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THE CICADA GENUS *CHREMISTICA* STÅL (HEMIPTERA: CICADIDAE) IN SUNDALAND

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This study presents a revision of the 17 species of the cicada genus *Chremistica* Stål occurring in Sundaland: Malayan Peninsula, Java, Sumatra and Borneo. Nine species were already known to science: *Chremistica biloba* Bregman, *C. bimaculata* (Olivier), *C. guamusangensis* Salmah & Zaidi, *C. kecil* Salmah & Zaidi, *C. minor* Bregman, *C. nesiotis* Breddin, *C. pontianaka* (Distant), *C. tridentigera* (Breddin), and *C. umbrosa* (Distant). Eight species are new to science: *Chremistica borneensis*, *C. brooksi*, *C. cetacauda*, *C. echinaria*, *C. hollowayi*, *C. malayensis*, *C. niasica*, and *C. sumatrana*. The Sundaland species of *Chremistica* belong to three species groups: the *C. pontianaka* group, the *bimaculata* group and the *tridentigera* group. A key to the species is presented for the identification of the males of *Chremistica* from Sundaland. The geographical distributions of the species are presented in maps.

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Key words. – *Chremistica*; Cicadidae; taxonomy; new species; key; distribution; Sundaland; South East Asia.

The first aim of this paper is to contribute to the knowledge of cicada biodiversity in Sundaland: the Malayan Peninsula south of the Isthmus of Kra, Sumatra, Borneo and Java, and the small islands between and around these islands. The cicada inventories in nature reserves and other areas in Peninsular Malaysia and in the Bornean states of Malaysia, Sabah and Sarawak, have been strongly intensified in the last decade under the supervision of the Center for Insect Systematics, Universiti Kebangsaan Malaysia and the Institute for Tropical Biology and Conservation, Universiti Malaysia Sabah. These activities have greatly increased our knowledge of the cicada fauna (e.g. Zaidi & Ruslan 1995a, b, c). Many new species have been described and several genera have been revised taxonomically in recent years (e.g. Duffels & Zaidi 2000, Duffels 2004). Nevertheless, several genera still need to be revised, and quite a number of undescribed species are still awaiting description. Keys to genera and species, and good descriptions and illustrations of species greatly facilitate a reliable identification of the species. This basic systematic work is regarded as a prerequisite for further research on cicada biodiversity. Biodiversity studies of cicadas in Sulawesi, New Guinea, and the West

Pacific, have already demonstrated that cicadas can be instrumental in recognizing hot spots of species richness and areas of endemism with unique biota (e.g., Boer & Duffels 1997).

The genus *Chremistica* Stål, 1870 contains 41 species occurring in India, Sri Lanka, continental South East Asia, Taiwan, Philippines, Malayan Peninsula, Sumatra, Borneo and Java, the Lesser Sunda Islands, viz., Lombok, Sumba, Sumbawa and Timor, and Sulawesi, while one group of species is recorded from Madagascar (Metcalf 1963; Bregman 1985). The present paper presents a revision of the species of *Chremistica* of Sundaland: the Malayan Peninsula south of the Isthmus of Kra, Sumatra, Borneo and Java, and the small islands between and around these islands. A key to the 17 *Chremistica* species recorded from this area is presented together with descriptions and illustrations of the species. Eight species are new to science.

HISTORY OF THE GENUS

Stål (1870) described *Chremistica* for the first time as a subgenus of *Cicada*. In the same publication, *Cicada viridis* Fabricius, 1803 and two new species,

Cicada (*Chremistica*) *tagalica* and *Cicada* (*Chremistica*) *semperi* were attributed to *Chremistica*. In 1904, Distant (1904a) designated *Cicada* (*Chremistica*) *viridis* as the type species of *Chremistica* (see also the discussion at the end of this chapter).

In the same year, Distant (1904b) described the new genus *Rihana* with *Fidicina ochracea* Walker, 1850 as type species. The nomenclature became really confusing when, only two years later, Distant regarded *Cicada* (*Chremistica*) as a synonym of *Rihana* (Distant 1906a, b). In his synonymic catalogue of Cicadidae, Distant (1906b) included 44 species in the genus *Rihana*; 13 species of *Rihana* being recorded from the Oriental region. The synonymy proposed by Distant was corrected by Kirkaldy (1907), who published some annotations to Distant's 1906 catalogue including the remark that Distant's name *Rihana* should be a junior synonym of *Chremistica*. In spite of the fact that Kirkaldy's correction was quite right, the name *Rihana*, instead of *Chremistica*, was used for almost two more decades. Horvath (1926) was the first author after Kirkaldy who used the name *Chremistica* and explicitly mentioned *Rihana* as a junior synonym (see Metcalf 1963 pages 167-170 for a chronological overview).

In his classic publication 'Cicadas of Malaysia' Moulton (1923) presented a key to the five species of *Rihana* from Malaysia: *R. pontianaka* (Distant, 1888), *R. germana* (Distant, 1888), *R. viridis* (Fabricius, 1803), *R. bimaculata* (Olivier, 1790) and *R. pisanga* Moulton 1923. The name 'Malaysia' was used by Moulton (l.c.) for the area comprising: the Malayan Peninsula south of the Isthmus of Kra, Sumatra, Borneo, Palawan, Java, Bali, and the small islands between and around these larger islands. Moulton's 'Malaysia' stands for the same area that is called 'Sundaland' in the present paper. A few years later Singh-Pruthi (1925) and Moulton & China (1926) presented the first figures of the male genitalia of cicadas, that proved their value for identification. Between 1923 and 1955 only three species, all from China, were added to *Chremistica* by respectively Liu (1940) and Chen (1940, 1943). The catalogue by Metcalf (1963), which includes all literature available at the end of the year 1955, lists 28 species of *Chremistica*, of which 23 are recorded from South East Asia including Sri Lanka, India and China.

An important contribution to the taxonomy of *Chremistica* was made by Bregman (1985). He presented a revision of the *Chremistica tridentigera* group (eleven species) from South East Asia and a phylogenetic analysis of the group mainly based on characters of the male genitalia. Bregman (l.c.) divided *Chremistica* into four subgroups: the *martini* group from Madagascar, the *coronata* group from the Lesser Sunda Islands, the *pontianaka* group from continental

South East Asia and Sundaland, and the *tridentigera* group from Sri Lanka, South India, continental South East Asia and Sundaland. The *martini* group comprised: *C. martini* (Distant, 1905), *C. pulverulenta* (Distant, 1905), *C. hova* (Distant, 1905) and *C. nigrans* (Distant, 1904). The *coronata* group comprised: *C. coronata* (Distant, 1889), *C. operculissima* (Distant, 1897) and *C. timorensis* (Distant, 1892). The *pontianaka* group comprised: *C. atrovirens* (Guérin-Méneville, 1838), *C. germana* (Distant, 1888), *C. nesiotis* (Breddin, 1905), *C. numida* (Distant, 1911), *C. ochracea* (Walker, 1850), *C. pontianaka* (Distant, 1888) and *C. viridis* (Fabricius, 1803). The *tridentigera* group comprised: *C. atra* (Distant, 1909), *C. biloba* Bregman, 1985, *C. minor* Bregman, 1985, *C. mixta* (Kirby, 1891), *C. polyhymnia* (Walker, 1850), *C. seminigera* (Distant, 1909), *C. sempri* Stål, 1870, *C. siamensis* Bregman, 1985, *C. tagalica* Stål, 1870, *C. tridentigera* (Breddin, 1905) and *C. umbrosa* (Distant, 1904). In the last decade, two new species were described from China: *Chremistica longa* by Lei et al. (1995) and *Chremistica maculata* by Chou & Lei (1997). Recently Boulard (2000, 2001b) described three new species, *C. loici* Boulard, 2000, *C. matilei* Boulard, 2000 and *C. elenae* Boulard, 2001 from Madagascar and two new subspecies from the Seychelles. In 2002, Boulard also added one new species, *C. moultoni*, to the fauna of Thailand (Boulard 2002).

CLASSIFICATION

The taxonomic position of *Chremistica*

According to Hayashi (1987) *Chremistica* is closely related to *Cryptotympana* Stål, 1861 (South East Asia) and *Tibicen* Berthold, 1827 (= *Lyristes* Horváth, 1926) (Eurasia and North America). The cladistic analysis of the Cicadoidea presented by Moulds (in press) attributes *Cryptotympana* and *Tibicen* and five genera from Australia to a subgroup of the tribe Cryptotympanini. This subgroup is characterized by (1) the large tymbal covers, that reach laterally to the margin of the operculum and anteriorly to the metathorax, and tightly close the tymbal cavity, and (2) the much enlarged male tergites 2 and 3 with posterior margins that are strongly bent to the posterior at the lateral sides of the abdomen. These same characters are also found in *Chremistica*, so that this genus should be allocated in the same subgroup of the Cryptotympanini. According to Moulds (in press) *Cryptotympana* and *Tibicen* form a monophyletic group because the thecal apex is partly or entire membranous. The narrow membranous apical part of the theca found in *Chremistica* suggests that this genus belongs to the same group. Hayashi (1987) also mentions the completely united uncus as a character

for *Chremistica*, *Cryptotympana* and *Tibicen*.

Chremistica can be distinguished from *Tibicen* and *Cryptotympana* by the triangular head, which is 0.5-0.6 times as long as distance between eyes, the swollen and prominent postclypeus, the well developed median glabrous area on the postclypeus, and the well developed claspers with lateral and medial lobes. In *Tibicen* and *Cryptotympana*, the head is much shorter, the postclypeus less prominent and the glabrous area usually much smaller. *Cryptotympana* can be distinguished from *Chremistica* and *Tibicen* by two characters of the male genitalia, the narrow stick-like uncus, which is spatula-like to (fairly) broad in *Chremistica* and *Tibicen*, and the presence of apical spine-like projections on the theca, which are absent in *Chremistica* and *Tibicen* (Hayashi, 1987).

The uncus shape and the unarmed theca of the Pacific genera *Heteropsaltria* Jacobi, 1902, *Raiateana* Boulard, 1979 and *Nggeliana* Boulard, 1979 which are not included in Moulds' cladistic analysis (in press) suggest that these genera are more related to *Chremistica* and *Tibicen* than to *Cryptotympana*.

Infrageneric relationships in *Chremistica*

Bregman (1985) tentatively subdivided the genus *Chremistica* in four species groups: the *martini* group, the *coronata* group, the *pontianaka* group, and the *tridentigera* group (see introduction). For this revision of the Sundaland species we introduce the new *bimaculata* group for those species of Bregman's *pontianaka* group which have a conspicuous broad black fascia along the anterior margin of the postclypeus. The 17 species of Sundaland are arranged in three groups: *C. pontianaka* group (5 species), the *C. tridentigera* group (5) and the *C. bimaculata* group (7). The *martini* and *coronata* groups are not represented in Sundaland. The subdivision of the genus proposed here is very preliminary since the 24 *Chremistica* species not occurring in Sundaland have not been studied. A more definitive classification of the genus should be based upon comparative morphological study of representatives of all groups of *Chremistica* and related genera, and proper phylogenetic analysis.

C. pontianaka group

The following species are attributed to the *pontianaka* group: *C. pontianaka*, *C. niasica*, *C. hollowayi*, *C. guamusangensis*, and *C. cetacauda*. A possible synapomorphy for the *pontianaka* group is the median glabrous area of the postclypeus that narrows ventrally to the 8th pair of black transverse grooves and continues in a semi-oval area of the ground colour at the clypeal suture while it dorsally continues in a median, often semi-elliptic spot of the ground colour at the frontoclypeal suture.

The medial ends of the upper 8-11 pairs of transverse black grooves are connected by a black line, but in *C. cetacauda*, only the upper 0-3 pairs of black grooves are medially connected. A similar feature is found in some species of the *tridentigera* group. The species of the *bimaculata* group have a conspicuous broad black fascia along the anterior margin of the dorsal side of the postclypeus.

C. bimaculata group

The following species are attributed to the *bimaculata* group: *C. bimaculata*, *C. malayensis*, *C. brooksi*, *C. nesiotis*, *C. echinaria*, *C. sumatrana* and *C. kecil*. A possible synapomorphy for the species of the *C. bimaculata* group is the conspicuous broad black fascia along the anterior margin of the postclypeus, which is formed by the fusion of the mediodorsal black colouration in the upper 4-5 pairs of transverse grooves. A second possible synapomorphy is found in the unmarked underside of the postclypeus.

C. tridentigera group

The following species are attributed to the *tridentigera* group: *C. tridentigera*, *C. biloba*, *C. umbrosa*, *C. borneensis* and *C. minor*. The species of the *tridentigera* group have arc-shaped claspers, which is almost certainly a synapomorphy for the group. The long lateral pygofer lobes, which are at least 3 times as long as wide and sometimes twisted, are synapomorphic for the species of the *tridentigera* group with exception of *C. borneensis*, which has relatively short lobes. Another possible synapomorphy for the species of the *tridentigera* group is the anteriorly more or less distinctly trilobate median black marking on the vertex which is often narrowly connected with the black colouration around the eyes.

List of species

pontianaka group

pontianaka (Distant, 1888)
niasica Yaakop & Duffels sp. n.
guamusangensis Salmah & Zaidi, 2002
hollowayi Yaakop & Duffels sp. n.
cetacauda Yaakop & Duffels sp. n.

bimaculata group

bimaculata (Olivier, 1790)
malayensis Yaakop & Duffels sp. n.
brooksi Yaakop & Duffels sp. n.
nesiotis Breddin, 1905
echinaria Yaakop & Duffels sp. n.
sumatrana Yaakop & Duffels sp. n.
kecil Salmah & Zaidi, 2002

Table 1. Distribution of the species of *Chremistica*.

| Species | Malayan Peninsula | Sarawak | Borneo | | | Sumatra | Java |
|--------------------------|-------------------|---------|--------|------------|--------|---------|------|
| | | | Sabah | Kalimantan | Brunei | | |
| <i>C. pontianaka</i> | • | • | • | • | | | |
| <i>C. niasica</i> | | | | | | Nias | |
| <i>C. guamusangensis</i> | • | | | | | | |
| <i>C. hollowayi</i> | | • | • | | • | | |
| <i>C. cetacauda</i> | | | | | | • | |
| <i>C. bimaculata</i> | | | | | | | • |
| <i>C. malayensis</i> | • | | | | | | |
| <i>C. brooksi</i> | | | | | | • | |
| <i>C. nesiotis</i> | • | • | • | • | • | | |
| <i>C. echinaria</i> | • | | | | | | |
| <i>C. sumatrana</i> | | | | | | • | |
| <i>C. kecil</i> | • | | | | | | |
| <i>C. tridentigera</i> | | • | • | • | • | | |
| <i>C. biloba</i> | | • | | • | | | |
| <i>C. umbrosa</i> | • | | | | | • | |
| <i>C. borneensis</i> | | | • | | | | |
| <i>C. minor</i> | • | • | | | | | |
| Number of species | 8 | 6 | 5 | 4 | 3 | 5 | 1 |

tridentigera* grouptridentigera* Breddin, 1905*biloba* Bregman, 1985*umbrosa* (Distant, 1904)*borneensis* Yaakop & Duffels sp. n.*minor* Bregman, 1985**DISTRIBUTION**

The genus *Chremistica* is recorded from Madagascar, India and Sri Lanka, continental South East Asia, Taiwan, Philippines, Malayan Peninsula, Sumatra, Borneo and Java, Sulawesi and the Lesser Sunda Islands. The genus *Chremistica* comprises 42 species of which 17 occur in Sundaland (Malayan Peninsula, Sumatra, Borneo, Java) (Metcalf 1963; Duffels & Van der Laan 1985, Bregman 1985; Chou et al. 1997; Boulard 2001b, 2002).

The distribution of the Sundaland species of *Chremistica* is given in table 1 and in species distribution maps (figs. 68-75). The highest number of *Chremistica* species has been recorded from the Malayan Peninsula (8 species), while lower numbers are found in Borneo (7 species), Sumatra (4 species), Java (1 species) and Nias (1 species). Of the 17 Sundaland species, 13 species are island or peninsula endemics and 4 species are more widely distributed. The percentage of island endemics for *Chremistica* is highest in Java (1 species: 100%) and Nias (1: 100%), followed by Sumatra (3: 60%), Borneo (4: 57%), and Malayan Peninsula (4: 50%). Some of the island endemics have very restricted distributions: *C. niasica* is

restricted to Nias Island, west of Sumatra, *C. echinaria* is mainly restricted to mountainous areas in Peninsular Malaysia, *C. kecil* has been recorded from one locality, Tasik Chini, in Peninsular Malaysia, and *C. borneensis* has been recorded from Tawau Hills, Sabah, only. None of the four more widely distributed species occur all over Sundaland. Three species, *C. pontianaka*, *C. nesiotis* and *C. minor* occur in the Malayan Peninsula and Borneo. *C. umbrosa* is recorded from the southern part of the Malayan Peninsula, the eastern coastal area of Sumatra, and from Banka Island and various other islands in the southern Strait of Malacca.

MATERIAL AND METHODS

The institutions listed below are the depositories for the material studied. Abbreviations given are used in this paper.

| | |
|--------|--|
| AMNH | American Museum of Natural History, New York |
| BMNH | Natural History Museum, London (former British Museum (Natural History)) |
| KBIN | Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussel |
| MNKM | Muzium Negara Malaysia, Kuala Lumpur |
| MNP | Muséum National d'Histoire Naturelle, Paris |
| MOULDS | Private collection Mr. M. S. Moulds, Greenwich, Australia |
| MZHF | Zoological Museum, Finnish Museum of Natural History, Helsinki |

| | |
|------|--|
| NHMW | Naturhistorisches Museum, Wien |
| PMS | Prirodoslovni Muzej Slovenije, Ljubljana |
| RMNH | Nationaal Natuurhistorisch Museum (former Rijksmuseum voor Natuurlijke Historie), Leiden |
| ROME | Royal Ontario Museum, Toronto, Ontario |
| UKM | Pusat SistematiK Serangga, Universiti Kebangsaan Malaysia, Bangi, Malaysia |
| UMS | Universiti Malaysia Sabah, Kota Kinabalu |
| USNM | United States National Museum, Washington D.C. |
| ZMA | Zoologisch Museum, Universiteit van Amsterdam, Amsterdam |
| ZMH | Zoologisches Institut und Zoologisches Museum, Hamburg |

The maps for the species distributions were printed from the 'Biodiversity Database of the Cicadas of South East Asia and the West Pacific' with the programme MapInfo for Power Mac, version 4.03 on maps of ADC-Worldmap version 2.0 vol. 4 Southern Asia & Australia. The localities and other data from the specimen labels in the database are filed in the programme File-Maker Pro 4.0. The information about geographical co-ordinates has been retrieved from the following sources: 'Atlas van Tropisch Nederland' (Anonymous 1938), The Times Atlas of the World (Anonymous 1994), and the GEOnet Names Server of the U.S. Defense Mapping Agency (<http://www.nima.mil/gns/html/index.html>).

The terminology adopted in this paper for features of the body and the male genitalia is given in figs. 1-3.

TAXONOMIC PART

Genus *Chremistica* Stål

Cicada (*Chremistica*) Stål, 1870: 714 [For further references before 1980 see: Metcalf 1963; Duffels & Van der Laan 1985].

Chremistica, Hayashi 1987: 124-125; Chou et al. 1997: 265-273; Boulard 2001a: 114-117; Boulard 2001b: 130.

Diagnosis

Medium-sized to fairly large cicadas. Head triangular, 0.5-0.6 times as long as distance between eyes; head including eyes distinctly narrower than pronotum and slightly wider than mesonotum. Postclypeus swollen and prominent. Median glabrous area of postclypeus well developed and ventrally narrowing to 7th pair of transverse ridges. Rostrum ochraceous with median black line and with a dark apex reaching middle or hind coxae. Postclypeus and head with black marking. The species of *Chremistica* from Sundaland, except *C. umbrosa*, can be recognized by the similar pattern of black thorax markings.

Pronotum with black paramedian oblique fissures which are anteriorly connected with a medially interrupted black fascia along anterior margin of pronotum, and posteriorly connected with an V- or U-shaped, median black mark at anterior margin of pronotum collar; these markings often enclose a median anchor spot. Mesonotum with a pair of paramedian obconical fields, a pair of lateral obconical fields enclosing an elongate spot and a central mesonotal mark often enclosing a pair of small oval spots. Tegmina and wings hyaline, tegmina of the Sundaland species either without infuscations or with only two infuscations at the bases of the 2nd and 3rd apical areas; other species of the genus may have more developed pattern of infuscations at the bases of the apical areas and at the apices of the longitudinal veins of the apical areas. Male operculum 1.2-1.3 times as long as wide; apical margin rounded and usually just not reaching posterior margin of sternite 2. Female operculum reaching to half-length of sternite 2. Tymbal covers large reaching laterally to the margin of the operculum and anteriorly to the metathorax, tightly closing the tymbal cavity. Male abdomen with enlarged tergites 2 and 3; posterior margins of tergites 2 and 3 strongly bent to the posterior. Anterior tergite margins in male and female abdomen with black bands. Male pygofer with a pair of basal lobes and a pair of lateral lobes. Uncus triangular. Clasper well developed with lateral and medial lobes. Aedeagus long and stout. Basal plate convex.

The type species of *Chremistica*.

This paragraph partly relies on an excellent nomenclatorial exegesis by Boulard (2001a) on the identities of *Tettigonia viridis* Fabricius, 1803 and *Cicada viridis* sensu Stål, 1869 [nec Fabricius, 1803]. The identity of these species is most relevant for the designation of the type species of the genus *Chremistica*.

Tettigonia viridis Fabricius, 1803 was described from 'America meridionali' with reference to "Stoll. Cic.l.t.18.fig.100" in Stoll (1788). Fig. 100 in Stoll's book depicts a green-brown cicada with light-brown head and pronotum with dark brown to black marking, a green mesonotum with black stripes and a light-brown abdomen. This cicada was named 'De groengerande zingende Cicade' in Dutch [the singing cicada with green margins] and 'La Cigale chanteuse à bords verts' in French, and comes from 'Surinam'.

However, much confusion about the identity of *Tettigonia viridis* Fabricius arose when Stål (1869) redescribed this species and explicitly mentioned *Cicada bimaculata* Olivier, 1790 from Java as a synonym of *Cicada viridis* sensu Stål, 1869 [nec Fabricius, 1803]. *Cicada bimaculata* is the latinized name of another species described by Stoll (1788) as 'De twee-vlak'

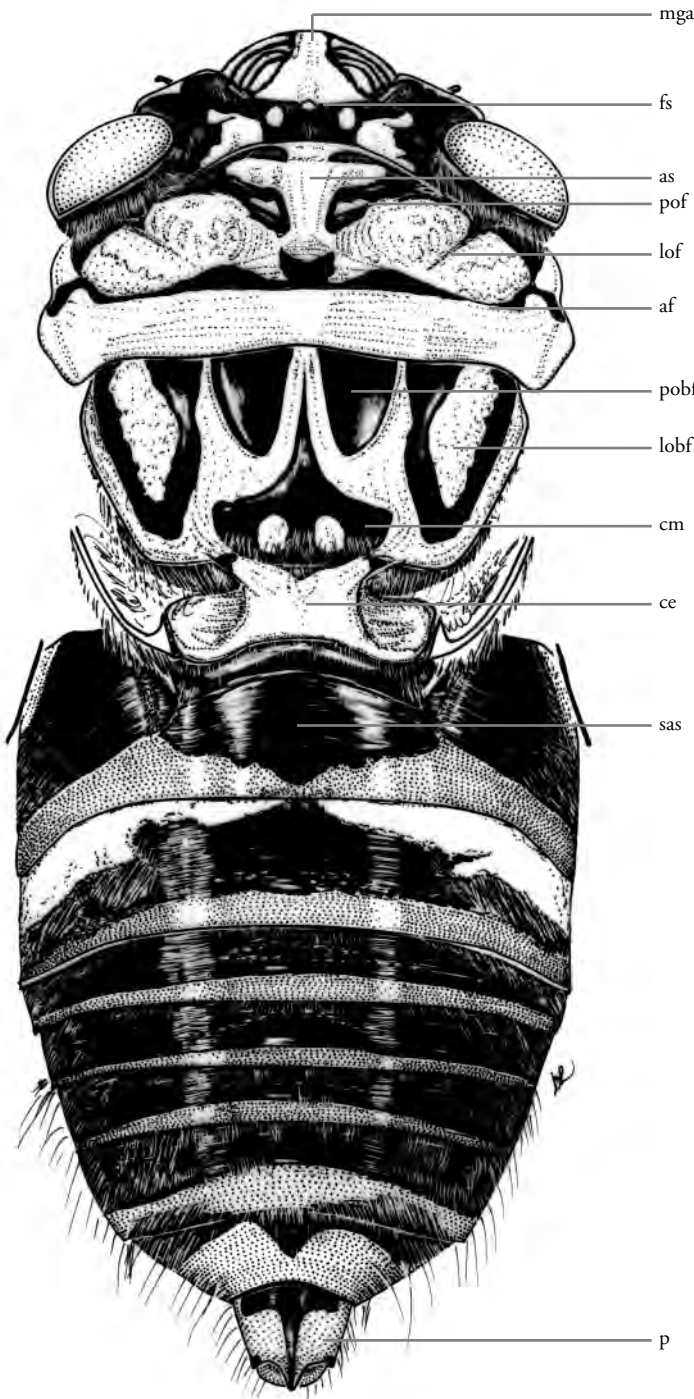
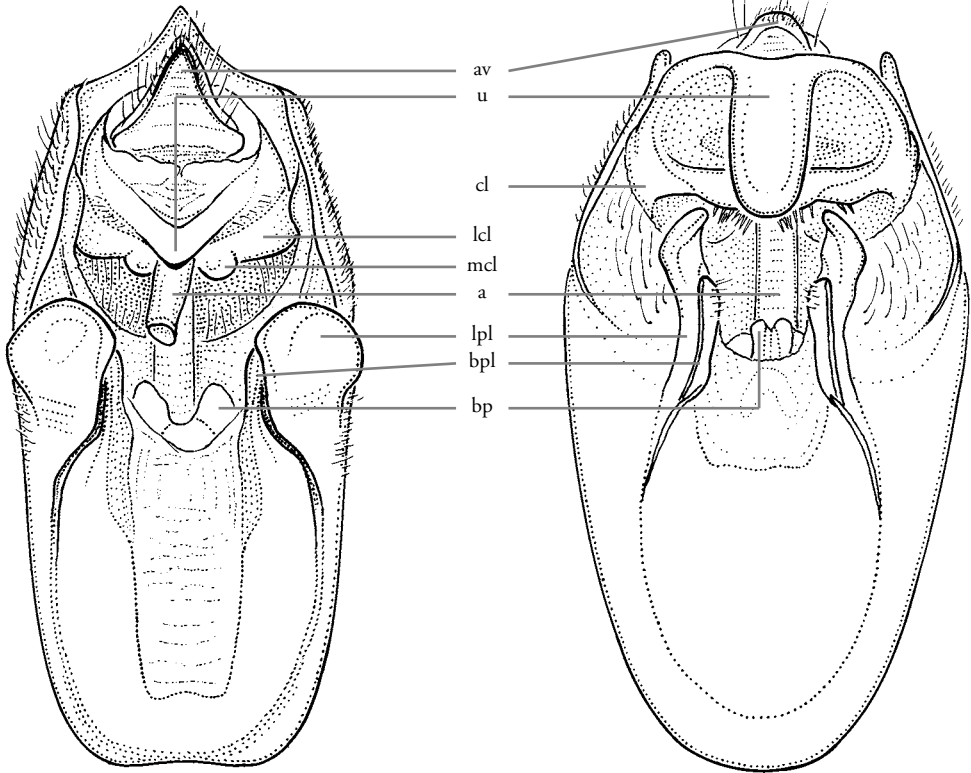


Fig. 1.
Chremistica guamusangensis,
body in dorsal view: af, ambi-
ent fissure; as, anchor spot; ce,
cruciform elevation; cm, cen-
tral mark; fs, frontoclypeal su-
ture; mga, median glabrous
area; lof, lateral oblique fis-
sure; lobf, lateral obconical
field; p, pygofer; pobf, para-
median obconical field; pof,
paramedian oblique fissure;
sas, second abdominal seg-
ment.

2

3



Figs. 2. *Chremistica pontianaka*, pygofer in ventral view. 3, *Chremistica tridentigera*; pygofer in ventral view: a, aedeagus; av, anal valves; bp, basal plate; bpl, basal pygofer lobe; cl, clasper; lcl, lateral clasper lobe; lpl, lateral pygofer lobe; mcl, medial clasper lobe; u, uncus.

in Dutch [the two-patched cicada] and 'La Cigale à deux taches' in French and depicted in fig. 132.

In fact we are dealing with two different species named *viridis*: *Tettigonia viridis* Fabricius, 1803 and *Cicada viridis* sensu Stål, 1869 [nec Fabricius, 1803].

Tettigonia viridis Fabricius, 1803 (= 'De groengerande zingende Cicade' figured by Stoll in fig. 100) is a green cicada from Surinam. The correct name for this species is *Cicada marginata* Olivier, 1790, since 'La Cigale chanteuse à bords verts' was already latinized by Olivier (1790). *Cicada marginata* is currently placed in the neotropical genus *Ariasa* Distant, 1905.

Cicada viridis sensu Stål, 1869 [nec Fabricius, 1803] (= 'De twee-vlak' figured by Stoll in fig. 132) is a species from Java with distinct obconical fields on the mesonotum and two patches of white wax on abdominal segment 2. *Cicada bimaculata* Olivier, 1790 is the correct name for *Cicada viridis* sensu Stål, 1869

[nec Fabricius, 1803]. *Cicada bimaculata* is currently placed in the Southeast-Asian genus *Chremistica*.

Stål (1870) established *Chremistica* as a subgenus of *Cicada* and accommodated three species in the new subgenus: *Cicada viridis* sensu Stål, 1869 from Java and two new species from the Philippines: *tagalica* and *semperi*. Kirkaldy (1907: 305) was the first author who designated the type species of *Chremistica* in the following phrase: 'The type of *Chremistica* is *viridis* Stål (= *bimaculata* Ol),....'. Since *C. bimaculata* (Olivier) from Java is a senior synonym of *Cicada viridis* sensu Stål, 1869 [nec Fabricius, 1803], *C. bimaculata* is the type species of the genus *Chremistica*.

Key to the species of *Chremistica*

This key has been designed for identification of the males of *Chremistica* from Sundaland since the female of two species (*C. brooksi* and *C. cetacauda*) are

unknown, and the female of three species (*C. minor*, *C. borneensis* and *C. guamusangensis*) are only known from one single specimen. This key is therefore of limited value for the identification of the females.

1. Anterior part of postclypeus with a continuous, broad, black, transverse fascia, formed by fusion of black colouration of upper 4-5 pairs of transverse grooves. Underside of postclypeus, including transverse grooves, unmarked *bimaculata* group 2
 - Anterior part and underside of postclypeus with two paramedian series of black transverse grooves 8
2. Abdominal tergite 3 with a pair of lateral oval, white pubescent, waxy patches covering anterior four-fifths of lateral parts of tergite. Male genitalia as in figs. 21-22, Java *bimaculata*
 - Abdominal tergite 3 missing lateral oval, white patches 3
3. Median part of black band on tergite 2 reaching to posterior margin of tergite. Male genitalia as in figs. 40-41. Sumatra *sumatrana*
 - Median part of black band on tergite 2 not reaching to posterior margin of tergite 4
4. Black bands on abdominal tergites 5-6 narrow laterad; black band on tergite 6 covering less than 50% of tergite surface 5
 - Black bands on abdominal tergites 5-6 are equally wide along their whole length; black band on tergite 6 covering more than 50% of tergite surface 6
5. Body length: 23.8-26.3 mm. Medial clasper lobes broadly semi-circular shaped with rounded edges (fig. 32). Southern Thailand, Peninsular Malaysia, Borneo *nesiotis*
 - Body length: 28.6-34.2 mm. Medial clasper lobes with three, sometimes four or five, narrowly triangular teeth at the tips (fig. 25). Southern Thailand; Peninsular Malaysia *malayensis*
6. Body length 30.0-34.8 mm. Lateral ridges of uncus swollen and densely covered with bristles. Southern Thailand; Peninsular Malaysia; Borneo; Sumatra *echinaria*
 - Body length 27.5 mm or less. Lateral ridges of uncus not swollen and without bristles 7
7. Body length 23.9-25.3 mm. Aedeagus with ventral process. Medial clasper lobe triangular-shaped. Male genitalia as in figs. 44-45. Peninsular Malaysia *kecil*
 - Body length: 27.2-27.5 mm. Aedeagus without ventral process. Medial clasper lobe with three narrowly triangular teeth and with jagged posterior margin. Male genitalia as in figs. 29-30. Sumatra *brooksi*
8. Central mesonotal fascia not connected with spots in front of cruciform elevation. Medial and lateral black margins of lateral obconical field often open (fig. 90). Male genitalia as in figs. 56-57. Peninsular Malaysia; Sumatra *umbrosa*
 - Central mesonotal fascia connected with pair of spots in front of cruciform elevation. Medial and lateral black margins of lateral obconical field continuous 9
9. Lateral oblique fissures on pronotum with broad black line. Clasper arc-shaped (figs. 3 & 48) 10
 - Lateral oblique fissures on pronotum without broad black line. Clasper not arc-shaped 12
10. Body length male less than 32 mm. Abdominal segment 3 with lateral white waxy patch. Black marking enclosing ocelli narrowly connected with frontoclypeal suture (width of connection less than distance between lateral ocelli) 11
 - Body length male 33.9-35.7 mm. Abdominal segment 3 without lateral white waxy patch. Black marking enclosing ocelli broadly connected with frontoclypeal suture (connection at least as broad as distance between lateral ocelli). Borneo *borneensis*
11. Uncus broad, slightly longer than wide, and tapering into two bluntly triangular short lobes (fig. 52). Borneo *biloba*
 - Uncus narrow, 3-4 times as long as wide, and slightly narrowing proximad to a very weakly bilobate apical margin (fig. 48). Borneo *tridentigera*
12. Medial ends of upper 8-11 pairs of transverse black grooves on postclypeus connected by black line. Aedeagus without ventral process 13
 - Medial ends of upper 1-3 pairs of transverse black grooves on postclypeus connected by black line; other black grooves not connected. Aedeagus with ventral process (fig. 18). Sumatra *cetacauda*
13. Body length in males 26.4-38.0 mm. Paramedian oblique fissures on pronotum with broad black line. Tegmina with transverse veins at bases of second and third apical areas lightly infuscated. 14
 - Body length in males 20.1-21.7 mm. Paramedian oblique fissures on pronotum with narrow black line. Tegmina without infuscations. Male genitalia as in figs. 64-65. Peninsular Malaysia, Borneo *minor*
14. Pronotum with two broad, black irregular fasciae: one in between paramedian and lateral oblique fissures, and another in between lateral oblique fissure and ambient fissure. Male genitalia as in figs. 14-15. Borneo *hollowayi*
 - Pronotum without such fasciae 15
15. Abdominal tergite 3 either with a white pubescent, waxy band along anterior margin or

- with a pair of white pubescent, waxy patches covering anterior two-thirds to three-fourths of lateral parts of tergite 16
- Abdominal tergite 3 densely silvery to coppery hirsute along anterior margin of tergite 3 but without coverage of white wax. Male genitalia as in figs. 4-5. Peninsular Malaysia, Borneo *pontianaka*
 - 16. Body length males 26.4-29.8 mm. Median U-shaped black mark at anterior margin of pronotum collar connected with black fasciae in paramedian oblique fissures. Nias Island . *niasica*
 - Body length males 34.4-38.0 mm. Median U-shaped black mark at anterior margin of pronotum collar not connected with black fasciae in paramedian oblique fissures. Peninsular Malaysia *guamusangensis*

***Chremistica pontianaka* group**

The *Chremistica pontianaka* group consists of five species: *C. pontianaka*, *C. niasica*, *C. guamusangensis*, *C. hollowayi* and *C. cetacauda*. *C. pontianaka* has a wide distribution in Peninsular Malaysia, Borneo and Sumatra, *C. guamusangensis* is endemic to Peninsular Malaysia, *C. cetacauda* is endemic to Sumatra, *C. niasica* is endemic to Nias Island, and *C. hollowayi* is endemic to Borneo.

A possible synapomorphy for the *pontianaka* and *bimaculata* groups together is the black marking on the head: the dorsal side of the head is black except the anterior parts of the vertex lobes and supra-antennal plates and a pair of spots of the ground colour between lateral ocelli and eyes. The species of the *tridentigera* group have an anteriorly trilobate median black marking on the vertex, which is narrowly connected with the black colouration around the eyes.

A possible synapomorphy for the *pontianaka* group is the glabrous area on the postclypeus that ventrally narrows to the 8th pair of black transverse grooves and continues in a semi-oval shaped area at the clypeal suture, while it dorsally continues in a median, often semi-elliptic spot of the ground colour at the frontoclypeal suture. A black line connects the medial ends of the upper 8-11 pairs of transverse black grooves, except in *C. cetacauda*, in which only the upper 0-3 pairs of black grooves are medially connected. A similar feature is found in *C. minor* and *C. borneensis* of the *C. tridentigera* group. In two other species of this group, *C. tridentigera* and *C. biloba*, the glabrous area on the postclypeus continues in an area of the ground colour at the clypeal suture but the glabrous area is dorsally often separated from the spot at the frontoclypeal suture by a transverse black fascia. *C. umbrosa* has an open connection between the median glabrous area and the semi-oval spot at the frontoclypeal suture but the postclypeus is totally

black below the glabrous area.

Four species of the *pontianaka* group, *C. pontianaka*, *C. niasica*, *C. guamusangensis* and *C. hollowayi* have narrow infuscations at the bases of the second and third apical areas of the tegmina. Such infuscations are found in three other Sundaland species: *C. tridentigera*, *C. biloba* and *C. borneensis*. All species of the *bimaculata* group have unspotted tegmina.

***Chremistica pontianaka* (Distant, 1888)**

(figs. 2, 4-7, 68, 76)

Cicada pontianaka Distant 1888a: 298, Lectotype ♂ [here designated]: ‘Coll. R. I. Sc. N. B. / Borneo Pontianak / Bollen’ (the original printed label ‘Pontianak. / Bollen’ is glued on a more recent, printed, yellow label ‘Coll. R. I. Sc. N. B. / Borneo’), ‘Type’, ‘Syntype’, ‘Cicada / pontianaka / Dist.’ (Distant’s handwriting), ‘Rihana / pontianaka / Dist.’ (handwritten) (KBIN) [examined].

Cicada pontianaka; Distant 1888b: 457; Distant, 1890: Pl. V figs. 7a, b; Distant, 1892a: 97; Distant 1892b: xiii; Noulhier 1896: 254; Noulhier & Martin 1904: 179; Kirkaldy 1907: 305; Kirkaldy 1913: 7.

Cicada daiaca, Breddin 1900: 180; Distant 1906b: 41; Moulton 1912: 129; Moulton 1923: 72, 131 (? in syn. of *Ribana pontianaka*) [not examined].

Rihana pontianaka, Distant 1912: 27; Distant 1913: 39; Moulton 1923: 129; 130; Moulton 1925: 434; Moulton 1928: 511; Schmidt 1928: 107; Lallemand 1931: 76; Singh-Pruthi 1925: 190; Pl. XIX figs. 136A, B; Kato 1932: 154, Pl. XXVII fig. 5; Kato 1944: 2.

Chremistica pontianaka; Metcalf 1963: 179; 180; Bregman 1985: 38; Zaidi & Hamid 1996: 53; Zaidi & Ruslan 1997: 220; Zaidi & Ruslan 1998: 347; Zaidi et al. 1999: 302; Zaidi et al. 2001: 110, 112; Salmah & Zaidi 2002: 227; Schouten et al. 2004: 372, 373.

Lectotype designation

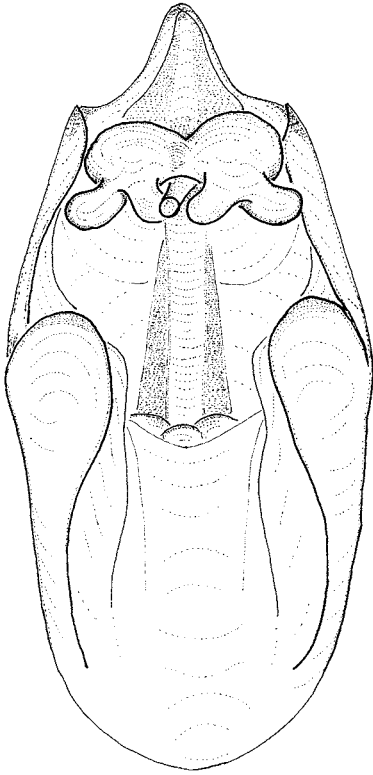
Cicada pontianaka was described after an unknown number of specimens from Pontianak (West Coast, Borneo) deposited in KBIN. This collection contains 4 syntypes of *Cicada pontianaka* from Pontianak. One syntype bearing the identification label ‘Cicada pontianaka Dist.’ in Distant’s handwriting has been designated lectotype. The specimen of *Cicada pontianaka* labeled ‘type’ in BMNH comes from Sumatra (Bock collection) and is not a type specimen.

Description

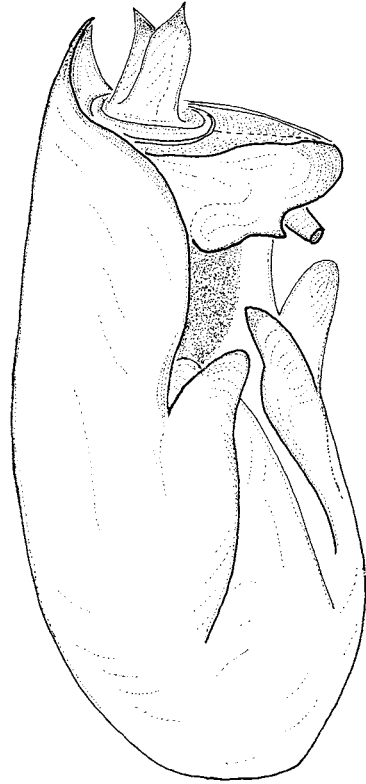
Ground colour of head, pronotum and mesonotum orange-brown to dark ochraceous, sometimes with greenish tinge; pronotum collar ochraceous, but posterior one-fourth to two-thirds or median part sometimes with greenish tinge. Ventral side of body with lateral bands of waxy white pilosity running from eyes to abdominal segment 8.

Head. – Dorsal side black except anterior parts of vertex lobes and supra-antennal plates and a pair of triangular-shaped spots of the ground colour with

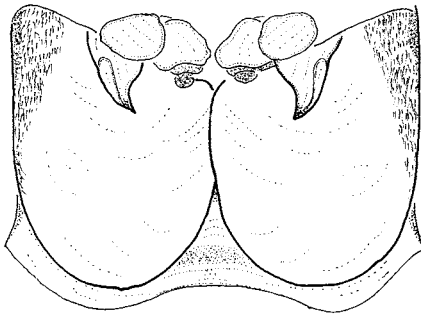
4



5



6



7



Figs. 4-7. *Chremistica pontianaka*. – 4, male genitalia in ventral view; 5, male genitalia in lateral view; 6, male operculum in ventral view; 7, female operculum in ventral view.

inwardly curled anterior tips between lateral ocelli and eyes; spots sometimes enclosing a black dot. Vertex sparsely covered with short white to coppery hairs. Postclypeus fairly strongly prominent, transverse grooves, medial band and basal part of postclypeus with short white to coppery hairs. Median glabrous area of postclypeus ventrally connected with sometimes narrow, semi-oval area of the ground colour at clypeal suture and dorsally continuing in a median, semi-elliptic, sometimes semi-oval, spot of the ground colour at the frontoclypeal suture. Gena, lorum and anteclypeus covered with long white to coppery hairs with exception of glabrous keel of anteclypeus. Rostrum with black-brown apex reaching just beyond middle coxae.

Thorax. – Pronotum. Black fasciae in paramedian oblique fissures anteriorly connected with medially interrupted black fascia along anterior margin of pronotum, and posteriorly connected with an U-shaped, median black mark that touches the black ambient fissure along anterior margin of pronotum collar; markings enclosing a median anchor spot of the ground colour. Black colouration of ambient fissure laterally widened.

Mesonotum. – Paramedian obconical fields reaching to half-length of mesonotum disc. Lateral obconical fields extending to seven-eighths of mesonotum and enclosing a narrow to broad, elongate area, which is sometimes blackish tinged. Central mark often enclosing a pair of small oval spots of the ground colour, basal part of central mark sparsely covered with coppery hairs. Median point of central mark sometimes touching posterior margin of pronotum collar.

Legs. – Coxae pale ochraceous. Fore femora ochraceous with black fascia connecting dark brown spines. Middle and hind femora dark ochraceous with castaneous tinge. Tibiae dark ochraceous, middle and hind tibiae with dark brown annulation at distal ends.

Tegmina and wings. – Tegmina often with bronzy reflection. Basal cell brownish to olivaceous. Transverse veins at bases of second and third apical areas narrowly brownish or black. Venation of tegmina light brownish in basal third, turning dark brown apically. Costal vein castaneous in basal half, apical half black. Wings with light to dark brown venation.

Male operculum (fig. 6). – Castaneous. Basal two-fifths of medial margins slightly overlapping and occasionally narrowly to broadly black or brown-black from base to middle of distal margin. Lateral margin slightly concave, basal half to two-thirds black.

Male abdomen. – Dorsal side dark castaneous to black. Tymbal covers dark brownish laterally turning to light brownish. Black bands along anterior margins of tergites 2-6 reaching medially to three-fourths of segment length, those on tergites 7 and 8 reaching to half of segment length. Dorsal side of abdomen

sparsely covered with golden pubescence. Anterior margin of tergites 3 and 7 and whole segment 8 silvery to coppery hirsute. Ventral side of abdomen (dark) brown to black, median part of sternites 2 and 8 often darkened. Sternites sparsely covered with silvery hairs, paratergites with dense silver pilosity.

Male genitalia (figs. 4-5). – Pygofer ochraceous, dorsally marked with black. Lateral pygofer lobes dark brown, in ventral view broad, apical part semi-circular (fig. 4), and in lateral view with acutely angled incision between lateral pygofer lobe and lateroventral pygofer margin (fig. 5). Basal pygofer lobes with bluntly triangular apical margins reaching to three-fifths of pygofer length, apical parts of lobes curved inward. Uncus triangular, apical part dark brown. Medial clasper lobes semi-circular-shaped with rounded edges, apical parts of lobes slightly curved inward. Lateral claspers lobes slightly longer, narrower and more oblique than in the other species of this group. Surface of lateral clasper lobes sparsely covered with pale ochraceous short hairs. Basal plates strongly convex. Anal valves sparsely covered with pale ochraceous long hairs.

Female operculum (fig. 7). – Ochraceous. Lateral margin weakly convex, basal half or two-thirds brown-black. Laterodistal corner of operculum rectangular to obtuse. Posterior margin slightly sinuate and distinctly curved towards meracanthus.

Female abdomen. – Dorsal side orange-brown with transverse black bands along anterior margins of tergites 2-7; these bands have a median protrusion reaching to two-thirds of segment length. Tergite 8 with a narrow black band with a large triangular protrusion reaching to two-thirds of tergite length or to posterior tergite margin. Black bands on tergites 2-8 widen laterad. Segment 9 dorsally with a median black fascia, which is broadly connected with a pair of paramedian spots, and ventrally with broad black fasciae along anterior halves of lower segment margins, which are distally narrowly connected with another pair of black spots. Anterior margin of sternite 3 with median small black dot, anterior margins of sternites 4 to 7 with black-brown bands between spiracles. Paratergites with white to coppery pilosity and anterior sternite margins sparsely covered with white to coppery short hairs.

Measurements (body length ♂ n=10; other measurements n=6♂ 5♀). – Body length ♂ 31.1-33.8 mm, ♀ 29.3-31.8 mm; head width ♂ 12.0-13.6 mm, ♀ 9.9-11.6; pronotum width ♂ 11.2-13.4 mm, ♀ 10.6-12.4 mm; tegmen length ♂ 39.8-43.0 mm, ♀ 30.0-40.5 mm.

Material examined. – 222♂ 23♀. MALAYSIA: PENINSULAR MALAYSIA: PERLIS: Kaki Bukit, Wang Kelian, 9.xii.1992, Zaidi, Sham, Saiful & Kudin, 1♂ (UKM). – KELATAN: Gua

- Musang, Mendrop, 5.ii.1992, Zaidi, Ruslan & Ismail, 1♂ (UKM); Gua Musang, 2♂ (UKM); Gua Musang, 19-22.ii.1994, Zaidi & Talib, 1♂, same data but coll. Zaidi, Ruslan & Saiful, 1♂ (UKM). – KEDAH: Langkawi, Lubuk Semilang, 5-8.ii.1994, Ruslan, Ismail & Zabidi, 1♂ (UKM). – PAHANG: Bukit Fraser, 2.iii.1999, street lights, M. Zaidi & M. Y. Ruslan, 1♂ (ZMH); Bukit Rengit, 24-27.ii.1991, Amin, 2♂, same data but coll. Fuad, 1♂, 9.ii.1992, S. Abin, 1♂ (UKM); Cameron Highlands, 2.ii.1992, Zaidi, Ruslan & Ismail, 3♂, same data but 15-16.ii.1998, Salleh & Ismail, 3♂ (UKM); Cameron Highlands, Tanah Rata, 2.ii.1992, Ruslan, 1♂ (UKM); Gunung Benom, 5.iv.1967, Ray, L. L., 1♀, same data but 6.iv.1967, 1♀, 7.iv.1967, 2♀, 8.iv.1967, 1♀, 9.iv.1967, 1♀ (MNKM); Kuala Lompat, 8-10.iii.1996, Cynthia Okralis, 1♂ (UKM); Taman Negara, Kuala Juram, 28-29.vii.1995, Zaidi & Ruslan, 1♂ (UKM); Taman Negara, Merapoh, 19-21.ii.1994, Zaidi, Ruslan & Saiful, 8♂, same data but 5.ii.1992, Zaidi, Ismail & Ruslan, 11♂ (UKM); Tasik Chini, Kg. Melayu, 14.iv.1993, Zaidi, Ruslan & Kudin, 1♂ (UKM). – PERAK: Gopeng, Kg. Sungai Itek, Badrol, 1♂ (UKM); Kwala Kangsar ii.iii.1900, B. Jachan vend. 15.vii.1900, 1♂ (ZMH), Kuala Kangsar, 20.i.1996, Reza & Loqman, 2♂ (UKM); Larut Hills, 6.iii.1932, H. M. Pendlebury, 1♂ (MNKM); Pangkor Isl. 25.i.1992, Ostküste, leg. Jäch 7, 1♀ (NHMW). – SELANGOR: Bangi, Uni. Keb. Mly., 26.i.1981, Salmah, 1♂ (UKM), same data but 6.ii.1984, Hanifah, 1♂ (UKM); Bangi, Kamsis E, 22.xi.1987, 1♂ (UKM); Bandar Baru Bangi, 25.xi.1988, Ekling, 1♂ (UKM); Hutan Bangi, 9.iii.1993, Abd. Karim, 1♂ (UKM); Bukit Kutu, iv.1915, 3457', 4♂ (MNKM); Maxwell Hill, 30.iv.1974, Ray L. L. 1♂ (MNKM); Semenyih, Sungai Lalang, 11.i.1992, Azwari, 1♂ (UKM). – KUALA LUMPUR: Kuala Lumpur, 6.iv.1921, V. Knight, 4♂ (MNKM). – MELAKA: Rim, ii.1908, 5♂ (MNKM). – NEGERI SEMBILAN: West Coast, Pulau Rumbia, 7.iv.1931, 1♂ (MNKM); Cape Rachado, Light Home, x.1920, S. Harding, 1♂ (MNKM); Gunung Angsi, 2000-1790', iv.1918, 2♂ (MNKM); Pasoh Forest Reserve, 0.3km ESE station quarters, 10 km W Ayer Hitam, 350 m, 14.ii.1997, at light, M. Kos, buffer zone of regenerating forest (selectively logged), 1♂ 2♀, same data but 11.iii.1997, M. Kos & S. Azman, 3♂ 2♀ (ZMA); 12.ii.1997, M. Kos, 1♂ 1♀ (ZMA); 9.iii.1997, M. Kos & S. Azman, 1♂ (ZMA); Pasoh Forest Reserve, 0.9km ENE station quarters, 10 km W Ayer Hitam, 350 m, 9.ii.1997, at light, M. Kos, trail between primary forest and buffer zone, 3♂ 1♀, same data but 8.iii.1997, M. Kos & S. Azman, 2♂ 2♀, 6.iii.1997, M. Kos & M. Y. Ruslan, 2♂ 2♀, 11.ii.1997, M. Kos, 1♂ 1♀ (ZMA); Pasoh Forest Reserve, 2.2km NNE station quarters, 10 km W Ayer Hitam, 300 m, 10.ii.1997, at light, M. Kos, primary forest, old tree tower, W-side 50 ha plot, 1♂, same data but 7.iii.1997, M. Y. Ruslan & S. Azman, 3♀, 10.iii.1997, M.Y. Ruslan & S. Azman, 2♀ (ZMA); Pasoh Hutan FRIM, 18-19.iii.1995, Ismail & Ruslan, 2♂ (MNKM). – JOHOR: Endau Rompin N. P., at light, 7.iii.2000, G. Withaar, 1♂ (ZMA); Endau Rompin N. P., Junction Logging Rd/Access Rd 02°31'35.3"N 103°23'58.5"E, forest edge, Transect edge 2, At light, 20.ii.2001, M. A. Schouten, 1♂ (ZMA); Endau Rompin, Janing Ridge, 20 min. 02°31'19"N 103°23'59"E, Primary lowland rainforest, Transect primary 6, At light, 29.iii.2001, M. A. Schouten & F. Cheong, 1♀ (ZMA), same data but Transect primary 5, 28.iii.2001, 1♀ (ZMA); Transect primary 4, 27.iii.2001, M.A. Schouten, A. Majanil & M. Renganathan, 1♀ (ZMA); Endau Rompin N. P., Janing Ridge, 5 min., 02°31'33"N 103°24'03"E, Disturbed forest, Transect disturbed 6, At light, 26.iii.2001, M. A. Schouten, 1♀ (ZMA). – BORNEO, MALAYSIA, SABAH: Beaufort, Kg. Selangon, 3.xi.1991, Khamis Selamat, 1♂ (UKM); Beaufort 105 km of Long Pa Sia area: airstrip Long Pasia, 4°24'N 115°43'E, 16.iv.1987, Van Tol & Huisman, at light, 18.20.20.30 h., semicultivated area. 1000m, asl. near disturbed evergreen trop. rainforest, 3♂ (RMNH); Danum Valley, 5°01'N 117°47'E, 14.ix.1987, 220m, A. H. Kirk-Spriggs, N. M. W. Sabah (Borneo) Expedition, NMW., z. 1987.094, Light trap sample roadside, secondary forest; 1♂ (NHMW); Lembah Danum, 25-30.viii.1991, M. S., Zaidi, Mail & Lan, 3♂, same data but 22-26.viii.1992, Ismail, Sham & Yusof, 1♂, 23.viii.1994, Sham, 1♂, 16.ix.1995, Zaidi, 3♂ (UKM); 60 km W of Lahad Datu, Danum Valley Field Centre at junction Sg. Segama and Sg. Palum Tambun, 4°58' 117°48'E, at light, 21.iii.1987, 18.30.20.30, Clearing nr E trail, edge of untouched evergr. lowl. rainforest, Leg. van Tol & Huisman, 2♂ (RMNH); Inanom, 20.ix.1991, Ferdinand, 1♂ (UKM); Kota Kinabalu, Bukit Padang, 2.iii.1985, Rosminah, 1♂, same data but 9.iii.1985, Faridah, 1♂, 1.iv.1987, Sahfol, 1♂, 6.xi.1989, S. R. Sonay, 1♂, 20.viii.1990, H.K. Chan & Raj, 1♂ (UKM); Kota Kinabalu, UKMS, 10.I.1985, Sarimah D., 1♂ (UKM), same data but 20.iii.1985, Zuraidah, 1♂, 3.ii.1987, Han Twai Hin, 1♂, 3.x.1987, M. Salleh, 2♂, 12.iv.1997, Nordin Wahid, 1♂ (UKM); Weston, 20.viii.1986, Shafol, 1♂ (UKM); Tawau Hill, jungle lodge, 300 m, garden/secondary growth, at light, 25.iii.2001, J. P. & M. J. Duffels, 1♂ (ZMA); Tawau, Tibow, 5-9.iv.2000, elev. 390m, Noramly Muslim, 29♂ (UKM); Tawau, Hills Park, 1-3.iv.2000, Noramly Muslim, 1♂ (UKM); Lahad Datu, Tabin, km 21, 14-16.iii.1998, Nordin, 3♂ (UKM). – SARAWAK: Baram River, 21.v.1979, Ray L. L., 1♂, same data but 7.x.1920, J. C. Moulton, 1♀ (MNKM); Bintulu, Taman Hidupan Liar, 3.iii.1992, Zaidi, 7♂ (UKM), same data but 14.viii.1994, Zaidi & Talib, 6♂; Bintulu, Pekan, 3.iii.1992, Zaidi, 1♂ (UKM); Miri, 2-8.ii.1993, Salleh & Ismail, 3♂ (UKM); Kedurung, Light House, J. C. Moulton (Sarawak Museum), 22.xii.1913, 5♂ (ZMH); Kedurung, Moulton, 1♂ (USNM); Kuching, 3♂ (AMNH); Sarawak, Max Weber, Borneo Exp. 3♂ (RMNH); Coll. 1904 v. d. Bergh., Coll. D. Mac Gillavry, 1♂ (ZMA); Lanjak Entimau, 28-29.ii.1992, Zaidi, 10♂ (UKM); Borneo, Sarawak, 1♂ (USNM); Limbang, Mendamit, 18-21.ii.1991, Zaidi, 1♂ (UKM); Gunung Mulu Nat. Park, Site 14, ii, Camp 2.5 Mulu, 1000m, 113461, Lower 1 montane for. MV-canopy/understorey, J. D. Holloway, RGS Mulu Expedition, B.M. 1978-206, 5♂ (BMNH); Sibul, 1-3.iii.1992, Zaidi, 5♂ (UKM); Saribas, iii.1923, 1♂, same data but ix.1923, 1♂ (MNKM); Kampus UPM, 2-3.iii.1992, Zaidi, 9♂, same data but 10.x.1992, 8♂ (UKM). – INDONESIA: KALIMANTAN: Balikpapan, H. F. Harst, 1911, 2♂ (RMNH); Kuning, Kec. Ketapang, 80m, 7.xi.1999, 01°06'00"S 110°28'22"E, Oilpalm plantation near riverine forest, at light, M. Lammertink, 8♂ (ZMA); Pontianak, Bollen, 2♂ paralectotypes, same data but with label: Rihana pontianaka Dist., 1♂ paralectotype (KBIN); Kalimantan Timur, W. of Tanjungredeb, 0°51'49"N 117°11'14"E, 50-75m, M. Lammertink, Camp '35' Berau, Forest Management Project, selectively logged Dipterocarp forest, 1♂ (ZMA); Borneo, East Kalimantan, logging camp Bongan, Tanjung Soke, W of Gunung Beratus, 116°10'05"E 0°56'25"S, leg. Resit Sözer, 12.xii.1999, 1♂, same data but 10.xii.1999, 2♂ (ZMA), 11.xii.1999, 7♂ (ZMA). – BORNEO: Borneo, Le Moulnt vend. via Reinbek, Eing. Nr. I, 1957, 2♂ (ZMH);

Borneo, Breitenstein, 1850, 1♂ (NHMW); Schwanen, Borneo, 1♀ (RMNH); Borneo, HE 5329, 5♂ (MZHF); Borneo, Coll. Signoret, 1♂ (NHMW); Borneo, ex. coll. Schulz, Eing. R, 1956, W. Wagner ded., 2♂ (ZMH). – SUMATRA: Sumatra (Bock), Type [error], 1♂ (BMNH); Indragira, Songei Lalah, 14.vii.1900, W. Burchard leg., 1♂ (ZMH). – RIOUW: Riouw, D. K. G. Blokzeijl, 1♂ (RMNH). – AMBON: Ambon, Prager, Museum Natura Artis Magistra, 1♂ (ZMA). – JAVA: Java, Peitl. 855, 2♂ (NHMW); Java, Muller, 1♂ (RMNH); Aurora, 1884, 1♀ (NHMW).

Distribution (fig. 68)

C. pontianaka is widespread in Peninsular Malaysia and Borneo (Sabah, Sarawak, Kalimantan). Specimens from Luzon, Philippines (USNM) have tentatively been identified as *C. pontianaka*. The occurrence of *C. pontianaka* in Sumatra needs confirmation. The records from Java are doubtful. The records of *C. pontianaka* from the Lesser Sunda Islands and islands east of Wallace's Line (Moluccas, Amboina, Lombok, Sumbawa, Timur and New Guinea) in Metcalf (1963) are probably based on misidentifications.

Chremistica niasica Yaaqop & Duffels sp. n. (fig. 69, 77)

Type material. – 11♂ 3♀. Holotype ♂: 'G. Madjeja / Noord Nias / Mitschke 10.xiii.1993' (BMNH). – Paratypes: INDONESIA: SUMATRA: NIAS ISLAND: G. Madjeja Noord Nias, Mitschke^{3rd} trim '95, 3♂ 2♀ (BMNH) 1♂ (ZMA) 1♂ (UKM); Eil[land] [= Island] Nias, E. E. W. G. Schröder, don. 04.1908, 3♂ (RMNH); Nias, Mircla Rusly, Distant-Coll., 1911-383, 1♂ (BMNH); Nias, Kleiweg de Zwaan, 1911, 1♂ (RMNH); M. Nias, Kalim Bungo, 1ste sem '96, H. Mitschke, 1♀ (BMNH); Sumatra, Levick Bequest, 1941-83, 1♂ (BMNH).

Diagnosis

C. niasica can be separated from *C. pontianaka* by the conspicuous white wax covering the pubescent, anterior two-thirds to three-fourths of lateral parts of tergite 3; the pubescence is also found in *pontianaka* but it is not covered with white wax. The male genitalia of this species are like those in *C. pontianaka*. *C. niasica* (body length in males: 26.4-29.8 mm) is somewhat smaller than *pontianaka* (31.1-33.8 mm).

Description

Ground colour of head and thorax dark ochraceous. Ventral side of body with lateral bands of waxy white pilosity running from eyes to abdominal segment 8.

Head. – Dorsal side black except anterior parts of vertex lobes and supra-antennal plates and a pair of broadly triangular spots of the ground colour tapering

toward posterior supra-antennal plates and occasionally enclosing a black dot. Median glabrous area of postclypeus ventrally connected with, sometimes narrow, semi-oval area of the ground colour at clypeal suture and dorsally continuing in a median, semi-elliptic, sometimes semi-oval area of the ground colour at frontoclypeal suture; some paratypes have a transverse dark line near the 3rd pair of postclypeal transverse ridges. Gena, lorum, and anteclypeus with exception of keel sparsely covered with long silvery hairs. Rostrum reaching just beyond middle coxae.

Thorax. – Pronotum. Black fasciae in paramedian oblique fissures triangularly widened, anteriorly connected with medially interrupted black fascia along anterior margin of pronotum and posteriorly connected with an U-shaped, median black mark that just reaches the black band in the ambient fissure along anterior margin of pronotum collar. Black colouration of ambient fissure laterally widened. Median anchor spot often enclosing a median longitudinal, dark brown, narrow line extending to one-fourth and occasionally to three-fourths of length of spot. Lateral parts of anchor spot sometimes separated from median part and forming oval spots of the ground colour.

Mesonotum. – Paramedian obconical fields reaching to half-length of mesonotum disc. Lateral obconical fields extending to fourth-fifths or seven-eighths of mesonotum and enclosing a large, narrowly to broadly elongate spot. Apical parts of paramedian obconical fields and mediolateral margins of lateral obconical fields sometimes connected to anterolateral edges of central mark. Anterior parts of paramedian obconical fields sometimes fused.

Legs. – Marking and colouring as in *pontianaka*.

Tegmina and wings. – Marking and colouring as in *pontianaka*.

Male operculum. – Pale castaneous. Medial margins slightly overlapping. Black colouration of medial margin extending from base to middle of apical margin. Lateral margins weakly undulate or slightly concave with white to coppery pilosity, basal one-fourth to one-third brown.

Male abdomen. – Dorsal side black-brown to brown. Tymbal covers castaneous, laterally often turning to light brownish. Conspicuous, white pubescent, waxy patches cover anterior two-thirds or three-fourths of lateral parts of tergite 3. Median part of anterior margin of tergite 3 sometimes sparsely covered with white pilosity connecting the two lateral patches. Median part of posterior margin of tergite 2 in most specimens orange-brown. Posterior margins of tergites 3-6 with very narrow red-brown band. Lateral parts of anterior margins of tergites 7 and 8 with white to coppery pilosity. Ventral side of abdomen light to dark brown, sternite 8 dark brown.

Anterior parts of sternites and paratergites silvery hirsute.

Male genitalia. – As in *C. pontianaka* but surface of lateral clasper lobes densely covered with ochraceous short hairs.

Female operculum. – As in *pontianaka* but lateral margins more convex and densely covered with white hairs.

Female abdomen. – Black bands along anterior margins of tergites 2-4 reach medially to two-thirds of segment length. Tergites 5-8 black with narrow red-ochraceous hind margins, but posterior halves of tergites 7 and 8 often ochraceous. Segment 9 often with variable black marking, occasionally whole segment black. Dorsal side of abdomen coppery to silvery hirsute, especially along anterior segment margins. A pair of conspicuous white pubescent, waxy patches cover anterior halves of lateral parts of tergite 3. Ventral side brownish; sternites 4 to 6 with somewhat darkened bands along anterior margins and between pairs of spiracles; sternite 7 with dark brown marking. Paratergites 3-7 waxy silvery hirsute, anterior and lateral parts of sternites silvery hirsute. Black median marking at anterior margin of sternite 3.

Measurements (body length ♂ n= 10; other measurements n= 6♂ 3♀). – Body length ♂ 26.4-29.8 mm, ♀ 23.7-25.3 mm; head width ♂ 11.6-12.0 mm, ♀ 10.4-11.4 mm; pronotum width ♂ 11.9-12.1 mm, ♀ 10.3-11.9 mm; tegmen length ♂ 39.4-43.1 mm, ♀ 37.0-37.6 mm.

Distribution (fig. 69)

This species is probably endemic to Nias Island, west of Sumatra. The specimen labeled 'Sumatra' probably also comes from Nias Island.

Chremistica guamusangensis Salmah & Zaidi, 2002
figs. 1, 8-13, 69, 78

Chremistica guamusangensis Salmah & Zaidi, 2002: 225, 226, 231, figs. 1-4. Holotype ♂: 'Kelantan: Gua / Musang / 19-22.ii.1994 / Zaidi and Talib' 'Type' (UKM) [examined].

Diagnosis

This species resembles *C. pontianaka* but can be distinguished by the marking on the pronotum: the median U-shaped black mark at the anterior margin of the pronotum collar is not connected with the black paramedian oblique fissures, while the black median mark and the black paramedian fissures are fused in *C. pontianaka*. *C. guamusangensis* (body length in males: 34.4-7-38.0 mm) is also slightly larger than *C. pontianaka* (31.1-33.8 mm) The males of *C. guamusangensis* have a characteristic, white

pubescent, waxy band along the anterior margin of abdominal tergite 3; this band is medially narrow or interrupted and widens laterally to two-thirds of segment length. *C. pontianaka* has a similar white pubescence along anterior margin of tergite 3 but this is not covered by white wax.

Description

Ground colour of head and thorax dark yellow to ochraceous, occasionally orange-brown to dark ochraceous, pronotum collar often with greenish tinge. Ventral side of body with lateral bands of waxy white pilosity running from eyes to abdominal segment 8.

Head. – Dorsal side black except anterior parts of vertex lobes and supra-antennal plates and a pair of more or less broadly triangular, spots of the ground colour, enclosing a brown dot, between lateral ocelli and eyes. Anterior angle of spot separated by a very narrow black line from a curled tip that reaches to half the distance between posterior margin of head and anterior margin of supra-antennal plates. Vertex sparsely covered with short golden hairs. Postclypeus prominent. Median glabrous area of postclypeus ventrally narrowly connected with semi-oval area of the ground colour at clypeal suture and dorsally continuing in a median, semi-oval or triangular spot of the ground colour at frontoclypeal suture. Gena, lorum, and anteclypeus with exception of keel densely covered with long white to coppery short hairs. Rostrum with black apex just reaching anterior margin of hind coxae.

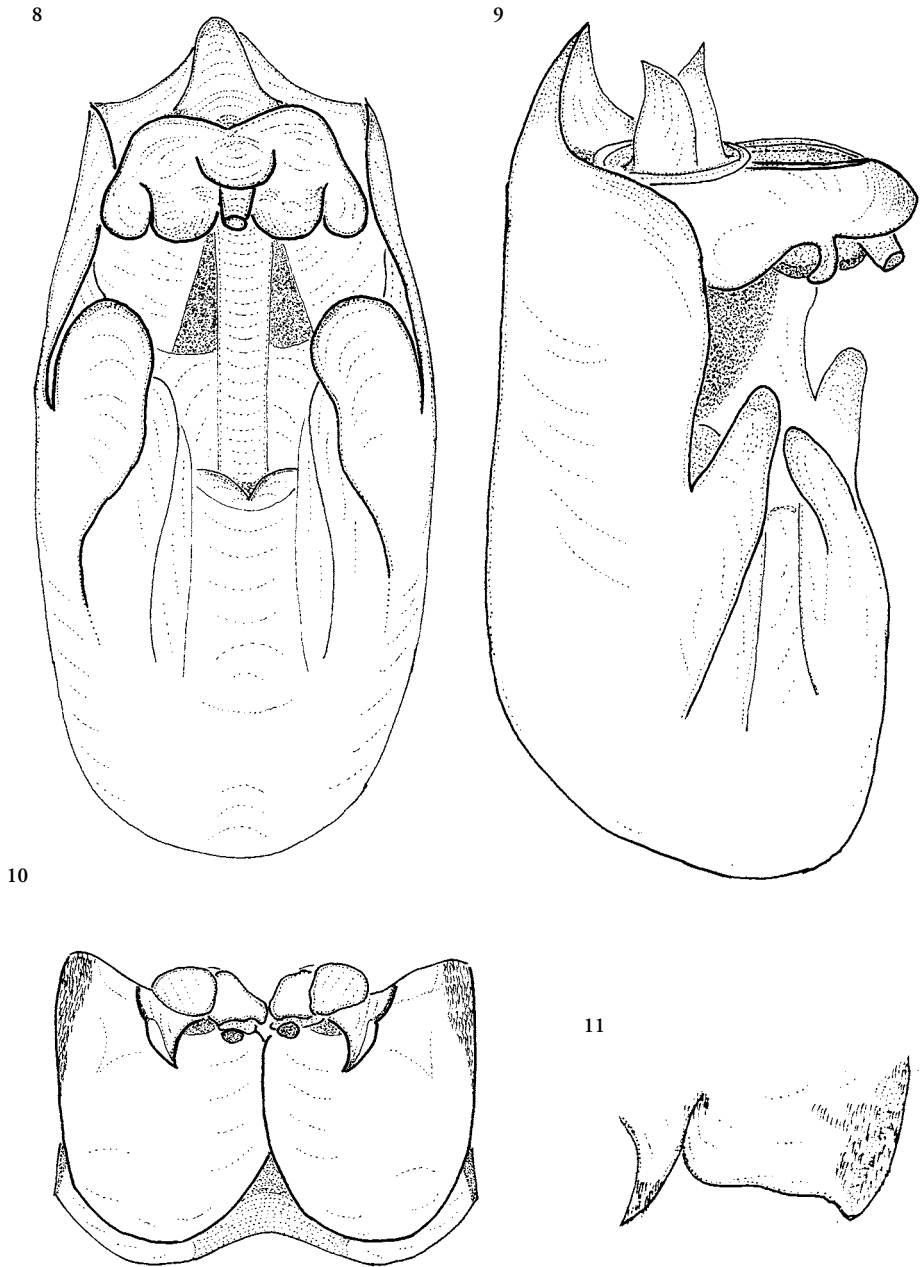
Thorax. – Pronotum. Black fasciae in paramedian oblique fissures anteriorly connected with medially interrupted black fascia along anterior margin of pronotum. Median black mark at anterior margin of pronotum collar either V- or U-shaped or reduced to a pair of juxtaposed black spots; median mark not connected with black fasciae in paramedian oblique fissures. Black colouration of ambient fissure laterally widened.

Mesonotum. – Paramedian obconical fields reaching to half-length of mesonotum disc. Lateral obconical fields extending to seven-eighths of mesonotum disc and enclosing a broadly elongate spot of the ground colour. Central mark enclosing a pair of fairly large, oval spots of the ground colour.

Legs. – Ochraceous. Fore femora with black fascia connecting the black spines. Dark brown annulation at distal ends of middle and hind tibiae.

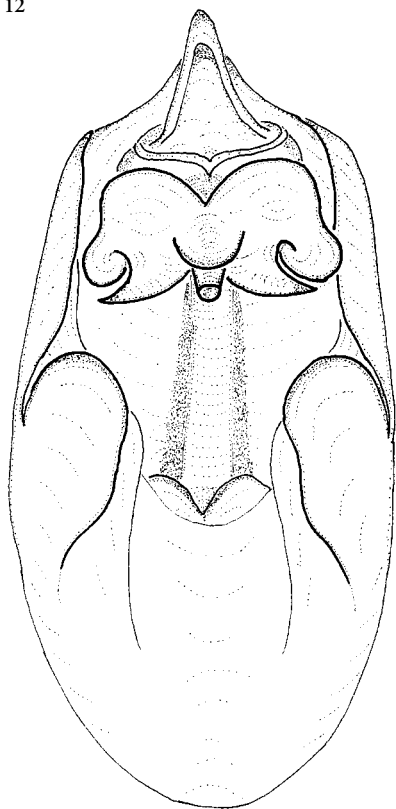
Tegmina and wings. – As in *pontianaka* but basal half of costal vein castaneous and apical half black. Wings with light to dark brown venation.

Male operculum (fig. 10). – Basal two-fifths to three-fourths of medial margins slightly overlapping, basal one-fourth of medial margin sometimes black. Lateral margin weakly undulate or slightly concave,

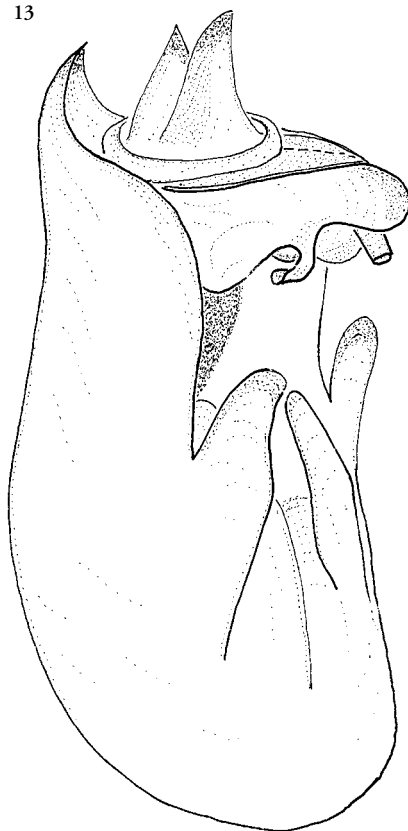


Figs. 8-11. *Chremistica guamusangensis*. – 8, male genitalia in ventral view; Gua Musang; 9, male genitalia in lateral view; Gua Musang; 10, male opercula in ventral view; 11, female operculum in ventral view.

12



13



Figs. 12-13. *Chremistica guamusangensis*. – 12, male genitalia in ventral view; Bitulu; 13, male genitalia in lateral view; Bintulu.

with white to coppery pilosity, basal third brown.

Male abdomen. – Dorsal side dark castaneous to black. Anterior margin of tergite 3 with conspicuous white pubescent, waxy transverse band; the band is medially very narrow or interrupted and widens laterad to two-thirds of segment length. Anterior margins of tergites 7 and 8 densely covered with short white hairs. Ventral side brown to black. Sternite 2, posterior half or one-third of sternite 7 and medial and posterior part of sternite 8 darkened. Anterior sternite margins covered with coppery to white hairs; paratergites with a more dense pilosity.

Male genitalia (figs. 8-9). – Pygofer ochraceous, dorsally marked with black. Lateral pygofer lobes dark brown, in ventral view broad, apical part semi-circular, in lateral view with acutely angled incision between lateral margin of pygofer lobe and lateroventral pygofer margin. Basal pygofer lobes with bluntly triangular apex reaching to half of pygofer length, apical parts of lobes curved inward. Uncus broadly

triangular, apical part dark brown. Claspers brown. Medial clasper lobes very variable in shape (see the paragraph on variability following the description). Lateral clasper lobes covered with pale ochraceous hairs. Basal plate strongly convex. Anal valves with sparse pale ochraceous long hairs.

Female operculum (fig. 11). – Colouring as in *pontianaka*, but lateral margin more convex and covered with waxy white pilosity.

Female abdomen. – Brownish. Black bands along anterior margins of tergites 2-6 reaching medially to half or two-thirds of segment length; median part of distal border of black band on anterior tergite 2 forming a small black protrusion. Black bands on tergites 7 and 8 reaching to one-fourth of segment length. Anterior tergite margins sparsely covered with golden pubescence. Anterolateral parts of tergites 3, 7 and 8 covered with white hairs. Anterior half of segment 9 dorsally black, but the black colour extends medially to the caudal dorsal beak; basal parts of

segment 9 along lower segment margins somewhat darker brown. Lateral parts of sternites densely covered with waxy white hairs.

Measurements (n=10♂ 1♀). – Body length ♂ 34.4-38.0 mm, ♀ 30.8 mm; head width ♂ 13.0-14.0 mm, ♀ 12.7 mm; pronotum width ♂ 13.7-15.1 mm, ♀ 13.1 mm; tegmen length ♂ 46.4-50.2 mm, ♀ 41.2 mm.

Variability. – The medial clasper lobes are very variable in shape. Three types can be recognized: (1) bluntly rectangular with straight, oblique lateral margin and inwardly curved apical part (fig. 9); (2) bluntly triangular with apical part of lobe weakly curved inward and pointing laterad, and with tip of lobe strongly angular; (3) sharply triangular with apical part of lobe strongly curved inward and pointing laterad (fig. 12), posterior margin of lobe irregular and tip of lobe weakly angular. These differently shaped medial clasper lobes are found in specimens collected in the same locality and on the same day; the specimens do not differ in other morphological characters.

Material examined. – 123♂ 1♀. MALAYSIA: PENINSULAR MALAYSIA: KELANTAN: Gua Musang, 19-22.ii.1994, Zaidi and Talib, 3♂ paratypes 13♂ (UKM), same data but coll. Zaidi, Ruslan and Saiful, 5♂ (UKM); Gua Musang, Mendrop, 5.ii.1992, Zaidi, Ruslan and Ismail, 2♂ (UKM); Gua Musang, in the town, 10-15.iii.1999, J. P. and M. J. Duffels, M. Y. Ruslan and M. Zaidi, 10-15.iii.1999, 51♂ (ZMA). – KEDAH: Langkawi, Lubuk Semilang, 5-8.ii.1994, Ruslan, Ismail and Zabidi, 1♂ (UKM); Temergor Stausee, 2.ii.1992, leg. Jäch (20), 2♂ (NHMW). – PAHANG: Bentong, Camang, 8-9.ii.1992, Zaidi and Ruslan, 1♂ (UKM); Cameron Highlands, Tanah Rata, 2.ii.1992, Ruslan, 3♂ (UKM); Cameron Highland, 2.ii.1992, Zaidi, Ruslan and Ismail, 4♂, same data but 5.ii.1992, 3♂ (UKM); Cameron Highland, 15-16.ii.1990, Salleh and Ismail, 7♂ (UKM), Cameron Highland, 15-16.ii.1990, Ruslan and Ismail, 1♂ paratype (UKM), same data but 14-16.ii.1992, Zabidi, 3♂ (UKM); Cameron Highland, 2.i.1972, B. M. 1973, 1♂ (BMNH); Cameron Highland, Tanah Rata, 8.ii.1948, H. T. Pagden, Ex F.M.S. Museum. B. M. 1955-354, 1♂ (BMNH); Tanah Rata, near Cameron Highlands, 1.iii.1970, S. Suzuki leg., 1♂ (Moulds); Cameron Highland, Tanah Rata. 2.ii.1978, M. Umamo leg., 1♂ (Moulds); Cameron Highland, Kg. Raja, 3.iv.1974, D. B. Kurtak, 1♂ (MNKM); Taman Negara, Kuala Juram, Merapoh, 10-11.iii.1997, Ismail and Muzamil, 3♂ paratypes 8♂ (UKM); Merapoh, 10-11.iii.1997, Ismail and Muzamil, 1♂ paratype (UKM); Taman Negara NP, Kuala Juram, E of Merapoh, 4°39' N 102°08' E, edge primary rainforest (near dormitory), at light, 13.iii.1999, J. P. and M. J. Duffels, M. Zaidi and M. Y. Ruslan, 2♂ (ZMA) – PERAK: Gopeng K. Sungai Itak, Badrol, 1♂ paratype 7♂ (UKM); Kwala Kangsar, II.III.1900, B. Jachan vend. 15.vii.1900, 1♀ (ZMH). – SELANGOR: Kajang, 12.ii.1994, Yong Yin Yee, 1♂ (UKM). – NEGERI SEMBILAN: Gemencheh, 11.ix.1996, Ismail and Ruslan, 1♂ (UKM); Fraser Hill, A. S. Corbet, 2.iii.1930, 1♂ (BMNH). – SARAWAK: Bintulu, 14.ix.1994, Zaidi and Talib, 1♂ paratype 4♂ (UKM). – I NDONESIA: SUMATRA: Medan 1909, van Loghem, 1♂ (RMNH).

Distribution (fig. 69)

This species is probably endemic to Peninsular Malaysia. The records of this species from Sarawak and Sumatra need confirmation.

Chremistica hollowayi Yaakop & Duffels sp. n. (figs. 14-17, 70, 79)

Type material. – 3♂ 2♀. Holotype ♂: 'SARAWAK: / Gunung Mulu / Nat. Park.' 'Site 20. Mar. - Apr. / W. Melinau Gorge / 150m, 422577 / FEG 3. Kerangas. / MV - understorey.' 'J. D. Holloway, RGS Mulu exped, / B. M. 1978-206.' (BMNH). – Paratypes: same data as holotype, 2♂ (BMNH). – MALAYSIA: SABAH: Pulau Gaya, 26-30.x.1991, Zaidi and S. Abin, 1♀ (UKM). – BRUNEI: N. Borneo, Waterstradt, 1♀ (BMNH).

Diagnosis

C. hollowayi can be distinguished by the presence of two pairs of pronotal fasciae that are not found in any other species of the genus: a pair of short, fairly broad, black irregular fasciae in between paramedian and lateral oblique fissures, and a pair of long, oblique, broadly black irregular fasciae in between lateral oblique fissure and lateral part of ambient fissure. This species also has some unique features in the male genitalia: very weakly convex lateral pygofer lobes and a very weakly concave incurvation beyond the pygofer lobe instead of a more or less deep incision as found in other *Chremistica* species.

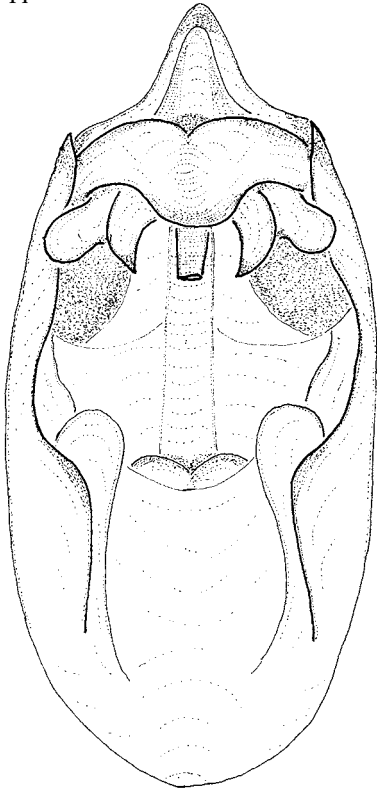
Description

Ground colour of head, pronotum and mesonotum dark yellow to dark ochraceous, sometimes with greenish tinge.

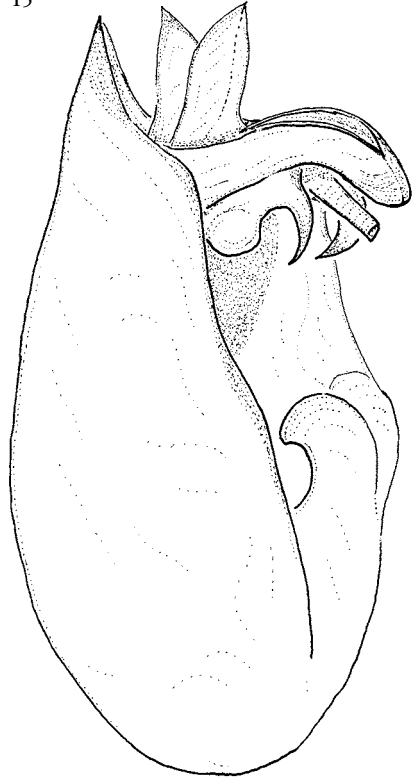
Head. – Dorsal side black except anterior parts of vertex lobes and supra-antennal plates and a pair of rounded triangular spots of the ground colour, with slightly inwardly curled anterior tips, between lateral ocelli and eyes. Vertex sparsely covered with short coppery hairs. Postclypeus prominent. Median glabrous area of postclypeus ventrally connected with semi-oval area of the ground colour at clypeal suture and dorsally continuing in a median, semi-oval spot of the ground colour at frontoclypeal suture. Transverse grooves black with white to coppery pubescence. Gena, lorum, and anteclypeus with exception of keel black and densely covered with yellowish to coppery hairs. Rostrum with black apex just reaching hind coxae.

Thorax. – Pronotum. Black fasciae in paramedian oblique fissures anteriorly connected with medially interrupted black fascia along anterior margin of pronotum, and posteriorly connected with an V-shaped, median black mark that touches the black

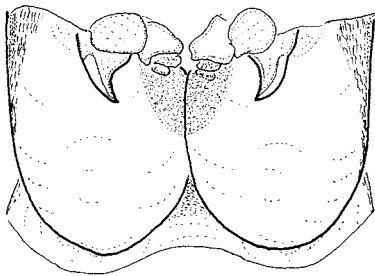
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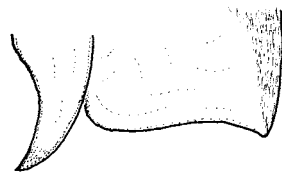
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16



17



Figs. 14-17. *Chremistica hollowayi*. – 14, male genitalia in ventral view; 15, male genitalia in lateral view; 16, male opercula in ventral view; 17, female operculum in ventral view.

ambient fissure at anterior margin of pronotum collar. Median anchor spot of the ground colour enclosing a longitudinal median black streak which is one-fourth to three-fourths as long as the spot. A fairly broad, irregular black fascia with medially curved tip, in between paramedian and lateral oblique fissures, connected to black anterior pronotum ridge and about one-third to half as long as lateral oblique fissure. A long, oblique, broadly black irregular fascia, in between lateral oblique fissure and lateral part of ambient fissure, running parallel to lateral fissure from anterior ridge of pronotum to black ambient fissure.

Mesonotum. – Paramedian obconical fields reaching to about half-length of mesonotum disc. Lateral obconical fields enclosing a fairly broad to very narrow, elongate spot of the ground colour. Basal part of central mark sparsely covered with white to coppery hairs.

Legs. – Ochraceous, sometimes dark ochraceous. Fore femora with somewhat darkened fascia connecting brownish black spines. Distal ends of femora darkened.

Tegmina and wings. – Tegmina often with bronzy reflection. Basal cell dark olivaceous to olivaceous. Transverse veins at bases of second and third apical areas narrowly brownish or black. Venation of tegmina brown in basal third, turning dark brown apically. Costal vein pale ochraceous in basal half, apical half dark brown. Venation of wings brown to dark brown.

Male operculum (fig. 16). – Ochraceous. Basal part with dark brown colouration extending medially to two-thirds of medial margin and laterally to about half-length of lateral margin. Medial margins slightly overlapping. Lateral margin densely covered with coppery hairs.

Male abdomen. – Dorsal side of abdomen black; lateral one-third to two-thirds of tymbal covers light ochraceous. Dorsal side of abdomen sparsely covered with silvery or golden pubescence but more densely pubescent along anterior margins and on lateral parts of segments. Ventral side of abdomen ochraceous to dark brown, and densely covered with short golden hairs.

Male genitalia (figs. 14-15). – Pygofer ochraceous, dorsally marked with black. The lateroventral pygofer margin forms a very weakly convex lateral pygofer lobe and a very weakly concave incurvation beyond the pygofer lobe instead of a more or less deep incision as found in other *Chremistica* species. Basal pygofer lobes reaching beyond lateral lobes of pygofer to two-fifths of pygofer length, apical parts of lobes widened and curved inward. Uncus dark brown and bluntly triangular-shaped in ventral view. Medial clasper lobe castaneous, narrow, with acute, strongly incurved apex. Lateral clasper lobe ochraceous, and

slightly bulbous. Basal plates strongly convex. Aedeagus ochraceous to dark brown.

Female operculum (fig. 17). – Ochraceous. Lateral margin straight, basal three-fourths brown-black. Laterodistal corner of operculum obtuse. Posterior margin straight and distinctly curved towards meracanthus.

Female abdomen. – Tergites 2-8 black and covered with golden pubescence. Segment 9 dorsally with a median M-shaped black marking that is broadly connected with black fasciae along lower segment margins. Ventral side of abdomen black and densely covered with long coppery hairs. Sternites 3 to 7 with a pair of broad paramedian, black-brown marks reaching from anterior margin to three-fourths of sternite length.

Measurements (n=3♂ 2♀). Body length ♂ 30.5-33.6 mm, ♀ 29.7-29.9 mm; head width ♂ 12.3-12.9 mm, ♀ 12.3-12.6 mm; pronotum width ♂ 11.6-13.0 mm, ♀ 9.7-12.1 mm; tegmen length ♂ 42.4-45.0 mm, ♀ 41.5-43 mm.

Distribution (fig. 70).

C. hollowayi is recorded from Borneo Island (Sabah, Sarawak and Brunei).

Etymology

This species is named in honour of Dr. Jeremy Holloway, who collected the male specimens of the type series.

Chremistica cetacauda Yaakop & Duffels sp. n.
(figs. 18-20, 70, 80)

Type material. – 2♂. Holotype ♂: 'P. O. Stolz / Solok (Sum) / 14.I.1913' (RMNH). – Paratype: INDONESIA: SUMATRA: Padang, Schild, 1♂ (NHMW).

Diagnosis

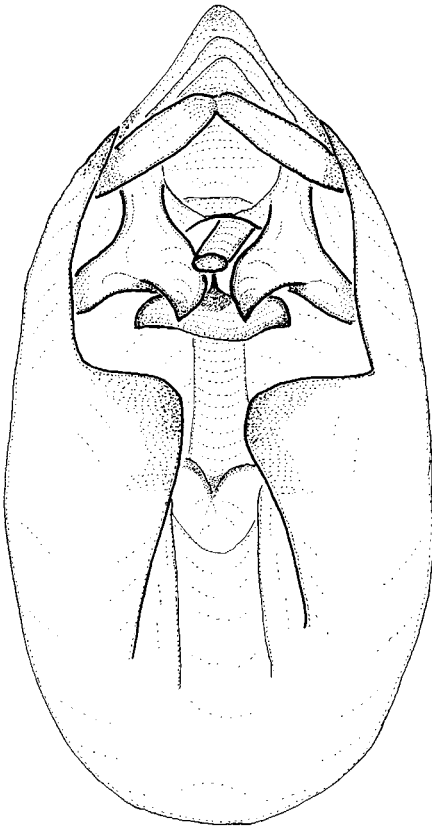
C. cetacauda has nine pairs of black fasciae in the transverse grooves on the ventral side of the post-clypeus. A black transverse line connects the medial ends of the black fasciae in the upper three pairs of grooves; the medial ends of the other black fasciae are not connected. In the other species of the *pontianaka* group a narrow black line connects the medial ends of the upper 8-11 black fasciae in the grooves of each side.

Description of male

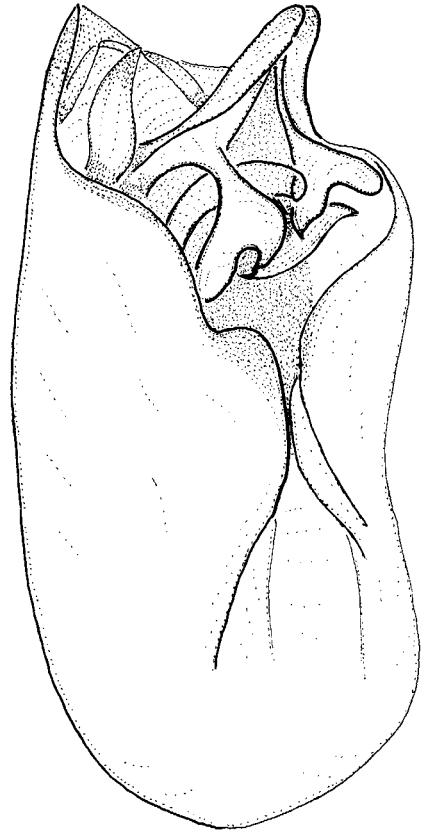
Ground colour of head, pronotum and mesonotum yellow to ochraceous, but pronotum collar of the paratype with greenish tinge.

Head. – Dorsal side black except anterior parts of vertex lobes and supra-antennal plates and a pair of obliquely triangular, spots of the ground colour

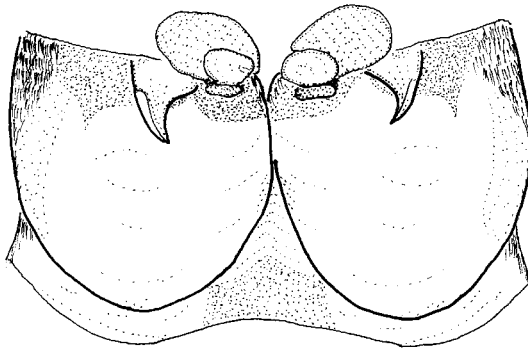
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19



20



Figs. 18-20. *Chremistica cetacauda*. – 18, male genitalia in ventral view; 19, male genitalia in lateral view; 20, male opercula in ventral view.

between lateral ocelli and eyes. Vertex sparsely covered with short, white to coppery, hairs. Postclypeus weakly prominent. Median glabrous area of postclypeus separated from median, triangular spot of the ground colour at frontoclypeal suture by a black transverse line that connects medial ends of upper three pairs of black grooves. Next five pairs of transverse grooves with long black fasciae, which are not connected at their medial ends; lowest pair of fasciae very short and connected with a pair of lateral black marks at clypeal suture. Transverse grooves and basal part of postclypeus covered with silvery pubescence. Anterior half of gena, posterior half of lorum, and anteclypeus with exception of keel, black. Gena, lorum and anteclypeus with exception of keel sparsely covered with long white hairs. Rostrum with dark brown apex just reaching hind coxae.

Thorax. – Pronotum. Black fasciae in paramedian oblique fissures connected anteriorly with medially interrupted black fascia along anterior margin of pronotum, and posteriorly with an U-shaped, median black mark that touches black ambient fissure along anterior margin of pronotum collar; these black markings enclose a median anchor spot of the ground colour. Black paramedian oblique fissures enclose narrow, oblique spots of the ground colour.

Mesonotum. – Paramedian obconical fields reaching to about half-length of mesonotum disc. Lateral obconical fields enclosing a (very) narrow elongate spot of the ground colour. Basal part of central mark sparsely covered with coppery short hairs.

Legs. – Ochraceous, with greenish tinge in holotype. Spines on fore femora yellow-brown.

Tegmina and wings. – Basal cell pale olivaceous. Venation of tegmina light brownish in basal third, remaining venation dark brown. Costal vein castaneous in basal half, apical half brown-black. Venation of wings light to dark brown.

Operculum (fig. 20). – Ochraceous. Laterobasal corner of operculum black. Medial margins not overlapping. Lateral margin oblique and almost straight. Lateral third of operculum with golden hairs.

Abdomen. – Orange-yellow. Medial corners of tymbal covers dark brown, paratype with anterior fourth of cover black. Tergites 2-9 with black bands along anterior segment margins. Black band on tergite 2, with median protrusion in the holotype, reaching to two-thirds of segment length; black band on tergite 3 reaches to four-fifths of segment length, and those on tergites 4 to 8 reach medially to half of the segment length and widen laterally. Dorsal side of abdomen sparsely covered with golden pubescence. Ventral side of abdomen brownish ochraceous and covered with silvery pubescence.

Genitalia (figs. 18-19). – Pygofer ochraceous, dorsally with large brown mark, anal valves and uncus

brown; aedeagal ventral process reddish brown. Lateral pygofer lobe in ventral view gradually widening and convexly curved to apical margin of pygofer lobe that is slightly inwardly curved and forms a right-angled corner with laterodistal pygofer margin; there is no incision between pygofer lobe and pygofer margin. Basal pygofer lobes reaching to two-fifths of pygofer length. Uncus triangular and curved upward, lateral ridges slightly swollen. Medial clasper lobe triangular-shaped with tip pointing proximad. Medial margin of medial clasper lobes convex. Lateral clasper lobe situated behind medial lobe. Aedeagus long and stout, with ventral process shaped like the tail of a whale. Process connected to aedeagus by narrow stalk, apical part of process semi-spherical with strongly concave and outwardly curved posterior margin. Basal plate strongly convex.

Measurements (n=2). – Body length 25.2-27.0 mm; head width 10.9-11.7 mm; pronotum width 10.4-11.5 mm; tegmen length 34.5-38.5 mm.

Distribution (fig. 70)

This species is probably restricted to Sumatra Island.

Etymology

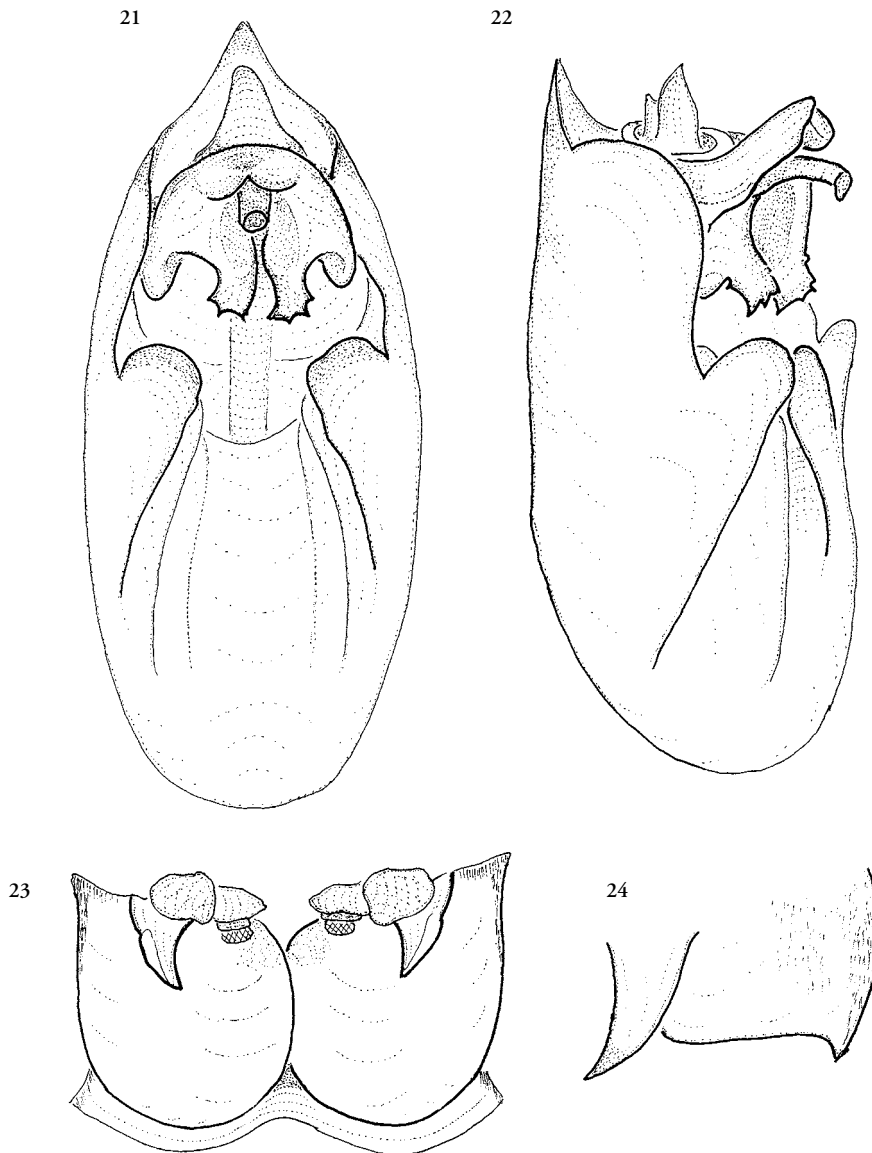
This species is characterized by the ventral process of the aedeagus which is shaped like the tail of a whale. The name 'cetacauda' is composed of two parts 'ceta' derived from Cetacea (Latin for whales) and 'cauda' (Latin for tail).

Chremistica bimaculata group

This group consists of seven species: *C. bimaculata* (Olivier), *C. brooksi* Yaakop & Duffels sp. n., *C. echinaria* Yaakop & Duffels sp. n., *C. kecil* Salmah & Zaidi, *C. malayensis* Yaakop & Duffels sp. n., *C. nesiotis* Breddin and *C. sumatrana* Yaakop & Duffels sp. n. A possible synapomorphy for the species of *C. bimaculata* group is the conspicuous, broad black, transverse fascia, along the anterior margin of the postclypeus, which is formed by fusion of black colouration of upper 4-5 pairs of transverse grooves. A second possible synapomorphy is found in the unmarked underside of the postclypeus.

The *bimaculata* group can be divided into two subgroups: *C. bimaculata*, *C. malayensis* and *brooksi* with both, fairly long medial clasper lobes, tapering proximad and armed with triangular teeth, and broad and distinct lateral pygofer lobes, and *C. nesiotis*, *C. echinaria* and *C. sumatrana* with semispherical medial clasper lobes without armature and with less distinct lateral pygofer lobes. *C. kecil* has unarmed triangular median clasper lobes.

C. bimaculata is endemic to Java. *C. malayensis* is endemic to the central part of Peninsular Malaysia.



Figs. 21-24. *Chremistica bimaculata*. – 21, male genitalia in ventral view; 22, male genitalia in lateral view; 23, male opercula in ventral view; 24, female operculum in ventral view.

C. brooksi is endemic to Sumatra, and *C. nesiotis* has a wide distribution in South Thailand, Peninsular Malaysia, Singapore, and Borneo, *C. echinaria* is restricted to mountainous areas of Peninsular Malaysia, *C. sumatrana* is endemic to Sumatra island, and *C. kecil* is endemic to Peninsular Malaysia.

Chremistica bimaculata (Olivier, 1790)
(figs. 21-24, 71, 81)

[*Cicada bimaculata*]; Stoll 1788: 91, Pl. XXIV Fig. 132; Olivier 1797: Pl.113, Fig. 7.

Cicada bimaculata Olivier, 1790: 756; Walker 1850: 116; Kirby 1893: 178, 180 (= *C[icada] atrovirens* Guérin-Ménéville).

Cicada *bimaculata*; Germar 1821: 97; Germar: 1830: 7; Germar: 1834: 61, 71
Cic[ada] bimaculata; Burmeister 1835: 182; Stål 1866: 171 (= [*Cicada* *atrovirens* Guérin-Méneville); Kirby 1892: 304 (= [*Cicada* *atrovirens* Guérin-Méneville)
Cicada atrovirens Guérin-Méneville 1838: 182; Walker 1858: 30; Kirkaldy 1909: 391 (in syn. of [*Cicada* *bimaculata* Olivier).
[*Cicada* *bimaculata*; Dohrn 1859: 73; Dallas 1867: 556 (= [*Cicada* *atrovirens* Guérin-Méneville).
Cicada *bimaculata*; Stål, 1869: 5 (in syn. of *Cicada viridis* Stål [nec Fabricius 1803]).
Cicada viridis [nec Fabricius, 1803]; Distant 1892a: 98, Pl. XII, Figs. 19, 19a-b (= *Cicada bimaculata* Olivier; = *Cicada atrovirens* Guérin-Méneville).
Ribana *bimaculata*; Distant 1906b: 33; Distant 1909: 208; Distant 1912: 27 (= *Tettigonia viridis* Fabricius, 1803 [error]; = *Cicada atrovirens* Guérin-Méneville).
Ribana bimaculata; Distant 1917: 101; Kato 1932: 154; Kato 1934: Pl. 62, Fig. 16; Moulton 1923: 129, 131, 132.
Chremistica bimaculata; Schmidt 1932: 118; Kato 1956: 89, 114; Metcalf 1963: 170-172 (in syn. of *Chremistica atrovirens*); Duffels & Van der Laan 1985: 58; Bregman 1985: 50; Boulard 2001a: 113-119; Boulard 2001b: 130.
Chremistica atrovirens; Metcalf 1963: 170-172; Bregman 1985: 39.

Not: Boulard 2002: 55-58, figs. 14-15 (this record of *C. bimaculata* from Thailand is based upon misidentification; the male genitalia of the supposed *bimaculata* differ in several respects from the true *bimaculata* from Java).

Diagnosis

Olivier's description (1790) and figure (1797) of the cicada named 'La cigale a deux taches' in French and '*Cicada bimaculata*' in Latin were copied from Stoll (1788). Olivier's description of *Cicada bimaculata* does not deviate in any detail from Stoll's description of 'De Twee-vlak' in Dutch or 'La Cigale a deux taches' in French (p. 91, pl. XXIV fig. 132). This makes most likely that Olivier did not study any material of *Cicada bimaculata* but used Stoll's work as a basis for the description of this species.

C. bimaculata is easily distinguished from the other species in *C. bimaculata* group by a pair of conspicuous, white pubescent, waxy oval patches covering anterior four-fifths of lateral parts of abdominal tergite 3.

Description

Ground colour of head and thorax ochraceous, sometimes with greenish tinge. Ventral side of body with lateral bands of waxy pilosity running from eyes to segment 8.

Head. – Dorsal side black except anterior parts of vertex lobes and supra-antennal plates and a pair of triangular to conical spots of the ground colour enclosing a narrow black dot, between lateral ocelli and eyes; spots with narrow, inwardly curled anterior

tip that occasionally forms a separate small spot. Vertex covered with coppery short hairs. Postclypeus prominent. Median dorsal spot of postclypeus at frontoclypeal suture semi-elliptic, sometimes broadly triangular and occasionally truncate. Anterior two-thirds of gena, posterior half of lorum and a pair of spots on anteclypeus black. Gena, lorum and anteclypeus with exception of keel densely covered with yellow to white long hairs. Rostrum with black-brown apex just reaching hind coxae.

Thorax. – Pronotum. Black fasciae in paramedian oblique fissures anteriorly connected with medially interrupted black fascia along anterior margin of pronotum, and posteriorly with an U-shaped, median black mark that touches the black ambient fissure along anterior margin of pronotum collar; markings enclosing a median anchor spot of the ground colour. Black fasciae in paramedian oblique fissures sometimes enclosing a long narrow spot of the ground colour.

Mesonotum. – Paramedian obconical fields extending to half and sometimes three-fourths of mesonotum disc length. Lateral obconical fields enclosing a very narrow to narrow, elongate spot of the ground colour. Central mark sometimes enclosing a pair of spots of the ground colour, basal part of central mark sparsely covered with coppery short hairs. Median point of central mark sometimes touching posterior margin of pronotum collar. Anterior branches of cruciform elevation with a small apical black spot.

Legs. – Pale ochraceous, sometimes orange-brown. Fore femora with two long, pale ochraceous to occasionally yellowish-brown, spines with dark-brown tips and a very small triangular spine distally of the most distal long spine.

Tegmina and wings. – Basal cell of tegmina pale ochraceous or greenish. Costal vein dark ochraceous sometimes greenish in basal half and turning dark brown or castaneous apically. Venation ochraceous, sometimes olivaceous, in basal third, turning dark brown apically.

Male operculum (fig. 23). – Light brownish and sometimes orange-brown. Basal two-fifths, or sometimes three-fifths, of medial margins slightly overlapping; in one specimen the medial margins don't overlap. Lateral margin straight and slightly oblique.

Male abdomen. – Ochraceous to light brownish. Black bands along anterior segment margins medially about as wide as laterally. Tymbal covers entirely or only medially brown-black. Black bands on tergites 2 and 3 reaching to three-fourths of segment length. A pair of conspicuous white pubescent, waxy oval patches covers anterior four-fifths of lateral parts of tergite 3. Black bands on tergites 4 to 6 reaching to half or three-fourths of segment length, those on

tergites 7 and 8 to one-fourth or half of segment. Dorsal side of abdomen with silvery to golden pubescence. Ventral side of abdomen pale ochraceous and sometimes dark brown. Posterior sternite margins with somewhat darkened or dark brown bands. Median part of sternite 2 and whole of sternite 8 black to dark brown; median part of other sternites sometimes dark brown. Sternites and paratergites densely covered with silvery to golden pubescence.

Male genitalia (figs. 21-22). – Pygofer ochraceous, dorsally marked with black, and sparsely covered with ochraceous hairs along proximal and laterodistal margins. Lateral pygofer lobes brown to castaneous, in ventral view with convex apical margins which are slightly curved inwards, and in lateral view with acutely angled incision between lateral pygofer lobe and lateroventral pygofer margin (fig. 22). Basal pygofer lobe with bluntly triangular apical margin, reaching to two-thirds of pygofer length, apical parts of lobes curved inward. Uncus brown to dark brown, lateral margin weakly convex and apical margin strongly convex. Claspers brown to black-brown. Medial clasper lobe often rectangular sometimes narrowing to a more or less acute mediobasal angle. Lateral margin of clasper lobe slightly concave, medial margin straight to slightly convex, and apical margin straight to concave; lateral and apical margins often with a variable number of triangular teeth. Lateral clasper lobe oval-shaped, pointing distad and reaching to half of medial clasper lobe length; medial margin densely covered with ochraceous short hairs. Basal plates strongly convex.

Female operculum (fig. 24). – Pale ochraceous. Lateral margin weakly convex; basal half or two-thirds brown-black. Laterodistal corner of operculum obtuse. Posterior margin straight slightly oblique and distinctly curved toward meracanthus.

Female abdomen. – Ochraceous to light brownish with black bands along anterior tergite margins: those on tergites 2 and 3 reach medially to three-fourths of segment length, those on tergites 4 to 6 to half or three-fourths of length, and those on tergites 7 and 8 to one-fourth or half of length. Posterior sternite margins somewhat darkened, occasionally with dark brown bands. Anterior sternite margins sparsely, sometimes densely, covered with coppery to golden pubescence; lateral parts of sternites densely pubescent.

Measurements (n=10♂ 4♀). – Body length ♂ 24.1-27.6 mm, ♀ 22.4-25.1 mm; head width ♂ 10.3-11.5 mm, ♀ 9.7-10.1 mm; pronotum width ♂ 9.6-11.6 mm, ♀ 9.0-9.7 mm; tegmen length ♂ 31.5-38.5 mm, ♀ 31.2-32.2 mm.

Material examined. – 15♂ 10♀. INDONESIA: JAVA: Java, *Bimaculata*? Oliv., Encycl. p. 756, Germar. p.

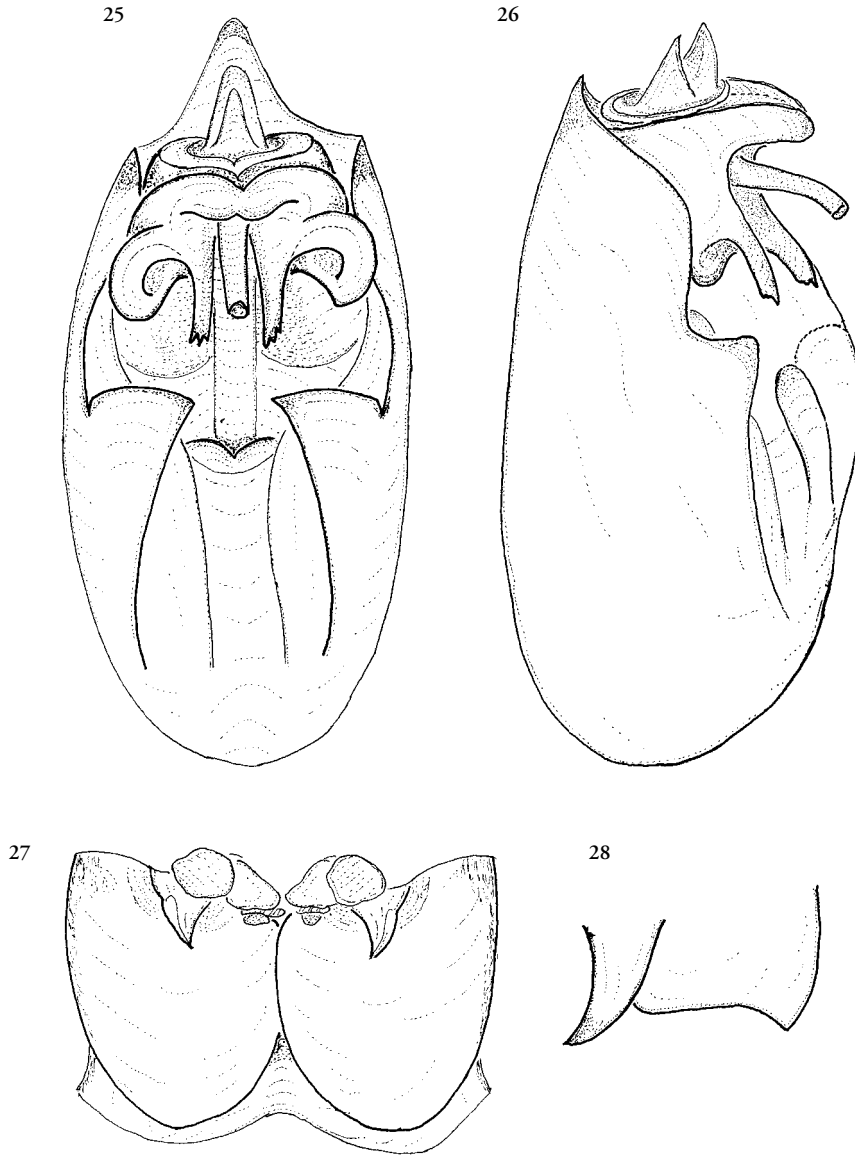
61, Stoll. p. 132 (handwritten) 'Peut-etre le type !? Michel Boulard det. 1981 [this specimen is not the type], 1♂ (MNP); Batavia, W. C. v. Heurn, 1931-38, 2♂ (RMNH); Buitenzorg, ca. vi.1927, Frangenheim, 1♀ (ZMA); Java, Coll. Signoret, 1♂ (NHMW); Java, M. C. Piepers, 1♀ (RMNH); Salatiga, 10.xi.1908, v. d. V, 1♂ (RMNH); Noesa Kembangan, xi.1910, F. C. Drescher "dupla", 1♂ (UKM), same data but 13.xi.1927, 1♂ (UKM), ii.1914, coll. Dr. D. MacGillavry, 1♀ (UKM); Salatiga, 10-16, 1♀ (ZMA); Tjilatjap, Drescher, 17.xii.1926, coll. Dr. D. MacGillavry, 1♂ (ZMA), same data but ii.1913, 1♀ (ZMA), xii.1913, 1♂ (ZMA), v.1913, 1♀ (ZMA), i.1915, 1♂ 1♀ (ZMA), ii.1915, 1♀ (ZMA), xi.1915, 1♀ (ZMA); Res. Semarang, Gedangan, 40 m, Fr. A. Th. H. Verbeek. No.IV., 1♀ (RMNH); Tangj. Priok, Dr. P. Buitendyk, 5.xiii.1912, 1♂ (RMNH); Without locality: *Distigma* de Haan [probably ms name], 1♂ (RMNH); tangkap di lampoe (Gazling) [caught at lamp], 2.x.39, Ir. P. A. Blijdorp, 1♂ (RMNH).

Distribution (fig. 71)

C. bimaculata is probably endemic to Java. In the large material of *Chremistica* studied for this revision we have not seen a specimen of *C. bimaculata* from other islands or the mainland of South East Asia. The records from Cambodia, Malayan Peninsula and Indo-China (Moulton 1923) and several other localities listed by Metcalf (1963) are probably based upon misidentifications. The recent record of *C. bimaculata* from Thailand by Boulard (2002) is also based upon misidentification, the male genitalia of the supposed *bimaculata* (Boulard 2002: figs. 14-15) differ in several respects from the true *bimaculata* from Java. In recent years, *C. bimaculata* has been recorded repeatedly from Sabah, Borneo (Zaidi, Ruslan & Azman 1999, 2000; Zaidi, Noramly & Ruslan 2000a, b); a part of this material was studied by us and proved to belong to *C. nesiotetes*.

Chremistica malayensis Yaakop & Duffels sp. n. (figs. 25-28, 71, 82)

Type material. – 21♂ 12♀. Holotype ♂: 'Perak: Temenggor / Ekspedisi MNS - Belum / 29.xi-5.xii.1993' (UKM). – Paratypes: PENINSULAR MALAYSIA: PAHANG: Cameron Highland, 2.iv.1990, Zaidi, Ismail and Ruslan, 1♀ (UKM); Bukit Fraser, 10.iii.1991, Nordin Wahid, 1♂ (UKM); Bukit Fraser, 3.v.1991, Zaidi, Ismail and Ruslan, 1♂ 1♀ (UKM); Bentong, Camang, 8-9.ii.1992, Zaidi and Ruslan, 1♂ (ZMA) 1♀ (UKM); Gunung Benom, 3.iv.1967, Ray L. L., 1♀ (MNKM) 1♀ (ZMA), same data but 7.iv.1967, Ray L. L., 1♀ (MNKM). – PERAK: Kwala-Kangsar, ii.iii.1900, B. Jachan vend., 15.vii.1900,



Figs. 25-28. *Chremistica malayensis*. – 25, male genitalia in ventral view; 26, male genitalia in lateral view; 27, male opercula in ventral view; 28, female operculum in ventral view.

3♂ (ZMH); Perak, Doherty, Distant-Coll., 1911-383, 3♂ (BMNH); West Coast, Pulau Rumbia, 15.iii.1931, E. Seimund, Ex: Coll. F.M.S. Museums, 1♂ (MNKM); West Coast, Pulau Rumbia, at light, Sel. Museum, Ex F. M. S., B. M. 1955-354, 10.iii.1926, E. Seimund, 1♀ (MNKM). – SELANGOR: Bukit Kutu, at light, 3500 ft. 19.iii.1931, H. M. Pendlebury, Ex F.M.S. Museum., B. M. 1955-354, 1♂ (BMNH);

Kutu Hill, A. S. Corbet coll, B. M. 1948-587, 13.iii.1931, 2♂ (BMNH); Kuala Lumpur, 9.ii.1931, at light, Ex. F.M.S. Museum, B. M. 1955-354, 1♂ (BMNH); Malacca, 1890, Plason, 6♂ (NHMW); Maxwell Hill, 2106, 30.iv.1974, Ray L. L., 1♀ (MNKM). – THAILAND: Bulsit Besar, Siam, Malay States, 1♀ (BMNH); Nakon Sri Tamarat, 5.iii.1922, H. M. Pendlebury, Ronpibum Light, Ex. F.M.S.

Museum, B. M. 1955-354, 1 ♀ (MNKM); Nakon Sri Tamarat, Khao Luang, 2000 ft, 26.iii.1922, H. M. Pendlebury, 1 ♀ (MNKM); Without locality: 1 ♀ (MNKM). – Other material. – PENINSULAR MALAYSIA: Malaysia, Ex. Coll. Agri. Dept., The Gulf, iii, Ex F.M.S. Museum, B. M. 1955-354, 1 ♂ (MNKM).

Diagnosis

C. malayensis (body length males: 28.6-34.2 mm) is only slightly smaller than *C. echinaria* (30.0-34.8 mm), but the two species are distinctly larger than the other species of the *C. bimaculata* group. *C. malayensis* differs from *C. echinaria* in the black bands on tergites 3 to 6 which distinctly narrow laterad in *C. malayensis* but remain equally wide in *C. echinaria*, while the black band on tergite 6 covers less than 40% of the tergite surface in *C. malayensis* and more than 40% in *C. echinaria*. The ground colour of the body of *C. malayensis* is somewhat lighter than in *C. echinaria*. The most reliable characters to separate *C. malayensis* from *C. echinaria* are found in the very characteristic male genitalia.

Description

Ground colour of body orange-brown to dark ochraceous, pronotum collar sometimes with greenish tinge.

Head. – Dorsal side black except anterior parts of vertex lobes and supra-antennal plates and a pair of conical, spots of the ground colour between lateral ocelli and eyes; spots enclosing a narrow, triangular, black dot which occasionally divides the spot in two. Vertex sparsely covered with short silvery hairs. Postclypeus prominent. Transverse grooves, medial band and basal part of postclypeus covered with yellow to coppery hairs. Median dorsal spot of the ground colour at frontoclypeal suture often semi-elliptic and sometimes semi-oval. Anterior two-thirds of gena black. Gena, lorum and anteclypeus with exception of keel sparsely covered with yellowish short. Rostrum with dark brown apex just passing middle coxae.

Thorax. – Pronotum. Black fasciae in paramedian oblique fissures triangularly widened, sometimes enclosing a long narrow spot, anteriorly connected with medially interrupted black fascia along anterior margin of pronotum, and posteriorly connected with an V-shaped, median black mark that touches the black ambient fissure along anterior margin of pronotum collar. Proximal part of median anchor spot, bordered by the median V-shaped mark and separated from the rest of the spot by a transverse black line. Lateral parts of anchor spot sometimes forming separate, narrow, transverse, oval spots.

Mesonotum. – Paramedian obconical fields

extending to half-length of mesonotum disc. Lateral obconical fields extending to seven-eighths of mesonotum and enclosing a (very) narrow to fairly broad, elongate spot of the ground colour. Basal part of central mark sparsely covered with golden to coppery short hairs. Median point of central mark sometimes reaching posterior margin of pronotum collar.

Legs. – Pale orange to ochraceous. Fore femora with somewhat darkened fascia connecting brown spines. Tibiae of middle and hind legs with brown annulation at distal ends.

Tegmina and wings. – Tegmina often with bronzy reflection. Basal cell light brownish. Venation ochraceous in basal third, turning light brown apically. Costal vein dark ochraceous in basal half, apical half black. Wings with light to dark brown venation.

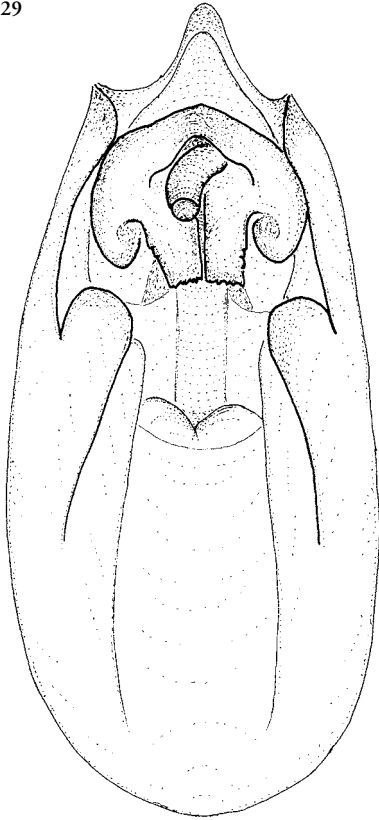
Male operculum (fig. 27). – Pale red-orange to ochraceous and sometimes dark ochraceous, sparsely covered with silvery to golden pubescence. Basal two-thirds of medial margins slightly overlapping. Lateral margin straight, oblique and curled upward, and brownish at base.

Male abdomen. – Medial corners of tymbal covers brown to dark brownish. Tergite 1 with a pair of conspicuous, pubescent, waxy white dots laterodistally of posterior branches of cruciform elevation. Tergites 2-4 with black bands along anterior margins medially reaching to three-fourths of segment length; bands on tergites 3 and 4 narrowing laterad to at most one-eighth of segment length. Tergites 5 and 6 with similar marking of black bands reaching medially to one-fourth to three-fourths of segment length, and laterally to at most half-length of segment. Tergite 7 often with black band reaching to at most one-third of segment length. Tergite 8 with median black triangle at anterior margin. Anterior halves and lateral parts of tergites sparsely, sometimes densely, covered with short coppery hairs. Sternites with silver pilosity, paratergites densely covered with silvery hairs.

Male genitalia (figs. 25-26). – Pygofer ochraceous to dark ochraceous, dorsally marked with brown. Lateral pygofer lobe pale ochraceous, apical part cup-shaped, in lateral view with right-angled corner between lateral margin of pygofer lobes and lateroventral pygofer margin. Basal pygofer lobes in lateroventral view with fairly broad, strongly convex apical margin, apical parts of lobes slightly curved inward. Uncus ochraceous, lateral margin weakly and apical margin strongly convex. Medial clasper lobes long and narrow, apex with 3, or sometimes 4 or 5 narrow, triangular teeth. Medial and lateral margins of medial clasper lobe straight. Lateral clasper lobes fairly large, oval-shaped, reaching to two-thirds of length of medial clasper lobes. Aedeagus very long and stout. Basal plates weakly convex.

Female operculum (fig. 28). – Pale red-orange to

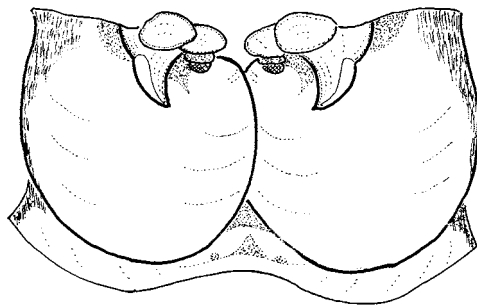
29



30



31



Figs. 29-31. *Chremistica brooksi*. – 29, male genitalia in ventral view; 30, male genitalia in lateral view; 31, male opercula in ventral view.

ochraceous with white pilosity. Lateral margin weakly convex, basal two-fifths black. Laterodistal corner narrowly rounded rectangular. Posterior margin undulate and convexly curved toward meracanthus.

Female abdomen. – Tergite 1 without a pair of conspicuous lateral white dots. Black bands at anterior margins of tergites 2-4 reach medially to three-fourths of segment length and narrow laterad, those on tergites 5-7 reach to half-length the segment. Sternites with silver pilosity, paratergites densely covered with silvery hairs.

Measurements (n= 10♂ 4♀). – Body length ♂ 28.6-34.2 mm, ♀ 27.7-28.3 mm; head width ♂ 11.7-12.8 mm, ♀ 11.5-13.0 mm; pronotum width ♂ 11.3-12.8 mm, ♀ 11.5-13.0 mm; tegmen length ♂ 40.2-44.1 mm, ♀ 37.4-42.5 mm.

Distribution (fig. 71).

This species is probably endemic to the central part of Peninsular Malaysia.

Chremistica brooksi Yaakop & Duffels sp. n.
(figs. 29-31, 71, 83)

Type material. – 3♂. Holotype ♂: 'Sumatra / Benkoelen Dist. / 1912-1919 / C. J. Brooks. / 1920-43'. (BMNH). – Paratypes: INDONESIA: SUMATRA: W. Sumatra, Ketaun, vii.1917, C. J. Brooks coll., 1♂ (BMNH); Pahmungan, damar garden, 12.viii.2001, damar garden, dead on leaf "Bacar Manuk" (local name), K. Smets, 1♂ (ZMA).

Diagnosis

C. brooksi resembles *C. malayensis* in the marking of the body. The two species can be distinguished by the black fasciae on abdominal tergites 5-6 which are equally wide along their whole length in *C. brooksi*, and narrow laterad in *C. malayensis*. Moreover, *C. brooksi* (body length male 27.2-27.5 mm) is smaller than *C. malayensis* (28.6-34.2 mm). In the *bimaculata* group, equally wide black fasciae on tergites 4-6 are also found in two other species *C. echinaria* and *C. kecil* but these species are respectively larger (30.0-34.8 mm) and smaller (23.9-25.3 mm) than *C. brooksi*. *C. brooksi* resembles *C. bimaculata* in the shape of the medial clasper lobe, but the lateral margin of the medial clasper lobe is straight to convex in *C. brooksi* and concave in *C. bimaculata*.

Description of male

Ground colour of body orange-brown to dark ochraceous; pronotum collar ochraceous with greenish tinge. Lateral parts of ventral side of body from eyes to abdominal segment 8 densely covered with waxy white pilosity.

Head. – Dorsal side black, except anterior parts of

vertex lobes and supra-antennal plates, and a pair of conical spots of the ground colour between lateral ocelli and eyes; the spots have narrow and inwardly curved lateral tips and enclose a black dot. Median dorsal spot of postclypeus at frontoclypeal suture semi-elliptic or triangular. Vertex sparsely covered with short coppery hairs. Postclypeus weakly prominent, anterior margin with broad black, transverse fascia, but transverse ridges in the fascia sometimes ochraceous. Postclypeus with exception of postclypeal keel sparsely covered with coppery short hairs. Anterior half of gena and posterior margin of lorum black. Gena and lorum and anteclypeus sparsely covered with white hairs. Rostrum with dark brown apex just reaching hind coxae.

Thorax. – Black fasciae in paramedian oblique fissures triangularly widened, anteriorly connected with medially interrupted black fascia along anterior margin of pronotum, and posteriorly connected with an V-shaped, median black mark that stands upon the black fascia in the ambient fissure. Lateral oblique fissures with broad black fasciae in the paratype from Pahmungan, the other specimens have no marking in these fissures.

Mesonotum. – Paramedian obconical fields extending to half-length of mesonotum disc. Lateral obconical fields extending to seven-eighths of mesonotum and enclosing a narrowly elongate spot. Basal part of central mark densely covered with coppery pubescence.

Legs. – Orange-brown to ochraceous. Spines on fore femora brown.

Tegmina and wings. – Basal cell olivaceous. Tegmina with brown venation in basal third, turning dark brown apically. Costal vein in basal half olivaceous, sometimes dark ochraceous, turning dark brown apically. Wings with light brown to brown venation.

Operculum (fig. 31). – Orange-brown to ochraceous. Basal two-thirds of medial margins slightly overlapping. Lateral margin convex, curled up and covered with waxy white pilosity.

Abdomen. – Tergite 1 with a pair of conspicuous, pubescent, waxy white dots laterodistally of posterior branches of cruciform elevation. Medial corners of tymbal covers brownish to dark brown. Black bands along anterior margin of tergites 2, 3 and 4 with median protrusion reaching to three-fourths of segment length, those on tergites 3 and 4 narrow laterad to at most one-eighth of segment length. Tergites 2-4 are much darker in the paratype from Pahmungan: tergite 2 black with exception of a narrow orange-brown line along posterior margin and a pair of transverse paramedian marks; black band on tergite 3 reaches medially to posterior tergite margin and narrows laterally to two-thirds of segment length; black band on

tergite 4 reaches medially almost to posterior tergite margin and narrows laterally to two-thirds of segment length. Black bands on tergites 5 and 6 reach to three-fourths of segment length and are equally wide along their whole length. In the paratype from Pahmungan tergites 5-6 are black with exception of a narrow orange-brown line along posterior tergite margins. Black bands on tergites 7 and 8 reach medially to half of segment length. In the paratype from Pahmungan tergite 7 with a black band reaching to three-fourths of segment length, and tergite 8 with a pair of paramedian orange-yellow marks. Dorsal side of abdomen covered with short coppery hairs. Posterior part of sternite 8 brownish. Anterior parts of sternites with sparse silvery pilosity, paratergites much denser pilose.

Genitalia (figs. 29-30). – Pygofer ochraceous, dorsally marked with brown. Lateral pygofer lobes in ventral view broad with semicircular, weakly inwardly curved, apical part; in lateral view with fairly deep, narrowly rounded incision between lateral margin of pygofer lobe and lateroventral pygofer margin. Basal pygofer lobe in lateroventral view fairly broad with narrowly convex, inwardly curved apical part reaching to half-length apical part of lateral pygofer lobe. Uncus brownish, broadly triangular, lateral margin weakly convex and thickened, and apical margin narrowly convex. Medial clasper lobe dark brown with lateral margin either convex with (three) small triangular teeth or straight without teeth, medial margin straight or slightly outcurved, and posterior margin convex with 4-6 small teeth. Lateral clasper lobe fairly large, oval-shaped, swollen, extending to two-thirds of medial clasper lobe. Basal plates convex.

Measurements (n= 3) – Body length 27.2-27.5 mm; head width 11.1-11.4 mm; pronotum width 10.5-10.6 mm, tegmen length 36.9-38.3 mm.

Distribution (fig. 71).

This species is restricted to Sumatra Island.

Etymology

This species is named in honour of Dr. C. J. Brooks, who collected two males of the type series.

Chremistica nesioties Breddin, 1905 (figs. 32-35, 72, 84)

Chremistica nesioties Breddin, 1905: 220, 221, Holotype ♂: 'Banguey / Ins. nördl. Borneo / W. Kedenburg / ded. 20.vii.1894'. 'Type' 'Cicada / nesioties / Type! Bredd.' (handwritten) (ZMH) [examined].

Chremistica nesioties; Metcalf 1963: 174; Weidner & Wagner 1968: 142; Bregman 1985: 39; Duffels & Van der Laan 1985: 59; Salmah & Zaidi 2002: 229; Schouten et al. 2004: 372, 373.

Diagnosis

C. nesioties is a small species (body length males: 23.8-26.3 mm). It differs from another small species of the *bimaculata* group, *C. kecil* (body length: 23.9-25.3 mm) in the black bands on abdominal segments 4-6 that narrow laterad in *C. nesioties* and are equally wide in *C. kecil*.

Description

Head, thorax and abdomen orange-brown to ochraceous, pronotum, mesonotum and underside of thorax sometimes with greenish tinge.

Head. – Dorsal side black except anterior parts of vertex lobes and supra-antennal plates and a pair of more or less triangular to conical spots of the ground colour between lateral ocelli and eyes; the spots have narrow inwardly curled lateral tips. Vertex sparsely covered with short silvery hairs. Postclypeus prominent. Transverse grooves, medial band and basal part of postclypeus with short silvery hairs. Lateral sides of postclypeus, gena and lorum covered with fairly long yellowish hairs. Rostrum with black-brown apex just reaching hind coxae.

Thorax. – Pronotum. Black fasciae in paramedian oblique fissure anteriorly connected with medially interrupted fascia along anterior margin of pronotum, and posteriorly connected with an U-shaped, median black mark that touches the black ambient fissure along anterior margin of pronotum collar. Black fasciae in paramedian oblique fissures sometimes enclose a narrow, oblique spot of the ground colour. Lateral parts of median anchor spot occasionally forming separate, narrow, transverse oval spots; proximal part of anchor spot bordered by the median V-shaped mark and separated from the rest of the spot by a broad transverse black line.

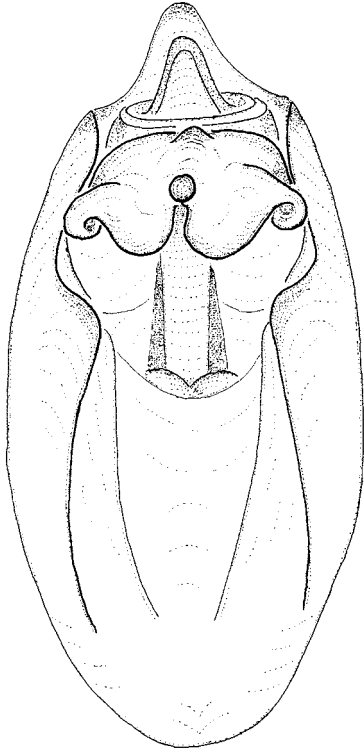
Mesonotum. – Paramedian obconical fields about half as long as mesonotum disc. Lateral obconical fields enclosing an, often (very) narrow, elongate spot. Central mark sometimes enclosing a pair of small oval spots of the ground colour; posterior part sparsely covered with coppery short hairs. Median point of central mark sometimes touching posterior margin of pronotum collar.

Legs. – Pale ochraceous, sometimes with yellowish green. Fore femora with two long, pale ochraceous to occasionally yellowish-brown, spines with dark-brown tips and a very small triangular spine distally of the most distal long spine.

Tegmina and wings. – Tegmina often with bronzy reflection. Basal cell light brownish. Costal vein ochraceous to light brownish sometimes greenish in basal half, turning dark brown apically. Venation of tegmina and wings light to dark brown in basal third, turning dark brown apically.

Male operculum (fig. 34). – Light brownish to

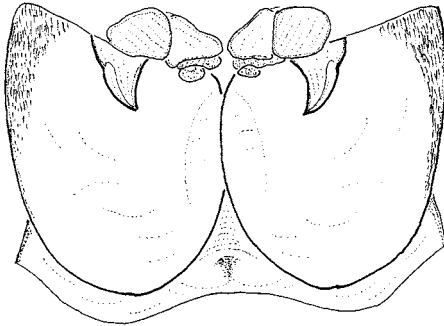
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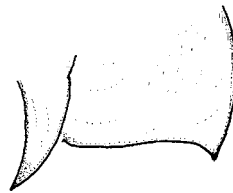
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35



Figs. 32-35. *Chremistica nesiotetes*. – 32, male genitalia in ventral view; 33, male genitalia in lateral view; 34, male opercula in ventral view; 35, female operculum in ventral view.

yellowish, sometimes with greenish tinge. Basal two-fifths of medial margins slightly overlapping. Lateral margin straight to slightly convex, oblique and curled up; lateral margin black-brown at base. Surface of operculum with sparse golden pilosity.

Male abdomen. – Medial corners of tymbal covers brown to dark brownish. Tergites with black bands along anterior segment margins. Black bands on tergites 2, 3 and 4 often with triangular median protrusion reaching to half to three-fourths of segment length. Black bands on tergites 3 and 4 narrow laterad to at most one-eighth of segment length, those on tergites 5 and 6 reach medially to half or three-fourths of segment, and slightly narrow laterad to at most half of segment length. Black bands on tergites 7 and 8 reach medially to one-fourth to half of segment length. Dorsal side of abdomen sparsely covered with golden pubescence, but anterior tergite margins densely, sometimes sparsely, covered with short copulatory hairs. Ventral side of abdomen pale ochraceous, sometimes dark olivaceous. Posterior half or one-fourth of sternite 8 sometimes somewhat darkened. Lateral parts of sternites sparsely and median part of sternites 3 and 4 densely covered with golden pubescence.

Male genitalia (figs. 32-33). – Pygofer ochraceous, dorsally marked with black. Lateral pygofer lobes in ventral view with a broad and straight apical margin, a narrowly rounded, slightly inwardly curved, mediobasal corner, and an obtusely angled corner between apical margin of lobe and the more distal pygofer margin. Basal pygofer lobes with bluntly triangular, slightly inwardly curved, apical part reaching to three-fifths of pygofer length. Uncus light to dark brown, bluntly triangular, lateral and apical margins weakly convex. Medial clasper lobe broadly semicircular with rounded edges; lateral part of lobe strongly inwardly curved. Lateral clasper lobe small, narrowly rounded. Basal plates weakly convex.

Female operculum (fig. 35). – Pale ochraceous. Lateral margin straight to weakly convex, basal part brown-black. Lateral part of operculum sometimes with waxy white pilosity. Laterodistal corner of operculum obtuse. Posterior margin undulate and strongly curved toward meracanthus and with white to golden pilosity.

Female abdomen. – Black bands on tergites 2 and 3 reach medially to one-fourth to three-fourths of segment length and narrow laterad, but the triangular median protrusions of the black bands sometimes touch the posterior tergite margins. Black bands on tergites 4 to 6 reach medially to one-fourth to half of segment length but sometimes widen laterally. Anterior parts of sternites silvery pilose. Paratergites with dense silvery pilosity. Sternite 7 sometimes with a pair of paramedian brownish spots.

Measurements (n=10♂ 6♀). – Body length ♂ 23.8-26.3 mm, ♀ 19.4-25.5 mm; head width ♂ 9.5-11.2 mm, ♀ 9.4-10.8 mm; pronotum width 9.7-11.0 mm, ♀ 10.6-9.2 mm; tegmen length ♂ 33.2-35.8 mm, ♀ 30.6-29.9 mm.

Material examined. – 35♂ 54♀. THAILAND: Peninsular Siam, Patalung Paknam Lampam, 6.iii.1924, I. H. N. Evan, Ex. F.M.S. Museums. B. M. 1955-354, 1♂ (BMNH). – MALAYSIA: PENINSULAR MALAYSIA: PAHANG: Jengka, Bandar Tun Razak, 10-14.iii.1993, Ruslan, 1♀ (UKM); Kuala Lompat, 11-13.ix.1990, Zaidi and Ismail, 2♂ (UKM); Kuala Lompat, 28.ix.1995, Zaidi and Ruslan, 1♂ (UKM); Kuala Lompat, 18-29.ix.1990, Zaidi and Ruslan, 1♂ (UKM). – PERAK: Banding, 29-30.vi.1991, Ismail, Yusof and Zabidi, 1♀ (UKM); Maxwell Hill, 9.iii.1967, Ray L. L., 1♂ (MNKM); Maxwell Hill, 14.v.1975, Ray L. L., 1♀ (MNKM); Temenggor, Ekspedisi MNS-Belum, 4-10.iv.1994, Zaidi, Ruslan and Ismail, 1♂ (UKM); Temenggor, Ekspedisi MNS-Belum, 29.xi.-5.xii.1993, 1♂ (UKM); – SELANGOR: Hutan Bangi, 21.ii.1993, Abd. Karim, 1♂ (UKM); Bangi, UKM campus, 29.ix.1999, at light, M. A. Schouten, 1♀ (ZMA). – KUALA LUMPUR: Kuala Lumpur, 30.iii.1936, H. T. Pagden, 1♂ (BMNH); Kuala Lumpur, 10.xi.192, 1♀ (MNKM); Sungai Buluh Forest Reserve, 23.vii.1969, Ray D. Leordy, 2♀ (MNKM). – NEGERI SEMBILAN: Gemencheh, 11.x.1996, Ismail and Ruslan, 1♀ (UKM); Port Dickson, 17.i.1993, Khairul, 1♀ (UKM). – JOHOR: Endau Rompin N. P., Junction Logging Rd/Access Rd 02°31'35.3"N 103°23'58.5"E, forest edge, Transect edge 12, at light, 23.v.2001, M. A. Schouten and A. J. de Boer, 1♂ 1♀ (ZMA), same data but: Transect edge 8, 14.iv.2001, M. A. Schouten, 1♂ (ZMA), Transect edge 5, 22.iii.2001, M. A. Schouten, 1♂ (ZMA), Transect edge 9, 18.iv.2001, M. A. Schouten, 1♀ (ZMA), Transect edge 6, 24.iii.2001, M. A. Schouten, 1♀ (ZMA); Endau Rompin N. P., NERC 02°31'45.4"N 103°23'52.5"E, secondary forest, Transect secondary 9, at light, 23.iv.2001, M. A. Schouten, 1♂ (ZMA), same data but Transect secondary 6, 24.iii.2001, 2♀ (ZMA), Transect secondary 7, 14.iv.2001, 1♀ (ZMA), Transect secondary 4, At light, 19.iii.2001, 1♀ (ZMA); Endau Rompin NP, Sg. Jasin near Kuala Jasin river bank, secondary and primary forest, at light, 20.iii.1999, J. P. and M. J. Duffels, M. Y. Ruslan, 2♀ (ZMA); Endau Rompin NP, Access road to NERC, 22.iii.1999, J. P. and M. J. Duffels, M. Zaidi, M. Y. Ruslan, 1♂ (ZMA); Endau Rompin NP, Road Staging point to Kuala Jasin, bridge 9, disturbed forest margin, at light, 22-23.iii.1999, J. P. and M. J. Duffels, M. Zaidi, M. Y. Ruslan, 1♂ (ZMA); Endau Rompin NP, Logging road, at light, 10.ix.1999, M. A. Schouten, 1♀ (ZMA); Endau Rompin, Access road to NERC, at light, 14.viii.1999, disturbed forest, J. P. Duffels, M. A. Schouten, M. Y. Ruslan, 1♀ (ZMA); Endau Rompin, NERC at light, 7.x.1999. 02°31'44"N, 103°24'02"E, disturbed forest, M. A. Schouten, M. Y. Ruslan and Chew Keng Lin, 1♂ 1♀ (ZMA), same data but different coll. M. A. Schouten and F. Cheong, 1♂ 1♀ (ZMA); Endau Rompin N. P., Bridge 5, at light, 11.ix.1999, disturbed forest, M. A. Schouten, 1♀ (ZMA); Endau Rompin NP, 1st. river crossing Sungai Jasin, at light, 9.x.1999, M. A. Schouten, M. Y. Ruslan and Chew Keng Lin, 1♀ (ZMA). – SINGAPORE: 1th Mile, Bukit Timah, 1♂ (MNKM); Bukit Timah, iv.1923, C. H. S., 1♀ (MNKM). – MALAYSIA: BORNEO: SABAH: Banguay Ins. nordl. Borneo, W. Kedenburg, 20.vii.1894, paratype of

Cicada nesioties Bredd., 2♀ (ZMH); Bettotan, nr. Sandakan, 13.viii.1927, 1♀ (MNKM); Danum Valley FC/LD, 25.viii.1994, J. Sauk, Aslimah, 1♀ (UKM); Lembah Danum, 25-30.ix.1991, M. S. Zaidi, Ismail and Ruslan, 2♂ (UKM); Lembah Danum, 16.x.1995, Zaidi, 1♂ (UKM); Lembah Danum, 17.iv.1994, John, 1♀ (UKM); Lahad Datu, 60 km W of Danum Valley Field Centre at junction Sg. Segama and Sg. Palum Tambun, 150m, 4°58'N 117°48'E, at light, 21.iii.1987, 18.30-20.30. Clearing nr E trail, edge of untouched evergr. lowl. rainforest, leg. Van Tol and Huisman, 2♂ (RMNH), same data but, bridge of Palum Tambun, 23.iii.1987, 18.30.21.00. Edge of untouched evergr. lowl. rainforest, leg. Van Tol and Huisman, 1♂ (RMNH); 15 km W Lahad Datu, confl. S. Sabran, S. Danum, S/N, 25.xi.1987, 117°41'E 4°57'N, 220, J. Huisman and R. de Jong, 1♀ (RMNH); Danum Valley, 4°01'N 117°47'E, 20.x.1987, 120 m, NMW Sabah (Borneo) Expedition, NMW., z. 1987.094, light trap sample, primary forest edge, A. H. Kirk-Spriggs, 1♀ (NMWC); Kinabatangan, Batu Putih, 6-18.iv.1994, Nordin Wahid, 1♂ (UKM); Sepulut, Batu Punggul, 350m, at light, 9.xi.1987, Akira Ueda leg. 00116, 1♂ (UKM); Tawau, Tibau, 390m, 5-9.iv.2000, Noramly Muslim and Ruslan, 3♀ (UKM); Tawau Hills Park, 1-3.iv.2000, 390m, Noramly Muslim, 1♂ 2♀ (UKM); Tawau Hill, jungle lodge, 300 m, garden/secondary growth, at light, 27.iii.2001, J. P. and M. J. Duffels, 1♂ (ZMA), same data but 26-29.iii.2001, J. P. and M. J. Duffels, 2♀ (ZMA); Tenom, 29.v.1984, coll. C. L. Chan, 1♂ 1♀ (UKM); Tuaran R. Centre, 21.iii.1997, Nordin Wahid, 2♀ (UKM); Ulu Dosun Palm Oil Research Stn., 50 km W of Sandakan, iv. 1978, J. Frazier and D. Clyne, 1♂ 2♀ (Moulds). – SARAWAK: Bintulu UPM, 20.iii.1992, Zaidi, 1♀ (UKM); Gunung Mulu Nat. Park, Site 20, iii-iv, W. Melinau Gorge, 150m-442577, FEG 3. Kerangas, MV-understorey, J. D. Holloway, RGS Mulu expd. B. M. 1978-206, 2♂, same data but Site 16, iii, Long Pala (Base), 70m. 324430, Alluv. second. for MV-on batu-Canopy, 1♀ (BMNH), Site 7, i, Long Pala (Base), 50 m, 324450, Alluvial/ secondary forest. Acl-understorey, 3♀ (BMNH); Julau, Lanjak Entimau, 28-29.ii.1992, Zaidi, 1♂ (UKM); Sarawak, F. Baczes, 1886, 1♂ (NHMW); Sarawak, 1908, C. J. Brooks, 1♂ (BMNH). – BRUNEI: Temburong, Kuala Belalong, F. S. C. Mixed Dipterocarp For. 60-300 m, 16-20.iv.1993, E. Heiss, 1♀ (ZMA). – INDONESIA: BORNEO: KALIMANTAN: Apau Ping, 3°6' N 115°49' E, 438m, 3.iv.1994, B. Hubley, DC Darling, IIS 940534, UV light beside stream north of village flowing through agricultural land into Bahau River, 1♂ 1♀ (ROME); Borneo Exp. Bloe-oe, B. (B[oven]= Upper) Mahakkam, ii.1896, 1♀ (RMNH); Borneo Exped. Dr. Nieuwenhuis, 1934, Boven (=Upper) Mahakkam, 3♀ (RMNH); Long Tua, Bahau River shore, 3°10'N 115°47'E, 8.ix.1994, 440m, uv light, B. Hubley, IIS 940550, 1♀ (ROME); Borneo Exped. Büttikofer, Smitau, 1899, Velthuyzen, 2♀ (RMNH); Tandjong, Sudost-Borneo, Fritz Suck, 31.xii.1895, 1♂ 2♀ (ZMH); Karimata Island, Nat. Ketapang Res. ii.1991, IIS 910035, Sutrisno Djenal, primary rainforest, Closed canopy, 350m, 108°40'-109°10'BT 1°25'-1°50'LS, 2♂ (ROME).

Distribution (fig. 72)

C. nesioties is widespread in South Thailand, Peninsular Malaysia, Singapore and Borneo (Sabah, Sarawak, Brunei and Kalimantan). The records from 'Java' are doubtful.

Chremistica echinaria Yaakop & Duffels sp. n. (figs. 36-39, 73, 85)

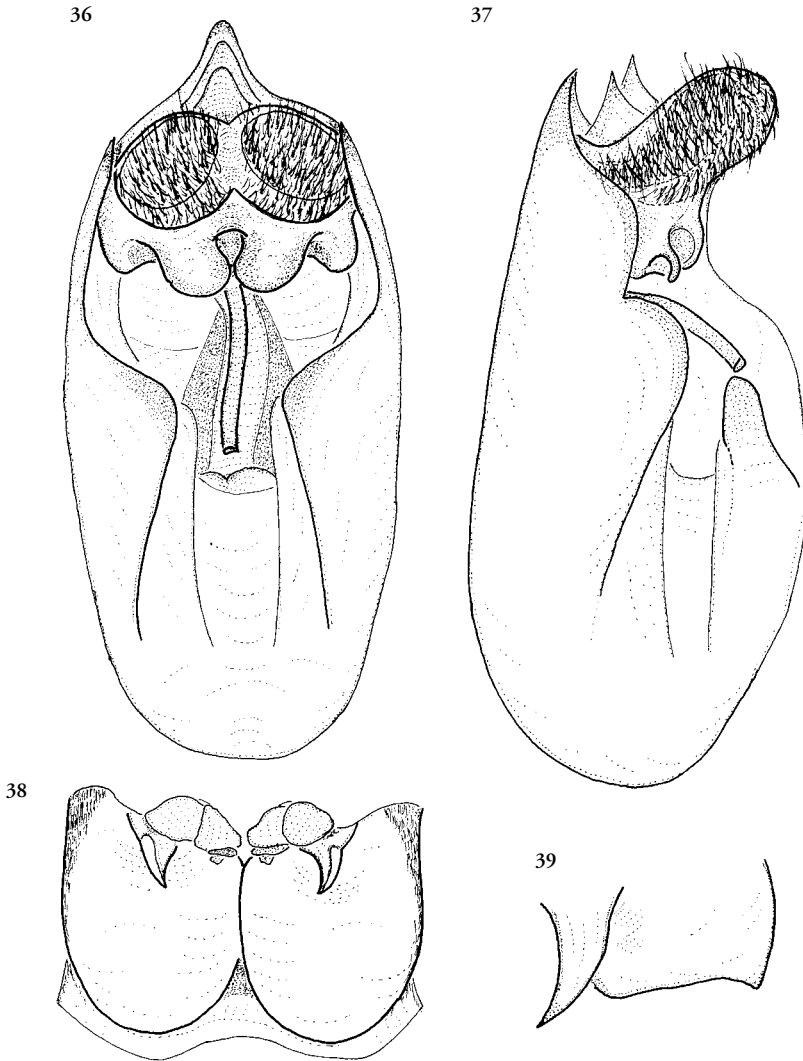
Type material. – 23♂ 11♀. Holotype ♂: 'Perak F. M. S / Larut Hills / 8.ii.1932 / H. M. Pendlebury' (MNKM). – Paratypes: MALAYSIA: PENINSULAR MALAYSIA: PAHANG: Bentong, Camang, 8-9.ii.1992, Zaidi and Ruslan, 1♀ (UKM); Bukit Fraser, 21.iii.1989, Ismail, Ruslan and Nor, 1♂ 1♀ (UKM); Bukit Fraser, 2.iii.1999, street lights, Zaidi and M. Y. Ruslan, 4♂ (ZMA) 1♂ (UMS); Bukit Fraser, 10.iii.1991, Mohan Rajji, 1♀ (UKM); Bukit Fraser, 3.v.1991, Zaidi, Ismail and Ruslan, 4♂ 1♀ (UKM); Cameron Highlands, 4.iv.1990, Zaidi, Ismail and Ruslan, 2♀ (UKM); Cameron Highlands, MNS Boh, 1400 m, 16.4.1994, M. Gogala, 1♂ (PMS). – PERAK: Gunung Benom, 9.iv.1967, Ray L. L. 1♀ (MNKM); Maxwell Hills, 9.iii.1967, Ray L. L., 1♂ (MNKM); Maxwell Hill, Taiping, 195, 10.iii.1967, Ray L. L., 1♂ (MNKM); F.M.S. Larut Hills, at light, 3700ft., 8.ii.1932, H. M. Pendlebury, Ex. F.M.S. Museum, B. M. 1955-354, 2♂ (MNKM). – SELANGOR: Bukit Kutu, iv.1915, 3457', 1♂ (MNKM); Bukit Kutu, at light, 3500 ft, Ex. F.M.S. Museum, B. M. 1955-354, H. M. Pendlebury, 19.iii.1931, 3♂ 1♀ (BMNH), same data but 14.iii.1931, 1♀ (BMNH). – MALAYA: Penang Hills, 1800-2500 ft, S. S. Flower, 99-248, 1♂ (BMNH); West Coast, Pulau Rumbia, 18.xii.1931, Set. Plus, Ex. F. M. S. Museum, B. M 1955-354, E. Seimund, 1♂ (MNKM). – NEGERI SEMBILAN: Gunung Angsi, 2000-2790, iv.1918, 1♀ (MNKM); Kuala Pilah, Ex. coll. Agri. Dept, Ex. F.M.S. Museum, B. M. 1955-354, 1♂ (MNKM). – BORNEO: MALAYSIA: SARAWAK: Limbang, Mendamit, 18-2.ii.1991, Zaidi, 2♂ (UKM). – THAILAND: Peninsular Siam, Nakon Sri Tamarat; Khoa Luang, 200 ft, Ex F.M.S. Museum, B. M. 1955-354, 14.iii.1922, H.M. Pendlebury, 1♀ (MNKM).

Diagnosis

C. echinaria can be distinguished from the other species if its subgroup viz., *C. sumatrana* and *C. nesioties*, by its large body size (body length males 30.0-34.8 mm), and the much darker ground colour of the body. The most reliable character to separate *C. echinaria* from *C. nesioties* and *C. sumatrana* is found in the male genitalia: the lateral parts of the uncus are strongly swollen, oval-shaped and densely covered with brown to castaneous bristles; the uncus in *C. nesioties* and *C. sumatrana* is only slightly elevated and not covered with bristles.

Description

Ground colour of head, thorax and abdomen dark ochraceous to brownish black. Pronotum collar sometimes with greenish tinge. Lateral parts of



Figs. 36-39. *Chremistica echinaria*. – 36, male genitalia in ventral view; 37, male genitalia in lateral view; 38, male opercula in ventral view; 39, female operculum in ventral view.

ventral side of body from eyes to abdominal segment 8 densely covered with waxy white pilosity.

Head. – Dorsal side black except anterior parts of vertex lobes and supra-antennal plates and a pair of more or less conical to pentagonal spots of the ground colour between lateral ocelli and eyes; the spots have narrow curved tips and enclose a black dot. Vertex sparsely covered with short coppery hairs. Postclypeus prominent. Transverse grooves, medial band and basal part of postclypeus covered with yellow to coppery short hairs. Median dorsal spot at frontoclypeal

suture often semi-elliptic, sometimes semi-oval. Anterior half or two-thirds of gena, and posterior half of lorum black. Gena, lorum and anteclypeus, with exception of keel, densely covered with long yellow to coppery hairs. Rostrum with black apex reaching just beyond middle coxae.

Thorax. – Pronotum. Broad black fasciae in paramedian oblique fissures triangularly widened and sometimes enclosing a narrow spot, anteriorly connected with a pair of paramedian semispherical black spots at anterior pronotal ridge by a narrow black

fascia along the pronotal ridge, and posteriorly connected with V-shaped, median black mark touching the black ambient fissure along anterior margin of pronotum collar. Proximal part of median anchor spot, bordered by the median V-shaped mark, sometimes separated from the rest of the spot by a narrow to broad transverse black line. Lateral oblique fissures sometimes black or darkened.

Mesonotum. – Sometimes with greenish tinge. Paramedian obconical fields reaching to half-length of mesonotum. Lateral obconical fields extending to seven-eighths of mesonotum length and enclosing a large, sometimes fairly narrow, obconical area of the ground colour. Central mark sometimes enclosing a pair of small, oval spots of the ground colour; median point of central mark sometimes reaching to posterior margin of pronotum collar. Basal part of central mark sparsely covered with golden to coppery short hairs. Anterior branches of cruciform elevation often with a small apical black spot.

Legs. – Pale orange to ochraceous. Tips of spines on femora brown. Middle and hind tibiae often somewhat darkened at distal ends.

Tegmina and wings. – Tegmina often with bronzy reflection. Basal cell light brownish to olivaceous. Venation of tegmina dark ochraceous in basal third, turning light brown apically. Costal vein dark ochraceous in basal half, apical half black. Venation of wings light to dark brown.

Male operculum (fig. 38). – Ochraceous, sparsely covered with silvery to golden pubescence. Basal two-fifths of medial margins slightly overlapping. Lateral margin slightly convex and curled up.

Male abdomen. – Medial corners of tymbal covers brown-black. Tergite 1 often with a pair of conspicuous, pubescent, waxy white dots laterodistally of posterior branches of cruciform elevation. Distal borders of black bands of tergites 2 to 4 usually straight, rarely with small triangular median protrusion, and reaching medially to two-thirds or three-fourths of segment length. Black bands on tergites 3 and 4 often narrowing laterad to at most two-fifths of segment length. Lateral part of band on tergite 3 sometimes enclosing a narrow, transverse spot of the ground colour. Black bands on tergites 5 and 6 medially reaching to half to three-fourths of segment length, those on tergites 7 and 8 to one-fourth to half of segment length. Dorsal side of abdomen densely covered with golden pubescence. Ventral side orange to ochraceous and silvery hirsute, mediolateral thirds of sternites 7 and 8 light brown to black-brown.

Male genitalia (figs. 36-37). – Pygofer ochraceous, dorsally marked with dark brown. Lateral pygofer lobe pale ochraceous with straight to very weakly convex apical margin and rounded rectangular medial corner; in lateral view with rectangular corner

between apical margin of lobe and lateroventral pygofer margin. Basal pygofer lobes with slightly inwardly curved conical apical part. Uncus ochraceous, lateral parts of uncus strongly swollen, oval-shaped and densely covered with brown to castaneous bristles. Medial clasper lobes semi-circular-shaped, with slightly convex medial margin, and strongly inwardly curved lateral margin. Lateral clasper lobe bulbous-shaped, reaching to lateral sides of pygofer; apical parts slightly curved inward. Aedeagus long. Basal plates strongly convex.

Female operculum (fig. 39). – Pale ochraceous. Lateral margin convex, basal two-thirds black. Laterodistal corner obtuse. Posterior margin undulate and convexly curved toward meracanthus.

Female abdomen. – Tergite 1 often with a pair of conspicuous lateral white dots. Black band along anterior margin of tergite 2 reaches medially to three-fourths of segment length and narrow laterad, similar bands on tergites 3 and 4 reach medially to two-thirds of segment length and widen laterad, and those on tergites 5-7 reach to half-length or one-third (tergite 7) of the segment length. Distal borders of black bands on segments 2-7 sometimes with triangular median protrusion. Dorsal abdomen densely covered with shiny golden pubescence. Ventral side of abdomen brown. Sternites with shiny white pilosity and scattered long hairs, paratergites covered with dense white pilosity.

Measurements (n = 10♂ 4♀). – Body length ♂ 30.0-34.8 mm, ♀ 29.0-31.5 mm; head width ♂ 12.1-14.3 mm, ♀ 12.0-13.1; pronotum width ♂ 12.4-14.1 mm, ♀ 11.9-13.2 mm; tegmen length ♂ 41.0-47.1 mm, ♀ 39.8-42.8 mm.

Distribution (fig. 73)

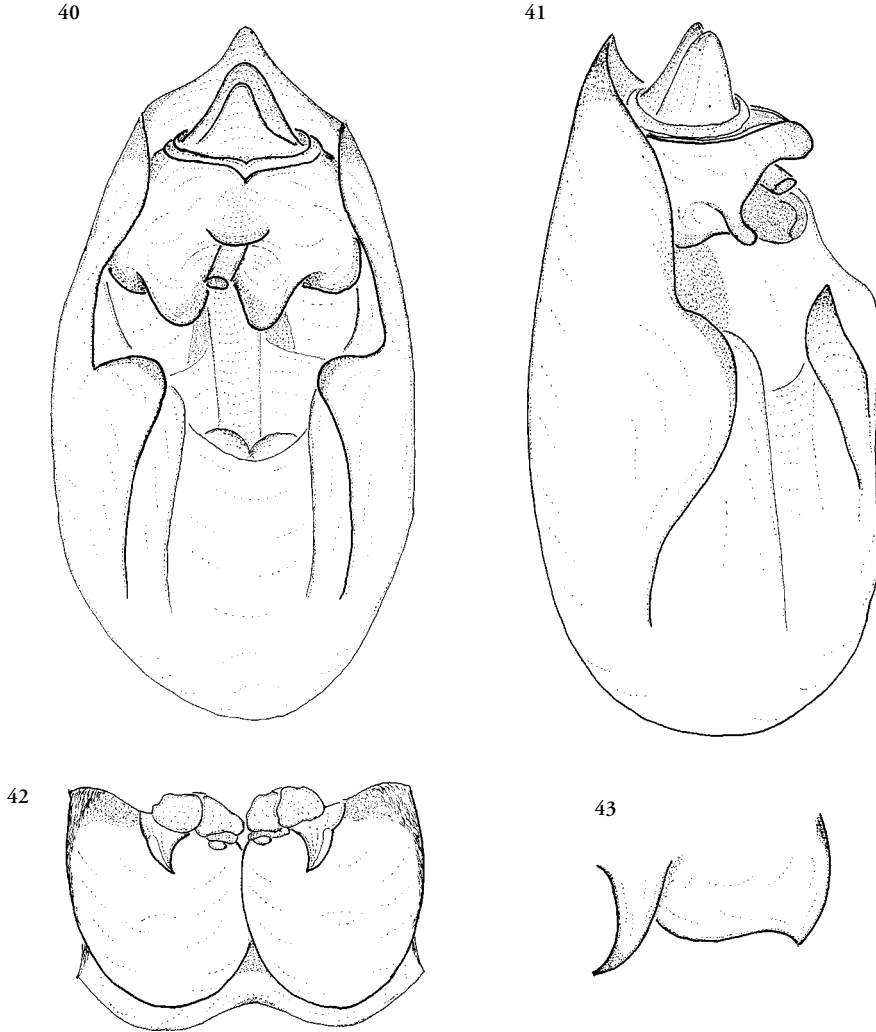
This species is recorded from the mountainous areas of the Malayan Peninsula. The two specimens labeled Sarawak, Limbang, Mendamit may be mislabeled; the occurrence of *C. echinaria* in Borneo needs confirmation.

Etymology

This species is characterized by the strongly swollen lateral parts of the uncus which are densely covered with brown to castaneous bristles. The name 'echinaria' refers to this feature that resembles the spiny surface of a sea-urchin (*Echinus* in Latin).

Chremistica sumatrana Yaakop & Duffels sp. n.
(figs. 40-43, 73, 86)

Type material. – 24♂ 3♀. Holotype ♂: 'Mus. Leiden, Ir. P. v. Hemert, / Pladjoe (Sum.), / 1923-'26, / leg. Dr. C. R. Bakker' (RMNH). – Paratypes: INDONESIA, SUMATRA: Deli, L. P. de Bussy, 12♂



Figs. 40-43. *Chremistica sumatrana*. – 40, male genitalia in ventral view; 41, male genitalia in lateral view; 42, male opercula in ventral view; 43, female operculum in ventral view.

(ZMA) 1♂ (UKM) 1♂ (UMS); Deli, 1884, 1♂ (NHMW); NE Sumatra, Kuala Simpang, lowland cultiv. area, iii.1954, at light, A. Sollaart, 1♂ (RMNH), same data but: viii.1953, 1♂ (RMNH); Langkat, E. Versmann leg. 85-86, Senator Versmann, 25. viii. 1986, 1♂ (ZMH); Langkat, Balei Gadjah, Le. Moults vend. via Reinbek, Eing. Nr. i.1957, 1♂ (ZMH); Medan, Doloc Baros Sumatra, Le. Moults vend. via Reinbek, Eing. Nr. i.1957, 1♂ (ZMH); Palembang, Douglas, 1916, coll. Dr. D. McGillavry, 1♀ (ZMA); Ris. Tapanoeli, acq. 1894, A. L. v. Hasselt, 1♂ (RMNH); Sumatra, Breitenstein, 8842, 1♂ (NHMW); Sumatra, A. Weiss,

don 1914, 1♀ (ZMA); Sumatra of [or] Java, D. G. Vordesman, 1♀ (RMNH). – Other specimens: N. Guinea, Merauke, coll. Dr. D. McGillavry, 1♂ (ZMA).

Diagnosis

C. sumatrana can be distinguished from the other species in this group by the median part of the black band on tergite 2 reaching the posterior margin of tergite 2; this black band does not reach the posterior margin of the segment in the other species of the group.

Description

Ground colour of head, thorax, and abdomen dark yellow to dark ochraceous.

Head. – Dorsal side black except a pair of conical spots of the ground colour between ocelli and eyes; the spots often enclose a black dot; anterior angles of spots often with a curled tip separated from the spot by a very narrow black line. Vertex densely covered with short silvery hairs. Postclypeus weakly prominent. Dorsal side of head covered with yellow to coppery hairs. Median dorsal spot at frontoclypeal suture of postclypeus broadly, sometimes narrowly, semi-elliptic. Lateral margins and basal part of postclypeus covered with silvery hairs. Anterior two-thirds of gena and posterior fourth of lorum black. Gena, lorum and anteclypeus, with exception of keel, sparsely covered with long white to coppery hairs. Rostrum with black apex reaching beyond middle coxae.

Thorax. – Pronotum. Black fasciae in paramedian oblique fissures triangularly widened and sometimes enclosing a narrow, oblique spot of the ground colour, anteriorly connected with medially interrupted black fascia along anterior margin of pronotum, and posteriorly connected with an V-shaped, median black mark that is fused with the black ambient fissure along the pronotum collar. Proximal part of median anchor spot bordered by median V-shaped mark and separated from rest of spot by a broad transverse black line. Lateral oblique fissures sometimes darkened.

Mesonotum. – Paramedian obconical fields extending to half-length of mesonotum disc. Lateral obconical fields extending to seven-eighths of mesonotum and enclosing (very) narrow, elongate spots of the ground colour. Basal part of central mark sparsely covered with coppery and sometimes with white to coppery hairs. Median point of central mark sometimes reaching posterior margin of pronotum collar.

Legs. – Pale ochraceous, sometimes orange-brown, and sparsely covered with short coppery hairs. Fore femora with slightly darkened fasciae connecting the pale brown spines.

Tegmina and wings. – Tegmina often with bronzy reflection. Basal cell pale ochraceous. Venation of tegmina light brownish in basal third, turning dark brown apically. Costal vein dark ochraceous or sometimes dark yellow in basal half, apical half black. Venation of wings light to dark brown.

Male operculum (fig. 42). – Dark ochraceous, sometimes orange-brown and covered with silver pilosity. Basal two-fifths of medial margins slightly overlapping. Lateral margins straight to weakly convex, basal one-third black.

Male abdomen. – Tergite 1 with a pair of conspicuous pubescent, waxy white dots laterodistally of

posterior branches of cruciform elevation. Medial corners of tymbal covers dark brown. Median part of distal border of black band on tergite 2 reaching posterior tergite margin. Distal border of black bands along anterior margin of tergites 3 and 4 rarely with small triangular median protrusion, reaching to four-fifths of segment length. Posterior margin of black band on tergite 3 with large sublateral excavation. Band on tergite 4 narrows laterad to at most half of segment length. Bands on tergites 5 and 6 reaching to four-fifths of segment length and about equally wide along whole length. Dorsal side of abdomen densely, sometimes sparsely, covered with golden to coppery pubescence. Ventral side of abdomen dark brown, sometimes pale ochraceous, and densely covered with silver pilosity. Posterior half to two-thirds of sternites 7 and 8 brown.

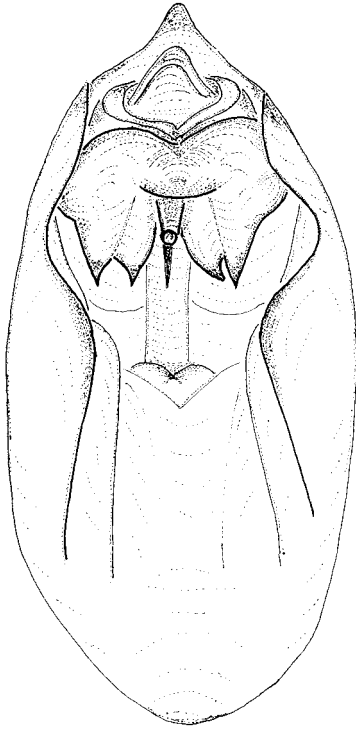
Male genitalia (figs. 40–41). – Pygofer light to dark ochraceous, dorsally marked with dark brown. Lateral pygofer lobe with weakly convex and slightly inwardly curved apical margin and rounded rectangular medial corner; in lateral view with right-angled corner between lateral margin of pygofer lobe and lateroventral pygofer margin. Basal pygofer lobes with convex apical margin, reaching to three-fifths of pygofer length, apical parts of lobes curved inward. Uncus ochraceous, apical part brownish, bluntly triangular and elevated in lateroventral view. Medial clasper in lateroventral view with straight to slightly convex lateral margin, an oblique medial margin, and a straight to weakly convex apical margin. Lateral clasper lobes fairly large and reaching to lateral sides of pygofer. Basal plate weakly convex.

Female operculum (fig. 43). – Pale ochraceous and covered with silvery hairs. Lateral margin brownish to black, weakly to fairly strongly convex. Laterodistal corner obtuse and broadly rounded. Posterior margin undulate.

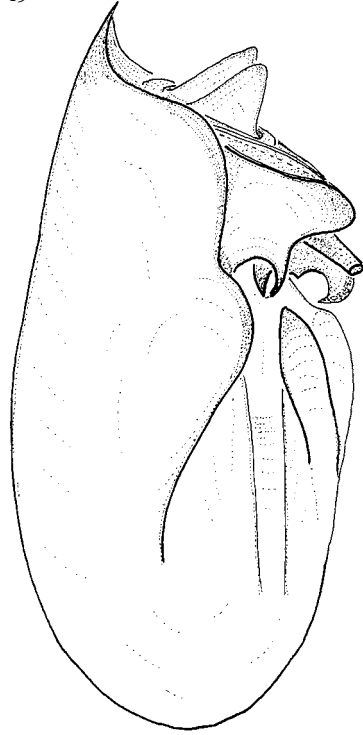
Female abdomen. – Tergite 1 without a pair of conspicuous lateral white dots. Black bands along anterior margins of tergite 2–3 medially (almost) reaching posterior segment margin and laterally narrowed, similar bands on segment 4–6 reach medially to two-thirds of segment length and slightly widen laterad, while the band on tergite 7 reaches to one-third of segment length. Distal borders of black bands sometimes with triangular median protrusion. Ventral side of abdomen ochraceous and with scattered white pilosity.

Measurements (n=10♂ 3♀). – Body length ♂ 26.9–31.7 mm, ♀ 23.0–26.2 mm; head width ♂ 11.4–12.3 mm, ♀ 9.7–10.9 mm; pronotum width 11.3–12.8 mm, ♀ 9.9–10.8 mm; tegmen length ♂ 38.6–41.0 mm, ♀ 33.0–37.9.0 mm.

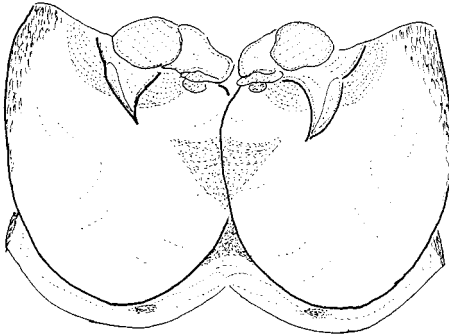
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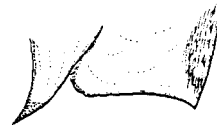
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46



47



Figs. 44-47. *Chremistica kecil*. – 44, male genitalia in ventral view; 45, male genitalia in lateral view; 46, male opercula in ventral view; 47, female operculum in ventral view.

Distribution (fig. 73)

This species is restricted to Sumatra Island. The specimen from New Guinea is probably mislabeled; the genus *Chremistica* does not occur in this island.

Chremistica kecil Salmah & Zaidi, 2002
(figs. 44-47, 73, 87)

Chremistica kecil Salmah & Zaidi, 2002: 225, 227, 237, figs. 5-8, Holotype ♂: 'Pahang: Tasik Chini / Kg. Melayu / 14.iv.1993 / Zaidi, Ruslan and Kudin', 'Type' (UKM) [examined].

Diagnosis

C. kecil can easily be distinguished from the other species of the *bimaculata* group by its small size (body length male: 23.9-25.3 mm). *C. kecil* is slightly larger than *C. minor* (body length ♂ 20.1-21.7 mm, but *C. kecil* is missing the transverse black lines on the underside of the postclypeus that are found in *C. minor*.

Description

Ground-colour of head, pronotum and mesonotum orange-brown to ochraceous, pronotum collar often with greenish tinge.

Head. – Dorsal side black except anterior parts of vertex lobes and supra-antennal plates and a pair of conical spots of the ground colour with narrow lateral, inwardly curled, tips, between lateral ocelli and eyes; spots enclosing a black dot. Vertex sparsely covered with short silvery hairs. Dorsal side of postclypeus with three pairs of black transverse grooves connected to the mediodorsal black part; transverse ridges between black grooves sometimes black. Underside of postclypeus including grooves ochraceous. Median glabrous area of postclypeus dorsally black. Median dorsal spot of the ground colour at frontoclypeal suture semi-elliptic. Postclypeus fairly strongly prominent. Transverse grooves, medial band and basal part of postclypeus covered with silvery pubescence. Anterior two-thirds of gena black, posterior part of gena, lorum and anteclypeus ochraceous. Lateral sides of postclypeus, gena and lorum covered with yellowish short hairs. Rostrum with black apex reaching hind coxae.

Thorax. – Pronotum. Black fasciae in paramedian oblique fissures triangularly widened and sometimes enclosing a narrow, oblique spot of the ground colour, anteriorly connected with medially interrupted black fascia along anterior margin of pronotum, and posteriorly connected with an V-shaped, median black mark that stands upon the black ambient fissure at anterior margin of pronotum collar. Lateral oblique fissures without black marking. Lateral parts of anchor spot sometimes forming separate, narrow, transverse oval spots.

Mesonotum. – Paramedian obconical fields extending to half-length of mesonotum disc. Lateral obconical fields enclose a (very) narrow elongate spot and reach to seven-eighths of mesonotum disc. Central mark sparsely covered with coppery short hairs at base. Median point of central mark sometimes reaching to posterior margin of pronotum collar.

Legs. – Pale ochraceous, sometimes with yellowish green. Fore femora with somewhat darkened fascia connecting pale brown spines. Middle and hind tibiae sometimes with pale brown annulation at distal ends.

Tegmina and wings. – Tegmina often with bronzy

reflection. Basal cell pale olivaceous. Venation light brownish in basal third, remaining venation dark brown. Costal vein castaneous in basal half, apical half black. Venation of wings light to dark brown.

Male operculum (fig. 46). – Pale castaneous sometimes yellowish with greenish tinge. Basal two-fifths of medial margins slightly overlapping. Lateral parts, posterior margin and medial margin sparsely covered with golden pubescence.

Male abdomen. – Medial corners of tymbal covers brown to dark brownish. Tergites 2-8 with black bands along anterior margins. Black bands on tergites 2 to 5 with triangular median protrusion, reaching to two-thirds of segment length, those on tergites 3 and 4 narrow laterad to at most one-fourth of segment length. The black band on tergite 6 reaches to half the segment length and widens laterally, tergites 7 and 8 have very narrow black bands. Dorsal side of abdomen sparsely covered with golden pubescence. Anterior tergite margins sparsely, sometimes densely, covered with short coppery hairs. Ventral side of abdomen pale castaneous, but posterior half of sternite 2, anterior fourth of sternites 3 to 7, and posterior fourth of sternite 8 somewhat darkened. Lateral parts of sternites sparsely and median part of sternites 3 and 4 densely covered with golden pubescence.

Male genitalia (figs. 44-45). – Pygofer ochraceous, but apical parts of lateral pygofer lobes, anal valves and the whole uncus darkened. Lateral pygofer lobe weakly developed, with broad and convex apical margin and an obtusely angled corner between apical margin of lobe and the more distal pygofer margin. Basal pygofer lobes with bluntly triangular apical margin and slightly outwardly curved apical part. Uncus short, bluntly triangular and elevated. Medial clasper lobe triangular with weakly convex medial margin. Lateral clasper lobe triangular with slightly convex lateral margin and inwardly curved apically. Aedeagus long and stout, with a long ventral process attached to basal part of aedeagus.

Female operculum (fig. 47). – Pale ochraceous. Lateral margin weakly convex. Laterodistal corner of operculum obtuse. Posterior margin, straight, slightly oblique and slightly curved toward meracanthus. Lateral margin with white to golden pilosity.

Female abdomen. – Dorsal side of abdomen pale castaneous, sometimes with greenish tinge. Distal border of black bands along anterior margin of tergites 2 to 6 with triangular median protrusion, reaching to three-fourths of segment length. Tips of median triangular protrusion of tergites 2 and 3 sometimes touching posterior margins of tergites 2 and 3. Ventral side of abdomen pale ochraceous, sometimes yellowish green. Anterior tergite margins and lateral parts of sternites sparsely covered with golden pubescence.

Measurements (n=2♂ 2♀). – Body length ♂ 23.9-25.3 mm, ♀ 21.2-23.9 mm; head width ♂ 9.6-10.0 mm, ♀ 8.7-10.0 mm; pronotum width ♂ 9.3-10.4 mm, ♀ 8.6-9.7 mm; tegmen length ♂ 31.4-31.6 mm, ♀ 29.3-31.3 mm.

Material examined. – 2♂ 3♀. MALAYSIA: PENINSULAR MALAYSIA: Pahang, Tasik Chini, Kg. Melayu, 14.iv.1993, Zaidi, Ruslan and Kudin, ♂ holotype, same data but 15.v.1993, 1♂ paratype (without genitalia), 1♀ paratype (UKM), 1♀, UKM, same data but 12-14.v.1993, Zaidi, Ruslan and Kudin, 1♀ paratype (UKM).

Distribution (fig. 73)

This species is only known from Tasik Chini, Pahang in Peninsular Malaysia.

Chremistica tridentigera group

This group was erected by Bregman (1985) for 11 species of *Chremistica*. Five species that are currently attributed to the *tridentigera* group occur in Sundaland: *C. tridentigera*, *C. biloba*, *C. umbrosa*, *C. borneensis* and *C. minor*. Possible synapomorphies for the *tridentigera* group are (1) the arc-shaped claspers that are laterally connected with the uncus and (2) the long lateral pygofer lobes, which are at least 3 times as long as wide and sometimes twisted. *C. borneensis*, a new species from Borneo with arc-shaped claspers but relatively short lateral pygofer lobes is tentatively added to the *tridentigera* group.

C. tridentigera, *C. biloba*, *C. umbrosa* and *C. borneensis* and two other members of the *tridentigera* group, viz., *C. siamensis* Bregman from Thailand and *C. mixta* (Kirby) from Sri Lanka (Bregman, 1985), have a dorsal aedeagal process. This is a possible synapomorphy for these species. The lateral oblique fissures on the pronotum are black in *C. tridentigera*, *C. biloba*, *C. umbrosa* and *C. borneensis*; this line is missing in *C. minor*. The anterior margin of the median black marking on the vertex is trilobate in *C. tridentigera*, *C. biloba*, *C. umbrosa* and *C. borneensis*; the black marking on the vertex is more broadly connected with the anterior margin of the head in *C. minor*. In the *pontianaka* and *bimaculata* groups the vertex is black with exception of the anterior parts of vertex lobes and supra-antennal plates and a pair of spots between lateral ocelli and eyes. *C. tridentigera*, *C. umbrosa* and *C. borneensis* have more or less triangular male opercula, while the medial margins of the opercula are not overlapping.

C. tridentigera, *C. biloba* and *C. borneensis* are restricted to Sabah. *C. minor* is recorded from Borneo, Sarawak and the southern part of Peninsular Malaysia. *C. umbrosa* is known from Peninsular Malaysia and Sumatra.

Chremistica tridentigera (Breddin, 1905) (figs. 3, 48-51, 74, 88)

Cicada tridentigera Breddin, 1905, Lectotype ♂: 'C. tridentigera, Bredd.', 'R. tridentigera Brdd.' (handwritten), 'G. Breddin determ.' (ZMH) [not examined]. See Bregman (1985: 56-57) for lectotype designation.

Cicada tridentigera; Weidner & Wagner 1968: 142.

Chremistica tridentigera; Metcalf 1963: 181; Duffels & Van der Laan 1985: 59; Bregman 1985: 39-60, Figs. 1, 4, 14, 37-39; Zaidi 1997: 110; Zaidi & Azman 2003: 96, 97.

Diagnosis

C. tridentigera and the next species, *C. biloba*, are very similar in their external features, but can be distinguished by characters of the male genitalia. The females belonging to *C. tridentigera* or *C. biloba* have been listed below as 'females of *C. tridentigera* or *C. biloba*'. The description of the female of *C. tridentigera* given below has been made after female specimens from Danum Valley since males of *C. tridentigera* have been recorded from this locality.

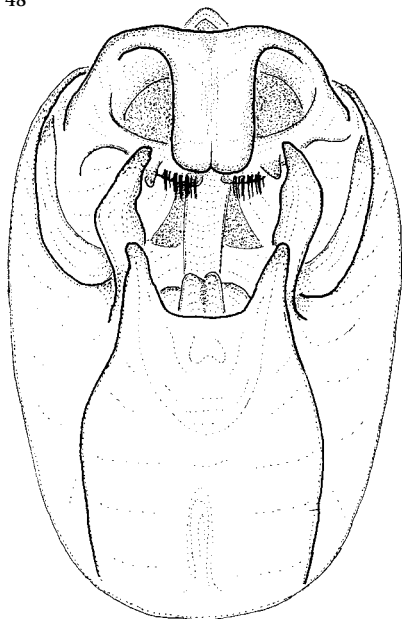
Description

Ground-colour of head, pronotum, and mesonotum orange-brown to ochraceous, pronotum collar often with greenish tinge. Ventral side of body brown to dark brown and with lateral bands of waxy white pilosity running from eyes to abdominal segment 8.

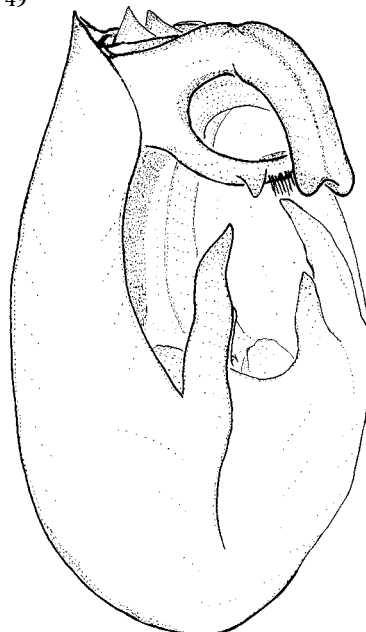
Head. – Vertex with median black marking enclosing ocelli, anterior margin of this marking trilobate with its median triangular lobe reaching frontoclypeal suture, and posterior margin broadly connected with posterior margin of head. The median marking continues laterad in an irregular fascia that widens to the eye and encloses a mushroom-shaped spot of the ground colour at posterior margin of head; the black colouration next to the eyes sometimes continues along anterior margins of supra-antennal plates and vertex lobes. Vertex sparsely covered with short coppery to white hairs. Postclypeus prominent and with median, semi-circular, or sometimes triangular, area of the ground colour at frontoclypeal suture; this area is separated from a median, elliptic, glabrous area of the ground-colour by a transverse fascia formed by the fusion of the black colour of the upper 2-3 transverse grooves. The glabrous area reaches to the 7th or 8th pair of black transverse grooves and is narrowly connected with a semi-oval area of the ground colour at the clypeal suture. Anterior half of gena, posterior half of lorium, and anteclypeus with exception of keel, black. Gena, lorium and anteclypeus, with exception of keel, covered with long white to coppery hairs. Transverse grooves, medial band and basal part of postclypeus covered with white pilosity. Rostrum with black apex just passing middle coxae.

Thorax. – Pronotum. A pair of central black, more

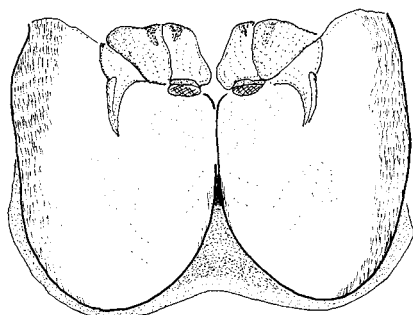
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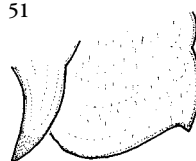
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51



Figs. 48-51. *Chremistica tridentigera*. – 48, male genitalia in ventral view; 49, male genitalia in lateral view; 50, male opercula in ventral view; 51, female operculum in ventral view.

or less rounded triangular spots at anterior ridge of pronotum. Black fasciae in paramedian oblique fissures fairly broad and connected with V-shaped median black mark at anterior margin of pronotum collar. Comma-shaped black fasciae extending from middle of paramedian oblique fasciae to the posterior. Lateral oblique fissures with broad black fasciae which are connected at both ends with a black fascia in the ambient fissure.

Mesonotum. – Paramedian obconical fields reaching to half-length of mesonotum. Lateral obconical fields extending to three-fourths of mesonotum length and enclosing an elongate spot of the ground

colour. Central mark encloses a pair of fairly large spots of the ground colour. Anterior branches of cruciform elevation sometimes with a narrow black transverse line.

Legs. – Dark ochraceous, sometimes with castaneous tinge. Fore femora with black fascia connecting the dark brown spines. Fore tibiae with dark brown fascia on outer side.

Tegmina and wings. – Tegmina often with bronzy reflection. Basal cell olivaceous. Transverse veins at bases of second and third apical areas with very lightly brownish suffusion. Venation of tegmina ochraceous in basal third, turning dark brown apically.

Costal vein ochraceous to brownish in basal half, apical half black. Venation of wings light to dark brown.

Male operculum (fig. 50). – Brown to dark ochraceous. Broadly triangular, medial margins not overlapping and slightly diverging from base. Lateral margins slightly oblique, straight, and curled up.

Male abdomen. – Tymbal covers brown, sometimes dark brown. Tergite 2 brownish with a median black-brown mark. Tergites 3-6 black-brown, but tergite 3 with a pair of conspicuous lateral, white pubescent, waxy patches. Tergite 7 with black-brown anterior band, medially extending to half the segment length and laterally widening to whole length of segment; posterior part of tergite orange-brown. Tergite 8 with narrow brownish anterior part and orange-brown posterior part. Dorsal side of abdomen sparsely to densely covered with golden pubescence. Ventral side brown, sometimes red-brown, and with sparse coppery pubescence.

Male genitalia (figs. 48-49). – Pygofer pale ochraceous, but lateral pygofer lobes, uncus, clasper lobes and aedeagus light brownish. Lateral pygofer lobes with bluntly triangular, medially curved, apical part. Pygofer in lateral view with rounded incision between lateral pygofer lobe and lateroventral margin of pygofer. Basal pygofer lobes with bluntly triangular apical margin reaching to two-thirds of lateral pygofer lobes, and situated next to these lobes. Uncus narrow, 3-4 times as long as wide, and slightly narrowing to a very weakly bilobate apical margin. Median juxtaposed ends of arc-shaped clasper lobes thickened and with short castaneous bristles pointing proximad. Median part of lateral clasper lobe at half-length with weakly to strongly developed pointed appendage directed proximad. Aedeagus with subapical dorsal process. Basal plate convex.

Female operculum (fig. 51). – Brown to dark ochraceous. Lateral margin undulate. Laterodistal corner obtuse. Posterior margin convex and curved toward meracanthus.

Female abdomen. – Tergite 2 black, turning brownish laterad. Tergites 3-6 black, tergite 3 with conspicuous shiny white pubescent, oval lateral patches that expand on tergite 4. . Tergite 7 with very narrow, black anterior band, that laterally widens to almost whole length of segment, posterior part of segment light ochraceous. Tergite 8 with narrow black-brown anterior band and orange-brown posterior part. Ventral side of abdomen brown to red-brown, sternite 7 sometimes variegated with black-brown. Segment 9 ochraceous, dorsally with W-shaped black-brown figure and ventrally sometimes with vague black-brown marking.

Measurements (n=5♂ 5♀). – Body length ♂ 29.4-30.4 mm; ♀ 26.7-32.0 mm; head width ♂ 11.6-12.2 mm, ♀ 11.3-13.9 mm; pronotum

width ♂ 11.3-11.9 mm, ♀ 10.7-14.2 mm; tegmen length ♂ 38.8-43.0 mm, ♀ 37.1-43.2 mm.

Material examined. – 7♂. BORNEO: MALAYSIA: SABAH: Lembah Danum, 25-30.ix.1991, M. S. Zaidi, Ismail and Ruslan, 1♂ (UKM); Danum Valley, 5°01'N 117°47'E, 29.ix.1987, 200m, A. H. Kirk-Spriggs, NMW Sabah (Borneo), Expedition, NMW., z. 1987, 094, light trap sample, understorey forest, 1♂ (NMWC); Kuamut, Gunung Rara, 5-14.xii.1996, light trap, 1♂ (UKM); Tawau Hills, light trap., 15-18.iv.2000, ITO Gen. leg. 1♂ (UKM); Tawau, Tibow, 5-9.iv.2000, 390m, Noramly Muslim and Ruslan, 1♂ (UKM); Tawau Hill, jungle lodge, 300 m, garden/ secondary growth, at light, 27-29.iii.2001, J. P. and M. J. Duffels, 1♂ (ZMA).

Females of *C. tridentigera* or *C. biloba*: BORNEO: MALAYSIA: SABAH: Beaufort, Kg. Selangon, 3.xi.1991, Khamis Selamat, 1♀ (UKM); Danum Valley, 5°01'N 117°47'E, 29.ix.1987, 200m, A. H. Kirk-Spriggs, NMW Sabah (Borneo), Expedition, NMW., z 1987, 094, light trap sample, understorey forest, 1♀ (NMWC), same data but 1.x.1987, 220m, 1♀ (NMWC); Lembah Danum, 2.iv.1989, Salleh, Ismail and Nor, 1♀ (UKM); Borneo, Sabah, Danum Valley, 5°01'N 117°47'E, 1.x.1987, 220m, A. H. Kirk-Spriggs, NMW Sabah (Borneo), Expedition, NMW., z. 1987, 094, light trap sample, understorey forest, 1♀ (NMWC); 60 km W Lahad Datu, DVFC, nr Segama Bridge; 150 m, 20.xi.1987, 117°48'E 4°58'N, J. Huisman and R. de Jong, 1♀ (ZMA); Tawau, Tibow, 5-9.iv.2000, 390m, Noramly Muslim and Ruslan, 1♀ (UKM); Tawau Hills Pk, 1-3.iv.2000, elev. 390m, Noramly Muslim, 1♀ (UKM).

Distribution (fig. 74)

This species has been described from Banguay (= Banggi) island north of Borneo and is also recorded from Borneo (Brunei; Malaysia: Sarawak and Sabah) (see also Bregman 1985).

Chremistica biloba Bregman, 1985 (figs. 52-55, 70, 89)

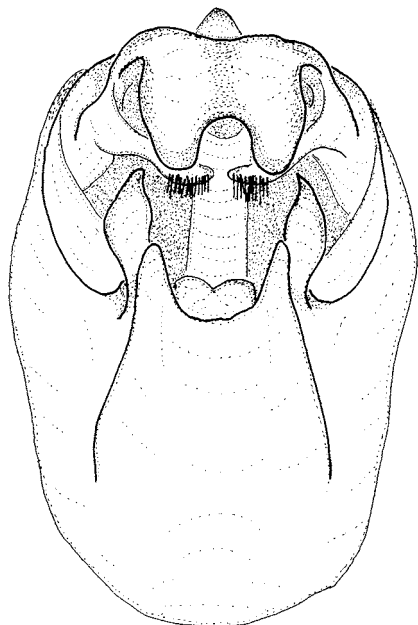
Chremistica biloba Bregman, 1985: 39-60, Figs. 2, 13, 35, 36, Holotype ♂: 'Sarawak: Gunung Mulu Nat. Park' Site 20, Mar-Apr., W. Melinau Gorge, 150m, 442577, FEG 3 Kerangas. MV-understorey' R. G. S. Exped. 1977-8, J. D. Holloway, B. M. 1978-206' (BMNH) [not examined].

Chremistica biloba; Zaidi 1997: 110.

Differential diagnosis

This species can only be separated from *C. tridentigera* by characters of the male genitalia. The uncus of *C. biloba* is broad, slightly longer than wide and tapers into two blunt lobes with strongly convex apical margins; the uncus of *C. tridentigera* is narrow,

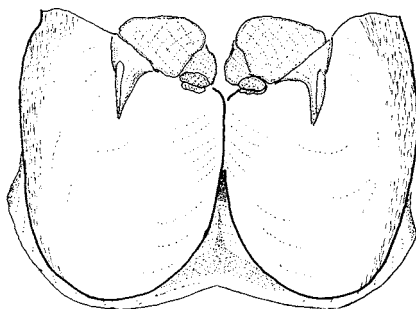
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55



Figs. 52-55. *Chremistica biloba*. – 52, male genitalia in ventral view; 53, male genitalia in lateral view; 54, male opercula in ventral view; 55, female operculum in ventral view.

3-4 times as long as wide, and slightly narrows to a very weakly bilobate apical margin. The median part of the lateral clasper lobe of *C. biloba* is missing the weakly to strongly developed pointed appendage directed proximad as found in *C. tridentigera*. The median juxtaposed ends of the clasper lobes of *C. biloba* are thickened as in *C. tridentigera* but more densely covered with fairly long dark ochraceous bristles.

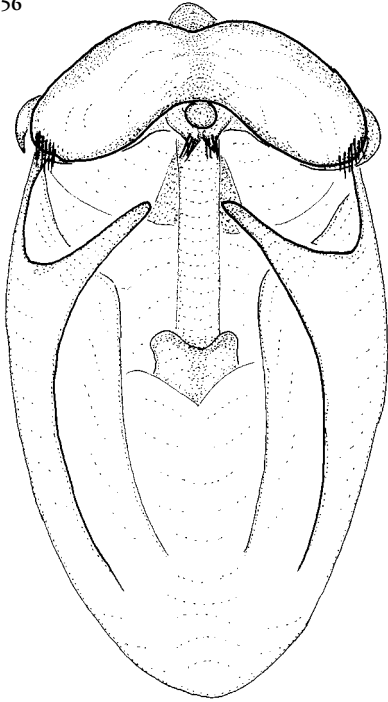
Measurements (n= 1♂). – Body length 29.9 mm; head width 12.4 mm; pronotum width 12.6 mm; tegmen length 41.5 mm.

Material examined. – 1♂. BORNEO: INDONESIA: KALIMANTAN: Borneo Exp., Dr. Nieuwenhuis, Long Bloe-oe, Mahakkam, 1898, 'Paratype *Chremistica biloba* sp. n.', 1♂ (ZMA).

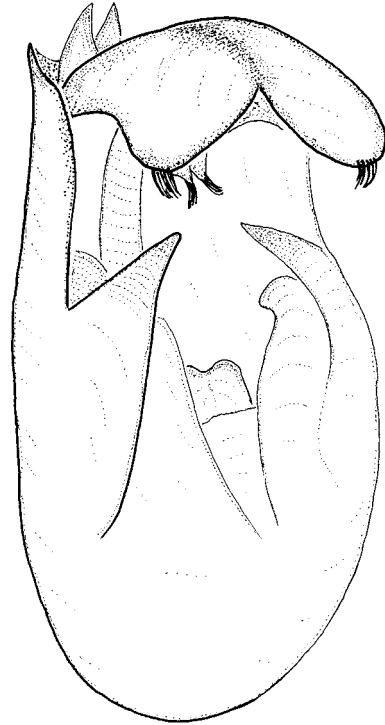
Distribution (fig. 70)

Bregman (1985) described this species from Borneo (Sarawak and Kalimantan). No new material of this species has become available.

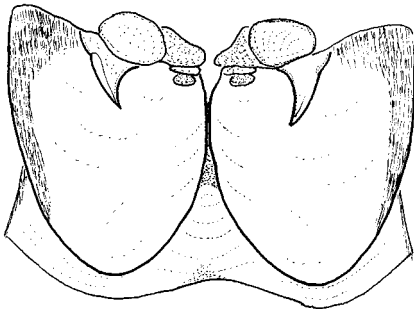
56



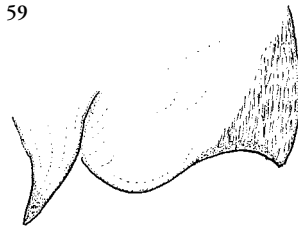
57



58



59



Figs. 56-59. *Chremistica umbrosa*. – 56, male genitalia in ventral view; 57, male genitalia in lateral view; 58, male opercula in ventral view; 59, female operculum in ventral view.

Chremistica umbrosa (Distant, 1904)
(figs. 56-59, 74, 90)

Cicada umbrosa Distant, 1904a: 330, 331. Holotype ♂: 'Bouro Doherty', red label 'Type' (BMNH) [not examined].

Rihana umbrosa; Distant 1906b: 34; Distant 1912: 28; Moulton 1912: 128; Moulton 1923: 129.

Chremistica umbrosa; Metcalf 1963: 181, 182; Bregman 1985: 52; Salmah & Zaidi 2002: 226, 229; Schouten et al. 2004: 372, 373.

Rihana pisanga Moulton, 1923: 69, 129, 131, 168, Pl. IV.

figs. 20, 20a, b. Lectotype ♂: 'Pulau Pisang' (BMNH) [not examined]; Kato 1932: 155; Salmah & Zaidi 2002: 229 (in syn. of *C. umbrosa*).

Chremistica pisanga; Metcalf 1963: 178; Bregman 1985: 52 (in syn. of *C. umbrosa*) Zaidi et al. 1996: 60; Salmah & Zaidi 2002: 229 (in syn. of *C. umbrosa*).

Diagnosis

This species can be distinguished from the other species of the genus by the marking on the mesonotum: the lateral obconical field encloses a broadly

elongate spot of the ground colour, but the medial and lateral black margins of this obconical field are often open; the median fascia is usually not connected with the pair of spots in front of the cruciform elevation. *C. umbrosa* also differs from its congeners in the strongly diverging medial margins of the male opercula. The fairly short and broad uncus with bundles of reddish bristles at its lateral edges is very characteristic for *C. umbrosa*.

Description

Ground-colour of head, thorax and dorsal side of abdomen dark yellow to brown, sometimes with greenish tinge. Lateral parts of ventral side of body from eyes to abdominal segment 8 densely covered with waxy white pilosity.

Head. – Black median marking on vertex consisting of a median triangle enclosing the median ocellus and attached to the frontoclypeal suture, and two black markings each enclosing a lateral ocellus and narrowing towards the supra-antennal plates and the vertex lobes; markings enclosing the median and lateral ocelli more or less fused. Black marking along inner sides of eyes. Somewhat darkened dot between lateral ocelli and eye. Vertex sparsely covered with short white to coppery hairs. Postclypeus prominent. Postclypeus with broad median area of the ground colour at frontoclypeal suture that narrows into a median, elliptic, black-brown bordered glabrous area reaching to 6th to 7th pair of black transverse grooves; basal part of postclypeus black. Gena, lorum and anteclypeus, with exception of anterior margin and keel of anteclypeus, black, and sparsely covered with long white to coppery hairs. Rostrum with black-brown apex just reaching hind coxae.

Thorax. – Pronotum. Broad black fasciae in paramedian oblique fissures connected with a pair of paramedian black triangles at anterior pronotal ridge by a narrow black fasciae along the pronotal ridge. Median black mark at anterior margin of pronotum collar consisting of two juxtaposed black dots that are not connected with the paramedian oblique fissures. Lateral oblique fissures occasionally partly or entirely black. Ambient fissure partly or entirely with a narrow black line.

Mesonotum. – Paramedian obconical fields reaching to half-length of mesonotum, medial margins often concave and irregular. Lateral obconical fields extending to seven-eighths of mesonotum and enclosing a broadly elongate, irregular spot of the ground colour; but medial and lateral margins of obconical field often open. Central fascia of central mark usually not connected with pair of spots in front of cruciform elevation.

Legs. – Fore femora pale yellow with dark brown fascia connecting dark brown spines. Middle and

hind femora dark ochraceous with castaneous tinge. Tibiae dark ochraceous, distal ends of middle and hind tibiae somewhat darkened.

Tegmina and wings. – Tegmina sometimes with bronzy reflection. Basal cell light brownish. Transverse vein at base of second apical area with distinct round infuscation; base of third apical area occasionally lightly infuscated. Venation of tegmina brown to ochraceous in basal third, turning dark brown apically. Costal vein castaneous in basal half, apical half black. Venation of wings light to dark brown.

Male operculum (fig. 58). – Brown to ochraceous. Broadly triangular, medial margins not overlapping, and strongly diverging from base. Lateral margins straight to slightly oblique, and curled up.

Male abdomen. – Tergite 1 black. Medial corners of tymbal covers brownish black. Distal border of black band on tergite 2 straight or with small triangular median protrusion, and reaching medially to half to two-thirds of segment length. Tergite 3 with pair of lateral, white, pubescent oval patches. Distal border of black band on tergite 3 usually straight, but occasionally with paramedian concavities and small median triangular protrusion, and reaching medially to half to two-thirds of segment length. Black bands on tergites 4-6 about equally wide along whole length and reaching to three-fourths or two-thirds of segment length. Distal borders of black bands on tergites 7 and 8 reach medially to one-fourth to three-fourths of segment length and laterally almost to hind margin of segment. Dorsal side of abdomen densely covered with yellow to waxy white, sometimes golden, pubescence. Ventral side of abdomen dark brown to brownish black.

Male genitalia (figs. 59-60). – Pygofer pale yellow to ochraceous, dorsally marked with black. Lateral pygofer lobe fairly long and strongly tapering to acute, medially curved, apical part; pygofer in lateral view with broadly rounded incision between lateral margin of pygofer lobe and lateroventral pygofer margin. Basal pygofer lobes extending to half-length of lateral pygofer lobe and partly hidden behind these lobes. Uncus broad, elevated, and consisting of a pair of rounded rectangular fused lobes. Lateral part of uncus slightly curved downward; lateral edge of uncus bearing bundle of reddish bristles pointing proximad. Lateral clasper lobes brownish black, hook-shaped. Juxtaposed ends of medial clasper lobes slightly swollen and provided with bundle of reddish bristles. Aedeagus with broad dark brown dorsal process fairly close to opening of aedeagus. Basal plate weakly convex.

Female operculum (fig. 59). – Pale ochraceous. Lateral margin straight or weakly undulate. Laterodistal corner of operculum rounded rectangular. Posterior margin strongly concave in lateral half but

strongly convex toward meracanthus.

Female abdomen. – Distal borders of black bands along anterior margins of tergites 2 to 8 often with triangular median protrusion, reaching medially to half or sometimes one-fourth of segment length and laterally almost to posterior segment margin. Segment 9 dorsally with a median M-shaped black marking and ventrally with a pair of black to brown dots, and with broad brown to black fasciae along lower segment margins. Ventral side of abdomen with dark brown to brownish black marking on median part of sternites. Dorsal sides of abdomen densely covered with short coppery to silvery hairs, ventral side with silver pilosity.

Measurements. (n= 6♂ 6♀). – Body length ♂ 33.4-35.1 mm, ♀ 20.4-20.0 mm; head width ♂ 13.4-14.1 mm, ♀ 11.4-12.0 mm; pronotum width ♂ 11.0-11.5 mm, ♀ 10.3-10.8 mm; tegmen length ♂ 43.2-44.6 mm, ♀ 39.4-40.2 mm.

Material examined. – 14♂ 16♀. MALAYSIA: PENINSULAR MALAYSIA: KEDAH: Nr. Jitra, Catchment Area, Ex F.M.S. Museum, B. M. 1955-354, 1♀ (MNKM). – PAHANG: Taman Negara, Lata Berkoh, 30.x.1995, Zaidi, Ruslan and Mahadir, 1♀ (UKM); Taman Negara, Sg. Relau, E. of Merapoh, 4°41'N 102°36'E, 9-11.iii.1999, J. P. and M. J. Duffels and M. Y. Ruslan, 1♂ (ZMA); Taman Negara NP Kuala Juram, E. of Merapoh, 4°39'N 102°08'E, edge primary rainforest (near dormitory), at light, 12.iii.1999, J. P. and M. J. Duffels and M. Zaidi and M. Y. Ruslan, 1♀ (ZMA), same data but 15.iii.1999, 1♀ (ZMA); Taman Negara, Kuala Juram, 16-19.xi.1995, Ruslan, 1♀ (UKM). – NEGERI SEMBILAN: Pasoh Forest Reserve, 0.3 km ESE station quarters, 10 km W Ayer Hitam 350m, at light, buffer zone of regenerating forest (selectively logged), 9.iii.1997, M. Kos and S. Azman, 1♂ 1♀ (ZMA), same data but 11.iii.1997, 2♀ (ZMA). – SELANGOR: Pulau Ayer Merbau, at light, 10.v.1923, H. C. A., 1♀ (MNKM); Bangi, UKM, 16.iii.1990, Haniza, 2♂ (UKM), same data but Charles K. Juat, 26.i.1989, 1♂ (UKM). – JOHOR: Endau Rompin, Janing Ridge, 5 min. 02°31'33"N 103°23'03"E, Disturbed forest, Transect primary 6, At light, 26.iii.2001, M. A. Schouten and F. Cheong, 1♀ (ZMA); Endau Rompin, Janing Ridge, 20 min. 02°31'19"N 103°23'59"E, Primary lowland rainforest, Transect primary 10, At light, 17.v.2001, M. A. Schouten, A. J. de Boer and G. Witaar, 1♀ (ZMA); Endau Rompin N. P., Headquarters, at light, disturbed forest, 15.viii.1999, J. P. Duffels, M. A. Schouten, M. I. Zaidi and M. Y. Ruslan, 1♂ (ZMA); Endau Rompin, 13.ii.2001, Zaidi and Azman, 2♂ (UKM) Pulau Pisang, Light House, 1.iv.1921, 1♂ 1♀ (MNKM), same data but 3.iv.1921, 1♀ (MNKM), 4.iv.1921, 1♂ (MNKM). – SINGAPORE: Ex. F.M.S. Museum, B. M. 1955-354, 29.iv.1934, 1♀ (MNKM). – INDONESIA: Bangk, Panhkalpinang, 9.x.1976, leg. E. H. Bon, Collectie W. H. Gravestijn, 1♂ (ZMA); Pulau Tujuh, (Toedjoe), E. H. Bon, Collectie W. H. Gravestijn 8.ix.1974, 1♂ (ZMA), same data but 10.viii.1974, 1♀ (ZMA), 6.viii.1974, 1♂ 1♀ (ZMA); Pulau Tujuh, near Banka, Collectie W. H. Gravestijn, v.1975, 1♂ (ZMA).

Distribution (fig. 74)

This species is recorded from the southern part of the Malayan Peninsula, the eastern coastal area of Sumatra, and from Banka Island and various other islands in the southern Strait of Malacca.

Chremistica borneensis Yaakop & Duffels sp. n. (figs. 60-63, 75, 91)

Type material. – 4♂ 1♀ Holotype ♂: 'MALAYSIA, Sabah / TAWAU HILL, jungle lodge, 300 m' 'garden /secondary / growth at light / 27-29.iii.2001 / J. P. and M. J. Duffels' (ZMA). – Paratypes: same data as holotype, 1♂ (ZMA) 1♂ (UKM) 1♂ (UMS); Tawau Hills Pk, 1-3.iv.2000, elev. 390m, Noramly Muslim, 1♀ (UKM).

Diagnosis

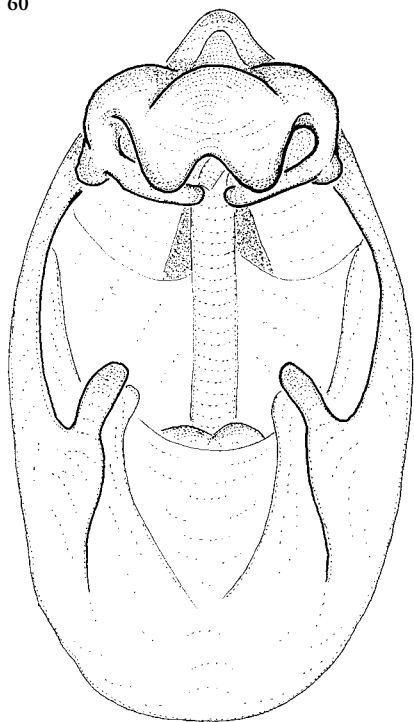
C. borneensis differs from the other species of the *tridentigera* group in the relatively short lateral pygofer lobes that reach just beyond the basal pygofer lobes. The marking of the body in *C. borneensis* is similar to that of *C. tridentigera* and *C. biloba*, but *C. borneensis* is missing a pair of conspicuous lateral white waxy patches on tergite 3 as found in *C. tridentigera* and *C. biloba*. *C. borneensis* is also distinctly larger than the other two species: body length male *C. borneensis*: 33.9-35.7 mm, *C. tridentigera*: 26.7-32.0 mm, *C. biloba*: 29.9 mm.

Description

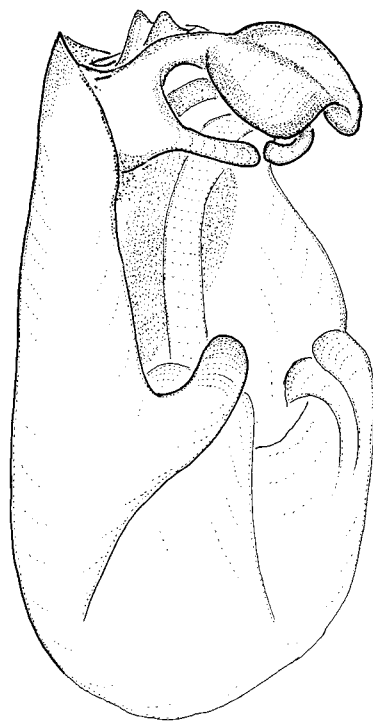
Ground-colour of head and thorax and dorsal side of abdomen orange-brown to dark ochraceous, pronotum collar with greenish tinge. Ventral side of body brown to dark brown and with lateral bands of waxy white pilosity running from eyes to abdominal segment 8.

Head. – Vertex with median black marking enclosing ocelli, anterior margin of this marking trilobate, median lobe broadly connected with frontoclypeal suture; posterior margin bilobate and touching posterior margin of head. The median marking continues laterad in an irregular fascia that widens to the eyes and encloses a triangular spot of the ground colour, with a central black dot, at the posterior margin of the head. Vertex sparsely covered with short coppery to white hairs. Postclypeus strongly prominent, and with median, semi-elliptic area of the ground colour at frontoclypeal suture, which is connected with a median, elliptic, glabrous area reaching to the 7th or 8th pair of black transverse grooves, and more ventrally with an oval area of the ground colour at the clypeal suture. Gena, posterior two-thirds of lorum, and anteclypeus with exception of keel, black. Gena, lorum and anteclypeus with exception of keel, densely covered with long white to yellow hairs. Rostrum

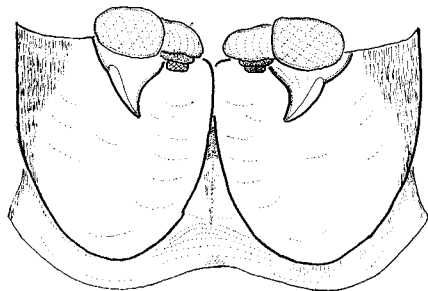
60



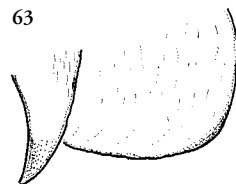
61



62



63



Figs. 60-63. *Chremistica borneensis*. – 60, male genitalia in ventral view; 61, male genitalia in lateral view; 62, male opercula in ventral view; 63, female operculum in ventral view.

with brownish apical part just reaching hind coxae.

Thorax. – Pronotum. A pair of central black, more or less rounded triangular spots at anterior pronotal ridge. Black fasciae in paramedian oblique fissures broad and connected with the U-shaped median black mark at anterior margin of pronotum collar. Short, curved, black fasciae extending from middle of

paramedian oblique fasciae to the posterior. Lateral oblique fissures with broad black fasciae that are connected at both ends with a narrow black line in the lateral part of the ambient fissure.

Mesonotum. – Paramedian obconical fields reaching to half-length of mesonotum. Lateral obconical fields extending to three-fourths of mesonotum

length and enclosing a very narrowly elongate, lanceolate spot of the ground colour. Central mark enclosing a pair of large spots of the ground colour.

Legs. – Brown with castaneous tinge to dark brown. Fore femora with dark brown fasciae connecting black spines. Basal parts of tibiae light brown.

Tegmina and wings. – Tegmina often with bronze reflection. Basal cell olivaceous. Venation of tegmina dark brown in basal third, turning brown apically. Costal vein ochraceous in basal half, apical half brown-black. Venation of wings light to dark brown.

Male operculum (fig. 62). – Dark brown to black. Broadly triangular, medial margins not overlapping, and slightly diverging from base. Lateral margins straight to slightly oblique and curled up.

Male abdomen. – Dorsal side castaneous to brownish black. Medial corners of tymbal covers brownish black. Black band on tergite 2 reaching medially to two-thirds of segment length and narrowing laterad. Black band on tergite 3 reaching to two-thirds or three-fourths of segment length. Black bands on segments 4-6 and 8 about equally wide along whole length and reaching to about half the segment length, that on segment 7 extends to one-third of segment length. Anterior two-thirds of tergites 3-6 sparsely with golden pubescence. Posterolateral margins of tergites 3 to 6 with densely set silvery hairs. Ventral side of abdomen dark brown to brownish black. Sternites sparsely covered with golden pubescence.

Male genitalia (figs. 60-61). – Pygofer yellow to ochraceous, dorsally marked with black. Uncus, claspers, and aedeagus ochraceous to dark brown. Lateral pygofer lobe fairly short with rounded apical part, which is slightly curved mediad. Pygofer in lateral view with rounded incision between lateral pygofer lobe and lateroventral margin of pygofer. Basal pygofer lobes with rounded apical margin, slightly shorter than lateral pygofer lobes and reaching to half the pygofer length. Uncus broad at base, slightly narrowing proximad and tapered into two bluntly triangular lobes which have slightly convex apical margins. Median juxtaposed ends of claspers rounded rectangular. Lateral clasper lobes obtuse. Aedeagus with long dorsal process. Basal plate strongly convex.

Female operculum (fig. 63). – Brownish black. Lateral margin undulate. Laterodistal corner obtuse. Posterior margin convex and curved toward meracanthus.

Female abdomen. – Dorsal side castaneous to brownish black. Black bands on tergites 2 to 3 reach medially to half the segment length and widen laterally; those on tergites 4 to 8 reach medially to one-fourth of segment length and widen laterally. Black band on tergite 9 reaching medially to three-fourths of segment length. Posterior margins of tergites 4 to 7 covered with white to golden pubescence. Tergites 8

and 9 covered with golden pubescence. Ventral side of abdomen brownish and with golden pubescence. Median part of sternite 7 black.

Measurements. (n = 4♂ 1♀) – Body length ♂ 33.9-35.7 mm, ♀ 31.7 mm; head width ♂ 14.1-14.2 mm, ♀ 13.8 mm; pronotum width ♂ 13.6-14.5 mm, ♀ 14.2 mm; tegmen length ♂ 42.2-45.9 mm, ♀ 43.2 mm.

Distribution (fig. 75)

This species is only recorded from Tawau Hills, Sabah, Borneo.

Chremistica minor Bregman, 1985 (figs. 64-67, 75, 92)

Chremistica minor Bregman 1985: 46, 47. Holotype ♂: 'Sarawak: Gunung Mulu Nat. Park' 'Site 14, February, Camp 2.5, Mulu, 1000 m. 413461, Lower 1. montane for., 'MV-canopy/understorey' ' J. D. Holloway, RGS Mulu exped., B.M. 1978-206' (BMNH) [examined].

Diagnosis

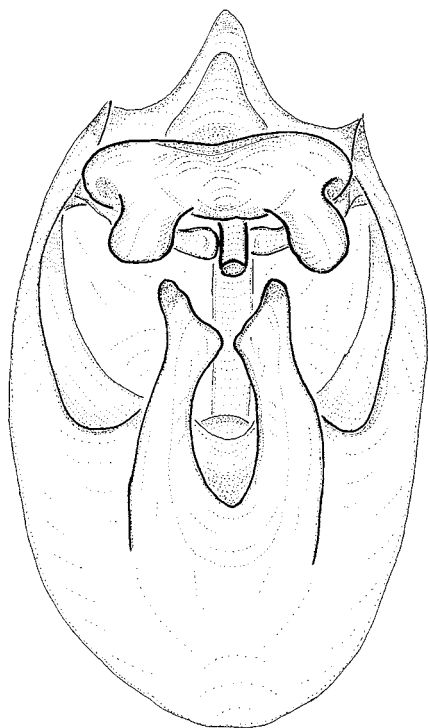
C. minor has arc-shaped claspers and long basal pygofer lobes and is therefore allocated in the *tridentigera* group, in spite of the fact that it has a different marking on the head, more alike to that of the *pontianaka* group. *C. minor* is the smallest species in the *tridentigera* group (body length: 20.1-21.7 mm), and can also be recognized by the very narrow black lines in the paramedian oblique fissures on the pronotum and the short paramedian obconical spots that reach to one-third of length of mesonotum only.

Description

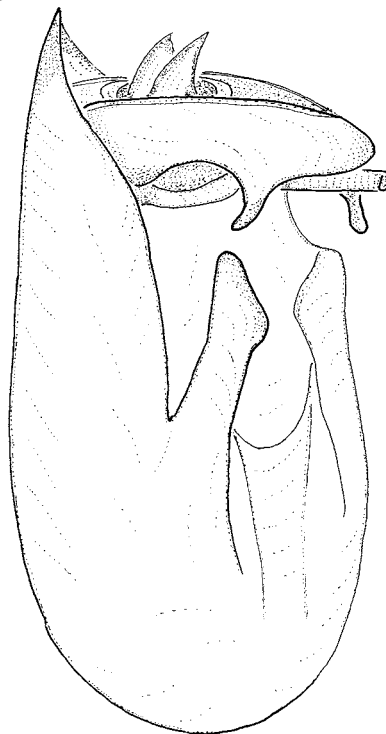
Ground-colour of head and thorax dark yellow, occasionally reddish-brown, with greenish tinge. Lateral parts of ventral side of body from eyes to segment 8 densely covered with waxy white pilosity.

Head. – Black marking on median part of head enclosing ocelli and reaching to frontoclypeal suture, posterior margin sometimes touching posterior margin of head. Median marking narrows laterodistally to three-fourths of head length. Black marking along inner sides of eyes. Vertex sparsely covered with short white to coppery hairs. Postclypeus prominent. Transverse grooves on postclypeus black. Median, broadly semi-elliptic spot of the ground colour at frontoclypeal suture connected with a median glabrous area ventrally narrowing to 7th pair of black transverse grooves; the median glabrous area is narrowly connected with an oval area at the clypeal suture. Anterior two-thirds of gena, lorum and anteclypeus, with exception of keel, black. Gena, lorum and anteclypeus, with exception of keel, densely covered with long silvery hairs. Rostrum with dark

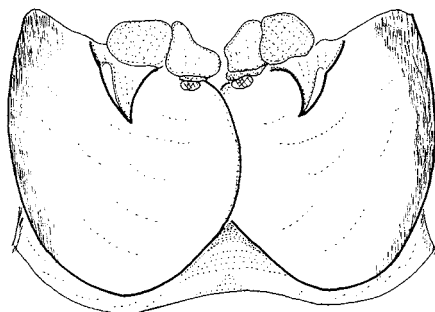
64



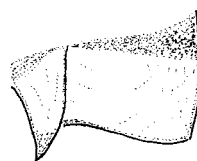
65



66



67



Figs. 64-67. *Chremistica minor*. – 64, male genitalia in ventral view; 65, male genitalia in lateral view; 66, male opercula in ventral view; 67, female operculum in ventral view.

brown apex reaching middle coxae.

Thorax. – Pronotum. A pair of central black triangular spots at anterior ridge of pronotum. Black fasciae in paramedian oblique fissures very narrow. Small V-shaped, median black mark at anterior margin of pronotum collar not connected with paramedi-

an oblique fissures. Ambient fissure black.

Mesonotum. – Paramedian obconical fields short, reaching to one-third of mesonotum disc. Lateral obconical fields extending to five-sixth of mesonotum length and enclosing broad, oval spots of the ground colour. Central mark enclosing a pair of fairly large

spots of the ground colour, basal part of central mark sparsely covered with coppery white hairs. Anterior branches of cruciform elevation sometimes with small black apical spot.

Legs. – Dark yellow, sometimes with ochraceous tinge. Fore femora with dark brown fascia connecting the yellow-brown spines. Distal ends of middle and hind tibiae somewhat darkened.

Tegmina and wings. – Tegmina often with bronzy reflection. Basal cell yellowish to ochraceous. Venation of tegmina dark yellow to brown in basal third, turning dark brown apically. Costal vein olivaceous in basal half, apical half ochraceous. Tegmina without infuscation. Venation of wings light to dark brown.

Male operculum (fig. 62). – Basal two-fifths of medial margins broadly overlapping. Lateral margin oblique, slightly convex, and curled up, basal part black.

Male abdomen. – Dorsal side dark ochraceous. Tymbal covers ochraceous. Distal border of black bands of tergites 2 to 8 usually straight and occasionally with small triangular median protrusion, reaching medially to one-fourth to half of segment length. Dorsal side of abdomen sparsely covered with ochraceous to brown pubescence. Ventral side of abdomen brown, and sparsely covered with golden pubescence. Median part of sternites 2 and 8 dark brown to brownish black.

Male genitalia (figs. 64-65). – Pygofer ochraceous. Lateral pygofer lobes long, with triangular apical margin, and hidden behind basal pygofer lobes. Pygofer in lateral view with acute-angled incision between lateral margin of lateral pygofer lobes and lateroventral margin of pygofer. Basal pygofer lobes long, with bluntly triangular apical margin, oblique, apical part slightly pointing mediad. Basal pygofer lobes situated in front of lateral pygofer lobes and reaching five-eighths of pygofer length. Uncus dark brown, triangular in ventral view with two lateral lobes with strongly convex apical margins pointing laterad. Medial juxtaposed ends of lateral clasper lobes thickened and with sharply triangular apical margins. Basal plates weakly convex.

Female operculum (fig. 67). – Sparsely covered with golden pubescence. Lateral margin weakly convex. Laterodistal corner of operculum obtuse. Posterior margin straight and oblique toward meracanthus.

Female abdomen. – Dorsal side ochraceous. Black band on tergite 2 reaching to four-fifths of segment length. Distal borders of black bands of tergites 3 to 8 usually straight, with small triangular median protrusion reaching to half of segment length, and widening laterally. Dorsal side of abdomen sparsely covered with golden pubescence. Ventral side of abdomen brown, and sparsely covered with golden pubescence. Lateral part of sternite 6 black. Sternite 7 black. Pos-

terior halves of sternites 8 and 9 black.

Measurements (n=2♂ 1♀). – Body length ♂ 20.1-21.7 mm, ♀ 20.8 mm; head width ♂ 9.5-10.1 mm, ♀ 9.9 mm; pronotum width ♂ 8.3-9.5 mm, ♀ 9.1 mm; tegmen length ♂ 29.5-31.9 mm, ♀ 27.7 mm.

Material examined. – 2♂ 1♀. MALAYSIA: PENINSULAR MALAYSIA: PAHANG: Rompin Endau, 23.ix.1992, Badrol and Haji, 1♂ 1♀ (UKM). – JOHOR: 1909-165, H. N. Ridley, 1♂ (BMNH)

Distribution (fig. 75)

This species has been recorded from Gunung Mulu, Sarawak by Bregman (1985). The present study reveals its occurrence in the southern part of Peninsular Malaysia.

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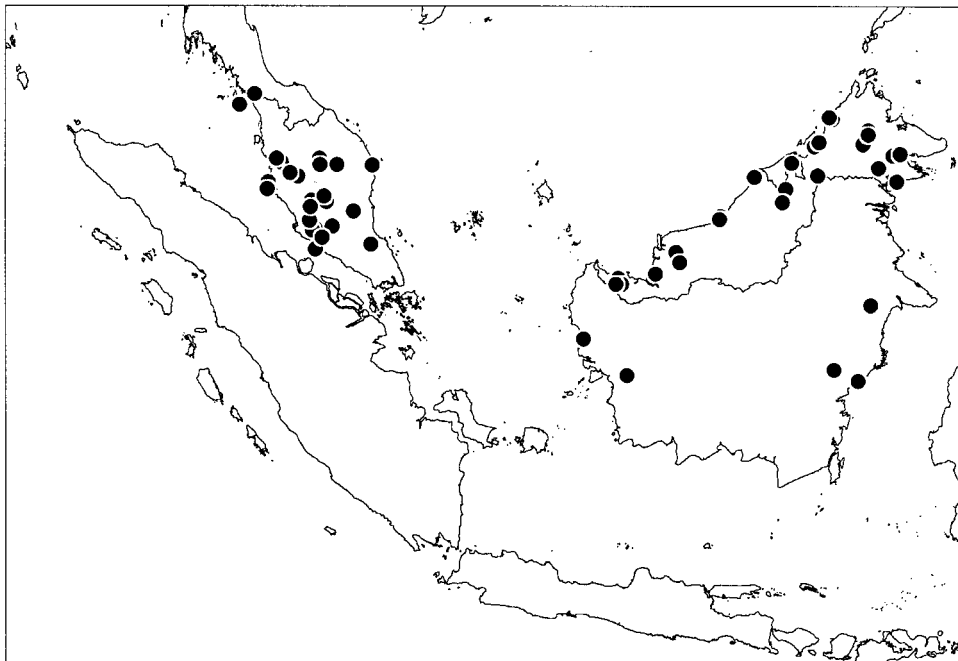


Fig. 68. Distribution of *Chremistica pontianaka*.

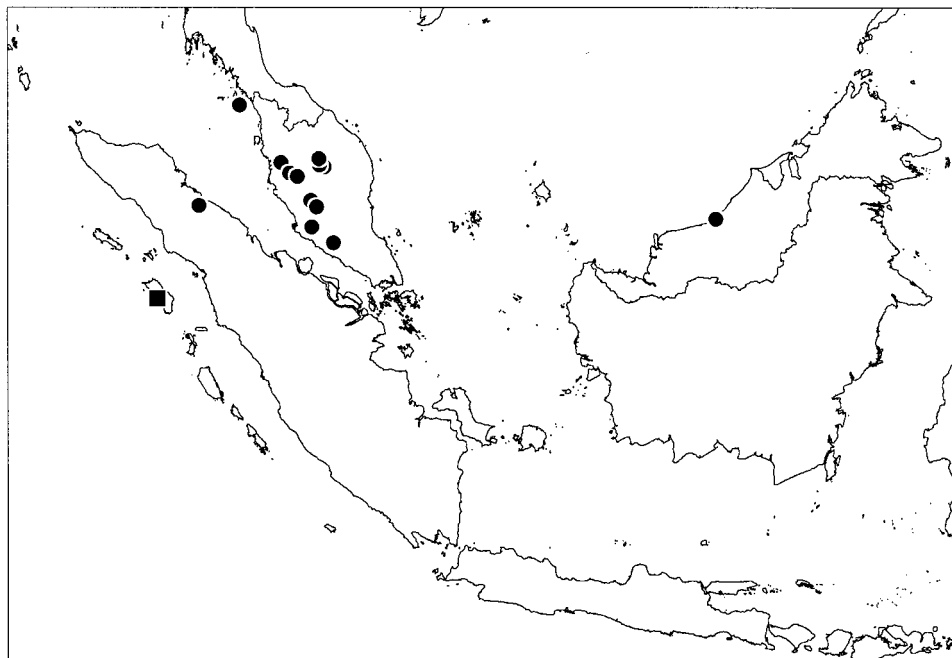


Fig. 69. Distribution of *Chremistica guamusangensis* (rounds) and *C. niasica* (squares)

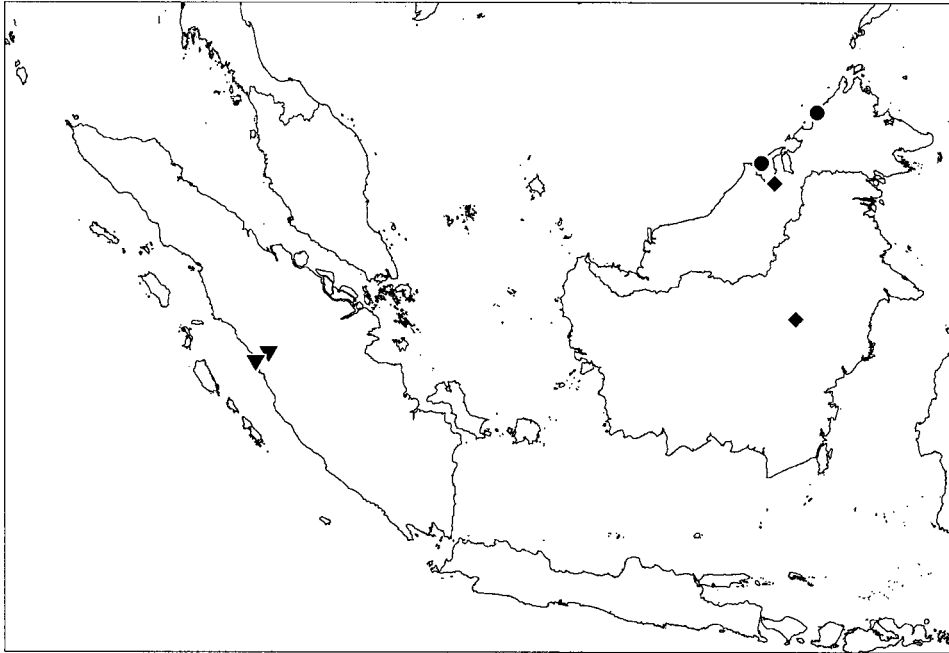


Fig. 70. Distribution of *Chremistica biloba* (diamonds), *C. cetacauda* (reversed triangles) and *C. hollowayi* (rounds).

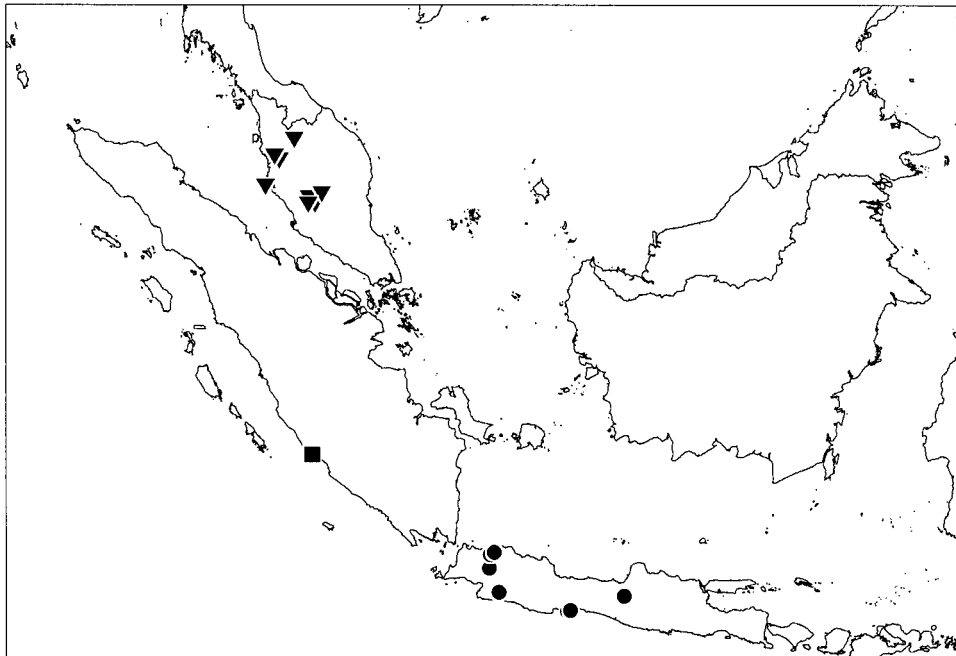


Fig. 71. Distribution of *Chremistica bimaculata* (rounds), *C. brooksi* (squares) and *C. malayensis* (reversed triangles).

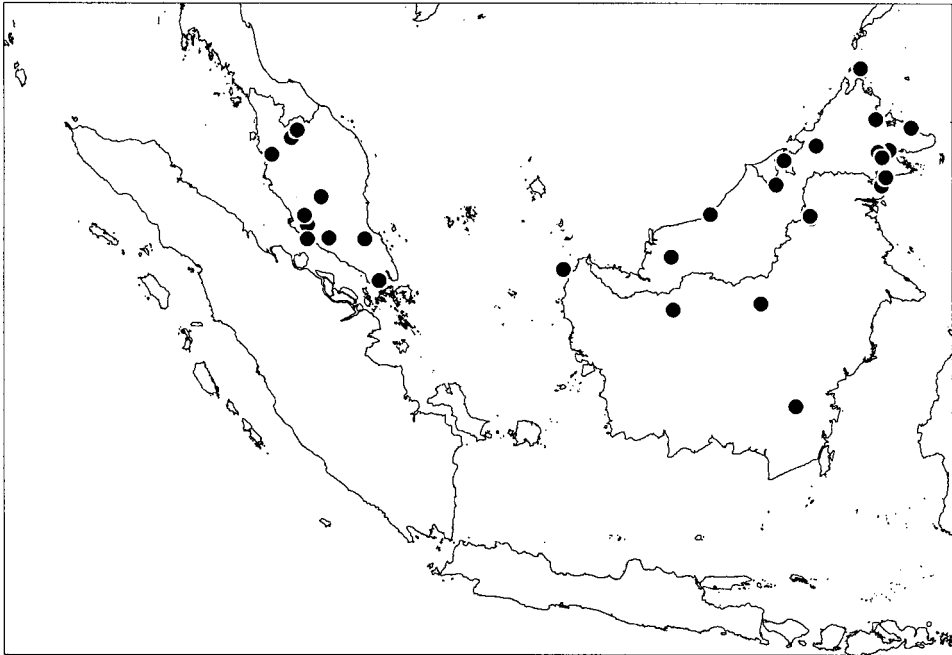


Fig. 72. Distribution of *Chremistica nesiotae*.

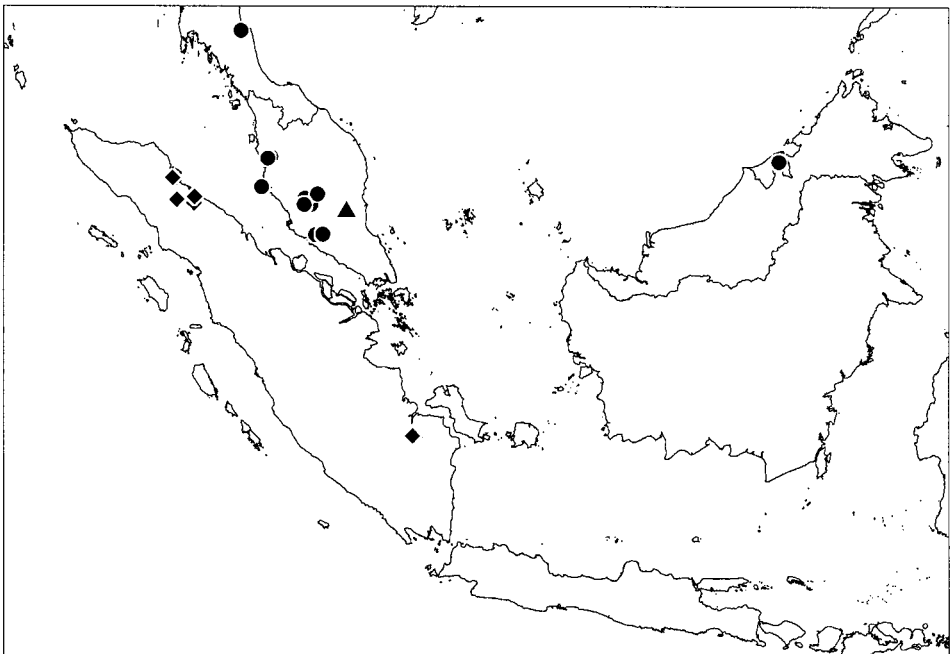


Fig. 73. Distribution of *Chremistica echinaria* (rounds), *kecil* (triangles) and *C. sumatrana* (diamonds).

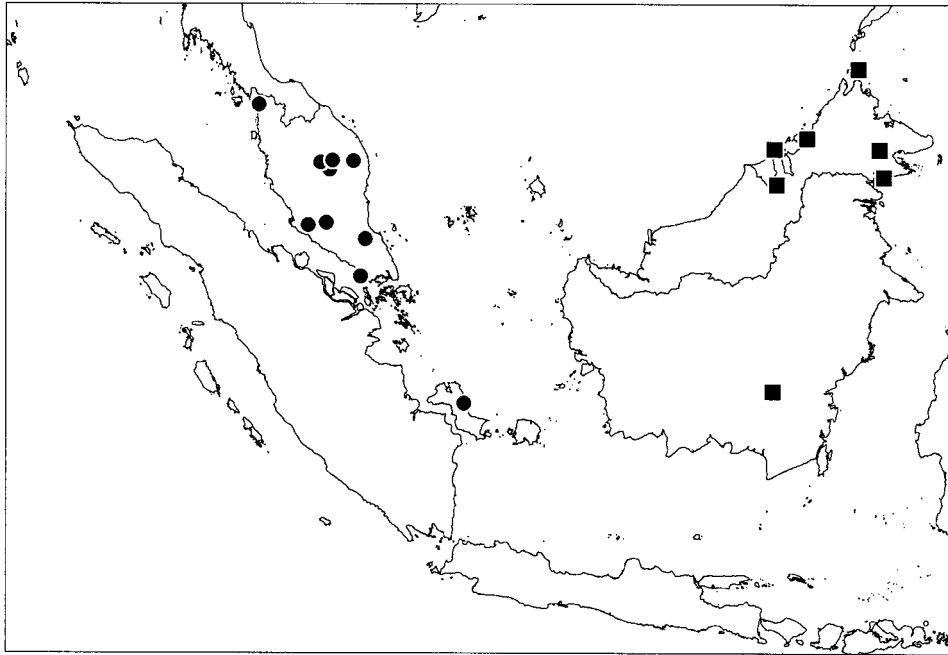


Fig. 74. Distribution of *Chremistica tridentigera* (squares) and *C. umbrosa* (rounds).

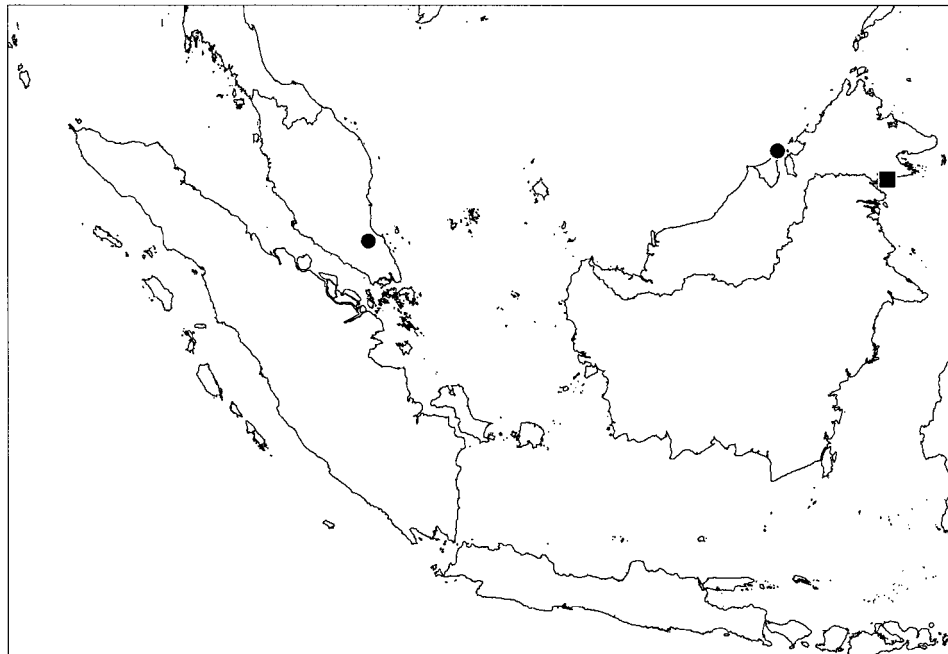


Fig. 75. Distribution of *Chremistica borneensis* (squares) and *C. minor* (rounds).

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Figs. 76-79. *Chremistica* species. – 76, *C. pontianaka*, East Kalimantan, Borneo; 77, *C. niasica*, paratype, G. Madjeja, Noord [=North] Nias; 78, *C. guamusangensis*, holotype, Gua Musang, Kelantan, Malaysia; 79, *C. hollowayi*, holotype, Gunung Mulu, Sarawak, Borneo.

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Figs. 80-83. *Chremistica* species. – 80, *C. cetacauda*, paratype, Padang, Sumatra; 81, *C. bimaculata*, Java; 82, *C. malayensis*, paratype, Perak, Malaysia; 83, *C. brooksi*, holotype, Benkoelen, Sumatra.

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Figs. 84-87. *Chremistica* species. – 84, *C. nesiotis*, Lembah Danum, Sabah, Borneo; 85, *C. echinaria*, holotype, Larut Hills, Perak, Malaysia; 86, *C. sumatrana*, holotype, Pladjoe, Sumatra; 87, *C. kecil*, paratype, Tasik Chini, Pahang, Malaysia.

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Figs. 88-90. *Chremistica* species. – 88, *C. tridentigera*, Danum Valley, Sabah, Borneo; 89, *C. biloba*, paratype, Long Bloe-oe, Borneo; 90, *C. umbrosa*, Merapoh, Pahang, Malaysia.

91



92



Figs. 91-92. *Chremistica* species. – 91, *C. borneensis*, holotype, Tawau Hill, Sabah, Borneo; 92, *C. minor*, Rompin Endau, Pahang, Malaysia.

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