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Two new species of the neotropical bee genus *Caenaugochlora* (s. str.) MICHENER (Insecta: Hymenoptera: Halictidae: Augochlorini)

With 4 Figures

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Abstract. Two new species of augochlorine bees, *Caenaugochlora* (*Caenaugochlora*) *elisabethae* and *C. (C.) jeffreyi*, are described and illustrated. *C. elisabethae* is from Costa Rica and Panama, while *C. jeffreyi* is from Colombia.

The genus *Caenaugochlora* MICHENER is a wide spread group of species of the New World bee tribe Augochlorini (Halictidae). The genus is at present represented by 13 described species ranging from Mexico to Ecuador and is divided into two subgenera (MOURE & HURD, 1987). The nominate subgenus is characterized by the usual presence of long eye hairs, a normally pectinate inner hind tibial spur, and a strong anterior border to the basitibial plate. The subgenus *Ctenaugochlora* EICKWORT has consistently short eye hairs, a closely packed pectinate inner hind tibial spur (with over 10 teeth), a weak anterior border on the basitibial plate, and strong radiating basal striae on the propodeal triangle. The current study presents two new species of *Caenaugochlora* (s. str.) from Costa Rica, Panama, and Colombia. The morphological terminology is based on MICHENER (1944) and EICKWORT (1969).

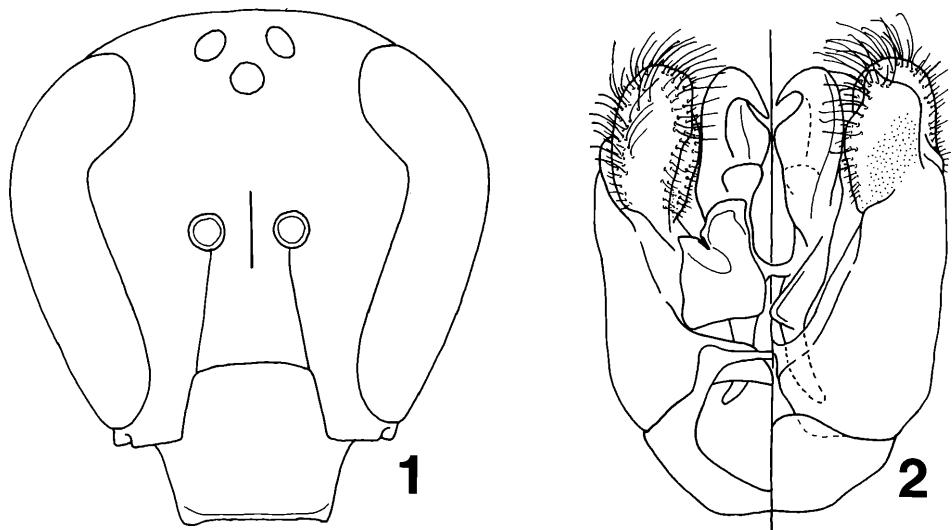
Caenaugochlora (*Caenaugochlora*) *elisabethae* spec. nov. (Figs. 1–2)

Holotype: Female, "Costa Rica, San José Prov., 3 km S. San Antonio de Escazú, 1700 m, 16 July 1988, W. Wcislo", in the Snow Entomological Museum, University of Kansas, Lawrence, KS, USA. Allotype: Male, "Panamá, Chiriquí, 20 km N. Gualaca, Finca La Suiza, 1200 m, 08°39'N, 82°12'W., 12 June 1995, J. Ashe and R. Brooks, #189, ex: *Heliconia*", in the Snow Entomological Museum, University of Kansas, Lawrence, KS, USA. Paratypes: 1 female, "Costa Rica, Puntarenas Prov., Monteverde, 26 June 1981, S. Knapp, #0048" 1 female, "Costa Rica, Puntarenas Prov., Monteverde, 24 April 1981, S. Knapp, #0029" Both paratypes are in the Cornell University Insect Collection, Ithaca, NY, USA.

Description. Female. Total body length 11.28 mm; fore wing length 8.08 mm. Head longer than wide (length 2.72 mm; width 2.56 mm). Gena about equal to compound eye in profile. Epistomal sulcus orthogonal. Distal two-thirds of clypeus extending beyond lower tangent of compound eyes; clypeus and supraclypeal area gently rounded and weakly protuberant in profile; supraclypeal area slightly longer than wide. Mandible with well defined subapical tooth. Labral basal elevation suborbital.

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Figs. 1–2: *Caenaugochlora (Caenaugochlora) elisabethae* spec. nov.

1: Female head, frontal aspect. – 2: Male genital capsule, left half is the ventral aspect, right half is the dorsal aspect; stippled area is where a membranous region exists on the dorsal gonostylar process.

culate; distal extension narrowly triangular, without labral teeth. Frontal line carinate between and just above antennae, becoming a moderately impressed line half way between antennae and median ocellus. Scape length 1.24 mm; pedicel slightly longer than flagellomere I; flagellomere I roughly as long as wide; remaining flagellomeres each slightly longer than wide and longer than I; distal flagellomere longer than previous flagellomeres. Ocelli not enlarged; median ocellus to lateral ocellus 0.1 mm; between lateral ocelli 0.28 mm; lateral ocellus to compound eye 0.32 mm. Compound eyes strongly emarginate, moderately convergent below; eye hairs long. Vertex short. Preoccipital ridge carinate. Hypostomal ridge carinate, not projecting beyond posterior margin of head, anterior angle rounded. Mouthparts normal; glossa moderately long, about half the length of the prementum. Pronotal lateral angle produced and sharply orthogonal; lateral ridge sharply angled; dorsal ridge carinate. Mesoscutum broadly rounded anteriorly; mesoscutal lip low and rounded, slightly projecting over pronotum; median line moderately impressed; parapsidal lines weakly impressed. Tegula rounded; intertegular distance 2.08 mm. Scutellum about twice as long as metanotum. Subpleural signum protuberant, forming a short tubercle. Propodeal triangle slightly shorter than scutellum; propodeal dorsal ridge carinate; lateral ridge carinate two-thirds of way to dorsal ridge, then becoming rounded. Wing veins dark brown, basal vein distad of $cu-v$ crossvein by 2 times the width of vein; $1r-m$ confluent with $1m-cu$; $2r-m$ distad of $2m-cu$ by 3.5 times the width of vein. First submarginal cell longer than second and third combined; second submarginal cell not narrowed anteriorly; anterior border of second submarginal cell along Rs approximately equal to anterior border of third submarginal cell; anterior border of third submarginal cell about half that of posterior border; marginal cell apex truncate and appendiculate; wings hyaline. Distal hamuli arranged 4-1-3. Basitibial plate narrowly rounded, well defined on all borders. Inner hind tibial spur pectinate, 5 teeth (not including apex as a tooth). Metasoma unmodified.

Mandible black with dark red apex. Clypeus, supraclypeal area, and lower half of face granular with scattered weak punctures; remainder of face with small punctures, punctures almost confluent with one another; clypeus and supraclypeal area dark blue-purple; remainder of head metallic red-purple. Antennae black. Surface becoming weakly granular on vertex. Gena smooth, impunctate, shining; lower border becoming weakly costate. Postgena weakly costate and imbricate. Mesosoma entirely metallic red-purple. Pronotum smooth and shining. Mesoscutum closely punctate; punctures around lateral borders and parapsidal lines almost confluent; medially punctures becoming smaller, weaker,

and sparse, space between punctures smooth and shining; just above pronotal lobe mesoscutal surface rugose. Tegula dark brown. Scutellum with few weak punctures, posterior border becoming weakly rugose. Metanotum weakly roughened. Pleura rugose, ventrally becoming more weakly roughened. Propodeal triangle with reticulating rugae branching from basal border, becoming weaker at apical border; surface otherwise granular; lateral and posterior surfaces granular; lateral surface with very weak reticulating rugae. Legs dark brown with brilliant metallic red-purple highlights. Basitibial plate dark brown with black border. Metasoma black with strong brilliant metallic red-purple highlights; surface impunctate, weakly imbricate, and shining.

Face, vertex, and gena with widely scattered dark hairs, such hairs moderately long; shorter, dark hairs also scattered on upper half of face. Postgena with long, lighter hairs widely scattered, each with few short branches. Pronotal dorsal surface with dark hairs, each with few short branches; laterally with extremely short, simple, silvery hairs appressed to surface but not obscuring surface. Mesoscutum with similar dark hairs as on pronotum; such hairs becoming longer and more branched on scutellum and metanotum. Pleura with scattered simple, yellow hairs each with short branches. Propodeal triangle without hairs; propodeal lateral and posterior surfaces with long, branched, yellow hairs. Fore leg with fuscous pubescence. Mid leg with fuscous and yellow hairs on inner surfaces; stiff, black hairs on outer surfaces of mesotibia and mesotarsus. Hind leg with scopula formed of long, plumose, yellow hairs on trochanter and femur; inner surfaces of tibia and tarsus with yellow and fuscous hairs, outer surfaces with stiff, black hairs. Anterior half of tergum I with moderately long, simple, yellow hairs. Remainder of tergum I and following terga with more widely scattered, shorter, simple, yellow hairs; becoming slightly longer and more numerous on lateral margins; hairs becoming darker on apical terga. Sterna with long, simple, yellow hairs; hairs sometimes with a few branches.

Male. As in the female except as follows: Total body length 10.88 mm; fore wing length 7.92 mm. Head longer than wide (length 2.64 mm; width 2.4 mm). Labrum without basal elevation; with short, weakly triangular extension. Mandible simple. Scape length 0.84 mm; flagellomere II longer than I, antennae moderately long. Basitibial plate absent. Inner hind tibial spur serrate. Sternum III with slight median depression along apical margin. Sternum IV with median emargination along apical margin; moderate triangular setal patch at median point of emargination, setae raised on short tubercles. Sternum V with median emargination along apical margin. Sternum VI with median depression along apical margin. Male genitalia as in Figure 2. Apex of clypeus black, remainder metallic red. Integument of body metallic red.

Upper half of face and inner margin of compound eye with extremely short, appressed, plumose, yellow hairs not obscuring the surface. Pubescence of remainder of body generally lighter than female.

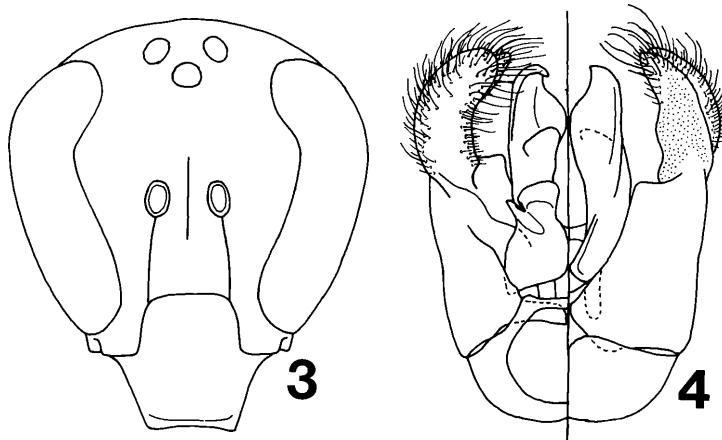
Remarks. The species described above can be easily distinguished from the previously described Costa Rican and Panamanian *Caenaugochlora* s. str.; *C. costaricensis* (FRIESE), *C. gemmella* (COCKERELL), and *C. macswaini* MICHENER; by the overall brilliant metallic red or purple coloration and the structure and sculpturing of the propodeum.

Etymology. The specific name honors Elisabeth A. Engel, dear friend and beloved sister.

***Caenaugochlora (Caenaugochlora) jeffreyi* spec. nov. (Figs. 3–4)**

Holotype: Female, "Colombia, Prov. Valle, Rio Anchicaya, 400 m, 10 February 1977; M.D. Breed and C.D. Michener". **Allotype:** Male, "Colombia, Valle, Rio Anchicaya, 400 m, 28 September 1976, Bell, Breed, and Michener". **Paratype:** 1 male, same collection information as allotype. All specimens comprising the type series for *C. jeffreyi* are in the Snow Entomological Museum, University of Kansas, Lawrence, KS, USA.

Description. As in *C. elisabethae* with the following modifications: Female. Total body length 6.9 mm; fore wing length 5.04 mm. Head longer than wide (length 2.02 mm; width 1.8 mm). Gena equal to compound eye in profile. Supraclypeal area more protuberant than in *C. elisabethae* and more so than clypeus. Mandible with moderate subapical tooth. Frontal line carinate between antennae, becoming an impressed line half way between antennae and median ocellus. Scape length 0.72 mm;



Figs. 3–4: *Caenaugochlora (Caenaugochlora) jeffreyi* spec. nov.

3: Female head, frontal aspect. – 4: Male genital capsule, left half is the ventral aspect, right half is the dorsal aspect; stippled area is where a membranous region exists on the dorsal gonostyilar process.

pedicel slightly longer than flagellomere I; flagellomere I longer than wide; flagellomeres II–V each as long as wide and longer than I; flagellomeres VI–VIII each as long as wide and slightly longer than previous flagellomeres; IX as long as wide and slightly longer than VIII; distal flagellomere longer than wide and longer than IX. Median ocellus to lateral ocellus 0.22 mm; between lateral ocelli 0.18 mm; lateral ocellus to compound eye 0.06 mm. Eye hairs short. Glossa long, as long as prementum. Median line and parapsidal lines moderately impressed. Intertegular distance 1.22 mm. Scutellum one and three-quarters times longer than metanotum. Subpleural signum not protuberant. Propodeal triangle slightly shorter than scutellum; propodeal dorsal ridge rounded; lateral ridge carinate half of way to dorsal ridge, then becoming rounded. $2r_m$ distad of $2m-cu$ by 2 times the width of vein. Second submarginal cell slightly narrowed anteriorly; anterior border of second submarginal cell along Rs slightly shorter than anterior border of third submarginal cell; marginal cell apex acute. Wing hairs relatively long. Distal hamuli arranged 3-1-3. Inner hind tibial spur pectinate, 4 teeth (not including apex as a tooth).

Mandible yellow-orange with dark red-brown apex. Clypeus smooth with widely scattered weak punctures; apex yellow-orange, remainder dark brown with strong metallic green and brassy highlights. Supraclypeal area weakly coriarious with weak punctures confined to basal and lateral margins; dark brown with metallic green and brassy highlights stronger than those on clypeus. Remainder of head brilliant metallic green; face closely punctate, ground otherwise smooth. Scape yellow with apex becoming light brown; remainder of antenna brown. Gena smooth; postgena weakly costate. Pronotum granular, brilliant green; lateral surface smooth, brown with strong metallic green highlights. Remainder of mesosoma brilliant metallic green. Mesoscutum closely punctate, punctures separated by width of a puncture or less; medially mostly smooth with sparse minute punctures. Tegula orange and semi-translucent. Scutellum smooth with sparse minute punctures, most prominent on lateral borders. Metanotum granular and impunctate. Pre-episternum smooth, closely punctate near juncture with mesepisternum. Mes- and metepisternum smooth; hypo-epimeral area with strong brassy highlights. Propodeal triangle with few, weak striae reaching from basal margin to just under half of triangle length; surface imbricate. Propodeal lateral and posterior surfaces smooth. Legs yellow-orange. Metasoma yellow-orange.

Clypeus and supraclypeal area with widely scattered yellow, simple hairs; remainder of face with short, scattered, simple, suberect hairs; such short hairs interspersed with longer, simple, yellow hairs on vertex; shorter hairs becoming branched on gena; postgena widely scattered with moderately long, yellow, hairs with few, short branches. Pronotal dorsal surface with moderately long, yellow hairs, some with few short branches; laterally with extremely short, simple, yellow hairs appressed to sur-

face but not obscuring surface. Mesoscutum with short, yellow, simple hairs; such hairs becoming much longer and branched on metanotum and posterior border of scutellum. Pleura with moderate length, simple, yellow hairs, becoming slightly longer ventrally. Propodeal lateral and posterior surfaces with long, yellow hairs, each with few short branches; scattered short, simple, suberect hairs. Legs with yellow-orange pubescence. Hind leg with scopa formed of long, plumose, yellow-orange hairs on trochanter and femur. Anterior half of tergum I widely scattered with long, simple, yellow hairs. Remainder of tergum I and following terga with shorter, simple, yellow hairs; becoming progressively longer and more numerous on lateral margins and on following terga. Sterna with long, simple, yellow hairs; hairs sometimes with a few branches.

Male. As in the female except as follows: Total body length 8.88 mm; fore wing length 6.16 mm. Head longer than wide (length 2.24 mm; width 2.12 mm). Labrum without basal elevation; with short, weakly triangular extension. Mandible simple. Scape length 0.76 mm. Inner hind tibial spur serrate. Sternum II with strong median depression, much stronger than in *C. elisabethae*. Sternum IV with median emargination along apical margin; large triangular setal patch at point of emargination, setae raised on short tubercles. Sternum V with median depression along apical margin. Sternum VI with median emargination on apical margin. Male genitalia as in Figure 4.

Apex of clypeus white; remainder of clypeus and supraclypeal area brilliant metallic green. Scape and pedicel yellow-orange; remainder of antenna brown. Inner margins of tegula with green highlights. Coxae brilliant metallic green. Metasoma brilliant metallic green.

Pubescence of mesoscutum more dense than in female. Sterna with widely scattered, short, simple, yellow hairs.

Remarks. *C. gemmella* (COCKERELL) is the only other species currently recorded from Colombia (this species is also known from Costa Rica and Guatemala). *C. gemmella* differs from *C. jeffreyi* in the following characteristics: glossa only three-quarters length of prementum; closely punctate and roughened pleura; closely packed punctures on scutellum and central disk of mesoscutum; tegula mostly metallic green with remainder dark brown; propodeal triangle about as long as metanotum and with weak striae reaching apical margin; dark brown legs with strong metallic green highlights; and a brilliant metallic green metasoma in females.

Because the basitibial plate and its border are the same color as the rest of the leg in *C. jeffreyi* it is difficult to discern. Thus, special care should be made when examining this structure in specimens.

Etymology. The specific name honors Jeffrey G. Engel, fellow admirer of the natural world and dear brother.

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