THE INDO-AUSTRALIAN SPECIES OF THE GENUS *ROPALIDIA* (= ICARIA) (HYM., VESPIDAE)

(First part)

By

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> "*Icaria* is a very interesting genus which should be thoroughly studied".
> (F. X. WILLIAMS, 1919).

The Vespid genus *Ropalidia* GUÉRIN-MÉNEVILLE (syn. *Icaria* DE SAUSSURE) is spread over the Ethiopian, Oriental and Australian regions and contains a considerable number of species.

For some general information on the synonymy, the characters, the distribution and the ethology of the genus I may refer to the well-known work of J. BEQUAERT on the Vespidae of the Belgian Congo [1]).

A few Indo-Australian *Vespidae,* now regarded as belonging to the genus *Ropalidia,* have already been described, under other generic names, about the beginning of the nineteenth century (by WEBER and FABRICIUS), and since that time various authors (SMITH, DE SAUSSURE, CAMERON a.o.) have described numerous new species from this part of the world. Nevertheless our knowledge of the genus was far from satisfactory, because the existing descriptions are for the greater part very incomplete and sometimes even incorrect.

The difficulties involved in the identification of the *Ropalidia* species must certainly be regarded as the main cause for the fact that up to the present so little has been published about the extremely interesting life history of these wasps. For many species are quite common, and observations on their nesting and feeding habits can easily be carried out in various localities. It is therefore hoped that the present revision, by facilitating the determination of these insects, will stimulate the interest of field entomologists in the study of their life histories.

During my leave in Europe in 1933-'34 I had an opportunity to study most of the types of the previously described species, preserved in the Museums at Amsterdam, Leiden, London and Oxford. A careful study of these specimens has revealed, that many species have been misunderstood by the recent authors, so that in most Museum collections even the commonest species are incorrectly named. Furthermore I could ascertain that various forms, described as new

[1]) Bull. Amer. Mus. Nat. Hist. XXXIX, 1918, pp. 1 - 384.

species, are either invalid or merely represent subspecies or varieties of formerly described species.

The results of my studies as regards the nomenclature of the species discussed in the first part of this paper are as follows:

1. "Species", to be regarded as subspecies or varieties.

I. duchaussoyi GRIB. = *R. marginata* (LEP.), subsp. *duchaussoyi* (GRIB.).
I. erythrospila CAM. = *R. malayana* (CAM.), var. *erythrospila* (CAM.).
R. gravelyi DOVER & RAO = *R. rufoplagiata* (CAM.), var. *gravelyi* (DOVER & RAO).
I. jacobsoni BUYSS. = *R. variegata* (SM.), subsp. *jacobsoni* (BUYSS.).
I. jucunda CAM. = *R. marginata* (LEP.), subsp. *jucunda* (CAM.).
I. lugubris SM. = *R. sumatrae* (WEB.), subsp. *lugubris* (SM.).
I. nigroplagiata CAM. = *R. mathematica* (SM.), subsp. *nigroplagiata* (CAM.).
I. parvimaculata CAM. (1907) = *R. malayana* (CAM.), var. *parvimaculata* (CAM.).
I. torrida SM. = *R. mathematica* (SM.), subsp. *torrida* (SM.).
I. unicolor SM. = *R. mathematica* (SM.), subsp. *unicolor* (SM.).

2. "Species", considered to be identical with previously described species or subspecies.

I. bilineata CAM. = *R. cyathiformis* (F.).
I. cagayanensis ASHM. = *R. cyathiformis* (F.).
I. ceylonica CAM. = *R. cyathiformis* (F.).
I. cohni BUYSS. = *R. gregaria* (SAUSS.).
Anthreneida coronata WHITE = *R. sumatrae* (WEB.).
R. delicata DOVER = *R. malayana* (CAM.).
Eumenes formicaria F. = *R. sumatrae* (WEB.).
I. fulvipennis GRIB. = *R. modesta* (SM.).
I. impetuosa SM. = *R. gregaria* (SAUSS.).
I. intermedia CAM. = *R. picta* (SAUSS.).
I. maculifrons CAM. = *R. picta* (SAUSS.).
I. marangensis GRIB. = *R. sumatrae* (WEB.).
Vespa mutillata ILL. = *R. sumatrae* (WEB.).
I. pendula SM. = *R. variegata* (SM.).
I. pruinosa CAM. = *R. marginata* (LEP.), subsp. *jucunda* (CAM.).
Polistes pubescens F. = *R. sumatrae* (WEB.).
I. rufinoda CAM. = *R. sumatrae* (WEB.).
I. socialis SAUSS. = *R. mathematica* (SM.), subsp. *unicolor* (SM.).
I. speciosa SAUSS. = *R. sumatrae* (WEB.).
I. spilocephala CAM. = *R. gregaria* (SAUSS.).
I. ungulata BINGH. = *R. modesta* (SM.).

3. New names for species or subspecies, the present names of which are invalid.

R. binghami m. (= *I. sumatrae* BINGH., nec WEB.).

R. magnanima m. (= *I. guttatipennis* BINGH., nec SAUSS., ♀).

R. marginata (LEP.), subsp. *indica* m. (= *Vespa ferruginea* FABR., nec GMEL., nec OLIV.).

R. marginata (LEP.), subsp. *rufitarsis* m. (= *I. guttatipennis* BINGH., nec SAUSS., ☿).

R. marginata (LEP.), subsp. *sundaica* m. (= *Polistes sumatrae* F., nec *Vespa sumatrae* WEB.).

4. New species, subspecies and varieties, described in the following pages.

R. artifex (SAUSS.), var. *fuscata* m.

R. celebensis m.

R. colorata m., with var. *sordida* m.

R. crassa m.

R. granulata m., with subsp. *borneensis* m.

R. hongkongensis (SAUSS.), subsp. *juncta* m.

R. magnanima m., subsp. *albitarsis* m.

R. mathematica (SM.), subsp. *binotata* m.

R. rufocollaris (CAM.), subsp. *atrata* m.

R. rufoplagiata (CAM.), subsp. *nursei* m.

R. stigma (SM.), subsp. *rufa* m.

R. variegata (SM.), subspp. *dichroma, flavinoda* and *interrupta* m.

5. Species, described by P. CAMERON under the generic name *Icaria*, but since then correctly transferred to other genera.

"Icaria" annulipes, carinata (nec SAUSS.) (= *cameroni* D.T. = *carinifera* SCHULZ), *fulvinerva, fuscipennis, leptogaster, longipetiolata, quadrimaculata, singapurensis, sulciscutis, tinctipennis,* and *wroughtoni* all belong to the subfam. *Polybiinae. I. flavobilineata* is a *Polistes*.

6. A species described by error from the Oriental region.

I. formosa SAUSS., Ét. fam. Vesp. II, 1853, p. 37 (India), the type of which I have studied in the Br. Mus., appears to be identical with *Ropalidia hova* (SAUSS.), described from Madagascar (cf. BEQUAERT, Bull. Am. Mus. Nat. Hist. XXXIX, 1918, p. 342). The latter name must be sunk into synonymy.

Subdivision of the genus. — BEQUAERT (l.c.) has discussed the trials, made by previous authors, to divide the genus into subgenera. In his opinion the species may perhaps form three natural divisions, distinguished by differences in the shape of the abdominal segments and in the structure of the

mesopleura. This last character is regarded by me as being the most valuable, and I have therefore united in the first part of this paper all species belonging to BEQUAERT's group 2b, which is characterized by the presence of a raised vertical carina in the anterior part of the mesopleura. As I have recently pointed out, the separation thus made seems to be supported by differences in the habits of the species [1]). The possibility to divide the other species into natural groups will be discussed in the second part of this publication, but it may be mentioned here that there appear to be various forms intermediate between the groups 1 and 2a.

Subspecies and varieties. — The coloration of many of the *Ropalidia*-species is very variable. Therefore, as in other groups of the *Vespidae*, the chief characters of the species must be sought in structure and sculpture. In accordance with other authors I do not regard the differences in coloration as being of specific value. Nevertheless I have paid much attention to the coloration, because almost every species appears to have its own specific colour pattern, and often this pattern is recognizable in even the most extreme variations. Sometimes the colour variations are connected by all possible transitions, occurring in the same area, and in such cases I have at most described the extreme forms as varieties. Other colour forms, however, appear to be rather constant and when these are restricted to certain geographic areas, I have used for them the term subspecies. BEQUAERT has avoided this term in his works on the *Vespidae*, because it has been used for different subdivisions of a species (l.c., p. 12), but I think it may be used with advantage for those variations representing a species in a part of its distribution area.

References. — In the literature references, the generic and specific names used by previous authors are given only if they differ from the names used in this paper. The „!" before a reference indicates that I have studied one or more of the specimens (types in case of new species) described by the author concerned. The catalogues of DALLA TORRE (Catalogus Hymenopterorum, vol. IX, 1894, and Genera Insectorum, vol. 19, 1904) have not been included in the reference lists.

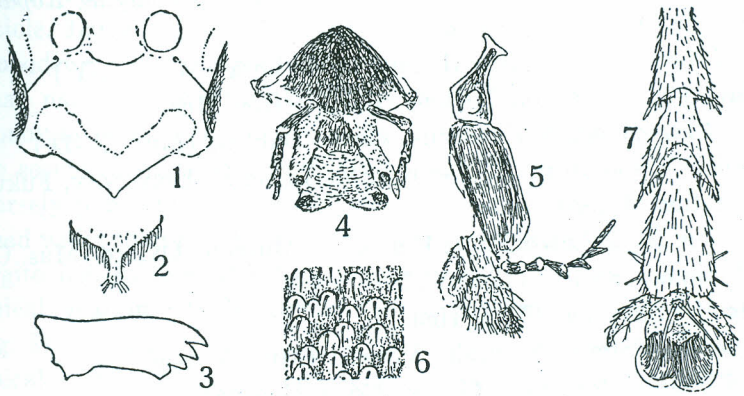
Characters. — The specific characters are given in the following order: morphology of head, thorax, abdomen, wings; sculpture; pubescence; length (from anterior face of head to the posterior margin of second tergite = h. + th. + t. 1 + 2); coloration. A few notes may serve to elucidate the descriptions.

The relative dimensions of various parts of the body are indicated by numbers, obtained by micrometer-measurings.

The shape of the head is of some importance; as a rule I have compared the greatest width with the height (distance between top of ocelli and apex of clypeus) and with the width of the thorax (measured just in front of the tegulae); furthermore the greatest width of the temples is compared with the

[1]) J. VAN DER VECHT, The nesting habits of *Ropalidia flavopicta* (SM.). Entom. Meded. Ned. Indië, 6, 1940, pp. 47 - 50.

width of the eyes, as the head is seen in profile. The shape of the clypeus (fig. 1) is not very variable; it is pentagonal, more or less convex, the upper side with a median emargination, the lateral sides contiguous with the eyes over a distance of varying length, the free sides strongly converging towards the apex which is often produced into a minute tooth. For comparisons of length and width the former is measured from the upper side (not from the centre of the emargination) to the apex; as the width is taken the smallest distance between the eyes. — The mouth parts (figs. 2 - 5) have not been described, as they are very uniform throughout the genus: mandibles short, with four teeth, the inner of which is shorter and blunter than the others; labrum small and hidden under the clypeus, weakly chitinized, strongly produced in the middle, its anterior margin with a row of long bristles; maxillary and labial palpi resp. with 6 and 4 segments.



Figs. 1 - 7. *R. malayana* (CAM.); 1. clypeus; 2. labrum; 3. mandible; 4. labium; 5. maxilla; 6. puncturation of second abdominal tergite; 7. apical tarsal segments of mid leg.

The length of the first abdominal segment or petiole has always been measured from the end of the basal slit to the posterior edge of the tergite. Particularly in some of the commoner species the shape of the two basal abdominal segments appears to be slightly variable, when a large number of specimens is examined.

In the species described in the first part of this revision the major part of the body is densely punctate; the punctures are often rather shallow and bear a short central bristle or hair; similar punctures on the second tergite are often not margined posteriorly (fig. 6). The posterior part of the postscutellum is as a rule impunctate in the middle, the size of this space (polished area) is in some species larger than in others.

The legs do not appear to present characters which may be used for the discrimination of the species; the middle and posterior tibiae each have two apical spurs, the inner spur of the hind legs is always broader than the outer one; fourth tarsal segment bilobate, the fifth segment with two simple claws of equal size and a distinct pulvillus (fig. 7).

Apart from the normal secondary sexual characters (13 antennal segments, 7 visible abdominal segments) the males differ from the females as follows: body generally somewhat smaller and more slender, head flatter, clypeus less convex, eyes more strongly swollen, temples narrower; antennae as a rule somewhat thinner, in most species the segments of the flagellum with elongate swellings at their underside, the tyloides, which in some species are dentiform (fig. 32), in others they give the flagellum the appearance of being serrate, as seen in profile (fig. 27); seventh abdominal sternite flat, rounded posteriorly. In the males of many species the head is more extensively marked with yellow than in the opposite sex.

Material studied. — The present revision would not have been possible without the generous help and cooperation of various institutions and private entomologists. My sincere thanks are firstly due to the authorities of the following Museums, for giving me the opportunity of studying *Ropalidia*-specimens preserved in their collections.

American Museum of Natural History, New-York (Mus. N.-Y.) [1].

British Museum of Natural History, London (Br. Mus.).

Deutsches Entomologisches Institut, Berlin-Dahlem (Mus. B.-D.).

Entomological Laboratory of the Kyushu Imperial University, Fukuoka, Japan (Kyushu Imp. Univ.).

Hope Department of Entomology, University Museum, Oxford (Mus. Oxf.).

Indian Museum, Calcutta (Mus. Calc.).

Musée Heude, Shanghai (Mus. Heude).

Museo Civico di Storia Naturale, Venezia (Mus. Venice).

Muséum d'Histoire Naturelle, Genève (Mus. Geneva).

Naturhistorisches Hofmuseum, Wien (Mus. Vienna).

Rijksmuseum van Natuurlijke Historie, Leiden (Mus. L.).

Sarawak Museum, Kuching, Sarawak (Mus. Sar.).

Selangor Museum, Kuala Lumpur, F.M.S. (Mus. K. L.).

Zoölogisch Museum, Amsterdam (Mus. Amst.).

Zoölogisch Museum, Buitenzorg (Mus. Btzg.).

Many interesting specimens have been received for study from Prof. J. BEQUAERT, Boston, whose helpful suggestions are also very much appreciated, from Dr. A. VON SCHULTHESS, Zürich, and from Mrs. M. E. WALSH, Semarang, Java. I am much indebted to Dr. B. M. HOBBY, the Chief Entomologist of the Oxford University Expedition to British North Borneo [1]) in 1932, for the loan of the material collected by this expedition. Furthermore I studied the collections of Dr. J. G. BETREM, Semarang, Java, and of Prof. W. ROEPKE, Wageningen, Holland. Finally this paper deals also with the species collected by myself in Java, Sumatra, Borneo and Bangka Island.

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[1]) Abbreviations used in the following pages are added in brackets.

[1]) A general account of this expedition, containing a map of the areas visited, is given by T. H. HARRISSON in 1933 in the Geographical Journal, pp. 385 - 410.

Key to the Indo-Australian Ropalidia-species.

The following key has been restricted to the females, as these are much commoner than the males; if however the secondary sexual differences, mentioned on p. 108 are taken into account, the key may also be used for the latter sex.

A. Mesopleura with a more or less distinct raised vertical carina in their anterior part. Pro- and mesonotum densely punctate. Antennae of male with tyloides, sometimes serrate or dentate. 1

B. Mesopleura without raised vertical carina in their anterior part. Puncturation in some species very sparse. Antennae of male, so far known, not serrate or dentate, tyloides sometimes absent. (These species will be discussed in the second part of this paper).

1. Propodeum with two basal convergent carinae, running from the posterior lateral angles of the postscutellum in the direction of the base of the petiole. Large species (11 - 17 mm). 2
— Propodeum without such carinae. 5
2. Head narrower than the thorax just before the tegulae. Horizontal part of pronotum rather long in the middle, coarsely punctate. Apical margin of the second abdominal tergite armed with a row of spines or teeth. Body coarsely punctate, clypeus with scattered punctures. 3
— Head wider than the thorax just before the tegulae. Apical margin of second tergite not spinose. Puncturation less coarse, clypeus densely punctate. 4
3. Apical margin of the second tergite with rather long and sharp spines (fig. 8). ..... *R. binghami* m., p. 113
— Apical margin of the second tergite with short and blunt teeth (fig. 9). *R. pilosa* (SM.), p. 116
4. Large species, 14 - 17 mm. Second abdominal segment black or brown, with at most a vague indication of a pale apical fascia. Basal tarsi of legs II and III pale yellowish white. (Ultimate antennal segment of male more than twice as long as wide in the middle). ..... *R. magnanima* m., p. 125
— Smaller, 11 - 13 mm. Second abdominal segment as a rule with a distinct pale apical fascia, more rarely uniformly ferruginous or brownish black. *R. marginata* (LEP.), p. 117
5. Abdominal petiole flask-shaped, about 2 - 2½ times as long as wide and 3 times as long as high (figs. 19 - 28). Propodeum evenly rounded, finely transversely striate, the median furrow narrow and shallow, usually obsolete at the base; rarely entirely black, as a rule with two longitudinal markings which are nearly always connected in the median line of the propodeum. Second abdominal segment with a yellow apical fascia, rarely entirely dark; as seen in profile, its sternite distinctly more convex than the tergite (except in *R. artifex*). Stigma of wings yellowish, radial cell with a dark cloud. ..... *stigma*-group, 6
— Abdominal petiole shorter; when it is nearly as long as in the *stigma*-group, the propodeum has a well pronounced median concavity or it is not trans-

versely striate; yellow markings of propodeum, if present, separated by a median dark or ferruginous line. 10

6. Tergite of second abdominal segment more or less strongly raised posteriorly in the middle, as seen from behind not evenly rounded. (Mesonotum black). ..... *R. artifex* (SAUSS.), p. 134

— Tergite of second abdominal segment normal 7

7. A large species (12 - 13 mm), with long and slender antennae, third antennal segment more than three times as long as wide at apex. Mesonotum, metapleura and sides of propodeum black. Clypeus with a small yellow spot at apex. ..... *R. rufocollaris* (CAM.), p. 137

— Smaller or otherwise different. 8

8. Clypeus red, with a yellow spot at the apex. Scutellum red; sides of petiole with a short yellow line at the base. Yellow fascia of the pronotum narrow, often distinct in the middle only. Yellow spots at base of second tergite small. ..... *R. hongkongensis* (SAUSS.), p. 139

— Sides of clypeus more or less yellow. 9

9. Metapleura punctate, the punctures superficial, most distinct as the thorax is seen from behind. Head rather thick, not much narrowed behind the eyes. Sides of the petiole rufous, rarely with indication of a yellow mark at the base. Second sternite rarely with yellow spots. *R. mathematica* (SM.), p. 130

— Metapleura impunctate. Head distinctly narrowed behind the eyes. Sides of the petiole with a distinct yellow line at the base. Second sternite as a rule with a large yellow spot on each side of the base.
R. stigma (SM.), p. 126

10. Petiole almost as slender as in the species of the *stigma*-group; propodeum with a well pronounced concavity; body black, a transverse line on the pronotum, and the scutellum and postscutellum bright red.
R. scitula (BINGH.), p. 142

— Petiole either shorter, or more strongly swollen posteriorly. Coloration not as in *scitula*. 11

11. Mesonotum with coarse, round, crater-like punctures; the interspaces distinct and rather shiny, in the centre and near the tegulae as large as the punctures. Temples narrow, less than half the width of the eyes. Clypeus higher than wide. Petiole, as seen in profile, gradually swollen from the base to a point straight above the end of the sternite, where it reaches its greatest height (fig. 45). Median impression of propodeum wide and shallow. Second abdominal segment vertically cut off at the end. (Antennae of ♂ very characteristic: fig. 46). ..... *R. philippinensis* (SAUSS.), p. 163

— Mesonotum more densely punctate, the punctures usually finer and less deep; the interspaces very rarely flat, usually linear, the puncturation being more or less reticulate. Temples often wider. 12

12. Second abdominal sternite, as seen in profile, steeply sloping at the base, the greatest height of the segment at about ⅓ from the base; petiole long, slightly shorter than the second segment (figs. 29 and 30). Propodeum

entirely punctate, the puncturation reticulate and as dense as on the mesopleura, but slightly more irregular; the median impression wide and shallow. Mesopleura very strongly swollen. (Antenna of ♂: fig. 32).

R. taiwana SONAN, p. 143

— Second sternite more evenly rounded, or the median area of the propodeum impunctate, or the abdominal petiole shorter. 13

13. Second abdominal segment cylindrical, as seen from above distinctly longer than wide. Petiole often more than half as long as the second segment, parallel-sided at base, the posterior part strongly swollen, narrowed again towards the apex. Stigma of fore wing yellow, radial cell with an ill defined cloud in the distal two thirds. Face with a yellow mark between the antennae. 14

— If the second abdominal segment is longer than wide, the abdominal petiole is shorter than half the length of the second segment, or it is not narrowed at the apex, or the space between the eyes is dark. Apical cloud of fore wing often more distinct. 15

14. Second abdominal segment obliquely cut off at the end, the tergite being longer than the sternite (fig. 34).

R. picta (SAUSS.) and *R. gregaria* (SAUSS.), pp. 145 and 149

— Second abdominal segment vertically cut off at the end (fig. 37).

R. colorata m., p. 151

15. First abdominal tergite, as seen in profile, very abruptly swollen just behind the end of the basal slit (figs. 48, 50 and 51). Posterior margin of postscutellum slightly produced in the middle. Median excavation of propodeum rather wide and deep. 16

— First abdominal tergite gradually swollen. 18

16. Apical margin of first abdominal tergite strongly depressed, flattened, wide in the middle and narrowed towards the sides. Second abdominal segment as long as high. ..... *R. rufoplagiata* (CAM.), p. 165

— Apical margin of first abdominal tergite narrow and less flattened, slightly wider at the sides than in the middle. Second abdominal segment longer than high. 17

17. First abdominal tergite very strongly swollen posteriorly (fig. 50). Second abdominal segment vertically cut off at the end.

R. plebeja (SAUSS. 1862), p. 169

— First abdominal tergite less swollen posteriorly (fig. 51). Second abdominal segment obliquely cut off at the end, the tergite slightly longer than the sternite. ..... *R. celebensis* m., p. 170

18. Radial cell with a well defined dark cloud which occupies the distal half or two thirds of the cell, the proximal part hyaline (fig. 40). 19

— Radial cell either entirely dark, or clouded along the anterior margin, or entirely yellow. 21

19. First abdominal segment very strongly swollen posteriorly, the second seg-

ment considerably longer than high (fig. 44). Body coarsely sculptured, moderately shiny. Length 9 mm. ..... *R. crassa* m., p. 162

— Petiole less swollen posteriorly (figs. 39 and 43). Sculpture finer, body less shiny. Smaller species, rarely over 8 mm long. 20

20. Clypeus dull and rather densely punctate. Head strongly swollen behind the eyes, the lower part of the temples distinctly visible as the head is viewed in front. The space between the ocelli raised to the level of the top of the posterior ocelli. Abdominal petiole 1½ times as long as wide; second segment longer than high. (Mandibles without a dark spot at the base; clypeus with a median longitudinal reddish or black line at the base). *R. variegata* (SM.), p. 154

— Clypeus, at least the anterior half, somewhat shiny, with scattered punctures. Head much narrowed behind the eyes, the lower part of the temples scarcely visible as the head is viewed in front. The space between the ocelli not raised. Abdominal petiole slightly wider than in the preceding species, less than 1½ times as long as wide; second segment about as long as high. (Mandibles with a dark spot at the base, clypeus with a dark transverse spot slightly below the centre). .... *R. cyathiformis* (F.), p. 158

21. Radial cell clouded along the anterior margin, the posterior part hyaline (fig. 53). 22

— Radial cell entirely dark or yellow, in the first case posteriorly at least darker than the cubital cells. 23

22. Abdominal petiole distinctly longer than wide. Second segment densely and finely punctate. ..... *R. horni* SONAN, p. 171

— Petiole short, wider than long. Second segment rather coarsely and rugosely punctate. ..... *R. malayana* (CAM.), p. 174

23. Sides and concavity of propodeum coarsely, rugosely punctate. Second abdominal tergite densely punctate, but the punctures well defined, locally with distinct, flat interspaces; the puncturation of the petiole very coarse and dense. Stigma and part of the wing veins yellow, radial cell yellowish. *R. modesta* (SM.), p. 187

— At least the median excavation of the propodeum finely sculptured. Second abdominal tergite as a rule densely, reticulately punctate, the interspaces linear. Stigma black or brown, rarely yellow; radial cell dark. 24

24. Second abdominal segment, as seen in profile, obliquely cut off at the end, the sternite distinctly longer than the tergite. Propodeum not obliquely striate near the posterior lateral angles of the postscutellum. Second tergite distinctly wider than long. Stigma dark. 25

— Second abdominal segment vertically cut off at the end or nearly so. Propodeum with fine oblique striae near the posterior lateral angles of the postscutellum. 27

25. Length of third antennal segment about 1¾ times its width at apex. Apical margin of second abdominal segment slightly depressed. *R. curvilineata* (CAM.), p. 177

— Length of third antennal segment 2½ - 3 times its width at apex. Apical margin of second abdominal segment very strongly depressed. 26

26. Second abdominal segment much wider than long (5: 4). Posterior ocelli four times as far from the eyes as from each other. Wings with a strong yellowish tinge. Second abdominal segment often partly reddish, its depressed apical margin indistinctly carinate. Length 12 -13 mm.
R. opulenta (SM.), p. 185

— Second abdominal tergite slightly wider than long. Posterior ocelli three times as far from the eyes as from each other. Wings not yellowish. Second abdominal segment apparently always black, its depressed apical margin strongly carinate. Length 10 - 11 mm. ..... *R. sumatrae* (WEB.), p. 181

27. Propodeum evenly rounded and shining; the median furrow narrow, not very deep, slightly narrowed towards the petiole; the median impressed line with some short transverse carinae; the surface on each side of the furrow very finely obliquely striate, but as these parts are yellow, the striae are only visible in certain lights. Subapical cloud of forewing not extending into the top of the third cubital cell.
R. latebalteata (CAM.), p. 178

— Propodeum with a wider median furrow, microscopically rugose and almost dull; the median impressed line without transverse carinae. The subapical cloud of the fore wings covers the radial cell and part of the third and fourth cubital cells. 28

28. Temples almost as wide as the eyes. Stigma dark. Coloration almost as in *R. sumatrae:* black, a line on the clypeus whitish, abdominal petiole red or black. ..... *R. granulata* m., p. 189

— Width of the temples at most two thirds of the width of the eyes. Stigma yellowish. Body more extensively marked with pale yellow.
R. ornatipes (CAM.), p. 180

Ropalidia binghami, new species.

!1897. BINGHAM, C. T., Fauna Brit. India, Hym. I, p. 389, fig. 119 ("*Icaria sumatrae* Web."), ♀ (♂!).

Female. — Head flat, seen in front scarcely wider than high (38: 36), seen from above very slightly excavated posteriorly, nearly three times as wide as long (38: 14), slightly narrower than the thorax (38: 40). Temples narrow, widest in the middle, where they are, as seen in profile, ⅔ as wide as the eyes. Inner orbits further apart on the vertex than at the clypeus (19: 15). Frons slightly convex, ocelli in a flat triangle, posterior ocelli almost twice as far from the eyes as from each other, the latter distance is nearly twice their diameter. Antennae scarcely further from the eyes than from each other, interantennal shield distinctly convex. Clypeus rather strongly convex, slightly longer than wide (17: 15), upper side deeply emarginate, apex rather sharply pointed. The anterior portion of the clypeus is only about half as long as the basal inter-ocular part. Mandibles as usual. Antennae rather slender, third segment

longer than the following two together, about three times as long as wide at apex, fourth segment distinctly longer than wide, tenth segment only about 1⅓ times as wide as long.

Thorax short, high and broad, less than 1½ times as long as wide. Pronotum long, truncate anteriorly, transverse carina distinct, but only slightly raised; the horizontal part is rather long in the middle; sides slightly converging towards the head, not sinuate. Mesonotum almost as wide as long, much narrowed anteriorly, slightly convex. Scutellum convex, postscutellum with a short horizontal part and a longer vertical posterior part, its posterior angles projecting. Mesopleura strongly swollen, mesopleural suture faintly indicated, epicnemial carina distinct. Propodeum short and steep, seen in profile slightly convex beneath; with two sharp and distinct carinae which start from the posterior angles of the postscutellum; the carinae are slightly curved inwards and distinctly converging, but do not reach the apex of the propodeum. The space between them is nearly flat at the base and has a shallow longitudinal impression in its apical half.

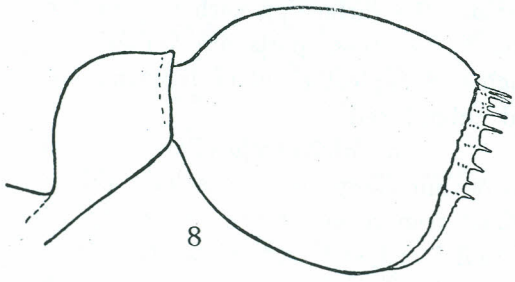


Fig. 8. *R. binghami* m.; first and second abdominal segments (♀).

Abdomen: fig. 8. First segment, seen from above, slightly longer than wide; its basal linear part is short and, dorsally, incised for the greater part of its length to take up the relatively long abdominal muscle. Second segment less than twice as wide as the first (40: 23), as seen from above distinctly longer than wide, roundly, but rather abruptly, widened at the base, its sides parallel, slightly converging towards the apical margin which is rather wide, strongly depressed and armed with a row of long and acute spines. These spines are only present on the tergite, they are longest in the middle and decrease somewhat in size towards the sides of the tergite; in the only specimen to hand there are also two shorter spines in the middle, between the long ones. The whole row consists of 17 spines, of which the longest are about twice as long as the depressed margin, and half as long as the third antennal segment. It is probable that the number and the length of the spines may prove to be somewhat variable. The apex of the second sternite is widely and shallowly emarginated, the depressed margin is slightly narrower than that of the tergite.

Wing venation: second cubital cell strongly narrowed at the top, it receives the first recurrent vein about in the middle and the second in ¾ of its base. Third cubital cell about as high as wide at the top, it is somewhat wider at the base, the third cubital nervure being distinctly oblique and slightly waved.

Body dull, except the mandibles, the clypeus, the face around and between

the antennae, the temples and the second sternite, which are more or less shining. Postscutellum with a small median polished area at the posterior margin.

Clypeus with scattered and fine punctures, more coarsely and densely punctate along the anterior margin, except in the middle, where a small triangular area is impunctate. Mandibles with distinct punctures. Frons, vertex, pro- and mesonotum, mesopleura behind the epicnemial carina, scutellum and postscutellum (except the polished area) densely and coarsely, reticulately punctate; the punctures on the metapleura slightly smaller, many of them being clearly separated. Propodeum on both sides of the carinae coarsely obliquely striate, rugosely punctate on the sides; median area dull, indistinctly sculptured at base, rugosely punctate at apex. The swollen part of the first tergite, and the second tergite, show about the same puncturation as the mesonotum, that on the former is even slightly coarser, particularly towards the apical margin. Puncturation of the second sternite much denser at the sides than in the middle, where the interspaces are very distinct.

The body is covered with a short and fine greyish tomentum; on the second tergite this tomentum is black, so that this part of the body has a deep black colour. The erect pubescence is denser and, especially on the propodeum and the abdomen, longer than in many other species.

Black; apex of mandibles and tarsal claws rufous brown, first abdominal segment brownish red, the basal linear part and an ill defined spot at the base of the swollen part of the tergite fuscous; apical margin and spines of the second segment brownish yellow and transparent. Wings subhyaline, veins dark brown, fore wings infuscated along the anterior margin; there is a very distinct dark subapical spot, which covers the apical ⅔ of the radial cell, a part of the third and the greater part of the fourth cubital cell.

M a l e. — Head relatively much shorter and flatter than in the female, seen in front distinctly wider than high (33: 28), seen from above about 2½ times as wide as long (33: 13), about as wide as the thorax. Temples very narrow, seen in profile less than half as wide as the eyes (4: 9). Inner orbits much further apart on the vertex than at the clypeus (17: 12). Inter-antennal shield with a blunt median carina. Posterior ocelli less than twice as far from the eyes as from each other, the latter distance is about twice their diameter. Antennae about 1½ times as far from each other as from the eyes, the latter being more swollen than in the female. Clypeus flat, slightly longer than wide, apex much blunter than in the female; the basal inter-ocular part is about 2½ times as long as the anterior part. Antennae slender, third and following segments with tyloides, but not serrate; third segment slightly more than 2½ times as long as wide at apex, fourth segment about as long as wide, following segments wider than long, tenth segment about 1½ times as wide as long, last segment 1½ times as long as wide at base, rather strongly narrowed towards the apex, which is slightly curved.

Thorax about the same as in the female. Abdomen more slender, the first segment less swollen, the second segment more rounded at the base. First

segment, as seen from above, nearly 1½ times as long as wide, its greatest height is slightly less than its width. Second segment, without the spines, about as long as wide. There is no distinct depressed apical margin, the spines emerge considerably below the surface of the segment, they are slightly curved inwards and longer than in the female, but fewer in number; in the specimen before me there are eleven spines, the longest of which are only slightly shorter than the third antennal segment.

Wing-venation and body-sculpture about the same as in the female; last sternite flat and shining. Pubescence on clypeus dense and silvery white.

Clypeus, an indistinct spot at the base of the mandibles and a short line along the inner orbits, pale yellow; coloration for the rest as in the female; the spot at the base of the swollen part of the first tergite is better defined.

Length (h. + th. + t. 1 + 2), ♀: 14 mm, ♂: 12 mm.

Siam: 1 ♀, Luang Prabang, Hat Thoun, 10 Nov. 1917, R. V. DE SALVAZA (holotype, Br. Mus.).

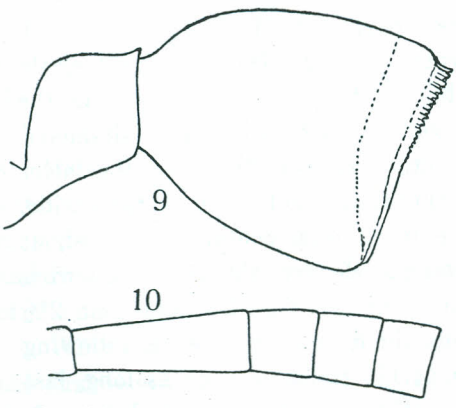
Tenasserim: 1 ♂, Mergui, May 1890, C. T. BINGHAM (allotype, Br. Mus.). This specimen bears a label in BINGHAM's handwriting: "*Icaria coronata* WHITE ♀" [1]).

Ropalidia pilosa (SM.).

!1859. SMITH, F., Jl. Proc. Linn. Soc. Zool. III, p. 22, ♂ (*Icaria*, Celebes).
1871. SMITH, F., Jl. Proc. Linn. Soc. Zool. XI, p. 379 (*Icaria*).

As this species is very closely allied to *R. binghami* it will be sufficient to point out the main differences.

Female. — Head about as wide as the thorax, the latter is relatively somewhat longer than in *R. binghami*. Mesonotum distinctly longer than wide. Propodeal carinae slightly less convergent. The swollen part of the first abdominal segment somewhat less rounded above, as seen in profile (fig. 9). Second abdominal segment somewhat longer, nearly twice as wide as the first (40: 21), as seen from above more gradually rounded at the base; the sternite much flatter; the apical margin less strongly depressed, on the tergite this margin bears a great number of short longitudinal carinae which slightly project over the edge, thus forming a row of short and blunt teeth (fig. 9).



Figs. 9 - 10. *R. pilosa* (SM.); 9. first and second abdominal segments; 10. part of antenna of ♀.

Puncturation similar to that of *R. binghami*, but the punctures somewhat coarser and slightly more remote, with small but distinct interspaces on the pro- and mesonotum. Postscutellum almost uniformly densely punctate, the

[1]) The identity of *Icaria* (*Anthreneida*) *coronata* WHITE will be discussed under *R. sumatrae* (WEB.).

posterior polished area very small. Second abdominal tergite densely and coarsely punctate, the punctures oval, deepest anteriorly, somewhat confluent.

Pubescence and tomentum similar to that of *R. binghami,* almost uniformly yellowish brown.

Black; the following parts dull reddish brown: mandibles, clypeus (except at the sides), a spot near the inner orbits just above the clypeus, the basal three antennal segments (apex of third segment somewhat darkened), pronotum, scutellum, postscutellum, the posterior half of the swollen part of the petiole, two oblong and ill-defined spots on the basal two thirds of the second tergite, and the legs (coxae more or less blackish). Second abdominal segment with a brownish yellow apical fascia (compare fig. 9) which is much narrowed on the sternite; the depressed margin of this segment is brownish yellow, those of the following segments are somewhat darker. Wings as in *R. binghami,* but with a distinct yellowish tinge, the veins paler.

M a l e. — Differs from the female mainly by the same characters as are noted for *R. binghami* ♂, but the head is slightly narrower than the thorax; the temples are extremely narrow, seen in profile less than one third as wide as the eyes. Inner orbits somewhat less strongly converging towards the clypeus than in *R. binghami.* Median carina of inter-antennal shield sharp. Posterior ocelli more than twice as far from the eyes as from each other. Apex of clypeus rather acute. First abdominal segment slightly longer than wide, the second as in the female, the apical teeth even slightly shorter.

Clypeus and a line along the inner orbits (almost reaching the eye-emargination) pale yellow; mandibles yellowish, their outer margin black, the teeth reddish brown, underside of antennae brownish; the remainder as in the female.

Length (h. + th. + t. 1 + 2), ♀: 14.5 mm, ♂: 13.5 mm.

C e l e b e s: The holotype of this species is a ♂ collected by WALLACE in Celebes (Mus. Oxf.). As the female is described here for the first time, I design a female from Patoenoeang, S. Celebes, collected by H. FRUHSTORFER in January 1896, as the allotype (coll. m.).

Further specimens: ♂, S. Celebes, Samanga, Nov. 1895, H. FRUHSTORFER (Mus. Vienna), a ♂ from the same locality and collector in my collection and a number of specimens from Celebes in the collection of Dr. A. VON SCHULTHESS, Zürich.

Ropalidia marginata (LEP.).

This is a common species, distributed in a number of colour-phases from India (including Ceylon) to the Marianna Islands, New Guinea and New Caledonia. It was known already to FABRICIUS, who described one of the varieties occurring in British India as *Vespa ferruginea* in 1793, but this name cannot be used, as it is preoccupied by *V. ferruginea* GMEL. (1790) and by *V. ferruginea* OLIV. (1791). In my opinion there can be little doubt that *Polistes sumatrae* FABR. (1804), described from Sumatra and not recognized by DE SAUSSURE or by other authors, represents an other form of the same species. Unfortunately,

the name *sumatrae* had been given by WEBER in 1801 to an other species of the present genus *Ropalidia* (*Vespa sumatrae* WEB.) and so LEPELETIER's *marginata* appears to be the oldest valid name.

The present arrangement of the colour-phases described below must be regarded as preliminary, as the coloration of all these phases appears to be more or less variable and also because I have studied only a limited number of specimens. From my rather incomplete data on the distribution of the different phases it appears that some of them are geographically segregated, but it is also true that at least two of them occur in the same area.

The structural characters of *R. marginata* are as follows:

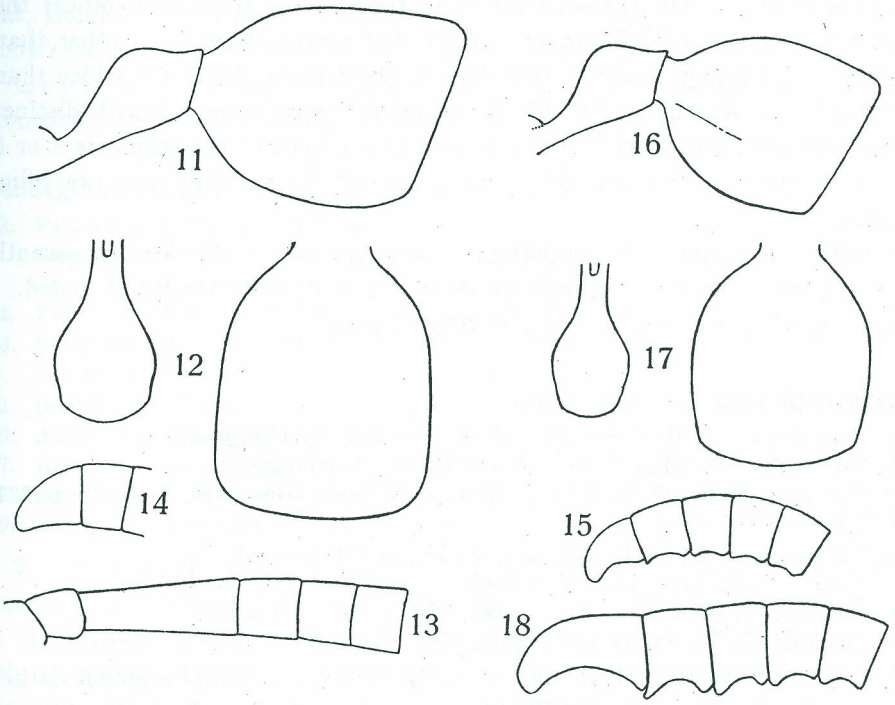
F e m a l e. — Head thick, seen in front distinctly wider than high (45: 40), seen from above more than twice as wide as long (45: 20), distinctly wider than the thorax (45: 40). Temples thick, scarcely narrowed towards the base of the mandibles, seen in profile slightly narrower than the eyes. Inner orbits slightly further apart on the vertex than at the clypeus (23 : 21). Ocelli small, less than twice as far from the eyes as from each other; the latter distance is less than twice their width; the anterior ocellus is not larger than the posterior ones. Antennae somewhat further from the eyes than from each other, interantennal shield slightly convex. Clypeus convex, wider than long (21: 19), upper side deeply emarginate, apex without a distinct tooth, extremely narrowly truncate; the anterior portion of the clypeus is distinctly shorter than the basal inter-ocular part (8.5: 10.5). Antennae: third segment less than three times as long as wide at apex, fourth segment somewhat longer than wide, tenth segment about 1½ times as wide as long, ultimate segment longer than wide at base (figs. 13 and 14).

Thorax approximately 1½ times as long as wide. Pronotum roundly truncate anteriorly, its sides converging towards the head, scarcely sinuate; transverse carina distinctly raised. Mesonotum longer than wide, convex. Scutellum rather strongly convex, with a fine, more or less distinct, impressed line in the middle; postscutellum gradually sloping, nearly flat in the middle, the sides somewhat swollen, its posterior angles rounded, slightly projecting. Propodeum with two convergent carinae at the base, running from the posterior angles of the postscutellum; the space between them is slightly concave at the base and deeply furrowed in its apical half.

Abdomen: figs. 11 and 12. Petiole linear at the base, the posterior two thirds strongly swollen, nearly spherical, constricted again towards the apex. The shape of the petiole and also that of the second segment appear to be somewhat variable; the latter is however always longer than wide and obliquely cut off at the end, the tergite being slightly longer than the sternite; the apical margin is extremely narrowly depressed and not spinose.

Wings: second cubital cell strongly narrowed towards the top, it receives the first recurrent vein slightly before or in the middle of the base and the second in ¾ of the base. Third cubital cell much wider at the base than at the top, third cubital vein strongly oblique and curved.

Body dull, abdomen slightly shiny, mandibles and anterior part of the clypeus shiny; the impunctate area in the middle of the posterior part of the postscutellum moderately shiny, not polished.



Figs. 10 - 15. *R. marginata* (LEP.); 11. first and second abdominal segments; 12. the same, from above; 13. base of flagellum of antenna of ♀; 14. tip of the same; 15. tip of antenna of ♂.
Figs. 16 - 17. *R. marginata* (LEP.), subsp. *duchaussoyi* (GRIB.); 16. first and second abdominal segments; 17. the same, from above.
Fig. 18. *R. magnanima* m., tip of antenna of ♂.

Clypeus rather densely punctate at the base, the punctures fine and irregular, apical half with scattered larger punctures. Frons, vertex, pro- and mesonotum, mesopleura behind the epicnemial carina, scutellum and the larger part of the postscutellum densely and reticulately punctate; the puncturation superficial, somewhat coarser on the thorax — especially on the mesopleura — than on the head. Temples and metapleura more remotely punctate. Propodeum obliquely transversely striate, the striae most distinct and regular in the lower half, the base and the sides irregularly and rugosely punctate. Posterior half of the petiole and the second tergite densely and irregularly punctate, the punctures are superficial and not margined behind; puncturation of the second sternite more remote, particularly at the base, the punctures better defined than on the tergite.

The body is covered with a very fine, pale brownish tomentum; clypeus and propodeum bear some longer erect hairs.

Male. — Head relatively wider and flatter than in the female, wider than high (43: 36), seen from above nearly 2½ times as wide as long (43: 18),

distinctly wider than the thorax (43: 39). Temples narrower than in the female, as seen in profile somewhat more than ⅔ as wide as the eyes. Inner orbits slightly further apart on the vertex than at the clypeus (20: 18). Posterior ocelli approximately 1½ times as far from the eyes as from each other; the ocellar area strongly raised. Antennae somewhat further from each other than from the eyes. Clypeus much flatter than in the female, distinctly wider than long, apex blunt. Antennae: fig. 15; third and following segments with distinct tyloides, forming small teeth at the base and at the apex of the segments 4 or 5 to 11, ultimate segment strongly curved, slightly longer than the preceding segment.

Thorax and abdomen somewhat more slender than in the female, seventh sternite flattened, its apex, as well as that of the ultimate tergite, rounded.

Length (h. + th. + t. 1 + 2), ♀♂ 11 - 13 mm.

R. marginata (LEP.), typical form.

1836. LEPELETIER, A., Hist. Nat. Ins. Hym. I, p. 541, ♀♂ (*Epipona*).
1852. SMITH, F., Ann. Mag. Nat. Hist. (2) IX, p. 47 (*Epipona*).
?1853. SAUSSURE, H. DE, Ét. fam. Vesp. II, p. 38 ♀ (*Icaria ferruginea*, "ouvr."); p. 237, ♀ (*Icaria*).
1862. SAUSSURE, H. DE, Stett. Ent. Ztg. XXIII, p. 139 (*Icaria*).
?1871. SMITH, F., Jl. Proc. Linn. Soc. Zool. XI, p. 378 (*Icaria ferruginea*).
1884. GRIBODO, G., Ann. Mus. Civ. Genova, XXI, p. 355, ♀ (*Icaria*).
1897. BINGHAM, C. T., Fauna Brit. India, Hym. I, p. 388, ♀ (nec ☿) (*Icaria*).

♀. — Light ferruginous brown all over, the second abdominal segment darker and more obscure above; the following parts more or less distinctly yellow: a spot at the base of the mandibles, the anterior margin of the clypeus, a short line along the inner orbits, the underside of the first antennal segment, a very narrow line along the pronotal carina, two spots on the mesopleura (one beneath the tegulae and one below the middle near the posterior margin), two spots on the scutellum (often absent), two more or less distinct spots on the post-scutellum, two longitudinal marks close to the apex of the propodeum, a narrow fascia at the apex of the first and second abdominal segments and the anterior face of coxae I; sometimes also coxae II and III with yellow markings. Wings flavo-hyaline with a more or less distinct sub-apical fuscous cloud on the fore-wing, covering the apical half of the radial cell and the upper margin of the third and fourth cubital cells, nervures brown, stigma brownish yellow.

♂. — Mandibles, clypeus and the lower part of the face yellow, otherwise as in the female.

The coloration of this form appears to be somewhat variable as regards the extent of the yellow markings. In some specimens these are scarce and small, whereas others (from Ceylon and Madras) are rather abundantly marked with yellow, as described above. As I have seen several transitional forms between the darker and the brighter specimens, I prefer to treat them all under the same name.

India: Kumaon, N. India, Miss A. BROOK (Br. Mus.); Dharwar, SWALE (Br. Mus.); Deesa, Abu, NURSE (Br. Mus.); Madras (Mus. L., coll. m.); Ramnad, Madras, N. ANNANDALE (Mus. Calc.), Bombay (Br. Mus., coll. BEQUAERT); Surat, Bombay Pres., DUDGEON (Mus. Calc.); Jubbulpore, Centr. Provinces, S. RIBEIRO (Mus. Calc.); Bangalore (Br. Mus., Mus. Calc.).

Ceylon: Puttalam, W. HORN (Mus. B.-D., coll. BEQUAERT, coll. VON SCHULTHESS, coll. m.); Colombo (Mus. Vienna).

R. marginata (LEP.), subsp. **indica,** new name.

1793. FABRICIUS, J. C., Ent. syst. II, p. 280 (*Vespa ferruginea*) (nec *Vespa ferruginea* GMEL., LINNÉ: Syst. nat. Ed. 13 a, I, 5, 1790, p. 2767; nec *Vespa ferruginea* OLIV., Encycl. méthod. Insect. VI, 1791, p. 683).
1804. FABRICIUS, J. C., Syst. Piez., p. 277 (*Polistes ferruginea*).
1853. SAUSSURE, H. DE, Ét. fam. Vesp. II, Vesp., p. 38 ♀, T. 5, F. 6; p. 237 (*Icaria ferruginea*).
1870. HORNE, CH., Trans. Zool. Soc. Lond. VII, 3, p. 169 (*Icaria ferruginea*).
1889. ANDRÉ, E., Naturaliste, p. 189 (*Icaria ferruginea*).
1897. BINGHAM, C. T., Fauna Br. India, Hym. I, p. 387, fig. 118 (*Icaria ferruginea*).
1918. BEQUAERT, J., Bull. Am. Mus. Nat. Hist. 39, p. 247 (*R. ferruginea*).
1929. BEQUAERT, J. and SALT, G., Psyche 36, no. 3, p. 263 (*R. ferruginea*).

♀. — Lighter or darker ferruginous brown; the following parts yellow: a vague spot at the base of the mandibles, the anterior margin of the clypeus, a line at the underside of the first antennal segment, small and often indistinct markings on the face along the inner orbits, a very narrow line along the pronotal carina, two transverse spots on the postscutellum, an oval spot on each side at the apex of the propodeum, a narrow transverse band on the apex of the petiole, a very wide fascia, concave anteriorly and occupying nearly the posterior half of the second segment. The width of the fascia on the second segment appears to be somewhat variable, but it is always much wider than in the other varieties. There is always a shading of black in front of the fascia on the second segment, and often also on the first segment. Coxae I with a large yellow spot, coxae II with a small spot; metatarsi of legs II and III more or less yellowish. — In the ♂ the mandibles, clypeus and the lower part of the face are yellow, the vertex is (?always) partly black.

Some of the specimens before me show additional black markings; in a ♂ from Calcutta there is a wide transverse black line on the vertex between the eyes, a black spot at the anterior and one at the posterior margin of the mesonotum and a black line along the suture between meso- and metapleura.

India: 1 ♀ 1 ♂, Amballa, M. M. CARLETON (resp. holotype & allotype, coll. m.); Manora, Karachi, F. W. TOWNSEND (Br. Mus.); Sind, Karachi, W. D. CUMMING (Mus. Calc.); W. Bengal, Paresnath (4300'), N. ANNANDALE (Mus. Calc.); Calcutta, ROTHNEY (Mus. L.); Barkuda Isl., Chilka Lake, Madras Res., N. ANNANDALE (Mus. Calc.); Bangalore, Madras Pres. (Mus. Calc.); Madras (coll. VON SCHULTHESS); Kurrachee, MAINDRON (coll. BEQUAERT).

Indo-China: S. Annam, Pha-Rang, FRUHSTORFER (Mus. Vienna, coll.

m.); the specimens from this locality are transitional between *indica* and *sundaica*.

R. marginata (LEP.) subsp. **rufitarsis**, new subspecies.

1897. BINGHAM, C. T., Fauna Brit. India, Hym. I, p. 387 (*Icaria guttatipennis*).

This form is easily distinguished from typical *marginata* by the entirely black second abdominal segment. BINGHAM regarded this form as the worker of his "*Icaria guttatipennis* Sauss." (*R. magnanima* in the present paper), and it is indeed very similar to the var. *albitarsis* of that species. However, I prefer to treat these forms as specifically different, because the ♂ of typical *magnanima* is distinctly different from that of typical *marginata*. Unfortunately the males of *rufitarsis* and *albitarsis* are not known at present and therefore a definite conclusion must be left to the future.

♀. — Ferruginous brown, with the second abdominal segment entirely brownish black. A spot at the base of the mandibles and the anterior margin of the clypeus pale ferruginous or yellowish. Posterior half of propodeum with two oval yellow spots, converging towards the base of the petiole; the apex of the latter with a narrow yellow fascia. Legs, including the tarsi, ferruginous. Sub-apical spot of forewing distinct.

The coloration of the thorax is variable: in one of the specimens before me the mesopleura, except a broad line in the middle, the mesosternum, the metapleura and the metasternum are black, whereas the mesonotum and propodeum have irregular black lines along their margins.

Tenasserim: 1 ♀, Haundraw Valley, V - 1893, BINGHAM (holotype, Br. Mus.); 2 ♀♀, BINGHAM, without locality-label (probably Tenasserim or Burma) (Br. Mus.); 1 ♀, Tavoy, BINGHAM (Mus. Calc.).

Burma: 2 ♀♀, Bhamo, VI - 1886, FEA (Mus. Venice, coll. VON SCHULTHESS).

R. marginata (LEP.), subsp. **sundaica**, new subspecies.

?1804. FABRICIUS, Syst. Piez., p. 273 (*Polistes sumatrae*); nec *Ropalidia sumatrae* (WEB.) (= *Vespa sumatrae* WEB., 1801).

?1871. SMITH, F., Jl. Proc. Linn. Soc. Zool. XI, p. 378 (*Icaria ferruginea*).

?1884. GRIBODO, G., Ann. Mus. Civ. Stor. Nat. Genova, ser. 2a, vol. I, p. 356 (*Icaria ferruginea*).

?1915. SCHULTHESS, A. VON, Nova Caledonia, Zool., vol. II, L. I, no. 3, p. 48, descr. ♂ (*Icaria marginata*).

1929. DOVER, C., Bull. Raffles Mus., no. 2, p. 46 (*R. ferruginea*).

1931. DOVER, C., Jl. Fed. Malay St. Mus. XVI, p. 257 (*R. ferruginea*).

1932. SCHULTHESS, A. VON, Rés. Scient. Voy. Ind. Or. Néerl. Léopold, IV, fasc. 5, p. 40 (*Icaria marginata*).

This form differs from *indica* in having a narrower fascia on the second abdominal segment and from *jucunda* (CAM., 1898) (= *Icaria pruinosa* CAM., 1906) in being darker and in the absence of large yellow spots on the scutellum.

♀. — Body dark ferruginous brown, more or less variegated with black. A large spot at the base of the mandibles, a V-shaped line along the anterior

margin of the clypeus, a line at the underside of the scape, a short line (often indistinct or absent) along the inner orbits, a very narrow line along the transverse carina of the pronotum, a minute spot beneath the tegulae (sometimes absent), two large spots, sometimes scarcely separated, on the postscutellum, two oblique markings — narrowed and converging towards the base of the petiole — on the lower half (or two thirds) of the propodeum, yellow. Petiole with a narrow apical yellow fascia, second segment with a wider fascia of the same colour (its width is about $^1/_4$ - $^1/_5$ of the length of the tergite in the middle and $^1/_3$ of its length at the sides). Anterior face of coxae I yellow, coxae II and III with yellow markings. Clypeus often with a black mark behind the yellow margin, mesopleura sometimes with a small yellow spot near the posterior margin, scutellum either entirely ferruginous or with two small and indistinct yellow spots; first and second segment always with a (resp. narrow and broad) black transverse fascia, ill defined anteriorly, in front of the transverse yellow band.

♂. — Mandibles, clypeus and the lower part of the face entirely yellow, coxae II largely yellow, otherwise as in the female.

Holotype and allotype: ♀ ♂ from Koeripan, between Batavia and Buitenzorg, W. Java, 19 Aug. 1934, J. v. d. VECHT, in my collection.

Marianna Islands: 1 ♂, Saipan, Garapan, 2 Febr. 1936, T. ESAKI (Kyushu Univ.).

Malay Peninsula: Perak, Pahang, Kedah, Mt. Ophir, Kuala Lumpur (Mus. K.L.); Perak, Kuala Kangsar, GRUBAUER (Mus. Vienna).

Sumatra: Tebing Tinggi, Padang, Loeboek Sikaping, Koeala Belilas in Indragiri (Mus. Btzg.); various localities in Res. Palembang (Mus. L., coll. m.); do. in Benkoelen Res. and Res. Lampong Districts (coll. m.); Deli (coll. LINDEMANS, coll. ROEPKE and coll. m.).

Bangka Isl.: rather common, v. d. VECHT (coll. m.).

Borneo: Sampagan, 1937, Mrs. M. E. WALSH (coll. m.); Samarinda (coll. VON SCHULTHESS); West-Koetei, Moeara Moentai, Sept. 1938, B. M. HOEKS (Mus. Btzg.).

Java: common (plains - 800 m).

Karimon Djawa Isl.: LIEFTINCK (Mus. Btzg.).

Among the specimens from the Eastern part of the Archipelago which I have examined, many differ in some respects from the typical *sundaica*, but the differences are so slight and there appear to be so many transitional forms, that I have not been able to distinguish well defined colour forms.

The general colour may be brighter or darker red; the mesonotum is sometimes entirely black, and the width of the apical band of the second tergite is also somewhat variable.

The specimens from the localities, recorded below, are therefore preliminarily placed within the variation limits of *sundaica*.

For the Papuan-Australian representatives, however, I have used the name

jucunda CAM., because it appears desirable to separate this form, which can easily be distinguished from *sundaica* by the presence of large yellow spots on the scutellum, from the darker variety occurring in the larger Sunda Islands. As the Philippine specimens agree in coloration with *jucunda,* they are also recorded under that name.

Bali: Den Pasar, Rd. AWIBOWO, 1935 (in some specimens the mesonotum is entirely black, while others agree with typical *sundaica;* coll. m.).

Lombok: Sapit, 2000′, FRUHSTORFER (1 ♀, mesonotum black, Mus. Vienna); Ampenan, BARBOUR (mesonotum almost entirely reddish, coll. BEQUAERT).

Soemba: Waingapoe and Laora, DAMMERMAN (Mus. Btzg., coll. m.).

Flores: Laboean Badjo, J. K. DE JONG (Mus. Btzg., coll. m.).

Timor: "Timor", WIENECKE (Mus. L.).

Wetter: SCHÄDLER (Mus. L.).

Kisar and Roma: KÜHN (coll. VON SCHULTHESS, coll. m.).

Celebes: Patoenoeang and Samanga, FRUHSTORFER (Mus. Vienna, coll. VON SCHULTHESS, coll. m.); Pagowat, ROSENBERG (Mus. L.).

Boeroe: 5 ♀ 2 ♂, DENIN (Mus. Btzg.).

Ceram: 1 ♀ S. Ceram (Mus. Btzg.).

Banda: SAIDA (Mus. Vienna); Banda Neira, PLASON (Mus. Vienna).

Amboina: DOLESCHALL (Mus. Vienna).

R. marginata (LEP.), subsp. **jucunda** (CAM.).

!1898. CAMERON, P., Mem. Manch. Soc. 42, no. 11, p. 46, ♀ (*Icaria jucunda*).
!1906. CAMERON, P., Tijdschr. v. Ent. 49, p. 228, ♀ (*Icaria pruinosa*).

Generally brighter than typical *sundaica;* the black markings much reduced; scutellum with two large yellow spots.

The holotype is a ♀ from N. Guinea, CUTHBERTSON (Mus. Oxf.).

New Guinea: 1 ♀, Pt. Moresby, JESWIET (coll. ROEPKE).

New-Britain: 1 ♂, Matupi, FINSCH (Mus. Vienna).

Thursday Isl.: 1 ♂, MACKIE & FOOTE (coll. m.).

Queensland: 1 ♂, Cooktown, A. G. MAYER (coll. BEQUAERT); 4 ♀ 1 ♂, Cape York (Mus. Vienna, coll. m.).

Philippine Islands: 1 ♀ 1 ♂, "Phil. Isl.", LEDYARD (Br. Mus.); Manila (Mus. Vienna, coll. m.); Los Baños, NACION; do., HIZON (coll. BEQUAERT).

R. marginata (LEP.), subsp. **duchaussoyi** (GRIB.).

1896. GRIBODO, G., Misc. Ent. 4, p. 13, ♀ (*Icaria duchaussoyi*).
!1915. SCHULTHESS, A. VON, Nova Caledonia, Zool. vol. II, L. I, no. 3, p. 48 (var. of *I. marginata*).

♀. Body generally more slender than in typical *marginata* (figs. 16 and 17, p. 119). Dull reddish brown, with darker, ill-defined, markings on the clypeus, the vertex and the pronotum; mesonotum and the larger part of the meso- and metapleura and the propodeum black; petiole dark reddish brown, second segment almost black, its base and a narrow band at the apical margin dull

reddish; the following segments reddish brown, darker towards the base. Coxae, trochanters, base of femora I, and femora II and III (except for the knees) blackish.

Though the male of this form is at present unknown, I think Dr. VON SCHULTHESS was correct in regarding *duchaussoyi* as a variety of *marginata*. Apparently this species reaches in New-Caledonia the Eastern limit of its distribution area. In the Solomon Islands it appears not to be represented, at least I did not find it among a large number of *Vespidae* from these islands, which were collected by Mr. H. T. PAGDEN.

I studied one of the series of 23 ♀♀ of the var. *duchaussoyi*, collected at Coné in New Caledonia by SARASIN and ROUX (1911); this specimen was kindly submitted to me by Dr. A. VON SCHULTHESS.

Ropalidia magnanima, new species.

!1897. BINGHAM, C. T., Fauna Brit. India, Hym. I, p. 387 (*Icaria guttatipennis* SAUSS.).
1929. DOVER, C., Bull. Raffl. Mus., 2, p. 46 (*Icaria guttatipennis* SAUSS.).

This species, though certainly very closely allied to *R. marginata*, is easily distinguished by its larger size, the length of both sexes being about 14 - 17 mm. The petiole appears to be somewhat stouter and the head is slightly more swollen behind the eyes. In the male sex the ultimate antennal segment is much longer than in *marginata* (fig. 18, p. 119).

R. magnanima m., typical form.

♀. — Dark reddish brown, with very vague and indistinct yellow markings on the mandibles and on the anterior margin of the clypeus; the apical margin of the second abdominal segment with a very narrow and inconspicuous brownish yellow fascia. Metatarsi of legs II and III nearly entirely yellowish white. Subapical cloud of forewing much darker than in typical *marginata*.

♂. — Mandibles partly brownish yellow; a line on the underside of the first antennal segment, the anterior and lateral margins of the clypeus and the space around the antennal sockets, yellowish. Frons with a black spot above each antenna, vertex with a black spot enclosing the ocelli. Tarsi slightly darker than in the female. Otherwise as in the female.

Length (h. + th. + t. 1 + 2), ♀♂ 15 - 16 mm.

Burma: 1 ♀, 1 ♂, Schwego Myo, 1885, FEA (resp. holo- and allotype, Mus. Venice).

Tenasserim: 1♀, Taungoo, NURSE (paratype, Br. Mus.).

R. magnanima m., subsp. **albitarsis,** new subspecies.

This variety is readily distinguished from the typical form by the colour of the abdomen and of the legs.

♀. — Head and thorax dark reddish brown, propodeum often brownish black, abdomen black, the swollen part of the petiole and sometimes also the base of the second segment with ill-defined dark rufous markings. The following

parts may be pale yellow: a small spot (sometimes indistinct) at the inner side of the base of the mandibles, and a narrow fascia at the apex of the petiole (absent in most specimens from Saigon and in that from Tonkin). The legs are dark brown to blackish, basal two or three joints of tarsi II and III yellowish white, with the extreme apex brownish; tarsi I brown, the metatarsus sometimes paler in the middle. Forewings with a very distinct sub-apical cloud, stigma pale brownish yellow.

In a specimen from Tonkin the thorax is black, with the exception of the larger part of the pronotum, two longitudinal marks on the mesonotum, and the scutellum, which are dark reddish brown.

Length (h. + th. + t. 1 + 2), 14 - 17 mm.

Tenasserim: 1 ♀, Haundraw Valley, VIII - 1894, BINGHAM (holotype, Br. Mus.).

Indo-China: 4 ♀♀, Saigon, 1888, RANSON (Mus. Vienna, coll. m.), 1 ♀, Tonkin, Than Moi, H. FRUHSTORFER (Mus. Vienna); 1 ♀, Cochin-China, Zhudaumot, 12.VIII.1923, R. VITALIS DE SALVAZA (Mus. Heude).

Ropalidia stigma (SMITH).

!1858. SMITH, F., Jl. Proc. Linn. Soc. Zool. II, p. 114, ♂ (*Polybia*).
?1867. SAUSSURE, H. DE, Reise Novara, Zool. II, Hym., p. 22 (*Icaria bioculata*).
?1871. SMITH, F., Jl. Proc. Linn. Soc. Zool. XI, p. 379 (*Icaria artifex*, nec SAUSS.).
1871. Ibid., p. 384 (*Polybia*).
<1897. BINGHAM, C. T., Fauna Br. India, Hym. I, p. 389 (*Icaria artifex*).
1907. CAMERON, P., Jl. Straits Br. Roy. As. Soc. Bengal 48, p. 26 (*Icaria artifex*).
1913. SCHULTHESS, A. VON, Mitt. Schweiz. Ent. Ges. XII, p. 164 (*Icaria*).
1918. BEQUAERT, J., Bull. Am. Mus. Nat. Hist., XXXIX, p. 247 (*R. artifex*).
<1925. DOVER, C., Jl. As. Soc. Bengal, New Series XX, 1924, p. 301 (*R. artifex*).
1931. DOVER, C., Jl. Fed. Mal. St. Mus. XVI, p. 257 (*R. artifex*).

Up to the present this species has never been correctly identified. In most collections it stands under the name "*artifex* SAUSS.", but although I have not seen the type of that species, I am convinced that it is not identical with *R. stigma* (SM.). Sometimes the name "*variegata* SM." has been applied to the present species, and it has also often been mixed up with *R. mathematica* (SM.) and *R. rufocollaris* (CAM.).

Female. — Head moderately flat, seen in front distinctly wider than high (39 : 35), seen from above more than twice as wide as long (39 : 18), distinctly wider than the thorax (39 : 31). Temples narrow, seen in profile slightly more than half as wide as the eyes (6 à 7 : 11). Inner orbits further apart on the vertex than at the clypeus (19.5 : 15). Frons scarcely convex, ocelli in an almost equilateral triangle, the posterior ocelli at least three times as far from the eyes as from each other; the latter distance is shorter than their diameter. Antennae slightly further from the eyes than from each other. Clypeus slightly convex, somewhat longer than wide, its apex produced into a minute tooth; anterior portion of the clypeus about half as long as the basal inter-ocular part (5 : 10). Mandibles of the usual shape, outer side convex with a slight impres-

sion at the base. Antennae slender, scape slightly curved, more than four times as long as wide at apex, third segment nearly three times as long as wide at apex, slightly shorter than the three following segments together, fourth segment about square in outline, fifth to eleventh segments slightly wider than long, tenth segment about 1⅓ times as wide as long, ultimate segment slightly longer than wide at the base.

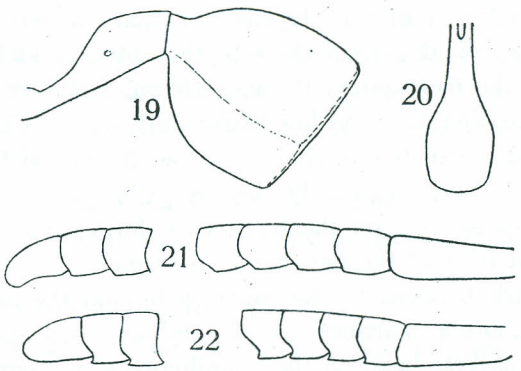
Thorax moderately long, seen from above nearly 1½ times as long as wide. Pronotum truncate, transverse carina sharp and distinct, the sides of the pronotum nearly straight, slightly converging towards the head. Mesonotum about as long as wide between the tegulae, slightly convex, with a distinct median impressed line in its anterior part. Scutellum rather strongly convex, with a more or less distinct median impressed line at the base; postscutellum obliquely sloping, nearly flat, its sides not projecting. Mesopleura strongly swollen below. Propodeum, as seen from above, broadly rounded, in profile nearly straight, as a whole convex, the sides rounded, without any carinae or teeth; the median impression is narrow and shallow.

Abdomen: figs. 19 and 20. Petiole long and slender, more than twice as long as wide, spiracles very slightly projecting, not or scarcely visible as the petiole is seen from above. Second segment, seen from above, approximately as long as wide, about 2½ times as wide as the first; the apical, depressed and discoloured margin less narrow than in many other species; the suture between tergite and sternite usually rather distinct.

Wing venation much as usual, second cubital cell strongly narrowed towards the top, receiving the first recurrent nervure in or slightly beyond its middle and the second near the end, third cubital cell about as high as wide at the top, dilated at the base, the third cubital vein being slightly oblique and waved.

Body moderately dull, clypeus shiny, postscutellum nearly entirely polished, propodeum moderately shiny, abdomen less dull than the thorax.

Anterior half of the clypeus with a few scattered punctures; temples scarcely punctate; frons, vertex, pro- and mesonotum, mesopleura (behind the epicnemial carina) and scutellum densely, reticulately, but finely and very superficially, punctate; postscutellum with a few punctures on its anterior angles, metapleura impunctate, propodeum finely obliquely striate. Posterior part of the first tergite with remote and irregular puncturation, puncturation of the second tergite



Figs. 19 - 21. *R. stigma* (SM.); 19. first and second abdominal segments; 20. first abd. segm. from above; 21. parts of antenna of ♂. Fig. 22. *R. mathematica* (SM.), subsp. *binotata* m., parts of antenna of ♂.

somewhat denser, but very superficial, particularly at the base, the punctures not margined behind; the second sternite practically impunctate at the base, the punctures on the posterior half deeper and better defined than on the tergite, interspaces mostly larger than the punctures.

Nearly the whole body is covered with a fine and thin, appressed greyish tomentum (it is absent on the mandibles, the anterior third of the clypeus and the polished area of the postscutellum); moreover there are some longer erect hairs, most distinct on the clypeus, the propodeum and the abdomen.

M a l e. — Head flat, seen in front wider than high (35 : 30), seen from above about 2½ times as wide as long (35 : 14), slightly wider than the thorax (35 : 31). Eyes strongly swollen, as seen in profile more than twice as wide as the narrow temples (11 : 5). Inner orbits further apart on the vertex than at the clypeus (17 : 13). Posterior ocelli 2½ times as far from the eyes as from each other; the latter distance is scarcely shorter than their diameter. Clypeus flat, as long as wide, apex much blunter than in the female. Antennae (fig. 21) slender, with distinct tyloides, but not serrate.

Thorax and abdomen somewhat slenderer than in the female.

Sculpture very much as in the female, but the clypeus impunctate and the polished area of the postscutellum slightly smaller.

Length (h. + th. + t. 1 + 2), ♀ ♂: 9 - 11 mm.

R. stigma (SM.), typical form.

♀. — Ferruginous to rufescent brown, more or less variegated with black on the head, the thorax (especially the propodeum) and the base of the petiole; yellow markings more abundant than in any other known species of this group.

In the darkest specimen I have seen the following parts are black: a very narrow line along the basal margin of the clypeus, a median line on the basal half of the clypeus, the space between and around the ocelli and two lines running from there to the antennal sockets, the prosternum, the margins of the mesonotum, the mesopleura, metapleura and median segment (with the exception of the yellow markings!), narrow lines along the margins of scutellum and postscutellum, and the upper surface of the basal half of the petiole.

Mandibles nearly entirely yellow, clypeus yellow with a median brown or blackish line on the basal two thirds; furthermore are yellow: a line at the underside of the first antennal segment, a line along the inner orbits, an oblong mark between the antennae, a line on the temples, a transverse fascia on the pronotum, narrowed in the middle, two spots on the mesopleura, a broad transverse band on the scutellum, and a narrower one on the postscutellum, an irregular line along the lateral margins of the propodeum, and a median mark, consisting of two connected longitudinal stripes, somewhat narrowed towards the apex, a line on each side of the basal half of the petiole, a narrow transverse line on its apex (often obsolete), a large spot of variable size on each side at the base of the second tergite, similar spots on the sternite, and a narrow transverse band on the posterior margin of the second segment. Tegulae

brownish, margins more or less yellow. Coxae I and the major part of coxae II and III yellow, femora I with a broad longitudinal stripe below, femora II and III with narrower yellow stripes, upper surface of tibiae I and II with a short yellow line before the apex, tarsi brown or brownish yellow, the rest of the legs brownish to blackish. — The coloration of the legs is rather variable, in dark specimens some of the markings mentioned may be absent. — Underside of antennae pale ferruginous, posterior margins of third and following abdominal segments testaceous. Wings hyaline, the costal margin of the forewing, a spot in the apical corner of the median cell and the anterior two thirds of the radial cell fuscous, veins brown, stigma yellow.

♂. — Coloration about the same as in the female, but the clypeus and the face below the antennae entirely yellow.

Ropalidia stigma (SM.) is distributed over a large part of the Oriental region, but apparently it does not occur on the islands beyond the line of WALLACE. Specimens from South India and Ceylon are less extensively marked with black than those from various other localities, but I have not seen sufficient material to decide whether they deserve a special name.

India: Bombay Pres., Matheran (Br. Mus.); Ceylon, Ratanpura (Mus. Vienna), Kandy (Mus. Calc., coll. m.), Peradeniya (Br. Mus.); Assam, Margherita (Mus. Geneva); Tenasserim, Maulmein, BINGHAM (Br. Mus.).

Indo-China: Luang Prabang, Sop Choun, R. V. DE SALVAZA (Br. Mus.).

Pulau Aor (in S. China Sea): N. SMEDLEY (Mus. K.L.).

Philippine Islands: Luzon, Los Baños (Mus. L., coll. BEQUAERT); Mt. Maquiling (coll. m.), 1 ♂ Limay (coll. v. SCHULTH.).

Malay Peninsula: Peninsular Siam, Perak, Pahang, Johore, Selangor, Malaya, Singapore (Mus. K.L., Mus. Vienna, Br. Mus., coll. v. SCHULTH., coll. m.).

Sumatra: East Coast Res., Tandjong Morawa, Dr. B. HAGEN (Mus. L.); Benkoelen Res., Boekit Item and Tandjong Sakti, Mrs. M. E. WALSH (coll. m.); Djambi Res., Sarolangoen (Mus. Btzg.); Lampong Districts: Wai Lima (Mus. Btzg.); Kedaton, Mrs. E. VAN DER VECHT (coll. m.).

Borneo: "Borneo", F. BACZOS (Mus. Vienna); Br. N. Borneo, Sarawak (Mus. Oxford., Mus. Sar.); Bettotan and Samawang, C. BODEN KLOSS and H. M. PENDLEBURY (Mus. K.L., coll. m.).

Sebesi Isl. and Verlaten Isl. (Mus. Btzg.).

Java: W. Java (much less common than *R. mathematica*, specimens from Djasinga, Buitenzorg, Depok, Djampang and Penandjoeng Bay in Mus. Btzg. and coll. m.); M. Java, Tegal, L. G. E. KALSHOVEN (coll. m.); E. Java, Baoeng and Poerwodadi, J. G. BETREM (coll. m.).

The holotype is a ♂ from N. W. Borneo, Sarawak, collected by WALLACE, in the Oxford Museum (labelled „Sar."); as the allotype I select a female from Sarawak, Samawang, in my collection.

R. stigma (SM.), subsp. **rufa**, new subspecies.

This form differs from typical *stigma* as follows: Clypeus rufous at the base, first antennal segment without a yellow line, the line along the inner orbits short, the space between the antennae rufous, temples with a short and indistinct yellow line; pronotum yellow in the middle only, mesopleura and scutellum red, the spots at the base of the second tergite and sternite small or absent. Coxae III red, legs as a whole darker than in the typical form.

Assam: 1 ♀, N.E. Assam, Sadiya, Abor Exp., 23 Nov. 1911, KEMP leg., no. 6570, 19 (holotype, Mus. Calc.); 2♀♀, N.E. Assam, Dibrugarh, Abor Exp., 17 - 19 Nov. 1911, KEMP leg. (Mus. Calc., coll. m.); 1♀, Assam, Khasia Hills (coll. v. SCHULTH.).

China: 1♀, Hainan, Nodoa, 25 March 1936, G. Ros (Mus. Heude). — This latter specimen is slightly more extensively marked with yellow than those from Assam.

Ropalidia mathematica (SM.).

!1860. SMITH, F., Jl. Proc. Linn. Soc., Zool. V, p. 90, ♀ (*Polybia*).
1871. SMITH, F., Ibid., XI, p. 384 (*Polybia*).
1913. SCHULTHESS, A. VON, Mitt. Schweiz. Ent. Ges. XII, p. 164 (*Icaria*).
1925. DOVER, C., Jl. As. Soc. Bengal, N.S. XX, 1924, p. 301 [syn. of *Ropalidia artifex* (SAUSS.)].

Female. — Head somewhat narrower than in *R. stigma*, as seen from above slightly more convex anteriorly and less narrowed behind the eyes. Temples thick, seen in profile slightly narrower than the eyes. Inner orbits further apart on the vertex than at the clypeus (18.5 : 15). Posterior ocelli less than three times as far from the eyes as from each other, the latter distance is about equal to their diameter. Antennae slightly thicker than in *R. stigma*.

The shape of the first abdominal segment is somewhat variable, as a rule it is more slender than in *R. stigma*, being about 2⅓ - 2½ times as long as wide. The second segment is slightly shorter than in *stigma* and distinctly obliquely cut off at the end, the tergite being somewhat longer than the sternite; the former is rather flat, the sternite is strongly convex.

Wing-venation somewhat variable, the second cubital cell is much narrowed at the top and usually receives both recurrent veins more or less close to each other beyond its middle.

Sculpture much as in *R. stigma;* clypeus impunctate at the base, the anterior portion with a few distinct punctures; mesopleura in their upper half with a small triangular impunctate area at the posterior margin. Upper half of metapleura irregularly striate, the lower half with distinct, though remote and shallow, punctures; postscutellum with a few punctures along the anterior margin.

Male. — Head slightly thicker than in *R. stigma*, as seen from above slightly more excavated posteriorly. Posterior ocelli 2 - 2½ times as far from the eyes as from each other, the distance between them is either equal to their diameter or slightly shorter. Antennae (fig. 22, p. 127) shorter than in *R. stigma*,

distinctly serrate, third segment ± 2⅓ times as long as wide at the apex (seen from below).

Length (h. + th. + t. 1 + 2), ♀: 9 - 11 mm, ♂: 8 - 10 mm.

R. mathematica (SM.), typical form.

♀. — Ferruginous brown, with the following parts blackish: the space between and around the ocelli, a narrow transverse line at the base of the clypeus, more or less distinct lines along the sutures of the thorax, and a spot on the upper half of the metapleura continued anteriorly on the mesopleura. Second abdominal segment, especially the posterior half of the sternite, somewhat darker than the other parts of the body. Furthermore the body is marked with yellow as follows: a spot on the basal half of the mandibles, clypeus (except for a broad median rufous line which almost reaches the apex), a minute spot between the antennae, a short line along the inner orbits (not reaching the eye-emargination), an elongate spot on the lower third of the temples, a transverse fascia on the pronotum (narrowed in the middle and at the sides), two spots on the mesopleura, scutellum and postscutellum (except for the dark lines along their margins), a broad line along the lateral margin of the propodeum (continued on the lower posterior angle of the metapleura) and a broad median mark which is slightly narrowed towards the apex of the propodeum and scarcely incised at the apex, two large irregular spots at the base of the second tergite and a narrow transverse band at the posterior margin of the second segment. Tegulae brownish. Coxae I and the major part of coxae II and III yellow, the rest of the legs ferruginous. A narrow line at the posterior margin of the first abdominal segment and the depressed margin of the second segment testaceous. Wings subhyaline, much as in *R. stigma,* but the dark stain in the radial cell as a rule somewhat narrower.

Celebes: 1 ♀, Makassar, WALLACE (holotype, Mus. Oxf.); this specimen bears a label written by MEADE-WALDO: "*Icaria stigma*". I studied another specimen from S. Celebes, Patoenoeang, Jan. 1896, H. FRUHSTORFER (Mus. Vienna).

Lombok: some ♀♀, Sapit, 1000′ and Sambaloen, 4000′, H. FRUHSTORFER (Mus. Vienna).

In coloration this form resembles typical *stigma,* but the black as well as the yellow markings are less abundant. The most striking differences are the broader median line on the clypeus and the absence of yellow markings on the sides of the first tergite and on the second sternite.

R. mathematica (SM.), subsp. **binotata,** new subspecies.

1853. SAUSSURE, H. DE, Étud. fam. Vesp. II, p. 25 (*Icaria variegata,* var., nec type!).

♀. — Differs from the typical form as follows: Antennae brownish above, ferruginous below; the sides of the clypeus rufous at the base, the spot on the temples small or absent, those on the face smaller; thorax more abundantly marked with black: a broad line along the posterior margin of the mesonotum

and of the mesopleura, the larger part of the postscutellum and metapleura and the posterior face of the propodeum (except for the median yellow marking) black or blackish; the lower yellow spot on the mesopleura small or absent; postscutellum with two small separate spots on its anterior half, rarely with an entire transverse fascia; the yellow line at the sides of the propodeum often much reduced, the median marking narrower and more deeply incised at its apex; base and apical fourth of the petiole brownish or blackish; second abdominal segment much darker than in the typical form, nearly black, with similar yellow markings, its sternite as a rule immaculate, rarely with two small yellow spots at some distance from the base; third and following segments dark brown. Coxae as in the typical form, the remainder of the legs ferruginous brown with dark stains on femora, tibiae and metatarsi.

♂. — Coloration as in the female, but the mandibles (except for the teeth), the clypeus, the face below the upper margin of the antennal sockets, a line at the underside of the first antennal segment and an irregular marking on the mesosternum, yellow; postscutellum in some specimens entirely black, without yellow markings; legs as in the ♀ (in a specimen from the island of Bangka the femora I and II have a yellow line at their underside).

Java: 1♀, 1♂, W. Java, Tapos on Mt. Gedeh (800 m), Aug. 1936, author (holo- and allotype, coll. m.).

I studied numerous other specimens from Java, where this is the most common *Ropalidia*-species. It occurs in the plains as well as in the mountains up to about 1200 m above sea level (Mus. L., Mus. Btzg., Mus. Vienna, coll. BETREM, coll. ROEPKE, coll. m.).

Specimens with the same coloration have been found in Bali (Gitgit and Den Pasar, coll. m.), in S. Sumatra, Lampong Districts (many localities, coll. m., Mus. Btzg.) and in Bangka Island, Troe and Toboali, 4 ♀♀, 1♂ (coll. m.); specimens from North and Central Sumatra are slightly different and require further study.

The collection of the Museum at Leiden contains some old, discolored specimens from Timor (leg. WIENECKE), which seem to belong to this subspecies (comp. subsp. *unicolor*).

R. mathematica (SM.), subsp. **nigroplagiata** (CAM.).

!1900. CAMERON, P., Ann. Mag. Nat. Hist. ser. 7, vol. 6, p. 487, ♀ (*Icaria nigroplagiata*).

With some doubt this form is brought under *mathematica*, my knowledge of it being based upon three female specimens only (incl. the type).

♀. — Clypeus rufous at the base, the median line broad; mandibles with a small yellow spot; inner orbits rufous; prothorax with a short and narrow transverse line in the middle; postscutellum with a narrow transverse line; the connected lines on the propodeum abbreviated; the spots at the base of the second tergite small, the apical band of this segment narrow, and obsolete in the middle of the sternite. Metapleura and propodeum (except for the yellow

marking) blackish. Coxae I yellow anteriorly, II partly yellow; the rest of the legs ferruginous, partly blackish, tibiae I paler than the others.

India: Khasia, 2♀♀, one of which is the holotype (Mus. Oxf.); E. Himalaya, Darjiling Distr., Pashok, 2000′, 1 ♀, F. H. GRAVELY (Mus. Calc.).

R. mathematica (SM.), subsp. **unicolor** (SM.).

!1859. SMITH, F., Jl. Proc. Linn. Soc. Zool. III, p. 168, ♀ (*Icaria unicolor*, Kei).
!1862. SAUSSURE, H. DE, Stett. Ent. Zeitg. XXIII, p. 136, ♀ (*Icaria socialis*, Timor).
1871. SMITH, F., Jl. Proc. Linn. Soc. Zool. XI, p. 380 (*Icaria unicolor*).

In the Eastern part of the Archipelago *R. mathematica* shows a strong reduction of the yellow markings, the body thus becoming almost entirely paler or darker brown; the black markings are sometimes present, sometimes almost obsolete. A similar phenomenon is observed in *R. variegata*. The dark forms of *R. mathematica* have been described from Kei (*unicolor* SM.), Timor (*socialis* SAUSS.) and Ceram (*torrida* SM.). I treat *socialis* as a synonym of *unicolor*, because I have not been able to find differences of any importance between the types of these forms; *torrida* (SM.) may be preliminarily regarded as a separate subspecies.

♀. — Body entirely dark brownish; narrow lines along the margins of the clypeus, and some indistinct markings on the mesosternum and the metapleura blackish.

Kei Isl.: 1♀, WALLACE, holotype of *Icaria unicolor* SM. (Mus. Oxf.); some females from the same locality (coll. VON SCHULTHESS, coll. m.).

Timor: WIENECKE, holo-, allo- and paratypes of *Icaria socialis* SAUSS. (Mus. L., coll. m.); 2 ♀, "Timor" (Mus. Geneva). Roma Isl.: 1 ♂, KÜHN, leg. VON SCHULTHESS (coll. m.).

Wetar Isl.: 1 ♀, SCHÄDLER (Mus. L.); apex of clypeus somewhat yellowish; the specimens from the latter two islands which I have seen are somewhat smaller than those from Kei, but otherwise not different.

A further study of *R. mathematica* in Timor will certainly be of interest, for at present it is not known whether the yellow marked specimens and the subsp. *unicolor* fly together or in separated areas, and whether transitions between these two forms occur.

Queensland: Cape York, 19.V.1932, Harvard Exp., Darlington, 1 ♀ (coll. m.); in this specimen the apex of the clypeus and the inner orbits are somewhat yellowish, the second abdominal tergite has a distinct, narrow, apical yellow band, and the black markings on head and thorax are more like in typical *mathematica*; the greater part of the second segment is blackish.

R. mathematica (SM.), subsp. **torrida** (SM.).

!1863. SMITH, F., Jl. Proc. Linn. Soc. Zool. VII, p. 42, ♀ (*Icaria torrida*).
1871. SMITH, F., Ibid., vol. XI, p. 380 (*Icaria torrida*).

♀. — Much like the subsp. *unicolor* (SM.), but the second and following abdominal segments blackish.

Ceram: 2 ♀♀ (incl. the holotype), WALLACE (Mus. Oxf.).
Amboina: 1 DOLESCHALL, 1859 (Mus. Vienna).
"Moluccas": 1 ♀ (Mus. Geneva).

Ropalidia artifex (SAUSS.).

1853. SAUSSURE, H. DE, Ét. fam. Vesp. II, p. 25, no. 3, ♀, T. 4, F. 3 (*Icaria variegata*); p. 236 (*Icaria artifex*).

1894. DALLA TORRE, C. G. DE, Cat. Hym., IX, p. 117, ♀ (*Icaria artifex*). (The record "Am.: New Cambria" is erroneous, as is also the synonymy: "? *Pol. biocu-lata* F.").

Under the name *variegata* (SM., 1852) H. DE SAUSSURE described a species from Java (coll. SPINOLA), but after having come to the conclusion, that his species was not identical with the *variegata* of SMITH, he gave it the name *artifex* (l.c., p. 236). There is little doubt that DE SAUSSURE's material consisted of at least two different species, for he mentions as a variety a form with two yellow points on the postscutellum, which most probably will prove to be *R. mathematica*, var. *binotata* m. Though I did not see the type material, the description of the abdomen: "deuxième segment..... ayant en dessus la forme de toit, surtout a son bord postérieur" leaves little doubt that it was based upon the species described below. This view is confirmed by DE SAUSSURE's description of the coloration, which does not fit to any of the other Javan representatives of the *stigma*-group, the present species being the only one which has the mesonotum entirely black.

The fact that *R. artifex*, as interpreted by me, is rare in Java and probably confined to primary forests, does not exclude the possibility that DE SAUSSURE had this species before him, for during the last century the area covered with that type of vegetation in Java has very much decreased. Consequently many insects, which are unable to live in cultivated areas, have become much scarcer than they were formerly.

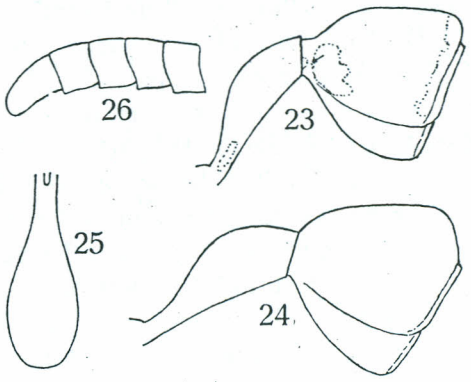
As far as I know, *R. artifex* has not been recognized since 1853, and the species recorded under this name by various authors are either *R. stigma* or *R. mathematica*.

Female. — Head as in *R. stigma*, distinctly wider than the thorax (38.5 : 33). Temples well developed, seen in profile about ¾ of the width of the eyes. Posterior ocelli three times as far from the eyes as from each other, the latter distance is about as long as their width and slightly shorter than the space between the posterior ocelli and the anterior one. Clypeus moderately convex, about as wide as high, apex rather acute; anterior portion much shorter than the basal interocular part. Mandibles rather short, upper tooth short, but less blunt than in many other species, the lower teeth subequal and acute. Antennae long and slender, scape slightly curved and flattened, nearly four times as long as wide at apex, third segment more than 2½ times as long as wide at apex, slightly shorter than the three following segments together, fourth segment about square in outline, the following seven segments wider than long,

tenth segment less than 1½ times as wide as long, twelfth segment somewhat longer than wide at base; flagellum only slightly and gradually swollen beyond the third segment.

Thorax as in *R. stigma;* propodeum with a broad median impressed line in its posterior half.

Abdomen very remarkably shaped (figs. 23 - 25). First segment long, more than 2½ times as long as wide, spiracles faintly projecting, scarcely visible when the segment is seen from above. Second segment, seen from above, slightly wider than long; as seen in profile, the tergite is more or less strongly raised posteriorly, where it forms a rounded bunch; the shape appears to be somewhat variable: in some specimens the bunch is less strongly developed and closer to the apical margin than in others.



Figs. 23 - 26. *R. artifex* (SAUSS.); 23. first and second abdominal segments, ♀ from Java; 24. the same, ♀ from Sumatra; 25. first abd. segm. of latter specimen, from above; 26. apical segments of antenna of ♂.

Wing venation, puncturation and pubescence as in *R. stigma.*

M a l e (described after a specimen from Sumatra). — Head seen in front distinctly wider than high (38 : 33), seen from above more than twice as wide as long (38 : 17), much wider than the thorax (38 : 31). Eyes strongly swollen, temples narrow, seen in profile less than half as wide as the eyes. Posterior ocelli about three times as far from the eyes as from each other. Clypeus scarcely convex, about as long as wide, apex rather bluntly pointed, the basal interocular portion three times as long as the anterior part. Antennae long and slender, with distinct tyloides, finely serrate (fig. 26).

Thorax and abdomen slenderer than in the female. Sculpture as in the female, clypeus impunctate.

Length (h. + th. + t. 1 + 2), ♀♂: 9 - 11 mm.

The coloration of this species is variable, even in the same locality. My material does not permit the distinction of well defined colour phases, but I have named the darkest form, which occurs in Sumatra and the Malay Peninsula and differs considerably in coloration from the typical form of Java.

R. artifex (SAUSS.), typical form.

♀. — Brownish black; the tips of the mandibles, a line on the temples, a spot between the antennae, the pronotum behind the yellow line, a spot at the base of the metapleura, and the swollen part of the abdominal petiole, dull reddish; the following parts yellow: mandibles almost entirely, a small spot on the temples near the base of the mandibles, clypeus (except for a median black line which does not reach the apex), a line at the underside of the antennal

scape, a line along the inner orbits (the upper part often somewhat reddish), a transverse fascia along the pronotal carina, large transverse spots on scutellum and postscutellum, two broad confluent lines on the propodeum, a line on each side of the base of the petiole, a basal spot on each side of the second tergite, two smaller ones, apparently of variable size (sometimes absent?) on the sternite, and an apical band on the second tergite, widened in the middle and continued on the side of the sternite. Legs brownish, coxae almost entirely yellow, femora I yellow below, apical half of femora II with a yellow line, knees ferruginous. Underside of antennae, the tegulae and the third and following abdominal segments dull ferruginous. Wings as in *R. stigma*, the radial cell almost entirely infuscated.

♂. — I have not yet seen any males from Java, but among the material from the Malay Peninsula (Kedah Peak) are a few males which have almost the same yellow markings as the females from Java. The mandibles are entirely yellow, the dark line on the clypeus is narrower, the underside of the antennae is entirely yellow, there is a small yellow spot between the antennae, and the spots on the second abdominal segment are small. The reddish colour is less extensive, the pronotum is black, with the exception of a narrow yellow line along the transverse carina.

West-Java: 2 ♀♀, Djampang Tengah, 1934, Mrs. M. E. WALSH (coll. m.); 1 ♀, S.E. Priangan, Penandjoeng Bay, July 1936, Mrs. M. E. WALSH (coll. m.); 1 ♀, same locality and date, M. A. LIEFTINCK (Mus. Btzg.).

Malay Peninsula: A series of 7 ♀♀ and 4 ♂♂ from Kedah Peak, 3000′ - 3300′, March 1928, H. M. PENDLEBURY (Mus. K.L., coll. m.), contains some specimens which are only slightly darker than those from Java, while in others the red and yellow markings are largely replaced by black, the latter specimens thus representing various transitional forms between typical *artifex* and the variety described below.

Borneo: Some specimens from North Borneo, Samawang near Sandakan, jungle, July 1927, PENDLEBURY and BODEN KLOSS, have the yellow markings on the thorax and abdomen partly replaced by dark red; the basal half of the clypeus is reddish and the basal spots on the second abdominal segment are absent.

R. artifex (SAUSS.), var. **fuscata,** new variety.

♀. — Black; the following parts yellow: a large spot on the mandibles, a broad line at the anterior margin of the clypeus, a line along the inner orbits, curved inwards at the top and not reaching the eye-emarginations, two distinct minute spots between the antennae, a large spot on coxae I and a short line on coxae II. Temples with an indistinct reddish line, sometimes yellowish near the base of the mandibles. Antennal scape ferruginous below. Transverse fascia of pronotum narrow, reddish brown. Scutellum and propodeum with vague reddish spots or entirely black. The swollen part of the petiole at least partly red. Legs fuscous, inner side of tibiae I and II pale brownish, tarsi brown.

♂. — Yellow markings somewhat less reduced: mandibles, a spot on the temples near their base, the clypeus (except for a median black line not reaching the apex), anterior face of coxae I and II and a line on coxae III, yellow (in a ♂ from Borneo only coxae I yellow). Coloration otherwise as in the female.

Sumatra: 2♀♀, 1♂, N. Sumatra, Toba Lake, B. HAGEN (holo- and allotype, resp. ♀♂, in Mus. L., 1 ♀ coll. m.); 1 ♀, S. Sumatra, Lampong Districts, Kasoei, Aug. 1933, H. R. A. MULLER (coll. m.); in this specimen the yellow line on the clypeus is very narrow, the pronotum is almost entirely black, and the swollen part of the abdominal petiole is only partly reddish.

Malay Peninsula: 2 ♀♀, Kuala Lumpur, March 1936, PENDLEBURY (Mus. K.L., coll. m.).

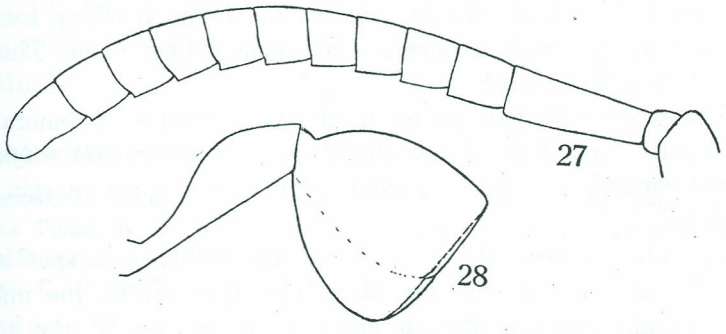
Borneo: 1 ♂, S. Borneo, Tanggarang, Mt. Pandjang, 4 July 1937, Mrs. M. E. WALSH (coll. m.); 1 ♀, "Pulo Laut" (Isl. Poeloe Laoet, S.E. of Borneo) (Mus. Venice).

Ropalidia rufocollaris (CAM.).

!1900. CAMERON, P., Ann. Mag. Nat. Hist. (7) VI, p. 497, ♀ (*Icaria*).
1925. DOVER, C., Jl. As. Soc. Bengal, N.S., XX (1924), p. 301 (*R. ruficollis* (nom. mus.!), var. of *R. artifex*).

This species is closely allied to *R. stigma* (SM.), but it is readily distinguished by its larger size. Furthermore it differs from *stigma* in the following characters.

Female. — Temples about two thirds of the width of the eyes, as seen in profile. Inner orbits further apart on the vertex than at the clypeus (22: 19). Antennae more slender than in *stigma*, third segment slightly more than three times as long as wide at the apex, fourth segment longer than wide, twelfth segment distinctly longer than wide at the base. Scutellum slightly flatter than in *stigma*, without an impressed line at the base. Abdominal petiole (fig. 28) somewhat longer and slenderer than in *stigma*, about 2½ times as long as wide.



Figs. 27 - 28. *R. rufocollaris* (CAM.); 27. antenna of ♂; 28. first and second abdominal segments of ♀.

Polished area of the postscutellum smaller than in *stigma*, broadly triangular. — Puncturation much the same as in *stigma*, but coarser and denser, especially

the mesonotum and mesopleura reticulately punctate, temples and metapleura with distinct punctures, postscutellum punctate along its entire anterior margin. The striae on the propodeum are somewhat coarser. — Pubescence denser and more conspicuous.

Male. — Differs from *stigma* in the same characters as described for the female; moreover the antennae are distinctly serrate (fig. 27) and the head is relatively wider (as seen in front, height: width = 38 : 47). As seen in profile, the strongly swollen eyes are nearly three times as wide as the temples. The distance between the inner orbits on the vertex compared with that at the clypeus is relatively larger (20 : 15). Apical margin of the second abdominal segment strongly depressed.

Length (h. + th. + t. 1 + 2), ♀ 12 - 13 mm, ♂ 11 - 12 mm.

R. rufocollaris (CAM.), typical form.

♀. — Head dark rufous; vertex and two lines running downward from there to the antennal sockets, a narrow line along the basal margin of the clypeus and an ill defined spot in the centre of the clypeus, black; a large spot at the base of the mandibles, and the anterior margin of the clypeus, yellow; antennae pale ferruginous below.

Thorax black; prothorax rufous with a narrow and inconspicuous pale line along the transverse carina; tegulae ferruginous; a longitudinal mark on the mesopleura, and the scutellum nearly entirely, rufous; postscutellum with a yellow spot on each side, the polished area obscurely rufous, propodeum with a median yellow mark, consisting of two rather narrow vertical lines, which are either connected in the middle or separated by a narrow black line. Apical lamellae of propodeum pale yellowish.

Abdominal petiole red, the basal half black with a yellow line on each side, the apical margin with an ill defined transverse yellowish band. Second segment obscurely brownish, a ring around the constricted base (usually hidden under the apical margin of the first tergite) and — connected herewith — a short line on each side of the tergite, yellow (the latter marking sometimes obsolete); apical margin with a narrow transverse yellow band. Third and following segments dull brownish.

Legs brown, coxae with pale yellow markings, underside of femora I and II pale ferruginous, tarsi dark. Wings slightly darker than in *R. stigma*, the subapical cloud somewhat larger and extended over the upper margin of the fourth cubital cell.

♂. — Mandibles, clypeus, the space below the antennae, a spot between them, a line on each side of the face along the inner orbits, the underside of the first antennal segment and an often indistinct line at the temples, yellow. The flagellum of the antennae pale yellowish beneath. Epicnemium of mesopleura with a large yellow spot on each side, coxae I and II nearly entirely yellow, coxae III with large yellow markings, underside of femora I and II with a yellow stripe; the remainder as in the female.

India: Assam, Khasia Hills (several specimens — amongst which the type — in Br. Mus.); Darjiling Distr.: 1 ♀, Pashok, 2000′, L. C. HARTLESS, 3 ♀♀, Singla, 1500′, Lord CARMICHAEL (Mus. Calc., coll. m.); Tibet, 2 ♀♀, 1 ♂, Khamba Jong, F. A. MOLLER (Mus. Calc.).

A male from Carin Cheba, 400 - 600 m, L. FEA, Nov. 1888, sent to me by the Museum at Venice, differs from the typical form in having the yellow markings larger and more abundant: temples with a yellow line, widened below, scutellum with two yellow spots, median line on propodeum wider, the spots at the base of the second tergite larger, base of second sternite with a large yellow spot which is incised in the middle.

R. rufocollaris (CAM.), subsp. **atrata,** new subspecies.

♀. — Differs from the typical phase as follows: Head black; a small spot at the base of each mandible and a small triangular spot at the apex of the clypeus, yellow; a minute spot between the antennae, a short line along the inner orbits and a small spot on the upper part of the temples, rufous. Thorax black; pronotum with a short transverse ferruginous line in the middle; tegulae brownish; propodeum with two minute spots in the middle near the apex; apical lamellae ferruginous. Abdominal petiole as in typical *rufocollaris*, but without lateral yellow lines; the apical margin testaceous, without a distinct fascia. Second abdominal segment black; its basal constricted neck pale yellow; apical margin obscurely rufous. Third and following segments dull brownish. Legs brownish black, coxae I with a yellow spot, coxae II with a narrow lateral yellow line.

♂. — Black, marked with dirty yellow [1]) as follows: Mandibles, clypeus (except for a short blackish line in the middle near the base), a short line along the inner orbits, reaching the centre of the eye-emargination, the under side of the first antennal segment, a large spot on the epicnemium of the mesopleura and the anterior face of coxae I and II (the former with a blackish stain at the base). The remainder as in the female.

Siam: 1♀, Doi Setep, W. P. COCKERELL (holotype, coll. BEQUAERT).

Indo-China: 1♂, Luang Prabang, Sop Choun, R. V. DE SALVAZA, allotype, Br. Mus.).

Ropalidia hongkongensis (SAUSS.).

!1853. SAUSSURE, H. DE, Étud. fam. Vesp. II, p. 239 ♀ (*Icaria*, Hongkong).
1904. DALLA TORRE, K. W. VON, Gen. Insect. 19, p. 73 (*Icaria;* erroneously recorded from Senegal).
1926. DOVER, C., China Jl. Science & Arts, IV, no. 5, p. 233.

Female. — Head slightly wider than high, as seen from above somewhat flatter anteriorly than in *R. stigma,* rather distinctly excavated behind; temples wider than in *stigma,* as seen in profile about ¾ of the width of the eyes. Ocelli

[1]) Probably the coloration of these parts will appear to be brighter in fresh specimens.

about three times as far from the eyes as from each other, the distance between the posterior ocelli slightly longer than their diameter. Clypeus and mandibles as in *R. stigma.* Antennae slender, first segment more than 4½ times as long as wide at the apex, third segment three times as long as wide at the apex, fourth segment slightly longer than wide, fifth and following segments wider than long, tenth segment 1½ times as wide as long, the last segment slightly longer than wide at the base.

Shape of thorax and abdomen similar to that of *R. stigma;* the first abdominal segment $2^1/_6$—$2^1/_4$ times as long as wide, the second segment more distinctly obliquely cut off at the end, the sternite distinctly shorter (and more convex) than the tergite; the depressed apical margin of the second segment narrow.

Body dull, the anterior portion of the clypeus shiny, the impunctate and shiny area on the postscutellum smaller than in *stigma,* broadly triangular; propodeum moderately shiny.

Sculpture much as in *R. stigma;* the basal portion of the clypeus rather strongly punctate, the punctures larger than the interspaces, the anterior portion with some coarser punctures; temples distinctly punctate, the punctures fine and shallow; base and sides of postscutellum strongly punctate, metapleura with shallow and remote puncturation, the striae on the propodeum coarser and more pronounced. The puncturation at the base of the second abdominal segment is coarser and more distinct than in *R. stigma.*

Pubescence normal.

Body rather dark ferruginous brown; the following parts more or less blackish: a line along the basal margin of the clypeus, a transverse line on the vertex enclosing the ocelli, the sutures of the thorax, pro- and mesosternum, a median line (dilated anteriorly) on the mesonotum, metapleura and propodeum partly, the upper and under side of the basal linear part of the petiole and a transverse line near its apex; the extension of the black markings on these parts is without doubt variable. Second abdominal segment dark reddish brown. The yellow markings are as follows: a small basal spot at the inner side of the mandibles, a small triangular mark (well defined posteriorly !) at the apex of the clypeus, a very narrow line along the pronotal carina (sometimes reduced and then only present in the narrow middle), a narrow transverse line at the base of the postscutellum, dilated towards the sides and often interrupted in the middle, a median longitudinal line on the propodeum (much narrower than in typical *stigma* and in *mathematica* subsp. *binotata,* not narrowed towards the apex as in these species, but with parallel sides), a transverse line on the constricted neck of the second abdominal tergite (distinctly visible when this segment is bent downwards), two rather small spots (in the specimen from Hainan nearly obsolete) at the base of the second tergite and a narrow transverse band at the apex of both tergite and sternite; on the tergite this fascia has normally a small rectangular incision on either side at some distance from the middle, the band on the sternite is narrower and shows two

shallow emarginations. Legs reddish brown, tibiae III somewhat darker near the apex, coxae I with a narrow yellow line near the apex. Tegulae ferruginous. Posterior margin of the first tergite translucent. The posterior margins of the second and following segments testaceous.

M a l e. — Head as in *R. stigma,* but the temples a trifle less narrowed towards the mandibles. Antennae less slender than in *R. stigma,* third segment 2⅔ times as long as wide at apex, fourth segment square in outline, fifth-twelfth segments wider than long, the last segment long, more than 1½ times as long as wide at the base; third and following segments with moderately raised tyloides, distinctly carinate. Clypeus almost impunctate.

The following parts are yellow: mandibles (except for the teeth), clypeus, the temples near the mandibles, the underside of the first and second antennal segments and the base of the third, the face below a line connecting the centres of the eye-emarginations (except for a dark line above each antenna), the major part of the mesosternum, all coxae, and more or less distinct lines on all femora and tibiae, a more or less distinct line at the sides of the basal part of the petiole, and two large round spots, almost united in the middle, on the second sternite; the remainder as in the female.

Length (h. + th. + t. 1 + 2), 10½ mm.

C h i n a: 1 ♀, Hongkong (holotype, Br. Mus.). I was able to make a more detailed study of a specimen from the same locality, which I had compared with the type in 1934 (coll. Br. Mus.). Hainan, 1 ♀ 2 ♂♂, Hummocks, May 1936, G. ROS (Mus. Heude, ♂-allotype in coll. m.); Foochow, 1 ♀, KELLOG (coll. BEQUAERT).

R. hongkongensis (SAUSS.), subsp. **juncta,** new subspecies.

♀. — Distinguished from typical *hongkongensis* by the sculpture of the clypeus and the basal portion of the second abdominal segment, these parts being finely, superficially and rather remotely punctate. The striae on the propodeum are also somewhat finer and less distinct.

Abdominal petiole with a short lateral yellow line at the base; the spots at the base of the second tergite somewhat larger than in the typical form.

♂. — Characterized by a reduction of the yellow colour, as compared with the typical form; the spot between the antennae is smaller, the anterior part of the mesosternum is less extensively yellow, the spots on the second sternite are very small or absent. Coxae III reddish with a yellow line, posterior tibiae often entirely brownish.

The coloration of this form appears to be remarkably constant.

Length (h. + th. + t. 1 + 2), ♀: 10 - 11 mm, ♂: 9 - 10 mm.

J a v a: 1♀, 1 ♂, Tjiboerial near Buitenzorg, W.- Java, 19. IV - '35, J. v. d. VECHT (resp. holo- and allotype, coll. m.); paratypes: W.-Java, 7 ♀♀ and 5 ♂♂, Tjiboerial, Djasinga, Goenoeng Tjampea, Goenoeng Tjileueur, Batoetoelis, Soekaboemi (coll. m.).

B a n g k a I s l a n d: Batoe Roesa, 1♀ 1 ♂, Dec. '35 (coll. m.).

India: Assam, Khasia Hills (Br. Mus.); Tenasserim, Taungoo, Col. NURSE, 1 ♀ (Br. Mus.); 1 ♂ without locality label (Mus. Vienna).

Further specimens: W. Java, Bolang-Toge, Djasinga and Soekanegara (Mus. Btzg.).

Ropalidia scitula (BINGH.).

!1897. BINGHAM, C. T., Fauna Br. India, Hym. I, p. 392, no. 683, ♀ (*Icaria scitula*, Sikkim, Rangit Valley).

Male. — Head wider than high (36 : 29), seen from above flat anteriorly, roundly emarginate behind, more than twice as wide as long (36 : 15), distinctly wider than the thorax. Temples more than half as wide as the eyes (6 : 10). Eyes much further apart on the vertex than at the clypeus (18.5 : 14.5), the latter nearly one fifth wider than long, scarcely convex. Ocelli in an equilateral triangle, the posterior ocelli more than twice as far from the eyes as from each other. Vertex and temples separated from the occiput by a very strong carina. Antennae further from each other than from the eyes, interantennal shield very slightly convex. Length of third antennal segment more than twice its width at apex, distinctly more than the length of the two following segments together; flagellum slightly and gradually swollen towards the tenth segment, which is 1⅔times as wide as long, the following segments gradually decreasing in width, the ultimate segment broadly rounded, about as long as wide at base. Third and following antennal segments with distinct, rounded tyloides, but not serrate, the tyloides do not reach the apical margins of the segments. Lower teeth of mandibles acute.

Thorax rather short, its length less than 1½ times the width. Pronotum truncate anteriorly, slightly arcuate, with a distinct transverse carina; the sides converging towards the head, very slightly sinuate. Mesonotum slightly longer than wide. Mesopleura with faint epicnemial carina. Scutellum and postscutellum convex, gradually sloping, the groove between them shallow; scutellum with a fine impressed line on its anterior half. Propodeum rather steeply sloping, median impression moderately deep, wide at the base, narrowed towards the apex, with traces of a median longitudinal carina in its basal half; sides of propodeum strongly swollen, rounded.

First abdominal segment much as in *R. stigma*, but shorter, the apical part wider, almost four times as wide as the short, basal, linear part, less than half as wide as the second segment; apical margin not depressed. Second abdominal segment slightly wider than long and almost as high as long, somewhat obliquely cut off at the end, the tergite being slightly longer than the sternite; apical margin extremely narrow, but strongly depressed.

Wings normal, third cubital cell slightly wider at the base than at the top.

Body dull, mandibles and posterior triangular area of postscutellum shining. Clypeus sparsely punctate; frons, vertex, temples, pro- and mesonotum, mesopleura, scutellum and greater part of postscutellum densely reticulately punctate; propodeum rugose, very finely transversely striate in the middle;

basal two thirds of first abdominal segment with scattered punctures, the posterior part more densely and coarsely punctate; second and third tergites very densely punctate, except at the base without interspaces, the punctures as large as those on the mesonotum, but not margined posteriorly; the punctures on the second sternite larger and better defined, but slightly more remote, especially in the centre.

Pubescence short and brownish, longer and silvery white on clypeus, sternum and propodeum, third and following abdominal segments with brownish fringes.

Body black, inner margin of mandibles with a yellow line, a line of the same colour along inner orbits; bright red: a line on the pronotum, abbreviated at the sides, but reaching back along the posterior margin nearly to the tegulae, scutellum and postscutellum (except for the shining triangular area of the latter, which is black). Legs dark brownish, spurs of tibiae brownish yellow. Wings hyaline, fore wing fuscous along its anterior margin, with a fuscous cloud in the radial cell, veins and stigma dark brown.

I had no opportunity to make a detailed study of the female of this species.

India: Described from a male specimen from Darjiling, April 1894, coll. C. T. BINGHAM (labelled "♀" by BINGHAM) (Br. Mus., compared with BINGHAM's type); Khasia Hills, 1 ♀, and Sikkim, 1 ♂ (Br. Mus.); Sikkim, 1800′, DUDGEON, 1 ♂ (Mus. Calc.).

Ropalidia taiwana SONAN.

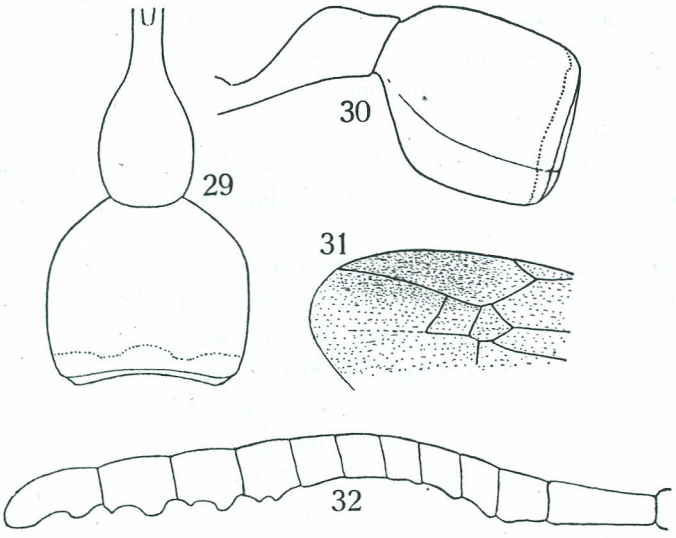
1935. SONAN, J., Transact. Nat. Hist. Soc. Formosa XXV, p. 201, ♀♂, figs. (*R. taiwana* and *R.t.* var. *koshunensis*).

Female. — Head rather thick, distinctly wider than high (44 : 38), as seen from above more than twice as wide as long (44: 20), slightly wider than the thorax. Temples, as seen in profile, about ¾ of the width of the eyes. Inner orbits further apart on the vertex than at the clypeus (23: 18). Ocelli in an almost equilateral triangle, the posterior ones three times as far from the eyes as from each other; the latter distance about equal to their diameter. Clypeus slightly wider than long, shape as usual. Antennae slender, third segment slightly longer than the following two together; flagellum not much swollen, the tenth segment only slightly wider than long.

Thorax short and high; pronotum truncate anteriorly, with a distinct transverse carina, the sides very slightly converging towards the head. Mesopleura strongly swollen below; scutellum strongly convex, with a fine impressed median line, postscutellum flat, almost vertical. Propodeum short and steep, with a deep median furrow, the sides swollen and rounded, without carinae or projecting angles.

Abdomen (figs. 29 and 30) very characteristic, especially the shape of the second segment, as it is seen in profile. Both the tergite and the sternite of this segment have a narrow, strongly depressed apical margin, which bears a

great number of longitudinal carinae; the suture between tergite and sternite very distinct.



Figs. 29 - 32. *R. taiwana* SONAN; 29. first and second abdominal segments from above; 30. the same, in profile; 31. part of fore wing; 32. antenna of ♂.

Wing venation: fig. 31.

Body dull; clypeus slightly shiny anteriorly, the polished area of the postscutellum short, but wide.

Clypeus rather densely punctate, the punctures well separated and somewhat increasing in size towards the anterior margin; frons, vertex, pro- and mesonotum, mesopleura behind the epicnemial carina, scutellum and the anterior part of the postscutellum rather coarsely and densely, reticulately punctate; the propodeum with a similar puncturation; the upper part of the metapleura striate, the lower part almost impunctate. The swollen part of the first tergite, and the second tergite, have about the same puncturation as the mesonotum, but the punctures are not margined posteriorly; the punctures on the second sternite are larger and sparser, more distinctly separated, than on the tergite.

Body covered with a short and fine pale yellowish, partly silvery, tomentum; the erect pubescence is most distinct on the head, the propodeum and the abdomen.

Reddish brown; an elongate spot on the mandibles, the anterior margin of the clypeus, a very narrow line along the pronotal carina, and a narrow apical fascia on the second segment, yellow; the following parts black or blackish: upper side of antennal segments 4 - 12, a narrow line along the margins of the clypeus and a spot in its centre, a broad transverse band on the vertex, (anteriorly extended along the inner orbits), the occiput, the anterior (vertical) face of the pronotum, the mesonotum, the anterior and posterior part of the mesopleura, the mesosternum, the metapleura and the propodeum, the base

of the first tergite, a spot on its swollen part, and the first sternite. Legs ferruginous brown, coxae, trochanters and femora with more or less distinct blackish markings. Tegulae ferruginous. Wings brownish hyaline, slightly darker in the median cell and the anterior two thirds of the radial cell; veins brown, stigma brownish yellow.

Male. — Head relatively wider than in the female (width: height = 42 : 32); temples narrow, less than half the width of the eyes; clypeus much flatter and shorter, the sides rather strongly diverging towards the apex which is wide, bluntly pointed, and scarcely protruding beyond a line through the eye-bases. Antennae (fig. 32) very characteristic, the median portion (segments 5 - 9) curved, the tenth and following segments with strong, dentiform, shining tyloides.

Second abdominal segment somewhat shorter than in the female, its apical margin more strongly depressed. Seventh sternite flat, rounded posteriorly, its base with a wide and shallow impression.

Clypeus densely covered with short whitish pubescence, not distinctly punctate; pale yellow, with a median dark line, which is widened below and does not reach the apex. A spot between the antennae and short lines along the lower inner orbits pale yellow; underside of first and second antennal segments reddish yellow.

The rest as in the female.

Specimens of both sexes without a dark spot on the clypeus have been described by SONAN as var. *koshunensis*.

Length: (h. + th. + t. 1 + 2): ♀ 9 - 11 mm, ♂ 10 mm.

Formosa: Shinchiku, Hori, Urai, Koshun, Hassen-zan (SONAN); Kosempo, SAUTER (Mus. B.-D., coll. m.); Kuraru, C. TAKEYA (Kyushu Univ.); Taihorin, SAUTER (Mus. B.-D., coll. BEQUAERT, coll. m.); Hassenzan and Rokki, L. GRESSITT (coll. BEQUAERT, coll. m.); 1 ♂, Taihorinsho, SAUTER (coll. m.).

South China: Ku-ling and T'ienmu-Shan, OCTAVE PIEL (Mus. Heude, coll. m.); somewhat darker than the Formosan specimens, postscutellum almost entirely black.

Ropalidia picta (SAUSS.).

?1804. FABRICIUS, J. C., Syst. Piez., p. 290, n. 19 (*Eumenes fasciata*, Java).
1853. SAUSSURE, H. DE, Étud. fam. Vesp. II, p. 38 (*Icaria ferruginea*, var. B); p. 238, ♀☿ (*Icaria picta*, Bengal).
1867. SAUSSURE, H. DE, Reise d. Novara, Zool. II, 1, Hym., p. 22 (*Icaria pendula* ?, Java).
1897. BINGHAM, C. T., Fauna of Brit. India, Hym. I, p. 388, ♀ ☿ (*Icaria variegata*).
!1903. CAMERON, P., Jl. Straits Br. R. As. Soc. 39, p. 172, ♀ (*Icaria maculifrons*, Borneo).
!1905. CAMERON, P., Tijdschr. v. Ent. XLVIII, p. 70, ♀ (*Icaria intermedia*, Java).
1907. CAMERON, P., Jl. Straits Br. R. As. Soc. 48, p. 26 (*I. intermedia* and *I. maculifrons*, Borneo).
1911. BUYSSON, R. DU, Abh. Senckenb. Naturf. Gesellsch. XXXIV, p. 229 (*I. picta*).
!1929. DOVER, C., Bull. Raffles Mus., Singapore, 2, p. 47 (*Ropalidia variegata*).

!1931. DOVER, C., Jl. Fed. Mal. St. Mus. XVI, p. 257 (*R. variegata*).
1935. SONAN, J., Trans. Nat. Hist. Soc. Formosa XXV, p. 199, fig. 8 (p. 200) (*R. variegata*).

This species has generally been confused with *R. variegata* (SM.), from which it differs, however, by the greater size, the shape of the first and second abdominal segments, the curved and excavated last antennal segment of the male, etc. *R. picta* has also been mixed up with the species of the *stigma*-group, but from these it is easily distinguished by the petiole which is more strongly swollen posteriorly, furthermore the yellow lines on the propodeum are always separated by a more or less narrow black line.

I did not see the type of this species, but DE SAUSSURE's description is sufficiently complete to allow a certain recognition; moreover, in the British Museum I saw specimens which had been identified by DU BUYSSON, and it appears very probable that this author based his conception of *R. picta* on an examination of the type which is in the Museum at Paris. Most probably *Eumenes fasciata* F. is the male of this species, but the description is too short to recognize it with sufficient certainty. The identification of SCHULZ (1912) (see p. 159), who studied the type in the Museum at Kopenhagen, is certainly incorrect; a renewed study of the type will therefore be necessary.

R. picta is very closely allied to *R. gregaria* (SAUSS.) which I have treated as a separate species, but which can only be distinguished with certainty from *picta* in the male sex.

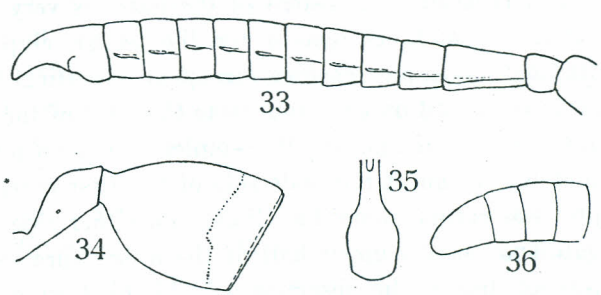
F e m a l e. — Head subcircular and rather thick, as seen in front slightly wider than high (36: 33), seen from above not much narrowed behind the eyes and somewhat more than twice as wide as long (36 : 16), distinctly wider than the thorax (36 : 31). Temples wide, as seen in profile nearly as wide as the eyes, distinctly narrowed towards the base of the mandibles. Inner orbits further apart on the vertex than at the clypeus (19 : 15). Front convex, ocelli in an equilateral triangle, the space between them distinctly raised, posterior ocelli more than twice as far from the eyes as from each other, the latter distance is somewhat less than 1½ times their diameter. Clypeus about as long as wide, moderately convex, with a very small apical tooth. Antennae quite distinctly further from the eyes than from each other, flagellum short, third antennal segment less than twice as long as wide at the apex, about as long as the following two together, fourth and following segments wider than long, the tenth segment 1⅔ times as wide as long, the last segment slightly longer than wide at the base.

Thorax slender, more than 1½ times as long as wide as seen from above. Pronotum roundly truncate, transverse carina well raised and distinct, the sides of the pronotum almost straight, scarcely converging towards the head. Mesonotum conspicuously longer than wide, strongly narrowed anteriorly, with a median impressed line in its anterior half. Scutellum convex, with a fine median impressed line at the base. Postscutellum comprised in the posterior face of the thorax, almost flat in the middle, the sides somewhat rounded, not

projecting. Mesopleura swollen below, epicnemial carina moderately distinct. Propodeum very slightly convex as seen in profile, the sides straight and converging towards the abdomen as seen from behind, posterior face scarcely excavated, almost flat, with a rather wide median impressed line.

Abdomen (figs. 34 and 35) slender; apical half of petiole more swollen than in the *stigma*-group, the apex obliquely cut off as seen in profile, the petiole is about twice as long as wide and distinctly wider than high; spiracles slightly projecting; the petiole is narrowed at the end, but the apical margin is not depressed. Second segment nearly three times as wide as the first, distinctly longer than wide (42 : 35), about 1⅓ times as long as high; as seen in profile, it is obliquely cut off at the end, the tergite being longer than the sternite; as seen from above, the sides are rounded at the base, and parallel or very slightly diverging towards the end in the posterior two thirds; apical margin narrow, but strongly depressed; sternite much more convex than the tergite, the suture between them fine, visible at the base only.

Wings normal, the second cubital cell much narrowed towards the top, it receives the first recurrent vein about in the middle and the second in ¾ of its base; third cubital cell usually higher than wide at the radius, much widened towards the base, the third cubital vein being strongly oblique.



Figs. 33 - 35. *R. [illegible]* (SAUSS.); 33. antenna of ♂; 34. first and second abdominal segments; 35. first abd. segm. from above.
Fig. 36. *R. gregaria* (SAUSS.), apical segments of antenna of ♂.

Body dull, except for the mandibles, the anterior portion of the clypeus and a small triangular polished area in the middle of the posterior half of the postscutellum.

Clypeus with distinct, but rather remote puncturation, the punctures larger and denser near the apex; front, vertex, pro- and mesonotum, mesopleura (behind the epicnemial carina), scutellum and postscutellum (except for the polished area) densely, but rather finely and superficially punctate, upper part of metapleura with a few transverse striae, lower part with some scattered small punctures; propodeum transversely striate and finely punctate at the sides, obliquely striate on the posterior face. Posterior part of the first tergite and the entire second tergite densely, finely, somewhat irregularly punctate, the punctures are superficial and not margined behind, those on the second sternite are slightly larger and more remote.

The body is covered with a fine and thin greyish tomentum; there are some longer erect hairs on the clypeus, the propodeum and the abdomen.

M a l e. — Head a little wider and flatter than in the female, distinctly wider than high as seen in front (35 : 31), about 2⅓ times as wide as long

as seen from above (35 : 15), distinctly wider than the thorax (35 : 31). Eyes larger and temples narrower than in the female, the latter about half as wide as the former, as seen in profile. Inner orbits further apart on the vertex than at the clypeus (18 : 13.5). Ocelli in an almost equilateral trangle, the space between them raised, posterior ocelli nearly twice as far from the eyes as from each other, the latter distance is 1½ times their diameter. Clypeus wider than long, almost flat, apex much blunter than in the female. Antennae with distinct tyloides; the last segment with a short but prominent tyloide at the base, its apical two thirds gradually narrowed and curved (fig. 33).

Clypeus with scattered small and indistinct punctures; thorax and abdomen sligthly more slender than in the female, seventh abdominal segment rounded at the end, the sternite flat. The remainder as in the female.

Length (h. + th. + t. 1 + 2), ♀♂ 7 - 9 mm.

The coloration of the typical form is as follows:

♀. — Lighter or darker ferruginous brown, with yellow and blackish markings; especially the extent of the latter is very variable.

Yellow: mandibles (except for the teeth), clypeus (except for a median longitudinal mark, not reaching the apex), a vertical line between the antennae, as a rule continued on the front up to the level of the eye-incisions, a line along the inner orbits, a line on the temples (often narrowed or interrupted below the middle), a line at the underside of the first antennal segment, a line along the pronotal carina, somewhat dilated on either side of the narrow middle, an elongate spot on the upper half of the mesopleura, scutellum, postscutellum, a small spot below the insertion of the hind wings, two broad vertical lines occupying the entire posterior face of the propodeum, with the exception of the dark median line, an irregular spot of variable size on either side of the base of the second tergite, a rather wide band or the posterior margin of the second segment (widened at the sides, its width in the middle is about ¼ of the length of the tergite), anterior face of coxae I, lateral spots on coxae II (sometimes entirely yellow) and III, a line at the underside of femora I and II, and a line at the outer side of tibiae I and II.

The extension of the black colour is very variable. In some specimens only a spot on the vertex, enclosing the ocelli, and a narrow median line on the propodeum are black, but in others the ferruginous colour on the head, thorax and second abdominal segment may be largely replaced by black or blackish, and in such specimens the yellow markings are also more or less reduced. The darkest specimen in may collection is a female from S. Borneo, Tanggarang (Mrs. M. E. WALSH, 1937); it has the following parts black: clypeus (except for a narrow yellow line on the anterior and lateral margins), front (except for a small yellow spot between the antennae and a short yellow line at inner orbits), the larger part of vertex and temples, the sides and anterior face of the pronotum, the mesothorax (except for a rufous spot on meopleura, and the scutellum which is rufous), the metapleura and metasternum, the propodeum

(except for two short and narrow yellow lines [1])), the larger part of the second abdominal segment (base reddish without yellow spots, yellow apical fascia present), coxae (small yellow spots on coxae I and II), trochanters and the basal half of the femora.

♂. — Clypeus yellow, rarely with a vague blackish spot in the middle of the base; the lines at the inner orbits usually reach the top of the eye-incision; as a rule the yellow spot between the antennae is gradually widened upwards, and transversely cut off at the level of the top of the eye-incisions. The line on the temples not interrupted. Prosternum, mesosternum and epicnemium of mesopleura yellow, sometimes partly blackish. Mesopleura often with a second yellow spot on the lower half near the posterior margin. The black markings are often more extensive than in females from the same nests.

Apparently various transitions between darker and brighter specimens occur, and at present I am unable to separate the available material into distinct colour varieties.

R. picta is one of the most common species and appears to be spread over the greater part of the Oriental region; it is represented in almost every collection of Oriental wasps. I have seen specimens from the following localities: India: Sikkim, Assam, Bengal (Calcutta); Indo-China: Annam; Saigon; S. China: Hainan, Canton; Foochow; Formosa; Yonakuni Isl., Ishigaki Isl. (Kyushu Imp. Univ.); Malay Peninsula; Poeloe Weh, Sabang (Mus. Btzg.); Sumatra; Bangka Isl.; Borneo (incl. the type of *Icaria maculifrons* CAM. (Br. Mus.) and 2 ♀ from R. Kapah, Oxford Univ. Exp.); Java (incl. the type of *Icaria intermedia*, in Zool. Museum, Amsterdam); Karimon Djawa Isl. (LIEFTINCK, Mus. Buitenzorg).

In Java *R. picta* is very common in cultivated areas in the plains and the lower part of the mountain region, up to about 1000 m above sea-level. In 1929 I collected a few males on the summit of Mt. Salak in W. Java (2100 m), and as it seems highly improbable that the species was nesting there, I suspect that the males of *R. picta* show a similar habit of visiting mountain tops as has been observed in *Polistes diabolicus* SAUSS. by ROEPKE (Tijdschr. Ent. 59, 1916, p. 175 - 179).

Ropalidia gregaria (SAUSS.).

1853. SAUSSURE, H. DE, Étud. fam. Vesp. II, p. 236, ♀ (*Icaria*, Australia).
1862. SAUSSURE, H. DE, Stett. Ent. Ztg. XXIII, p. 137 (*Icaria*).
!1860. SMITH, F., Jl. Proc. Linn. Soc. Zool. IV, p. 131, ♀ (*Icaria impetuosa*, Batjan).
1871. SMITH, F., Jl. Proc. Linn. Soc. Zool. XI, p. 380 (*I. impetuosa*).
1894. FROGGATT, W. W., Proc. Linn. Soc. N.S. Wales IX, 2nd ser., p. 30 (*I. gregaria*).
!1906. CAMERON, P., Tijdschr. voor Entom. XLIX, p. 230, ♀ (*Icaria spilocephala*, Etna Bay, New Guinea).
1909. BUYSSON, R. DU, Bull. Soc. Ent. France, p. 306, ♂ (*Icaria cohni*, Bougainville, Solomon Islands).

[1]) In a specimen from Long Nawang, Borneo, Dec. '25, ERIC MJÖBERG (coll. BEQUAERT) these lines are entirely absent.

1913. MEADE-WALDO, G., Ann. Mag. Nat. Hist. (8) XI, p. 46 [*Icaria* (*Icariola*) *gregaria*].

1918. BEQUAERT, J., Bull. Am. Mus. Nat. Hist. XXXIX, p. 246 (*Icaria gregaria* mentioned in discussion of subgenera of *Ropalidia*).

Under the name *gregaria* I have ventured to bring together all representatives of a form which in the male sex is easily distinguished from *R. picta* by the shape of the last antennal segment (fig. 36), which is not excised and curved as in that species. I did not succeed in finding any reliable morphological differences of importance between the females of *picta* and *gregaria*. The coloration of *R. gregaria* is similar to that of *R. picta* and appears to vary between the same limits; the material studied by me does not allow a segregation into geographically separated colour forms.

The distribution of *R. gregaria* is very remarkable; it is spread from Celebes and the Philippines to the Fiji Islands and North Australia, thus occurring nowhere together with *R. picta* (I did not see specimens from the Lesser Sunda Islands).

I studied material from the following localities:

Philippine Islands: Luzon, Los Baños (coll. m.), Manila (coll. m.). Mindanao, Kolambugan (Mus. L.); 1 ♂, Calian, Davao, C. F. CLAGG (coll. BEQUAERT). Basilan, many specimens, BÖTTCHER (coll. v. SCHULTH., coll. m.).

Celebes: 2 ♂♂ "Celebes" (Br. Mus.); 1 ♀ 1 ♂ Todjamboe, 1000 m, L. J. TOXOPEUS, 1936 (coll. m.); 2 ♀♀, 1 ♂ Latimodjong Mts., May 1931, C. F. CLAGG (coll. BEQUAERT); 1 ♀, Sengkang, Sept. 1931, author (coll. m.); 5 ♀♀ 2 ♂♂, S. Celebes, 1936, AWIBOWO (coll. m.).

Moluccas: 1 ♀, Batjan, WALLACE (type of *Icaria impetuosa* SM., Oxf. Mus.); Laboean (coll. ROEPKE). Boeroe, Namlea (coll. ROEPKE); 1 ♀, "Boeroe", DENIN (Mus. Btzg.). Ceram, 1 ♀ 1 ♂ (Oxf. Mus.), 1 ♂ (Br. Mus.). Amboina, 1 ♀, WALLACE (Oxf. Mus.); 2 ♀♀, 3 ♂♂, Dr. DOLESCHALL (Mus. Vienna, coll. m.).

Kei Islands: 5 ♀♀, 2 ♂♂, with nest, Toeal, 1922, H. C. SIEBERS (Mus. Btzg.).

New Guinea: 1 ♀, Etna Bay (type of *Icaria spilocephala* CAM., Mus. Amst.); 1 ♀, Kloofbivak, S. N. Guinea, 27 Febr. 1913 (Mus. Amst.); 1 ♀, Hollandia, leg. STÜBER (coll. m.); 1 ♀, Finschhafen, 1910, HERTLE (coll. v. SCHULTH.); 2 ♀♀, N. Guinea (Mus. Btzg.).

Bismarck Archipelago: 2 ♀♀, "Neu Pommern, Gazellen-Halbinsel", RECHINGER (Mus. Vienna, coll. m.).

Solomon Islands: Russell Isl., Guadalcanar, Malaita, W. M. MANN (coll. BEQUAERT); several specimens from these islands and from Santa Isabel, Kulombangara, and Shortland Isl., 1933 - '34, H. T. PAGDEN and R. J. A. W. LEVER (coll. PAGDEN, coll. Imp. Inst. Entom., coll. m.). The type of *Icaria cohni* BUYSS. is a ♂ from Bougainville, I do not know whether it is still in existence.

Fiji Isl.: 1 ♀, Labeti, W. M. MANN, leg. BEQUAERT (coll. m.).

N. Australia: 4 ♀♀, "Austr. sept.", 1864, THOREY (Mus. Vienna, coll.

m.); Queensland, Colosseum, MJÖBERG (coll. v. SCHULTH., coll. m.); 2 ♀♀, Palm Isl. to Cooktown, 1896, A. G. MAYER (coll. BEQUAERT, coll. m.).

Ropalidia colorata, new species.

F e m a l e. — Head rather thick, seen in front distinctly wider than high (39 : 34), seen from above more than twice as wide as long (39 : 18), slightly wider than the thorax (39: 35). Temples thick, seen in profile about as wide as the eyes. Inner orbits further apart on the vertex than at the clypeus (21 : 16). Frons slightly convex; ocelli small, placed in a nearly equilateral triangle, posterior ocelli less than twice as far from the eyes as from each other; the latter distance is about twice their diameter, the anterior ocellus is not larger than the other ones. Antennae about as far from the eyes as from each other, interantennal shield slightly convex. Clypeus convex, scarcely wider than long (16 : 15), basal margin deeply emarginate, apex normal; the anterior portion of the clypeus is about half as long as the basal interocular part. Mandibles as usual. Antennae [1]) rather thick, third segment scarcely more than twice as long as wide at apex, and only a little longer than the following two segments together, fourth segment slightly wider than long; flagellum gradually, but distinctly swollen beyond the third segment; tenth segment 1¾ times as wide as long; apical segment slightly shorter than wide at base.

Thorax rather stout, seen from above nearly 1½ times as long as wide, seen in profile about 1⅓ times as long as high. Pronotum truncate anteriorly, transverse carina distinct, moderately raised; sides of the pronotum nearly straight, only slightly converging. Mesonotum slightly convex, distinctly longer than wide between the tegulae, much narrowed anteriorly. Scutellum convex, with a fine, median, impressed line; postscutellum steeply sloping, angles rounded, not projecting. Mesopleura swollen below, mesopleural suture faintly indicated, epicnemial carina present, but distinct in its lower part only. Propodeum of about the same shape as in *R. picta* (SAUSS.), sides gently rounded, posterior face steeply sloping, scarcely concave, there is a distinct impressed line in the middle.

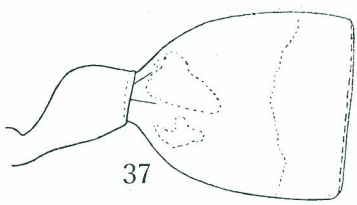


Fig. 37. *R. colorata* m., first and second abdominal segments.

Abdomen: fig. 37. First segment flask-shaped, shorter than in *R. picta*, only 1½ times as long as wide; its greatest height is slightly less than its width. Second segment more than twice as wide as the first (38: 16), slightly longer than wide (43: 38) and nearly as high as wide; its sides parallel, rounded at the base and somewhat converging towards the apex. As seen in profile, the second segment appears to be vertically cut off at the apex, not obliquely as in *R. picta*. Apical margin of the first tergite distinctly depressed and discolorate, that

[1]) The description of the antennae has been drawn up from the females from Kangra Valley; in the holotype only the three basal segments are present.

of the second tergite only very narrowly depressed. Suture between second tergite and sternite visible at the base only.

Wings large, the second cubital cell narrowed towards the top; it receives the first recurrent vein about in the middle and the second in ¾ of its base. Third cubital cell about as high as wide at the top, it is about 1¾ times as wide at the base as at the top, the third cubital vein being strongly oblique, except in its upper part, where it is parallel to the second cubital vein.

Body dull, except the mandibles, the anterior part of the clypeus and a small area on the posterior part of the postscutellum.

Clypeus with distinct and well separated punctures, which are slightly smaller than the intermediate spaces; frons, vertex, pro- and mesonotum, mesopleura, scutellum and base and sides of postscutellum densely, but rather finely and superficially punctate; propodeum finely punctate at the sides, its posterior face indistinctly obliquely striate. Posterior part of the first tergite and the entire second tergite densely, finely and irregularly punctate, the punctures are superficial and not margined behind; those on the second sternite are slightly larger and more remote.

The whole body is covered with a fine and thin greyish tomentum; there are some longer erect hairs on the clypeus, the propodeum and the abdomen.

Light ferruginous red, with yellow and blackish markings. Yellow: the mandibles, except the apex; clypeus, except a dark rufous or blackish median line, which ends some distance before the apex; a broad line at the inner orbits, ending in the top of the eye-emargination; scape of antennae in front, a longitudinal triangular mark between the antennae, a more or less interrupted line on the temples, a transverse line along the pronotal carina, a longitudinal mark beneath the tegulae, the anterior half of the scutellum, the postscutellum; two broad lines on the posterior face of the propodeum, separated by a black median line which is slightly narrowed towards the apex, a narrow fascia at the apex of the first tergite, an irregular spot on each side of the second tergite at the base, a much smaller one on the sternite (often absent?), and a wide apical fascia on the second tergite and sternite; this fascia is slightly narrowed in the middle of the tergite, here it is about as wide as the length of the scutellum; front side of coxae I, two spots on coxae II, and narrow lines on the outer side of all tibiae. Blackish: extreme apex of mandibles, median line on clypeus, the upper margin of the clypeus narrowly, the space around and a spot above the antennae, a sinuous transverse line on the vertex between the eyes, enclosing the ocelli (often reduced?), the occiput, the margins of the mesonotum narrowly, an irregular line along the posterior margin of the mesopleura, some marks along the anterior and the posterior margin of the mesosternum, the metapleura; a median line, and a spot on each side near the apex of the propodeum; the base of the first segment, and the extreme base of the second segment. This segment has a brownish transverse line before the apical yellow fascia, this line is ill defined anteriorly and narrower than the apical fascia. Trochanters II and III and apex of inner side of tibiae III brownish. The third and fol-

lowing segments are only partly visible, their apices appear to be brownish yellow. Wings hyaline with a yellowish tinge, anterior margin slightly darker, apical part of radial cell slightly infuscated; nervures yellowish brown, stigma somewhat paler.

There can be little doubt, that the coloration of this species is rather variable.

Male. — Head relatively wider and shorter than in the female, seen in front much wider than high (39: 32), seen from above more than twice as wide as long (39 : 16), slightly wider than the thorax (39 : 34). Eyes strongly swollen, as seen in profile much wider than the temples (10: 7). Inner orbits further apart on the vertex than at the clypeus (20: 15). Lateral ocelli only 1⅓ times as far from the eyes as from each other, the latter distance is more than twice their diameter. Clypeus flat with a shallow median impression in the anterior half, slightly wider than long, basal margin deeply emarginate, apex much blunter than in the female, anterior portion only about $^1/_5$ as long as the basal interocular part. Antennae slender, third segment twice as long as wide at apex and slightly longer than the following two segments together; fourth segment square in outline, fifth segment slightly wider than long, tenth segment about 1½ times as wide as long, apical segment 1½ times as long as wide at the base, narrowed towards the top and distinctly curved, but less than in *R. picta* ♂. Third and following segments with small tyloides, not serrate.

Thorax and abdomen very much as in the female, but somewhat more slender, first abdominal segment slightly more than 1½ times as long as wide, second segment $1^1/_5$ times as long as wide.

Puncturation about the same as in the female.

The coloration of the allotype is as a whole much darker than that of the females. Head yellow, occiput, a transverse fascia on the vertex between the eyes, and two lines, which connect this fascia with the antennal sockets, black; upper side of antennae with a dark line, which becomes indistinct towards the apex. Prothorax yellow with a ferruginous spot on each side; mesonotum wholly black; scutellum ferruginous, yellow at the base, postscutellum yellow; mesopleura yellow, variegated with ferruginous, there is an irregular black line along their posterior margin; metapleura black; propodeum with two yellow lines, which are slightly converging towards the apex, they are separated by the black median line, sides ferruginous with irregular fuscous markings. Second segment about as in the female, but the ferruginous part nearly wholly fuscous, the lateral spots larger. Legs yellow, coxae, trochanters and femora partly ferruginous and fuscous; inner side of tibiae II and III bright ferruginous, the latter fuscous at the apex. Wings as in the female.

A male from Kangra Valley is somewhat darker; the vertex is entirely black, pronotum ferruginous with a narrow yellow line along the transverse carina; the mesonotum, however, has a reddish spot in the centre. The spots at the base of the 2nd tergite are smaller, the sternite is immaculate.

Length (h. + th. + t. 1 + 2), ♀ ♂ 10 mm.

India: 1 ♀ 1 ♂, Peshawar, E. Y. WATSON (resp. holo- and allotype, Br. Mus.); paratypes: Punjab, Kangra Valley, 4500′, VI-1899, DUDGEON (1♀ Brit. Mus., 2 ♀♀, 1 ♂, Mus. Calc., 1 ♀, coll. m.); 1 ♀, Iret, Murree Hills, V-1934, Dr. H. S. PRUTHI (Mus. Calc.).

R. colorata m., var. **sordida,** new variety.

A female specimen from Kooloo, India, M. M. CARLETON (coll. J. BEQUAERT) agrees in most respects with the foregoing description, but the second abdominal segment is slightly longer in relation to its width (46 : 38) and has a somewhat wider depressed apical margin. The coloration is similar to that of typical *colorata*, but the ground colour is darker ferruginous and the yellow markings are much reduced, as follows: mandibles ferruginous yellow, the line between the antennae and those along the inner orbits shorter, the latter not reaching the eye-emarginations; temples entirely ferruginous; the line along the pronotal carina extremely narrow; mesopleura, scutellum and postscutellum ferruginous, the latter with a dark transverse mark in the middle, propodeum with two narrow yellow lines; the spots at the base of the second segment strongly reduced, scarcely visible; tibiae I and II with rudiments of yellow lines, tibiae III entirely ferruginous. Mesosternum with a wide median black line; scape of antennae blackish above.

Length (h. + th. + t. 1 + 2), 10½ mm.

Ropalidia variegata (SMITH).

!1852. SMITH, F., Ann. Mag. Nat. Hist. (2) 9, p. 48 ♀ (*Epipona*).
!1857. SMITH, F., Cat. Hym. Br. Mus. V, p. 98, no. 23 ♀ (*Icaria pendula*).
1853. SAUSSURE, H. DE, Ét. fam. Vesp. II, p. 237 ♀ (*Icaria*).
1870. HORNE, CH., Trans. Zool. Soc. Lond. VII, 3, p. 169, ♀ Pl. 20, figs. 8, 8a & 9 (*Icaria*).
1871. SMITH, F., Jl. Proc. Linn. Soc. Zool. XI, p. 378 [*Icaria* (*Epipona*)].
1871. SMITH, F., Ibid., p. 378 (*Icaria pendula*).
1897. BINGHAM, C. T., Fauna Brit. India, Hym. I, p. 388, ☿ (nec ♀!) (*Icaria*).
1918. BEQUAERT, J., Bull. Am. Mus. Nat. Hist. 39, p. 247.
1925. DOVER, C., Jl. As. Soc. Bengal, N.S. 20 (1924), p. 302.

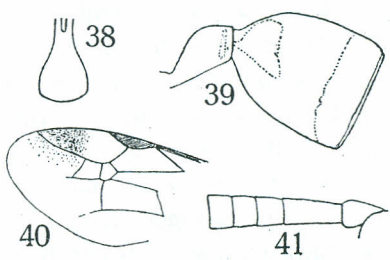
Female. — Head rather thick, seen in front slightly wider than high (33: 29), seen from above scarcely more than twice as wide as long (33: 15), distinctly wider than the thorax (33 : 29). Temples thick, their lower part distinctly visible as the head is seen in front, they are widest below the middle, seen in profile somewhat narrower than the eyes (7: 8.5). Inner orbits further apart on the vertex than at the clypeus (18 : 14). Frons convex, the space between the ocelli raised to the level of the top of the posterior ocelli; ocelli small, placed in a nearly equilateral triangle, posterior ocelli 1⅓ times as far from the eyes as from each other; the distance between them is nearly 2½ times their diameter, the anterior ocellus is not larger than the other ones. Antennae as far from the eyes as from each other, inter-antennal shield slightly convex. Mandibles and clypeus normal, the latter slightly wider than long, its

apex produced into a small triangular tooth. Antennae (fig. 41) rather thick, third segment slightly more than 1½ times as long as wide at apex and as long as the two following segments together, tenth segment 1¾ times as wide as long, last segment subconical, about as long as wide at the base.

Thorax somewhat stouter than in *R. picta*, but otherwise of about the same shape as in that species. Humeral angles of pronotum distinct, the anterior, carinate edge of the sides emarginate. Mesonotum slightly longer than wide, much narrowed anteriorly. Scutellum with a fine median impressed line at the base. Epicnemial carina distinct in its lower part only. Propodeum as in *R. picta*.

Abdomen: figs. 38 and 39. First segment short and narrow, 1½ times as long as wide, its width is only about $^2/_5$ of that of the second segment. Second segment somewhat longer than wide (34 : 31) and about $1^1/_6$ times as long as high; as seen in profile this segment appears to be vertically cut off at the end. Discolorate posterior margin of the first segment relatively wide, but not strongly depressed, that of the second segment more distinctly depressed. Suture between second tergite and sternite scarcely visible.

Wing venation: fig. 40; second cubital cell pentagonal, receiving the first recurrent vein in the middle and the second in ¾ of its base. Third cubital cell about 1½ times as wide at the base as at the top; the lower two thirds of the third cubital vein strongly bent outwards.



Figs. 38 - 41. *R. variegata* (SM.); 38. first abdominal segment, from above; 39. first and second abd. segm.; 40. part of fore wing; 41. part of antenna of ♀.

Body dull, the surface sculpture is difficult to observe as the entire body is covered with a rather dense whitish tomentum; posterior area of postscutellum slightly shiny. Clypeus, frons, vertex, pro- and mesonotum, mesopleura, scutellum and base and sides of postscutellum densely punctate, the punctures rather small and superficial, the interspaces smaller than the punctures; temples less densely punctate; propodeum dull, extremely finely rugose, the sculpture however not distinct. First abdominal segment practically impunctate; second segment rather densely punctate, the punctures on the tergite superficial and not margined behind, those on the sternite more remote, but better defined.

Male. — Clypeus flatter than in the female, the temples narrower. Eyes much further apart on the vertex than at the clypeus (19 : 13). Posterior ocelli 1⅓ times as far from the eyes as from each other, the latter distance is about three times their diameter. Antennae without tyloides, length of third segment nearly twice the width at apex, and slightly less than the length of the fourth and fifth segments together; flagellum strongly swollen towards the apex; eleventh segment almost twice as wide as long, apical segment conical, rounded at apex, not incised. Seventh sternite flattened, rounded at apex.

Length (h. + th. + t. 1 + 2), ♀: 7 - 8 mm, ♂: 6½ - 7½ mm.

The following subspecies may be distinguished:

1. Base of second abdominal segment with yellow lateral spots. .....2.
— Base of second abdominal segment immaculate. .....3.
2. Ferruginous, with extensive yellow markings. *R. variegata,* typical form.
— Ferruginous, with black and - less extensive - yellow markings. *R. variegata,* subsp. *jacobsoni* (BUYSS.).
3. Reddish brown, partly blackish, with yellow markings on coxae and on face of male only. ..... *R. variegata,* subsp. *dichroma* m.
— With more extensive yellow markings. .....4.
4. First abdominal segment with narrow apical yellow fascia, second segment with a wide yellow fascia at apex. ..... *R. variegata,* subsp. *interrupta* m.
— Swollen part of first abdominal segment almost entirely yellow, apical margin of second segment reddish. ..... *R. variegata,* subsp. *flavinoda* m.

R. variegata, typical form.

Ferruginous brown, with the following parts yellow: mandibles (except the apex), clypeus (except a median ferruginous line which does not reach the apex), a line along the inner orbits, reaching the emargination and widened below, a spot between the antennae, under side of first antennal segment, a line on the temples, a narrow transverse line along the pronotal carina, a narrow line along the posterior margin of the pronotum, tegulae (except a ferruginous spot at their outer side), the anterior and lateral margins of the scutellum, the postscutellum, two spots on the mesopleura, two spots on the mesosternum (separated by the median suture), the margin of the propodeal stigmata, two broad lines on the posterior face of the propodeum (abruptly widened below the middle and separated by the ferruginous median furrow), a narrow transverse fascia in front of the depressed margin of the abdominal petiole, two lateral irregular spots at the base of the second tergite (straightly cut off along the suture between tergite and sternite), a rather wide apical fascia on second tergite and sternite (somewhat narrowed in the middle, where its width is about ¼ of the length of the tergite), the apical margins of the following segments, coxae I and II and a large spot on coxae III, a line on femora I and II, a spot at the apex of femora III, the outer side of all tibiae and the metatarsi I and II. The second abdominal segment is somewhat darkened in front of the apical fascia. — In some specimens there is a distinct dark spot just above each of the antennal sockets. — Wings hyaline, yellowish along the anterior margin, with a cloud in the apical half of the radial cell and the upper part of the fourth cubital cell; nervures yellowish brown, stigma somewhat paler.

Sometimes there are two transverse oblique yellow lines behind the ocelli and a small yellow spot between them; the spots on the mesopleura may be confluent.

India: The holotype is a female from India, Poona, Capt. F. DOWNES (labelled no. 60 - 15, E.-I.C.) (Br. Mus.). Further specimens studied: 1 ♀, 3 ♂♂, India, BAREILY, coll. C. HORNE (including the type of *I. pendula* SM., Br. Mus.);

8 ♀♀, Benares, May 1896; 5 ♀♀, Deesa, 1898-'99 (all in Br. Mus.); 1 ♀, Calcutta, Aug. 1906, N. ANNANDALE; 1 ♀, Bihar, Monghyr, Sept. 1909, J. T. JENKINS; 1 ♂, South India, MINCHIN (all in Mus. Calc.); 1 ♀, W. Himalayas, Patiala State, base of Simla Hills, Pinjore, July 1911, leg. Mus. Calc. (coll. m.); 1 ♀, Madras (Mus. L.).

R. variegata, subsp. **jacobsoni** (BUYSS.).

!1908. BUYSSON, R. DU, Notes Leyden Museum 30, p. 123, ♀ (*Icaria jacobsoni*, Java).

The female differs from the typical phase as follows: Mandibles partly ferruginous, clypeus either yellow or ferruginous with yellowish apex, the median line black; yellow markings along inner orbits and between antennae small; a large black spot above each antenna, the space between and around the ocelli black; yellow line on temples reduced or absent, posterior margin of pronotum without yellow line; margins of mesonotum, mesosternum, metapleura and propodeum more or less blackish, mesopleura entirely ferruginous or with a small yellow spot beneath the tegulae, markings on scutellum and postscutellum of variable size; first abdominal segment without yellow fascia, the second segment strongly darkened in front of the apical fascia; yellow markings on legs somewhat reduced.

In the male the clypeus is yellow, with a small wedge-shaped black mark at the base; mesonotum entirely black; propodeum almost or entirely black, except for the two yellow lines.

J a v a: 1 ♀, Batavia, Antjol, EDW. JACOBSON (holotype, Mus. L.); 1 ♂, Batavia Bay, Isl. Purmerend, Febr. 1937, author (allotype, coll. m.); 4 ♀♀, Kaliwoengoe, Aug. 1910, EDW. JACOBSON (Mus. L.); 2 ♀♀, Tjiampea near Buitenzorg, F. DUPONT (coll. m.).

B a n g k a I s l.: both sexes from Batoe Roesa, Pangkalpinang and Troe, Dec. 1935, author (coll. m.).

Some specimens from I n d i a: 1 ♀, 1 ♂, Bombay and 1 ♀, 1 ♂, Abu, NURSE (Br. Mus.) cannot be distinguished from the specimens from Java and Bangka.

R. variegata (SM.), subsp. **dichroma,** new subspecies.

♀. — Dark reddish brown; black: a broad median line on the clypeus, a spot above each antenna, the space between and around the ocelli, the margins of mesonotum and mesopleura, the mesosternum, the metapleura and the propodeum (except for some rufous markings). First abdominal segment darkened at the base, the second in the middle. Legs brown, blackish at the base, coxae I partly yellowish.

♂. — Mandibles, sides of clypeus, a small spot between the antennae, a short line along the inner orbits, anterior face of coxae I and a lateral line on coxae II pale yellow; the black markings on frons and vertex united, mesonotum and propodeum entirely black; the remainder as in the female.

T i m o r: Holotype (♀), allotype (♂) and 12 female paratypes from Timor, WIENECKE leg., in Mus. Leiden; 2 ♀♀ from the same locality in Mus. Geneva.

R. variegata (SM.), subsp. **interrupta,** new subspecies.

♀. — Dull reddish; mandibles and median area of clypeus ferruginous; sides of clypeus, a short line along inner orbits, and a spot between the antennae, pale yellow; frons and vertex with black markings of variable size above the antennae and between and around the ocelli; antennae reddish, apical half of flagellum blackish above, margins of propleura and mesopleura more or less black, mesonotum with black margins or almost entirely black, sternum and metapleura black; scutellum and postscutellum each with two yellow spots; propodeum black, somewhat reddish at the base, posterior face with two yellow lines (almost obsolete in the paratype); first abdominal segment blackish at base, with narrow, yellow, apical fascia; second segment black, with a wider, yellow, apical fascia, which is widely interrupted on the sternite; coxae I with large yellow spots, II and III with small yellow spots, base of femora blackish. Wings as in the typical form.

Thursday Island: 2 ♀♀, March, A. MACKIE and A. FOOTE; holotype in coll. J. BEQUAERT, paratype in coll. m.

The swollen part of the first abdominal segment is somewhat wider than in the preceding forms, and the apical margin is slightly more depressed, but otherwise this form is not sufficiently different from typical *variegata* to regard it as a separate species.

R. variegata (SM.), subsp. **flavinoda,** new subspecies.

♀. — Differs from *interrupta* as follows: Generally darker; clypeus dull reddish, with black median line; yellow markings on face much reduced; scutellum and postscutellum yellow, the former with a brownish median line; propodeum black with two rather large yellow lines; the swollen part of the first abdominal tergite almost entirely yellow, the anterior margin of the yellow marking M-shaped; second and following segments brownish black, their posterior margins brownish. Legs black; apex of femora, and tibiae and tarsi reddish.

Slightly larger than the preceding forms (8½ mm).

Queensland: 1 ♀, Cape York, July 1932, Harvard Expedition (holotype, coll. J. BEQUAERT).

Ropalidia cyathiformis (FABR.).

1804. FABRICIUS, J. G., Syst. Piez., p. 289, no. 18, ♀ (*Eumenes*, Java).
!1898. CAMERON, P., Mem. Manch. Soc. 42, no. 11, p. 48, ♀ (*Icaria ceylonica*, Ceylon).
1905. ASHMEAD, W. H., Canad. Entom. 37 ?, p. 3 (*Icaria cayayanensis*, Phil. Isl.).
1905. ASHMEAD, W. H., Proc. U.S. Nat. Mus. XXVIII, p. 962 (*Icaria cagayanensis*, rect.).
!1905. CAMERON, P., Tijdschr. v. Ent. XLVIII, p. 72, ♀ (*Icaria bilineata*, Java).
1912. SCHULZ, W. A., Berl. Ent. Zeitschr. LVII, p. 88, no. 191 (*Icaria cyathiformis* (F.) should be identical with *Eumenes fasciata* F. and *Icaria variegata* (SM.)).

Eumenes cyathiformis and *E. fasciata,* both described from Java by FABRICIUS in 1804, have not been recognized by DE SAUSSURE or by other subse-

quent authors. In 1912, SCHULZ studied the types of these species (resp. 1 ♀ and 2 ♂♂) in the Museum at Kopenhagen. He states that both species are identical with *Icaria variegata* (SM.), but I cannot agree with his opinion.

As regards the first mentioned species, the original description leaves no doubt that it is identical with *Icaria bilineata* CAM., also described from Java. The following characters are of special importance: "*Clypeo flavo, maculi media fusca. Thorax ferrugineis, margine antico lineas duas exserente maculisque quatuor loco scutelli flavis ..... segmento ... secundo maximo maculis quatuor baseos majoribus, margineque flavis*". SCHULZ (l.c.) gave the following elucidation to FABRICIUS' description of the second abdominal segment: "Die Urbeschreibung von *cyathiformis* ist so zu verstehen, dass das 2. Hinterleibstergit an der Basis nur zwei gelbe Flecken trägt, während sich aus seiner Endrandbinde zwei weitere solche nach vorn abheben". As *bilineata* CAM. is the only Javan species which possesses this set of characters, I do not hesitate to sink CAMERON's name as a synonym of *cyathiformis*.

There remains some doubt, however, about FABRICIUS' second species, *Eumenes fasciata*. I strongly suspect that this is neither the male of *R. cyathiformis*, nor of *R. variegata*. The original description applies well to *R. picta* (SAUSS.), but it is not complete enough to state with certainty that FABRICIUS had not a male of one of the species of the *stigma*-group before him. Therefore I prefer to delay a decision in this matter until a renewed study of the type will have been possible.

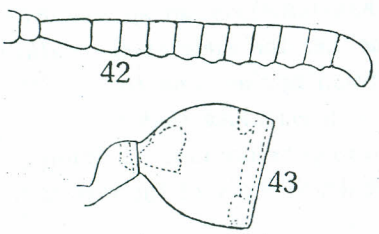
R. cyathiformis has generally been confused with other species. In the British Museum I found it under the names *variegata* and *artifex;* the Museum at Buitenzorg possesses specimens determined by VON SCHULTHESS as *Icaria pendula*. *Icaria ceylonica* CAM. and *I. cagayanensis* ASHM. are not sufficiently different to be regarded as varieties, the coloration of this species being variable in some respects even in specimens from the same locality.

F e m a l e. — Head moderately thick, seen in front somewhat wider than high (30 : 26), seen from above more than twice as wide as long (30 : 13), distinctly wider than the thorax (30 : 27); the head is narrowed behind the eyes, the lower part of the temples being scarcely visible as the head is seen in front. Temples narrower than in *R. variegata*, seen in profile distinctly narrower than the eyes (5 : 7,5). Inner orbits further apart on the vertex than at the clypeus (15 : 12); front somewhat convex, the space between the ocelli not raised; ocelli small, placed in an equilateral triangle; posterior ocelli more than twice as far from the eyes as from each other, the distance between them is slightly longer than their diameter; anterior ocellus scarcely larger than the others. Clypeus distinctly wider than long (12 : 10), moderately convex, the apex produced into a small tooth. Antennae as far from each other as from the eyes, interantennal shield slightly convex, with a very distinct fovea. Antennae more slender than in *R. variegata;* third segment more than twice as long as wide at the apex and longer than the two following segments together, tenth

segment 1½ times as wide as long, apical segment about 1¼ times as long as wide at the base.

Thorax rather short, seen from above less than 1½ times as long as wide, slightly higher than wide. Pronotum roundly truncate anteriorly, with a well developed transverse carina, the sides of the pronotum slightly converging towards the head, somewhat convex. Mesonotum slightly longer than wide. Scutellum somewhat convex, with a fine median impressed line over more than half of its length. Postscutellum steeply sloping, scarcely convex, its posterior angles rounded, not projecting. Mesopleura swollen below, epicnemial carina rather indistinct, especially in its upper part. Propodeum rounded, rather steeply sloping, the sides somewhat swollen; median longitudinal impression rather shallow, narrowed towards the base of the petiole and with a fine impressed line in the middle.

Abdomen (fig. 43) similar to that of *R. variegata,* but the petiole slightly wider in relation to its length (less than 1½ times as long as wide) and the second abdominal segment shorter (the difference is most distinct when the length is compared with the height: 7 : 6 in *variegata,* and about equal in *cyathiformis*).



Figs. 42 - 43. *R. cyathiformis* (F.); 42. antenna of ♂; 43. first and second abdominal segments.

The wing venation is rather variable, but in most specimens the second and third cubital cells are less strongly narrowed towards the top than in *R. variegata;* as a rule the third cubital vein is less oblique and often almost straight.

Body less dull than in *R. variegata;* clypeus somewhat shiny, with only a few scattered punctures, the sculpture otherwise much as in *R. variegata,* but the punctures somewhat finer and shallower.

Head and thorax ferruginous brown, abdomen brown; abundantly marked with yellow as follows: mandibles (except for the teeth and a dark spot at the base), clypeus (except for a dark transverse, sometimes semilunar, spot on its disk, slightly before the middle), a spot between the antennae, a line along the inner orbits, reaching the eye-emargination, a line on the temples (more or less narrowed or interrupted in the middle and widened below), the under side of the first antennal segment, a line along the transverse carina and one along the posterior margin of the pronotum, two subparallel lines on the disk of the mesonotum (often indistinct or absent), an elongate spot on the mesopleura beneath the tegulae, a small spot at the insertion of the hind wings, two large subquadrate spots at the base of the scutellum, two spots on the postscutellum, two broad longitudinal lines on the posterior face of the propodeum (separated by a dark median line, which is gradually narrowed towards the base of the petiole), a narrow transverse band in front of the depressed margin of the abdominal petiole, two subcircular spots at the base of the second tergite and two smaller, transverse and oval spots near the apex, the latter

connected with the rather narrow apical fascia of this segment (the width of this fascia in the middle is about $^1/_{10}$ of the length of the tergite), coxae I, the major part of coxae II and a large lateral spot on coxae III, a line at the anterior side of femora I and II and on the upper side of femora III, a more or less distinct line on tibiae I, the basal two thirds of tibiae II and III, and the metatarsi.

Furthermore the body is marked with black, but the extension of these markings is very variable. In dark specimens the following parts are black or blackish brown: spots on mandibles and clypeus as already noted above (? always present), the suture at the base of the clypeus, a spot above each of the antennal sockets, the space between and around the ocelli, the occiput, the prosternum, the margins of the mesonotum, two lateral longitudinal lines and a posterior transverse band on the mesonotum, the mesopleura, the mesosternum, a narrow transverse line at the base of the postscutellum, the metapleura, a line in the median furrow of the propodeum and the sides of the propodeum. Especially the dark markings on the thorax are often strongly reduced.

The flagellum of the antennae is brownish above, pale ferruginous below; the third and following abdominal segments are brown, with more or less distinct, rather irregular, transverse bands in front of the testaceous apical margins.

Wings hyaline, with a conspicuous dark spot occupying more than the apical half of the radial cell, and the upper margin of the fourth cubital cell; nervures brown, stigma brownish yellow.

Male. — Head wider and flatter than in the female, seen in front much wider than high (28 : 23), seen from above 2½ times as wide as long, distinctly wider than the thorax (28 : 25). Temples much narrower than in the female, seen in profile less than half as wide as the eyes. Inner orbits further apart on the vertex than at the clypeus (14 : 10). Posterior ocelli twice as far from the eyes as from each other. Antennae nearly 1½ times as far from each other as from the eyes. Clypeus flat, slightly wider than long, apex moderately acute, but not produced into a tooth. Antennae: fig. 42; third and following segments with tyloides, forming blunt teeth in the middle of the segments, last segment slightly curved, about 1½ times as long as the preceding segment.

Thorax and abdomen a trifle more slender than in the female, seventh sternite flattened, its apex — as well as that of the seventh tergite — rounded.

Coloration as in the female, but the mandibles and the clypeus entirely yellow, the markings on the lower part of the face larger.

Length (h. + th. + t. 1 + 2), ♀ 6 - 7½ mm, ♂ 5½ - 6½ mm.

I studied specimens from the following localities:

Ceylon: Kandy and Peradeniya (Br. Mus.); 1 ♀, Periyakullam, YERBURY (type of *Icaria ceylonica* Cam., ROTHNEY coll. in Mus. Oxf.).

Assam: 4 ♀♀, 1 ♂, Mishmi Hills, 2200′, March 1928, PERCY SLADEN Exp. (Br. Mus.); 1 ♀, Upper Renging, 2150′, Abor Exp., S. W. KEMP (Mus. Calc.).

Burma: 2 ♀♀, Rangoon and Moulmein, Febr. '08, N. ANNANDALE (Mus. Calc., coll. m.).

Philippine Islands: Port Banga, BÖTTCHER (coll. v. SCHULTH., coll. m.); 1 ♀, Los Baños, 1915, TEODORO (coll. BEQUAERT, compared by him with the type of *Icaria cagayanensis* in the U.S. Nat. Mus. and kindly sent to me for study).

Malay Peninsula: 4 ♀♀, with two nests, Kuala Lumpur (Mus. K.L.); 4 ♀♀, Singapore, PFEIFFER (Mus. Vienna, coll. m.).

Java: 1 ♀, Semarang, Tjandi (type of *Icaria bilineata* CAM., Br. Mus.); Batavia, BUITENDIJK, JACOBSON; Semarang, JACOBSON; Ambarawa, LUDEKING (all in Mus. L.); Salatiga and Soerabaja (coll. ROEPKE); Buitenzorg, both sexes with nests (Mus. Btzg., coll. m., incl. the allotype); Malang, J. G. BETREM (coll. BETREM, coll. m.).

Karimon Djawa Isl.: 4 ♀♀, Nov. 1930, M. A. LIEFTINCK (Mus. Btzg., coll. m.).

Celebes: 3 ♀♀, Central Celebes, Rantepao, July 1936, L. J. TOXOPEUS (Mus. Btzg., coll. m.); 2 ♀♀, Kandari, 1874, BECCARI (Mus. Venice, coll. m.).

Ropalidia crassa, new species.

Closely allied to *R. variegata,* but, apart from differences in the coloration, easily distinguished by the shape of the abdomen and the coarser sculpture.

Female. — Head slightly wider than high (37 : 34), and twice as high as long (34: 17), very slightly narrowed behind the eyes, somewhat wider than the thorax (37 : 34.5). Temples strongly developed, seen in profile ¾ of the width of the eyes. Inner orbits further apart on the vertex than at the clypeus (24:20). Posterior ocelli 1⅓ times as far from the eyes as from each other; the distance between them about 2½ times their diameter, the space between the ocelli slightly raised. Clypeus normal, as wide as long. Antennae as far from each other as from the eyes, rather short, and conspicuously swollen in their apical half; length of third segment less than twice the width at apex, and slightly more than length of fourth and fifth segments together; tenth segment almost twice as wide as long.

Thorax stout; pronotum truncate, transverse carina sharp, slightly recurved at the sides; scutellum slightly more convex than in *R. variegata,* with a distinct median impression; shape of propodeum as in *R. variegata.*

Abdomen: fig. 44; the posterior part of the first segment strongly swollen, about 2½ times as wide as the short, basal, linear part, its apical margin scarcely depressed. Second abdominal segment about 1½ times as long as wide, and more than twice as wide as the first segment; apical margin rather wide and strongly depressed, with numerous fine longitudinal carinae; the tergite very slightly longer than the sternite, the suture between them indistinct.

Body dull, except for the posterior area of the postscutellum, abdomen slightly shining. Puncturation coarser and deeper than in the allied species. Clypeus rather densely punctate, the punctures well separated, but not clearly defined; frons and vertex densely, reticulately, punctate, the latter with a small impunctate area at the outer side of the posterior ocelli; temples irregularly

punctate, less densely in their lower part; pro- and mesonotum, scutellum and greater part of postscutellum densely and coarsely, reticulately, punctate, the bottom of the punctures shining; puncturation of mesopleura slightly finer, metapleura without distinct punctures; propodeum irregularly rugose, with some distinct oblique striae near the posterior angles of the postscutellum and some transverse striae in the median impression, the sides reticulately punctate. The swollen part of the first abdominal segment coarsely punctate at the sides and posteriorly, not reticulate; the second tergite coarsely and densely, somewhat irregularly, punctate, almost without interspaces, the punctures oblong and not margined behind; the punctures of the second sternite better defined, large, with distinct interspaces; in the centre of the sternite these are even larger than the punctures.

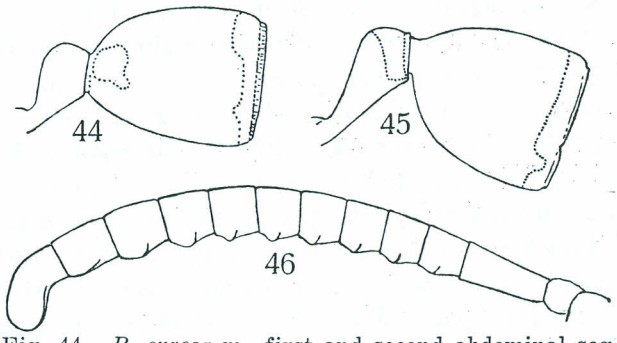


Fig. 44. *R. crassa* m., first and second abdominal segments.

Figs. 45 - 46. *R. philippinensis* (SAUSS.); 45. first and second abdominal segments; 46. antenna of ♂.

Black; antennae ferruginous, brownish above; yellow: mandibles (except for the brownish teeth), a narrow V-shaped line at the apex of the clypeus, a short line along the inner orbits, a line at the underside of the first antennal segment, a narrow fascia along the pronotal carina, a spot on the posterior half of the tegulae, a minute spot on each side of the posterior face of the propodeum, a spot on each side of the base of the second abdominal tergite, a transverse fascia at the apex of this tergite, and a narrower one on the sternite. Anteriorly the fascia on the sternite is somewhat irregular, this being caused by two transverse yellow spots which are partly included in the fascia (as in *R. cyathiformis*). Coxae and trochanters black, femora blackish at base, tibiae II and III brownish above, the remainder of the legs ferruginous. Wings almost hyaline, with a fuscous cloud covering the apical two thirds of the radial cell, and the upper part of the third and fourth cubital cells.

Length (h. + th. + t. 1 + 2), 9 mm.

Celebes: 1 ♀, Palopo, Todjamboe (1000 m), July 1936, L. J. TOXOPEUS (holotype, coll. m.).

Ropalidia philippinensis (SAUSS.).

!1853. SAUSSURE, H. DE, Ét. fam. Vesp. II, p. 240, ♀ (*Icaria*, Philippine Islands).

Female. — Head scarcely wider than high (45 : 43), about as wide as the thorax. Clypeus slightly longer than wide. Temples narrow, less than half as wide as the eyes. Posterior ocelli 1½ - 2 times as far from the eyes as from each other, the latter distance is twice their diameter. Inner orbits much further

apart on the vertex than at the clypeus (24 : 17.5). Length of third antennal segment twice is width at the apex.

Thorax short, less than 1½ times as long as wide. Pronotum truncate anteriorly, its sides almost straight and scarcely convergent. Scutellum and postscutellum strongly convex, the groove between them shallow; propodeum steeply sloping, in the middle almost flat, the sides rather strongly convex.

Abdomen: fig. 45 (p. 163); first tergite strongly swollen and widened posteriorly, its greatest width more than three times the width at the base, its dorsal face very moderately convex in transverse direction, the greatest height ¾ of the greatest width; second segment longer than wide (51 : 44), vertically cut off at the end, the narrow apical margin strongly depressed, slightly incised at the junction of the tergite and the sternite.

Puncturation coarse and dense; the punctures rather deep and well defined. Clypeus covered with coarse round punctures, which are somewhat smaller than the interspaces. Mesonotum with distinct shining interspaces in the centre and near the tegulae, the posterior lateral angles somewhat rugosely punctate. Puncturation of mesopleura somewhat reticulate; lower part of metapleura almost impunctate. Shining area of postscutellum of normal size. Median part of propodeum very finely rugose, rather dull, the sides rugosely punctate. First abdominal segment punctate at the sides and behind; the second tergite rather densely punctate, the punctures oblong and not margined posteriorly; the punctures on the second sternite larger, but more remote.

Pubescence short and sparse, most dense on the face and on the propodeum.

Dull reddish brown; more or less suffused with black on the vertex, the sides of the mesonotum, the propodeum and the second abdominal segment; the following parts yellow: a spot on the mandibles, apex and sides of the clypeus, a short line at the inner orbits, a spot between the antennae, a line at the underside of the first antennal segment, a rather broad transverse fascia on the pronotum, a spot beneath the tegulae, a broad band on the scutellum (interrupted by a narrow median reddish line), a narrow, slightly interrupted transverse line at the base of the postscutellum. The first abdominal tergite has a rather broad yellow fascia in front of the narrow, discoloured, apical margin; second segment with a yellow apical fascia, which is somewhat indistinctly defined anteriorly, on the sternite it has two rectangular incisions. Coxae extensively marked with yellow, femora and tibiae with more or less distinct yellow lines. — Wings brownish hyaline, with moderately dark clouds in the apex of the median cell and in the radial cell; stigma and veins dark brown.

Male. — Clypeus flat; antennae very remarkably shaped: fourth to twelfth segments with a transverse, shining ridge at the underside, the ultimate segment curved, broadly rounded at the apex, its underside with an oblique shining keel (fig. 46, p. 163). Second abdominal segment (? always) more elongate than in the female (length: width = 50 : 37).

Clypeus and the space beneath the antennae yellow; the yellow spot between the antennae longer than in the female, Vertex, mesonotum and

propodeum almost entirely black, the second abdominal segment strongly suffused with blackish. Coloration otherwise as in the female.

Length (h. + th. + t. 1 + 2), 7.5 - 8.5 mm.

Philippine Islands: 1 ♀, holotype (Br. Mus.); 1 ♀, Mindanao, Surigao (Mus. L.); 1 ♂, Luzon, Los Baños, 16 Sept.1915, V. S. SULIT, allotype (coll. BEQUAERT); 1 ♀, "Phil. Islands" (coll. v. SCHULTH.).

Ropalidia rufoplagiata (CAM).

!1905. CAMERON, P., Tijdschr. v. Ent. XLVIII, p. 71, ♀ ♂ (*Icaria*, Java).

Female. — Head rather thick, seen in front wider than high (38 : 32), seen from above more than twice as wide as long (38 : 16), distinctly wider than the thorax (38 : 32). Temples strongly developed, widest below the middle, where they are about as wide as the eyes. Inner orbits further apart on the vertex than at the clypeus (20: 16). Front slightly convex; ocelli in a somewhat flattened triangle, the posterior ocelli only about 1½ - 1¾ times as far from the eyes as from each other, the latter distance is about 2½ times their diameter. Antennae as far from the eyes as from each other. Clypeus slightly convex, somewhat wider than long. Antennae rather short, conspicuously swollen in their apical half, third segment almost 2½ times as long as wide at the apex, fourth segment nearly square in outline, the following segments wider than long, the tenth more than 1⅔ times as wide as long, the ultimate segment slightly longer than wide at the base.

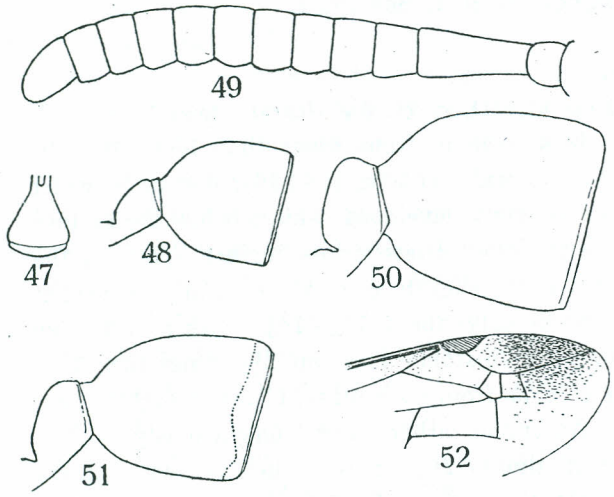
Thorax stout, seen from above nearly 1½ times as long as wide. Pronotum roundly truncate anteriorly, transverse carina sharp and distinctly raised, the sides of the pronotum nearly straight, scarcely converging towards the head. Mesonotum very slightly convex, about as wide as long, with a fine impressed line in the middle of its anterior half. Scutellum and postscutellum nearly flat. Mesopleura strongly swollen below, mesopleural suture very faintly indicated, sterno-pleural suture distinct, epicnemial carina well developed, especially in its lower half. Propodeum broadly rounded as seen from above, in profile nearly straight, the sides distinctly swollen, the median impression moderately deep and well defined, rather wide at the base, gradually narrowed from the middle towards the base of the abdomen, the median impressed line more or less distinct.

Abdomen: figs. 47 and 48. Petiole very short, slightly longer than wide, roughly triangular, as seen in profile abruptly swollen at the base, the strongly depressed apical margin wide, narrowed towards the sides. Second segment as long as high, usually slightly wider than long, as seen in profile nearly vertically cut off at the end, the tergite being only slightly longer than the sternite; apical margin narrow, but strongly depressed; the suture between tergite and sternite very fine.

Wing venation rather variable; radial cell 2½ - 3 times as long as wide; second cubital cell strongly narrowed towards the top, as a rule it receives

both recurrent veins close to each other slightly beyond the middle of its base; third cubital cell variable, more or less narrowed towards the radial cell.

Body moderately dull, anterior margin of clypeus shiny, postscutellum with a small transverse polished area at the apex, propodeum silky, abdomen less dull than the thorax.



Figs. 47 - 49. *R. rufoplagiata* (CAM.); 47. first abdominal segment from above; 48. first and second abdominal segments; 49. antenna of ♂.
Fig. 50. *R. plebeja* (SAUSS.), first and second abdominal segments.
Figs. 51 - 52. *R. celebensis* m.; 51. first and second abdominal segments; 52. part of fore wing.

Basal two thirds of the clypeus with a few very fine punctures, anterior margin coarsely and irregularly punctate; frons, vertex, pronotum, mesonotum, and mesopleura (behind the epicnemial carina) densely reticulately punctate, the punctures superficial and moderately large. Scutellum and the major part of the postscutellum with finer and more or less distinctly separated punctures. Metapleura and the sides of the propodeum with a few scattered punctures, the median impression of the latter very finely transversely striate. Abdominal petiole with a few punctures at the sides near the end, second segment with an almost impunctate area at the base, the tergite rather densely punctate, but the punctures very superficial and not margined behind, punctuation of the second sternite somewhat coarser.

Body rather densely covered with a fine appressed tomentum, there are some longer, erect, hairs, most striking on the clypeus, the propodeum and the legs.

M a l e. — Head much less different from that of the female than in many other species, seen in front distinctly wider than high (37 : 30), seen from above scarcely 2½ times as wide as long, not much narrowed behind the eyes. Eyes not much swollen, seen in profile hardly wider than the temples; inner orbits much further apart on the vertex than at the clypeus (20: 14). Ocelli small, about 1⅓ times as far from the eyes as from each other, the latter distance is three times their diameter. Clypeus almost flat, wider than long, apex much blunter than in the female. Antennae short and thick (fig. 49), slightly further from each other than from the eyes, third and following segments with distinct tyloides, but not serrate, ultimate segment longer than wide, bluntly rounded at the end, not incised.

Thorax somewhat less stout than in the female.

Clypeus densely pubescent and not distinctly punctate, abdominal sternites 3 - 6 with fringes of long hairs, seventh sternite flattened. The remainder as in the female.

Length (h. + th. + t. 1 + 2), ♀♂: 7 - 9 mm.

The coloration of this species is very variable.

R. rufoplagiata (CAM.), typical form.

♀. — Body black, abundantly marked with reddish and yellow. Reddish: frons (except for a black line above each antenna), mandibles (except for a yellow spot at the base), a U- or O-shaped mark on the basal two thirds of the clypeus, antennae (darker above, scape yellow in front), a line on the temples, pronotum, lateral and posterior spots on mesonotum, one or two marks on mesopleura, scutellum, the greater part of the first abdominal segment, and the base of the second abdominal segment. Yellow: clypeus (except for above-mentioned mark), a spot at inner side of base of mandibles, a line on the first antennal segment, a line along the pronotal carina, tegulae (often partly brownish), postscutellum, two curved lines on apical two thirds of propodeum, a transverse line in front of the depressed apical margin of the first abdominal segment, a broad apical band (incised on each side anteriorly) on the second segment; the apical margins of the third and following segments brownish yellow.

Legs: greater part of coxae yellow, trochanters and base of femora II and III partly blackish, the rest rufous.

Wings hyaline, yellowish along the costal margin, with a well defined, oval, fuscous spot which covers the apical two thirds of the radial cell and the upper margin of the third and fourth cubital cells; veins brownish, stigma testaceous.

The male appears to be generally darker than the female. In the Javan specimens the clypeus has a large black spot at the base, frons and interantennal shield are for the most part blackish, mesonotum, mesopleura and propodeum are almost or entirely black.

W. Java: 2 ♀♀, Batavia, Nov. 1907, EDW. JACOBSON (Mus. L.); 2 ♀♀, 20 ♂♂, Buitenzorg, May 1939, author, bred from nest (coll. m.); M. Java: 1 ♀♂, Tjandi near Semarang, F. C. DRESCHER (resp. holo- and allotype in Mus. Amsterdam; 1 ♀ paratype from the same locality in Br. Mus.), 2 ♀♀, Goendih, 3 March 1931, L. G. E. KALSHOVEN (coll. m.); E. Java: a series of both sexes, Malang, Febr. 1926, April 1930 and March 1933, J. G. BETREM (coll. BETREM and coll. m.); Soerabaja (coll. Prof. W. ROEPKE); Pasoeroean (sec. CAMERON); idem (coll. VON SCHULTHESS, Mus. Geneva and coll. m.).

Bangka Island: 2 ♀♀, 1 ♂, BUDDING (Mus. L.).

Andaman Islands: 1 ♀, Ross Isl., 30 March 1911, PAIVA (Mus. Calcutta).

The specimens from Malang are somewhat darker than the others.

R. rufoplagiata (CAM.). subsp. **nursei,** new subspecies.

This form differs from the typical phase as follows: Reddish markings

much more extended: the black colour on the head is reduced to the occiput, a small spot above each antenna and a large spot on the vertex enclosing the ocelli; the spots on the mesonotum occupy more than half of its surface, mesopleura with a broad reddish line, metapleura reddish at base and apex; the yellow lines on the propodeum longer and much widened posteriorly; second abdominal segment reddish, somewhat brownish in front of the apical fascia. Legs: anterior face of coxae almost entirely yellow, trochanters and base of femora somewhat brownish, the rest rufous.

India: a series of ♀♀, Bombay Pres., Matheran, March 1899, Col. C. G. NURSE (Br. Mus.). These specimens were named by Col. NURSE, but apparently a description has never been published.

R. rufoplagiata (CAM.), subsp. **gravelyi** (DOVER & RAO).

!1922. DOVER, C., and H. SRINIVASA RAO, Jl. As. Soc. Bengal (N.S.) XVIII, p. 244, ♀ (*Ropalidia gravelyi*).

This form is considerably darker than the typical phase.

Body black; reddish: a spot between the antennae, a stripe along the inner orbits, the sides and apical margin of the clypeus (sometimes yellowish), the first antennal segment beneath, a small line on the temples, pronotum (partly), two ill defined spots at the base of the second segment and all tibiae and tarsi. Yellow: a spot at the base of the mandibles, a band on posterior margin of postscutellum, a small spot on each side of propodeum, apical bands of first and second abdominal segments. Third and following segments brown.

S. India: Cochin State, Kavalai, (1000 - 3000'), F. H. GRAVELY (holotype and paratype in Mus. Calc.).

The specimens listed below are all darker than typical *rufoplagiata* from Java, but they do not agree in all respects with the subsp. *gravelyi*. However, the differences appear to be so little constant, that it is impossible to divide the available material into well separated varieties.

Burma: 1 ♀, Schwego Myo, 1885, L. FEA, 1 ♂, Carin Chebà (900 - 1100 m), June 1888, L. FEA (Mus. Venice). — ♀: Lateral and anterior margins of clypeus broadly yellow, pronotum black with a fine yellow transverse line, tegulae yellow, postscutellum yellow, propodeum entirely black, first segment reddish (with yellow apical fascia); ♂: Antennae yellow beneath, clypeus black, pronotum reddish (with black spot in posterior angle), postscutellum with a black spot at base, the band on the second segment much reduced.

Siam: 11 ♀♀, Ban Pa Den, 8 April 1920, R. V. DE SALVAZA (Br. Mus.). — These specimens differ from *gravelyi* in having the propodeum entirely black; the first abdominal segment is almost wholly reddish (with yellow apical fascia), the base of the second segment is dark brown.

Malay Peninsula: 1 ♀, Kuala Lumpur, 10 July 1932; 1 ♀♂, Negri Sembilan, Port Dickson, resp. Jan. and Dec. 1935; 1 ♂, Kedah Peak (3300 - 3950'), 14 March 1928; all collected by H. M. PENDLEBURY (Mus. K.L., coll. m.).

Sumatra: 3 ♀♀, Sibolangit, Oct. 1925, FULMEK and KARNY (Mus. Btzg.).

The specimens from Malacca and Sumatra are darker than *gravelyi:*

clypeus sometimes entirely black, pronotum black with a fine yellow line, tegulae brownish or black, the yellow colour on the scutellum sometimes reduced to a small apical spot, propodeum black; first segment red with yellow apical fascia, second segment black, somewhat reddish at the base, the apical fascia narrow (absent in the darkest female from Sibolangit); legs dark, coxae with yellow spots or entirely black. In the males from Negri Sembilan and Kedah Peak mandibles and clypeus are black, but the prothorax is entirely reddish.

Ropalidia plebeja (SAUSS.).

!1862. SAUSSURE, H. DE, Stett. Ent. Zeitg. XXIII, p. 138, no. 8, ♀ (*Icaria plebeja*, Celebes: Gorontalo) (nec *I. plebeja* SAUSS. 1863).

Female. — Head rather thick, seen in front slightly wider than high (39 : 36), seen from above about twice as wide as long (39 : 19), scarcely wider than the thorax (39 : 37). Temples well developed, in profile about as wide as the eyes. Inner orbits further apart on the vertex than at the clypeus (23 : 17). Ocelli small, placed in a flattened triangle, the anterior one slightly larger than the others. Posterior ocelli only about 1½ times as far from the eyes as from each other; they are separated by a distance, which is nearly three times their diameter. Antennae slightly further from the eyes than from each other, inter-antennal shield very slightly convex, scarcely impressed in its upper part. Clypeus slightly convex, somewhat wider than long (17 : 15), its apex moderately acute, armed with a minute tooth. Antennae moderately slender, scape slightly curved, about 3½ times as long as wide at apex, third segment less than three times as long as wide at apex, longer than the three following segments together; fourth - eleventh segments distinctly wider than long, tenth segment more than 1½ times as wide as long, apical segment subconical, as long as wide at base.

Thorax rather large, seen from above about 1½ times as long as wide, seen in profile about 1⅓ times as long as high. Pronotum truncate, transverse carina sharp, moderately raised, not ending before the lower margin of the propleura; the sides of the pronotum nearly straight, scarcely converging towards the head. Mesonotum slightly longer than wide between the tegulae, feebly convex. Scutellum moderately convex, with a shallow median longitudinal impression; postscutellum slightly convex, its sides not projecting, its posterior margin slightly produced in the middle. Mesopleura strongly swollen, mesopleural suture scarcely indicated, epicnemial carina distinct, at least in its lower part. Propodeum, as seen from above, truncate behind, with bluntly rounded angles; the median impression wide and rather deep, the sides of the posterior face strongly swollen, slightly carinate at the base and with some transverse striae, which are most distinct below the middle of the slope, where they appear as very fine teeth, when the segment is seen in profile.

Abdomen: fig. 50, p. 166. First segment very short, scarcely longer than wide, about half as wide as the second segment, apical margin depressed, form-

ing a very narrow pale coloured lamella, which is slightly widened at the sides. Second segment slightly longer than wide, its sides subparallel, rounded off at the base, apical margin very narrowly depressed and discoloured. Suture between tergite and sternite indistinct.

Wing venation about the same as in *R. rufoplagiata* (CAM.), but the third cubital cell slightly narrower at the top (abcissae of radius: 6, 3, 4, 16). The second cubital cell receives both recurrent veins close to each other and slightly beyond the middle of its base. Third cubital vein oblique, but scarcely sinuate.

Body rather dull; mandibles, epicnemium of mesopleura, the median part of the posterior margin of the postscutellum, and the sixth sternite, distinctly shining, the second abdominal segment less dull than the thorax. Clypeus rather closely punctate, the punctures becoming larger towards the apical margin; frons, vertex, pro- and mesonotum and the mesopleura very closely and rather finely reticulately punctate; temples, scutellum and larger part of postscutellum covered with well separated, moderately fine punctures. Propodeum very finely transversely aciculate (40 ×!) and in addition covered with scattered, shallow, and rather irregular punctures. First abdominal segment with some scattered punctures, second segment closely punctate, nearly rugose, the punctures somewhat larger than those on the scutellum, but superficial and not margined posteriorly.

The whole body is covered with a very fine greyish pile, some longer erect hairs are visible on the clypeus, the propodeum and the abdomen.

Black; antennae rufous, apical half of flagellum brownish above, mandibles ferruginous, with a yellowish spot at the base; clypeus black in the middle, the lateral and apical margins yellow, the apical fascia is interrupted in the middle; an ill-defined spot above the insertion of the antennae rufous; pronotum rufous, a line along the transverse carina and a narrow line on its posterior margin yellowish; tegulae yellow, scutellum rufous; postscutellum yellow, with a black line, narrowed towards the sides, at the base. First abdominal segment rufous, with a yellow apical fascia, occupying about ¼ of its length; second segment dark brown, with minute yellow spots around the stigmata, its apical margin with a yellow fascia, which is about as wide as that of the first segment. Apical margins of the following segments testaceous. Legs rufous, coxae black with yellow markings, trochanters black at the base, femora partly blackish. Wings subhyaline, with a subapical fuscous cloud; stigma yellow, veins brownish.

N. Celebes: 1 ♀, Gorontalo (holotype in Mus. L.).

For the differences between this species and *R. crassa* see p. 162.

Ropalidia celebensis, new species.

Allied to *R. plebeja* (SAUSS.), but the first abdominal segment less swollen posteriorly.

Female. — Posterior ocelli twice as from the eyes as from each other, the latter distance less than twice their diameter. Third antennal segment 2½

times as long as wide at apex, slightly shorter than the three following segments together. Propodeum without transverse striae on the sides of the posterior face. Abdomen: fig. 51 (p. 166); first abdominal segment more strongly swollen than in *R. rufoplagiata,* the second segment longer than in that species, somewhat obliquely cut off at the end, the tergite being slightly longer than the sternite.

Puncturation distinctly coarser than in *R. rufoplagiata;* the clypeus rather closely punctate, also at the base; the bottom of the punctures on the mesonotum shining, puncturation of meapleura moderately dense.

The whole body covered with thin, short, erect pubescence.

Head and thorax black; mandibles entirely ferruginous; clypeus yellow, with a wide median blackish mark, somewhat narrowed at the base; furthermore are yellow: the inter-antennal shield (except for a median brownish line), a short line at the inner orbits, the pronotum and propleura (except for a small dark spot in front of the tegulae), the tegulae, two large spots in the anterior angles of the scutellum (the remainder brownish), the postscutellum, and two short, converging, lines at the apex of the propodeum. First abdominal segment red, partly somewhat brownish; second segment black, with a large reddish spot on each side at the base and a narrow, apical, yellow fascia; the following segments brownish. Antennae, wings (fig. 52, p. 166) and legs as in *R. plebeja.*

Length (h. + th. + t. 1 + 2), 9 mm.

S. Celebes: 1 ♀, Bantoe Batoe District, Latimodjong Mts., May 1931, C. F. CLAGG (holotype, coll. J. BEQUAERT).

A female specimen in the British Museum (Celebes, SMITH coll., pres. by Mrs. FARREN WHITE, 99 - 303) agrees with the holotype in shape and sculpture, but differs considerably in coloration:

Mandibles with distinct yellow spot at the base; basal mark on clypeus reddish; frons, a transverse spot behind the ocelli, and a spot on the temples, reddish; pronotum red, with yellow lines along the carina and the posterior margin; the black on mesonotum, mesopleura and propodeum largely replaced by reddish; scutellum red, the yellow spots smaller; yellow lines on propodeum slightly wider; first tergite with distinct apical fascia; basal half of second segment reddish, the posterior part brownish, with yellow apical fascia.

Perhaps this specimen represents a distinct variety, but I prefer not to name it unless more material is available.

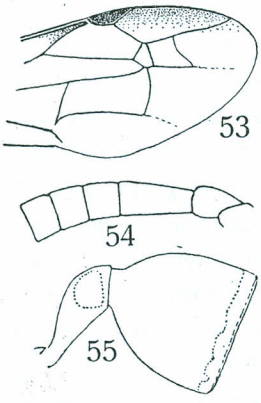
Ropalidia horni SONAN.

1938. SONAN, J., Arb. Morph. Tax. Ent. 5, p. 260, ♀♂, fig. 1 (♀) (Mindanao, Philippine Islands).

Female. — Head rather flat, slightly wider than high (34 : 31), distinctly wider than the thorax (34 : 28). Temples, seen in profile, slightly narrower than the eyes. Inner orbits further apart on the vertex than at the clypeus

(19 : 15). Anterior ocellus slightly larger than the posterior ones; the distance between the latter is 1⅓ times their diameter, they are twice as far from the eyes as from each other. Clypeus wider than long (15 : 12). Antennae (fig. 54) moderately long, length of the third segment twice its width at apex.

Thorax slender, its length fully 1½ times the width. Pronotum roundly truncate anteriorly, its sides scarcely convex, slightly convergent. Scutellum and postscutellum normal. Propodeum, as seen in profile, scarcely convex, the sides gradually rounded, the median excavation moderately deep, slightly narrowed towards the base of the abdomen.



Figs. 53 - 55. *R. horni* SONAN; 53. part of fore wing; 54. part of antenna of ♀; 55. first and second abdominal segments.

Abdomen: fig. 55. First abdominal segment, as seen from above, parallel-sided at the base, the posterior part gradually widened towards the apex, the sides of this swollen part moderately convex; its greatest width 1¼ times the height and about $^3/_5$ of the length; the apical margin of the tergite not depressed. Second abdominal segment as long as wide, and slightly longer than high; the sternite somewhat more convex than the tergite; the narrow apical margin strongly depressed.

Wing venation (fig. 53) as usual, the shape of the cubital cells somewhat variable; in SONAN's drawing the second recurrent vein is interstitial, but this appears not to be the normal condition, for in all my specimens it enters the second cubital cell a little before the end. Third cubital cell narrowed towards the top, the third transverse cubital vein oblique.

Body dull, clypeus moderately shining, polished area of postscutellum of normal size, propodeum slightly shining.

Clypeus with a few fine and scattered punctures; frons, vertex, pro- and mesonotum, mesopleura, scutellum and anterior part of postscutellum densely, somewhat reticulately punctate, the punctures superficial and not very coarse (much less coarse than in *R. philippinensis*); metapleura with a few punctures (not densely punctate, as is stated in the original description). Posterior face of propodeum finely, obliquely and rather regularly striate, the striae most distinct near the posterior angles of the postscutellum and in the median furrow, in this furrow they are visible as small transverse carinae; the sides of the propodeum rugosely punctate. First abdominal segment irregularly punctate posteriorly; second tergite densely, somewhat reticulately, but superficially punctate, the punctures on the second sternite larger and more remote.

Pubescence short and fine, whitish, the propodeum with some longer hairs.

Reddish brown, partly more blackish; the following parts yellow: a spot at the base of the mandibles, a spot on the lower part of the temples, the clypeus, a line at the inner orbits (almost reaching the centre of the eye-incision), a line at the underside of the first antennal segment (sometimes

indistinct); a broad fascia at the anterior margin of the pronotum, the tegulae (except a spot at their outer margin), a large spot at the top of the mesopleura, two large spots on the scutellum, two smaller ones at the base of the post-scutellum, two large spots on the posterior face of the propodeum, narrowed towards the base of the abdomen and separated by a broad dark median line; two well separated spots on the first abdominal tergite, just in front of the discolored apical margin, a fascia at the apex of the second abdominal segment, a similar, but narrower fascia at the apex of the third tergite [1]); anterior face of coxae I, a large spot on coxae II, a line on coxae III, a line at the outer side of tibiae I and II, often also on tibiae III. — Apical half of the second abdominal segment usually strongly infuscate in front of the yellow fascia.

Wings subhyaline, darker in the apex of the median cell and in the anterior part of the radial cell; stigma and veins brown.

Male. — Lower half of the eyes more strongly swollen, the eyes much further apart on the vertex than at the clypeus (33 : 22); the clypeus flat, not wider than high. Antennae slightly longer than in the female, of about the same shape, distinctly swollen in their apical half; tyloides present, but small, the antennae not serrate; apical antennal segment not incised, roundly triangular in outline.

Mandibles almost entirely yellow, the face more extensively yellow than in the female: lines at inner orbits larger, produced into the eye-incisions, above the clypeus confluent with a large yellow spot between the antennae. Antennae fuscous above, ferruginous below. Yellow markings on coxae II and III larger; underside of femora I and II with a yellow line, femora III dark, tibiae III with or without yellow line. Otherwise as in the female.

Length (h. + th. + t. 1 + 2), ♀ 7½ - 8½ mm, ♂ 7 mm.

The coloration of this species appears to be rather constant; the entirely yellow clypeus in the female, and the presence of two spots on the scutelli and the first abdominal segment are very characteristic.

SONAN described this species after some specimens from Zamboanga, S. Mindanao; the holotype (♀) is in the Museum at Berlin-Dahlem (Deutsches Entomologisches Institut), the allotype (♂) in the Department of Agriculture, Government Research Institute, Taihoku, Formosa. I studied a number of specimens from Zamboanga which probably belonged to the same lot as the type material.

Philippine Islands: Mindanao, many specimens from Zamboanga, Dec. '17, BÖTTCHER (coll. v. SCHULTH., coll. m.); 4 ♀♀, 1 ♂, Momungan (Mus. L., coll. m.); 1 ♀, Calian, C. F. CLAGG (coll. BEQUAERT). Basilan, 2 ♀♀, Maloong, KUWASIMA (Kyushu Imp. Univ.); 1 ♀, 2 ♂♂ (Mus. L.). Dinagat, 2 ♀♀, Dec. '15, BÖTTCHER (coll. m.). Surigao, 2 ♀♀ (Mus. L.). Butuan, 2 ♀♀ (Mus. L.). Samar, 6 ♀♀, 2 ♂♂, Catbalogan (Mus. L.).

North Borneo: many specimens from Kudat (Sept. 1927), Samawang

[1]) The yellow markings of the abdomen are partly omitted in the original description, but they are present in the accompanying figure.

near Sandakan (July '27), and 2 ♀♀ from Labuan Isl. (Sept. '27), BODEN KLOSS & PENDLEBURY (Mus. K.L., coll. m.); 1 ♀, Labuan Isl., 1895 (Br. Mus.).

In most females from Borneo the space between the antennae (supraclypeal area) is more or less yellow; in some specimens the spots on the first abdominal segment are almost united in the middle.

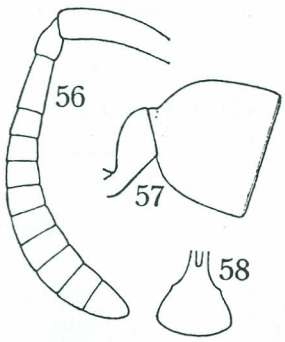
Ropalidia malayana (CAM.).

!1903. CAMERON, P., Jl. Straits Br. R. As. Soc. 39, p. 171, ♀ (*Icaria*, Borneo, exact locality not given).

!1931. DOVER, C., Jl. Fed. Mal. St. Mus. 16, p. 257, ♀ (*delicata*, Pahang, Malay Peninsula).

F e m a l e. — Head moderately thick, slightly wider than high (29 : 27), distinctly wider than the thorax (29 : 25). Temples well developed, seen in profile somewhat narrower than the eyes. Inner orbits further apart on the vertex than at the clypeus (16.5 : 13). Ocelli in an almost equilateral triangle, posterior ocelli nearly three times further from the eyes than from each other, the latter distance slightly longer than their width. Clypeus convex, distinctly wider than long (13 : 10.5), apex rather acute. Lower margin of the mandibles slightly emarginate at the base. Antennae (fig. 56) rather short, flagellum strongly swollen, second segment half as long as the third, which is more than twice as long as wide at apex and slightly longer than the following two segments together.

Thorax rather short, seen from above about 1⅓ times as long as wide. Pronotum roundly truncate anteriorly, the sides nearly straight, slightly converging. Scutellum convex, with a faint trace of a median impressed line: postscutellum slightly convex. Propodeum short, seen from above the sides broadly rounded, seen in profile slightly convex; median excavation wide and deep, narrowed towards the base of the abdomen.



Figs. 56 - 58. *R. malayana* (CAM.); 56. antenna of ♀; 57. first and second abdominal segments; 58. first abd. segm. from above.

Abdomen: figs. 57 and 58; first tergite (as usually measured from the end of the basal slit) somewhat shorter than wide, the depressed apical margin narrow, but distinct; the width of the second segment somewhat variable, but always exceeding the length, approximately twice the width of the first segment, the depressed apical margin very narrow; second sternite not more convex than the tergite.

Wing venation variable; the second recurrent vein sometimes almost interstitial, the third cubital cell usually large, often scarcely narrowed towards the radial cell.

Body rather dull, clypeus, concavity of propodeum, and swollen part of first abdominal tergite shining; polished area of postscutellum of normal size.

Clypeus with some scattered punctures; frons, vertex, pro- and mesonotum, scutellum, anterior part of postscutellum, and mesopleura behind the epicnemial carina, densely punctate, the puncturation rather coarse in relation to the size of the insect, somewhat rugose. Metapleura scarcely punctate, propodeum with a few striae near the posterior lateral angles of the postscutellum, the concavity very feebly sculptured, the sides partly transversely rugose, with some large irregular punctures. First abdominal tergite with some medium sized punctures on the sides and the apical margin, second segment very coarsely and densely, rugosely punctate, the punctures not distinctly margined posteriorly; the punctures on the sternite slightly less dense than on the tergite.

Body covered with a fine, appressed, silvery pile, which however is so thin, that the sculpture is very distinctly visible; clypeus, propodeum and abdomen with some short erect hairs.

Male. — Head slightly wider and flatter than in the ♀, temples much narrower, seen in profile about half as wide as the eyes. Eyes wider and more swollen, their distance at the clypeus shorter. Clypeus flatter, slightly wider than long (11: 9). Antennae slightly longer and thinner than in the ♀, tyloides present, but rather indistinct; length of third segment twice its width at the apex, fourth segment about square in outline, tenth segment more than 1½ times as wide as long; ultimate segment rounded, not curved or incised, as long as wide at base.

Thorax and abdomen very much as in the ♀; last abdominal sternite slightly convex, its apical margin rounded.

Length (h. + th. + t. 1 + 2), ♀♂ 6 - 7 mm.

This species is very variable as regards the coloration, and even specimens from one and the same locality may differ considerably in this respect.

I have distinguished three color phases (described by CAMERON as different species), viz. typical *malayana*, with extensive yellow markings, *erythrospila*, with the greater part of the thorax reddish, and *parvimaculata*, which as compared with *malayana* is characterized by the reduction of the yellow markings. This reduction, however, may be more or less complete, and on some parts of the body it may be much more pronounced than on others. Various transitional forms appear to occur. *R. delicata* scarcely differs from typical *malayana* and can not be regarded as a distinct phase.

R. malayana (CAM.), typical form.

Black; the following parts yellow: a small spot at base of mandibles, a large spot on each side of the clypeus, a short and narrow line at inner orbits (often absent), underside of first antennal segment (sometimes brownish), the greater part of the pronotum (the sides ofen brownish), the tegulae, two large spots on scutellum, a broad transverse band on postscutellum (sometimes scutelli entirely yellow), a large spot on each side of the propodeal concavity, and apical fasciae of the first and second abdominal segments. Coxae with more or less distinct yellow spots, greater part of tibiae yellow, tarsi brownish yellow.

Wings hyaline, veins and stigma dark brown, the anterior margin of the fore wings slightly infuscated, the anterior half of the radial cell fuscous.

Borneo: 1 ♀, Sarawak, CAMERON coll. (Br. Mus., labelled: "cotype"); 1 ♀, Santubong (Mus. Sar.); 1 ♀, Claudetown, 16 July 1932 (Oxf. Univ. Exp.); 2 ♀♀, Samawang, H. M. PENDLEBURY (Mus. K.L.); 1 ♀, Palawan Besar, E. Borneo, Mrs. M. E. WALSH (coll. m.).

Malay Peninsula: 1 ♀, Pahang, type of *delicata* DOVER (Br. Mus.); 2 ♀♀, Pahang, Soengei Tahan, H. M. PENDLEBURY (Mus. K.L.); 1 ♀, Perak, Larut Hills, 3700 - 4000′, Febr. '32, H. M. PENDLEBURY (coll. m.); 1 ♀, Kelantan (coll. m.).

Sumatra: 3 ♂♂, Sibolangit, Oct. 1925, FULMEK and KARNY (Mus. Btzg., coll. m.); 1 ♂, Deli, Soengei Krio, April 1928, J. C. VAN DER MEER MOHR (Mus. Btzg.); 2 ♂♂, Toba Lake, Dr. B. HAGEN (coll. m.); 1 ♀, Benkoelen, July 1916, E. JACOBSON (Mus. L.).

Lingga Isl.: 1 ♀, CAMERON coll., labelled "type" (Br. Mus.).

Bangka Isl.: many specimens with nest, Dec. 1935, author (coll. m.).

R. malayana (CAM.), var. **parvimaculata** (CAM.).

!1907. CAMERON, P., Jl. Straits Br. R. As. Soc. 48, p. 25, ♀ (*Icaria*, Marup, N. Borneo).

Coloration as in typical *malayana*, but the yellow markings more or less reduced: spots on clypeus smaller, sometimes absent; transverse line on pronotum narrow or absent; markings on scutelli much reduced or absent; spots on propodeum small or absent; first and second abdominal segments either with narrow apical fasciae, or one or both of these segments entirely black. Tibiae black, sometimes yellowish at base and apex. Even my darkest specimens have a small yellow spot at the base of the mandibles.

The holotype of *parvimaculata* is a ♀ without abdomen, from Marup, N. Borneo, leg HEWITT, 1906, in the Br. Mus.; there is a paratype from the same locality in the Sarawak Museum.

Borneo: Here this dark variety appears to be more common than anywhere else; I studied specimens from the following localities: Kuching (Mus. Sar.); Bettotan, H. M. PENDLEBURY (Mus. K.L., coll. m.); Sibau River, BÜTTIKOFER (Mus. L., coll. m.); Melawi, W. Borneo, 1924, BLANCHEMANCHE (Mus. Btzg.); Pajan River, Dec. 1925, E. MJÖBERG (coll. m.); Sandakan, BAKER (coll. BEQUAERT); Foot of Mt. Dulit, junction of Rivers Tinjar & Lejok; R. Kapah Trib. of R. Tinjah; Mt. Dulit, 4000′; Mt. Kalulong, 5000′, smaller peak (all collected by Oxf. Univ. Exp.). The specimens from the latter two localities are almost entirely black.

Malay Peninsula: 1 ♀, Selangor, Bukit Kutu, 3300′, Sept. '30, H. M. PENDLEBURY (coll. m.).

Sumatra: 1 ♀, Sibolangit, G. FAIRCHILD (coll. BEQUAERT).

R. malayana (CAM.), var. **erythrospila** (CAM.).

!1908. CAMERON, P., Deutsch. Ent. Zeitschr. 1908, p. 563, ♀ (*Icaria*, Kuching, Borneo).

!1931. DOVER, C., Jl. Fed. Mal. St. Mus. 16, p. 257 (*R. erythrospila*, Selangor & Peninsular Siam).

Differs from typical *malayana* as follows: Lateral spots on clypeus smaller, covering only the anterior half; pronotum red, sometimes with a yellow line in the middle; mesonotum red, often more or less blackish; tegulae red; scutellum and postscutellum red, sometimes with yellow spots; propodeum without yellow spots, often reddish in the middle. Apical fascia of petiole often absent. — Generally slightly smaller than the preceding forms.

Borneo: 1 ♀, Kuching, 1906, holotype (Br. Mus.); 1 ♀, Sarawak, Mt. Matang, 1500′, G. E. BRYANT (Br. Mus.); Bettotan and Kabayau, 1933, H. M. PENDLEBURY (Mus. K.L., coll. m.).

Peninsular Siam: Nakon Sri Tamarat, Khao Luang (Mus. K.L.).

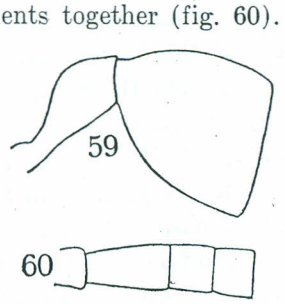
Malay Peninsula: Kedah, Jitra, Bukit Timah, Kuala Lumpur and Singapore, H. M. PENDLEBURY (Mus. K.L., coll. m.); 1 ♀, Perak, Taiping Hills, 1923, M. R. HENDERSON (mesonotum black, coll. BEQUAERT); 1 ♂, Singapore, BAKER (coll. m.); 5 ♀♀, Penang, 1913, G. E. BRYANT (Br. Mus.); 2 ♀♀, H. N. RIDLEY, 1904 (Br. Mus.).

Ropalidia curvilineata (CAM.).

!1908. CAMERON, P., Deutsch. Ent. Zeitschr. 1908; p. 564, ♀ (*Icaria*, Borneo).

Female. — Head slightly wider than high (40 : 37), not much wider than the thorax (40 : 36), slightly narrowed behind the eyes. Temples, as seen in profile, about ⅔ as wide as the eyes. Inner orbits further apart on the vertex than at the clypeus (22: 18). Posterior ocelli three times as far from the eyes as from each other; the distance between them about equal to their diameter. Clypeus scarcely wider than long. Antennae short and thick, not much widened towards the apex, length of third antennal segment only 1¾ times its width at apex, it is slightly shorter than the two following segments together (fig. 60).

Thorax normal, its length 1½ times its width. Pronotum roundly truncate anteriorly, its sides almost straight, slightly converging towards the head. Scutellum convex, postscutellum almost flat, rather steeply sloping. Propodeum, as seen from above, rounded, as seen in profile distinctly convex, the median furrow distinct, but rather narrow and shallow.



Figs. 59 - 60. *R. curvilineata* (CAM.); 59. first and second abdominal segments; 60. part of antenna of ♀.

Abdomen: fig. 59. Posterior part of the first tergite strongly swollen and more than three times as wide as the basal portion, but less than half as wide as the second segment; the posterior, flattened and discolored margin rather wide, moderately depressed. Second segment distinctly wider than high, obliquely cut off at the end, the sternite being considerably longer in the middle than the tergite (5 : 4), its depressed apical margin narrow.

Wing venation as usual, the third cubital cell moderately narrowed towards the radial cell.

Body slightly shining; anterior part of the clypeus and the propodeum more strongly so; polished area of postscutellum of normal size.

Clypeus with scattered, shallow punctures; frons densely punctate, but not reticulate, the space near the eye-incisions and the vertex less densely punctate, puncturation of mesonotum and upper part of mesopleura dense and reticulate; mesonotum, scutellum, anterior part of postscutellum and lower part of mesopleura less densely and more superficially punctate; metapleura almost impunctate; propodeum very finely sculptured in the middle, somewhat rugose at the sides, where near the apex a fine transverse striation is visible in some lights; base of propodeum without lateral striae, median channel indistinctly transversely striate. The swollen part of the petiole densely punctate; second tergite densely, reticulately punctate, the punctures not margined behind; second sternite sparsely punctate, with large interspaces.

Pubescence short and fine, whitish, dorsally brownish, the propodeum and the abdomen with some longer hairs.

Brownish black; antennae, propodeum, legs and apex of abdomen dark brown; first abdominal segment red (its apical margin ferruginous); yellow markings: a spot at the base of the mandibles, a transverse line at the anterior margin of the clypeus, a small spot at inner orbits, a narrow line along the pronotal carina, two coalescent transverse spots at the base of the postscutellum, two longitudinal, wedgeshaped spots on the apical two thirds of the propodeum, converging towards the petiole (these spots sometimes small or absent), a narrow transverse line on the first tergite, just in front of the depressed apical margin, and a spot on the anterior face of coxae I; coxae II and III sometimes with a narrow yellow line; in some specimens the second abdominal segment has a narrow, pale, apical fascia.

Wings subhyaline with a yellowish tinge, veins brown, stigma dark brown; apex of median cell, and a cloud covering the radial cell and the anterior part of the third and fourth cubital cells, fuscous.

Length (h. + th. + t. 1 + 2), ♀ 9 - 10 mm.

Malay Peninsula: 1 ♀, Perak, Batang Padang, Jor Camp, 1800′, May '23, H. M. PENDLEBURY (Mus. K.L.); 1 stylopized ♀, Selangor, Pahang, Genting Sempak, Hill Stream, Sept. '26, C. DOVER (Mus. K.L.); 1 ♀, Selangor, Bukit Kutu, 3300′, Sept. '32, H. M. PENDLEBURY (coll. m.).

Borneo: 1 ♀, "Quop. Oct. '06" (holotype, in Br. Mus.); 1 ♀, Sarawak, Kuching, Jan. 1900 (Mus. Sar.); 1 ♀, Sarawak, Foot of Mt. Dulit, junction of rivers Tinjar & Lejok, July '32 (Oxf. Univ. Exp.).

Sumatra: 6 ♀♀, Lampong Districts, Mt. Tanggamoes, 450 - 650 m, July-Aug. '35, Mrs. M. E. WALSH (coll. m.).

Ropalidia latebalteata (CAM.).

!1902. CAMERON, P., Jl. Straits Br. R. As. Soc. 37, p. 100, ♀ (*Icaria*, Borneo).
1931. DOVER, C., Jl. Fed. Mal. St. Mus. XVI, p. 257.

This species appears to be closely allied to *R. curvilineata;* it is easily

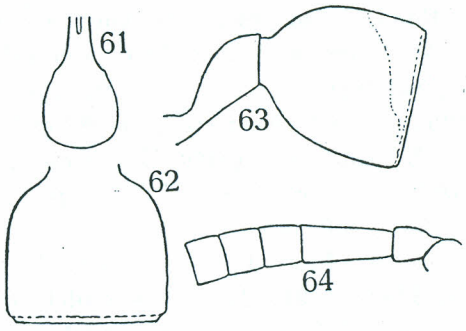
distinguished by the denser puncturation of head and thorax, by the shape of the second abdominal segment, and by the coloration.

F e m a l e. — Head flatter than in *curvilineata,* more distinctly narrowed behind the eyes. Temples, as seen in profile, less than two thirds the width of the eyes. Antennae slender, length of the third segment 2½ times its width at the apex, it exceeds the fourth and fifth segments together in length by half the length of the sixth segment (fig. 64).

Thorax as in *curvilineata.*

Abdomen: figs. 61 - 63: as a whole more slender than in *curvilineata;* the second segment scarcely wider than long, almost vertically cut off at the end; the depressed apical margin narrow.

Body duller than in the preceding species, but clypeus and propodeum shining, and the polished area of the postscutellum of normal size. Puncturation somewhat coarser and denser than in *curvilineata;* the propodeum finely transversely striate, the striae also visible at the base.



Figs. 61 - 64. *R. latebalteata* (CAM.); 61 - 62, first and second abdominal segments, from above; 63. the same, in profile; 64. part of antenna of ♀.

Dark reddish brown, the first abdominal segment yellowish red, the second almost black; body extensively marked with yellow as follows: a spot at base of mandibles, clypeus (except for a broad, rounded, median mark not reaching the apex), a line at inner orbits, running from the clypeus to the centre of the eye-incision, an interrupted line on the temples, the underside of the first and second antennal segments; an irregular line along the pronotal carina (much broader than in *curvilineata*), the tegulae (except for a brownish spot on their outer side), a longitudinal spot on upper art of mesopleura, two spots at base of scutellum (sometimes reddish or entirely reduced), two transverse spots, covering the punctate area of the postscutellum, two triangular spots on the posterior three fourths of the propodeum (their inner sides almost parallel, the outer sides converging towards the abdomen), a transverse yellow line just in front of the depressed apical margin of the petiole, a fascia at the apex of the second segment, usually much widened towards the middle of the tergite. Legs brownish, coxae with large yellow spots; lines or spots of the same colour are present on the distal parts of the femora; tibiae sometimes each with a small yellow spot on their outer side.

Wings subhyaline, stigma and veins dark brown, apex of median cell brownish; the subapical cloud is almost confined to the radial cell, the anterior margin of the fourth cubital cell being only slightly dusky.

Length (h. + th. + t. 1 + 2), 8 - 9 mm.

P e n i n s u l a r S i a m: 2 ♀♀, Nakon Sri Tamarat, Khao Lung, 2000 - 2500′, March '22, H. M. PENDLEBURY (Mus. K.L., coll. m.); 1 ♀, "Siamese Malay

States, ANNANDALE & ROBINSON, 1903 - 127", erroneously determined by P. CAMERON as *Icaria hongkongensis* (Br. Mus.).

Malay Peninsula: many females from Selangor (Bukit Kutu, 3500', Pahang), Kedah (Nr. Jitra, Catchment Area), Perak (Batang Padang, 1800') leg. H. M. PENDLEBURY (Mus. K.L., coll. m.).

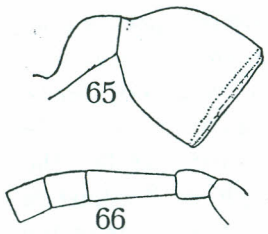
Borneo: 1 ♀, Sarawak, 1903 - 249, 1 ♀, Kuching, Sarawak, 1914 - 110, both labelled "type" in CAMERON's handwriting, and both in the Br. Mus.; I regard the first specimen as the true holotype, supposing that the date on the label indicates only when the specimen was acquired by the Br. Mus. (it was described in 1902!). A third specimen, probably belonging to the original type-material, is a ♀ from Kuching (1899 - 1900) in the Sarawak Museum. Further specimens from Sarawak: 1 ♀, Bettotan, 1 ♀, Samawang, 1927, H. M. PENDLEBURY (Mus. K.L., coll. m.); 1 ♀, Mt. Dulit, Dulit Trail, primitive forest, Aug. '32 (Oxf. Univ. Exp.); some ♀♀, Sandakan, BAKER (coll. VON SCHULTH., coll. m.).

Sumatra: 1 ♀, Sibolangit, Febr. '26, G. FAIRCHILD (coll. BEQUAERT); 1 ♀, Sibolga, 1913, E. JACOBSON (det. by v. SCHULTH. in 1927 as *Icaria torrida*) (coll. m.); 1 ♀, Serapai Koer, 1915, E. JACOBSON (coll. m.); many females with nest, Benkoelen Res., Moeara Tenam, July '35, Mrs. M. E. WALSH (coll. m.).

Ropalidia ornatipes (CAM.).

!1908. CAMERON, P., Deutsch. Ent. Zeitschr. 1908, p. 564, ♀ (*Icaria*, Kuching, Borneo).

Female. — Closely allied to *R. latebalteata* (CAM.). Temples about two thirds of the width of the eyes. Posterior ocelli more than three times as far from the eyes as from each other. Antennae slender, the length of their third segment more than 2½ times its width at apex, it is considerably longer than the two following segments together (fig. 66).



Figs. 65 - 66. *R. ornatipes* (CAM.); 65. first and second abdominal segments; 66. part of antenna of ♀.

Abdomen (fig. 65): first abdominal segment short, the swollen part four times as wide as the basal portion, and almost half as wide as the second segment. The latter is straightly cut off behind, slightly wider than long, seen in profile about as high as long; apical margin strongly depressed.

Sculpture very much as in *R. latebalteata*, but the punctures more superficial; clypeus with only a few punctures, vertex sparsely punctate, with distinct interspaces; propodeum dull, very finely sculptured, the base with distinct lateral striae, the excavation not transversely striate.

Dull reddish brown; basal antennal segments, pronotum, upper part of mesopleura, the scutelli and the legs somewhat brighter; first abdominal segment ferruginous; the head marked with pale yellow as follows: clypeus (except for the extreme anterior margin and a broad median line, narrowed at the base and not reaching the apex), a spot at base of mandibles, a short and narrow,

interrupted line on the lower part of the temples and a short line at lower inner orbits, scarcely reaching above the base of the antennae. Thorax with the pronotum indistinctly yellowish in the middle, a small spot under the tegulae and two (often reduced ?) spots at base of postscutellum, pale yellow; tegulae ferruginous. Apical margin of the first abdominal tergite reddish yellow, second segment with a narrow yellow apical fascia, the anterior margin of which is obscurely reddish. Coxae I almost entirely yellowish white, II and III with yellow markings; tibiae I narrowly, II and III on the outer side more broadly, whitish yellow. Wings as in *R. latebalteata*, but the stigma brownish yellow, not dark brown as in that species.

Length (h. + th. + t. 1 + 2), ♀ 7½ - 8½ mm.

Borneo: 1 ♀, Sarawak, Kuching (holotype in Br. Mus.); 1 ♀, Bettotan near Sandakan, July '27, C. BODEN KLOSS & H. M. PENDLEBURY (coll. m.).

Ropalidia sumatrae (WEB.).

1801. WEBER, F., Observ. Ent., Kiliae, p. 103 (*Vespa*, Sumatra).
1802. ILLIGER, J. C. W., Magaz. Insektenk. I, p. 189, no. 19 (*Vespa mutillata*).
1804. FABRICIUS, J. C., Syst. Piez., p. 279, no. 49 (*Polistes pubescens*).
1804. FABRICIUS, J. C., Syst. Piez., p. 288, no. 15 (*Eumenes formicaria*).
!1841. WHITE, A., Ann. Mag. Nat. Hist. (I), 7, p. 321, nota (*Anthreneida coronata*, locality unknown).
1853. SAUSSURE, H. DE, Étud. fam. Vesp. II, p. 242 (*Icaria ?sumatrae*).
1853. SAUSSURE, H. DE, Étud. fam. Vesp. II, p. 245 (*Anthreneida coronata*).
!1855. SAUSSURE, H. DE, Rev. Mag. Zool. (2) 7, p. 374, ♂ (*Icaria speciosa*) (♀!).
1857. SMITH, F., Cat. Hym. Br. Mus. V, p. 98, no. 27 (*Icaria speciosa*).
1862. SAUSSURE, H. DE, Stett. Ent. Ztg. XXIII, p. 134, no. 2 (*Icaria speciosa*).
1871. SMITH, F. Jl. Proc. Linn. Soc. Zool., XI, p. 379 (*Icaria sumatrae, Icaria speciosa*).
1891. GRIBODO, G., Bull. Soc. Ent. Ital. XXIII, p. 243, ♀ (*Icaria marangensis*).
1897. BINGHAM, C. T., Fauna Brit. India, Hym. I, p. 390, no. 679, fig. 120, ♀ (*Icaria speciosa*, nec *I. sumatrae* p. 389!).
!1904. CAMERON, P., Jl. Straits Br. Roy. As. Soc. 41, p. 121, ♀ (*Icaria rufinoda*).
1912. SCHULZ, W. A., Berl. Ent. Zeitschr., LVII, p. 88 (*Icaria speciosa*).
1914. MEADE-WALDO, G., Ann. Mag. Nat. Hist. (8), 14, p. 406 (*Icaria speciosa*).
1914. SCHULTHESS, A. VON, Zool. Jahrb. Syst. 37, p. 259 (*Icaria marangensis*).
!1927. SCHULTHESS, A. VON, Suppl. Ent. XVI, p. 83 (*Icaria speciosa*).
!1929. DOVER, C., Bull. Raffles Mus. Singapore 2, p. 47, no. 29 (*speciosa*).
!1931. DOVER, C., Jl. Fed. Malay St. Mus. XVI, p. 256 (*speciosa*).
1932. SCHULTHESS, A. VON, Rés. scient. Voy. Ind. Or. Néerl. Léopold, vol. IV, fasc. 5, p. 40 (*Icaria speciosa*).

For this species the name *speciosa* SAUSS. has been generally used, but there is no doubt that WEBER's description of *sumatrae* (1801) applies to the same species, and the name *speciosa* must therefore be sunk into synonymy.

Eumenes formicaria F., erroneously recorded by its author from South America, has been recognized as identical with *Icaria speciosa* by W. A. SCHULZ (l.c.); according to him the two type-specimens in the Museum at Kopenhagen are labelled "Sumatra, DALDORFF".

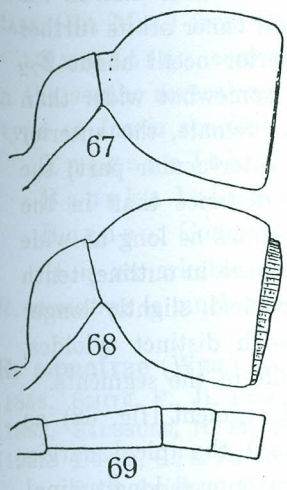
My interpretation of *Anthreneida coronata* WHITE is based upon the study of a specimen in the Br. Mus.; it lacks the abdomen, but could nevertheless be recognized with certainty as a ♂ of *R. sumatrae*. The specimen bears a label: "*Anthreneida scutellaris* WHITE", but this is scratched out and on the other side is written: "*A. coronata*"; furthermore it bears a note, written by G. MEADE-WALDO: "Type of *Anthreneida* White, formed on 1 specimen. Bingham considers it a variety of *Icaria*. G.M.W. 1909". The peculiar aberrant venation of this specimen, described by WHITE and even more detailed by BINGHAM (l.c., p. 390), leaves no doubt that it is indeed the true type of *Anthreneida*. Apparently its abdomen had already got lost when BINGHAM studied the type, and, being misled by the inexact original description ("the second abdominal segment appearing encircled at the apex by a coronet of short flattened equal processes placed close to each other, somewhat like the peristome of certain mosses; the second segment nearly conceals the other segments, from one of which, however, the processes may arise."), this author identified *A. coronata* with the species, now described by me as *R. binghami*.

That *Icaria marangensis* is nothing but the common *R. sumatrae*, was proved by the study of a specimen, compared by GIORDANI SOIKA with GRIBODO's type.

F e m a l e. — Head moderately flat, seen in front wider than high (44 : 39), seen from above more than twice as wide as long (44: 20), much wider than the thorax (44 : 36). Temples thick, seen in profile almost as wide as the eyes. Inner orbits slightly further apart on the vertex than at the clypeus (24 : 21). Frons scarcely convex, ocelli placed in an almost equilateral triangle, posterior ocelli about three times as far from the eyes as from each other, the latter distance slightly longer than their diameter. Antennae somewhat further from the eyes than from each other, interantennal shield slightly convex, with a fine impressed line in its upper half. Clypeus wider than long, moderately convex, the sides much diverging towards the anterior margin and contiguous with the inner orbits for a short distance only, basal emargination rather shallow, the basal interocular part of the clypeus distinctly longer than the anterior portion (10 : 8). Antennae (fig. 69) slender, apical half of flagellum slightly thickened, third segment almost three times as long as wide at the apex, fourth segment longer than wide, fifth segment square in outline, 6th - 11th segments wider than long, tenth segment 1⅓ times as wide as long, last segment somewhat longer than wide at the base.

Thorax oval, roundly truncate anteriorly, about 1½ times as long as wide. Pronotal carina distinct, but not much raised; the sides of the pronotum somewhat convex, distinctly converging towards the head. Mesonotum moderately convex, as long as wide between the tegulae, with a fine median impressed line on its anterior part. Scutellum convex, with a fine median impressed line. Postscutellum flattened in the middle, the sides rounded, somewhat projecting. Mesopleura strongly swollen below, mesopleural suture faintly indicated, epicnemial carina and sterno-pleural suture distinct. Propodeum moderately long,

as seen from from above the sides less swollen than in *R. opulenta*, seen in profile the upper outline nearly straight, slightly convex at the base; without carinae, teeth or projecting angles; median impression pear-shaped, narrowed towards the base of the petiole, moderately deep and with a rather wide impressed line in its middle.



Figs. 67 - 69. *R. sumatrae* (WEB.) ; 67. first and second abdominal segments of ♀; 68. the same, of ♂; 69. part of antenna of ♀.

Abdomen: fig. 67. Petiole 1½ times as long as wide and nearly twice as long as high, linear at the base, its posterior two thirds gradually and roundly widened towards the end. Second segment distinctly wider than high and, seen from above, slightly wider than long, with subparallel sides, strongly and somewhat abruptly narrowed towards the base, seen in profile obliquely cut off behind, the tergite being shorter in the middle than the sternite (this character is however much less pronounced than in *R. opulenta*); apical margin strongly depressed, with fine longitudinal carinae.

Wing venation: first cubital cell rather short, second cubital cell much higher than wide, narrowed towards the top, it receives the first recurrent vein about in the middle and the second close to the end. Third cubital cell narrowed towards the top, the third cubital vein being oblique.

Body rather dull; mandibles and anterior part of clypeus strongly shiny, the small posterior median area of the postscutellum moderately shiny, posterior face of propodeum somewhat less shiny, its sides dull.

Mandibles and anterior half of clypeus with some scattered punctures, basal half of clypeus almost impunctate. Front, vertex, pro- and mesonotum, scutellum, mesopleura and anterior and lateral margins of postscutellum densely, partly reticulately, punctate, the punctures however rather fine and shallow; metapleura with a few indistinct punctures; the sides of the propodeum punctate, especially at the base, the median impression impunctate. First abdominal segment with superficial puncturation on the sides and the posterior half of its swollen part; second tergite densely reticulately punctate, the punctures deeper than those on the thorax, distinctly margined posteriorly, with only a few interspaces, the sternite more remotely punctate with distinct interspaces; the following tergites with large punctures.

Body covered with a very fine whitish to greyish tomentum, there are some longer erect hairs on the clypeus, the propodeum, and the abdomen.

Black; a spot at the base of the mandibles and a rather wide V-shaped fascia on the anterior margin of the clypeus whitish; first abdominal segment bright orange-red (darker in old specimens), blackish at the base; the apical margins of the second and following segments, and the tarsi, dark brown.

Wings subhyaline, fore wings with a dark spot in the apical corner of the median cell and a dark cloud occupying the radial cell and a large part of the third and fourth cubital cells.

Male. — Head relatively shorter and flatter than in the female, much wider than high (42 : 34), seen from above about 2½ times as wide as long (42 : 16.5), much wider than the thorax (42 : 35). Temples narrower than in the female, as seen in profile less than half as wide as the eyes. Inner orbits further apart on the vertex than at the clypeus (20 : 16). Posterior ocelli about 2½ times as far from the eyes as from each other. Clypeus somewhat wider than long, rather convex, but much less produced than in the female, the anterior portion being only about one third as long as the basal inter-ocular part; the lateral margins contiguous with the eyes for a greater distance than in the female, apex blunt. Antennae slender, third segment 2½ times as long as wide at apex, fourth segment longer than wide, fifth segment square in outline, tenth segment about 1½ times as wide as long, last segment conical, slightly longer than wide at the base; third and following segments with distinct tyloides, but not serrate, the tyloides highest before or in the middle of the segments.

Thorax and abdomen slender, the second abdominal segment (fig. 68) as seen from above wider than long (the apical margin included), the apical margin very wide and strongly depressed, with numerous well pronounced longitudinal carinae.

Wing venation variable, the second cubital cell may be triangular or even sligthly petiolate, the second recurrent vein sometimes interstitial or even ending in the third cubital cell (see the discussion on *Anthreneida*, p. 182).

Puncturation somewhat coarser than in the female, pubescence slightly denser.

A spot at the base of the mandibles, a transverse spot at the apex of the clypeus (variable in size, but apparently always much smaller than in the ♀) and a short line along the inner orbits dirty yellowish white; apical margin of the second abdominal segment translucent yellowish brown; legs and antennae more or less brownish; the remainder as in the female.

Length (h. + th. + t. 1 + 2), ♀: 10 - 11 mm, ♂: 9 - 10 mm.

Burma: Rangoon, July '98 (Br. Mus.); 4 ♀♀, Mergui, DOHERTY, 1 ♀, Shan Hills in Upper Burma, J. C. BROWN, 1 ♀, Thingannyinaung to Myawadi, 900', 2 ♀♀, Dawna Hills (all in Mus. Calc.); 1 ♀, Palon (Pegu), Aug.-Sept. 1887, FEA (Mus. Venice, compared with type of *marangensis* GRIB. by A. G. SOIKA in 1934).

Siam: 1 ♀, Makami R., COCKERELL (coll. BEQUAERT); 4 ♀♀, Ban Pa Den, 1920, R. V. DE SALVAZA (Br. Mus.).

Indo-China: 1 ♀, Haut Mekong, Vien Ponkha, May '18, R. V. DE SALVAZA (Br. Mus.).

Tenasserim: 2 ♀♀, Haundraw Valley, 1 ♀ Thaungyin Valley, 1 ♀, Ataran Valley, C. T. BINGHAM (Br. Mus.); 1 ♀, Ataran Valley (Mus. Calc.); 1 ♀, Thagatà, April 1887, FEA (Mus. Venice).

Peninsular Siam: 2♀♀, ANNANDALE & ROBINSON (Br. Mus.); Nakon Sri Tamarat (Mus. K. L.).

Malay Peninsula: apparently common, I saw several specimens from Kedah, Perak, Pahang, Selangor and Singapore (Br. Mus., Mus. K. L., coll. m.), including the type (Mus. K. L.) and a "cotype" of *Icaria rufinoda* CAM. (Br. Mus.) from Singapore; 1 ♀, Johore (Mus. Calc.).

Sumatra: common, from Atjeh in the north to the Lampong Districts in the south; several specimens in Mus. Btzg., Mus. B.-D., Mus. L., Br. Mus. (type of *Icaria speciosa* SAUSS.), coll. BEQUAERT and coll. m.

Enggano Isl.: 2 ♀♀, WIENECKE (Mus. L.).

Bangka Isl.: many specimens and one nest in coll. m.

Borneo: Compare subsp. *lugubris*.

It is remarkable that this species does not occur in Java. The male of *R. sumatrae* is much rarer in collections than the female.

R. sumatrae (WEB.), subsp. **lugubris** (SM.).

!1858. SMITH, F., Jl. Proc. Linn. Soc. Zool. II, p. 115, ♀ (*Icaria lugubris*, Borneo).
!1862. SAUSSURE, H. DE, Stett. Ent. Ztg. XXIII, p. 134, ♀ (*Icaria lugubris*).
!1922. DOVER, C., & H. SRINIVASA RAO, Jl. As. Soc. Bengal (New Series) XVIII, p. 246, ♀ (*R. krishna*, Calcutta).
1925. DOVER, C., Jl. As. Soc. Bengal (New Series) XX, p. 302 (*R. lugubris* = *R. krishna*).

This subspecies is the Bornean representative of *R. sumatrae;* it differs from the typical form in having the first abdominal segment black instead of red. This difference, however, is not entirely constant; in some of the specimens I have seen the first segment is partly red.

Borneo: 2 ♀♀, Sarawak, WALLACE, type and cotype of *I. lugubris* SM. (Oxf. Mus.); 3♀♀, "Borneo" (Mus. L.); 2♀♀, W. Borneo, Benkajang at Ledo River, July '33, H. R. A. MULLER (coll. m.); 1♀ 1♂, E. Borneo, Kariorang, April '37, Mrs. M. E. WALSH (coll. m.), 1 ♀, Bandjermasin (Mus. Venice). All these specimens have the first segment entirely black. — The Oxford University Expedition brought 14 ♀♀ from Mt. Dulit, 4000′, 2 ♀♀ from Mt. Kalulong, 5000′, and 4 ♀♀ from Claudetown; in some of these the first segment is almost as extensively red as in the typical form, in others it is entirely black, and all possible transitions are present.

India: 1♀, "Calcutta and environs", C. DOVER (holotype of *R. krishna* DOVER & RAO, Mus. Calc.). The occurrence of this form in Bengal needs confirmation.

Ropalidia opulenta (SMITH).

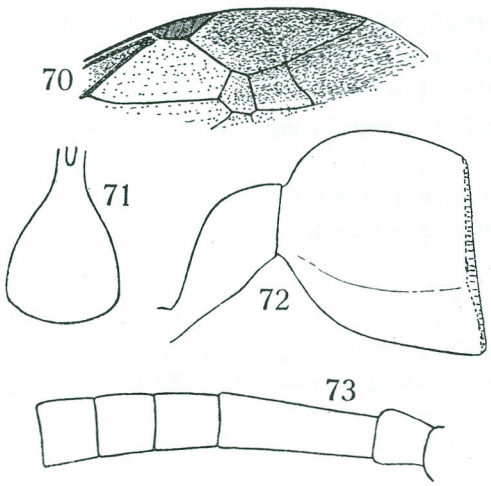
!1857. SMITH, F., Cat. Hym. Br. Mus. V, p. 99, ♀ (*Icaria*, Borneo).
!1858. SMITH, F., Jl. Proc. Linn. Soc. Zool. II, p. 115 (*Icaria*).
!1862. SAUSSURE, H. DE, Stett. Ent. Ztg. XXIII, p. 133, ♀ (*Icaria*).

This species is very closely allied to *R. sumatrae.*

Female. — Ocelli rather large, their diameter longer than the distance between the posterior ocelli, the latter slightly further from the anterior ocellus

than from each other, and more than four times as far from the eyes. Antennae (fig. 73) very slender, scape curved and flattened, about 3½ times as long as wide at apex, length of third segment three times its width at apex, fourth segment longer than wide, the rest as in *R. sumatrae.*

Pronotum roundly truncate anteriorly, the sides almost straight, very slightly converging towards the head. Concavity of propodeum oval, broader and deeper than in *R. sumatrae,* with a distinct, impressed median line.



Figs. 70 - 73. *R. opulenta* (SM.); 70. part of fore wing; 71. first abdominal segment, from above; 72. first and second abd. segments of ♀, in profile; 73. part of antenna of ♀.

Abdomen: figs. 71 and 72. First segment as in *R. sumatrae,* the second segment is very characteristic: it is strongly obliquely cut off behind, the tergite being much shorter in the middle than the sternite, the former, as viewed from above is about 1¼ times as wide as long; the apical margin is distinctly depressed, very narrow in the middle, slightly wider at the sides of the segment, its longitudinal carinae much finer than in *R. sumatrae.*

Wing venation (fig. 70) as in *sumatrae;* the body slightly duller than in that species, the tomentum has a more brownish yellow tinge; the puncturation slightly coarser, and somewhat denser on the second abdominal tergite; sides of propodeum punctate and indistinctly transversely striate; third and following abdominal tergites with large punctures.

Black, a spot at base of mandibles and a rather wide V-shaped fascia on the anterior margin of the clypeus ivory white; antennae brownish black, obscurely ferruginous beneath; tegulae brown or ferruginous; legs dark brown, tarsi partly dark ferruginous. First and second abdominal segments dull orange-red, the latter with an obscure brownish transverse fascia in the middle before the posterior margin, sometimes this segment is almost entirely brownish black, with only the posterior margin yellowish; third and following segments brownish black, their apical margins testaceous. Wings subhyaline with a yellowish tinge, the dark stains as in *sumatrae.*

In some specimens the posterior part of the thorax is more or less extensively marked with dull red; in the most brightly coloured specimens which I have seen the propodeum (except the anterior laterial angles), the postscutellum and the lower half of the metapleura are red.

M a l e. — Generally more slender than the female; the head flatter, much wider than high (52: 40); temples only half as wide as the eyes; clypeus almost flat, wider than high (21: 17), blunter and less produced anteriorly; antennae

slender, length of third segment fully three times its width at apex, fourth segment longer than wide; third and following antennal segments with distinct tyloides, but not serrate.

Clypeus more densely and coarsely punctate than in the female.

Coloration as in the female, but the spot at the base of the mandibles and the pale fascia of the clypeus much reduced or absent; the second abdominal segment apparently always brownish black, with the posterior margin yellowish.

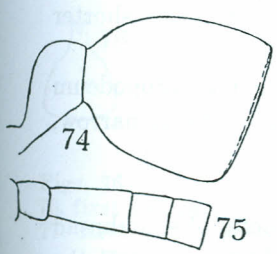
Length (h. + th. + t. 1 + 2), ♀ 11 - 12 mm, ♂ 10 - 11 mm.

Borneo: some ♀♀ (incl. the holotype) and 1 ♂, Sarawak (Br. Mus.); 1 ♀, 1 ♂, Sarawak, WALLACE (Mus. Oxf.); 2 ♀♀, "Borneo", MULLER (Mus. L.); 1 ♀, "Borneo", F. BACZES (Mus. Vienna); 2 ♀♀, N. Borneo, 1912, and 1 ♂, Middle East-Borneo, H. C. SIEBERS (Mus. Btzg.); 1 ♀, Beran, 1926, E. MJÖBERG (coll. m.); 2 ♀♀, Sarawak, Lio Matu, Baram River, Oct. 1920, J. C. MOULTON (Mus. K.L., coll. m); many specimens from Bettotan and Samawang near Sandakan, July 1927, BODEN KLOSS and PENDLEBURY (Mus. K.L., coll. m.); do. from Mt. Kinabalu: Kabayau (600′), Kiau (3000′) and Kenokok (3300′), April-May '29, H. M. PENDLEBURY (Mus. K.L., coll. m.); do. from Foot of Mt. Dulit, junction of Rivers Tinjar and Lejok, Aug.-Oct. '32, and from R. Kapah Trib. of R. Tinjar, Oct.-Nov. '32 (Oxf. Univ. Exp., partly in coll. m.); 1 ♀, Mt. Dulit (4000′), moss forest (Oxf. Univ. Exp.); 2 ♀♀, E. Borneo, Babidjoelon, June '37, Mrs. M. E. WALSH (coll. m.).

Ropalidia modesta (SM.).

!1858. SMITH, F., Jl. Proc. Linn. Soc. Zool. II, p. 115, ♀ (*Icaria*, Sarawak, Borneo).
1891. GRIBODO, G., Bull. Soc. Ent. Ital. 23, p. 245, ♀ (*Icaria fulvipennis*, Sumatra).
!1897. BINGHAM, C. T., Fauna Br. India, Hym. I, p. 391, ♀ (*Icaria ungulata*, Tenasserim).
1931. DOVER, C., Jl. Fed. Mal. St. Mus. XVI, p. 257 (*R. ungulata*).

Female. — Head thick, wider than high (44 : 38), slightly wider than the thorax (44 : 40), as seen from above not much narrowed behind the eyes; temples strongly developed, in profile almost ¾ of the width of the eyes. Clypeus convex, wider than high. Ocelli as in *R. sumatrae*. Antennae rather thick, their third segment twice as long as wide at apex, the fourth segment about square in outline (fig. 75).



Figs. 74 - 75. *R. modesta* (SM.); 74. first and second abd. segments; 75. part of antenna of ♀.

Pronotum roundly truncate anteriorly, the transverse carina not much raised; the sides convex, strongly converging towards the head. Scutellum and postscutellum strongly convex, cushion-shaped, the former with a fine, impressed median line. Mesopleura strongly swollen. Propodeum, as seen in profile, distinctly convex, the sides rather strongly swollen; the concavity wide, not very deep, with an impressed median line.

Abdomen: fig. 74; the first tergite more strongly swollen posteriorly than in *sumatrae;* the second seg-

ment, as seen from above, as long as wide, seen in profile somewhat obliquely cut off at the end, the tergite in the middle longer than the sternite (in *sumatrae* and *opulenta* the sternite is longer); apical margin of second segment much narrower than in *sumatrae,* and less strongly depressed.

Wing venation as in *R. sumatrae;* body rather dull, mandibles and anterior part of clypeus shiny; polished area of postscutellum small; propodeum dull, the median furrow shiny.

Puncturation dense, coarse and deep; clypeus with scattered superficial punctures; front, vertex, pro-and mesonotum, scutellum, postscutellum (except for the polished area), and mesopleura densely, reticulately punctate; the puncturation of the posterior part of the mesopleura sparser; the epicnemium of the mesopleura with only a small impunctate area; metapleura with scattered, but distinct, punctures; propodeum densely and coarsely punctate, the concavity moreover transversely striate, the sides at the base with oblique striae. First abdominal tergite very coarsely and densely punctate, only at the extreme base the punctures more remote, with distinct interspaces; the punctures on the second tergite finer and sparser, with distinct interspaces; unlike in most other species the punctures of the second tergite are round, and well defined posteriorly; second sternite more sparsely punctate than the tergite.

Pubescence somewhat finer and sparser than in *R. sumatrae;* the tomentum pale brownish.

Black; first abdominal segment red, brownish at the base; mandibles with a more or less distinct pale yellow spot at the base; anterior margin of clypeus brownish, sometimes with traces of a pale yellow V-shaped fascia; tips of mandibles, underside of antennae, tegulae, apical lamellae of propodeum, apical margins of third and following abdominal segments, and knees and tarsi more or less brownish. Wings subhyaline, with a yellow tinge, the anterior margin of the median cell, and the radial cell, more strongly yellow; wing tip slightly fuscous; costa, subcosta, basal vein, and the basal two thirds of the median vein brown, the other veins and the stigma yellow.

M a l e. — Head flatter than in the female, distinctly wider than high (40 : 34); temples narrow, less than half the width of the eyes; clypeus very slightly convex, its apex bluntly pointed. Antennae short and thick, third segment twice as long as wide at apex, fifth and following segments with small, oblong, rounded tyloides, not serrate; apical segment bluntly conical, shorter than its width at the base.

Thorax and abdomen slightly more slender than in the female, propodeum more coarsely sculptured, apical margin of second abdominal segment narrow, moderately depressed.

Clypeus densely covered with short whitish pubescence.

The following parts pale yellow: a large spot on the mandibles, a broad V-shaped fascia on the anterior half of the clypeus, and the underside of the first antennal segment. Apical half of antennae pale ferruginous below.

In other respects scarcely different from the female.

Length (h. + th. + t. 1 + 2), ♀ 9 - 10 mm, ♂ 9 mm.

Burma: 3 ♀♀, Lower Burma, Mergui, DOHERTY (Mus. Calc., coll. m.).

Tenasserim: 1 ♀, Domdami Valley, Oct. '94, BINGHAM (holotype of *I. ungulata*, Br. Mus.).

Peninsular Siam: 1 ♀, Trang, Bandrang (or Bandrong?), April 1924, L. H. N. EVANS (Mus. K. L.).

Borneo: 1 ♀, Sarawak, WALLACE (holotype of *I. modesta*, Oxf. Mus.); some ♀♀, Kuching, 1899 - 1900 (Mus. Sar.); 1 ♀, Mt. Kalulong, Long Manian, Nov. '32 (Oxf. Univ. Exp.); 1 ♀, N. W. Borneo, 95 - 226 (Br. Mus.).

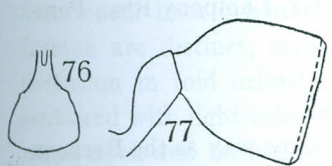
Sumatra: Benkoelen Res.: 2 ♀♀, Benkoelen, 0 - 50 m, May '35, and 1 ♂ (allotype) and 1 ♀, Tandjong Sakti, 600 m, June '35, Mrs. M. E. WALSH (coll. m.); 2 ♀♀, Lampong Res., Giesting on Mt. Tanggamoes, 600 - 800 m, Dec. '34, LIEFTINCK & TOXOPEUS (Mus. Btzg.).

Java: West Java, Radjamandala, 400 m, 2 ♀♀, Oct. '36, and 1 ♀, March '38, Mrs. M. E. WALSH (coll. m.); 1 ♀, East Java, Mountains south of Djember, 1937, R. VAN DER VEEN (coll. m.).

Ropalidia granulata, new species.

This species resembles *R. sumatrae* in coloration, but is easily distinguished from it by the smaller size, the coarser puncturation, the presence of lateral striae at the base of the propodeum, and the shape of the abdomen.

Female. — Head wide and rather thick, distinctly wider than high, (40 : 35), considerably wider than the thorax (40 : 33); as seen from above roundly narrowed behind the eyes; temples strongly developed, seen in profile more than three fourths the width of the eyes. Clypeus much wider than high (18 : 14), slightly convex. Eyes distinctly further apart on the vertex than at the clypeus (22 : 18). Ocelli in an almost equilateral triangle, the posterior ones almost three times as far from the eyes as from each other; the latter distance is equal to their diameter. Antennae slender, length of third segment slightly more than 2½ times its width at apex, and about equal to the length of the 4th, 5th and half of the 6th segments together; the fourth segment distinctly longer than wide, the width of the 10th segment less than 1½ times its length.



Figs. 76 - 77. *R. granulata* m., 76. first abd. segm. from above; 77. first and second abd. segments, in profile.

Pronotum truncate anteriorly, the humeral angles not much rounded, the sides almost straight, slightly converging towards the head, the transverse carina distinctly raised. Scutellum and postscutellum convex, the former without a median impressed line. Propodeum, as seen in profile, scarcely convex, its sides not much swollen, the concavity moderately deep and rather wide, narrowed towards the abdomen, with a distinct median furrow.

Abdomen: figs. 76 and 77; the swollen part of the first segment almost four times as wide as the short and narrow basal portion, but less than half

as wide as the second segment; the latter slightly wider than long. Apical margin of first tergite distinct, but narrow and not much depressed; the second segment has the apical margin somewhat wider, strongly depressed, and longitudinally carinate, though less distinctly than in *R. sumatrae.*

Body dull; the anterior part of the clypeus, and the propodeum (especially the median furrow), somewhat shiny; polished area of postscutellum of normal size.

Puncturation of head and thorax very much as in *R. sumatrae,* but the punctures relatively somewhat coarser and deeper; the propodeum more coarsely sculptured, the sides densely and irregularly punctate, the base with some distinct oblique striae near the posterior angles of the postscutellum. Basal three fourths of the first abdominal tergite almost impunctate, the posterior part (except the apical margin) strongly, irregularly punctate; puncturation of second tergite dense and coarse, reticulate; the punctures on the second sternite large, but shallow and not sharply defined, sparser than on the tergite, separated by distinct interspaces; the following tergites with large, irregular punctures.

Pubescence fine and sparse, yellowish grey.

Wings normal, third cubital cell not much narrowed towards the top.

Black; mandibles, antennae, tegulae and legs partly brownish, first abdominal segment red; anterior margin of clypeus with a broad, V-shaped, pale yellow fascia, a spot at the base of the mandibles and a short line at the inner orbits also pale yellow. Wings subhyaline; apex of median cell, and a cloud occupying the upper margin of the third and fourth cubital cells, fuscous.

Male. — Head relatively wider than in the female (width: height = 38:30), the eyes more strongly swollen, much wider apart on the vertex than at the clypeus (19 : 13); clypeus short, only slightly protruding beyond a line through the eye-bases, scarcely convex, bluntly pointed anteriorly; temples narrow, seen in profile about ⅓ as wide as the eyes. Antennae somewhat thicker than in the female; third and following segments with distinct linear tyloides, but not serrate.

Head without pale yellow markings, the extreme apex of the clypeus, and a short and narrow line at the inner orbits pale brownish.

Length (h. + th. + t. 1 + 2), ♀ 7 - 8 mm, ♂ 7 mm.

Malay Peninsula: 1♀, Pahang, Kuala Teku, 500′, Dec. '21, H. M. PENDLEBURY (holotype, coll. m.); 1♂, Kelantan (allotype, coll. m.).

Sumatra: 1 ♀, "Sumatra", MULLER (Mus. L.); 1 ♀, Lampong Res., Pembangkok, Sept. '32, H. R. A. MULLER (coll. m.).

R. granulata m., subsp. **borneensis,** new subspecies.

This subspecies differs from the typical form in the same way as the Bornean subsp. *lugubris* differs from typical *R. speciosa:* it has the red colour of the first abdominal segment replaced by black. In two of the specimens which I studied the first segment is entirely black; in the others the posterior margin of the first tergite is reddish.

Borneo: 4♀♀, Bettotan near Sandakan, July '27, BODEN KLOSS & PENDLEBURY (holotype and paratype in coll. m., two paratypes in Mus. K. L.).