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A REVIEW OF THE GENUS *CALLIPHARA* GERMAR, 1839 (HEMIPTERA: SCUTELLERIDAE)

by

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With 55 text-figures

SYNOPSIS

The genus *Calliphara* is described. Its 15 species and 6 additional subspecies are classified into 4 species-groups on the basis of the morphology of the male genitalia, and a key is provided for their separation. *Calliphara solomonensis* sp. nov. from the Solomon Is. and *C. vollenhoveni* sp. nov. from the Bismarck Archipelago are described. A synonymic catalogue of all species-group taxa within the genus is given. Fifteen lectotype designations are made. The history and relationships of *Calliphara* are discussed. *Notacalliphara* gen. nov. is founded for *Calliphara rostrata* Distant, and *Notacalliphara pseudofasciata* sp. nov. from New Guinea is described. *Paracalliphara* gen. nov. is founded for *Calliphara flagrans* (Walker).

INTRODUCTION

This study of the genus *Calliphara* arose from a limited faunal study of the Scutelleridae of the Solomon Islands. During the course of this work, it was noted that many of the specimens of *Calliphara* examined were incorrectly identified, a number of different identification criteria apparently having been applied by previous workers. Study of the male genitalia indicated that genitalic characters would form a satisfactory basis for the discrimination of species and species groups in *Calliphara*, and highlighted the failings of the traditional use of colour as a major character. Study of the genitalia also indicated three species that could not be considered closely related to *Calliphara* s. str.; new genera are founded for these species in this paper.

The genus *Calliphara* has a wide distribution extending to China and the Philippine Islands in the North and to Queensland and the Loyalty Islands in the South; the largest number of species are to be found in New Guinea

and the surrounding islands. The habitats and food-plants are largely unknown.

Relationships of *Calliphara*

Calliphara was placed by McDonald (1961) in the subtribe Sphaerocoraria of the tribe Scutellerini. Originally established on the basis of body form by Stål (1873), the subtribe was redefined by Leston (1952) as "including only such genera as possess a [pygophoral] strigil". McDonald (1961) further modified this by including only those genera possessing a ventral pygophoral strigil, in order to exclude the genus *Lampromicra* Stål, which he believed to be subtribally distinct from *Calliphara*. The "pygophoral strigil" of Leston and McDonald is here referred to as the ventrolateral and dorso-lateral setal patches of the pygophore (= male genital capsule) (fig. 1). The function of this structure is probably to immobilise the female genitalia during copulation, providing a highly frictional surface opposing the force imposed by the parameres. Pygophoral setal patches have now been found in nine genera: *Sphaerocoris* Burmeister, *Chiastosternum* Karsch, *Hyperoncus* Stål, *Lampromicra* Stål, *Chrysocoris* Hahn, *Graptophara* Stål, *Calidea* Laporte, *Scutiphora* Laporte and *Calliphara* Germar (Leston, 1952; McDonald, 1961, and personal observation). In some other genera, the position of the setal patch is occupied by longer setae or hairs. Some species of *Calliphara* and *Chrysocoris* lack the ventrolateral setal patch, which would exclude those species from the Sphaerocoraria sensu McDonald. The wide distribution of the pygophoral setal patches within the subfamily Scutellerinae (equivalent to McDonald's tribe Scutellerini) and the presence of apparently derived structures in a number of genera indicate that the presence of these patches is plesiomorphic for the subfamily. Common possession of the setal patches is thus unsuitable as a character to define a monophyletic group within the subfamily.

With the present state of knowledge of the Scutellerinae, it is difficult to separate tribes within the subfamily. It seems, however, that *Calliphara* should remain in the same tribe as *Scutellera*. *Calliphara* is closely related to *Lampromicra* and *Chrysocoris*, both of which, however, are greatly in need of revision; *Chrysocoris* in particular will probably be found to consist of several genera.

Taxonomic history

Germar (1839) founded *Calliphara* to include many of the more highly-coloured Scutellerinae, and distinguished it from *Callidea* Burmeister (an unnecessary emendation for *Calidea* Laporte) on characters of the rostrum

and scutellum. Schiödte (1842) synonymised *Calliphara* with *Callidea*, and proposed a new name, *Philia*, for *Callidea*, this due to supposed homonymy of both *Callidea* and *Calliphara*. Schiödte considered *Calliphara* to be a junior homonym of *Calliphora* Macquart, 1835 (Diptera: Calliphoridae), but as the names differ in spelling a replacement name is not justified.

Stål (1865) separated *Calliphara* from *Callidea* and *Chrysocoris* Hahn, using as a key character the exposure by the scutellum of the costal margins of the hemelytra.

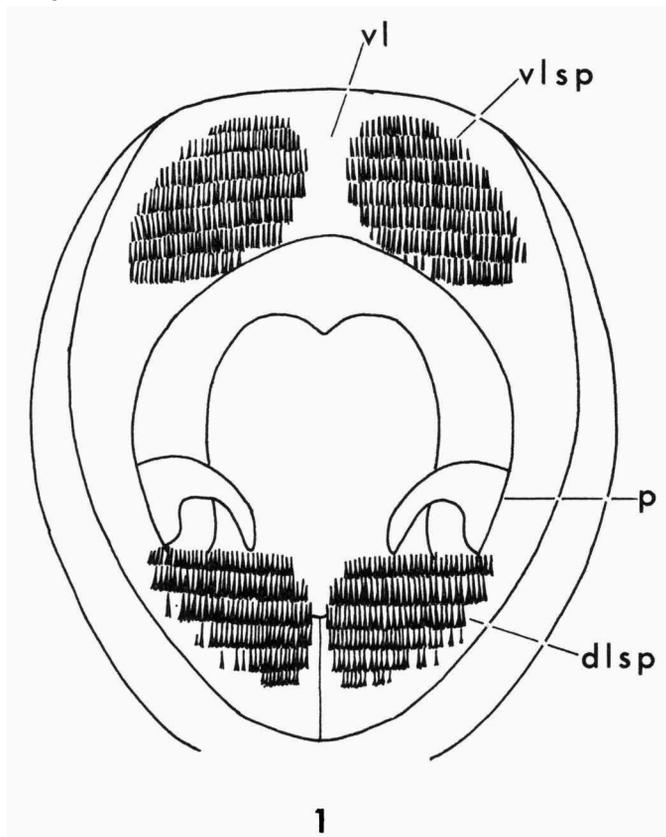


Fig. 1. *Calliphara*; semi-diagrammatic view of caudal face of male pygophore. vl — ventral lip, vlsp — ventrolateral setal patch, dlsp — dorsolateral setal patch, p — paramere.

Stål (1873) considered *Calliphara* to have three subgenera, describing *Calliphara* (*Chrysophara*) to include *excellens* Burmeister, *nobilis* Linnaeus, *regalis* Fabricius, *eximia* Vollenhoven and *munda* Stål, and reducing *Lamprophara* Stål, 1865 (previously without included species) to *Calliphara* (*Lamprophara*) to include *bifasciata* White.

Schouteden (1904) considered *Lamprophara* to be a separate genus, but it was again reduced to the status of subgenus by Kirkaldy (1909), who followed Stål (1873) in his interpretation of the genus and subgenera.

Distant (1902) stated that the type-species of *Calliphara* was *Cimex nobilis* Linnaeus, in which he was followed by Schouteden (1904). However, *nobilis* Linnaeus was not originally included in *Calliphara* by Germar (1839), and thus could not be validly fixed as the type-species. This was pointed out by Kirkaldy (1909: xxxv), who fixed *Cimex imperialis* Fabricius as type species of *Calliphara*, but contradicted himself (1909: 297) by citing *nobilis* Linnaeus as type-species. It is clear, however, that *imperialis* Fabricius is the first validly fixed type-species of *Calliphara*.

Coloration

The coloration of species of *Calliphara* (and related genera) has in the past frequently been used as a character of taxonomic importance, and indeed is utilised in the key of the present paper. Colour is produced in these insects by two distinct mechanisms: interference and pigmentation.

The metallic coloration exhibited by many of the species is produced by interference between incident and reflected light in transparent layers of the cuticle. If these transparent layers are caused to swell, for example by placing the specimen in an atmosphere of steam at 100°C, the coloration changes from blue to green to orange to yellow. Differences in colour that appear very great may thus be due to minute differences in thickness of parts of the cuticle, and are not necessarily due to genetic isolation. For example, series of *Calliphara regalis* have been examined that, although collected at the same locality at the same time, and thus almost certainly belonging to the same breeding population, contain orange, green and blue individuals. On the other hand, in some instances differences in interference colour are associated with a degree of isolation; for example, *C. caesar* has an orange scutellum in all known parts of its range except on the island of Biak, where all known specimens have a blue scutellum; similarly, *C. prasinia* has a blue or blue-green scutellum in all known parts of its range except on the Admiralty Is., where all known specimens have an orange scutellum (subsp. *admiraltyensis*).

Many species are marked dorsally by black or blue-black spots, of which the most apparent are the five or seven on the scutellum. These are produced by pigment, and may vary considerably in extent. Thus relatively rare specimens of *C. regalis* (as exemplified by the type) completely lack spots, whilst others (such as those described by Vollenhoven as *C. eximia*) have five or seven large spots, more or less fused, dorsally on the scutellum.

C. dimidiata exists as three geographically limited forms, distinguished on the basis of pigmentation patterns. In all cases the posterior half of the scutellum is dark bluish or greenish black, a band of red or yellow crosses the scutellum medially, and the anterior margin of the pronotum is broadly dark, concolorous with the posterior scutellum. In *C. dimidiata cruenta*, found in Queensland and the islands of the Torres Straits, the pronotum is predominantly red or yellow, with the dark region confined to the anterior part (in one specimen examined, the dark portion had expanded to cover all but two areas on the posterior lobe of the pronotum), and the anterior half of the scutellum is always red or yellow; in *C. d. dimidiata*, found in S. E. New Guinea and the Aru Is., the pronotum is entirely dark, and the anterior lobe of the scutellum is yellow or red; in *C. dimidiata fasciata*, known to occur in N. W. New Guinea, the anterior margin of the scutellum is also dark greenish-black, leaving only a pale yellow fascia across the scutellum.

Interference colour and pigment colour may be constant within a species or may show considerable variation. Due to this variability colour, as a taxonomic character, should always be used circumspectly in *Calliphara* and related genera.

Material

Specimens examined during the course of this study are deposited in the following museums:

Institut Royal des Sciences Naturelles de Belgique, Brussels (IRSNB)

Universitetets Zoologiske Museum, Copenhagen (UZM)

Institut für Pflanzenschutzforschung, Eberswalde (IP)

Bernice P. Bishop Museum, Honolulu (BPBM)

Rijksmuseum van Natuurlijke Historie, Leiden (RMNH)

British Museum (Natural History), London (BMNH)

Linnaean Society, London (LIN)

University Museum, Oxford (UM)

Natur-Museum und Forschungs-Institut "Senckenberg", Frankfurt
(NMFIS)

Naturhistoriska Riksmuseet, Stockholm (NR)

Figures

In this paper figures are given of male genitalia in ventral or dorsal and "lateral" aspects. In all cases "lateral" refers to the lateral aspect of the right side when viewed ventrally. Where individual structures of the genitalia are depicted, e.g. conjunctival appendages, they are the right (when viewed ventrally) members of symmetrically-paired structures.

Calliphara Germar

Calliphara Germar, 1839: 122. Type-species: *Cimex imperialis* Fabricius, by subsequent designation (Kirkaldy, 1909: xxxv).

Calliphara (*Chrysophara*) Stål, 1873: 17. Type-species: *Tetyra excellens* Burmeister, by subsequent designation (Kirkaldy, 1909: xxxv). Syn. nov.

Lamprophara Stål, 1865: 34. Type-species: *Calliphara bifasciata* White, by monotypy. Syn. nov.

Elongate insects of moderate to large size; more or less punctate dorsally; blue, green, orange or black, usually with metallic sheen.

Head declivous, more or less convex dorsally, shorter or longer than anterior pronotal margin, lateral margins sinuate anterior to eyes. Clypeus somewhat elevated anteriorly, extending at least as far as paraclypeae. Eyes large, close to anterior pronotal margin. Distance between ocelli at least four times that between ocellus and eye. Ocelli large, level with posterior margins of eyes. Sparsely punctate or impunctate dorsally, often minutely punctate posterior to ocelli. Antennae five-segmented; segments I and II cylindrical; III, IV and V flattened dorsoventrally, sulcate dorsally; IV and V indistinctly sulcate ventrally; segment I not, or barely, attaining front of head; II subequal to I; III, IV and V each at least three times as long as II. Rostrum attaining at least the posterior coxae, segment II being longer than III or IV.

Pronotum convex posteriorly, steeply declivous anteriorly; antero-lateral margin shallowly concave, often narrowly carinate, carina terminating abruptly at posterior angles; prescutellar angles more or less rounded. More or less punctate; impunctate band between calli parallel to anterior margin; sexual dimorphism in prototal punctation frequent, the females being more heavily punctate along anterior margin and on disc of posterior lobe. Scutellum convex, declivous posteriorly, not covering proximal two-thirds of costal margins of hemelytra or tips of wings; more or less punctate, punctation particularly heavy at basal angles. Anterior margin of propleuron explanate medially, often punctate. Metapleural scent gland orifice between coxae, opening onto raised, straight furrow directed laterad; evaporatorium extending onto mesopleuron. Prosternite, mesosternite and metasternite shallowly sulcate. Femora cylindrical; with sparse, short hairs on dorsal, anterior and posterior faces, ventral face more thickly pilose. Tibiae usually with single dorsal sulcus becoming more pronounced distally; dorsal faces glabrous, bounded laterally by line of fine hairs; anterior, posterior and ventral faces with stiff, bristle-like hairs becoming more abundant distally. Tarsi with stiff, bristle-like hairs abundant ventrally, more scattered elsewhere.

Ventral abdominal surface convex. Posterior margin of each sternite broadly concave. Sulcus extending mesad from spiracles, slightly longer than

distance from spiracle to lateral margin of sternite. Posterior angles of sternites III-VII sometimes produced into spine or tubercle.

Pygophore with ventral lip present or absent; dorsal and usually ventral border with patch of short, stout setae on each side, directed ventrad (fig. 1). Parameres hook-shaped, with long setae at apex of vertical member. Phallosome unsclerotised ventrally and basally. Vesica short or long, apically bilobed; ventral (gonoporal) process more or less curved; dorsal process broad at least basally, more or less produced caudad. Conjunctiva produced into three pairs of appendages: I, fully sclerotised, long, unbranched, curved or straight, tapering from base to acute or rounded apex, oval or circular in cross-section; II, membranous, sclerotised to a greater or lesser extent distally, proximally on dorsal surface, branched; III, largely sclerotised, bifurcate in some species. Female with spiracle on eighth paratergite clear; first valvifer large; ninth paratergite small. First valvifer at rest at about 60° to plane of long axis of body.

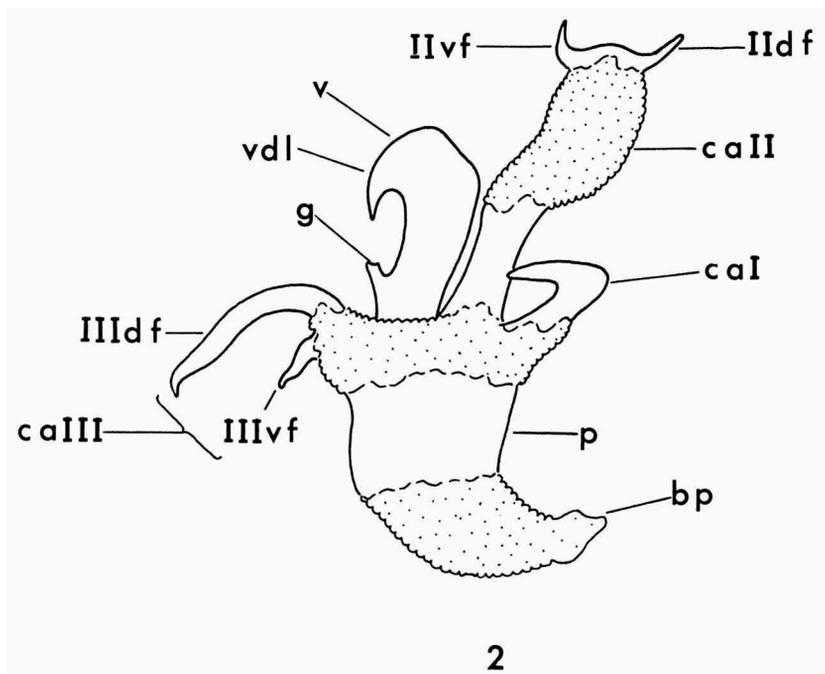


Fig. 2. *Calliphara*; semi-diagrammatic view of lateral aspect of male genitalia. bp — basal plate, p — phallosome, caI — conjunctival appendage I, caII — conjunctival appendage II, IIvf — ventral fork of conjunctival appendage II, IIdf — dorsal fork of conjunctival appendage II, caIII — conjunctival appendage III, IIIvf — ventral fork of conjunctival appendage III, IIIdf — dorsal fork of conjunctival appendage III, v — vesica, g — gonopore, vdl — dorsal lobe of vesica.

Species groups in *Calliphara*

Calliphara is here divided into four species groups, based on the morphology of the male genitalia. One of these species groups includes all of the species included by Stål (1873) in the subgenus *Chrysophara*, but otherwise there is no resemblance to the original three subgenera. *Lamprophara bifasciata* (White) is, by the morphology of its male genitalia, closely related to *Calliphara prashlinia* (Guérin), and is included in the same species group.

A simplified and semi-diagrammatic view of the male genitalia, with a key to the terms employed in the descriptions, is given in fig. 2.

I. *excellens* species group

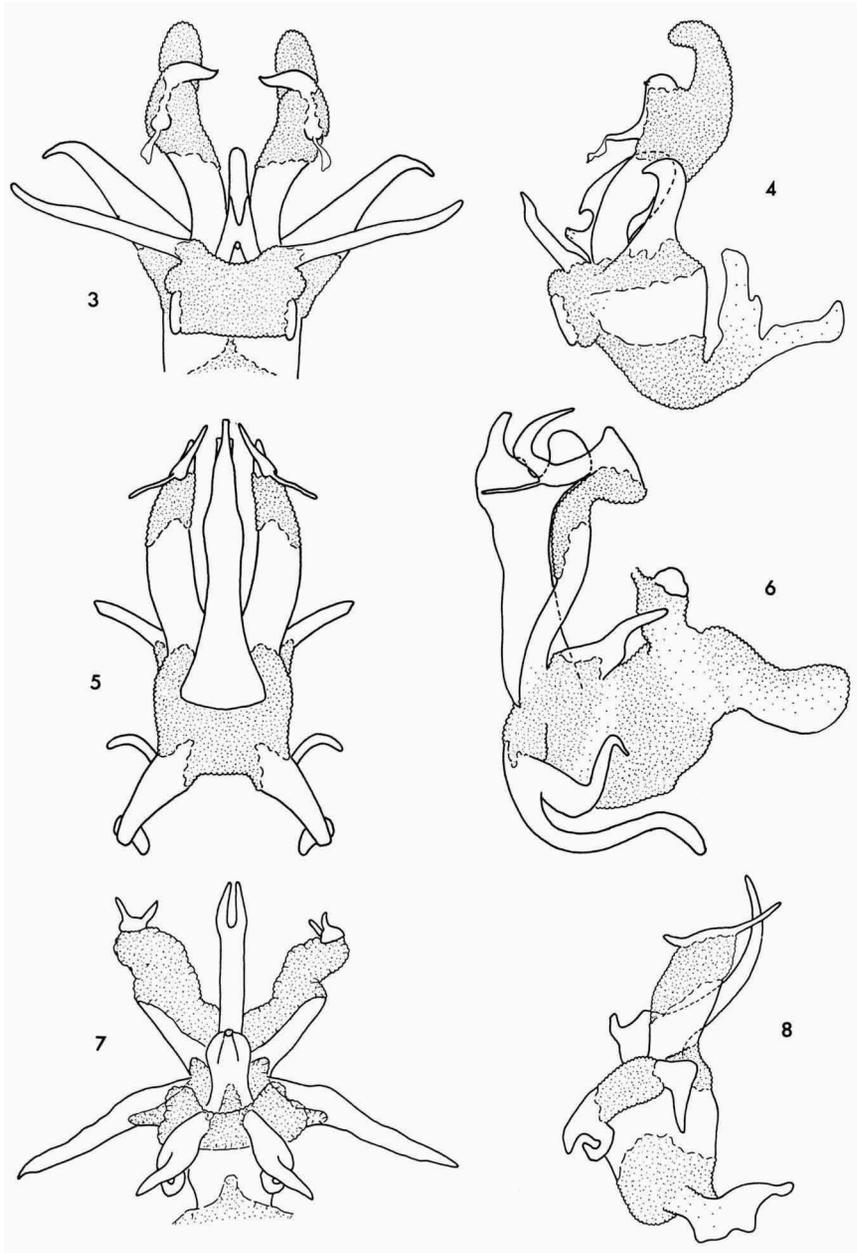
To include: *nobilis* (Linnaeus), *regalis* (Fabricius), *regia* (Westwood), *excellens* (Burmeister), *lanceolata* Distant, *munda* Stål and *imperialis* (Fabricius).

Description: Caudal face of pygophore with ventral lip absent (except in *lanceolata*); ventrolateral setal patch present, oval; dorsolateral setal patch present, elongate (reduced in *excellens*). Vesica short or long, dorsal lobe produced dorsad and more or less caudad to gonopore, rounded apically. Conjunctiva with appendage II membranous, sclerotised basoventrally and apically, apical sclerotisation bifurcate, the two forks more or less curved, subequal, ventral fork with very lightly sclerotised sac attached; appendage III bifurcate, dorsal fork sclerotised, very long, slightly curved, cylindrical, ventral fork small, membranous (*lanceolata*) or sclerotised and acute (figs. 3, 4).

II. *prashlinia* species group

To include: *prashlinia* (Guerin), *billardierii* (Fabricius), *placida* Breddin and *bifasciata* White.

Description: Caudal face of pygophore with ventral lip present; ventrolateral setal patch present, oval; dorsolateral setal patch present, oval. Vesica as long as conjunctival appendage II, dorsal lobe broad, obtusely rounded, with or without lateral projections apically. Conjunctiva with appendage II membranous, sclerotised basoventrally and apically, apical sclerotisation bilobed, dorsal lobe much reduced (sclerotised or unsclerotised), ventral lobe bifurcate, both forks elongate, more or less curved; appendage III bifurcate, dorsal fork sclerotised, long, irregularly sinuate, acute apically, ventral fork sclerotised, shorter, curved and recurved, acute apically (figs. 5, 6).



Figs. 3-8. *Calliphara* spp. (3) *nobilis*, male genitalia, ventral, (4) *nobilis*, male genitalia, lateral, (5) *billardieri* male genitalia, ventral, (6) *billardieri* male genitalia, lateral, (7) *solomonensis* male genitalia, ventral, (8) *solomonensis* male genitalia, lateral.

III. *caesar* species group

To include: *caesar* (Vollenhoven), *solomonensis* sp. nov. and *vollenhoveni* sp. nov.

Description: Caudal face of pygophore with ventral lip absent; ventrolateral setal patch absent or much reduced (*caesar*); dorsolateral setal patch elongate, sparse. Vesica short, dorsal lobe elongate, curved apically, apically bifurcate, forks parallel, straight or recurved ventrad. Conjunctiva with appendage II membranous, sclerotised basoventrally and apically, apical sclerotisation bifurcate, both forks curved or straight, acute; appendage III bifurcate, dorsal fork sclerotised, long, sinuate, acute apically, ventral fork sclerotised, shorter, curved and recurved, acute apically (figs. 7, 8).

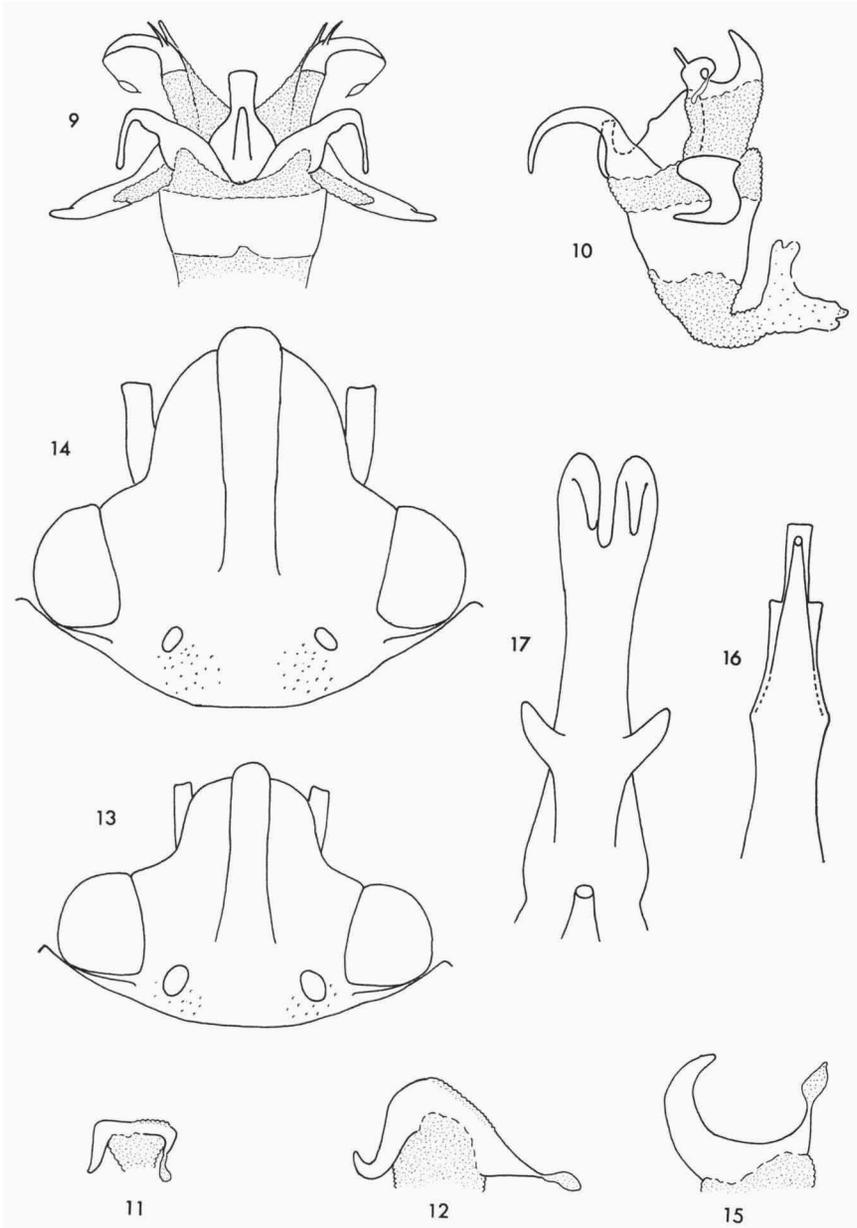
IV. *dimidiata* species group

To include: *dimidiata* (Dallas).

Description: Caudal face of pygophore with ventral lip present, narrow; ventrolateral setal patch present, reduced; dorsolateral setal patch elongate, sparse. Vesica short, dorsal lobe small, obtusely rounded. Conjunctiva with appendage II bilobed, dorsal lobe thinly sclerotised or membranous, large, ventral lobe more thickly sclerotised, long, with lightly sclerotised sac attached apically; appendage III bifurcate, dorsal fork sclerotised, long, curved, ventral fork lightly sclerotised, much reduced or absent (figs. 9, 10).

Synoptic key to species and subspecies of *Calliphara*

1. Posterior angle of abdominal sternite III (second visible) produced into a tubercle or spine; body length at least 15 mm 2
- Posterior angle of abdominal sternite III not so produced or, if small tubercle present, body length under 11 mm 4
2. Head posterior to ocelli minutely punctate. Spines at posterior angles of abdominal sternites large. Scutellum, disc of pronotum and abdominal sternites II-VI yellow or orange. Dorsal lobe of vesica rounded apically, not bifurcate. Timor. *C. regia* Westwood
- Head posterior to ocelli obscurely punctate or impunctate. Spines at posterior angles of abdominal sternites small. Scutellum and pronotum green with cupreous sheen, marked with black. Dorsal lobe of vesica apically bifurcate 3
3. Abdominal venter green-bronze, anterior margins of sternites black. Pronotum clearly punctate. Male genitalia as in figs. 22-30. Solomon Is. *C. solomonensis* sp. nov.



Figs. 9-17. *Calliphara* spp. (9) *dimidiata* male genitalia, ventral, (10) *dimidiata* male genitalia, lateral, (11) *munda* conjunctival appendage II, apical sclerotisation (drawn in plane of dorsal fork), (12) *nobilis* conjunctival appendage II, apical sclerotisation (drawn in plane of dorsal fork), (13) *nobilis* head, dorsal, (14) *excellens* head, dorsal, (15) *regalis* conjunctival appendage II, apical sclerotisation (drawn in plane of dorsal fork), (16) *placida* vesica, ventral, (17) *caesar* vesica, ventral.

- Abdominal venter brown, green-bronze only on margins. Pronotum obscurely punctate. Male genitalia as in figs. 32-40. Bismark Archipelago *C. vollenhoveni* sp. nov.
4. Posterior angle of abdominal sternite IV produced into a tubercle or spine. Lateral margins of abdominal sternites impunctate 10
- Posterior angle of abdominal sternite IV not so produced or, if so produced, lateral margins of abdominal sternites strongly punctate 5
5. Body length less than 12 mm. Dorsum green-bronze, marked with black spots on scutellum and pronotum; abdominal venter green-bronze, with brown longitudinal line mesally. Conjunctival appendage I acute apically; apical sclerotisation of conjunctival appendage II as in fig. 11. China *C. munda* Stål
- Body length at least 14 mm. Colour variable. Conjunctival appendage I blunt apically or, if acute, apical sclerotisation of conjunctival appendage II as in fig. 12 6
6. Eyes very large, their length about half distance from back of eye to front of head (fig. 13). Rostrum attaining middle of hind coxae, rarely reaching abdominal sternites 9
- Eyes smaller, their length slightly more than one-third distance from back of eye to front of head (fig. 14). Rostrum attaining abdominal sternite III. Philippines, Celebes (*excellens*) 7
7. Femora yellow, at least proximally. Strongly punctate, appearing dull. Spots on scutellum reduced in size. Palawan
. *C. excellens coelestis* Taeuber
- Femora proximally red, occasionally entirely blue. Relatively less punctate, shiny 8
8. Blue-green dorsally; costal margin of hemelytra blue-green. Philippines, Celebes *C. excellens excellens* Burmeister
- Reddish-purple dorsally, variably marked with blue-green; costal margin of hemelytra purple. Philippines *C. excellens speciosa* White
9. Densely punctate dorsally and ventrally (except on disc of abdominal venter); punctation on lateral margins of abdominal sternites of similar density to that of basal angles of scutellum. Lateral margins of abdominal sternites pinkish red; disc of abdominal venter reddish-brown, surrounded by green-blue strip. Conjunctival appendage II of male genitalia with apical sclerotisation as in fig. 12. Burma, Malaysia, Philippines, China, Borneo; eastern limit of known distribution — Halmahera, Celebes, Flores *C. nobilis* (Fabricius)
- Less densely punctate dorsally and ventrally; punctation on lateral margins of abdominal sternites much less dense than that of basal angles

- of scutellum. Abdominal venter reddish-brown to blue, with a brown tint at least medially on the disc. Colour very variable dorsally: unicolorous golden to blue with black markings. Conjunctival appendage II with apical sclerotisation as in fig. 15. Loyalty Is., Solomon Is., Queensland, Admiralty Is., New Guinea; western limit of known distribution — Halmahera, Obi, Buru, Timor *C. regalis* (Fabricius)
10. Body length less than 12 mm. Tibiae cylindrical, without dorsal sulcus. Dorsum yellow with green markings. Samoa, Fiji *C. bifasciata* White
- Body length at least 14 mm. Tibiae sulcate dorsally, at least distally 11
11. Abdominal sternites III and IV yellow or orange, IV occasionally with dark brown or black posterior margin; other sternites yellow or brownish black 12
- Abdominal sternites III and IV fuscous or dark brown, at least in part 17
12. Abdominal sternites II, III and IV pale orange or red, sternites V-VII blackish-brown; posterior margin of sternite IV usually dark brown (*dimidiata*) 13
- Abdominal sternite V pale yellow or orange, occasionally fuscous anteriorly 14
13. Scutellum with pale yellow transverse median fascia, otherwise dorsum shining green or green-blue. North and West New Guinea
- *C. dimidiata fasciata* (Walker)
- Anterior part of scutellum pale yellow or reddish orange; head, pronotum and posterior of scutellum dark green or blue. New Guinea, Aru Is.
- *C. dimidiata dimidiata* (Dallas)
14. Pronotum pale orange or reddish orange, at least posteriorly, with or without dark brown or bluish black longitudinal fascia medially. Vesica not as long as conjunctival appendage II 15
- Pronotum brownish or bluish black, without orange or red markings. Vesica as long as, or nearly as long as conjunctival appendage II 16
15. Thoracic pleura yellowish orange. Pronotum reddish orange, with medial longitudinal fascia and humeral angles green. Scutellum reddish, with or without green spot at apical angle. Dorsolateral setal patches of pygophore oval, thick. Timor Laut *C. lanceolata* Distant
- Thoracic pleura bluish black, except occasionally on ostiolar peritreme and evaporatorium. Posterior lobe of pronotum red, orange or yellow, sometimes divided by brownish black longitudinal median fascia extending from anterior lobe. Scutellum orange or red anteriorly, dark bluish black posteriorly. Dorsolateral setal patch elongate, reduced to one or two lines of setae. N. Queensland, Islands of the Torres Straits *C. dimidiata cruenta* Stål

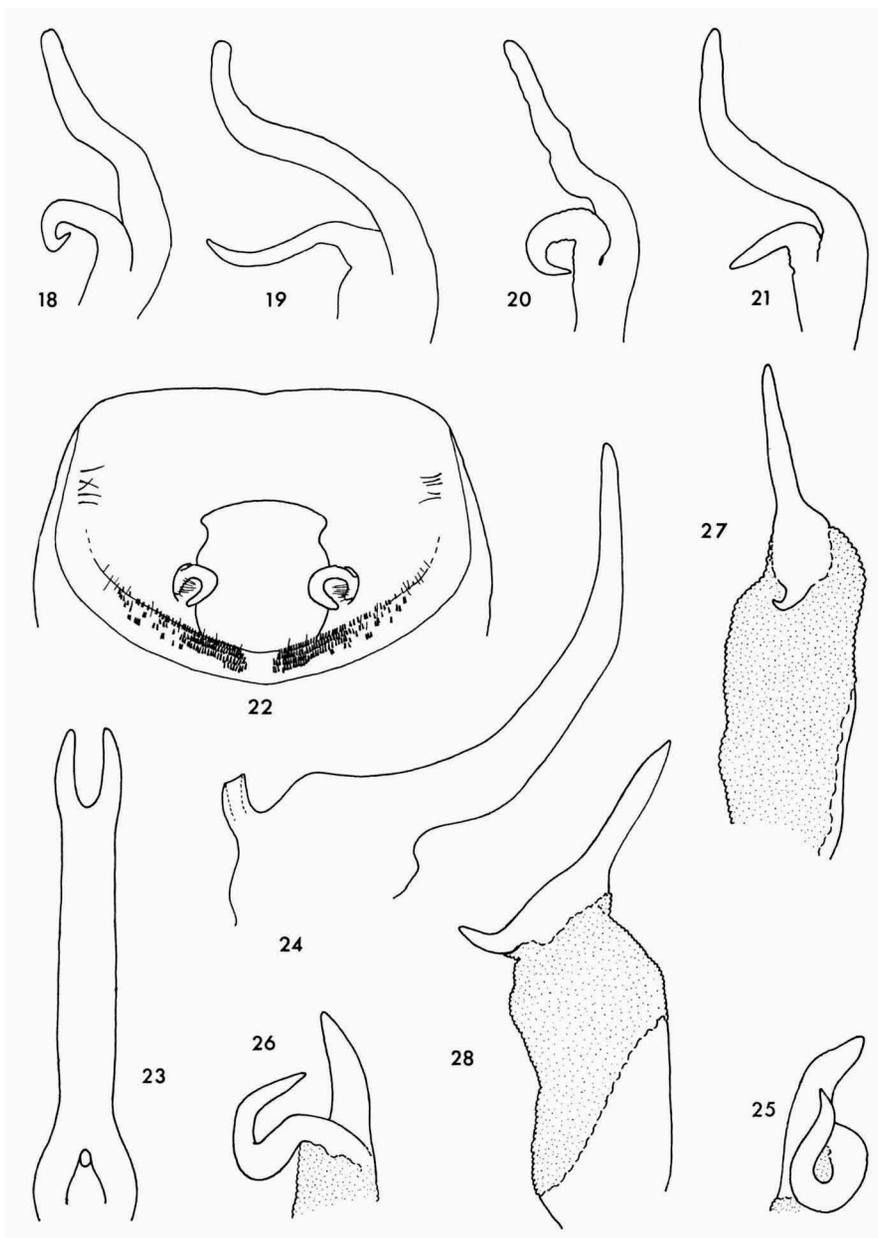
16. Scutellum orange, with bluish black markings proximally, medially and distally. New Guinea *C. placida placida* Breddin
 — Scutellum orange, with bluish black markings distally, never proximally and medially. New Guinea, Aru, Ceram . . . *C. billardieri* (Fabricius)
17. Pronotum and scutellum reddish orange or fuscous; head, and frequently apical angle of scutellum, metallic green. Ventral surface dark metallic green-blue, with reddish fuscous margin to abdomen and thorax. Ventral lip of pygophore absent; vesica much shorter than conjunctival appendage II. N. Queensland *C. imperialis* (Fabricius)
 — Markings not as above; dark greenish black, or with black marks on scutellum. Ventral lip of pygophore present or absent; vesica as long as conjunctival appendage II 18
18. Ventral lip of pygophore present; ventrolateral and dorsolateral setal patches present, thick; dorsal lobe of vesica not apically bifurcate (fig. 16) 19
 — Ventral lip of pygophore absent; ventrolateral setal patches sparse or absent; dorsal lobe of vesica apically bifurcate (fig. 17). Scutellum orange or fuscous with black markings (New Guinea, Morotai) or blue (Biak) *C. caesar* (Vollenhoven)
19. Dorsal fork of conjunctival appendage III half the length of ventral fork (figs. 18, 19). Dark blue-green dorsally, occasionally with fuscous patches on scutellum; a pair of obscure dark spots medially on scutellum. Head broad. New Guinea *C. placida scintillans* Breddin
 — Dorsal fork of conjunctival appendage III less than half the length of ventral fork (figs. 20, 21). Metallic green-blue dorsally, or with scutellum golden; scutellum with seven more or less obscured blue-black spots. Head narrower (*prasinia*) . . . 20
20. Scutellum golden-orange. Admiralty Islands
 *C. prasinia admiraltyensis* Kirkaldy
 — Scutellum green-blue. Solomon Islands, New Hebrides.
 *C. prasinia prasinia* (Guérin)

Descriptions of new species

Calliphara solomonensis sp. nov.

Length: male, 15.2-17.5 mm, mean 16.6 mm (n = 7); female, 15.0-19.0 mm, mean 17.4 mm (n = 10). Maximum pronotal width: male, 7.7-8.6 mm, mean 8.1 mm (n = 7); female, 7.7-9.5 mm, mean 8.7 mm (n = 10).

Head, pronotum, scutellum, thoracic pleurites and legs, blue to green, with a more or less distinct cupreous sheen; vertex, centre of intercallial impunc-



Figs. 18-21. *Calliphara* spp. (18) *placida* conjunctival appendage III, ventral, (19) *placida* conjunctival appendage III, lateral, (20) *prasinia* conjunctival appendage III, ventral, (21) *prasinia* conjunctival appendage III, lateral. Figs. 22-28. *Calliphara solomonensis*. (22) pygophore, caudal, (23) vesica, ventral, (24) vesica, lateral, (25) conjunctival appendage III, ventral, (26) conjunctival appendage III, lateral, (27) conjunctival appendage II, ventral, (28) conjunctival appendage II, lateral.

tate band, black; posterior lobe of pronotum with three irregular black spots, fused, present or absent; scutellum with five black spots of variable size; thoracic pleurites glossy, dark brown, cupreous or green; metapleural osteolar peritreme and evaporatorium black, dull or glossy; abdominal sternites black or dark brown, their posterior and lateral margins blue, green or cupreous. Head, pronotum, scutellum, thoracic pleurites and abdominal sternites sparsely pilose, hairs fine, erect. Head, thoracic pleurites and abdominal sternites impunctate; pronotum with punctate row close to and parallel with anterior margin, punctation sometimes sparse or absent medially; pronotal disc, pronotal margins and anterior scutellar lobe weakly punctate; posterior pronotal angles, basal scutellar angles and posterior scutellar lobe strongly punctate.

Ratio of antennal segments I:II:III:IV:V: male, 1.00:0.43:2.96:3.29:3.39; female, 1.00:0.49:2.73:3.03:3.43. Rostrum reaching fourth abdominal sternite, ratio of segments I:II:III:IV : 1.0:1.9:1.5:1.4.

Posterior angles of abdominal sternites III-VII produced into spines becoming progressively larger from III to VII, those of VII being smaller than VI in the male and occasionally so in the female.

Pygophore with ventral margin truncate, notched medially; ventral lip absent; ventrolateral setal patch represented by very sparse, long setae; dorsolateral setal patch elongate, sparse, becoming more dense mesally (fig. 22). Dorsal lobe of vesica produced dorsoposteriorly, apically bifurcate (figs. 23, 24). Conjunctiva with appendage I sclerotised, apex directed dorsad (figs. 29, 30); appendage II long, apical sclerotisation produced into two spines, the ventral one curved and less than half length of dorsal (figs. 27, 28); appendage III sclerotised, bifurcate, ventral fork long, strongly curved (figs. 25, 26).

First valvifer of female with slight longitudinal depression laterally, disc convex. Ninth paratergite depressed medially (fig. 31).

Remarks.

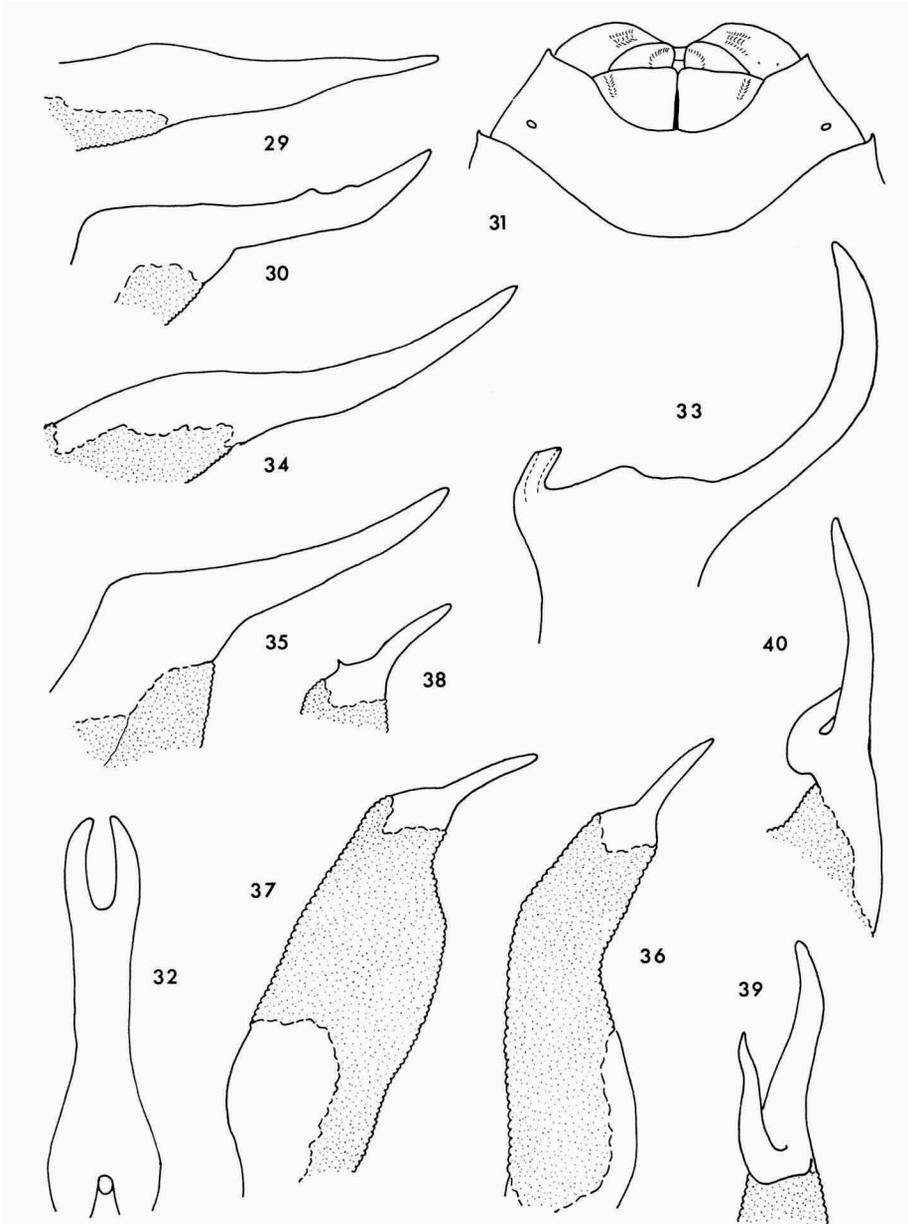
C. solomonensis is a member of the *caesar* species group, and can be distinguished from the other species by the form of the vesica.

Distribution. *C. solomonensis* is widely distributed within the Solomon and Bougainville Island groups, and will probably be found eventually on all of the larger islands.

Material examined.

Holotype ♂, Solomon Is.: Kolombangara I., Kolombara, 2000', 30.viii. 1965, Roy. Soc. Exped. (BMNH).

Paratypes 8 ♂, 4 ♀, same data as holotype (BMNH); 2 ♂, Solomon Is.,



Figs. 29-31. *Calliphara solomonensis*. (29) conjunctival appendage I, ventral, (30) conjunctival appendage I, lateral, (31) female terminalia. Figs. 32-40. *Calliphara vollenhovi*. (32) vesica, ventral, (33) vesica, lateral, (34) conjunctival appendage I, ventral, (35) conjunctival appendage I, lateral, (36) conjunctival appendage II, ventral, (37) conjunctival appendage II, lateral, (38) conjunctival appendage II, apical sclerotisation, lateral, showing small spine, (39) conjunctival appendage III, ventral, (40) conjunctival appendage III, lateral.

Kolombangara I., Jack Harbour, Karibana Est., 9.vi.1934, H. T. Pagden (BMNH); 1 ♀, Solomon Is., Kolombangara I., Kusi, 21.viii.1965, Roy. Soc. Exped. (BMNH); 2 ♀, Solomon Is., Guadalcanal, Gold Ridge, 20.ix.1958, P. Fenemore (BMNH); 1 ♀, Solomon Is., Guadalcanal, Kukum, 21.ix.1963, P. Greenslade (BMNH); 1 ♀, Solomon Is., Guadalcanal, 30.iii.1966, P. Greenslade (BMNH); 1 ♀ Bougainville I., J. B. Poncelet (BMNH); 1 ♀, Bougainville I. (BMNH); 2 ♂, 2 ♀, Bougainville I., Kieta (RMNH).

Additional material (received after description): 1 ♂, 1 ♀, Solomon Is., Malaita, E. of Kwalo (E. of Auki), 350 m, 29.ix.1957, J. L. Gressitt (BPBM); 1 ♀, Solomon Is., Russel Is., Pavuvu I., Pepesala, 0-100 m, 19.vii.1964, Straatman (BPBM); 1 ♂, Solomon Is., Vella Lavella, Pusiasama, 14.xi.1963, Shanahan (BPBM).

***Calliphara vollenhoveni* sp. nov.**

Length: male: 14.4-16.7 mm, mean 15.5 mm (n = 8); female, 15.3-18.0 mm, mean 17.0 mm (n = 9). Maximum pronotal width: male, 7.5-8.9 mm, mean 8.0 mm (n = 8); female, 8.0-9.0 mm, mean 8.8 mm (n = 9).

Head with vertex black or dark green, dorsal and ventral surfaces metallic green; calli, posterior pronotal lobe and disc of anterior pronotal lobe dark blue or black; anterior pronotal lobe, except disc, metallic bronze-green; costal margin of hemelytra purple-blue; scutellum bronze-green, with five large irregular black spots, one apically, the others paired, arranged longitudinally along the midline; pro-, meso- and metasterna pale brown; thoracic pleura dark green to bronze; ostiolar peritreme and evaporatorium black; legs black; dark brown or metallic blue-green; abdominal venter with disc dark brown, occasionally paler medially; lateral margins of sterna and exterior halves of posterior sternal margins metallic bronze-green. Head, pronotum, scutellum and thoracic pleura glabrous; thoracic sterna sparsely pilose; abdominal sternites very sparsely pilose or glabrous. Head impunctate, ratio of lengths of antennal segments I:II:III:IV:V: male, 1.0:0.4:2.6:2.9:3.1; female, 1.0:0.5:2.6:2.9:3.1. Rostrum reaching abdominal sternite III or IV; ratio of segment lengths I:II:III:IV: male, 1.0:1.9:1.5:1.4; female, 1.0:1.9:1.2:1.3.

Pronotum with punctate band close to and parallel with anterior margin in female, reduced in male; punctate band across disc in female, reduced or absent in male. Thoracic pleura impunctate. Legs with tibial sulcus distinct, at least distally. Scutellum with disc of anterior lobe impunctate; basal angles and posterior lobe punctate. Abdominal sternites impunctate, corrugated laterally. Posterior angles of sternites III to VII produced into tubercles or spines.

Pygophore with ventral margin truncate, notched medially; ventral lip absent; ventrolateral setal patch represented by very sparse, long setae; dorsolateral setal patch sparse, becoming more dense mesally, elongate. Vesica with dorsal lobe produced dorsoposteriorly, apically bifurcate (figs. 32, 33). Conjunctiva with appendage I sclerotised, apex directed dorsad (figs. 34, 35); appendage II long, apical sclerotisation produced into long spine, ventral spine absent (figs. 36, 37) or very small (fig. 38); appendage III sclerotised, bifurcate, ventral fork long, strongly curved (figs. 39, 40).

First valvifer of female with longitudinal depression laterally, disc convex. Ninth paratergite depressed medially, eighth paratergite depressed medially.

Remarks.

This species is very closely related to *solomonensis* sp. nov., but may be distinguished from that species by the shorter vesica, the greatly reduced ventral fork of the apical sclerotisation of conjunctival appendage II, and the less curved ventral lobe of conjunctival appendage III. Both males and females may be distinguished from *solomonensis* by the relatively lighter punctuation dorsally, the larger black spots on the scutellum, and the colour of the abdominal sternites.

Distribution. New Britain, New Ireland.

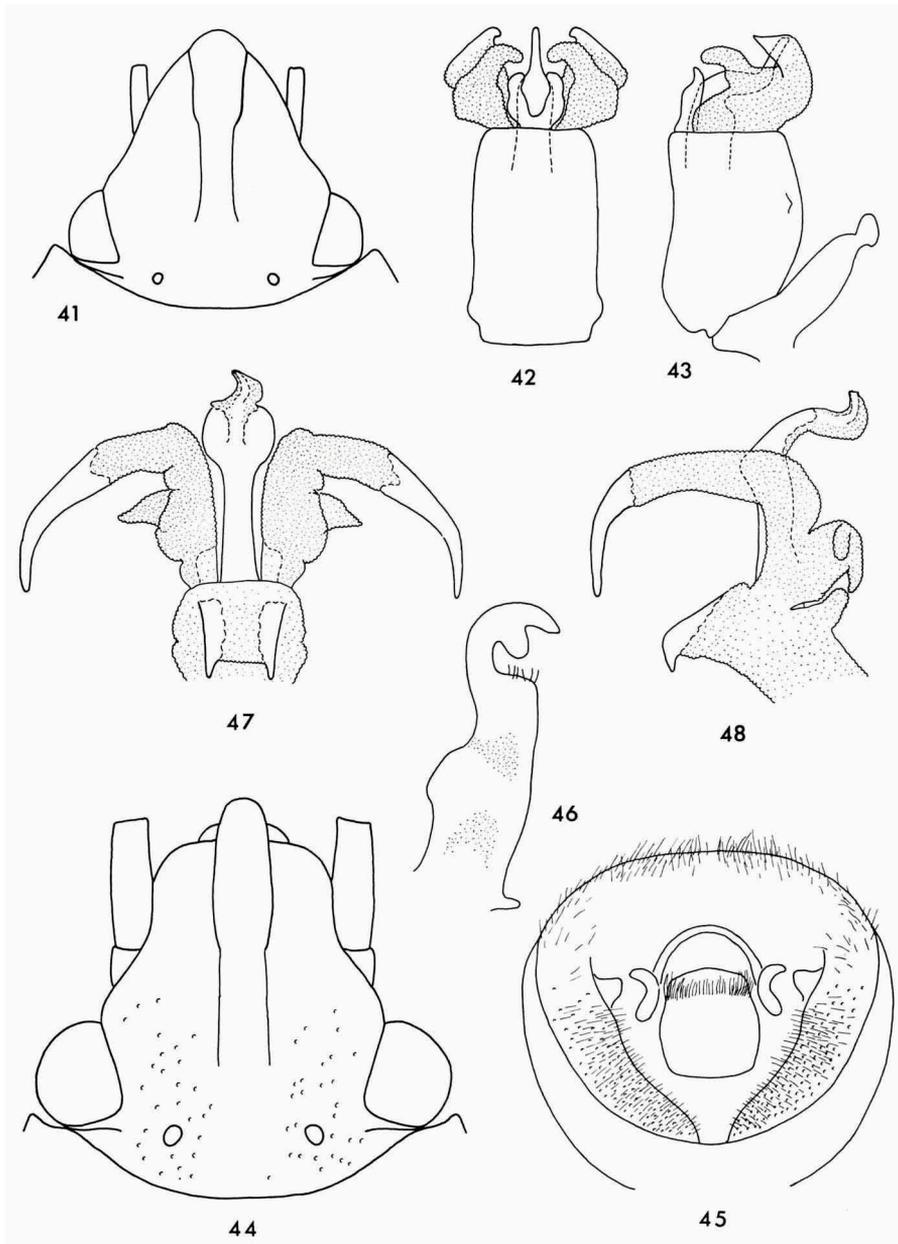
Material examined.

Holotype ♂, New Britain: Gazelle Pen., Mt. Sinewit, 900 m, 5-14.xi.1962, J. Sedlacek (BPBM).

Paratypes, 3 ♂, same data as holotype (BPBM); 1 ♀, New Britain: Gazelle Pen., Upper Warangoi, Ilugi, 230 m, 8-11.xii.1962, J. Sedlacek (BPBM); 1 ♀, New Britain: Gazelle Pen., Upper Warangoi, 250-600 m, 28-30.xi.1962, Sedlacek (BPBM); 1 ♀, New Britain: Gisiluve, Nakanai Mts., 1050 m, 25.vii.1956, Ford (BPBM); 2 ♀, New Britain: Ti, Nakanai Mts., 28.vii.1956, Ford (BPBM); 1 ♀, New Britain: Mt. Ivitki, Baining Mts., 27.xi.1957, Smart (BMNH); 1 ♀, New Ireland: Lemkamin, 7.iv.1962, Noona Dan Exped. (BMNH); 3 ♂, 3 ♀, New Ireland: Schleinitz Mts., Lelet Plateau, Oct. 1959, Brandt (BPBM); 1 ♂, New Ireland: "Camp Bishop", 12 km up Kait R., 240 m, 13.vii.1956, Ford (BPBM).

Synonymic catalogue and lectotype designations

During the course of this work, it was necessary to establish firmly the identity of a number of species, and lectotypes were therefore designated. These designations are included, where appropriate, in the catalogue below. Type-depositories are given in all cases where known; if a type-specimen or series has not been examined, the species name is marked with an asterisk (*).



Figs. 41-43. *Paracalliphara flagrans*. (41) head, dorsal, (42) male genitalia, ventral, (43) male genitalia, lateral. Fig. 44. *Notacalliphara pseudofasciata* head, dorsal. Fig. 45. *N. rostrata* pygophore, caudal. Figs. 46-48. *N. pseudofasciata*. (46) paramere, ventro-apical view, (47) male genitalia, ventral, (48) male genitalia, lateral.

Calliphara Germar, 1839: 122

Lamprophara Stål, 1865: 34. Syn. nov.

Calliphara (Chrysophara) Stål, 1873: 17. Syn. nov.

bifasciata White

**Calliphara (Scutellera?) bifasciata* White, 1839: 541. Type recorded as deposited in BMNH, but not now present in the collection.

Callidea (Calliphara) bifasciata (White); White, 1842b: 85.

Callidea quadrifera Walker, 1868: 514. Lectotype, ♂, here designated, with labels: "Type" and "16; 85" and "327" and "Callidea quadrifera" and "Brit. Mus.; Type No.; Hem. 461." BMNH.

Calliphara (Lamprophara) bifasciata White; Stål, 1873: 17.

Lamprophara bifasciata (White); Schouteden, 1904: 31.

Calliphara (Lamprophara) bifasciata White; Kirkaldy, 1909: 298.

billardierii (Fabricius)

Tetyra billardierii Fabricius, 1803: 129. Lectotype, ♀, here designated, with labels: "Billar-; dierii" UZM.

Scutellera billardierii (Fabricius); Guérin, 1838: 154.

Scutellera splendida Montrouzier, 1855: 94. Lectotype, ♂, here designated, with labels: "Woodlark (P. Montrouzier)" and "coll. R.I.Sc.N.B.; Nouvelle Guinée; ex. coll. Schouteden" and "Type" and "Scutellera splendida Montr. Typ.". Four paralectotypes present. IRSNB.

Calliphara billardierii (Fabricius); Stål, 1873: 17.

Calliphara oculatorum Breddin, 1905: 186. Syn. nov. Lectotype, ♀, here designated, with labels: "Museum Paris; Arch. Salomon; Lucas 1890" and "coll. Breddin" and "Calliphara oculatorum; Breddin cotypus; Lehemann det." and "oculorum Brdn." and "Cotypus" and "H. Lehemann det." and "Syntypus". One paralectotype present. DEI.

Calliphara billardierei (Fabricius); Schouteden, 1907: 108. (laps. cal.).

Calliphara billiardierei (Fabricius); Froggatt, 1907: 328. (laps. cal.).

caesar (Vollenhoven)

Callidea caesar Vollenhoven, 1863: 21. Holotype, RMNH.

Callidea quadrinotata Walker, 1867: 38. Syn. nov. Lectotype, ♂, here designated, with labels: "Paratype" and "Cer.e" and "Saunders; 65.13" and "Callidea; quadrinotata; Walker's Catal." and "Calliphara; caesar (Voll.); C. H. Lyal det. 1976". Two paralectotypes present. BMNH.

Calliphara caesar (Vollenhoven); Stål, 1873: 17.

Calliphara quadrinotata papuensis Kirkaldy, 1909: 298. Syn. nov. BMNH (probable syntypic material).

dimidiata dimidiata (Dallas)

Callidea dimidiata Dallas, 1851: 24. Holotype, BMNH.

Callidea laticincta Walker, 1867: 35. Lectotype, ♂, here designated, with labels: "Type" and "Aru" and "Wallace" and "Saunders; 65.13" and "43. *Callidea laticincta*" and "Brit. Mus.; Type No.; Hem. 466.". One paralectotype present. BMNH.

Calliphara dimidiata (Dallas); Stål, 1873: 17.

dimidiata cruenta Stål

**Calliphara cruenta* Stål, 1873: 17. Syn. nov., stat. nov. NR.

dimidiata fasciata (Walker)

Tetrarthria fasciata Walker, 1867: 20. Syn. nov., stat. nov. Lectotype, ♂, here designated, with labels: "Paratype" and "Dorei" and "Saunders; 65.13" and "Tetrarthria; fasciata; Walk. Cat.". Four paralectotypes present. BMNH.

Callidea elongata Vollenhoven, 1868: 175. Syn. nov. Lectotype, ♀, here designated, with labels: "Bernst.; Salwatti" and "Holotypus" and "Museum Leiden; *Calliphara elongata* Voll.; det." and "Museum Leiden; *Calliphara* (C.s.str.); *elongata* Voll.; Det." and "*Calliphara; fasciata* Walk.; det. C. H. C. Lyal 1976". RMNH.

Calliphara dimidiata var. *elongata* (Vollenhoven); Kirkaldy, 1909: 297.

Calliphara (*Chrysophara*) *fasciata* (Walker); Kirkaldy, 1909: 298.

excellens excellens (Burmeister)

**Tetyra excellens* Burmeister, 1834: 287.

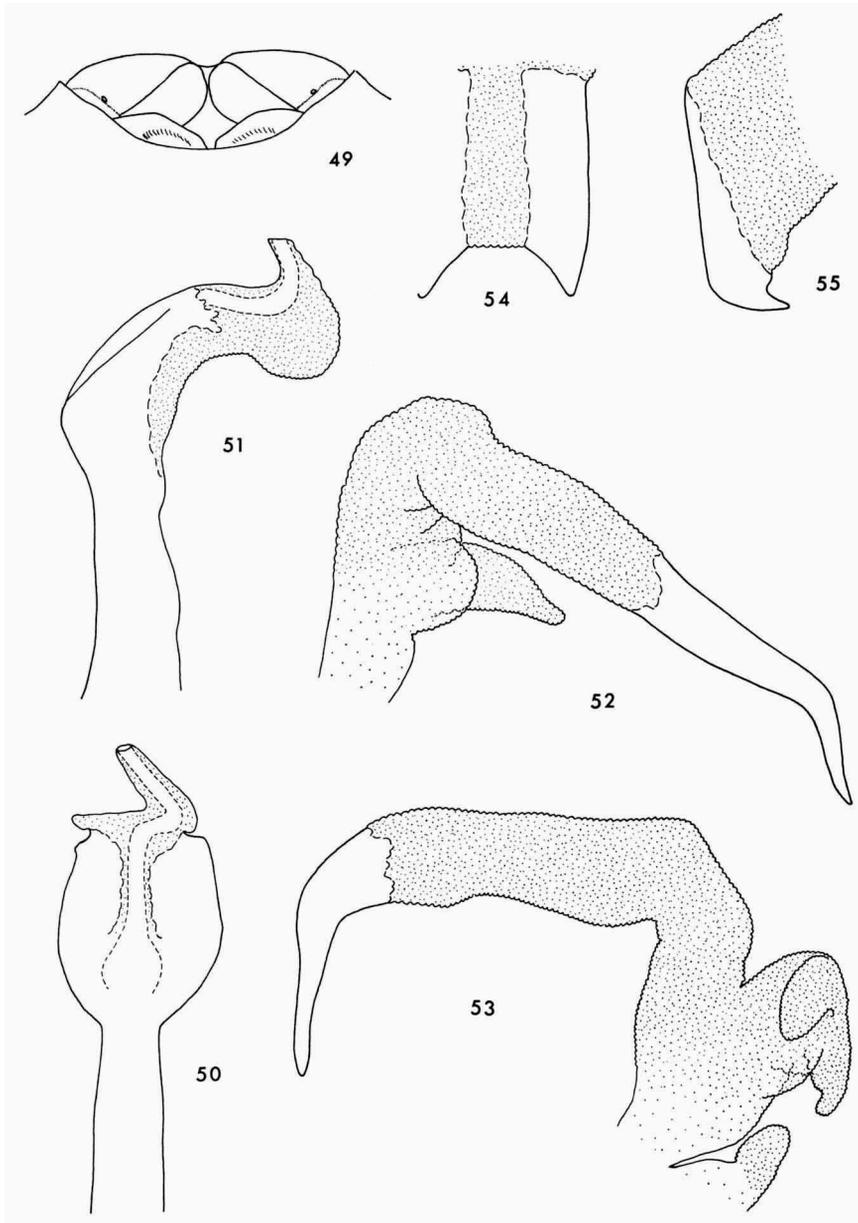
Tectocoris obscura Westwood, 1837: 14. Lectotype, ♀, here designated, with labels: "Type" and "Praslinius; var?; Guer. Voy.; Coquille" and "*Calliphara; excellens; Burm.*" and "Type; Westw. (Hope); C. Hemipt. 1837; Part 1, page 14; Distant, P. Z. S.; 1900, p. 807-825" and "Type Hem.; No. 30; *Tectocoris; obscura; Westwood; Hope Dept. Oxford*". UM.

Calliphara obscura (Westwood); Germar, 1839: 130.

Calliphara (*Chrysophara*) *excellens* (Burmeister); Stål, 1873: 17.

excellens coelestis Taeuber

Calliphara excellens coelestis Taeuber, 1929: 210. Holotype, BMNH.



Figs. 49-55. *Notacalliphara pseudofasciata*. (49) female terminalia, (50) vesica, ventral, (51) vesica, lateral, (52) conjunctival appendages I + II, ventral, (53) conjunctival appendages I + II, lateral, (54) conjunctival appendage III, dorsal, (55) conjunctival appendage III, lateral.

excellens speciosa (White)

**Callidea speciosa* White, 1842a: 80. Type recorded as deposited in BMNH, but not now present in the collection.

Calliphara excellens speciosa (White); Tacuber, 1929: 210.

imperialis (Fabricius)

Cimex imperialis Fabricius, 1775: 697. Lectotype, ♀, here designated, with labels: "Type" and "Australia" and "63.47" and "Brit. Mus.; Type. No.; Hem. 389". BMNH.

Calliphara imperialis (Fabricius); Germar, 1839: 126.

lanceolata Distant

Calliphara lanceolata Distant, 1903: 250. Lectotype, ♂, here designated, with labels: "Tenimber; Malay Archipelago; W. Doherty; 1903-31" and "Calliphara; lanceolata; Dist." Three paralectotypes present. BMNH.

munda Stål

Calliphara munda Stål, 1866: 153. NR.

Calliphara (Chrysophara) munda Stål; Stål, 1873: 18.

nobilis (Linnaeus)

Cimex nobilis Linnaeus, 1763: 17. Lectotype, ♂, here designated, with labels: "nobilis" and "3" and "Calliphara; nobilis (L.); C. H. C. Lyal det. 1978". Seven other specimens present: five *Scutellera perplexa* Westwood (= *Cimex nobilis* Fabricius nec Linnaeus), two Scutellerine nymphs. LIN.

**Cimex pustulatus* Panzer, 1798: 111. Preocc.

**Scutellera buquetii* Guérin, 1838: 159, 162.

Callidea nobilis (Linnaeus); Germar, 1839: 117.

Calliphara buquetii (Guérin); Stål, 1866: 153.

Calliphara (Chrysophara) nobilis (Linnaeus); Stål, 1873: 17.

Calliphara nobilis (Linnaeus); Distant, 1902: 53.

placida placida Breddin

Calliphara placida Breddin, 1905: 186. Lectotype, ♂, here designated, with labels: "Arfak, N. Guinea" and "coll. Breddin" and "cotypus" and "Calliphara placida Brd; Lehemann det." and "placida Brd" and "H. Lehemann det." and "Syntypus". Two paralectotypes present. IP.

placida scintillans Breddin

Calliphara placida scintillans Breddin, 1905: 186. Lectotype, ♂, here designated, with labels: "Museum Paris; Nouv-Guinee; Dorey; Raffray & Mandron: 1878" and (blank red square) and "coll. Breddin" and "H. Lehemann det.". Four paralectotypes present. IP.

prasinia prasinia (Guérin)

**Scutellera prasinia* Guérin, 1838: 158, 160.

Callidea prasinia (Guérin); Germar, 1839: 118.

Calliphara prasinia (Guérin); Stål, 1866: 152.

Tetrarthria nigra Walker, 1867: 23. Lectotype, ♂, here designated, with labels: "Type" and "56; 85" and "Tetrarthria; nigra; Walk." and "Brit. Mus.; Type No.; Hem. 469" and "178". BMNH.

Callidea ebenina Walker, 1867: 39. Lectotype, ♂, here designated, with labels: "New. Heb." and "Saunders; 65.13" and "Callidea; ebenina; Walker's Catal.". Three paralectotypes present. BMNH.

Calliphara nitidissima Schouteden, 1906: 138. Syn. nov. IRNSB.

prasinia admiraltyensis Kirkaldy comb. nov.

Calliphara (*Chrysophara*) *quadrinotata admiraltyensis* Kirkaldy, 1909: 298. Lectotype, ♂, here designated, with labels: "Wild Isl.; Admiralty Isl.; Chall. Coll." and "Calliphara; prasinia; admiraltyensis; C. H. C. Lyal det. 1977". Two paralectotypes present. BMNH.

regalis (Fabricius)

Cimex regalis Fabricius, 1755: 697. Lectotype, ♀, here designated, with labels: "Type" and "Lectotype" and "Australia" and "63.47" and "Brit. Mus.; Type No.; Hem. 388". BMNH.

Scutellera regalis (Fabricius); Guérin, 1838: 154.

Calliphara regalis (Fabricius); Germar, 1839: 127.

Callidea eximia Vollenhoven, 1863: 20. Syn. nov. Lectotype, ♀, here designated, with labels: "Cotyus" and "Bernst.; Ternate" and "Museum Leiden; Calliphara (*Chrysophara*); eximia Voll." and "Cat. No. 6". Seven paralectotypes present. RMNH.

Tetrarthria sobria Walker, 1867: 21. Syn. nov. (taken from synonymy with *prasinia* (Guérin)). Lectotype, ♀, here designated, with labels: "Type" and "New Heb" and "66; 12" and "Tetrarthria; Callidea [striked out!]; sobria; Walk" and "Brit. Mus.; Type No.; Hem. 468". BMNH.

- Callidea erythrospila* Walker, 1867: 33. Lectotype, ♂, here designated, with labels: "Cer" and "Saunders; 65-13" and "Type" and "Callidea erythrospila" and "Brit. Mus.; Type No.; Hem. 473". (Dissected). BMNH.
- Callidea semirufa* Walker, 1867: 34. Lectotype, ♀, here designated, with labels: "Type" and "Waigiou" — "Wag" on reverse — and "Saunders; 65-13" and "Brit. Mus.; Type No.; Hem. 472" and "39 Callidea semirufa" — "Callidea billardieri" on reverse — and "Callidea; semirufa; (type) Walk.". BMNH.
- Callidea biplaga* Walker, 1867: 35. Lectotype, ♂, here designated, with labels: "Aru; Isl." — "58; 48" on reverse — and "Type" and "42 Callidea biplaga" and "Brit. Mus.; Type No.; Hem. 471". (Dissected). BMNH.
- Calliphara (Chrysophara) eximia* (Vollenhoven); Stål, 1873: 18.
- Calliphara (Chrysophara) regalis* (Fabricius); Stål, 1873: 18.

regia (Westwood)

- Callidea regia* Westwood, 1837: 16. Lectotype, ♀, here designated, with labels: "Type" and "181" and "regia Hope" and "592" and "Calliphara; imperialis; Fabr." and "Type; Westw. (Hope); C. Hemipt. 1837; Part 1, page 16; Distant, P.Z.S.; 1900, p. 807-825." and "Type; Westw. (Hope); C. Hemipt. 1837; Part 1, page 16; Distant, P.Z.S.; 1900, p. 807-825." and "Type Hem.; No. 31; Callidea; regia; Westwood; Hope Dept. Oxford". UM.
- **Scutellera regalis* var. *peronii* Guérin, 1838: 155.
- Calliphara peronii* (Guérin); Germar, 1839: 126.
- Calliphara regia* (Westwood); Germar, 1839: 126.

solomonensis sp. nov.

vollenhoveni sp. nov.

Incertae sedis

regia alloreensis Lehemann

- **Calliphara regia alloreensis* Lehemann, 1920: 139. NMFIS.

regia timorensis Lehemann

- **Calliphara regia timorensis* Lehemann, 1920: 139. NMFIS.

bipunctata Lehemann

- **Calliphara bipunctata* Lehemann, 1920: 139. NMFIS.

Species removed from *Calliphara* as a result of this study

Chrysocoris paradisiaca (Breddin) comb. nov.

Calliphara paradisiaca Breddin, 1905: 186. IP.

Paracalliphara (gen. nov.) *flagrans* (Walker) comb. nov.

Tetrarthria flagrans Walker, 1867: 24. Lectotype, ♂, here designated, with labels: "Type" and "Tetrarthria; flagrans; Walk" and "Brit. Mus.; Type No.; Hem. 467". BMNH.

Calliphara flagrans (Walker); Kirkaldy, 1909: 297.

Notacalliphara (gen. nov.) *rostrata* (Distant) comb. nov.

Calliphara rostrata Distant, 1903: 250. BMNH.

Paracalliphara gen. nov.

Type-species: *Tetrarthria flagrans* Walker, 1867: 24.

Ovate insects of moderate size, more or less punctate dorsally, with metallic colouring.

Head declivous, following line of anterior lobe of pronotum, convex dorsally, as long as width across eyes, lateral margins sinuate anterior to eyes. Clypeus slightly elevated anteriorly, extending further than paraclypeae. Paraclypeae convex, sloping to lateral margin. Eyes close to anterior pronotal margin; width of eye one quarter of interocular distance. Ocelli small, slightly nearer eyes than to midline of head, level with posterior margin of eyes (fig. 41). Head sparsely pilose ventrally and on antennifers. Vertex impunctate, wrinkled. Antennae five-segmented; segments I and II cylindrical; III, IV and V flattened dorso-ventrally, IV indistinctly sulcate dorsally distally, V sulcate dorsally proximally; segment II subequal to I, attaining front of head; III, IV and V each at least twice as long as II. Rostrum attaining fifth abdominal sternite, segment II being longer than III or IV.

Pronotum convex posteriorly, declivous anteriorly, lateral punctate sulcus bisecting declivity, separating impunctate discs of anterior and posterior lobes; anterior margin convex behind eyes, concave just mesad of eyes, convex behind collum; anterior angles acute; antero-lateral margins more or less straight, sparsely pilose, narrowly carinate, carina terminating at posterior angles; posterior and prescutellar angles rounded; posterior margin shallowly concave; prescutellar angles heavily punctate. Scutellum convex,

declivous posteriorly, not covering costal margins of hemelytra and tips of wings; anterior lobe impunctate; disc of posterior lobe weakly punctate; basal angles and lateral margins more strongly punctate. Anterior margin of propleuron explanate medially, punctate. Metapleural scent gland orifice between coxae, opening onto raised, broad, glossy area inclined anteriorly, surrounded by roughened evaporatorium extending onto mesopleuron. Pleurites glabrous, propleuron punctate anteriorly and posteriorly, posterolateral angle and coxite impunctate; meso and meta pleura impunctate. Sternites with median longitudinal sulcus underlying rostrum. Femora cylindrical; anterior and posterior faces glabrous or sparsely pilose; ventral face more thickly pilose with long, erect hairs. Tibiae cylindrical, first leg with dorsal sulcus on tibia indistinct or absent; dorsal face very sparsely pilose; anterior and lateral faces moderately pilose, with short decumbent or semi-decumbent hairs; ventral face thickly pilose, with long erect hairs becoming more abundant distally. Tarsi with stiff, bristle-like hairs ventrally, abundant on first tarsomere, less abundant on second and third; anterior, dorsal and posterior faces with sparse, long, semi-decumbent hairs.

Ventral abdominal surface convex, impunctate, glabrous or sparsely pilose. Posterior margin of each sternite broadly concave on disc, becoming concave towards lateral margin. Seventh sternite twice as long medially than at lateral margins. Sulcus extending mesad from spiracles, slightly longer than distance from spiracle to lateral margin of sternite. Posterior angles of sternites III-VI rounded, VII produced into spine.

Pygophore with ventral lip absent; dorsal border with patch of long setae on each side. Parameres hook-shaped, with long setae at apex of vertical member. Phallosome strongly sclerotised. Vesica bulbous at base, produced dorsoposteriorly, gonopore at apex. Conjunctiva produced into three pairs of appendages: I and II elongate, membranous, apically sclerotised; III short, thickly sclerotised, curved and rounded (figs. 42, 43). Female genitalia with first valvifer large, deeply depressed, ninth paratergite small. First valvifer at rest at 90° to plane of long axis of body.

Remarks.

Paracalliphara at present contains only one species, *P. flagrans* (Walker), from New Guinea. It is related to *Lampromicra* Stål, from which it may be most readily separated by its larger size and the high degree of fusion of conjunctival appendages I + II. It may be distinguished from *Calliphara* and *Chrysocoris* by the shape of the head, the relative sizes of the ocelli and eyes, and by the clearly fused state of conjunctival appendages I + II.

Notacalliphara gen. nov.

Type-species: *Calliphara rostrata* Distant, 1903: 250.

Ovate insects of moderate to large size, more or less punctate dorsally, often brightly coloured with a metallic sheen.

Head declivous, following line of anterior lobe of pronotum, convex dorsally, shorter than anterior pronotal margin. Exterior margins of paraclypeae raised, sinuate anterior to eyes, apex truncate, exposing apices of maxillary plates (fig. 44). Clypeus elevated anteriorly, extending as far as or slightly beyond paraclypeae. Eyes large, close to anterior pronotal margin. Distance between ocelli at least three times distance between ocellus and eye. Ocelli small, level with posterior margin of eyes. Head sparsely pilose dorsally and ventrally. Vertex sparsely punctate. Antennae four-segmented; segment I not projecting in front of head, about half length of II; II, III and IV subequal. Rostrum attaining at least fifth abdominal sternite, segment II longer or as long as III; IV and I shorter.

Pronotum convex posteriorly, declivous anteriorly; anterior margin broadly concave, shallowly convex behind collum; anterior angles acute; antero-lateral margins straight, narrowly carinate, carina terminating at posterior angles; posterior and prescutellar angles rounded; posterior margin shallowly concave; calli impunctate; anterior margin strongly punctate, otherwise sparsely so; pilosity absent or sparse on disc, otherwise moderate. Scutellum convex; anterior lobe elevated; posterior lobe declivous, not covering costal margins of hemelytra or tips of wings; sparsely to moderately punctate, sparsely pilose, pilosity more marked on posterior lobe. Costal margins of hemelytra sparsely punctate and sparsely pilose. Anterior margin of propleuron broadly raised. Metapleural scent gland orifice between coxae, opening onto raised, elongate furrow directed laterad; evaporatorium extending onto mesopleuron. Pleurites sparsely pilose; propleuron and mesopleuron punctate or impunctate; metapleuron impunctate. Sternites with median longitudinal furrow underlying rostrum, pilose. Femora cylindrical; sparsely or moderately pilose, pilosity becoming more dense distally; ventral face narrowly glabrous. Tibiae cylindrical, clearly sulcate dorsally; dorsal face glabrous or very sparsely pilose; anterior, posterior and ventral faces with stiff, bristle-like hairs becoming more abundant and longer distally. Tarsi with stiff, bristle-like hairs abundant ventrally, more scattered elsewhere.

Ventral abdominal surface convex, impunctate, moderately to thickly pilose. Posterior margins of sternites broadly concave. Sternites III to VI with mesal longitudinal glabrous furrow. Sulcus extending mesad from spiracles, slightly longer than distance from spiracle to lateral margin of sternite. Posterior angles of sternites III to VII sometimes produced into small spine or tubercule.

Pygophore with ventral lip absent; dorsal lip present; dorsal and ventral borders with long bristle-like hairs abundant; ventral margin punctate; dorsal lip rugose; stout projection present laterally (fig. 45). Parameres hook-shaped, apically bifurcate (fig. 46). Phallosome strongly sclerotised. Vesica sclerotised, membranous apically, explanate laterally at apex; gonopore apical, ejaculatory duct sclerotised, clearly visible inside vesica. Conjunctiva produced into three pairs of appendages: I small, membranous or very thinly sclerotised; II long, membranous, sclerotised and acute apically, lightly sclerotised basally; III short, sclerotised apically (figs. 47, 48).

Female genitalia with first valvifer small, ninth paratergite large (fig. 49).

Remarks.

Notacalliphara is erected for *N. rostrata* (Distant), from the Ké Islands, and *N. pseudofasciata* sp. nov., from New Guinea. A third species, also from New Guinea, and presently known only from a single female, remains to be described. *Notacalliphara* is not closely related to *Calliphara*, *Chrysocoris* or *Lampromicra*, as may be seen from the many differences in the structure of the male genitalia, particularly in the vesica. The genus may be distinguished from all other genera of the Scutellerinae by the dorsal exposure of the maxillary plates. The affinities of *Notacalliphara* are at present uncertain.

Description of new species

***Notacalliphara pseudofasciata* sp. nov.**

Length: male, 16.6 mm ($n = 1$); female, 18.0 mm ($n = 1$). Maximum pronotal width: male, 8.5 mm ($n = 1$); female, 9.5 mm ($n = 1$).

Shiny black; antennae and tarsi, dull black; median fascia on scutellum, abdominal sternites II-V and anterior border of sternite VI, stramineous; lateral margins of sternites III-VI, spines of posterior sternal angles, shiny black. Anterior margin of propleuron, thoracic sternites and posterior abdominal sternites with long, semi-decumbent pubescence; body surface otherwise with short semi-decumbent pubescence distributed as in generic description. Vertex of head, antennifers, pronotum, posterior lobe and basal angles of scutellum weakly punctate; propleura anterior and posterior to coxae strongly punctate, otherwise weakly punctate or impunctate; mesopleura strongly punctate anteriorly, disc impunctate, becoming rugose laterally, posterior margins minutely granulate; metapleura impunctate, minutely granulate around ostiolar peritreme; abdominal sternites impunctate.

Ratio of antennal segments I:II:III:IV: male 1.0:3.1:2.9: (missing); female, 1.0:3.3:3.3:3.4. Rostrum attaining anterior margin of abdominal

sternite VII; ratio of segments I:II:III:IV: male, 1.0:1.9:2.1:2.0; female, 1.0:2.1:2.3:1.9.

Posterior angles of abdominal sternites III-VII produced into very small spines.

Pygophore as in generic description (fig. 45). Vesica as in generic description (figs. 50, 51). Conjunctiva with appendage I small, membranous (figs. 52, 53); appendage II elongate, membranous, convoluted, apical sclerotisation acute (figs. 52, 53); appendage III membranous ventrally, sclerotised dorsally and at apex (figs. 54, 55).

Female genitalia with first valvifer small, ninth paratergite large (fig. 49).

Remarks.

N. pseudofasciata is presently known from only two specimens. These were found in the British Museum (Natural History) collections mixed with specimens of *Calliphara fasciata* (Walker), and with identical data. The coloration of the two species is identical and it is likely that there is a mimetic association between them.

N. pseudofasciata can be distinguished from *N. rostrata* (Distant) by the form of the male genitalia and the colour of the dorsum, which is red and black in *rostrata*.

Material examined.

Holotype ♂, W. New Guinea: Mt. Norno, S. of Mt. Bougainville, 700 ft, —.ii.1936, L. E. Cheesman (BMNH).

Paratype, 1 ♀, Dutch New Guinea: Humboldt Bay Distr., Bewar Mts., —.ix.1937, W. Stuber (BMNH).

DISCUSSION

Calliphara is typical of a number of genera of Scutellerinae in that colour has been utilised as a character of taxonomic value to a far greater extent than is justified. The unreliable nature of the character is evident in the case of such species as *C. regalis* (Fabricius), which exists in a number of intergrading colour forms. When used as a major determinant, colour has proven misleading in the case of *C. prasinia admiraltyensis* Kirkaldy, which was hitherto placed as a subspecies of *quadrinotata* purely on the basis of its similar coloration.

The substitution of characters of the male genitalia as a guide to relationships is a considerable improvement, and these structures should be investigated in all Scutellerine studies. However, the clarification of relationships is not complete; within *Calliphara*, several problems remain to be solved for which gross morphological study is insufficient. For example, *C. caesar*

(Vollenhoven) lives on a number of islands around and including New Guinea; considerable numbers have been dissected, and variations have been found in the male genitalia. These variations could in part be correlated with altitude and geographical locality of the various collecting areas, but due to low numbers of individuals available from each area, no picture of the variability within each population could be formed (with the exception of the Biak Island form, which is undoubtedly distinct from the mainland New Guinea forms). The relationships within the *caesar* species complex remain obscure, and may well require karyological studies to elucidate the situation.

Detailed morphological and karyological studies of large samples from individual populations will doubtless aid an understanding of the genus *Calliphara*, and shed some light on the dispersal and evolution of insects in the Australo-Oriental boundary region.

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