

Smith

Sarawak Hymenoptera I

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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.

[Read June 16th, 1857.]

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. CTENOPECTRA, *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 Nepaul.

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 late 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 tegulae 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 tegulae, a line on each side of the metathorax, a spot beneath the wings, the tubercles and legs, yellow; the coxae 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 $1\frac{2}{3}$ 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 tegulæ rufo-piceous; the wings hyaline and iridescent, the nervures dark ferruginous; the apical joints of the tarsi pale; the posterior tibiæ 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 $2\frac{1}{2}$ lines. Pale reddish-yellow; the flagellum fuscous above; wings reddish-brown, with their apex beyond the stigma milky-white; the intermediate and posterior tibiæ 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 $3\frac{1}{2}$ lines. Black: the scape of the antennæ 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 $3\frac{1}{2}$ 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 $1\frac{1}{2}$ 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 $2\frac{1}{2}$ 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 $2\frac{1}{2}$ 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 $2\frac{1}{2}$ 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 æconomy. 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 laete rufis; abdomine subtus pallide rufo-testaceo.

Female. Length 9 lines. Head shining, dark rufo-piceous; the carinae at the insertion of the antennae, the antennae, 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 tegulae 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 incrassate, 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 antennae 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; antennae 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 incrassate, rounded in front and truncate behind; the abdomen dark rufopiceous, 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 $5\frac{1}{2}$ 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 rufo-piceous; 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 $3\frac{1}{2}$ 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 $3\frac{1}{2}$ 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 unispinosus, 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 $2\frac{1}{2}$ 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 $2\frac{1}{2}$ 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 VINDEK*. *P. niger*, subnitidus; thorace supra deplanato, 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 subseriata, thorace transversim striato.

Worker. Length $4\frac{1}{2}$ lines. Reddish-brown: the coxae, 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. hamatodes*, 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 $4\frac{1}{2}$ 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 striæ.

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 abdo-
minisque 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 incassate, 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-irides-
cens; 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 $3\frac{1}{4}$ 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 striae 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 antennae 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 striae on the vertex diverging from the centre; the antennae 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.* rufescens-fusca; antennis elongatis; thorace ovato, postice truncato; alis hyalinis; abdominis nodo incrassato, subtus spinis duabus parvis armato.

Male. Length 4 lines. Red-brown: antennae 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 $2\frac{1}{2}$ 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 *Celiocæys* 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 $2\frac{3}{4}$ lines. Dark rufo-fuscos: 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, obsoletely 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, binodî.

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; tarsis rufo-piceis.*

Worker. Length $1\frac{1}{4}$ 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 $1-1\frac{1}{4}$ 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 tibiæ 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 striæ; 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 $1\frac{3}{4}$ 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 $1\frac{1}{2}$ –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. Taprobanæ*, 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 $3\frac{3}{4}$ 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, fasciaeque 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 5-5½ 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, fasciaque 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 pedequo 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).



