



# Taxonomy of South American species of *Ceratina* (*Calloceratina*) Cockerell, 1924 with comments on new species-groups proposed for this subgenus (Hymenoptera: Apidae: Xylocopinae)

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**Abstract.** Two new species of the small carpenter bee genus *Ceratina* (*Calloceratina*) Cockerell, 1924 are described and illustrated. *Ceratina* (*Calloceratina*) *mourei* new species, and *Ceratina* (*Calloceratina*) *silveirai* new species, form the *silveirai* species-group, a very distinct set within the subgenus *C.* (*Calloceratina*). The taxonomy of South American species was approached, being redescribed and illustrated the species *Ceratina* (*Calloceratina*) *chloris* (Fabricius, 1804) and *Ceratina* (*Calloceratina*) *triangulifera* Cockerell, 1914, proposing the *chloris* species-group for them. The diagnosis for the subgenus *Calloceratina* is presented and an identification key for the South American species is also proposed.

**Keywords:** Apoidea; carpenter bees; Ceratinini; Neotropical.

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*Ceratina* Latreille, 1802 is the only genus of the tribe Ceratinini (Hymenoptera: Apidae), and except for Antarctica, this genus is widely distributed, although it is rare and limited in distribution in Australia (MICHENER 2007). The taxon consists of wasp-like bees, with nearly hairless bodies, which nest in thin, rotted or burnt tree branches (SILVEIRA *et al.* 2002) or in pithy dead stems or twigs that they enter at broken ends (MICHENER 2007), and, due to this behavior, they are commonly known as small carpenter bees.

The genus has ca. 380 valid species distributed in 23 subgenera (OLIVEIRA *et al.* 2020). Among the currently recognized subgenera, only six are exclusive to the Western hemisphere: *Calloceratina* Cockerell, 1924; *Ceratinula* Moure, 1941; *Crewella* Cockerell, 1903; *Neoclavicera* Roig-Alsina, 2013; *Rhysoceratina* Michener, 2000; and *Zadontomerus* Ashmead, 1899. *Ceratina* (*Euceratina*) Hirashima, Moure & Daly, 1971 (HIRASHIMA 1971) despite being reported from the Western hemisphere, is originally from the Palearctic region, having been accidentally introduced into the United States through California in 1949 (DALY 1966, 1973).

*Ceratina* (*Calloceratina*) was described by COCKERELL (1924) and, according to MICHENER (2007), the subgenus is almost exclusively Neotropical, occurring from Tamaulipas and Nayarit (Mexico) to Rio Grande do Sul (Brazil). MOURE (2007) recognized 12 species in the subgenus, with only two recorded for South America: *Ceratina* (*Calloceratina*) *chloris* (Fabricius, 1804), and *Ceratina* (*Calloceratina*) *triangulifera* Cockerell, 1914. Indeed, the subgenus is quite complex and diverse, and it is likely that the number of species exceeds 20.

The main goal of this paper is to propose two new species-groups within *Ceratina* (*Calloceratina*) and redescribing the other two South American species, providing a diagnosis for both. Furthermore, we present a diagnosis for the subgenus *Calloceratina* and an identification key for the South American species.

## MATERIAL & METHODS

Several institutions provided the specimens studied in this article. Their names and acronyms are as follows: **AMNH**, American Museum of Natural History, New York, USA; **CASC**, California Academy of Sciences, California, USA; **IFML**, Colección Instituto - Fundación Miguel Lillo, Tucumán, Argentina; **INPA**, Instituto Nacional de Pesquisas da Amazônia, Amazonas, Brazil; **MACN**, Museo Argentino de Ciencias Naturales Bernardino Rivadavia, Buenos Aires, Argentina; **MCP**, Coleção de Abelhas do Museu de Ciências e Tecnologia da Pontifícia Universidade Católica do Rio Grande do Sul, Rio Grande do Sul, Brazil; **MCZ**, Museum of Comparative Zoology, Cambridge, USA; **MECN**, Museo Ecuatoriano de Ciencias Naturales, Quito, Ecuador; **MEFLG**, Museo Entomológico Francisco Luis Gallego, Medellín, Colombia; **MHNBA**, Museu de História Natural da Bahia, Universidade Federal da Bahia, Bahia, Brazil; **MPEG**, Museu Paraense Emílio Goeldi, Pará, Brazil; **MSNT**, Museo Regionale

di Scienze Naturali, Turin, Italy; **MZUEFS**, Museu de Zoologia da Universidade Estadual de Feira de Santana, Bahia, Brazil; **MZUSP**, Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil; **NHMD**, Natural History Museum of Denmark, Copenhagen, Denmark; **NHMUK**, Natural History Museum, London, UK; **NMNH**, National Museum of Natural History, Washington D.C., USA; **OUNNH**, Oxford University Museum of Natural History, Oxford, UK; **QCAZ**, Museo de Zoología de la Pontificia Universidad Católica del Ecuador, Quito, Ecuador; **RPSP**, Coleção Entomológica "Prof. J.M.F. Camargo", Departamento de Biologia, FFCLRP, Universidade de São Paulo, Ribeirão Preto, Brazil; **SEMC**, Snow Entomological Museum Collection, University of Kansas, Lawrence, USA; **UFMG**, Universidade Federal de Minas Gerais, Minas Gerais, Brazil; **UFPB**, Universidade Federal da Paraíba, Paraíba, Brazil; **UFPE**, Universidade Federal de Pernambuco, Pernambuco, Brazil; and **ZMB**, Museum für Naturkunde der Humboldt Universität zu Berlin, Berlin, Germany.

Morphological terminology follows MICHENER (2007), except for the propodeal triangle, referred to as metapostnotum (BROTHERS 1976). Abbreviations used for common morphological terms are "S", metasomal sterna; "T", metasomal terga; and "OD", ocellar diameter (based on the lateral ocellus). All diagnoses were based on females, except for the structures of male terminalia. The measurements are given in millimeters (mm), except for the relative measurements where we used the OD for comparison. In order to assess the extremes of a given length within a series of specimens, only the smallest and largest specimens were taken into consideration.

Label information from separate labels is segregated by "/" (double slashes). Some annotations and typographic errors from labels were identified with "[ ]" (square brackets). For each species, a list of localities where specimens were recorded is provided, along with the information on the number of specimens, sex, and institutions where they are deposited.

Photomicrographs were prepared using a Leica M205C stereomicroscope attached with a Leica DFC295 and a Leica Application Suite V4.1 Interactive Measurements, Montage.

## SYSTEMATICS

### Genus *Ceratina* Latreille, 1802

#### Subgenus *Calloceratina* Cockerell, 1924

**Diagnosis** (Adapted from MICHENER 2007). Body length between 5.7 and 13.5. Integument coloration varying from black to strongly brilliantly metallic green or blue, some species with the metasoma copper, gold or metallic dark purple. Yellow marks restricted to labrum, clypeus and legs, normally at least with a pale-yellow stripe on the apical margin of outer surface of metatrochanter; rarely yellowish marks in pronotal lobes, tegulae and on costal sclerite in forewings. Genal area always without yellow or pale marks; some males with yellow marks on the mandible and above the lateral margins of clypeus. Females with scopa on metafemur and metatibia. Genal area and disc of mesoscutum with extensive smooth and polished areas, normally slightly denser on males. Maxillary palpus five or six segmented. Three mandibular teeth in females, being the median tooth the largest, followed by the inferior; males with two mandibular teeth, the superior largest. Ocelli delimited posteriorly by a conspicuous furrow. Preoccipital carina present, varying from weakly to well developed, normally more conspicuous in males. Pronotum with distinct transverse carina, sometimes interrupted medially, in front of posterior margin of pronotum, curving strongly downwards on each side of procoxa, rarely absent on lateral areas. Procoxa never strongly expanded laterally. Protibia and mesotibia with two

dorsoapical spiniform projections. Basitibial plate of female and some males usually represented by conspicuous oblique carina, sometimes reduced or vestigial. Marginal cells at least two times as long as the distance from its apex to wing tip. Tergal graduli present on T2 to T4 or T5. Wax plates on S2 and S3. *Ceratina* (*Calloceratina*) shares the strong pronotal carina with *C. (Crewella)* and *C. (Neoclavicera)*, but their species can be distinguished by de tibial carina in females, and the absence of pale marks on lower paraocular area and gena.

#### *chloris* species-group

**Diagnosis.** Small to moderate-sized species, body length ranges from 7.3-11.8; integument bright metallic green or bluish; yellow marks in females restricted to clypeus and legs; body densely punctated; clypeus with a narrow median longitudinal roughened area delimited by coarse punctures; metapostnotum microsculptured, basally rugoso-striate; preoccipital carina well developed; lateral areas of pronotum with strong carina forming lamella; metatibia in females with developed carina; graduli present on T2 to T4 or T5.

Male: Apical margin of T7 slightly emarginated, rounded, rarely truncated; preapical margin of S5 with or without acute processes.

#### *Ceratina* (*Calloceratina*) *chloris* (Fabricius, 1804)

(Figures 1-2)

*Megilla metallica* Fabricius, 1804: 334 ["homonym" *Megilla metallica* FABRICIUS 1804: 332]; MOURE 1960: 138 [species of Fabricius, as "n.syn." (in error)].

*Megilla chloris*; FABRICIUS 1804: 334 ["nom. nov." for *M. metallica* proposed in the same work: errata, page 18].

*Podalirius metallicus*; DALLA TORRE 1896: 276 [catalog].

*Ceratina* (*Calloceratina*) *chloris*; MOURE 1960: 138 ["comb."; "lectotype designation"; taxonomy]; SILVEIRA et al. 2002: 146 [Brazil bees checklist]; MOURE 2007: 638 [catalog].

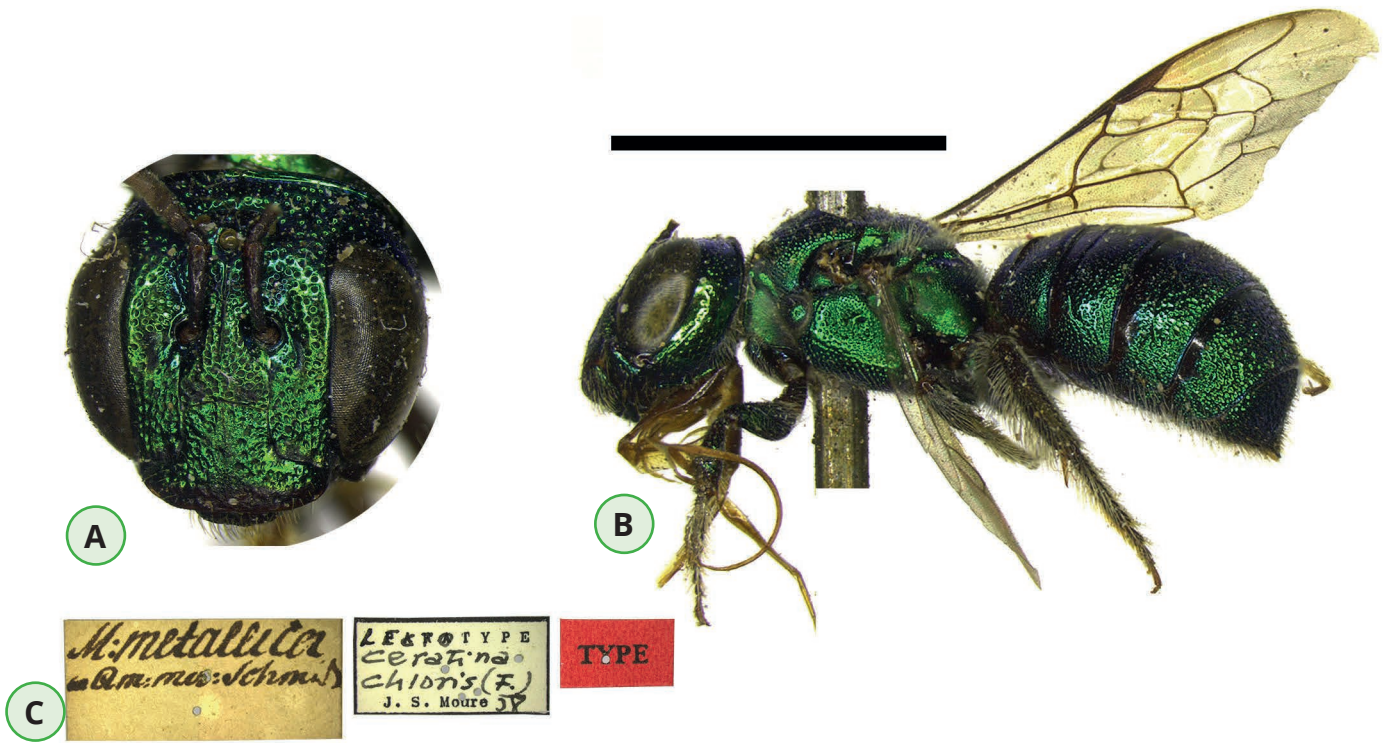
*Ceratina laeta* Spinola, 1841: 138; SMITH 1854: 227 [catalog]; 1862: 40 [distribution]; DALLA TORRE 1896: 199 [catalog]; DUCKE 1902: 361 [distribution, flower record]; SCHROTTKY 1902: 480, 481 [key, redescription]; COCKERELL 1905: 325 [key]; H.S. SMITH 1907: 119 [key, distribution]; SCHROTTKY 1909: 221 [taxonomy]; DUCKE 1910a: 84 [comparative note]; DUCKE 1910b: 363 [taxonomy]; FRIESE 1910: 696 [taxonomy]; STRAND 1910: 504 [taxonomy]; SCHROTTKY 1910: 88 [taxonomy]; COCKERELL 1914: 315 [taxonomy]; FRIESE 1916: 294, 322, 323 [taxonomy]; COCKERELL 1917: 475 [citation]; COCKERELL 1918: 685, 688 [key, taxonomy]; COCKERELL 1920: 176 [taxonomy]; FRIESE 1925: 19 [distribution, nest]; SCHWARZ 1934: 10, 11 [distribution, taxonomy]; SCHWARZ 1943: 33 [taxonomy]; COCKERELL 1949: 482 [taxonomy]; SILVEIRA et al. 2002: 147 [Brazil bees checklist, as *incertae sedis*]; GONZALEZ et al. 2004: 59 [citation].

*Ceratina* (*Calloceratina*) *laeta*; MICHENER 1954: 148 [Panama bees checklist, synonymy, taxonomy]; MOURE 1960: 138 [taxonomy]; HIRASHIMA 1971: 373 [taxonomy]; AYALA et al. 1996: 462 [Mexico bees checklist]; SILVEIRA et al. 2002: 147 [Brazil bees checklist, as *incertae sedis*].

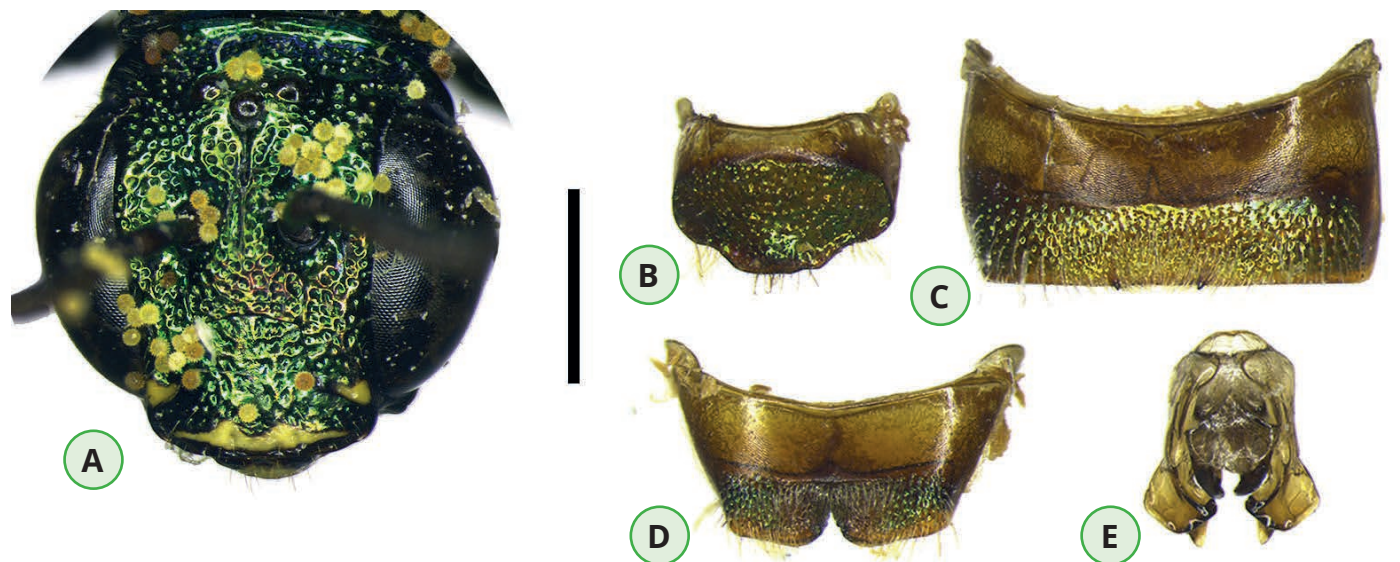
*Ceratina smaragdina* Smith, 1854: 226; DALLA TORRE 1896: 200 [catalog].

*Ceratina* (*Calloceratina*) *smaragdina*; MICHENER 1954: 148, 149 [Panama bees checklist, synonymy, taxonomy]; MOURE 1960: 139 [taxonomy].

*Ceratina viridula* Smith, 1879: 95; DALLA TORRE 1896, 201 [catalog]; SCHROTTKY 1902: 478, 481 [key, redescription];



**Figure 1.** Lectotype ♀ of *Ceratina (Calloceratina) chloris* (Fabricius). (A) head in frontal view; (B) lateral habitus; (C) labels attached to the specimen. Scale bar (B) = 5.0 mm. Credit T.Mahlmann.



**Figure 2.** Male of *Ceratina (Calloceratina) chloris* (Fabricius). (A) head in frontal view; (B) T7; (C) S5; (D) S6; (E) genital capsule. Scale bar = 1.0 mm. Credit T.Mahlmann.

COCKERELL 1905: 325 [key]; 1914: 315 [taxonomy]; COCKERELL 1918: 688 [taxonomy]; COCKERELL 1920: 176 [taxonomy, sp. reval.]; SILVEIRA *et al.* 2002: 147 [Brazil bees checklist, as *incertae sedis*].

*Ceratina (Calloceratina) viridula*; MICHENER 1954: 149 [Panama bees checklist, synonymy, taxonomy]; MOURE 1960: 139 [taxonomy].

*Ceratina laeta imperialis* Schrottky, 1909: 221.

**Diagnosis.** Integument bright metallic green or bluish, including lateral margins of labrum, base of mandible, and anterior inner third of tegula; sometimes disc of labrum with a small yellow spot; clypeus with a maculation ranging from a narrowed horizontal stripe to a large rounded or triangular spot; graduli present on T2 to T4.

Male: Apical margin of T7 slightly emarginated, sometimes truncated or rounded; preapical margin of S5 with two short

acute processes separated from each other by approximately 5-8x their own length (Figure 2B-C).

**Redescription.** Lectotype female: Body length 9.4; forewing length 6.4; clypeus approximately 1.4 times as wide as long; ocellocular distance 2.5 OD; ocelloccipital distance 2.2 OD.

**Color.** Integument bright metallic green including lateral margins of labrum, base of mandible, and anterior inner third of tegula; rest of labrum, mandible, and apical margin of clypeus brownish. Slight bluish reflections on frons and lateral areas of mesoscutum, near pronotal lobes. Tegula light brown, translucent; wing veins brown and wing membrane weakly brownish. Legs brownish with metallic green reflections, except on basitarsi. Metasoma bright metallic green; base of T2-T5 brownish with reddish-brown bands on preapical margins of T2 and T3, interrupted medially. Yellow marks on trochanters and a dorsal faded stripe on protibia.

**Pubescence.** Mostly whitish, yellowish on labrum, mandible,

metatibia, tarsi and apex of metasoma. Disc of propodeum with long hairs, lateral areas with short and dense hairs intermingled with long hairs more evenly distributed. Preapical margins of T3, on T4 and on lateral sides of T5 covered with brownish, short spatulate setae.

**Integumental surface.** Body coarsely punctate except as follows: large smooth and polished areas on genal area and disc of mesoscutum. Narrow longitudinal polished area on posterior margin of metapostnotum.

**Structure.** Maxillary palpus five-segmented. Graduli present on T2 to T4.

**Variation.** Integument slightly more metallic bluish, mainly in specimens from Brazil. Some specimens with metallic green reflections, including the lectotype of *Ceratina laeta*, on outer surface of metabasitarsi. Some specimens with coppery reflections on face and propodeum. Yellow marks: some specimens, mainly from Panama, have a rounded spot on disc of labrum; median apical margin of clypeus with a maculation ranging from a narrowed stripe to a large circle or triangle. Pubescence on T4 quite inconstant: some specimens from Peru and Brazil with short, whitish and sparse setae. Median longitudinal area of clypeus with integumental surface quite inconstant: coarse punctured intermingled with microsculptured areas poorly defined; some specimens with a median longitudinal narrow groove delimited by coarse punctures (specimens from Bolivia, Brazil and Colombia); clypeus with roughened area only on apical margin. Some specimens with pronotal carina less pronounced, laterally not forming lamella (Bolivia and Brazil). Body length ranges from 7.7 to 11.8.

**Male redescription.** Similar to female except as follows: three translucent brown spots at base of labrum; sometimes with yellow rounded spots at base of mandible and disc of labrum; apical margin of clypeus with a horizontal, broad yellow stripe, dilated upwards on disc and with a small notch at base; small subtriangular spots on lower paraocular area, over lateral expansions of clypeus, sometimes quite faded; absence of spatulate setae on metasoma; apical margin of T7 with three tufts of relatively long hairs; preoccipital carina more pronounced; metatibia with vestigial carina; apical margin of T7 slightly emarginated, sometimes truncated or rounded; preapical margin of S5 with two relatively short acute processes separated from each other by approximately 5-8x their own length; apical margin of S6 with a median wide inverted "V-shaped" notch (Figure 2D), sometimes slightly quadrangular; genital capsule as in figure 2E. Body length ranges from 7.3-9.8; forewing length 5.6-6.4; clypeus, measured at its base, approximately 1.5 times as wide as long; ocellular distance 2.8 OD; ocellocapital distance 2.5 OD. Male terminalia as in Figure 2B-E.

**Type locality.** "Ex. Am. Mer."; According to MOURE (1960), probably Guyana.

**Type material examined.** *Megilla metallica*: Type [handwritten, red label] // *M. metallica*, ex Am. Mer. Schmidt [handwritten] // Lectotype, *Ceratina chloris* (F.), J.S. Moure 58[1958] (Lectotype ♀, NHMD); *metallica* [handwritten] // Paratype [Paralectotype], *Ceratina chloris* (F.), J.S. Moure 1958 (Paralectotype ♀, NHMD); *Ceratina laeta*: Typus [red handwritten, white label and signed on the back side by Moure, 1958] // Red label without information // Museo Zoologia Torino - Italia // Coll. Spinola sc. 132, MRSN Torino ITALY // *Ceratina lata* [*laeta*], Ann. Soc. Ent. ♀, D.Buquat., Cayenne, M. Leprieur (Holotype ♀, MSNT); *Ceratina smaragdina*: Java [handwritten] // Java [handwritten, bluish label] // Holotype, *C. smaragdina* = *C. laeta* Spin., J.S. Moure 1957 (Holotype ♀, OUMNH); *Ceratina viridula*: Type [round label with orange margin] // B.M. TYPE HYM. 17B.327

// *Ceratina viridula*, Type Sm. [handwritten] // St. Paulo [handwritten, blue round label] (Holotype ♂, NHMUK).

**Additional material examined.** ARGENTINA: Misiones, Jan.23 - 29, 1986, Luis E. Peña (1♀ AMNH); Misiones, P.N. Iguazu, 52°40'S,+500 - 700, 54°27'W,+050-190, 07.x.2008, A. Taylor & N.Veiga, PCYU-NVS: 00960 // ARG-6828: 40 (1♀ MACN); *idem* 10.vii.2008, PCYU-NVS: 00971 // ARG-14512-35 (1♀ MACN); F5.97 // Misiones (1♀ MACN); F2.08 // Misiones (1♂ MACN); Misiones, D. Iguazu, Cataratas, De Crio-Viana, x.1954 (1♀ MACN); Misiones, Porto Iguazu, P.N. Iguazu, 25°40.561'S, 54°27.120'W, 14.viii.2009, N.Veiga, PCYU-NVS: 03958 // ARG-6828:41 (1♀ MACN); *idem* 03.vii.2009, PCYU-NVS: 03999 // ARG-6828:39 (1♀ MACN); *idem* 54°27.165'W, PCYU-NVS: 03966 // ARG-6828:42 (1♂ MACN); Misiones, Iguazu National Park, 25°40.878'S, 54°09.755'W, 27.xi.2007, A.Taylor, sweep, ant:471 (1♂ MACN); BOLIVIA: Bolivia (1♂ MACN); Santa Cruz Dept. [Departamento], Roboré, 40Km E, Santiago, 29 Nov. 2004, 640m, D.W. Roubik (1♀ MHNBA); Santa Cruz, Buena Vista, 8. vii.1973 // C.Porters, L.Stange, E.Demares // Colección, Inst. - Fund. M. Lillo, (4000) - S.M. Tucuman, Tucuman - Argentina (1♀ IFML); Santa Cruz Dept. [Departamento], Roboré, 60Km E, Tucavaca Val., 28 Nov. 2004, D.W. Roubik (1♀ MHNBA); Depto. [Departamento] Santa Cruz, Estac. Experimental General Saavedra, 9.vii.1972, C.Potter, L.Stange // Colección, Inst. - Fund. M.Lillo, (4000) - S.M. Tucuman, Tucuman - Argentina (1♀ IFML); Depto. [Departamento] Santa Cruz, El Palmar, 6. vii.1972, C.Potter, L.Stange // Colección, Inst. - Fund. M. Lillo, (4000) - S.M. Tucuman, Tucuman - Argentina (1♂ IFML); La Paz, Chulumani, 1,700m, 27.iii.1979, M. Cooper, B.M. 1979-216 (1♀ NHMUK); Santa Cruz Dept. Roboré- 40 KmE Santiago, 29. Nov.2004, 640m, DW Roubik # (1♀ MHNBA); La Paz, Chulumani, 1,700m, 2.iv.1979, M. Cooper, B.M 1979-216 (1♀ NHMUK); BRAZIL: Acre, Rio Branco, 30.x.1974, M.L. Oliveira // N° 0051 (1♀ INPA); [Amapá], Macapá, 19.5.1900, Ducke // Brazil, Estado do Pará // Coleção Ducke // MPEG, HYM, 11131518 (1♀ MPEG); [Amapá], Estado do Pará // Macapá, 19.v.1900, Ducke // Coleção Ducke // MPEG, HYM, 11131523 (1♀ MPEG); AP[Amapá], 01.xii.1981, I.S. Gorayeb e Equipe // Mata P1, Armadilha Suspensa 15m // MPEG- HYM 11131662 ♂ // *Ceratina* (*Calloceratina*) cf. *chloris* Det. Pires & Ramos, 2009 (1♀ MPEG); AM[Amazonas], Manaus, Univ.[Universidade] Amazonas, Trilha do viveiro, 14.i.2002 (11h50) // Verbenaceae: *Stachytarpheta australis*, Pena, MR (1♀ INPA); *idem* 06.xii.2001 (8h32), Euphorbiaceae: pião-pajé [probably *Jatropha podagrica* Hook.], Penas, MR & Oliveira, FPM (1♀ INPA); 5119 // 0148 // [Amazonas], A bordo do [Barco] Marupiara, R.[Rio] Demeni, R.[Rio] Negro, Em 11.9.[19]75, Col. F. Vieira (1♀ INPA); Bahia, Salvador, Bairro Patamares, Cond. Colina C; 12°57'1"S; 38°24'3"W; vii.2020, Mahlmann & Hipólito Leg. // Col. Em flor (11h): *Vitex* cf. *agnus-castus* L. (Lamiaceae) // *Ceratina* (*Calloceratina*) *chloris* (Fabricius, 1804), Det. T.Mahlmann, 2020 (1♂ INPA); Ab-15, MHS Ferreira // Bahia, Campus-UEFS, FSA. 12°12'10"S, 38°58'15"W ~ 243m, 9.ii.2007 (9:30h), Caatinga // *Pityrocarpa moniliformis* (Benth.) Luckow & Jobson (Leg.: Mimosoideae), Ind.: 27 Carga Pol.(.)N° // *Ceratina* (*Calloceratina*) *chloris* (Fabricius, 1804), Det. F.F. de Oliveira, 2010 (1♀ MHNBA); *idem* 11.ii.2007, 10:40 (1♀ MHNBA); BA[Bahia], Feira de Santana, Campus da UEFS (LABIO), 03.iv.2008, Janela vidro (2° andar), T. Mahlmann Leg. (1♀ MHNBA); *idem* 19.viii.2008 (1♀ MHNBA); *idem* 03.iv.2008 (1♀ MHNBA); Feira de Santana, BA[Bahia], 14.iv.2000, Lg. Leila Mara // MZUEFS #20871 (1♂ MZUEFS); Doutorado Juliana Hipólito, PPG Ecologia/UFBA #00337 // BA[Bahia], Ibicoara, Faz.[Fazenda] Muçambé, Data:17.xi.2012, GPS:, J.Hipólito e equipe Leg. // Col. Em flor de *Coffea arabica* L. (Rubiaceae) // *Ceratina* (*Calloceratina*) *chloris* Det. T.Mahlmann, 2015 (1♀ INPA); Bahia, Chapada Diamantina, Cascavel [Ibicoara state], Agropolo-Bagisa-Proj. FAO, Data: 16.i.2012, GPS:, azul[blue pantrap], Ponto: 2, 1200, U.Penna col. // FAO 03089 (1♀ MHNBA); *idem* Rafaela \*02598 // POLINFRUT, Data:22.ix.2011, ARCA azul[blue pantrap]: 3,

Ponto:2, Rafaela Santos *Leg.* (1♀ MHNBA); Bahia, Conceição do Almeida, 20.xi.2011, Rede entomológica, T.Santana & T. Oliveira *Leg.* (1♀ MHNBA); Ceará, P.N.[National Park] Ubajara, -3,83830°,- 40.89803° // 14 - 19.ii.2013, 843 m.a.[ altitude meters], ML Oliveira *Leg.* (1♂ INPA); Visitantes Florais, *G. barbadense*, Cenargen, 14046 - 41921 // Brasília, DF[Distrito Federal], 01.02.2008, A.C. Botelho // *Ceratina cf. chloris* (Fabricius, 1804), F.A. Silveira, det. 2009 (1♀ UFMG); Dist. Sta. Cruz 11191 - 33018 // Aracruz, ES[Espírito Santo], 08.09.2006 A.A. Azevedo (1♀ UFMG); Hotel Fazenda Mato Grosso, 6048, 16842 // Cuiabá, MT[Mato Grosso], 18.02.2000, F.A. Silveira (1♀ UFMG); *idem* 16843 (1♀ UFMG); *idem* 16841 (1♀ UFMG); Rio Caragnata, Matto [Mato] Grosso, Brazil, iii.1953, F. Plaumann // *Calloцерatina laeta* Spin., Det. J.S. Moure, 1957 (1♂ SEMC); Abelhas, Cerrado, Manesmann, Faz. Brejão, 5351 - 14667 // Brasilândia de Minas, MG[Minas Gerais], 04.11.1999, A.A. Azevedo (1♀ UFMG); Reinventário, EPDA[Research and Environmental Development Station] de Peti, 8685-26324 // São Gonçalo do Rio de Baixo / MG[Minas Gerais], 07/06/2002, C.F. Cardoso // *Ceratina (Calloцерatina) chloris* ♀ (Fabricius, 1804) C.F. Cardoso, det. 2006 (1♀ UFMG); São Gonçalo do Rio de Baixo / MG[Minas Gerais], 07/06/2002, C.F. Cardoso // *Ceratina (Calloцерatina) chloris* ♂ (Fabricius, 1804) C.F. Cardoso, det. 2006 // Reinventário, EPDA[Research and Environmental Development Station] de Peti, 8686-26325 (1♂ UFMG); Reinventário, EPDA [Research and Environmental Development Station] de Peti, 9996 - 29332 // São Gonçalo do Rio Baixo, MG[Minas Gerais], 23.02.2004, G.M. Yazbeck // *Ceratina (Calloцерatina) chloris* (Fabricius, 1804) ♀, L.M. Santos, det. 2006 (1♀ UFMG); Reinventário, EPDA[Research and Environmental Development Station] de Peti, 10007 - 29348 // São Gonçalo do Rio Baixo, MG[Minas Gerais], 23.02.2004, G.M. Yazbeck // *Ceratina (Calloцерatina) chloris* (Fabricius, 1804) ♀, L.M. Santos, det. 2006 (1♀ UFMG); Reinventário, EPDA[Research and Environmental Development Station] de Peti, 10293 - 30121 // São Gonçalo do Rio Baixo, MG[Minas Gerais], 07.06.2002, R. Loyola // *Ceratina (Calloцерatina) chloris* (Fabricius, 1804) ♀, R. Loyola det., 2002 (1♀ UFMG) NE 02, 02.10.2003, 10:20, Barbadense, Paraíba, CG[Campina Grande] // Campina Grande, PB[Paraíba], 02.10.2003, Algodão Barbadense // *Ceratina (Calloцерatina) chloris* (Fabricius, 1804), A. Silveira, det. 2004 (1♀ UFMG); *idem* 29.02.03, 10:30, Mocó, Paraíba // 29.02.2003, Algodão Mocó (1♀ UFMG); *idem* NE 03, 30.09.03, 10:30 (2♀ UFMG); *idem* 01.10.03, 09:30 (2♀ UFMG); *idem* 02.10.03, 09:00 (1♀ UFMG); *idem* 02.10.03 (1♀ UFMG); *idem* 03.10.03, 09:00 (1♀ UFMG); *idem* 03.10.03, 10:30 (2♀ UFMG); *idem* 02, 06.10.03, 09:00 (1♀ UFMG); *idem* 03, 07.10.03, 09:30 (1♀ UFMG); *idem* 07.10.03 10:45 (1♀ UFMG); *idem* 08.10.03, 09:00 (1♀ UFMG); *idem* 08.10.03, 10:30 (1♀ UFMG); 08.10.03 9:00 (1♀ UFMG); *idem* 14.10.03, 09:00 (1♀ UFMG); *idem* 15.10.03, 09:45 (2♀ UFMG); *idem* 20.10.03, 09:00 (1♀ UFMG); *idem* 22.10.03, 9:00 (1♀ UFMG); *idem* 20.10.03, 10:00 (1♀ UFMG); *idem* 21.10, 10:00 (1♀ UFMG); *idem* 22.10.03, 10:30 (1♀ UFMG); *idem* 23.10.03, 10:20 (1♀ UFMG); *idem* 24.10.03, 10:00 (2♀ UFMG); *idem* Mustelinum, 29.09.03, 09:00 (1♀ UFMG); *idem* 03.10.03, 10:30 (1♀ UFMG); *idem* 07.10.03, 09:30 (1♀ UFMG); *idem* 07.10.03, 10:45 (1♀ UFMG); 08.10.03, 09:00 (1♀ UFMG); *idem* 09.10.03, 09:30 (1♀ UFMG); *idem* 09.10.03, 10:45 (2♀ UFMG); *idem* 13.10.03, 09:30 (1♀ UFMG); *idem* 15.10.03, 10:45 (1♀ UFMG); *idem* 16.10.03, 10:20 (1♀ UFMG); *idem* 20.10.03, 9:00 (1♀ UFMG); *idem* 22.10.03, 09:20 (2♀ UFMG); *idem* 12.04.05, 10:30h (1♀ UFMG); *idem* 23.10.03, 10:20 (1♀ UFMG); *idem* 15.04.05, 10:35h (1♀ UFMG); *idem* 15.04.05, 10:35 (1♀ UFMG); Barbadense, 29.09.03, 09:00 (1♀ UFMG); *idem* 29.09.03, 10:30 (1♀ UFMG); *idem* 30.09.03, 09:00; *idem* 01.10.03, 09:30 (3♀ UFMG); *idem* 02.10.03, 09:00 (2♀ UFMG); *idem* 02.10.03, 09:00 (1♀ UFMG); *idem* 03/02.10.03, 10:20 (1♀ UFMG); *idem* 03.10.03, 09:00 (3♀ UFMG); *idem* 02, 03.10.03 (1♂ UFMG); *idem* 03 06.10.03, 09:00 (1♀ UFMG); *idem* 02, 06.10.03, 10:00 (1♀ UFMG); *idem* 11, 06.10.03, 10:00 (1♀ UFMG); *idem* 03, 07.10.03, 09:30 (1♀ UFMG); *idem* 07.10.03, 10:45 (1♀ UFMG); *idem* 08.10.03, 09:00 (1♀ UFMG); 08.10.03, 10:30 (3♀ UFMG); *idem* 09.10.03, 10:45 (1♂ UFMG); *idem* 14.10.03, 09:00 (2♀ UFMG); *idem* 14.10.03, 01:45 (3♀ UFMG); *idem* 15.10.03, 10:45 (1♀ UFMG); *idem* 20.10.03, 09:00 (1♀ UFMG); *idem* 02, 21.10.2003 (1♀ UFMG); *idem* 21.10.03 (1♀ UFMG); *idem* 21.10.02, 10:30 (1♂ UFMG); *idem* 22.10.2003, 10:30 (1♂ UFMG); *idem* 03, 22.10.03 (1♀ UFMG); *idem* 02, 22.10.2003, 10:30 (1♀ UFMG); *idem* 03, 24.10.03, 10:00 (1♀ UFMG); Barbadense, 11.4.05, 10:17h // 39 // Campina Grande, PB[Paraíba], 11.04.2005, Algodão Barbadense // *Ceratina (Calloцерatina) chloris* (Fabricius, 1804) ♀, C.F. Cardoso, det. 2006 (1♀ UFMG); *idem* 12.04.05, 08:40h, 48, (1♀ UFMG); *idem* 12.04.05, 10:30h, 19 (1♀ UFMG); *idem* 12.04.05, 08:40, 47 (1♀ UFMG); *idem* 13.04.05, 10:00, 63, (1♀ UFMG); *idem* 14.04.05, 10:34, 76 (1♀ UFMG); *idem* 15.04.05, 10:35, 82 (1♀ UFMG); *idem* 81 (1♀ UFMG); *idem* 19.04.05, 12:10, 113 (1♀ UFMG); *idem* 112 (1♀ UFMG); *idem* 111 (1♀ UFMG); 114 (1♀ UFMG); 27.04.05, 11:15, 132 (1♀ UFMG); *idem* 28.04.05, 11:15, 143 (1♀ UFMG); *idem* 02.05.2005, 11:10, 191 (1♀ UFMG); *idem* 09.05.05, 11:15h, 229 (1♀ UFMG); *idem* 230 (1♀ UFMG); *idem* 228 (1♀ UFMG); *idem* 10.05.05, 11:10, 256 (1♀ UFMG); *idem* 258 (1♀ UFMG); *idem* 243 (1♀ UFMG); *idem* 246 (1♀ UFMG); *idem* 13.05.05, 11:10, 267 (1♀ UFMG); *idem* 275 (1♀ UFMG); *idem* 276 (1♀ UFMG); *idem* 18.05.05, 11:00, 284 (1♀ UFMG); *idem* 20.05.05, 11:00, 320 (1♀ UFMG); *idem* 304 (1♀ UFMG); *idem* 308 (1♀ UFMG); *idem* 305 (1♀ UFMG); *idem* 306 (1♀ UFMG); *idem* 329 (1♀ UFMG); Paraíba, J.[João] Pessoa, vii - 955, Pe. Pereira (1♀ MZUSP); 20909 // PB[Paraíba], Rio Tinto, APA Mamanguape, Miriri, 21.iv.2002, M.C.M. Silva col. (1♀ UFPB); *idem* 20910 (1♀ UFPB); *idem* 20911 (1♀ UFPB); *idem* 20908 (1♂ UFPB); 13500 // PB[Paraíba], João Pessoa, Bairro dos Estados, Mata, 11. iii.2005, M.S. Silveira col. (1♀ UFPB); 10749 // PB[Paraíba], João Pessoa, Bairro dos Estados, Rua, 02.x.2004, M.S. Silveira col (1♂ UFPB); 11574 // PB[Paraíba], João Pessoa, Água Fria, Rua, 01.xii.2004, M.S. Silveira col. (1♂ UFPB); Obidos, baixo Amazonas, Pará, Dirings, NOV 1960 (1♀ MZUSP); Obidos // Brazil, Estado do Pará // Coleção Ducke // MPEG-HYM 11131520 (1♂ MPEG); Obidos, (Traira), Estº Para, Dirings, Fev., 1961 (1♀ MZUSP); PA[Pará], Obidos, Faz. Pajurá, 1°37'21"S, 55°23'14"W, 5 - 11.ix.2001 // Malaise, J.A. Rafael & J.F. Vidal *Leg.* (1♀ INPA); Obidos // Brazil, Estado do Pará // Coleção Ducke // MPEG-HYM 11131524 (1♀ MPEG); Pará, 20.6.1902, Ducke // Coleção Ducke // MPEG-HYM 11131522 (1♀ MPEG); Brazil, Estado do Pará // Oyapock [Oiapoque], 6.6.1904, Ducke // Coleção Ducke // MPEG-HYM 11131521 (1♀ MPEG); Pará, 2.4.1900, Ducke // Coleção Ducke // MPEG, HYM, 11131519 (1♀ MPEG); PA[Pará], Peixe-Boi, 15.iv.1977 // Pará, WL Overal // *Ceratina cf. chloris* (Fab.) det. Camargo, 82 // MPEG-HYM 11131516 (1♀ MPEG); [Pará], Óbidos, // P.Herbst Collection Ex. Reed // *Ceratina laeta* Spin. ♀, det.Ducke, 1908 // Obidos, Brazil (1♀ CASC); Paraná, Foz do Iguazu, 26.iv.1964, C.E. & E.S.Ross (2♀ CASC); *idem* 25.iv.1964, C.E. & E.S.Ross (1♂ CASC); Igarassu, PE[Pernambuco], Usin. S. José; Piedade, 21.05.2007, P.Y. Ojima, *Leg.* // L125 P1362 *Gurania bigoniacea [bignoniacea]* // *Ceratina (Calloцерatina) chloris* (Fabricius, 1804), A420 ♀, P.Y Ojima det. 2010 (1♀ UFPE); *idem* 39871 UFPE (1♀ UFPE); *idem* 39769 UFPE (1♀ UFPE); Rio de Janeiro State, Mangaratiba, vii.1968, M. Alvarenga (1♀ AMNH); PUC, RS [Rio Grande do Sul], 10.12.1993, A. Grossman *leg.* // 7990, H:16, F:14, 10° // *Ceratina chloris* (Fabricius, 1804), Schindwein det., 1994 (1♀ MCP); Porto Alegre, PUC, RS [Rio Grande do Sul], 3.i.1995, Mardiore Pinheiro // 9630, H:18, F:14, 1045 // *Ceratina (Calloцерatina) chloris* (Fabricius, 1804), ♀, Schindwein det., 1996 (1♀ MPC); PUC, RS[Rio Grande do Sul], 8.11.1993, A. Grossman *leg.* // 7855, H:16, F:14, 15-1530 // *Ceratina chloris* (Fabricius, 1804), Schindwein det., 1994 (1♀ MCP); Porto Alegre, PUC, RS[Rio Grande do Sul], 3.1.1995, Mardiore Pinheiro // 9632, H:18, F:14, 1045 // *Ceratina (Calloцерatina) chloris* (Fabricius, 1804), ♀, Schindwein det., 1996 (1♀ MPC); Porto Alegre, PUCRS, RS [Rio Grande do Sul], 15.i.1997, Santos C.G. col. // Planta: *Merremia dissecta* // *Ceratina chloris* // MCT,

PUCRS, 105530 (1♀ MCP); Porto Alegre, PUCRS, RS [Rio Grande do Sul], 15.i.1997, Santos C.G. col. // MCT, PUCRS, 105529 (1♀ MCP); Porto Alegre, PUCRS, RS [Rio Grande do Sul], 15.i.1997, Santos C.G. col. // Planta: *Merremia dissecta* // MCT, PUCRS, 105536 (1♀ MCP); Horto, AES, Triunfo, [Rio Grande do Sul], 18.xii.02, Alvarez A.D. col. // Área Degradada, Flor tubular roxa, H: 10:30 - 12:00 // *Ceratina* spp. // MCT, PUCRS, 105540 (1♀ MCP); Porto Alegre, PUCRS, RS [Rio Grande do Sul], 14.i.1997, Santos C.G. col. // Planta: *Merremia dissecta* // *Ceratina chloris* // MCT, PUCRS, 105531 (1♀ MCP); Porto Alegre, PUC, RS [Rio Grande do Sul], 27.12.1994, Mardiore Pinheiro // 9637, H:18, F: 14, 8:30 // *Ceratina* (*Calloceratina*) *chloris* (Fabricius, 1804), ♀, Schindwein det., 1996 (1♀ MPC); Porto Alegre, PUC, RS [Rio Grande do Sul], 3.i.1995, Mardiore Pinheiro // 9631, H:18, F:14, 1045 // *Ceratina* (*Calloceratina*) *chloris* (Fabricius, 1804) ♀, Schindwein det., 1996 (1♀ MPC); Roraima, FLONA [National Forest] Roraima, 2.94135°N, 61.62780°W // Rio Mucajai, 18 - 21.xii.2017, M.L. Oliveira & F.F. Xavier F. Leg. (1♀ INPA); 12.704 // *Ceratina laeta* Spin. ♀ (*affinis*) // 97458 // SP [São Paulo], Avanhandava, 1903, Barbe Leg. (1♀ MZUSP); St. [São Paulo] // F. Sm. Coll., 79 - 22 // C. (*Calloceratina*) *chloris* (Fabricius.), Pe. J. S. Moure 1972 (1♂ NHMUK); Araçatuba, SP [São Paulo], X - 61, Rio Jacarecatinga, Lane & Rabello col. // Coleção J. Lane (1♀ MZUSP); COLOMBIA: *Ceratina chloris* Fabr. P.D. Hurd, 59 [1959] // Villavicencia, [Meta], Alt. 500 m (1♀ MEFLG); Porce. Ant., Santa Lucia R.b, 10 - 12 m. Pescado, 27.08.1997, Allan Smith P. ♀ // Anthophoridae, Xylocopinae, Ceratinini, *Ceratina*, Msp.1 00578 (1♀ MEFLG); Copacabana (Ant.), en *Epiphyllum truncatum*, Abr.1982, J. Cardona // 477 (1♀ MEFLG); Porce., Ant., Cancana RB., 10 - 12, Pescado, 2.07.1997, Allan Smith P. ♀ // Anthophoridae, Xylocopinae, Ceratinini, *Ceratina*, Msp.1 00575 (1♀ MEFLG); Porce., Ant., Normandia, R.b, 8 - 10 a.m., Pescado 30.10.1997, Allan Smith P. ♀ // Anthophoridae, Xylocopinae, Ceratinini, *Ceratina*, Msp.1 00585 (1♀ MEFLG); Slèv. 23.II.10 // C.T. Trechmann, Bequest, B.M. 1964-549 (1♀ NHMUK); Slèv. 23. II.10 // C.T. Trechmann, Bequest, B.M. 1964-549 (1♀ NHMUK); Rionegro, Ant., en *Baccharis* sp., Jun.1975, J. Caro // 2602 // ♀ (1♀ MEFLG); Porce., Ant., La Picardia, R.a. 10 - 12 a.m., Pescado, 1.10.1997, Allan Smith P. ♀ // Anthophoridae, Xylocopinae, Ceratinini, *Ceratina*, Msp.1 00582 (1♀ MEFLG); COSTA RICA: Puntarenas Banco, Tiskita, 25m, 8°21'21"N, 83°8'6"W, 20 - 25.FEB.2000, C. Michener, CR1M00 003 // SMO 151731, KUNHM-ENT // *Ceratina* (*Calloceratina*) sp., det. RW Brooks 19 (1♀ SEMC); FRENCH GUIANA: Kourou, Beach NW., 2.Jun.77, D. Roubik, No.23 // HDJ // *Ceratina* (*Calloceratina*) *chloris* (Fabr.) ♀ det. H.V. Daly 1978 (1♀ MHNBA); Kourou, x.11.1976, C.D. Michener, larvae in colln (1♀ SEMC); Kourou, 22.May.1981, D. Roubik, No.7 (2♀ MHNBA); Kourou (beach) 2.March.1977, C.D. Michener // *Ceratina chloris*, wing No2, Bryan N. Danforth (1♀ SEMC); Montagne de Père, Kourou, X.10.1976, Otis, Winston & C.D. Michener (1♀ SEMC); Kourou (beach), 2. March.1977, C.D. Michener (1♀ SEMC); GUYANA: on *Vernonia* sp., Mazaruni: Teak Plantation, 15.viii.1937 // Coll. Richards & Smart, B.M. 1937-776 (1♀ NHMUK); PANAMA: *Ceratina laeta* Spin. // F. Sm., Coll. 79 - 22 // C. (*Calloceratina*) *chloris* (F.), Pe. J.S. Moure, 1972 (1♀ NHMUK); Panamá // Smith coll., pres. By Mrs. Farren White., 99 - 303 (1♀ NHMUK); Panama: Veraguas Prov., Coibita Is., 15.Apr.2008, baits D. Roubik coll. #37 (5♀ MHNBA); Veraguas Prov., Coibita (Rancheria) Is., Apr.11 - 16.2008, #, D.W. Roubik collector (1♀ MHNBA); Sakai, 2211 (1♀ MHNBA); *idem* 2212 (1♀ MHNBA); Pueblo Nuev, Pan. Pr., Pan., iv-13- 1945, C.D. Michener // *Ceratina laeta* Spin, Det: C.D. Michener, 51 [1951] (1♀ SEMC); PARAGUAY: Concepción: Cororõ, 25.ii. - 1.iii.1997, B. Garcete coll. // *Ceratina* sp. ♀ (*Calloceratina*), Det. A.H. Smith-Pardo (1♀ SEMC); Independência, II.20.1950, J. Foerster (1♀ SEMC); PERU: [Huanuco], Monzon Valley, Tingo Maria, 23.ix.1954 // E.I.Schlinger & E.S.Ross collectors (1♀ CASC); Departamento de Junin, 6.4km E. Acobamba, 31.xii.1954, E.I.Schlinger and E.S.Ross (1♀ CASC); Junín Dept.[Departamento], La Merced,

4Km NE, La Merced Rd., 900m, 11°1'18"S, 75°19'0"W, 15. OCT.1999, R. Brooks, D. Bizoska, PERU 1B99 025, ex: on Orange Daisy // SMO 148001, KUNHM - ENT (1♀ SEMC); Junín Dept.[Departamento], La Merced, 4Km NE, La Meced Rd., 900m 11°1'18"S, 75°19'0"W, 15.OCT.1999, R. Brooks, D Bizoska, PERU 1B99 025, ex: on Orange Daisy // SMO 147982, KUNHM-ENT (1♀ SEMC); [Loreto], Iquitos, 26.7.1906, Ducke // Peru amazônico // Coleção Ducke // MPEG, HYM, 11131517 (1♀ MPEG); Madre de Dios, Boca Magu Airstrip, Alto Madre de Dios River, 220m, 12°17'3"S, 71°53'6"W, 27.OCT.2000, R. Brooks, PERU 1B00 114, ex: on wet sand near river // SMO 257087, KUNHM - ENT // *Ceratina* (*Calloceratina*), Det. A.H. Smith - Pardo (1♀ SEMC); TRINIDAD AND TOBAGO: Trinidad: Port of Spain., 6.iii.1933. J. Ogilvie, B.M. 1933-305 (1♀ NHMUK); Arima Valley, Trinidad, B.W.I. 9.iii.1951 // Grift of New York Zoo. Soc. Dept., Tropical Research, William Beebe, Dir. (1♀ AMNH); Tobago, Old Grange Tower // West Indies: Tobago, 1-4.ii.1931, Capt A.K. Totton, B.M. 1931-183 (1♀ NHMUK).

**Distribution.** Argentina (Misiones); Bolivia (La Paz, Santa Cruz); Brazil (Acre, Amazonas, Amapá, Bahia, Ceará, Distrito Federal, Espírito Santo, Minas Gerais, Mato Grosso, Pará, Paraíba, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Sul, Roraima, São Paulo); Colombia (Antioquia, Meta); Costa Rica (San José, Tiskita); French Guiana (Cayenne, Kourou); Guyana; Panama (Coclé, Panamá, Sakai, Veraguas); Paraguay (Alto Paraná, Concepción, Independencia); Peru (Huánuco, Junín, Loreto, Madre de Dios); Trinidad and Tobago (Trinidad, Tobago); Venezuela (not stated).

**Comments.** FABRICIUS (1804), in the original description, did not indicate how many specimens were studied and the type locality, referring only to "America meridionali". According to MOURE (1960), observing the history of the type material described by Fabricius, probably it was collected in Guyana. In the same work, Moure designated the lectotype and a "paratype", but in fact it should be interpreted as a paralectotype, both deposited in the NHMD. Moure also gave the status of "N. Syn." for *Megilla metallica*, probably a typographical error. Among the species studied, this was the most abundant and with the largest area of occurrence. The whereabouts of the type of *C. laeta imperialis* Schrottky is unknown (MOURE 2007), and its study was based on the original description. According to the variations observed, it is possible that *C. chloris*, as interpreted here, could be a repository of cryptic species. Because it is a very difficult group to study and because it is not possible to establish a pattern among the variations, further studies including DNA analysis, will be necessary to confirm more surely if it corresponds to a polymorphic species or several cryptic species.

#### *Ceratina* (*Calloceratina*) *triangulifera* Cockerell, 1914

(Figures 3-4)

*Ceratina triangulifera* Cockerell, 1914: 315; COCKERELL 1931: 549 [comparative note].

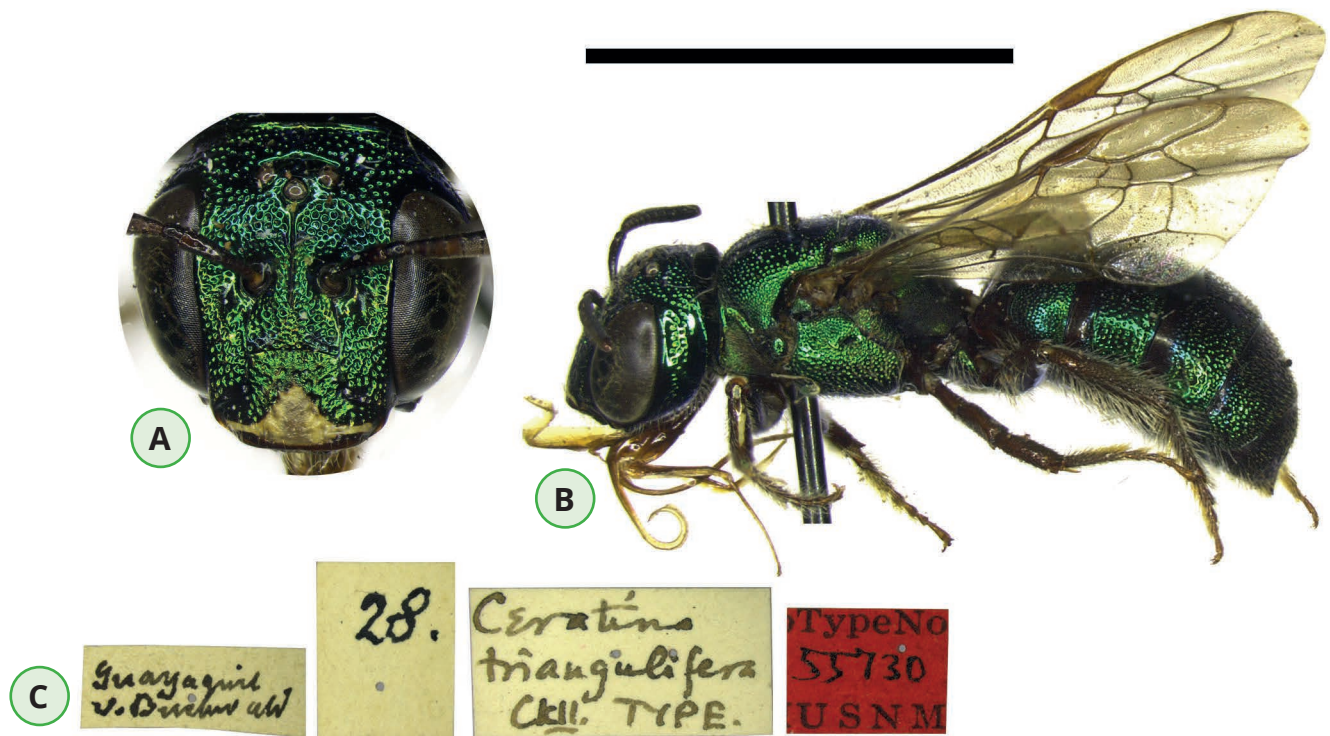
*Ceratina ecuadoria* Friese, 1916: 323; COCKERELL 1931: 549 [synonymy].

*Ceratina* (*Calloceratina*) *triangulifera*; MOURE 2007: 639 [catalog].

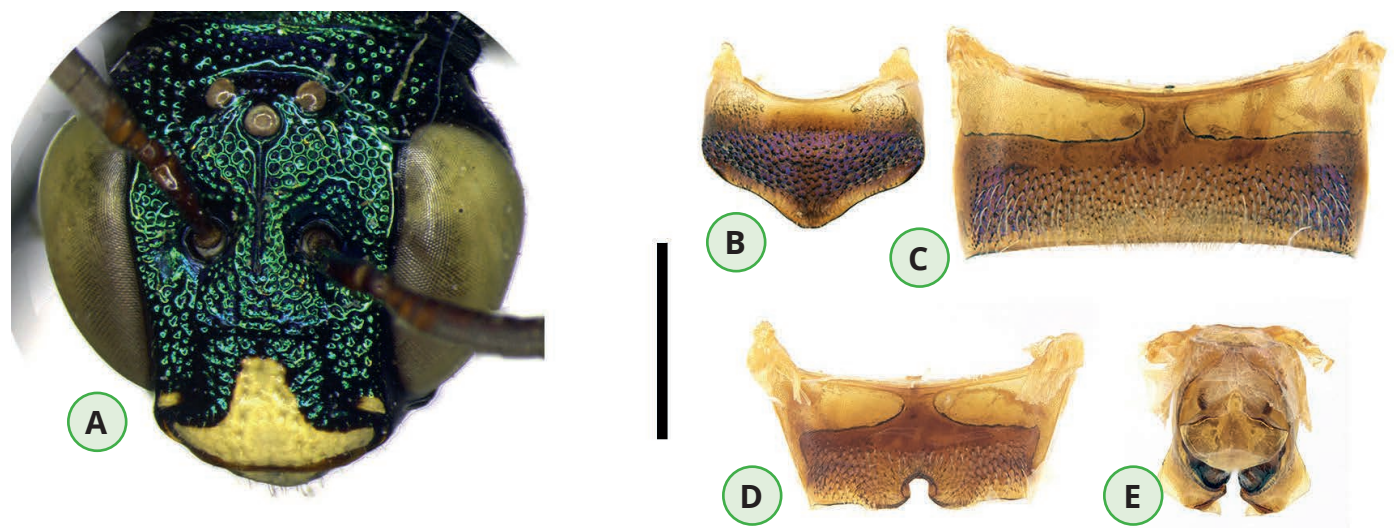
**Diagnosis.** Integument bright metallic green including base of mandible, with slight metallic bluish reflections; disc of labrum with small, rounded spot; clypeus with a large yellow triangular maculation expanded towards its lateral expansions; graduli present on T2 to T5.

Male: Apical margin of T7 narrow and slightly emarginated or rounded. Preapical margin of S5 without acute processes (Figure 4B-C).

**Redescription.** Holotype female (Figure 3): Body length 8.4;



**Figure 3.** Holotype ♀ of *Ceratina (Calloceratina) triangulifera* Cockerell. (A) head in frontal view; (B) lateral habitus; (C) labels attached to the specimen. Scale bar (B) = 5.0 mm. Credit T.Mahlmann.



**Figure 4.** Male of *Ceratina (Calloceratina) triangulifera* Cockerell. (A) head in frontal view; (B) T7; (C) S5; (D) S6; (E) genital capsule. Scale bar = 1.0 mm. Credit T.Mahlmann.

forewing length 6.0; clypeus approximately 1.4 times as wide as long; ocellular distance 2.7 OD; ocelloccipital distance 2 OD.

**Color.** Integument bright metallic green, including base of mandible, with slight metallic bluish reflections; labrum, mandible, apical margin of clypeus and disc of T2-T4 brownish. Slight coppery reflections on lower half of face and propodeum. Tegula light brown, translucent; wing veins brown and wing membrane weakly brownish. Legs brownish with metallic green reflections on coxae, trochanters, outer surface of femora, imperceptible depending on viewing angle, and protibia. Reddish-brown bands on preapical margins of T2 and T3, interrupted medially. Dorsopical surface of profemur with a triangular yellow spot; dorsobasal surface of tibiae with a rounded yellow spot, near to articulation with femora, faded in mesotibia; dorsal yellow stripe on protibia.

**Pubescence.** Mostly whitish, yellowish on labrum, mandible, tarsi, and apex of metasoma. Disc of propodeum with long hairs, lateral areas with short and dense hairs intermingled

with long hairs more evenly distributed. T4-T6 covered with short yellowish setae, spatulate on T4 and sides of T5.

**Integumental surface.** Body coarsely punctate except as follows: large smooth and polished areas on genal area and disc of mesoscutum. Narrow longitudinal polished band on posterior margin of metapostnotum.

**Structure.** Maxillary palpus five-segmented. Preoccipital carina well pronounced. Lateral areas of pronotum with carina strongly pronounced forming lamella. Metatibia with developed carina. Graduli present on T2 to T5.

**Variation.** Yellow mark on labrum sometimes absent. Rounded spot on tibiae more evident in some specimens. Body length ranges from 7.9-9.6.

**Male description.** Similar to female except as follows: metallic bluish reflections and yellow marks more evident; three translucent brown spots at base of labrum, the middle one smaller; labrum almost entirely pale yellow; pale yellow stripe at base of mandible, near inner margin; maculation on clypeus

broader in its lateral expansions; small whitish subtriangular spots on lower paraocular area, over lateral expansions of clypeus; disc of tegula with small whitish rounded spot; preoccipital carina more pronounced; metatibia with reduced carina; apical margin of T7 narrow and slightly emarginate or rounded; preapical margin of S5 without acute processes, but apparently with a couple of scars (Figure 4C); apical margin of S6 with a wide quadrangular notch medially (Figure 4D); genital capsule as in figure 4E. Body length 8.4; forewing length 5.8; clypeus approximately 1.3 times as wide as long; ocellular distance 2.4 OD; ocellocipital distance 1.7 OD. Male terminal structures as in Figure 4B-E.

**Type locality.** Ecuador: Guayas, Guayaquil.

**Type material examined.** *Ceratina triangulifera*: Guayaquil, v. Buchwald [handwritten] // 28 [handwritten] // *Ceratina triangulifera* Ckll. Type [handwritten] // Type 55730 USNM [red label] // Loan from USNMNH 2054346 (Holotype ♀, NMNH); *Ceratina ecuadoria*: Ecuador, Guayaquil [Guayaquil], 1901, Buchwald // *Ceratina ecuadoria* ♀, 1915 Friese Det. [handwritten] // Typus [orange label] // Zool. Mus. Berlin [yellow label] (Syntype ♀, ZMB); Ecuador, Guayaquil [Guayaquil], 3.1901, Buchwald // *Ceratina ecuadoria* ♂, 1915 Friese Det. [handwritten] // Typus [orange label] // Zool. Mus. Berlin (Syntype ♂, ZMB).

**Additional material examined.** ECUADOR: Guayaquil, 1923, Buchwald, *Cucurbita* // *Ceratina laeta* V. *ecuatoria*, ♀ 1910, Friese det. // Coll. Friese // Zool. Mus. Berlin (1♀ ZMB); Guayaquil, 4.1923, Buchwald, *Cucurbita* // *Ceratina laeta* V. *ecuatoria*, ♀ 1910, Friese det. // Zool. Mus. Berlin (1♀ ZMB); *idem Ceratina laeta* V. *ecuatoria*, ♀ 1909, Friese det. // 97459 (1♀ MZUSP); Guayaquil, 3.1901, Buchwald // *Ceratina laeta* Friese det. (1♀ MACN); Guayas, Naranjal, iv.1985, Legit: G. Onore // QCAZ I 18971 (1♀ QCAZ); Loja, Vilcabamba, Legit: Onore // QCAZ I 18948 (1♀ QCAZ); Manabí, Portoviejo, viii.1985, Legit: L.Coloma // QCAZ I 18935 (1♀ QCAZ); *idem* QCAZ I 18943 (1♀ QCAZ); *idem* QCAZ I 18942 (1♀ QCAZ); *idem* 006 // QCAZ I 64441 (1♀ QCAZ); *idem Ceratina* det. D.W. Roubik, 1991 // QCAZ I 18934 // *Ceratina* (*Calloceratina*) det. J.S. Ascher, 2012 (1♀ QCAZ); Manabí, 5.xii.1985, Legit: J. Ullos // QCAZ I 18936 (1♀ QCAZ); Pichincha, Endesa, 700m, 00°05'00"N, 79°02'00"W, 4 Julio, 2003, P. Santacruz // QCAZ I 64446 (1♀ QCAZ). PERU: Lambayeque, 1km S. Lambayeque, Carretera Panamericana, 23.vii.1975, col. C.Poter, L.Stange // Colección, Inst. - Fund. M. Lillo, (4000) - S. M. Tucuman, Tucuman - Argentina (1♀, 1♂ IFML); [Lambayeque], 10km S. of Chiclayo, iii.19.1951 // Ross and Michaelbacher Collectors (3♀♀, 1♂ CASC); 5mi S. of Chiclayo, Lambayeque, 20m., i.17.1955 // E.I.Schlinger and E.S.Ross (1♀ CASC); Samne, ca. 40km NE Trujillo Provincia, La Libertad, 7°59'S, 78°41'W, elev. Ca. 1500m, 12 - 17 July, 1975, C.Porter, L.Stange // Colección, Inst. - Fund. M. Lillo, (4000) - S. M. Tucuman, Tucuman - Argentina (2 ♂♂ IFML).

**Distribution.** Ecuador (Guayas, Loja, Manabí, Pichincha); Peru (La Libertad, Lambayeque).

**Comments.** COCKERELL (1914), in the original description, did not report how many specimens were studied, describing only the type female. It differs from *C. (Calloceratina) chloris* by the very distinct pigmentation of the face and legs in both sexes, smaller ocellocipital distance compared to the ocellular distance (subequal in *C. (Calloceratina) chloris*), graduli present on T2 to T5 and for the difference in morphology of male terminalia structures.

#### *silveirai* species-group

**Diagnosis.** Moderate-sized species, body length ranges from 9.3-11.5; integument bright metallic green; yellow marks in females, when present, limited to clypeus and trochanters; body sparsely punctate leaving large, polished spaces

between punctures especially on front and vertex (distance between punctures approximately equal to or wider than 1 DO); metapostnotum finely reticulate, sometimes almost polished and with a weak median carina; dorsoapical teeth of pro and mesotibia greatly asymmetric, the upper one much longer, mainly on females; graduli present on T2 to T4.

Male: Apical margin of T7 gently emarginate to almost straight with a short median angular projection; preapical margin of S5 without acute processes, apical margin broadly emarginate or deeply notched medially (Figures 6D-E, 8D-E).

#### *Ceratina (Calloceratina) silveirai* Mahlmann & Oliveira, F.F., n. sp.

[urn:lsid:zoobank.org:act:CF9F033F-BC7A-4161-8190-E82A3A670816](https://doi.org/10.3896/urn:lsid:zoobank.org:act:CF9F033F-BC7A-4161-8190-E82A3A670816)

(Figures 5-6)

**Diagnosis.** Clypeus sometimes with a narrow yellow, horizontal stripe on apical margin, and with a median longitudinal slightly depressed, smooth, polished area delimited by coarse punctures; metapostnotum finely reticulate, almost polished and with a weak median carina; lower interocular distance larger than superior, inner orbits of compound eyes divergent below giving the head a square aspect; metatibia with developed carina.

Male: Apical margin of T7 gently emarginate with a short median angular projection; apical margin of S5 with a deeply "U-shaped" notch medially (Figure 6D-E).

**Description.** Holotype female (Figure 5): body length 10.4; forewing length 7.1; clypeus approximately 1.9 times as wide as long; ocellular distance 2.3 OD; ocellocipital distance 2.6 OD.

**Color.** Integument evenly bright metallic green including lateral margins of labrum, base of mandible, and anterior inner third of tegula; rest of labrum, mandible, and apical margin of clypeus brownish. Posterior third of pronotum and surface below pronotal lobe light brown. Tegula translucent, light brown; wing veins brown and wing membrane weakly brownish. Legs brownish with strong metallic green reflections. Basal areas of T2-T4 brownish. Reddish-brown bands on preapical margins of T2 and T3, interrupted in middle. Pale-yellow stripe on apical margin of outer surface of trochanters.

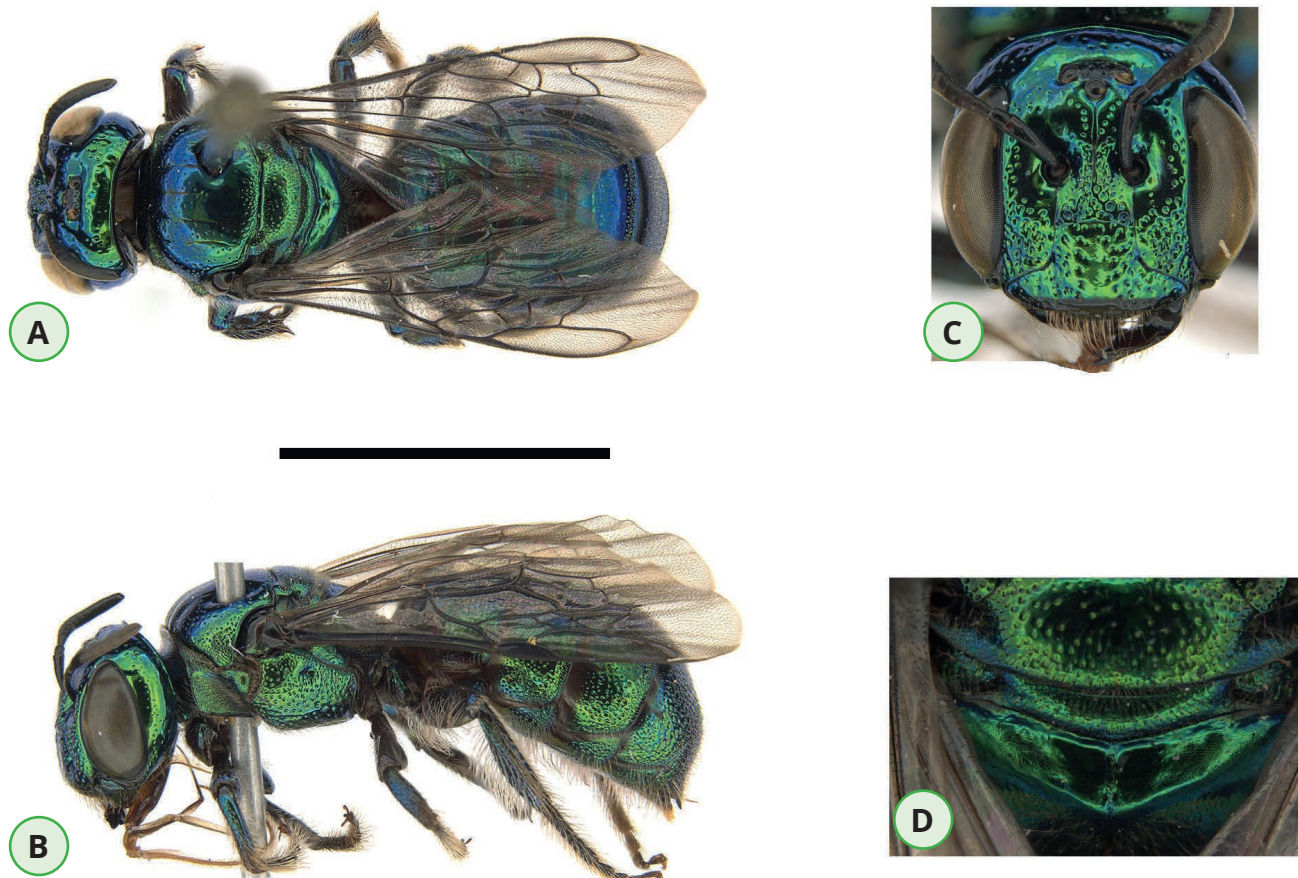
**Pubescence.** Mostly whitish, yellowish on labrum, mandible, tarsi, and apex of metasoma. Disc of propodeum with long hairs, lateral areas with short and dense hairs intermingled with long hairs more evenly distributed. Preapical margins of T4 and T5 covered with short spatulate setae.

**Integumental surface.** Punctuation denser and marked on lower paraocular area and clypeus, laterally. Mesosoma with finer and sparser punctuation leaving large, polished areas between the punctures on mesoscutum, lower portion of mesepisternum, and especially on mesoscutellum (distance between punctures approximately 1 DO). Metepisternum with a large, polished area on lower half. Disc of T1-T4 with fine and sparse punctuation, denser on T5 and T6.

**Structure.** Maxillary palpus six-segmented. Lateral areas of labrum slightly depressed, lateral and posterior margins slightly concave. Lower interocular distance larger than upper, inner orbits of compound eyes divergent downward, giving head a square aspect. Preoccipital carina weak. Lateral areas of pronotum with weak carina. Graduli present on T2 to T4.

**Variation.** Some specimens have a narrow yellow, horizontal stripe on apical margin of clypeus. Integument with coppery





**Figure 5.** Holotype ♀ of *Ceratina (Calloceratina) silveirai* sp. n. (A) dorsal habitus; (B) lateral habitus; (C) head in frontal view; (D) metapostnotum in dorsal view. Scale bar = 5.0 mm. Credit T.Mahlmann.

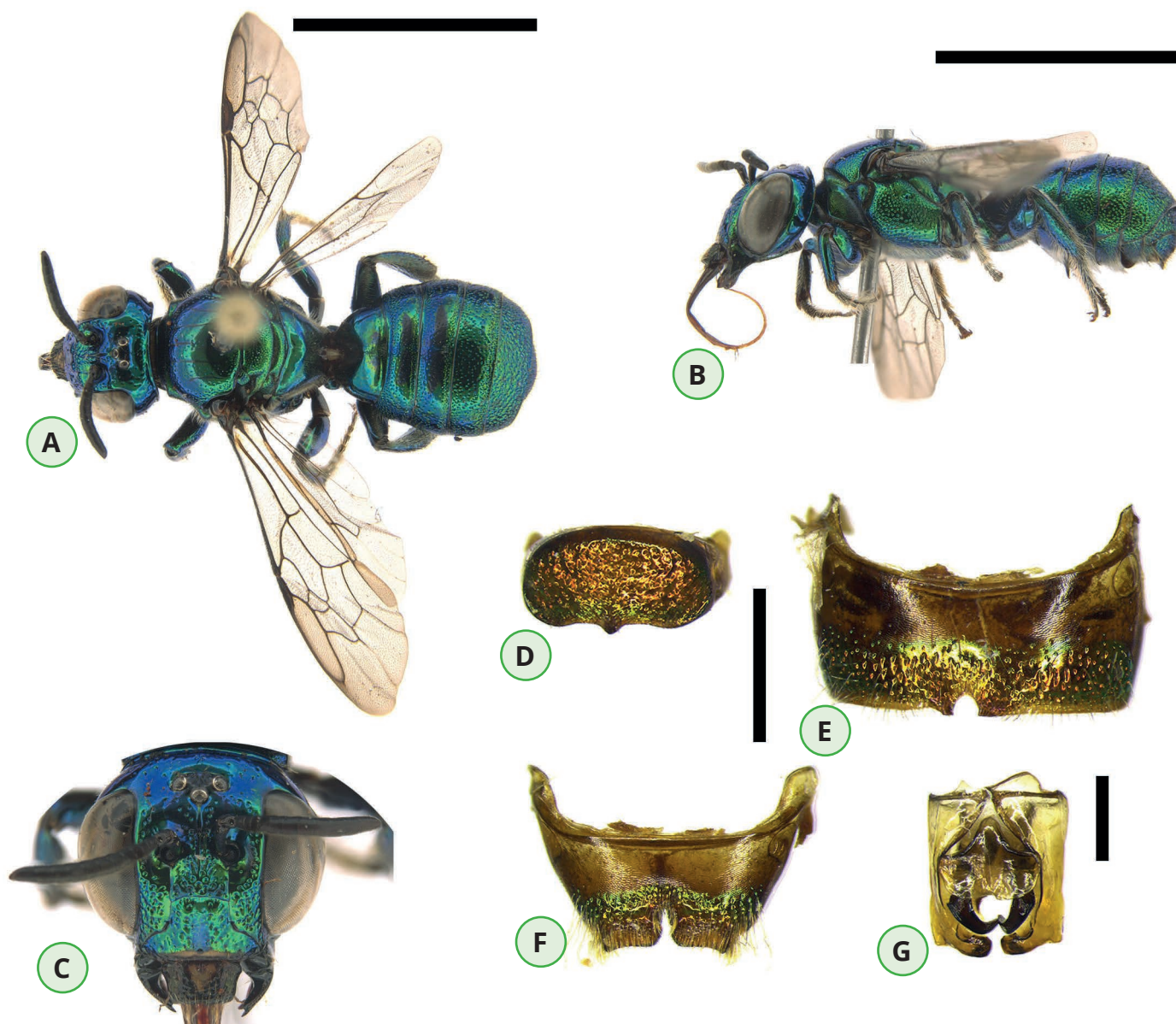
reflections in two specimens (Napo: Ecuador and Rondônia: Brazil). Body length ranges from 9.3-11.5.

**Allotype male (Figure 6).** Similar to the female except as follows: more evident bluish reflections; translucent brown spots at base of labrum almost imperceptible; yellow marks on disc of labrum, and a narrow horizontal stripe on apical margin of clypeus; absence of spatulate setae on metasoma; lateral margins of T6 with long hairs reaching the same length as hairs of T7; median clypeal depression more pronounced; preoccipital and pronotal carinae more developed; metatibia with reduced carina; apical margin of T7 gently emarginate with a short median angular projection; apical margin of S5 with deeply "U-shaped" notch medially; lateroapical margin of S6 ending in two acute projections, medially with a long subtriangular notch, twice as long as greatest width (Figure 6F); genital capsule as in figure 6G. Body length 10; forewing length 6.5; clypeus approximately 1.6 times as wide as long; ocellular distance 2 OD; ocelloccipital distance 2 OD. Some variation was observed: body length ranges from 8.3-11. Male terminalia as in Figure 6D-G.

**Type material.** HOLOTYPE ♀. BRAZIL: Amazonas, Atalaia do Norte, Res. [Reserva] Natural Palmari, 4°17'21"S; 70°17'36.8"W; 09.ix.2014; Varredura; J.C. Câmara, F.F. Xavier e A. Plant Leg. (INPA). ALLOTYPE ♂. BRAZIL: Amazonas, Manacapuru, Mundo Azul Sítio Agroinclusivo, -3.279958; -60.546108, 14.viii.2020, Mahlmann Leg. // Col. Em flor (10:00), *Cosmos sulphurea* (Asteraceae) (INPA). PARATYPES (16♀, 6♂). BRAZIL: Acre, Mêncio Lima, Serra do Divisor, 7°27'4"S; 73°38'57"W, 06-15.xii.2019, Malaise, Ferreira, JVA // 2356 (1♀ MHNBA); Acre, RESEX[Reserva Extrativista] Alto Juruá, Rio Tejo - 980204 // 22.vii.1995, M.L. Oliveira col. // AJ0011 (1♀ RPSP); Pará, Serra Norte, Pojuca, 06.viii.1985 // Pará, R.D. Thomaz // MPEG HYM 11004577 // *Ceratina (Calloceratina)* cf. *chloris*, Det. Pires & Ramos, 2009 (1♀ MPEG); *idem* 04.vii.1985 // MPEG HYM 11004578 (1♀ MPEG); Pará, Serra Norte, Estação Fofoca, 22.vi.1985 // Pará, M.F. Torres // MPEG HYM, 11004574 //

*Ceratina (Calloceratina) chloris*, Det. Pires & Ramos, 2009 (1♀ MPEG); Rondônia, Porto Velho, Estrada Santo Antonio, 8°48'37"S; 63°57'04"W, 01.x.2004, Malaise, Maria Áurea Silveira Leg. // Male SAMD 05/10/04, n°2820, *Augochloropsis* sp.1 (1♀ INPA); V. Rondônia (378 Km S. de P. Velho), Rondonia, 25.i - 09.ii.1961, Pereira e A. Machado (1♀ MZUSP); COLOMBIA: Putumayo, Villa Garzon, 8 mi. S. Mocoa, 22.vii.1978, M.Cooper, B.M. 1978-431 (1♂ NHMUK); ECUADOR: Pichincha, Reserva Geobotánica Pululahua, Lomas circundantes al cráter 2200m, LN 00°02'; LW 78°29', Feb. 1997, G. Estévez // MECN 13032 // *Ceratina (Calloceratina)* det. J.S. Ascher 2012 // aff. *Chloris* (1♀ MECN); Sucumbios, Sacha Lodge, 270m, 0°28'14"S, 76°27'35"W, 24.iii.1999, D. Brzoska, ECU 1B99 032B // SMO 187562, KUNHM-ENT (1♀ SEMC); Napo, Lago Agrio, Williner, 5.76 (1♀ AMNH); Orellana, Payamino Research Station, 0°29'36.01"S, 77°17'29.15"W, 300m, tropical rainforest, Malaise // 20.vii - 12.viii.2007, coll. CPDT Gillett BMNH (E), 2007-65 (1♂ NHMUK); Orellana, Parque Nacional Yasuní, Bloque 16, 180m, 05.viii.2000, J.J. Bravo // *Ceratina* R.B. Gonçalves det. // QCAZ I 64412 // *Ceratina (Calloceratina)* det. J.S. Ascher 2012 (1♀ QCAZ); Orellana, Parque Nacional Yasuní, 180m, 76°21'W; 00°40'S, 05.viii.2001, J.J. Bravo // QCAZ I 64414 (1♀ QCAZ); Orellana, Parque Nacional Yasuní, 250m, -0.67131; -76.40050, viii.2011, A. Argoti // QCAZ I 259353 // *Ceratina (Calloceratina)* det. J.S. Ascher 2012 (1♀ QCAZ); Coca on Rio Napo, Napo, Pastaza Prov., V.1965 // L.E. Pena Collector (1♂ AMNH); Napo, Cabañas Aliñahui 580m, 77°40'00"W; 01°30'00"S, 07.iii.2005, J. Salvador // QCAZ I 9768 (1♀ QCAZ); PERU: MD[Madre de Dios], Tambopata Pres, Explores' Inn, 200m, 12°51'S, 69°18'W, 05.xii.96. coll A. Brower // *Ceratina (Calloceratina)*, det. J.S. Ascher (1♀ AMNH); [Junín], Chanchamayo, 18.vi.1949, 1.100m, J.M. Schunke, B.M. 1950-559 (1♀ NHMUK); Dept. [Departamento] Loreto, Pucallpa // 09.v.1952, J.M. Schuncke, B.M. 1952-645 (1♂ NHMUK); *idem* 23.v.1961, B.M.1961-64 (1♂ NHMUK); *idem* 27.viii.1959, B.M.1961-64 (1♂ NHMUK). All specimens of the type series are in excellent conditions.

**Additional material examined.** PERU: Madre de Dios,



**Figure 6.** (A - C) Allotype ♂ of *Ceratina* (*Calloceratina*) *silveirai* sp. n. (A) dorsal habitus; (B) lateral habitus; (C) head in frontal view. (D - G) Paratype (m#) of *Ceratina* (*Calloceratina*) *silveirai* sp. n. (D) T7; (E) S5; (F) S6; (G) genital capsule. Scale bars: (A and B = 5.0 mm); (D - F = 1.0 mm); (G = 0.5 mm). Credit T.Mahlmann.

Rio Tambopata Reserve, 30km. (air)SW Puerto Maldonado, 290m., 12°50'S, 69°20'W, 25 - 30 April, 1984, W.J. Pulawski collector (1♂ CASC); Madre de Dios, Tambopata, Wild Res. 12°51'S, 69°17'W, 290m, 22-25 January, 1985, J. Carpenter & D. Bowers // *Ceratina* det. M.S. Engel // MCZ-ENT 00511469 (1♀ MCZ); [Huánuco], Monson Valley, Tingo Maria, 12.x.1954 // E.I. Schlinger & E.S. Ross collectors (1♀ CASC); [Huánuco], Tingo Maria, Rio Huallaga, 700m, 1940, leg. Weyrauch // i.xii, W.K.W. 178 // ex - col Weyrauch (1♂ MACN). All these specimens are housed at MACN. We understood it safer to exclude from the type series.

**Distribution.** Colombia (Putumayo); Brazil (Acre, Amazonas, Pará, Rondônia); Ecuador (Napo, Orellana, Pastaza, Sucumbíos); Peru (Huánuco, Junín, Loreto, Madre de Dios).

**Etymology.** The name of this species is a tribute to our esteemed colleague, in memoriam, Professor Dr. Fernando Amaral da Silveira, due to his valuable contributions to the knowledge of bee taxonomy, especially for the Neotropical and Brazilian bee fauna, and to whom we very honorably dedicate this species and the present paper.

**Comments.** Species closely related to *C. (Calloceratina) mourei* n. sp. from which it differs by the sparser punctation on head, metepisternum and T4; metapostnotum basally

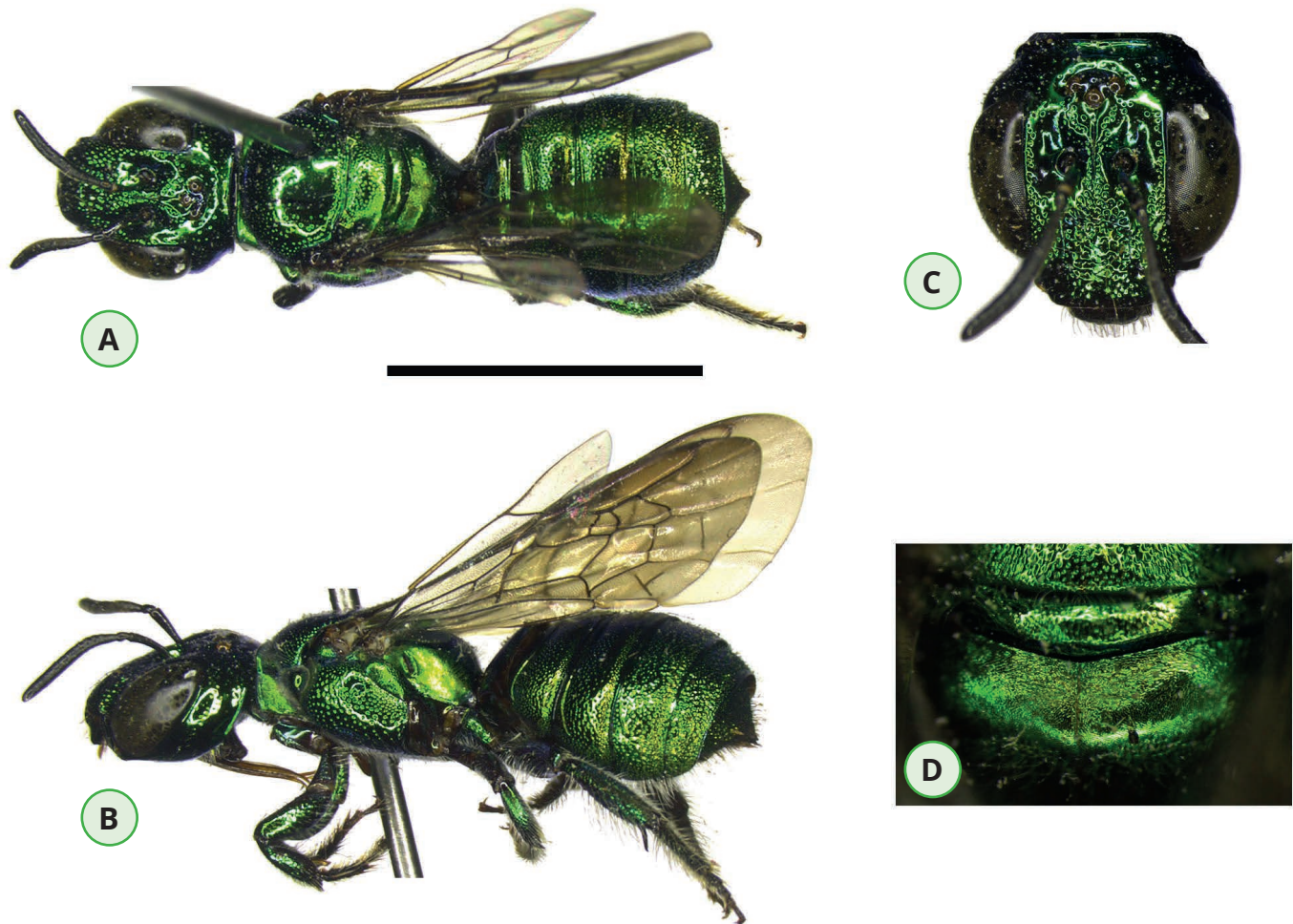
with a weak median carina; lower interocular distance larger than superior, inner orbits divergent below; metatibia with developed carina (ca. 3 DO); the difference in morphology of T7, S5 and S6 of male. At first glance this species can easily be misunderstood with other bright metallic green species (e.g., *C. chloris*) (Figures 1-2), as observed being commonly found with this misidentification in some collections. The resemblance, however, is basically limited by the color of the integument, which is bright metallic green. The sparser punctation, which is uniformly dense in *C. chloris* (front and vertex with punctures separated by a distance 0.5-1.0 times puncture diameter, Figure 1A), metapostnotum finely reticulate with a weak median carina (Figure 5D), the great asymmetry of dorsoapical teeth of pro and mesotibia and the male terminal structures are unique to the subgenus.

***Ceratina (Calloceratina) mourei* Mahlmann & Oliveira, F.F., n. sp.**

[urn:lsid:zoobank.org:act:CF2D522B-9074-42FC-B546-3F79042F82BF](https://doi.org/10.21203/rs.3.rs-2888881/v1)

(Figures 7-8)

**Diagnosis.** Yellow marks limited to trochanters; clypeus with a narrow median longitudinal, smoothly rough, polished area delimited by coarse punctures, slightly depressed on males; tentorial pit at level of lower tangent of compound eyes,



**Figure 7.** Holotype ♀ of *Ceratina (Calloceratina) mourei* sp. n. (A) dorsal habitus; (B) lateral habitus; (C) head in frontal view; (D) metapostnotum in dorsal view. Scale bar = 5.0 mm. Credit T.Mahlmann.

clypeus weakly protuberant; metapostnotum finely reticulate; metatibia with reduced carina (ca. 2 DO).

Male: Apical margin of T7 almost straight with a short median angular projection; apical margin of S5 broadly emarginate medially (Figure 8D-E).

**Description.** Holotype female (Figure 7): body length 10.7; forewing length 6.9; clypeus approximately 1.5 times as wide as long; ocellocular distance 2.6 OD; ocelloccipital distance 2.5 OD.

**Color.** Integument evenly bright metallic green including lateral margins of labrum, base of mandible, and anterior inner third of tegula; mandible, labrum, and apical margin of clypeus brownish. Posterior third of pronotum and surface below pronotal lobe light brown. Tegula translucent light brown, veins brown and wing membrane weakly brownish. Legs brownish with strong metallic green reflections. Reddish-brown bands on preapical margins of T2 and T3, interrupted in middle. Pale-yellow stripe on apical margin of outer surface of trochanters.

**Pubescence.** Mostly whitish, yellowish on labrum, mandible, tarsi, and apex of metasoma. Disc of propodeum with long hairs, areas with short and dense hairs intermingled with long hairs more evenly distributed. T4 and T5 covered with short spatulate whitish setae.

**Integumental surface.** Punctuation denser and conspicuous on lower half of head. Mesosoma with finer and sparser punctuation leaving large, polished areas between the punctures, especially on mesoscutum and lower portion of mesepisternum. Metepisternum with a small, polished area near propodeal spiracle. Metapostnotum finely reticulate.

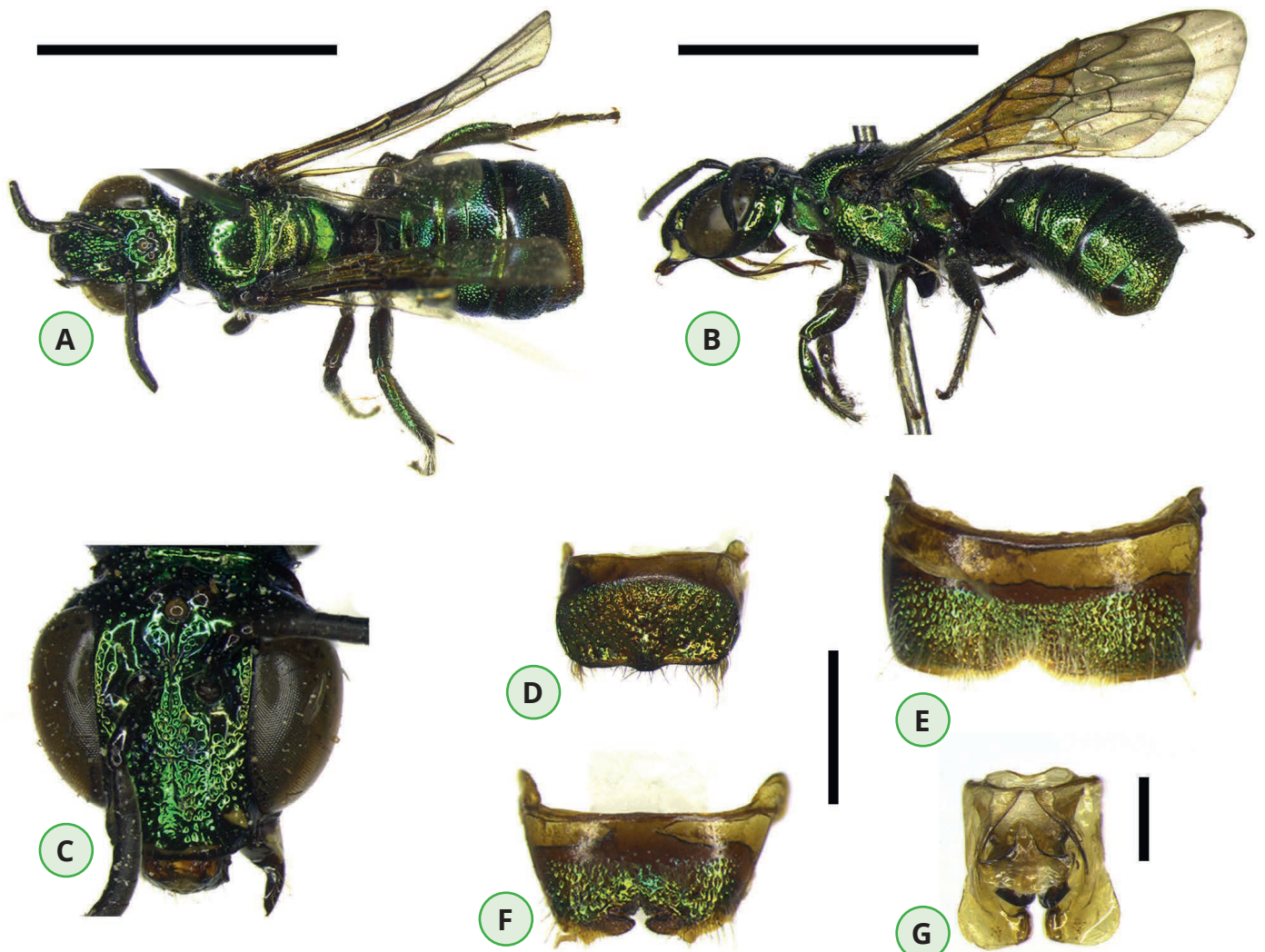
Disc of T1-T3 with fine and sparse punctuation.

**Structure.** Tentorial pit at the level of lower tangent of compound eyes, clypeus weakly protuberant in lateral view. Preoccipital carina well developed. Lateral areas of pronotum with strong carina forming lamella. Metatibia with reduced carina. Graduli present on T2 to T4.

**Allotype male (Figure 8).** Similar to female except as follows: three translucent brown spots at base of labrum; yellow marks on disc of labrum, base of mandible, and a narrow horizontal stripe on apical margin of clypeus; small subtriangular spots on lower paraocular area, over lateral expansions of clypeus absence of spatulate setae on metasoma; lateral margins of T6 with long hairs as long as hairs of T7; apical margin of T7 with long and plumose hairs on sides delimiting a median tuft of shorter and blacker simple hairs; disc of clypeus with a median longitudinal depression delimited by coarse punctures; metatibia with vestigial carina; apical margin of T7 almost straight with a short median angular projection; preapical margin of S5 without acute processes, apical margin broadly emarginate medially; apical margin of S6 with two acute projections, medially with a "star-shaped" notch (Figure 8F); genital capsule as in figure 8G. Body length 9.7; forewing length 6.2; clypeus approximately 1.3 times as wide as long; ocellocular distance 2.5 OD; ocelloccipital distance 2 OD. Male terminal structures as in Figure 8D-G.

**Type material.** HOLOTYPE ♀. COLOMBIA: Amaz. [Amazonas], Tarapaca, 14 - 30.ix.1976, M. Cooper, B.M. 1976-727 (NHMUK). ALLOTYPE ♂. PERU: Loreto, Pucallpa, 20.x.1961, J.M. Schunke, B.M. 1961-64 (NHMUK). All specimens are in excellent conditions.

**Distribution.** Colombia (Amazonas); Peru (Pucallpa).



**Figure 8.** Allolotype ♂ of *Ceratina* (*Calloceratina*) *mourei* sp. n. (A) dorsal habitus; (B) lateral habitus; (C) head in frontal view; (D) T7; (E) S5; (F) S6; (G) genital capsule. Scale bars: (A and B = 5.0 mm); (D - F = 1.0 mm); (G = 0.5 mm). Credit T.Mahlmann.

**Etymology.** The name of this species is a tribute to our esteemed colleague, in memoriam, Professor Dr. Jesus Santiago Moure (popularly known in the academic community as Padre Moure) due to his valuable contributions to the knowledge of bee taxonomy, especially from the Neotropics.

**Comments.** See comments on *C. (Calloceratina) silveirai* n. sp.

- Clypeus with a large yellow triangular maculation expanded towards its lateral expansions; graduli present on T2 to T5; S5 of male without acute processes (Figure 4C).....  
 .....*C. (Calloceratina) triangulifera* Cockerell

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**KEY TO THE SOUTH AMERICAN SPECIES OF CERATINA (CALLOCERATINA)**

1. Body sparsely punctated leaving large, polished spaces between punctures, especially on frons and vertex (distance between punctures approximately equal to or wider than 1 DO) (Figs 5C, 7C); (*silveirai* species-group)..... 2
- Body densely punctated, polished areas only on gena and disc of mesoscutum..... 3
2. Metapostnotum finely reticulate, almost polished and with a weak median carina (Figure 5D); lower interocular distance much larger than upper, inner orbits of compound eyes diverging below giving the head a square aspect (Figure 5C) ..... *C. (Calloceratina) silveirai* n. sp.
- Metapostnotum finely reticulate (Figure 7D); inner orbits of compound eyes subparallel (Figure 7C) .....  
 ..... *C. (Calloceratina) mourei* n. sp.
3. Clypeus with a maculation ranging from a narrowed horizontal stripe to a large rounded or triangular spot; graduli present on T2 to T4; S5 of male with two short acute processes separated from each other by approximately 5-8x their own length (Figure 2C) .....  
 ..... *C. (Calloceratina) chloris* (Fabricius)

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