply constricted in the middle; in front rugose, with a smooth shining space before the constriction; the metathorax deeply excavated, produced laterally into an acute spine on each side; the tibiae and tarsi pale testaceous. Abdomen heart-shaped; the basal node flattened anteriorly, with the sides angulated; the second node globose.

*Worker minor.* Differs in having the head proportionably smaller, and the thorax smooth and shining above.

*Hab.* Borneo (Sarawak).

4. *CREMATOGASTER OBSCURUS*. *C. testaceus*, lævis et nitidus; thorace strangulato; metathorace bispinoso.

*Worker*. Length  $1\frac{1}{4}$  line. Dull testaceous; the base of the scape and of the flagellum, the clypeus and mandibles, pale; the head smooth and shining. Thorax: rounded in front, with a central longitudinal channel; deeply strangulated in the middle; the metathorax somewhat quadrate, with the posterior lateral angles produced into short spines; the legs with the apex of the joints, and the tarsi, pale testaceous. Abdomen heart-shaped; the basal node of the peduncle flattened in front, the narrow end above.

*Hab.* Borneo (Sarawak).

5. *CREMATOGASTER INFLATUS*. *C. niger*, lævis et nitidus; parte postica thoracis pallide testacea, inflata.

*Worker*. Length  $2\frac{1}{2}$  lines. Black, smooth and shining; the antennæ dark rufo-piceous; the mandibles striated and ferruginous, their teeth black; eyes small and lateral, placed about the middle of the head. Thorax: the anterior margin rounded; the posterior portion inflated into a yellowish semi-transparent bladder-like swelling, divided in the middle by a deep longitudinal depression; the swollen part not quite so wide as the head; the apical joints of the tarsi rufo-testaceous. Abdomen heart-shaped; the peduncle, base, and the apical margin of the first segment, obscurely rufo-piceous.

*Hab.* Singapore; Borneo (Sarawak).

This is one of those singular and anomalous species, which, without any particle of information, derived from observation, puzzle and perplex the naturalist; what can possibly be the use of the bladder-like excrescence on the thorax of this insect, it is difficult to imagine; to the touch it is elastic, and apparently forms a receptacle for saccharine fluids. With the aid of a microscope, a small circular orifice can be seen at each of the posterior lateral angles of the swollen part, and small crystallized particles are apparent, not only within the orifice, but scattered over the surface of the inflation; we may, therefore, reasonably suppose that this singular apparatus is for the purpose of elaborating a suitable and necessary aliment for the larvæ of this singular insect.

6. *CREMATOGASTER DIFFORMIS*. *C. niger*; capite thorace multum latiore; thorace dilatato et postice profunde excavato; abdomine cordato.

*Worker*. Length  $2\frac{1}{4}$  lines. Black; head very large, twice as wide as the thorax; the tips of the mandibles, and apical joints of the flagellum, dark ferruginous; the head smooth and shining; the eyes small, placed laterally about the middle of the head. Thorax: the anterior margin rounded, the sides parallel behind; the metathorax greatly dilated at the sides and above, and with a deep excavation behind;

the legs stout, with their joints and the tarsi ferruginous. Abdomen heart-shaped, with the base, in some examples, slightly ferruginous.

*Worker minor.* Differs only in being one-third smaller.

*Hab.* Singapore; Borneo (Sarawak).

This species resembles the *C. inflatus* in form; but the swollen portion of the thorax is of a solid consistency; it forms, however, a similar laboratory of saccharine matter; the orifice from which it exudes is not exactly at the posterior angles, but a little way beneath; in some specimens, masses of crystallized particles can be seen beneath the orifice; of this species, both large and small workers have been examined, and the same apparatus is found on them both.

#### Gen. ATTA, Latr.

1. ATTA PENETRANS. *A. capite thoraceque nigris; abdomine obscure rufo-piceo; alis subhyalinis; capite thoraceque longitudinaliter striatis.*  
*Female.* Length 4 lines. Black and shining; head longitudinally finely striated; the mouth, clypeus and antennæ, ferruginous. Thorax: elongate-ovate, the prothorax anteriorly and the legs, ferruginous; the thorax above with oblong punctures which run into stræ; an impunctate line in the middle of the mesothorax anteriorly; the metathorax truncated, the truncation smooth and shining; wings subhyaline, with a fuscous line along the costal nervure; the apical margins of the wing with a fringe of very fine white hairs. Abdomen: elongate-ovate, dark rufo-piceous, the apical margins of the segments brighter; the nodes of the peduncle globose and punctured.

*Hab.* Borneo (Sarawak).

2. ATTA CINGULATA. *A. ferruginea; pedibus abdomineque pallide ferrugineis; capite maximo, thorace triplo latiore.*  
*Worker major.* Length  $1\frac{1}{4}$  line. Head very large, ferruginous, the antennæ paler; eyes very small, placed at the sides of the head a little before the middle. Thorax: pale ferruginous, very convex or globose anteriorly, much narrower behind, with two short acute spines on the metathorax; legs pale rufo-testaceous. Abdomen: ovate, with the base truncated, with a fuscous ring in the middle; the nodes of the peduncle globose.

*Worker minor.* About 1 line in length. The head much smaller and more elongate; in colour, resembling the larger worker, and equally smooth and shining; the abdomen with a fuscous ring in the middle.

*Hab.* Borneo (Sarawak).

#### Gen. PHYSATTA.

*Head small; eyes* of moderate size, placed a little before the middle; *ocelli* in a triangle on the vertex; *mandibles* stout and denticulate

at the apex; *antennæ* short, not so long as the head and thorax; the *scape* nearly as long as the flagellum, slightly thickened at the apex; *flagellum* subclavate, 6-jointed, the first joint shorter than the second; the third, fourth and fifth about the same length as the first, the apical joint the length of the two basal ones. *Maxillary palpi* 3-jointed, the basal and apical joints of about equal length, the intermediate joint twice the length of the apical joint, the latter obliquely truncate at the apex. *Labial palpi* 3-jointed, the two basal joints clavate, the apical one fusiform. *Thorax* subglobose; *anterior wings* with one marginal and two submarginal cells, the first submarginal cell about the length of the stigma, the second extending to the apex of the wing; with one sub-triangular discoidal cell; the *tibiæ* armed with a single spur at the apex. *Abdomen* globose, pedunculated, the peduncle formed of two nodes.

This genus in one of its most prominent characters agrees with the genus *Heptacondylus*, both having seven-jointed antennæ: their relative proportions are, however, very different, as well as that of the joints of the flagellum; the wings have also a different neururation; this latter character will, I am inclined to believe, prove eventually that by which the generic divisions of the Hymenoptera must be regulated; even at present, with our meagre and imperfect knowledge of the species, it does, if strictly adhered to, bring together assemblages of species, allied alike in habit and structure; when taken in connexion with the structure of the mandibles and legs, indicative of habit, it becomes perhaps the most safe and available character hitherto adopted for their generic subdivision; the greatest help to science I think is its simplification.

1. *PHYSATTA DROMEDARIUS*. *P. capite thoraceque ferrugineis; alis abdomineque nigris.*

*Female*. Length  $6\frac{1}{2}$  lines. The head, thorax, legs and petiole of the abdomen ferruginous; the mandibles with four or five black teeth; the head and thorax longitudinally striated and clothed, as well as the legs, with erect thin fulvous pubescence; the intermediate and posterior legs dark rufo-piceous; wings dark fuscous, slightly iridescent; the metathorax armed with two short stout spines at its base, the truncated portion transversely striated. Abdomen black, covered with a short erect fuscous pubescence; the nodes of the petiole subglobose, the first attached to the thorax by a short stout petiole.

*Hab.* Borneo (Sarawak).

## Gen. TYPHLATTA.

*Mandibles* triangular; *eyes* obsolete; *flagellum* 9-jointed; petiole of the abdomen formed of 2 nodes.

The above characters are those of the worker of the species; probably an examination of the other sexes would present other very distinctive generic characters, particularly in the neururation of the wings: the palpi I have not examined.

1. TYPHLATTA LÆVICEPS. *T. niger*, nitidus; capite, thorace antice et abdomine glaberrimis; antennis tarsisque rufo-piceis.

*Worker.* Length 2 lines. Black; the head glassy-smooth and shining; ovate, with the posterior margin of the vertex truncate; in some examples, an indistinct castaneous spot at the sides of the head, in the usual situation of the eyes; the antennæ ferruginous. Thorax elongate, compressed at the sides; very smooth and shining anteriorly, with a delicate striation in the middle, the metathorax being finely rugulose; the tarsi rufo-piceous. Abdomen: ovate, very smooth and shining; the nodes subglobose, the basal one being the smallest.

*Hab.* Borneo (Sarawak).

## Subfam. CRYPTOCERIDÆ.

## Gen. ECHINOPLA.

*Head* transverse; *eyes* small, placed laterally, high on the head; antennæ 12-jointed, inserted forwards on the head, wide apart; the *labial palpi* 4-jointed, the three basal ones of about equal length, clavate; the apical joint as long as the two preceding joints united; the *maxillary palpi* 5-jointed, elongate, the three apical joints long and slender, the two basal ones much shorter and stouter; *mandibles* short, stout, and of equal width throughout, armed with five stout teeth. *Thorax* oblong-quadrate; legs of moderate length; *tarsi* 5-jointed; each tibia armed with a single spine at the apex. *Abdomen* globose; peduncle formed of a single node; the first segment very large, concealing the other segments beneath it.

1. ECHINOPLA MELANARCTOS. *E. nigra*, hispida; oculis extantibus; abdominis squama in utroque latere spina longa acuta horizontali; abdomine globoso.

*Worker.* Length 3 lines. Black; the head, thorax and abdomen, covered with short blunt spines, or pedestals, each having a long hair at its summit; the palpi pale testaceous; the antennæ inserted under thin elevated curved plates on the anterior part of the face, the face with a rugose striation; the head smooth beneath, shining and concave; the eyes very prominent and globose. Thorax rugose; the legs slightly pubescent, the calcaria pale testaceous. (Fig. and details, Plate I.)

*Hab.* Singapore.

2. *ECHINOPLA PALLIPES*. *E. nigra*, hispida; oculis prominentibus; abdomine globoso; squama in utroque latere spina horizontali; pedibus pallide testaceis.

*Worker*. Length  $2\frac{1}{2}$  lines. Black, rugose; the abdomen vermiculate, interspersed with slight elevations placed in great regularity over the entire upper surface, each elevation terminating in a hair; the scape and the mandibles ferruginous; the eyes very prominent; the palpi and legs pale testaceous, with the tarsi rufo-piceous; the peduncle transverse, produced on each side into a short horizontal spine; the abdomen rufo-piceous.

*Hab.* Borneo (Sarawak).

It is very difficult to describe the sculpturing of this insect; on the head it is strongest; the species strongly resembles *E. melanarctos*, but the elevations are shorter, as well as the hairs at their apex.

3. *ECHINOPLA STRIATA*. *E. nigra*; capite, thorace et abdomine longitudinaliter striatis; thorace oblongo, subquadrato; pedunculo transverso.

*Worker*. Length 3 lines. Black; the head, thorax and abdomen finely striated longitudinally; the head with an obscure blue tinge; the palpi pale rufo-testaceous. Thorax: oblong, the margins denticulate, the anterior margin rounded, the lateral margins narrowed to the middle, and again widened posteriorly; above slightly arched; the division of the pro- and meso-thorax distinctly marked by a suture; that of the meso- and meta-thorax by a deep strangulation; the peduncle of the abdomen incrassate, transverse, and armed on each side by a stout spine. The entire insect thinly sprinkled with erect black hairs.

*Hab.* Malacca.

Of this species I have only seen two individuals: I place it in this genus with some hesitation; but the antennæ are similar; the thorax and scale of the abdomen of the same form; the legs also are short, as in *Echinopla*: the principal difference being, that the eyes are less prominent; it is altogether a very curious and remarkable species.

#### Gen. CATAULACUS, *Smith*.

1. *CATAULACUS INSULARIS*. *C. niger*; vertice spinis duabus postice armato; alis flavo-hyalinis; metathorace hispinoso; abdomine cordato.

*Male*. Length 3 lines. Black: head and thorax rugose; the antennæ, the eyes, the mandibles, the tibiæ and the tarsi, ferruginous; the palpi pale; the eyes very large and prominent; the clypeus produced and broadly truncate in front; the hinder margin of the vertex straight, margined, and having the posterior lateral angles produced into stout acute spines; the outer margins of the spines serrated; beneath are smaller spines at the lower lateral angles; the wings sub-

hyaline and yellowish; the nervures scarcely discernible; the hinder margin of the metathorax slightly emarginate its entire width, with an acute spine at each of the lateral angles. The nodes of the abdomen rugose; the first node oblong-quadrate; the second nearly quadrate; the abdomen reddish at the base, and, as well as the nodes, thinly sprinkled with erect whitish hairs.

*Hab.* Borneo (Sarawak).

2. *CATAULACUS HORRIDUS*. *C. niger*; capitis angulis posticis spinosis; marginibus capitis crenulatis; thorace aspere sculpto, spinis duabus acutis elongatis postice armato; abdomine ovato, basi striato.

*Worker.* Length 3 lines. Black; the antennæ short, thick and clavate; the apex rufo-testaceous; head reticulated, produced before the eyes and widely truncated, the lateral angles of the truncation rounded; the lateral margins with a short spine before the eyes; the vertex with the posterior margin emarginate its entire width, forming at the lateral angles large acute spines. Thorax: ruggedly sculptured on the disk, narrowed to the apex of the mesothorax, which is separated from the hinder portion by a deep transverse incision; produced posteriorly at the angles into long, stout, acute spines; the nodes of the abdomen rugose; abdomen rounded, emarginate and striated at the base; the entire insect sprinkled with short erect white setæ.

*Hab.* Borneo (Sarawak). Malacca.

3. *CATAULACUS RETICULATUS*. *C. niger*, delicatule reticulatus, præsertim in abdomine; marginibus capitis thoracisque lateribus crenulatis; thorace spinis duabus validis postice armato.

*Worker.* Length 1½–2 lines. Black; head and thorax reticulated; antennæ short, thick and clavate; the clypeus widely emarginate; the sides of the head produced into a sharp angle in front of the eyes; behind the eyes the margin is crenulated, the posterior lateral angles acute. Thorax: the anterior margin slightly rounded; the sides rounded and narrow to the metathorax, with a short tooth anteriorly and posteriorly; the thorax produced behind into two elongate, lateral, acute spines; the anterior tibiæ and tarsi and the apical joints of the intermediate and posterior tarsi, ferruginous. Abdomen: oval, margined, emarginate in front and very delicately reticulate.

*Var. a. minor.* The scape, apical joint of the flagellum, the margin of the head before the eyes and the legs, ferruginous.

*Hab.* Borneo (Sarawak).

This species somewhat resembles the *C. Taprobana*, but is different in sculpture and form.

#### Gen. MERANOPLUS, *Smith*.

1. *MERANOPLUS CASTANEUS*. *M. castaneo-rufus*; capite thoraceque subrugosis; metathorace bispinoso; pedunculi nodo secundo spina postice armato.



*Female.* Length  $3\frac{1}{4}$  lines. Chestnut-red; the flagellum obscurely red; the teeth of the mandibles and the eyes black; the head and thorax above longitudinally strigose, the head more finely so, both sparingly covered with scattered erect fine pale hairs; the scutellum rugose; the metathorax with a stout acute short spine on each side at its base; the central portion of the truncation shining and finely striated longitudinally; the legs with scattered pale hairs, the femora dark red towards their base. The nodes of the peduncle of the abdomen rugose; the first, viewed laterally, wedge-shaped; the second subquadrate, the posterior margin produced into an acute spine; the second node is produced into an angular tooth or process at its base, and both are sprinkled with long erect hairs. Abdomen ovate, finely punctured, and thinly sprinkled with long pale hairs, most thickly covered towards the apex.

*Hab.* Borneo (Sarawak).

2. *MERANOPLUS CORDATUS*. *M. castaneo-rufus*; thorace quadrispinoso; abdomine cordato.

*Worker.* Length 2 lines. Chestnut-red; the head and thorax palest; the head very delicately reticulated; the eyes small and black, placed at the sides of the head backwards near the vertex; the clypeus widely truncate in front. Thorax: punctured, the anterior margin somewhat transverse, slightly produced and rounded in the middle, the lateral angles acute; the sides rounded and narrowed to the base of the metathorax; the posterior margin transverse; at the angles are long acute spines, with a second shorter spine before them; the truncated vertical portion of the metathorax has on each side about the middle of the lateral margins a short acute spine. Abdomen: the first node, viewed laterally, is wedge-shaped, the second somewhat quadrate, its posterior margin above produced into an acute spine; the upper margin of the first node, truncate; the abdomen heart-shaped, acute at the apex; the entire insect sprinkled with erect pale hairs.

*Hab.* Borneo (Sarawak).

This is probably the worker of *M. castaneus*.

3. *MERANOPLUS MUCRONATUS*. *M. capite*, thorace pedibusque ferrugineis; abdomine nigro; thorace quadrato; angulis singulis spina acuta armatis.

*Worker.* Length  $2\frac{1}{4}$  lines. The head and thorax ferruginous; the abdomen black; the head coarsely rugose, narrowed before the eyes and widely emarginate in front; the eyes prominent, behind them the margins are widened slightly to half the distance between them and the posterior angles of the head, towards which the margins are narrowed; the head sprinkled with a few long erect reddish hairs. Thorax: quadrate, rugose, with the angles produced into four very long, stout, acute spines; the hinder margin with two short blunt teeth or spines in the middle, with two minute ones beyond them placed some-

what obliquely; the metathorax with two long, rather slender, very acute spines; the thorax and legs thinly sprinkled with very long ferruginous hairs; the abdomen sprinkled with long erect ferruginous hairs, the nodes rugose.

Var. *a*. The femora rufo-fuscous.

*Hab.* Malacca (Mount Ophir).

To this species Mr. Wallace attached a ticket, upon which he had written "House Ant: " but I have not obtained any further information.

## Fam. MUTILLIDÆ.

### Gen. MUTILLA, *Linn.*

1. *Mutilla blanda*, *Smith, Cat. Hym.* pt. iii. p. 32.

*Hab.* Malacca (Mount Ophir). India.

2. *Mutilla representans*, *Smith, Cat. Hym.* iii. p. 35.

*Hab.* Borneo (Sarawak). Malacca. India.

3. *MUTILLA DEIDAMIA*. *M. nigra*; scapo, mandibulis, thorace, pedibus abdominisque segmento basali rubris.

*Female.* Length 3-4 lines. Head black; the scape, palpi and mandibles, ferruginous, tips of the latter black; the flagellum ferruginous towards the apex beneath. Thorax: elongate-quadrate, slightly widened behind, above rugose, the lateral margins crenulated; sprinkled with reddish-brown pubescence; the legs ferruginous, thinly sprinkled with a mixture of reddish and of glittering white hairs. Abdomen: black, the basal segment red; three ovate spots of silvery white pubescence placed transversely towards the base of the second segment, and a broad fascia of the same at the base of the third segment; at the base, apex and beneath, a scattered glittering white pubescence.

*Hab.* Borneo (Sarawak).

4. *MUTILLA URANIA*. *M. capite thoraceque sanguineis*; abdomine nigro, basi segmenti secundi macula ovata, fasciaque segmenti tertii, flavescenti-albis.

*Female.* Length  $6\frac{1}{2}$  lines. Head and thorax blood-red and coarsely rugose; the mandibles and antennæ black; the flagellum obscurely red beneath. Thorax: the legs black and covered with glittering yellowish-white pubescence. Abdomen: longitudinally rugose, a reversed heart-shaped spot at the base of the second segment, and the third covered with yellowish-white pubescence; a triangular black spot at the base of the third segment in the middle; beneath, the segments are fringed with long pale hairs; the apical margins of the segments of the abdomen with a sooty-black pubescence.

*Male.* Length 5-5 $\frac{1}{2}$  lines. This sex has the head nearly, or quite black;

the eyes slightly reniform. Thorax red; the wings dark brown with a purple iridescence, pale towards their base. Abdomen black, smooth and shining, much narrowed at the base, and subpetiolate; the second and two following segments fringed with long white pubescence; the three apical segments fringed with black.

*Hab.* Borneo (Sarawak).

5. *MUTILLA SUSPICIOSA*. *M. nigra*, pubescens; alis fuscis; abdominis segmentis secundo tertioque rubris.

*Male.* Length 4-7 lines. Black; the eyes slightly emarginate; the head covered with a thin silvery-white pubescence, most sparing on the vertex, which is shining and coarsely punctured. Thorax covered with a silvery pubescence, densely so on the metathorax; the disk of the mesothorax shining, with elongate punctures which run into striæ; in the middle are three elongate carinæ; the tegulæ large and shining-black; the wings dark fuscous, with a purple iridescence. Abdomen finely punctured; the apical margin of the basal segment, and the second and third segments, red; sprinkled with long glittering silvery-white hairs.

*Hab.* Borneo (Sarawak).

This species very closely resembles the *M. fuscopennis*: but I think it is sufficiently distinct.

6. *MUTILLA GRACILLIMA*. *M. capite abdomineque nigris*; thorace rubro; alis obscure fuscis.

*Male.* Length 4 lines. Head and abdomen black, the thorax bright red; head shining, with longitudinal furrows, and a deep channel before the anterior stemma; the scape, and first joint of the flagellum, ferruginous; the pro- and meso-thorax rugose; the metathorax with large separated punctures; the wings fuscous, subhyaline at their base; the anterior tibiæ and femora, and the intermediate femora, ferruginous; the calcaria white. Abdomen: the two basal segments with purple and blue tints; the apical margin of the second segment, and the third segment, with a broad band of silvery-white pubescence; the following segments fringed with black pubescence.

*Hab.* Borneo (Sarawak).

7. *MUTILLA FAMILIARIS*. *M. capite abdomineque nigris*; thorace rubro; abdominis basi subito truncato; abdominis segmenti secundi basi macula, tertii fascia lata argenteo-pubescentibus.

*Female.* Length  $4\frac{3}{4}$  lines. Head and abdomen black, the former rugose; the flagellum ferruginous beneath. Thorax ferruginous and oblong-quadrate; the disk rugose; the margins crenulated. Abdomen with elongate confluent punctures; the basal segment abruptly truncated; the second segment with a small ovate spot in the middle of its base, and the third segment covered with short silvery-white pubescence;

beneath, the margins of the segments are fringed with long-white pubescence.

*Hab.* Singapore.

Although this species bears a very close resemblance to several which have been described, it is very distinct, and may be readily distinguished by the abrupt truncation of the basal abdominal segment.

8. *MUTILLA CALLIOPE*. *M. capite nigro; thorace rubro; abdomine cyaneo, fascia lata argenteo-pubescenti decorato.*

*Female.* Length 3-3½ lines. Head black, punctured, the punctures running into longitudinal striæ; the base of the scape, and the tips of the mandibles, ferruginous. Thorax bright ferruginous, elongate-quadrate and coarsely rugose; the posterior angles rounded; the anterior tibiæ and tarsi, and the base of the intermediate and posterior femora, ferruginous; the legs with a scattered silvery pubescence, that on the thorax above, ferruginous; the thorax slightly carinated at the sides. Abdomen dark blue; the apical margin of the second segment, and the base of the third, with united fasciæ of bright silvery pubescence; the sides and apex of the abdomen with scattered silvery hairs.

*Male.* Resembles the female in colour, but has the legs entirely black; with the apical margin of the second abdominal segment, pale testaceous; the wings dark brown; the eyes large and ovate.

*Hab.* Borneo (Sarawak).

9. *MUTILLA PROSERPINA*. *M. capite abdomineque nigris; thorace pedibusque rubris; abdominis segmenti secundi basi maculis duabus ovatis, tertii fasciæque argenteo-pubescentibus.*

*Female.* Length 2-3 lines. Head black; the scape, mandibles and palpi, ferruginous. Thorax ferruginous, oblong, rounded in front and behind; rather finely rugose, sprinkled with reddish-brown pubescence, the margins crenulated; the legs ferruginous, with the knees and tarsi slightly fuscous. Abdomen: the extreme base ferruginous; the second segment with two ovate spots, and the third with a fascia of silvery-white pubescence; beneath, and towards the apex above, thinly sprinkled with long glittering white hairs.

*Hab.* Borneo (Sarawak).

10. *MUTILLA PANDORA*. *M. capite abdomineque nigris; thorace rubro; abdominis segmento secundo maculis tribus ovatis, tertio fascia argenteo-pubescenti ornatis.*

*Female.* Length 5 lines. Head black; the scape, flagellum beneath, except the basal segment, the palpi, and basal half of the mandibles, ferruginous; the head coarsely and closely punctured, with scattered erect black hairs above, and with silvery white ones beneath. Thorax and legs bright ferruginous, the former oblong-quadrate, coarsely rugose, the lateral margins crenulated; sprinkled with reddish

pubescence. Abdomen black, the base ferruginous; covered with short black pubescence; three ovate spots at the base of the second segment, a narrow fascia on its apical margin, and a broad one on that of the following segment, of silvery-white pubescence; beneath, shining and punctured, the margins of the segments rufo-piceous and fringed with glittering pale hairs.

*Hab.* Borneo (Sarawak).

11. *MUTILLA SIBYLLA*. *M. capite abdomineque nigris; thorace rubro; abdominis segmenti secundi basi maculis duabus ovatis, fasciæque segmenti tertii albo-pubescentibus.*

*Female.* Length 4-6 lines. Black; the thorax red; a tubercle at the insertion of each antenna, and the middle of the mandibles, ferruginous; the vertex with scattered long erect reddish brown hairs; on the clypeus, mouth and cheeks are some long glittering silvery-white hairs; the palpi elongate. Thorax: oblong-quadrate, the anterior margin slightly rounded; the legs with scattered glittering white hairs; the legs black, with the tarsi obscurely rufo-piceous; the calcaria pale testaceous. Abdomen: two small ovate spots at the base of the second segment, and a broad fascia on the apical margin of the third, of dense, short, silvery-white pubescence; beneath, the segments shining, and the second with scattered large deep punctures; the apex of the abdomen with long white pubescence.

*Hab.* Borneo (Sarawak).

12. *MUTILLA CASSIOPE*. *M. capite abdomineque nigris; thorace pedibusque rubris; tibiis tarsisque fuscis; abdominis basi truncata.*

*Female.* Length 3 lines. Head and abdomen black, the former closely and strongly punctured; the mandibles, palpi and antennæ beneath, ferruginous; the scape rufo-piceous. Thorax ferruginous; the anterior margin transverse; slightly and evenly narrowed to the apex of the metathorax; the lateral margins crenulated; the disc coarsely rugose; the coxæ and femora ferruginous; the tibiæ and tarsi fuscous. Abdomen: the base abruptly truncate; covered with elongate punctures; the apical margin of the third segment with a fascia of snow-white pubescence; sprinkled over with long silvery-white hairs.

*Hab.* Borneo (Sarawak).

13. *MUTILLA DARDANUS*. *M. capite abdomineque nigris; thorace pedequè antico rubris; alis fuscis; abdominis segmentis primo, secundo tertioque pube alba fasciatis.*

*Male.* Length 6 lines. Head and abdomen black; the thorax red; the eyes emarginate; the antennæ incrassate at the base, tapering to the apex; a deep longitudinal furrow runs from the insertion of the antennæ to the posterior margin of the vertex, on each side of which is a similar furrow which terminates before the insertion of the antennæ; the ocelli distinct on the vertex. Thorax: the anterior legs

ferruginous; wings brown, and iridescent. Abdomen shining, punctured, and having purple and blue tints in different lights; a narrow fascia on the apical margin of the first segment and a broader one on the second and third, of snow-white short dense pubescence; the margins of the apical segments fringed with long black pubescence.

*Hab.* Borneo (Sarawak).

14. *MUTILLA UNIMACULATA*. *M. capite abdomineque nigris; thorace ferrugineo; abdominis segmenti secundi basi macula ovata, segmento tertio fascia lata alba pubescente.*

*Female.* Length 6 lines. Black; the thorax ferruginous, and coarsely rugose. Head sprinkled with dark brown hairs, eyes large and ovate; the clypeus and scape with whitish hairs. Thorax oblong-quadrate, slightly narrowed posteriorly; the disk with short reddish-brown pubescence at the sides; beneath and on the legs it is of a glittering silvery-white; the metathorax with long thin pale pubescence; an ovate spot at the base of the second segment, and the third segment clothed with dense short white pubescence, in the middle at its base, a triangular black shape; beneath, the apical margins of the second, third and fourth segments with white marginal pubescent fasciæ.

*Hab.* Borneo (Sarawak).

#### Gen. MYRMOSIDA, *Smith*.

*Head* subquadrate; *stemmata* in a triangle on the vertex; *eyes* large, round and lateral; *antennæ* subfiliform, inserted at the base of the clypeus, not closely approximating; the *clypeus* triangular; *mandibles* triangular. *Thorax*: longitudinally quadrangular, the sides slightly rounded; the posterior margin of the prothorax curving backwards to the origin of the wings; the tegulæ small; the superior wings with one marginal and two submarginal cells; the first submarginal receiving the first recurrent nervure. *Abdomen*: ovate, the two basal segments forming distinct nodes, the first subquadrate, the second node widening towards the apex and again narrowing at one fourth from the apex.

The insect from which the above characters are drawn being a male, there can be little doubt that when the other sex is discovered the generic characters will require a complete revision; in the neuration of the wings this genus very closely approaches that of *Mutilla*, the males of which have the third submarginal cell frequently obliterated, and the form of the abdomen often very eccentric; the form of the eyes also varies, from being deeply emarginate or reniform, to being round and very prominent. The situation of the present genus I think must be next to *Myrmosa*:

we should certainly expect to find the female apterous, and the genus correctly placed in the family *Mutillidæ*.

1. *MYRMOSIDA PARADOXA*. *M. nigra*; capite thoraceque rude rugosis; alis subhyalinis; abdomine basi binodoso.

*Male*. Length 4 lines. Black; head nearly as wide as the thorax, coarsely rugose, across the face between the eyes are some deep transverse grooves; the face with two longitudinal carinæ, outside of which the antennæ are inserted; the scape short and thick, the flagellum nearly of equal thickness throughout, pointed at the apex, the extreme tip pale testaceous; mandibles ferruginous at their apex; the palpi pale testaceous. Thorax: coarsely rugose; wings subhyaline, the nervures ferruginous, stigma dark brown; the anterior tarsi ferruginous, with a dense glittering pale pubescence beneath; the base of the femora, knees and apex of the tibiæ and apical joints of the tarsi, ferruginous; the calcaria pale rufo-testaceous. The abdominal nodes coarsely longitudinally rugose; the abdomen smooth and shining, the second and following segments punctured, with their apical margins impunctate.

*Hab.* Singapore.

Only one specimen of this very singular insect has been captured, and is in the collection of W. W. Saunders, Esq.

### Tribe FOSSORES, *Latr.*

#### Fam. SCOLIADÆ.

#### Gen. SCOLIA, *Fabr.*

Div. 1. *The anterior wings with two submarginal cells and one recurrent nervure.*

1. *Scolia erratica*, *Smith*, *Cat. Hym.* pt. 3. p. 88.

*Scolia verticalis*, *Burm. Abh. Nat. Ges. Halle*, p. 37.

*Hab.* Sarawak.

Div. 2. *The anterior wings with two submarginal cells and two recurrent nervures.*

2. *Scolia aureicollis*, *St. Farg. Hym.* iii. 499.

*Hab.* Singapore.

3. *Scolia grossa*, *Burm. Abh. Nat. Ges. Halle*, i. p. 23.

*Hab.* Sarawak.

This is *Tiphia grossa* of the 'Systema Piezatorum' of Fabricius.

4. *Scolia Iris*, *St. Farg. Hym.* iii. p. 547.

*Hab.* Malacca (Mount Ophir). Java. Sumatra. China (Shanghai).

Div. 3. *The anterior wings with three submarginal cells and one recurrent nervure.*

5. *Scolia patricialis*, *Burm. Abh. Nat. Ges. Halle*, i. 19.

*Hab.* Malacca. Sumatra.

6. *Scolia rubiginosa*, *Fabr. Syst. Piez.* p. 241.

*Hab.* Malacca. Java.

7. *SCOLIA CINCTA*, *Smith.* *S. nigra*; vertice flavo; alis nigris; abdomine fascia pubescente ferruginea.

Black; the head, from the insertion of the antennæ to the hinder margin of the vertex, yellow, glossy smooth. The thorax closely and strongly punctured; a smooth shining space in the middle of the disk; the scutellum also shining, with a few large scattered punctures; the wings brown-black with a splendid violet iridescence, rather paler towards their base with the nervures ferruginous; the metathorax truncated and slightly concave. Abdomen: closely but more finely punctured than the thorax, with a shining nearly impunctate space in the middle of each segment; the posterior margin of the second segment with a fringe of bright ferruginous pubescence, also a little ferruginous pubescence at the tip of the apical segment.

*Female.* *Hab.* Borneo (Sarawak). Length 13 lines.

This species is most closely allied to *S. patricialis*, but has the sculpture of the thorax very different and has no yellow markings on the scutellum, base and third segment of the abdomen, which distinguishes that species.

8. *Scolia procera*, *Fabr. Syst. Piez.* p. 241.

*Hab.* Sarawak. Java.

Nearly all the specimens of this fine species have been brought from Java. I believe it has occurred in India, but Borneo is probably the extent of its geographical range to the south.

9. *SCOLIA OPALINA*, *Smith.* *S. atra*; alis nigris; metathorace abdomineque opalino pulcherrime lavatis.

Black, with splendid prismatic colours reflected in certain lights; the head smooth and shining, and with a few scattered punctures; the scape of the antennæ smooth and shining, the flagellum opaque. Thorax: above shining, somewhat distantly but evenly punctured, a smooth space on the disk of the mesothorax; wings brown-black with a splendid violet iridescence. The abdomen smooth and shining, the sides and the two apical segments rather closely punctured, in the middle of the three basal segments only a few fine scattered punctures; beneath strongly but not very closely punctured. *Female.* Length 12 lines.

The male resembles the female, but is, if possible, more beautiful in the splendour of its metallic lustre. Length 9 lines.

*Hab.* Sarawak.



10. *SCOLIA SPECIOSA*. *S. atra*; fronte, macula post-oculari, thoracis maculis duabus frontalibus, metathorace supra, fascia annuli tertii abdominis interrupta, flavis.

Black and shining; the head impunctate; a large bell-shaped macula on the face extending from the margin of the vertex to the insertion of the antennæ, a black spot nearly in the centre of the space enclosing the ocelli; the eyes and a lunate spot behind them yellow. Thorax: a broad yellow stripe on each side in front curving over each tegula, having a straight oblique termination within; the metathorax yellow at the base as far as the margin of the truncation; the whole of the disk of the thorax impunctate, or with only a few widely scattered punctures on the sides of the mesothorax and scutellum: from the anterior angles of the latter a deeply impressed smooth line passes forward, terminating opposite to the anterior margin of the tegulæ; the post-scutellum punctured and the thorax on each side of the scutellum opaque; the wings brown-black, with a splendid violet and blue iridescence, the nervures black. Abdomen: closely punctured, the first segment with a central smooth space at its base; the second segment smooth and shining, except at the sides; the third smooth at the base with a broad transverse yellow stripe slightly interrupted in the middle; beneath, the segments smooth and shining in the middle, and with a few scattered punctures.

*Female*. Length 15 lines. *Hab.* Sarawak.

This is one of the most beautiful species of the genus, and has not hitherto been captured in any other locality than Borneo.

#### Gen. TIPHIA, *Fabr.*

1. *TIPHIA FUMIPENNIS*. *T. nitida, atra, punctata*; alis anticis fumatis purpureo-iridescentibus.

*Female*. Length 8 lines. Black, shining, pubescent, with scattered punctures; the mandibles ferruginous, fringed beneath with bright fulvous hairs; the head strongly punctured. The prothorax strongly punctured, its posterior margin impunctate, smooth and shining; the mesothorax strongly punctured; the tegulæ smooth and shining; the superior surface of the metathorax with three central longitudinal elevated lines, the spaces between them rugose; the verge of the truncation and the lateral margins bordered by an elevated line; the surface has a shining silky appearance and is very delicately transversely reticulated; the anterior wings smoky, with a bright purple iridescence; the posterior pair faintly coloured towards their apex; the legs with a glittering white pubescence. Abdomen: smooth and shining; the three apical segments punctured; the apex rufopiceous.

*Hab.* Borneo (Sarawak).

2. *TIPHIA STIGMA*. *T. nitida, atra, punctata*; alis subhyalinis, stigmatibus atro.

*Male*. Length 5 lines. Black, punctured and shining; the clypeus with shining white pubescence; its anterior margin notched; tips of the mandibles ferruginous; the flagellum fuscous beneath; the metathorax with three or four longitudinal elevated lines; wings subhyaline, faintly smoky towards their apex; the nervures pale testaceous; the stigma large and black; the tibiae and tarsi with glittering white pubescence; the calcaria pale testaceous. Abdomen: the first segment much narrower than the second, and subglobose; the following segments thinly covered with sooty-black pubescence.

*Hab.* Borneo (Sarawak).

3. *TIPHIA FLAVIPENNIS*. *T. nitida, atra, sparse griseo-pubescentibus*; alis flavescentibus.

*Female*. Length 4-5 lines. Black, with scattered punctures: the mandibles ferruginous; the palpi pale testaceous; the flagellum obscurely ferruginous beneath; the scape fringed beneath with long glittering pale hairs; the superior surface of the metathorax, with three longitudinal elevated lines, extending to the verge of the truncation; the outer margin of the tegulae piceous; wings yellowish, their apical margins slightly clouded; stigma small, and as well as the nervures, pale testaceous; the legs with a glittering white pubescence; the calcaria pale testaceous. Abdomen: smooth and shining, with scattered delicate punctures; the margins of the segments thinly fringed with long pale hairs; the apex rufo-piceous.

*Hab.* Borneo (Sarawak).

#### Gen. MYZINE, Latr.

1. *MYZINE TRICOLOR*. *M. punctata, nitida*; capite rubro; thorace nigro; abdomine metallico-cyaneo.

*Female*. Length 10 lines. Head red; the thorax black; the abdomen metallic-blue; the face closely and coarsely punctured; the vertex shining, the punctures finer and more distant; a deep punctured fovea behind the ocelli; the scape in front, and the mandibles ferruginous, the latter black at their tips. Thorax coarsely punctured; the wings brown at their apex, becoming by degrees hyaline at their base, the anterior pair with a bright violet iridescence; the nervures black; the legs strongly spinose, with scattered white pubescence. The abdomen partaking of purple and violet tints in different lights.

*Hab.* Borneo (Sarawak).

#### Fam. POMPILIDÆ.

##### Gen. POMPILUS, Fabr.

This extensive genus of insects, some species of which inhabit

every known country of the world, contains individuals exhibiting great variety, not only in their colouring, but also in their structure and form; one group, which contains the most highly coloured and elegantly formed species, have their tibiæ and tarsi destitute, or nearly so, of spines; another, on the contrary, have their tibiæ more or less spined, the anterior tarsi spined, and frequently pectinated; a third group have the intermediate and posterior tibiæ furnished with a double row of teeth, or serrations, the tarsi being strongly spined. All the above striking differences are, however, linked together by imperceptible modifications; these will always be found, when an extensive collection of these insects, from various countries, are brought together and carefully examined. The differences alluded to are undoubtedly of high value, when investigating the œconomy and habit of the species; thus we find, that the *P. punctum* of Europe, which belongs to the subgenus *Agénia*, in which the species are destitute of spines on the tibiæ, is not a burrowing insect, but constructs tubular cells of mud; *P. rufipes*, on the contrary, is eminently fossorial and has serrated posterior tibiæ, and has also the anterior tarsi furnished with long cilia. In the present paper, I adopt as subgenera, the names given to the groups by Schiödte, in Krøyer's Tidsskrift.

1. **POMPILUS LEUCOPHÆUS.** *P. schistaceo-pubescens*; facie albo-maculata; prothoracis margine postica alba; alis fuscis basi hyalinis.

*Male.* Length  $5\frac{1}{2}$  lines. Black, covered with slate-coloured pubescence or pile; a spot on each side of the clypeus, the inner orbits of the eyes, not reaching their vertex, a narrower line behind them and the palpi, yellowish-white; the antennæ stout and tapering to their apex; the hinder margin of the prothorax white and subangulated; wings brown, becoming gradually hyaline to their base; the tibiæ and tarsi strongly spinose; a white spot on the posterior tibiæ near their base; the calcaria nearly as long as the basal joint of the tarsi. Abdomen densely pilose; the apical margins of the three basal segments naked and shining; the four apical segments beneath, naked and shining.

*Hab.* Malacca.

2. **POMPILUS VAGABUNDUS.** *P. ater*, guttis maculisque flavis variegatus; alis hyalinis apice fuscis; tibiis posticis ferrugineis.

*Female.* Length  $5\frac{1}{2}$  lines. Black; a line on the inner orbits of the eyes; the anterior margin of the clypeus with a narrow line which unites with a quadrate spot on each side of the clypeus, and a narrow line behind the eyes, yellow; the face with a thin silvery pile, and the cheeks with a few white hairs. Thorax covered with a fine silky white

pile, which is more dense on the coxæ and femora beneath; the posterior margin of the prothorax, and a minute spot on the outer margin of the tegulæ, yellow; the wings hyaline, with a dark fuscous cloud at the apex of the anterior pair: the second submarginal cell twice the width of the third, which is subangular; the nervures fuscous; the calcaria and posterior tibiæ ferruginous, the latter black at their extreme base and apex; the tibiæ and tarsi spinose; the anterior tarsi ciliated. Abdomen covered thinly with a fine changeable pile; a transverse yellow fascia near the base of the second and third segments, the first slightly interrupted in the middle, both widest at the sides; a narrow transverse yellow fascia in the middle of the fifth segment, slightly produced upwards in the middle.

*Hab.* Borneo (Sarawak).

This species has a strong resemblance to the *P. variegatus* of Europe, but from which it is abundantly distinct.

3. *POMPILUS PULVEROSUS*. *P. ater*, pubesque cinerea tectus; alis hyalinis apice nigro-fuscis.

*Male.* Length 4 lines. Black; entirely covered with a fine glittering white silky pile; the face silvery; head and thorax smooth, shining and impunctate; the hinder margin of the prothorax subangular; the wings hyaline and iridescent, with a slight fuscous cloud beyond the first submarginal cell; the nervures dark fuscous; the legs spinose, with their calcaria nearly as long as the basal joint of the tarsi. Abdomen with a faint tinge of blue in certain lights.

*Hab.* Borneo (Sarawak).

#### Subgen. *PRIOCNEMIS*, *Schiödte*.

4. *PRIOCNEMIS SERICOSOMA*.

*Pompilus sericosoma*, *Smith, Cat. Hym.* p. 146. no. 137.

*Hab.* Sumatra. Borneo (Sarawak).

5. *PRIOCNEMIS OPTIMUS*. *P. atra*, capite, thorace, dorso metathoracisque lateribus et maculis basi, coxis intermediis, aureo-pubescentibus; alis nigro-fuscis; femoribus posticis ferrugineis, basi apiceque nigris.

*Female.* Length 8 lines. Black; the head and scape above covered with golden pubescence; the clypeus convex, somewhat produced in the middle of its anterior margin, which is slightly emarginate and recurved; the apex of the mandibles ferruginous. Thorax: the prothorax, mesothorax, scutellum, and sides of the metathorax posteriorly, covered with golden pubescence; a golden spot at the sides of the pectus, close to the base of the intermediate coxæ; the wings dark fuscous with a beautiful violet iridescence; the posterior margin of the inferior pair subhyaline; legs elongate, the middle of the posterior femora ferruginous; the intermediate and posterior tibiæ with a

double row of serrations. Abdomen subpetiolate and covered with a fine silky pile.

*Hab.* Singapore.

6. *PRIOCNEMIS VERTICALIS*. *P. ater*; vertice antennarumque articulis basalibus flavis; thorace flavo-guttato; alis, tibiis tarsisque flavis.

*Female*. Length 9–12 lines. Black; the vertex and face above the antennæ and also the scape, yellow; the first and second joints of the flagellum more or less yellow. Thorax: a line on the posterior margin of the prothorax, a quadrate spot on the disk of the mesothorax touching the scutellum, the latter as well as an ovate spot on the post-scutellum, the outer margins of the tegulæ, the tips of the femora, the tibiæ and tarsi, yellow: the claw-joint of the latter black; the wings yellow with their nervures ferruginous; the wings palest towards their apical margins, their extreme edge indistinctly fuscous; the metathorax transversely striated; the posterior tibiæ with two rows of serrations, the intermediate pairs spinose. Abdomen smooth and shining.

*Hab.* Malacca (Mount Ophir); Borneo (Sarawak).

This species bears a close resemblance to *P. unifasciata*, Smith, 'Cat. Hym.' iii. p. 145, but independent of a difference in the neururation of the anterior wings, the armature of the legs is totally different: in *P. unifasciata* the posterior tibiæ are armed with long scattered spines, not serrated, as in the present species.

#### Subgen. *AGENIA*, *Schödte*.

##### 7. *AGENIA BLANDA*.

*Pompilus blandus*, *Guér. Voy. Coq. Zool.* ii. pt. 2. p. 260.

*Hab.* Borneo (Sarawak); Singapore; Malacca (Mount Ophir).

8. *AGENIA ATALANTA*. *A. atra*; capite thoraceque flavo notatis; alis flavis fusco terminatis; tibiis tarsisque flavis.

*Male*. Length 7–7½ lines. Black; covered with fine silky pile. The clypeus, sides of the face, scape in front, a line behind the eyes, the mandibles and palpi, yellow. The posterior margin of the prothorax, the outer margins of the tegulæ, a quadrate spot on the disk of the mesothorax touching the scutellum, and an ovate spot on the scutellum and post-scutellum yellow; the scutellum prominent; the tibiæ, tips of the femora and the tarsi yellow; the apex of the posterior tibiæ and the claws of the tarsi dusky; the metathorax transversely rugose-striate; the wings yellow, the nervures ferruginous; the tips of the anterior and posterior wings dark brown, with a purple iridescence. Abdomen, with a slight metallic lustre.

*Hab.* Borneo (Sarawak); Singapore.

9. *AGENIA ÆGINA*. *A. capite abdomineque nigris; thorace sanguineo; alis anticis fascia transversa fusca.*

*Female.* Length 5 lines. Head and abdomen black, the thorax red. The antennæ beneath and the mandibles ferruginous; the palpi elongate, pale testaceous. Thorax: the wings hyaline and iridescent, with a transverse broad dark fascia before the apex of the anterior wings; the nervures pale ferruginous, with a fuscous stain traversing the apical portion of the externo-medial nervure and the basal portion of the transverso-medial nervure; the anterior legs pale ferruginous; the tarsi, the tibiæ and apex of the femora above, fuscous; the intermediate legs fusco-ferruginous, with a yellow spot on the femora beneath towards their base; the posterior legs fusco-ferruginous; the femora yellow, with their apex fuscous. Abdomen smooth and shining, covered with a fine silky pile.

*Hab.* Borneo (Sarawak).

10. *AGENIA DAPHNE.* *A. atra*; capite thoraceque maculis auratis ornatis; alis subhyalinis, ad apicem subnubeculosis.

*Female.* Length 8 lines. Black; the face, vertex and clypeus covered with golden pile; the palpi pale testaceous. The prothorax, the apical margin of the disk of the mesothorax, the scutellum, an oblique stripe beneath the wings extending to the intermediate coxæ, the sides of the metathorax and the coxæ, covered with golden pile; the legs with a fine silky pile; the wings subhyaline, with a slight fuscous cloud before the apex of the anterior pair. Abdomen smooth and shining, covered with a fine changeable glittering silky pile.

*Hab.* Borneo (Sarawak).

11. *AGENIA LAVERNA.* *A. obscure cyanea, fascia albida; alis hyalinis; abdomine petiolato, annulo apicali albido.*

*Male.* Length 4 lines. Obscure blue, covered with a fine gray silky pile. The face, clypeus, labrum, palpi and scape in front, white; the labrum exserted; the antennæ as long as the body, testaceous beneath. The anterior femora in front, a narrow line in front of the intermediate pair, not extending to their apex, and a minute spot in front on the tegulæ, white; the wings hyaline and beautifully iridescent, the nervures black; the metathorax with a fine transverse granulation. Abdomen petiolated; the apical segment white.

*Hab.* Borneo (Sarawak).

This species in many respects approaches closely to the species of the genus *Ceropales*: its exserted labrum, white face, and indistinctly observable joints of the antennæ, are all characteristics of that genus, but the cubital nervure does not run to the apical margin of the wing.

12. *AGENIA MELAMPUS.* *A. atra; faciei lateribus, margine clypei antica mandibulisque flavis; alis fuscis basi hyalinis; annulis tribus basalibus abdominis ferrugineis.*

*Male.* Length  $5\frac{1}{2}$  lines. Black; the sides of the face, the anterior margin of the clypeus, the mandibles and scape in front, yellow, tips

of the mandibles ferruginous; the palpi black. Thorax: the anterior coxæ in front and a minute spot in front of the intermediate pair, yellow; the apex of the femora beneath and the anterior tibiæ in front, ferruginous; the posterior femora slightly ferruginous above; the wings brown with their base hyaline, the posterior pair palest. Abdomen petiolated, with the three basal segments ferruginous; the apical margin of the third segment dusky, covered with a fine white silky pile.

*Hab.* Borneo (Sarawak).

13. *AGENIA FLAVOPICTA*. *A. atra* flavo variegata; pedibus flavis; alis hyalinis iridescentibus.

*Female*. Length  $3\frac{1}{2}$  lines. Head black; a broad stripe at the inner orbits of the eyes, the clypeus, labrum, mandibles, palpi and scape in front, yellow; the flagellum reddish-yellow, fuscous above beyond the first joint. Thorax: the prothorax, tegulæ, scutellum, post-scutellum, the apex of the metathorax and the legs, yellow; the apical joints of the tarsi fuscous; the metathorax with a changeable golden pile; the wings hyaline and beautifully iridescent, the nervures testaceous. Abdomen: the second, third and fourth segments black with a changeable pile, the apical margins testaceous yellow; the basal and fifth and sixth segments, yellow; the apical segments incurved; the sting elongate.

*Hab.* Singapore.

14. *AGENIA HIPPOLYTE*. *A. atra*, facie metathoracisque lateribus aureo-pubescentibus; alis flavo-hyalinis; femoribus posticis ferrugineis, basi apiceque nigris.

*Female*. Length  $6\frac{1}{2}$  lines. Black, with a fine changeable pile; the face, clypeus and cheeks covered with a dense pale golden pile. The sides of the metathorax and the posterior coxæ above with a dense pale golden pile; the wings flavo-hyaline, the nervures testaceous; the posterior femora ferruginous, their base and apex black. Abdomen: distinctly petiolated, the apical margins of the segments narrowly rufo-testaceous; the sixth segment with a central longitudinal smooth shining space.

15. *AGENIA CELÆNO*. *A. atra*, cinereo-pubescentibus; facie abdomineque argenteo-iridescentibus; alis hyalinis apice fuscis.

*Female*. Length  $3\frac{1}{2}$  lines. Black; covered with a changeable cinereous pile, that on the face, coxæ and abdomen having in certain lights a silvery brilliancy; the tips of the mandibles and the palpi pale testaceous; the posterior margin of the prothorax curved; the wings hyaline, with a faint fuscous fascia crossing the superior pair at the second submarginal cell, the apex of the wings narrowly and slightly fuscous; the apical segment of the abdomen nigro-piceous with the extreme apex pale, very glossy, smooth and shining.

*Hab.* Singapore.

Gen. *MACROMERIS*, *St. Farg.*

*Macromeris*, *St. Farg. Hym.* iii. 4631.

1. *MACROMERIS SPLENDIDA*.

*Macromeris splendida*, *St. Farg. Hym.* iii. 464. 2.

*Hab.* Borneo (Sarawak). India. Java. China. Malacca.

2. *MACROMERIS ARGENTIFRONS*. *M. ater*, pube argentata tecta; facie dense pubescente; alis subhyalinis; metathorace quadrato.

*Female.* Length 8 lines. Black; covered with a fine silvery silky pile, very dense and brilliant on the face, base and apex of the metathorax, sides of the prothorax and coxæ; the wings subhyaline, the nervures dark ferruginous; the joints of the anterior tarsi remarkably attenuated at the base; the claws of the tarsi small and unidentate; the tibiæ slightly spinose; the thorax subelongate, the sides parallel; the metathorax transversely rugose. Abdomen distinctly petiolated, very smooth and shining, abruptly incurved; the aculeus elongate.

*Male.* About the same size as the female, similarly clothed with silvery pile; the coxæ greatly swollen; the femora much stouter than in the female, and ferruginous beneath; the anterior tibiæ ferruginous within; the posterior tibiæ bent inwardly at their base; the thorax gradually widening to the apex of the metathorax, which is finely roughened transversely and margined at the truncation. Abdomen small, distinctly petiolated, and very smooth and shining.

*Hab.* Borneo (Sarawak). Malacca. Singapore. Java.

Gen. *MYGNIMIA*, *Smith.*

This genus of *Pompilidæ* contains all those species which have the first recurrent nervure uniting with the second transversocubital nervure, the posterior tibiæ strongly serrated, with a double row of short spines. These insects are in fact the representatives of the *Pepsis* of South America, and embrace some of the largest and most beautiful species of *Pompilidæ*; all, with one solitary exception, (a species from Mexico), are inhabitants of the Old World; *Pepsis*, on the contrary, is almost exclusively found in the New World: I am only acquainted with four exceptions, three being African, and one from Singapore.

1. *MYGNIMIA FLAVA*.

*Pompilus flavus*, *Fabr. Syst. Piez.* p. 197.

*Hemipepsis flavus*, *Dahlb. Hym. Europ.* p. 123.

*Hab.* Borneo (Sarawak). Malacca (Mount Ophir). Singapore. India.

2. *MYGNIMIA ANTHRACINA*.

*Mygnimia anthracina*, *Smith, Cat. Hym.* pt. iii. 183.

*Hab.* Borneo (Sarawak). Malacca and Singapore.



3. *MYGNIMIA DUCALIS*. *M. atra*; alis nigris, anticis fascia argentata ornatis.

Black; the abdomen blue-black with a fine silky pile; the third and following joints of the flagellum fuscous, the tips of the joints ferruginous; the clypeus, the scutellum and post-scutellum, obscurely fusco-ferruginous; the metathorax transversely striated, and truncate at the apex; the margin of the truncation raised; the wings brown-black with bright violet and purple shades; a broad silvery band crosses the anterior wings beyond their middle, the band consisting of fine silvery pile. *Female*. Length 1 inch  $\frac{3}{4}$ .

*Hab.* Malacca (Mount Ophir).

4. *MYGNIMIA PRINCEPS*. *M. atra*; antennis flavis, alis nigris, anticis fascia subhyalina ornatis.

*Female*. Length 1 inch 10 lines. Black; with obscure shades of blue, the abdomen blue-black, covered with a fine pile which partakes of purple or blue shades in different lights. The scape of the antennæ ferruginous in front, the flagellum yellow; a ferruginous line bordering the anterior margin of the clypeus. Thorax: the hinder margin of the scutellum obscurely ferruginous; the metathorax coarsely transversely striated; the posterior tibiæ and basal joint of the tarsi with a fine changeable ferruginous pile within; the wings brown-black, with a broad sub-hyaline transverse fascia beyond the middle, the fascia tinged with yellow.

*Hab.* Borneo (Sarawak).

5. *MYGNIMIA IRIDIPENNIS*.

*Female*. Length 1 inch. Black; the clypeus densely covered with a short dense black pubescence, slightly emarginate in front; the mandibles obscurely ferruginous in the middle. Thorax: the wings with a splendid lustre of coppery and violet tints, beneath, equally vivid in colour; the metathorax coarsely striated transversely; the pro- and meso-thorax with a short black velvety pubescence. Abdomen sub-opake, with shades of blue in certain lights.

*Hab.* Malacca. Sarawak.

Fam. SPHEGIDÆ.

Gen. AMPULEX, *Jurine*.

1. *AMPULEX HOSPES*, *Smith, Cat. Hym.* pt. iv. p. 272.

The particulars in which this remarkable species differs from those with which I have associated it, would perhaps warrant the establishment of a new genus, but only a few specimens have yet been obtained; and although in all, the first transverse cubital nervure is obsolete, still it is a circumstance of frequent occurrence in the genus, particularly in the typical species *A. compressa*. The antennæ are much stouter and shorter, and the posterior angles of the thorax without spines, in all which particulars it differs from the rest of the genus.

2. *AMPULEX COMPRESSA*.

*Chlorion compressum*, *Fabr. Syst. Piez.* p. 219.

*Hab.* Malacca (Mount Ophir). Borneo (Sarawak).

3. *AMPULEX SMARAGDINA*. *A. læte viridis*; pedibus abdomineque purpureis; prothorace tuberculato; alis anticis obscure unifasciatis.

*Female.* Length 8 lines. Brilliant green with shades of violet and coppery effulgence; the vertex angulated, the sides oblique from the margin of the eyes; the antennæ shorter and much thicker than in *A. insularis*. The prothorax subtuberculate in front; the mesothorax, scutellum and post-scutellum, smooth and shining, the former with a longitudinal coppery vitta in middle; the wings subhyaline; the anterior pair with a slight fuscous cloud crossing them from the marginal cell; the legs bright purple; the anterior pair with their coxæ beneath, their femora and tibiæ in front ferruginous. Abdomen brilliant purple, smooth, shining and impunctate.

*Hab.* Singapore.

4. *AMPULEX INSULARIS*. *A. fulgide viridis*, abdomine purpureo lavato; prothorace elongato, lævigato, nitido, sine tuberculis; alis anticis fasciatis.

*Female.* Length 8 lines. Brilliant green; the head smooth and shining; the vertex subquadrate with the posterior angles rounded; the clypeus covered with silvery pubescence; the mandibles ferruginous; the antennæ black. The prothorax smooth and shining, not tuberculate; the mesothorax, scutellum and post-scutellum, smooth and shining; the metathorax transversely striated, and having a central and three lateral carinæ, the third recurved inwards at the apex; the sides margined, the apical angles produced into short acute teeth; the wings subhyaline with a fuscous cloud crossing the anterior pair at, and being the width of, the marginal cell; the tibiæ and tarsi obscurely æneous. Abdomen: very smooth and shining, with purple and violet tints; the apex compressed at the sides; the first segment much narrower than the second.

*Hab.* Borneo (Sarawak).

Gen. *TRIROGMA*, *Westw.*1. *TRIROGMA CÆRULEA*.

*Trirogma cærulea*, *Westw. Trans. Ent. Soc. Lond.* iii. 225 ♂. *Arcana*, *Ent.* ii. p. 66 ♀.

*Hab.* Singapore. Northern India and Madras.

2. *TRIROGMA PRISMATICA*. *T. fulgide cæruleo-viridis*; abdomine purpureo et violaceo lavato.

*Male.* Length 6 lines. Brilliant green, the abdomen vivid purple or violet in different lights, highly prismatic; the palpi and mandibles white, the latter ferruginous at their apex; the scape of the antennæ green with purple reflexions, the flagellum fuscous; the face below

the antennæ, the scape, cheeks and mandibles, thinly covered with long white pubescence; the head coarsely punctured; a deep transverse impressed line behind the ocelli, the vertex impunctate. Thorax the prothorax forming a neck, with two elevated tubercles behind the mesothorax with three or four transverse elevated carinæ at the base, the spaces between rugose; the disk behind, smooth and shining; the scutellum with an elevated shining tubercle in the middle; the metathorax smooth and shining, with an elevated carina traversing its margins; the lateral margins produced at the sides into a blunt angle or tooth; the disk with two longitudinal carinæ which curve towards the sides, then inwardly towards the apical margin, not quite meeting in the centre; between the curved carinæ are two central and two lateral ones, none extending to the outward ones; wings subhyaline and splendidly iridescent; the thorax at the sides and beneath, and also the abdomen, thinly clothed with white pubescence; the third segment above, with scattered short white hairs. Abdomen very delicately and distantly punctured.

*Hab.* Borneo (Sarawak).

This beautiful species is very distinct from the *Trirogma cærulea*, the only species previously known; the antennæ are much longer and perfectly filiform, the apex of the joints not thickened as in that species.

### Gen. SPHEX, *Fabr.*

#### 1. SPHEX SERICEA.

*Sphex sericea*, *Fabr. Syst. Piez.* p. 211, 19.

*Hab.* Borneo (Sarawak). Malacca.

This species is very widely distributed: we have seen examples from the islands of the Pacific, the Philippine Islands and Java; some specimens have the scutellum and post-scutellum black; in all probability the *S. ferruginea* of St. Fargeau is a variety of this insect.

#### 2. SPHEX NIGRIPES.

*Sphex nigripes*, *Smith, Cat. Hym.* pt. 4. p. 254 ♀.

*Hab.* Singapore. Sumatra.

#### 3. SPHEX DIABOLICUS. *S. ater*; metathorace densissime nigro-pubescent; alis flavo-hyalinis basi fuscis, apice subnebeculosis.

*Female.* Length 14 lines. Black; the head and thorax opaque; the mandibles very stout, forcipate, acute at their apex and having a stout tooth in the middle of their inner edge; their outer margins fringed with long hairs; the face thinly covered with black pubescence. Thorax: the metathorax covered with a dense black pubescence: a similar-coloured pubescence, but more sparing, clothes the thorax on the sides and beneath; wings flavo-hyaline, blackish at their base;

the apical margins of the anterior pair with a pale fuscous border ; the nervures ferruginous. Abdomen : sub-opake, smooth and slightly shining.

*Hab.* Borneo (Sarawak).

Gen. PELOPÆUS, *Latr.*

1. PELOPÆUS JAVANUS.

*Pelopæus Javanus*, *St. Farg. Hym.* iii. p. 309.

*Hab.* Borneo (Sarawak). Malacca. Java.

2. PELOPÆUS FERVENS. *P. ater*; clypeo scapoque antice, pedibus abdomineque ferrugineis ; alis subhyalinis.

*Female.* Length 8 lines. Black ; the scape in front, the clypeus and tips of the mandibles ferruginous. Thorax : the posterior margin of the prothorax, the tegulæ, a transverse line at the base of the scutellum, the tips of the anterior and intermediate femora, the posterior pair, except their base, the tibiæ and tarsi, ferruginous ; the apical joints of the tarsi fuscous ; the wings subhyaline, with a black spot at the apex of the superior pair ; the nervures ferruginous ; the mesothorax finely striated transversely, the metathorax much more strongly so ; the head and thorax thinly covered with long thin pale pubescence. Abdomen : ferruginous, with the base of the petiole black ; the three apical segments fusco-ferruginous.

*Hab.* Borneo (Sarawak).

Fam. LARRIDÆ, *Leach.*

Gen. TACHYTES, *Panzer.*

1. TACHYTES NITIDULUS.

*Crabro nitidulus*, *Fabr. Piez. Syst.* 309. 7.

*Hab.* India. Borneo.

2. TACHYTES ARGENTATUS.

*Tachytes argentata*, *Brullé, Exped. Sc. de Morée*, iii. p. 372.

*Hab.* Singapore. The Morea. Albania.

3. TACHYTES AURIFEX. *T. ater*; facie aurate pubescente ; pedibus ferrugineis ; alis flavo-hyalinis ; abdomine aurato-fasciato.

*Female.* Length  $10\frac{1}{2}$  lines. Black ; the face densely clothed with golden pubescence ; the cheeks and vertex behind, with a changeable golden pile ; the scape and mandibles at their base, ferruginous, the former black at their base above ; the palpi pale ferruginous. Thorax : with a changeable golden pubescence, very dense and shining on the posterior margin of the prothorax, the margins of the mesothorax and on the post-scutellum ; the tegulæ and legs ferruginous ; the coxæ and femora fuscous ; the wings flavo-hyaline, palest towards the apical margins, which have a pale fuscous narrow border. Abdomen :

fusco-ferruginous at the apex ; covered with a thin changeable golden pile ; each segment with a bright golden fascia on its apical margin ; beneath smooth and shining, with the apical margins of the segments rufo-piceous.

*Hab.* Borneo (Sarawak).

Gen. LARRADA, *Smith*.

1. LARRADA EXILIPES.

*Larrada exilipes*, *Smith, Cat. Hym.* pt. 4. p. 278.

*Hab.* Borneo (Sarawak).

2. LARRADA CARBONARIA. *L. nigerrima*; capite abdomineque nitidis; thorace opaco; alis rufescenti-fuscis, purpureo læte micantibus.

*Female.* Length 10 lines. Jet-black, shining ; the clypeus delicately punctured ; the flagellum fuscous ; the cheeks with a fine cinereous pile. Thorax : the pro- and meso-thorax, the scutellum and post-scutellum closely punctured ; the metathorax elongate, its superior surface finely shagreened ; the truncation finely strigose ; the tegulæ testaceous ; the wings brown, with a brilliant violet iridescence ; the legs strongly spinose. Abdomen : as long as the head and thorax, being smooth, shining and very delicately and sparingly punctured.

*Hab.* Singapore.

3. LARRADA SYCORAX. *L. nigerrima*, lævigata, nitida, punctata ; alis fuscis violaceo-iridescentibus.

*Female.* Length  $7\frac{1}{2}$  lines. Jet-black ; shining and finely punctured ; the face and cheeks covered with silvery pubescence interspersed with long pale hairs ; the metathorax oblong, truncated at the apex ; the superior surface with a central impressed longitudinal line, on each side of which it is delicately striated obliquely. The thorax : beneath, the sides and also the legs, covered with a cinereous pile, and sprinkled with long white hairs ; the wings brown, with a violet iridescence ; their base, as well as the posterior pair, palest. Abdomen : smooth, shining and very delicately and distantly punctured ; the margins of the segments slightly depressed and glittering in certain lights with silvery pile.

*Hab.* Borneo (Sarawak).

4. LARRADA POLITA. *L. nigra*; capite abdomineque nitidis; thorace opaco; femoribus tibiisque intermediis posticis ferrugineis; alis fusco-hyalinis.

*Female.* Length 6 lines. Black ; the head shining, the clypeus closely and finely punctured and covered with silvery pile ; the mandibles ferruginous. The pro- and meso-thorax closely punctured, thinly covered with a short glittering pubescence ; the metathorax transversely rugose ; the thorax on the sides and beneath covered with a fine changeable silvery pile ; the intermediate and posterior femora and tibiæ, bright ferruginous ; the wings fusco-hyaline and iridescent.

Abdomen : elongate, smooth, shining, and covered with a thin changeable glittering silvery pile; the apex acute and having a produced ferruginous style.

*Hab.* Borneo (Sarawak).

5. *LARRADA TISIPHONE*. *L. nigerrima*; capite thoraceque subopacis; metathorace reticulato; alis fusco-hyalinis.

*Female*. Length 4 lines. Black; the head very delicately and closely punctured, sub-opaque; the face and clypeus covered with silvery pubescence, the mandibles ferruginous at their apex; the cheeks with a bright silvery pile. Thorax: the pro- and mesothorax closely and finely punctured, the scutellum more delicately and sparingly so, the former sub-opaque, the latter shining; the metathorax coarsely reticulated; the tegulæ piceous; the wings fusco-hyaline and iridescent, the nervures black; the thorax beneath, and the legs, covered with a fine silky pile. Abdomen: smooth and shining, the apical margins of the segments with fasciæ of silvery pile, only observable in certain lights.

*Hab.* Borneo (Sarawak).

6. *LARRADA ALECTO*. *L. nigerrima*; capite thoraceque subopacis; metathorace reticulato; alis fusco-hyalinis.

*Female*. Length  $5\frac{1}{2}$  lines. Jet-black; the head shining; the cheeks with a silvery down; the clypeus impunctate; the mandibles ferruginous; the palpi rufo-testaceous. The mesothorax shining, closely and finely punctured; the scutellum shining; the metathorax rugose, more finely so towards the verge of the truncation, the latter transversely rugose; the tegulæ rufo-testaceous; wings fusco-hyaline, splendidly iridescent, with the nervures black; the legs strongly spinose, the knees somewhat ferruginous. Abdomen: smooth, shining and impunctate.

*Hab.* Singapore.

#### Gen. *LARRA*, *Fabr.*

1. *LARRA PRISMATICA*. *L. nigra*, pulchre prismatica, maculis fasciisque variis flavis ornata.

*Female*. Length 4-5 lines. Black, with prismatic tints of violet and blue, particularly on the abdomen. The palpi, labrum, clypeus and a triangular space above it, an abbreviated line at the inner orbits of the eyes, the scape in front and the flagellum beneath, yellow; the clypeus emarginate in its entire width and a black transverse spot in the middle, a similar spot at the base of the labrum, which is rounded in front. The posterior margin of the prothorax, the tubercles, the outer margins of the tegulæ, an oblique spot on each side of the scutellum, a transverse line on the post-scutellum and an elongate spot on the lateral margins of the metathorax, yellow, the margins compressed; the anterior legs with the femora beneath and a spot at their apex above, and the tibiæ and tarsi in front, yellow, the claw-joint entirely so;

the intermediate legs with a line on the femora behind, a spot at their apex in front, the tibiæ in front as well as the tarsi, yellow; the posterior legs with a stripe on the tibiæ in front at their base; the wings hyaline and iridescent. Abdomen: an elongate transverse yellow macula on each side of the basal segment near its apical margin, a yellow fascia on the apical margin of the second segment, widest at the sides, an abbreviated fascia in the middle of the third, an entire one on the fourth, and a spot on each side of the fifth.

*Male.* Differs in having the clypeus black, two parallel abbreviated yellow lines on the disk of the mesothorax and the fasciæ on the abdomen entire, that on the basal segment being very broad and deeply notched in the middle.

*Hab.* Borneo (Sarawak).

I have here restored the name *Larra* to one of the insects agreeing with the type, *L. vespiformis*,—the *Stizus vespiformis* of many authors.

### Gen. PISON, *Spin.*

1. PISON SUSPICIOSUS. *P. niger*; capite thoraceque rude punctatis; abdomine lævigato, nitido; facie pube argentea ornata.

*Female.* Length 4 lines. Black; the face with silvery pubescence; the palpi testaceous; the tips of the mandibles ferruginous; the head and thorax strongly and closely punctured, the clypeus finely so. Thorax: the tegulæ testaceous; the wings fusco-hyaline; the first recurrent nervure received at the apex of the first submarginal cell; the second at the apex of the second submarginal; the nervures dark fuscous; the metathorax with a number of coarse radiating striæ at its base; the truncation transversely rugose. Abdomen: very smooth and shining, with a few delicate scattered punctures; the margins of the segments depressed.

*Hab.* Singapore.

This species very closely resembles the *Pison rugosus*, but it differs from that species in the neurulation of the wings, and also in the puncturing of the abdomen; I suspect that an example in fine condition would have silvery bands on the abdomen.

### Subgen. PISONOIDES, *Shuck.*

*The anterior wings with one marginal cell, and two submarginal cells, each receiving a recurrent nervure.*

1. PISONOIDES OBLITERATUS. *P. ater*, glaber, tenuissime punctatus; facie argenteo-villosa; alis hyalinis iridescentibus; metathoracis basi lævi.

*Female.* Length  $3\frac{1}{2}$  lines. Black; the head and thorax punctured, the mesothorax rather distantly so; the clypeus and the notch of the eyes

with a silvery pubescence; the tips of the mandibles ferruginous; the tegulæ testaceous; the nervures brown; the costal nervure and the stigma black; the tibiæ and tarsi simple; the metathorax with a deep triangular depression at its base, which is obliquely striated on each side, and from which a deep smooth channel runs to the apex of the metathorax; on each side of the depression it is smooth and shining, and finely punctured beyond. Abdomen highly polished, with the margins of the segments deeply depressed; the apical margins with a fine short silky white pubescence; the sixth segment acute at the apex.

*Hab.* Borneo (Sarawak).

I have formed a section for the reception of this species, which I regard as a true *Pison*, having the petiolated cell obsolete, or rather the apical nervure of the usually enclosed cell. I have seen other species with the nervure obsolete in both, or sometimes only in one wing; the latter circumstance confirms my opinion of this species only being an exceptional case, and that it is a true *Pison*.

#### Fam. BEMBICIDÆ, *Westw.*

##### Gen. BEMBEX, *Fabr.*

*Bembex melancholica*, *Smith, Cat. Hym.* pt. iv. p. 328.

*Hab.* Borneo (Sarawak). Sumatra.

#### Fam. CRABRONIDÆ, *Leach.*

##### Gen. TRYPOXYLON, *Latr.*

1. *Trypoxylon bicolor*, *Smith, Cat. Hym.* pt. iv. p. 377.

*Hab.* Singapore. Madras.

2. *TRYPOXYLON PETIOLATUM*. *T. nigrum nitidum*, petiolo gracili elongato; abdominis articulis secundo et tertio ferrugineis.

*Female.* Length 7 lines. Black, very smooth and shining: the clypeus, the inner orbits of the eyes, the emargination of the eyes, and the cheeks, with a glittering silvery pile; the mandibles ferruginous; the palpi pale testaceous. Thorax: the tegulæ, anterior and intermediate tarsi, the extreme base of the posterior tibiæ, the calcaria, and the claws and pulvillus of the tarsi, pale rufo-testaceous; the apical joints of the tarsi fuscous; the sides of the thorax sprinkled with glittering silvery hairs; the wings hyaline, the nervures rufo-fuscous. Abdomen: the petiole slender, as long as the head and thorax, with the apex of its node, the second and third segments, ferruginous; covered with a fine changeable pile, only observable in certain lights.

*Hab.* Borneo (Sarawak).



3. *TRYPOXYON COLORATUM*. *T. nigrum*, læve, nitidum; pedibus pallide ferrugineis, abdomine subferrugineo supra, obscure maculato.

*Male*. Length  $7\frac{1}{4}$  lines. Black, smooth and shining: the clypeus, mandibles, palpi and scape of the antennæ, covered with golden pile; the cheeks and the emargination of the eyes with a glittering pale golden pile. Thorax: the posterior margin of the prothorax, the tegulæ, tubercles and legs, pale ferruginous; the intermediate and posterior tibiæ beneath, and also the tarsi, fuscous; the apex of the joints of the latter ferruginous; the wings hyaline, their nervures ferruginous, the stigma pale; the sides of the thorax and the metathorax with golden pubescence. Abdomen rufo-testaceous; the petiole, except its base, above, the node at its apex, above, as well as all the segments, more or less black, or rufo-fuscous above; the base and apex of the segments, as well as the apical segment entirely, pale; beneath entirely pale.

*Hab.* Borneo (Sarawak).

This species is about the size of *T. bicolor*, which it very much resembles, but from which it is very distinct.

#### Gen. CRABBO, *Fabr.*

1. *CRABBO FAMILIARIS*. *C. niger*, ocellis triangulariter ordinatis, mesothorace punctulato, pedibus flavis, metathorace lævi nitido, abdomine pubescente.

*Male*. Length  $2\frac{1}{4}$  lines. Black: head a little wider than the thorax, shining and delicately punctured; the stemmata in a triangle; the clypeus and cheeks with silvery pubescence; the scape yellow; the flagellum rufo-testaceous, slightly fuscous above; the palpi pale testaceous; the mandibles ferruginous at their apex. Thorax: the collar, tubercles, tegulæ, scutellum and post-scutellum, the extreme base of the wings, and the legs, of a sulphur-yellow; the wings hyaline and splendidly iridescent; the base of the femora and the coxæ slightly ferruginous; the mesothorax delicately punctured; the metathorax smooth and shining, with a central impressed fovea. Abdomen pubescent, with the apical margins of the segments rufo-piceous.

*Hab.* Borneo (Sarawak).

2. *CRABBO RUGOSUS*. *C. niger*, ocellis triangulariter ordinatis in vertice, mesothorace longitudinaliter striato, metathorace rugoso.

*Male*. Length  $2\frac{1}{4}$  lines. Black: head wider than the thorax, quadrate; the stemmata in a triangle on the vertex; an impressed line in front of the anterior stemma extending to the sulcation on the face; an impressed line running round the orbits of the eyes; the cheeks and face with a dense silvery pubescence; the scape yellow; the tips of the mandibles ferruginous. Thorax: an interrupted line on the collar, the tubercles, two spots on the scutellum, the post-scutellum, the tips of the anterior femora, all the tibiæ at their base,

and the basal joint of the tarsi, yellow; the apical joints of the tarsi rufo-fuscos; the yellow markings on the legs paler than those on the thorax; the mesothorax deeply striated longitudinally; the metathorax rugose; the wings hyaline and iridescent. Abdomen: the four basal segments with a small ovate yellow spot at their extreme lateral margins; the fifth with a yellow fascia at its base.

*Hab.* Borneo (Sarawak).

This species has a remarkably close resemblance to the *Crabro Panzeri* of this country.

### Gen. MELLINUS, *Fabr.*

1. *MELLINUS CRABRONIFORMIS*. *M. niger*, scapo palpis mandibulis tuberculis pedibusque flavis, abdomine ferrugineo.

*Female.* Length 4 lines. The head and thorax black; the legs and abdomen pale ferruginous; the head and thorax with a thin glittering pale golden pubescence; the palpi, mandibles and scape of a yellowish white; the flagellum testaceous, yellow beneath. Thorax smooth and shining; the tegulæ and base of the wings of a yellowish white; the wings hyaline and splendidly iridescent; the nervures testaceous; the metathorax with a subenclosed space at its base, with a row of sulcations along the basal margin; the sides and apex of the metathorax rugose. Abdomen pale ferruginous, smooth, shining and pubescent; the basal segment petiolated, the petiole curved, clavate at the apex.

*Hab.* Borneo (Sarawak).

I am aware that this insect, if a strict adherence to the neuration of the wings, as a character for generic subdivision, were rigidly adopted, would form a type of a new genus, but the difference is too slight in my opinion to justify such a course; in other respects it agrees with the insects included in the genus *Mellinus*; the principal difference in the neuration of the present species is the elongation of the third discoidal cell.

### Gen. CERCERIS, *Latr.*

1. *CERCERIS SEPULCRALIS*. *C. capite thoraceque nigris*, abdomine ferrugineo.

*Female.* Length  $7\frac{1}{2}$  lines. Black, with the abdomen ferruginous; the head and thorax finely shagreened; the face with a silvery-white pubescence; the carina between the antennæ, an ovate spot on the clypeus, and the mandibles, obscurely rufo-testaceous. Thorax: a minute obscure spot on the posterior margin of the prothorax, laterally, and a distinct spot on the tegulæ in front, pale yellow; the wings brown, their base subhyaline; the sides of the metathorax covered with hoary pubescence; an indistinct pale spot on the inter-

mediate and posterior tibiæ, outside; the apical joints of the anterior tarsi, and the calcaria, pale testaceous; the tarsi beneath, and the posterior tibiæ within, clothed with a golden-yellow pubescence.

*Hab.* Borneo (Sarawak).

## Group SOLITARY WASPS.

### Fam. EUMENIDÆ.

#### Gen. GAYELLA, *Saussure*.

1. *GAYELLA PULCHELLA*. *G. nigra*, punctata, subnitida, flavo-guttata et fasciata, pedibus ferrugineis flavo-guttatis, alis subhyalinis et iridescentibus.

*Female*. Length 10 lines. Black: head quadrate; the clypeus deeply emarginate in front, the angles of the emargination produced and denticulate; a large oblong spot behind the eyes, two oblique lines on the vertex nearly touching the summit of the eyes and inclined inwards, a stripe at the base of the scape in front, the labrum and mandibles, yellow. Thorax: the prothorax in front, two longitudinal abbreviated lines on the disk of the mesothorax, the tegulæ in front and behind, a slightly interrupted transverse line on the scutellum and post-scutellum; a spot beneath the wings, and the sides of the metathorax, yellow; the legs ferruginous; a stripe on the anterior femora outside, another on the anterior and intermediate tibiæ, and a spot at the apex of the posterior pair, yellow; the tibiæ and tarsi fuscous; the wings fusco-hyaline; the anterior margin of the superior pair yellowish, their apex slightly clouded. Abdomen: the lateral and apical margins of the petiole, an ovate spot on each side of the basal segment, a fascia a little before the apical margins of the first, second and third segments, yellow; beneath black.

*Hab.* Borneo (Sarawak).

#### Gen. EUMENES.

1. *Eumenes flavopicta*.

*Eumenes flavopicta*, *Blanch. Dict. d'Hist. Nat. de Ch., d'Orb. Ins.* pl. 2. fig. 2.

*Hab.* Singapore.

2. *Eumenes Blanchardi*, *Sauss. Mon. Guêpes, Sol.* p. 66.

*Hab.* Borneo (Sarawak).

3. *Eumenes quadrispinosa*, *Sauss. Mon. Guêpes, Suppl.* p. 134. pl. 7. fig. 2 ♀.

*Hab.* Malacca.

4. *Eumenes xanthura*, *Sauss. Mon. Guêpes, Sol.* p. 46.

*Eumenes circinalis*, *Fabr. Syst. Piez.* p. 286 (var.?).

*Hab.* Borneo (Sarawak).

5. *Eumenes hæmorrhoidalis*.*Vespa hæmorrhoidalis*, *Fabr. Syst. Piez.* p. 259.*Hab.* Borneo (Sarawak).6. *Eumenes quadrata*, *Smith, Trans. Ent. Soc. Lond.* n. ser. ii. p. 36.*Hab.* Borneo (Sarawak).

The specimens from Sarawak only differ from those from China in having the tibiæ and tarsi paler.

7. *EUMENES INCONSPICUA*. *E. nigra* flavo-variegata, capite thorace-  
que dense punctato, abdomine sublævigato nitido.

*Female.* Length 5 lines. Black: the clypeus deeply emarginate at the apex, the angles acute; the basal portion of the clypeus yellow, with a yellow spot above between the antennæ, and a narrow abbreviated yellow line behind the eyes; the tips of the mandibles, and the apex of the flagellum beneath, ferruginous. Thorax: an abbreviated line on the posterior margin of the prothorax in the middle, a spot beneath the wings and another before it, the tegulæ, a spot behind them, the post-scutellum, two spots on each side of the metathorax, the tips of the femora and the tibiæ, yellow; the anterior tarsi yellow, the intermediate and posterior pairs dusky; the intermediate and posterior tibiæ fusco-ferruginous beneath; wings subhyaline, the anterior margin of the superior pair fuscous. Abdomen: a minute spot on each side of the petiole, its apical margin, a larger spot on each side of the second segment and its apical margin, yellow; the following segments with a silky pubescence.

*Hab.* Borneo (Sarawak).8. *EUMENES SINGULARIS*. *E. nigra* flavo-variegata, capite thorace  
petioloque (ad apicem excepto) rude punctato; abdomine lævigato  
nitido.

*Female.* Length 6 lines. Black: the basal and the lateral margins of the clypeus, an oblong spot between the antennæ, a minute spot in the sinus of the eyes and a short line behind them, yellow; the apex of the antennæ ferruginous beneath. Thorax suborbicular; the prothorax in front, two spots on each tegula and another behind them, a transverse line on each side of the metathorax at its base, two ovate ones at its apex, and a spot beneath the wings, yellow; the anterior femora at their apex, the tibiæ, and the intermediate and posterior tibiæ outside, yellow; the wings fusco-hyaline, and iridescent, their apical margins darkest. Abdomen: the petiole longer than the head and thorax; the apical margin of the petiole, an ovate spot on each side of the first segment, its apical margin, and a line in the middle of that of the following segment, yellow; the thorax and abdomen beneath with a fine griseous pile.

*Hab.* Borneo (Sarawak).

Gen. RHYNCHIUM, *Spinola*.1. *Rhynchium hæmorrhoidale*.*Vespa hæmorrhoidalis*, *Fabr. Syst. Piez.* p. 259.*Hab.* Singapore. Malacca.2. *Rhynchium sanguineum*, *Sauss. Mon. Guêpes, Sol.* p. 110 (var. *R. hæmorrhoidalis*).*Hab.* Borneo (Sarawak).3. *Rhynchium metallicum*, *Sauss. Mon. Guêpes, Sol.* p. 114.*Hab.* Borneo (Sarawak).4. *Rhynchium nitidulum*.*Vespa nitidula*, *Fabr. Syst. Piez.* p. 260.*Hab.* Borneo (Sarawak).

The specimens from Borneo have the clypeus strongly punctured; in other respects they agree precisely with Indian and Javanese examples.

5. RHYNCHIUM OBSCURUM. *R. capite thoraceque rude punctatis, alis apice nigris, abdominis segmento primo rubro-fasciato.*

*Female.* Length 6 lines. Black: the head and thorax very coarsely punctured; the margins of the clypeus covered with silvery pile; the face with scattered, short, griseous pubescence. Thorax: the tegulæ black and shining; the wings fusco-hyaline; a dark stain along the anterior margin of the externo-medial cell, and a dark fuscous cloud beyond the second submarginal cell occupying the entire apex of the wings. Abdomen: opaque black, the apical margin of the first segment with an obscure ferruginous band; the apical margins of the following segments slightly and very obscurely ferruginous, and covered with fusco-ferruginous pubescence.

*Hab.* Borneo (Sarawak).Gen. ODYNERUS, *Latr.*1. *Odynerus flavo-lineatus*, *Smith, Cat. Hym.* pt. v. p. 60.*Hab.* Malacca (Mount Ophir). Java.2. ODYNERUS MANIFESTUS. *O. niger, capite thoraceque rude et confluent punctatis, clypeo scapo pedibus et prothorace flavo-guttatis, abdomine fasciis duabus flavis ornato.*

*Male.* Length 5 lines. Black: the head and thorax covered with deep coarse confluent punctures; a spot on each side of the clypeus, a line on the scape in front, and another behind the eyes, yellow; the clypeus produced and truncate in front. Thorax: a line on the posterior margin of the prothorax in the middle, a spot on the tegulæ in front and behind, the post-scutellum, the apex of the anterior and intermediate femora, and all the tibiæ outside, yellow; the tarsi black; wings subhyaline, the nervures black; the anterior margin of the

superior pair fuscous. Abdomen shining and delicately punctured; the first and second segments with a yellow fascia on their apical margins.

*Hab.* Borneo.

3. *ODYNERUS SEPTEM-FASCIATUS*. *O. niger* capite thoraceque profunde punctatis flavoque variegatis, abdominis segmentis flavo-marginatis, segmento secundo flavo-fasciato.

*Male*. Length 5 lines. Black: head and thorax deeply, but not coarsely punctured; the margins of the clypeus, the labrum, mandibles, scape in front, the sinus of the eyes, a longitudinal stripe running from the anterior stemma to the insertion of the antennæ, and a line behind the eyes, yellow. Thorax: a transverse line on the prothorax in front, not touching its anterior angles, two longitudinal abbreviated lines on the disk of the mesothorax, the tegulæ, two spots on the scutellum, the post-scutellum, the sides of the metathorax, a spot beneath the wings, an oblique line beneath it, and a similar line running down to the posterior coxæ, yellow; the legs yellow, with a fuscous line on the femora above and on the tibiæ behind. Abdomen: the anterior, posterior and lateral margins of the basal segment yellow; a fascia across the middle of the second segment, and another a little before its apical margin, and also before the margins of the three following segments, yellow; beneath, the second segment yellow, with an oblong black spot in the middle; the apical margins of the three following segments yellow.

*Hab.* Borneo (Sarawak).

4. *ODYNERUS MACULIPENNIS*. *O. niger*, punctatus, capite thoraceque flavo-guttatis, abdominis segmentis singulis flavo-fasciatis, alis apice nigro unimaculatis.

*Female*. Length  $3\frac{1}{2}$  lines. Black: the clypeus, mandibles, antennæ beneath, a spot between them, another in the sinus of the eyes, and a stripe behind them, yellow; the antennæ rufo-fuscous above; the mandibles ferruginous at their apex. Thorax: the anterior margin of the prothorax, the tegulæ and a spot behind them, a spot beneath the wings, the scutellum, a line on the post-scutellum and the sides of the metathorax, yellow; the legs yellow, with the coxæ and the femora above, more or less fuscous; the wings hyaline, with a black spot occupying the greater part of the marginal cell and passing off beyond it to the apex of the wings; the nervures fuscous. Abdomen shining and delicately punctured; the first segment short and cup-shaped, its apical margin thickened; the second segment much wider than the first, its sides rounded; a yellow fascia on the apical margins of the segments, that on the third segment much narrower than the others; an ovate spot on each side of the second segment, at its lateral margins, at the base.

*Hab.* Borneo (Sarawak).

This species is closely allied to the *O. miniatus* of Saussure.

5. *ODYNERUS MULTIPICTUS*. *O. niger*, capite thoraceque rade punctatis et flavo-variegatis, pedibus flavis, alis hyalinis apice fuscatis, abdomine flavo-fasciato.

*Female*. Length  $5\frac{1}{2}$  lines. Black : the head and thorax rugose-punctate ; the mandibles, clypeus, sinus of the eyes, a longitudinal line running from the anterior ocellus to the insertion of the antennæ, a parallel line on each side of the ocelli touching the eyes, a broad stripe behind the eyes, and the scape in front, yellow ; a black spot in the centre of the clypeus, and the apex of the mandibles, ferruginous ; the flagellum fulvous beneath. The prothorax in front, two longitudinal lines on the mesothorax, two ovate spots on the scutellum, the sides of the metathorax with a large angular spot, the tegulæ, a spot and an oblique line beneath them, and also the legs, yellow ; a line on the femora above and on the tibiæ behind, and the coxæ spotted with fuscous ; a black spot on the tegulæ ; the wings subhyaline and iridescent ; a dark cloud on the anterior margin of the superior pair towards their apex. Abdomen smooth and shining ; a yellow fascia on the apical margins of the segments, and also a fascia at the base of the first segment, with a transverse spot on each side of the second segment ; beneath, the second segment yellow, with a black quadrate spot at its base, a yellow fascia on the apical margins of the following segments

*Hab.* Borneo (Sarawak).

6. *ODYNERUS LATIPENNIS*. *O. niger*, angustus, elongatus, alis amplis apice nigro-maculatis, capite thoraceque flavo-guttatis, pedibus flavis, abdomine flavo-fasciato.

*Female*. Length 6 lines. Black : head and thorax strongly punctured ; the clypeus, and an ovate spot above, from which a narrow line runs up to the anterior ocellus, the sinus of the eyes, a stripe behind them and the scape in front, yellow ; the flagellum fulvous beneath ; the tips of the mandibles ferruginous. Thorax elongate ; the prothorax in front, the tegulæ, two spots on the scutellum, and the metathorax, yellow ; a longitudinal black line in the middle of the latter ; a yellow spot beneath the wings and an oblique line behind it ; the legs yellow ; the wings very large, subhyaline and iridescent ; the nervures towards the base of the wings fusco-ferruginous, towards their apex they are pale testaceous ; the costal and externo-medial cells with a slight fuscous cloud ; a dark cloud occupying the apical half of the marginal cell and passing on to the apex of the wings. Abdomen : the basal segment campanulate, the apical margins of the segments with yellow fasciæ.

*Hab.* Borneo (Sarawak).

This species belongs to the subgenus *Symmorphus*.

Group **SOCIAL WASPS.**Fam. **VESPIDÆ.**Gen. **ISCHNOGASTER**, *Guérin*.

1. *Ischnogaster cilipennis*, *Smith, Cat. Hym.* pt. v.  
*Hab.* Borneo (Sarawak). Malacca (Mount Ophir).
2. *Ischnogaster Mellyi*, *Ann. Soc. Ent. Fr.* 2<sup>e</sup> sér. x. p. 25. pl. 2. f. 1.  
*Hab.* Malacca. Sarawak.
3. **ISCHNOGASTER NIGRIFRONS.** *I. niger*, *subtus flavo-variegatus*,  
cellulis primo secundoque submarginalibus æquis, tertia breviori et ad  
cellulam marginalem angustata.  
*Female.* Length 6 lines. Black: the face and clypeus covered with  
pale golden pubescence, the colour changing in different lights; the  
clypeus produced at its apex into an acute spine; the scape in front,  
the flagellum beneath, the palpi and mandibles, yellow, the latter ferru-  
ginous at their apex. Thorax globose; the posterior margin of the  
prothorax, two oblique lines on the mesothorax anteriorly, a spot on  
each side of the scutellum, the post-scutellum, and two spots at the  
apex of the metathorax close to the insertion of the petiole, yellow;  
beneath, fusco-ferruginous; the legs rufo-piceous, with the knees and  
the anterior and intermediate tibiæ outside, yellow. Abdomen ob-  
scurely rufo-fuscous; the first segment petiolated; beneath, with two  
lines at the base of the node of the petiole; the extreme lateral mar-  
gins of the first segment, two oblique ones towards its apex beneath,  
an ovate spot on each side of the two following segments beneath,  
and the extreme lateral basal margin of the second segment above,  
yellow.  
*Hab.* Borneo (Sarawak).
4. *Ischnogaster micans*, *Sauss. Mon. Guêpes, Soc.* p. 8.  
*Hab.* Borneo (Sarawak). Malacca.

Gen. **POLISTES**, *Latr.*

- Polistes sagittarius*, *Sauss. Mon. Guêpes, Soc.* p. 56.  
*Hab.* Borneo (Sarawak). India. China. Greece.  
There is probably no species of this genus which is so widely distributed  
as the present; the specimens which I have seen from Borneo are all  
smaller than the Indian ones, and are more highly coloured; the  
mesothorax has a central longitudinal ferruginous stripe, and the me-  
tathorax two longitudinal ones.

Gen. **POLYBIA**, *Sauss.*

1. *Polybia Sumatrensis*, *Sauss. Suppl. Guêpes, Soc.*  
*Hab.* Sumatra. Borneo (Sarawak). Malacca.



2. *POLYBIA STIGMA*. *P. nigra*, flavo-variegata, alis anticis hyalinis, margine antico obscurato, stigmate flavo.

*Male*. Length 5 lines. Black: the clypeus and cheeks with a silvery pubescence; the mandibles, clypeus, sinus of the eyes, the antennæ beneath, and the cheeks, yellow. Thorax: the anterior margin of the prothorax, the tegulæ and a line beneath the wings, a broad oblique stripe on the sides of the metathorax, the scutellum, post-scutellum, and an oblong-quadrate spot beneath it, and also the legs, yellow; the femora and tibiæ slightly fuscous behind; the anterior wings with a dark spot at the apex of the externo-medial cell; the stigma honey-yellow, with a dark stripe beyond it at the margin of the wing. Abdomen: an ovate spot on each side of the second segment at its base, and a yellow fascia on the apical margin; the extreme apex of the abdomen yellow; the fascia on the second segment, continued beneath, and two ovate maculæ at its base.

*Hab.* Borneo (Sarawak).

This is probably the male of *P. decorata*.

3. *POLYBIA LUCTUOSA*. *P. opaca*, nigra, clypei margine antico flavo, segmentis primo tertio quartoque abdominis flavo-marginatis, alis apice nigro uni-maculatis.

*Female*. Length  $5\frac{1}{4}$  lines. Black: the anterior margin of the clypeus, slightly interrupted in the middle, and a very narrow line at the inner orbits of the eyes, not entering the sinus, yellow; the head and thorax opaque; wings hyaline, with a black spot on the anterior margin of the superior pair, near their apex. Abdomen: a narrow yellow fascia on the apical margins of the first, third and fourth segments, the extreme apex yellow.

*Hab.* Borneo (Sarawak).

4. *POLYBIA DECORATA*. *P. nigra*, flavo multidecorata, pedibus flavis.

*Female*. Length 5 lines. Black: the clypeus, mandibles, antennæ beneath, the sides of the face and sinus of the eyes, a spot above the clypeus running up into a point as high as the anterior ocellus, and two minute spots on the margin of the vertex, yellow. Thorax: the anterior margin of the prothorax, the tegulæ, and a large broad oblique spot beneath the wings, two longitudinal lines on the mesothorax, the scutellum and post-scutellum, the metathorax and legs, yellow; the scutellum and metathorax with a longitudinal black line down the middle; the wings subhyaline, with a fuscous cloud in the marginal cell; the tibiæ outside, and the tarsi above, slightly fuscous. Abdomen: the first segment campanulate, with a yellow spot on each side at its apex; the second segment with two very large spots at its base occupying nearly half the length of the segment, and nearly uniting its apical margin as well as those of the three following, with a marginal fascia, yellow; the apical segment entirely yellow; beneath

yellow, with only the apical margins of the segments narrowly fuscous.

*Hab.* Borneo (Sarawak).

Gen. ICARIA, *Saussure*.

1. *Icaria opulenta*, *Smith, Cat. Hym. pt. v. p. 99. ♀*.

The male of this species has been received from Borneo since I described the female, from which it only differs in having the clypeus and mandibles entirely black; in other respects they agree.

2. *Icaria speciosa*, *Sauss. Rev. Zool. (Guérin, 1855) p. 374.*

*Hab.* Borneo. Malacca. Sumatra.

3. *Icaria ferruginea*, *Fabr.*

*Polistes ferruginea*, *Fabr. Syst. Piez. p. 277.*

*Hab.* Malacca (Mount Ophir). India.

4. ICARIA LUGUBRIS. *I. opaca nigra pube sericea variabili vestita, alis subhyalinis, apice nigro subnebulosis.*

*Female.* Length 6 lines. Black: covered with a fine changeable white silky pile; head opaque, delicately roughened; the clypeus angular in front and with a broad white margin, smooth and shining anteriorly; the mandibles smooth and shining, with a white spot at their base. Thorax finely rugose; the sides of the prothorax, the scutellum and post-scutellum, very obscurely tinged more or less with ferruginous, sometimes not observable; the wings subhyaline, with a dark brown stain at the apex of the externo-medial cell, a similar stain occupies the marginal cell, and a paler cloud descends from it across the apex of the wing. Abdomen: the apex of the petiole and the apical margins of the third and following segments very indistinctly tinged with ferruginous, generally black; the third and following segments densely covered with silky pile.

In my Catalogue of Vespidae, I have indicated this species as being a black variety of *I. speciosa*; I had only one or two examples at that time for examination; but having now a series, I am satisfied of their being distinct: in *I. speciosa* the first segment of the abdomen is as broad as long, in the present it is longer than broad.

*Hab.* Borneo (Sarawak).

5. ICARIA MODESTA. *I. nigra, alis fulvo-hyalinis, abdomine ferrugineo.*

*Female.* Length 5 lines. Black: the head and thorax roughly punctured; the face and cheeks with short griseous pubescence; the clypeus angular in front, produced into an acute point. Thorax: the posterior margin of the prothorax ferruginous in the middle; the apical joints of the tarsi ferruginous; wings fulvo-hyaline, the ner-

vures dark ferruginous towards the base of the wings, and pale ferruginous towards their apex. Abdomen dark ferruginous, somewhat obscure; the first segment and base of the second bright red; the sides and the apex of the abdomen with a fine silky white pile.

*Hab.* Borneo (Sarawak).

Gen. *VESPA*, *Linn.*

1. *Vespa cincta*, *Fabr. Syst. Piez.* p. 254.

*Hab.* Borneo (Sarawak). Malacca (Mount Ophir).

2. *Vespa affinis*, *Fabr. Syst. Piez.* p. 254 (var. *V. cincta*?).

*Hab.* Malacca.

3. *Vespa tyrannica*, *Smith, Cat. Hym.* pt. 5. p. 119.

*Hab.* Singapore.

4. *Vespa (anomala) dorylloides*, *Sauss. Mon. Guêpes, Soc.* p. 112.

*Hab.* Borneo (Sarawak). Malacca. Singapore.

5. *Vespa bellicosa*, *Sauss. Mon. Guêpes, Soc.* p. 146.

*Hab.* Borneo (Sarawak).

6. *VESPA ANNULATA*. *V. nigra*, scutello flavo-maculato, post-scutello metathoraceque flavis, illo in summo nigro, segmentis tenuibus flavo marginatis.

*Worker.* Length 10 lines. The clypeus emarginate in front, its lateral angles acute and slightly produced; an elongate-quadrate black spot in the middle not extending to the anterior margin; the cheeks, mandibles, clypeus, a coronet-shaped spot above, the emargination of the eyes, the scape in front and the flagellum beneath, yellow. Thorax: a narrow line on the anterior and posterior margins of the prothorax, the tegulæ and a spot beneath the wings, an ovate spot on each side of the scutellum, the post-scutellum and metathorax, yellow; wings subhyaline, with a narrow fuscous stain at the anterior margin of the superior pair; legs yellow, with a fuscous stain on the tibiæ and femora above. Abdomen: two large spots at the base of the first segment, and a narrow fascia on the apical margins of all the segments, yellow; the yellow bands abruptly widened laterally; the abdomen yellow beneath, with the base of the segments blackish.

*Hab.* Borneo (Sarawak). Malacca.

Fam. TENTHREDINIDÆ, *Leach.*

1. *TENTHREDO COXALIS*. *T. chalybea*, clypeo palpis trochanteribus coxarum apicibus tibiisque postice albis, alis hyalinis.

*Female.* Length 4 lines. Steel-blue; the antennæ black; the clypeus and palpi white. Thorax: a line before and a spot beneath the tegulæ,

the trochanters, apex of the coxæ, the knees and the tibiæ behind, white; the wings hyaline and iridescent; the nervures and stigma dark brown; two minute white spots on the post-scutellum; the extreme apex of the abdomen with a white spot.

*Hab.* Singapore.

Gen. TREMEX, *Jurine*.

1. TREMEX INSULARIS. *T. ater*, capite thorace disco viridibus, abdomine et thorace flavo-variegatis, alis subhyalinis, margine antico fuscis.

*Female.* Length 8 lines. Head brassy-green, strongly punctured; the antennæ black with the apical joints yellow; the face thinly covered with white pubescence. Thorax: the disk and the scutellum with a green tinge; the pro- and metathorax above yellow; the segments of the abdomen have each a yellow fascia, the first two slightly interrupted, the terminal segment with an oblique yellow stripe on each side; the tibiæ yellow, the tarsi ferruginous; the base of the abdomen yellow beneath; the wings subhyaline, a dark fuscous stain along the anterior margin of the superior pair, the apical margins of both wings fuscous.

*Hab.* Borneo (Sarawak).

Fam. CYNIPIDÆ, *Westw.*

1. CYNIPS INSIGNIS. *C. flavo-ferruginea*, antennis fuscis, alis flavo-hyalinis apice fuscis.

*Female.* Length  $4\frac{1}{2}$  lines. Reddish-yellow, smooth and shining, rather paler beneath; the flagellum slightly fuscous, with the base and apex pale; tips of the mandibles black; the mesothorax deeply and transversely grooved; the base of the wings flavo-hyaline; from the base of the stigma to the apex dark fuscous; the insect is thinly covered with a short pale pubescence; the ovipositor black; the sheath and the claws dark ferruginous.

*Hab.* Borneo (Sarawak).

Fam. ICHNEUMONIDÆ, *Leach*.

1. ICHNEUMON PENETRANS. *I. niger*, capite thoraceque flavo variegatis, pedibus flavis nigro-maculatis, abdominis annulis flavo-marginatis.

*Female.* Length 8 lines. Black: the face below the insertion of the antennæ, the labrum, mandibles, palpi, cheek, inner orbits of the eyes, and the antennæ, yellow; the scape and base and apex of the flagellum black: a black spot above the clypeus, and the apex of the mandibles ferruginous. Thorax: the lateral margins of the prothorax, a

spot on the tegulæ, two longitudinal spots on the mesothorax, the scutellum, post-scutellum, two spots on the metathorax behind and a line at the sides, two oblique maculæ on the sides of the thorax and the legs, yellow; the anterior and intermediate legs with a fuscous line outside; the posterior femora and the apex of the tibiæ black; wings hyaline. Abdomen: the base of the petiole and its apical margin yellow; the base of the first segment and the apical margins of all the segments with a yellow fascia; beneath entirely yellow.

*Hab.* Borneo (Sarawak).

2. *ICHNEUMON COMISSATOR*. *I. niger*, antennis medio albis, thorace pedibusque flavo variegatis, abdominis petioli basi marginibus basalibus segmentorum trium sequentium duobusque segmentis apicalibus flavis.

*Male*. Length 7 lines. Black: antennæ white in the middle; the head is yellow, except the hinder part of the vertex, and a black stripe running from the vertex to the insertion of the antennæ. The prothorax has the anterior and posterior margins yellow; the tegulæ, two spots on the disk of the mesothorax, the scutellum and post-scutellum, and metathorax, yellow; a black spot on the tegulæ, another on the scutellum, and a black T-shaped mark on the metathorax; the thorax with yellow maculæ on the sides, and the legs yellow; the anterior and intermediate legs with a black line outside, and the posterior femora and apex of the tibiæ black. The petiole of the abdomen yellow, with a black macula at its apex; the first, second and third segments with a broad, deeply emarginate fascia at their base; the two apical segments entirely yellow.

*Hab.* Borneo (Sarawak).

#### Gen. *CRYPTUS*, *Fabr.*

1. *CRYPTUS CROCEIPES*. *C. niger*, metathorace bispinoso, antennis medio tarsisque posticis et abdomine apice albis, pedibus flavis.

*Female*. Length 5 lines. Black: subopake, with the apex of the abdomen white above; the middle of the antennæ, above, white about one-third of their length; the legs yellow; the posterior tibiæ and claw-joint of the tarsi, and also the anterior tarsi, fuscous; the posterior tarsi white; the wings hyaline and iridescent, with a faint cloud at the apex of the first submarginal cell, the stigma and nervures, black; the metathorax armed with two short spines which are white at their tips.

*Hab.* Borneo (Sarawak).

2. *CRYPTUS ELEGANS*. *C. niger*, antennis medio scutelloque et abdominis apice albis, alis hyalinis macula fusca ad apicem, abdominis fasciis albis, thorace bispinoso.

*Female.* Length  $4\frac{1}{2}$  lines. Black: the scape pale rufo-testaceous, the apical half of the flagellum and the palpi white; the apex of the flagellum, and the outside of the white portion, fuscous. The tegulæ, scutellum, a line on the post-scutellum, and the posterior tarsi, white; the legs pale rufo-testaceous; the metathorax rugose and armed with two white spines; the wings hyaline, with a fuscous stain descending from the stigma to the inferior margin of the discoidal cell. Abdomen: the basal segment rufo-testaceous at the base and white at its apical margin; the second segment black at its base, then rufo-testaceous, becoming white at its apical margin; the apex of the abdomen white.

*Hab.* Borneo (Sarawak).

3. *CRYPTUS LEPIDUS.* *C. niger*, alis hyalinis, tarsis posterioribus albo-, metathorace transverso-striatis, abdominis apice albo.

*Female.* Length 6 lines. Black; shining: antennæ white in the middle; the wings hyaline, the nervures black; the anterior and intermediate legs, and the posterior coxæ, reddish-yellow; the anterior and intermediate tarsi fuscous, the posterior pair white; the three apical segments white above; the posterior margins of the second and third segments with very narrow white fasciæ; the metathorax transversely striated.

*Hab.* Borneo (Sarawak).

#### Gen. *PIMPLA*, *Fabr.*

1. *Pimpla punctator.*

*Ichneumon punctator*, *Linn. Syst. Nat.* i. 935. 38.

*Pimpla pedator*, *Fabr. Syst. Piez.* p. 114. 6.

*Hab.* India. Borneo (Sarawak).

#### Gen. *MEGAPROCTUS*, *Brullé.*

1. *MEGAPROCTUS RUFICEPS.* *M. niger*, capite ferrugineo, thorace abdominisque segmento primo et secundo rugosis, alis hyalinis, tarsis posterioribus albis.

*Female.* Length 8 lines. Head and scape of the antennæ ferruginous, smooth and shining; the flagellum and tips of the mandibles black. Thorax opaque black, rugose, but not coarsely so; the mesothorax convex in front, sub-bituberculate, the tubercles obsoletely ferruginous; the wings hyaline, the nervures black; the base of the tibiæ, the apex of the first and second joints of the anterior tarsi, the third and fourth entirely, the intermediate pair wanting, and the posterior pair, white; the claw-joint of the latter black. Abdomen opaque black, broad at the base and slightly widening to the apex; the first segment and a large angular shape in the middle of the second with large close punctures; on each side of the angular shape it is longi-

tuinally rugulose; the apical segments smooth and shining; the ovipositor a little longer than the insect.

*Hab.* Singapore.

Gen. *RHYSSA*, *Grav.*

1. *RHYSSA MIRABILIS*. *R.* capite thorace pedibus anticis et intermediis sanguineo-rubris, coxis intermediis antice posticisque a tergo, albis, alis fuscis, abdomine basi nigro sensim ad apicem pallidiore, apice flavescenti-albo, ovipositore elongato.

*Female.* Length 13 lines. Head, thorax and anterior legs ferruginous; the mandibles black; wings dark fuscous, with a coppery effulgence; the intermediate and posterior legs dark rufo-piceous; the intermediate coxæ in front and the posterior pair behind, white; the intermediate tibiæ ferruginous in front, the tarsi fuscous; the apex of the metathorax above black, smooth and shining. Abdomen smooth and shining, black at the base, and gradually becoming paler to the apex, which is pale yellowish-white; the apical segments deeply emarginate in the middle above; the ovipositor one-third longer than the body.

*Hab.* Borneo (Sarawak).

2. *RHYSSA MACULIPENNIS*. *R.* nigra, flavo dense maculata, alis anticis macula magna fusca ad apicem.

*Female.* Length 10 lines. Black: the face, inner and outer orbits of the eyes, and a spot on the scape in front, yellow. Thorax: the posterior margin of the prothorax, the tegulæ and two spots beneath the wings, the scutellum and a minute spot on each side, at its anterior angles, a spot on the post-scutellum, a trilobate spot on the metathorax, in the middle, and a large irregular macula at the sides, yellow; the legs yellow; the tarsi fuscous; the anterior coxæ behind and the femora and tibiæ outside with a rufo-piceous stain, the intermediate and posterior black and spotted with yellow, the femora black above, the tibiæ fuscous at their base behind; the wings hyaline, with a faint yellow tinge, the nervures black, the stigma ferruginous; a large dark brown macula on the anterior wings placed at the apex of the stigma. Abdomen: a longitudinal yellow spot in the middle of the two basal segments, and an oblique ovate yellow spot at the sides of the three following segments towards their apical margins; the ovipositor one-fourth longer than the body.

*Hab.* Borneo (Sarawak). Singapore.

Gen. *MEGISCHUS*, *Brullé*.

1. *MEGISCHUS INSULARIS*. *M.* niger, capite ferrugineo, thorace abdominisque segmento primo rugosis, alis subhyalinis, ovipositore ad apicem albo annulato.

*Female.* Length 10 lines. Black: the head red, coarsely rugose, having three or four deep transverse curved grooves above the ocelli, in front

of which is a triangular shallow cavity which has several radiating carinæ; the corners of the triangle raised and recurved; the antennæ and palpi black. Thorax coarsely rugose, having a mixture of transverse sculpturing and large shallow punctures; wings fusco-hyaline, with the nervures black, a slight fuscous cloud in the first discoidal cell; the posterior margin of the prothorax narrowly pale testaceous; the posterior coxæ transversely rugose-striate; the posterior femora incrassate, denticulate beneath. Abdomen: the first segment transversely striated, the following smooth and shining; the ovipositor a little shorter than the body.

*Male.* About the same size as the female, similarly coloured and sculptured; the posterior femora similarly denticulate; the first segment of the abdomen more finely striated, the apical margins of the third and three following segments notched in the middle.

*Hab.* Sarawak.

#### Gen. MACROGASTER, *Brullé*.

1. MACROGASTER FLAVO-PICTUS. *M. nigro flavoque varius, alis anticis macula magna nigro-fusca ad apicem.*

*Female.* Length 15 lines. Head black; the face, cheeks, mandibles, and scape in front, yellow. Thorax black, transversely rugose; the posterior margin of the prothorax, a small and a large spot beneath the wings, the legs and breast in front, four spots on the mesothorax, a spot on the scutellum and a smaller one at each side, the tegulæ, and the base and sides of the metathorax, yellow; the wings hyaline; the nervures black; the stigma yellow; a large dark fuscous macula at the apex of the marginal cell extending across the second submarginal cell. Abdomen black and subopaque, with the apical margins of the segments smooth and shining; each segment with a yellow fascia before its apical margin, the two basal fasciæ widest in the middle, the four following narrowest in the middle, or the two last slightly interrupted; the ovipositor twice the length of the insect.

*Hab.* Singapore.

This species may possibly be a *Rhyssa* with the petiolated submarginal cell obsolete; the neurulation of the wing agrees with that of Brullé's genus *Macrogaster*. I am not acquainted with any other genus to which it could belong; the antennæ are those of *Rhyssa*, not apparently of *Macrogaster*.

#### Gen. OPHION, *Fabr.*

1. OPHION IRIDIPENNIS. *O. rufo-ferrugineus, capite postico flavo, abdomine fusco basi ferrugineo, metathorace rugoso.*

*Female.* Length 10 lines. Reddish-yellow; the eyes distinctly emarginate; the face smooth and shining, slightly convex; the tips of the mandibles black; the head yellow behind. Thorax: the mesothorax smooth and shining, with a central longitudinal fuscous stripe; the metathorax coarsely transversely rugose, with a series of short longi-



tudinal strizæ at the base; wings hyaline and splendidly iridescent, the nervures ferruginous, with the costal nervure and stigma much darker. Abdomen fuscous, with the first, second, and base of the third segments ferruginous.

*Hab.* Borneo (Sarawak).

2. *OPHION VESTIGATOR*. *O. rufo-testaceus*, abdomine apice fusco, metathorace subrugoso.

*Female*. Length 10 lines. Pale rufo-testaceous: eyes deeply emarginate; wings hyaline and iridescent, the nervures fusco-ferruginous; the meso- and metathorax rugose; the four apical segments of the abdomen fuscous and covered with short cinereous pubescence.

*Hab.* Malacca.

#### Gen. *XYLONOMUS*, Grav.

1. *XYLONOMUS FULGIDIPENNIS*. *X. opacus*, niger, antennis flavo-annulatis, alis nigris aureo-fulgentibus, abdomine nigro-chalybeo.

*Female*. Length 14 lines. Black and opaque: antennæ annulated with yellow; the thorax narrowed anteriorly; the metathorax large and wide; the wings dark brown, with a bright coppery effulgence; the tegulæ and two spots at the base of the metathorax obscurely blue. Abdomen blue-black, with bright tints of blue in certain lights.

*Hab.* Sarawak.

I have assigned this fine insect to the genus *Xylonomus*, to which it appears to belong; the neuration of the wings and the enlarged metathorax connect it with that genus.

#### Fam. *BRACONIDÆ*, Westw.

##### Gen. *BRACON*, Fabr.

1. *BRACON ACULEATOR*, Fabr. *B. ferrugineus*, antennis aculeoque nigris, alis flavescentibus, puncto marginali nigro.

*Ichneumon aculeator*, Fabr. *Ent. Syst.* ii. 159. 105.

*Bracon aculeator*, Fabr. *Syst. Piez.* 107. 21.

*Hab.* Malacca (Mount Ophir). Borneo (Sarawak). Tranquebar.

2. *BRACON QUADRICEPS*. *B. capite thorace pedibus anticis et intermediis coxisque posticis ferrugineis, pedibus posticis et abdomine nigris, alis fuscis basi hyalinis.*

*Female*. Length  $7\frac{1}{2}$  lines. Head, thorax, anterior and intermediate legs, and the posterior coxæ, ferruginous; the head and thorax smooth and shining, the former quadrate; the clypeus deeply emarginate; the scape and first joint of the flagellum ferruginous within; the wings yellow to the apex of the externo-medial cell, beyond which they are fuscous and mottled with a number of semitransparent spots; the base of the stigma reddish-yellow. Abdomen and posterior legs black; the first segment of the abdomen at an oblique angle with the following segments, above, with a central and two lateral carinæ, outside of which it is yellow; the second and third segments longitudi-

nally rugose-striate; the following segments smooth and shining; the ovipositor ferruginous, the sheaths black and very pubescent.

*Hab.* Borneo (Sarawak).

This species, which has the posterior tarsi thickened and the abdomen angulated at the base, I have little doubt belongs to the genus *Myosoma* of Brullé.

3. *BRACON SUSPICIOSUS*. *B. capite thorace pedibus anticis et intermediis sanguineo-rubris, alis fuscis, abdomine nigro.*

*Female.* Length 8 lines, of the ovipositor 9 lines. Black: the head, scape of the antennæ, anterior legs, pro- and mesothorax, ferruginous; the head subquadrate, very smooth and shining; the clypeus emarginate its entire width, the tips of the mandibles black. The thorax highly polished above; the wings dark fuscous, with a semi-hyaline streak crossing the lower angle of the first submarginal cell; the posterior tibiæ and tarsi stout. The first segment of the abdomen at right angles with the following segments; the second and third segments longitudinally striated, the following segments smooth and shining.

*Hab.* Borneo (Sarawak).

This species in all probability belongs to Brullé's genus *Myosoma*.

4. *BRACON INSIGNIS*. *B. capite thorace pedibus anticis et intermediis ferrugineis, metathorace supra nigro, abdomine pedibusque posticis nigris, alis nigro-fuscis, ovipositore corpore quadruplo longiore.*

*Female.* Length of the body 11 lines, of the ovipositor 44 lines. Head, thorax, anterior and intermediate legs ferruginous; the head and thorax smooth and shining, the antennæ black; the metathorax, posterior legs, and abdomen, black, wings dark fuscous; beneath the first submarginal cell is a minute hyaline spot. Abdomen: the basal segment, and a triangular impressed shape at the base of the second in the middle, longitudinally striated; the second, third, and fourth segments with a rugose striation, radiating from the middle of each segment; the apical segments smooth and shining; the ovipositor ferruginous, the sheaths black and pubescent.

*Hab.* Borneo (Sarawak).

5. *BRACON CEPHALOTES*. *B. rufescenti-flavus, antennis et ovipositore nigris, alis flavo-hyalinis, macula nigra ad stigmatis basin, alteraque in cellula prima discoidali.*

*Female.* Length 8 lines. Rufo-flavous; antennæ and tips of the mandibles black; anterior margin of the clypeus entire; head wider than the thorax, quadrate, smooth, and shining. Thorax very smooth, shining; the mesothorax very convex anteriorly, with an oblique depression on each side anteriorly; the wings flavo-hyaline, with a black macula at the base of the stigma, and a smaller one at its apex, a third macula in the first discoidal cell, and an oblong stain beyond it on the margin of the wing; the posterior wings with their apex and inferior margin fuscous; the posterior tarsi slightly fuscous. Abdo-

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men smooth and shining, the basal segment with a deep fovea anteriorly, and a convex shape beyond extending to the posterior margin; the two following segments with an oblique depression on each side.

*Hab.* Borneo (Sarawak).

This species resembles the *B. aculeata*, Fabr., but differs in not having the thorax narrowed anteriorly, and in having an additional spot on the wings; the head is also much larger, and in what I consider to be *B. aculeata*, the two basal joints of the antennæ are pale ferruginous.

6. *BRACON PERPLEXUS*. *B. flavus*, vertice macula triangulari notato, antennis tarsisque posticis et ovipositore nigris, alis fuscis, dimidio basali flavis.

*Female*. Length 6 lines. Yellow: the vertex with a large triangular shape, which extends to the insertion of the antennæ, the tips of the mandibles and the antennæ, black; the head smooth and shining; the thorax smooth and shining, with the posterior tarsi dusky; wings yellow-hyaline as far as the apex of the externo-medial cell, beyond which they are of a uniform black, not intense in colour, and with an oblong hyaline streak in the first submarginal cell and two ovate ones below; the stigma yellow at the base. Abdomen: the first segment with a central longitudinal convex shape in the middle, which, as well as the two following segments, is longitudinally striated; the ovipositor black.

*Hab.* Borneo (Sarawak).

7. *BRACON VAGATUS*. *B. capite thorace pedibusque anticis et intermediis ferrugineis, abdomine maculaque metathoracis nigris, alis flavescentibus*.

*Female*. Length 5 lines. Head, thorax and legs, smooth, shining, ferruginous, the antennæ black, a fuscous spot on the vertex. Thorax smooth and shining; the metathorax black above, and the posterior legs black; the wings flavo-hyaline; a black spot at each end of the stigma; the apex of the posterior wings and the apical portion of the inferior margin of the superior pair, slightly fuscous. Abdomen: the lateral and apical margins of the basal segment, and the apical margins of the third and following segments, yellow; the basal segment with a longitudinal deep lateral channel and a central carina; the second segment rugose, with the apical margin and three triangular spaces at the base, smooth, shining, black; the third segment with an oblique deeply impressed line on each side, the ovipositor black.

*Hab.* Malacca (Mount Ophir).

8. *BRACON INQUIETUS*. *B. capite thorace pedibusque anticis et intermediis ferrugineis, abdomine alis maculaque metathoracis nigris*.

*Female*. Length 9 lines. Head, thorax, anterior and intermediate legs, ferruginous; the face with a triangular flattened projecting appendage at the base of the clypeus; the antennæ black, the head quadrate, smooth and shining. Thorax smooth and shining, with a black spot on the metathorax above; the wings and posterior legs black. Ab-

domen finely rugose, the basal segment with two deeply impressed smooth longitudinal channels, the lateral margins yellow, beneath yellow; the ovipositor with its sheaths very pubescent.

*Hab.* Sarawak.

This species probably belongs to the genus *Myosoma* of Brullé.

9. *BRACON RUGIFRONS.* *B. niger*, capite thorace pedibusque anticis et intermediis ferrugineis, alis nigris.

*Female.* Length 5 lines. Black: head, thorax, anterior and intermediate legs ferruginous, the scape ferruginous; the thorax and the vertex smooth and shining, the face rugose; the head subquadrate; the thorax much narrowed towards the head; the mesothorax with two longitudinal smooth elongate impressed lines converging towards the scutellum; the wings of a uniform dark fuscous. Abdomen: the three basal segments longitudinally and irregularly striated; the basal segment margined laterally and having a central carina, the second segment with a central and two converging carinæ; the third segment with a deep transverse depression, the apical margin smooth and shining; the fourth segment irregularly depressed and striated at the base.

*Hab.* Borneo (Sarawak).

10. *BRACON FLORALIS.* *B. niger*, capite thorace pedibusque anticis ferrugineis, antennis pedibusque intermediis et posterioribus, alis et abdomine maculaque metathoracis nigris.

*Female.* Length  $6\frac{1}{2}$  lines. Head, scape of the antennæ, thorax, anterior and intermediate legs, ferruginous; the head and thorax very smooth and shining; the thorax narrowed anteriorly into a neck; the mesothorax with two elongate converging smooth impressed lines; the metathorax dark rufo-piceous above, with a bright ferruginous line down the centre; the intermediate tibiæ and tarsi black; wings dark brown, with a hyaline spot at the inferior angle of the first submarginal cell. Abdomen smooth and shining; the first segment with a deeply impressed channel on each side, and a central impressed line extending from the base half way towards the apex; the second segment with a spear-shaped elevation in the middle of its base, and a lateral deep longitudinal excavation at the sides; the third segment with an oblique impressed line at the sides.

*Hab.* Borneo (Sarawak).

11. *BRACON VULTUOSUS.* *B. capite thorace pedibusque anticis ferrugineis*, abdomine pedibusque intermediis et posticis, abdomine maculaque metathoracis nigris.

*Female.* Length 7 lines. Black: head, thorax and anterior legs, the scape and basal joints of the flagellum in front, ferruginous; the face with a projecting flattened appendage at the base of the clypeus; the scape fringed with black hairs on its inner margin. Thorax smooth and shining; the metathorax obscure, black in the middle and

rufo-piceous at the sides, above; wings fuscous, palest towards their apex, with the stigma yellow; the intermediate legs with the knees ferruginous. Abdomen opaque, finely rugose; the basal segment with a longitudinal striation, a deeply impressed space at the sides, with the extreme lateral margins, yellow; the second segment with a small arrow-headed raised shape in the middle of its base and an oblique impressed line on each side; the two following segments have also oblique impressed lines at the sides; the third and fourth segments with their apical margins straight in the middle and abruptly oblique at the sides.

*Hab.* Singapore.

12. *BRACON FOVEATUS*. *B. capite thorace pedibusque anticis ferrugineis, alis nigris, ovipositoreque elongato pubescentibus.*

*Female.* Length 7 lines. Black: head, thorax, scape in front and the anterior legs, ferruginous; the face punctured, the thorax smooth and shining; the mesothorax with two converging longitudinal depressions extending to the scutellum; the wings dark fuscous; the intermediate tibiae at their apex in front obscurely ferruginous. Abdomen: the four basal segments longitudinally rugose; the basal segment with a longitudinal smooth shining depression on each side; the second segment with two triangular smooth depressions and a longitudinal one on each side running onwards and terminating in a large fovea; the third and fourth segments with a smooth shining fovea on each side, the fifth and sixth segments smooth and shining; the ovipositor more than twice the length of the insect, and very pubescent.

*Hab.* Singapore.

13. *BRACON LABORIOSUS*. *B. capite thoraceque flavo-variegatis, pedibus anterioribus et intermediis flavis, abdomine annulis flavo-marginatis.*

*Female.* Length 7 lines. Black: the face, mandibles and cheeks, of a reddish-yellow; a black triangular spot in the middle of the face. Thorax shining, much narrower towards the head; a line before the tegulae uniting with a large spot beneath the wings, a transverse space between the posterior wings, the metathorax above, the tegulae and legs, yellow; a transverse black patch at the base of the metathorax with a line running backwards from each extremity; the posterior legs black with the knees yellow; the wings yellowish-hyaline, the nervures pale ferruginous, the apex of the wing slightly fuscous, a black spot at the base of the first submarginal cell, the stigma pale ferruginous. Abdomen: the basal segment yellow, with a shining black spot in the middle; the apical margins of the four following segments yellow; the abdomen yellow beneath, with an elongate black line on each side of the segments.

*Hab.* Borneo (Sarawak).

14. *BRACON CRASSIPES*. *B. capite thorace pedibusque anticis ferrugineis,*

metathorace supra nigro-piceo, abdomine pedibusque intermediis et posticis nigris, alis hyalinis basi fuscis.

*Female.* Length 8 lines. Head smooth and shining; antennæ and tips of the mandibles black; clypeus deeply emarginate. Thorax: much narrowed towards the head, smooth and shining; the wings subhyaline, the posterior pair fuscous towards the base, the superior pair yellowish, the nervures pale ferruginous, the costal nervures dark ferruginous, the stigma pale; the legs thick, particularly the posterior pair, the intermediate tibiæ ferruginous at the base. Abdomen: the basal segment at right angles with the following segments; the base of the second segment with an impressed oblique line on each side, and a central carina, each extending to about the middle of the segment; all the segments of an opaque black, and margined posteriorly; the margin of the second segment curved and strongly crenulated, the abdomen yellow beneath.

*Hab.* Singapore.

Gen. AGATHIS, *Latr.*

1. *Agathis flavipennis*, *Brullé, Hym.* iv. p. 484. 3.

*Hab.* Singapore. India.

Gen. MICRODUS, *Esenbeck.*

1. *MICRODUS APICALIS.* *M.* capite thorace pedibusque anticis et intermediis pallide ferrugineis, abdomine pedibusque posticis, mesothorace trimaculati et metathorace supra nigris, alis flavescentibus apice fuscis.

*Female.* Length  $5\frac{1}{2}$  lines. Head and thorax pale red; the antennæ, a spot enclosing the ocelli and the eyes, black. Thorax: the mesothorax divided into three elevations by two oblique converging deeply impressed lines, each division with a black stripe in the middle; wings yellow, fuscous beyond the apex of the stigma, the fuscous cloud inclining inwards and crossing both wings. Abdomen: the three basal segments longitudinally striated; their lateral margins and the apical margin of the basal segment, yellow; the abdomen yellow beneath. The ovipositor about the length of the insect.

*Hab.* Singapore.

Fam. CHALCIDIDÆ, *Walker.*

Gen. EPISTENIA, *Westwood.*

1. *EPISTENIA IMPERIALIS.* *E.* capite thoraceque purpureis rude punctatis, alis hyalinis, abdomine versicolori, segmentis apicalibus basi testaceis.

*Female.* Length  $7\frac{1}{2}$  lines. Head and thorax of a rich purple, the metathorax with tints of bright green; the legs black, the apex of the joints rufo-piceous as well as the apical joints of the tarsi. Abdomen: of

changeable hues, partaking of tints of blue, purple, violet or green, in different lights; the three basal segments deeply emarginate above, with central longitudinal depressions extending to their base; the ovipositor thick and pubescent, two-thirds of the length of the abdomen.

*Hab.* Borneo (Sarawak).

This beautiful insect appears to belong to the genus *Epistenia*, established by Westwood in Griffith's 'Animal Kingdom;' if not so, it is very closely allied.

Fam. CHRYSIDIDÆ, *Leach.*

Gen. HEDYCHRUM, *Latr.*

1. *HEDYCHRUM ORIENTALE*. *H. viridi-cyaneum*, capite thoraceque confertissime punctulatis, abdominis segmenti tertii margine apicali arcuato integerrimo, alis subhyalinis.

Length  $2\frac{1}{2}$  lines. The head and thorax very coarsely punctured, the abdomen more delicately so; the abdomen of a bright green, with blue tints in different lights, the flagellum fusco-testaceous, the mandibles ferruginous at their apex; the deep concavity of the face, in which the scape rests in repose, delicately transversely striate; the tooth at the lateral angles of the metathorax acute; the abdomen nigro-æneous beneath, with a thin, short, glittering pale pubescence, the apical segment widely emarginate.

*Hab.* Singapore.

Gen. CHRYSIS, *Linn.*

2. *CHRYSIS MALACHITICA*. *C. crassissime punctata viridi-cyanea*, thorace viridi-aureo, alis fusco-hyalinis, abdominis segmentis apicalibus dentibus sex armatis.

Length  $4\frac{1}{2}$  lines. Metallic green, splashed with gold on the thorax and sides of the abdomen; the flagellum, mandibles, and tarsi black; the hinder margin of the vertex tinged with blue. The disk of the thorax blue; the tegulæ and nervures of the wings with a purple tinge; the wings subhyaline and iridescent; the lateral posterior angles of the metathorax acute; the post-scutellum produced, the apex truncate. Abdomen: more finely punctured than the head and thorax, but most strongly so at the base; the basal margin with a deep excavation on each side, the lateral angles somewhat produced and obtuse; the basal margin of the second segment blue; the apical margin of the third segment armed with six acute teeth.

*Hab.* Borneo (Sarawak).

3. *CHRYSIS VESTIGATOR*. *C. viridis nitens purpureo variegata*, punctatissima, abdominis segmentis margine basali nigro-æneis, antridenticulato.

Length  $3\frac{1}{2}$  lines. Green, with shades and spots of deep blue; the tarsi, flagellum and mandibles, black; the head and thorax coarsely and

deeply punctured, the abdomen more finely so; one or two of the basal joints of the flagellum green above; the region of the ocelli blue. Thorax: a transverse blue line in the middle of the prothorax; the mesothorax with an oblong-quadrate blue shape in the middle; the wings subhyaline with the nervures brown. The abdomen with a central longitudinal smooth line; the middle of the abdomen tinged with rich blue; the apex distinctly tridentate.

The valuable collection of *Hymenoptera* which I have described, and, by permission of the Society, have had the pleasure of laying before them, is the property of W. W. Saunders, Esq., Fellow of the Society, and is the most complete collection formed by Mr. Wallace. In addition to the interest attached to the description of new species, I have endeavoured to show the extent of the known geographical range of those already described. Of the family *Apidae*, forty-one species are enumerated, twenty-six of which are new. It is, however, to the *Formicidae* that the most valuable additions are made: of the eighty-five species collected, only seven have been previously described; ten are added to the *Mutillidae*, forty-one to the Fossorial group, and thirteen to the family *Vespidae*. This enumeration will serve to give some idea of the valuable additions to science, resulting from the labours of Mr. Wallace, in collecting the insects of the Eastern Archipelago.

#### DESCRIPTION OF THE PLATES.

##### TAB. I.

Fig.

1. Tongue of *Ptenoplectra chalybea*. 1 a, labial palpi; 1 b, paraglossæ; 1 c, labium.
2. The maxilla of *Ptenoplectra chalybea*. 2 a, maxillary palpus.
3. The posterior leg of *Ptenoplectra*.
4. Calcar or spur on the posterior tibia of *Ptenoplectra*.
5. Anterior wing of *Ptenoplectra*.
6. *Myrmica longipes*, ♂.
7. The labial palpi of *Polyrhachis*.
8. Maxillary palpi of *Polyrhachis*.
9. Thorax and abdomen of *Polyrhachis bihamata*.
10. Labial palpi of *Heptacondylus*. 11. Maxillary palpi of the same.
12. Wing of the same. 13. Profile of the same. 14. Antennæ of the same.
15. Profile of *Physatta*. 16. Labial palpi of the same. 17. Maxillary palpi of the same. 18. Wing of the same. 19. Antennæ of the same.



Fig.

20. *Cerapachys oculatus*. 21. Head of the same. 22. Wing of the same.  
23. Antennæ of the same. 24. Abdomen of the same.  
25. *Echinopla melanarctos*. 26. Section of the abdomen of the same,  
showing the styles, or blunt spines, with hairs on their summits,  
which cover the abdomen above. 27. Maxillary palpus of the same.  
28. Mandible of the same. 29. Labial palpus of the same.

TAB. II.

1. *Myrmosida paradoxa*. 1 a, antennæ; 1 b, wing.  
2. *Crematogaster inflata*. 1 b, wing; 1 c, manble.  
3. *Cataulacus horridus*.  
4. *Cataulacus insularis*. 4 a, anterior wing.  
5. *Meranoplus cordatus*. 6. *Meranoplus mucronatus*.  
7. *Meranoplus castaneus*. 8. *Cataulacus reticulatus*.  
9. Tongue of *Gayella pulchella*. 9 a, labial palpi; 9 b, paraglossæ. 10.  
Maxilla. 10 a, maxillary palpi.  
11. Anterior wing of *Gayella pulchella*.

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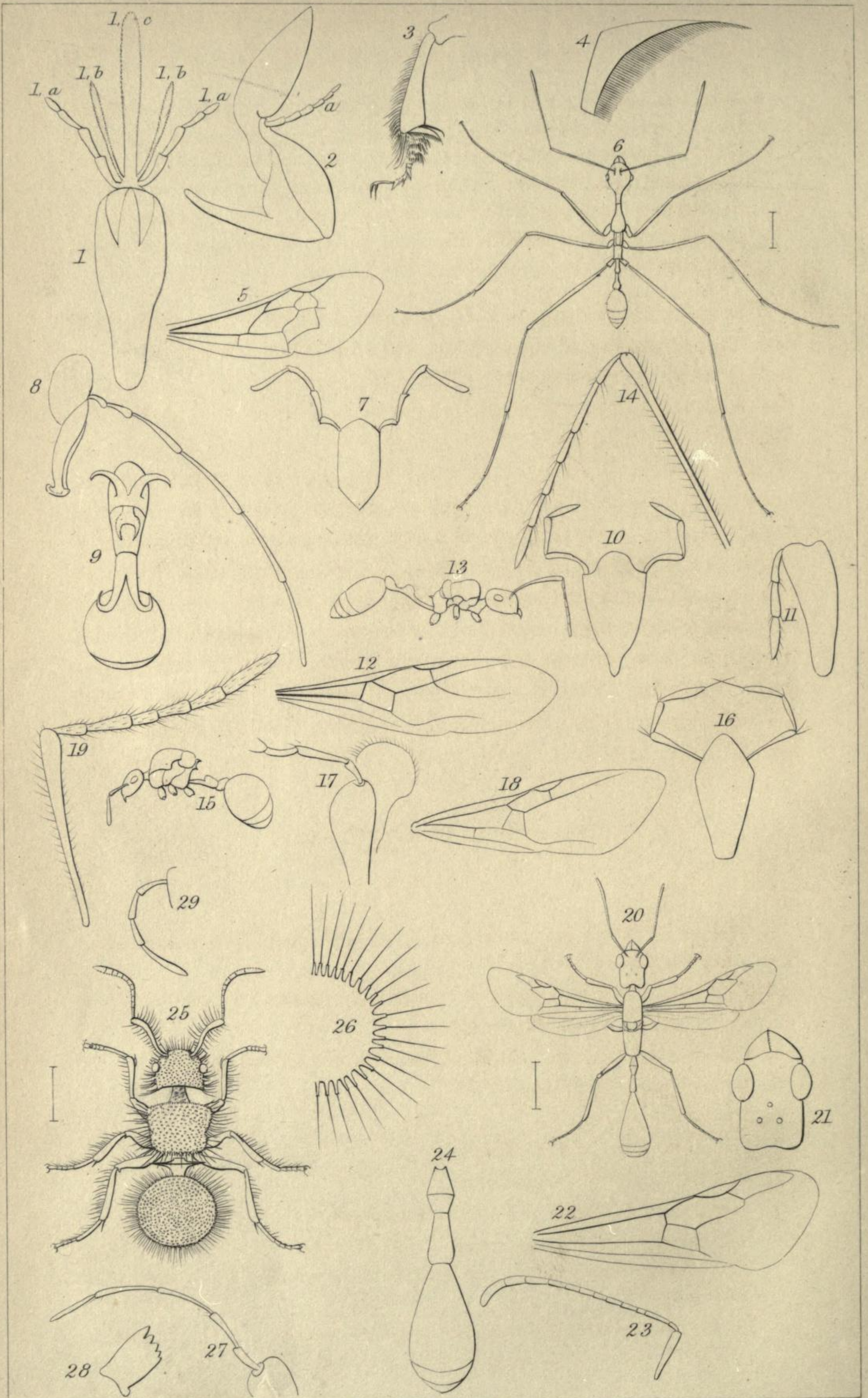
On the general Geographical Distribution of the Members of the  
Class AVES. By PHILIP LUTLEY SCLATER, Esq., M.A.,  
F.L.S.

[Read June 16th, 1857.]

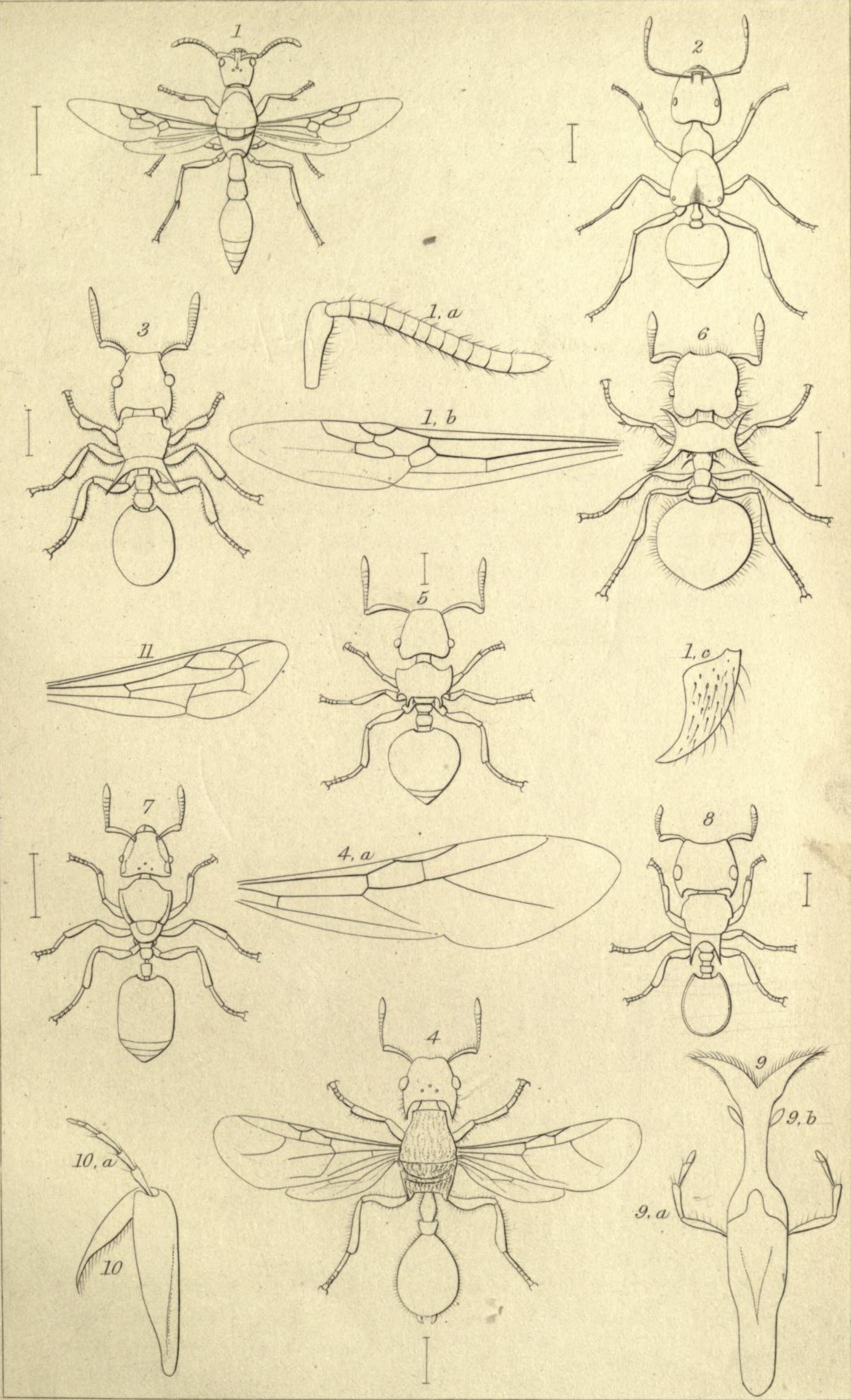
AN important problem in Natural History, and one that has hitherto been too little agitated, is that of ascertaining the most natural primary divisions of the earth's surface, taking the amount of similarity or dissimilarity of organized life solely as our guide. It is a well-known and universally acknowledged fact that we can choose two portions of the globe of which the respective Faunæ and Floræ shall be so different, that we should not be far wrong in supposing them to have been the result of distinct creations. Assuming then that there are, or may be, more areas of creation than one, the question naturally arises, how many of them are there, and what are their respective extents and boundaries, or in other words, what are the most natural primary ontological divisions of the earth's surface?

In the Physical Atlases lately published, which have deservedly attracted no small share of attention on the part of the public, too little regard appears to have been paid to the fact that the divisions of the earth's surface usually employed are not always those









Drawn & Etched by F Smith.