The identity of *Calliphara bipunctata*, with proposal of a new synonymy (Hemiptera: Heteroptera: Scutelleridae)*

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Abstract
The lectotype of *Calliphara bipunctata* Lehmann, 1920 (Hemiptera: Heteroptera: Scutelleridae: Scutellerinae), described from the Obi Islands of Indonesia, has been reexamined. The following synonymy is proposed: *Calliphara caesar* (Vollenhoven, 1863) = *C. bipunctata* Lehmann, 1920, new junior subjective synonym.

Keywords: Heteroptera, Scutelleridae, *Calliphara*, *Notacalliphara*, new synonym, Australian Region.

Kurzfassung
Die Zugehörigkeit von *Calliphara bipunctata*, mit Vorschlag einer neuen Synonymie (Hemiptera: Heteroptera: Scutelleridae)
Der von den Obi Inseln in Indonesien beschriebene Lectotypus von *Calliphara bipunctata* Lehmann, 1920 (Hemiptera: Heteroptera: Scutelleridae: Scutellerinae) wurde nachuntersucht. Folgende Synonymie wird vorgeschlagen: *Calliphara caesar* (Vollenhoven, 1863) = *C. bipunctata* Lehmann, 1920, neues jüngeres subjektives Synonym.

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Introduction

The genus *Calliphara* Germar, 1839, currently contains about 15 species. The centre of distribution of the genus is Papua New Guinea and the surrounding islands, with a few Oriental species (Lyal 1979, Tsai et al. 2011).

Calliphara bipunctata Lehmann, 1920, was described based on two male syntypes from Obi Island of Indonesia (Lehmann 1920) and has not received attention for a long time. Lyal (1979) could not access the type material in connection with his revision of the genus. Therefore, he listed the species as incertae sedis. Lis & Skórka (1996) reexamined the syntypes, designated a lectotype, redescribed and illustrated the species, and transferred it into the genus *Notacalliphara* Lyal, 1979, recognizing it as a valid species within the latter genus.
Based on a subsequent reexamination of the lectotype we disagree with the act of Lis & Skórka (1996). We revisit the problem and propose taxonomic and nomenclatural changes in the present paper.

Dedication: This paper is dedicated to Christian Rieger on the occasion of his 70th birthday and in recognition of his outstanding contribution to knowledge of Heteroptera.

Material and methods

External and genital structures were examined using stereoscopic (Olympus SZX9) and optical (XSZ-N107, Olympus CX21) microscopes. All drawings were made from alcohol-glycerol slide mounts using a camera lucida; genitalia were studied after careful and incomplete macerating in cold KOH solution. Measurements were taken using a micrometer eyepiece.
Type specimens and localities verified by us based on voucher specimens are marked with exclamatory point '!'.
Abbreviations for depositories: BMNH: Natural History Museum, London, United Kingdom; BPBM: Bernice P. Bishop Museum, Honolulu, USA; HNHM: Hungarian Natural History Museum, Budapest, Hungary; NHMW: Naturhistorisches Museum in Wien, Vienna, Austria; RMNH: Nationaal Natuurhistorisch Museum (Naturalis),

* Dr. Christian Rieger, honouring his 70th birthday.

Leiden, The Netherlands; ZJPC: Zdeněk Jindra Collection, Prague, Czech Republic; ZMUH: Zoologisches Museum, Universität Hamburg, Germany.

Taxonomy

Genus *Calliphara* Germar, 1839

Calliphara Germar, 1839: 122. Type species by subsequent designation (Distant 1902: 53): *Calliphara nobilis* (non Linnaeus, 1763): Germar, 1839 (= *Tetyra excellens* Burmeister, 1834).
A complete list of synonyms was provided by Tsai et al. (2011: 185).

References: A bibliography of the genus was presented by Tsai et al. (2011: 185).

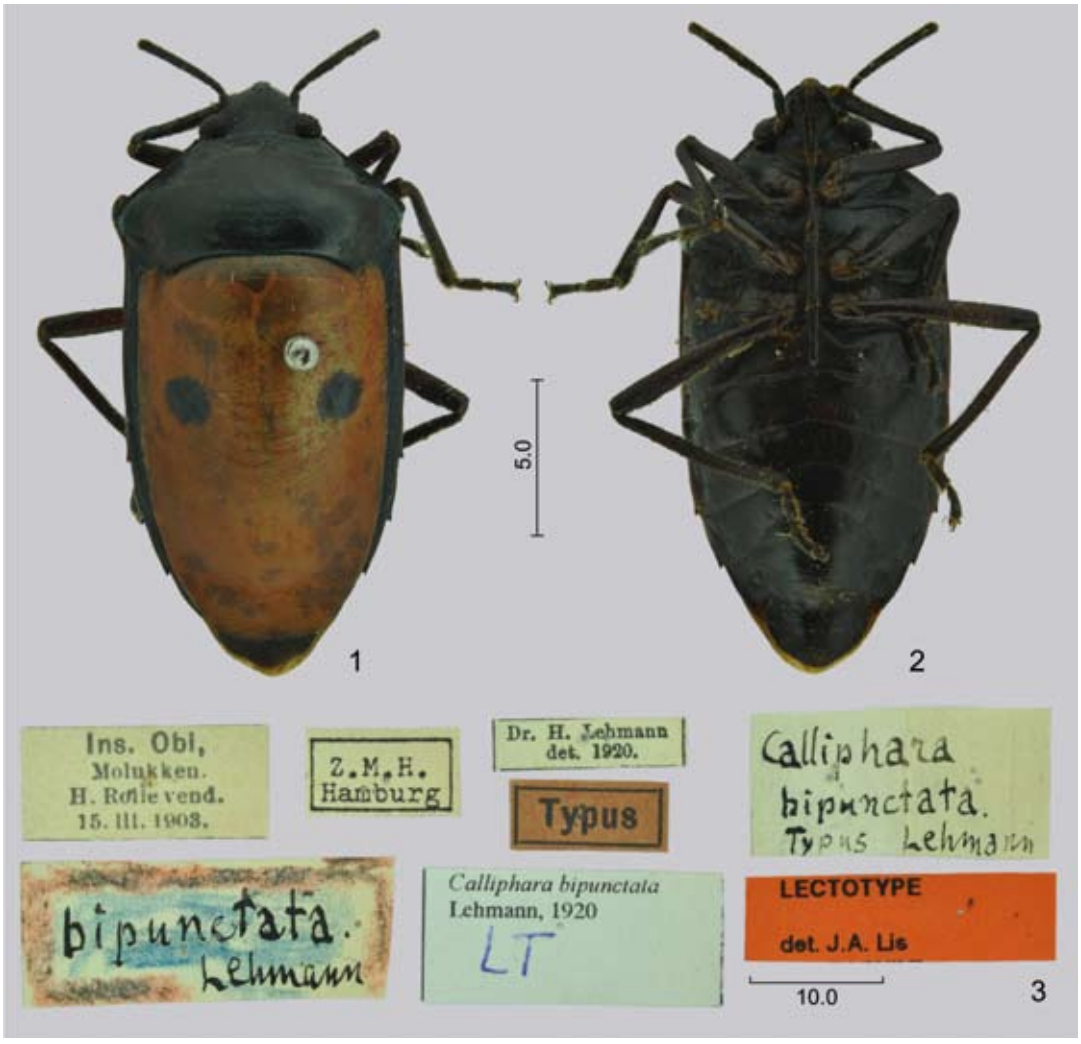
Calliphara caesar (Vollenhoven, 1863)

Callidea caesar Vollenhoven, 1863: 15, 21. Holotype (♀): [Indonesia:] Morotai; RMNH!.
Callidea quadrinotata Walker, 1867: 38. Lectotype (Lyal 1979: 169) (♂): [Indonesia:] Ceram [= Seram Is.]; BMNH! Synonymized by Lyal (1979: 169).
Calliphara quadrinotata var. b Distant, 1899: 38. Syntype(s): New Guinea; BMNH. Unavailable name (ICZN 1999, Art. 11.9.1).
Calliphara quadrinotata var. *papuensis* Kirkaldy, 1909: 298. Replacement name for *Calliphara quadrinotata* var. b Distant, 1899. Synonymized by Lyal (1979: 170).
Calliphara bipunctata Lehmann, 1920: 130. Lectotype (Lis & Skórka 1996: 47) (♂): [Indonesia:] "Molukken" [= Maluku Isls.]: Obi Is.; ZMUH! New subjective synonym.

References: Stål 1866: 152 (listed, distribution), Walker 1868: 511 (catalogue, distribution), Stål 1873: 17 (diagnosis, distribution), Lethierry & Severin 1893: 23 (catalogue, distribution), 48 (*quadrinotata*, uncertain placement), Distant 1899: 38 (*quadrinotata*, intraspecific variability), Schouteden 1904: 32 (catalogue, distribution), 33 (*quadrinotata*, catalogue, distribution), Kirkaldy 1909: 297 (catalogue, distribution), 298 (*quadrinotata*, catalogue, distribution), Lyal 1979: 152, 158, 162, 169 (revision, synonymy, figure, genitalia, intraspecific variability), Krikken et al. 1981: 252 (type material), Lis & Skórka 1996: 47 (*bipunctata*, type material, redescription, figures, genitalia, generic placement), Cassis & Vanags 2006: 336 (listed, distribution; *bipunctata*, generic placement).

Diagnosis
A large species (20.0-22.0 mm) readily distinguished from other congeners by the following combination of characters: Head long, anteocular portion more than 1.7 times as long as length of eye; disk of scutellum decorated with one or two pairs of rounded patches; posterolateral angles of abdominal ventrite III unarmed, ventrites IV-VII produced into a large, distinct, sharp spine; genital capsule with ventral lip absent, setal patches reduced (figs. 4-6); phallus as in figs. 7-9.

Redescription
Large species, body length to apex of scutellum 20.0-22.0 mm.
Colour: Ground colour of dorsum ochraceous of various shade, usually with moderate, sometimes strong metallic reflection (bright metallic blue in some extralimital populations), with deep purple to black markings; head black, with more or less strong metallic lustre; antenna and labium blackish; pronotum black, usually with blue-green or purple metallic lustre, a broad lateral fascia, suffusion on anterior collar, a pair of transverse oval patches on calli, a median patch between them, a pair of submedian patches and a pair of larger sublateral patches on disk and a pair of smaller patches on humeri black; scutellum yellow to red, with two pairs of large discal patches and frequently also with a large, transversely elongate subapical or apical patch; exposed portion of fore wing deep purple; thoracic pleuron of variable pattern of deep metallic blue and purple, metepimeron frequently with ochraceous shade, peritreme blackish, evaporatorium dark gray, thoracic sternum black, mesosternum usually metallic greenish or purple, anterior margins of pregenital abdominal ventrites broadly black, lateral margin occasionally ochraceous; legs rather uniformly blackish brown with more or less purplish metallic shine.
Structure: Head relatively long, about 1.3 times as wide as its median length, 1.65 times as wide across eyes as interocular distance, length of anteocular part more than 1.7 times as long as length of eye; apex of antennal segment I approaching but not reaching apex of mandibular plate, far remote from apex of clypeus; apex of labium extending to about middle of abdominal sternite III.
Pronotum narrowly explanate laterally, posterior abrupt termination of lateral carina appears as distinct, conspicuous denticle at humeral angle.
Pregenital abdomen: Ventrite III unarmed, poste-

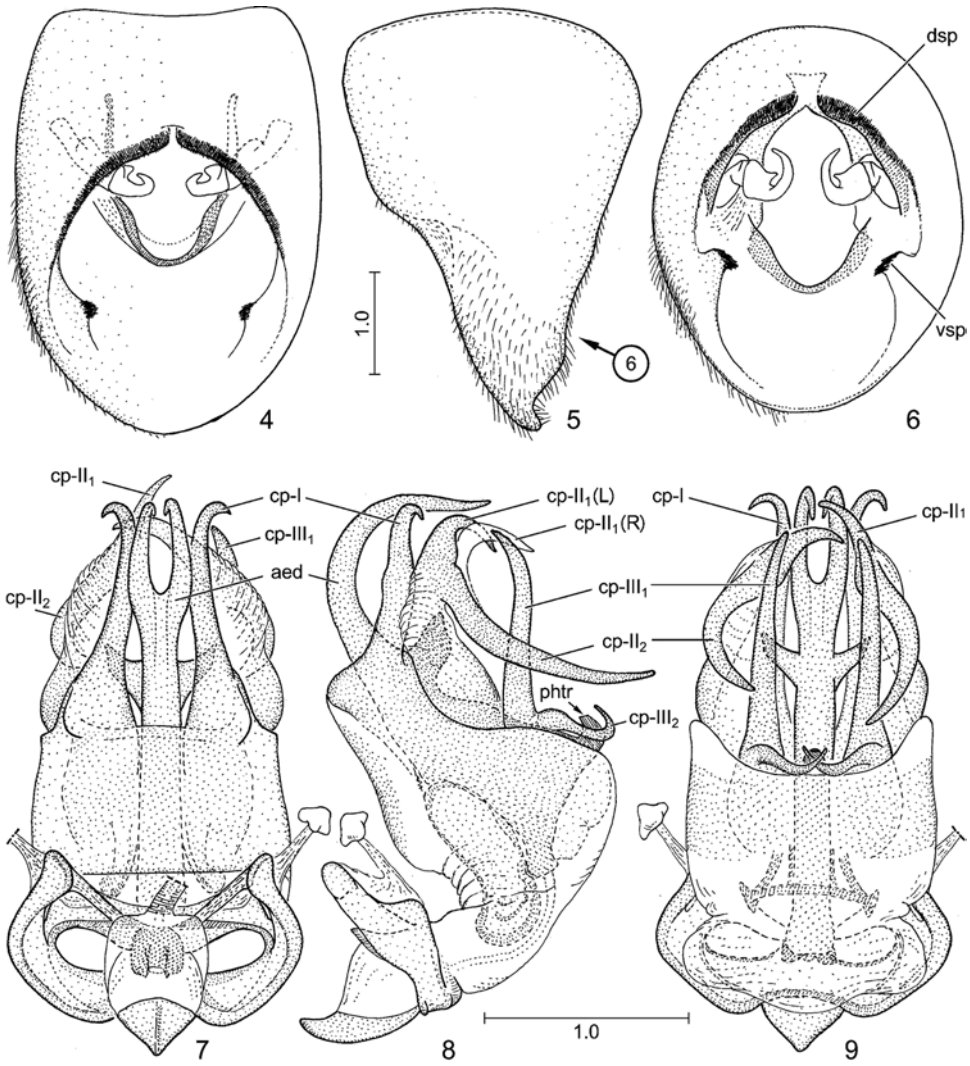


Figures 1-3. *Calliphara bipunctata* LEHMANN, 1920, Lectotype. (1) dorsal view; (2) ventral view; (3) labels. Scales in mm.

rolateral angles of ventrites IV-VII produced into a large, distinct, sharp spine; abdominal venter not punctured.

External male genitalia: Genital capsule (figs. 4-6) far produced posteriorly, infolding of ventral rim long; dorsolateral setal patches forming an elongate stripe narrowly surrounding dorsal sinus of posterior aperture; ventrolateral patches reduced, present as a pair of small sublateral tufts.

Paramere with an elongate, columnar stem and a hooked crown provided with a short process basally. Phallus (figs. 7-9) with short phallotheca strongly broadened distally in lateral view; cp-I (figs. 7-9: cp-I) strongly sclerotized, long, produced posteriad, base strongly broadened, apex curved laterad; cp-II (figs. 7-9: cp-II) with basal portion membranous (its wall weakly sclerotized laterally), apical portion bifurcate, forming a shorter posteriorly directed (figs. 7-9: cp-II_1) and a longer ventrally directed (figs. 7-9: cp-II_2), strongly sclerotized branch; cp-III strongly sclerotized, with a long posteriorly directed (figs. 7-9:



Figures 4-9. *Calliphara bipunctata* Lehmann, 1920, external male genitalia of lectotype. (4) Genital capsule, dorsal view; (5) same, lateral view; (6) same, posterodorsal view; (7) phallus, dorsal view; (8) same, lateral view; (9) same, ventral view. Scales in mm. Lettering: aed = aedeagus; cp-I = first conjunctival process; cp-II$_1$, cp-II$_2$ = branches of second conjunctival process; cp-III$_1$, cp-III$_2$ = branches of third conjunctival process (L = left, R = right); dsp = dorsal setal patch; phtr = phallotreme; vsp = ventral setal patch. Arrow in fig. 5 shows aspect of fig. 6.

cp-III$_1$) and a short ventrally directed (fig. 8: cp-III$_2$) process; aedeagus (figs. 7-8: aed) sclerotized, with a long, distally bifurcate dorsoapical process broadly arched ventrally, provided with a pair of short, ventrolaterally directed projections around its base, phallotreme (fig. 8: phtr) situated posteroventrally (in order to preserve the phallus of the lectotype in intact condition the inner sperm efferent system was not examined).

Intraspecific variability. The dorsal markings of the pronotum are strongly variable in extent, occasionally the discal patches are lacking, but very frequently they are extensive, variously

confluent, in extreme cases the whole pronotum is uniformly black with purplish reflection. The ground colour of the scutellum is usually ochraceous in most parts of the distribution area of the species; it is generally decorated with a pair of discal patches of variable size and shape (rounded or transversely elongate), the second pair might occasionally be lacking; it is usually provided with a large black subapical patch, the margin posteriad of the patch is usually shining metallic, sometimes black, in the latter case a large apical patch is present; in several specimens the apical portion of the scutellum is devoid of any markings. Specimens from Biak Island are overall deep metallic blue dorsally and ventrally, in these scutellum is provided with a pair of sublateral patches on the basal tumescence and a short median longitudinal vitta posteriad of basal tumescence of the scutellum.

Type material examined

Callidea caesar VOLLENHOVEN, 1863. Lectotype (♀): "Bernst. \ Morotai" [circle, handwritten], "Holotypus" [blue square, printed], "Museum Leiden. [printed] \ Callidea \ caesar Voll. [handwritten] \ Det [printed]" [with black frame], "Museum Leiden. [printed] \ Calliphara \ (C. s. str.) \ caesar Voll. [handwritten] \ Det [printed]" [with black frame], "RMNH Leiden \ HOLOTYPE" [red square, printed], "RMNH.INS.721893" [printed, with barcode]; pinned, left antennal segment IV and left hind tarsus lacking (RMNH).

Callidea quadrinotata WALKER, 1867. Lectotype (♂): "LECTO- \ TYPE" [circle with deep lilac margin, printed], "Cer. E" [handwritten circle], "Saunders. \ 65·13." [printed], "Callidea [printed] \ quadrinotata [handwritten] \ Walker's catal. [printed]", "LECTOTYPE \ Callidea \ quadrinotata \ Walker \ C.H.C. Lyal 1976" [red square, handwritten], "Calliphara [handwritten] \ caesar (Voll.) [handwritten] \ C.H. Lyal det. 197 [printed] 6 [handwritten]"; pinned, segment IV of right and II-IV of left antenna, segments II+III of right fore leg, tarsi of right mid, right and left hind legs lacking, male genitalia dissected, preserved in glass microvial pinned with the specimen (BMNH). Paralectotype (♀):"Saunders. \ 65·13." [printed], "Callidea [printed] \ quadrinotata [handwritten] \ Walker's catal. [printed]", "PARA- \ LECTO- \ TYPE" [circle with blue margin, printed]; pinned, with minor damage on antennae and legs (BMNH). Paralectotype (unknown sex): "Type" [circle with green margin, printed], "Amb. \\ 59 \ 25" [handwritten circle], "59·25. \ Amboina." [printed], "51. CALLIDEA QUADRINOTATA." [printed, cut from Walker 1867: 38], "BRIT. MUS. [printed] \ TYPE No. [printed] \ HEM. [printed] 475 [handwritten]" [pink square], "PARA- \ LECTO- \ TYPE" [circle with blue margin, printed]; pinned, with minor damage on antennae and legs, apex of abdomen lacking (BMNH).

Callidea quadrinotata var. *papuensis* KIRKALDY, 1909. Syntype? (♂): "Nuova Guinea \ Fly River \ L.M. D'Albertis 1876-77" [with black frame, printed], "Coll. Mayr" [printed], "Brit. Mus. [printed] \ 195 [printed] 4-404" [handwritten], "May be syntype \ of q. papuensis \ Kirk. [handwritten] \ C.H. Lyal det. 197 [printed] 7 [handwritten]"; pinned, with minor damage on antennae and legs (BMNH). Syntype? (♂): "Nuov a Guinea \ Fly River \ L.M. D'Albertis 1876-77" [with black frame, printed], "Brit. Mus. [printed] \ 195 [printed] 4-404" [handwritten], "Chrysophara \ quadrinotata \ var. papuensis \ Kirk. [handwritten] \ det. R.J. Izzard 19 [printed] 53. [handwritten]", "May be syntype \ of q. papuensis \ Kirk. \ C.H. Lyal det. 197 [printed] 7 [handwritten]"; pinned, with minor damage on antennae and legs (BMNH). Syntype? (♂): "2" [printed], "Lethierry" [printed], "Atkinson. \ Coll. \ 92-6." [printed], "May be syntype \ of q. papuensis \ Kirk. \ C.H. Lyal det. 197 [printed] 7 [handwritten]"; pinned, segments IIb–IV of both antennae, left fore leg distad of trochanter, right fore and left hind leg distad of femur, right hind leg distad of coxa, and tarsi of remaining legs lacking or damaged (BMNH).

Calliphara bipunctata LEHMANN, 1920. Lectotype (figs. 1-9) (♂): "Typus" [red square with black frame, printed], "Ins. Obi, \ Molukken \ H. Rolle vend. \ 15. III. 1903" [printed], "Calliphara \ bipunctata. \ Typus Lehmann" [handwritten], "Dr. H. Lehmann \ det. 1920." [with black frame, printed], "bipunctata. \ Lehmann" [handwritten, label decorated with blue, red and black pencil], "*Calliphara bipunctata* [printed] \ Lehmann, 1920 [printed] \ LT [handwritten]", "LECTOTYPE \ det. J.A. Lis" [red square, printed]; pinned, segments III+IV of both antennae and tarsus of left fore leg lacking; genital capsule removed, dissected, preserved in plastic microvial with glycerol, pinned with the specimen (ZMUH).

Additional specimens examined. Indonesia: Kayoa Is.: "Kaioa Is.", SAUNDERS 65-13 (1 ♀ BMNH); Seram Is.: "C. Ceram, Mansela" [= Manusela National Park], 2500 ft., 1919, leg. PRATT, B. M. 1932-116 (1 ♀ BMNH), Solea, 12 km SE of Wahai, 17.1-4.2.1997, leg. S. BÍLÝ (1 ♀ ZJPC); Ambon Is.: Waai, 21.5.1960, leg. A. M. R. WEG-

ner (1 ♂ BPBM); same locality and collector, 28.10.1960 (1 ♂ BPBM>HNHM); same locality and collector, 1960 (1 ♂ BPBM); same locality and collector, 15.10.1963, leg. A. M. R. Wegner (1 ♂ BPBM); same locality and collector, 21.4.1964 (1 ♀ BPBM>HNHM); same locality and collector, 23.4.1964 (1 ♂ BPBM); same locality and collector, 28.4.1967 (1 ♀ BPBM); "Amboina", 1859, leg. Doleschal (1 ♀ NHMW); West Papua (Irian Jaya): Sorong, 29.9.-6.10.1992, leg. B. Balázs (1 ♀ HNHM); Papua: Humboldt Bay District, Bewani Mts., 400 m, 7.1937, W. Stüber, B. M. 1938-177 (1 ♂ BMNH); Star Range, Sibil, 1260 m, at light, 27.4.1959, unknown collector, det. C. H. C. Lyal 1976 (1 ♂ RMNH>BMNH); same locality, 2.5.1959, unknown collector, det. C. H. C. Lyal 1976 (1 ♀ RMNH>BMNH); Biak Is.: Bodrick, Biok Schouten Eil, 16.6.1938, leg. L. J. Toxopeus, det. C. H. C. Lyal 1977 (1 ♂ BMNH); Base Biak, 21.7.1952, at light, L. D. Brongersma, B. M. 1980-63, det. C. H. C. Lyal 1977 (1 ♂ RMNH>BMNH).

Distribution: The species is restricted to Wallacea (apparently only East of the Weber line), in western New Guinea and in some of its surrounding islands (Biak Is.). Records from Admiralty Island (Distant 1899, Kirkaldy 1904, Kirkaldy 1909) pertain to *C. praslinia* (Guérin-Méneville, 1838) (Lyal 1979).
Indonesia: Maluku Isls.: Jilolo (Kirkaldy, 1909), Morotai!, Halmahera: "Halmaheira" (Stål, 1873), Obi!; Buru (Stål, 1866); Seram!; Ambon!; West Papua (Irian Jaya): Sorong!; Papua: Bewani Mts.!, Sibil!; Biak! Papua New Guinea: Fly River!

Discussion

1. The type material of *C. quadrinotata* var. *papuensis*

Distant (1899) defined three colour varieties of *C. quadrinotata* (now a junior synonym of *C. caesar*), and named them as var. a, b, c; these names are unavailable (ICZN 1999, Art. 11.9.1). The type locality of var. b was given as "New Guinea (Brit. Mus.)". Kirkaldy (1909) proposed the name var. *papuensis* for Distant's (1899) var. b. The type material of var. *papuensis* is therefore composed of the specimen(s) used by Distant (1899) for describing his var. b. Three specimens deposited in the BMNH were labelled by C. H. C. Lyal as potential syntypes; all of these were collected before 1899, but all of them have acquisition number after 1899, therefore we agree with Lyal that they are possibly syntypes but it is impossible to provide conclusive evidence about their type status.

2. The identity of *C. bipunctata*

Two syntypes of *C. bipunctata* were reexamined by Lis & Skórka (1996) who presented an illustration of the left paramere and the conjunctival processes of the phallus based on dissection of the single paralectotype. (More detailed illustrations of the genitalia of the lectotype are provided in figs. 4-9.) Inferring from their observations they transferred the species into *Notacalliphara*. The decision was made based on a set of morphological characters (cf. Lis & Skórka 1996: 47-48); these are listed and commented below (data on *Notacalliphara* spp. are based on reexamination of the type material of the two included species, *N. rostrata* (Distant, 1903) and *N. pseudofasciata* (Lyal, 1979):

(1) Absence of dorsal and ventral patches of short, stout setae on each side of caudal face of pygophore [= genital capsule]. – Reduced but distinct dorsolateral and ventrolateral setal patches are present in the examined lectotype of *C. bipunctata*: the dorsolateral patches are elongate, narrowly surround dorsal sinus of posterior aperture of genital capsule; ventrolateral patches reduced, present as a pair of small tufts. Setal patches are lacking in the two described members of *Notacalliphara*.
(2) Absence of ventral lip and presence of dorsal lip of pygophore [= genital capsule]. – The terms "dorsal lip" and "ventral lip" were extensively used by Lyal (1979) in descriptions of members of *Calliphara* and other genera, but without explanation. The term apparently was adopted from papers by McDonald (1961, 1963, 1966). After careful comparison of descriptions of McDonald (1961, 1963, 1966) and Lyal (1979) with the illustrations in their papers and with specimens of the taxa in concern we are still unable to recognize the dorsal and ventral "lips", and it seems that the ventral "lip" is merely a more or less raised, protuberance-like posterior portion of the infolding of the ventral rim, sometimes paired (cf. McDonald 1961: 177), sometimes not (cf. McDonald 1963: 24). Since the "lips" of different taxa where previous authors used this term are likely not homologous, furthermore the descriptions and illustrations of these structures are frequently controversial, we are convinced that it is better to discontinue using this term.
Because of the above inconsistencies it is difficult to evaluate this character in *C. bipunctata*. Lyal (1979) claimed that the ventral lip is present in several species of *Calliphara* (*C. praslinia* and

C. dimidiata species groups) whilst absent in others (*C. excellens* and *C. caesar* species groups). As a consequence the opinion of LIS & SKÓRKA (1996) that the absence of the ventral lip in *C. bipunctata* has genus level significance and supports its removal from *Calliphara* is apparently without any basis.

(3) Bifurcated paramere. – The general shape of the paramere of *C. bipunctata* is more or less similar to that of the other members of the genus; presence of a small process at base of crown has at most species level importance. On the other hand, the paramere strikingly differs from those of the two described species of *Notacalliphara*: paramere in the latter genus has a swollen stem and a finger-like crown with bifurcate apex.

(4) Shape of conjunctiva. – LIS & SKÓRKA (1996) stated that "the shape of conjunctiva" support removal of *C. bipunctata* from *Calliphara* and its placement into *Notacalliphara*, but they did not specify exactly which characters of the conjunctiva do they consider to support their proposed combination. The presence of three pairs of conjunctival processes (cp-I: long, sclerotized, unbranched; cp-II: long, membranous, distally sclerotized, branched; cp-III: largely sclerotized, frequently branched) in *C. bipunctata* does not differ from the condition found in all other species of *Calliphara* (cf. LYAL 1979), but it strongly contrasts with the condition found in *Notacalliphara* (cp-I: small, membranous or very thinly sclerotized; cp-II: long, membranous, distally sclerotized; cp-III: short, distally sclerotized) (cf. LYAL 1979).

Despite of the opinion of LIS & SKÓRKA (1996) characters of the exoskeleton and genitalia clearly support the placement of the species into *Calliphara*. Moreover, examination of the lectotype revealed no species level differences between *C. bipunctata* and *C. caesar*, therefore the following new subjective synonymy is proposed: *Calliphara caesar* (VOLLENHOVEN, 1863) = *C. bipunctata* LEHMANN, 1920, syn. nov.

3. The intraspecific variability of dorsal markings of *C. caesar*

The lectotype and paralectotype of *C. bipunctata* differ from typical specimens of *C. caesar* in lack of the posterior pair of discal patches of the scutellum. A single identically marked specimen from Ambon Island was seen (NHMW). Since typical specimens (disk of scutellum decorated with two pairs of dark patches) of *C. caesar* are common in Ambon Island there seems little support to recognize *C. bipunctata* as a geographic subspecies of *C. caesar*, and it is considered as a colour variety without taxonomic significance. Examination of further specimens of the metallic blue-green colour morph of *C. caesar* apparently restricted to Biak Island and clarifying its distribution might result in the recognition of this form as a geographic subspecies.

Summary

1. In contrary of the placement into *Notacalliphara* LYAL, 1979, proposed by LIS & SKÓRKA (1996) *Calliphara bipunctata* LEHMANN, 1920, must be placed into *Calliphara* GERMAR, 1839.
2. The species is a junior subjective synonym of *C. caesar* (VOLLENHOVEN, 1863).
3. Available evidence does not support recognition of *C. bipunctata* as a geographic subspecies of *C. caesar*.

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