

DESCRIPTIONS AND RECORDS OF ORIENTAL AND PAPUAN
SOLITARY VESPIDAE (HYM.).

By

Dr. J. VAN DER VECHT

(Buitenzorg, Java).

During my leave in Europe in 1933-'34, I had an opportunity to examine the types of various Oriental and Australian Vespidae in the British Museum at London, the University Museum at Oxford, and the Museums at Leiden and Amsterdam. As is well known among the students of Hymenoptera, our knowledge of the representatives of the order in this part of the world is still very incomplete. This may be partly due to the fact that many of the species are local or rare, but the study is especially complicated by the inadequate work of some of the previous authors, viz. F. SMITH and P. CAMERON, whose descriptions are as a rule so short or inexact, that it is often impossible to recognize their species from the descriptions alone. Most of the types of these authors have never been redescribed and I was therefore very glad to have the opportunity of studying these valuable insects.

In the present paper I have accepted the generic definitions as given by J. BEQUAERT in his excellent paper on the Vespidae of the Belgian Congo (Bull. Am. Mus. Nat. Hist. XXXIX, 1918, pp. 1-384). This includes the suppression of *Rygchium* as a separate genus and the acceptance of *Pachymenes* and *Ancistrocerus* as distinct genera. In *Pachymenes* are brought together a few species in which the shape of the abdomen is intermediate between that of *Eumenes* and of *Odynerus*; their first abdominal tergite has no trace of a transverse carina. *Ancistrocerus* contains the species with a transverse carina or suture on the first tergite ¹⁾).

I am convinced that this classification is very unsatisfactory from a phylogenetic point of view, because each of the genera thus defined contains species, which are in many respects very closely allied to one or more species of the other genera. However, any attempt to arrange the Oriental *Odynerus*-like wasps in more natural groups would probably result in a failure, in view of our very imperfect present knowledge of these insects. Moreover a revision of the generic and subgeneric divisions of the solitary Vespidae can hardly be undertaken for a single region, many groups of apparently closely allied species being represented in various parts of the world.

¹⁾ The genus *Nortonia*, which differs from *Ancistrocerus* mainly in having the first abdominal segment narrowed as in *Pachymenes*, is not treated in this paper.

The following notes and descriptions must therefore be merely regarded as an attempt to contribute to the knowledge of various species and varieties, which up to the present were confused with others, incompletely described or entirely unknown.

For the interpretation of the terms "holotype, allotype and paratype" I refer to J. BEQUAERT, by whom this subject was fully discussed in Ann. Mag. Nat. Hist. (10), II, 1928, pp. 139 - 140.

The "!" before the literature references indicates that I have examined the type(s) (in case of new species) or other specimens on which the authors based descriptions or records.

I wish to acknowledge my indebtedness to the authorities of the above mentioned Museums, for their kindness in allowing me to study their collections. I am under special obligation to the "Bachiene Stichting" which enabled me to visit London and Oxford by a financial contribution to the cost of this trip. Furthermore, I wish to thank Prof. G. D. HALE CARPENTER of Oxford, who permitted me to borrow from the collection of the Oxford University Museum a number of Vespidae, which I compared with types of SMITH and CAMERON during my visit.

Prof. J. BEQUAERT, Boston, obliged me very much by sending me some critical notes on my preliminary description of the new genus *Nortozumia*.

I am much indebted to Mr. H. T. PAGDEN, Department of Agriculture, Kuala Lumpur, for going through the manuscript of this paper.

Calligaster SAUSS.

Calligaster cyanopterus SAUSS.

! 1852. SAUSSURE, H. DE, Ét. fam. Vesp. I, p. 23, pl. IX, fig. 7, ♀ (*Calligaster cyanoptera*, Java).

1891. GRIBODO, G., Bull. Soc. Ent. Ital. 23, p. 261, ♂ (*Calligaster javanus*, Java or, Kalipare).

In my opinion GRIBODO's species is undoubtedly conspecific with *C. cyanopterus*, of which I examined the holotype (♀, Java, CALKOEN leg.) in the Museum at Leiden. That GRIBODO did not recognize his specimen as a ♂ of *cyanopterus* may be due to the fact that the shape of the clypeus is very different in the two sexes: the anterior margin is transverse in the female, but deeply emarginate in the male. Furthermore GRIBODO compared his specimen with a female from Sumatra, the wings of which are said to be cupreous, but this latter specimen was certainly not a typical *cyanopterus*, for in the Javan specimens the wings have always a bluish iridescence.

Up to the present *C. cyanopterus* is the only species of *Calligaster* known to occur in Java. Other Oriental species have been described from India and Borneo, and in my collection I have an unidentified species from Celebes.

The Philippine species, of which the life history was described by F. X. WILLIAMS (Bull. Hawaii. Sugar Pl. Ass., no. 14, 1919, "*Calligaster cyanopterus*"),

is not conspecific with *C. cyanopterus*. It will be described in a forthcoming paper by Prof. J. BEQUAERT.

In Java *Calligaster cyanopterus* SAUSS. is not rare in the forests. It occurs in the plains as well as in the mountains, but apparently not above an altitude of about 1000 m. I have seen specimens from the following localities: Djasinga (150 m); Mt. Gedeh, Tjiboenar (900 m); Djampang, Mt. Tjimerang (6 - 800 m); Pelaboean Ratoe (20 m); Mt. Limboeng (900 m); Penandjoeng Bay, Kalipoetjang (200 m); Linggerdjati (Mt. Tjareme); Mt. Slamet, Batoerraden (800 m) (all in Mus. Buitenzorg). — Mt. Gedeh, Tapos (800 m), author; Djampang Tengah, Mt. Tjisoeroe (600 - 800 m), Mrs. M. E. WALSH; S. Banjoemas, Koebangkangoeng (25 m), F. C. DRESCHER; Mt. Raoeng, Bajoekidoel (450 - 700 m), H. LUCHT, (all in my collection). — The species may be found throughout the year.

Nortozumia, new genus.

Head much swollen behind the eyes, the posterior ocelli at least twice as far from the occiput as from the eyes. Mandibles moderately elongate and narrower than is usual in the Zethinae, somewhat knife-like, strongly grooved on the outer surface; their apices decussate when closed, the cutting edge long, very oblique, with broad, blunt teeth (fig. 1, c and d). Labial palpi 4-jointed. Maxillary palpi 6-jointed. Clypeus transverse, truncate and toothed at apex. Antennae 12-jointed in ♀, 13-jointed in ♂; apical segment in ♂ hook-like and folded back. Thorax somewhat depressed. Mesopleura with epinenial carina. Propodeum: concavity rather narrow, limited by carinae on the sides, separated from the postscutellum by the contiguous median portions of the dorsal areas; dorsal and ventral lateral areas separated by a carina which ends in a transverse, raised lamella close to the articular valvulae. First abdominal segment stalk-like, moderately swollen, ovate with a much narrower basal portion; the tergite with a transverse crest close to the base, behind the articular slit; spiracular tubercles prominent. Second segment slightly narrowed basally, but not stalk-like. Mid tibiae with one spur. Claws bifid. Second cubital cell triangular, the two intercubital veins narrowly separated on the radius; the lower margin nearly straight, receiving the first recurrent at an acute angle before the middle and the second recurrent close to the second intercubitus (fig. 2 c).

Genotype: *Zethus rufofemoratus* P. CAMERON (1903).

As Prof. J. BEQUAERT kindly pointed out to me, the generic and subgeneric concepts in the Zethinae are at present in the utmost confusion. It is therefore difficult to say, whether *Nortozumia*, which, also in BEQUAERT's opinion, appears to be a natural group, will be regarded in the future as a genus, or as a subgenus of *Discoelius*, which is apparently its nearest ally. *Nortozumia* differs from the genotype of *Discoelius* (*zonalis* PANZ.) in the shape of the mandibles, the course of the first recurrent vein, the presence of only one spur on the mid tibiae

and in having a transverse crest at the base of the first tergite. Some of these differences are of minor importance, but unless the limits of the genera in the Zethinae are better defined than at present, I think it advisable to give *Nortozumia* generic rank.

Nortozumia rufofemorata (CAM.) (fig. 1, a-g).

! 1903. CAMERON, P., Jl. Straits Br. As. Soc. 39, p. 165, ♀ (*Zethus rufofemoratus*, Sarawak, Kuching).

? 1910. MEADE-WALDO, G., Ann. Mag. Nat. Hist. (8), 5, p. 47 (*Montezumia pulchella* SMITH = *Gayella pulchella* SMITH).

! 1914. MEADE-WALDO, G., Ann. Mag. Nat. Hist. (8), 14, p. 404 (*Montezumia pulchella* SM. = *Zethus rufofemoratus* CAM.).

MEADE-WALDO'S opinion (1914) upon the identity of "*Montezumia pulchella* SMITH" and "*Zethus rufofemoratus* CAM." has apparently been based upon a "cotype" of the former species in the British Museum. Unfortunately, this specimen does not belong to the same species as the holotype in Oxford, and as SMITH'S description leaves no doubt that the latter specimen is correctly regarded as the true type, *rufofemoratus* cannot be a synonym of *pulchella*. MEADE-WALDO'S earlier note on *Montezumia pulchella* was probably based upon the same specimen in the British Museum.

♀ - Clypeus (fig. 1a) $1\frac{1}{3}$ times as wide as long (including the teeth), contiguous with the eyes over a short distance only. Inter-antennal shield with longitudinal median carina; front with a shallow impression below the middle.

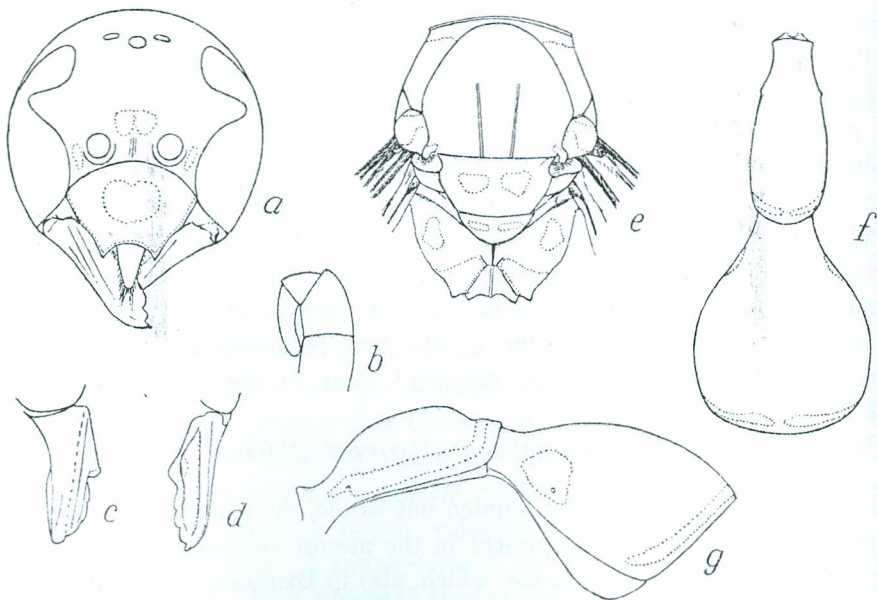


Fig. 1. — *Nortozumia rufofemorata* (CAM.).

a, head of female; b, terminal antennal segments of male; c and d, lateral and anterior view of mandible of female; e, dorsal view of thorax of female; f and g, dorsal and lateral view of first and second abdominal segments of female.

Ocelli placed in a flattened triangle, the posterior ocelli almost as far from the eyes as from each other and three times as far from the occiput as from the eyes. Inner orbits a trifle further apart on the vertex than at the clypeus. Third antennal segment $1\frac{1}{2}$ times as long as wide at the apex, distinctly longer than the fourth segment which is approximately square in outline.

Thorax as wide as the head, pronotum narrowed anteriorly, the anterior margin distinctly carinate, the lateral angles rounded, not projecting. Mesonotum with distinct parapsidal furrows. Anterior margin of scutellum depressed, crenulate. Propodeum with a short, irregular, median furrow at the base, the narrow concavity with a median longitudinal carina.

Abdomen: figs. 1f and 1g; first tergite with a rather deep transverse impression in front of the yellow apical fascia, the apical margin thin, slightly depressed; the first sternite with a broad longitudinal carina in the middle and two longitudinal grooves on each side of it.

Head and thorax faintly shining; puncturation of the head moderately coarse, rather sparse in the centre of the clypeus, very dense on the frons, reticulate in the median impression of the frons, much sparser on the vertex where most of the interspaces are larger than the punctures; temples slightly more coarsely and densely punctate than the vertex. Pronotum, anterior portion of mesonotum, and the postscutellum densely, reticulately punctate; puncturation of mesopleura coarser, but not less dense; the posterior portion of the mesonotum and the scutellum more sparsely punctate. Metapleura and ventral lateral area of propodeum coarsely, but rather regularly, longitudinally striate; the dorsal lateral areas densely punctate, with a median, impunctate area, separated from the lateral carina by a row of short transverse ridges; concavity dull, finely sculptured. — Abdomen rather shining. First tergite densely covered with medium-sized well defined punctures, more sparsely punctate medially, posterior to the transverse ridge, the narrow apical margin almost impunctate. Second tergite scarcely less densely punctate, but the punctures more superficial and ill defined; there is a conspicuous transverse row of punctures at the base of the narrow, depressed, apical margin; puncturation of third and fourth tergites dense, coarser in the middle than at the sides, their impunctate apical margins rather wide; fifth and sixth tergites impunctate, with microscopically fine sculpture. Second and following sternites punctate like the corresponding tergites, but the punctures finer and sparser.

Black; marked with yellow as follows: clypeus (except for one or two black marks in the centre), the first antennal segment beneath, a spot above the inter-antennal shield, a short and narrow line along the inner orbits near the antennae, a line on the temples, a transverse fascia on the anterior margin of the pronotum, a spot on the mesopleura below the tegulae, the posttegulae, two (rather small) spots on the scutellum, a transverse line on the postscutellum (interrupted in the middle); on the dorsal lateral areas of the propodeum: a spot at the base and a broad oblique line at the posterior margin, running from the top of the concavity towards the apex; a U-shaped line along the

lateral and posterior margins of the first tergite, commencing in front of the stigmata, and slightly interrupted posteriorly in the middle; an irregular lateral spot on each side of the base of the second tergite, and a rather narrow pre-apical fascia, very narrowly interrupted in the middle, on this tergite; longitudinal yellow spots on the outer side of femora I and tibiae I and II, a small spot close to the apex of femora II and a minute spot at the apex of femora III. Apical half of the mandibles dark reddish; the median portion of the tegulae and the depressed apical margin of the first tergite brown; articular valvulae of propodeum, coxae, trochanters and femora of mid and hind legs ferruginous; the remainder of the legs (except for the yellow markings) brownish or black, the apical tarsal joints ferruginous. Wings brownish hyaline with yellow and purplish reflections, darker along the anterior margin, especially in the apex of the median cell, in the radial cell and the second, third and fourth cubital cells.

♂ - Smaller; the clypeus narrower than in the female, the apex scarcely more deeply emarginate; the eyes distinctly further apart on the vertex than at the clypeus (15 : 11). Third antennal segment almost twice as long as wide at the apex, slightly longer than the fourth segment; twelfth segment short and narrow; the last segment narrow, slightly curved, tapering towards the end, distinctly reaching over the base of the eleventh segment (fig. 1b). Thorax as in the female. The seventh abdominal sternite flattened, rounded at the apex.

Punctuation as in the female; the coloration of one of the two males before me differs from that of the female as follows: clypeus entirely yellow, inner orbits and temples black, femora II and III without distinct yellow markings; femora II brownish, the apex ferruginous. — In the other male specimen the scutellum is entirely black, the dorsal lateral areas have no spot at the base and the spots at the base of the second tergite are absent.

Length (h. + th. + t. 1 + 2), ♀: 14 - 15 mm, ♂: 11 - 12 mm.

Described from 1 ♀ and 2 ♂♂ from Borneo, Sarawak, Kuching (R. SHELFORD) in the Oxford University Museum (nrs. 1900: 11191 (♀), 11180 and 11206 (♂♂)). The first described male specimen is herewith designated as the allotype of this species; in 1934 I studied the holotype in the British Museum and compared it with the specimens described above.

Nortozumia pulchella (SM.) (fig. 2, a-c).

! 1858. SMITH, F., JI. Proc. Linn. Soc. Zool. II, p. 108, ♀ (*Gayella pulchella*, Borneo, Sarawak).

! 1902. CAMERON, P., JI. Straits Br. As. Soc. 37, p. 109, ♀ (*Montezumia? forticeps*, Borneo, Sarawak, Mt. Matang).

Very closely allied to the preceding species, but easily distinguished from it by the shape of the clypeus, the apex of which is in both sexes more deeply emarginate (fig. 2a). The last antennal segment of the male is shorter and does not reach the base of the eleventh segment (fig. 2b). The scutellum appears to have a more distinct median impressed line.

The present species is more richly marked with yellow than *N. rufofemorata*: clypeus in both sexes entirely yellow; vertex with two oblique yellow lines, running from the centre of the vertex towards the top of the eyes; mesonotum with two yellow lines (♀) or black (♂), scutellum with large, almost square, spots; dorsal lateral areas of propodeum nearly entirely yellow; third and fourth abdominal tergites with a preapical fascia; the remainder as in *N. rufofemorata*.

SMITH's description is not very exact: the labrum and mandibles are not yellow, but the former is ferruginous, the latter are dark ferruginous, black at base and apex; furthermore SMITH's remarks upon the yellow abdominal fasciae are incorrect, because he did not regard the petiole as the first abdominal segment.

I studied a male of this species, herewith designated as the allotype, from N.W. Borneo, Sarawak, Mt. Matang (3600'), R. SHELFORD, in the collection of the Oxford University Museum (no. 1900, 11190); in 1934 I compared that specimen with the holotype in the same Museum.

Pareumenes SAUSS.

The genus *Pareumenes* is well represented in the East Indian Archipelago, but most species are rare, and some of them have been described under other generic names. SOIKA (1935) gave valuable descriptions of some of SMITH's "*Eumenes*"-species, which really belong to this genus, and in the following pages all the *Pareumenes*-species of the Archipelago are listed, a few species described by other workers under *Eumenes* and *Pterochilus* have been incorporated in this genus and some varieties of known species are described here for the first time.

The Indian species *P. brevirostratus* SAUSS., *indianus* SAUSS. and *rufopetiolatus* WICKW., and the Chinese *P. imperatrix* (SM.) are omitted from this list, as these forms are insufficiently known to me.

Heterochromy and homeochromy.

In his excellent paper on the colour forms of the Oriental hornets *Vespa tropica* and *V. affinis* (Treubia 15, pp. 329 - 352, 1936), BEQUAERT has drawn attention to the superficial resemblance in coloration (homeochromy) of colour varieties of different species, occurring in the same area.

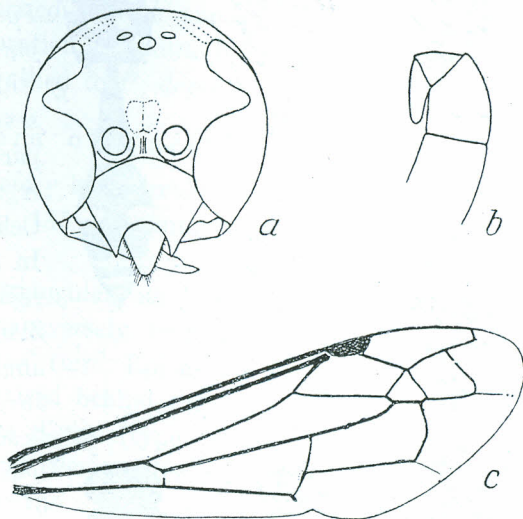


Fig. 2. — *Nortozumia pulchella* (SM.).
a, head of male; b, terminal antennal segments of male; c, fore wing of male.

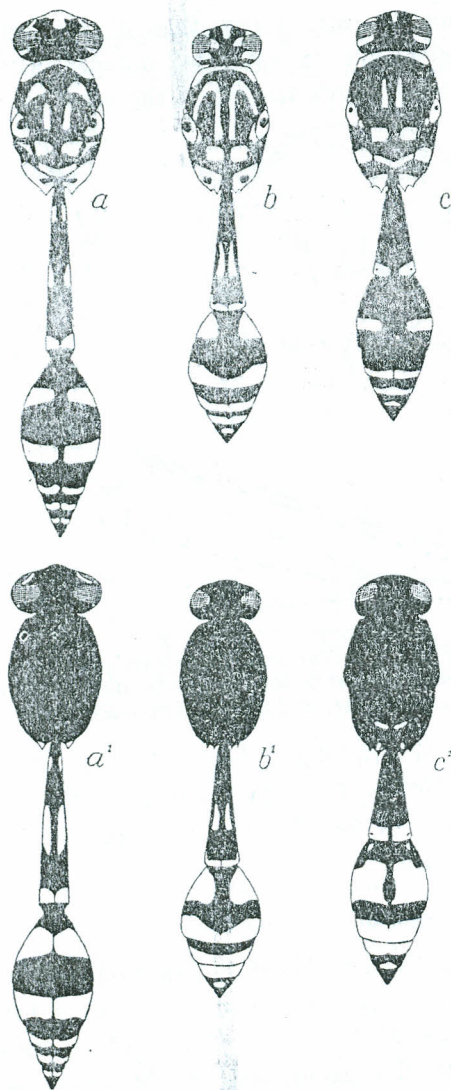


Fig. 3. — Heterochromy and homeochromy in *Eumenes* and *Pareumenes*; above: specimens from Sumatra and Borneo; below: specimens from Java.

- Eumenes arcuatus continentalis*
ZIMM., Sumatra, Borneo.
Eumenes arcuatus blanchardi
SAUSS., Java.
Pareumenes depressus SAUSS.,
Sumatra.
Pareumenes depressus thoracicus m.,
Java.
Pareumenes quadrispinosus
intermedius m., Sumatra, Borneo.
Pareumenes quadrispinosus javanus
m., Java.

A remarkable instance of homeochromy is exhibited by some colour varieties of species of *Eumenes* and *Pareumenes*. As is well known, heterochromy is strongly developed in the wide-spread *Eumenes arcuatus*, of which several colour forms occur in various parts of the Oriental and Australian regions (ZIMMERMANN, Zeitschr. Morph. Oek. d. Tiere 22, pp. 173-230, 1931). In Sumatra and Borneo this species is represented by the var. *continentalis* ZIMM. ¹⁾, which has the whole body abundantly marked with yellow; in the Javan form, var. *blanchardi* SAUSS., the head and thorax are almost entirely black, but some of the yellow markings of the abdomen are larger than in the var. *continentalis*. As is shown in the accompanying figures, *Pareumenes quadrispinosus intermedius* from Sumatra and Borneo and *P. depressus* from Sumatra agree very much in coloration with the var. *continentalis* of *E. arcuatus*; the Javan forms of these two *Pareumenes*-species, described below, are homeochromic with *E. arcuatus blanchardi*. In all the Javan specimens of these species the reduction of the yellow markings of the head and the thorax is accompanied by an increase in size of the spots on the second abdominal tergite.

Further studies of the colour varieties of *Pareumenes* will certainly reveal other instances of homeochromy and will show that various *Pareumenes*-forms closely agree in coloration with certain forms of *Eumenes*. When examining specimens of *P. brevisrostratus* SAUSS. in the British Museum, I noted that this species resembles *E. maxillosus* F.,

¹⁾ This variety differs only slightly, and apparently not constantly, from the typical form and is therefore not recognized by some authors (SOJKA, 1935).

var. *conicus* F. from India. *P. depressus* SAUSS., var. *pictifrons* (SM.) from Celebes is homeochromic with *E. arcuatus* F., var. *fulvipennis* (SM.) from the same island, both being characterized by the almost complete reduction of the yellow markings. Similar coloration is shown by *P. pullatus* (SM.) from Ceram, a species which is closely allied to *P. depressus*.

The subgenera of *Pareumenes*.

The genus *Pareumenes* has recently been divided by SOIKA (Ann. Mus. Civ. Storia Nat. Genova LVII, 1935, pp. 137, 145) into two subgenera, which may be separated as follows:

First abdominal sternite triangular, its lateral margins straight, and at least part of its surface transversely striate. First tergite triangular, not distinctly swollen in its apical third. Epicnemial carina well developed. Head subcircular, vertex not raised behind the ocelli.

Pareumenes SAUSS. (type: *P. quadrispinosus* SAUSS.).

First abdominal sternite for the greater part of its length narrow, rather abruptly widened close to the apex, thus forming a triangular apical area similar to that in *Eumenes* s. str., its surface not transversely striate. Apical portion of the first tergite swollen. Epicnemial carina absent. Head higher than wide, the vertex raised behind the ocelli.

Pseumenes SOIKA (type: *P. eximius* SM.).

Subgenus *Pareumenes* SAUSS. s. str.

Pareumenes (*Pareumenes*) *quadrispinosus* SAUSS.

- ! 1854. SAUSSURE, H. DE, Ét. fam. Vesp. Suppl. p. 134, ♀♂, pl. VII, figs. 2, 2g. (*Pareumenes quadrispinosa*, India).
 1897. BINGHAM, C. T., Fauna Br. India, Hym. I, p. 336, ♀♂ (*Eumenes quadrispinosa*, India).
 ? 1922. DOVER, C. & H. S. RAO, Jl. As. Soc. Bengal 18, p. 236 (*Eumenes quadrispinosa*).
 ? 1925. DOVER, C., Jl. As. Soc. Bengal 20 (1924), p. 296 (*Pareumenes quadrispinosa*).
 1928. BEQUAERT, J., Ann. Mag. Nat. Hist. (10) II, p. 172 (*Pareumenes quadrispinosus*).
 ? 1931. DOVER, C., Jl. Fed. Mal. St. Mus. 16, p. 252 (*Pareumenes quadrispinosa*).

This species has been confused by some authors with *P. depressus* SAUSS. DOVER (1931) considers the latter to be a variety of *P. quadrispinosus*, which is certainly not correct, for *P. depressus* belongs to the subgenus *Pseumenes*. The insect of which PIEL (1935) studied the interesting life-history is in my opinion not *P. quadrispinosus*, but *P. depressus*; this is apparent from the figures in PIEL's paper and was moreover confirmed by the examination of a specimen determined by that investigator and kindly sent to me some time ago.

DOVER (1925) recorded *Eumenes eximius* SM. (1860) as a synonym of the present species, but I agree with SOIKA that SMITH's species is quite different and belongs to the subgenus *Pseumenes*.

In India *P. quadrispinosus* has developed some colour varieties, which have

not yet been sufficiently distinguished. In the holotype (Br. Mus., London) the petiole is ferruginous, but there are other forms with a black petiole (cf. BINGHAM, p. 337). The Indian forms, however, are all much more abundantly marked with yellow than the following two varieties from the Western part of the East-Indian Archipelago.

Pareumenes quadrispinosus SAUSS., var. **intermedius**, new variety (fig. 3c).

Female. — Black; marked with yellow as follows: clypeus; underside of first antennal segment; a line running from the anterior ocellus towards the clypeus, abruptly widened above the antennal insertions; the eye-emarginations; a line on the temples; a transverse fascia on the pronotum; two subparallel lines on the mesonotum; tegulae (except for a black spot anteriorly); post-tegulae; a large spot on the upper part of the mesopleura and a small linear spot below it; two rather widely separated spots on the scutellum; a curved line on the posterior margin of the postscutellum; spots at base and apex of the dorsal areas of the propodeum (the black space between them being T-shaped), the articular valvulae of the propodeum; a transverse fascia at the apex of the first tergite, widely interrupted in the middle and enclosing a small black spot on each side; a rather narrow transverse fascia, more widely interrupted, on the second tergite (its distance from the base about twice that from the apex); apical fasciae on the third and fourth tergites and a transverse mark in the middle of the apex of the fifth tergite; the first sternite (except for a black spot at the apex); more than the basal half of the second sternite and small spots on the posterior lateral angles of the second and third sternites.

Legs black; coxae I with a lateral line, outer side of femora I, a short line on the apical half of femora II, and broad lines on all tibiae, yellow. Wings slightly darker than in the Sumatran form of *Eumenes arcuatus* (var. *continentalis* ZIMM.).

Male. — Coloration as in the female; coxae II with a yellow lateral line; metatarsus of legs II and III with a yellow line above. Wings somewhat less dark than in the female.

Length (h. + th. + t. 1 + 2), ♀ 19 mm, ♂ 14 mm.

Holotype: ♀, Borneo, Sarawak, Kuching, R. SHELFORD, 23 Dec. 1899, coll. Oxford Mus. (no. 1900, 11189); allotype: ♂, Sumatra, Benkoelen Res., Benkoelen, Mrs. M. E. WALSH, 10 - 18 May 1935, in my collection.

Pareumenes quadrispinosus SAUSS., var. **javanus**, new variety (fig. 3c¹).

Differs from the preceding form in having the head and thorax almost entirely black; the markings of the abdominal tergites are however larger than in *intermedius*.

Female. — Black; marked with yellow as follows: four minute and indistinct spots on the clypeus (sometimes absent); a narrow line on the underside of the first antennal segment; a small triangular mark on the frons just above the inter-antennal shield; two narrow transverse spots on the apical margin

of the postscutellum and some very small and indistinct spots at the apex of the dorsal lateral areas of the propodeum. Articular valvulae pale yellow, partly translucent. Apical fascia of first tergite slightly wider than in *intermedius*; width of the transverse fascia of the second tergite more than half the length of the tergite, interrupted in the middle and with a rectangular incision on each side anteriorly; posteriorly the yellow markings reach the apex of the tergite at the side only, the posterior margin of the tergite thus having a black band which is almost as wide as the apical yellow fascia of the first tergite; base of second tergite with a small yellow spot on each side; the fasciae on the tergites 3 and 4 more than twice as wide as in *intermedius*, the spot on the fifth tergite somewhat larger than in that form. The sternites less extensively marked with yellow than in *intermedius*: the first sternite with narrow yellow lines along the lateral margins of its posterior half and a narrow transverse line at the apex; the basal marking on the second sternite reduced, its width being less than half the length of the sternite.

Legs black, without yellow markings; wings as in the preceding variety.

Male. — Head: clypeus with two irregular yellow lines, converging towards the apex; a small yellow spot in the eye-emargination; a short yellow line on the front between the anterior ocellus and the inter-antennal shield, the marking above the shield reduced. Thorax entirely black; articular valvulae of propodeum almost entirely translucent. The lateral yellow lines on the first abdominal sternite much reduced. Front side of tibiae I with a narrow yellow line, tibiae II and III with minute yellow spots close to the apex. The remainder as in the female.

Length (h. + th. + t. 1 + 2), ♀ 19 mm, ♂ 12½ mm.

Holotype: ♀, S.W. Java, Wijnkoopsbay, Mrs. M. E. WALSH, March 1935; allotype: ♂, E. Java, Baeng, Dr. J. G. BETREM, Aug. 1935; paratypes: ♀, O. Java, Telawa, Dr. L. G. E. KALSHOVEN, 22 Febr. 1933; all in my collection. The Museum at Leiden possesses a male specimen which bears a label in RITSEMA's handwriting: "Dr. PLOEM, Sumatra", but I suspect that this record will prove to be erroneous and that the specimen originates from Java.

***Pareumenes (Pareumenes) pullatus* (SM.).**

! 1863. SMITH, F., Jl. Proc. Linn. Soc. Zool. VII, p. 39, ♀ (*Eumenes pullatus*, Ceram).

The holotype (Oxf. Mus.) is a female from Ceram, it represents a species which appears to be closely allied to *P. quadrispinosus* and may perhaps be regarded as a subspecies only. It differs from the Javan form of *P. quadrispinosus* as follows:

Entirely black, except for a small spot between the antennae, and the antennal scape, which are pale yellow.

Slightly larger, puncturation somewhat coarser, especially on the frons, the temples, the mesonotum and the mesopleura. Postscutellum with some distinct punctures. Sculpture of propodeum distinctly coarser. Thorax clothed with dense, short, black pubescence. Wings more distinctly yellowish.

Pareumenes (Pareumenes) fulvipennis (CAM.).

! 1898. CAMERON, P., Mem. Manch. Soc. 42 (11), p. 39, ♀ (*Pterochilus* (sic!) *fulvipennis*, Poona).

This species must be placed in the genus *Pareumenes*, it is allied to *P. quadrispinosus* SAUSS.

Ferruginous; most of the head, pronotum and coxae I yellow; second tergite with two ill defined yellow spots, the following segments with yellow apical fasciae. Clypeus more distinctly dentate than in *P. quadrispinosus* var. *javanus* m., mesopleura less punctate than in that form. First abdominal tergite impunctate above, distinctly punctate posteriorly at the sides.

The holotype is a female from Poona, coll. ROTHNEY (Oxf. Mus.), labelled: "*Pt. flavipennis*". The mouth parts are mounted on a slide, which bears a label: "*fulvipennis*"!

Pareumenes (Pareumenes) artifex (SM.).

! 1861. SMITH, F., Jl. Proc. Linn. Soc. Zool V, p. 86, ♀ (*Eumenes artifex*, Makassar).
1935. SOIKA, A. G., Ann. Mus. Civ. Stor. Nat. Genova LVII, p. 140, ♀ (*Pareumenes (Pareumenes) artifex*, Makassar).

The holotype, a female from Makassar, is in the Museum at Oxford. I possess a female from South Celebes, recently collected by Mr. AWIBOWO.

Pareumenes (Pareumenes) vindex (SM.).

! 1859. SMITH, F., Jl. Proc. Linn. Soc. Zool. III, p. 20, ♂ (*Eumenes vindex*, Celebes).
1882. MAINDRON, M., Ann. Soc. Ent. France (6) II, p. 269 (*Eumenes pomiformis* var. *vindex*).
1935. SOIKA, A. G., Ann. Mus. Civ. Stor. Nat. Genova, LVII, p. 142, ♂, fig. IV (*Pareumenes (Pareumenes) vindex*, Makassar).

SOIKA believes that *P. vindex* will probably prove to be the male of *P. artifex*, but until more material is available, it may be regarded as a separate species. In *P. vindex* the first and second abdominal segments are less densely unctate, the apical spines of the propodeum are shorter and the emargination of the clypeus is somewhat deeper than in *P. artifex*. *P. vindex* has the legs yellow, variegated with red and black, the legs of *P. artifex* are for the most part reddish.

areumenes (Pareumenes) multicolor SOIKA.

1935. SOIKA, A. G., Ann. Mus. Civ. Stor. Nat. Genova LVII, p. 138, ♀ (*Pareumenes (Pareumenes) multicolor*, Soembawa, Tambora).

areumenes (Pareumenes) secundus (DALLA TORRE).

1862. SMITH F., Jl. Proc. Linn. Soc. Zool. VI, 1862, p. 58, ♀ (*Odynerus fallax*, Gilolo; nec SAUSS. 1852).
1889. DALLA TORRE, K. W. VON, Wien. Ent. Ztg. 8, p. 125 (*Odynerus secundus*).
894. DALLA TORRE, K. W. VON, Cat. Hym. IX, p. 95 (*Odynerus secundus*).
904. DALLA TORRE, K. W. VON, Gen. Insect. 19, Vespidae, p. 54 (*Odynerus secundus*).

This species is allied to *Pareumenes multicolor* SOIKA; according to my notes the abdominal petiole of SMITH's type is somewhat shorter and wider.

Subgenus **Pseumenes** SOIKA.

Pareumenes (Pseumenes) depressus SAUSS. (fig. 3b).

1854. SAUSSURE, H. DE, Ét. fam. Vesp. Suppl. p. 135, ♀ (*Pareumenes depressa*, India).
1897. BINGHAM, C. T., Fauna of Br. India, Hym. I, p. 337, ♀♂ (*Eumenes depressa*, India, Tenasserim).
1929. DOVER, C., Bull. Raffles Mus. II, p. 44 (*Pareumenes depressa*, Borneo, Sarawak).
1935. PIEL, O., Notes d'Entom. Chin. II, fasc. 6 (*Pareumenes quadrispinosus*, China).

In the British Museum this species is represented by specimens from Sikkim, China, Siam, Tenasserim (Haundraw Valley) and the Malay Peninsula. Father OCTAVE PIEL, who studied the fascinating life history of this species in detail, kindly sent me a female from Zô-Se, Kiangsu, Shanghai, and this specimen appears to agree in many respects with a female from Sumatra, Res. Benkoelen, Boekit Item (650 m) and a male from Sumatra, Res. Palembang, Pagar Alam (750 m), resp. June and May 1935 (Mrs. M. E. WALSH), in my collection. Structurally, both forms are identical, but there are some differences in the coloration: in the latter specimens the lower part of the mesopleura has a large longitudinal yellow mark, which is absent in the Chinese specimen, furthermore the markings on the abdomen are smaller in the specimens from Sumatra. All specimens recorded above have two hook-shaped marks on the mesonotum.

The Javan representative of this species, which is described below, is remarkable for the reduction of the yellow markings on the head and thorax.

Pareumenes (Pseumenes) depressus SAUSS., var. **thoracicus**, new variety (fig. 3b¹).

Female. — Black; head with more or less distinct rudiments of yellow markings at the base of the clypeus, on the frons, in the eye-emarginations and on the temples; in the darkest specimen before me (the holotype) the clypeus and the eye-emarginations are entirely black. Thorax without yellow markings, the articular valvulae of the propodeum pale yellowish, translucent. Coloration of abdomen as in the typical form: first tergite with two elongate spots behind the middle and a transverse apical fascia which is narrowly interrupted in the middle and laterally bent at right angles to be continued along the sides of the apical third or fourth of the tergite; second tergite with a large oval spot on each side at the base; second to fourth tergites with transverse apical bands, the band on the second tergite broadly emarginate anteriorly; fifth tergite with a transverse spot at the apex. Second sternite with a more or less distinct, elongate spot at the lateral margin on each side, about the middle of the sternite.

Legs black; femora I with a minute yellow spot close to the apex; front side of tibiae I with a yellow line; the claw joints of the tarsi of legs I yel-

lowish, of legs II and III brownish. Wings slightly more yellowish than in *Eumenes arcuatus* var. *blanchardi* SAUSS.

Male. — Clypeus with a large, oval, yellow spot, which is more or less deeply incised anteriorly; inter-antennal shield with a yellow spot; eye-emarginations yellow; anterior tarsi pale brownish yellow; outer side of tibiae II with an irregular yellow line. The remainder as in the female.

Length (h. + th. + t. 1 + 2), ♀ 18-20 mm (a female from Tjibamben measures only 13 mm), ♂ 13-15 mm.

Holotype: ♀, West-Java, Djampang, April 1933, native collector, leg. F. VERBEEK (coll. m.); allotype: ♂, W.-Java, Djampang Wetan, Radjamandala, Oct. 1936, Mrs. M. E. WALSH (coll. m.); paratypes: five females, W. Java: Djampang; Djampang Tengah, Tjiangsana, Mrs. WALSH; Tjibamben, F. DUPONT, all in my collection; one male (locality-label in RITSEMA's handwriting: "Dr. PLOEM, Sumatra", most probably erroneous!) in Mus. Leiden. The "female *Eumenes* from Lawang, Eastern Java, bearing a manuscript name by CAMERON" in the British Museum, mentioned by BEQUAERT (Ann. Mag. Nat. Hist. 10, II, 1928, p. 170) belongs to the here described variety of *P. depressus*.

***Pareumenes* (*Pseumenes*) *depressus* SAUSS., var. *pictifrons* (SM.).**

! 1861. SMITH, F., Jl. Proc. Linn. Zool. V, p. 86, ♀ (*Eumenes pictifrons*, Celebes, Makassar).

1910. MEADE-WALDO, G., Ann. Mag. Nat. Hist. (8) V, p. 46 (*Pareumenes pictifrons*).

1935. SOIKA, A. G., Ann. Mus. Civ. Stor. Nat. Genova LVII, p. 147, ♀ (*Pareumenes* (*Pseumenes*) *pictifrons*).

This appears to be another colour variety of *P. depressus* SAUSS.; in structure and sculpture it agrees perfectly with my *depressus*-specimens from China, Sumatra and Java.

Black; head with yellow markings as follows: a spot at the base of the clypeus, the inter-antennal shield, the lower half of the inner orbits, the eye-emarginations, a median line on the lower part of the frons, the underside of the first antennal segment, two spots on the vertex and a short line on the temples; thorax and abdomen entirely black. Femora I and II, and all tibiae, marked with yellow, tarsi I pale brown, II and III dark brown.

The holotype is a female from Makassar (Oxf. Mus.).

***Pareumenes* (*Pseumenes*) *eximius* (SM.).**

! 1861. SMITH, F., Jl. Proc. Linn. Soc. Zool. V, p. 126, ♀ (*Eumenes eximius*, Batjan).

1935. SOIKA, A. G., Ann. Mus. Civ. Stor. Nat. Genova LVII, p. 145, ♀, fig. V (*Pareumenes* (*Pseumenes*) *eximius*).

SOIKA has drawn attention to the close resemblance of this species to *P. depressus* var. *pictifrons*. According to this author, the only differences would appear to be found in the puncturation, which is much denser in *P. eximius*, and in the coloration. However, when I compared the types of both species, I noted that the apical teeth of the propodeum are distinct in *P. depressus* var. *pictifrons*, but almost obsolete in *P. eximius*.

Pareumenes (Pseumenes) laboriosus (SM.).

!1861. SMITH, F., Jl. Proc. Linn. Soc. Zool. V, p. 87, ♀ (*Eumenes laboriosus*, Celebes, Makassar).

The holotype is a female from Makassar (Oxf. Mus.). From the notes which I made during an examination of the type specimen in 1934 I suspect that this species comes into the subgenus *Pseumenes*, but further investigations on its systematic position will be necessary. Body slender; the striae on the sides of the propodeum moderately sharp, the punctures between them conspicuous; the apical teeth of the propodeum are long and sharp; the posterior part of the first tergite is almost impunctate in the middle. The clypeus has a median black spot.

Pareumenes (Pseumenes) politus (SM.).

!1861. SMITH, F., Jl. Proc. Linn. Soc. Zool. V, p. 127, ♀ (*Eumenes politus*, Batjan).

At present only the female of this species is known, but I suspect that *P. medianus*, described from Ceram, will prove to be the male of *P. politus*.

In addition to SMITH's description it may be noted that the frons and the mesonotum are densely punctate, the mesopleura have distinct punctures, and the punctures on the abdominal petiole are very fine. Postscutellum and propodeum rather coarsely punctate. The clypeus rather deeply emarginate anteriorly and with a large central black spot. With the exception of the anterior coxae the legs are entirely ferruginous.

The holotype is a female from Batjan (Oxf. Mus.).

Pareumenes (Pseumenes) medianus (SM.).

!1863. SMITH, F., Jl. Proc. Linn. Soc. Zool. VII, p. 38, ♂ (*Eumenes medianus*, Ceram).

In "Genera Insectorum", vol. 19, p. 23 (1904) this species has erroneously been recorded by VON DALLA TORRE as *E. meridianus* SM.

According to my notes on the type (a male from Ceram in the Oxford Museum) this may perhaps be the male of *P. politus* (SM.). Clypeus entirely yellowish white, deeply emarginate as in *P. politus*. The line on the lower part of the frons narrow, abruptly widened between the antennae. As in *P. politus* the legs are ferruginous, coxae I dark. Puncturation of head and thorax less regular and slightly coarser than in *P. politus*. Abdominal petiole coarsely and irregularly punctate, more or less rugose. Mesonotum and second and following abdominal segments entirely black. Puncturation of mesopleura coarse, the punctures not well defined. Sculpture of the sides of the propodeum not exceedingly coarse.

Pareumenes (Pseumenes) sublaevis (SM.).

!1857. SMITH, F., Cat. Hym. Br. Mus. V, p. 23, ♀ (*Eumenes sublaevis*, Borneo, Sarawak).

1928. BEQUAERT, J., Ann. Mag. Nat. Hist. (10) II, p. 171 (*Pareumenes sublaevis*).

Besides the type in the British Museum I have seen the following specimens: 1 ♀ Sumatra, MULLER, 1 ♂ N.E. Sumatra, Tandjong Morawa, Serdang, Dr. B. HAGEN, and 1 ♂ S. Borneo, all in Mus. Leiden; 1 ♂ N. Borneo, Sarawak, Kuching (SHELFORD) in Oxford Mus. (no.11321).

Pareumenes (Pseumenes) volatilis (SM.).

- ! 1863. SMITH, F., Jl. Proc. Linn. Soc. Zool. VII, p. 38, ♀ (*Eumenes volatilis*, Mysol)
 ! 1864. SMITH, F., Ibid., VIII, p. 87 (*Eumenes volatilis*, N. Guinea).
 1935. SOIKA, A. G., Ann. Mus. Civ. Stor. Nat. Genova LVII, p. 148, ♀, fig. VI (*Pareumenes (Pseumenes) volatilis*).

The Leiden Museum possesses a female from Aru (ROSENBERG leg.), which differs in coloration from the holotype as follows: clypeus with only a black spot in the middle (in the type with a median black line, which is triangularly dilated in its upper half); first abdominal segment with a distinct apical yellow band, which is incised (almost interrupted) in the middle anteriorly; the spot at the base of the second tergite larger; the apical bands of the second and third tergites entire, rather wide at the sides, the median portion anteriorly with two shallow emarginations; the fourth tergite with a yellow band which is abbreviated at the sides.

Eumenes LATR.

Eumenes (Eumenes) multipictus SAUSS.

1855. SAUSSURE, H. DE, Rev. Mag. Zool. (2) 7, p. 372, ♂ (*Eumenes multipicta*, Sumatra).
 1931. DOVER, C., Jl. Fed. Mal. St. Mus. 16, p. 253 (*Eumenes multipictus*, Malaya).
 1935. SOIKA, A. G., Ann. Mus. Civ. Stor. Nat. Genova LVII, p. 126, ♀♂, pl. II, fig. (*Eumenes acus*, Borneo, Sumatra, Java).

SOIKA's excellent description leaves no doubt that his *E. acus* is identical with *E. multipictus* SAUSS. This species is widely spread in the Malaysian subregion; it is apparently restricted to the forests.

Malaya: Pahang, 1000 ft., jungle (DOVER, l.c.); Singapore (Br. Mus.).

Sumatra: "Sumatra" (there are specimens from this island in the British Museum, but I did not see the type); Marang (SOIKA, l.c.); Serdang, Tandjong Morawa, Dr. B. HAGEN (Mus. Leiden); Lampong Distr., Soengeilangka Est. Mt. Betoeng (400 m), 27 III 1937, Mrs. VAN DER VECHT (coll. m.).

Banka Isl.: Tobaali, 3 XII 1935 (I bred a ♂ from a clay cell which contained a number of small Geometrid caterpillars; the cell was affixed to rootlet, sheltered by an overhanging bank at the side of a sunken road).

Borneo: Sarawak (SOIKA, l.c.); Sarawak, Kuching, SHELFORD (Mus. Oxf., nrs. 11181, 11195, 11196); W. Borneo, Bengkajang, Ledo (Sambas River 25 VII 1933, H. R. A. MULLER (coll. m.); S. coast of Borneo (Mus. Leiden).

West-Java: Djasinga, 28 IV 1935, author; Djampang (Mt. Tjisoer and Bibidjilan), Mrs. M. E. WALSH; Djampang Wetan, Radjamandala, Mrs. M. E. WALSH (all in my collection); East-Java: Kalipare (SOIKA, l.c.).

Eumenes (Omicroides) singularis SM.

- !1858. SMITH, F., Jl. Proc. Linn. Soc. Zool. II, p. 109, ♀ (*Eumenes singularis*, Sarawak).
 1882. MAINDRON, M., Ann. Soc. Ent. France (6) II, p. 268 (*Eumenes pomiformis*, var. *singularis*).
 1935. SOIKA, A. G., Ann. Mus. Civ. Stor. Nat. Genova LVII, p. 129, ♀; fig. II; pl. II, fig. 1 (*Eumenes (Omicroides* n. subg.) *singularis*, Sarawak, Perak).

The holotype, a ♀ from Sarawak, is in the Oxford Museum. The Museum at Leiden possesses a ♀ from N.E. Sumatra, Serdang, Tandjong Morawa (Dr. B. HAGEN leg.).

Pachymenes SAUSS.**Pachymenes fragilis** (SM.).

- !1857. SMITH, F., Cat. Hym. Br. Mus. V, p. 61, ♂ (*Odynerus fragilis*, Borneo).
 !1861. SMITH, F., Jl. Proc. Linn. Soc. Zool. V, p. 89, ♀ (*Odynerus petulans*, Celebes, Makassar).
 !1862. SMITH, F., Ibid. VI, p. 58 (*Odynerus maculipennis*, nec SM. 1858, Gilolo).
 !1862. SAUSSURE, H. DE, Stett. Ent. Ztg. 23, p. 195, ♀♂ (*Odynerus fragilis*, Borneo).
 1897. BINGHAM, C. T., Fauna Br. India, Hym. I, p. 367 (*Odynerus fragilis*, Burma, Tenasserim, Borneo).
 !1902. CAMERON, P., Jl. Straits Br. As. Soc. 37, p. 114, (*Odynerus lybas*, Borneo, Sarawak).
 !1905. CAMERON, P., Tijdschr. v. Ent. XLVIII, p. 77, ♂♀ (*Odynerus drescheri*, Java, Tjandi near Semarang).
 1908. CAMERON, P., Deutsch. Ent. Zeitschr., p. 561, ♂ (*Odynerus brooksii*, Borneo, Sarawak, Kuching).
 1929. DOVER, C., Bull. Raffles Mus. 2, p. 45 (*Odynerus fragilis*, Singapore Island).
 1934. SCHULTHESS, A. VON, Arb. morph. tax. Ent. Berlin-Dahlem, 1, pp. 92—94, ♀♂ (*Odynerus (Lionotus) fragilis*, Java, Formosa, Phil. Isl.).

This species has usually been regarded as an *Odynerus*, but it belongs to the genus *Pachymenes* as defined by BEQUAERT (1918); according to this authority it is exactly like the small African *Pachymenes*. A good description is given by Von SCHULTHESS (1934).

Pachymenes fragilis is a widely distributed species; in Java it is one of the commonest Vespidae and occurs everywhere in the cultivated areas from the plains up to about 1000-1200 m above sea-level.

As appears from the list of synonyms, *P. fragilis* has been described or recorded by SMITH and CAMERON under various names, which, after a study of the types, can no longer be regarded as valid. I did not see the type of *Odynerus brooksii* CAM., but the description leaves no doubt that it is based upon a specimen of *P. fragilis* (SM.).

It may be noted that a few specimens from Siberoet, Mentawai Isl. (Mus. Buitenzorg), have an interrupted transverse fascia at the base of the posterior part of the first tergite. A similar coloration is present in some specimens from Java in my collection, in a few others only small lateral spots are present. Also in specimens from Formosa the base and the sides of the posterior part of the first tergite are more or less marked with yellow.

Apart from these minor differences, the coloration of this species is rather constant, even in widely separated localities, and it is therefore of special interest, that M. A. LIEFTINCK discovered in 1930 a melanistic variety in the Karimon Djawa Islands, North of Java, which up to the present has not been observed elsewhere.

***P. fragilis* (SM.), var. *karimonensis*, new variety.**

♀ - Black, with only the following pale yellow markings: a transverse line at the base of the clypeus, a spot between the antennae, a line on the underside of the first antennal segment, a small spot in the eye-emargination, a short stripe along the upper part of the outer orbits and a narrow line on the posttegulae. Tips of mandibles, tarsi, anterior tibiae and extreme apices of abdominal segments brownish. Wings more strongly infuscated than in the typical form.

♂ - Similar to the female; first abdominal segment either entirely black (allotype) or with a narrow, yellow, apical fascia.

Karimon Djawa Island, North of Java, 22 - 30 Nov. 1930, M. A. LIEFTINCK; holotype (♀) and allotype (♂) in Mus. Buitenzorg, paratypes (1 ♀, 1 ♂) in my collection.

***Pachymenes icarioides* (BINGH.) (fig. 4).**

! 1897. BINGHAM, C. T., Fauna of Br. India, Hym. I, p. 372, ♀ (*Odynerus icarioides* Tenasserim).

This species is closely allied to *P. fragilis* (SM.) and differs from it mainly in the sculpture, size and coloration.

♀ - Head, seen in front, slightly wider than high (39 : 36); clypeus wider than high (17 : 15), its apex slightly emarginate with dentiform angles, the distance between the angles less than $\frac{1}{4}$ of the total width of the clypeus. Mandibles with rather acute teeth. Inter-antennal shield with a median longitudinal carina. Posterior ocelli almost $1\frac{1}{2}$ times as far from the eyes as from

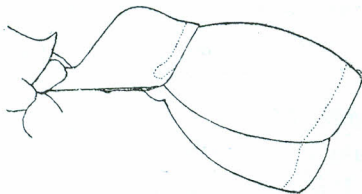


Fig. 4. — First and second abdominal segments of female of *Pachymenes icarioides* (BINGH.), lateral view.

each other. Vertex with two minute tubercles behind the ocelli ¹⁾. Thorax about the same shape as in *P. fragilis*; as in that species the postscutellum is bituberculate and consists of a short horizontal and a much longer vertical portion, and the propodeum has a well developed tooth on each side at the apex just above the articular valvula; in the present species these

teeth are somewhat wider at the base than in *fragilis*. Abdomen: fig. 4; as seen from above, the second segment is about $1\frac{1}{2}$ times as wide as the first (38 : 24).

¹⁾ These tubercles are also present in *P. fragilis*; apparently they have been overlooked by VON SCHULTHESS (l.c., pp. 92 - 94). The tubercles are most readily observed when the head is looked at from the front with a strong lens.

Punctuation denser and coarser than in *P. fragilis*, especially on the frons, the pro- and mesonotum, the scutellum, the mesopleura and the posterior portion of the first tergite; these parts are uniformly reticulately punctate. Punctuation of second abdominal segment slightly denser and coarser than in *fragilis*.

In coloration this species differs from *fragilis* as follows: there is no yellow spot on the frons between the antennae, the spots in the eye-incisions and on the temples are very small, the tegulae are ferruginous, the mesopleura and scutellum are entirely black, the postscutellum has a transverse yellow band, interrupted in the middle, the apical teeth of the propodeum are almost entirely yellow, the second abdominal tergite has no yellow lateral spots at the base, the third segment is black, its apical margin fuscous, the following segments entirely dark fuscous. Legs as in *P. fragilis*. Anterior margin of the fore wings slightly less infuscate than in that species.

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

Described from a female from N.W. Borneo, Sarawak, Kuching, R. SHELFORD, in the Oxford University Museum (no. 1900, 11224). I compared this specimen with BINGHAM's type in the British Museum in 1934.

Pachymenes petiolatus (SM.).

! 1859. SMITH, F., Jl. Proc. Linn. Soc. Zool. III, p. 164, ♀ (*Odynerus petiolatus*, Aru).

! 1861. SMITH, F., Ibid. V, p. 129, ♂ (*Odynerus petiolatus*, Dory, N. Guinea).

1894. DALLA TORRE, K. W. VON, Cat. Hym. IX, p. 88 (*Odynerus petiolatus*).

1904. DALLA TORRE, K. W. VON, Gen. Insect. 19, Vespidae, p. 51 (*Odynerus petiolatus*).

! 1906. CAMERON, P., Nova Guinea, V, 1, p. 65, ♀ (*Eumenes spilonotus*, N. Guinea).

! 1928. BEQUAERT, J., Ann. Mag. Nat. Hist. (10), II, p. 159, ♀ (*Pachymenes spilonotus*).

1932. BEQUAERT, J., Rés. scient. voy. Ind. néerl. Leopold, vol. IV, fasc. 5, p. 50 (*Ropalidia petiolata*).

In general appearance this remarkable wasp is somewhat like *Montezumia impavida* BINGH., but structurally it is markedly different. BEQUAERT (1928) studied CAMERON's specimen from Manoekwari in the British Museum (holotype of *Eumenes spilonotus*), but was unable to examine the mouthparts and therefore would not exclude the possibility that the species belongs to the genus *Montezumia*. However, as the maxillary and labial palpi are respectively 6- and 4-jointed, it may be preliminarily placed in the genus *Pachymenes*, although it differs much from the other Oriental and Papuan representatives of that heterogeneous group.

Odynerus LATR.

The following species have been described as *Odynerus*, but belong to other genera:

Pareumenes secundus (DALLA TORRE) = ! *Odynerus fallax* SMITH (Jl. Proc. Linn. Soc. Zool. VI, 1862, p. 58, ♀, nec SAUSS. 1852) = *Odynerus secundus* DALLA TORRE, Wien. Ent. Ztg. 8, p. 125, 1889). — Type locality: Gilolo (= Halma-hera).

Pachymenes petiolatus (SMITH) = ! *Odynerus petiolatus* SMITH (Jl. Proc. Linn. Soc. Zool. III, 1859, p. 64, ♀). — Type locality: Aroe. (For further synonymy see p. 279).

Ropalidia jaculator (SMITH) = ! *Odynerus fallax* SMITH (Jl. Proc. Linn. Soc. Zool. VII, 1863, p. 40, ♀; nec SAUSS. 1852, nec SMITH 1862) = *Odynerus jaculator* SMITH (Ibid., XI, 1871, p. 377) = *Odynerus tertius* DALLA TORRE (Wien. Ent. Ztg. 8, 1889, p. 125). — Type locality: Misool.

Apparently DALLA TORRE has overlooked the fact that SMITH renamed his second "*Odynerus fallax*" in 1871.

Ropalidia mysolica (DALLA TORRE) = ! *Odynerus conspicuus* SMITH (Jl. Proc. Linn. Soc. Zool. VII, 1863, p. 40, ♀; nec SAUSS. 1857) = *Odynerus mysolicus* DALLA TORRE (Wien. Ent. Ztg. 8, 1889, p. 125). — Type locality: Misool.

Ropalidia fulvopruinosa (CAM.) = ! *Odynerus (Leionotus) fulvopruinosus* CAMERON (Tijdschr. v. Ent. XLIX, 1906, p. 225). — Type locality: Etna Bay, New-Guinea.

Odynerus brunnipes (FABR.).

1804. FABRICIUS, J. G., Syst. Piez., p. 265, no. 66 (*Vespa brunnipes*, Sumatra).

1852. SAUSSURE, H. DE, Ét. fam. Vesp. I, p. 264 (unknown to DE SAUSSURE: "probablement un *Odynerus*").

1867. SAUSSURE, H. DE, Reise Novara, Zool. 2 (I), p. 12, ♀, pl. I, fig. 7 (*Odynerus javanus*, Java, Batavia).

Long ago, FABRICIUS described, under the name *Vespa brunnipes*, a wasp from Sumatra, which up to the present has not been recognized by the subsequent authors. Though the description is based upon colour characters only, it is complete enough to allow without doubt the identification of FABRICIUS' insect with *Odynerus javanus* SAUSS., a common species in Sumatra and Java. The Sumatran specimens have exactly the same coloration as those occurring in Java and therefore the name *javanus* must be sunk into synonymy. In other parts of the Archipelago this species has developed a number of colour varieties, some of which have been described by DE SAUSSURE and SMITH as different species.

The colour forms known to me may be separated as follows:

1. Legs brownish, body almost entirely black
..... *O. brunnipes*, var. *atratus*, new variety.
- Legs ferruginous 2.
2. Body with pale yellow markings; first abdominal tergite with a narrow yellow apical fascia *O. brunnipes* (F.), typical form.
- Thorax with orange-yellow markings: the first abdominal tergite black with a narrow yellow apical fascia, which is more or less reddish anteriorly *O. brunnipes*, var. *ignobilis* (SM.).
- Thorax with brick-red markings; posterior half of the first tergite red with a more or less distinct yellow apical fascia
..... *O. brunnipes*, var. *pocillum* (SAUSS.).

The typical form of *O. brunnipes* (FABR.) is represented in my collection by specimens from various localities in Sumatra, Banka, Java and Bali.

***O. brunnipes*, var. *ignobilis* (SM.).**

! 1861. SMITH, F., Jl. Proc. Linn. Soc. Zool. V, p. 87, ♀ (*Odynerus ignobilis*, Celebes, Makassar).

! 1862. SAUSSURE, H. DE, Stett. Ent. Ztg. 23, p. 202, ♀♂ (*Odynerus armatus*, Celebes).

Probably common in Celebes: Tondano (Mus. Leiden), Makassar (Oxf. Mus.), Paloe (a series of both sexes in my collection). Specimens from Aroe (Mus. Leiden) have the same coloration as those from Celebes.

***O. brunnipes*, var. *pocillum* (SAUSS.).**

! 1862. SAUSSURE, H. DE, Stett. Ent. Ztg. 23, p. 204, ♂ (*Odynerus pocillum*, Timor).

In the collection of the Museum at Leiden this form is represented by specimens from Timor (including the type) and by a female from the island Wetter (SCHÄDLER leg.).

***O. brunnipes*, var. *atratus*, new variety.**

Structure and sculpture as in typical *O. brunnipes*; body almost entirely black, legs brownish; both sexes with a short pale yellow line in the eye-sinus; ♂: clypeus almost entirely pale yellow, first antennal segment with a pale yellow line, flagellum ferruginous beneath.

Holotype and allotype: resp. ♀ and ♂, Timor, WIENECKE (Mus. Leiden), paratypes from the same locality in Mus. Leiden and in my collection.

***Odynerus maculipennis* SM. (fig. 5).**

! 1858. SMITH, F., Jl. Proc. Linn. Soc. Zool. II, p. 111, no. 4, ♀ (*Odynerus maculipennis*, Sarawak).

! 1905. CAMERON, P., Jl. Straits Br. As. Soc. 44, p. 161, ♀ (*Odynerus kuchingensis*, Sarawak).

♀ - Head subcircular; clypeus convex, scarcely longer than wide, somewhat flattened and strongly narrowed towards the apex, which is about one third of the total width of the clypeus, the apex emarginate and rather bluntly bidentate ¹⁾. Vertex with two small tubercles behind the ocelli. Posterior ocelli somewhat further from the eyes than from each other. Pronotum truncate, the sides rather strongly converging towards the head. Scutellum moderately convex, with a fine median impressed line, nearly obsolete in the middle; post-scutellum with a short horizontal portion and a much longer vertical face, the upper margin of the latter slightly emarginate in the middle, the postscutellum thus being bituberculate, but not distinctly bidentate. Propodeum entirely

¹⁾ At a superficial examination, the apical teeth seem to be rather acute, because the anterior edge of the clypeus has a brownish margin which is widened in the middle.

vertical, posterior face slightly concave, with a distinct median impressed line; the sides not carinate, with a distinct triangular tooth just above the articular valvula. First and second abdominal segments: fig. 5.

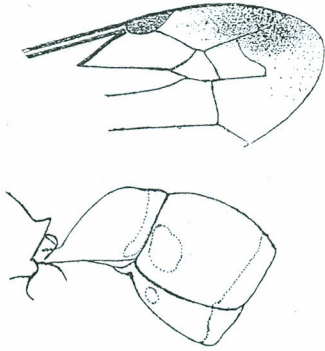


Fig. 5. — *Odynerus maculipennis* SM.; above: part of fore wing, below: lateral view of first and second abdominal segments of female.

Body slightly shining, frons dull. Clypeus finely, sparsely punctate, the punctures becoming larger towards the anterior margin; frons and vertex finely and densely punctate, more sparsely between the ocelli; mesonotum less densely punctate medially, where most of the interspaces are larger than the punctures; puncturation of mesopleura, scutellum and the lateral areas of the propodeum fine and rather sparse; anterior and posterior margins of the postscutellum crenulate. Puncturation of abdomen dense and rather fine.

Black; abundantly marked with yellow as follows: clypeus, mandibles (except for the teeth), scape of antennae (except for a dark line above), a small circular spot between the antennae, the eye-sinus, a line along the inner orbits from the sinus to the clypeus, a line behind the eyes, gradually narrowed towards the mandibles; a broad transverse band on the pronotum (not continued on the sides), tegulae (a brownish spot in the centre), posttegulae, a large spot on the upper half of the mesopleura, a broad transverse band, slightly narrowed in the middle, on the scutellum, a short transverse line, also narrowed in the middle, on the postscutellum; two large vertical marks, narrowed below, on the sides of the concavity of the propodeum; transverse apical fasciae on the 1st to 5th tergites and 2nd to 5th sternites, the line on the second segment wider than the others, that on the third tergite very narrow; two irregular lateral spots at the base of the second tergite and two similar, but smaller, spots on the sternite. Coxae I yellow in front, II and III with a yellow lateral line; trochanters dark; femora I and II yellow, with a dark line above, femora III dark, brownish at the apex; tibiae yellow, II and III with a dark line on the inner side; tarsi yellowish brown. Wings hyaline with a conspicuous cloud in the apical half of the radial cell and the anterior part of the fourth cubital cell (fig. 5), veins brownish black, stigma dark brown.

Length (h. + th. + t. 1 + 2), 7-8 mm.

Described from two females from N.W. Borneo, Sarawak, Kuching (R. BELFORD) in the collection of the Oxford University Museum (1900, nrs. 11218 and 11219); I compared these specimens with the types of *O. maculipennis* SM. (Mus. Oxf.) and of *O. kuchingensis* CAM. (Br. Mus.) in 1934. Recently Mrs.

E. WALSH collected this species in Borneo: 1 ♀, E. Borneo, Palawan, Sarawak, May 1937 and 1 ♀, S. Borneo, Tanggarang, Mt. Pandjang, 4 July 1937 (Ill. m.).

F. SMITH recorded this species from Gilolo (Jl. Proc. Linn. Soc. Zool. VI, 1862, p. 58), but according to my notes WALLACE's specimen from that locality in the Oxford Museum is a male of *Pachymenes fragilis* (SM.).

Odynerus latipennis SM.

!1858. SMITH, F., Jl. Proc. Linn. Soc. Zool. II, p. 112, ♀ (*Odynerus latipennis*, Borneo, Sarawak).

During my visit to the Oxford Museum I made the following notes on the holotype:

Anterior margin of clypeus narrowly truncate. First segment somewhat narrower than the second. Abdomen very finely punctate, the apical margins of the first and second tergites distinctly depressed and shining. Scutellum flat, postscutellum entirely included in the dorsal face of the thorax, the posterior face formed by the obliquely sloping propodeum only. The vertical base of the first abdominal tergite yellow. This species superficially resembles *O. rugifrons* CAM., but differs from it by the shape of the clypeus (anterior margin slightly emarginate in *O. rugifrons*), the coloration of the mesopleura (black with yellow spots in the present species; entirely yellow in *O. rugifrons*) and the absence of yellow spots on the second abdominal tergite.

Odynerus cilicius CAM.

!1902. CAMERON, P., Jl. Straits Br. As. Soc. 37, p. 111, ♀ (*Odynerus cilicius*, Borneo, Sarawak, Kuching).

1910. MEADE-WALDO, G., Ann. Mag. Nat. Hist. (8) 6, (p. 100?).

According to MEADE-WALDO, this species is identical with *O. latipennis* SM., but having seen the types of both species, I do not believe that his view is correct. *O. cilicius* has the head and the thorax rather sparsely and superficially punctate, whereas these parts are more strongly punctate in *O. latipennis*.

The propodeum is rounded at the sides, the anterior half of the first abdominal tergite is yellow, the second tergite has two transverse yellow bands which are anastomosing at the sides. Puncturation of the abdomen very fine and superficial.

The holotype is a female from Sarawak, Kuching (Br. Mus.).

Odynerus hewittii CAM.

!1907. CAMERON, P., Ann. Mag. Nat. Hist. (7) 20, p. 82, ♂ (*Odynerus hewittii*, Sarawak, Kuching).

First abdominal segment truncate anteriorly, but without a transverse ridge or carina; coloration almost exactly the same as in *Ancistrocerus bilaminatus* V. D. VECHT (p. 292), with which species it agrees moreover in many structural characters; the puncturation is, however, finer and sparser than in that species and the depressed and translucent posterior margins of the abdominal segments are extremely narrow.

♂ - Head slightly wider than high, widest above the middle; clypeus somewhat wider than long, strongly narrowed towards the truncate apex, which

is slightly broader than $\frac{1}{4}$ of its greatest width. Inter-antennal shield with a strong longitudinal carina; frons almost flat. Posterior ocelli $1\frac{1}{2}$ times as far from each other as from the eyes, and about as far from each other as from the occiput. Third antennal segment nearly $1\frac{1}{2}$ times as long as the fourth, ultimate segment small and recurved, its end reaching the apex of the tenth segment.

Pronotum truncate, the horizontal part much narrowed in the middle, where the posterior flattened margin is contiguous with the transverse carina over a distance greater than the space between the ocelli, the sides rather strongly converging towards the head. Mesonotum slightly wider than long; scutellum and postscutellum flat, the latter entirely included in the horizontal face of the thorax. Horizontal area of the propodeum well developed laterally (its sides parallel at the base, converging posteriorly), almost linear and strongly impressed in the middle, the posterior face concave, with a strong, median, impressed line, entirely margined by a fine carina, the sides below angular as in *Ancistrocerus bilaminatus*.

First abdominal segment truncate anteriorly, higher than long, the posterior portion distinctly wider in the middle than at the sides. Second segment, seen from above, less than $1\frac{1}{4}$ times as wide as the first. The depressed and translucent posterior margins of all the segments very narrow, and not flared, much narrower than in *Ancistrocerus septemfasciatus* and allied species.

Puncturation finer and sparser than in *Ancistrocerus bilaminatus*, similar to that of *Odynerus guttulatus* SAUSS.; the interspaces on the frons and mesonotum distinct, flat and quite dull; vertex more sparsely punctate, the two longitudinal yellow lines on the mesonotum slightly raised and almost impunctate; mesopleura densely punctate, metapleura impunctate and shining; the dorsal lateral areas of the propodeum impunctate at the base, posteriorly with a row of large and deep punctures along the carina bordering the concavity, the latter impunctate and shining; the ventral lateral areas with irregular punctures and striae, most coarsely sculptured in their upper part. First and second abdominal segments with a few indistinct punctures at the sides, the remainder of the abdomen impunctate.

Black; abundantly marked with yellow as follows: clypeus, mandibles (except for their margins), underside of first antennal segment, ocular sinus, a line from the sinus to the clypeus, a longitudinal mark (narrowed above and widened below) on the frons between the anterior ocellus and the antennal shield, a triangular spot on each side of the vertex (situated behind the ocelli and almost touching the eyes), a line on the temples, a broad transverse line (widened at the sides) on the pronotum, two lines on the mesonotum, two large spots on the mesopleura, tegulae (except for a brownish spot in the centre), posttegulae, a transverse band on the anterior $\frac{2}{3}$ of the scutellum (emarginate posteriorly), a transverse line on the postscutellum; a large mark on the propodeum, interrupted in the middle and covering the dorsal lateral areas, the upper and posterior margins of the ventral lateral areas, and the upper and

lateral margins of the concavity; a transverse band at the base of the posterior portion of the first abdominal tergite, a band near the base of the second tergite, and similar bands on the posterior margins of the 1st to 6th tergites. The two bands on the first and the second tergites are connected laterally by a short longitudinal line; the basal band of the second tergite is rather strongly dilated at the sides; the apical bands of the five anterior tergites are narrowly incised in the middle; the seventh tergite has an indistinct yellow spot in the middle near the apex. The second sternite is yellow, with a large, quadrate, black spot at the base; the third to sixth sternites have yellow apical fasciae. Legs yellow; posterior face of coxae II and III, trochanters, and lines on all femora and tibiae brownish black; apical tarsal segments ferruginous.

Wings subhyaline, iridescent, darker along the anterior margin, with an ill defined and not very dark cloud in the apical two thirds of the radial cell and the upper margin of the fourth cubital cell.

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

Described from two males from Borneo, Sarawak, Kuching (SHELFORD leg.) in the Oxford Museum (nrs. 1900: 11199 and 11216); in 1934 I compared these specimens with the holotype of *Odynerus hewittii* CAM. (which is from the same locality) in the British Museum.

CAMERON's remarkable conceptions of the structure of his objects of "study" are well demonstrated by the following quotation from his description of the coloration of the abdomen: ".....the first abdominal segment at the top of the apical slope, its apex and the apices of the following seven (sic!) segments, dilated laterally and that on the seventh also in the middle, a mark in the centre of the eighth..... yellow".

Odynerus guttulatus SAUSS.

- !1862. SAUSSURE, H. DE, Stett. Ent. Zeitg. 23, p. 200, ♀ (*Odynerus guttulatus*, Sumatra).
 1891. GRIBODO, G., Bull. Soc. ent. Ital. XXIII, p. 297, ♀ (*Odynerus guttulatus*).
 ?1897. BINGHAM, C. T., Fauna Br. India, Hym. I, p. 368, ♀ (*Odynerus multipictus*, India, Borneo) (nec *multipictus* SM.?).
 !1908. CAMERON, P., Deutsch. Ent. Zeitschr., p. 562, ♀ (*Odynerus santubongensis*, Borneo: Santubong).

The holotype of *O. guttulatus* SAUSS., a female from Sumatra (MULLER leg.), is in the Leiden Museum. H. DE SAUSSURE believed this species to be conspecific with *O. multipictus* SM. (1858, nec SM. 1859) from Borneo, but it is undoubtedly different, as has been noted by GRIBODO (1891).

Whether the specimens recorded by BINGHAM (1897), VON SCHULTHESS (1914) and DOVER (1929) as *O. multipictus* SM. were correctly identified, remains doubtful; I suspect that at least some of them will prove to belong to *O. guttulatus* SAUSS.

The holotype of *guttulatus* has two yellow lines on the mesonotum, the clypeus is yellow with an irregular black spot in the middle, the yellow mark on the scutellum is excavated posteriorly, the postscutellum bears a narrow

transverse yellow fascia, the mesopleura have two yellow spots, and the first abdominal segment has two transverse yellow fasciae, the first of which is widely interrupted in the middle and abbreviated at the sides. I was not able to find any differences of importance between typical *guttulatus* and the holotype of *O. santubongensis* CAM., which I examined in the British Museum.

Besides the specimens mentioned above I studied 4 ♀♀ and 3 ♂♂ from S. Sumatra, Lampong Districts (Kasoei, Kedaton, Oosthaven, Soengeilangka), 1 ♂ from W. Borneo, Bengkajang (Ledo at the Sambas-river, Dr. H. R. A. MULLER leg.) (all in my collection), and 2 ♀♀ and 1 ♂ from N. Borneo, Sarawak (Kuching, SHELFORD leg.) in the Oxford Museum (nrs. 11204, 11213 and 11212).

The yellow lines on the mesonotum are very small in some specimens, the postscutellum is usually black, and in the male sex the spot on the clypeus is sometimes entirely absent.

The following two forms have been described as separate species, but as I am unable to find any characters in structure or sculpture, by which they differ from *O. guttulatus*, I prefer to regard them as colour varieties of that species.

***O. guttulatus*, var. *heterospilus* (CAM.).**

! 1907. CAMERON, P., Ann. Mag. Nat. Hist. (7) 20, p. 85, ♀ (*Ancistrocerus megaspilus*, Sarawak, Kuching).

! 1914. MEADE-WALDO, G., Ann. Mag. Nat. Hist. (8) 14, p. 405 (*Odynerus megaspilus*).

1931. DOVER, C., Jl. Fed. Mal. St. Mus. 16, p. 255 (*Odynerus megaspilus*, Selangor, Peninsular Siam).

It is doubtful whether this form will prove to be constantly different from typical *guttulatus*. The clypeus is entirely yellow, the posterior margin of the transverse yellow band on the scutellum is almost straight. — Mesonotum with two yellow lines as in the typical form.

I studied 2 ♀♀ and 1 ♂ from the type locality (Borneo, Sarawak, Kuching, SHELFORD leg.; Oxford Mus., nrs. 11209, 11215 and 11217), which I had compared with the holotype of *O. megaspilus* in the British Museum in 1934. In my collection are 1 ♀ and 3 ♂♂ from S. Sumatra (Benkoelen and Lampong Districts) and 1 ♂ from Banka Island.

***O. guttulatus*, var. *megaspilus* (CAM.).**

! 1907. CAMERON, P., Ann. Mag. Nat. Hist. (7) 20, p. 84, ♀ (*Odynerus heterospilus*, Sarawak, Kuching).

The holotype of this species, a female from Borneo, is in the British Museum. It bears a label in CAMERON's handwriting: "*Odynerus erythrospilus* type", but as far as I know, CAMERON never described an *Odynerus* from Borneo under that name. As the specimen mentioned agrees perfectly with the description of *O. heterospilus*, I cannot doubt that it is correctly regarded as the type of that species. Similar errors are frequently met with in CAMERON's work.

The present variety differs from typical *guttulatus* as follows:

♀ - Clypeus entirely yellow; mandibles yellow, their margins brownish; the spot above the inter-antennal shield about half as long as in *guttulatus*; the vertex, the posterior angles of the pronotum and two spots on the mesonotum dull reddish; the extent of the latter markings is apparently variable. Anterior and posterior margins of the tegulae yellow; the transverse band on the scutellum narrow, the postscutellum black. First abdominal segment orange-red, marked with yellow as in *guttulatus*, but the transverse spots at the base of the posterior portion sometimes indistinct. Second tergite without lateral yellow spots; second sternite black with a narrow, yellow, apical fascia, the base and the sides sometimes more or less yellowish; the third to fifth segments with narrow, pale brownish, apical fasciae, the sixth segment yellow, brownish at the base. Legs: anterior face of coxae I yellow, coxae II and III with a lateral yellow line, trochanters brownish, femora I and II and all tibiae yellow, each with a longitudinal brownish line, femora III brown, tarsi yellow.

Described from 2 ♀♀ from Borneo, Sarawak, Kuching (SHELFORD leg.) in the Oxford Museum (nrs. 11244 and 11245). In 1934 I compared these specimens with CAMERON's type in the British Museum.

***O. guttulatus*, var. *nigridorsus*, new variety.**

This is the Javan representative of *O. guttulatus*. It appears to be constantly different from the typical form, that it deserves to be regarded as a variety. It differs from the typical form in having the clypeus entirely yellow, whereas the yellow lines on the mesonotum are always absent. Postscutellum always black. The transverse yellow lines at the base of the posterior portion of the first tergite are often more or less reduced.

Holotype: ♀, W. Java, Djasinga (100 m), 15 XI 1936; allotype: ♂, from the same locality, 28 IV 1935 (author); paratypes from several localities in W. Java (Depok, Buitenzorg, Tjiampea, Tapos on Mount Gedeh, Soekaboen, Djampang, Wijnkoopsbay) and from Baoeng and Poerwodadi in E. Java; all in my collection. This species occurs in light forests up to about 800 m above sea-level.

***Odynerus boholensis* v. SCHULTH.**

1934. SCHULTHESS, A. VON, Arb. morph. tax. Ent. Berlin-Dahlem I, no. 2, pp. 91-92.
♀♂ (*Odynerus (Lionotus) boholensis*, Philippine Islands).

Dr. A. VON SCHULTHESS kindly sent me a paratype (♂ from Bohol) of this species, which appears to be very closely allied to *O. guttulatus*. It differs from the latter as follows: anterior margin of clypeus with a deep triangular incision; puncturation of head and thorax sparser, the interspaces shining; dorsal lateral areas of propodeum with distinct punctures, ventral lateral areas almost impunctate and shining. Depressed apical margin of second abdominal tergite extremely narrow.

Odynerus duplostrigatus v. SCHULTH.

1934. SCHULTHESS, A. VON, Arb. morph. tax. Ent. Berlin-Dahlem I, no. 2, pp. 95-96, ♂♂ (*Odynerus (Lionotus) duplostrigatus*, Philippine Islands).

A female from Sarawak, Kuching (SHELFORD) in the Oxford Museum (no. 11214) may safely be regarded as belonging to this species. The clypeus has a short longitudinal black line in the middle, the inner orbits above the sinus are black, there is a yellow spot on each side between the ocellus and the eye; the scutellum has two yellow spots, and the lateral and posterior margins of the second abdominal sternite are yellow. Otherwise agreeing with the original description.

Odynerus multipictus SM.

! 1858. SMITH, F., Jl. Proc. Linn. Soc. Zool. II, p. 112, ♀ (*Odynerus multipictus*, Borneo, Sarawak) (nec *O. multipictus* SM. 1859).

In coloration very similar to *O. guttulatus* SAUSS. The following differences may be noted: yellow lines on mesonotum longer and wider; the yellow spot on the lower part of the mesopleura larger; the basal band of the first abdominal segment well developed, much longer than the posterior band which is abbreviated at the sides.

O. multipictus may easily be distinguished from *O. guttulatus* by the much coarser sculpture, the frons, vertex, pro- and mesonotum and mesopleura being coarsely reticulately punctate, without any flat interspaces. The yellow lines on the mesonotum are somewhat raised and almost impunctate. Concavity of propodeum bordered by a strong carina, incised and more or less distinctly bidentate in its upper part. First abdominal tergite with a very faint transverse ridge, this species thus being more or less intermediate between *Odynerus* and *Ancistrocerus*. The posterior margin of the abdominal tergites not depressed; the anterior three tergites distinctly, but sparsely and rather finely, punctate.

In the male the clypeus is yellow, with a brownish spot of variable size at the apex, the latter very slightly emarginate; the last antennal segment slender and recurved, almost reaching the middle of the tenth segment.

I studied a female from Borneo, Sarawak, Kuching (Oxf. Mus., no. 1900, 11198) which I compared with SMITH's type in the same Museum in 1934. In the Museum at Buitenzorg is a ♀ from W. Sumatra, Padang, Nov. 1924 (C. BODEN KLOSS and N. SMEDLEY). In Java this species is rare and apparently restricted to the primary forests. W. Java: 1 ♀, Djampang, F. A. TH. H. VERBEEK, 1 ♀, Radjamandala (400 m), 1 ♀ 1 ♂, E. Priangan, Penandjoeng; E. Java: 1 ♀ 1 ♂, Tengger (1000 m), 1 ♂, Waterfall Baoeng (400 m), Mrs. M. E. WALSH (coll. m.). The last specimen may be regarded as the allotype.

It is uncertain whether the specimens recorded as *O. multipictus* SM. by BINGHAM (Fauna Br. India, Hym. I, 1897, p. 368), VON SCHULTHESS (Zool. Jahrb. Syst. 37, 1914, p. 266) and DOVER (Bull. Raffles Mus. 2, 1929, p. 45) really belong to this species; I suspect that these authors did not distinguish *O. multipictus* SM. from *O. guttulatus* SAUSS.

In the specimens from Java the yellow markings are slightly less extensive than in those from Borneo and Sumatra.

Odynerus obscurus (SM.).

1858. SMITH, F., Jl. Proc. Linn. Soc. Zool. II, p. 110, ♀ (*Rhynchium obscurum*, Borneo, Sarawak).

As far as I know, this species has not been recorded since it was described by SMITH in 1858. I studied a ♂ from Borneo, Sarawak, Kuching in the collection of the Oxford Museum, which I compared with the type in 1934, and a ♀ from Sumatra, Benkoelen, Tandjong Sakti, May 1935 (Mrs. M. E. WALSH) in my collection.

O. obscurus is closely allied to the common *O. argentatus* (F.), but in both sexes it is easily separated from that species by the following characters:

Body stouter; head slightly flatter; clypeus truncate anteriorly (not emarginate as in *O. argentatus*); propodeum shorter and wider, somewhat less rounded at the sides; wings brownish beyond the cells, with a very dark and conspicuous cloud covering the radial cell, the upper part of the third and the larger part of the fourth cubital cell; there is a hyaline line along the outer margin of the lower half of the third cubital cell; tegulae and narrow lines along the apical margins of the abdominal tergites (sometimes indistinctly) brownish red; body covered with a brownish yellow tomentum (silvery in *argentatus*). As in *O. argentatus* the ♂ has a flattened tubercle on the seventh sternite.

The ♂ in the Oxford Museum is herewith designated as the allotype.

Odynerus iridipennis (SM.).

1861. SMITH, F., Jl. Proc. Linn. Soc. Zool. V, p. 128, ♀ (*Rhynchium iridipenne*, Amboina).

An examination of the holotype in the Oxford Museum showed that this species is closely allied to *O. argentatus* (F.). Body more slender; clypeus very slightly longer than wide between the eyes (30 : 29), anterior margin as deeply emarginate as in *O. argentatus*; puncturation of the thorax coarser than in that species; first and second abdominal segments more distinctly punctate; the sides of the first segment less distinctly converging towards the base; as seen from above this segment appears to be transversely truncate at the base, not rounded as in *O. argentatus*.

The specimens recorded by VON SCHULTHESS (Zool. Jahrb. Syst. 37, 1914, p. 263) as *Rhynchium iridipenne* will probably prove to belong to another species.

Odynerus flavolineatus (SM.).

! 1857. SMITH, F., Cat. Hym. Br. Mus. V, p. 60, ♀ (*Odynerus flavolineatus*, Java).

! 1862. SAUSSURE, H. DE, Stett. Ent. Zeitg. 23, p. 197, ♀♂ (*Odynerus flavolineatus*, Java).

1897. BINGHAM, C. T., Fauna Br. India, Hym. I, p. 360, ♀ (*Rhynchium flavolineatum*, Sikhim, Tenasserim, Java).

1931. DOVER, C., Jl. Fed. Mal. St. Mus. 16, p. 255 (*Odynerus* (Rh.) *flavolineatus*, Pahang, Perak).

This species appears to be widely distributed in the Western part of the Archipelago; in Java it is not common and apparently restricted to the primary forests.

I have seen the following specimens: 2 ♀♀, 1 ♂, W. Borneo, Bengkajang, Ledo, Dr. H. R. A. MULLER (coll. m.); Sumatra: 1 ♀, Soengei Simawoeng, Sum.-exp. 1877 (Mus. Leiden), 2 ♀♀, Benkoelen, Tandjong Sakti, Mrs. M. E. WALSH, 1 ♂, Lampong Districts, Kedaton, Wai Rilau, Mrs. VAN DER VECHT; W. Java: 2 ♀♀, Djampang, Mrs. M. E. WALSH (coll. m.), 1 ♀, Penandjoeng Bay, Kali-poetjang, M. A. LIEFTINCK (Mus. Buitenzorg); M. Java: 1 ♀, Salatiga, 1910 (coll. Prof. W. ROEPKE); E. Java: 3 ♀♀, 4 ♂♂, Waterfall Baoeng, Dr. J. G. BETREM (coll. m., additional specimens in coll. BETREM); 1 ♀, Bajoekidoel, H. LUCHT (coll. m.).

Odynerus xanthozonatus ASHM.

- ! 1903. CAMERON, P., Jl. Straits Br. As. Soc. 39, p. 168, "♂" (♀!) (*Odynerus carinicolis*, *xanthozonatus*, Phil. Islands).
 1928. WILLIAMS, F. X., Phil. Jl. Science 35, p. 99, ♂, pl. 6, figs. 1 and 3 (*Odynerus* (*Leionotus*) *xanthozonatus*, Phil. Islands).
 1934. SCHULTHESS, A. VON, Arb. morph. tax. Ent. Berlin-Dahlem, Bd. 1, pp. 96-97, ♀♂ (*Odynerus* (*Lionotus*) *chartergoides*, Phil. Islands).

Two specimens from Los Baños, determined and kindly sent to me by WILLIAMS, agree in all respects with the description of *O. chartergoides*. As the determination is in my opinion correct, I regard the latter name as a synonym of *xanthozonatus*.

The Philippine species is closely allied to *O. manifestus* SM. from Borneo; they can be placed together with *tinctipennis* WALK. (1860), *wroughtoni* CAM. (1898) and *laboriosus* SM. (1863) (= *waigeuensis* CAM. 1913) in a well defined group which may be indicated as the *manifestus*-group.

Ancistrocerus WESMAEL.

Ancistrocerus carinicolis (CAM.).

- ! 1903. CAMERON, P., Jl. Straits Br. As. Soc. 39, p. 168, "♂" (♀!) (*Odynerus carinicolis*, Sarawak, Kuching).

♀ - Head subcircular, rather thick; clypeus slightly wider than long, almost flat, narrowed towards the apex which is slightly emarginate with dentiform angles and measures about one third of the total width of the clypeus. Antennae short and thick, third segment shorter than wide at the apex, fourth segment as long as the third, $1\frac{1}{3}$ times as wide as long, the following segments even slightly wider, the last segment broadly rounded at the end. Inter-antennal shield with a distinct median carina. Frons regularly convex; posterior ocelli

a trifle further from the eyes than from each other. Temples narrow, separated from the occiput by a strong carina.

Thorax rather long and narrow, rectangular. Pronotum truncate, with a well marked transverse carina, the sides parallel posteriorly, slightly converging towards the head anteriorly. Mesonotum, scutellum and postscutellum very slightly convex, the latter entirely included in the dorsal face of the thorax. Propodeum truncate posteriorly, the horizontal area rather wide at the sides, much narrowed towards the middle, where it is depressed and narrowly incised, the apex of the postscutellum almost touching the concavity, which is moderately impressed with carinate margins.

The anterior face of the first abdominal segment fits perfectly into the concavity of the propodeum; the tergite has a long vertical and a somewhat shorter horizontal portion, these parts are separated by an indistinct, partly interrupted, transverse ridge; second abdominal segment slightly wider than the first, much wider than long; its sternite with a curved, crenulate, transverse groove at the base.

Head and thorax dull, abdomen moderately shining. Clypeus irregularly and rather sparsely punctate, puncturation of frons, pronotum, mesopleura, scutellum, postscutellum and horizontal area of propodeum deep, coarse and reticulate, slightly less dense on vertex and mesonotum; the anterior portion of the first abdominal segment impunctate, the posterior part distinctly, irregularly punctate at the base (more coarsely on the sides), apical half almost impunctate. Second segment finely and sparsely punctate, the puncturation of the third segment very fine, the following segments almost impunctate.

Black; pronotum red; the following parts pale yellow: the clypeus partly, the eye-sinus, a line on the under side of the antennal scape, a subcircular spot above the inter-antennal shield, a line on the upper part of the temples, a small spot on the mesopleura below the tegulae, the posttegulae, a broad line along the upper and lateral margins of the concavity of the propodeum, slightly interrupted in the middle above, and narrow bands on the apical margins of the first five tergites and of the second sternite. On the third sternite an apical band is indicated by a few spots; the band on the fifth tergite, and perhaps also on some of the others, may be obsolete; the band on the second tergite is wider than the others and shows a minute incision in the middle anteriorly. Mandibles pale ferruginous, tegulae ferruginous-yellow, prosternum and coxae I dark ferruginous; coxae II and III, trochanters and femora II and III brownish; femora I brownish yellow; tibiae I and II ferruginous with a pale yellow line on the outer side, tibiae III brownish, pale yellow at the base; tarsi ferruginous, the basal segments pale yellow. Wings hyaline, with a faint cloud in the apical half of the radial cell and the upper part of the fourth cubital cell.

The coloration of the clypeus appears to be variable: in the type it is yellow, with a black transverse mark in the middle, whereas in the specimen



before me there is only a transverse yellow line, slightly interrupted in the middle, at the base.

Length (h. + th. + t. 1 + 2), 7 mm.

Described from a female from N.W. Borneo, Sarawak, Kuching, 1899 (SHELFORD) in the collection of the Oxford University Museum (no. 1900, 11207). I compared this specimen with CAMERON's type (Br. Mus.) in 1934.

Recently Mrs. M. E. WALSH collected a female of this species in S. Borneo (Loa Teboek, 3 July 1937), which differs from the specimen described above as follows: scutellum and postscutellum reddish, apical fascia of first tergite partly obsolete, third and fourth tergite with small lateral spots, fifth tergite black.

Ancistrocerus bilaminatus, new species.

This species may easily be confused with *Odynerus multipictus* SM., with which it agrees in size and coloration. However, the first tergite bears a distinct transverse carina, whereas *O. multipictus* has only a faint indication of such a structure. The median incision of the horizontal area of the propodeum is wider, the lower part of the concavity is abruptly narrowed towards the abdomen, the sides thus being angular below. The apical margins of the second and third abdominal segments are depressed, and produced into short, thin, somewhat flaring, margins.

The two yellow fasciae on the first tergite are connected at the sides by a short lateral, longitudinal, line; the second abdominal segment has a median and a posterior transverse fascia (in *O. multipictus* there are two lateral spots and a posterior fascia).

A. bilaminatus appears to resemble *Odynerus laminiger* GRIBODO (Bull. Soc. Ent. Ital. 23, 1891, p. 299), which was described from Liangtéan in Borneo but according to the description of that species the apical margins of all abdominal segments are depressed and testaceous.

Malaya: 1 ♂, Selangor, Bukit Kutu (3500'), H. M. PENDLEBURY; 1 ♀, S. Borneo, Beroet Island, W. of Sumatra, Sept. 1924, C. BODEN KLOSS and N. SMEDLEY (Mus. Buitenzorg); 1 ♀, S. Sumatra, Ranau, 24 Aug. 1933, Dr. H. R. A. MULLER (holotype, coll. m.); 1 ♂, Borneo, Sarawak, Kuching, SHELFORD (Oxf. Mus., no. 1900, 11203); 3 ♂♂, W. Java, Djampang Tengah, Mt. Tjisoeroe, Mrs. M. E. WALSH (one of these is the allotype, coll. m.).

In the specimens from Java the anterior fascia of the second tergite is slightly interrupted in the middle.

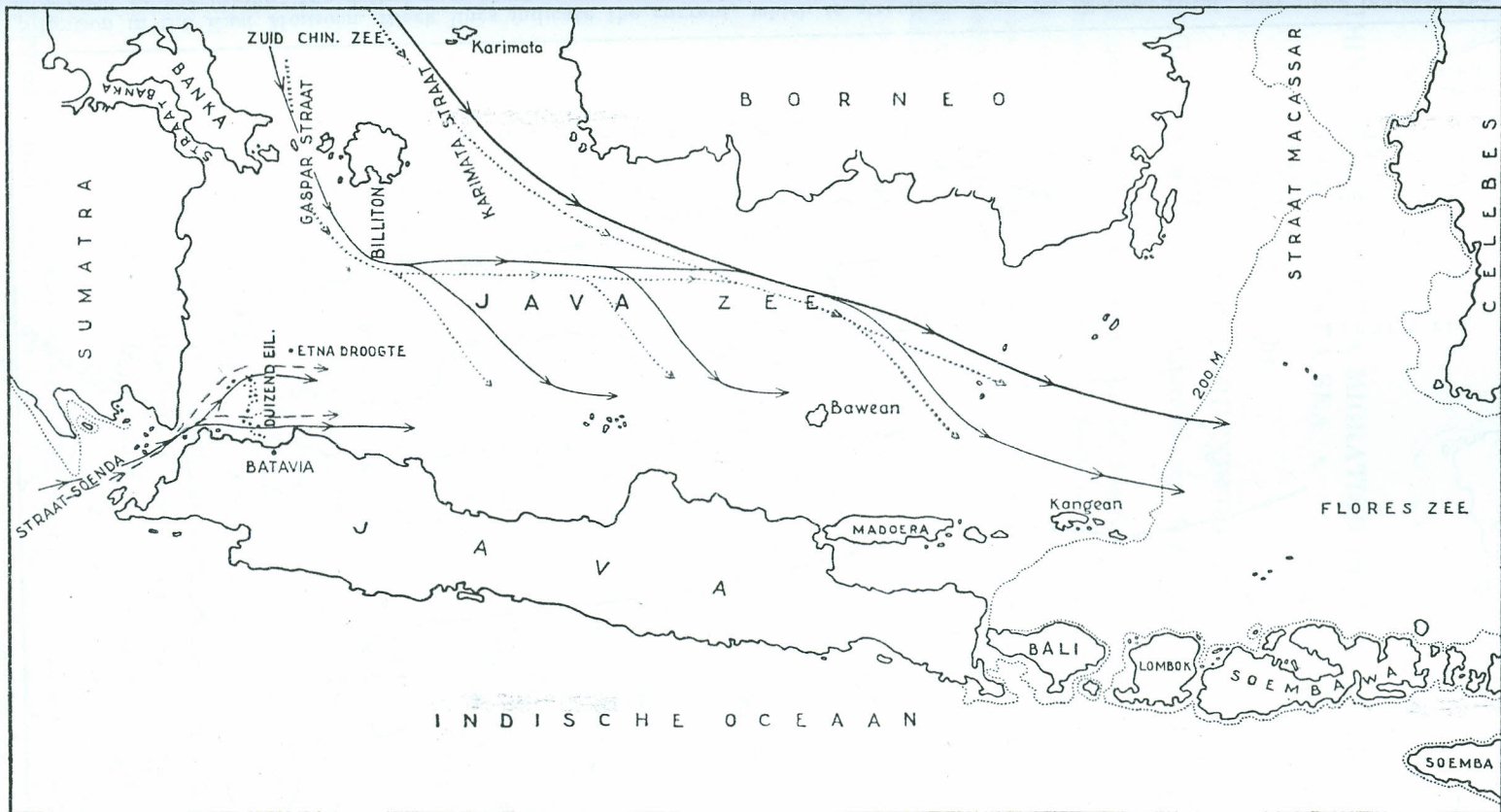
The Museum at Leiden possesses an *Ancistrocerus*-specimen from Sumatra (MULLER leg.) which probably represents a closely allied, hitherto undescribed species. The sides of the propodeal concavity are not angular below and the fourth abdominal segment has a distinctly depressed apical margin. As the specimen is unique and not in good condition, I prefer to leave this form unnamed until more material is available.

Gribodia ZAVATTARI.**Gribodia confluenta (SM.).**

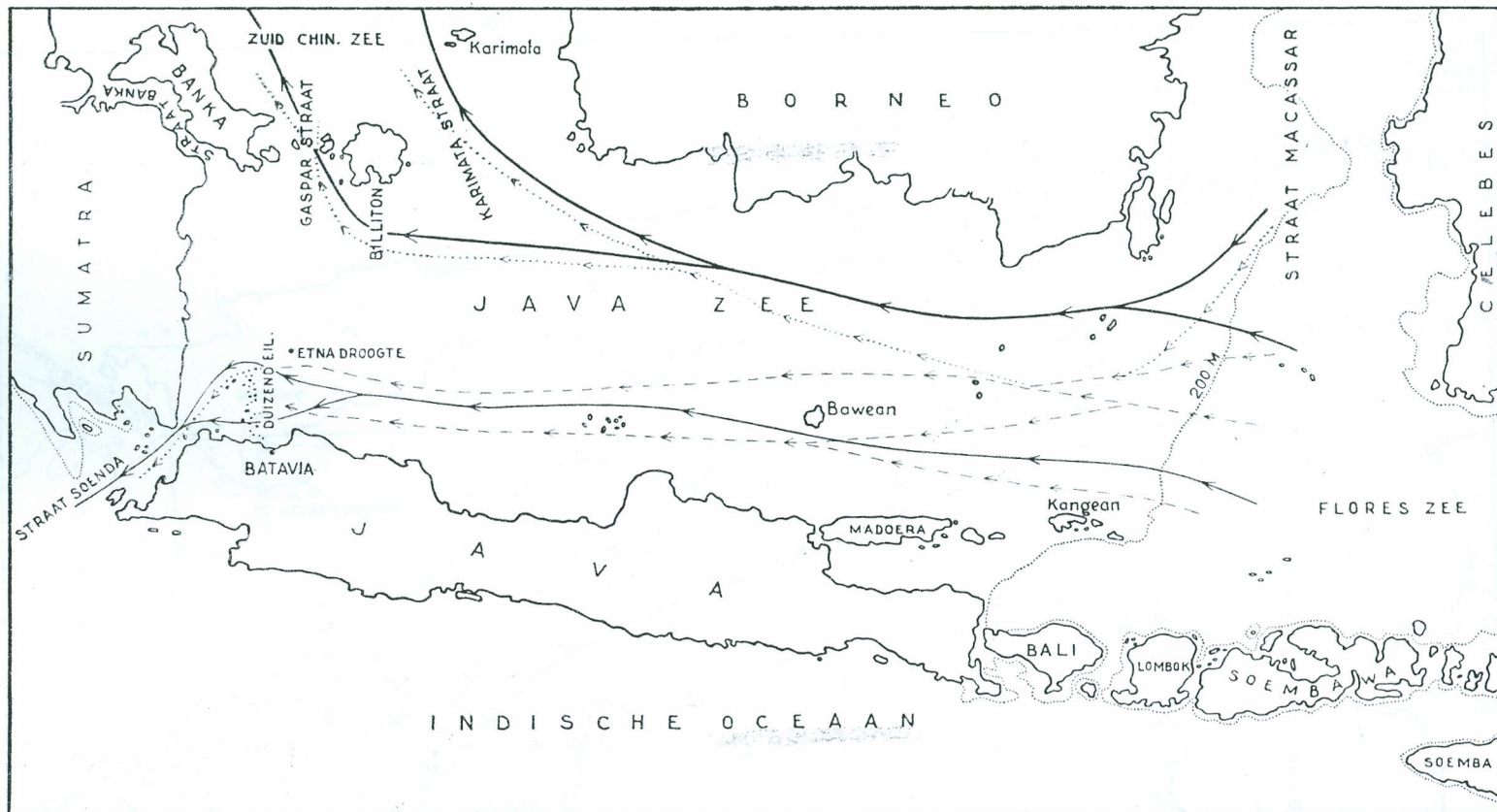
- ! 1857. SMITH, F., Cat. Hym. Br. Mus. V, p. 62, ♀ (*Odynerus confluentus*, Sumatra).
1891. GRIBODO, G., Bull. Soc. ent. Ital. 23, p. 267, ♀♂ (*Monobia cavifrons*, Pulo Laut).
! 1897. BINGHAM, C. T., Fauna Br. India, Hym. I, p. 367, ♀ (*Odynerus confluentus*, Tenasserim, Sumatra).
! 1902. CAMERON, P., Jl. Straits Br. As. Soc. 37, p. 112, ♀ (*Odynerus hyades*, Borneo, Sarawak).
1903. CAMERON, P., Ibid. 39, p. 168 (*Odynerus hyades*).
1910. MEADE-WALDO, G., Ann. Mag. Nat. Hist. (8) VI, p. 100 (*Odynerus confluentus* = *hyades*).
1912. ZAVATTARI, E., Arch. f. Naturgesch. 78A, H. 4, p. 162, ♀♂ (*Gribodia cavifrons*, Malaya, Borneo, Pulo Laut).
1929. DOVER, C., Bull. Raffles Mus. 2, p. 45 (*Odynerus confluentus*, Borneo, Sarawak).
1931. DOVER, C., Jl. Fed. Mal. St. Mus. 16, p. 255 (*Odynerus confluentus*, Malaya).

As has been stated by CAMERON (1903), this species is variable as regards the amount of yellow on the body and the legs.

In the British Museum I examined the types of SMITH and CAMERON, and two specimens from the BINGHAM collection: a female from Tenasserim, Thaungyin Valley, agreeing with SMITH's type, and a very large and dark female from Assam, Margherita. The latter specimen has a black spot on the clypeus, the markings on the sides of the thorax much reduced, the scutellum black, and only the first and second abdominal segments with yellow apical fasciae. — Further specimens examined: 1 ♂, E. Borneo, Pelawan Besar, Mrs. M. E. WALSH (coll. m.); 1 ♀, Sumatra, Serdang, Tandjong Morawa, Dr. B. HAGEN (Mus. Leiden); 1 ♂, Mentawai Isl., Sipora, Dr. H. H. KARNY (Mus. Buitenzorg; in this specimen the yellow markings are very extensive); 6 ♀♀, W. Java, Djampang, Mts. Tjimerang and Tjisoeroe, F. A. TH. H. VERBEEK and Mrs. M. E. WALSH (coll. m.) and 1 ♂, W. Java, Radjamandala (400 m), Mrs. M. E. WALSH (coll. m.).



Situation in the Westmonsoon. For an explanation see the East Monsoon Chart.



Situation in the East Monsoon. Black lines indicate the current, which is strongest near the Borneo coast. Red lines indicate the movement of the lajang; the dotted ones show a movement which is more or less hypothetical thus far, the dashed show the movement which is more or less certain.