

Systematic studies of the subgenus *Crewella* of *Ceratina* (Hymenoptera, Apidae, Xylocopinae), with a revision of the species occurring in Argentina

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Abstract: The subgenus *Crewella* Cockerell of *Ceratina* Latreille is found only in the Neotropical region, with maximal diversity in South America. A morphological study of the species in the subgenus led to the recognition of five species groups, based on several characteristics of the head, the first metasomal tergum, and the female sixth metasomal tergum. A key to the species-groups is presented. The following new species are described: *C. dalyana* from Colombia, *C. amazonica*, *C. crassipunctata*, and *C. foveinasis* from Peru, *C. duplocarinata*, *C. guaranítica*, and *C. lobata* from Argentina, *C. acuminata* from Brazil and Paraguay, and *C. carbonaria* from Argentina and Brazil. Lectotypes are designated for *C. brunneipes* Friese, *C. diligens* Smith, and *C. vernoniae* Schrottky. The following are new synonyms: *C. brunneipes* Friese, 1910 of *C. maculifrons* Smith, 1854, and *C. gossypii* var. *asuncionis* Strand, 1910 of *C. gossypii* Schrottky, 1907. A revision of the species in Argentina, with a key to species, is presented.

Key words: *Ceratina*, small carpenter bees, taxonomy, new species.

Resumen: Estudios sistemáticos del subgénero *Crewella* de *Ceratina* (Hymenoptera, Apidae, Xylocopinae), con revisión de las especies presentes en la Argentina. El subgénero *Crewella* Cockerell de *Ceratina* Latreille se encuentra solamente en la región Neotropical, con máxima diversidad en América del Sur. Un estudio morfológico de las especies del subgénero permite reconocer cinco grupos de especies, basándose en varias características de la cabeza, del primer tergo metasomal y del sexto tergo metasomal de la hembra. Se presenta una clave para los grupos de especies. Se describen las siguientes nuevas especies: *C. dalyana* de Colombia, *C. amazonica*, *C. crassipunctata* y *C. foveinasis* de Perú, *C. duplocarinata*, *C. guaranítica* y *C. lobata* de la Argentina, *C. acuminata* de Brasil y Paraguay, y *C. carbonaria* de la Argentina y Brasil. Se designan lectotipos para *C. brunneipes* Friese, *C. diligens* Smith y *C. vernoniae* Schrottky. Los siguientes son nuevos sinónimos: *C. brunneipes* Friese, 1910 de *C. maculifrons* Smith, 1854, y *C. gossypii* var. *asuncionis* Strand, 1910 de *C. gossypii* Schrottky, 1907. Se presenta una revisión de las especies en la Argentina con una clave para las especies.

Palabras clave: *Ceratina*, abejas carpinteras pequeñas, taxonomía, nuevas especies.

INTRODUCTION

The subgenus *Crewella* Cockerell is one of the seven subgenera of *Ceratina* Latreille present in the New World (Michener, 2007; Roig-Alsina, 2013). It includes large and colorful species with metallic reflections, although they are not as brightly colored as most species of the related subgenus *Calloceratina* Cockerell (Michener, 2007). *Crewella* occurs from Costa Rica to central Argentina, with maximum diversity in South America, particularly in tropical areas.

The subgenus *Crewella* has an elevated number of species, but no comprehensive account of it is available to date. Moure (2007) listed 37 available names in his Catalog, five of them as

synonymous. Two names, *C. rotundiceps* Smith and *C. asunciana* Strand, have been removed to *Neoclavicera* (Roig-Alsina, 2013), and clarification of several other names awaits further study.

The aim of this contribution is to call attention to the morphological diversity within the subgenus *Crewella*, and to revise the species occurring in Argentina.

MATERIAL AND METHODS

The specimens studied were borrowed from the following institutions (acronyms of collections and names of the people who loaned the material are in parentheses): California Academy of Sciences, San Francisco, USA

(CAS, R. Zuparko, C. Grinter); Essig Museum of Entomology, University of California, Berkeley, USA (EMEC, R. Zuparko); Facultad de Agronomía, Universidad de Buenos Aires, Buenos Aires, Argentina (FAUBA, J. P. Torretta); Facultad de Ciencias, Universidad de la República, Montevideo, Uruguay (FCE-HY, E. Morelli); Instituto Fundación Miguel Lillo, Tucumán, Argentina (IFML, C. Berta, E. Pérez); Museo Argentino de Ciencias Naturales, Buenos Aires, Argentina (MACN); Museo de Historia Natural de Montevideo, Montevideo, Uruguay (MNHNM, F. Scarabino); Museo de La Plata, La Plata, Argentina (MLP, M. Lucía), Museum für Naturkunde, Humboldt Universität, Berlin, Germany (ZMB, F. Koch); Natural History Museum, London, United Kingdom (NHMUK, D. Notton); United States National Museum, Smithsonian Institution, Washington D.C., USA (USNM, S.G. Brady, P. Gentili Poole).

Terminology for structures follows Michener (2007). Terms specific to the morphology of species in the genus *Ceratina*, such as the transpronotal groove, lateral carina and lower tooth of the pronotum, and parts of the coxae, are illustrated in Roig-Asina (2013).

The following abbreviations are used: the maximum diameter of the median ocellus (MOD) is taken as a reference to express the length of the pubescence and other structures; the diameter of punctures (PD) is used to express separation between punctures; the metasomal terga (T) and sterna (S) are identified with Arabic numerals; in the lists of material studied F stands for female, and M for male.

SYSTEMATICS

Ceratina subgenus *Crewella* Cockerell

Ceratina (*Crewella*) Cockerell, 1903: 202. Type species: *Ceratina titusi* Cockerell, 1903, by original designation.

The subgenus *Crewella* is characterized by the strongly punctate body with metallic colors, the face with yellow or white marks in both sexes, the well-developed preoccipital carina, the maxillary palpus with six segments, the pronotal collar delimited anteriorly by a continuous carina (the lateral portion of which is frequently lamellate, ending in a tooth-like projection), the fore and mid tibia each with both a dorsoapical spine and a ventroapical spine (Fig. 1B), the basitibial plate of the female indicated by a strong

tooth, the presence of wax plates on the second and third metasomal sterna in females, and by the presence of graduli on the second to fourth metasomal terga and second to third metasomal sterna in both sexes.

Five species-groups can be recognized within *Crewella*, according to the degree of development of the juxtantennal carina, the structure of the clypeus, the structure of the first metasomal tergum, and the presence of depressions (usually a longitudinal furrow) on the female sixth metasomal tergum. These features are discussed below.

In many subgenera of *Ceratina* the areas that surround the antennal sockets are evenly depressed, meeting the frontal carina along the midline of the face, thus forming a biconcave interantennal prominence. In some other subgenera the prominence is more or less convex. In most species of *Crewella* the interantennal prominence is flattened, with steep sides ending at the mesal margin of the antennal socket. In some species, the sides of this flattened prominence are expanded laterally forming a juxtantennal carina (Fig. 1A), which hides in frontal view the mesal margin of the antennal socket. Such a carina is characteristic of the *maculifrons*, *dalyana*, and *foveinasis* species groups. The only species of the subgenus *Crewella* with a convex interantennal prominence are found within the *amazonica* group.

The clypeus of many *Crewella* bears a median longitudinal, narrow depression. This depression is present and usually distinct in species of the *amazonica*, *titusi* and *foveinasis* groups, weak or absent in species of the *maculifrons* group, and absent in *C. dalyana*. The apex of the clypeus in species of the *maculifrons* group is truncate (Fig. 12C, t), although sometimes narrowly so. An outstandingly large, concave truncation is characteristic of species of the *foveinasis* group (Fig. 6B, t).

The first metasomal tergum varies in several features, such as the extent and punctuation of the disc, the presence or absence of a marginal zone, and the juncture of the anterior and dorsal surfaces, whether it is angulate or evenly rounded. A large disc separated from the anterior surface by a distinct angle is characteristic of the *maculifrons* group (Fig. 2B), while the *titusi* and *foveinasis* groups have an outstandingly short disc (Fig. 2A). A sharply delimited, depressed, impunctate, polished marginal zone is present in most species of *Crewella* (Fig. 2A–B), except those of the *amazonica* group. Such a distinct marginal zone is rare among other subgenera of *Ceratina*.

The pattern of mouthparts elongation is different in species of the *titusi* and *foveinasis* groups. In *C. titusi* and related species the second segment of the labial palpus is the longest, while in *C. foveinasis* and related species it is the first segment of the labial palpus that is considerably longer than the second. Thus, it can be concluded that long mouthparts have evolved independently at least twice within the subgenus *Crewella*.

Key to species-groups of *Ceratina* (*Crewella*)

- 1.- Hypostomal area concave, limited posterolaterally by rounded genal tubercle (Fig. 3C, gt). Mesopleuron anteriorly with omaular ridge on upper third.
.....*dalyana* species group
- .- Hypostomal area convex; genal tubercle absent. Anterior and lateral surfaces of mesopleuron gradually rounded, without omaular ridge. 2
- 2.- T1 with dorsal surface apically without a differentiated, depressed marginal zone. Punctate disc of T1 long, approximately twice as long as MOD, not separated from anterior surface by transverse rim.
.....*amazonica* species group
- .- Dorsal surface of T1 apically with sharply delimited, depressed marginal zone (Fig. 2A–B). Disc of T1 of variable length; when twice or over twice as long as MOD, then separated from anterior surface by transverse, polished, impunctate low rim. 3
- 3.- T1 with disc densely punctate, much longer (2–4 times) than posterior polished marginal zone (Fig. 2B). T6 usually with distinct median longitudinal furrow (Fig. 13G). Juxtantennal carina present, well developed (Fig. 1A).*maculifrons* species group
- .- T1 with disc short, at most 1.5x as long as posterior polished marginal zone; disc bearing few or no punctures (Fig. 2A). T6 and juxtantennal carina variable. 4
- 4.- Apex of clypeus distinctly truncate; truncation concave, 0.19–0.27x as long as length of clypeus (Fig. 6B). Labrum with single median tubercle (Fig. 6B). In species with long mouthparts, first segment of labial palpus the longest. Interantennal prominence forming laterally distinct juxtantennal carina (Fig. 6A).*foveinasis* species group.
- .- Apex of clypeus usually simple, if short truncation present, not longer than 0.1x length of clypeus. Labrum with two preapical denticles or tubercles. In species with long

mouthparts, second segment of labial palpus the longest. Interantennal prominence usually without juxtantennal carina hiding mesal margin of antennal socket in frontal view (Fig. 5A–B).*titusi* species group

C. dalyana species group ***Ceratina* (*Crewella*) *dalyana* nov. sp.** (Fig. 3A–C)

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Diagnosis. This species stands apart in its own species group. It agrees with species of the *C. maculifrons* and *C. foveinasis* groups in the well-developed juxtantennal carina, but the clypeus is not truncate, the female sixth tergum lacks any median longitudinal impressions, and the forecoxa has a flattened, square lateral projection. The anterior surface of T1 in *C. dalyana* curves posteriorly in an arc merging gradually with the dorsal surface, without a clear limit between the two evenly punctate areas. Outstanding features of this species are the presence of a genal tubercle (Fig. 3C), the concave hypostomal area, the reduced ocelli (Fig. 3B), the mesopleuron forming anteriorly an omaular ridge, and the red metasoma. The genal yellow band is as long as the eye, curving dorsally into the vertex (Fig. 3A).

Female. Length, 9.1–9.5 mm (holotype 9.1 mm); length of forewing, 6.9–7.1 mm (holotype 6.9 mm). *Color.* Head and mesosoma black, with dark blue metallic tints; antenna with scape, pedicel and first flagellomere red, other flagellomeres dark brown; apex of clypeus and base of labrum brownish; legs dark brown, coxae and forefemur with dark blue metallic tints, distotarsi and tibial spurs yellowish brown; metasoma red, except T1 dorsally with dark blue metallic tints and T5–T6 blackened medially. Following parts yellow: clypeus with large, roughly triangular mark occupying apical 0.5–0.7 of clypeus; paraocular area with long mark, from lateral lower angle of clypeus to upper level of antennal socket; gena with yellow stripe 0.9–1.1x as long as eye, curving dorsally into vertex; forefemur with apical spot, and foretibia with basal spot followed by longitudinal dorsal stripe. Tegula brownish, translucent; wings evenly infusate, with brown veins and pterostigma. *Structure.* Clypeus weakly convex in lateral view, without apical truncation; basal and central parts finely reticulated between and within shallow punctures, apex

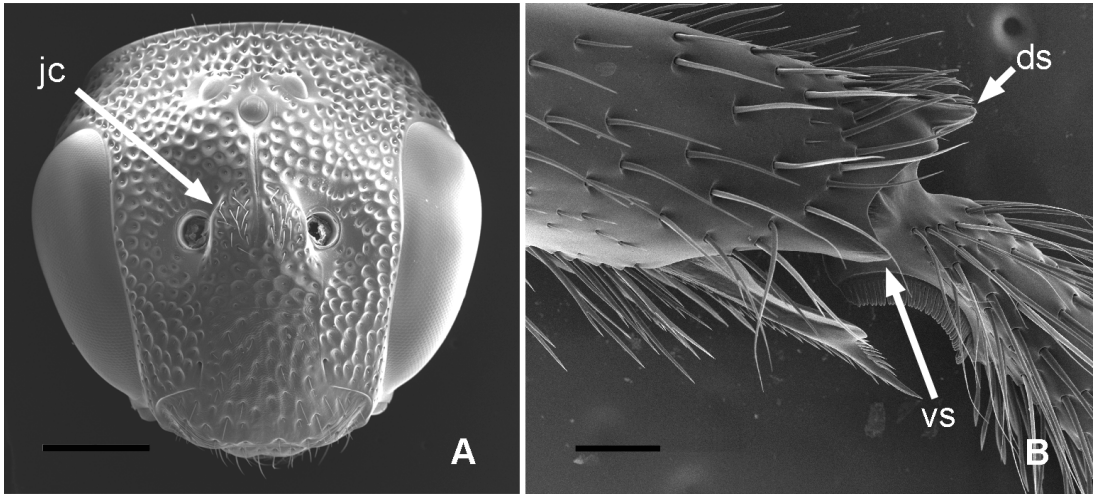


Figure 1. *Ceratina (Crewella) morrensis* Strand, female. A. Head, frontal view (arrow indicates juxtantennal carina (jc)). B. Apex of foretibia, outer view; arrows indicate dorsoapical (ds) and ventroapical (vs) spines. Scale bars, A = 0.5 mm, B = 0.1 mm.

and sides polished between punctures; without median longitudinal impression. Labrum 0.7x as long as basal width; weakly convex, without any carinulae or tubercles. Hypostomal carina low, of uniform height. Hypostomal area concave, posteriorly with rounded tubercle. Proportion between length of eye and length of second segment of labial palpus 1:1.95–1.97. Preoccipital carina simple behind ocelli. Ocelli much reduced, their diameter approximately 0.5x maximum diameter of antennal socket. Distance between lateral ocellus and preoccipital carina 6x MOD. First flagellomere 1.3x as long as its apical width. Lateral carina of pronotum lamellate. Mesopleuron forming anteriorly an omaular ridge. Dorsal area of metapostnotum basally with short, longitudinal rugae, medially with distinct longitudinal carinula, other parts finely granulate. Center of lateral part of mesopleuron with hairs 0.8–1.1x MOD. Forecoxa with flattened, square lateral projection. Lateral angle of hind coxa narrowly rounded. Hind tibial spine on basal 0.35 of tibial length. T1 with short dorsal surface merging gradually with anterior surface, without clear limit between them; both areas densely punctate; polished marginal zone as long as MOD. Apical margin of T2 and T3 truncate. T4 with median basal area not rugose, flat between punctures, remainder of tergum and T5 rugose. T5 with setae 0.4–0.6x MOD. S6 punctate.

Male. Unknown.

Etymology. This is the unnamed species of *Crewella* referred to by Howell V. Daly (1985),

when he discussed the presence of a genal tooth among distantly related ceratinines. It is named to honor him.

Distribution. Colombia, department of Magdalena.

Material studied. *Holotype:* Colombia. Female, on road from Barranquilla to Puerto Colombia, Atlántico, 5-VII-1973, P. A. Rauch, 10:30–12:30 hs, much roadside vegetation in bloom (EMEC, #83,281). *Paratypes:* 2 F, same data as holotype (EMEC, #83,282 and #83,283).

C. amazonica species group

Species of this group are characterized by the lack of a depressed, polished marginal zone on T1, present in all other groups of *Crewella*. The punctate disc of T1 is long, approximately twice as long as MOD, and the juncture between the anterior and dorsal surfaces is evenly rounded. The interantennal prominence is convex or rather flattened, but not as flat as in the other groups. The apical margin of the clypeus is simple, not truncate. The forecoxa has a rounded lateral projection, and the female T6 lacks a median longitudinal furrow. Species of this group are rather small, 5.5–6.5 mm long. Besides the two species from Peru described below, I have seen undescribed species from Bolivia and Colombia (preserved in IFML), each represented by only one specimen. I prefer to wait for more material to characterize these species.

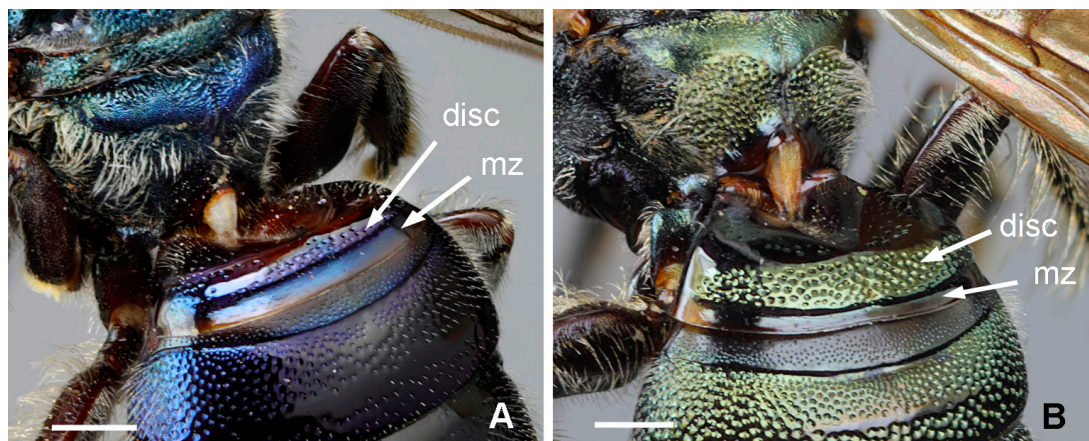


Figure 2. Posterior part of mesosoma and basal terga of metasoma of species of *Ceratina* (*Crewella*) Cockerell. Arrows indicate disc and marginal zone (mz) of T1. A. *C. duplocarinata*, new species B. *C. morrensis* Strand. Scale bars = 0.5 mm.

***Ceratina* (*Crewella*) *amazonica* nov. sp.**
(Figs. 4A–B, 14D)

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Diagnosis. This species can be distinguished from *C. crassipunctata* by the smaller punctures of the scutum, the impunctate genal area behind the upper third of the eye, the disc of T1 with punctures sparse or absent close to the lateral margins of the disc, and the mesopleuron below the scrobe, close to the meso-metapleural suture, with small punctures bearing plumose hairs.

Female. Length, 5.8–6.3 mm (holotype 6.0 mm); length of forewing, 4.5–4.7 mm (holotype 4.5 mm). **Color.** Black, with dark olive-green tints on most of head, mesosoma and metasoma and scattered purplish reflections on face; some specimens with dark blue instead of olive-green tints. Legs black with ferruginous distotarsi; hind tibial spurs blackish. Yellow marks on face variable in extent: clypeus with preapical median mark, varying in length from one third to two thirds of clypeal length; paraocular area of holotype with spot close to lateral lower angle of clypeus, and minute spot close to eye below level of antennal socket, but other specimens with lateral stripe bordering eye, either entire or briefly interrupted; gena with yellow stripe 0.4–0.6x as long as eye; forefemur with or without apical spot, and foretibia with basal spot followed by longitudinal stripe. Tegula dark brown. Wings evenly, weakly infusate, with veins and pterostigma dark brown. **Structure.**

Clypeus weakly convex in lateral view; in frontal view with median longitudinal area finely tessellate and sides polished between punctures; without apical truncation; median longitudinal impressed line present. Labrum 0.7x as long as basal width; convex, without denticles or carinulae. Hypostomal carina low, of uniform height. Proportion between length of eye and length of second segment of labial palpus 1:1. Preoccipital carina simple. Distance between lateral ocellus and preoccipital carina 1.8x MOD. First flagellomere 1.25x as long as its apical width. Lateral carina of pronotum lamellate. Dorsal area of metapostnotum basally with short, longitudinal rugae; central portion with short irregular rugae and distinct longitudinal median carinula. Center of lateral part of mesopleuron with hairs 0.7–1.1x MOD, plumose. Lateral angle of hind coxa rounded. Hind tibial spine on basal 0.4 of tibial length. T1 with impunctate anterior surface; dorsal surface 2x as long as MOD, punctate, but punctures sparse or absent close to lateral margins of disc; without depressed marginal zone. T4 with median basal area not rugose, remainder of tergum and T5 rugose. T5 with stiff, erect setae 0.5–0.6x MOD. S6 with small apical impunctate area.

Male. Length, 5.3–5.5 mm; length of forewing 4.0–4.2 mm. **Color.** Similar to that of female, with following parts yellow: narrow paraocular band tapering above to level of antennal socket, large triangular mark occupying apical two thirds of clypeus, central mark on labrum, antero-basal mark on mandible, narrow genal stripe, apical spot on forefemur, basal spot followed by

longitudinal stripe on foretibia, and basal spot on middle tibia. *Structure*. First flagellomere as long as its apical width. Median ocellus in frontal view above upper tangent of eyes. Apical margin of T7 medially, weakly emarginate. Metasomal sterna strongly punctate. S6 (Fig. 14D).

Etymology. The specific name refers to the distribution of the species in the Amazonian region.

Distribution. Peru, departments of Huánuco and Junín.

Material studied. *Holotype*: Peru. Female from Monson Valley, Tingo María, XII-2-1954, E.I. Schlinger & E.S. Ross (CAS). *Following paratypes*: Peru. 1 F, 2 M, Monson Valley, Tingo María, X-9-1954, XI-29-1954, E.I. Schlinger & E.S. Ross (CAS), and 1 F, 1 M, same data (MACN); 1 F, Junín, Colonia Perene, Río Perene, 18 mi. NE La Merced, I-3-1955, E.I. Schlinger & E.S. Ross (CAS).

***Ceratina (Crewella) crassipunctata* nov. sp.**
(Figs. 4C–D, 14E)

urn:lsid:zoobank.org:act:929CCEA0-D004-4284-A8DE-D5311462EB6B

Diagnosis. This species can be distinguished from *C. amazonica* by the larger punctures of the scutum (Fig. 4C–D), the punctate gena, the disc of T1 with punctures reaching the lateral margins of the disc, and the mesopleuron below the scrobe, close to the meso-metapleural suture, with larger punctures bearing hairs with minute branches. The male is also distinguished by the reduced yellow marks (Fig. 4D); the labrum, mandibles, and genae are black.

Female. Length, 5.5–6.5 mm (holotype 6.3 mm); length of forewing, 4.4–4.8 mm (holotype 4.5 mm). *Color*. Black, with dark olive-green tints on most of head, mesosoma and metasoma; some specimens with scattered purplish reflections on face, scutum, and T2–T4. Legs black with ferruginous distotarsi and tibial spurs. Following marks yellow: clypeus with preapical, median mark; paraocular area with spot close to lateral lower angle of clypeus and with small spot close to eye below level of antennal socket; gena with or without yellow mark, when present, from vestigial to narrow stripe 0.4x as long as eye; forefemur with apical spot and foretibia with basal spot followed by longitudinal stripe. Tegula dark brown. Wings evenly, weakly infuscate with veins and pterostigma dark brown. *Structure*. Clypeus weakly convex in

lateral view, without apical truncation, with median longitudinal impressed line, and with median longitudinal area finely tessellate and sides polished between punctures. Labrum 0.7x as long as basal width; convex, without denticles or carinulae. Hypostomal carina low, of uniform height. Proportion between length of eye and length of second segment of labial palpus 1:0.9. Preoccipital carina simple. Distance between lateral ocellus and preoccipital carina 2.4x MOD. First flagellomere 1.25x as long as its apical width. Lateral carina of pronotum lamellate. Dorsal area of metapostnotum basally with short, longitudinal rugae; central portion with short irregular rugae and distinct longitudinal median carinula. Center of lateral part of mesopleuron with hairs 0.8–1.2x MOD, with minute branches. Lateral angle of hind coxa rounded. Hind tibial spine on basal 0.4 of tibial length. T1 with few, shallow punctures on anterior surface; dorsal surface 2x as long as MOD, punctate, with punctures reaching lateral margins of disc; without depressed marginal zone. T4 with median basal area not rugose, remainder of tergum and T5 rugose. T5 with setae 0.5–0.6x MOD. S6 punctate.

Male. Length, 5.8 mm; length of forewing 4.5 mm. *Color*. Similar to that of female, with following parts yellow: small spot on lower paraocular area, two small apical spots on clypeus, apical spot on forefemur. *Structure*. First flagellomere as long as its apical width. Median ocellus in frontal view above upper tangent of eyes. Apical margin of T7 medially, weakly emarginate. Metasomal sterna strongly punctate. S6 (Fig. 14E).

Etymology. The name of the species refers to the coarse punctures of the scutum.

Distribution. Peru, department of Huánuco.

Material studied. *Holotype*: Peru. Female from Monson Valley, Tingo María, XII-2-1954, E.I. Schlinger & E.S. Ross (CAS). *Following paratypes*: Peru. 1 F, 1 M, Monson Valley, Tingo María, XI-29-1954, XII-2-1954, E.I. Schlinger & E.S. Ross (CAS); 4 F, Huánuco, 10 mi. SW Las Palmas, 1000 m, IX-26-1954, E.I. Schlinger & E.S. Ross (CAS), and 1 F, same data (MACN).

C. titusi species-group

In this group the interantennal prominence is broadened, more or less flattened, but with steep sides that do not hide the mesal margin of the antennal socket in frontal view. The clypeus has the apical margin simple, not truncate. The disc of T1 bears few or no punctures, and is ex-

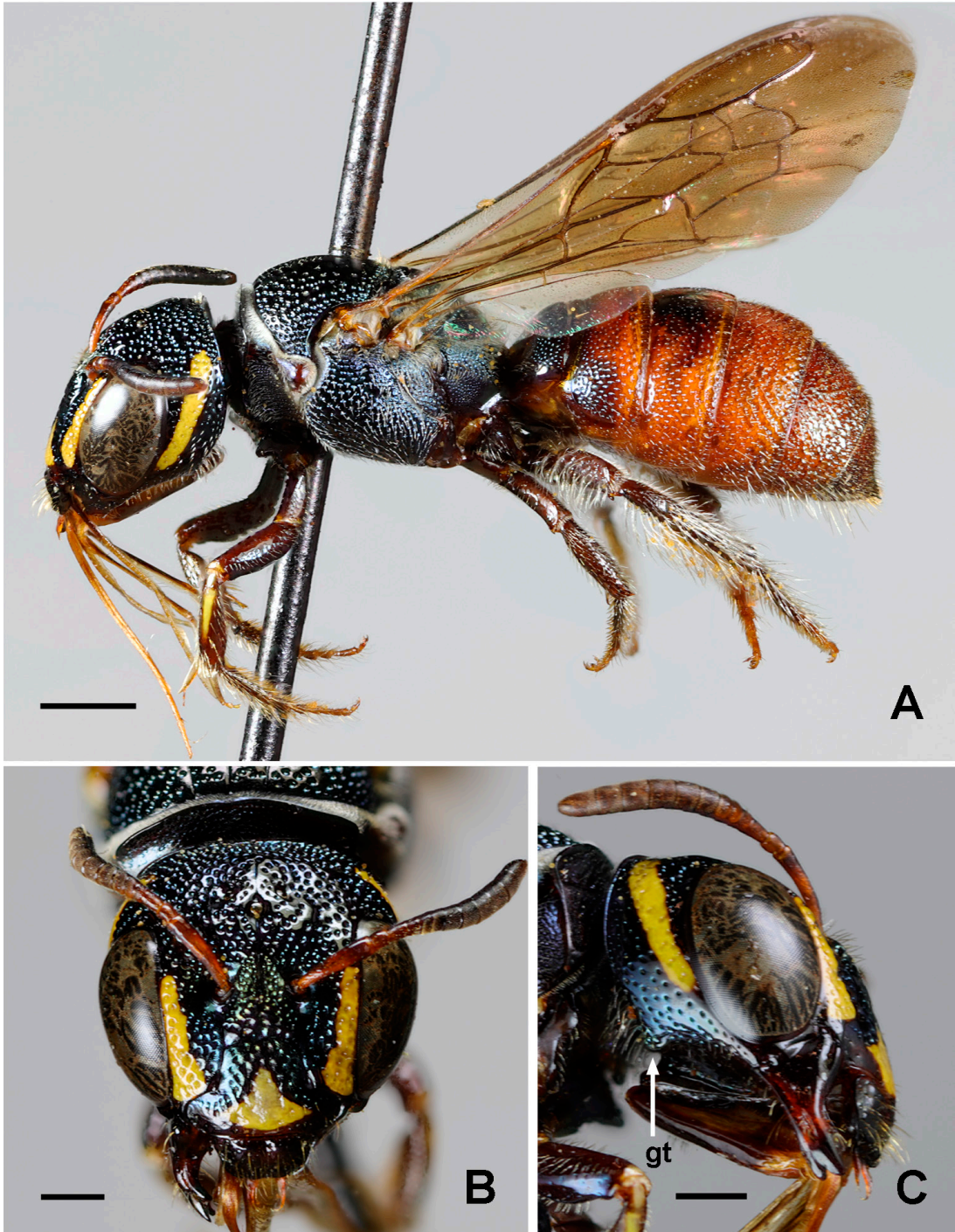


Figure 3. *Ceratina (Crewella) dalyana*, new species, female holotype. A. Lateral habitus. B. Face. C. Head, lateral view; arrow indicates genal tubercle (gt). Scale bars, A = 1 mm; B-C = 0.5 mm.

tremely short, as long as or shorter than the posterior polished marginal zone (Fig. 2A), which is approximately as long as MOD. The lateral projection of the forecoxa is frequently flattened and squarish, but rounded in some species. The female T6 lacks a median longitudinal furrow. Many species have long mouthparts. In these species the second segment of the labial palpus is the longest. Besides the three species treated below, in this group also belong *C. bicolorata* Smith, *C. longiceps* Smith, and *C. pubescens* Smith, all described from Ega, Brazil, and *C. glossata* Michener described from Canal Zone, Panamá.

***Ceratina (Crewella) duplocarinata* nov. sp.**
(Figs. 2A, 5A)

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Diagnosis. This species is closely related to *C. glossata* by the long mouthparts, the dentate hypostomal carina, and the flattened, squarish lateral projection of the forecoxa. The two species also have a rounded tumescence on the frons at each side of the frontal carina, similar to that of species of the subgenus *Zadontomerus*, but punctate, not polished as in the latter. *Ceratina duplocarinata* is easily recognized by the bright blue coloration, and by the the double preoccipital carina behind the ocelli (similar to that of *C. diligens*, Fig. 8A).

Female. Length, 6.5–9.5 mm (holotype 9.5 mm); length of forewing, 5.2–6.5 mm (holotype 6.5 mm). **Color.** Bright blue on most of head, mesosoma and metasoma; some specimens with bronzy reflections on face and pronotal collar (as in the holotype) and some specimens with purplish reflections on metasomal terga. Mandibles, labrum, apex of clypeus and polished area of scutum black; T2–T3 with transverse black band on center of discs; legs black with ferruginous distotarsi, and blue reflections on coxae, trochanters and femora; tibial spurs blackish. Following marks yellow: clypeus with apical, median mark; each paraocular area with two marks, one close to lateral lower angle of clypeus and another one close to eye, below level of antennal socket, latter one sometimes minute or absent; gena with yellow stripe 0.6–0.9x as long as eye; forefemur with apical spot and foretibia with basal spot. Tegula dark brown. Wings weakly infuscate with veins and pterostigma dark brown. **Structure.** Clypeus weakly convex in lateral view, without apical

truncation, with median longitudinal area finely granulate and sides of clypeus polished between punctures; with median longitudinal impression restricted to apical third to apical half of clypeus. Labrum 0.8x as long as basal width; with basal convexity at each side of middle and two preapical denticles. Hypostomal carina anteriorly elevated and strongly angulate backwards, forming tooth-like elevation. Proportion between length of eye and length of second segment of labial palpus 1:1.7–1.8. Preoccipital carina double behind ocelli. Distance between lateral ocellus and preoccipital carina 2.5–2.6 times MOD. First flagellomere 1.15x as long as its apical width. Lateral carina of pronotum lamellate. Dorsal area of metapostnotum basally with short, longitudinal rugae; central portion with numerous irregular rugulae and more or less distinct longitudinal median carinula. Center of lateral part of mesopleuron with hairs 0.6–0.8x MOD. Lateral angle of hind coxa rounded. Hind tibial spine on basal 0.4 of tibial length. T1 with short dorsal surface, disc as long as posterior polished, depressed marginal zone; disc with one or two rows of small, close punctures; marginal zone as long as MOD. Apical margin of T2 and T3 rounded. T4 with median basal area not rugose, remainder of tergum and T5 rugose. T5 with setae 0.3–0.4x MOD. S6 with small apical impunctate area.

Male. Unknown.

Etymology. The specific name refers to the double preoccipital carina present in this species.

Distribution. Argentina, province of Misiones.

Material studied. *Holotype:* Argentina. Female from Misiones, Depto. Iguazú, Cataratas, X-1954, De Carlo & Viana (MACN). *Following paratypes:* Argentina. Misiones: 14 F, Depto. Iguazú, Cataratas, X-1954, De Carlo & Viana (MACN); 16 F, Puerto Iguazú, Parque Nacional Iguazú, 22-V-2009, 5-VI-2009, 3-VII-2009, 17-VII-2009, 14-VIII-2009, 28-VIII-2009, 11-IX-2009, N. Veiga (MACN); 3 F, Parque Nacional Iguazú, 17-XI-2008, 20-XI-2008, 9-XII-2008, Zamudio, Colleselli & Gómez de Oliveira (MLP); 1 F, Parque Nacional Iguazú, Rta. 101, 28-IX-2016, L. Álvarez, M. Lucía, P. Ramello (MLP); 1 F, Parque Nacional Iguazú, Rta. 101, 27-IV-2018, L. Álvarez, D. Aquino (MLP); 1 F, Bemberg, 12-29-I-1945, Hayward, Willink & Golbach (IFML).

***Ceratina (Crewella) titusi* Cockerell, 1903**
(Fig. 5B)

Ceratina (Crewella) titusi Cockerell, 1903: 201–202

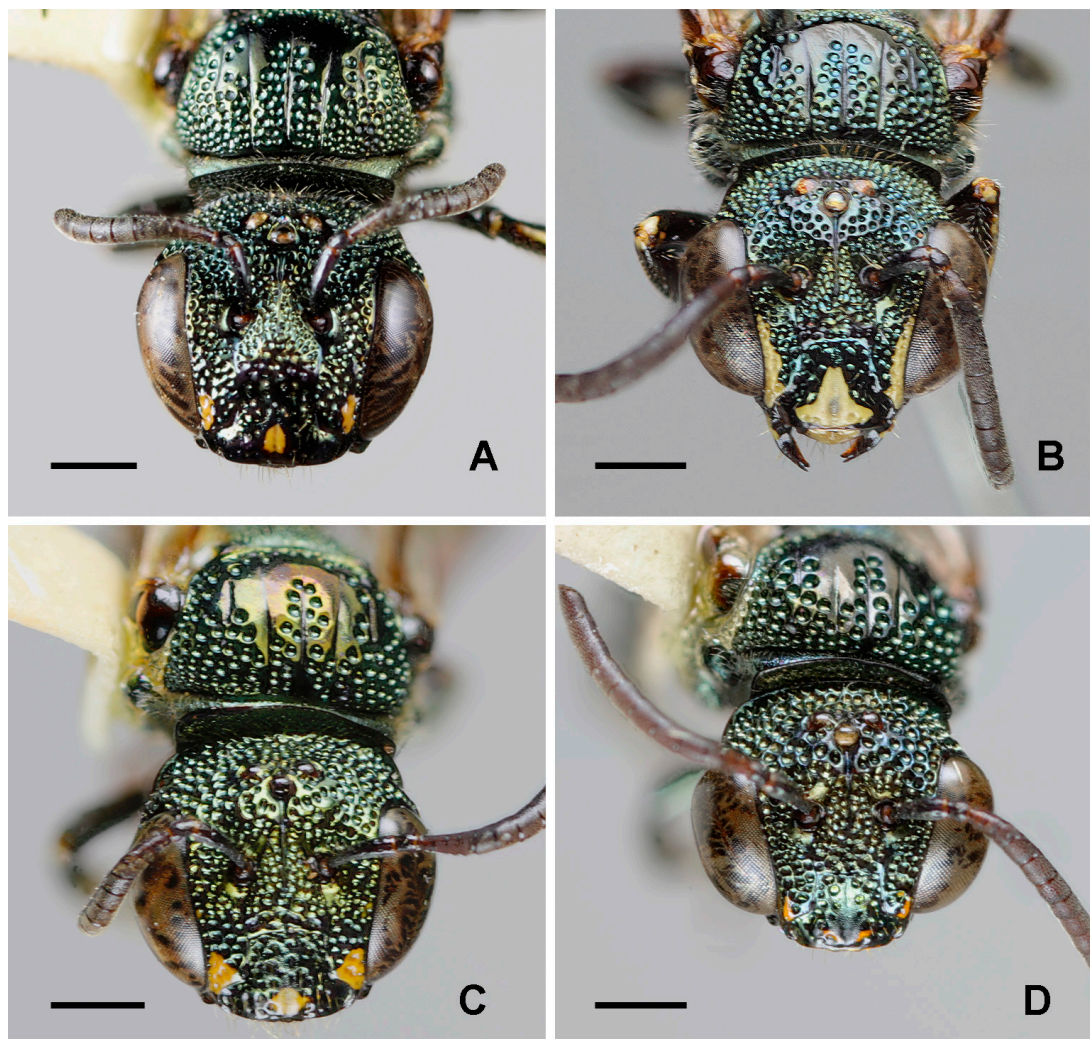


Figure 4. Frontal view of head and dorsal view of scutum of species of the *Ceratina* (*Crewella*) *amazonica* species-group. A–B. *C. amazonica*, new species, female holotype (A), and male (B). C–D. *C. crassipunctata*, new species, female holotype (C), and male (D). Scale bars = 0.5 mm.

(holotype female, Bartica, British Guiana, May 21, 1901, J.R. Crew, USNM, examined). Michener, 1954: 150. Moure, 2007: 645.

Diagnosis. This species is characterized by its long mouthparts, the polished first metasomal tergum with a short disc bearing a few minute punctures, the long dorsal area of the metapostnotum, twice as long as the metanotum, and the long yellow marks on the clypeus and paraocular areas (Fig. 5B).

Female. Length, 8.5–9.6 mm; length of forewing, 6.8–7.5 mm. **Color.** Black, specimen from Iguazú, Argentina, with greenish metallic reflections on pronotal collar, dorsal area of metapostnotum

and metasomal terga. Legs with ferruginous distotarsi and black tibial spurs. Following marks yellow: clypeus with median triangular longitudinal mark occupying apical 0.6–0.8 of clypeus; paraocular area with long mark, from lateral lower angle of clypeus to level of antennal socket; gena with yellow stripe 0.7–0.8x as long as eye; forefemur with apical spot and foretibia with basal spot followed by longitudinal dorsal stripe (these marks darkened in the holotype). Tegula dark brown. Wings infusate with veins and pterostigma dark brown. **Structure.** Clypeus weakly convex in lateral view, without apical truncation, with shallow median longitudinal impression; median longitudinal area finely

granulate and sides of clypeus polished between punctures. Labrum 0.85x as long as basal width; with basal convexity at each side of middle. Hypostomal carina anteriorly with strong, rounded elevation. Proportion between length of eye and length of second segment of labial palpus 1:2.27 (holotype), 1:1.9 (specimen from Misiones). Preoccipital carina simple behind ocelli. Distance between lateral ocellus and preoccipital carina 2.25 times MOD. First flagellomere 1.15x as long as its apical width. Lateral carina of pronotum lamellate. Dorsal area of metapostnotum long, twice as long as metanotum, granulose, basally with short, longitudinal rugae; medially with longitudinal impression and rudimentary carinula. Center of lateral part of mesopleuron with hairs short, 0.75–1.0x MOD. Lateral angle of hind coxa rounded. Hind tibial spine on basal 0.4 of tibial length. T1 without clear limits between anterior surface, disc of tergum, and marginal zone; disc forming short rounded ridge with few minute punctures; marginal zone depressed, approximately 1.2–1.3x MOD. Apical margin of T2 and T3 rounded. T4 rugose on apical third (medially) to apical half (laterally), basally with integument flat between punctures; T5 rugose. T5 with setae 0.6–0.8x MOD. S6 with small apical impunctate area.

Male. Unknown.

Comments. The mandible of the holotype has the usual three teeth characteristic of species of *Ceratina*, not two as mentioned by Cockerell (1903) in the original description. Cockerell also mentioned that the mandible was produced into a tooth beneath. No such tooth was found upon examination of the holotype; probably Cockerell misinterpreted the anterior enlargement of the hypostomal carina as a projection of the mandible.

The specimens studied from Misiones, Argentina, have the mouthparts somewhat shorter than those of the holotype from Guyana, and the yellow genal stripe is much broader. Apart from these differences, the specimens are nearly identical.

The brief original description of *C. punctulata* Spinola (1841), described from French Guiana, is very suggestive of this species. Probably *C. titusi* may become a junior synonym, but the type of *C. punctulata* was not available for study.

The anterior elevation of the hypostomal carina readily separates *C. titusi* from the closely related *C. pubescens*, which has golden reflections and a hypostomal carina of uniform height.

Distribution. Argentina, province of Misiones. Guyana, Cuyuni-Mazaruni Region.

Material studied. Argentina. Misiones: 1 F, Iguazú National Park, 22-XI-2007, sweep, A. Taylor (MACN); 1 F, Parque Nacional Iguazú, Rta. 101, 27-IV-2018, L. Álvarez, D. Aquino (MLP). Guyana. Cuyuni-Mazaruni Region: holotype F, Bartica, 21-V-1901, J.R. Crew (USNM)

***Ceratina (Crewella) vernoniae* Schrottky,
1920
(Figs. 5C–D, 14F)**

Ceratina vernoniae Schrottky, 1920: 211–212 (lectotype female, present designation, Puerto Bertoni, Alto Paraná, Paraguay, IV.1919, flr. *Vernonia* sp., USNM ENT 00534293, examined).

Ceratina (Crewella) vernoniae: Moure, 2007: 645.

Diagnosis. This species is characterized by the extremely short disc of T1, reduced to a sharp ridge with a few indistinct punctures medially, the short mouthparts, and the red color of the scape, pedicel and proximal three flagellomeres. It is closely related to *C. bicolorata*, from which it is differentiated by the smaller punctures of the head and scutum, and the coloration of the antennae.

Female. Length, 7.2–8.0 mm; length of forewing, 5.8–6.2 mm. **Color.** Black, with green metallic tints on head, sides of T3, entire T4–T6 and S4–S6; on face with purplish reflections in part; T2–T3 with purpureous tints. Antenna with scape, pedicel and proximal three flagellomeres red. Following marks yellow: clypeus with apical, median mark frequently notched basally; paraocular area with large triangular mark close to lateral lower angle of clypeus; gena with narrow yellow stripe 0.3–0.5x as long as eye; forefemur with or without apical spot and foretibia with or without basal spot. Foretibia partly reddish, tibial spurs reddish. Tegula brown. Wings infusate, darker along costal margin; veins and pterostigma dark brown. **Structure.** Clypeus straight in lateral view, with short apical truncation, 0.07–0.10x as long as length of clypeus, with distinct median longitudinal impression; at each side of impression without punctures and finely granulate. Labrum 0.7x as long as basal width; with basal convexity at each side of middle, and two median preapical small tubercles. Hypostomal carina not elevated, of uniform height. Proportion between length of eye and length of second segment of labial palpus 1:0.9. Preoccipital carina simple behind ocelli. Distance between lateral ocellus and preoccipital carina 2.3–2.5 times MOD. First flagellomere 1.3x as long as its apical width. Lateral carina of

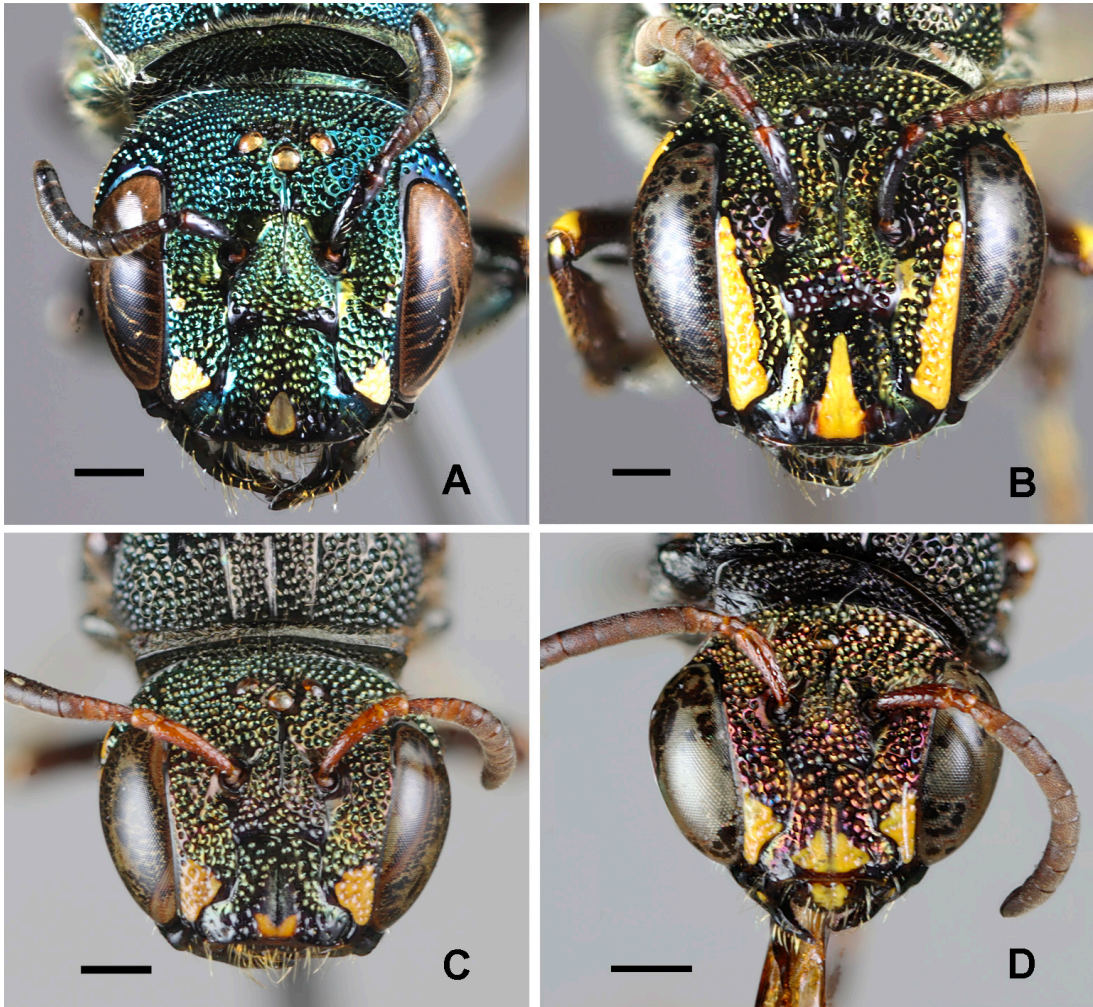


Figure 5. Frontal view of head of species of the *Ceratina* (*Crewella*) *titusi* species-group. A. *C. duplocarinata*, new species, female holotype. B. *C. titusi* Cockerell, female. C–D. *C. vernoniae* Schrottky, female (C), and male (D). Scale bars = 0.5 mm.

pronotum lamellate, forming lower tooth. Dorsal area of metapostnotum granulate, basally with short, longitudinal rugae; medially with single longitudinal carinula. Center of lateral part of mesopleuron with hairs short, 0.4–0.6x MOD. Lateral angle of hind coxa rounded. Hind tibial spine on basal 0.4 of tibial length. Anterior surface of T1 with few, sparse punctures; disc of T1 reduced to transverse ridge bearing few punctures; marginal zone impunctate, polished, medially as long as MOD. Apical margin of T2 and T3 truncate. T4–T5 rugose between punctures. T4–T5 with very short setae, on T5 0.3–0.4x MOD. S6 without impunctate median areas.

Male. Length, 7.0 mm; length of forewing,

5.7 mm. **Color.** Similar to that of female, with following parts yellow: paracocular area with large triangular mark close to lateral lower angle of clypeus, median triangular mark on apical third of clypeus, basal mark on labrum, small antero-basal mark on mandible, short genal stripe, apical spot on forefemur, and basal spot followed by longitudinal stripe on foretibia. **Structure.** First flagellomere as long as its apical width. Median ocellus in frontal view above upper tangent of eyes. Apical margin of T7 medially, weakly emarginate. Metasomal sterna strongly punctate. S6 (Fig. 14F).

Comments. The specimen designated as lectotype bears a label “this is the holotype / F. Moure 1957.” Since in the original description

Schrottky mentions that the species varied in length from 8.2 to 8.8 mm, it is clear that he examined more than one specimen. Consequently, a lectotype is designated.

Distribution. Argentina, province of Misiones. Brazil, state of Rio de Janeiro. Paraguay, department of Alto Paraná.

Material studied. Argentina. Misiones: 1 F, Cataratas Iguazú, 9-VII-1973, A. Willink (IFML); 1 M, San Ignacio, 20-I-2017, on *Hyptis* sp., J.P. Torretta & L. Alvarez (MACN); 1 F, Parque Nacional Iguazú, 14-II-2009, Zamudio, Colleselli & Gómez de Oliveira (MLP); 1 F, Parque Nacional Iguazú, Rta. 101, 25-IV-2018, L. Álvarez, D. Aquino (MLP). Brazil. Rio de Janeiro: 1 F, Rio de Janeiro (MACN). Paraguay. Alto Paraná: 1 F, lectotype, Puerto Bertoni, IV-1919, flr. *Vernonia* sp. (USNM).

C. foveinasis species-group

Species in this group have a juxtantennal carina which hides the mesal margin of the antennal socket, as in the *C. maculifrons* group. The large, concave, polished clypeal truncation is distinctive, 0.19–0.27x as long as the clypeus (Fig. 6B, t). The labrum on the basal third is impunctate, polished, and has a single median tubercle. The disc of T1 is short, at most 1.5x as long as the posterior polished marginal zone. The forecoxa has a rounded lateral projection. The female T6 is strongly rugose, with a poorly defined median longitudinal furrow. Known species have long mouthparts, with the first segment of the labial palpus the longest. Besides the species described below, *C. cupreiventris* Smith (described from Ega, Brazil) also belongs in the group.

Ceratina (Crewella) foveinasis nov. sp. (Fig. 6A–B)

urn:lsid:zoobank.org:act:3F2D-5ED4-EA26-44FC-B25D-DF539CC0B43D

Diagnosis. This species is characterized by its bicolored metasoma and the median tubercle of the labrum not carinate. It is distinguished from *C. cupreiventris* by the larger and denser punctures on the face and scutum.

Female. Length, 6.8–7.8 mm (holotype 7.8 mm); length of forewing, 5.7–6.3 mm (holotype 6.3 mm). **Color.** Black, with blue metallic tints on most of head, pronotum, mesopleura, metapleura, metapostnotum and propodeum; interantennal area and frons with purplish

reflections; sides of T2–T3, T4–T6 and metasomal sterna with green metallic tints (as in holotype, some other paratypes with tints blue instead of green); T1 and discs of T2–T3 with dark purplish tints; legs with blue reflections on three proximal segments, distotarsi ferruginous. Following marks yellow: clypeus with preapical, median mark; labrum with central mark; paraocular area with triangular mark close to lateral lower angle of clypeus; gena with yellow stripe 0.6–0.7x as long as eye; forefemur with apical spot and foretibia with basal spot followed by longitudinal stripe in some specimens. Tegula dark brown. Wings weakly infusate, narrowly darkened along costal margin of forewing; veins and pterostigma dark brown. **Structure.** Clypeus in lateral view straight, with concave, polished apical truncation 0.20–0.25x as long as length of clypeus. Clypeus with weak median longitudinal impression; finely reticulated between and within shallow punctures. Labrum convex, medially tuberculate, 0.68–0.70x as long as basal width; with basal median impunctate, polished area. Hypostomal carina low, of uniform height. Proportion between length of eye and lengths of first and second segment of labial palpus 1:1.6–1.2. Preoccipital carina simple behind ocelli. Distance between lateral ocellus and preoccipital carina 2.0x MOD. First flagellomere 1.15x as long as its apical width. Lateral carina of pronotum strong, lamellate. Dorsal area of metapostnotum basally with short, longitudinal rugae; central portion with short irregular rugae and distinct longitudinal median carinula. Center of lateral part of mesopleuron with hairs 0.9–1.4x MOD, minutely branched. Lateral angle of hind coxa rounded. Hind tibial spine on basal 0.4 of tibial length. T1 with anterior surface mostly polished, with few punctures; disc punctate, medially 1.5x as long as posterior depressed, polished marginal zone. T4 rugose apically and laterally, T5 rugose. T4–T5 with very short, erect, pointed setae, 0.3–0.5x MOD. T6 with narrow, shallow longitudinal median impression. S6 with median longitudinal impunctate keel.

Male. Unknown.

Etymology. The specific name refers to the concave apical depression of the clypeus.

Distribution. Peru, department of Huánuco.

Material studied. *Holotype:* Peru. Female from Yurac, 67 mi. E of Tingo María, XI-16-1954, E.I. Schlinger & E.S. Ross (CAS). *Following paratypes:* Peru. 3 F, Monson Valley, Tingo María, XI-10, XI-21, and XI-29-1954, E.I. Schlinger & E.S. Ross (CAS), and 1 F, same data (MACN).

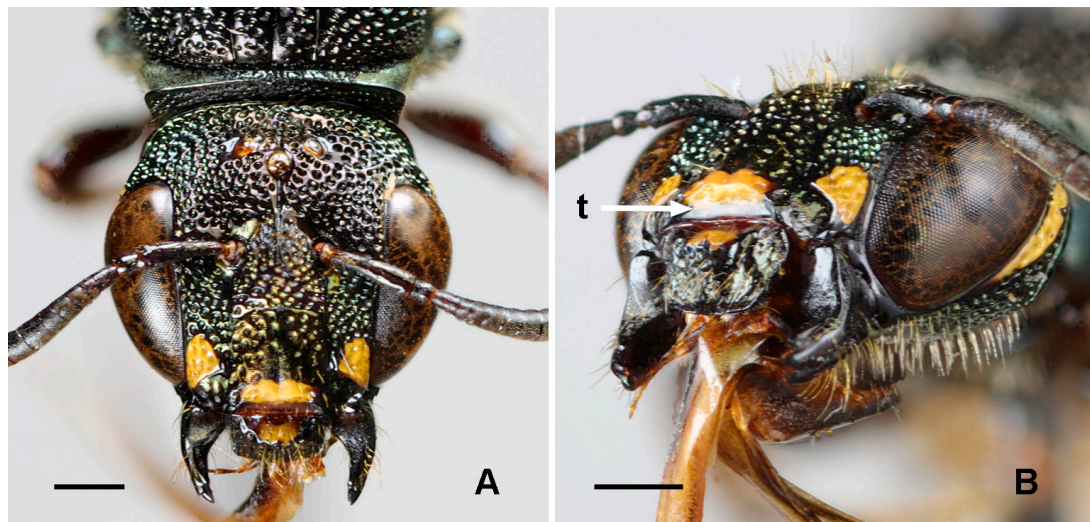


Figure 6. *Ceratina* (*Crewella*) *foveinasis*, new species, female holotype. A. Face. B. Anterolateral view of head showing clypeal truncation (arrow, t) and labrum. Scale bars = 0.5 mm.

C. maculifrons species-group

This group is readily recognized by the developed juxtantennal carina, which hides, in frontal view, the mesal margin of the antennal socket (Fig. 1A, jc). The clypeus is truncate apically, the truncation being 0.08–0.23 times as long as the length of the clypeus (Fig. 12C, t). The dorsal surface of T1 is densely punctate, the disc being long, several times (2.5–5.0) longer than the posterior polished marginal zone (Fig. 2B, mz), and usually forming a distinct angle with the punctate anterior surface of the tergum, from which it is separated by a transverse, polished, impunctate low rim. The female sixth tergum bears a median longitudinal furrow, much impressed in most species (Fig. 13G), rather weak in *C. diligens*, *C. guaranitica*, and *C. lobata*, and enormous in *C. paraguayensis* (Fig. 13F). All studied species have short mouthparts and a short, rounded lateral projection of the forecoxa. Besides the eleven species treated below, *C. aspera* Schrottky (described from São Paulo, Brazil) and *C. chrysocephala* Cockerell (described from Manaus, Brazil) also belong in the group.

Ceratina (*Crewella*) *acuminata* nov. sp.

(Figs. 7A–B, 13E, 14G)

urn:lsid:zoobank.org:act:4B17E965-16B4-43E7-9F1B-45009618AAE5

Diagnosis. This species is readily distinguished

in both sexes by the sharply pointed lateral angle of the hind coxa (Fig. 13E), and the dorsoapically compressed hind femur. The face has cupreous metallic tints as in *C. morrensis*, but the scape, pedicel and first flagellomere are black (Fig. 7A–B). The hind tibia bears a distinct yellow spot, while in *C. morrensis* it usually bears a ferruginous basal mark. *Ceratina acuminata* can also be distinguished from *C. morrensis* by the longer hairs of mesopleuron and the shape of S6 of the male.

Female. Length, 8.5–10.2 mm (holotype 10.2 mm); length of forewing, 6.5–7.3 mm (holotype 7.3 mm). **Color.** Black, with cupreous metallic tints on face and blue metallic tints on rest of head, mesosoma, proximal segments of legs, and metasoma; some specimens with reduced blue reflections and discs of T2–T5 black, without metallic tints. Following yellow spots: clypeus with apical, median mark; paraocular area with large mark bordering eye, broadest close to lateral margin of clypeus and narrow above, usually constricted at level of upper margin of clypeus; some specimens (as in holotype) with paraocular mark split in two, so face with five yellow marks; gena with yellow stripe 0.75–0.85x as long as eye; forefemur with apical spot; foretibia with basal spot followed by stripe; middle and hind tibiae with basal spot. Distotarsi ferruginous. Tegula brown. Wings infusate; in some specimens forewing darker on costal half of marginal cell; veins and pterostigma brown. **Structure.** Clypeus in lateral view straight to slightly raised

before truncation; apical truncation short, 0.11–0.15x as long as length of clypeus. Clypeal median longitudinal impression weak or absent; clypeus medially reticulated between and within punctures. Labrum convex, 0.7x as long as basal width; with two short, preapical, longitudinal carinulae. Hypostomal carina low, of uniform height. Proportion between length of eye and length of second segment of labial palpus 1:1.2. Preoccipital carina simple behind ocelli. Distance between lateral ocellus and preoccipital carina 2.4–2.6x MOD. First flagellomere 1.25x as long as its apical width. Lateral carina of pronotum lamellate. Dorsal area of metapostnotum finely granulose, basally with short, longitudinal rugae, much reduced in some specimens; medially with irregular longitudinal carinula. Center of lateral part of mesopleuron with hairs 0.7–1.1x MOD. Lateral angle of hind coxa produced into sharp, flattened point (Fig. 13E). Hind femur dorsally compressed on apical two fifths; outer surface of this portion flattened. Hind tibial spine on basal 0.3 of tibial length. T1 with anterior surface and disc densely punctate. Apical margin of T2 and T3 briefly truncate medially, rounded laterally. T4 rugose laterally and apically, medially flat between punctures; T5 rugose. T4–T5 with very short, flattened setae, on T5 0.3–0.4x MOD. T6 with longitudinal median furrow. S6 with median longitudinal impunctate line.

Male. Length, 7.3–8.0 mm; length of forewing 6.0–6.2 mm. *Color.* Similar to that of female, with following parts yellow: large paraocular band occupying most of paraocular area to upper level of clypeus, tapering then up to level of antennal socket; broad triangular mark on apex of clypeus; large spot on base of mandible; most of labrum, except lateral and apical margins; genal stripe; forefemur with apical spot; foretibia with basal spot followed by stripe; basal spot on middle and hind tibiae. *Structure.* First flagellomere as long as its apical width. Median ocellus in frontal view above upper tangent of eyes. Apical margin of T7 entire, medially weakly emarginate. Discs of S3 with median impunctate area, S4–S5 punctate. S6 (Fig. 14G).

Etymology. The specific name (*acuminatus*, pointed in latin) refers to the acute lateral angle of the hind coxa.

Comments. This species is included in the key to species of Argentina below, since it occurs east and west of the province of Misiones, in Brazil and Paraguay.

Distribution. Brazil, states of Mato Grosso do Sul, Minas Gerais, Rio de Janeiro, and São Paulo.

Paraguay, department of San Pedro.

Material studied. *Holotype:* Paraguay. Female from departamento San Pedro, Icuá Pindó, XII-1946, Bridarolli (MACN). *Following paratypes.* Brazil. Mato Grosso do Sul: 1 F, Selvíria, 1/2-XII-1996, Generani & Scaramozzino (CAS). Minas Gerais: 1 F, Lagoa Santa, Burmeister collection (MACN). Rio de Janeiro: 3 F, Ilha do Governador, D. Federal, III-1954, L.C. Alvarenga (CAS). São Paulo: 2 M, Itirapina, 1-XII-1996, Scaramozzino & Generani (CAS), and 1 M, same data (MACN).

***Ceratina (Crewella) carbonaria* nov. sp.**

(Figs. 7C–D, 14H)

urn:lsid:zoobank.org:act:D47AD536-20A3-4038-9189-52A313170FDB

Diagnosis. This species is characterized by its black coloration, without any metallic tints, or with scarce bluish reflections on T1–T2. The marginal cell and the costal margin of the apex of the forewing are strongly infuscate, contrasting with the remainder of the less infuscate wing. The lateral carina of the pronotum is low, as in *C. gossypii*, from which it is readily differentiated by the color pattern.

Female. Length, 8.0–10.0 mm (holotype 10.0 mm); length of forewing, 6.2–7.5 mm (holotype 7.3 mm). *Color.* Black, shiny, but without metallic color tints, except with bluish reflections on base of T2, and sometimes also on T1. Clypeus with apical, median, yellow mark. Paraocular area with two yellow marks, one close to lateral lower angle of clypeus and another one bordering eye from level of upper margin of clypeus to antennal socket. Gena with yellow stripe 0.5–0.7x as long as eye. Legs black with reddish distotarsi; forefemur with apical yellow spot; foretibia with basal yellow spot followed by yellow stripe; middle and hind tibiae with basal yellow spot; tibial spurs reddish. Tegula dark brown. Wings infuscate; forewing distinctly darker on apex of radial cell, entire marginal cell, and costal margin of apex of wing; veins and pterostigma brown. *Structure.* Clypeus in lateral view straight to slightly raised before truncation; apical truncation short, 0.12–0.19x as long as length of clypeus. Clypeal median longitudinal impression weak or absent; clypeus medially reticulated between punctures (separated by 0.2–0.5 PD). Labrum convex, 0.6x as long as basal width; with two short, preapical, longitudinal carinulae. Hypostomal carina not elevated, of uniform height. Proportion between length of eye and

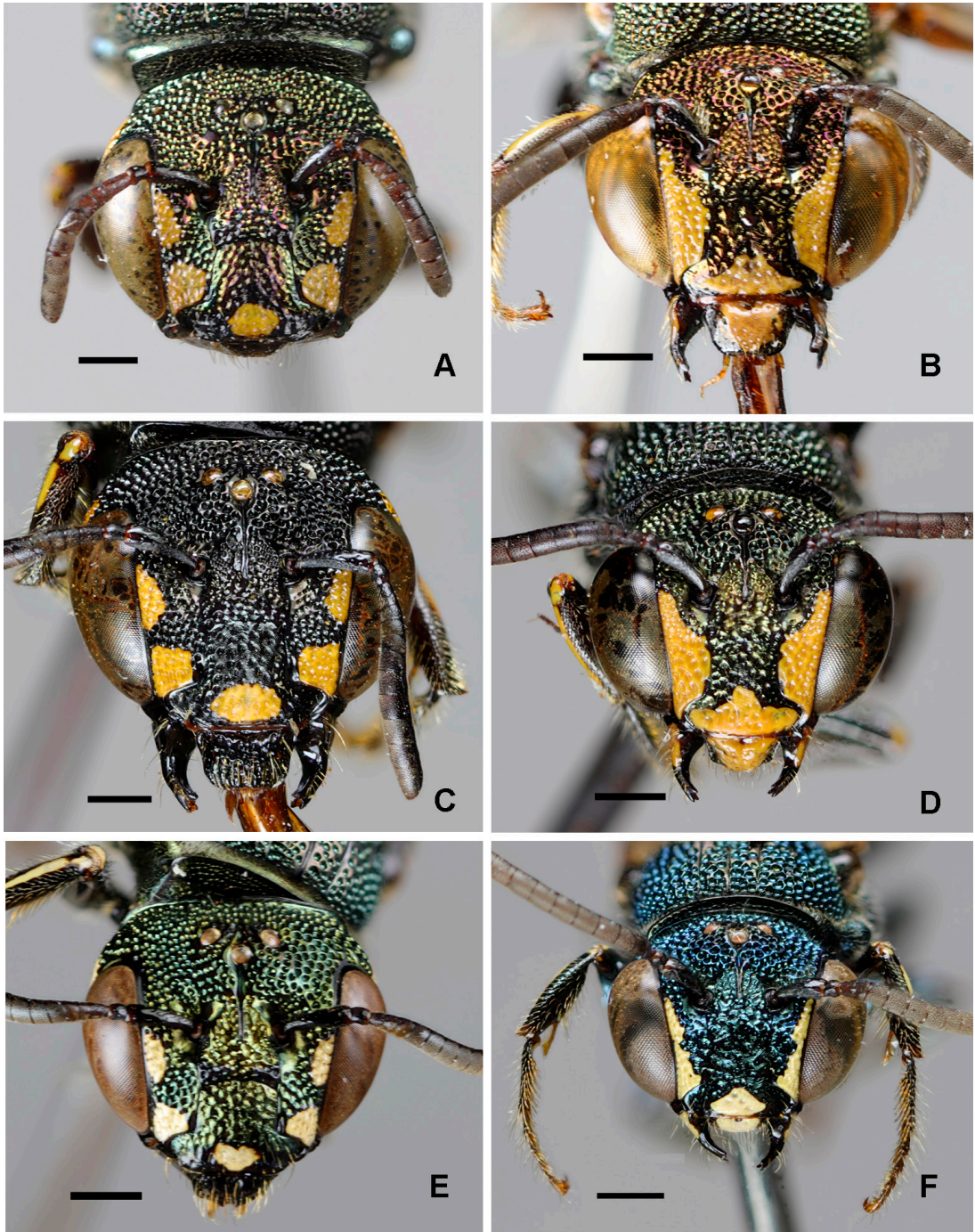


Figure 7. Frontal view of head of species of the *Ceratina* (*Crewella*) *maculifrons* species-group. A–B. *C. acuminata*, new species, female holotype (A), and male (B). C–D. *C. carbonaria*, new species, female holotype (C), and male (D). E–F. *C. diligens* Smith, female (E), and male (F). Scale bars = 0.5 mm.

length of second segment of labial palpus 1:0.90–0.95. Preoccipital carina simple behind ocelli. Distance between lateral ocellus and preoccipital carina 2.1–2.2 times MOD. First flagellomere 1.15x as long as its apical width. Lateral carina of pronotum low close to transpronotal groove and progressively but moderately elevated ventrally, not forming lower tooth. Dorsal area of metapostnotum finely granulose, basally with short, longitudinal rugae; in some specimens medially with few irregular wrinkles. Center of lateral part of mesopleuron with hairs 1.0–1.3x MOD, with short branches. Lateral angle of hind coxa rounded. Hind tibial spine on basal 0.33 of tibial length. T1 with anterior surface and disc densely punctate. Apical margin of T2 and T3 distinctly truncate medially, laterally rounded to briefly truncate. T4 rugose, or with basomedian part of disc flat between punctures; T5 rugose. T4–T5 with very short, broad setae, longer on T5 (0.3–0.5x MOD). T6 with longitudinal median furrow. S6 with median longitudinal impunctate keel; sternum straight in lateral view.

Male. Length, 7.5 mm; length of forewing 6.0 mm. *Color.* Similar to that of female, with following parts yellow: large paraocular band occupying entire lower part of paraocular area to upper level of clypeus, tapering then up to level of antennal socket; inverted T-shaped mark on apex of clypeus; large spot on base of mandible; most of labrum, except lateral and apical margins; genal stripe; forefemur with apical spot; foretibia with dorsal stripe on all its length; and basal spot on middle and hind tibiae. *Structure.* First flagellomere as long as its apical width. Median ocellus in frontal view above upper tangent of eyes. Apical margin of T7 entire, medially weakly emarginate. Discs of S3–S5 punctate. S6 (Fig. 14H).

Etymology. The name *carbonarius*, black as charcoal in latin, refers to the lack of metallic colors in this species.

Distribution. Argentina, province of Misiones. Brazil, states of Santa Catarina and São Paulo.

Material studied. *Holotype:* Argentina. Female from Misiones, Piñalito, Departamento Frontera, X-1954, De Carlo & Viana (MACN). *Following paratypes:* Argentina. Misiones: 1 M, same data as holotype (MACN); 2 F, Misiones, #7028 (MACN); 1 F, Loreto, A. Ogloblin (MLP). Brazil. Santa Catarina: 2 F, São Bento, 22-X-1978, H.V. Daly (EMEC). São Paulo: 2 F, Bauerei, 60 km N São Paulo, 12-VII-1966, E. Schlinger (EMEC).

***Ceratina (Crewella) diligens* Smith, 1879**
(Figs. 7E–F, 8A, 14A–C)

Ceratina diligens Smith, 1879: 96 (lectotype female, Santarem, Brazil, NHMUK, examined, present designation). Dalla Torre, 1896: 198. Schrottky, 1902: 482.

Ceratina maculifrons: Holmberg, 1903: 434. Schrottky, 1907a: 274; 1907b: 477–479, 480; 1913: 252. Strand, 1909: 230; 1910: 504. Ducke, 1910: 363 (partim). Misidentifications.

Ceratina (Crewella) diligens: Moure, 2007: 643.

Diagnosis. This species is readily distinguished by the double preoccipital carina in both sexes (Fig. 8A, dc), and the convex profile of the sixth sternum of the female. Males have the apical margin of T7 laterally weakly to strongly notched (Fig. 14A–B). This species is smaller than most species of the *maculifrons* group of *Crewella*, with some males as small as 4.8 mm long.

Female. Length, 6.3–8.5 mm (lectotype 8.0 mm); length of forewing, 4.9–6.0 mm (lectotype approx. 5.4 mm, tattered wings). *Color.* Black, with metallic tints on head, mesosoma and metasoma varying from olive-green to blue. Some blue specimens with discs of metasomal terga black, shiny, without metallic tints. Face with five yellow spots: clypeus with apical, median mark, and each paraocular area with two marks, one close to lateral lower angle of clypeus and another one bordering eye from level of upper margin of clypeus to antennal socket. Lectotype with small yellow mark on labrum; all other examined specimens with labrum black. Gena with yellow stripe 0.3–0.7x as long as eye. Legs with coxae, trochanters and femora black; tibiae and basitarsi variable, from yellowish brown (as in lectotype) to black; distal tarsomeres always paler than basitarsus; tibial spurs reddish brown; forefemur with apical yellow spot; foretibia with basal yellow spot followed by yellow stripe; middle tibia with basal yellow spot and hind tibia usually with ferruginous basal spot. Tegula dark brown to black. Wings weakly infuscate; forewing darker on costal half of marginal cell; veins and pterostigma brown. *Structure.* Clypeus in lateral view weakly convex; apical truncation short, 0.08–0.12 x as long as length of clypeus, in some specimens poorly defined medially. Clypeus without median longitudinal furrow or impression; reticulated between and within large, close punctures. Labrum 0.62–0.64x as long as basal width; with two short, preapical, longitudinal carinulae. Hypostomal carina low, of uniform height. Proportion between length of eye and

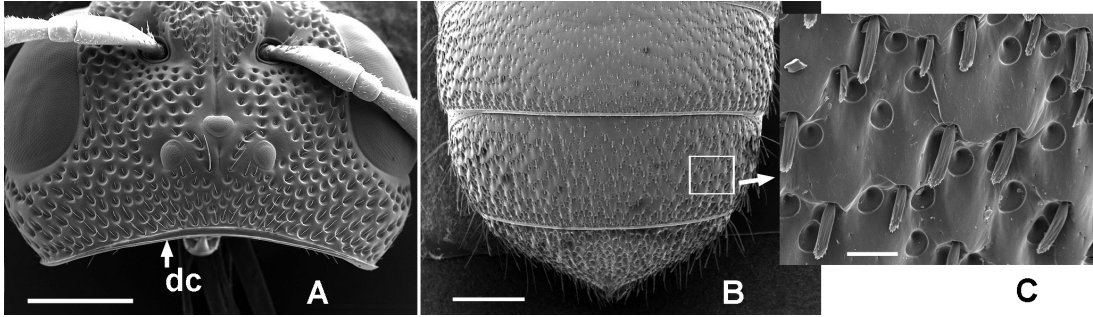


Figure 8. A. *Ceratina* (*Crewella*) *diligens* Smith, female. Dorsal view of head showing double preoccipital carina (arrow, dc). B–C. *C. gossypii* Schrottky, female. Dorsal view of metasomal T4–T6, with detail of punctures and setae on T5. Scale bars, A, B = 0.5 mm; C = 0.05 mm.

length of second segment of labial palpus 1:1.0–1.1. Preoccipital carina double behind ocelli. Distance between lateral ocellus and preoccipital carina 1.9–2.2 times MOD. First flagellomere 1.0–1.1x as long as its apical width. Lateral carina of pronotum strong, forming lower tooth. Dorsal area of metapostnotum rugulose, basally with short, longitudinal rugae. Center of lateral part of mesopleuron with hairs 0.7–1.3x MOD, with very short branches. Lateral angle of hind coxa rounded. Hind tibial spine on basal 0.33 of tibial length. T1 with anterior surface and disc densely punctate. Apical margin of T2 laterally rounded, medially rounded to briefly truncate; apical margin of T3 rounded. T4 rugose on apical 0.15–0.20; disc with integument flat between punctures; T5 variable, similar to T4 to rugose on apical 0.75. T4–T5 with very short, pointed setae, scarcely longer on T5 (0.2–0.3x MOD). T6 with longitudinal median impression. S6 with median longitudinal impunctate keel; sternum convex in lateral view.

Male. Length, 4.8–6.3 mm; length of forewing 4.1–4.5 mm. **Color.** Similar to that of female, with following parts yellow: narrow paraocular band from lower lateral angle of clypeus to level of antennal socket; transverse spot on apex of clypeus; spot on base of mandible; median, basal spot on labrum; genal stripe; marks on legs variable, usually forefemur with apical spot, foretibia and forebasitarsus with dorsal stripe on entire length, and basal spot on middle tibia; some specimens also with yellow spot on hind tibia, and others with legs mostly black, with yellow marks reduced to those on forefemur and tibia. **Structure.** First flagellomere 0.8–0.9x as long as its apical width. Median ocellus in frontal view above upper tangent of eyes. Apical margin of T7 medially weakly emarginate, laterally from sinuous to distinctly notched. Discs of S3–S5 punctate.

S6 (Fig. 14C).

Comments. A lectotype is designated, since at least two specimens of this species from the Smith collection are preserved at NHMUK. Smith (1879) did not indicate the number of specimens studied. The lectotype bears the following labels: “Type” (round label bordered with red); “B.M. Type / Hym / 17B 329;” “*Ceratina* / *diligens* / Type Sm.” (handwritten); “Santar / em” (round label), “54 / 63” (round label). The second specimen, also from Santarem, Smith Collection 79-22, is designated as paralectotype.

This species has not been properly recognized by subsequent authors, as indicated in the synonymy above. Schrottky (1907b: 477–470) redescribed it in detail under the name *C. maculifrons*, and his misidentification was followed by Strand (1909, 1910). Ducke (1910) erroneously synonymized *C. diligens* under *C. maculifrons*.

The margins of the double preoccipital carina behind the ocelli can be close together in some specimens, while in other specimens they may be separated by a considerable intervening space, as in Fig. 8A. The lateral portion of the apical margin of T7 of the males varies from being just sinuous to having a distinct, sharp notch. This variation can be observed among specimens from the same location, as in those from Iguazú National Park, Province of Misiones, Argentina, figured here (Fig. 14A–B). Most specimens in Argentinean populations bear a well-defined notch. The tibiae and basal tarsomeres are usually dark brown to black, but specimens with pale yellowish-brown tibiae and tarsi are found in series collected in the same place at the same time, where both types of coloration are observed.

Distribution. Argentina, provinces of Chaco, Corrientes, Formosa, Misiones, Salta, and Santa Fe. Brazil, states of Minas Gerais, Pará, and São Paulo. Paraguay, departments of Asunción,

Cordillera, and Itapuá.

Material studied. Argentina. Chaco: 2 F, 1 M, Río Bermejito, XI-2010, F. Vossler (MACN); 1 F, Castelli, XI-2010, F. Vossler (MACN); 1 F, Parque Nacional Chaco, 12/13-XI-2007, L. Compagnucci (MACN); 3 F, Roque Sáenz Peña, 1930, Ohnmeiser (MACN). Corrientes: 1 F, cerca Bella Vista, 9-XI-1969, C. Porter (IFML); 1 F, Santa Ana, 8-V-1971, Porter & Stange (IFML); 1 F, Corrientes, 22-III-1911, A. Soto (MACN); 1 F, Ituzaingó, I-2009, G. Galvani (MACN); 1 F, San Cayetano, Ebco, 6/10-XI-2007, L. Compagnucci (MACN); 1 F, 1 M, Parque Nacional Mburucuyá, N. Veiga (MACN); 2 F, Yapeyú, Dpto. San Martín, 3-XII-2012, ex *Stigmaphyllon jatrophyfolium*, H. Marrero (FAUBA). Formosa: 1 F, Reserva El Bagual, 18-VIII-2001, J.P. Torretta (MACN); 1 F, San Francisco de Laishi, Reserva El Bagual, sobre *Turnera grandiflora*, 28-II-2013, J. P. Torretta (FAUBA); 1 F, Las Lomitas, 15-XI-2007, L. Compagnucci (MACN); 3 F, Reserva Natural Formosa, VII-IX-2009, Gorini (MACN); 1 F, Laguna Oca, ciudad de Formosa, I-2008, G. Galvani (MACN); 1F, Laguna Oca, ciudad de Formosa, 26-IX/4-X-2008, trampa amarilla, G. Galvani (MACN). Misiones: 1 F, Bemberg, 12-29-I-1945, Hayward, Willink & Golbach (IFML). 1 F, INTA Cerro Azul, 19-X-2010, Roig Alsina et al. (MACN); 2 F, Posadas (MACN); 8 F, 4 M, 1 km SO Loreto, 3-4-XII-2014, C. Roig & A. Roig A. (MACN); 18 F, 4 M, Depto. Iguazú, Cataratas, X-1954, De Carlo & Viana (MACN); 1 F, Parque Nacional Iguazú, 14-II-2009, Zamudio, Colleselli & Gómez de Oliveira (MLP); 3 F, Azara, 27-I-2018, Álvarez & Almada (MLP). Salta: 1 F, 1 M, Embarcación, IX-1989, A. Roig A. (MACN); 1 F, Embarcación, 5-XII-1954, A. Ogloblin (MLP); 1 F, Tartagal, 11-VIII-1973, C. Porter (IFML); 1 F, Aguas Blancas, 11-V-1968, L. Stange (IFML); 4 F, 1 M, Río Pescado, ca. Orán, 19-VII-1971, Porter & Stange (IFML); 2 F, Rosario de la Frontera, 28-VIII-1971, Stange & Porter (IFML). Santa Fe: 1 F, La Gallareta, 17-III-1946, Hayward & Willink (IFML). Brasil. Minas Gerais: 3 F, Passos, X-1963, C. Elias (EMEC). Pará: 2 F, Santarém, lectotype and paralectotype (NHMUK); 1 M, Belém, 10-II-1960, P. San Martín (MNHNM); São Paulo: 2 F, Bauerei, 60 km N São Paulo, 12-VII-1966, E. Schlinger (EMEC); 1 F, Itu, 7-XII-1968, J. Chemsak (EMEC); 1 F, Itirapina, 1-XII-1996, Scaramozzino & Generani (CAS).

***Ceratina (Crewella) gossypii* Schrottky, 1907**

(Figs. 8B–C, 9A–B, 13A, 13C, 14I)

Ceratina gossypii Schrottky, 1907b: 479–480 (holotype female, Paraguay, Villa Encarnación, probably lost). Strand, 1910: 505. Schrottky, 1913: 252. Cockerell, 1937: 2. Silveira *et al.* 2002: 147. Rasmussen *et al.*, 2009: 34.

Ceratina gossypii var. *asuncionis* Strand, 1910: 506 (female syntypes, Paraguay, Asunción, 26-IX and 7-X, ZMB, not examined). New synonym.

Diagnosis. This species is distinguished by the reduced lateral carina of the pronotum, the short clypeal truncation, and the extended yellow markings in both sexes, including a yellow spot on the posterior margin of the pronotal lobe in most specimens. A yellow mark on the pronotal lobe is also present in *C. paraguayensis*, but in this species the entire posterior half of the lobe is yellow. Males of *C. gossypii* have a yellow stripe on the dorsal surface of the foretibia and on the forebasitarsus, and the basal spot on the hind tibia usually reaches the basitibial spine. Females may have the yellow paraocular mark entire or divided in two.

Female. Length, 7.0–9.7 mm; length of forewing, 5.2–7.1 mm. *Color.* Black, with metallic tints on head, mesosoma and metasoma varying from olive-green to blue. Face usually with three yellow spots: clypeus with apical, median mark, and paraocular area with large mark bordering eye, broadest close to lateral margin of clypeus and narrow above, frequently constricted at level of upper margin of clypeus; some specimens with paraocular mark split in two, so face with five yellow marks. Gena with yellow stripe 0.5–0.7x as long as eye. Pronotal lobe frequently with yellow spot on posterior margin, sometimes small or absent. Forefemur with apical yellow spot; foretibia with basal yellow spot followed by yellow stripe; middle tibia with basal yellow spot and hind tibia with yellow spot at least half as long as basitibial area and usually reaching basitibial spine; tibial spurs and distal tarsomeres reddish brown. Tegula brown to dark brown. Wings infusate, with brown veins and pterostigma. *Structure.* Clypeus straight in lateral view, reticulated between and within large punctures; apical truncation short, 0.06–0.13x as long as length of clypeus. Clypeus usually without median longitudinal impression, but few specimens with such impression weakly indicated. Labrum 0.6x as long as basal width, strongly punctate, with median longitudinal depression and two preapical, short, longitudinal carinulae. Hypostomal carina low, of uniform height. Proportion between length of eye and length of second segment of labial palpus 1:0.95–1.05. Preoccipital carina simple behind

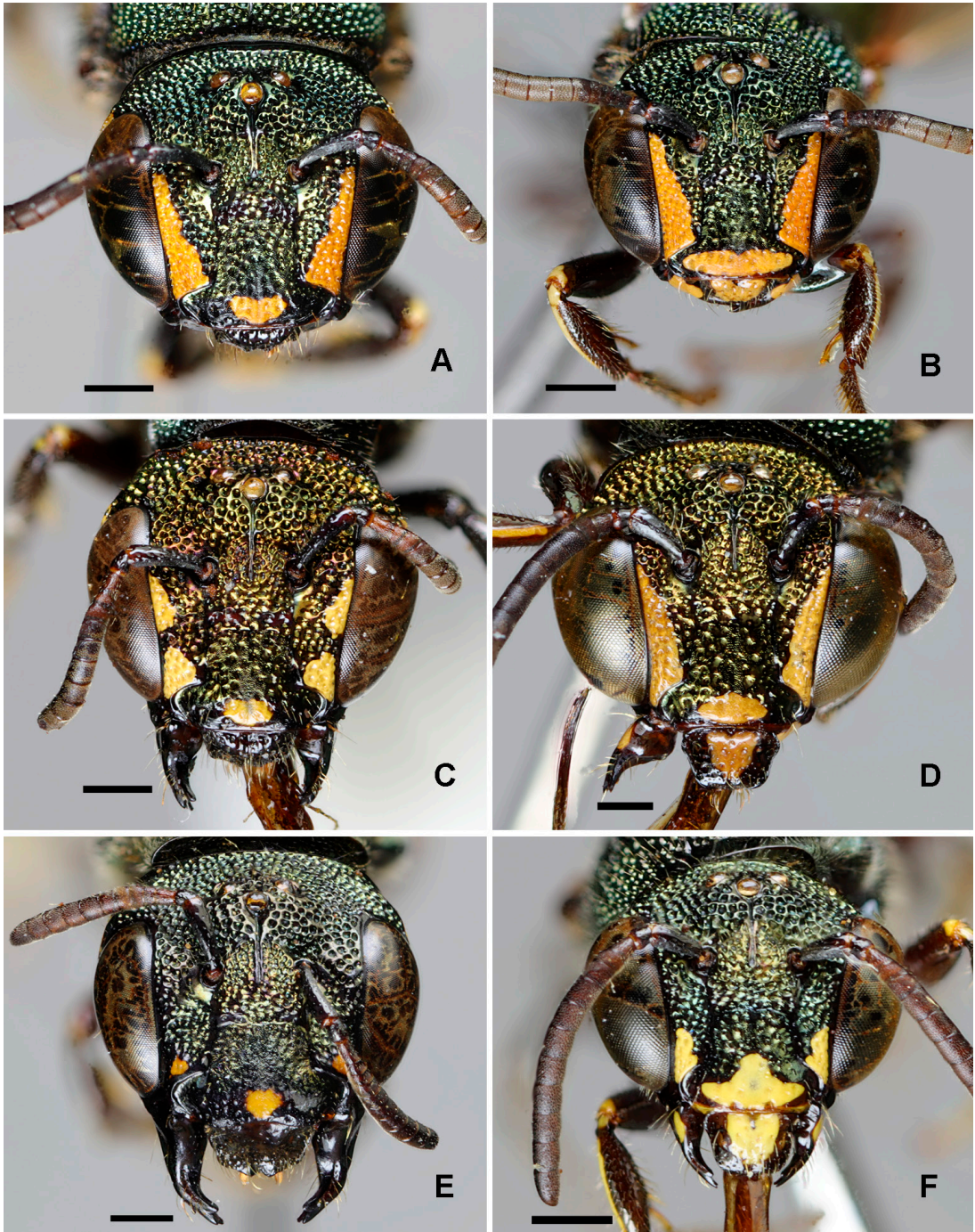


Figure 9. Frontal view of head of species of the *Ceratina* (*Crewella*) *maculifrons* species-group. A–B. *C. gossypii* Schrottky, female (A), and male (B). C–D. *C. guaranitica*, new species, female holotype (C), and male (D). E–F. *C. lobata*, new species, female holotype (E), and male (F). Scale bars = 0.5 mm.

ocelli. Distance between lateral ocellus and pre-occipital carina 2.2–2.7 times MOD. First flagellomere 1.2x as long as its apical width. Lateral carina of pronotum low, frequently carinate, but shortly lamellate in some specimens. Dorsal area of metapostnotum finely granulose, basally with short, longitudinal rugae. Center of lateral part of mesopleuron with hairs 0.7–1.1x MOD, with distinct branches. Lateral angle of hind coxa broadly rounded (Fig. 13C) to narrowly rounded (as in Fig. 13D). Hind tibial spine on basal 0.33 of tibial length. T1 with disc densely punctate. Apical margin of T2 and T3 rounded. T4 rugose on apical 0.15–0.30; disc with integument flat between punctures; T5 rugose. T4–T5 with very short, decumbent setae with rounded apices, those on T5 as long as 0.3–0.5x MOD. T6 with median longitudinal furrow. S6 with median longitudinal impunctate keel; sternum straight in lateral view.

Male. Length, 7.0–7.8 mm; length of forewing 5.3–6.2 mm. *Color.* Similar to that of female, with following parts yellow: paracocular band from lower lateral angle of clypeus to level of antennal socket; transverse spot on apex of clypeus; spot on base of mandible; median, basal spot on labrum; genal stripe; frequently with spot on posterior margin of pronotal lobe; forefemur with apical spot, foretibia and forebasitarsus with dorsal stripe usually on entire length; basal spot on middle and hind tibiae, spot on hind tibia usually reaching basitibial spine. *Structure.* First flagellomere 1.2x as long as its apical width. Median ocellus in frontal view above upper tangent of eyes. Apical margin of T7 entire, medially weakly emarginate. Discs of S3–S5 punctate. S6 (Fig. 14I).

Comments. Schrottky's detailed description (1907b) allows the identification of this taxon with certainty, in spite of the loss of the type. The holotype had green metallic tints, as most specimens studied from Formosa and Corrientes in Argentina, but other specimens are bright blue, a color variation also observed in *C. maculifrons* and *C. diligens*. Strand (1910) studied specimens of *C. gossypii* from Villa Morra and Asunción (Paraguay), and described the variety *asuncionis* for five females from Asunción with the paracocular mark divided in two. The extent of the paracocular yellow mark varies in *C. gossypii* from a single broad mark to two small, well separated spots. This variation occurs in specimens from the same population.

This species is closely related to *C. maculifrons*, from which it differs in several details. Both

taxa have the same color variation, from metallic olive-green to blue, and have the same pattern of yellow markings, presenting specimens with three or five marks on the face. *Ceratina gossypii* has a narrower clypeal truncation, the clypeus usually lacks a median longitudinal impression (but few specimens have such impression weakly indicated), the lateral carina of the pronotum is weaker, in most specimens much reduced at the level of the transpronotal groove, the setae on the disc of T5 are prostrate, short, and with broad apices (Fig. 8B–C), the pilosity of the mesopleuron is more plumose, and the labrum more strongly punctate. Specimens of *C. maculifrons* have a clypeal truncation 0.16–0.22x as long as the length of the clypeus, a distinct median longitudinal impression on the clypeus, a lamellate, strong lateral carina on the pronotum, erect, pointed setae on the disc of T5, pilosity on the mesopleuron below the hypoepimeral area with hairs simple or with short branches, and the labrum basally mostly polished, with small punctures. These differences hold between the studied specimens from northern Argentina, Bolivia and Paraguay (*C. gossypii*), and those from the Amazonian region (*C. maculifrons*), and I keep them as separate species, but further study of material from intervening areas may show that this is just clinal variation, and that *C. gossypii* is a junior synonym of *C. maculifrons*.

Distribution. Argentina, provinces of Chaco, Corrientes, Formosa, and Misiones. Bolivia, department of Beni. Brazil, states of Minas Gerais, Rio Grande do Sul and São Paulo. Paraguay, departments of Asunción, Itapúa, and San Pedro.

Material studied. Argentina. Chaco: 2 F, Capitán Solari, Parque Nacional Chaco, 31-VII-2008, A. Taylor & N. Veiga (MACN). Corrientes: 1 F, Corrientes city, Camping El 15, 15-XII-2015, ex *Ipomoea* sp., J.P. Torretta (MACN); 1 F, Santa Teresa, Parque Nacional Mburucuyá, 31-VIII-2009, N. Veiga (MACN). Formosa: 16 F, 3 M, Reserva Laguna Oca, ciudad Formosa, 26-IX/4-X-2008, pan traps, G. Galvani (MACN); 5 F, 3 M, Reserva Laguna Oca, ciudad Formosa, I-2008, G. Galvani (MACN); 1 F, 2 M, Laguna Blanca, P.N. Pilcomayo, 14-VIII-2008, A. Taylor & N. Veiga (MACN). Misiones: 1 F, Bompland, 14-III-1910, P. Jörgensen (MLP); 22 F, 5 M, Depto. Iguazú, Cataratas, X-1954, De Carlo & Viana (MACN); 1 F, Loreto, II-1945, Viana (MACN); 3 F, 1 M, Loreto, A. Ogloblin (MLP); 1 F, Loreto, III-1953, Montes (MLP); 1 F, Pastoreo Grande, III-1953 (MLP); 1 F, Santa Ana, XI-1952 (MACN); 4 F, 1 M, P:N: Iguazú, 10-VII-2007, 29-VII-2007,

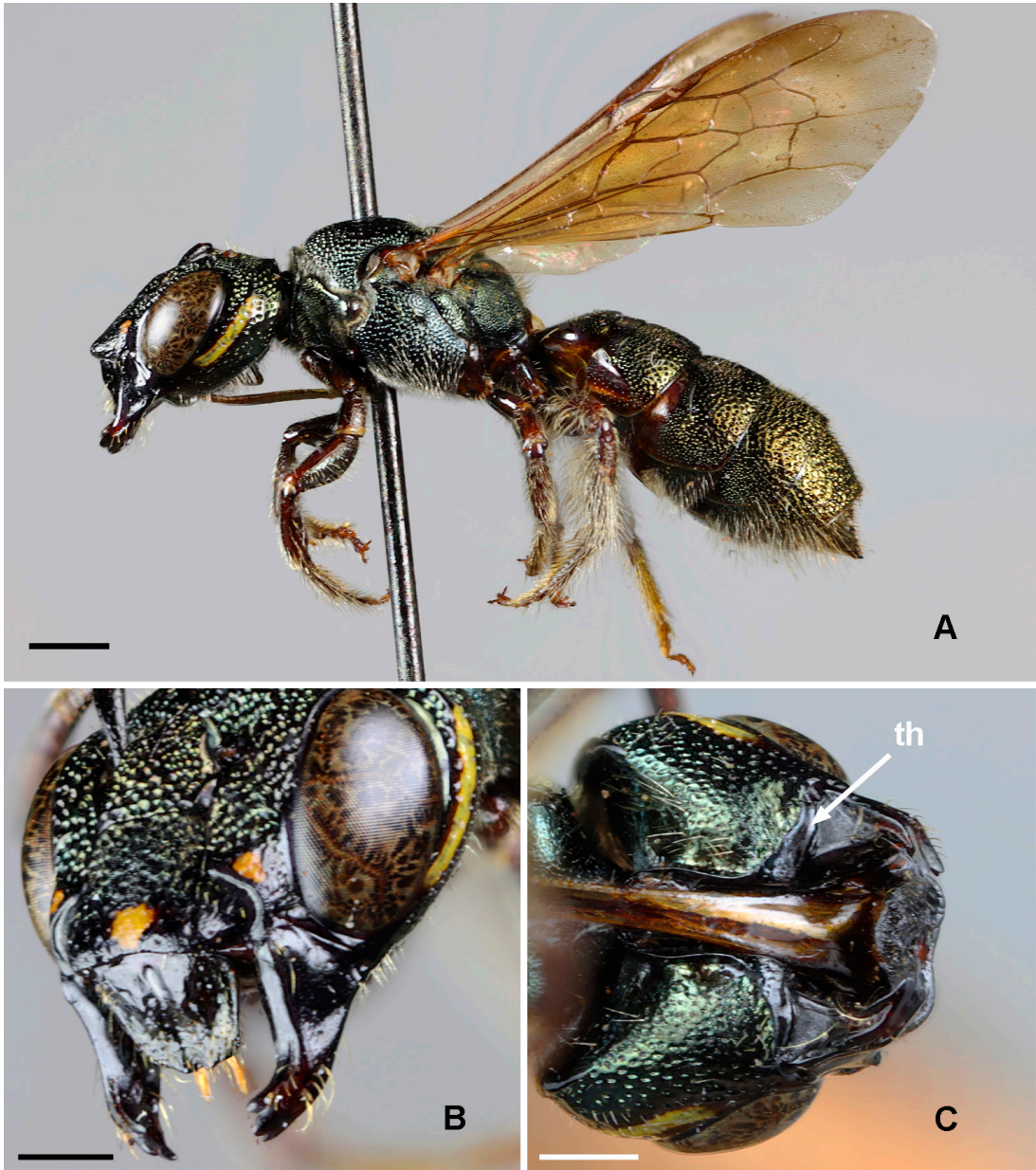


Figure 10. *Ceratina* (*Crewella*) *lobata*, new species, female holotype. A. Lateral habitus. B. Anterolateral view of head showing modified apex of clypeus and labrum. C. Ventral view of head, showing anterior thickening of hypostomal carina (arrow, th). Scale bars, A = 1 mm; B-C = 0.5 mm.

A. Taylor & N. Veiga (MACN); 34 F, 3 M, Puerto Iguazú, Parque Nacional Iguazú, 2-III-2009, 19-VI-2009, 3-VII-2009, 14-VIII-2009, 28-VIII-2009, 11-IX-2009, 29-IX-2009, N. Veiga (MACN); 4 F, Iguazú, 30-I/13-III-1945, Hayward, Willink & Golbach (IFML); 1 F, Bemberg, 14-30-III-1945, Hayward, Willink & Golbach (IFML); 1 F, San

Ignacio, II-1953 (MLP); 1 F, San Ignacio, Parque Provincial Teyú Cuaré, ex *Galianthe eupatorioides*, 18-II-2012, J. P. Torretta (FAUBA). Bolivia. Beni: 1 F, Prov. Ballivian, Estación Biológica Beni (14°S, 66°W), II-1991, 226 m, on *Pacourina edulis*, Kunze & Gumbert (EMEC). Paraguay. San Pedro: 1 F, San Estanislao, Williner (MACN).

***Ceratina (Crewella) guaranitica* nov. sp.**
(Figs. 9C–D, 14J)

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Diagnosis. This species is distinguished by the granulose dorsal area of the metapostnotum, the truncate apical margin of T2 and T3, the reduced apical truncation of the female clypeus, and the shallow longitudinal impression of the female T6, which is accompanied by a lateral depression at each side of it. The face bears cupreous metallic reflections, as in *C. morrensis*, from which it is readily distinguished by the black antennae and the longer pubescence on the mesopleuron.

Female. Length, 8.5–9.5 mm (holotype 9.0 mm); length of forewing, 6.6–7.3 mm (holotype 6.6 mm). *Color.* Black, with metallic color tints: bronzy-green on head and metasoma, on face with cupreous reflections on upper half, several specimens also with some cupreous reflections on metasomal terga (more pronounced on T1–T3) and sterna; bronzy-green also on dorsum of pronotum, perimeter of scutum, scutellum and metanotum; pleurae with bluish tints; dorsal area of metapostnotum and propodeum without metallic reflections. Face with five yellow spots: clypeus with apical, median mark, and each paracocular area with two marks, one close to lateral lower angle of clypeus and another one bordering eye from level of upper margin of clypeus to antennal socket. Gena with yellow stripe 0.7–0.85x as long as eye. Forefemur with apical yellow spot; foretibia with basal yellow spot followed by yellow stripe; tibial spurs reddish brown. Tegula dark brown to black. Wings infusate; veins and pterostigma brown. *Structure.* Clypeus in lateral view weakly convex; apical truncation reduced, 0.08–0.1x as long as length of clypeus. Clypeus with weak median longitudinal impression; reticulated between and within shallow, close punctures. Labrum convex, 0.60–0.64x as long as basal width; with two short, preapical, longitudinal carinulae. Hypostomal carina low, of uniform height. Proportion between length of eye and length of second segment of labial palpus 1:1.0–1.1. Preoccipital carina simple behind ocelli. Distance between lateral ocellus and preoccipital carina 2.3 times MOD. First flagellomere 1.15–1.30x as long as its apical width. Lateral carina of pronotum strong, forming lower tooth. Dorsal area of metapostnotum granulose, only laterally rugose or with few short, longitudinal rugae. Center of lateral part of mesopleuron with

hairs 0.6–1.0x MOD, with very short branches. Lateral angle of hind coxa rounded. Hind tibial spine on basal 0.33 of tibial length. T1 with anterior surface and disc densely punctate. Apical margin of T2 and T3 truncate. T4 rugose on apical 0.15–0.20; disc with integument flat between punctures; T5 rugose on apical 0.75 to entirely rugose. T4–T5 with very short, pointed setae, longer on T5 (0.3–0.4x MOD). T6 with shallow longitudinal median impression, and at each side of it with lateral weak to conspicuous depression. S6 with median longitudinal impunctate keel; sternum straight in lateral view.

Male. Length, 7.0–7.8 mm; length of forewing 5.3–6.2 mm. *Color.* Similar to that of female, with following parts yellow: paracocular band from lower lateral angle of clypeus to level of antennal socket; transverse spot on apex of clypeus; spot on base of mandible; median, basal spot on labrum; genal stripe; forefemur with apical spot, foretibia with basal spot followed by dorsal stripe; middle tibia with basal spot. *Structure.* First flagellomere 0.8x as long as its apical width. Median ocellus in frontal view above upper tangent of eyes. Apical margin of T7 entire, medially weakly emarginate. Discs of S3–S5 punctate. S6 (Fig. 14J).

Etymology. The specific name refers to the region where the species occurs, the Guaraní department in the province of Misiones.

Distribution. Argentina, province of Misiones.

Material studied. *Holotype:* female, Argentina, Misiones, Moconá, 5-XII-2004, H. Walantus (MACN). *Following paratypes:* Misiones: 1 F, same data as holotype (MACN); 1 F, Depto. Guaraní, Parque Provincial Moconá, 18-XII-2013, ex *Eupatorium* sp., J. P. Torretta (MACN); 1 M, Depto. San Javier, Puerto Londera, IX-1947, M. Viana (MACN); 1 F, San Ignacio, 15-VII-1945, F. Monrós, R. Yapibiri (MLP); 1 F, Iguazú National Park, 30-XI-2007, A. Taylor (MACN); 1 F, P. Rico, 29-III-1949 (MLP).

***Ceratina (Crewella) lobata* nov. sp.**
(Figs. 9E–F, 10A–C, 14K)

urn:lsid:zoobank.org:act:0527D980-9430-44CA-8357-B313CBDF8EF6

Diagnosis. This species is characterized by the thickened portion of the hypostomal carina bordering the mandibular socket in both sexes (Fig. 10C, th), and by the produced female apex of the clypeus, medially emarginate, and lobate on each side of the middle (Figs. 9E, 10B–C). The labrum

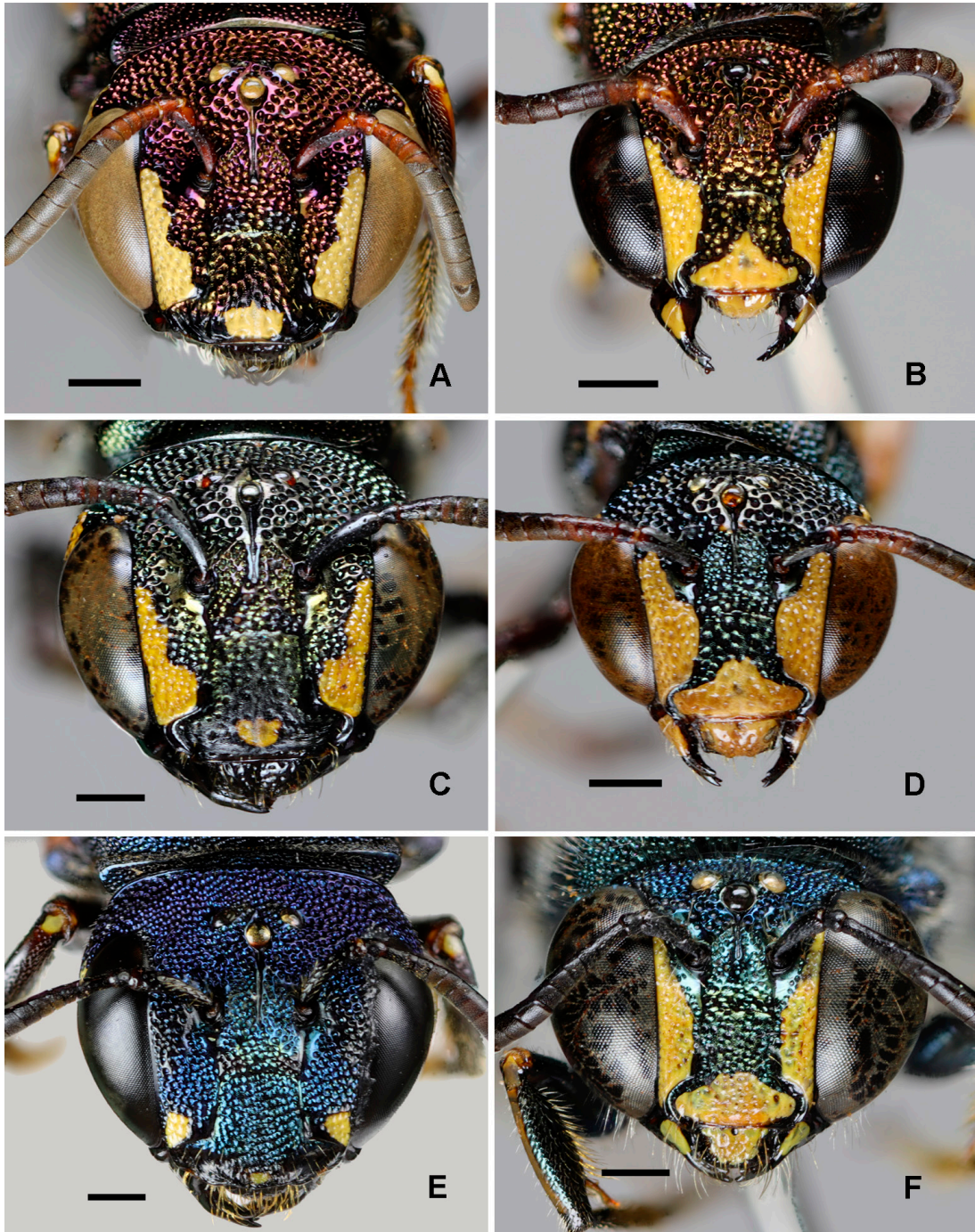


Figure 11. Frontal view of head of species of the *Ceratina* (*Crewella*) *maculifrons* species-group. A–B. *C. morrensis* Strand, female (A), and male (B). C–D. *C. paraguayensis* Schrottky, female (C), and male (D). E–F. *C. rupestris* Holmberg, female (E), and male (F). Scale bars = 0.5 mm.

of the female is also diagnostic, bearing a median longitudinal furrow (Fig. 10B).

Female. Length, 8.0–9.0 mm (holotype 9.0 mm); length of forewing, 6.7–7.1 mm (holotype 7.1 mm). *Color.* Black, with metallic color tints: dark blue on head and mesosoma, reddish on frons and interantennal area, and bright olive-green on metasoma. Clypeus with apical, median, small yellow mark; paraocular area with single yellow mark close to lateral lower angle of clypeus; gena with yellow stripe 0.6–0.75x as long as eye. Legs black with reddish distotarsi; forefemur with or without apical yellow spot; foretibia with basal yellow spot; tibial spurs reddish. Tegula dark brown. Wings weakly infuscate; veins and pterostigma brown. *Structure.* Clypeus in lateral view straight; without clypeal median longitudinal impression; apical truncation recessed, hidden in frontal view, short, 0.10–0.12x as long as length of clypeus. Clypeus medially reticulated between and within shallow punctures; apex of clypeus medially emarginate and lobate on each side of middle. Labrum long, 0.85–0.90x as long as basal width; with median longitudinal sulcus and two small preapical denticles. Transverse portion of hypostomal carina bordering mandibular socket distinctly thickened. Proportion between length of eye and length of second segment of labial palpus 1:1.30. Preoccipital carina simple behind ocelli. Distance between lateral ocellus and preoccipital carina 2.3 times MOD. First flagellomere 1.2x as long as its apical width. Lateral carina of pronotum elevated, but not forming lower tooth. Dorsal area of metapostnotum rugulose medially and granulose laterally, basally with short, longitudinal rugae. Center of lateral part of mesopleuron with hairs 1.7–1.4x MOD, simple or with minute branches. Lateral angle of hind coxa rounded. Hind tibial spine on basal 0.33 of tibial length. T1 with anterior surface and disc densely punctate. Apical margin of T2 and T3 rounded. T4 rugose on apical 0.20; disc with integument flat between punctures; T5 rugose. T4–T5 with very short, erect, pointed setae, longer on T5 (0.35–0.45x MOD). T6 with longitudinal median impression weak. S6 with median longitudinal impunctate keel; sternum straight in lateral view.

Male. Length, 6.5 mm; length of forewing 5.4–5.5 mm. *Color.* Similar to that of female, with following parts yellow: small paraocular spot adjacent to lateral margin of clypeus, and not surpassing above upper level of clypeus; inverted T-shaped mark on apex of clypeus; small anterior spot on outer surface of mandible; median, basal

spot on labrum; genal stripe; forefemur with apical spot; foretibia with basal spot followed by dorsal stripe. *Structure.* First flagellomere as long as its apical width. Median ocellus in frontal view above upper tangent of eyes. Apical margin of T7 entire, medially weakly emarginate. Discs of S3–S5 punctate. S6 (Fig. 14K)

Etymology. The name of the species refers to the peculiar bilobate apex of the female clypeus.

Distribution. Argentina, provinces of Jujuy and Salta.

Material studied. Holotype female, Argentina, Jujuy, Calilegua, II-1952 (MACN). Following paratypes: Jujuy: 1 F, S of San Francisco, 1448 m, -23.63350 -64.95267, 21-IV-2018, R. González V. (MACN-En 34.403). Salta: 1 F, 1 M, Aguas Blancas, 24-26-IV-1981, A. Roig A. (MACN); 1 M, Río Pescado ca. Orán (-22° 53' -64° 27'), 11-20-VII-1970, C. Porter (IFML).

Ceratina (Crewella) maculifrons Smith, 1854

Ceratina maculifrons Smith, 1854: 227–228 (holotype female, from Brazil, B.M. Type Hym. 17B 330, NHMUK, examined). Dalla Torre, 1896: 199.

Ceratina brunneipes Friese, 1910: 701–702 (lectotype female, by present designation, from Brazil, Amazonas, Obidos, I-1906, B.712, ZMB, examined). New synonym.

Ceratina punctiventris Friese, 1910: 702–703 (female syntypes, from Brazil, Pará, Ducke, ZMB, not examined). Synonymy of Ducke, 1910: 363.

Diagnosis. This species is distinguished by the extended yellow markings in both sexes, including a yellow spot on the posterior margin of the pronotal lobe in most specimens. All tibiae have a yellow basal spot, that on the hind tibia usually reaching, and sometimes surpassing, the basitibial spine. Males have a yellow stripe on the dorsal surfaces of the foretibia and the forebasitarsus. Females may have the yellow paraocular mark entire or divided in two. Two other species have extended yellow markings: *C. paraguayensis* and *C. gossypii*. *Ceratina maculifrons* is readily differentiated from the former by the weakly infuscate wings with brown veins and pterostigma, and the narrow longitudinal furrow on the female T6. *Ceratina paraguayensis* has bright yellowish-brown wings, with yellowish veins and pterostigma, and the costal sclerite of the forewing bears a yellow spot. Differences with *C. gossypii* are discussed under that species.

Comments. *Ceratina maculifrons* would run to *C. gossypii* in the key to species of Argentina

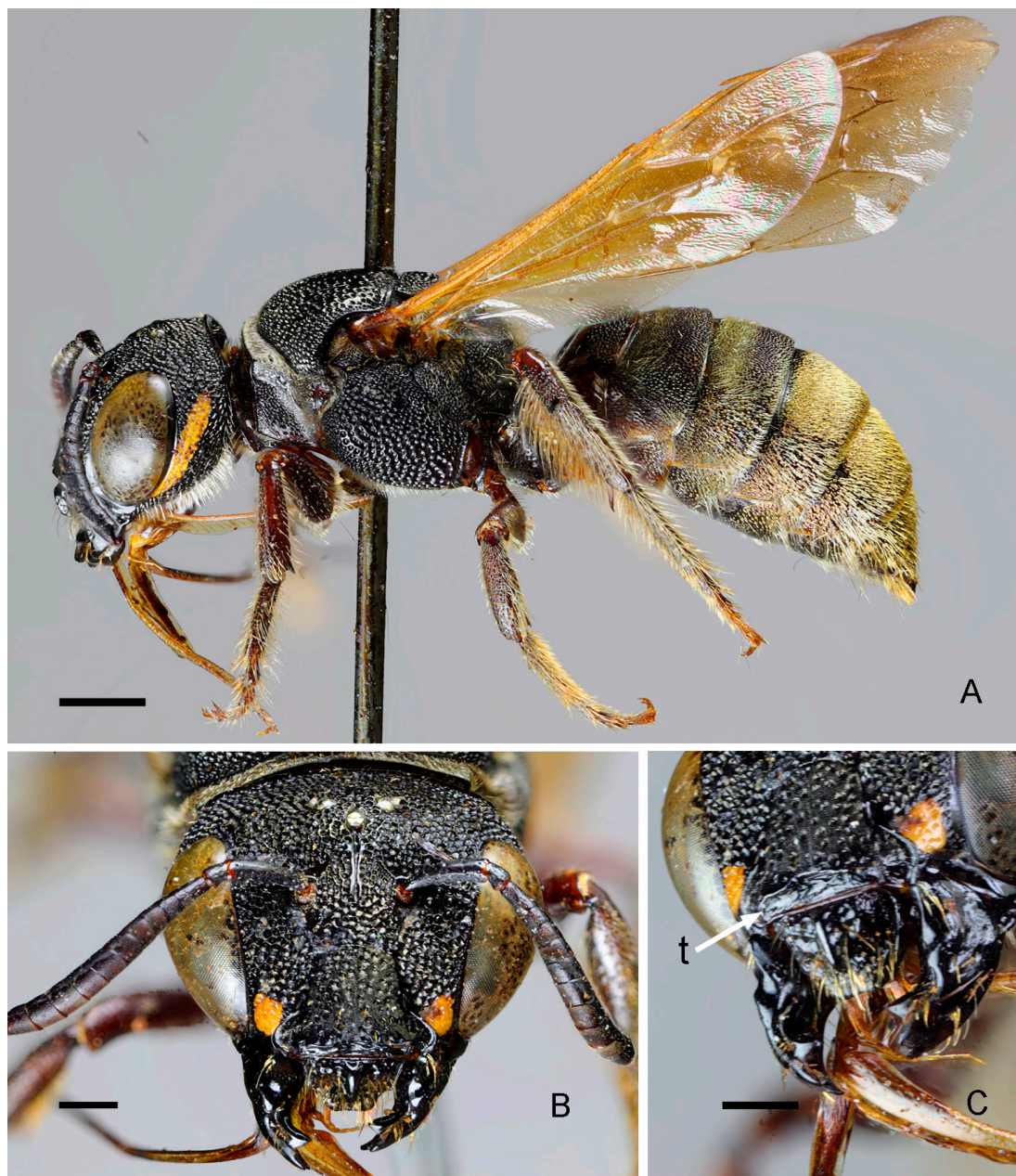


Figure 12. *Ceratina* (*Crewella*) *sericea* Friese, female. A. Lateral habitus. B. Face. C. Anterolateral view of head showing clypeal truncation (arrow, t), and carinate labrum. Scale bars, A = 1 mm; B-C = 0.5 mm.

below, except that the lateral carina of the pronotum is lamellate, not low and carinate. Other differences between these two morphologically very similar species are discussed above under *C. gossypii*. Specimens of *C. maculifrons* vary in the color of the integument from metallic olive-green to distinctly metallic blue, and the paraocular yellow mark of the female varies from entire to

divide into two spots.

The name *C. maculifrons* Smith (1854) has been used by subsequent authors to refer to different species. The citations of Holmberg (1903), Schrottky (1907a, b, 1913) and Strand (1909, 1910) correspond to specimens of *C. diligens*. The usage of the name by other authors needs further clarification.

The specimen selected as lectotype of *C. brunneipes*, a female from Obidos, agrees in all morphological details with the type of *C. maculifrons*. The reddish coloration of the pale markings suggests that the lectotype was collected with cyanide.

Two specimens collected by Ducke in Pará (17.IX.1899 and 6.XII.1899), preserved in CAS, were identified by him as *C. punctiventris* Friese. These specimens are probably part of the same series from Pará sent by Ducke to Friese, and used by the latter author for his description of *C. punctiventris*. The two specimens agree in detail with Friese's description, and I take Ducke's synonymy of this name under *C. maculifrons* as correct.

Distribution. Brazil, state of Pará. Colombia, department of Meta.

Material studied. Brazil. Holotype female *Ceratina maculifrons* Smith, Brasilia, Capta D. Swainson, F. Sm. coll. 79-22, BM Type Hym 17B330 (NHMUK); 1 F, Brazil, coll. Smith 99-303 (NHMUK). Pará: Lectotype female *Ceratina brunneipes* Friese, Amazonas, Obidos, I-1906, G.712 (ZMB); 2 F, Pará, 17.IX.1899 and 6.XII.1899, Ducke, P Herbst collection ex Reed (CAS). Colombia. Meta: Restrepo, 18-VI-1974, L. Stange (IFML).

***Ceratina (Crewella) morrensis* Strand, 1910**

(Figs. 1A–B, 2B, 11A–B, 13D, 14L)

Ceratina morrensis Strand, 1910: 504–505 (syntypes female and male, Villa Morra and Trinidad, Paraguay, ZMB, not examined). Cockerell, 1919: 176. Strand, 1912: 267.

Ceratina morrensis var. *cuprifrons* Strand, 1910: 505–506 (syntypes, female, Villa Morra, Paraguay, ZMB, not examined). Cockerell, 1919: 176.

Ceratina (Crewella) morrensis: Moure, 2007: 644.

Diagnosis. This species is readily distinguished by the red color of the scape, pedicel, and proximal flagellomeres. The only other species in the area with this color pattern is *C. vernoniae*, of the *C. titusi* species-group. Also characteristic of both sexes of *C. morrensis* are the profuse cupreous tints on the head and thorax, the infuscate wings, being the costal half of the marginal cell darker, and the narrowly rounded (Fig. 13D) to briefly pointed lateral angle of the hind coxa. The hairs on the center of the lateral part of the mesopleuron are very short, distinctly shorter than those on the anterior margin and those close to the metapleuron. This type of pilosity separates

C. morrensis from *C. acuminata* and *C. guaranitica*, which may also have cupreous tints, but their pilosity on the mesopleuron is of even length.

Female. Length, 7.5–11.0 mm; length of forewing, 6.2–8.5 mm. **Color.** Black, with various amounts of green and cupreous metallic tints. Face with greenish tints and curpeous color restricted to areas around ocelli and antennal sockets, to face entirely cupreous; pronotum with cupreous tints restricted to anterior and dorsal surfaces, to entirely cupreous; scutum and scutellum with cupreous tints on the perimeter; metanotum, propodeum and metasoma usually with greenish tints, but many specimens with metasoma black, shiny, without metallic tints (see comments below). Antenna with scape, pedicel, and proximal two to three flagellomeres red. Face with three yellow spots: clypeus with apical, median mark, and paraocular area with large mark bordering eye, broadest close to lateral margin of clypeus and narrow above, usually constricted at level of upper margin of clypeus; few specimens with paraocular mark split in two, so face with five yellow marks. Gena with yellow stripe 0.7–0.8x as long as eye. Forefemur with apical yellow spot; foretibia with basal yellow spot followed by yellow to ferruginous stripe; middle tibia with basal yellow to ferruginous spot; hind tibia with ferruginous basal mark, usually extending to, or surpassing, basitibial spine. Tegula brown. Wings infusate; forewing darker on costal half of marginal cell; veins and pterostigma brown. **Structure.** Clypeus in lateral view weakly convex; apical truncation 0.10–0.17x as long as length of clypeus. Clypeus without median longitudinal furrow or impression; reticulated between and within large punctures. Labrum 0.69–0.72x as long as basal width; with two short, preapical, longitudinal carinulae. Hypostomal carina low, of uniform height. Proportion between length of eye and length of second segment of labial palpus 1:1.0–1.1. Preoccipital carina simple behind ocelli. Distance between lateral ocellus and preoccipital carina 2.4–2.8 times MOD. First flagellomere 1.0–1.1x as long as its apical width. Lateral carina of pronotum strong, forming lower tooth. Dorsal area of metapostnotum rugulose, granulose in some specimens, basally with short, longitudinal rugae. Center of lateral part of mesopleuron with hairs 0.4–0.8x MOD, shorter than hairs close to mesopleuron. Lateral angle of hind coxa narrowly rounded to briefly pointed. Hind tibial spine on basal 0.33 of tibial length. T1 with anterior surface and disc densely punctate. Apical margins of T2 and T3 laterally rounded, medially

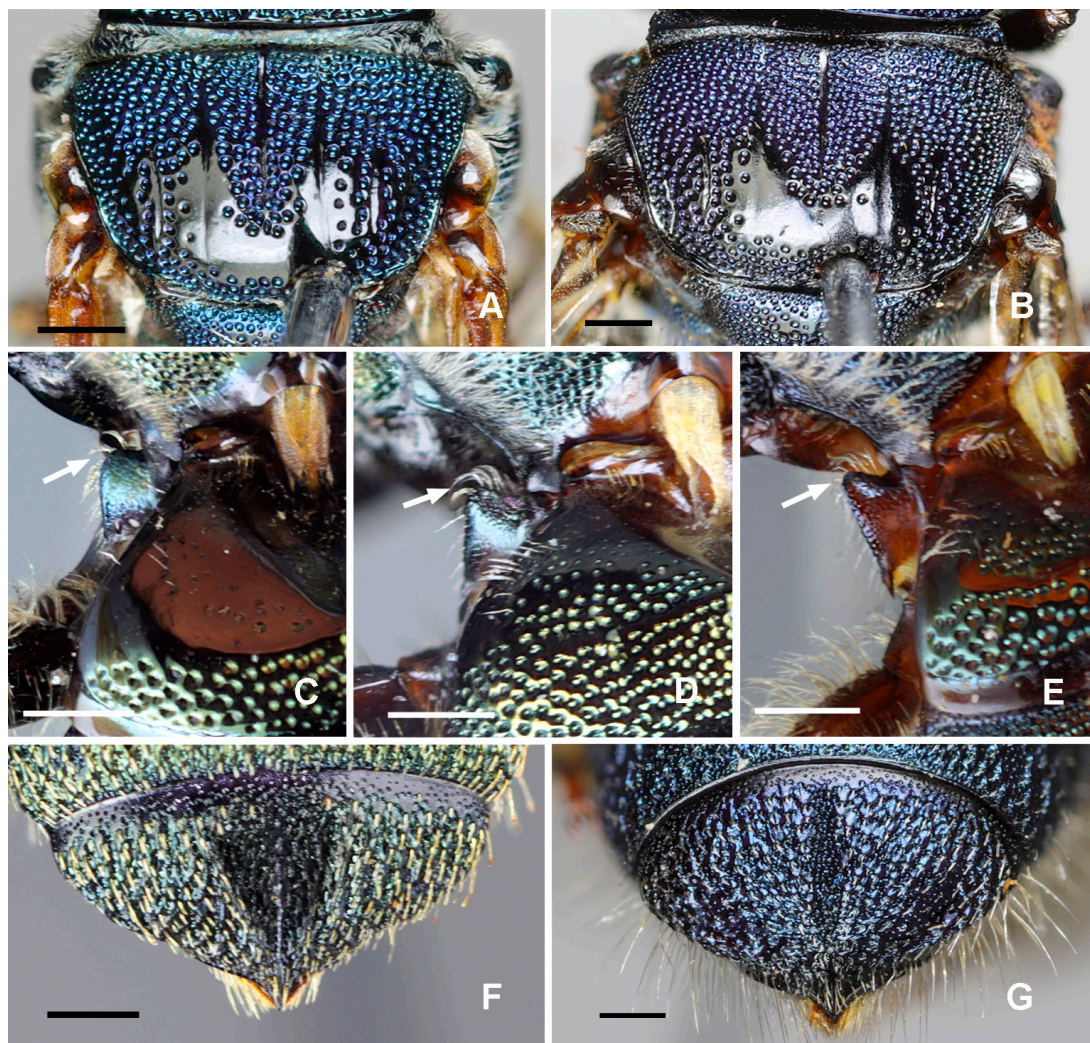


Figure 13. Structures of species of *Ceratina* (*Crewella*) Cockerell. A. Scutum of *C. gossypii* Schrottky, female. B. Scutum of *C. rupestris* Holmberg. C. Hind coxa of *C. gossypii*, showing broadly rounded lateral angle (arrow). D. Hind coxa of *C. morrensis* Strand, showing narrowly rounded lateral angle (arrow). E. Hind coxa of *C. acuminata*, new species, showing pointed lateral angle (arrow). F. T6 of female *C. paraguayensis* Schrottky. G. T6 of female *C. rupestris*. Scale bars = 0.5 mm.

rounded to briefly truncate. T4 rugose on apical 0.15–0.20; disc with integument flat between punctures; T5 variable, similar to T4 to entirely rugose. T4–T5 with very short, erect, pointed setae, on T5 0.3–0.4x MOD. T6 with longitudinal median furrow. S6 with median longitudinal impunctate keel; sternum straight in lateral view.

Male. Length, 7.2–8.3 mm; length of forewing 6.2–6.8 mm. **Color.** Similar to that of female, with following parts yellow: large paraocular band occupying entire lower part of paraocular area to upper level of clypeus, tapering then up to level of antennal socket; triangular mark on

apex of clypeus; anterior spot on outer surface of mandible; median, basal spot on labrum; genal stripe; forefemur with apical spot; foretibia with basal spot followed by dorsal stripe; middle tibia without o with small spot. Hind tibia ferruginous basally. **Structure.** First flagellomere 0.8x as long as its apical width. Median ocellus in frontal view above upper tangent of eyes. Apical margin of T7 entire, medially weakly emarginate. Discs of S3–S5 punctate. S6 (Fig. 14L).

Comments. Specimens studied from Parque Nacional Iguazú, province of Misiones, all have an entirely black metasoma, while most

specimens from northwest and north-central Argentina have the metasoma with metallic green tints. The two types of coloration are found among specimens from other localities of Misiones (Loreto and San Ignacio), of Formosa (Reserva El Bagual), and of Entre Ríos (Liebig). Of over a hundred and fifty studied specimens, only three have been found with an intermediate coloration: T2–T3 or T2–T4 black and other terga and sterna greenish, although green not as bright as in all-green specimens. No morphological differences are seen between these two color morphs. This color variation was already mentioned by Cockerell (1919).

The types were not examined, but Strand's detailed original description of *C. morrensis* allows the identification of the species with certainty. The variety *cuprifrons* was proposed by Strand for specimens from the same locality (Villa Morra), but with more extensive cupreous tints.

Distribution. Argentina, provinces of Chaco, Corrientes, Entre Ríos, Formosa, Jujuy, Misiones, Salta, and Tucumán. Bolivia, departments of Beni and Santa Cruz. Brazil, state of Paraná. Paraguay, departments of Asunción, Cordillera, Itapúa, and San Pedro. Peru, department of Madre de Dios. Uruguay, department of Artigas.

Material studied. Argentina. Chaco: 2 F, Parque Nacional Chaco, 12-13-XI-2007, L. Compagnucci (MACN); 12 F, 1 M, Capitán Solari, Parque Nacional Chaco, 5-V-2008, 31-VII-2008, 14-VIII-2008, A. Taylor & N. Veiga (MACN); 1 M, Gral. Pinedo, 2-XII-1952, O. Casal (MLP). Corrientes: 1 F, San Cayetano, Ebcu, 20-21-X-2010, Roig Alsina et al. (MACN); 2 F, Parque Nacional Mburucuyá, N. Veiga (MACN); 7 F, 1 M, Parque Nacional Mburucuyá, 21-VI-2008, 8-VIII-2008, 17-X-2008, A. Taylor & N. Veiga (MACN); 2 F, 1 M, Yapeyú, 26-III-2010, en *Ipomoea cairica*, Lucía & Álvarez (MLP); 1 F, Santo Tomé, 5-XII-2017, L. Álvarez, P.J. Ramello (MLP). Entre Ríos: 2 F, 1 M, Liebig, 18-XII-2004, A. Roig A. (MACN); 3 F, Pueblo Liebig, XII-1996, L. Caire (MLP); 2 F, Concordia, INTA, 1-2-III-2011, G. Dellapé (MLP). Formosa: 4 F, Reserva El Bagual, 5-III-2000, D. Vázquez (MACN); 2 F, Reserva Natural Formosa, VIII-IX-2009, Gorini (MACN); 20 F, 2 M, Ingeniero Juárez, Reserva Natural Formosa, 3-VIII-2009, 8-IX-2009, 3-III-2010, N. Veiga (MACN). Jujuy: 4 F, Calilegua, 13-II-1950, Monrós & Willink (IFML); 1 F, Los Perales, 12-II-1951, Monrós & Willink (IFML); 1 F, 5 km W Caimancito, 29-VII-1977, L. Stange (IFML); 3 F, Caimancito, 22-XI-1942, flores de *Opuntia* (MLP); 1 M, Travi

(MACN); 1 F, San Pedro, La Esperanza, 10-III-1955, Förster (MLP); 1 F, Río Chico, 18-II-1955 (MLP). Misiones: 13 F, 4 M, Depto. Iguazú, Cataratas, X-1954, De Carlo & Viana (MACN); 1 F, Andresito, 14-VIII-1991, J. Bruera (MACN); 18 F, 1 M, Parque Nacional Iguazú, 16-XI-2007, 25-XI-2007, 1-XII-2007, A. Taylor (MACN); 9 F, Parque Nacional Iguazú, 20-XI-2008, 12-XII-2008, 14-II-2009, Zamudio, Colleselli & Gómez de Oliveira (MLP); 2 F, Parque Nacional Iguazú, Rta. 101, 28-IX-2016, 1-X-2016, L. Álvarez, M. Lucía, P. Ramello (MLP); 4 F, Loreto, A. Ogloblin (MLP); 2 F, Puerto Bemberg, III-1950, Partridge (MLP); 1 F, 1 M, 1 km SW Loreto, 3-4-XII-1914, C. Roig & A. Roig A. (MACN); 1 M, INTA Cerro Azul, 19-X-2010, Roig Alsina et al. (MACN); 1 F, Bompland, 14-III-1910, Jörgensen (MLP); 1 F, Bompland, 19-22-XI-2007, Lucía & Alvarez (MLP); 1 F, Parque Nacional Iguazú, 24-XI-1980, A. Willink (IFML); 1 F, Cataratas del Iguazú, 5-9-XI-1970, Porter & Stange (IFML); 2 M, San Ignacio, Parque Provincial Teyú Cuaré, ex *Galianthe eupatoroides*, J. P. Torretta (FAUBA). Salta: 1 F, Embarcación, XI-1989, A. Roig A. (MACN); 2 F, Embarcación, 5-XII-1954, A. Ogloblin (MLP); 2 F, Campo Alegre, 13-XI-2002, B. Schlumberger (MACN); 1 F, Reserva Campo Alegre, 25 km N ciudad Salta 12-VI-2020, J. Carracedo, G. Ellenrieder (MACN); 1 F, Puente del Toro, 15-XI-2002, B. Schlumberger (MACN); 1 F, 2 M, Saucelito, 1-XII-1952, A. Ogloblin (MLP); 1 F, Gral. Ballivián, flores de *Opuntia*, 17-XI-1942 (MLP); 1 M, Urundel, 22-XI-1942, A. Ogloblin (MLP); 1 F, 1 M, Río de Las Piedras, 29-IV-1951, A. Ogloblin (MLP); 1 F, Quebrada de San Lorenzo, 9-XII-1976, L. Stange (IFML); 6 F, 4 M, Tartagal, 11-VIII-1973, C. Porter (IFML); 2 F, Aguas Blancas, 11-V-1968, L. Stange (IFML); 2 F, Río Pescado, ca. Orán, 19-VII-1971, Porter & Stange (IFML); 1 F, Rosario de la Frontera, 29-VIII-1971, Stange & Porter (IFML); 1 F, Hotel Termas, Rosario de la Frontera, 15-IV-2015, R. González V. (MACN); 1 M, 2 km S Campamento Vespucio, 10-VII-1971, Fidalgo (IFML). Tucumán: 5 F, Jardín Instituto Lillo, Tucumán, 5-13-VII-1978, C. Porter (IFML); 1 F, Tucumán, I-1911, Girard (MACN); 1 M, Tafí Viejo, Girard (MACN); 1 F, San Pedro de Colalao, Arnau (MACN); 3 F, San Pedro de Colalao, Arnau (MLP); 1 F, Siambón, Depto. Tafí, 4-II-1946, D. Olea (MLP); 2 F, V. Strelkov, I-1941 (MLP); 1 F, Ruta Provincial 307, km 20-30, 1-XI-2004, Compagnucci & Grismado (MACN); 4 F, 1 M, Horco Molle, 700 m, 10-II-1975, L. Stange (IFML); 1 M, Horco Molle, 11-IV-1982, A. Willink

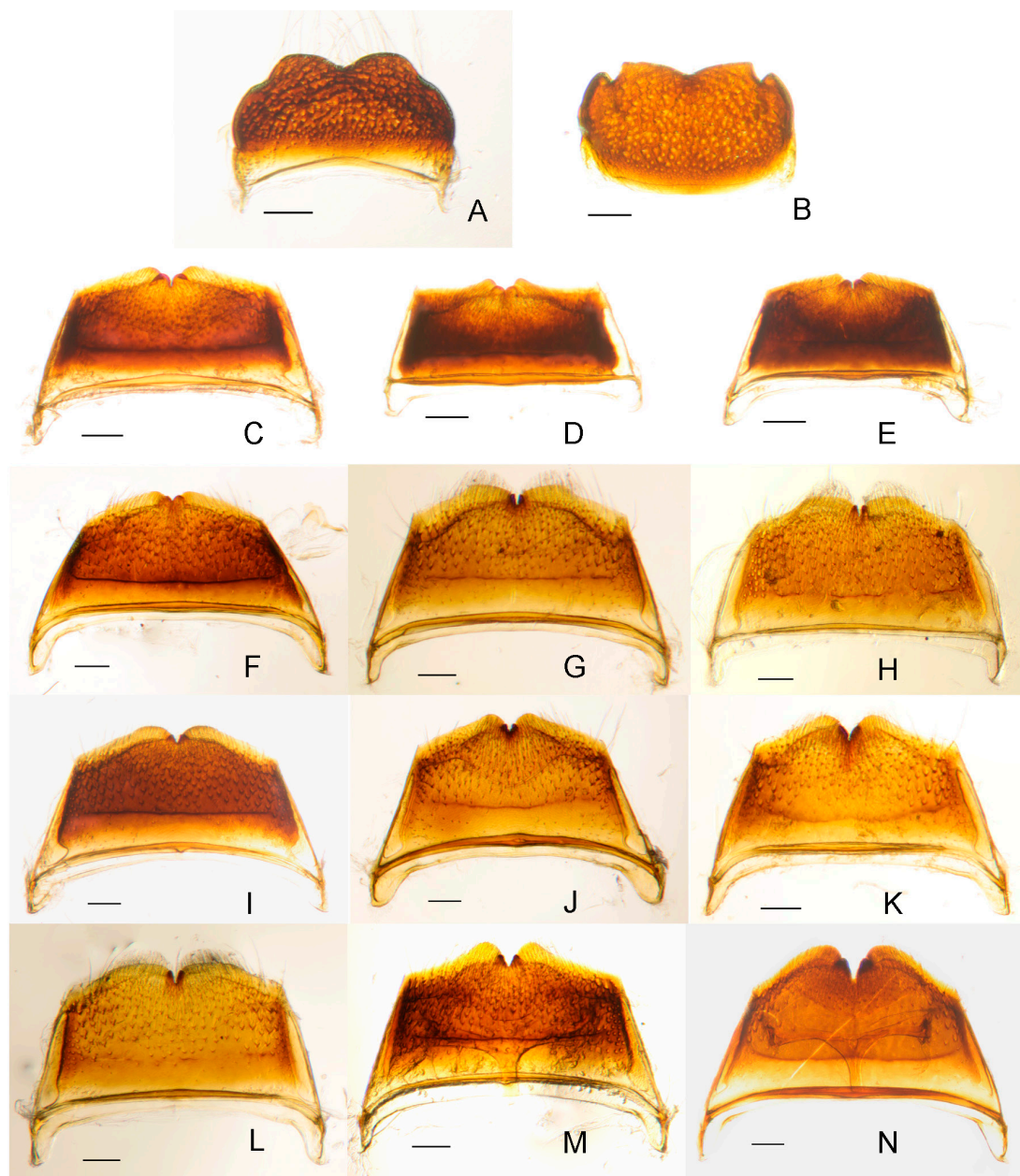


Figure 14. T7 (A-B) and S6 (C-N) of males of species of *Ceratina* (*Crewella*) Cockerell. A-B. Shape variation of apical margin of T7 in dorsal view in two specimens of *C. diligens* Smith from the same population (Iguazú National Park, Misiones, Argentina). C. *C. diligens* Smith. D. *C. amazonica*, new species. E. *C. crassipunctata*, new species. F. *C. vernoniae* Schrottky. G. *C. acuminata*, new species. H. *C. carbonaria*, new species. I. *C. gossypii* Schrottky. J. *C. guaranítica*, new species. K. *C. lobata*, new species. L. *C. morrensis* Strand. M. *C. paraguayensis* Schrottky. N. *C. rupestris*, Holmberg. Scale bars = 0.2 mm.

(IFML); 1 F, Horco Molle, VI-1975, A. Roig A. (MACN); 1 M, Horco Molle, 18-I-1981, A. Roig A. (MACN); 1 M, Dique San Ignacio, 18-V-1964, A. Willink (IFML); 1 M, San Pedro de Colalao, 26-IV-1959, A. Terán (IFML); 1 F, Trancas, San Pedro de Colalao, I-1953, J.M. Arnau (IFML); 1 M, Trancas, Tacanas, II-1951, J.M. Arnau (IFML); 2 F, Quebrada de Lules, 27-XI-1966, L. Stange (IFML); 4 F, 1 M, Tucumán, 25-X-1965, Weyrauch, reared from nest (EMEC). Bolivia.

Beni: 1 F, 1 M, Prov. Ballivián, Estación Biológica Beni, 14°S 66°W, I-1991, Kunze & Gumbert (EMEC). Santa Cruz: 1 F, Taruma, 50 km E Santa Cruz de la Sierra, 10-VII-1973, Porter, Stange & Demarest (IFML); 1 F, Comarapa (-17° 54,428' -64° 32,369'), Schlumpberger & Brokamp (MACN). Brazil. Paraná: 1 F, Foz do Iguazu, 26-IV-1964, C.E. & E.S. Ross (CAS). Paraguay. San Pedro: 1 F, San Estanislao, XII, Williner (MACN). Perú. Madre de Dios: 1 F, Infierno, 25 km SSW Puerto Maldonado, 5-V-1984, W. Pulawski (CAS). Uruguay. Artigas: 1 F, Artigas, 10-I-1966, Weyrauch (IFML).

***Ceratina (Crewella) paraguayensis*
Schrottky, 1907**

(Figs. 11C–D, 13F, 14M)

Ceratina paraguayensis Schrottky, 1907b: 476–477, 480 (holotype female, Villa Encarnación, Paraguay, probably lost). Strand, 1910: 505. Schrottky, 1913: 252. Cockerell, 1937: 2. Rasmussen *et al.*, 2009: 34. *Ceratina (Crewella) paraguayensis*: Silveira *et al.*, 2002: 147. Moure, 2007: 644.

Diagnosis. This species is readily distinguished by the large impression of the female T6, in the form of an inverted triangle (Fig. 13F), by the yellowish-brown wings, and by the extended yellow markings in both sexes, being the pronotal lobe yellow on the rear half.

Female. Length, 8.5–11.0 mm; length of forewing, 6.7–7.6 mm. *Color.* Black, with dark blue metallic tints on head and mesosoma, and bronzy-green tints on metasoma; some specimens with cupreous reflections on frons and discs of metasomal terga. Face with three yellow spots: clypeus with apical, median mark, and paraocular area with large mark bordering eye, broadest close to lateral margin of clypeus and tapering above to level of antennal socket. Gena with yellow stripe 0.5–0.7x as long as eye. Pronotal lobe and costal sclerite of forewing with yellow spot. Forefemur with apical yellow spot; foretibia with basal yellow spot followed by yellow stripe; middle and hind tibiae with yellow spot, that on hind tibia usually reaching or surpassing basitibial spine; tibial spurs and distal tarsomeres reddish brown; Tegula yellowish brown. Wings pale, yellowish brown; veins and pterostigma yellowish brown. *Structure.* Clypeus in lateral view with raised apex; apical truncation short, 0.10–0.15x as long as length of clypeus. Clypeus without median longitudinal furrow or impression; reticulated between and within large punctures. Labrum convex, 0.6x as long as basal width; with reduced

preapical, longitudinal carinulae. Hypostomal carina low, of uniform height. Proportion between length of eye and length of second segment of labial palpus 1:1.05. Preoccipital carina simple behind ocelli. Distance between lateral ocellus and preoccipital carina 2.2–2.4 times MOD. First flagellomere 1.0–1.1x as long as its apical width. Lateral carina of pronotum low close to transpronotal groove, becoming stronger below. Dorsal area of metapostnotum granulose, basally with short, longitudinal rugae. Center of lateral part of mesopleuron with hairs 0.5–0.8x MOD, with very short branches. Lateral angle of hind coxa rounded. Hind tibial spine on basal 0.33 of tibial length. T1 with disc densely punctate. Apical margin of T2 and T3 laterally rounded, medially truncate. T4 rugose apically, on 0.15–0.20 of its length; disc with integument flat between punctures; T5 strongly rugose. T4–T5 with very short setae, those on T4 not sticking out of punctures, on T5 as long as 0.4–0.5x MOD. T6 with large median triangular impression. S6 with median longitudinal impunctate keel; sternum straight in lateral view.

Male. Length, 8.5 mm; length of forewing 6.2 mm. *Color.* Similar to that of female, with following parts yellow: large paraocular band occupying entire lower part of paraocular area to upper level of clypeus, tapering then up to level of antennal socket; large, transverse mark on apex of clypeus; large basal spot on outer surface of mandible; most of labrum, except apical rim; genal stripe; pronotal lobe with spot occupying rear half; forefemur with apical spot; foretibia and forebasitarsus with dorsal stripe; middle tibia with basal spot; hind tibia with yellow mark extending beyond basitibial spine. *Structure.* First flagellomere as long as its apical width. Median ocellus in frontal view above upper tangent of eyes. Apical margin of T7 entire, medially weakly emarginate. Discs of S3–S5 punctate. S6 (Fig. 14M).

Distribution. Argentina, provinces of Chaco, Corrientes, Formosa, and Misiones. Brazil, states of Amapá, Minas Gerais, Rio Grande do Sul, and São Paulo. Guyana, Berbice River Region. Paraguay, departments of Itapuá and San Pedro. **Material studied.** Argentina. Misiones: 1 F, Bompland, 14-III-1910, P. Jörgensen (MLP); 5 F, “7028” (MACN); 1 F, Loreto, J. Foerster (MACN); 1 F, 1 km SW Loreto, 2-4-XII-2014, C. Roig & A. Roig A. (MACN). Formosa: 1 F, Laguna Oca, ca. Formosa, I-2008, G. Galvani (MACN); 1 M, Puerto Pilcomayo, II-1948, A. Martínez (MLP); 2 F, 1 M, Gran Guardia, 20-X-1952, J.

Foerster (MLP). Chaco: 1 M, Roque Sáenz Peña, Onmeiser (MACN). Corrientes: 10 F, 22-III-1911, Aniceto Soto (MACN); 1 F, Santa Teresa, Parque Nacional Mburucuyá, 1-I-2010, N. Veiga (MACN). Brazil. Amapá: 1 F, Vila Amazonas, 21-III-1964, C.E. & E.S. Ross (CAS). Paraguay. San Pedro: 1 F, Carumbé, 1-II/8-III-1966, R. Golbach (IFML).

***Ceratina (Crewella) rupestris* Holmberg, 1884**

(Figs. 11E–F, 13B, 13G, 14N)

Ceratina rupestris Holmberg, 1884: 136–137 (holotype female, Argentina, Tandil, Cerro Claraz, 24-II-1882, E. L. Holmberg, ad flores *Marrubii vulgaris*, lost). Dalla Torre, 1896: 200. Schrottky, 1903: 181. Schrottky, 1907b: 475. Schrottky, 1913: 252.

Ceratina foveiclypeata Strand, 1910: 508–509 (holotype female, San Lorenzo, Paraguay, 14-IV-1906, ZMB, not examined). Schrottky, 1920: 212. Synonymy of Moure, 2007: 645.

Ceratina (Crewella) rupestris: Silveira *et al.* 2002: 147. Moure, 2007: 645.

Diagnosis. This species is readily distinguished by the intense blue color of the body, the reduced yellow marks, the raised preapical margin of the clypeus, and the long first flagellomere (Fig. 11E–F). The punctation is denser, and the punctures smaller (Fig. 13B), than in other species of the *C. maculifrons* group, except *C. sericea*. Males are readily distinguished by the medially pointed apical margin of T7, the enlarged compound eyes, and the narrow, depressed frons, the median ocellus in frontal view lying below the upper tangent of the compound eyes (Fig. 11F).

Female. Length, 7.5–12.5 mm; length of forewing, 6.0–9.2 mm. *Color.* Head, mesosoma and metasoma metallic blue, except following parts black: antennae, sides of clypeus, labrum, mandibles, polished area of scutum, and pregradular areas of terga and sterna; some specimens with scarce purple reflections on face and pleurae. Face with small yellow spot on lower corner of paraocular area, but some specimens also with small yellow spot on apex of clypeus. Gena with yellow stripe 0.35–0.45x as long as eye. Legs with coxae, trochanters and femora with blue reflections; tibiae and tarsi black, except ferruginous distotarsi; forefemur with apical yellow spot and foretibia with small basal yellow spot; middle and hind tibiae with or without small basal yellow spot. Tegula dark brown to black. Wings infusate; veins and pterostigma brown. *Structure.* Clypeus in lateral view straight basal-

ly, but apically concave due to distinctly raised preapical margin; apical truncation 0.10–0.15x as long as clypeus. Clypeus without median longitudinal furrow or impression; reticulated between and within close punctures (separated by 0.2–0.3 PD). Labrum 0.57–0.62x as long as basal width; with two short, preapical, longitudinal carinulae. Hypostomal carina low, of uniform height. Proportion between length of eye and length of second segment of labial palpus 1:0.8–0.9. Preoccipital carina simple behind ocelli. Distance between lateral ocellus and preoccipital carina 2.3 times MOD. First flagellomere 1.75–1.80x as long as its apical width. Lateral carina of pronotum low, not forming lower tooth. Dorsal area of metapostnotum granulose, basally with short, longitudinal rugae. Center of lateral part of mesopleuron with hairs 0.3–0.4x MOD. Lateral angle of hind coxa rounded. Hind tibial spine on basal 0.28–0.30 of tibial length. T1 with disc densely punctate. Apical margin of T2 and T3 briefly truncate. T4 rugose on apical 0.20–0.75, basally with integument flat between punctures; T5 rugose. T4–T5 with short, decumbent setae with rounded apices, on T5 0.3–0.5x MOD. T6 with longitudinal median furrow. S6 with median longitudinal, impunctate, low keel; sternum straight in lateral view.

Male. Length, 7.7–10.0 mm; length of forewing 6.2–8.2 mm. *Color.* Similar to that of female, with following parts yellow: narrow paraocular band from lower lateral angle of clypeus to level of antennal socket; transverse spot on apex of clypeus; anterior spot on outer surface of mandible; median, basal spot on labrum; genal stripe; forefemur with apical spot, foretibia with basal spot followed by dorsal stripe; middle and hind tibiae without or with small basal spot. *Structure.* First flagellomere 1.8–2.0x as long as its apical width. Median ocellus in frontal view below upper tangent of eyes. Apical margin of T7 entire, medially with pointed projection. Discs of S3–S5 with smooth impunctate median area. S6 (Fig. 14N).

Distribution. Argentina, provinces of Buenos Aires, Córdoba, Entre Ríos, Formosa, Misiones, and Santa Fe. Brazil, states of Rio Grande do Sul and Santa Catarina. Paraguay, department of Asunción. Uruguay, departments of Canelones, Montevideo, and San José.

Material studied. Argentina. Buenos Aires: 3 F, 1 M, Otamendi, Pdo. Campana, 5-I-2000, 24-I-2000, 17-II-2000, A. Roig Alsina (MACN); 6 F, 12 km NO Tigre, Pdo. Tigre, 10-XI-1990 26-II-1993, A. Roig Alsina (MACN); 2 M, 5 km

SE Bosques, Reserva Hudson, Pdo. Florencio Varela, 13-XI-1996, A. Roig Alsina (MACN); 1 F, Río Luján, Club ACA, Pdo. Tigre, 13-X-2002, A. Roig Alsina (MACN); 1 M, La Reja, en humedal, Pdo. Moreno, 21-X-2001, A. Roig Alsina (MACN); 1 F, Solimar, Pdo. De la Costa, 4-III-2012, A. Roig Alsina (MACN); 2 F, Tandil, Las Dinás, Pdo. Tandil, 9-10-III-2011, C. Roig & A. Roig A. 1 F, Tandil, Pdo. Tandil, Foerster (MACN); 3 F, Tandil, 27/29.XI/2012, M. Lucía, L. Álvarez, C. Klimitis (MLP); 1 F, Zelaide, 12-XII-1944, Daguerre (MLP); 4 F, Reserva Punta Lara, 17-XI-2011, M. Lucía, L. Álvarez (MLP); 1 F, Punta Lara, Pdo. Ensenada, Foerster (MACN); 5 F, Club San Huberto, Pdo. Chascomús, 26-II-2012, R. González Vaquero (MACN); 1 M, Tigre, Pdo. Tigre, XII-1968, D. Carpintero (IFML); 2 F, 7 M, Monte Hermoso, 26/31-X-2006, L. Compagnucci (MACN); 1 F, 2 M, Ciudad de Buenos Aires, Reserva Costanera Sur, X-2006, J.P. Torretta (MACN); 1 F, Ing. Maschwitz, 15-III-1993, A. Roig A. (MACN); 5 F, 6 M, Ciudad de Buenos Aires, Reserva Costanera Sur, 20-I-2012, 24-III-2004, L. Compagnucci (MACN); 1 F, Ciudad de Buenos Aires, Reserva Costanera Sur, 23-XI-2016, A. Schaller (MACN); 1 M, Punta Indio, 24-II-2012, A. Sanguinetti (MACN); 4 F, San Antonio de Areco, 5-XII-2004, L. Compagnucci (MACN); 1 F, Zelaya, 26-IV-1918, Daguerre (MACN); 1 F, Sierra de La Ventana, 30-II-1954 (MACN); 1 F, Buenos Aires, 6-XI-1913, J. Brèthes (MACN); 1 M, Luján, H.H. Maristas (MACN). Córdoba: 2 F, Villa Cabrera, E. Giacomelli (MACN); 5 F, 1 M, Departamento Punilla, Valle Hermoso, II-1943, M.J. Viana (MACN); 1 F, La Falda, 20-II-2006, J.J. Martínez (MACN); 1 F, Córdoba, 26-XII-1900, Schulz (MLP); 1 F, San José, 17-X-1929, Williner (MLP); 1 F, La Falda, 7-I-1945, A. Martínez (MLP); 1 F, Aguila Blanca, 27-XI-1944 (MLP); 2 F, Cabana, 8-II-1937, M. Birabén (MLP). Entre Ríos: 2 F, Liebig, 15-XII-2004, A. Roig A. (MACN); 1 F, Federación, II-2004, G. Zubarán (MACN); 4 F, Concordia, INTA, 13-X-2009, 25-II-2010, G. Dellapé (MLP); 2 F, Villa Paranacito, 26-28-XI-2019, L. Álvarez (MLP); 1 F, Pronunciamiento, I-1962, Zelich (MLP); 9 F, 2 M, Parque Nacional El Palmar, 12-V-2008, 7-VII-2008, 15-IX-2008, 14-X-2008, 10-XI-2008, A. Taylor & N. Veiga (MACN). Formosa: 1 M, Bouvier, XI-1977, J. Klimaitis (MLP). Misiones: 2 F, Loreto, A. Ogloblin (MLP); 1 F, #7597 (MACN). Santa Fe: 1 F, Guadalupe, 8-XI-1945, A. Ogloblin (MLP). Uruguay. Canelones: 1 F, Las Piedras, 4-XI-1965 (FCE-UY); 9 F, 7 M, Canelones, Sauce, I-2006, E. Santos (MNHNM). Montevideo: 1 M,

Malvin, 14-XI-1965, F. Achaval (FCE-UY); 1 F, Malvin, XII-1965, M.F. Esc. (FCE-UY). San José: 5 F, San José, 3-III-1942, from nest, C. Carbonell (MLP).

Ceratina (Crewella) sericea Friese, 1910

(Fig. 12A–C)

Ceratina sericea Friese, 1910: 696–697 (holotype female, Villarica, Paraguay, Burgdorf leg. ZMB, not examined). Schrottky, 1914: 629.

Ceratina (Crewella) sericea: Silveira *et al.* 2002: 147. Moure, 2007: 645.

Diagnosis. This species is readily distinguished by the female labrum, with a prominent, basal longitudinal median keel (Fig. 12B–C), and by the golden, dense pubescence of T4–T6 (Fig. 12A). It is related to *C. rupestris* by the long first flagellomere, and the pattern of punctation, being the size of the punctures smaller than in other species of the *maculifrons* species group.

Female. Length, 11 mm; length of forewing, 8.4 mm (holotype 13 mm long according to Friese).

Color. Black; head, mesosoma and first metasomal segment without metallic reflections, remainder of metasoma with metallic bronzy tints, cupreous on discs of T4–T6. Setae on T4–T6 golden, notably dense, nearly hiding integument. Face with one small yellow spot on paracocular area, close to lateral lower angle of clypeus. Gena with yellow stripe nearly as long as eye. Legs without yellow spots; tibial spurs and distotarsi reddish. Tegula dark brown. Wings pale, yellowish brown; veins and pterostigma yellowish brown. **Structure.** Clypeus in lateral view straight, with raised apex; apical truncation 0.23x as long as length of clypeus. Clypeus with weak median longitudinal impression; reticulated between and within large punctures. Labrum 0.75x as long as basal width; with strong, prominent, median longitudinal keel on basal two thirds of labrum. Hypostomal carina low, of uniform height. Proportion between length of eye and length of second segment of labial palpus 1:13. Preoccipital carina simple behind ocelli. Distance between lateral ocellus and preoccipital carina 3x MOD. First flagellomere 1.7x as long as its apical width. Lateral carina of pronotum strong, but not forming lower tooth. Dorsal area of metapostnotum rugose basally and medially. Center of lateral part of mesopleuron with hairs very short, 0.3–0.6x MOD. Lateral angle of hind coxa pointed. Hind tibial spine on basal 0.4 of tibial length; spine strong, truncate. T1 with disc densely punctate. Apical margin of T2 and T3

truncate. T4 and T5 with dense, small punctures separated by 0.2–0.3 PD. T4–T5 densely setose, setae on T5 0.7–1.1x MOD. T6 with longitudinal median impression. S6 with median longitudinal impunctate keel; sternum weakly concave in lateral view.

Distribution. Argentina, province of Misiones. Brazil, state of Minas Gerais. Paraguay, department of Guayrá.

Material studied. Argentina. Misiones: 1 F, Bompland, 14-III-1910, P. Jörgensen (MLP).

Key to species present in Argentina

Females

- 1.- T1 with disc extremely short, as long as, or shorter than posterior polished marginal zone, which is 0.8–1.0x MOD (Fig. 2A); disc of T1 bearing few or no punctures. Interantennal prominence not hiding mesal margin of antennal socket in frontal view (Fig. 5A). T6 without median longitudinal furrow. (*C. titusi* species group). 2
- .- T1 with disc densely punctate, much longer (2–4x) than posterior polished marginal zone (Fig. 2B). Interantennal prominence forming laterally juxtantennal carina, which hides in frontal view mesal margin of antennal socket (Fig. 1A). T6 usually with distinct median longitudinal furrow (Fig. 13F–G). (*C. maculifrons* species group). 4
- 2.- Mouthparts long, in repose reaching hind coxae; second segment of labial palpus 1.7–2.0x as long as eye. Antennal scape, pedicel, and first flagellomeres piceous to black, at most apex of scape reddish. Hypostomal carina anteriorly with rounded elevation or with tooth. 3
- .- Mouthparts short, in repose barely surpassing front coxae; second segment of labial palpus 0.8–1.3x as long as eye. Antennal scape, pedicel, and first two to three flagellomeres red (Fig. 5C). Hypostomal carina of uniform height. *C. vernoniae*
- 3.- Forecoxa with lateral projection rounded. Hypostomal carina anteriorly with rounded elevation. T1 nearly impunctate. Face with three elongate yellow spots (Fig. 5B)..... *C. titusi*
- .- Forecoxa with lateral projection flattened, squarish. Hypostomal carina anteriorly forming strong tooth. T1 with one or two irregular rows of punctures on disc (Fig. 2A). Face with five yellow spots, although those at level of antennal sockets sometimes missing (Fig. 5A) *C. duplocarinata*
- 4.- First flagellomere long, 1.7–1.8x as long as its apical width (Figs. 11E, 12B). Notaulus and admedian line of scutum separated by irregular transverse rows of 5–7 punctures (Fig. 13B). 5
- .- First flagellomere as long as its apical width, or slightly longer (at most 1.2x). Notaulus and admedian line of scutum separated by irregular transverse rows of 3–4 punctures (Fig. 13A). 6
- 5.- Integument metallic blue, with some purple reflections (Fig. 11E); T4–T6 with sparse, white, short setae (on T5 0.3–0.5x MOD); wings weakly infusate, with brown veins. Labrum convex, densely punctate, without median keel. *C. rupestris*
- .- Integument black, with few bronzy reflections; T4–T6 densely covered with golden setae (on T5 0.7–1.1x MOD); wings and veins yellowish brown (Fig. 12A). Labrum with strong median longitudinal keel, occupying basal 0.75 of labrum (Fig. 12C). *C. sericea*
- 6.- T6 with large median depression in the shape of an inverted triangle (Fig. 13F). Costal sclerite of forewing with yellow spot; posterior half of pronotal lobe yellow. *C. paraguayensis*
- .- T6 with median longitudinal furrow (Fig. 13G). Costal sclerite of forewing brown to black; pronotal lobe frequently black. 7
- 7.- Preoccipital carina double behind ocelli (Fig. 8A). S6 convex in lateral view. ... *C. diligens*
- .- Preoccipital carina simple behind ocelli. S6 straight or weakly concave in lateral view. 8
- 8.- Apex of clypeus medially emarginate, and lobate on each side of middle (Figs. 9E, 10B–C); apical truncation recessed, hidden by lobes in frontal view. Labrum long, 0.85–0.90x as long as its basal width, with median longitudinal furrow from base to apex (Fig. 10B). Paraocular yellow mark restricted to small spot close to lateral lower angle of clypeus (Fig. 9E). *C. lobata*
- .- Apex of clypeus more or less straight, with truncation distinct in frontal view (as in Fig. 12C, t). Labrum shorter, with disc convex. Paraocular yellow mark long, from level of antennal socket to lower lateral angle of clypeus, or divided into upper and lower spots. 9
- 9.- Antennal scape on base and apex (to entire scape), pedicel, and proximal two to three flagellomeres red (Fig. 11A). At least frons and pronotum with intense cupreous reflec-

- tions (Fig. 11A). *C. morrensis*
- Scape, pedicel and proximal flagellomeres piceous to black. Color of frons and pronotum variable. 10
- 10.- Lateral angle of hind coxa pointed (Fig. 13E). Hind femur on apical third compressed dorsally, so that outer surface of this portion flattened. *C. acuminata*
- Lateral angle of hind coxa broadly to narrowly rounded (Fig. 13C–D). Hind femur on apical third not or weakly compressed dorsally, so that outer surface convex. 11
- 11.- Forewing from pterostigma to apex with strongly infuscate band, distinctly darker than remainder of wing; infuscate band occupying entire marginal cell. Integument black, without metallic color tints (Fig. 7C), except sometimes T1–T2 with bluish reflections. *C. carbonaria*
- Marginal cell of forewing not darker than remainder of wing. Integument with green, cupreous or blue metallic tints on head, mesosoma and metasoma. 12
- 12.- Apical margin of T2 and T3 rounded. Dorsal area of metapostnotum basally and along midline with short, longitudinal, irregular rugae; remainder of area finely granulose. Pronotal lobe frequently with yellow spot on posterior margin. Hind tibia with basal yellow mark, which frequently reaches basitibial spine. Lateral carina of pronotum usually low, carinate. *C. gossypii*
- Apical margin of T2 and T3 truncate. Dorsal area of metapostnotum granulose, only laterally rugose, or with a few short, longitudinal rugae. Pronotal lobe black. Hind tibia without basal yellow mark. Lateral carina of pronotum strong, lamellate. . *C. guaranitica*
- ing front coxae. Antennal scape, pedicel, and proximal two to three flagellomeres red (Fig. 5D). *vernoniae*
- Mouthparts long, in repose reaching hind coxae. Antennal scape, pedicel, and proximal flagellomeres piceous to black, at most apex of scape reddish. Unknown males of *C. titusi* and *C. duplocarinata* would run here.
- 3.- Apical margin of T7 medially with short, pointed projection. Discs of S3–S5 with median impunctate, polished area. Median ocellus in frontal view below upper tangent of eyes (Fig. 11F). First flagellomere long, 1.8–2.0x as long as its apical width (Fig. 11F). *rupestris*
- Apical margin of T7 medially weakly to distinctly emarginate. Discs of S3–S5 medially punctate. Median ocellus in frontal view above upper tangent of eyes. First flagellomere 0.8–1.2x as long as its apical width. 4
- 4.- Preoccipital carina double behind ocelli (as in Fig. 8A). Apical margin of T7 frequently with lateral sinuosity or notch (Fig. 14A–B). *C. diligens*
- Preoccipital carina simple behind ocelli. Apical margin of T7 laterally evenly convex, without any notch or sinuosity. 5
- 5.- Wings yellowish brown, with yellowish veins and pterostigma. Costal sclerite of forewing with yellow spot; posterior half of pronotal lobe yellow. Hind tibia with basal yellow mark surpassing basal half of tibia. *C. paraguayensis*
- Wings weakly to strongly infuscate, with brown to dark brown veins and pterostigma. Costal sclerite of forewing brown to black; pronotal lobe frequently black, at most with small yellow spot on posterior margin. Hind tibia without yellow marks, or with basal yellow mark not surpassing basitibial spine. 6
- 6.- Antennal scape on base and apex (to entire scape), pedicel, and proximal two to three flagellomeres red (Fig. 11B). At least frons and pronotum with intense cupreous reflections. *C. morrensis*
- Scape, pedicel and proximal flagellomeres piceous to black. Color of metallic reflections variable. 7
- 7.- Lateral angle of hind coxa pointed (Fig. 13E). Hind femur on apical third compressed dorsally, so that outer surface of this portion flattened. *C. acuminata*
- Lateral angle of hind coxa broadly to narrowly rounded (Fig. 13C–D). Hind femur on apical

Males

(Males of *C. duplocarinata*, *C. titusi*, and *C. sericea* unknown)

- 1.- T1 with disc short, as long as, or shorter than posterior polished marginal zone (as in Fig. 2A). Interantennal prominence not hiding mesal margin of antennal socket in frontal view (Fig. 5D). 2
- T1 with disc longer (2–4 times) than posterior polished marginal zone (as in Fig. 2B). Interantennal prominence forming laterally juxtantennal carina, which hides in frontal view mesal margin of antennal socket (Fig. 7B) 3
- 2.- Mouthparts short, in repose barely surpass-

- third not or weakly compressed dorsally, so that outer surface convex. 8
- 8.- Forewing from pterostigma to apex with strongly infuscate band, distinctly darker than remainder of wing; infuscate band occupying entire marginal cell. Integument black, without metallic color tints (Fig. 7D), except sometimes T1–T2 with bluish reflections. *C. carbonaria*
- .- Marginal cell of forewing not darker than remainder of wing, or at most darker on costal half of cell. Integument with green, cupreous or blue metallic tints on head, mesosoma and metasoma. 9
- 9.- Hind tibia with basal yellow mark, usually reaching basitibial spine. Pronotal lobe on posterior margin usually with yellow spot, sometimes small or absent. Lateral carina of pronotum usually low, carinate. .. *C. gossypii*
- .- Hind tibia dark brown to black, without basal yellow mark. Pronotal lobe black. Lateral carina of pronotum strong, lamellate. 10
- 10.- Paraocular spot large, extended from lateral margin of clypeus to level of antennal socket (Fig. 9D). Labrum 0.59–0.60x as long as basal width. *C. guaranitica*
- .- Paraocular spot small, adjacent to lateral margin of clypeus, not surpassing above upper level of clypeus (Fig. 9F). Labrum 0.68–0.70x as long as basal width. *C. lobata*

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