

The Papuan *Chrysosoma lucigena* group (Diptera: Dolichopodidae: Sciapodinae)

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ABSTRACT. The *Chrysosoma lucigena* species group is revised and comprises 13 species, all from New Guinea and immediately adjacent islands: *C. lucigena* (Walker) and *C. splendidum* (Wulp), and 11 newly described species: *C. akrikense*, *C. baiyerense*, *C. betege*, *C. bitcoin*, *C. cuprevittatum*, *C. fumifemoratum*, *C. macalpinei*, *C. orokaindi*, *C. oromissim*, *C. tabubil*, and *C. watutense*. The *lucigena* group comprises species with dark maculated wings, long setae on the femur and tibia of leg I, and metallic green and bronze thoracic coloration. The total loss of anterior dorsocentral setae in both sexes of the *lucigena* group is discussed in the context of a possible source for higher-level taxonomic characters in Diptera.

Introduction

The Sciapodinae (Diptera: Dolichopodidae) are one of the more cohesive dolichopodid subfamilies, the majority of which are readily identified by the excavated vertex and the branched wing vein M_{1+2} . These small, metallic green flies with “sweptback” wings are frequently seen running on foliage in moist habitats, making them familiar by sight even to casual observers. The subfamily is abundant in collections from the tropics, and the fauna of the topographically complex New Guinea region is particularly rich, with many undescribed species.

The sciapodine genus *Chrysosoma* Guérin-Ménéville has a long and complex taxonomic history. The presence of an apical antennal arista was the traditional key character used to separate it from other genera of the Sciapodinae. However, examination of the large heterogeneous assemblage of species considered to be *Chrysosoma* revealed that the apical arista is a homoplastic character, and by itself is not a reliable character for generic definition (see discussion in Bickel, 1994). Like many other sciapodine genera, *Chrysosoma*

is not strongly defined, and may itself be a polyphyletic assemblage. However, it acts as a “holding genus” for some 220 valid species primarily from the humid tropics of the Old World and Oceania (Wikipedia contributors, 2022), and many more species await both collection and description.

Although *Chrysosoma* itself may not be monophyletic, distinct monophyletic species groups can be delimited within this complex genus. One such group is the Papuan *Chrysosoma lucigena* species group, strictly confined to New Guinea and adjacent islands (it is not known from New Britain, some 100 km distant from New Guinea). The type species, *C. lucigena*, was collected by Alfred Russel Wallace during his 1857 stay on the Aru Islands, and was described by Francis Walker, the well-known (if somewhat infamous) entomological taxonomist employed at the British Museum (Natural History). This and related species collected subsequently in New Guinea reveal the *lucigena* group to be among the most striking Papuan Diptera, with dark maculated wings, very long setae on leg I, and metallic blue-green thoraces, often with prominent bronze bands (Figs 1, 2, 11).

Keywords: Dolichopodidae; Sciapodinae; *Chrysosoma*; New Guinea; new species; taxonomy; taxonomic characters

ZooBank registration: urn:lsid:zoobank.org:pub:DDF0DD37-49D6-4C1D-988E-E6B5EF186DBC

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Received: 16 March 2022 **Accepted:** 11 May 2022 **Published:** 21 September 2022 (in print and online simultaneously)

Publisher: The Australian Museum, Sydney, Australia (a statutory authority of, and principally funded by, the NSW State Government)

Citation: Bickel, Daniel J., and John Martin. 2022. The Papuan *Chrysosoma lucigena* group (Diptera: Dolichopodidae: Sciapodinae).

Records of the Australian Museum 74(4): 103–129. <https://doi.org/10.3853/j.2201-4349.74.2022.1818>

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Figure 1. *Chrysosoma bitcoin* sp. nov., male: right lateral view. Papua New Guinea, Eastern Highlands Province, near Goroka. Photographer: Piotr Naskrecki.



Figure 2. *Chrysosoma bitcoin* sp. nov., male: anterior view. Papua New Guinea, Eastern Highlands Province, near Goroka. Photographer: Piotr Naskrecki.

Materials and methods

The repositories of material studied or cited in this revision use the following acronyms: *AMS*, Australian Museum, Sydney; *ANIC*, Australian National Insect Collection, CSIRO, Canberra; *BMNH*, The Natural History Museum, London; *BPBM*, Bernice Pauahi Bishop Museum, Honolulu; *MNHN*, Muséum national d'histoire naturelle, Paris; *QMB*, Queensland Museum, Brisbane; *RMNL*, Naturalis Biodiversity Center, Leiden; *SAM*, South Australian Museum, Adelaide; and *USNM*, National Museum of Natural History, Smithsonian Institution, Washington, D.C.

Species are defined primarily based on the male genitalia and male secondary sexual characters (MSSC). Keys are based on nongenital characters where possible, although accurate identification often requires male postabdominal characters. Since male genitalia are external in Sciapodinae, clearing the hypopygium is rarely necessary. Species descriptions are condensed to avoid unnecessary repetition. Photographs of pinned museum specimens were made with a Leica M205A photomontage system. The left lateral view of the hypopygium or male genital capsule is shown for most species. In describing the hypopygium, “dorsal” and “ventral” refer to morphological position prior to genitalic rotation and flexion. Thus, in figures showing a lateral view of the hypopygium, the top of the page is morphologically ventral, while the bottom is dorsal. Morphological terminology follows Cumming & Wood (2017).

Measurements were made on representative dry specimens. Body length of males is measured from the base of the antennae to the tip of the seventh abdominal segment. The position of features on elongate structures such as leg segments is given as a fraction of the total length, starting from the base. The relative lengths of the podomeres are representative ratios and not measurements, and they are given for each leg in the following formula and punctuation: trochanter + femur; tibia; tarsomere 1|2|3|4|5. The following abbreviations and terms are used: *FSSC*, female secondary sexual character(s), non-genitalic characters found only on female body; *MSSC*, male secondary sexual character(s), non-genitalic characters found only on male body; *I, II, III*: pro-, meso-, metathoracic legs; *C*, coxa; *T*, tibia; *F*, femur; *ac*, acrostichal setae; *ad*, anterodorsal; *av*, anteroventral; *dc*, dorsocentral setae; *dv*, dorsoventral; *pd*, posterodorsal; *pv*, posteroventral; *t*, tarsus; and t_{1-5} , tarsomeres 1 to 5.

Taxonomy

Genus *Chrysosoma* Guérin-Ménéville

Chrysosoma Guérin-Ménéville, 1831: pl. 20, fig. 6. Type species: *Chrysosoma fasciatum* Guérin-Ménéville, 1831 [= *Dolichopus aeneus* Fabricius, 1805], des. Enderlein (1912: 373).

Description. *Head.* Vertex strongly excavated in both sexes; strong postvertical seta present, in line with postocular series; and strong diverging ocellar setae present; frons usually with group of fine setae or with weak vertical seta in males, and strong vertical seta in females; face sometimes bulging in males (MSSC), flat in females; clypeus usually distinctly free from margin of eyes in male, adjacent or near eyes in female; scape short, cuplike; pedicel with corona of short seta and long dorsal and ventral setae; postpedicel in both sexes

usually elongate tapering isosceles triangular, symmetrical with distinctly apical arista, females occasionally with distinctly dorsal arista; arista usually long, about two thirds body length in males, about half body length in females; ventral postcranium with abundant white setae.

Thorax. Mesoscutum often metallic green-blue with matt brown or bronze stripes over ac band and laterally above notopleuron; ac developed as 3–5 strong pairs; male usually with two strong posterior dc and only weak hairlike dc anterior (MSSC) while female usually with 5 strong dc, although sometimes also with only posterior two dc present; 1 postalar seta, only 1 postsutural supra-alar seta, only 1 presutural intra-alar seta, 2 notopleural setae, 1 postpronotal seta, and 1 presutural supra-alar seta present; lateral scutellar setae vary in size from about 2/3 length of medians to weak hairs, or sometimes even lost; propleural seta absent.

Legs. Coxa I usually with long black distolateral setae; femur I usually with ventral setae in both sexes; tibia I usually with dorsal chaetotaxy, often species specific and sometimes sexually dimorphic; various modifications of male legs (MSSC) include: tarsomeres I or II somewhat swollen with pale ventral pile, ornamented with crocheted hairs, banded or flattened; male tibia III sometimes with swollen callus which bears posterior slitlike excavation.

Wing. Hyaline but sometimes with brown maculations; vein M bifurcate, M_1 usually in long gentle curve to apex, with M_2 straight; veins R_{4+5} and M_1 almost converging at apex; vein M_2 curved and reaching margin; crossvein dm-m usually sinuate, often strongly so, but sometimes externally convex or bowed.

Abdomen: Male tergum and sternum 7 both well developed; sternite 8 subtriangular and covering left lateral foramen; epandrium subrectangular to subtriangular; hypandrium with narrow left lateral arm, arising beyond hypandrium midlength and extending just beyond apex of hypandrial hood; phallus with dorsal angle; epandrial lobe with 2 strong apical bristles; surstylus usually with large ventral lobe and digitiform dorsal projection, although variously modified; male cercus usually forked with elongate distal and basiventral arms.

Remarks. *Chrysosoma* is a complex and rich Old World genus with many generic synonymies (see discussion in Bickel, 1994). As noted in the Introduction, the genus is possibly a polyphyletic assemblage. However, the Papuan *Chrysosoma lucigena* species group, treated here, is defined by two strong synapomorphies, the presence of long setae on the femur and tibia of leg I and the total loss of anterior dorsocentral setae (dc) in both sexes.

The *Chrysosoma lucigena* species group

Description. *Head.* Male with weak vertical seta on lateral slope of frons, female with strong vertical seta; face slightly bulging in males, flat in females; pedicel with long dorsal and ventral setae; postpedicel short and triangular with dorsoapical arista; arista elongate, about as long as two-thirds body length in males.

Thorax. Usually with underlying metallic blue-green colour; mesonotum often with matt brown or bronze stripes over ac band and laterally above notopleuron; 3 pairs strong ac present; both sexes with only two strong posterior dc present, without sexually dimorphic anterior dc setae or hairs; pleura metallic blue-green but often with bronze vertical

stripe from base of notopleuron across katepisternum (e.g., Figs 11, 13, 19); lateral scutellar seta present as weak hair or absent.

Legs. Coxa I with 4–5 strong black lateral setae and often with gap to 3 apicolateral setae, and with silvery pruinosity (e.g., Figs 2, 11), but not often apparent on dried specimens; coxa III often with group of 3–5 white lateral setae instead of single strong black lateral. Both sexes have (a) femur I with row of long black ventral setae, (b) femur I often with row of long anterior setae, (c) tibia I usually with row of dorsal setae, often short seta near base, and 2–3 very long spaced setae distally, (d) basitarsi on all three legs very long, only slightly shorter than their tibiae, and (e) tarsus of each leg with tarsomeres 2–5 relatively short; males with tibia II setation highly reduced, but more complex in females, where known.

Wing. With dark brown maculations, and the patterns are sexually dimorphic in some clades; crossvein dm-m strongly sinuous; external adventitious stub-vein sometimes present externally on crossvein dm-m, and sometimes also near the middle of vein M_1 after branching from vein M_2 .

Abdomen. Hypopygium, characteristic of many *Chrysosoma*: epandrium subtriangular; male cercus with short distal digitiform projection, and a basiventral projection which bear diagnostic branches and setae.

Remarks. The thirteen species of the *lucigena* group are confined to New Guinea and adjacent islands. Most species are known from random collection events, and not part of focused surveys. However, of the thirteen species treated here, six occur more or less sympatrically near the former Wau Ecology Institute, Morobe Province, the most intensively collected area for terrestrial arthropods in New Guinea, with more than 30 years of Malaise trapping over an elevational range of 800–2400 m. Undoubtedly more *lucigena* group species await discovery in topographically complex New Guinea, especially from the poorly collected western side, the Indonesian provinces of Papua and West Papua.

The species of the *Chrysosoma lucigena* group have long setae on femur and tibia I, usually similar in both sexes, and strongly maculated wings. There is much homoplasy within the Sciapodinae and these characters have emerged independently elsewhere. Other *Chrysosoma* species have developed similar long leg setae, sometimes on femur II as well, such as in *C. cinctitarse* (de Meijere) and *C. spiniferum* (Wulp) from Java and Sumatra, members of the *leucopogon* group. As well, the striking black and white maculation pattern of some male wings in the *lucigena* group (e.g., Fig. 11), is not unlike that of male *Heteropsilopus pulcherrimus* (Becker) from Sri Lanka, and *C. excellens* Parent from the Solomon Islands and New Guinea, but these two species have distinctly different genitalia and leg setation (see further discussion in Bickel, 1994).

Loss of anterior dorsocentral setae in the *lucigena* group, and possible origins for higher taxonomic characters in Diptera

The family Dolichopodidae in general are noted for their wide range of male secondary sexual characters (MSSC), the non-genitalic modifications on the male body that are absent on females, and which are assumed to enable conspecific mate recognition during courtship. Here male secondary sexual characters are the rich source of morphological innovation. These range from the relatively trivial (such as a curved leg seta or arisal flag), to major modifications and even bizarre “deformation” of legs, antennae and wings. In most cases these modifications are confined to males while females are unaffected and retain the generalized conservative facies of their taxon.

The Dolichopodidae generally have 4–6 strong thoracic dorsocentral setae (dc) decreasing in size anteriorly. This is the plesiomorphic condition, found in both sexes across most of the family. However, in genera of the tribe Sciapodini (subfamily Sciapodinae) males have only the two posterior dc strong, while the anterior dc are reduced to fine weak hairs (MSSC). In most cases, females retain the plesiomorphic condition and have all dc strong, and this is the case with most *Chrysosoma* species. Nevertheless, occasionally females of some species have the anterior dc reduced to fine hairs as well, so they are similar to males in that character state (see further discussion in Bickel, 1994). Therefore in at least some cases, what are typically male secondary sexual characters also occur in the female phenotype.

What is unusual in the *Chrysosoma lucigena* group (apart from the maculated wings and leg setation) is that both sexes have only the two posterior dorsocentral (dc) setae present, without any residual anterior setae or hairs (e.g., Figs 1, 7, 26, 34). How can this be explained? Possibly the loss of all anterior dorsocentral setae occurred first in males, initially as the normal anterior setae are expressed as fine hairs (found as a MSSC in males of most Sciapodini species), and secondarily as the total loss or non-expression of these hair-like anterior dorsocentrals. This loss then was incorporated into the female phenotype, and with subsequent radiation forming a clade where all members lacked anterior dorsocentrals in both sexes. It is apparent from this example that genes for expression of MSSC may not be confined to the male sex chromosome, but possibly occur on autosomal genes with sex-limited expression. This has been shown for *Idiomyia* (“Hawaiian *Drosophila*”). Carson & Lande (1984), while working on the inheritance of a row of cilia which occurred only in males of *I. silvestris* Perkins, demonstrated that character expression had a polygenic basis, 30% contributed by sexlinked genes, while genes from two autosomes accounted for the remaining 70%.

If a species has what was a male secondary sexual character fixed in its phenotype and it forms a stem group, it may prove to be diagnostic at a higher taxonomic level. At least some of the distinctive characters separating genera may have originated as a MSSC secondarily incorporated into the phenotype of both sexes. This may account for the seemingly “trivial” and “nonadaptive” diagnostic characters used in the higher taxonomy not only of the Dolichopodidae but other families of Diptera. Indeed, it is the very triviality of characters originating as MSSC which would make selection against them weak, and thus likely to be retained in descendants regardless of other strong morphological selection.

**List of species in the
Chrysosoma lucigena group**

The *Chrysosoma lucigena* group includes the following 13 valid species, all from New Guinea and adjacent islands:

- Chrysosoma akrikense* sp. nov.
- Chrysosoma baiyerense* sp. nov.
- Chrysosoma betege* sp. nov.
- Chrysosoma bitcoin* sp. nov.
- Chrysosoma cuprevittatum* sp. nov.
- Chrysosoma fumifemoratum* sp. nov.
- Chrysosoma lucigena* (Walker), 1858: 91 (*Psilopus*)
- Chrysosoma macalpinei* sp. nov.
- Chrysosoma orokaindi* sp. nov.
- Chrysosoma oromissim* sp. nov.
- Chrysosoma splendidum* (Wulp), 1868: 111 (*Psilopus*)
- Chrysosoma tabubil* sp. nov.
- Chrysosoma watutense* sp. nov.

Some species in the *lucigena* group can be divided into monophyletic assemblages based on shared characters.

Assemblage A. This assemblage includes *Chrysosoma lucigena* (Walker), *C. macalpinei* sp. nov., *C. oromissim* sp. nov., *C. splendidum* (Wulp), and *C. tabubil* sp. nov. Species have the following characters: (a) male wings with large areas of dark brown maculation with opaque white wing apices (Figs 3, 8, 11, 16, 21), while females have a distinctly different maculation pattern, with a brown band along the anterior margin, and along vein M₁ and crossvein dm-m, otherwise hyaline (e.g., Fig. 6); (b) cercus with well-developed basiventral cercal arm, bearing projections and setae (e.g., Figs 4, 9, 18, 20, 25).

Assemblage B. This assemblage includes *Chrysosoma akrikense* sp. nov., *C. bitcoin* sp. nov., *C. cuprevittatum* sp. nov., and *C. orokaindi* sp. nov. Species have the following characters: (a) male and female wings various, but with both dark brown maculation and hyaline areas (Figs 28, 31, 33, 36); (b) cercus with digitiform distal arm and short thumb-like basiventral arm (Figs 30, 35, 38, 41).

Assemblage C. This assemblage includes *Chrysosoma baiyerense* sp. nov. and *C. betege* sp. nov. Species have the following characters: (a) male wings large dark brown maculation and hyaline areas, and both vein M₁ and crossvein dm-m with adventitious external stub-vein (Fig. 43); (b) cercus with both distal and basiventral arms subequal in length (Fig. 44).

Key to males of the *Chrysosoma lucigena* species group

The following key separates males of the *Chrysosoma lucigena* group in the context of the Australasian Sciapodinae (also see Bickel, 1994; Bickel & Martin, 2020, 2021). Figures of females sometimes show features similar to that of males.

- 1 Vertex strongly excavated on either side of ocellar tubercle, or if weakly excavated, vein M often distinctly branched, with M₂ present at least as a fold on membrane; mesonotum short, about as wide as long; hypopygium exerted and distinctly pedunculate; posterior mesonotum never flattened subfamily Sciapodinae
- Vertex not excavated, vein M₂ usually absent; other characters various other Dolichopodidae..... 2
- 2 Vein M branched and vein M₂ present, even if as fold on membrane; if unbranched, then males with anterior dc setae as weak hairs; other features various 3
- Vein M unbranched but with gentle anterior bend beyond crossvein dm-m (vein M₂ totally absent, without fold or indication on membrane); all dc setae strong in both sexes *Mesorhaga* Schiner
- 3 Arista elongate and usually apical on triangular postpedicel (if female with distinctly dorsal arista, then tibia I with strong dorsal and ventral setae, and lateral scutellar setae strong), male arista sometimes with apical flag; crossvein dm-cu sinuous; tibia I often with long setae 4
- Arista usually distinctly dorsal on subrectangular postpedicel, and rarely longer than head width; tibial chaetotaxy often weak, especially on males; crossvein dm-cu usually straight; tibia I rarely with long setae other Sciapodinae

- 4 Lateral scutellar setae usually less than $\frac{1}{3}$ length of medians; male frons usually without abundant hairs; halter usually yellow; wing usually hyaline or with distinct brown maculation 5
- Lateral scutellar setae strong, about $\frac{2}{3}$ length of medians; male frons with dense abundant hairs; halter black in both sexes; wing smoky coloured *Krakatauia* Enderlein* (part)
- 5 Vertex and frons usually with pruinosity; male frons often with hairs on lateral slope; male scape rarely swollen and vase like; pedicel often with long ventral and dorsal setae; femur I and tibia I often with longer setae; coxa I without strong lateral spine like setae *Chrysosoma* Guérin-Ménéville 6
- Frons polished metallic blue green; male frons bare or with single weak vertical seta only; male scape often swollen and vase like; femur I and tibia I in both sexes usually without major setae; coxa I with either 3–7 strong lateral spine like setae (stronger in females than males), or coxa I with 3 strong black distolateral setae *Plagiozopelma* Enderlein*
- 6 Lateral scutellar setae reduced to weak hairs or lost; wing with brown maculation 7
- Lateral scutellar strong, at least $\frac{1}{3}$ length of median scutellar setae; wing various other *Chrysosoma*
- 7 Femur I with only weak ventral setae; male postpedicel allantoid (sausage shaped), more than three times as long as wide; abdomen longer than length of head + thorax; both sexes with at least some anterior dc setae, even if hairlike (Melanesia, Australia) (see Bickel & Martin, 2021) *aeneum* group
- Femur I of both sexes with long black ventral and often anterior setae, and usually with long black dorsal on tibia I; male postpedicel triangular, tapering; abdomen subequal to length of head + thorax; only two posterior dc present in both sexes (New Guinea) *lucigena* group 8
- 8 Wing with large areas of dark brown maculation, and with opaque white apical maculation (Figs 3, 8, 11, 12, 16, 21) [females, where known, with distinctly different wing maculation] 9
- Wing with some areas of dark brown maculation mostly along anterior margin, but with hyaline membrane otherwise, without apical opaque white areas (Figs 22, 28, 33, 36, 39, 43, 45) [females, where known, with similar wing maculation] 13
- 9 Tibia I without long dorsal setae, only short setae present; femur I without row of long anterior setae; cercus with elongate subequal distal and basiventral arms (Figs 16, 18) *C. macalpinei* sp. nov.
- Tibia I with long dorsal setae (Figs 5, 7, 13); femur I with row of long anterior setae; cercus various 10
- 10 Cercus forked, with distal arm digitiform, and basiventral arm curved, tapering and almost twice length of distal arm (Fig. 14); coxae and femora mostly brownish; (Figs 12–14) *C. tabubil* sp. nov.
- Cercus various, with distal and basiventral arms subequal or basiventral arm with complex projections, not tapering in lateral view; leg colour various 11
- 11 Tibia II with offset ad-pd setae near $\frac{1}{4}$, and otherwise with short vestiture; relatively small, wing length < 9.5 mm; (Figs 19–21) *C. oromissim* sp. nov.
- Tibia II with more complex setation, with short ad at $\frac{1}{8}$, ad-pd setal pair at $\frac{1}{4}$, and with additional ad setae; large, wing length > 11 mm 12

- 12 Wing with strong dark brown maculation extending to posterior margin, including upper calypter (Fig. 8); distal cercal projection elongate (Fig. 9); femur I mostly brown except basally yellow (Figs 7, 10, 11) *C. splendidum* (Wulp)
- Wing with strong dark brown maculation, but basal posterior margin including upper calypter only slightly clouded (Fig. 3); distal cercal projection short (Fig. 4); femur I mostly yellow (Figs 3, 5, 6) *C. lucigena* (Walker)
- 13 All femora basally yellow and mostly dark brown distally (Figs 22, 23); cercus is forked with two elongate digitiform arms, with basiventral arm extending beyond surstylus (Fig. 25); dm-m crossvein and centre of vein M₁ each with external adventitious stub-vein (Fig. 24) *C. fumifemoratum* sp. nov.
- Femora usually either mostly yellow or mostly brown; cercus with basiventral arm shorter, not extending beyond surstylus (e.g., Figs 30, 44); vein M₁ never with external stub-vein 14
- 14 Cercus with elongate distal arm and short basiventral projection (Figs 30, 35, 38, 41) 15
- Cercus forked with subequal distal and basiventral arms (Figs 44, 47, 51) 18
- 15 Thorax mostly yellow with only metallic blue-green reflections; tibia II mostly bare of major setae (Figs 36–42) *C. orokaindi* sp. nov.
- Thorax with underlying metallic blue-green coloration and strong bronze coloration over ac band and laterally over notopleuron; tibia II with more strongly developed setation 16
- 16 Small sized, wing length < 7.0 mm; femur I with 3 long black ventral setae, decreasing in size distally from base to ½, and without long anterior setae; coxa I with only white lateral setae and hairs along length, and with 3 long black apicolateral setae (Figs 33, 35) *C. cuprevittatum* sp. nov.
- Larger, wing length > 7.0 mm; femur I with 4–5 long black ventral setae and with long anterior setae; coxa I with only black lateral setae along length, in addition to 3 long black apicolateral setae 17
- 17 Femur I with 5 long black ventral setae, decreasing in size distally from base to ⅔, and with 5–6 long black anterior setae spaced from base to apex; tibia I with 3 long spaced dorsal setae; basitarsus I very long, almost as long as tibia I (Figs 1–2, 28–32) *C. bitcoin* sp. nov.
- Femur I with 4 long black ventral setae, and with 3 long anterior setae spaced from ⅓ to ¾; tibia I with short dorsal at ⅓ and two very long dorsal setae at ¼ and ⅔; basitarsus I distinctly shorter than tibia I (Figs 40–42) *C. akrikense* sp. nov.
- 18 Wing veins without adventitious external stub-vein; femur I with only short anterior setae; basiventral cercal arm with apical curved projections (Figs 48–51) *C. watutense* sp. nov.
- Both vein M₁ and crossvein dm-m with adventitious external stub-vein; femur I with long anterior setae; basiventral cercal arm with various projections 19
- 19 Femora mostly yellow but femora II and III infuscated distally; basiventral cercal arm long, medially bowed and tapering (Figs 43–44) *C. betege* sp. nov.
- Femora mostly brown but yellowish basally; inner cercal arm shorter, also bowed, but with group of 6–8 strong external setae (Figs 45–47) *C. baiyerense* sp. nov.

* See Bickel & Martin (2020).

Description of species in the *Chrysosoma lucigena* group

Chrysosoma lucigena (Walker)

Figs 3–6

Psilopus lucigena Walker, 1858: 91.

Psilopus extendens Walker, 1865: 111.

Agonosoma lucigena (Walker), in de Meijere (1910: 81).

Chrysosoma lucigena (Walker), in Becker (1922: 142).

Type material and synonymical notes. Walker described *Psilopus lucigena* based on a male from the Aru Islands (Indonesia: Maluku) (BMNH, examined) and *Psilopus extendens* on a female from New Guinea (Indonesia: Papua) (BMNH, examined). Both specimens were collected by Alfred Russell Wallace. De Meijere (1910) accurately illustrated the hypopygium of *P. lucigena* (as *Agonosoma lucigena*). Becker (1922) referred *P. lucigena* to *Chrysosoma*. Parent (1934), in his study of the BMNH Walker types, somewhat confusedly made *Chrysosoma splendidum* a junior synonym of both *P. extendens* and *P. lucigena* at different places in the same paper. Bickel & Dyte (1989), followed de Meijere (1910) in regarding *Chrysosoma lucigena* and *C. splendidum* as separate species, and placed *P. extendens* in synonymy with *C. lucigena*. The two Walker species represent male and female of the same species, and I have seen similar associated specimens in collections.

Additional material. INDONESIA: **Papua Province:** 1♂, Cyclops Mtns, Mt. Lina, 3,500 ft [c. 1060 m], moss forest, III.1936, L. E. Cheesman (BMNH); 1♂, ♀, Hollandia [=Jayapura], 22–28 XI.1944, D. G. Hall (USNM); 1♂, 1♀, Ayan, 60 km NE of Agata, 18–22.XII.1976, J. C. Gressitt (BPBM). PAPUA NEW GUINEA: **Central Province:** 1♂, Koitaki, nr Port Moresby, 5.XII.1921, E. O. Pockley; 1♂, Elenagora, 5.X.1921, 8.X.1921, E. O. Pockley; 10♂, 4♀, Eilago, nr Port Moresby, 500 m, 3.V.1981, J. W. Ismay (AMS); Sogeri, 31.V.1907, L. Wharton (ANIC); 1♂ Uberi, Kokoda Trail, 550 m, 26.III.1974, D. H. Colless (ANIC); 1♂, 85 km (as 50 miles) W of Port Moresby, no other data (ANIC); 1♂, Tapini, 800–1000 m, XI.1968, N. L. H. Krauss (BPBM). **Eastern Highlands Province:** 2♂, Gimi Valley, W of Okapa, 1450 m, 1.VI.1967, A. Samuelson; 1♂, Aiyura, 1800–1900 m, 6.I.1965, J. Sedlacek (BPBM). **Hela Province:** 1♂, Betege, 20 km NW of Koroba, 1600 m, 20.IX.1963, R. Straatman (BPBM). **Madang Province:** Butemu village, Finisterre Mtns, 4000 ft (c. 1510 m), X.1964, R. Pullen (ANIC); 1♂, Butemu, Finisterre Mtns, 4000 ft (c. 1510 m), 15–24.X.1964, M. E. Bachuus, Stn. No. 30 (BMNH); 2♀, Wanang 3, -5.2277° 145.0797°, 175 m, Malaise trap, 18.XI–2.XII.2012, D. J. Bickel (AMS); Wanuma, 600–700 m, VIII.1968, N. L. H. Krauss; 2♂, ♀, Simbai, 1600–1800 m, IX–X.1968, N. L. H. Krauss (BPBM). **Milne Bay Province:** 1♂, 2♀, Normanby I., Wamula, 29.XII.1988–3.I.1989, R. de Keyzer (AMS). **Morobe Province:** 3♂, 7♀, Upper Manki logging area, nr Bulolo, 1600 m, sticky trap, 9 & 23.III.1973, F. R. Wylie & P. Shanahan (AMS); 1♂, E of Oomsis forestry camp, 200–300m, canopy fog, 3–5.III.1988, A. Allison; 3♂, 1♀, Mindik, 1200–1600 m, IX.1968, N. L. H. Krauss; 1♂, Aseki, 1200 m, 13.IV.1974, J. L. Gressitt; 1♂, Wau, 1200 m, X.1971, J. Sedlacek (BPBM); 6♂, Tikeling, nr Buso River, 20

km E of Lae, lowland rainforest, 17.VII.1999, D. K. Yeates (ANIC). **Oro Province:** 1♂, ♀, Popondetta District, Buri, nr Sasambata, 30.X.1963, D. K. McAlpine (AMS). **Sandaun (West Sepik) Province:** 1♂, May River, Patrol Stn, 100 m, 30.V.1963, R. Straatmann (BPBM); 1♂, Feramin, 1450 m, 26.VIII.1963, light trap, R. Straatmann (BMBM). **Simbu Province:** ♀, Kundiawa, Chimbu River, 27.III.1964, D. H. Colless (ANIC). **Western Province:** 1♂, Kionga, Fly River, 6.VIII.1969, J. L. Gressitt & J. Sedlacek; 1♂, Archbold Lake, 760 m, 27.XI.1961, L. Quate (BPBM).

Description. Male: body length: 9.6–9.9 mm; wing: 11.2 × 3.6 mm (Figs 3, 5).

Head. Vertex and frons metallic blue-green; strong postvertical seta as dorsalmost postorbital setae, and strong diverging ocellar setae present; vertex well excavated; weak black vertical seta bent at right angle facing laterally on lateral frons (MSSC); face metallic coppery colour and covered with orientated silvery pruinosity; clypeus metallic green with dense silvery pruinosity, and distinctly narrowed and free from sides of eyes and apically pointed; palp yellowish with black apical seta; proboscis brownish; scape and pedicel brown; postpedicel yellow basally and brown distally; scape short, cuplike; pedicel with corona of short setae and strong dorsal and ventral setae; postpedicel tapering triangular; arista dorsoapical, and about two-thirds body length; ventral postcranium with abundant white setae.

Thorax. Mesonotum mostly metallic blue-green with little pruinosity, but with wide coppery brown vittae across ac band from anterior mesonotal slope to anterior margin of scutellum, and between of dc row and dorsal edge of notopleuron; scutellum metallic green; pleura brown with metallic green reflections and grey pruinosity, and with bronze vertical stripe from base of notopleuron across katepisternum; setae black; 3 pairs long ac present; only two strong posterior dc present, without anterior dc setae or hairs; median scutellar seta strong, lateral scutellar seta as weak whitish hair.

Legs. CI and trochanter I and all femora mostly yellow; coxae and trochanters II and III dark brown; TI yellow basally becoming infuscated distally and tarsus I brownish; tibiae and tarsomeres II and III mostly yellowish; CI with 4–5 long spaced lateral setae to ½, with gap and 3 long black apicolateral setae; CII with some sparse white anterior hairs; CIII with 3 white lateral setae near ⅓. I: 12.3; 12.4; 11.2|2.0|1.8|1.2|0.8; FI with row of 7–8 black ventral setae, decreasing in size distally and with fine white ventral hairs, with row 7–8 long black anterior setae from ⅛ to ⅞; TI with four very long black dorsal setae at ⅛ (short), ¼, ⅓, and ⅔, otherwise bare; It₁ very long, only slightly shorter than TI, and with short ventral near base; It_{2–5} each relatively short. II: 13.3; 19.8; 16.8|2.7|1.8|0.8|0.6; FII bare of major setae; TII with short ad at ⅛, ad-pd setal pair at ¼, with ad stronger than pd, and short ad seta at ⅓ and ⅔; weak pd seta at ⅛, 2 short ventral setae, and with subapical corona of ad, av, ventral (strong) and pd setae; IIt₁ elongate and covered with short vestiture. III: 14.6; 24.6; 14.2|3.4|2.0|1.0|0.8; FIII bare of major setae; TIII with strong ad seta near ⅓, and with 9–10 spaced short dorsal setae along length; IIIt with bare of major setae.

Wing. Membrane and calypter mostly dark smoky brown, but with distal third mostly opaque white, and basal posterior membrane including upper calypter almost hyaline, or



Figures 3–6. *Chrysosoma lucigena* (Walker): (3) male habitus, left lateral view; (4) male postabdomen, left lateral view; (5) male habitus, anterior view; and (6) female habitus, left lateral view.

slightly infuscated; dm-m strongly sinuous; lower calypter brownish with fan of white setae; halter elongate, brown.

Abdomen. Tergites 1–5 metallic green with bronze reflections, with anterior half and posterior fifth of each tergite with matt brown bands across tergite overlap; tergites 2–5 with long black setae near distal margins and with short black vestiture; segments 6–8 dark brown with short black vestiture; hypopygium (Fig. 4) entirely dark brown with yellowish cercus; epandrium subtriangular; hypandrial arm arising near midlength, and hypandrial hood with irregular dorsal margin; 2 epandrial setae present; epandrial lobe with strong apical bristle and shorter subapical bristle; surstylus narrow and apically tapering with strong apical setae; cercus forked, with subtriangular distal arm and with elongate basiventral arm tapering to spine like apex, and with setae as figured.

Female (Fig. 6). Similar to male except as noted: wing length 7.5 mm; frons with strong black vertical seta, without the weak bend; thorax with similar coloration, but coppery vittae not as intensely developed across ac band and dorsal notopleuron; also with only two strong posterior dc present, without anterior dc setae or hairs; TII with ad-pd setal pair at

$\frac{1}{5}$ (ad stronger), ad setae at $\frac{1}{2}$, and $\frac{3}{4}$, pd seta at $\frac{2}{5}$, and ventral seta at $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{2}{3}$, and with circlet of subapical setae; wing membrane dark brown along anterior margin extending about halfway into cell r_{4+5} , and reaching to apex, and extending posteriad as brown cloud along M_1 , and along crossvein dm-m; posterior half of cell r_4 , membrane in cell m_2 both distad and basad of crossvein dm-m, and membrane posteriad of cell m_4 hyaline; wing without opaque white areas.

Remarks. *Chrysosoma lucigena* is widespread and common on the New Guinea mainland and offshore islands, and is known from coastal areas to elevations of some 1900 m. Both males and female have similar leg setation and coloration, but strikingly different in patterns of wing maculation (compare Figs 3 and 6). There is some size differences among specimens, but overall wing maculation, setation and male hypopygium are similar.

Chrysosoma lucigena (Walker) (Figs 3–6) and *C. splendidum* (Wulp) (Figs 7–10, 11), are two superficially similar and commonly collected species that have generated much attention. They are widely sympatric and show some intraspecific variation in size, leg coloration, development of mesonotal coppery bands, cercal structure and intensity

of wing maculation. This has generated extensive and somewhat confused discussion in the taxonomic literature [Walker (1858, 1865); Wulp (1868); de Meijere (1906, 1910, 1913, 1915); Edwards (1915); Becker (1922) and Parent (1934, 1939, 1941)] which has been compounded by inadequate comparative material, reliance on often rudimentary or inaccurate descriptions, and lack of access to types. After studying large recent collections, reviewing the literature, and viewing the types, I have separated males of the two species as noted in the text and the key.

Chrysosoma splendidum (Wulp)

Figs 7–10, 11

Psilopus splendidus Wulp, 1868: 111.

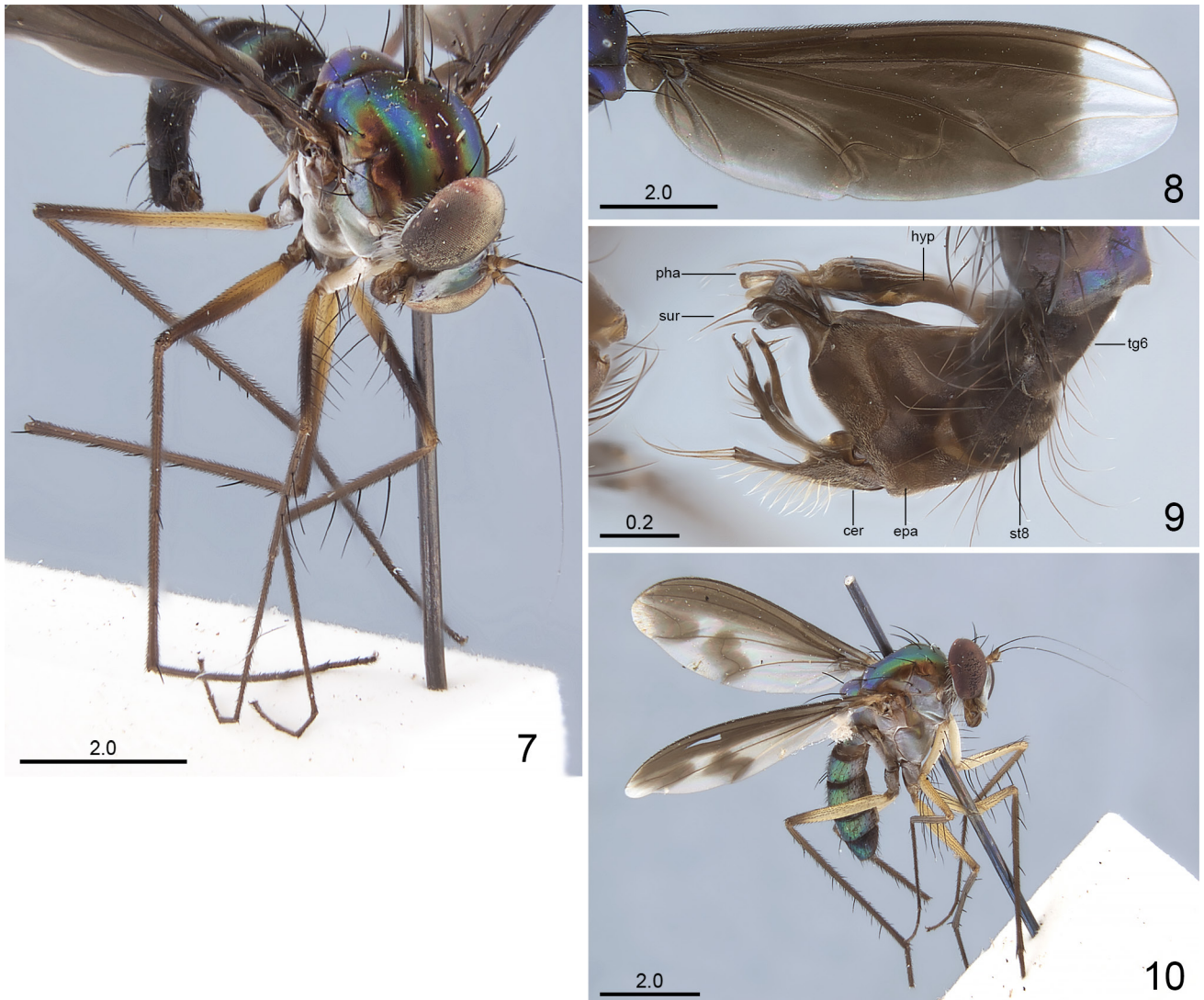
Agonosoma signatipenne de Meijere, 1906: 83.

Chrysosoma splendidum (Wulp), in Becker (1922: 143).

Type material and synonymical notes. Wulp (1868) described *Psilopus splendidus* based on a male from New Guinea (Indonesia: Papua) (RMNL examined). De Meijere (1906) distinguished it from Walker's closely related *P.*

lucigena, and in the same paper described *Agonosoma signatipenne* (RMNL, examined) from a female, noting its similarity to Walker's *P. extendens* except for absence of coppery mesonotal bands. De Meijere (1913) placed his *A. signatipenne* in synonymy with *P. splendidus*. As noted previously, Parent incorrectly placed *Chrysosoma splendidum* in synonymy with *C. lucigena*. Becker (1922) referred *P. splendidus* to the genus *Chrysosoma*.

Additional material. PAPUA NEW GUINEA: **Central Province:** 1♂, Vesilogo, near Songeri, no other data (AMS). **East Sepik Province:** 2♂, 2♀, Bainyik, 20.XII.1963; 1♂, Kuminibus, nr Maprik, 17.XII.1963; 1♂, Yamil, nr. Maprik, 16.XII.1963; 1♂, Imbia, nr Maprik, 18.XII.1963, (all D. K. McAlpine, AMS); 1♂, Pagwi, Sepik River, 5.III.1964, D. H. Colless (ANIC). **Sandaun Province:** 1♂, Torricelli Mtns, 200–1000 ft (60–300 m) I.1939, L. E. Cheesman (SAM); 3♂, 4♀, Krisa, nr Vanimo, IV.1939, L. E. Cheesman (SAM); 1♂, 2♀, Torricelli Mtns: 22 km south of Paup, 510 m, I.1939 & 1♂, Akimbo River, 510 m, L. E. Cheesman (BMNH); 1♂, Somoro, 1000–1100 m, 11.V.1975, J. L. Gressitt (BPBM). **Southern Highlands Province:** 1♂, Mt. Bosavi, 900 m, 11.V.1973, J. L. Gressitt (BPBM). **Western Highlands**



Figures 7–10. *Chrysosoma splendidum* (Wulp): (7) male habitus, right anterior; (8) male wing, dorsal view; (9) male postabdomen, left lateral view; and (10) female habitus, right lateral view. Abbreviations: *cer*, cercus; *epan*, epandrium; *hyp*, hypandrium; *pha*, phallus; *st8*, sternite 8; *sur*, surstylus; and *tg6*, tergite 6.



Figure 11. *Chrysosoma splendidum* (Wulp): (11) male habitus, left anterior view. [Locale and photographer unknown].

Province: 1♂, 50 km N of Mt Hagen, VI.1973, R. Lossin (AMS). **Western Province:** 1♂, Star Mtns, Camp 1, 5°13'S 141°14'E, 950–1200 m, II–III.2013, yellow pans, C. Muller (AMS).

Description. Male: body length 9.7–9.8 mm; wing: 11.2 × 3.6 mm (Figs 7, 11).

Head. Vertex and frons metallic blue-green; weak black vertical seta laterally on lateral frons (MSSC); face metallic coppery colour and covered with orientated silvery pruinosity; weak black vertical seta bent at right angle on lateral frons (MSSC); clypeus metallic green with dense silvery pruinosity, and distinctly narrowed and free from sides of eyes and broadly apically pointed; palp yellowish with black apical seta; proboscis brownish; antenna mostly yellow but postpedicel yellow basally and brown distally.

Thorax. Mesonotum mostly metallic blue-green with little pruinosity, but with coppery brown vittae across ac band from anterior mesonotal slope to anterior margin of scutellum, and between dc row and dorsal margin of notopleuron anteriorad from pa seta; scutellum metallic blue-green; pleura metallic green with dense grey pruinosity, and with bronze vertical stripe from base of notopleuron across katapisternum (Fig. 11); setae black; 3 pairs long ac present; only two strong posterior dc present, without anterior dc setae or hairs; median scutellar seta strong, lateral scutellar seta as weak whitish hair.

Legs. CI and trochanter I yellow; CII and CIII and their trochanters dark brown; FI and FII yellow in basal quarter, brown distally; FIII yellow along basal two-thirds and brown

distally; TI yellowish, TII and TIII brownish; tarsi mostly brown; CI with 4 long black spaced lateral setae and 3 long black apicolateral setae; CII with some sparse white anterior hairs; CIII with 4 white lateral hairlike setae near $\frac{1}{3}$. I: 11.0; 11.1; 10.4|1.8|1.4|1.0|0.6; FI with row of 7–8 black ventral setae, decreasing in size distally to $\frac{3}{4}$, and with fine white ventral hairs, with row 7–8 long black anterior setae from $\frac{1}{8}$ to $\frac{7}{8}$; TI with four very long black dorsal setae at $\frac{1}{8}$ (short), $\frac{1}{4}$, $\frac{2}{5}$, and $\frac{2}{3}$, otherwise bare; It₁ very long and with short ventral seta near base; It₂₋₅ each relatively short. II: 12.7; 19.6; 13.7|2.6|1.8|1.0|0.6; FII bare of major setae; TII with short ad seta at $\frac{1}{8}$, ad-pd setal pairs at $\frac{1}{4}$, with ad stronger than pd, and short ad seta at $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$; weak pd seta at $\frac{1}{8}$, and with subapical corona of ad, av, ventral (strong) and pd setae; IIt₁ elongate. III: 13.4; 21.7; 11.4|3.2|1.8|1.0|0.8; FIII bare of major setae; TIII with strong ad seta near $\frac{1}{8}$, and with 9–10 spaced short dorsal setae along length; IIIIt with ventral seta at base.

Wing (Fig. 8). Distal third mostly opaque white, otherwise membrane and upper calypter mostly dark smoky brown, but with basal posterior margin almost hyaline; lower calypter brownish with fan of white setae; halter elongate with yellowish stalk and brown club.

Abdomen. Tergites 1–5 metallic green with bronze reflections, with anterior half and posterior fifth of each tergite with matt brown bands across tergite overlap; tergites 2–5 with long black setae near distal margins and with short black vestiture; segments 6–8 dark brown with short black vestiture; sternite 8 subtriangular and covering left lateral

foramen; hypopygium (Fig. 9) entirely dark brown with slightly more yellowish cercus; epandrium subtriangular; hypandrial arm arising near midlength, and hypandrial hood with irregular dorsal margin; 2 epandrial setae present; epandrial lobe with strong apical bristle and shorter subapical bristle; surstylus narrow and apically tapering with strong apical setae; cercus forked, with digitiform distal projection and with elongate basiventral arm tapering to spine like apex, and with setae as figured.

Female (Fig. 10). Similar to male except as noted: wing length 7.8 mm; frons with strong black vertical seta, without bent seta; thorax mostly metallic green, but with distinct bronze vittae across ac band and dorsad of notopleuron; coxa I and legs mostly yellow, but FIII infuscated apically, and distal tarsomeres infuscated; TII with ad-pd setal pair at $\frac{1}{5}$ (ad stronger), ad setae at $\frac{1}{2}$, and $\frac{3}{4}$, pd seta at $\frac{2}{5}$, and ventral seta at $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{5}$, and with circlet of subapical setae; wing membrane dark brown along anterior margin extending about halfway into cell r_4 , and reaching almost to apex, and extending posteriad as brown cloud along M_1 , and along crossvein dm-m; posterior half of cell r_{4+5} , membrane in cell m_2 both distad and basad of crossvein dm-m, and membrane posteriad of cell m_4 hyaline.

Remarks. *Chrysosoma splendidum* is widespread on the New Guinea mainland, from coastal lowlands to elevations near 1900 m. It is a striking species as shown in Fig. 11. Both males and females have similar leg setation but differ in leg coloration and wing maculation pattern (cf. Figs 8 and 10), and females are distinctly smaller in size. Also see “Remarks” under *C. lucigena*, above.

Chrysosoma tabubil sp. nov. Bickel

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Figs 12–15

Type material. PAPUA NEW GUINEA: **Western Province:** holotype ♂, Tabubil, 5.307°S 141.251°E, 365 m, 4.II.2009, S. McEvey, McE27403 (AMS K.584237). Paratypes: 6♂♂, 1♀, Tabubil, 5°15'S 141°13'E, 650 m, 23–24.XI.1996, M. S. Moulds (AMS); 1♂, SE slope of Mt Arik (= Ian), NW of Tabubil, 5°10'S 141°09'E, 1625 m, 21–22.XI.1996, M. S. Moulds (AMS).

Additional material. PAPUA NEW GUINEA: **Chimbu Province:** 2♂, Crater Mtn. Biol. Res. Sta., 19–21.VIII.1995, G. N. Dodson (QMB).

Description. Male: body length 7.9–8.3 mm; wing: 9.4–9.8 × 3.2 mm (Figs 12, 13); similar to *C. lucigena* except as noted.

Head. Vertex and frons metallic blue-green; weak black vertical seta on lateral frons; face metallic coppery colour and covered with orientated silvery pruinosity; clypeus metallic green with dense silvery pruinosity, and free from sides of eyes and apically tapered; palp brown with black apical seta; proboscis brown; antenna mostly dark brown but postpedicel yellowish at very base.

Thorax. Mesonotum mostly dark metallic blue-green with little pruinosity, with coppery brown coloration faintly on anterior ac band, and more strongly between dc row and dorsal margin of notopleuron anterior from pa seta; scutellum

metallic blue; pleura metallic blue-green with grey pruinosity but with bronze vertical stripe from base of notopleuron across katepisternum; setae black; 3 pairs long ac present; only two strong posterior dc present, without anterior dc setae or hairs; median scutellar seta strong, lateral scutellar seta as weak hair.

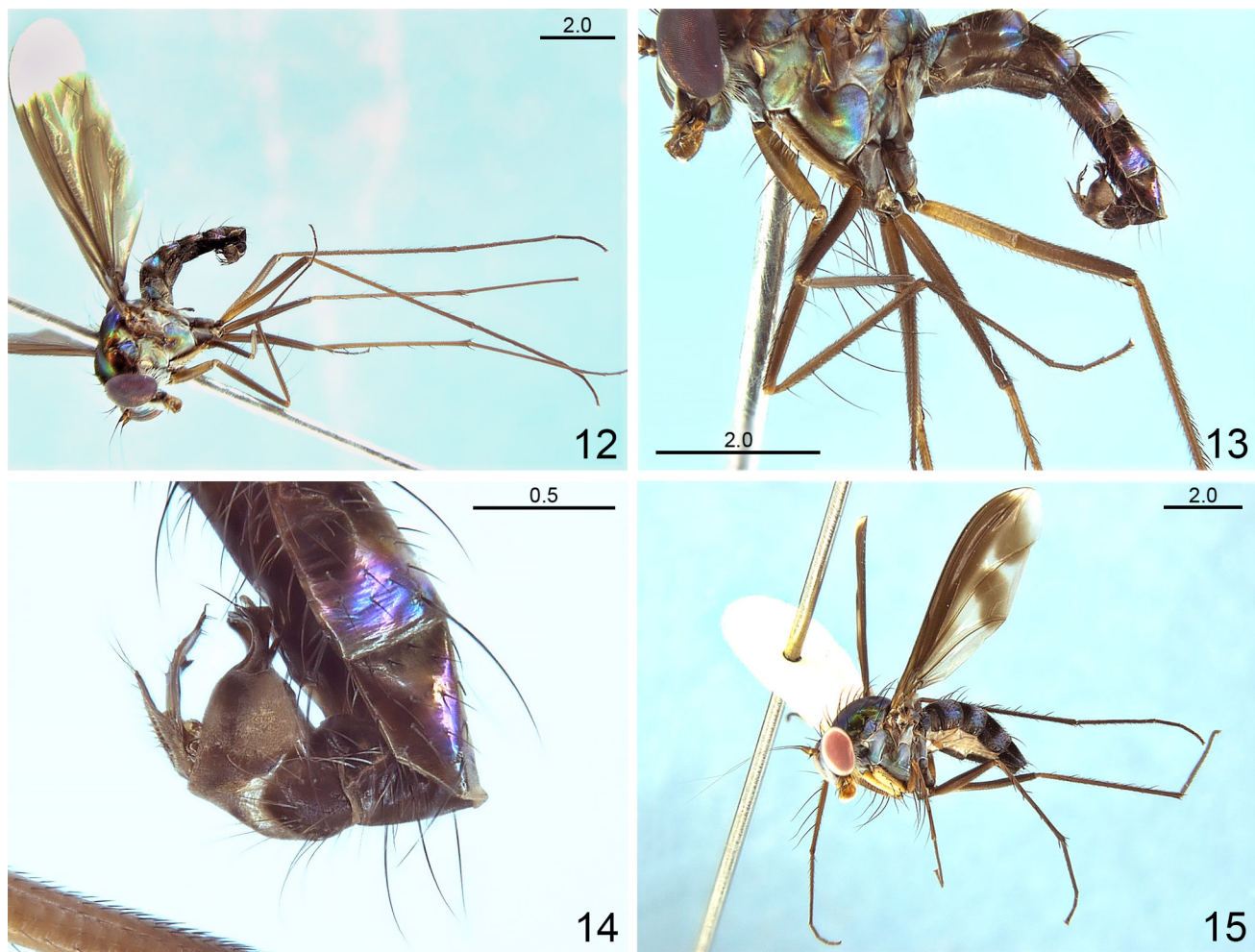
Legs (Fig. 13). Coxa I, and remainder of legs mostly brownish, although basal third of FIII yellowish (see Remarks, below); coxae and trochanters II and III dark brown; CI with 4–5 long spaced lateral setae to $\frac{1}{2}$, with gap and 3 long black apicolateral setae; CII with some sparse white anterior hairs; CIII with 2–3 white lateral setae near $\frac{1}{3}$. I: 9.5; 10.0; 9.0|1.9|1.4|0.8|0.5; FI with row of 5 long black ventral setae, decreasing in size distally from base to $\frac{2}{3}$ and with fine white ventral hairs, and with row 7–8 long black anterior setae from $\frac{1}{8}$ to $\frac{7}{8}$, with basal two shorter and four longest setae from $\frac{1}{3}$ to $\frac{3}{4}$; TI with four black dorsal setae at $\frac{1}{8}$ (short), $\frac{1}{4}$, $\frac{2}{5}$, and $\frac{3}{5}$ (all very long), otherwise bare; It_1 very long, only slightly shorter than TI, and with short ventral seta and some short dorsal setae near base; It_{2-5} each relatively short. II: 10.7; 16.7; 13.3|2.3|1.5|0.7|0.6; FII bare of major setae; TII with short ad-pd setal pair at $\frac{1}{8}$ with ad stronger than pd, ad setae at $\frac{1}{5}$, $\frac{1}{2}$, and $\frac{4}{5}$; weak pd seta at $\frac{1}{5}$, 2 short ventral setae at $\frac{1}{3}$ and $\frac{3}{5}$, and with subapical corona of ad, av, ventral (strong) and pd setae; II_t1 elongate and covered with short vestiture. III: 12.5; 20.7; 10.6|2.7|1.8|1.0|0.6; FIII bare of major setae; TIII with strong ad seta near $\frac{1}{6}$, and with 9–10 spaced short dorsal setae along length; III_t1 with short ventral seta near base.

Wing. Membrane and upper calypter almost entire dark smoky brown, but with apical fifth opaque white; lower calypter brownish with fan of dark brown setae; halter elongate, brown.

Abdomen. Tergites 1–5 metallic green with bronze reflections, with anterior half and posterior fifth of each tergite with matt brown bands across tergite overlap; tergites 2–5 with long black setae near distal margins and with short black vestiture; segments 6–8 dark brown with short black vestiture; hypopygium (Fig. 14) entirely dark brown; epandrium subtriangular; 2 epandrial setae present; epandrial lobe with strong apical bristle and shorter subapical bristle; surstylus expanded and clavate distally with dorsal curved digitiform projection, and with subapical lateral pedunculate seta; cercus forked, with distal projection elongate and digitiform with apical seta, and with elongate narrow outer basiventral arm reaching almost to surstylus, with curved apex, pair internal subapical setae, and with median U-shaped projection near mid-length bearing apical seta.

Female (Fig. 15). Similar to male except as noted: wing length 6.7 mm; frons with strong black vertical seta, without the weak bent; thorax also mostly metallic blue-green and also with only two strong posterior dc present, without anterior dc setae or hairs; TII with ad seta at $\frac{1}{10}$, $\frac{1}{5}$ (strong), $\frac{1}{3}$, $\frac{3}{5}$ and $\frac{3}{4}$, pd seta at $\frac{1}{6}$, $\frac{2}{5}$, ventral seta at $\frac{2}{5}$ and $\frac{3}{4}$, and circlet of subapical setae; wing membrane dark brown along anterior margin extending about halfway into cell r_{4+5} , and reaching to apex, and extending posteriad as brown cloud along M_1 , and along crossvein dm-m; posterior half of cell r_{4+5} , membrane in cell m_2 both distad and basad of crossvein dm-m, and membrane posteriad of cell m_4 hyaline; wing without opaque white areas.

Remarks. *Chrysosoma tabubil* is known from the Tabubil



Figures 12–15. *Chrysosoma tabubil* sp. nov.: (12) male habitus, left lateral view; (13) male thorax, legs and abdomen, left lateral view; (14) male postabdomen, left lateral view; and (15) female habitus, left lateral view.

region near Ok Tedi Mine in Western Province, and also Chimbu Province, Papua New Guinea. The legs show varying degrees of infuscation among specimens, with most specimens having coxa I brownish and femora and tibiae mostly brownish, but some specimens have coxa I yellow and legs more yellowish. However, the hypopygia and leg setation are similar in all cases and I regard the specimens as conspecific. Males and females differ distinctly in wing maculation patterns and females are smaller in size (cf. Figs 12, 15).

Etymology. The specific epithet “*tabubil*” is an indigenous place name and should be regarded as a noun in apposition.

Chrysosoma macalpinei sp. nov. Bickel

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Figs 16–18

Type material. PAPUA NEW GUINEA: **Central Province:** holotype ♂, Woitape, Wharton Range, 11.X.1963, D. K. McAlpine (AMS K.584327). Paratypes: 2 ♀♀, same data as holotype (AMS); 1 ♀, same data, but 10.X.1963 (AMS).

Additional material. PAPUA NEW GUINEA: **Central Province:** 2 ♂♂, “942 Fame-Mondo Rd., 1/1/18” (AMS). **Morobe Province:** 1 ♂, Mt Missim, S side, 2000m, 13.VI.1964, pyrethrum fog of *Lithocarpus* sp., W. C. Gagne (BPBM); 1 ♂, Garaina, 800 m, 15.I.1968, J. & M. Sedlacek (BPBM).

Description. Male: body length 6.7–6.9 mm; wing: 8.6 × 2.9 mm (Fig. 16).

Head. Vertex and frons metallic blue-green; weak black vertical bent seta on lateral frons (MSSC); face and clypeus metallic green with dense silvery pruinosity; clypeus distinctly narrowed and free from sides of eyes; palp pale yellow with black apical setae; proboscis yellowish; antenna mostly yellow.

Thorax. Mesonotum mostly metallic blue-green with little pruinosity, and with bronze coloration laterad of dc row and dorsal margin of notopleuron; pleura metallic blue-green with grey pruinosity but with bronze vertical stripe from base of notopleuron across katapisternum; setae black; 3 pairs long ac present; only two strong posterior dc present, without anterior dc setae or hairs; median scutellar seta strong, lateral scutellar seta about one third length of median.

Legs. CI, all trochanters and remainder of legs yellow except femoral “knees” and distal tarsomeres infuscated; CII and CIII dark brown; CI with 3 long spaced lateral setae

to $\frac{1}{2}$, with gap and 3 long black apicolateral setae; CII with strong black anterolateral seta; CIII with white lateral hairs and two longer white setae. I: 9.1; 9.0; 8.0|2.1|1.6|0.8|0.6; FI with 5 long black ventral setae decreasing in size distally, from $\frac{1}{6}$ to $\frac{2}{3}$, and without row of anterior setae, and with black subapical pv seta; TI with short spaced dorsal and ventral seta along length, but without long outstanding setae. II: 9.5; 14.9; 11.0|2.4|1.8|1.0|0.8; FII bare of major setae, but with short subapical pv seta; TII with strong ad seta at $\frac{1}{4}$, and with subapical corona of ad, av, ventral and pd setae. III: 12.4; 20.9; 8.5|3.0|1.9|1.0|0.7; TIII with short spaced dorsal setae along length. FIII bare of major setae; TIII with short ad seta near $\frac{1}{5}$, and with 8–9 spaced short dorsal setae along length; III_t bare of major setae.

Wing. Mostly dark smoky brown, except for white opaque wing apex (distal tenth) and white opaque posterior half of cell r_4 to margin; dm-m strongly sinuous, sometimes with external adventitious stub-vein; upper calypter dark brown; lower calypter yellow with dark brown rim, and with fan of brown setae; halter yellowish with brown club.

Abdomen. Tergites 1–5 metallic blue with violet reflections with matt brown bands at tergal overlap and with slivery pruinosity laterally; terga with long black setae along distal margins and with short black vestiture; segments 6–8 dark brown with short black vestiture; lateral tergites and sternites with white hairs; hypopygium (Fig. 18) dark brown with yellowish cercus; epandrium subtriangular; hypandrial arm arising near midlength, and hypandrial hood with irregular dorsal margin; 2 epandrial setae present; epandrial lobe with strong apical bristle and shorter subapical bristle; surstylus narrow and apically tapering with strong apical setae; cercus basally forked, with elongate digitiform distal arm with long setae, and subequal in length to basiventral arm which tapering to point and with some apical setae.

Female (Fig. 17). Similar to male except as noted: wing length 7.3 mm; frons with single black vertical seta only, without weak black bent seta; clypeus almost adjacent to sides of eyes; also only two strong posterior dc present, without anterior dc setae or hairs; leg colour and setation similar; TI with 3 strong dorsal setae, at $\frac{1}{5}$ (short), $\frac{1}{3}$ and $\frac{2}{3}$ (both long); TII with offset ad-pd setal pair at $\frac{1}{4}$ (ad seta stronger), pd seta at $\frac{1}{2}$, and ventral seta at $\frac{1}{2}$ and $\frac{3}{4}$, and with subapical circlet of setae; crossvein dm-m without any stub-vein; wing membrane dark brown along anterior margin extending about halfway into cell r_{4+5} , and reaching to apex, and extending posteriad as brown cloud along M_1 , and along crossvein dm-m; posterior half of cell r_{4+5} , membrane in cell m_2 both distad and basad of crossvein dm-m, and membrane posteriad of cell m_4 hyaline; wing without opaque white areas.

Remarks. *Chrysosoma macalpinei* is known from various mid-elevational localities in the Central and Morobe Provinces, Papua New Guinea. Males of this species have tibia I bare, without the long setae so characteristic of most *lucigena* group members, while females have three strong dorsal setae on TI. The male opaque white wing apex is relatively small in extent. The male hypopygium is distinctive, with both the distal cercal arm and basiventral arm elongate and subequal.

Etymology. This species is named after the eminent Australian Museum dipterist David McAlpine, who collected the type series.

Chrysosoma oromissim sp. nov. Bickel

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Figs 19–21

Type material. PAPUA NEW GUINEA: **Morobe Province:** holotype ♂, Mt Missim, 7°15'S 146°48'E, 1500–1800 m, 7.I.1970, J. & M. Sedlacek (BPBM, BPBMNT 0000081242). Paratypes: 10♂♂, same data as holotype (BPBM).

Additional material. PAPUA NEW GUINEA: **Morobe Province:** 2♂, Wau, 1200 m, X.1971, J. Sedlacek (BPBM).

Description. Male: body length 7.5 mm; wing: 9.2 × 2.7 mm (Fig. 19).

Head. Vertex and frons metallic blue-green; weak black vertical seta on lateral frons (MSSC); face metallic coppery colour and covered with orientated silvery pruinosity; clypeus metallic green with dense silvery pruinosity, and distinctly narrowed and free from sides of eyes; palp yellowish with black apical seta; proboscis yellowish; scape and pedicel brown; postpedicel yellow basally and brown distally; antenna mostly yellow.

Thorax. Mesonotum mostly metallic blue-green with little pruinosity; pleura metallic blue-green with thin layer of grey pruinosity, and with bronze vertical stripe from base of notopleuron across katapisternum; setae black; only 3 pairs long ac present; only two strong posterior dc present, without anterior dc setae or hairs; median scutellar seta strong, lateral scutellar seta weak, about one third length of median.

Legs. CI, all femora, tibiae and tarsomeres I and II mostly yellow; CII and CIII and all trochanters brown; tarsus III yellowish; CI with 4–5 long spaced lateral setae to $\frac{1}{2}$, with gap and 2 long black apicolateral setae; CII with some sparse white anterior hairs; CIII with 2 white lateral setae near $\frac{1}{3}$. I: 12.0; 13.2; 11.2|2.6|2.0|1.2|1.0; FI with 5–6 long black ventral setae from base to $\frac{2}{3}$, and slightly decreasing in size distally, and with row of 7–8 long anterior setae from $\frac{2}{3}$ to $\frac{1}{5}$, and with white ventral hairs distally, and short black subapical seta; TI with 3 dorsal setae, increasing in size distally at $\frac{1}{8}$, and $\frac{1}{3}$ and $\frac{2}{3}$, and with some short scattered ventral setae along length; It, shorter than TI. II: 13.1; 19.2; 14.2|3.2|2.3|1.0|0.9; FII with row of short ventral hairs; TII with weak pd seta at $\frac{1}{8}$, strong ad seta at $\frac{1}{4}$, 2 short ventral setae, and with subapical corona of ad, av, ventral (strong) and pd setae; IIt, elongate and covered with short vestiture. III: 16.2; 25.3; 12.2|4.0|2.6|1.0|0.9; FIII with short white ventral hairs along length; TIII with ad-pd setal pair near $\frac{1}{5}$, and with 8–10 spaced short dorsal and 8–10 short ventral setae along length; III_t bare of major setae.

Wing (Fig. 21). Membrane and calypter mostly dark smoky brown, but with opaque white apex and basal posterior membrane; crossvein dm-m strongly sinuous; lower calypter yellowish with fan of brown setae; halter elongate, yellowish with dark brown club.

Abdomen. Tergites 1–5 metallic blue with violet reflections with matt brown bands at tergal overlap and with slivery pruinosity laterally; terga with long black setae along distal margins and with short black vestiture; segments 6–8 dark brown with short black vestiture; lateral tergites and sternites with white hairs; hypopygium (Fig. 20) entirely dark brown; epandrium subtriangular; hypandrial arm arising near midlength, and extending almost to apex of phallus; 2 epandrial



Figures 16–21. *Chrysosoma macalpinei* sp. nov.: (16) male habitus, right lateral view; (17) female habitus, left lateral view; (18) male postabdomen, right lateral view. *C. oromissim* sp. nov.: (19) male legs and thorax, left lateral view; (20) male postabdomen, left lateral view; and (21) male wing, dorsal view.

setae present; epandrial lobe with strong apical bristle and shorter subapical bristle; surstylus lobate ventrally and narrow, tapering dorsally; cercus deeply forked basally, and with two elongate subequal arms, straight narrow digitiform distal arm some whitish setae, and basiventral arm which to apically tapering to point and with some strong lateral setae.

Female. Unknown.

Remarks. *Chrysosoma oromissim* is known between elevations of 1200–1800 m in the Wau district, Morobe Province, Papua New Guinea.

Etymology. The specific epithet “*oromissim*” refers to the Mt Missim type locality, “oro” from Greek meaning “mountain” and “Missim” an indigenous place name. The epithet is a noun in apposition.

***Chrysosoma fumifemoratum* sp. nov. Bickel**

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Figs 22–27

Type material. PAPUA NEW GUINEA: **Western Province:** holotype ♂, Star Mtns, Camp 3, 5°09'S 141°15'E, 1050–1200 m, II–III.2013, yellow pans, C. Muller (AMS K.584238). Paratypes: 5♂♂, 3♀♀, same data as holotype (AMS).

Additional material. PAPUA NEW GUINEA: **Central Province:** 1♂, Guar'l, 1900–2100 m, X.1968, N. L. H. Krauss (BPBM). **Western Highlands Province:** 2♂♂, 2♀♀, Sepik-Waghi Divide, 1700 m, N of Baiyer River, forest, 7.VIII.1982, J. W. Ismay (AMS). **Western Province:** 1♂, Olsobip, 700–1150 m, 23.VIII.1969, M. Sedlacek (BPBM).

Description. Male: body length 8.5 mm; wing: 9.7 × 2.0 mm (Fig. 22).

Head (Fig. 26). Vertex and frons metallic blue-green; weak black vertical seta on lateral frons (MSSC); face and clypeus metallic blue-green, covered with dense silvery pruinosity; clypeus only slightly narrowed from sides of eyes; palp yellowish with black setae; proboscis yellowish; scape and pedicel brown; postpedicel yellow basally and brown distally.

Thorax. Mesonotum and scutellum mostly metallic blue-green with little pruinosity, but with diffuse bronze coloration over ac band, and area dorsad of notopleuron; pleura metallic blue-green with grey pruinosity but with bronze vertical stripe from base of notopleuron across katepisternum; setae black; only 3 pairs long ac present; only two strong posterior dc present, without anterior dc setae or hairs; median scutellar seta strong, lateral scutellar seta absent.

Legs (Fig. 23). Coxa and trochanter I yellow; coxae and trochanters II and III dark brown; femora vary from yellow basally and distal three-quarters dark brown to almost all distal femora dark brown and with femoral “knees” I and II yellow; tibiae mostly yellow, and tarsi brownish to dark brown; CI with 4–5 long spaced lateral setae basally to ½, with gap about one-third coxal length and with 3 long apicolateral setae; CII with some sparse white anterior hairs; CIII with 2 white weak lateral setae near ½. I: 11.2; 12.2; 10.3|2.1|1.7|1.0|0.7; FI on basal two-thirds with five long setae, decreasing in size distally, from strong and slightly sinuate basally to weak and straight distalmost, and with three long spaced anterior setae from ⅓ to ⅔, and with short black subapical seta; TI with four long spaced dorsal setae increasing in size distally, at ⅛, ¼, ⅓, ⅔. II: 12.0; 19.0; 14.5|3.2|2.0|0.8|0.6; FII with subapical pv seta; TII with weak pd seta at ⅛, ad-pd setal pair at ½ (ad seta stronger), short dorsal at ⅓, short ventral setae at ½ and ¾, and with subapical corona of ad, av, ventral (strong) and pd setae; II₁ elongate and covered with short vestiture. III: 14.2; 23.2; 12.0|4.0|2.0|1.0|0.8; FIII with short subapical pv seta; TIII with ad seta at ½, and some spaced short dorsal and ventral seta along length; III_t bare of major setae.

Wing (Fig. 24). Membrane anterior of vein R₄₊₅, and most of cell r₄₊₅, area around vein M₁ and dm-m crossvein mostly dark brown, but wing tip hyaline and with open hyaline window extending from midway in cell r₄₊₅ to posterior margin, and basal cell m₁ extending to posterior wing margin hyaline; R₄₊₅ and M₁ almost converging at apex, and with vein M₁ sometimes with external adventitious

stub-vein; crossvein dm-m strongly sinuate and with external adventitious stub-vein in centre; lower calypter yellowish with fan of weak whitish setae; halter elongate, with yellow stalk and brown club.

Abdomen. Tergites 1–5 metallic blue with violet reflections with matt brown bands at tergal overlap and with silvery pruinosity laterally; terga with long black setae along distal margins and with short black vestiture; segments 6–8 dark brown with short black vestiture sternite; hypopygium (Fig. 25) dark brown with brown cercus; epandrium subtriangular; hypandrial arm arising near midlength, and hypandrial hood with irregular dorsal margin; epandrial lobe with strong apical bristle and shorter subapical bristle; surstylus lobate ventrally, and dorsally pointed with strong apical seta; cercus basally forked, with two subequal elongate arms, distal arm with some apical setae, and basiventral arm thin and mostly bare.

Female (Fig. 27). Similar to male except as noted: wing length 7.6 mm; frons with strong black vertical seta, without short seta; clypeus almost adjacent eyes; femora with basal half yellow, grading into dark brown distally, with femoral “knees yellow”; leg I setae more sinuate; wing coloration and venation similar.

Remarks. *Chrysosoma fumifemoratum* is known only from elevations between 700–2100 m in Western, Western Highlands and Central provinces, Papua New Guinea. The femora of both sexes are yellow basally and mostly dark brown in the distal half. An external adventitious stub-vein is present on the dm-m crossvein and usually also present near the centre of vein M₁ (Fig. 24). The cercus is forked with elongate digitiform distal and basiventral arms and shows a superficial similarity to that of the New Guinea *C. fassilamellatum* Parent, but this latter species lacks long setae on leg I and the male anterior dc setae are present as weak hairs, and it does not belong in the *lucigena* group.

Etymology. This specific epithet “*fumifemoratum*” is from Latin and refers to this species’ darkly infuscated femora, *fuma* from Latin meaning smoke.

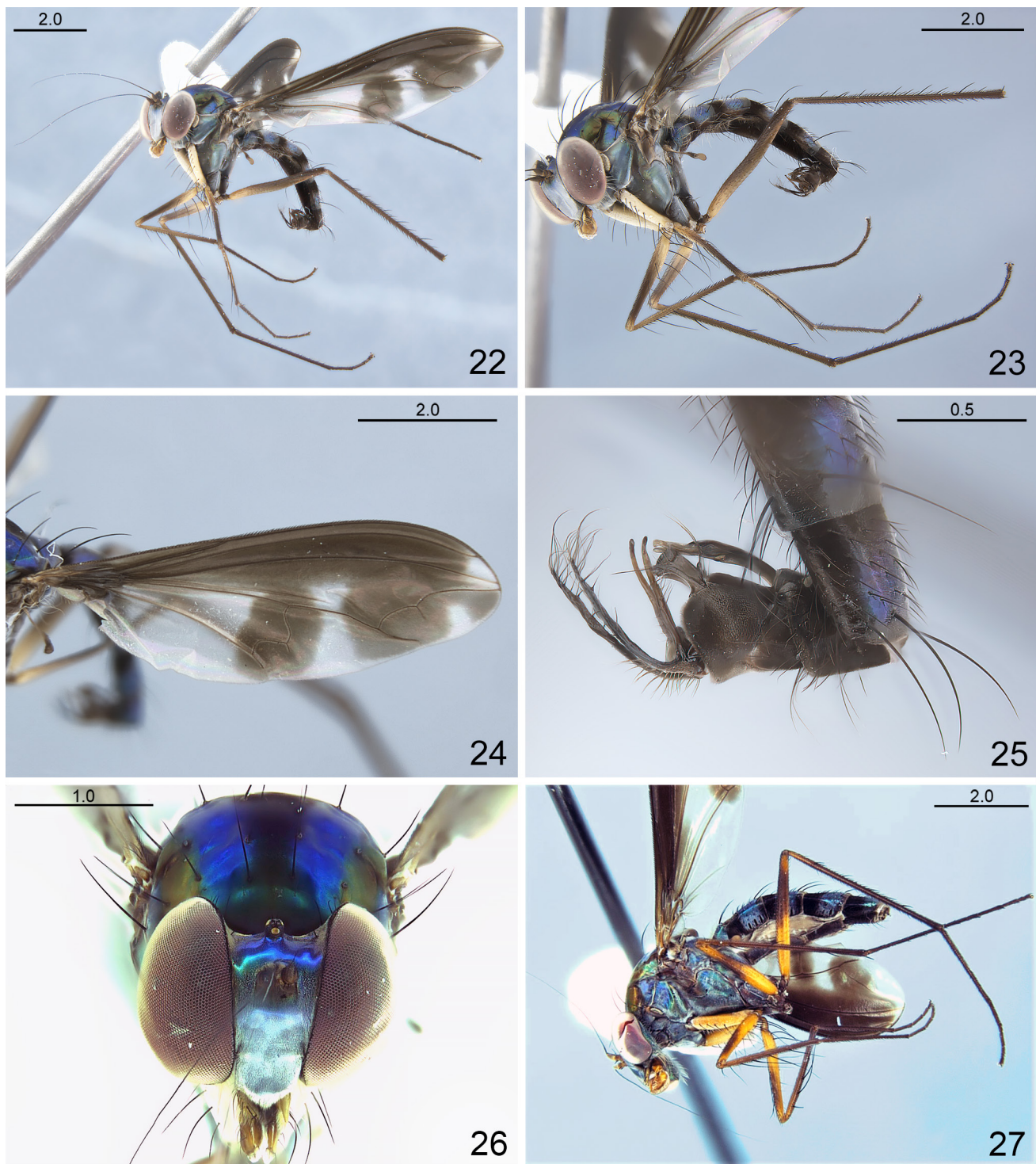
***Chrysosoma bitcoin* sp. nov. Bickel**

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Figs 1–2, 28–32

Type material. PAPUA NEW GUINEA: **Western Highlands Province:** holotype ♂, Sepik-Waghi Divide, 1700 m, N of Baiyer River, forest, 7.VIII.1982, J. W. Ismay (AMS K.584239). Paratypes: 2♂♂, 2♀♀, same data as holotype (Australian Museum, Sydney).

Additional material. PAPUA NEW GUINEA: **Chimbu Province:** 1♀, Mt Wilhelm, -5.7590, 145.1861, 2200 m, Malaise trap, 16-17.X.2012, Gewa, Damag, Novotny & Leponce (MNHN). **Eastern Highlands Province:** 2♂♂, Okapa, 31.XII.1964, R. Hornabrook (ANIC). **Hela Province:** 1♀, Betege, 20 km NW of Koroba, 1600 m, 20.IX.1963, R. Straatman (BPBM); 1♂, 5 km S of Tari, 1500m, 13.VI.1965, W. A. Steffan (BPBM); 1♂, SE of Koroba, 40 Km W of Tari, 1800 m, 26.IX.1963, R. Straatman; 1♀, same, but 1650 m, 17.IX.1963 (BPBM). **Madang Province:** 4♂♂, Simbai, 1600–1800 m, IX–X.1968, N. L. H. Krauss (BPBM).



Figures 22–27. *Chrysosoma fumifemoratum* sp. nov.: (22) male habitus, left lateral view; (23) male thorax, legs and abdomen, left lateral view; (24) male wing, dorsal view; (25) male postabdomen, left lateral view; (26) male head, anterior view; and (27) female habitus, left lateral view.

Morobe Province: 4♀, Upper Manki logging area, nr Bulolo, 1600 m, sticky trap, 9.III.1973, F. R. Wylie & P. Shanahan (AMS); 1♀, Wau, 7°25'S 146°42'E, 600 m, 2–3.XI.1996, M. S. Moulds. **Southern Highlands Province:** 1♀, Ambua Lodge, 25 km SE of Tari, 5°58'S 143°04'E, 2100 m, 14–16.XI.1996, M. S. Moulds (AMS). 1♂, road Mendi to Margarima, 1800 m, 3.II.1978, J. L. Gressitt (BPBM). **Western Highlands Province:** 1♂, Nondugl, 26.I.1955, R. E. Harrison (QMB); 1♀, Kendep Forest, 16.II.1964, G.

Szent-Ivany (BPBM); 1♀, Kendep, 2420 m (as 8000 ft.), XII.1961, W. W. Brandt (ANIC); 1♀, Minj River Valley, nr Uinba, 1800 m (as 6200 ft), 17.VIII.1963, R. Pullen (ANIC).

Description. Male: body length 7.2–7.4 mm; wing: 8.5 × 2.7 mm (Figs 28–29).

Head. Vertex and frons metallic blue-green; weak black curved vertical seta on lateral frons (MSSC); face metallic coppery colour and covered with orientated silvery

pruinosity; clypeus metallic green with dense silvery pruinosity, and distinctly narrowed and free from sides of eyes; palp yellowish with black setae; proboscis yellowish; antenna mostly yellow with some dorsal infuscation.

Thorax. Dorsum wide metallic blue-green coloration with little pruinosity, but mostly covered by broad bronze ac band extending from anterior mesonotum to base of scutellum and extending laterally to outside ac setal row, and with lateral bronze stripe from imaginary extension of dc row to notopleural area and extending posteriorly to above wing base; scutellum metallic blue-green; pleura metallic blue-green but with bronze vertical stripe from base of notopleuron across katepisternum, and with grey pruinosity; setae black; 3 pairs strong ac present; only two strong posterior dc present, without anterior dc setae or hairs; median scutellar seta strong, lateral scutellar seta weak, about one third length of median.

Legs (Figs 1–2). Coxa and trochanter I, all femora, and tibiae I and II mostly yellow; TIII and all tarsomeres brownish; coxae and trochanters II and III dark brown; CI with silvery pruinosity, and with 4–5 long spaced lateral setae to $\frac{1}{2}$, with gap and 2 long black apicolateral setae; CII with some sparse white anterior hairs; CIII with group of weak lateral white hairs. I: 9.1; 9.4; 9.0|2.0|1.3|0.8|0.6; FI with 5 long black ventral setae, decreasing in size distally from base to $\frac{2}{3}$, and with 5–6 long black anterior setae spaced from base to apex; TI with 3 long spaced dorsal setae, at $\frac{1}{8}$, $\frac{2}{5}$, and $\frac{3}{5}$; It_1 almost as long as TI and with short ventral seta near base. II: 11.0; 14.9; 12.3|2.9|1.8|1.0|0.7; FII some weak white ventral hairs and subapical pv seta; TII with strong ad seta at $\frac{1}{5}$, and with subapical corona of ad, av, ventral (strong) and pd setae; II_1 elongate. III: 12.0; 19.8; 10.4|3.0|1.9|1.0|0.8; FIII with some short white ventral hairs along length; TIII with offset ad-pd pair near $\frac{1}{5}$, and with spaced short dorsal and short ventral setae along length, and short subapical ad, av and ventral setae.

Wing. Membrane mostly dark brown, but with white opaque window in cell r_4 , basad of fork of veins M_1 and M_2 , and with sometimes faint white window in cell m_1 just basad of dm-m crossvein; posterior wing margin and upper calypter mostly hyaline or slightly brownish; crossvein dm-m strongly sinuous; lower calypter yellowish with fan of yellow; halter elongate, yellowish with dark brown club.

Abdomen. Tergites 1–5 metallic blue with violet reflections with coppery brown bands at tergal overlap and with silvery pruinosity laterally; terga with long black setae along distal margins and with short black vestiture; segments 6–8 dark brown with short black vestiture; lateral tergites and sternites with white hairs; hypopygium (Fig. 30) entirely dark brown; epandrium subtriangular; hypandrial arm arising near midlength, and hypandrial hood with irregular dorsal margin; 2 epandrial setae present; epandrial lobe with strong apical bristle and shorter subapical bristle; surstylus clavate with strong apical setae; cercus basally forked, with elongate straight digitiform distal arm and short basiventral projection.

Female (Figs 31, 32). Similar to male except as noted: wing length 8.1 mm; frons with strong black vertical seta, without short seta; clypeus almost adjacent eyes; thorax with similar coloration; also only two strong posterior dc present, without anterior dc setae or hairs; leg I setation similar; TII with offset ad-pd setal pair at $\frac{1}{8}$ with ad seta much stronger, and with dorsal seta at $\frac{1}{2}$, short ventral setae at $\frac{2}{5}$, and with apical circlet of short ad, av, ventral and pd setae; TIII with

strong ad seta at $\frac{1}{8}$, and with six spaced dorsal setae along length; wing membrane mostly dark brown, also with white opaque window in cell r_4 , with broad brown band extending over dm-m to posterior wing margin; cell m_1 just basad of dm-m crossvein and extending to posterior wing margin almost entirely hyaline.

Remarks. *Chrysosoma bitcoin* is known primarily from upland localities, from 1500 m to 2400 m in Papua New Guinea, especially in the highland provinces. It has striking copper vittae on the thoracic dorsum (see Figs 1–2). Males and females have similar leg I setation, and females, as usual in the *lucigena* group, are slightly smaller in size, and have different wing maculation and tibia II setation.

Etymology. This species is named bitcoin in recognition of a donation by one of the Australian Museum's supporters. This may be the first time a cryptocurrency donation has been used to support biodiversity discovery.

Chrysosoma cuprevittatum sp. nov. Bickel

urn:lsid:zoobank.org:act:7761AA7F-ECDA-4261-B653-905F5CBE4463

Figs 33–35

Type material. PAPUA NEW GUINEA: **Morobe Province:** holotype ♂, Mt Missim, 7°15'S 146°48'E, 2040–2400 m, 22–30.IV.1968, J. L. Gressitt & J. Sedlacek (BPBM. BPBMENT 0000081243). Paratype: 1♂, Wau, Bulldog Rd., 2000–2400 m, 19.V.1967, J. L. Gressitt (BPBM).

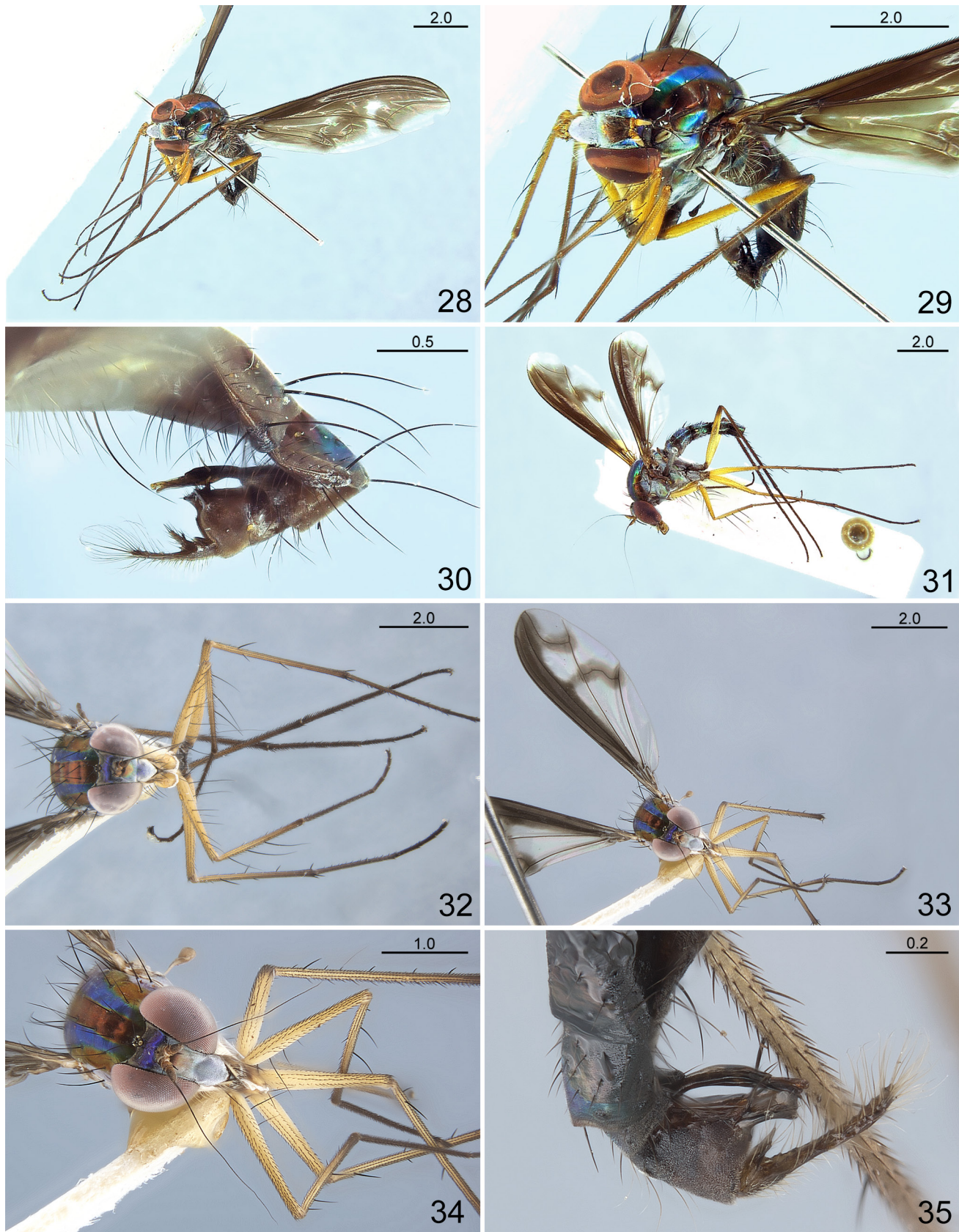
Additional material. PAPUA NEW GUINEA: **Morobe Province:** 1♂, Kaisenik, Biaru, 1600–2050 m, 9.III.1971, forest, J. Gressitt (BPBM); 1♀, nr Wau aerodrome, Biaru Rd., 1210 m, 4–15.XI.1987, canopy fog, *Castinopsis acuminatissima*, A. Allison (BPBM #1987.399); 1♀, Kuiper Range, 7°31'S 146°49'E, 2200 m, 31.X–1.XI.1996, M. S. Moulds (AMS).

Description. Male: body length 6.1 mm; wing: 6.6 × 2.0 mm; similar to *C. bitcoin* except as noted.

Head. Similar to *C. bitcoin*.

Thorax. Coloration and setation similar except scutellum without lateral scutellar seta.

Legs. Coxa and trochanter I, all femora and tibiae mostly yellow; and tarsomeres yellowish, becoming infuscated distally; FIII apically infuscated; coxae and trochanters II and III dark brown; CI with only white lateral setae and hairs (not strong black lateral setae) along length, and with 3 long black apicolateral setae; CII with some sparse white anterior hairs; CIII with single black lateral seta, not white hairs. I: 7.8; 8.0; 7.5|2.0|1.3|1.0|0.6; FI with 3 long black ventral setae, decreasing in size distally from base to $\frac{1}{2}$, and with very short ventral hair at $\frac{3}{5}$, and without anterior setae (as in Fig. 34); TI with dorsal setae at $\frac{1}{8}$ (very short), $\frac{1}{4}$, and $\frac{3}{5}$, increasing in size distally; It_1 very long, almost as long as TI and with short ventral seta near base. II: 8.7; 13.1; 11.2|2.5|1.8|0.9|0.6; FII some weak white ventral hairs and subapical pv seta; TII with offset ad-pd setal pair at $\frac{1}{8}$, ad seta at $\frac{1}{2}$, ventral seta at $\frac{1}{3}$, and $\frac{3}{4}$, and with subapical corona of ad, av, ventral and pd setae; II_1 elongate. III: 10.9; 15.4; 8.2|2.8|1.4|0.8|0.6; FIII bare of major setae; TIII with offset ad-pd pair near $\frac{1}{8}$, and with 8–10 spaced short dorsal and 8–10 short ventral setae along length, and short subapical ad, av and ventral setae.



Figures 28–35. *Chrysosoma bitcoin* sp. nov.: (28) male habitus, left anterior view; (29) male habitus, anterior view; (30) male postabdomen, left lateral view; (31) female habitus, left lateral view; (32) female habitus, anterior view. *C. cuprevittatum* sp. nov.: (33) female habitus, anterior view; (34) female head and legs, anterior view; (35) male postabdomen, right lateral view.

Wing. Membrane brown around vein R_{4+5} and anterior to anterior wing margin, also around vein M_1 and around crossvein dm-m, and extending anteriorly across cell r_{4+5} , such that hyaline window enclosed in cell r_{4+5} ; posterior basal wing membrane and upper calypter hyaline; crossvein dm-m strongly sinuous; lower calypter yellowish with fan of yellow; halter elongate, yellowish with dark brown club.

Abdomen. Tergites 1–5 mostly brown with metallic green-blue reflections with coppery brown bands at tergal overlap and with silvery pruinosity laterally; terga with long black setae along distal margins and with short black vestiture; segments 6–8 dark brown with short black vestiture; lateral tergites and sternites with white hairs; hypopygium (Fig. 35) dark brown with cercus brownish; epandrium subtriangular; hypandrial arm arising near midlength, and hypandrial hood with irregular dorsal margin; epandrial lobe with strong apical bristle and shorter subapical bristle; surstylus clavate; cercus basally forked, with straight digitiform distal arm and short basiventral projection.

Female (Figs 33, 34). Similar to male except as noted: wing length 6.4 mm; frons with black vertical seta, without short seta; clypeus almost adjacent to eyes.

Remarks. *Chrysosoma cuprevittatum* is known from 1200–2400 m elevation in Morobe Province, Papua New Guinea. It is very close to *C. bitcoin* with similar male hypopygia (cf. Figs 30, 36) but is distinctly smaller in size, has reduced ventral setae on femur I (cf. Figs 32, 34), and coxa I with only white lateral setae, not the usual black lateral setae in other members of the *lucigena* group. The male wing maculation pattern and tibia II setation is similar to that of the female, and that of female *C. bitcoin* as well.

Etymology. The specific epithet “*cuprevittatum*” is from Latin and refers to the metallic copper coloured ac thoracic band (Fig. 34).

Chrysosoma orokaindi sp. nov. Bickel

urn:lsid:zoobank.org:act:D5DDF5A4-EB98-4602-876E-8243B951E297

Figs 36–42

Type material. PAPUA NEW GUINEA: **Morobe Province:** holotype ♂, Mt Kaindi, 1700 m, 12.IX.1981, J. W. Ismay (AMS K.584236). Paratypes: 2♂♂, same data as holotype (AMS); 1♂, 1♀, Mt Missim, 7°15'S 146°48'E, 1500–1800 m, 7.I.1970, J. & M. Sedlacek (BPBM); 1♂, Wau, 1400–1600 m, 28.XII.1964, L. & M. Gressitt; 3♀♀, Wau, 1200–1300 m, 14.IX.1965 & 1500 m, 17.VI.1971; 2♂♂, Wau, 1150 m, 14.VI.1971, all J. Sedlacek (BPBM); 1♂, Wau, 1200–1450 m, 18.VI.1968, N. L. H. Krauss (BPBM).

Additional material. PAPUA NEW GUINEA: **Central Province:** 1♂, 1♀, Woitape, Wharton Range, 10.X.1963, D. K. McAlpine (AMS). **Morobe Province:** 1♂, Jimi River, VII.1961, W. W. Brandt (ANIC).

Description. Male: body length 8.4–8.6 mm; wing: 9.3 × 2.6 mm (Fig. 36).

Head. Vertex and frons metallic blue-green; weak black vertical seta on lateral frons (MSSC); face and clypeus metallic green with dense silvery pruinosity; clypeus distinctly narrowed and free from sides of eyes; palp pale

yellow with 3 black setae; proboscis yellowish; antenna mostly yellow, but postpedicel infuscated distally.

Thorax. Mostly yellow but mesonotum with shining metallic blue-green reflections and with little pruinosity; pleura mostly yellow but with metallic blue-green notopleuron and mesepisternum, and with orientated silvery pruinosity; scutellum metallic blue-green dorsally; setae black; ac comprising 3 widely spaced long setal pairs; only two strong posterior dc present, without anterior dc setae or hairs; median scutellar seta strong, lateral scutellar seta as tiny hair.

Legs (Fig. 37). CI, trochanter I and remainder of legs yellow except distal tarsomeres infuscated; coxae and trochanters II and III dark brown; CI with some white anterior hairs and with six long anterolateral setae along length; CII with some white hairs; CIII with group of weak white lateral hairs in basal half. I: 10.9; 11.7; 11.5|2.8|2.1|1.2|1.0; FI with ventral row of four long setae along basal half, declining in length distally, with basalmost seta five times length of distalmost, and with three anterior setae spaced from $\frac{1}{3}$ to $\frac{1}{2}$, with distal two setae longest, and with very short subapical seta; TI with short dorsal at $\frac{1}{6}$ and two very long dorsal setae, at $\frac{1}{4}$ and $\frac{3}{5}$; It_1 very long, subequal TI (MSSC), and with short ventral seta near base. II: 12.2; 21.1; 14.7|3.7|2.7|1.7|1.0; FII bare except from short preapical pv seta; TII totally bare of major setae but with apical ad seta. III: 10.0; 24.6; 15.0|3.6|2.4|1.1|0.6; FIII bare of major setae; TIII weak ad seta at $\frac{1}{8}$, and with short spaced dorsal setae along length; $IIIIt_1$ with short ventral seta near bare.

Wing. Membrane anteriorly of vein R_{4+5} , basal and distal thirds of cell r_{4+5} , and area around vein M_1 and dm-m crossvein mostly dark brown, but with open hyaline window extending from R_{4+5} to posterior margin; wing posterior to vein M_1 mostly hyaline except as noted above: crossvein dm-m strongly sinuate; lower calypter yellow with fan of white setae; halter basally yellow with dark brown stalk and club.

Abdomen. Tergites 1–6 metallic blue-green with bronze reflections with matt brown bands at tergal overlap and with silvery pruinosity laterally; terga with long black setae along distal margins and with short black vestiture; segments 7–8 dark brown; hypopygium (Fig. 38) entirely dark brown with yellowish cercus; epandrium subtriangular; hypandrial arm arising near midlength, and hypandrial hood with irregular dorsal margin; 2 epandrial setae present; epandrial lobe with strong apical bristle and shorter subapical bristle; surstylus ventrally lobate and dorsally digitiform; cercus basally forked, with elongate straight digitiform distal arm with cluster of long white apical setae, and with shorter tapering basiventral arm with setae.

Female (Fig. 39). Similar to male except as noted: wing length 8.6 mm; frons with strong black vertical seta, without short seta; clypeus almost adjacent eyes; thoracic coloration similar, and pleura also with orientated silvery pruinosity; also only two strong posterior dc present, without anterior dc setae or hairs; leg I setation stronger: CI with longer anterolateral setae along length, and FI with ventral row of five long setae along basal two thirds, TII with ad-pd setal pair at $\frac{1}{8}$, with ad seta stronger, and with dorsal seta at $\frac{1}{2}$, short ventral setae at $\frac{1}{3}$ and $\frac{3}{5}$, and with apical circlet of short ad, av, ventral and pd setae; TIII with strong ad seta at $\frac{1}{8}$, and with six spaced dorsal setae along length; wing similar, but sometimes with more extensive brown infuscation.

Remarks. *Chrysosoma orokaindi* is known only from elevations between 1200–1800 m in the Wau district, Morobe Province, Papua New Guinea. The thorax is predominately yellow, contrasting with the metallic blue-green thoracic coloration of other *lucigena* group members. Compared to females, males have weakly developed setation on tibiae II and III.

Etymology. The specific epithet “*orokaindi*” refers to the Mt Kaindi type locality, “*oro*” from Greek meaning “mountain” and “*Kaindi*” an indigenous place name. The epithet is a noun in apposition.

Chrysosoma akrikense sp. nov. Bickel

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Figs 40–42

Type material. PAPUA NEW GUINEA: **Western Province:** holotype ♂, SE slope of Mt Akrik (Ian), 15 km NW of Tabubil, 5°10'S 141°09'E, 1625 m, 1–4.IV.1994, R. B. Lachlan (AMS K.584240). Paratype: 1♀, same data as holotype but 6–12.IV.1994 (Australian Museum, Sydney).

Description. Male: body length 7.2 mm; wing: 7.5 × 2.4 mm (Fig. 40); similar to *C. bitcoin* except as noted.

Head. Frons with short weak black vertical seta (MSSC).

Thorax. Mesonotum (Fig. 40) mostly metallic blue-green but with broad bronze ac band reaching laterally beyond ac setal row and extending from anterior mesonotum to base of scutellum, and with lateral bronze band from position of post-alar and supra-alar setae to dorsalmost notopleuron, and with pleura and scutellum metallic blue-green with dusting of grey pruinosity; setae black; ac comprising 3 widely spaced long setal pairs; only two strong posterior dc present, without anterior dc setae or hairs; median scutellar seta strong, lateral scutellar as tiny hair.

Legs (Fig. 42). CI, trochanter I and remainder of legs yellow except apex of FIII dark brown, and distal tibiae and tarsomeres infuscated; coxae and trochanters II and III dark brown; CI with some white anterior hairs and with three long anterolateral setae in basal half, with gap from ½ to ¾ with only weak white hairs, and with 2 subapical distolateral setae; CII with some white hairs and apical black setae; CIII with group of weak white lateral hairs in basal half. I: 9.5; 11.2; 9.8|2.0|1.6|1.0|0.8; FI with ventral row of four long setae along basal three-fifths, with some shorter dorsal setae along length to half, and with three long anterior setae spaced from ⅔ to ¾; TI with short dorsal at ⅓ and two very long dorsal setae at ¼ and ⅓; It₁ very long and with short ventral seta near base. II: 11.0; 17.3; 13.3|3.2|1.1|1.1|1.0; FII bare except from short preapical pv seta; TII with strong ad seta at ⅓, and with subapical circlet of short dorsal, av and pv setae. III: 12.5; 21.0; 10.0|3.8|2.1|1.1|0.8; FIII bare of major setae; TIII with strong ad seta at ⅓, and with short spaced dorsal setae along length; IIIIt₁ with short ventral seta near base.

Wing. Membrane dark brown along anterior margin extending about one third distance into cell r₄₊₅, and reaching to apex, and extending posteriad as brown cloud along M₁, and along crossvein dm-m; posterior half of cell r₄₊₅ membrane in cell m₂, both distad and basad of crossvein dm-m, and membrane posteriad of cell m₄ hyaline; crossvein dm-m strongly sinuate and with short external adventitious

stub-vein at midlength.

Abdomen. Tergites 1–6 metallic blue-green with bronze reflections with matt brown bands at tergal overlap and with silvery pruinosity laterally; terga with long black setae along distal margins and with short black vestiture; segments 7–8 dark brown; hypopygium (Fig. 41) entirely dark brown with brown cercus; epandrium subtriangular; hypandrial arm arising near midlength, and hypandrial hood with irregular dorsal margin; 2 epandrial setae present; surstylus ventrally lobate and dorsally digitiform; cercus basally forked with straight digitiform distal arm, about twice length of short basiventral arm.

Female. Similar to male except as noted: wing length 6.9 mm; frons with strong black vertical seta, without short seta; clypeus almost adjacent eyes; thorax with similar coloration and setation, and also only two strong posterior dc present, without anterior dc setae or hairs; from ⅓ to ⅓; TII with ad-pd setal pair at ⅓, with pd seta at ⅓ and circlet of short dorsal, av and pv setae TI with longer dorsal at ⅓ and two very long dorsal setae, at ¼ and ⅓.

Remarks. *Chrysosoma akrikense* is known only from elevations near 1600 m in the Tabubil region, Western Province, Papua New Guinea. It is relatively small-sized and close to *C. cuprevittatum* in wing maculation, thoracic coloration and cercal structure (cf. Figs 35 and 41), but the two species have distinctly different leg I setation.

Etymology. The specific epithet “*akrikense*” is derived from *Akrik*, an indigenous place name.

Chrysosoma betege sp. nov. Bickel

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Figs 43–44

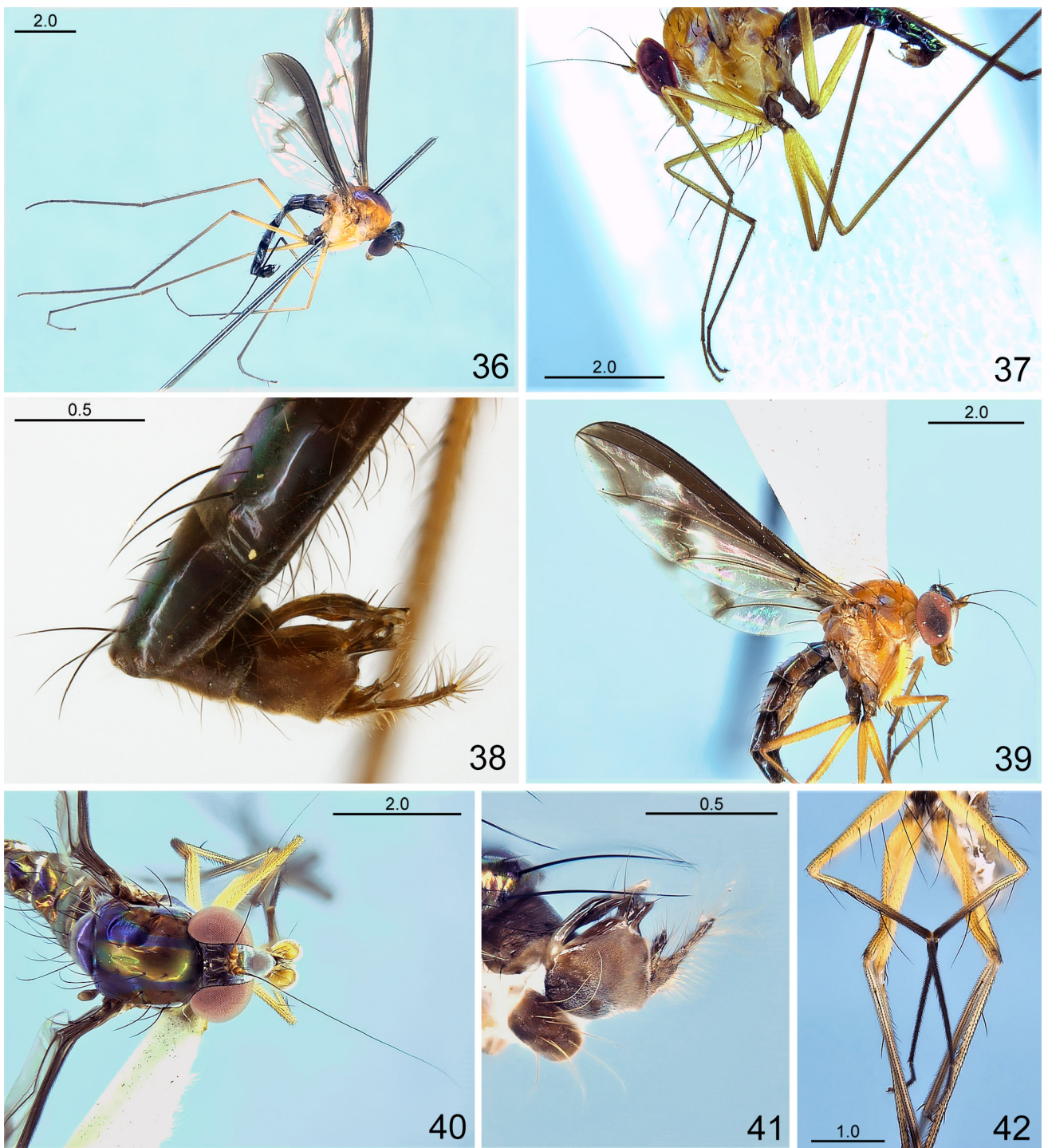
Type material. PAPUA NEW GUINEA: **Hela Province:** holotype ♂, Betege, 20 km NW of Koroba, 1600 m, 23.IX.1963, R. Straatman (BPBM, BPBMENT 0000081244).

Description. Male: body length 8.5 mm; wing: 9.4 × 3.0 mm (Fig. 43).

Head. Vertex and frons metallic blue-green; weak black vertical seta on lateral frons (MSSC); face and clypeus metallic green with dense silvery pruinosity; clypeus distinctly narrowed and free from sides of eyes; palp pale yellow with black apical seta; proboscis brownish; antenna dark brown.

Thorax. Mesonotum mostly metallic blue with little pruinosity, and with bronze vitta over ac band and dorsad of notopleuron; scutellum metallic blue; pleura metallic blue-green with grey pruinosity but with bronze vertical stripe from base of notopleuron across katepisternum; setae black; 3 pairs ac present; only two strong posterior dc present, without anterior dc setae or hairs; median scutellar seta strong, lateral scutellar seta as weak hair.

Legs. Coxa and trochanter I yellow; coxae and trochanters II and III dark brown; FI and TI yellow; FII and FIII yellow basally, but infuscated distally; with TII and TIII yellowish; tarsi I and II yellowish to brown distally, tarsus III missing; CI with five anterolateral setae; CII with black anterior setae; CIII with black lateral seta. I: 10.0; 10.7; 10.6|2.3|2.0|1.3|0.8; FI with 5 black ventral setae spaced



Figures 36–42. *Chrysosoma orokaindi* sp. nov.: (36) male habitus, right lateral view; (37) male thorax, legs and abdomen, left lateral view; (38) male postabdomen, right lateral view; (39) female, right lateral view. *C. akrikense* sp. nov.: (40) male head and thorax, dorsal view; (41) hypopygium, right lateral view; (42) male legs, anterior view.

along basal two-thirds and decreasing in size distally, and with three long anterodorsal setae at $\frac{3}{10}$, $\frac{2}{5}$, and $\frac{3}{4}$; TI with short seta at $\frac{1}{10}$ and with strong long dorsal setae at $\frac{2}{5}$ and $\frac{3}{4}$; It_1 long, subequal to TI. II: 11.2; 18.7; 11.1|2.7|1.6|0.8|0.4; FII ventrally bare of major setae; TII with strong ad seta at $\frac{1}{5}$, with tiny pd setae at $\frac{1}{5}$ and $\frac{1}{2}$, short ventrals at $\frac{1}{2}$ and with short subapical ad seta. III: 14.1; 23.0; tarsus missing; TIII with strong ad at $\frac{1}{5}$, and with 7–8 spaced dorsal setae

along length and some ventral setae along distal half; tarsus III missing.

Wing. Membrane anterior to vein M, distal quarter of wing (except for hyaline apex) and area around dm-m crossvein mostly dark brown, but with hyaline window extending from R_{4+5} to M distad of crossvein dm-m, and with basal posterior half of wing hyaline; crossvein dm-m strongly sinuous and with external adventitious stub-vein almost midway; distal

lower calypter yellow with fan of white setae; halter mostly brown with base of stalk yellow.

Abdomen. Tergites 1–5 metallic blue-green with violet reflections with matt brown bands at tergal overlap and with silvery pruinosity laterally; terga with long black setae along distal margins and with short black vestiture; segments 6–8 dark brown with short black vestiture; lateral tergites and sternites with white hairs; hypopygium (Fig. 44) entirely dark brown, including cercus; epandrium subtriangular; epandrial lobe with strong apical bristle and shorter subapical bristle; surstylus narrow and slightly expanded apically with dorsal hooklike projection; cercus basally forked, with straight digitiform external distal arm, and longer digitiform tapering and bowed basiventral arm.

Female. Unknown.

Remarks. *Chrysosoma betege* is known only from the type locality at mid-elevation, some 1600 m, in Hela Province, Papua New Guinea. This species is very close to *Chrysosoma baiyerense* as both species have similar wing coloration (cf. Figs 43, 46), an external adventitious stub-vein on both M_1 and the sinuate dm-m crossvein, and both with deeply forked cerci. However, the two species differ in leg coloration, and cercal structure, as noted in the key. *Chrysosoma betege* has a long tapering and bowed basiventral cercal arm.

Etymology. The specific epithet “*betege*” is an indigenous place name and a noun in apposition.

Chrysosoma baiyerense sp. nov. Bickel

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Figs 45–47

Type material. PAPUA NEW GUINEA: **Western Highlands Province:** holotype ♂, Sepik-Waghi Divide, 1700 m, N of Baiyer River, forest, 7.VIII.1982, J. W. Ismay (Australian Museum, Sydney K.594154).

Description. Male: body length 8.2 mm; wing: 9.1×2.5 mm (Fig. 45).

Head. Vertex and frons metallic blue-green; weak black vertical seta on lateral frons (MSSC); face and clypeus metallic green with dense silvery pruinosity; clypeus distinctly narrowed and free from sides of eyes; palp pale yellow with black apical seta; proboscis brownish; antennal scape and pedicel brown, postpedicel yellow.

Thorax. Mesonotum mostly metallic blue with little pruinosity, and with bronze band over notopleural area; scutellum metallic blue; pleura metallic blue-green with grey pruinosity but with bronze vertical stripe from base of notopleuron across katapisternum; setae black; 3 pairs ac present; only two strong posterior dc present, without anterior dc setae or hairs; median scutellar seta strong, lateral scutellar seta as tiny weak hair.

Legs. Coxa and trochanter I yellow; coxae and trochanters II and III dark brown; FI mostly dark brown but ventrally yellow along basal half; TI and tarsus I brownish; FII and remainder of leg II dark brown; FIII yellow along basal half, becoming dark brown along distal half; TIII and tarsus III brownish; CIII and their trochanters dark brown; CI with five long anterolateral setae; CII with black anterior setae; CIII with group of weak white lateral hairs. I: 11.2;

11.4; 10.2|2.7|1.9|1.1|0.9; FI with 4 long black ventral setae spaced along basal half and decreasing in size distally; TI with short seta at $1/10$ and with long dorsal setae at $2/5$ and $3/5$; It_1 long. II: 12.0; 18.5; 13.2|3.2|1.6|0.8|0.4; FII bare of major setae; TII with strong ad seta at $1/5$, and with tiny pd setae at $1/6$ and $1/2$, and with short subapical ad seta. III: 13.8; 22.0; 11.1|3.8|2.5|1.2|0.7; FIII with short white ventral hairs along length; TIII with strong ad at $1/5$, and with 7–8 spaced dorsal setae along length; $IIIIt_1$ with short ventral seta at base.

Wing (Fig. 46). Membrane anterior to vein M, distal quarter of wing (except for hyaline apex) and area around dm-m crossvein mostly dark brown, but with hyaline window extending from R_{4+5} to M distad of crossvein dm-m, and with basal posterior half of wing hyaline; vein M_1 with distinct external adventitious stub-vein; dm-m strongly sinuous and with external adventitious stub-vein almost midway; lower calypter yellow with fan of white setae; halter mostly brown with base of stalk yellow.

Abdomen. Tergites 1–5 metallic blue-green with violet reflections with matt brown bands at tergal overlap and with silvery pruinosity laterally; terga with long black setae along distal margins and with short black vestiture; segments 6–8 dark brown with short black vestiture; lateral tergites and sternites with white hairs; hypopygium (Fig. 47) entirely dark brown, including cercus; epandrium subtriangular; epandrial lobe with strong apical bristle and shorter subapical bristle; surstylus narrow and slightly expanded apically with dorsal hooklike projection; cercus basally forked, with straight digitiform external distal arm with long white setae, and basiventral cercal arm short and bowed with group of 6–8 strong external setae.

Female. Unknown.

Remarks. *Chrysosoma baiyerense* is known from the 1700 m type locality in Western Highlands Province, Papua New Guinea. This species has femora mostly dark brown, but with femur III yellow basally.

The inner cercal arm is bowed with group of 6–8 strong external setae. Both vein M_1 and crossvein dm-m have an external adventitious stub-vein.

Etymology. This species is named for the Baiyer River, Papua New Guinea.

Chrysosoma watutense sp. nov. Bickel

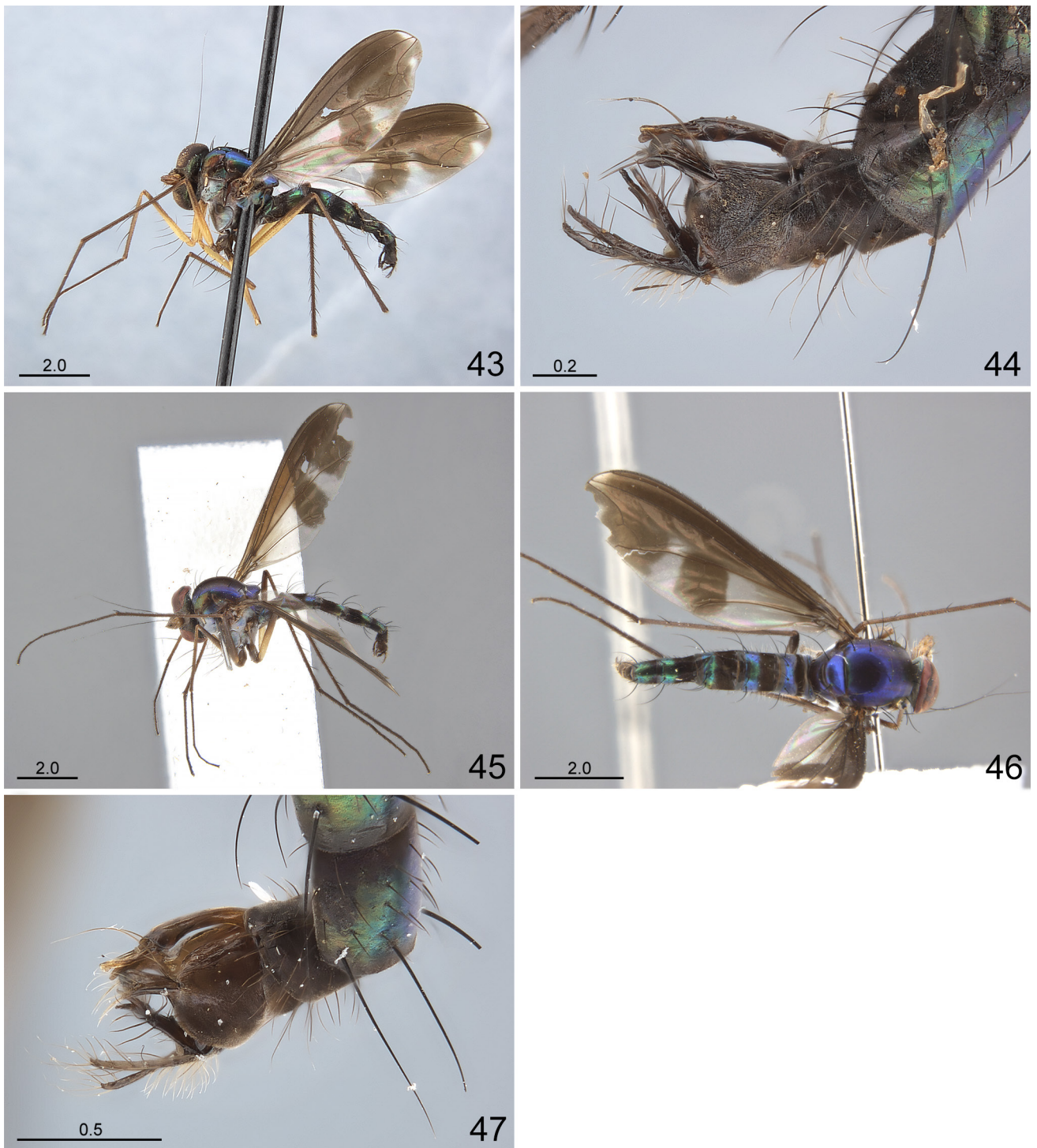
urn:lsid:zoobank.org:act:74BE465D-1A31-4622-820B-0813BE70660B

Figs 48–51

Type material. PAPUA NEW GUINEA: **Morobe Province:** holotype ♂, Wau, 1800–1900 m, mv light, 14.X.1972, G. G. E. Scudder (BPBM, BPBMENT 0000081245). Paratypes: 2♂♂, NE U[pper]. Watut, SW, 1300–1600 m, 1.V.1968, J. L. Gressitt (BPBM).

Description. Male (Fig. 48): body length 8.2 mm; wing: 9.0×2.4 mm.

Head. Vertex and frons metallic blue-green; weak black vertical seta on lateral frons (MSSC); face and clypeus metallic green with dense silvery pruinosity; clypeus distinctly narrowed and free from sides of eyes; palp pale yellow with black apical seta; proboscis yellowish; antenna mostly yellow.

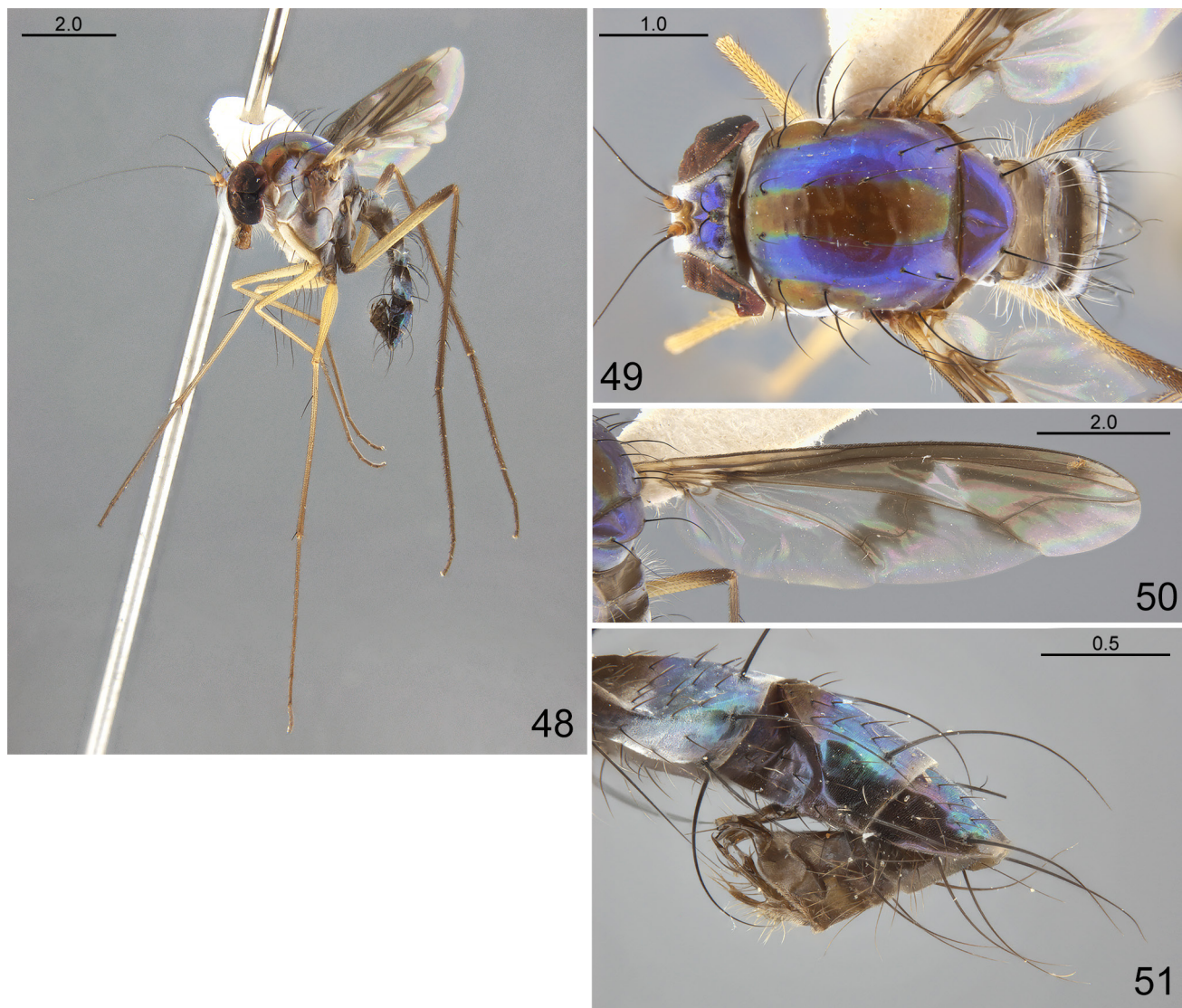


Figures 43–47. *Chrysosoma betege* sp. nov.: (43) male habitus, left lateral view; (44) male postabdomen, left lateral view. *C. baiyerense* sp. nov.: (45) male habitus, left lateral view; (46) male left wing, dorsal view; (47) male postabdomen, left lateral view.

Thorax. Mesonotum mostly metallic blue-green with little pruinosity, with broad bronze ac band extending from anterior mesonotum to base of scutellum, and laterally including dc row to notopleural area, and with metallic blue-green bands between ac and dc setal rows (Fig. 49); scutellum metallic blue-green; pleura metallic blue-green with grey pruinosity but with bronze vertical stripe from base of notopleuron across katapisternum; setae black; 3 pairs ac present; only two strong posterior dc present, without

anterior dc setae or hairs; median scutellar seta strong, lateral scutellar seta as weak whitish hair.

Legs. CI, trochanter I, and all legs I and II yellow; FIII yellow basally but distal fifth brown; tibia and tarsus III yellowish; CII and CIII and their trochanters dark brown; CI with row five long anterolateral setae; CII with black anterior setae; CIII with group of white lateral hairs and single longer white seta. I: 11.1; 11.3; 10.7|2.2|1.5|0.8|0.5; FI with 7 long black setae spaced along basal $\frac{4}{5}$ s, with the basal three setae



Figures 48–51. *Chrysosoma watutense* sp. nov.: (48) male habitus, left lateral view; (49) male thorax, dorsal view; (50) male wing, dorsal view; (51) male postabdomen, left lateral view.

longer and stronger than distal setae, and with 5 very short anterior setae from $\frac{2}{5}$ to $\frac{3}{4}$; TI with short seta at $\frac{1}{10}$ and with strong long dorsal setae at $\frac{1}{4}$ and $\frac{1}{2}$; It₁ very long, with short ventral seta at $\frac{1}{10}$. II: 13.2; 19.1; 16.0|3.3|1.9|1.0|0.4; FII with spaced long ventral setae along length, white basally, but black beyond $\frac{1}{2}$; TII with very strong ad seta at $\frac{1}{5}$, and with tiny pd setae at $\frac{1}{6}$ and $\frac{1}{2}$, and with short subapical ad seta. III: 15.0; 23.0; 14.2|3.2|2.2|0.7|0.5; FIII with short white ventral hairs along length; TIII with strong ad at $\frac{1}{5}$, and with row short spaced dorsal setae along length; IIIIt₁ with short ventral seta at base.

Wing (Fig. 50). Membrane anterior to vein M and area around dm-m crossvein mostly dark brown, but with apex, window extending from R₄₊₅ to M distad of crossvein dm-m, and with posterior half of wing hyaline; R₄₊₅ and M₁ almost converging at apex; M₂ reaching margin as fold; dm-m strongly sinuous; lower calypter yellow with fan of white setae; halter yellow with infuscated stalk.

Abdomen. Tergites 1–5 metallic blue-green with violet reflections with matt brown bands at tergal overlap and with

slivery pruinosity laterally; terga with long black setae along distal margins and with short black vestiture; segments 6–8 dark brown with short black vestiture; lateral tergites and sternites with white hairs; hypopygium (Fig. 51) entirely dark brown, including circus; epandrium subtriangular; epandrial lobe with strong apical bristle and shorter subapical bristle; surstylus narrow and slightly expanded apically with dorsal hooklike projection; cercus basally forked, with straight digitiform external distal arm with white setae, and with longer basiventral arm which has lateral curved projection and medially with curved projections.

Female. Unknown.

Remarks. *Chrysosoma watutense* is known from mid-elevational localities in Morobe Province, Papua New Guinea. Males of this species have mostly yellow femora, only short anterior seta on femur I, and the basiventral arm of cercus is complex with curved projections.

Etymology. This species is named for Watut, a place in Morobe Province, Papua New Guinea.

ACKNOWLEDGEMENTS. We thank the respective curators of these institutions for information and the loan of specimens: AMS—Derek Smith and Russell Cox; ANIC—Don Colless; BMNH—John Chainey; BPBM—Neal Evenhuis and Keith Arakaki; RMNL—P. van Helsdingen; SAM—Lynette Queale; and USNM—Chris Thompson. Piotr Naskrecki (pnaskrecki@oeb.harvard.edu) kindly gave permission to use the photographs in Figs 1 and 2. Natalie Tees prepared the plates. Scott Brooks and an anonymous reviewer provided useful comments on a manuscript version of this paper. Mark Carnegie generously provided funding for this research.

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